

B. T. BABBITT.
Steam-Boilers.

No. 146,858.

Patented Jan. 27, 1874.

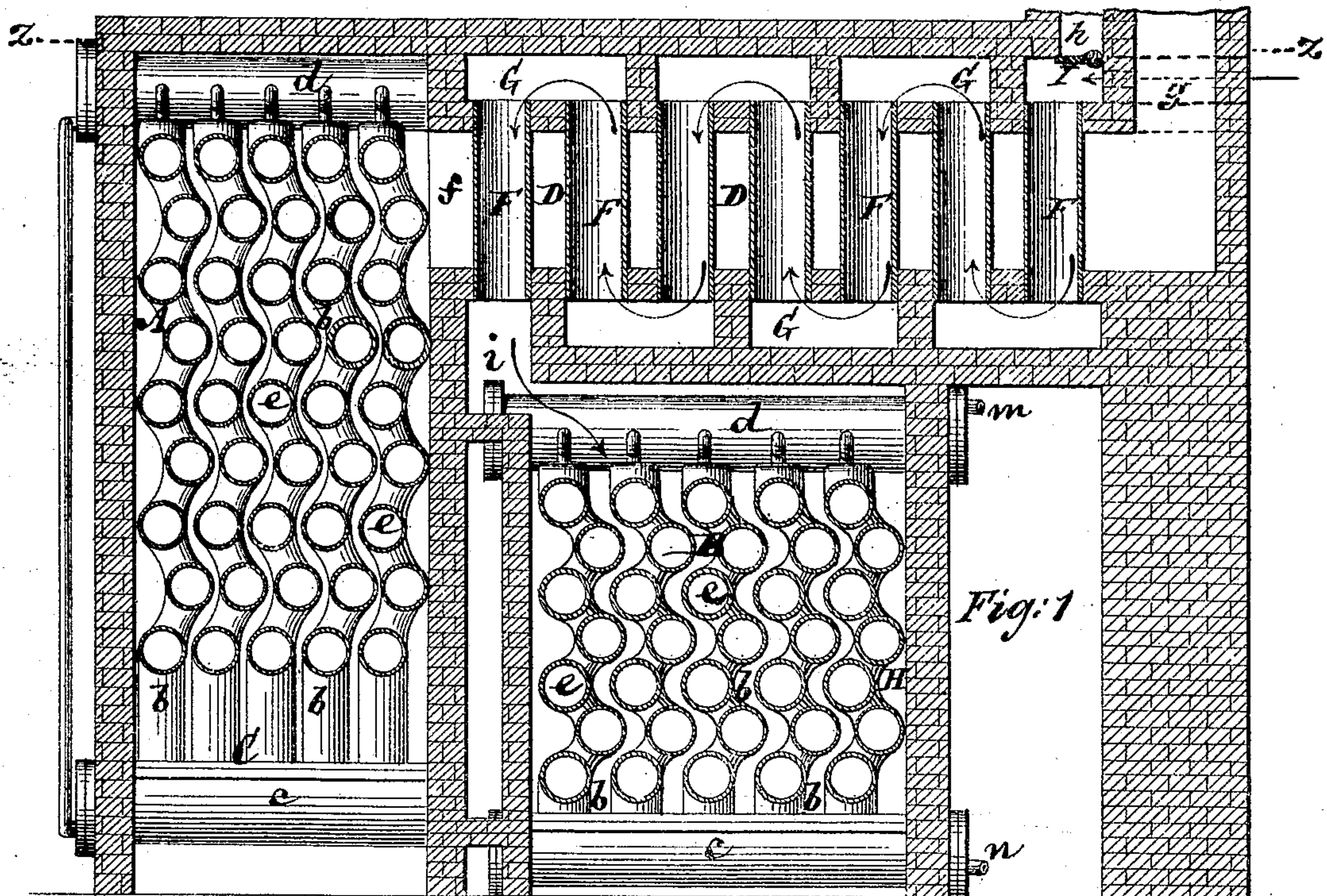
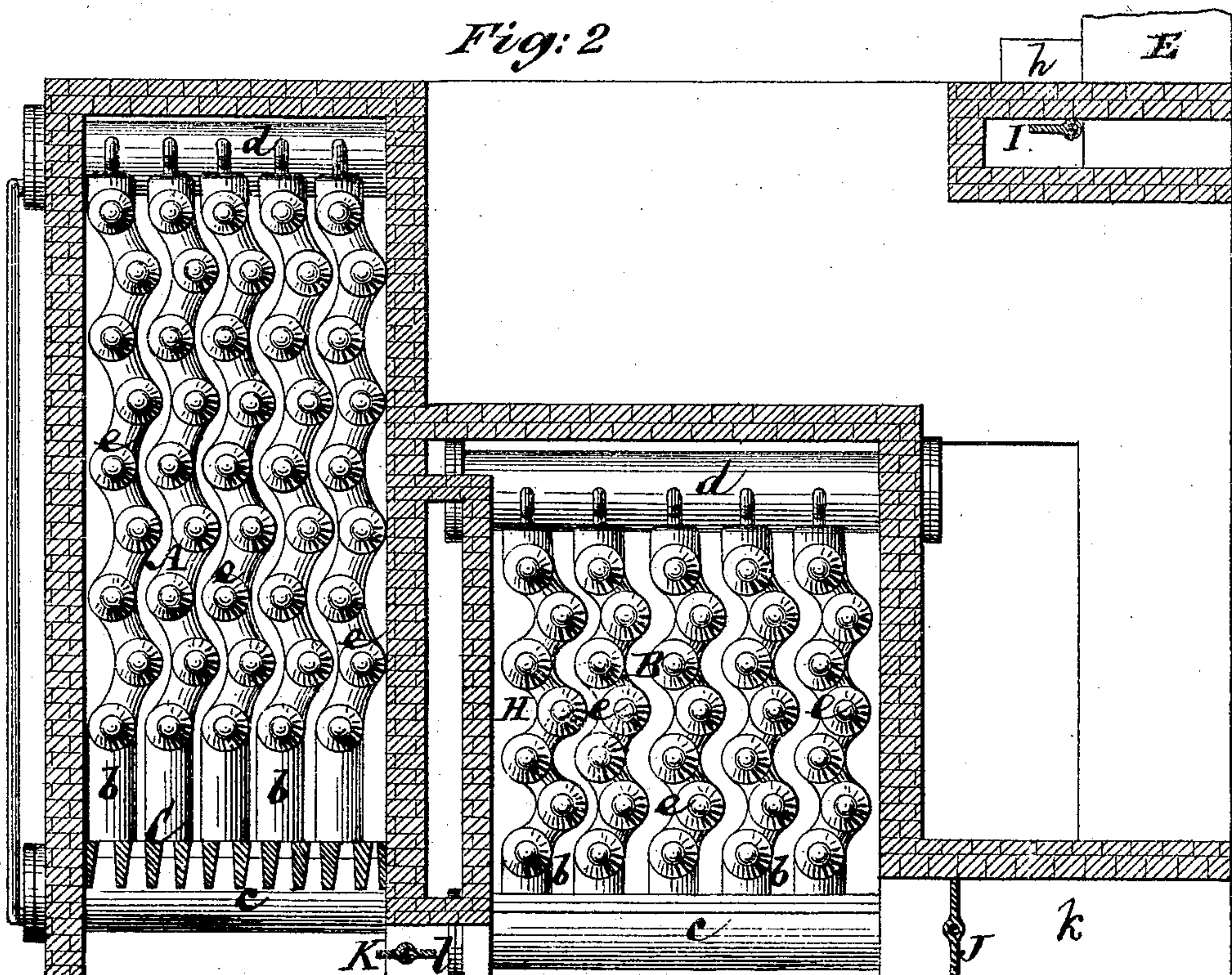


