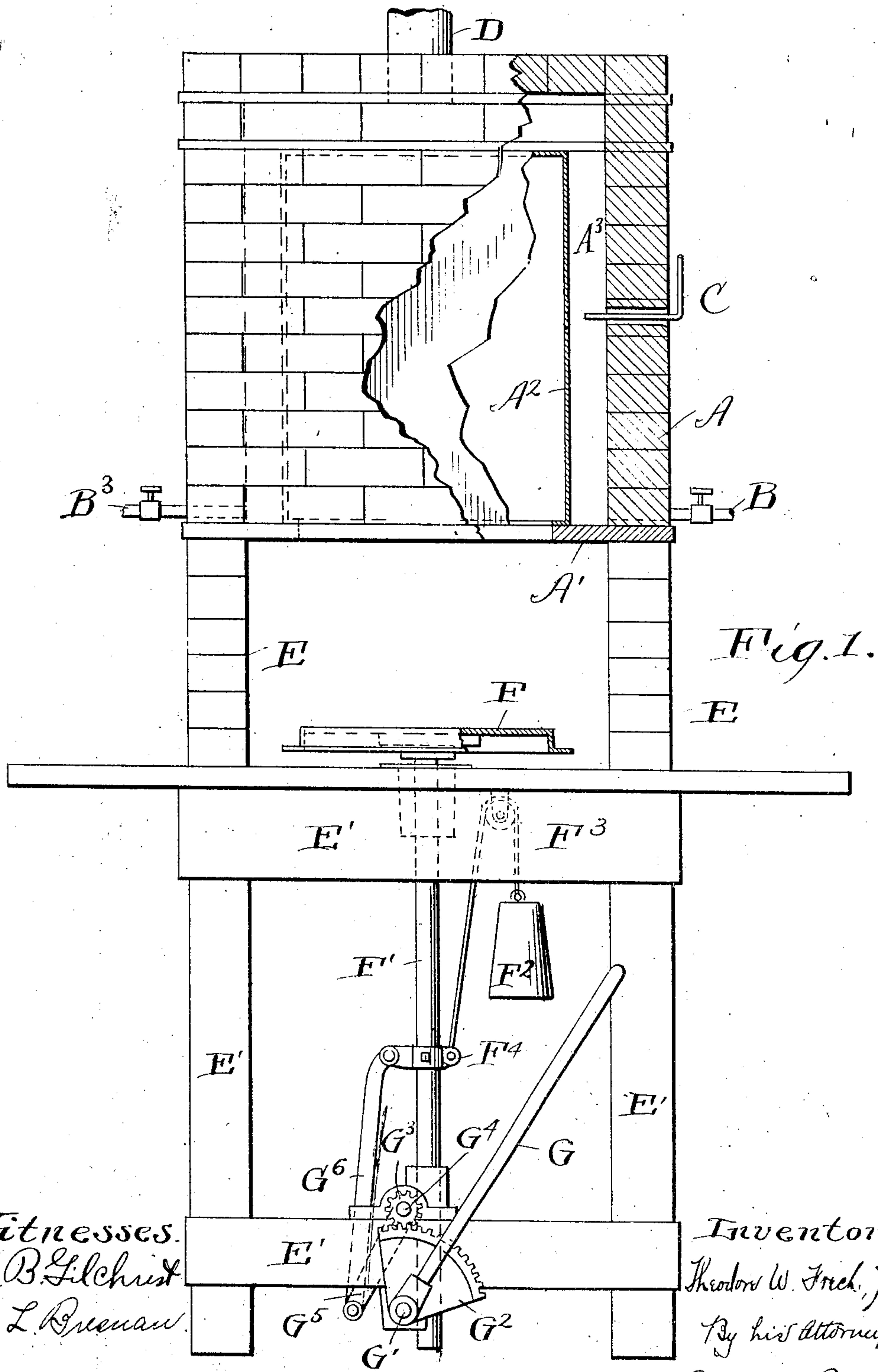


T. W. FRECH, JR.
GLASS HEATING FURNACE.
APPLICATION FILED SEPT. 8, 1905.

952,517.

