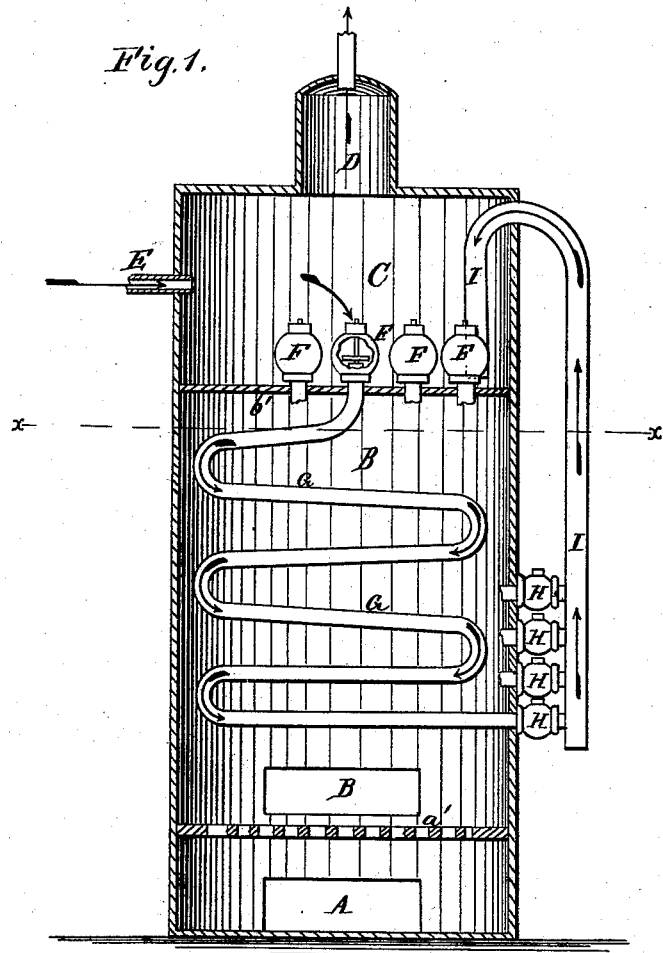


G. D. DALY.  
Steam-Boiler.

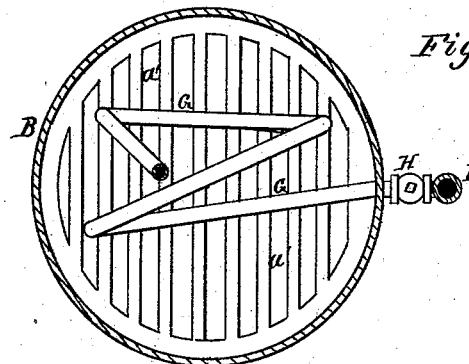
No. 214,631.

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*Fig. 1.*



*Fig. 2.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GUY D. DALY, OF FLATBUSH, NEW YORK.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **214,631**, dated April 22, 1879; application filed February 10, 1879.

*To all whom it may concern:*

Be it known that I, GUY D. DALY, of Flatbush, in the county of Kings and State of New York, have invented a new and Improved Steam-Boiler, of which the following is a specification.

Figure 1 of the drawings represents a sectional elevation of the boiler; Fig. 2, a cross-section through *x x*.

The object of this invention is to provide a steam-boiler of superior economy and efficiency, cheap and simple in construction, easy to repair, economical of fuel, quick to generate steam, and possessing elements of safety lacking in other boilers.

The boiler is of that type called a "fire-box" boiler, and is to be set in an upright position.

Within the shell are contained the ash-pit A, the fire-chamber B, which extends upward from grate-surface *a'* to crown-sheet *b'*, the water-space or boiler proper, C, and the steam-drum D.

A special object of this invention is to provide unusual facilities for the circulation of the water and a maximum amount of heating-surface, and these points are secured as follows: The feed-water is forced into the boiler, by pump or otherwise, through feed-pipe E. After it has attained a certain depth over the crown-sheet, the surplus flows down, through the stop-cocks F F, into the pipes or tubes G G, that in coils or zigzags partially fill the fire-chamber, and thence, through the cocks H H, into the outside tubes or pipes, I I, which should be jacketed to prevent loss of heat and condensation, back to the water-space.

In the drawings but one pipe system is shown complete; but in practice two or more systems are used, and the cocks H H are ordinarily arranged on a horizontal rather than on a vertical line.

The cocks F F are so arranged or constructed that while the water from above may flow through them into the tubes G G, upward pressure from the tubes at once closes them, or rather they remain open so long as the pressure in C exceeds in any degree the pressure in the tubes, and close instantly when the pressures are reversed; and so, also, of the

cocks H H. An excess of pressure in the tubes G G over that in C or I I keeps them open for the outward and upward flow of the water, while a reverse pressure closes them at once.

When the boiler is in operation it is found that a very slight excess of pressure in C keeps the cocks F F open and H H closed, and the tubes G G filled with water and steam until the action of the surrounding flames so increases the pressure therein as to overbalance that in C, close F F against further delivery of water, and open H H for relief. The pressure in the tubes G G being thus reduced, water again flows into them through cocks F F, to have its temperature increased, and to be ejected in the same way, and thus the circulation—the action and reaction—continues so long as the fires are kept up.

I am well aware that without the valves this arrangement of tubes in connection with the water-space would be of doubtful utility, if not altogether useless and dangerous, especially if very hot fires were maintained, for with even pressure throughout the tubes and water-space the circulation, which would always be sluggish, would become more feeble with increase of temperature.

The arrangement herein shown, on the contrary, compels a free circulation that must increase with each increment of heat.

To decrease the commotion caused by the return of the water and steam from tubes G G to the water-space C, I bend the tubes I I down to within a few inches of the crown-sheet.

It is obvious that upon the size of the tubes will depend the extent of heating-surface and the extent of the subdivision of the water exposed to the heat, and that smaller tubes can be used advantageously in this construction of boiler than could be practicable in any other. It will be seen, too, that any one system of tubes may be removed for repairs and replaced again most expeditiously.

The crown-sheet of the boiler being so far removed from the fire is less liable to injury than is the case in ordinary boilers.

The extent and disposition of the heating-surface assure great economy of fuel, and the rapid circulation in the tubes will keep them

free from sediment. These are a few of the advantages I claim for this construction of boiler.

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

1. The combination, in a steam-boiler, of the fire-chamber B, water-space C, cocks F F, tubes G G, cocks H H, and tubes I I, substantially as herein shown and described.

2. In combination with the water-space of a steam-boiler, one or more circulating systems, each consisting of cock F, tube G, cock H, and tube I, constructed and arranged substantially as herein shown and described.

GUY D. DALY.

Witnesses:

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