

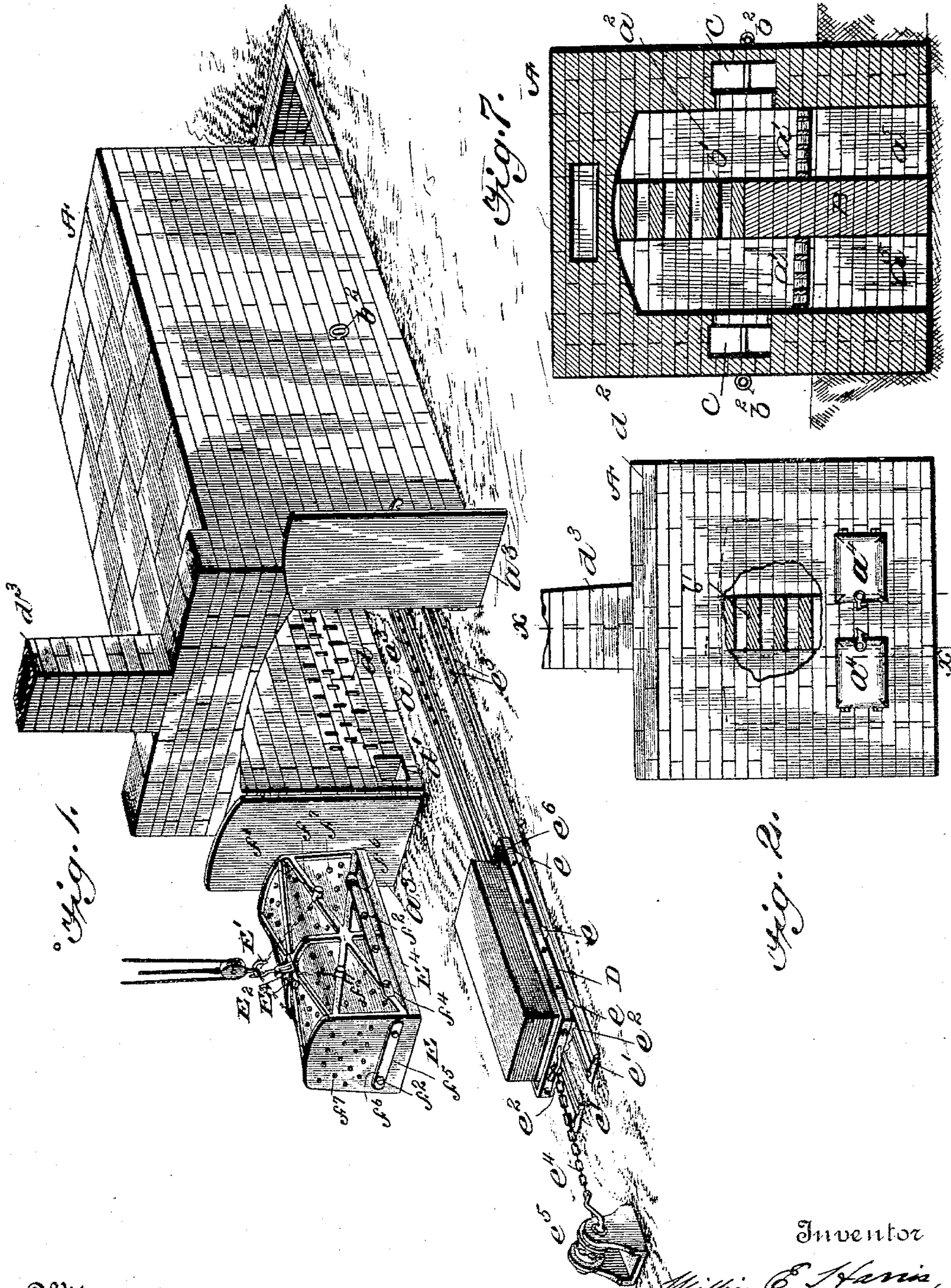
(No Model.)

2 Sheets—Sheet 1.

W. E. HARRIS.
ANNEALING FURNACE.

No. 566,682.

