

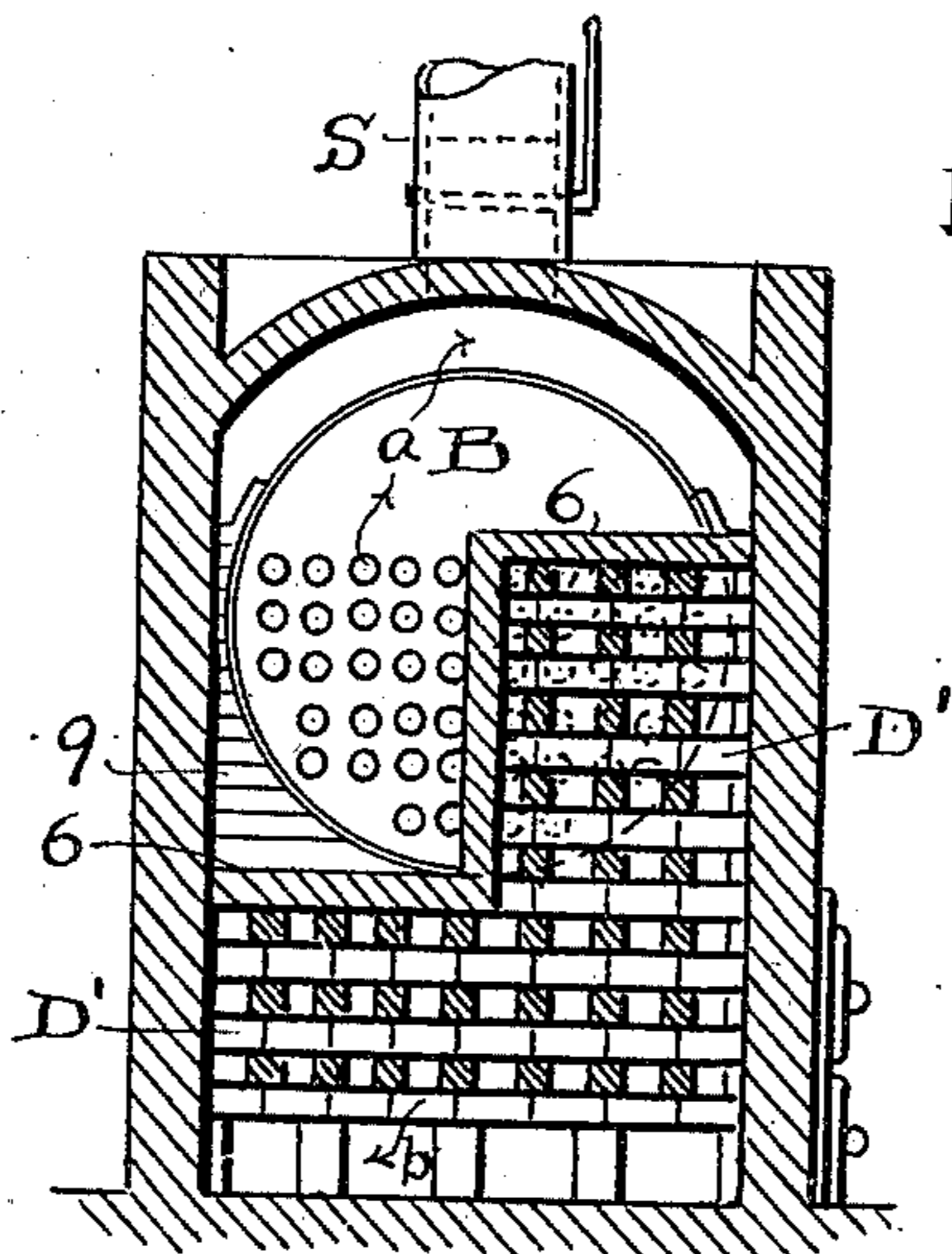
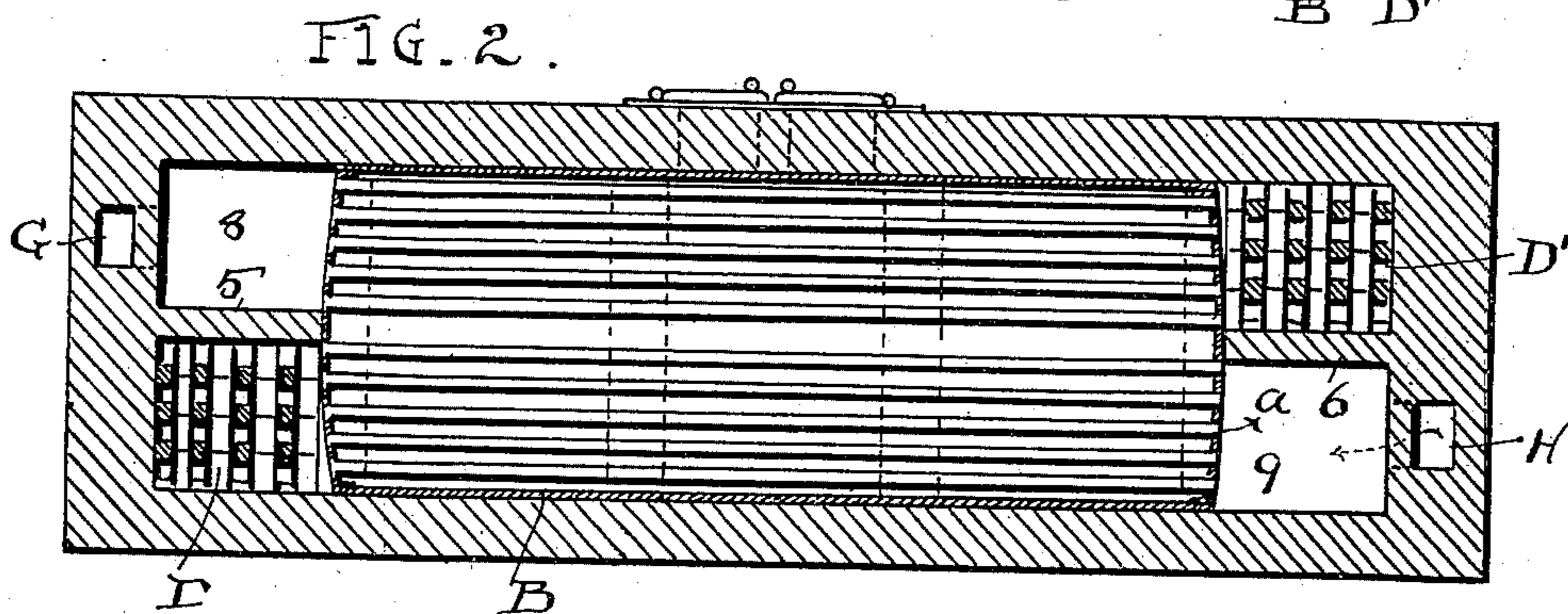
