

No. 767,341.

PATENTED AUG. 9, 1904.

C. J. HURREL.

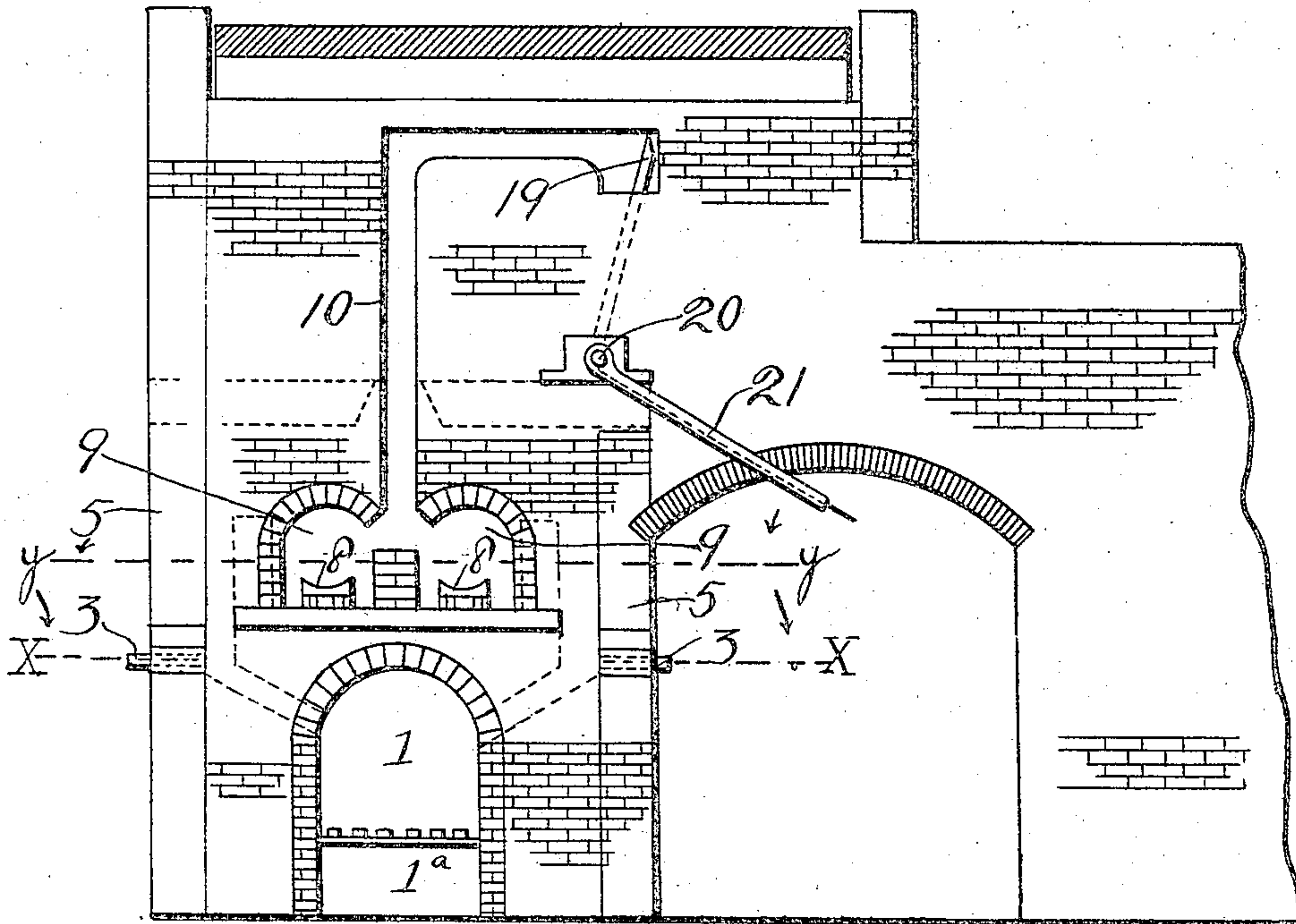
APPARATUS FOR FLATTENING CYLINDERS FOR MAKING WINDOW GLASS  
AND OVEN FOR SAME.