Patented Mar. 22, 1910.

2 SHEETS—SHEET 1.



Witnesses.
E. B. Gilchrist
N. L. Brennan

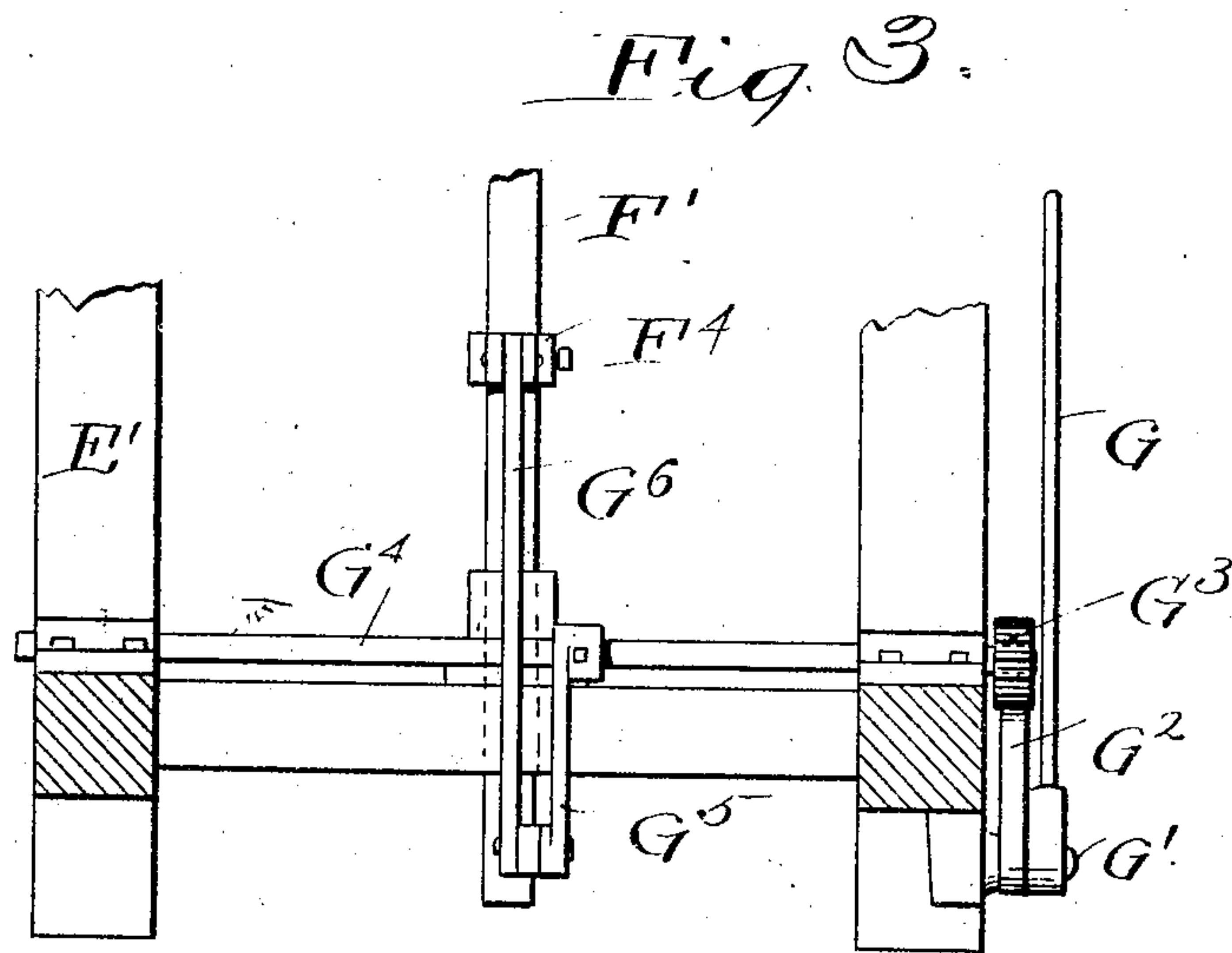
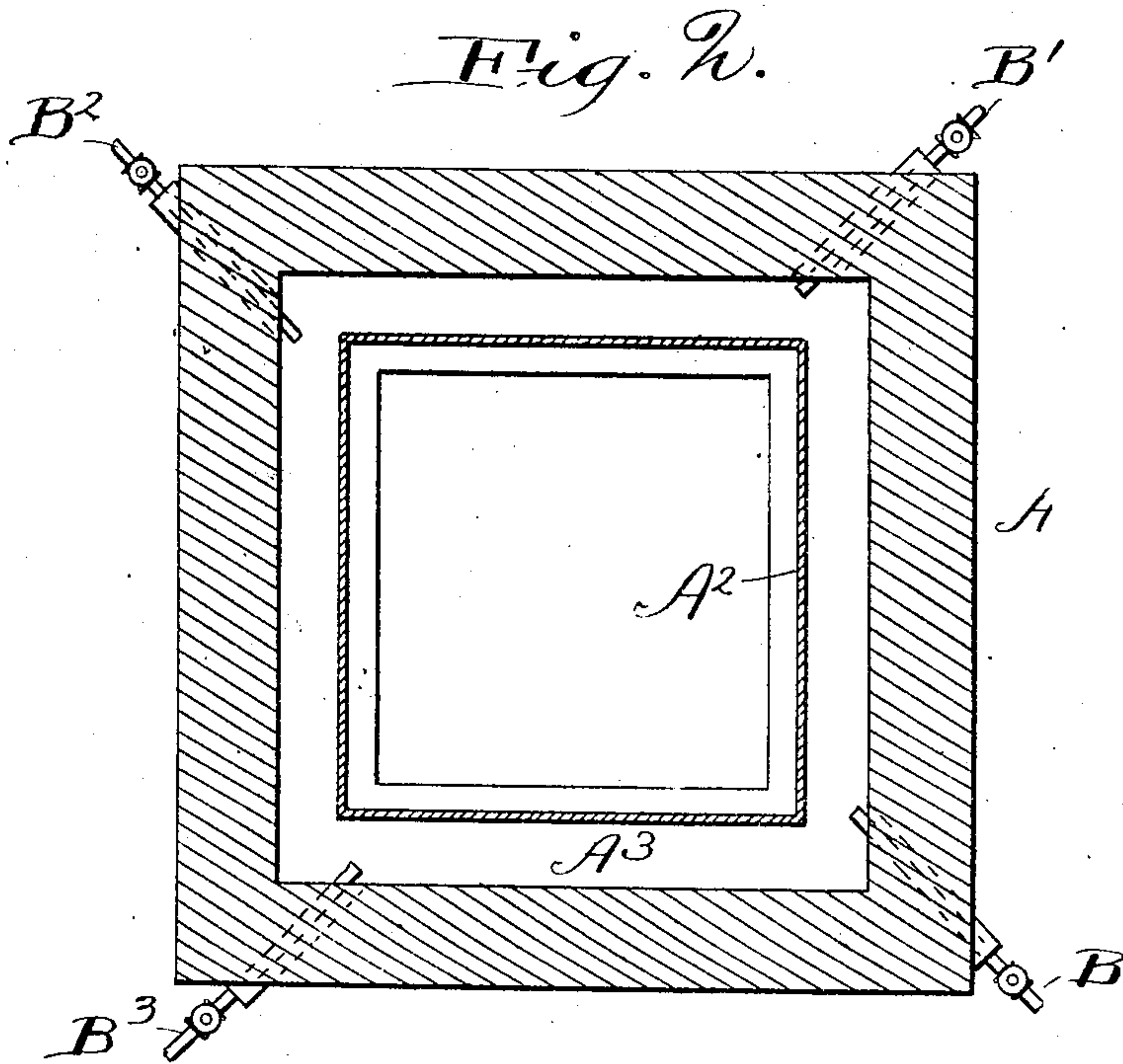
Inventor:
Theodore W. Frech, Jr.
By his attorney,
Thos. M. Bates

T. W. FRECH, JR.
GLASS-HEATING FURNACE.
APPLICATION FILED SEPT. 8, 1905.

952,517.

