

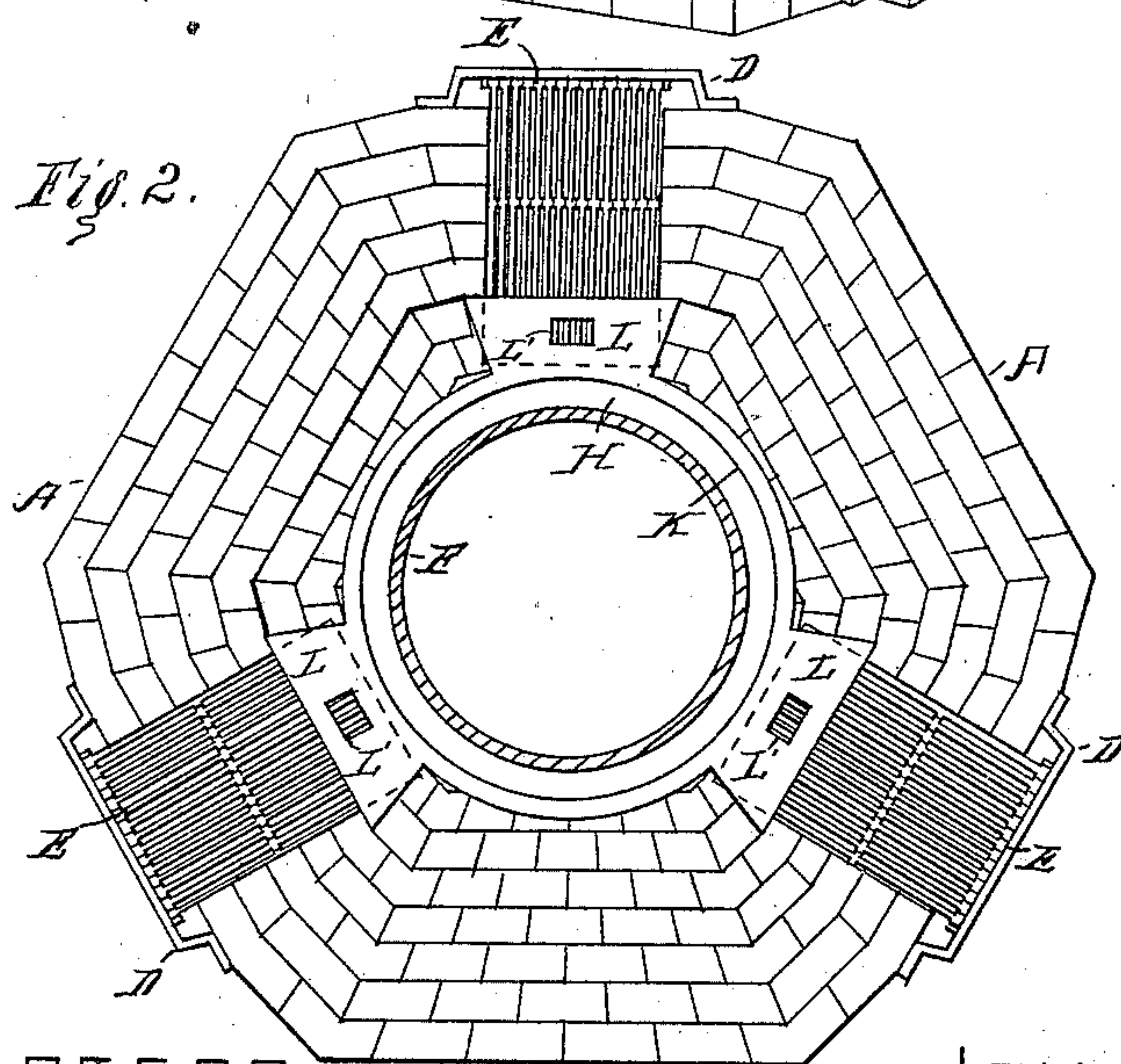