Patented Aug. 25, 1896.



Witnesses
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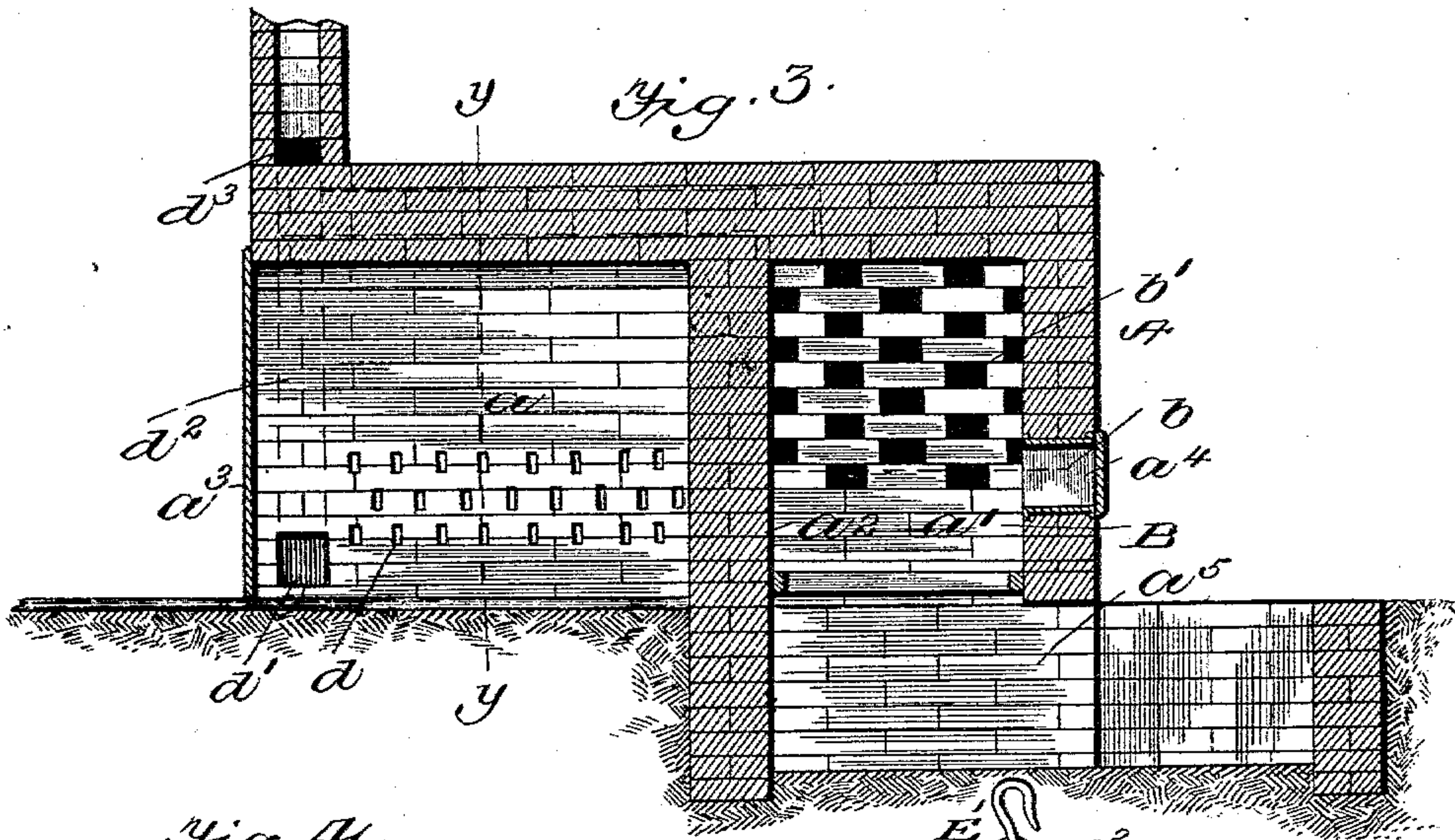


Fig. 4.

Fig. 6.

