

(No Model.)

2 Sheets—Sheet 1.

J. W. BONTA.

LEER OR ANNEALING OVEN FOR SHEET OR PLATE GLASS.

No. 529,316.

Patented Nov. 13, 1894.

FIG 1

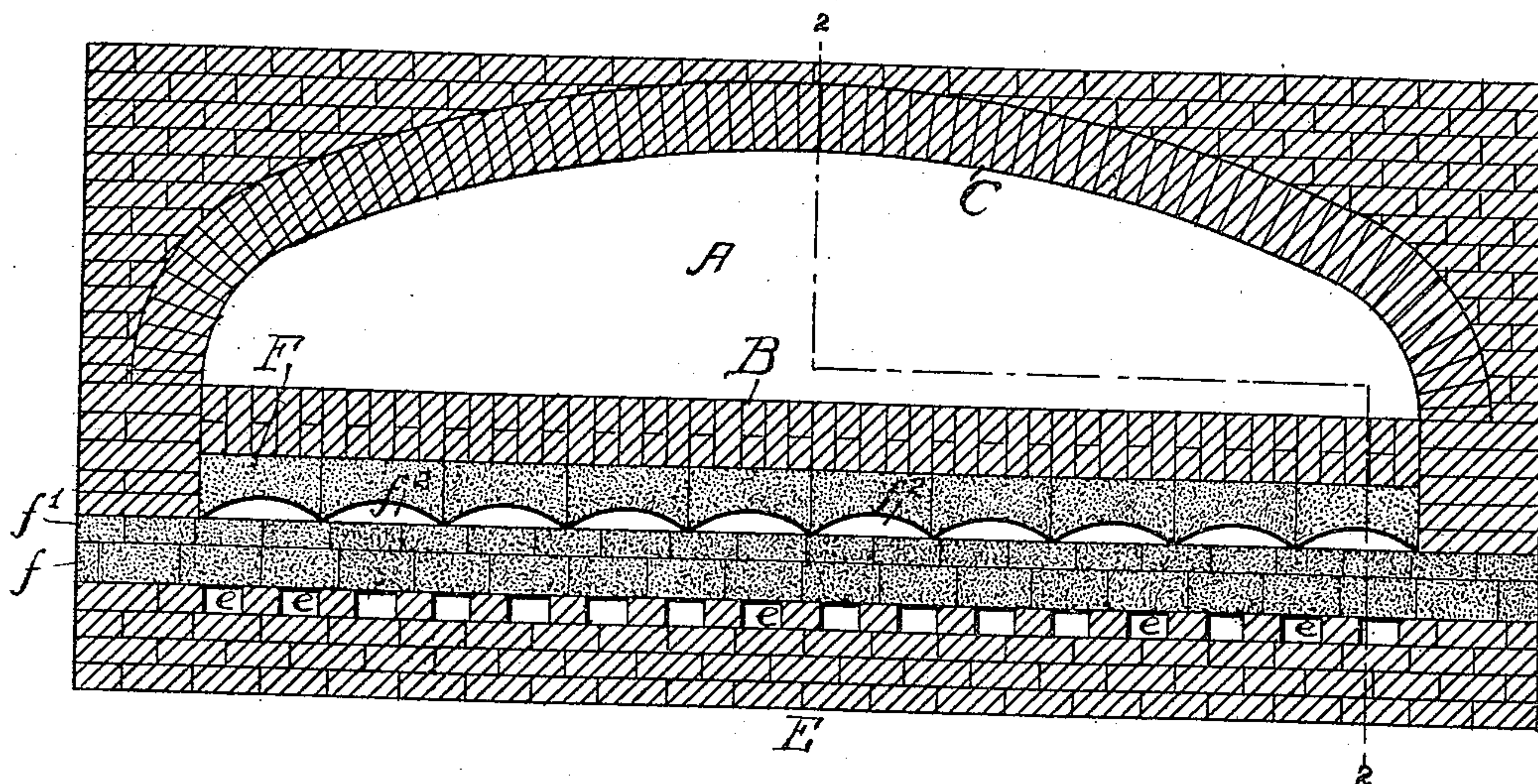
