

No. 695,590.

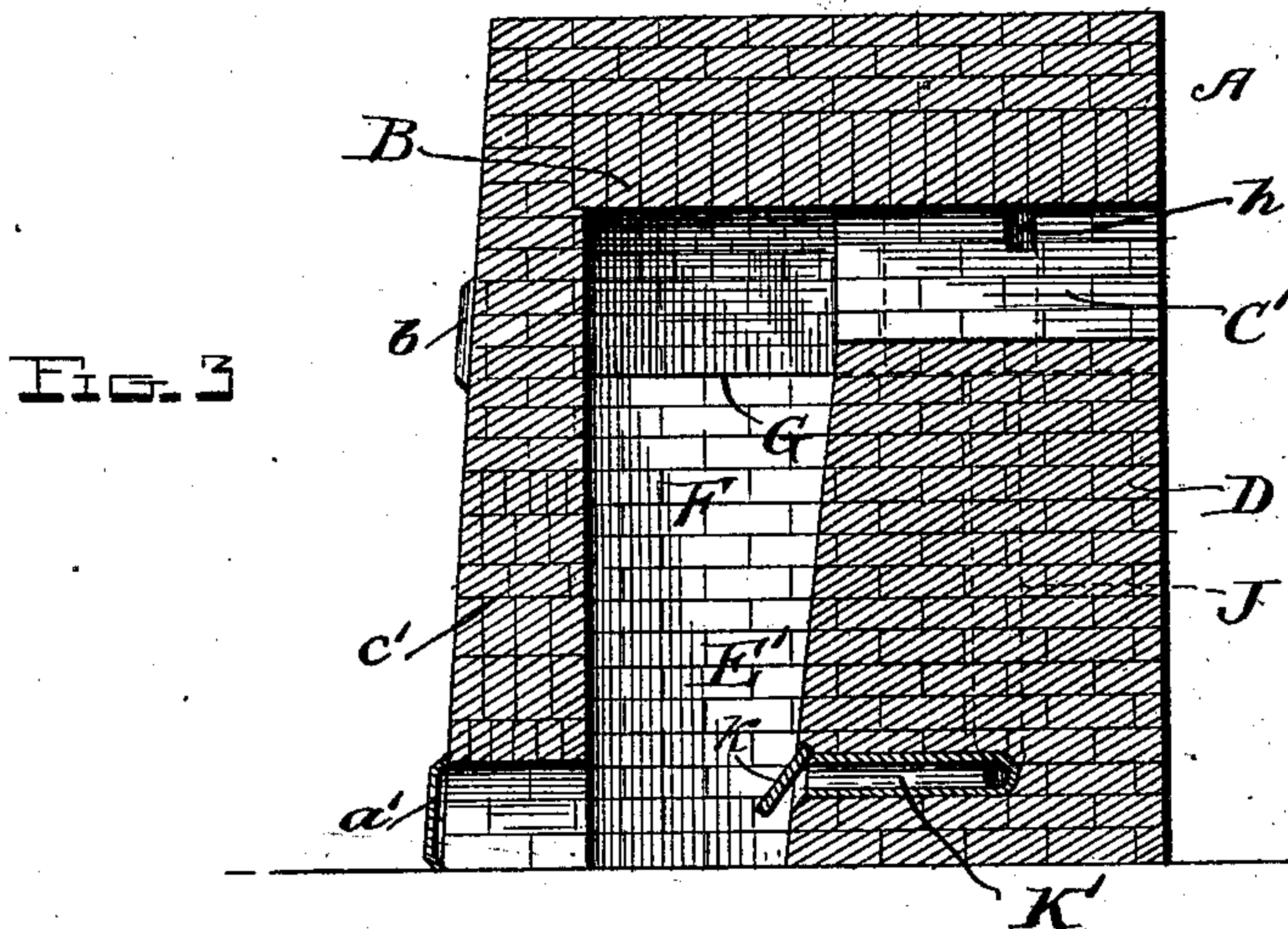