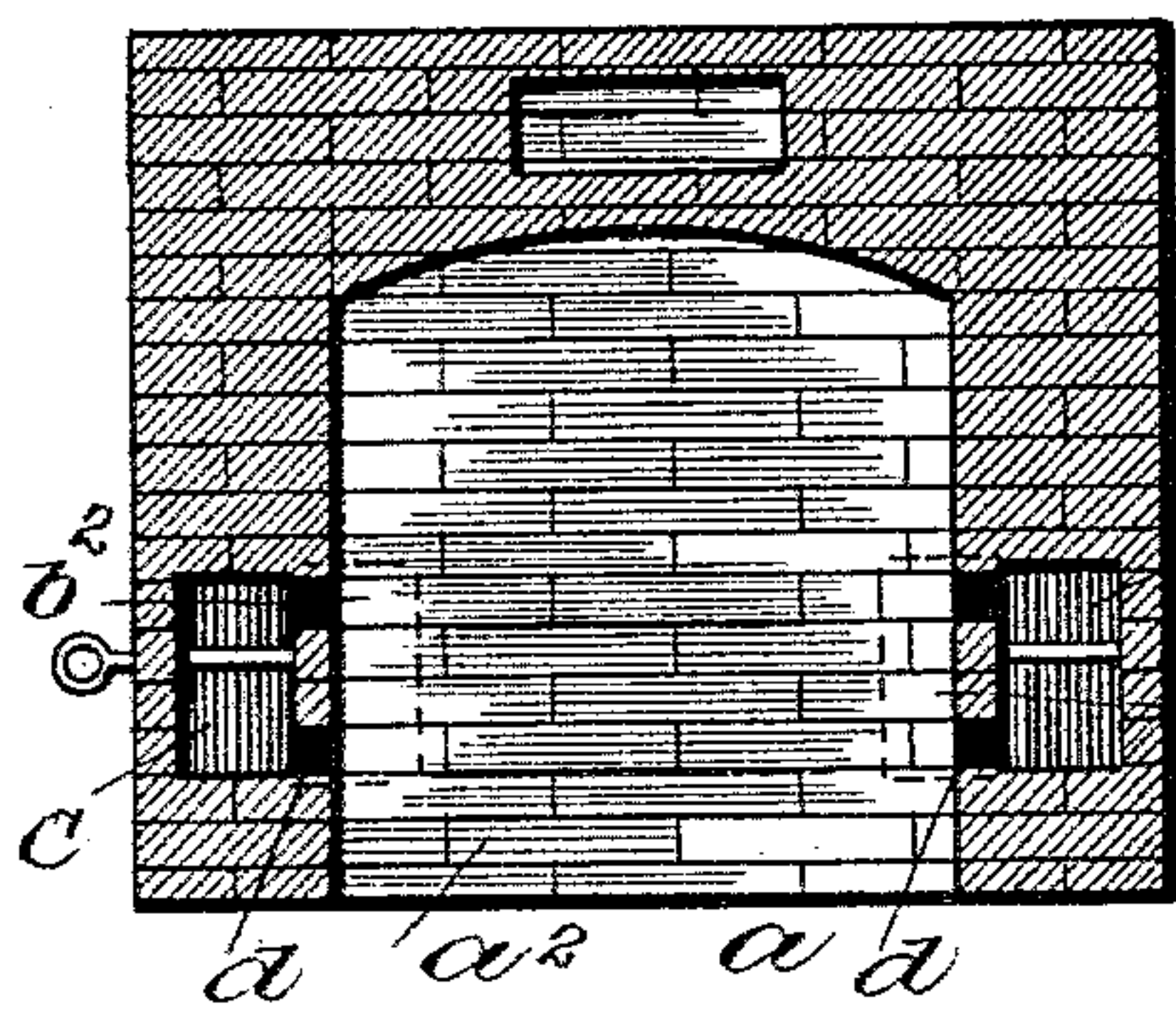
