

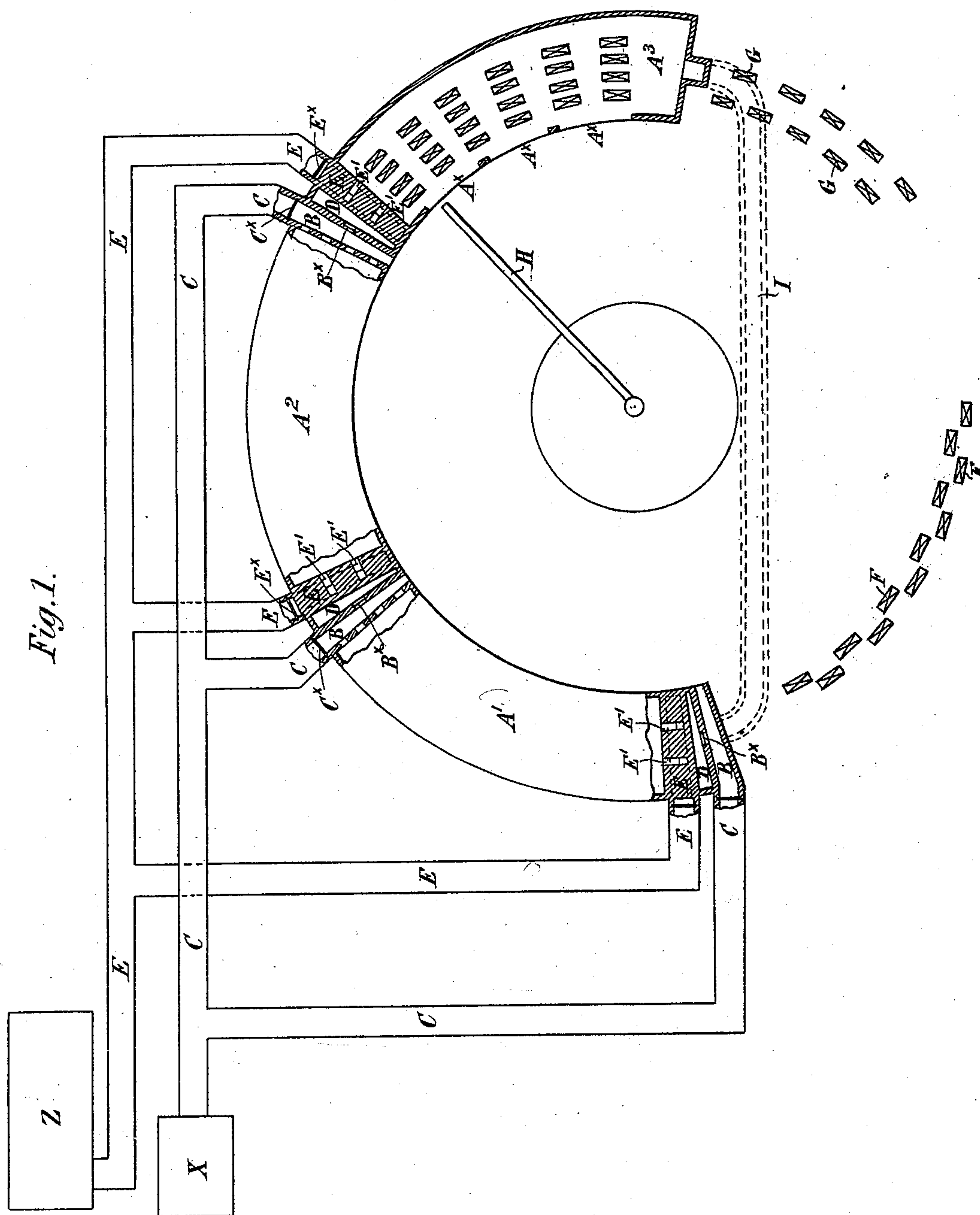
(No Model.)

2 Sheets—Sheet 1.

**J. H. ROGERS.**  
**ANNEALING FURNACE.**

No. 494,597.

Patented Apr. 4, 1893.



Witnesses  
B. H. Miller.  
C. M. Brooke

Inventor  
John Henry Rogers,  
By his Attorney  
Paldon Davidson & Wight.

(No Model.)

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Fig. 3.