Patented Mar. 22, 1910.

2 SHEETS—SHEET 2.



Witnesses.
E. B. Gilchrist
H. L. Brennan.

Inventor
Theodore W. Frech, Jr.
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

THEODORE W. FRECH, JR., OF CLEVELAND, OHIO, ASSIGNOR TO THE NATIONAL ELECTRIC LAMP COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF NEW JERSEY.

GLASS-HEATING FURNACE.

952,517.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed September 8, 1905. Serial No. 277,511.

To all whom it may concern:

Be it known that I, THEODORE W. FRECH, Jr., a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Glass-Heating Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

In the heating of glassware, and particularly articles of such delicate nature and structure as incandescent lamp bulbs, considerable difficulty has been experienced in properly feeding them into and removing them from annealing and heating ovens, and in securing an even treatment of the various articles while being heated.

In the course of removing the heated ware from the oven it is desirable to prevent its coming in contact with material of lower temperature, since this will result in setting up strains in the ware resulting in either immediate or ultimate fracture.

An additional disadvantage of the structures heretofore used flows from the fact that the doors for the feeding and removal of the work have been in either the sides, or the tops of the various types of furnaces. While with the feeding devices hitherto employed, this arrangement has been practically a necessity, it has nevertheless been very unsatisfactory owing to the fact that upon the opening of these doors, the hot air within the furnaces flows out with great rapidity and is replaced by the cold air from the exterior. The loss of heat occasioned by this action is of some moment when working with small ovens in which the volume of contained air is not large. The matter is of consequence not merely because of the waste in fuel but because of the waste of time occupied in again bringing the oven to the proper temperature; and, inasmuch as the displacement of the hot air by the cold air from the outside varies considerably in its extent, according to the temporary conditions surrounding the furnaces, there is no accurate standard by which to regulate the length of time for heating each successive charge.

To satisfactorily overcome these difficulties, I have devised an efficient and simple apparatus in which the heat is applied in such a manner as to be uniform in its effect upon the entire charge, and have further

provided means for feeding and withdrawing the articles in such manner that they shall not be subjected to contact with any material liable to chill or crack the same, and accomplishing all this in such manner that the heated air shall not escape from the furnace.

Referring to the accompanying drawings, Figure 1 is an end elevation partly in section. Fig. 2 is a cross section of the heating oven looking downward. Fig. 3 is a plan view of the feeding means.

In the various figures A represents the exterior walls of the heating oven, which walls are composed of any suitable refractory material, such as fire brick. The bottom wall A' of the oven is provided with a central aperture and supports a muffle A², which is itself provided with an opening in its bottom wall fitted to and registering with the opening in the wall A'. This muffle A² is somewhat smaller than the interior of the oven, so that a space A³ is formed between the side and top walls of said muffle and oven respectively.

For the purpose of heating the muffle, I have provided, as shown, four burners B, B', B², and B³, which project through the oven wall into the space A³. These burners are placed near the bottom of the oven and are so positioned with regard to the sides of the muffle as to protect the flame of each burner angularly against the walls thereof and proximate to the corners. The effect of this disposition of the flames is to cause a circulation of the heating gas around and about the muffle as it rises toward the top of the oven, from which leads an exit pipe D. As will be plain, a muffle heated in this manner is not liable to develop unevenly heated zones and the radiation to the interior will be uniform throughout. I preferably provide at some point within the wall of the oven a thermometer C, by which the temperature in the space A³ may be observed.

