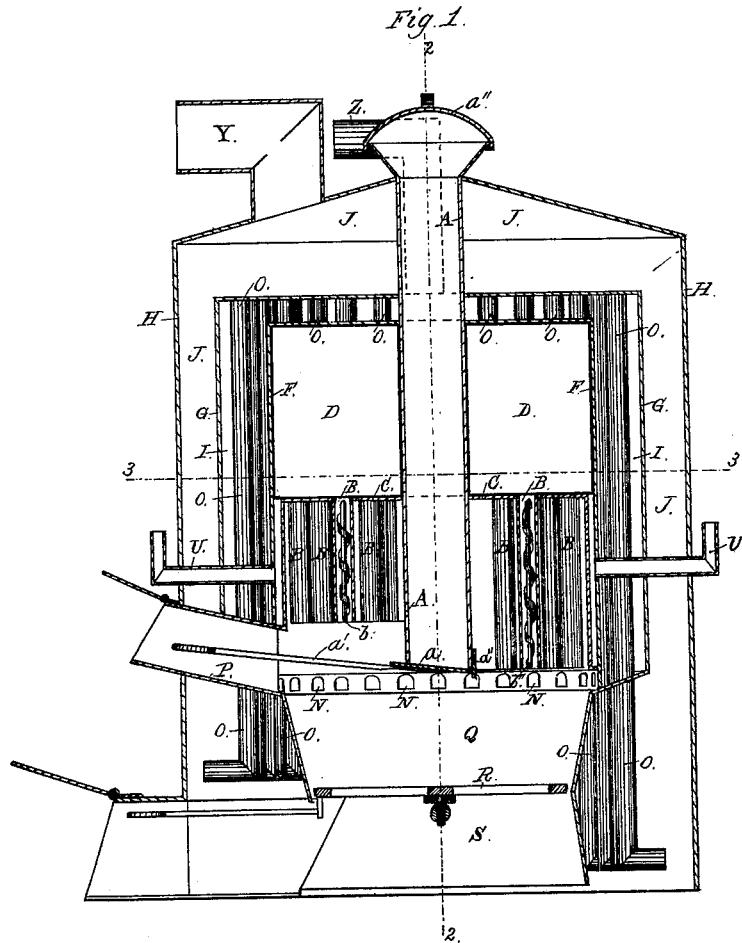


E. B. BUTTERWORTH.  
Heating-Apparatus.  
No. 202,928. Patented April 30, 1878.



Attest:

Geo. T. Smallwood Jr.  
Walter Allen

Inventor:

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By *Knight & Co.* Atty.

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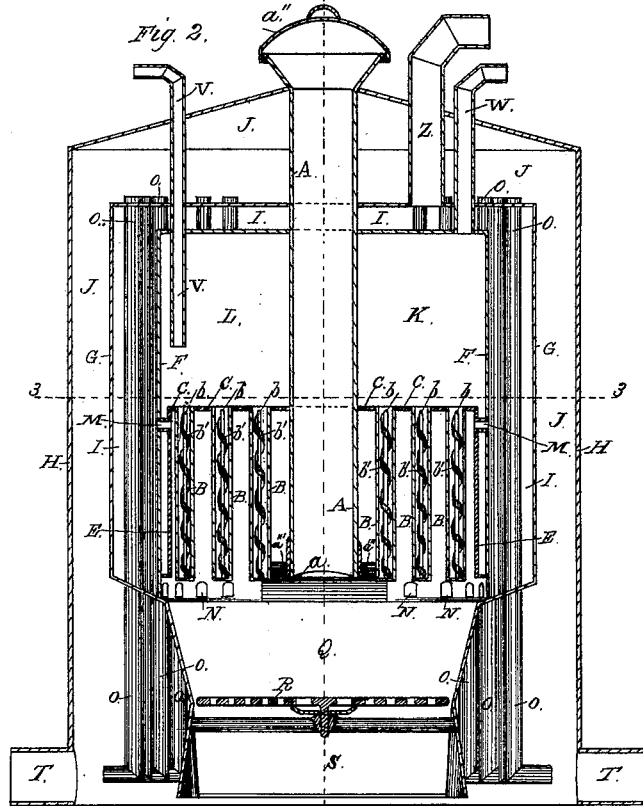


Fig. 2.