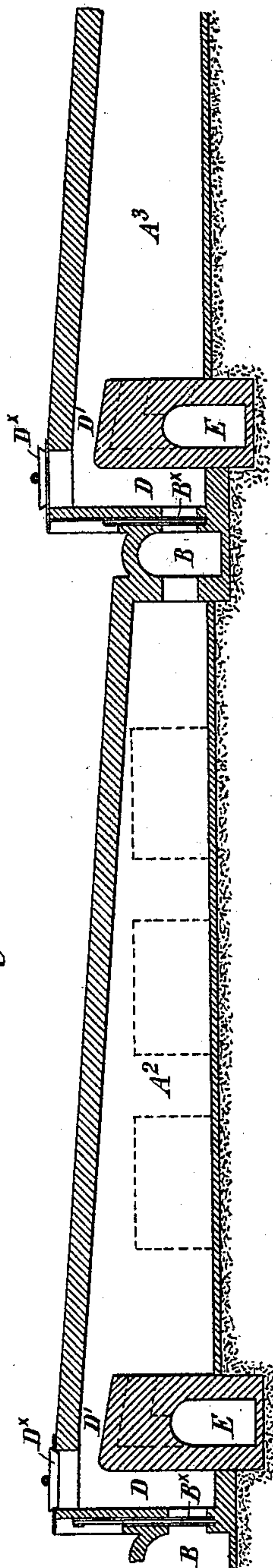
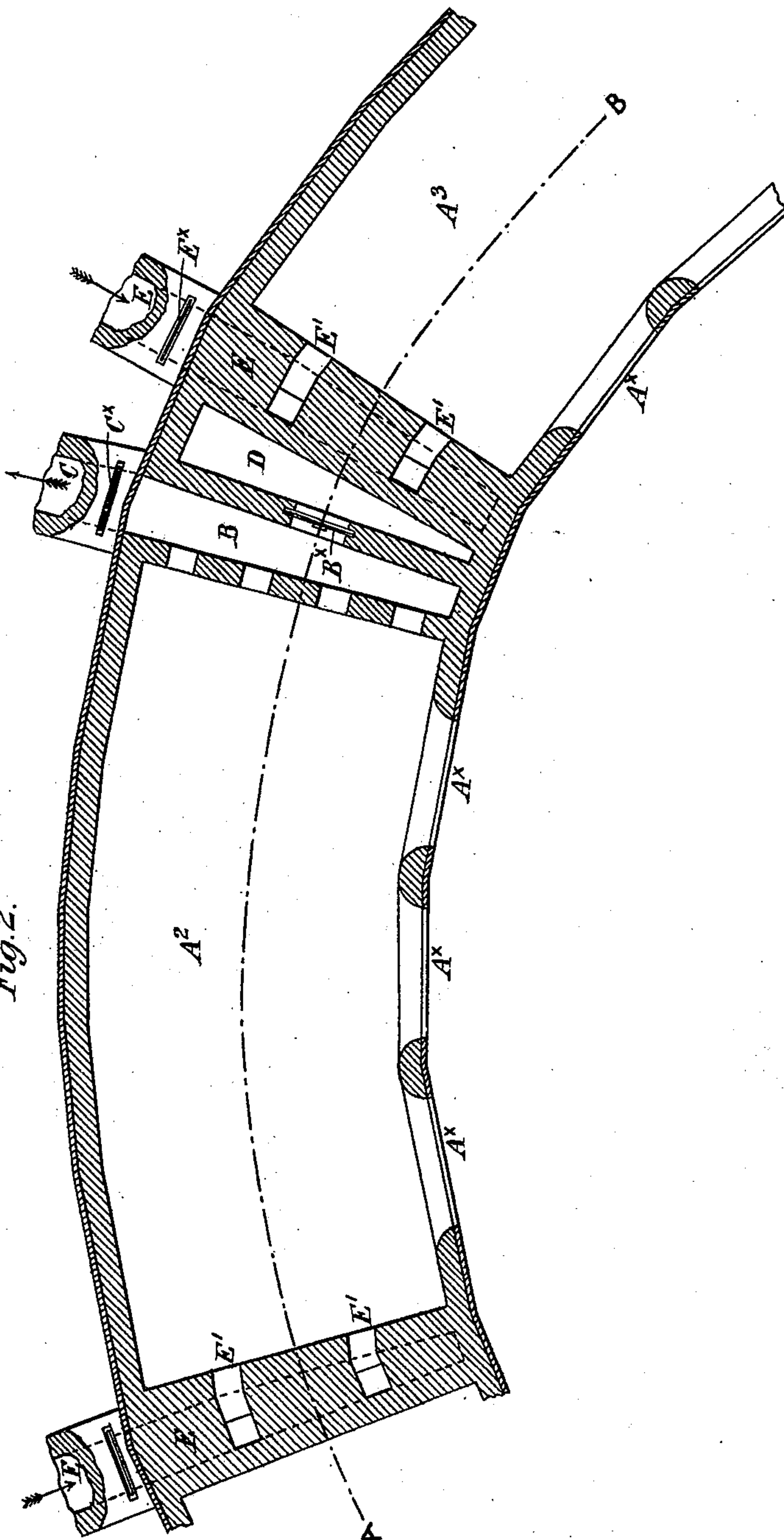