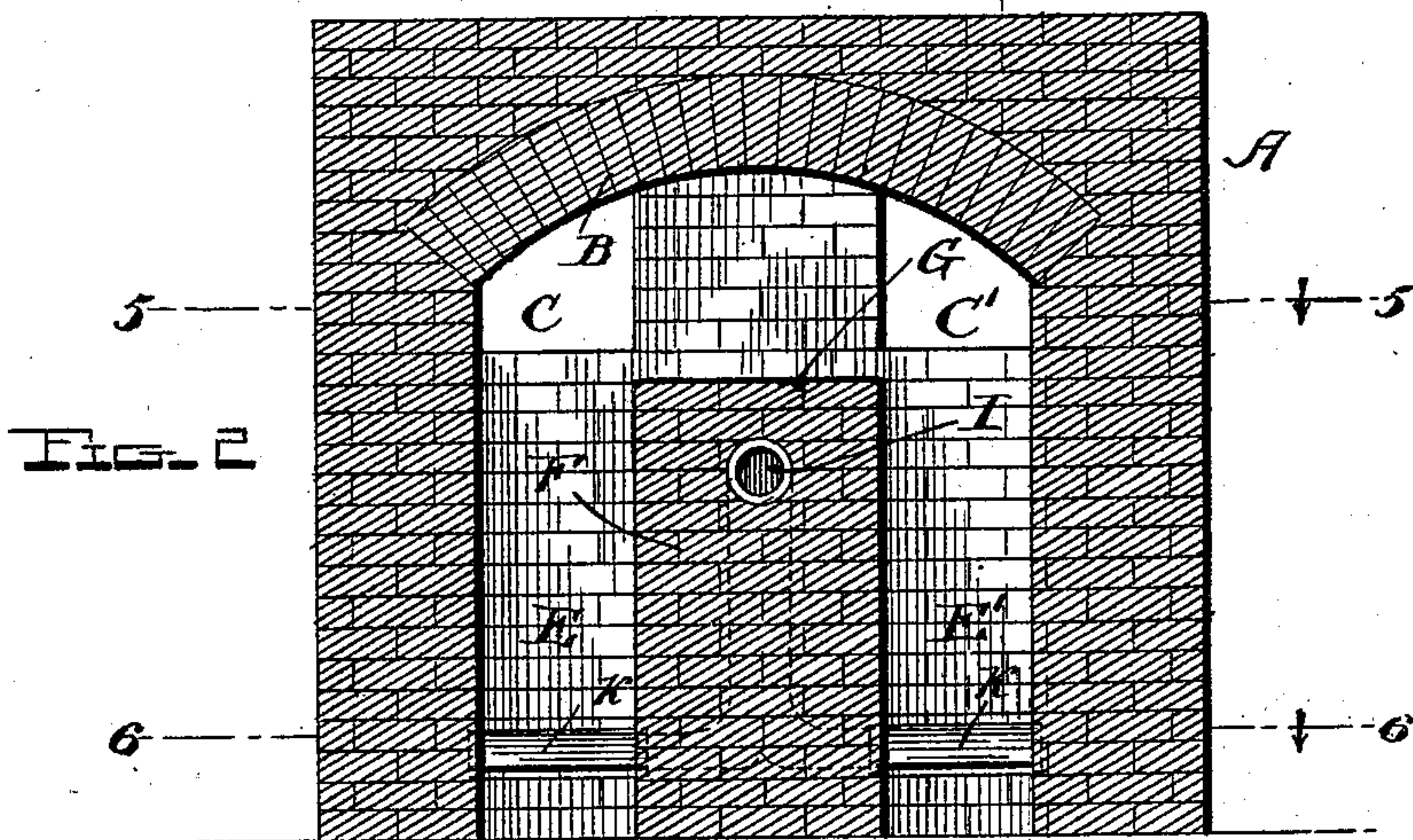
