

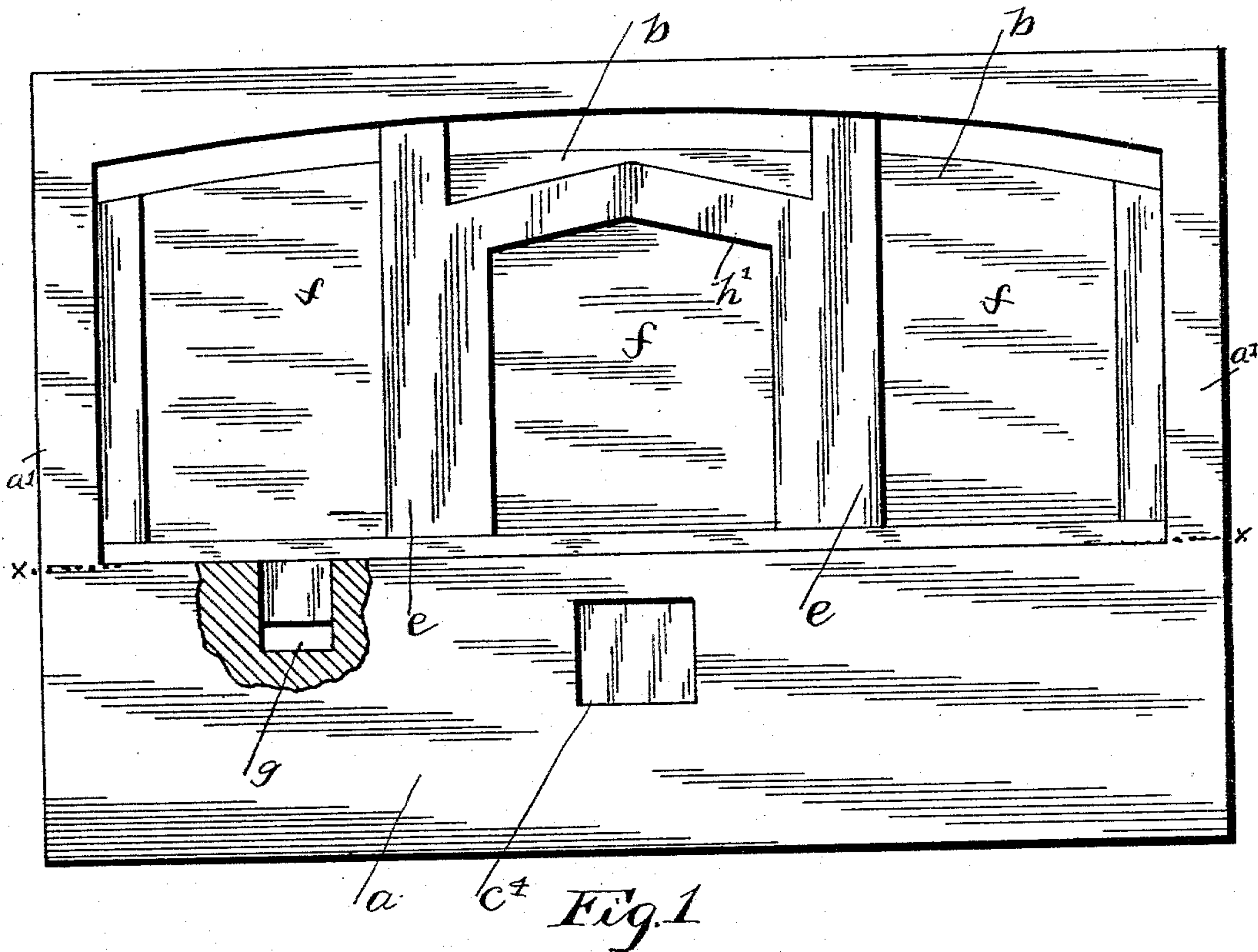
(No Model.)

3 Sheets—Sheet 1.

C. H. PRUST & J. WATKINS.
ANNEALING FURNACE.

No. 546,432.