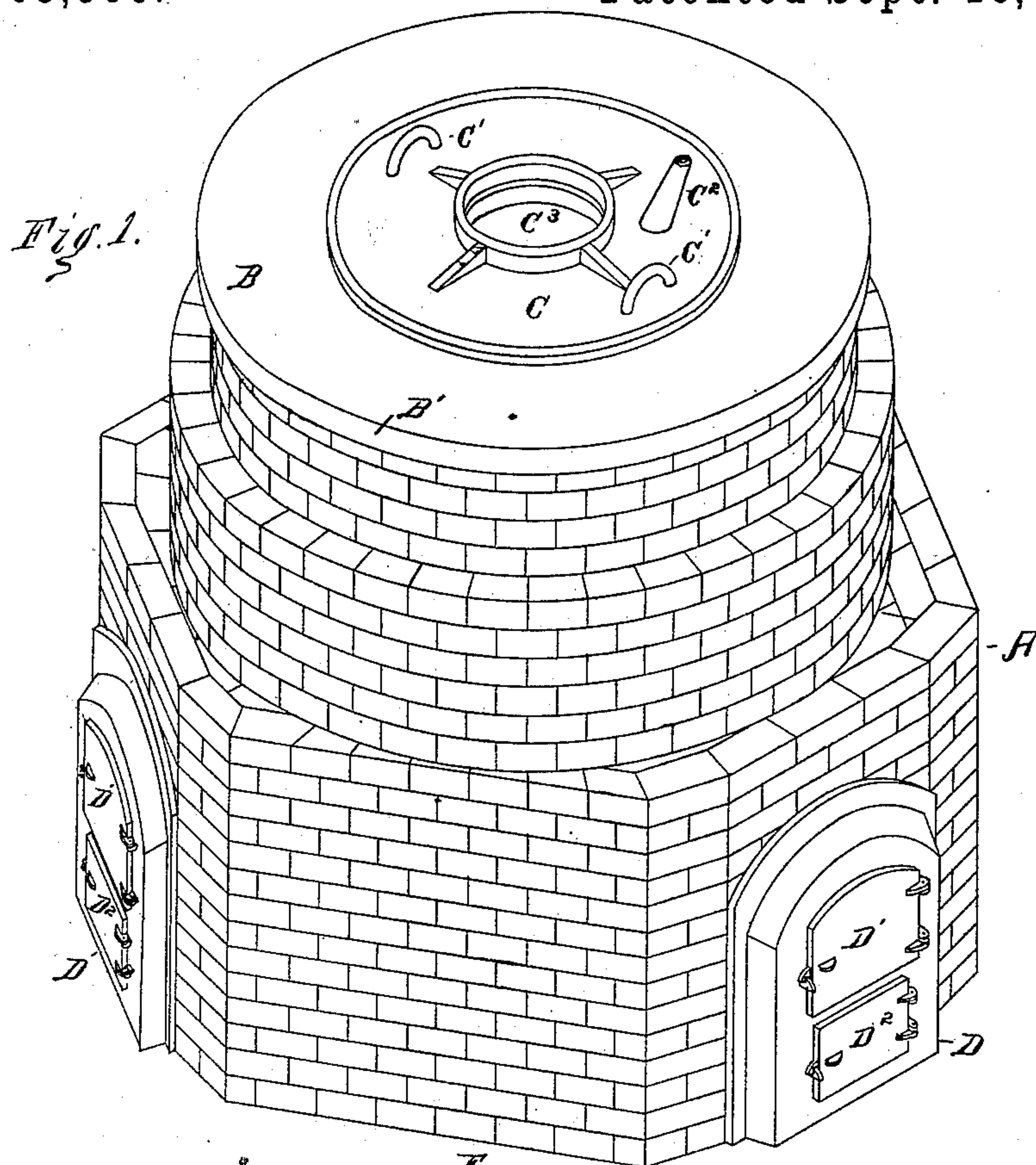
(No Model.)