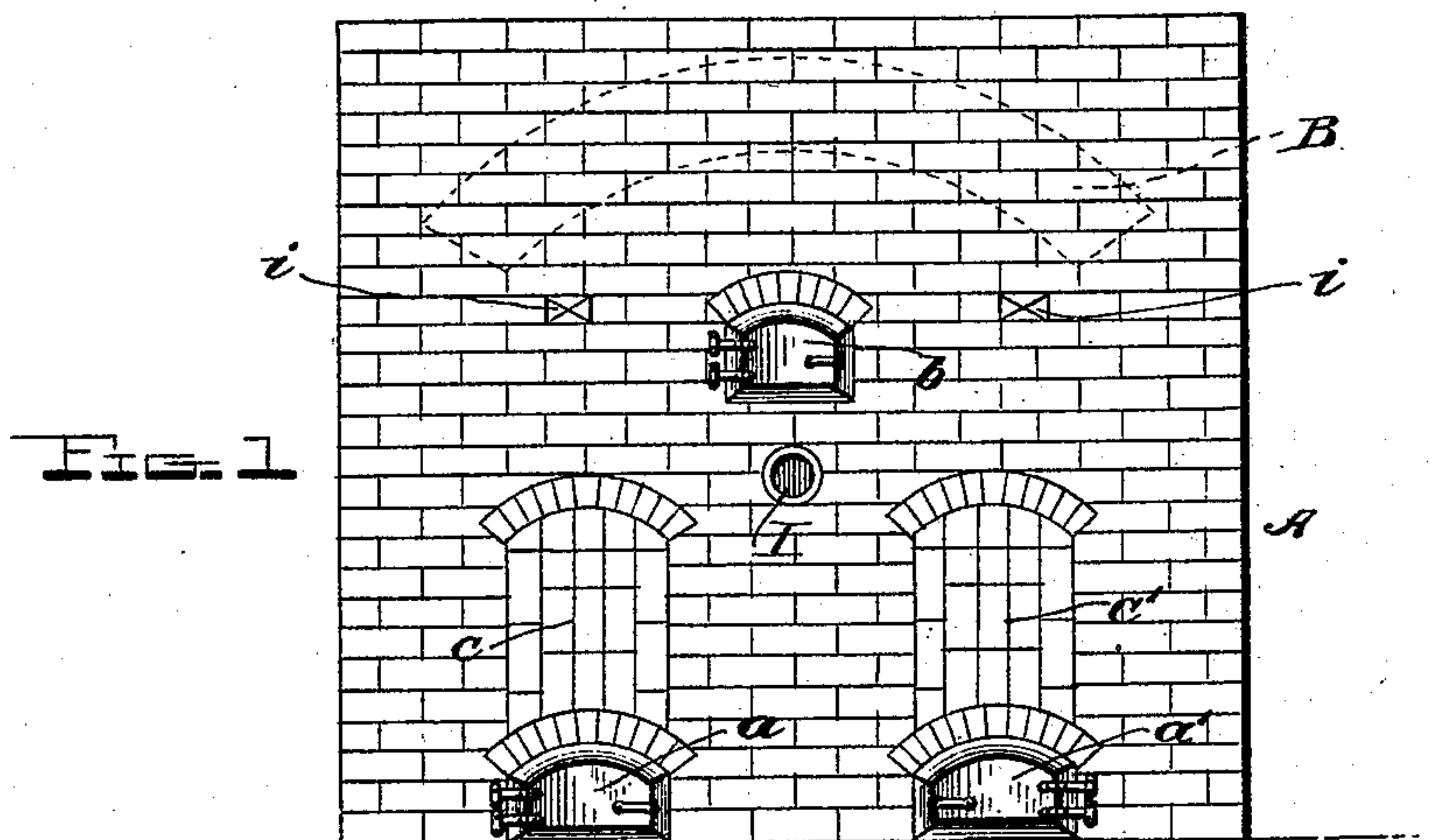
Patented Mar. 18, 1902.