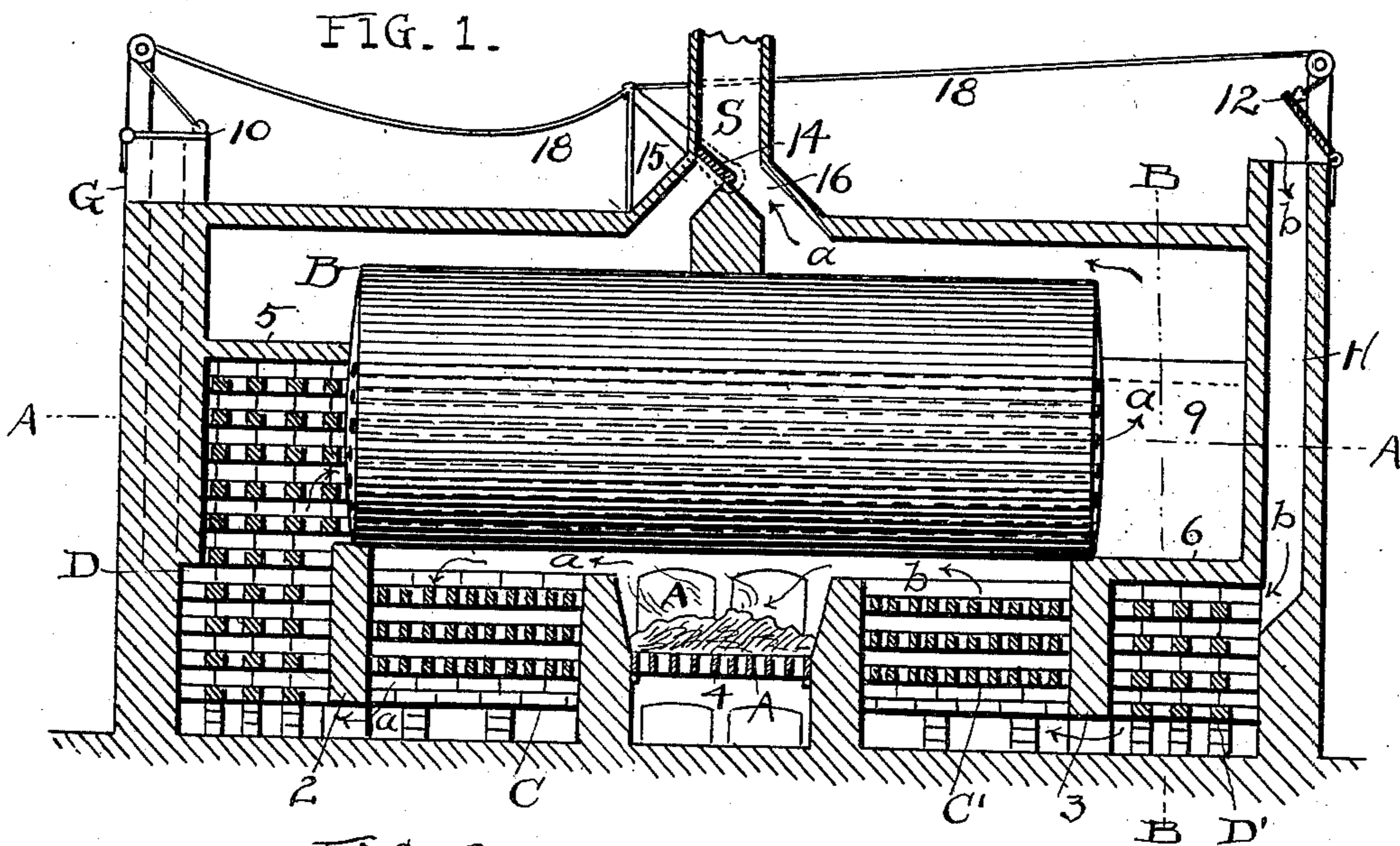
No. 668,309.