APPLICATION FILED JUNE 23, 1903.

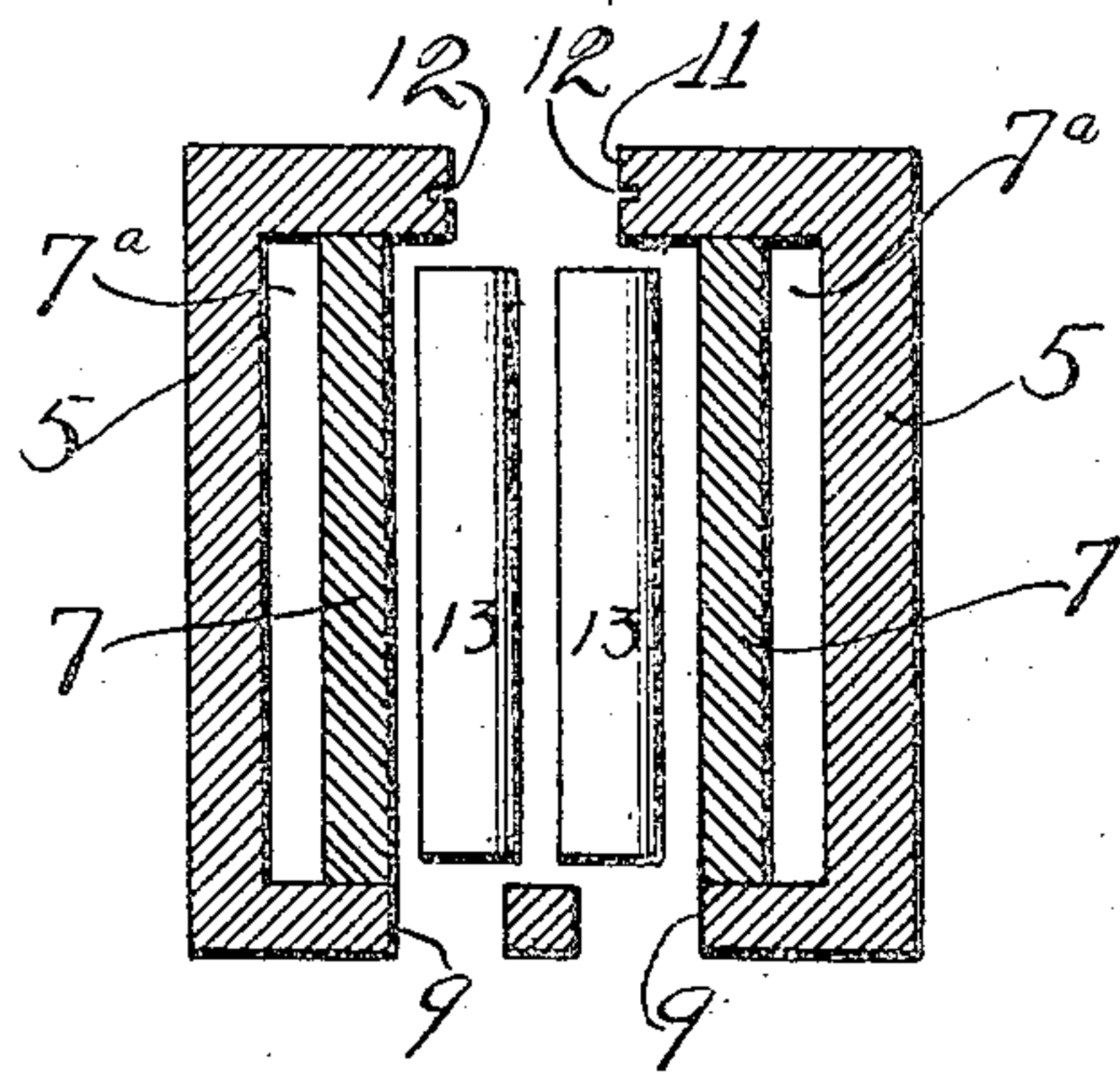
NO MODEL.