F. E. SWIFT.
BRICK AND KILN FURNACE.

(Application filed July 29, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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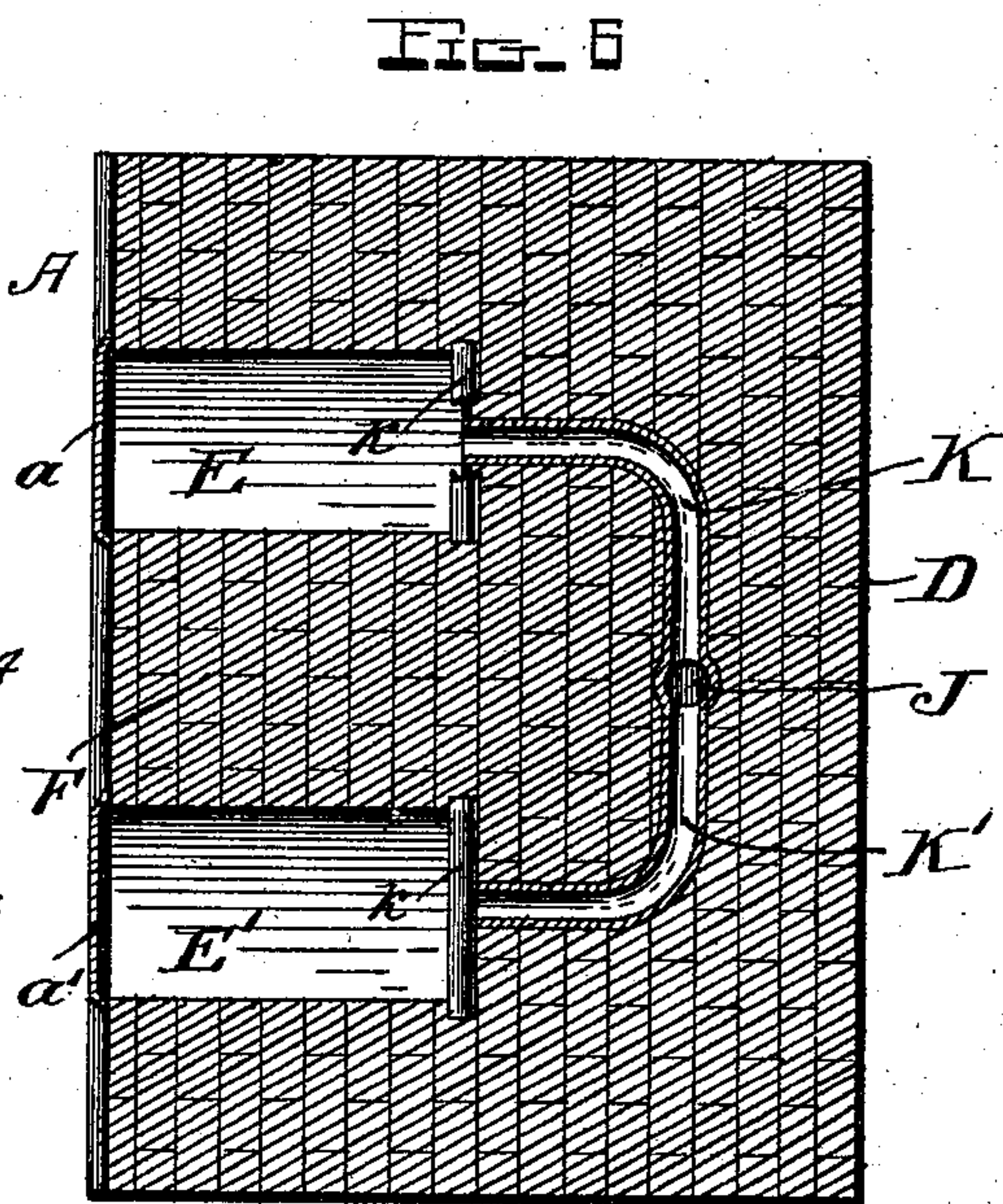
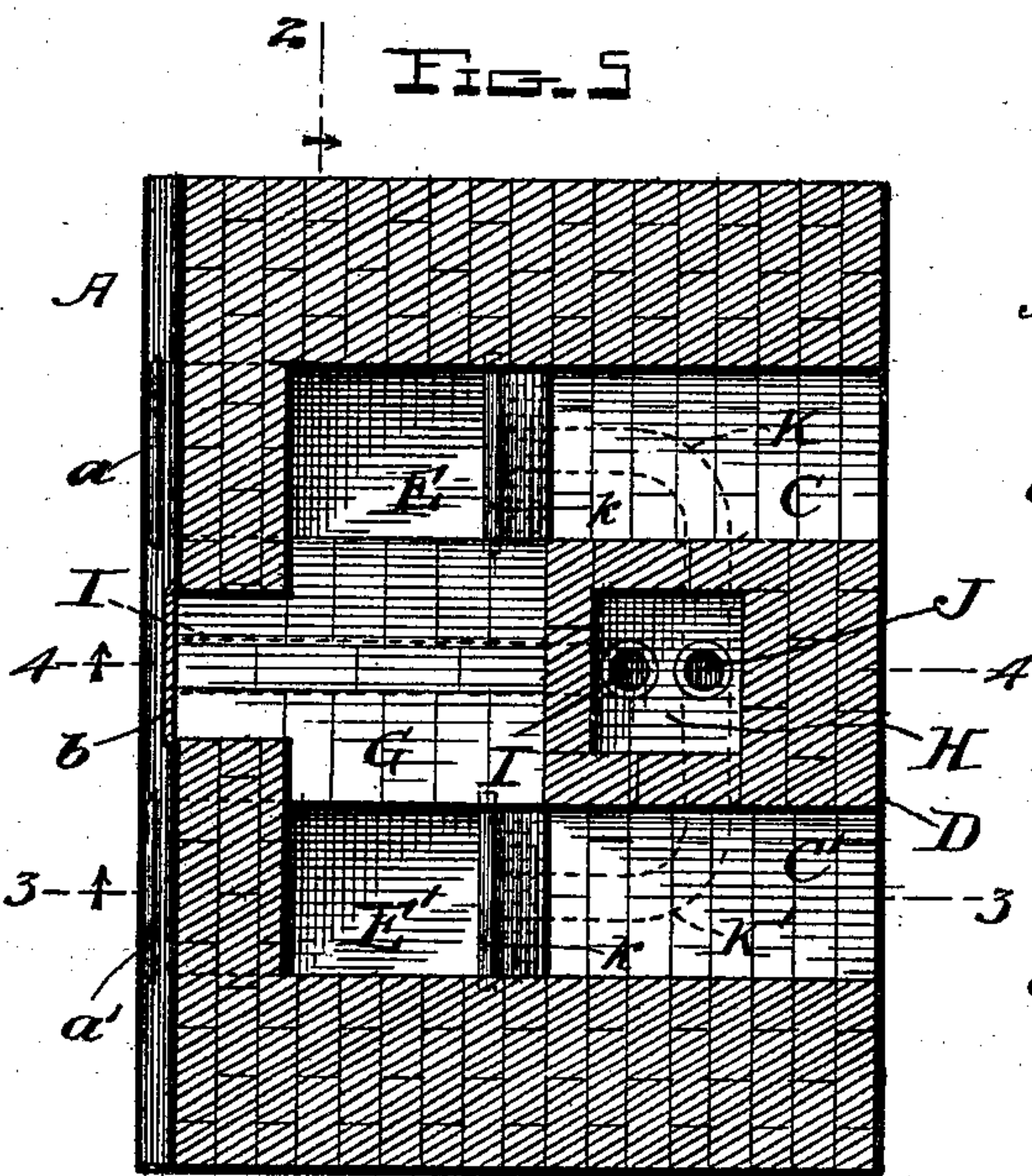