Patented Sept. 17, 1895.



Witnesses
H. B. Bradshaw
A. L. Phelps

Inventors
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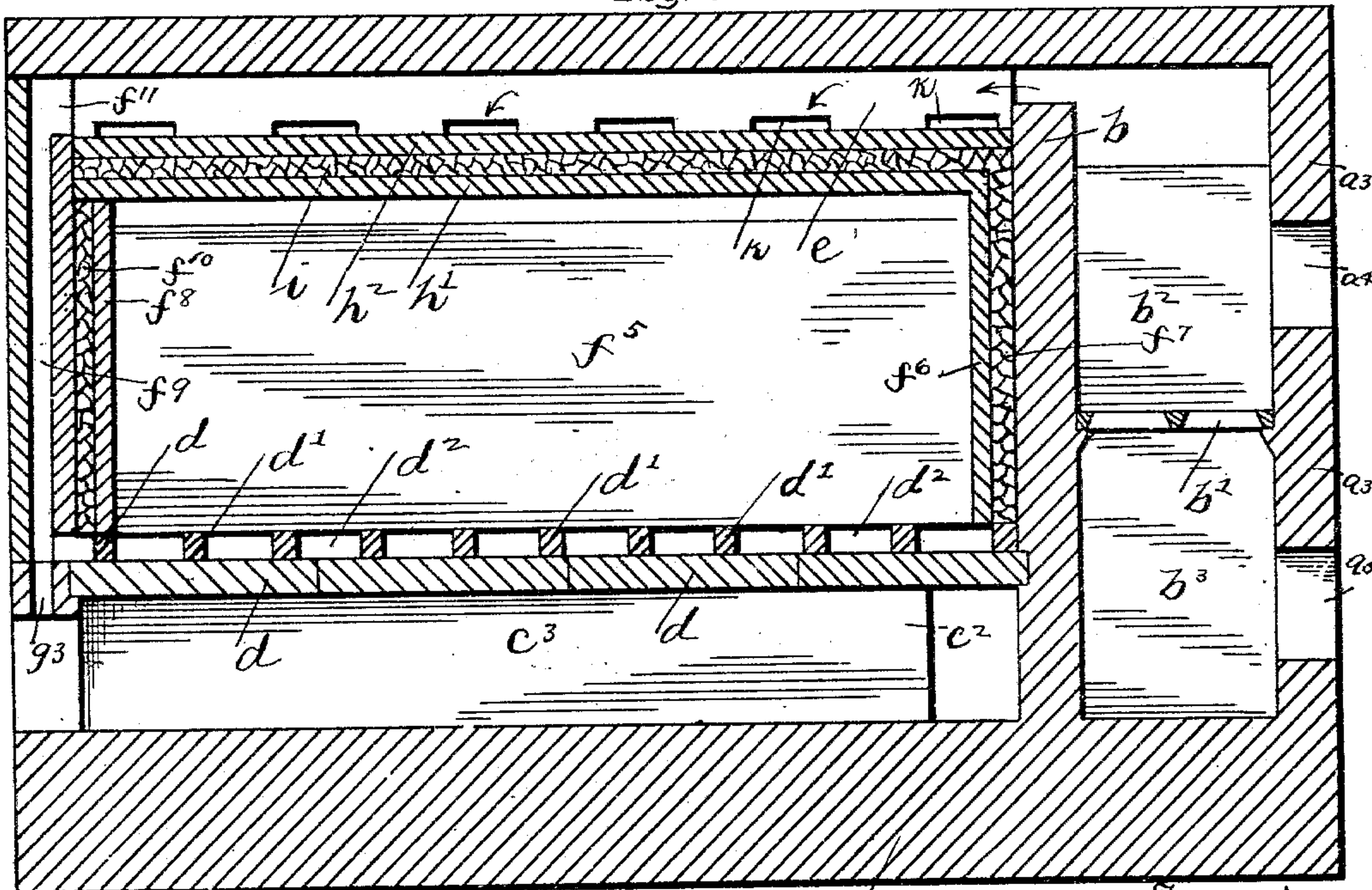
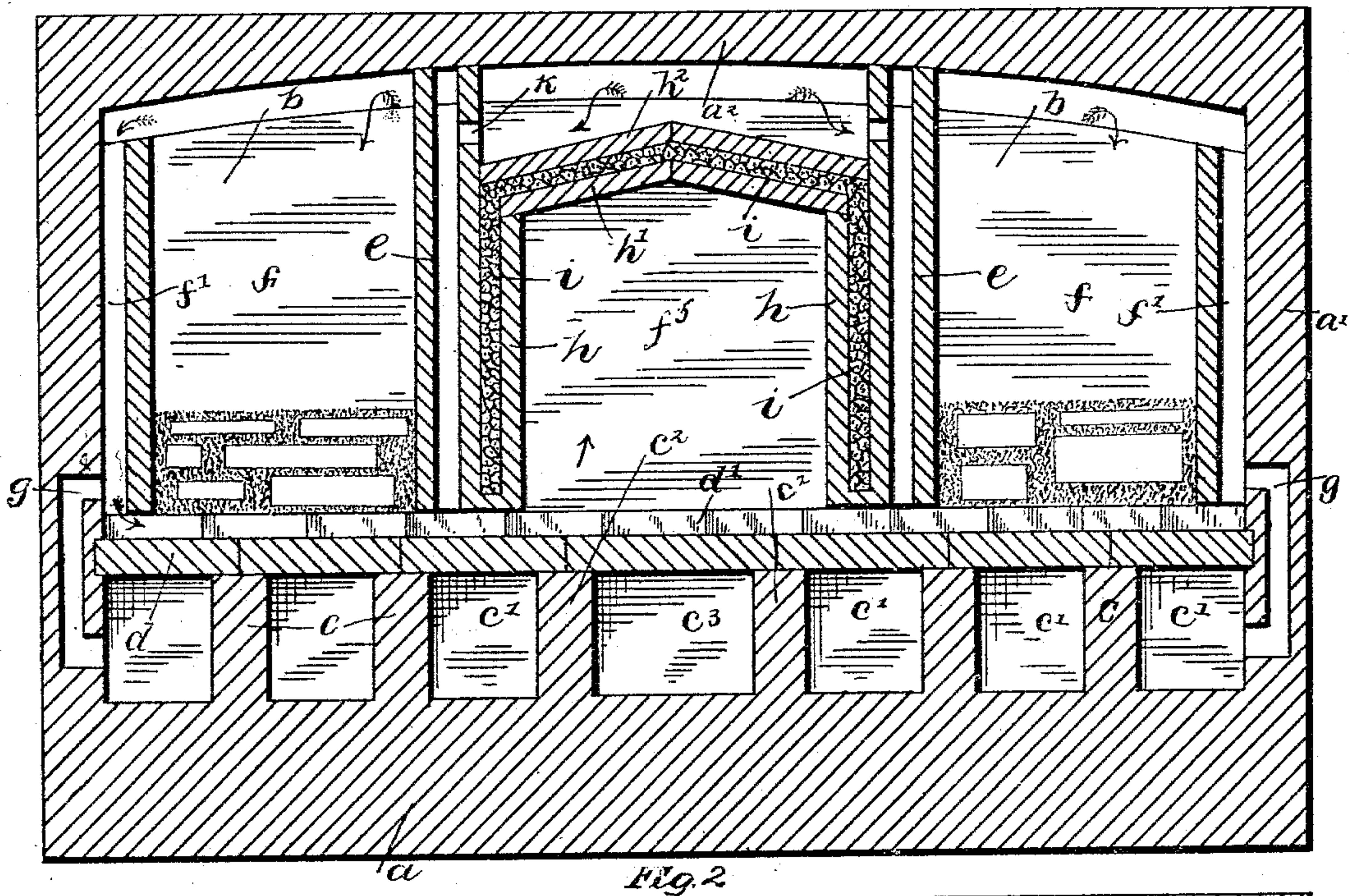
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Fig. 3

