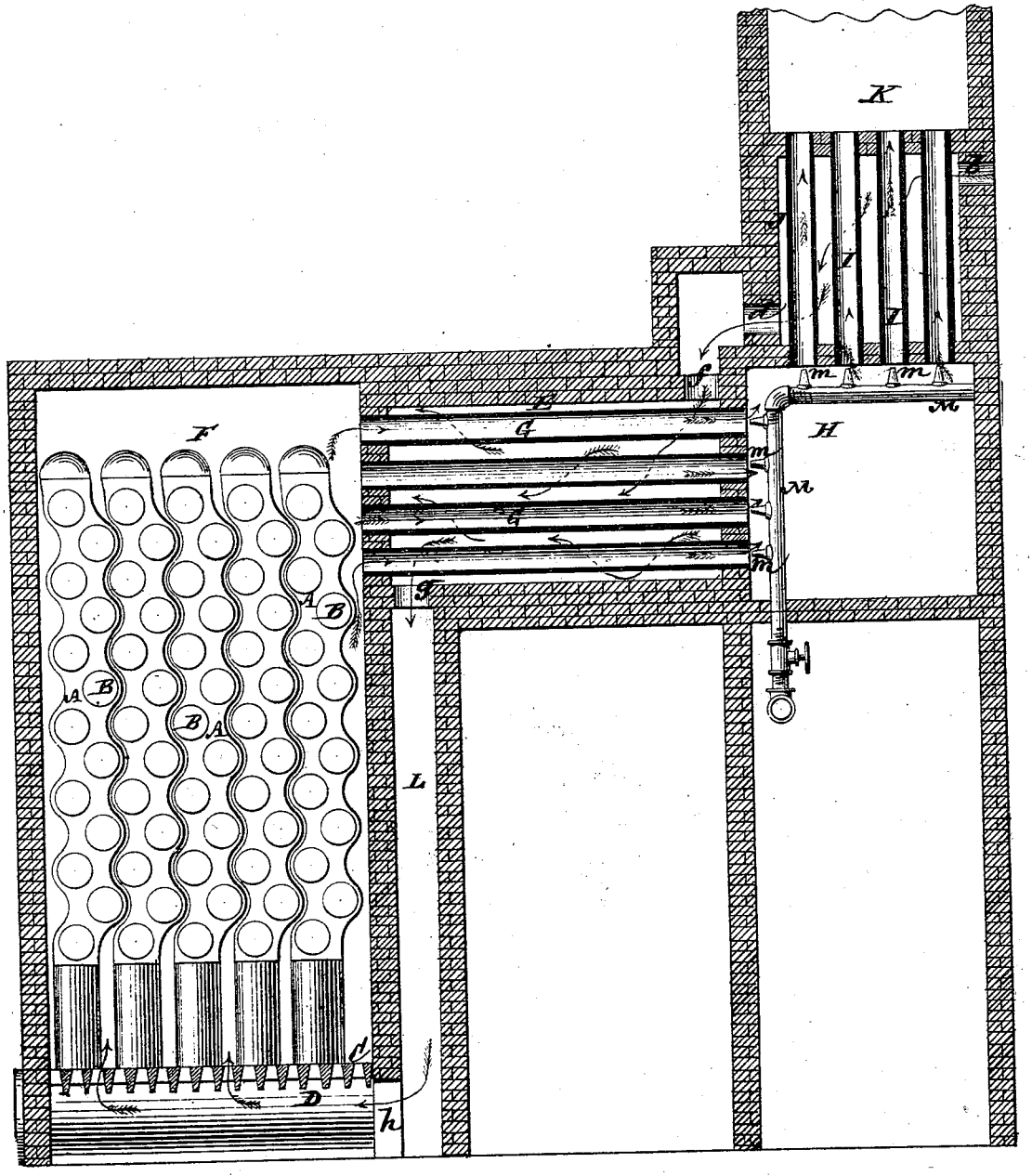
# B. T. BABBITT.

## Furnace.

No. 167,291. Patented Aug. 31, 1875.




Witnesses:
Michael Ryan
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# UNITED STATES PATENT OFFICE.

BENJAMIN T. BABBITT, OF NEW YORK, N. Y.

## IMPROVEMENT IN FURNACES.

Specification forming part of Letters Patent No. **167,291**, dated August 31, 1875; application filed June 23, 1875.

*To all whom it may concern:*

Be it known that I, BENJAMIN T. BABBITT, of the city, county, and State of New York, have invented certain new and useful Improvements in Air-Heating Apparatus for the Furnaces of Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to tubular air-heating attachments of steam-boilers; and consists in a novel combination, with the boiler or chamber inclosing the same, of tubes, chambers, and ducts, for the more perfect or economical heating of the air before it is introduced to the boiler-furnace to improve or promote combustion in the latter.

The accompanying drawing represents a mainly sectional vertical view of an air-heating apparatus constructed in accordance with my invention, and as connected with a steam-boiler.

The steam-boiler here represented is a sectional one, composed of hollow uprights A, of a waved or serpentine construction, and having hollow radial arms B projecting laterally from them, as in previous Letters Patent issued to me; but this invention is not restricted to any particular construction of steam-generator. C is the fire-grate of said boiler, and D the ash-pit. E is an upper chamber at the back or to one side of the boiler inclosing chamber F, and containing any number of horizontal tubes, G, through which the smoke and gaseous products of combustion pass from the chamber F. H is a chamber, into which the products of combustion pass from the tubes G, and from which they escape through upright tubes I within a chamber, J, into the chimney K, said chamber J being above the level of the chamber E. The air to be heated is introduced through one or more apertures, *b*, into the upper portion of the chamber J, within which it circulates, passing in a downward direction between and among or around the tubes I, and from thence through one or more lower openings, *d*, in the chamber J, into an air chamber or passage mounted on or inclosing the chamber E, and from whence it passes by one or more apertures, *f*, into the upper back portion of the chamber E. The air thus partially heated then circulates in a forward direction between and among or around the tubes G, and finally escapes by one or more forward lower openings, *g*, into an upright duct, L, down which it passes, and ultimately escapes by a lower opening, *h*, into the ash-pit D of the boiler-furnace. In this way, or by these means, the air is very thoroughly heated before passing to the boiler-furnace, and thus combustion is economized or accelerated. Arranged within the chamber H are any number of bent steam jet-pipes, M, provided with both lateral and upper discharge-nozzles *m*, set to project toward, and in close proximity with, those ends of the tubes G I which open into the chamber H, so that by letting steam into the pipe M both sets of tubes G I may be simultaneously cleaned or blown out.

I claim—

The combination, with the boiler case or chamber F and ash-pit D, of the chambers E J, with their tubes G I, the intermediate chamber H, the apertures *b d f g*, and the duct L, with its opening *h*, substantially as shown and described.

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