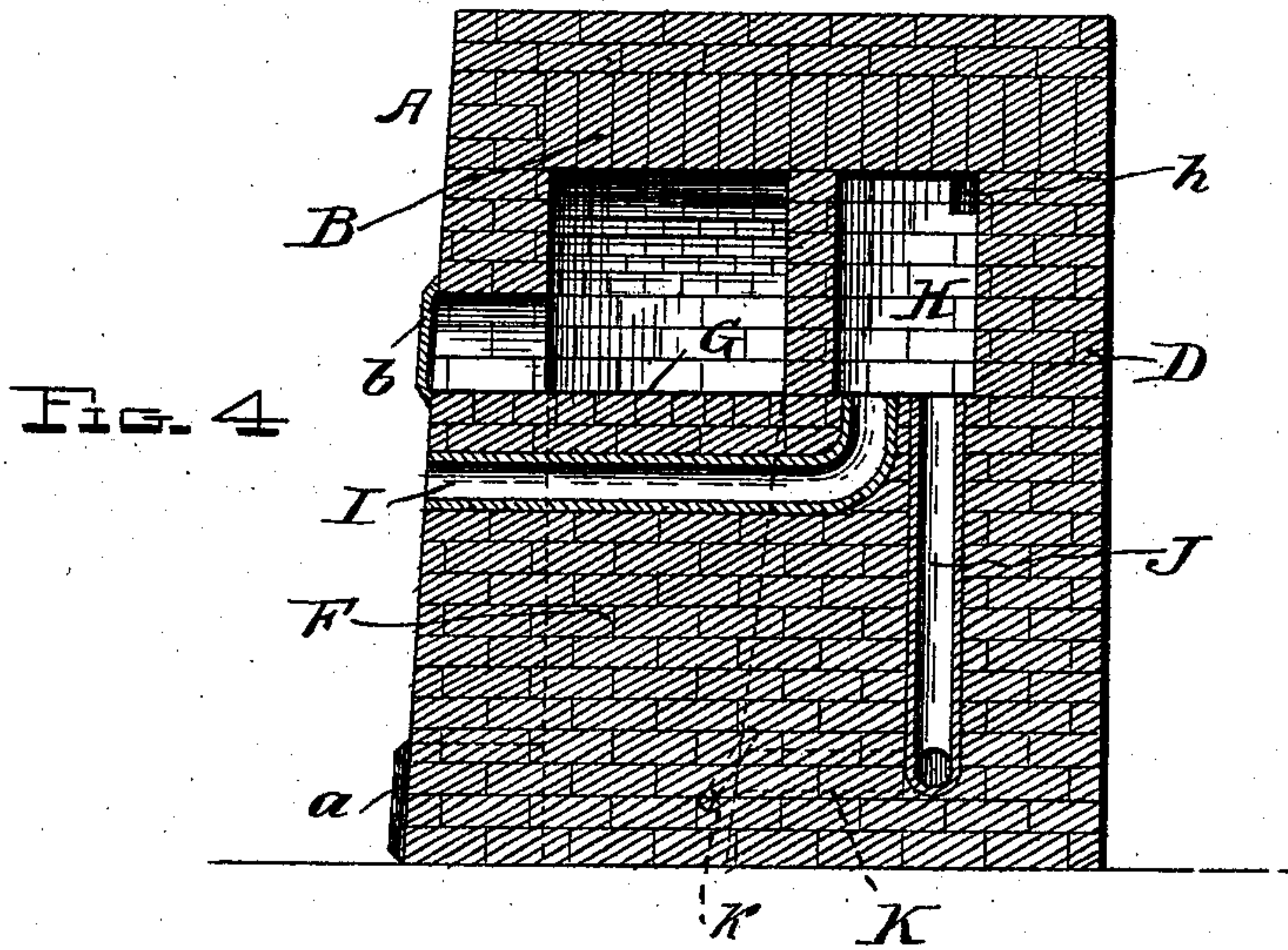
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UNITED STATES PATENT OFFICE.