3 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 5.*



WITNESSES:

*Wm. F. Doyle.*  
*J. S. Powers.*

INVENTOR  
*Charles J. Hurrel*  
BY  
*Robert L. Hurrel*  
Attorneys

No. 767,341.

PATENTED AUG. 9, 1904.

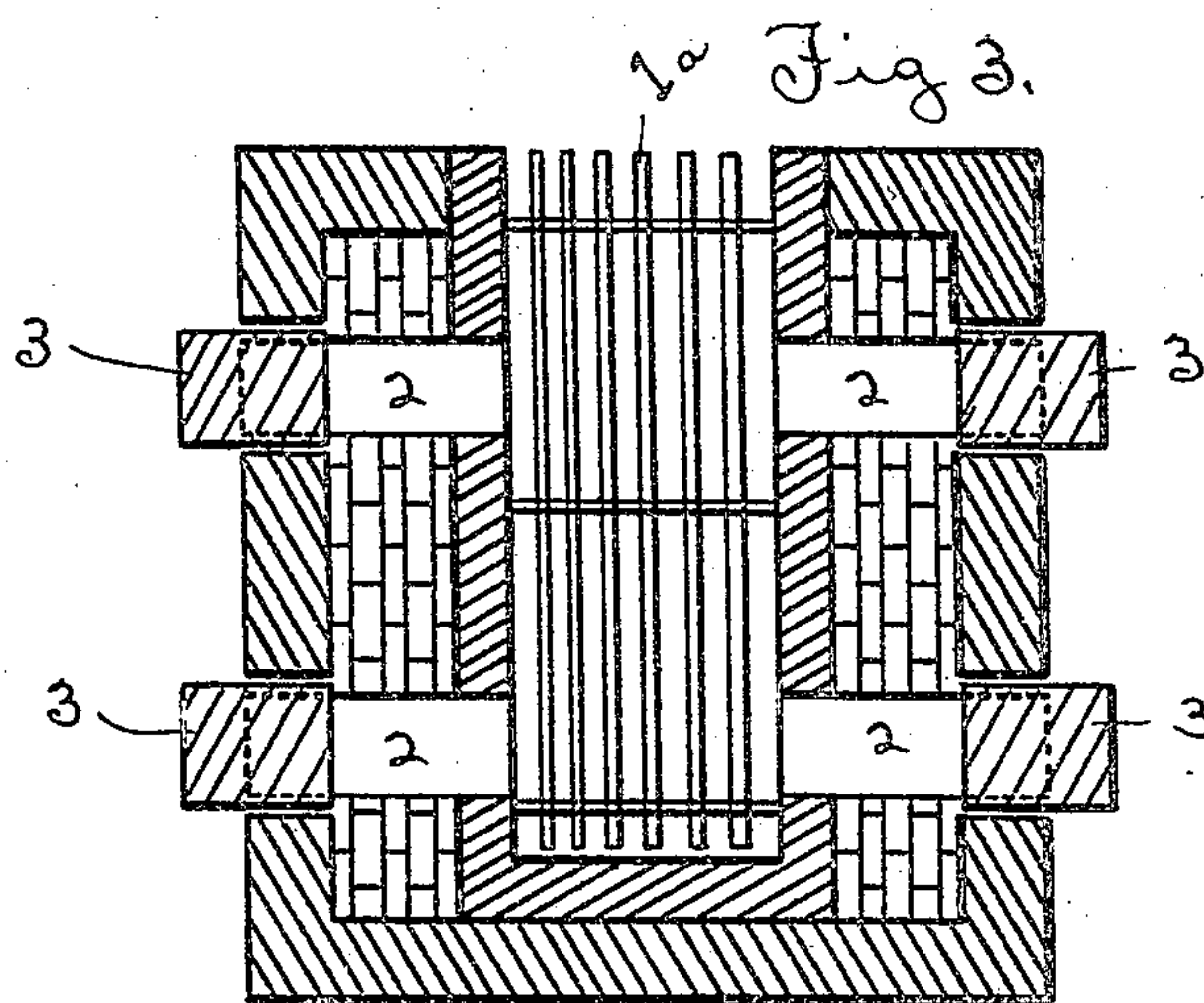
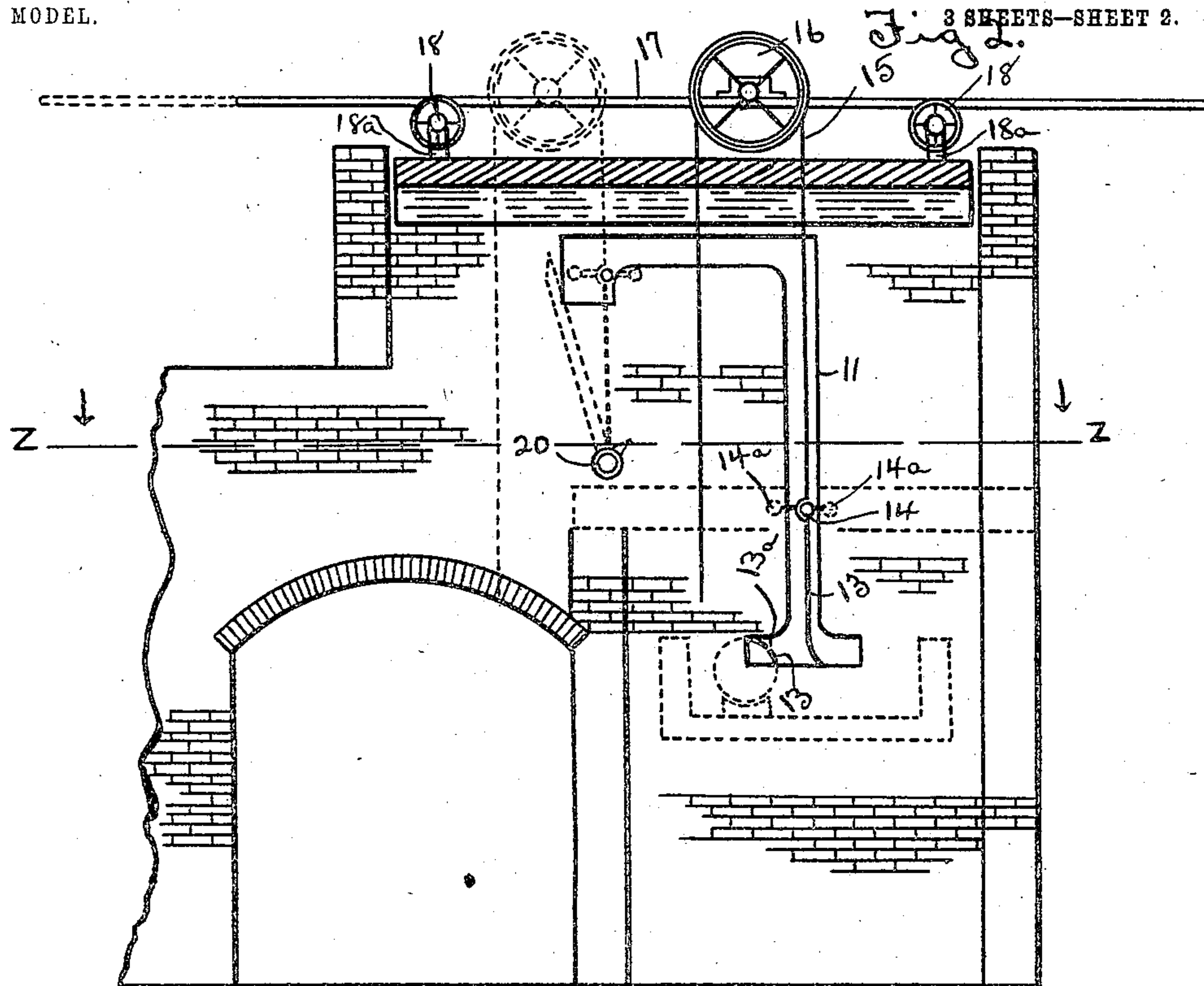
C. J. HURRLE.