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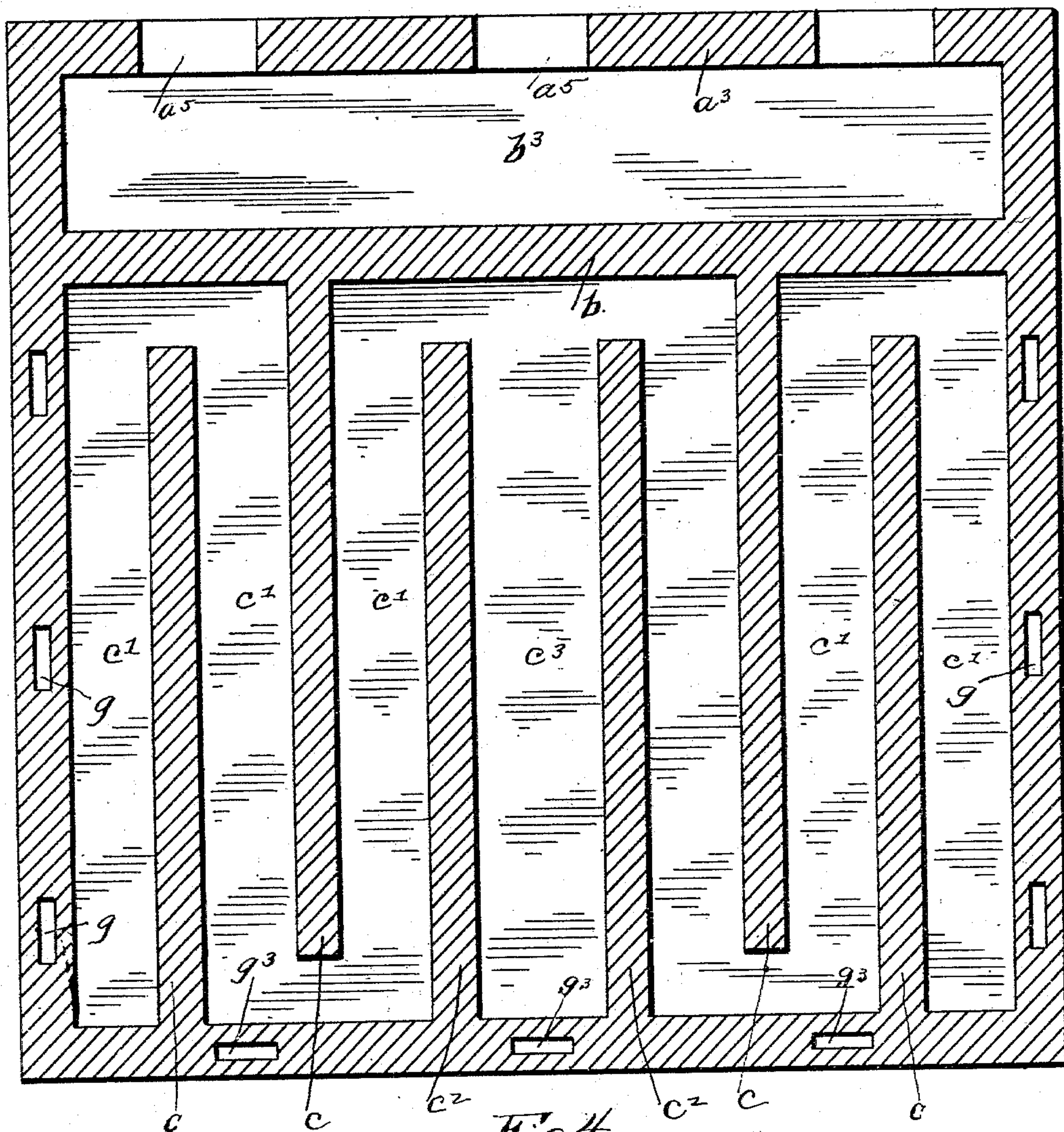
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UNITED STATES PATENT OFFICE.