Fig: 2



Witnesses:
Michael Ryan
Thos Holmes

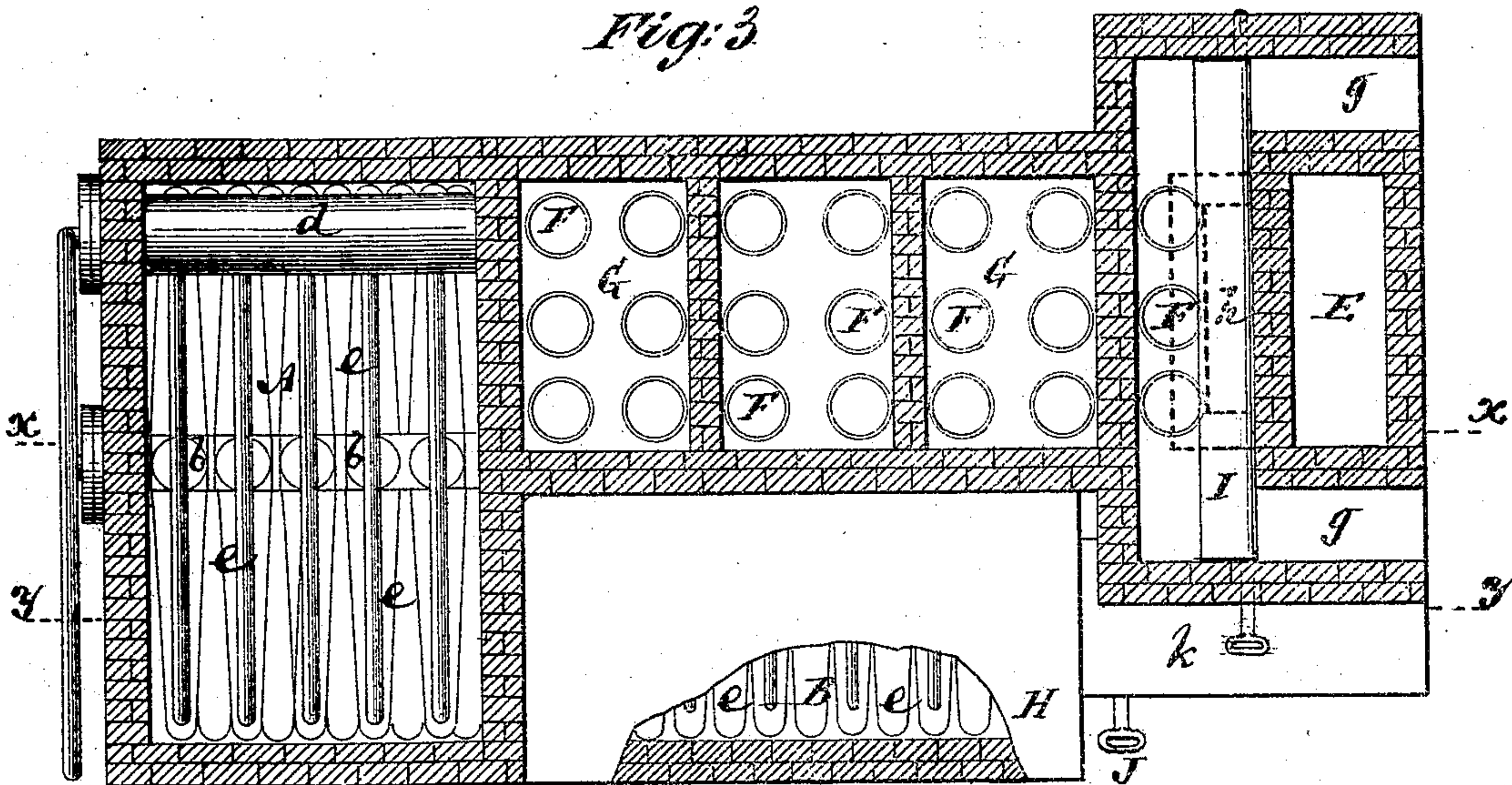
Benj T. Babbitt
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Fig. 3



Witnesses:

Michael Ryan
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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **146,858**, dated January 27, 1874; application filed September 2, 1873.

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 an Improvement in Steam-Boilers with Combined Air-Heating Attachment and Condenser, of which the following is a specification:

This invention consists in a novel arrangement or combination of steam-boiler, with an air-heating attachment, operating also as a condenser, whereby not only are the products of combustion, as they escape from the fire-place or furnace of the boiler, utilized in heating a current or currents of air, but such air is made capable of diversion by giving it an upward or downward draft, either to supply the furnace with heated air to promote combustion, or to conduct the same to one or more apartments of the building, according to the season and other controlling circumstances; also the exhaust steam of the engine, supplied by the boiler, is more or less condensed.

Figure 1 represents a vertical section, on the line *x x* in Fig. 3, of a steam-boiler, with a cold-air condenser and heater attached, in accordance with my invention; Fig. 2, a like section on the line *y y*; and Fig. 3, a mainly horizontal section on the line *z z*.