The above described means for heating the ware under treatment is supported by pillars E and suitable frame-work E' in such manner as to allow sufficient room for the reciprocation of a table F, which is designed to receive the glassware and to be lifted into place so as to form the bottom closure of the muffle A². The table F is supported on the upper end of a reciprocating

shaft F' guided in the frame work E' and counterbalanced by a weight F² supported from a pulley F³ and connected with the shaft F' by a bracket F⁴. This counterpoise weight enables the operator to reciprocate the tables up and down with comparatively small effort.

For the purpose of reciprocating the table I provide a hand lever G fixed to a segmental rack G², journaled at G' and meshing with a pinion G³ secured to a rock shaft G⁴. From the rock shaft G⁴ projects an arm G⁵ pivoted at its end to a link G⁶, which is connected with the supporting shaft F', in any convenient manner—preferably by being attached to the bracket F⁴. When the lever G is shifted to operate the rack and pinion, the arm G⁵ oscillates to elevate or retract the link G⁶ and cause a corresponding advance or lowering of the table F. The ware to be subjected to the heat treatment is placed upon the reciprocating table and the latter is lifted into place without the ware coming in contact with any highly heated materials. The heating of the ware, after it is placed within the oven, takes place at approximately the same rate as the heating of the table and no unevenness in the heat treatment results. After remaining within the oven for the proper length of time the table is lowered by shifting the lever G and the glass and table each allowed to cool until the former is in condition to be removed. It will be seen that the arrangement described provides a simple means for removing the hot glassware from the muffle without handling it in any way or allowing it to come in contact with any materials which by chance might be at a temperature lower than that of the ware itself.

Throughout this operation it will be seen that the heated air within the muffle is pocketed in such a way that it will have no tendency to flow therefrom and there will be no material fluctuation noticeable in the temperature during the short interval necessary to remove and renew the charges.

It has been found in practice that the above apparatus is effective in annealing and heat treating incandescent bulbs in a uniform manner, and permits of their being handled with a minimum percentage of breakage.

It will be obvious that certain immaterial alterations may be made in the structure without departing from the spirit of my invention or altering the character thereof.

Having described my invention, I claim:

1. A heating furnace comprising an oven provided with an opening in the bottom thereof, a muffle within the oven and spaced apart therefrom and provided with an opening in its bottom in register with the opening in the bottom of the oven, burners passing through the walls of the oven so disposed as to project their flames horizontally and angularly against the lower part of the side walls of said muffle, an exit for the heating gases in the top of the oven, a vertically reciprocative table positioned below the opening in the bottom of the muffle and provided with an overlapping flange adapted to seal the opening when the table is placed in elevated position, a supporting shaft for said table, a counterpoise attached to said shaft, and lever mechanism connected with said shaft for elevating and lowering the table.

2. A heating furnace comprising an oven provided with an opening in the bottom thereof, a muffle within the oven and spaced apart therefrom and provided with an opening in its bottom in register with the opening in the bottom of the oven, burners passing through the walls of the oven so disposed as to project their flames horizontally and angularly against the lower part of the side walls of said muffle, an exit for the heating gases in the top of the oven, a vertically reciprocative table positioned below the opening in the bottom of the muffle and provided with an overlapping flange adapted to seal the opening when the table is placed in elevated position, a supporting shaft for said table, a counterpoise attached to said shaft, and means for reciprocating the table consisting of a lever rigidly connected with a segmental rack, a pinion meshing with said rack and fixed on a rock shaft, an arm projecting from said rock shaft and connected by a pivoted link with the shaft supporting the table.

3. In a heating furnace, a muffle within the furnace having imperforate side and top walls and a feeding opening in the bottom thereof, and a vertically reciprocatory table adapted to receive the articles to be heated and to form a closure for the bottom of the muffle.

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

THEO. W. FRECH, JR.

Witnesses.

J. M. STRONG,
B. L. BROWN.