Patented Feb. 19, 1901.

J. P. GILL.  
FURNACE.

(Application filed Dec. 5, 1900.)

No Model.)



ATTEST  
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JOHN P. GILL, OF CLEVELAND, OHIO.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 668,309, dated February 19, 1901.

Application filed December 5, 1900. Serial No. 38,744. (No model.)

*To all whom it may concern:*

Be known that I, JOHN P. GILL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Furnaces; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in furnaces, and although the furnace is shown in this instance as associated with a boiler and is so described and claimed it should be understood that as a furnace simply it is applicable to other purposes as well wherein boilers are not used, such as annealing-ovens and ovens and uses of different kinds. However, as here shown, there is a boiler in the combination, and the heat from the furnace and fresh air for supplying combustion are passed alternately through the same channels to and from the furnace, first passing the heat, and thus heating the channel, and then passing the air through the same channel and heating the air before it reaches the furnace. This alternation involves both sides of the furnace, because while the heat is going out at one side air is coming in at the other.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of my improved furnace and boiler construction. Fig. 2 is plan view on line A A, Fig. 1. Fig. 3 is a cross-section on line B B, Fig. 1.

It will thus be seen that the entire plan of the furnace and the boiler also, as shown here, is double and reciprocal, the boiler being constructed especially to adapt it to use with a furnace of this kind, the object of course being to obtain as nearly perfect combustion as is practicable and consequent economy of fuel and a smokeless fire.

A represents the furnace. This may be of the very simple form here shown, or it may be of a very different form and construction, as may be best adapted to any given case, and there may be any suitable attachment connected therewith for feeding or supplying coal automatically or otherwise. Being located centrally across beneath the boiler B, the heat flows therefrom toward one end or the other

of the boiler over side walls, according as one channel or the other for the time is opened for this purpose. These channels lead from the furnace by a circuitous route to the smoke-stack S, and in Fig. 1 the products of combustion are shown as passing to the left from the furnace and air is approaching the furnace from the right, taking the course of the arrows in both cases. Thus at the left the products of combustion first descend through brick checker-work C into the open space at the bottom thereof, and thence beneath dividing-wall 2 into checker-work D, while at the right air is reaching the furnace first through checker-work D' and then dipping beneath wall 3, rising through checker-work C', and entering the furnace over the fire, where gases and smoke arise and where the essential work of combustion occurs. Of course there may be more or less air admitted from beneath through grate-bars 4, according to conditions which a capable fireman will understand and control.