Fig. 2.



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# UNITED STATES PATENT OFFICE.

JOHN HENRY ROGERS, OF GLYNCOED, ENGLAND.

## ANNEALING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 494,597, dated April 4, 1893.

Application filed August 29, 1892. Serial No. 444,442. (No model.) Patented in England June 2, 1891, No. 9,342.

*To all whom it may concern:*

Be it known that I, JOHN HENRY ROGERS, tin-plate manufacturer, a subject of the Queen of Great Britain, residing at Glyncoed, Llan-

5 elly, England, have invented certain new and useful Improvements in Annealing-Furnaces, (for which I have received Letters Patent in Great Britain, No. 9,342, dated June 2, 1891,) of which the following is a specification.

10 The object of my invention is to improve furnaces used for annealing more especially for annealing tin and terne plates. For annealing the plates I employ three or more but preferably three furnaces ranged in the arc

15 of a circle—each adapted to be heated by gas from a gas producer introduced together with air at one end while the products of combustion are led away by chimney outlets at the other end. During working, one furnace at a

20 time is thus heated. The air for supporting combustion in this furnace is led through the furnace last heated so that the air is heated and the furnace and the pots containing plates within it are cooled. The third furnace

25 is opened and the boxes within it which contain plates that have been annealed are removed and fresh boxes containing plates which are to be annealed are placed into it. The furnace is then closed and when closed may

30 be heated by leading through it the products of combustion which are passing away from the furnace that is being fired. The furnaces are set end to end and occupy only part of a circle. In the remainder of the circle can be

35 ranged two series of boxes, one series of boxes which have been removed from one of the furnaces can be cooling, while the other series can be emptied and refilled. The furnaces are formed with the openings in them through

40 which they are to be filled and emptied all in the side which is toward the center of the circle. At the center of the circle I place a crane with horizontal radial arm which can be swiveled around a central post to bring its outer

45 end to any point in the circle and can also be extended or contracted and its outer end raised or lowered to place boxes of plates into or take them from the furnaces.

Figure 1 is a plan view partly in section of the series of furnaces and central charging crane. Fig. 2 is a plan in section of one of the furnaces and a portion of the next ad-

joining furnace. Fig. 3 is a vertical section on the line A B Fig. 2.

A' A<sup>2</sup> A<sup>3</sup> are three furnaces ranged in the 55 arc of a circle and constructed with openings A<sup>x</sup> on the inner side through which the boxes of plates can be charged into the furnace or withdrawn. These openings have doors which are closed while the furnace is being 60 heated.

Each furnace at its end opens into a chamber B from which an outlet flue C passes to a chimney X.

C<sup>x</sup> is a valve or damper between the end 65 of the chamber and the outlet flue.

At the other end of the furnace is a flue E kept supplied with gas from a gas producer at Z.

E' are openings from the gas supply flue 70 into the furnace.

E<sup>x</sup> is a valve by which the passage of gas to these openings can be controlled.

D is a chamber between the chamber B at the exit end of the furnace and the firing end 75 of the next furnace.

B<sup>x</sup> is a valve or damper in an opening between the chambers B and D.

D' is a passage from the chamber D to the firing end of the furnace. 80

D<sup>x</sup> is a valve by which air can be admitted to the chamber D and passage D'.