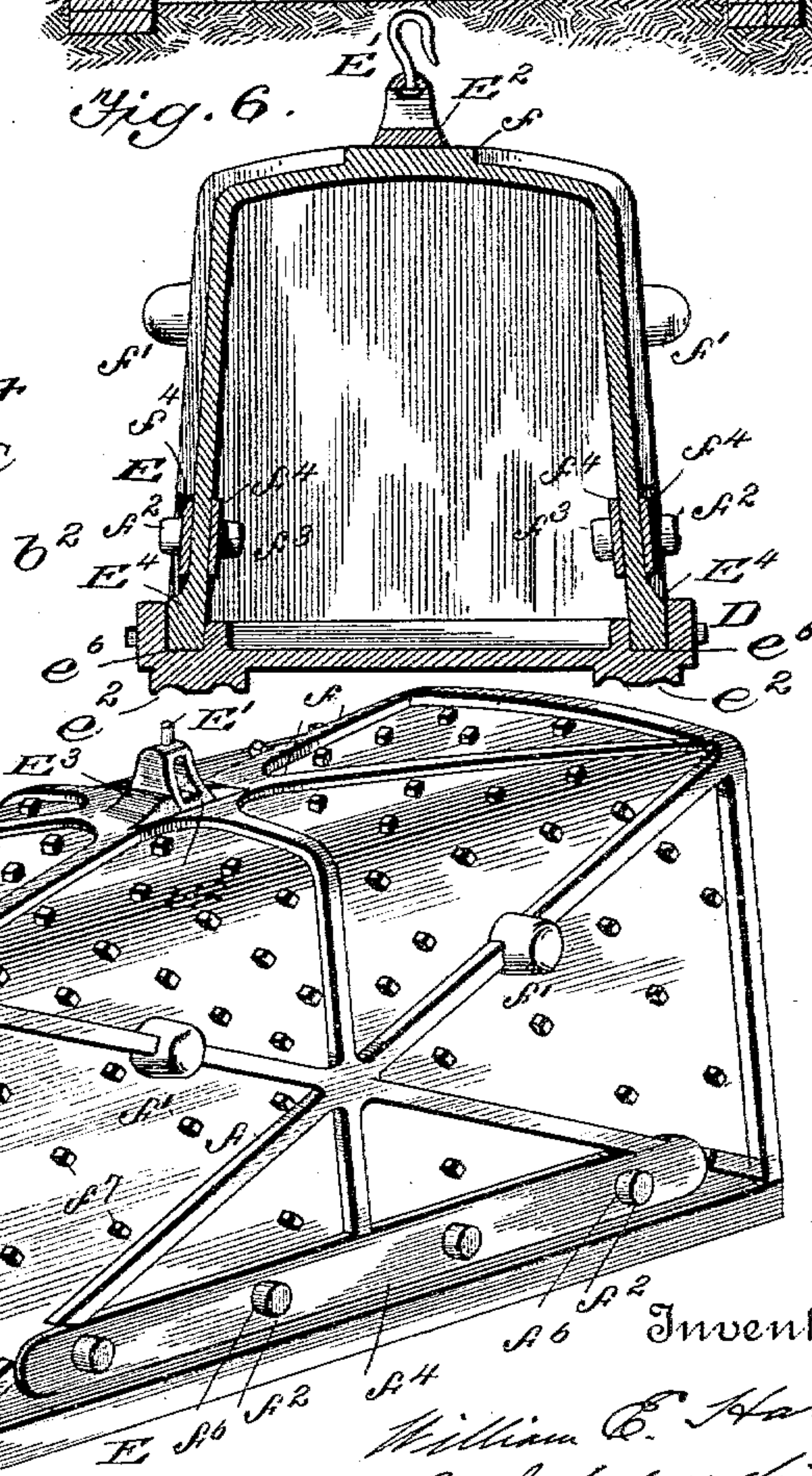