2 Sheets—Sheet 1.

J. W. ARLEN.  
ANNEALING FURNACE.

No. 305,366.

Patented Sept. 16, 1884.



Witnesses—

*Kirkley Hyde.*  
*Irving S. Porter*

INVENTOR—  
*John W. Arlen,*  
*By Albert M. Moore,*  
*His Attorney*

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Fig. 3.

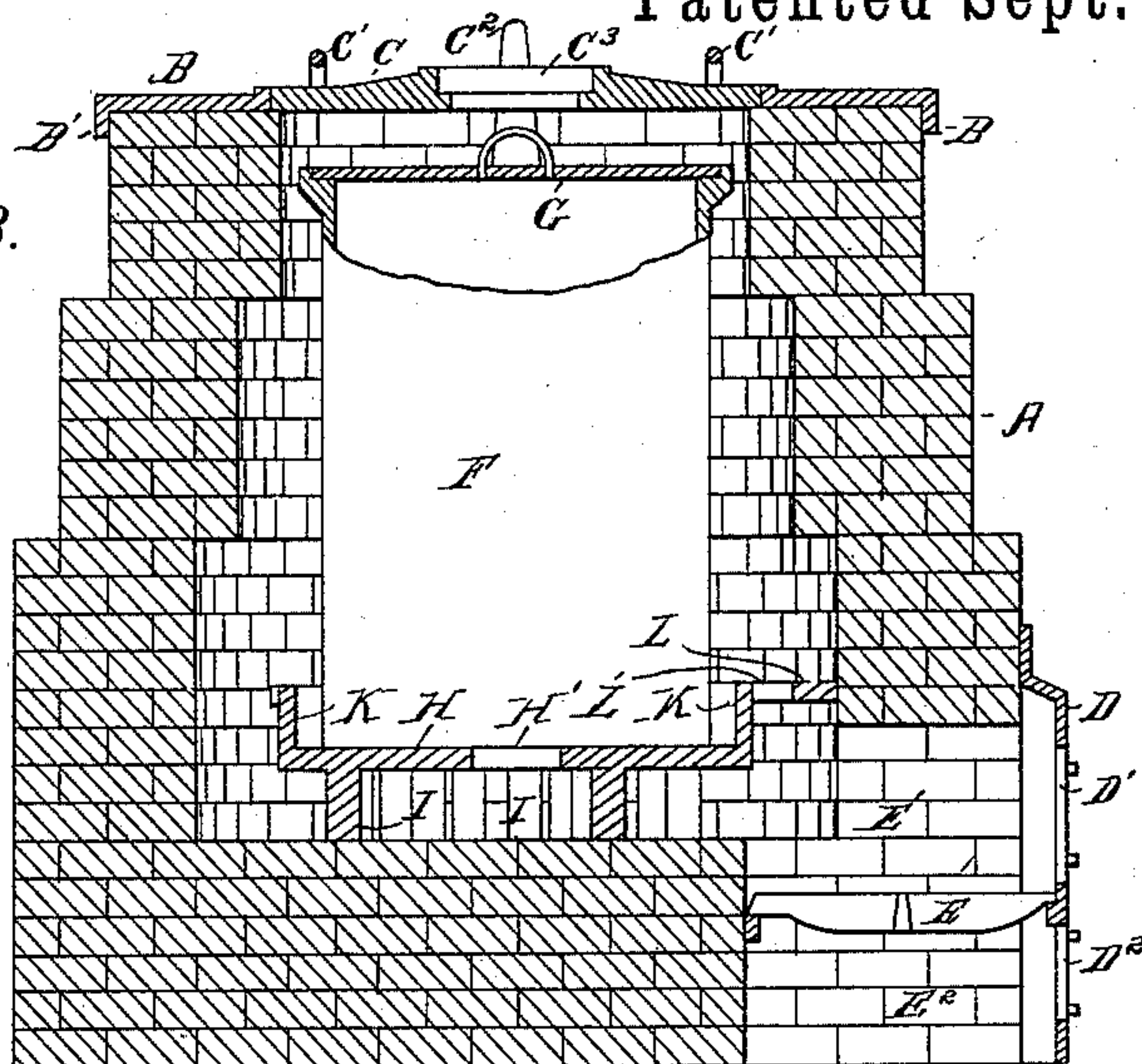


Fig. 4.