The space on the ends of the boiler and furnace is further compartmented or divided up by walls 5 and 6, a full cross-section of one of which is shown in Fig. 3. The upright portions of these walls come centrally of the ends of boiler B, while the lower horizontal portion lies half-way across the width of the boiler-space on a line just beneath the same and the upper horizontal portion lies well up toward the top of the boiler. This throws the full width of the boiler-space open to the checker-work D' up to bottom of the boiler and half said width from there to the top of wall 6 and leaves the other half (indicated by 8 and 9) at the respective ends open as flueway for the escape of products of combustion passing through the boiler. The flight of arrows *a* shows the direction of travel from the furnace and the flight of arrows *b* shows the direction taken by the fresh air for the furnace. In Fig. 2 the products of combustion issuing through checker-work D goes through the boiler, heating the same, and discharges into the open flue-space 9. When the direction of travel of the heat and air is changed or reversed, the travel of the heat will issue into the boiler through checker-work D' and emerge into chamber 8 and go thence

to discharge flue or stack S. Then the direction of travel of fresh air will be reversed also and air will now enter through checker-work chambers D and C to the furnace, traveling in the reverse direction to arrows *a*. The air approaches these chambers through down-flues or passages G and H, discharging beneath horizontal walls 5 and 6 into checker-work chambers D and D', respectively. Suitable valves 10 and 12 close flues G and H, and any suitable kind of valve 14 may be used to close the two passages 15 and 16, leading from the opposite ends of the boiler to stack S. As shown here, these three several valves are operatively connected by a chain or cord 18, so that all said valves can be moved together and instantly reverse the direction of travel of heat and air. This is done as often as may be required to work out my principle of operation, which is to heat one set of checker-work bricks by the outflowing heat so hot that they will practically superheat the inflowing air by the time it reaches the furnace, and thus prepare it to chemically combine at once with the gases arising from the coal, and thus effect perfect combustion and the consequent intense heat which such a fire produces. When the bricks on that side get so much cooled that the heating of the air becomes insufficient, the valves are reversed and the heat and air exchange circuits, and so on alternately. The air entering through either passage G or H cannot run to the boiler directly and must first pass through the furnace, because the opposite outlet-passage from the boiler is closed, as in Fig. 1. Hence the air coming in through flue H may fill checker-work chambers D', but can only find exit by draft from the furnace by a dip beneath dividing-walls 3, whence it runs to the furnace by checker-work C'.

If an oven or the like were used instead of the boiler, the same arrangement substantially would be observed, as here shown, the oven taking the place of the boiler and the heat passing through the oven from opposite directions alternately and the air for the furnace being heated in the same way.

Obviously two or more boilers could be used instead of one only and serve in the same way. If there were two, chamber D might discharge into one boiler and chamber D' into the other, said boilers corresponding to the present subdivision of the single boiler shown.

What I claim is—

1. In furnaces for boilers and other uses, a furnace and a set of inner and outer checker-work chambers at each side thereof and a wall between said chambers having a passage at its bottom from one chamber to the other, an air-inlet flue to each outer chamber and a separate heat-outlet also from each outer

chamber, and walls separating said air-inlets and heat-outlets, substantially as described.

2. A furnace and a set of walls in checker-work chambers at each side, said chambers and their walls constructed to pass the heat from the furnace down through one chamber and up through the other at each side of the furnace, and a separate passage-way for the heat from each outer chamber to the stack, substantially as described.

3. The furnace and the two checker-work chambers at its side and a wall separating said chambers having a passage at its bottom from one to the other, a separate air-inlet flue to each outer chamber, and separate valves controlling the said flues, substantially as described.

4. A furnace and a set of inner and outer checker-work chambers at each side thereof, one of said sets constructed to pass air first down through one chamber and then up through the other, and the other set constructed to pass heat down through one chamber and up through the other, and a discharge-passage from the heat-outlet chambers to the stack, substantially as described.

5. The furnace and the inner and outer checker-work chambers at each side thereof connected in pairs by an open passage at their bottom, a boiler having a portion of each end open to a portion of the outer of said chambers at said ends, and a wall dividing off the other portion of the ends of the boiler, substantially as described.

6. The furnace and the inner and outer checker-work chambers in sets at its sides, the boiler resting across said furnace and the inner of said chambers at the sides of the furnace, the other of said chambers each overlapping a portion of one end of the boiler and a wall closing out the portion of the boiler not so covered by said chambers, and means to cause the heat to travel first through one set of chambers and the corresponding portion of the boiler and then through the other set of chambers and the other portion of the boiler, substantially as described.

7. The furnace and a set of checker-work chambers at each of its sides, the boiler resting across said furnace and the inner of said chambers and having the outer chambers each in open relation to a portion of one end, a fresh-air flue to each outer checker-work chamber, a separate valved outlet-passage from each end of the boiler and valves controlling said outlet-passages and air-inlet flues, substantially as described.

Witness my hand to the foregoing specification this 24th day of November, 1900.

JOHN P. GILL.

Witnesses:

M. A. SHEEHAN,  
R. B. MOSER.