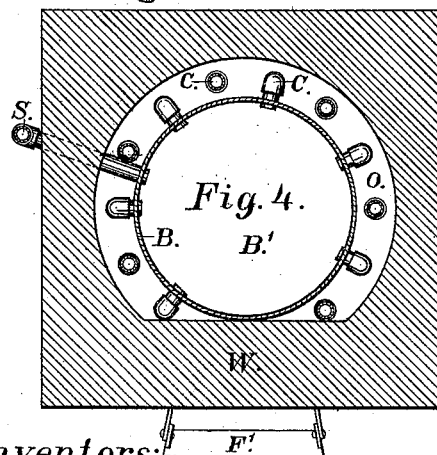
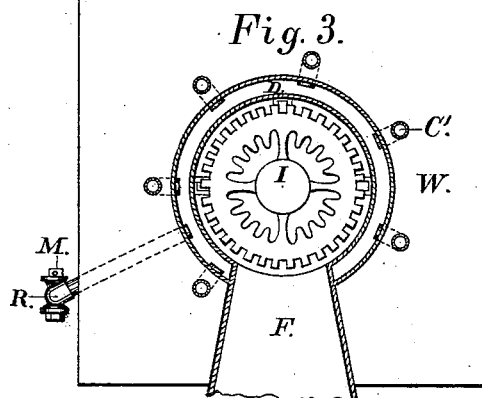
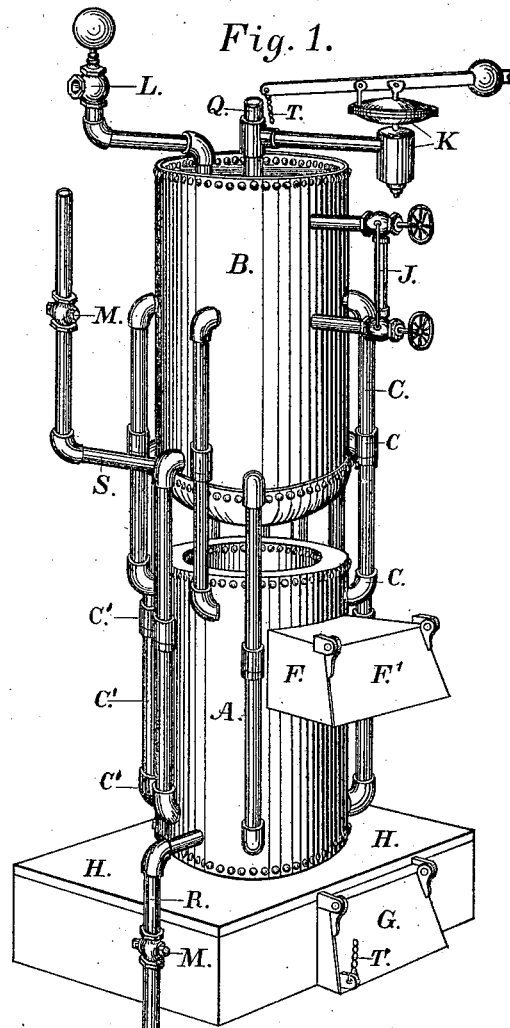
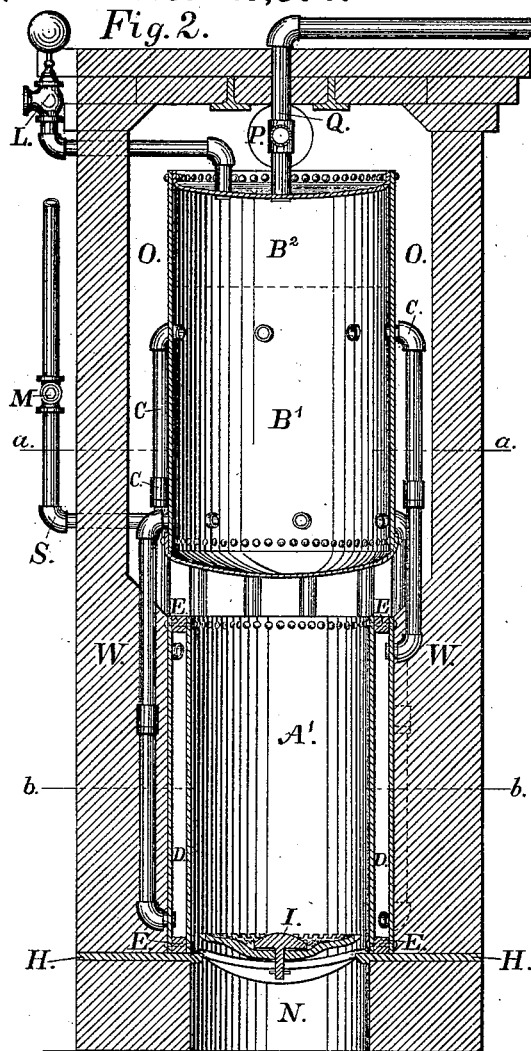


J. H. BIRCHALL & J. PARTON.
Steam-Heaters.

No. 217,574.

Patented July 15, 1879.