Similar letters of reference indicate corresponding parts.

A is the boiler, and B an attached cold-air condenser, for the exhaust steam of an engine worked by the boiler, and forming, or partially so, a heater for supplying hot air either to the furnace of the boiler or to the apartments of a building. Both structures, A and B, are represented as of similar sectional construction, although I do not restrict myself to a particular construction for either of them; the same, as shown, however, are composed, for the most part, of a number of hollow uprights, *b*, of a serpentine form, mounted on drums, *c*, also connecting with upper drums, *d*, and having attached to them a number of hollow radial arms, *e*, of tapering construction in their longitudinal section, and set staggering in relation with each other to produce a more effective surface action. C is the furnace, built up to form an outer casing to the boiler, and from which the products of combustion, after circulating among the uprights *b* and tapering

arms *e* of the boiler A, pass out by an upper-side opening, *f*, to a horizontal flue or chamber, D, which connects at its outer end with the chimney E. This horizontal flue or chamber is interspersed or filled with vertical pipes F, arranged to connect above and below with cross passages or chambers G, situated in such relation with each other—that is, the upper ones with the lower ones—and the pipes F being so disposed to connect with said chambers, that air suitably introduced for the purpose is free to circulate successively up one set of pipes, F, and down through the next set, or vice versa, throughout the length of the flue or chamber D, and so that the escaping products of combustion passing through the flue D serve to, more or less, heat the air thus circulating through the pipes F and passages G. The direction in which such air is made to take relatively to the length of the flue D depends upon the purpose to which it is proposed to apply the heated air. Thus it has an upward or downward draft given it through the chamber H for circulation among or around the uprights *b* and tapering arms *e* of the structure B, either by admitting or allowing it to pass off through the pipes F nearest the chimney E, accordingly as it is required to supply the furnace with heated air to promote combustion, or to conduct hot air into the building for warming purposes. To these ends the space, with which the upper ends of the pipes F nearest the chimney connect, is provided with one or more horizontal or outside air-inlets, *g*, and one or more vertical or top outlets, *h*, both controlled by a valve or damper, I, arranged so that when it is turned to open the inlets *g* it closes the outlet *h*, and vice versa. There also is a passage, *i*, connecting the upper end of the chamber H with the lower ends of the pipes F nearest the boiler; likewise an air-inlet, *k*, connecting the lower portion of the chamber H at the end farthest from the boiler with the outside atmosphere, and opened or closed, as required, by a damper, J. The opposite end of the chamber H at its bottom connects, by a passage, *l*, which is opened or closed by a damper, K, with the ash-pit of the furnace C. The exhaust steam from the engine is introduced at *m* to the structure B, and, after circulating through

said structure, passes off as water of condensation at *n*.

The operation is as follows: In the winter season when it is desired to employ the heated air in warming the building, the inlets *g* are closed and the outlets *h* opened by the damper I; the damper K also closed and the damper J opened. Cold air then entering at *k* operates to condense the exhaust steam in the structure B, and is partially heated by surface contact therewith, and afterward more fully heated by its passage through the pipes F and passages G till escaping at the outlet *h*. This is the upward draft. In the summer season, when the heated air is not required to warm the building, the damper I is turned to open the inlets *g* and close the outlet *h*; the damper J also closed and the damper K opened. This produces a downward circulation, causing the air to pass in a reverse direction through the pipes F and passage G, as indicated by arrow in Fig. 1, and, after circulating in a downward direction among the pipes and arms

of the structure B, to enter the ash-pit by the passage *l*, thus supplying the furnace with hot air to promote combustion.

The pipes F and passages G may be variously arranged, or a direct passage, connecting the chamber H with the inlets *g* and outlets *h*, be substituted for them; but such would be much inferior in point of efficiency.

What is here claimed, and desired to be secured by Letters Patent, is—

The combination, with the boiler A, furnace C, smoke flue or chamber D, and condenser or heater B, with its inclosing-chamber H, of an air-circulating passage or passages F G, connecting the chamber H at its top with one or more upper air-inlets, *g*, and outlets *h*; the damper I, the lower air-inlet *k*, the damper J, the passage *l*, and the damper K, substantially as and for the purposes herein set forth.

BENJ. T. BABBITT.

Witnesses:

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ANSON B. JACKSON.