FRANK E. SWIFT, OF WASHINGTON, IOWA.

BRICK AND KILN FURNACE.

SPECIFICATION forming part of Letters Patent No. 695,590, dated March 18, 1902.

Application filed July 29, 1901. Serial No. 70,099. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. SWIFT, a citizen of the United States, residing at Washington, in the county of Washington and State of Iowa, have invented certain new and useful Improvements in Brick and Kiln Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in furnaces for heating and burning purposes, its principal and preferred use being in connection with a brick, tile, or other kiln; and the object of the invention is to provide a furnace wherein provision is made for oxygenating the gases to provide for their perfect combustion and for feeding the fire with air from the back part of the furnace, so that the front part thereof may be closed up whenever required and drafts of wind prevented from having any effect upon the fires.

The present invention is designed as an improvement upon the brick-kiln furnace shown in my United States Letters Patent No. 501,380, granted July 11, 1893.

The invention consists of the novel features of construction, combination, and arrangement of parts hereinafter more fully described, and particularly pointed out in the appended claim.

In the accompanying drawings, Figure 1 is a front elevation of a furnace embodying my invention. Fig. 2 is a vertical cross-section of the same on the line 2 2 of Fig. 5. Fig. 3 is a vertical front-to-rear section through the furnace on the line 3 3 of Fig. 5. Fig. 4 is a vertical front-to-rear section on the line 4 4 of Fig. 5. Fig. 5 is a horizontal section of the furnace on the line 5 5 of Fig. 2, and Fig. 6 is a similar section on the line 6 6 of Fig. 2.

Similar letters of reference designate corresponding parts throughout the several views.

A designates the furnace-wall, which may be of any suitable size and form, it being preferably rectangular, as shown, although it may be round, square, or any other shape and capable of accommodating single furnaces or a series of several. This main wall has preferably the horizontally-curved arch B formed therein as a part thereof, and at the rear side of the main wall A is the upright wall D,

which is built up as far as the arch B and has on either side thereof the openings C C' of suitable size and shape, which openings are designed to communicate with a kiln (not shown) in order that the heat coming from the fire or fires within the furnace may pass through said openings into the interior of the kiln. The openings C C' may discharge directly into bag-flues when the furnace is used in connection with a downdraft-kiln, said flues serving to preliminarily conduct the heat to the top of the kiln in the usual manner.

The furnace is provided with two combustion-chambers E E', located upon opposite sides of a central partition-wall F and extending from front to rear of the furnace, and in these chambers the coal, slack, or other fuel used is burned for the purpose of heating the interior of the kiln. These furnaces may or may not be provided with grates, as desired.

The front of the furnace is provided with a central door b and the lower doors a a', one on each side of the central door. The doors a a' are essentially draft-doors, but may be used also for giving access to the combustion-chambers for the purpose of stirring up the fuel therein or removing ashes therefrom. Access to the interior of the combustion-chambers is designed to be secured, however, through openings formed in the front wall of the furnace immediately above the doors a a', which openings when the furnace is in use are closed by temporary brickwork filling c c', which may be removed whenever it is desired to get access to the combustion-chambers for the purpose of removing the ashes therefrom or for general cleaning and repairs.

Between the combustion-chambers E E' the top of the intermediate wall F is called the "coking bench or table" G, the upper surface of which is located preferably from about half a foot to a foot higher than the upper surface of the bed of fuel lying in the combustion-chambers. The purpose of the coking-table G is to provide a place whereon to coke or roast the coal or slack before it is drawn down into the combustion-chambers for the purpose of burning the same. The coal, slack, or other fuel is introduced upon the table G through the central door b. The space above the roast-

ing-table forms a chamber closed at top by the arch B.

In the wall D in rear of the coking-table is formed an air-heating chamber H, each side wall of which may be provided, if desired, with one or more lateral flues *h*, affording communication between said chamber and each opening C C' to insure a perfect combustion when refractory fuel is used; but these flues may be closed, if desired, and used or not used, according to the character of the fuel employed and the kind of ware which is being burned. They are generally closed when the back draft is used, as hereinafter stated. Peep-holes closed by suitable removable plugs *i* are provided at the front of the furnace, one above each combustion-chamber, whereby the fire or fires may be inspected from the exterior upon removing said plugs. The plugs may be removed also when it is desired to utilize the peep-holes as draft-openings to assist in supplying air to the interior of the furnace to regulate the combustion of the fuel, which is usually necessary when flues *h* are closed and the back draft is used.