CHARLES H. PRUST AND JAMES WATKINS, OF COLUMBUS, OHIO.

ANNEALING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 546,432, dated September 17, 1895.

Application filed February 27, 1895. Serial No. 539,852. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. PRUST and JAMES WATKINS, citizens of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Annealing-Furnaces, of which the following is a specification.

Our invention relates to the improvement of annealing-furnaces, and has particular relation to that class of furnaces designed for the production of malleable iron castings.

The objects of our invention are to provide an improved furnace of this class of superior construction and arrangement of parts; to provide improved means for producing a uniform distribution of heat throughout the interior of the furnace; to provide improvements in the arrangement and construction of the furnace-flues, and to produce other improvements which will be more fully pointed out hereinafter. These objects we accomplish in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of our improved furnace. Fig. 2 is a central vertical transverse section of the same. Fig. 3 is a central vertical longitudinal section, and Fig. 4 is a longitudinal sectional view taken on line xx of Fig. 1.

Similar letters refer to similar parts throughout the several views.

In the construction of our improved furnace we provide the same with a suitable foundation or base a . From the foundation a rise the side walls a' , the upper sides of the latter being connected by an arched roof a^2 .

a^3 represents the rear end wall, in which are provided the usual fire-box feed-openings a^4 and ash-pit openings a^5 .

Within the furnace-body and at a desirable distance from the rear end thereof we provide a transverse vertical bridge-wall b , the latter rising to within a short distance of the furnace top or roofing and having its upper side, preferably, slightly arched, as indicated in Fig. 2 of the drawings, to conform to the arch of the roof a^2 .

Between the bridge-wall and rear end wall a^3 are provided a horizontally-arranged grate-

bar frame b' , the latter extending, as shown, throughout the width of the interior of the furnace and resulting in the formation of a fire-box b^2 above and an ash-pit b^3 below the same.

In the upper portion of the furnace-base a are provided parallel flue-walls or partial partitions c , which extend alternately from the front of the furnace and bridge-wall. The flue-walls c , which extend from and are connected with the front of the furnace, terminate a short distance from the bridge-wall, while the remaining flue-walls c , which extend forward from the bridge-wall, terminate a short distance from said furnace front, thus resulting in the formation of parallel flues c' , which are connected alternately at their forward and rear ends.

As indicated in Fig. 4 of the drawings, the two central flue-walls, which are indicated at c^2 , are preferably both connected with the furnace front, thus forming a central flue c^3 with which the flues c' on either side thereof connect at their inner ends. From this central flue c^3 may lead outward through a suitable opening c^4 a conduit to a smokestack. Upon the flue-walls c c^2 are supported a flooring consisting of flat tiles d , the flooring thus formed serving to cover the base-flue openings $c' c^3$. Upon this tile-flooring d are supported, as indicated, transverse parallel rows of bricks or blocks d' , resulting in the formation between the same of transverse parallel flues or channels d^2 . Upon the upper sides of these bricks or blocks d and extending at right angles therewith are supported two hollow walls e , which are arranged respectively on opposite sides of the center of the width of the furnace-body and which extend upward to meet the roof-arch, as indicated more clearly in Fig. 2 of the drawings. These walls e serve, as indicated in the drawings, to separate the space within the furnace and above the tile-flooring into longitudinally-arranged compartments f . The two outer side compartments f communicate at their upper ends with the upper open ends of vertical side wall flues f' , which are formed on the inner sides of the side walls a' , and which at their lower ends communicate with the ends of the chan-

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nels or flues d^2 . These side wall flues f' also have their lower end portions communicating at intervals with the outer side bottom flues c' by means of ports or conduits g , which are formed in the side walls.