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM E. HARRIS, OF NILES, OHIO.

ANNEALING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 566,682, dated August 25, 1896.

Application filed October 15, 1895. Serial No. 565,738. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HARRIS, of Niles, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Annealing-Furnaces; and I do hereby 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 contemplates certain new and useful improvements in annealing-furnaces, and has for its objects, first, to provide for the control of the heat in the annealing-chamber; secondly, to provide an inclosing box which shall be strong and durable and not subject to damage by warping or expansion under the action of the heat required to anneal the metal plate therein; thirdly, the production of simple and efficient means for equalizing the heat of the fire-boxes, and, fourthly, to provide means for moving the annealing-box, containing many tons of metal plates, into and out of the annealing-furnace in a practical and easy manner.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a furnace constructed in accordance with my invention. Fig. 2 is a rear view thereof. Fig. 3 is a central longitudinal sectional view on the line $x x$, Fig. 2. Fig. 4 is a transverse sectional view of the line $y y$, Fig. 3. Fig. 5 is an enlarged view of the inclosing box. Fig. 6 is a transverse sectional view thereof. Fig. 7 is a sectional view illustrating the fire-boxes.

Referring to the drawings, A designates a furnace, which may be made of brick, stone, or the like; a , the annealing or heating chamber; a' , the fire-boxes, and a^2 a wall or partition separating said chamber and fire-boxes at their inner ends. The outer end of the chamber a is designed to be closed by hinged doors a^3 , while access is had to the fire-boxes through door-openings a^4 . Beneath the fire-boxes is the ash-pit a^5 , and extending upwardly therein through said fire-boxes is a central longitudinally-disposed wall B, preferably of brick, and that portion thereof above

the coal-line b is provided with numerous holes or openings b' , preferably formed by the removal or omission of bricks in checker-board-like order. This partition separates the fire in the two boxes, but allows the heat and products of combustion to pass through and equalize. The heat passes from the fire-boxes into two longitudinal tunnels C, built in the sides of the furnace and extending parallel with said fire-boxes and also with the annealing-chamber, into which latter they open through a series of holes or openings d . In each of said tunnels C is a damper b^2 , capable of being operated from the outside of the furnace and by means of which the heat from either fire-box can be cut off from the annealing-furnace, and also the draft can be shut to lower the fire. The heat passes from this chamber through larger openings d' , which communicate with flues d^2 , emptying into a chimney d^3 , common also to the fire-boxes.

The advantage of employing two fire-boxes in an annealing-furnace, separating said fire-boxes by a perforated partition, and having two tunnels leading to the annealing-chamber is that fires of different intensities can be maintained, or but one fire-box may be used, thus by means of the dampers in the two tunnels allowing the operator to control the degree of heat in the annealing-chamber. If but one fire-box is used, the tunnel leading therefrom may be closed by the damper therein and the heat caused to pass through the other fire-box and the tunnel of the latter to the annealing-chamber. This is of advantage when a low degree of heat in said chamber is desired. If both fire-boxes are used, the heat in the annealing-chamber can be further controlled by closing one damper, or both may be opened to allow a high degree of heat in said chamber.

D is a carriage for the sheets of metal upon which they are designed to be stacked. It is of rectilinear form, and is designed to travel on ball-rollers e , which fit in two double-grooved rails e' and corresponding grooved strips e^2 , attached to the under side of said carriage. These rails are on the bottom of chamber a , and extend outwardly some distance in front of the furnace. Those portions of the

rails within the chamber have holes or openings e^3 therein to allow for contraction and expansion. The carriage is preferably moved outward by a chain e^4 , attached thereto and to a windlass e^5 . In the top of the carriage, adjoining the sides and ends, is a continuous groove e^6 .

E is the inclosing box, the lower open end of which is designed to fit within the groove e^6 and inclose the metal sheets stacked on the carriage. This box is slightly arched at its top, and is formed with end, central, and diagonal bracing-strips f , which serve to strengthen the box and aid in preventing the warping thereof. From each of the sides of this box project two short hubs f' , with which the tackle of a crane (not shown) is designed to be connected, whereby said box can be readily lowered onto or removed from the carriage. A hook E' is removably attached to the top of the box, its flared or dovetail base E^2 fitting snug between overhanging edges of an open-ended recess E^3 , formed in the top of said box. By this means the hook can be readily removed from the top of one box and slipped in the open-ended recess of another when the top is to be lifted. This is ordinarily used only in small boxes, the preferred form of connection being that above described. The lower edge E^4 of the box is thickened, so as to add to the strength and bearing-surface thereof. With the sides and ends of this box are formed outwardly-projecting lugs f^2 , and also with the sides inwardly-projecting lugs f^3 .