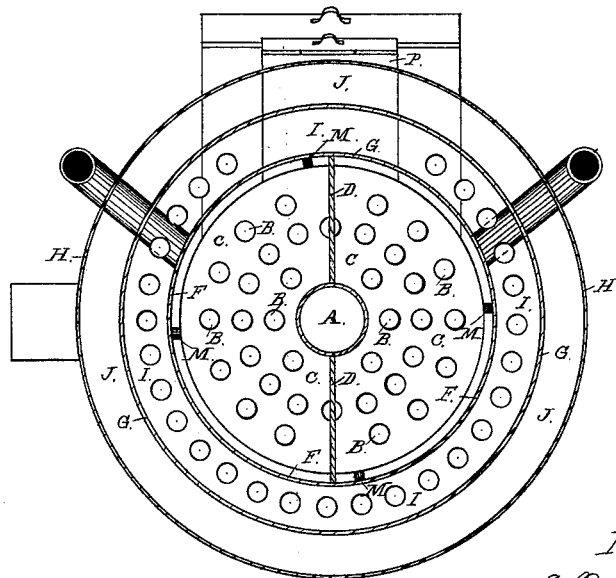


Fig. 3.

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# UNITED STATES PATENT OFFICE.

ENOCH B. BUTTERWORTH, OF OTTAWA, ONTARIO, CANADA.

## IMPROVEMENT IN HEATING APPARATUS.

Specification forming part of Letters Patent No. **202,928**, dated April 30, 1878; application filed December 21, 1877.

*To all whom it may concern:*

Be it known that I, ENOCH BRUCE BUTTERWORTH, of Ottawa, in the county of Carlton, Province of Ontario and Dominion of Canada, have invented an Improved Heating Apparatus, of which the following is a specification:

My improvements consist in combining, with a heater constructed with a chamber surrounding the magazine, drop-tubes, each containing an inner pipe surrounded by a spiral flange. The magazine is furnished at bottom with flanges for supporting the sliding shutter or shut-off and a stop to limit the movement of the shutter, which is operated by a bar extending through a chute, which forms a lower feeder.

In the accompanying drawings, Figure 1 is a vertical section of my improved heating apparatus on the line 1 1, Fig. 2. Fig. 2 is a vertical section on the line 2 2, Fig. 1. Fig. 3 is a horizontal section on the line 3 3, Figs. 1 and 2.

A is a magazine or feeder, whose lower end is constructed with flanges adapted to support a sliding shutter or shut-off, *a*, and a stop to limit the movement of the shutter. The shutter is constructed with a long rod or handle, *a'*, by which the shutter is moved to open or close the lower end of the magazine. Encircling the lower portion of the magazine are a number of drop-tubes, B, depending from a horizontal partition, C, which is supported by the magazine and an inner casing, F. Within each of the tubes B is located a pipe, *b*, supporting a spiral flange, *b'*. The water within the tubes B, becoming heated, is kept against the sides of the tube by means of the flanges *b'*, and then emerges at the upper end, being replaced by colder water, descending within the pipe *b* and passing out at the bottom of the tube.

Extending downward from the periphery of the horizontal partition is an encircling lining, E. Surrounding the above-described parts is the inner shell F, intermediate shell G, and an outer shell or casing, H, forming a

smoke-chamber, I, and hot-air chamber J, extending over the furnace. Between the vertical partition D, horizontal partition C, lining E, and the inner shell F are formed two chambers, K L, the chamber K forming a steam-boiler and the chamber L a hot-water chamber. M are pipes, inserted through the lining E and lower portion of the inner shell, for conducting the products of combustion and the smoke into the chamber I. This shell is also provided with openings N for the same purpose. Extending from the lower end of the furnace up through the smoke-chamber are tubes O, for conducting air into the upper portion of the outer chamber J. On one side of the furnace is inserted a chute, P, for feeding, and through which the shutter *a* is operated. Q is the fire-pot, R the grate, and S the ash-pit. T are air-inlets. On each side of the chute P are induction and eduction pipes U, for the supply of and withdrawal of water to and from the hot-water and steam chambers. V is a pipe for supplying hot water. W is a steam-pipe, Y hot-air pipe, and Z smoke-pipe. *a''* is a cover for the magazine.

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

1. The combination, with the depending or drop tubes B, of the inner pipes *b* and spiral flanges *b'*, as set forth.

2. The combination of magazine A, constructed with flanges *a''*, and provided with a stop, *a''*, and the shutter or shut-off *a*, provided with a bar, *a'*, substantially as set forth.

3. The heating-apparatus herein described, consisting of magazine A, surrounded by shell or casing F, the horizontal partition C, provided with drop-tubes B, the outer shell H, intermediate shell G, and air-tubes O, passing between the inner and intermediate shells F G, all substantially as shown and described.

ENOCH BRUCE BUTTERWORTH.

Witnesses:

GEO. R. BLYTH,  
WM. STEPHENS.