I is a flue from the exit end of the last of the assemblage of furnaces to the chamber C at the firing end of the first furnace. 85

When any one or other of the furnaces say the furnace A' has been charged with boxes of plates that are to be annealed and the furnace has been closed, heated gases from the preceding furnace A<sup>3</sup> which is at that time 90 being fired are led to it through the passage I which connects them and pass off from the opposite end of the furnace by the chimney outlet C at that end. Afterward when the firing of the furnace A<sup>3</sup> is discontinued and 95 the valve E<sup>x</sup> in the passage E through which gas was being supplied to this furnace is closed the valve or damper B<sup>x</sup> at the exit end of the furnace A<sup>2</sup> is also closed and the cold air inlet valve at the firing end of the furnace 100 A<sup>3</sup> is opened so that cold air can then pass into the furnace A<sup>3</sup>. In its passage through the furnace the air becomes heated and passes in its heated state into the furnace A'. At



the same time gas is admitted to this furnace and the firing of the furnace is proceeded with. When the furnace  $A^2$  has been charged and closed the chimney outlet between the furnaces  $A^2$  and  $A^3$  is opened by opening the valve  $C^x$  and the one between  $A'$  and  $A^2$  is closed—the heated gases from the furnace  $A'$  will then be led through the furnace  $A^2$  so as to heat its contents.

10 F F and G G represent boxes containing plates the boxes F may be boxes which have just been removed from one of the furnaces and set out to cool. The boxes G may be boxes which have been filled ready to be charged into a furnace.

15 H is a revolving crane the post of which is concentric with the arc in which the furnaces are ranged.

What I claim is—

20 1. The combination of three or more furnaces arranged in the arc of a circle end to end, each furnace having at one end a flue E connected with a gas producer and which delivers gas to the furnace, and at its opposite end a chamber B, connected with a chimney or exit, an air chamber interposed between the flue E, and the chamber B, an opening  $D^x$  for admitting cool air to said chamber, and valves for controlling the entrance and exit of gas and air, substantially as set forth.

30 2. The combination of three or more furnaces arranged in the arc of a circle end to end, each furnace having at one end a flue E connected with a gas producer and which delivers gas to the furnace, and at its opposite end a chamber B, connected with a chimney or exit, an air chamber interposed between the flue E and the chamber B, an opening  $D^x$  for admitting cool air to said chamber, valves for controlling the entrance and exit of gas and air, and a crane pivoted within the arc of furnaces and arranged to deliver blanks thereto, substantially as set forth.

45 3. The combination of three or more furnaces arranged end to end, each having at one end a flue E, connected with a gas pro-

ducer, and a passage  $E'$ , through which gas is projected downwardly into the furnace upon the blanks, an air chamber D, having a flue  $D'$ , delivering air to the furnace above the passage  $E'$ , a chamber B, at the opposite end of each furnace, and connected with a chimney, and a valve or gate  $B^x$ , for opening and closing communication between the exit passage B and the air chamber D.

55 4. The combination of the furnaces  $A'$   $A^2$ , arranged end to end, a gas chamber E, at the entrance end of each furnace connected with a gas producer, a chamber B, at the end of each furnace connected with a chimney, an air chamber D between the entrance E of one furnace and the exit chamber B, of the other furnace, a valve or gate  $B^x$  between said chambers B and D, a valve for controlling the entrance of cool air to the chamber D, a passage  $D'$  from the chamber D to the furnace  $A^2$ , and a flue  $E'$  for the passage of gas to the furnace  $A^2$  from the gas chamber E.

60 5. The combination of two or more furnaces arranged in the arc of a circle, openings on the inner side of each furnace through which articles may be inserted into or withdrawn from the furnace, a chamber B, into which the exit end of each furnace opens, a chimney flue C, fitted with a valve  $C^x$  leading from each chamber B, an opening fitted with a valve  $B^x$  from each chamber B, into the firing end of the next furnace, a gas flue E, fitted with a valve  $E^x$  passing across the interior of each furnace at a short distance from the firing end, a passage  $D'$  between the top of this flue and the top of the furnace, passages  $E'$  for gas to pass into the furnace from the gas flue E and an opening fitted with a valve  $D^x$  for admitting cold air to the passage  $D'$ .

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