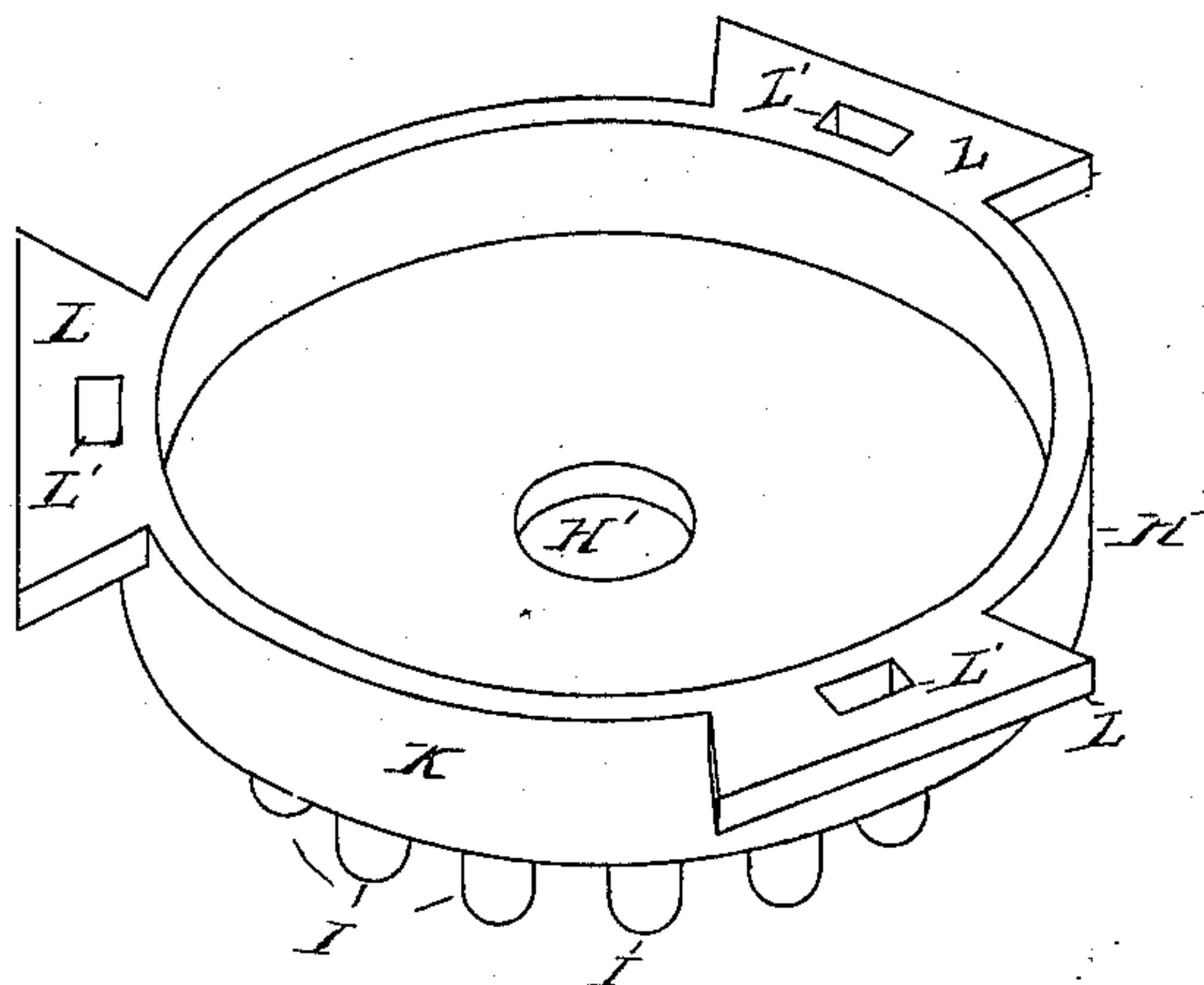
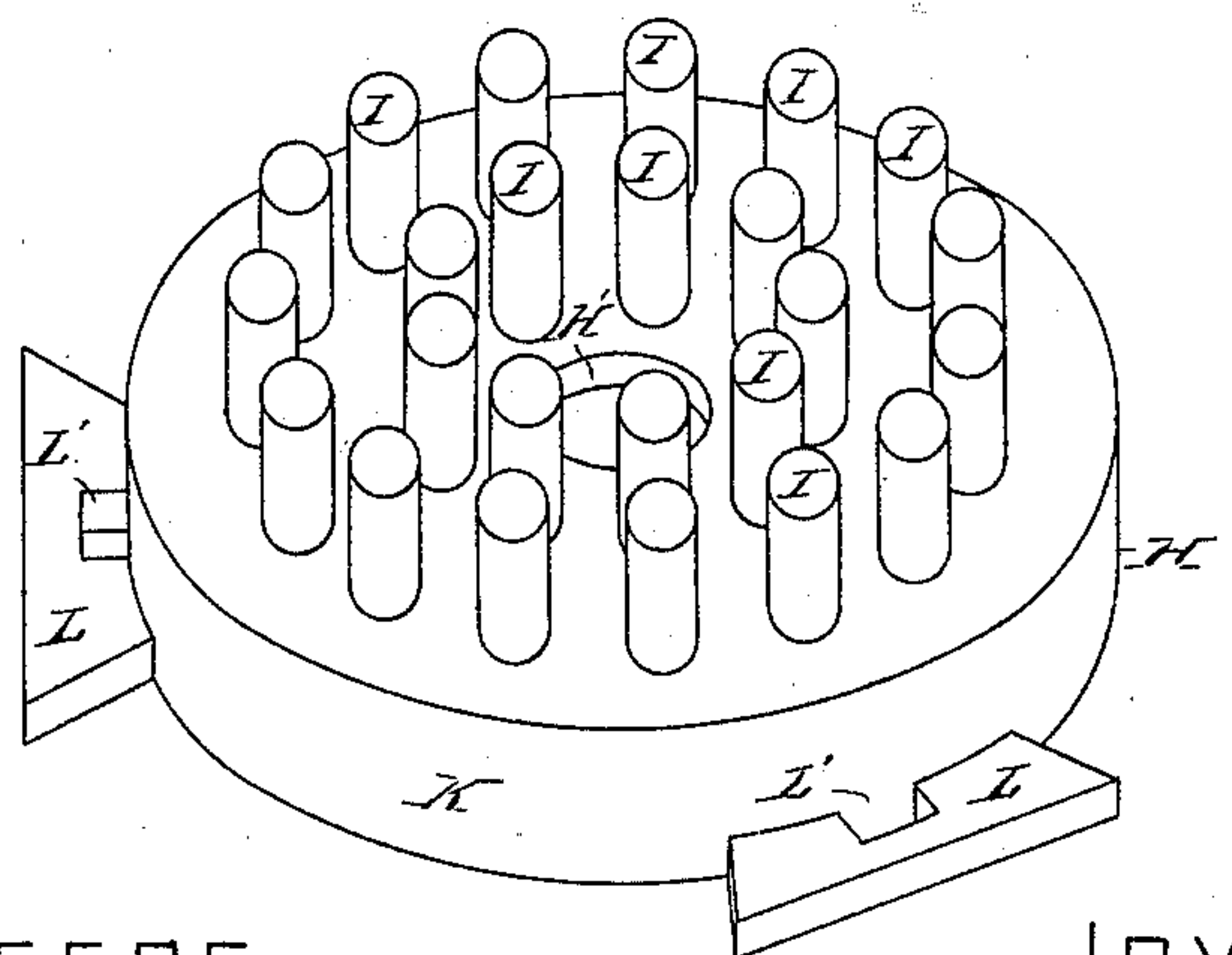