Witnesses:
Ciram Belford
Lewis A. Jacoby

Inventors:
John H. Birchall.
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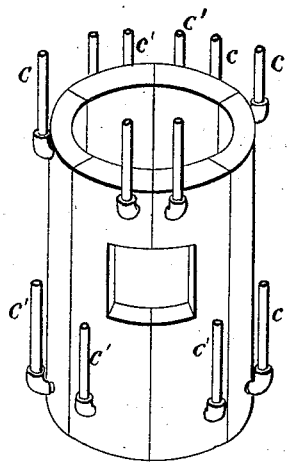
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Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN H. BIRCHALL AND JOHN PARTON, OF ALLENTOWN, PENNSYLVANIA.

IMPROVEMENT IN STEAM-HEATERS.

Specification forming part of Letters Patent No. **217,574**, dated July 15, 1879; application filed March 22, 1879.

To all whom it may concern:

Be it known that we, JOHN H. BIRCHALL and JOHN PARTON, both of Allentown, Pennsylvania, have invented certain Improvements in Steam-Heaters, of which the following is a specification.

Our invention relates to an improvement in devices for heating by means of steam or hot water, the improvements relating especially to the steam-generator or water-heater, and the objects of the improvements being to simplify the construction of the apparatus, to economize the consumption of fuel, and to insure the thorough circulation and rapid heating of the water.

These objects we attain in the manner which we will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of our improved steam-generator or water-heater without the surrounding brick-work or casing; Fig. 2, a vertical section of the complete apparatus; Fig. 3, a sectional plan on the line *b b*, Fig. 2; Fig. 4, a sectional plan on the line *a a*, Fig. 2; and Fig. 5, Sheet 2, a perspective view of a modification.

A is a double-walled fire-pot, composed, in the present instance, of two concentric cylinders connected together at the opposite ends by rings E, and inclosing an annular chamber, D.

Above the fire-pot is a cylindrical vessel, B, closed at both ends, and forming a water and steam reservoir, B¹ representing the water-space, and B² the steam-space. The upper portion of the water-space B¹ communicates, through a series of pipes, C, with the upper portion of the annular chamber D in the fire-pot, and the lower portion of said water-space B¹ communicates, through a series of pipes, C', with the lower portion of said annular space D.

The brick-work W, which forms the setting of the heater, is so constructed as to provide a flue, O, surrounding the vessel B, and communicating beneath the same with the combustion-chamber A', a passage, P, leading from the upper portion of the said flue to a suitable chimney or stack.

The fire-pot A rests upon a base-plate, H, beneath which is the ash-pit N, access to the

latter being gained through an opening provided with a damper, G, which is, by preference, connected by means of a chain, T, to the lever of a damper-regulator, K.

I is a shaking and dumping grate of the usual construction, and F is the casing surrounding the feed-opening, said casing having an ordinary hinged cover, F'.

L is the usual safety-valve, J a water-gage, and Q the steam-delivery pipe.

A feed-pipe, S, communicates with the lower portion of the water-space in the vessel B, and a pipe, R, conveys the water of condensation from the heating-pipes to the lower portion of the annular space D in the fire-pot, both pipes R and S being provided with stop-cocks or valves M.

The operation of the apparatus is as follows: Water from the pipe S is admitted into the vessel B until it fills the same to about the dotted line shown in Fig. 2, the annular chamber D in the fire-pot being completely filled. Fire is then kindled on the grate I, and the water in the chamber D, becoming heated, rises through the pipes C into the upper portion of the vessel B, a supply of cold water from the lower portion of said vessel passing down through the pipes C', and entering the chamber D at the lower end.

A constant upward current through the chamber D and pipes C and a downward current through the pipes C' are thus established, the rapidity of the circulation increasing as the heat of the fire increases.

In addition to the heat imparted to the water in the chamber D of the fire-pot, the vessel B is entirely surrounded by the products of combustion as they pass through the flue O.

One of the most valuable features of our invention—namely, the imparting of a proper degree of heat to the water at the expenditure of but a small amount of fuel—is due to the fact that the water circulating in the chamber D abstracts a great amount of heat from the fire-pot at the point where the latter is intensely heated by direct contact with the bed of coals, so that the required degree of heat for warming purposes can be imparted to the water without necessitating the maintenance of a bright fire.

The rapid generation of steam in our heater

is insured, owing to the fact that instead of heating the whole volume of water at once small volumes of water are heated in succession in the chamber D of the fire-pot, and these volumes of heated water pass into the vessel B without being chilled by contact with the descending volumes of cold water.

Although we have shown in the drawings what we consider to be the simplest method of constructing our heater or generator, it is not necessary to adhere to this construction in every case. For instance, the fire-pot, instead of being made of two concentric cylinders connected together at the ends by rings, might consist of a series of hollow cast-iron segments properly secured together, each segment having an ascending and descending

pipe, as shown in Fig. 5, and the vessel B, instead of being arranged vertically, might be horizontal.

We claim as our invention—

The within-described steam-generator or water-heater, consisting of a double-walled fire-pot, A, inclosing a water-chamber, D, the vessel or reservoir B above the same, and sets of ascending pipes C and descending pipes C', affording communication between the interior of the vessel B and the chamber D of the fire-pot, all substantially as specified.

JOHN H. BIRCHALL.
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Witnesses:

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