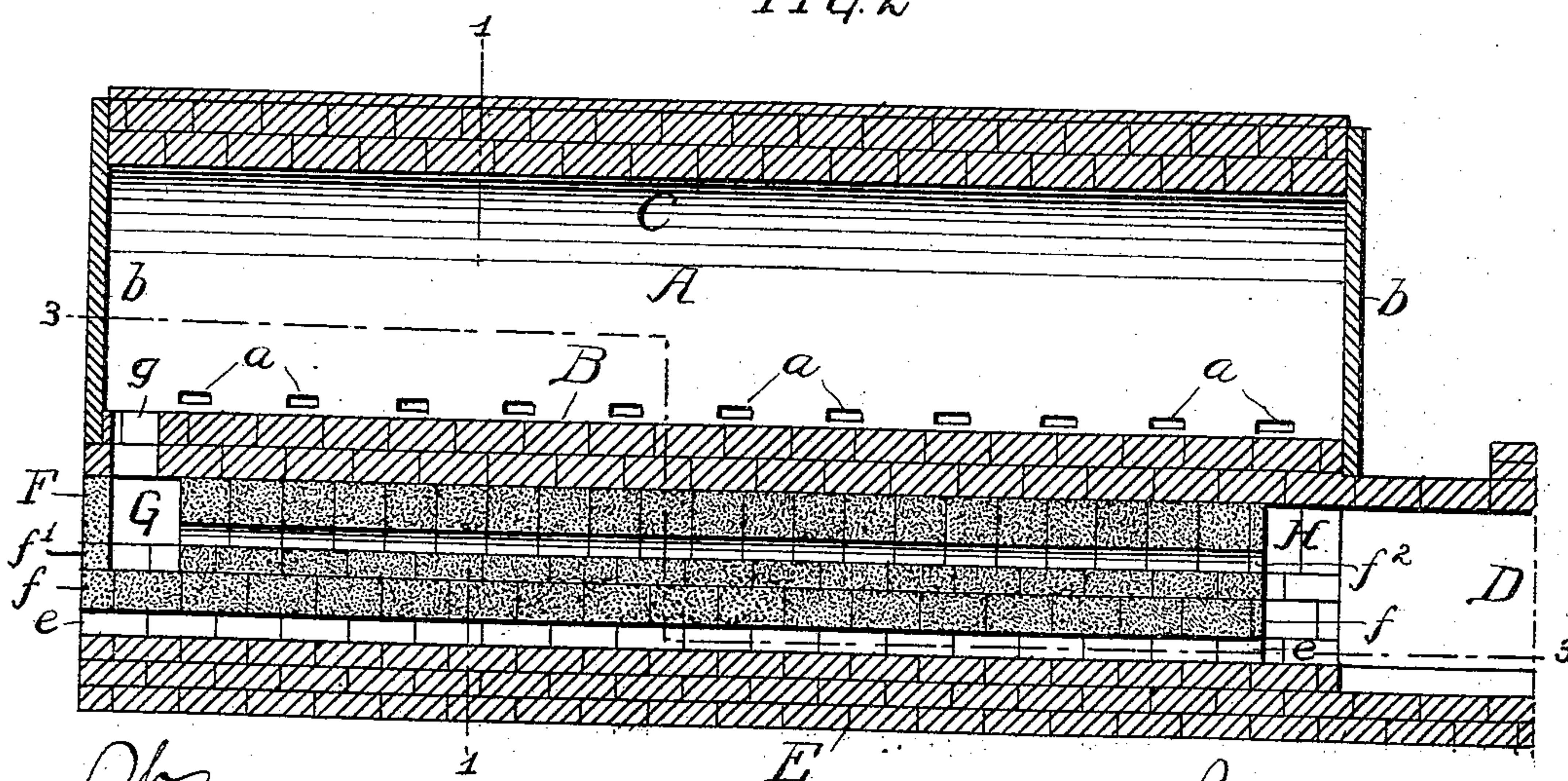


FIG. 2



Witnesses:

Harry G. Davis

Jas. L. Skidmore

Inventor:

Inventor:  
James W. Bonita.  
By his Attorney,  
Jno E Parker



(No Model.)