Fig. 5.



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# UNITED STATES PATENT OFFICE.

JOHN W. ARLEN, OF LOWELL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF  
TO WOODS, SHERWOOD & CO., OF SAME PLACE.

## ANNEALING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 305,366, dated September 16, 1884.

Application filed September 26, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. ARLEN, of Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Annealing-Furnaces, of which the following is a specification.

My invention relates to means of more equally distributing the heat beneath and around the pot, to prevent the pot from cracking, and to avoid injury to the charge or contents of the pot.

In the accompanying drawings, Figure 1 is an isometric view of the exterior of the furnace, showing the brick casing or setting of the furnace, the top plate, furnace-cover with its handles, peep-hole, and draft-hole, door-frames, and doors; Fig. 2, a horizontal section of the same, through the tops of the fire-places, showing the pot in horizontal section standing upon the base-plate, and the tops of the fire-grates, apron, and deflectors; Fig. 3, a vertical central section of the furnace through the middle of one of the grates, the base-plate, apron, one deflector, the furnace-cover, top plate, pot-cover and upper part of the pot being also shown in central section; Fig. 4, an isometric view of the base-plate, apron, and deflectors, the base-plate standing upon its legs; Fig. 5, an isometric view of the same inverted.

The brick work or setting A, the top plate, B, provided with a downwardly-projecting annular flange, B', to surround and hold in place the top course of the setting, and with a central aperture to receive the furnace-cover C, said furnace-cover provided with handles C' C', with a "horn" or peep-hole, C<sup>2</sup>, and with a central aperture, C<sup>3</sup>, to receive a smoke-pipe, the door-frame or door-front D, the fire-door D', and ash-pit door D<sup>2</sup>, grate-bars E, fire-place E', and ash-pit E<sup>2</sup>, annealing-pot F, and pot-cover G, are or may be all of the usual construction and operation. The grates, fire-places, and ash-pits are usually each three in number in a single furnace, as shown in Fig. 2, to get a more even heat. It is customary in such furnaces to rest the annealing-pot upon a central pier of solid brick laid in the well-known "fire-mortar," and larger in diameter than the pot. Such a pier will not

allow the fire to come in direct contact with the bottom of the pot, and the brick, being a poor conductor of heat, will keep the bottom of the pot comparatively cool, while the sides of the pot are heated to a very high temperature, generally to about a cherry-red heat; hence, owing to the unequal expansion of the sides and bottom or lower part of the pot, the pot is cracked, so that the hot air and the smoke are allowed to come in contact with the charge contained in the pot, and to oxidize and form a scale upon the charge or articles contained in the pot, to the great injury of the same. If the pot is only cracked for a short distance above the bottom, the pot is sometimes filled with ashes to a point above the crack and still used; but the capacity of the pot is thereby decreased and the crack is constantly extended until the pot becomes entirely useless.