On the inner sides of the hollow walls e and at a short distance from the latter we provide vertical lining-walls h , which, as shown in the drawings, preferably terminate below the line of the bridge-wall top. The upper sides of these walls h are connected by a suitable covering h' , which, as indicated in the drawings, may consist of tiling-plates arranged to meet over the center of the central compartment f . Above this cover h' and at a distance therefrom is supported a similar cover h^2 . Between the cover portions h^2 and h' and between the vertical lining-walls h and the inner sides of the hollow walls e we provide a packing or filling i of iron ore or similar material. In this manner the central compartment f is provided with a secondary or internal compartment f^5 . At the rear end of this internal compartment f^5 we provide a vertical end wall f^6 , between which and the inner surface of the bridge-wall is provided a suitable packing f^7 . The forward end portion of this internal compartment f^5 is also provided with a vertical end wall f^8 , between which and the front furnace-walls is provided a hollow wall resulting in the formation of a vertical flue f^9 , which extends upward to the top of the furnace. The lower end of this flue f^9 communicates with flue-openings g^8 formed in the forward end wall and the lower ends of which communicate with the base-flues c^3 . The upper portion of the flue f^9 communicates through suitable openings f^{11} with the upper portions of the compartments f . Between the inner wall of the flue f^9 and the wall f^8 is provided a suitable packing f^{10} . The wall f^8 and the hollow wall forming the flue f^9 and packing f^{10} are, however, of a temporary nature—that is, said walls and packing are only employed during the heating or annealing process and are removed to gain access to the compartments which they cover.

Above the cover-plates h^2 the inner section of each of the side walls e is provided with ports k , which communicate with the hollow of said walls. In operation the heat rises from the fire-box b^2 , and, following the direction of the arrows, passes over the top of the bridge-wall b and thence into the compartments f . From the upper portion of the central compartments f the heat passes through the ports k , down through the hollows of the walls e , thence into the channels d^2 , from which the heat may rise within said compartments f , or, passing through the side flues g and end flue f^9 , be drawn downward into the flues c^3 , from which the smoke and other products of combustion may escape to the stack through the opening c^4 .

From the operation and construction which

we have described it will be seen that a thorough and uniform circulation of heat will be attained throughout the various compartments and that a substantially equal distribution of heat is obtained both in the upper and lower portions of the furnace.

It is evident that the internal compartment formed by the use of the lining-walls h and cover-plates h' will serve as a safe repository for such castings as are readily affected by a direct heat and that the packing or lining which is contained about the walls of said compartments will operate to prevent a direct heat being imparted to the contents of the same. It is evident that the outer compartments f may be employed for the support of such articles as are adapted to withstand a direct or intense heat. In the use of these outer compartments f we do away with the employment of pots or other receptacles for the support and proper separation of the castings to be annealed and support said castings in an ore or similar packing placed directly within the compartments.

By causing the fire-box to extend completely across one end of the furnace-body, as herein shown, it will be seen that the various compartments of said furnace will be supplied with heat directly over the bridge-wall. It will be observed that our improved furnace is of simple, substantial, and reliable construction.

Having now fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an annealing furnace the combination with the base, external walls and cover, a fire space extending across one end of said furnace and a bridge wall in front of said fire space, of communicating heat circulating flues arranged in the furnace base, two or more compartments formed within said furnace, the upper portions of said compartments communicating with the fire box over the bridge wall, the lower portions of said compartments communicating with each other and a communication between said compartments and the circulating flues, substantially as and for the purpose specified.

2. In an annealing furnace the combination with the base, external walls and cover, a fire space and a bridge wall in front of said fire space, of transverse channels or ways d^2 arranged as described on the floor of the furnace and compartments within said furnace supported above said channels and communicating therewith, said compartments being separated by hollow walls and communicating with the fire space in their upper portions and with each other through said fire channels in their lower portions, substantially as and for the purpose specified.

3. In an annealing furnace the combination with the base, external walls, a cover and fire space, a bridge wall in front of the same and

heat flues arranged in said base, of ways or
channels d^2 formed above said base heat flues,
compartments arranged above said channels
and at right angles therewith as described,
5 one of said compartments having hollow side
walls and internal side and end lining walls
inclosing a packing and a communication be-
tween said fire space and compartments and

between said compartments and base flues,
substantially as and for the purpose specified. 10

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In presence of—

CHARLES H. KRAMER,
C. M. VOORHEES.