2 Sheets—Sheet 2.

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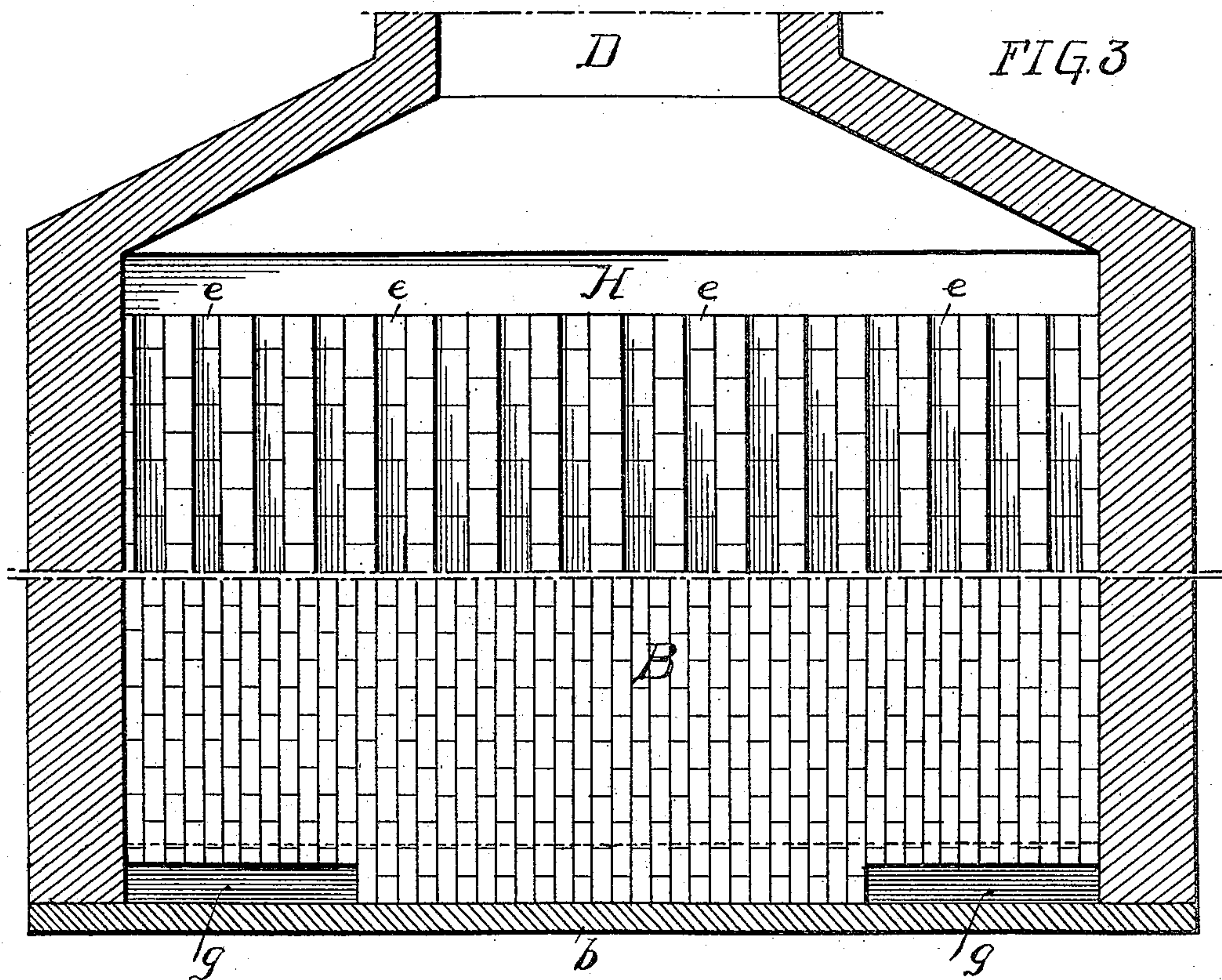
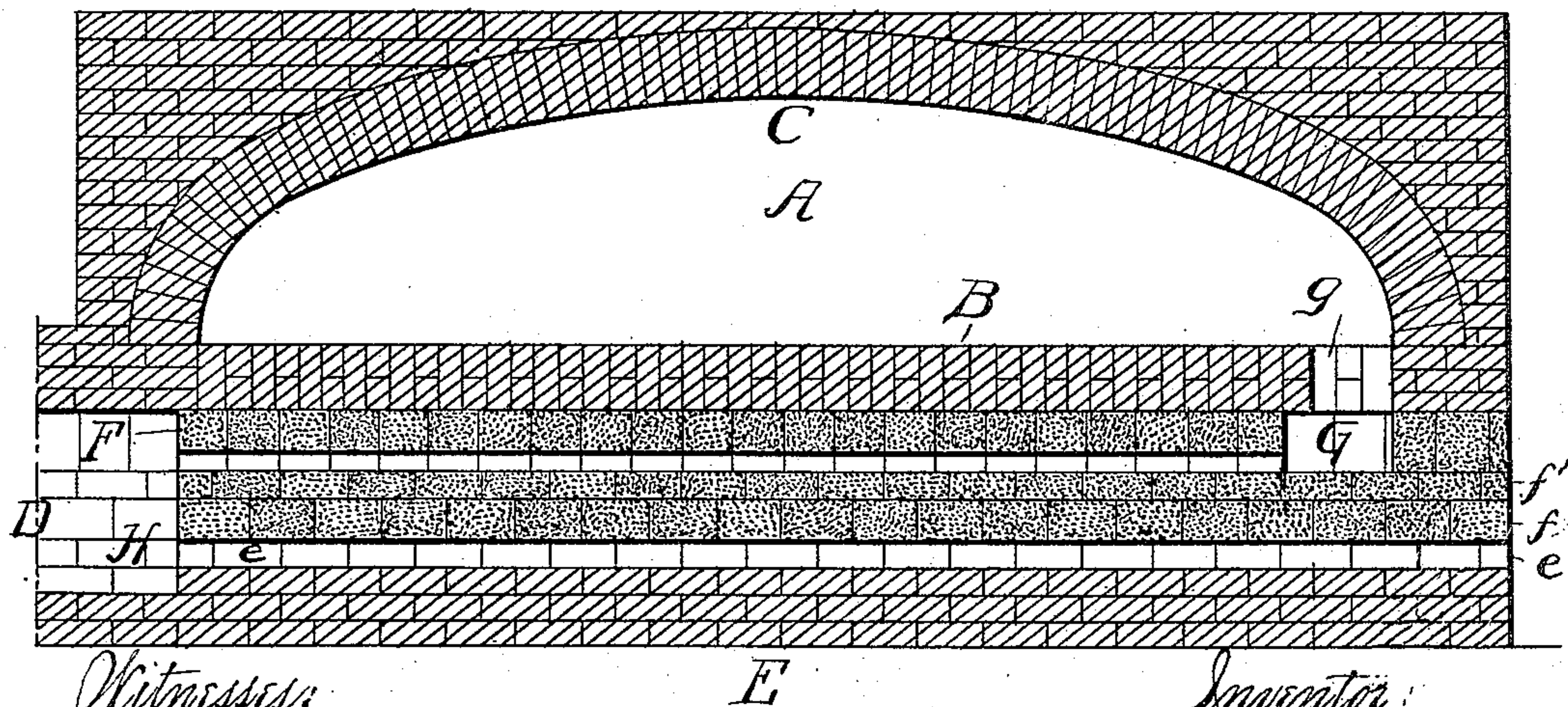