APPARATUS FOR FLATTENING CYLINDERS FOR MAKING WINDOW GLASS  
AND OVEN FOR SAME.

APPLICATION FILED JUNE 23, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses

*Benny S. Webster*  
*J. D. Ramag*

Inventor  
*Charles J. Hurle*

By *Joshua B. Webster*  
Attorney



No. 767,341.

PATENTED AUG. 9, 1904.

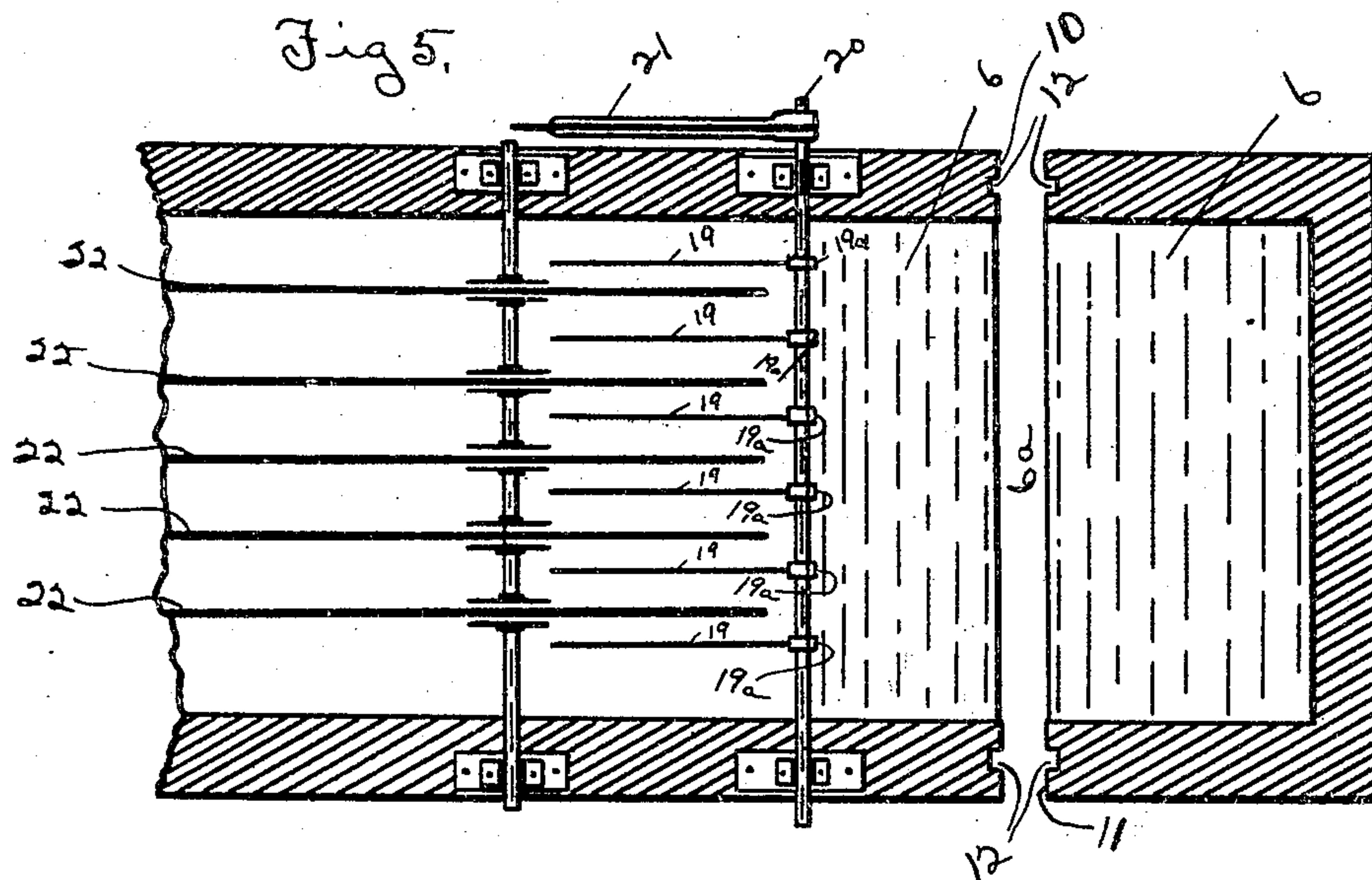
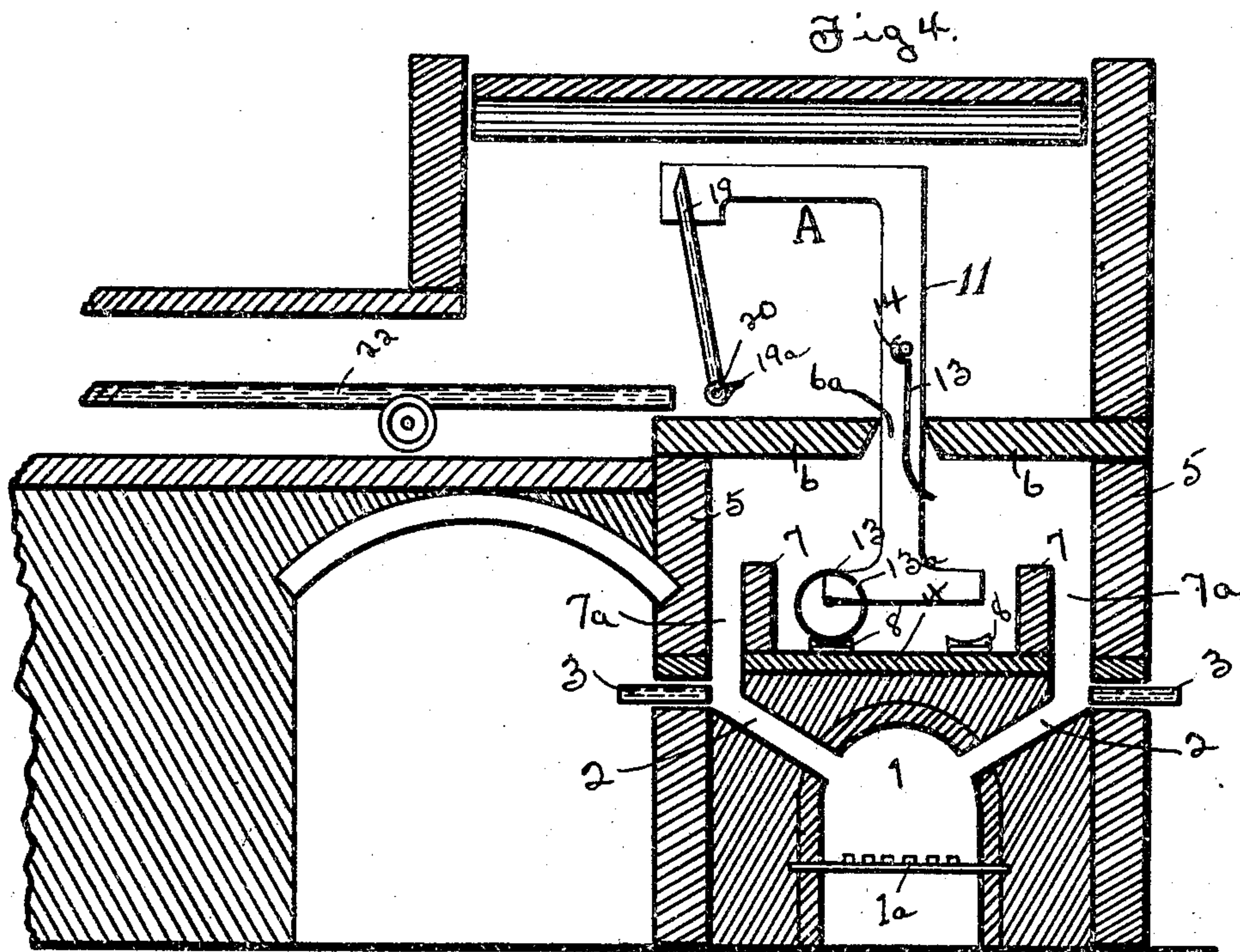
C. J. HURREL.