The air-heating chamber H is supplied with air through a horizontal flue I, extending to the exterior through the front wall of the furnace and communicating at its inner end with said chamber. Through this flue air is introduced into said chamber to be heated to more effectually combine with the gases and products of combustion from the combustion-chambers to oxygenate the same and provide for their perfect consumption. This heated air is conveyed to the combustion-chambers E E' through a vertical downdraft-flue J, connecting at its lower end with laterally and forwardly extending branch flues K K', opening at their forward ends through the rear wall of the furnace into said chambers, the front end of each branch flue K K' being guarded by an angularly-disposed deflector-plate *k*, which prevents access of ashes to said flues from the combustion-chambers, and thus avoids choking of the flues and impairment of the draft. By thus providing for the inlet of air into the air-heating chamber and supplying the proper amount of heated air to the combustion-chambers the smoke and other products of combustion are caused to be entirely consumed, so that a clear, white, and smokeless heat is produced in lieu of the black and dense smoke which is so objectionable. When the wind is blowing strongly toward the front of the furnace, drafts or gusts of air are apt to find their way through the doorways *a a'* to the combustion-chambers and seriously affect the fires. By my invention this objection may be entirely avoided, as by tightly closing up the doors *a a'* air will be excluded from passing from the front into the combustion-chambers and will be supplied to the air-heating chamber H through the flues I, whence it will pass downward through the flues J, K, and K' into the combustion-chambers in a heated condition and support combustion in the most per-

fect manner. It will be seen that by feeding air to the fires from the back part of the furnace the ash-pit openings may be closed without diminishing the draft to an objectionable extent, while at the same time preventing drafts or currents of wind from passing into the combustion-chambers from the front and interfering with the proper burning of the fuel. It will be further seen that by the arrangement of the flues which I have thus described air comes into the flame through the fuel at a point where carbon in the smoke may be ignited and the smoke thereby consumed. The design and purpose of this kind of furnace are principally to burn coal, slack, and other waste from the coal-mines that are totally unfit for burning in the ordinary plain furnace in connection with brick and tile kilns or any other purpose where intense heat is required.

I will now describe the operation of my improved furnace. The fires are started in the furnace by being built within the combustion-chambers E E' through the openings *c c'*, which are provided for that purpose and for the removal of ashes, and then said openings are closed by temporary fillings of brick-work. As soon as the fires are started the openings *a a'* may be closed and the door *b* opened, and through the latter large quantities of slack or other fuel are fed in onto the coking-table G. The openings *a a'* may be left open or closed, if desired, without affecting the coking of the slack. This slack or fuel thus placed upon the coking-table soon becomes heated and the gas passing off therefrom circulates through the openings C C' in the rear of the furnace and into the kiln, and as it thus passes to the rear it comes in contact with the heated oxygen which is admitted through the several air-flues, and consequently the gas will in this way be consumed or destroyed in the same manner as the smoke which arises from direct combustion from the furnace-grates. If the fuel which has been placed upon the coking-table had been thrown in the combustion-chambers instead, imperfect combustion of the same would have occurred, owing to its refractory qualities. Being located, however, where it is, it soon becomes fused or melted together, after which it is drawn off into the combustion-chambers by means of a furnace poker or hook or other suitable means, so that it can be placed directly upon the fire, and when thus used it is found to be exceedingly good fuel. The fuel is first thrown upon the coking-table through the door *b* and is raked off the coking-table whenever it may be needed for use in the combustion-chambers. In this way a regular, steady, and constant heat is produced, which is a very necessary and important desideratum in the burning of brick and tile and many other uses. Should the draft at the front of the furnace be too strong and gusts of air impair the free burning of the fuel in the combustion-chambers,

the doors or openings *a a'* may be tightly closed and a steady draft will be afforded by the passage of air through the flue I, heating-chamber H, and flues J, K, and K' down into the combustion-chambers, whereby combustion will be effectually supported.

The openings *c c'* at the front of the furnace may be closed by doors instead of the temporary fillings of brickwork, and various other changes in the form, proportion, and details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

15 Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

A furnace of the character described having combustion-chambers provided at the

front with doors or openings, a coking-chamber also provided at the front with a door or opening, a coking-table in said chamber, discharge-openings in the rear of the furnace communicating with the coking and combustion chambers, an air-heating chamber, 25 flues connecting said chamber with the discharge-openings, a flue for conducting air to the air-heating chamber, and flues for conducting the heated air from the air-heating chamber to the combustion-chambers, substantially as described. 30

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK E. SWIFT.

Witnesses:

A. S. FOLGER,
GEO. F. ROSS.