FIG. 4



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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PLATE GLASS COMPANY, OF WEST VIRGINIA.

## LEER OR ANNEALING-OVEN FOR SHEET OR PLATE GLASS.

SPECIFICATION forming part of Letters Patent No. 529,316, dated November 13, 1894.

Application filed February 2, 1894. Serial No. 498,902. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES W. BONTA, a citizen of the United States, residing at Wayne, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Leers or Annealing-Ovens for Sheet or Plate Glass; 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to certain improvements in leers or annealing ovens for sheet or plate glass, and has for its object to so construct the table or bed of the oven that it will be subjected to an even and regular degree of heat corresponding at all times to the heat in the upper portion of the oven, so that when a sheet of glass is resting upon the table or bed, its opposite faces will be subjected to the same or nearly the same degree of heat, and all subsequent breakage from uneven annealing will be avoided.

A further object of the invention is to so construct the table or bed and its foundation that the table will not "heave" or expand irregularly.

A further object is to utilize the escaping heat or products of combustion to heat the table, and a still further object is to prevent the excessive heating of the foundation of the oven, and so avoid the uneven expansion and contraction of the latter.

In leers for annealing sheet or plate glass, it has hitherto been usual to make the bed or table upon which the glass is to be placed, immediately on top of or forming the upper surface of a solid foundation on which the roof structure is supported. A heating gas, usually from a gas regenerative furnace, is forced in through openings in the opposite walls of the oven immediately above the foundation, and the heat deflected from the roof acts as the annealing agent for the glass. As the sheet rests upon a solid bed or foundation, the upper surface only of the sheet is

subjected to a high temperature, and the lower surface is subjected only to that heat absorbed by the table in the heating up of the oven before the sheet is placed upon the bed. The solid body of the foundation being of material irregular in density being subjected at different portions of its surface to different degrees of heat, expands at some points to a greater extent than at others, and the surface or table becomes uneven and irregular.

In Letters Patent granted to me on the 10th day of August, 1892, No. 480,230, I have described a construction of leer in which the glass receiving table is supported upon a row of bricks having ventilating spaces, which, to some extent, prevent the heating of the foundation to a temperature which would cause the uneven expansion of the latter, and the present invention, while retaining to some extent this desirable feature, seeks further to subject the table to a degree of heat equal to that of the oven proper, so that the opposite surface of the sheet of glass may be subjected to the same, or nearly the same, degree of radiated heat from the table and roof after the heating of the leer has been completed.

In the accompanying drawings:—Figure 1, is a transverse sectional elevation on the line 1—1, Fig. 2, of a leer or annealing oven constructed in accordance with my invention. Fig. 2, is a longitudinal section of the same on the line 2—2, Fig. 1. Fig. 3, is a sectional plan view on the line 3—3, Fig. 2, of a portion of the furnace; and Fig. 4, is a longitudinal sectional elevation of a slightly modified construction.

Referring to the drawings, A represents the furnace, having a table B, an arched roof C, and provided at each end with doors *b*, in the ordinary manner. On the opposite sides of the furnace are gas inlets *a* which direct the entering gas against the arched roof C, and at one end is a chimney or escape flue D, through which the burned gases finally escape.

The foundation E is built in the ordinary manner of any suitable depth, and is provided near its upper surface with a series of longitudinal air passages *e*, communicating at the front of the furnace with the atmosphere, and



at the rear of the furnace communicating with a flue or chamber H extending completely across the rear portion of the furnace and in direct communication with the chimney or escape flue D. These channels or passages *e* are formed by spacing the bricks of which the foundation is made, the upper walls of the passages being formed by a layer of fire-brick *f*, somewhat thicker than the ordinary brick of which the foundation is formed, and immediately above the layer *f* is a second layer *f'*, also of fire brick, and extending completely over and forming the top of the foundation. The constant passage of currents of atmospheric air through these channels or passages serves to prevent the injurious heating of the foundation. On this top layer of fire brick is placed a layer of arched bricks F, the bricks being placed end to end in a continuous series, and their arches forming continuous flues or passages *f*<sup>2</sup> extending from the front to the rear of the furnace. At the rear of the furnace these flues or passages all communicate with the flue or chamber H, into which the passages *e* enter, and at the front of the furnace is a similar flue or chamber G lined with fire brick, and having a capacity or area equal to the combined area of all of the channels or passages formed by the arched fire brick. The opposite ends of the channel or chamber G have ducts or passages *g* extending up through the bed B, and communicating with the interior of the oven, and form the only escape ducts for the gases entering through the openings *a*, so that such gases while in the state of combustion are led through the passages *g* into the chamber G, and from thence into the passages *f*<sup>2</sup> formed by the arched fire brick emptying into the flue or chamber H, from whence they are conducted to the chimney. The gases escaping from the flues *f*<sup>2</sup> into the chamber H being highly heated, and passing rapidly from the chamber to the chimney, act as injectors, and, creating partial vacuums in the rear ends of the passages *e*, act to draw atmospheric air through said channels or passages from the front of the oven, and this constant passage of atmospheric air will keep the foundation from becoming highly heated, while the bed B being formed of ordinary salmon brick, and being situated directly on top of the arched bricks F, will absorb the heat of the escaping gases, and will subject the under surface of the glass resting thereon to a degree of heat equal to, or nearly to, the heat of the oven.