To prevent the unequal expansion and cracking of the pot, it was formerly the general practice to erect an apron or annular vertical wall of one course (in thickness) of bricks around the edge of the pier, about an inch from the pot, to keep the flames from coming in direct contact with the pot near its base; but inasmuch as such a brick apron rarely lasts for more than one or two firings, the mortar being destroyed by the heat, and the bricks being knocked down (where they are most needed, that is, just inside of the fire-grate) by throwing the fuel against them, this apron is now omitted to a very great extent. It is well known that the annealing-pots F are of iron, weighing from one to two tons apiece, and require considerable skill for their proper construction, and that they are worth on an average about one hundred and fifty dollars apiece. They are sometimes spoiled at the first firing, and rarely last three months. The charge is, of course, generally much more valuable than the pot, so that the cracking of the pot, involving the loss of the pot and frequently of the charge, is a great damage to the owner.

To remedy the evils above referred to, I use a circular iron base-plate, H—say, about nine inches larger in diameter than the bottom of the pot—which plate H is supported upon iron legs I, cast upon said plate, so that the flame can pass under every part of said plate, which,



being a good conductor, conveys a large amount of the heat to the bottom of the pot. The base-plate is also provided with a central circular hole, H', the diameter of which is preferably a little less than a quarter as great as the diameter of the pot. This hole H' allows the center of the bottom of the pot to be heated directly to some extent, although the hole is mainly intended to allow the base-plate to expand in the heat without cracking. The plate H is also provided with a vertical annular iron flange or apron, K, cast on said plate, preferably, but not necessarily. This apron is about an inch and a half thick, and is about three inches from the pot, being on top of the outer edge of the base-plate. The base-plate and apron are concentric with the setting A, occupying the position heretofore held by the brick pier and brick apron. The iron apron accomplishes what has been heretofore attempted by the use of the brick apron—that is, it protects the lower part of the pot from the direct action of the flames, is not destroyed by the fire, and is not liable to be knocked down by throwing in the fuel.

I also cast on the upper edge of the apron K horizontal deflecting-plates L, or deflectors, one to each fire-place. These deflectors reach from the top of the apron to the brick work or setting A, being about the width of the grate, or a little less where they join the apron, and being considerably wider than the grate where they touch the casing. The outer edges of the deflectors are preferably straight in order that the brick-work may be fitted more accurately to them. The deflectors prevent the bulk of the flames from each fire-place striking directly against a small surface of the pot, and divide the flames and cause them to surround the pot. In order, however, that the pot may be heated as much next the fire-places as at other points, there is a small opening, L', through each of the deflectors L, to allow a part of the heat and flame to pass through them.

The plate H, with the connected legs I, apron

K, and deflectors L, may be cast in three or six sectors or parts, to facilitate their removal from the furnace through the top of the same.

It will be seen that the use of a metallic base-plate is advantageous, as the iron is a better conductor of heat than brick; that this advantage is heightened by the use of the legs, the spaces between which form flues to allow the fire access to all parts of the under side of said plate; that an iron apron is a better protector of the pot, and a better conductor of the heat to the base on which the pot rests than a brick apron; that an iron apron may be used on a brick pier; that the deflectors will serve their purpose, above described, if used with a brick apron while the brick apron lasts, and that the base-plate, apron, and deflectors may be made and used either separately or together.

I claim as my invention—

1. In an annealing-furnace, the combination of the fire-place, the apron, and a deflector, arranged horizontally above the fire-place at the top of the apron, as and for the purpose specified.

2. In an annealing-furnace, the combination of the fire-place, the apron, and a deflector, arranged horizontally above the fire-place at the top of the apron, and having its side edges divergent outwardly, as and for the purpose specified.

3. In an annealing-furnace, a deflector interposed between the fire-place and the annealing-pot, and provided with an opening or flue, as and for the purpose specified.

4. In an annealing-furnace, the combination of a base-plate, an annular apron, and deflectors, as and for the purpose specified.

5. In an annealing-furnace, the base-plate provided with a central opening and means for supporting said base-plate, as and for the purpose specified.

JOHN W. ARLEN.

Witnesses:

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