With the lugs of each side are designed to engage inner and outer plates f^4 , and with the lugs of the ends engage plates f^5 , which plates f^4 and f^5 have series of corresponding holes f^6 therein. These plates are preferably of steel, and may be fastened on in any suitable way. They are designed to strengthen the sides and ends of the box and prevent warping and cracking thereof. With the exterior of the box and also the sides and ends of the carriage are formed short, irregularly-arranged nubs or projections f^7 . Before the carriage is inserted into the annealing-chamber of the furnace the box is entirely covered with moistened clay, the nubs or projections f^7 aiding in the adhesion thereof to the box and carriage. After the box has once been subjected to the action of the furnace, it is annealed so that it will not crack or warp with subsequent heatings, and thereafter may be used without the clay covering. This is a vital necessity in the annealing of tin plates.

The advantages and operation of my invention are apparent from the foregoing.

The metal sheets are first stacked on the carriage and the box lowered into position, after which said box and the sides and ends of the carriage are covered with clay. The carriage is then moved into the annealing-chamber, the ball-rollers and double-grooved tracks permitting of the easy movement thereof. The doors are then closed, and the

sheets are subjected to the action of the heat. The heat travels from the fire-boxes through the tunnels of the annealing-chamber and out through the flues to the chimney. The inclosing box is made of cast iron, but is so firmly braced that warping or expansion thereof is prevented.

The partition-wall between the fire-boxes enables the operator to cool down the fires by neglecting or entirely putting out the fire in one fire-box or by shutting off the draft thereof by closing the damper, whereas in the furnace heretofore used great loss is sustained by reason of overheating.

Heretofore carriage-boxes in annealing-furnaces have generally been made of steel, or if of cast iron they crack or warp after a few heatings. Under my invention I obtain the advantage of cheapness of construction, as compared with steel boxes, and the box will not crack or warp, although constructed of cast-iron.

The double track with ball-rollers enables two men to move the annealing-box and carriage in and out of the furnace, whereas under the old methods as now practised several men are required to insert the box into the furnace.

I claim as my invention—

1. In an annealing-furnace having fire-boxes, the sides of which are provided with outlet holes or openings, ash-pits located beneath said fire-boxes, tunnels leading from the openings in said fire-boxes, an annealing-chamber into which said tunnels open, dampers located in said tunnels exit-flues leading from said chamber, and a central wall or partition between said fire-boxes and ash-pits and having holes or perforations therein above the coal-line, as and for the purposes set forth.

2. In an annealing-furnace having a chamber, a carriage designed to be moved in and out of said chamber, an inclosing box open at its bottom and designed to fit down on said carriage, inner and outer bracing-strips extending longitudinally along the sides of said box, and outer bracing-strips along the ends thereof and means for removably holding said bracing-strips, as set forth.

3. In an annealing-furnace having a chamber, a carriage designed to be moved in and out of said chamber, and an inclosing box having an open-ended recess in its top and a hook having its base removably held in said open-ended recess, as set forth.

4. In an annealing-furnace having a chamber, a carriage designed to be moved in and out of said chamber, an inclosing box having overhanging plates attached to its top, and a hook having its base designed to fit snugly within said recess, substantially as set forth.

5. In an annealing-furnace having a chamber, a carriage designed to be moved in and out of said chamber, and an inclosing box designed to fit down on said carriage and

having bracing-strips, and also having outer projecting lugs, along its sides and ends, and inner lugs extending from its sides, and steel plates having openings therein corresponding
5 to said lugs, as set forth.

6. In an annealing-furnace having a chamber, a carriage an inclosing box of cast-iron having an open-ended recess in its top and provided with inner and outer lugs, and series
10 of nubs or projections, plates secured on said

lugs, the top of said box, and a hook having its base designed to be removably held in said recess, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscrib- 15
ing witnesses.

WILLIAM E. HARRIS.

Witnesses:

GEO. W. UPTON,
EDWARD WAGSTAFF.