In the modified structure shown in Fig. 4, the arched bricks are laid in series transversely across the chamber, but perform the same function, and heat the under surface of the table in the manner previously described.

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

65 1. A leer or oven for annealing plate glass, comprising in combination, a bed or table on which the sheet or plate of glass is laid, a

conducting flue or flues for the products of combustion extending under said table, an inclosing roof structure having gas inlets, escape ducts leading from the interior of the oven to said flue or flues, and an escape flue or chimney with which said conducting flue or flues communicate, substantially as specified. 70

75 2. The combination in a leer or oven for annealing sheet or plate glass, of the bed or table on which the sheet or plate of glass is laid, a flue or flues extending under said table and communicating at one end with an escape flue or chimney, and at the opposite end with the interior of the oven, and an air passage or passages formed in the upper portion of the foundation, below the heat conducting flues and opening at one end to the atmosphere, and at their opposite ends communicating with the escape flue or chimney, substantially as specified. 80 85

90 3. The combination in a leer or oven for annealing sheet or plate glass, of the bed or table on which the sheet or plate of glass is laid, a series of heat conducting flues extending under said table, for the passage of the products of combustion and communicating at one end with an escape flue or chimney, a chamber at the front of the oven with which all of said heat conducting flues communicate, and ducts or passages extending from said chamber to the interior of the oven, substantially as specified. 95 100

105 4. The combination in a leer or oven for annealing sheet or plate glass, of the bed or table on which the sheet or plate of glass is laid, a series of arched fire brick forming heat conducting passages or flues, extending under said bed or table and supporting the same, a chamber at the front of the oven having an area equal to the combined area of all the heat conducting passages or flues, passages provided in the walls of the oven, and extending from said chamber to the interior of the oven, and an escape flue or chimney with which all of said heat conducting flues communicate, substantially as specified. 110

115 5. The combination in a leer or oven for annealing sheet or plate glass, of the bed or table on which the sheet or plate of glass is laid, a series of arched fire brick forming a support for the bed or table, and having passages or flues for the passage of the products of combustion, a chamber at the front of the oven with which all of said passages or flues communicate, said chamber communicating with the oven, a chamber formed at the rear of the oven, and with which said passages or flues communicate, a series of air passages formed in the upper portion of the foundation, and also communicating with such rear chamber, and an escape flue or chimney through which the mixed air and gas may escape, substantially as specified. 120 125 130

6. The combination in a leer or oven for annealing sheet or plate glass, of the bed or table on which the sheet or plate of glass is



laid, a series of arched fire brick F forming continuous passages  $f^2$  extending from end to end of the oven, a chamber G at the front of the oven and with which said passages  $f^2$  communicate, ducts  $g$  at the opposite end of said chamber leading into the interior of the oven, a chamber H at the rear of the oven, and with which said passages  $f^2$  also communicate, a foundation structure having passages  $e$  open to the air at the front of the furnace, and at the rear communicating with

said chamber H, layers  $f, f'$  of fire brick on top of the foundation, and immediately beneath the fire brick, and an escape duct or chimney with which the chamber H communicates, substantially as specified. 15

In testimony whereof I affix my signature in presence of two witnesses.

JAMES W. BONTA.

Witnesses:

JNO. E. PARKER,

H. S. DONALDSON.