APPARATUS FOR FLATTENING CYLINDERS FOR MAKING WINDOW GLASS  
AND OVEN FOR SAME.

NO MODEL.

APPLICATION FILED JUNE 23, 1903.

3 SHEETS—SHEET 3.



Witnesses

Percy S. Webster.

Theodore G. E. Hunt.

Inventor  
Charles J. Hurrel

By Joshua B. Webster

Attorney



# UNITED STATES PATENT OFFICE.

CHARLES J. HURREL, OF STOCKTON, CALIFORNIA.

APPARATUS FOR FLATTENING CYLINDERS FOR MAKING WINDOW-GLASS AND OVEN FOR SAME.

SPECIFICATION forming part of Letters Patent No. 767,341, dated August 9, 1904.

Application filed June 23, 1903. Serial No. 162,823. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES J. HURREL, a citizen of the United States, residing at Stockton, in the county of San Joaquin and State of California, have invented certain new and useful Improvements in Apparatuses for Flattening Cylinders for Making Window-Glass and Oven for Same, of which the following is a specification, reference being had to the accompanying drawings.

The invention has for its object improvements in ways, means, and apparatus employed in the flattening of cylinders of glass into sheets for making window-glass; and it consists in the arrangement and combination of parts and manner of operating same, which will be more fully described hereinafter.

In the drawings, Figure 1 is a front elevation of a furnace containing my improved flattening oven or chamber and a portion of my glass-flattening apparatus. Fig. 2 is a rear elevation of the same, also showing certain portions of the equipment. Fig. 3 is a plan of a portion of the furnace, shown in section through line X X of Fig. 1. Fig. 4 is a front sectional view showing the inside of the furnace and portions of its equipment. Fig. 5 contains a sectional plan of the furnace-outlines, in part through the line Z Z of Fig. 2, and also a plan of the sheet-glass-delivering apparatus shown by side elevation in Fig. 4. Fig. 6 is a plan shown in section through line Y Y of Fig. 1, also showing cylinders of glass in position and without the floor of the oven.

In all the figures like parts are marked with similar numerals and letters of reference.

I first construct a suitable furnace adapted to the use of my invention, of which furnace Figs. 1 and 2 and 4 present all the features which I claim and of which 1 designates the fire-box, of which 1<sup>a</sup> is the grate of any desired pattern. 2 designates four inclined flues leading from the fire-box 1 into the flattening oven or chamber at points of equal proportion. 3 designates dampers controlling the heat on its passage upward from the fire-box to the flattening-oven through the flues 2 and which are inserted through orifices in the furnace-walls. 4 is the floor of the flattening-oven, upheld by the arch of the fire-box 1 at its immedi-

ate center. 5 designates the side walls of the furnace, inclosing the flattening-oven. 6 is the top of the flattening-oven, having an opening or horizontal slot 6<sup>a</sup> in its center for the purpose as will be shown. 7 designates two vertical septums or division-walls, having their base upon the floor 4 of the oven parallel with and inclosing two benches 8, provided with concave surfaces adapted for the direct reception of the glass cylinders when in the inceptive stage of my process for flattening the same. 9 designates the front entrances to the flattening-oven, through which the cylinders of glass are admitted and placed on the benches 8. These entrances are provided with suitable doors. (Not shown.) 10 and 11 are vertical slots with horizontal extensions at their apexes in the front and rear walls, respectively, of the furnace and are provided each with channels 12 for purposes hereinafter shown. 13 is one of the cylinders of glass resting on a concave-face bench 8 in a position for the first stage of the process. 13<sup>a</sup> is the usual longitudinal split in a cylinder previously prepared for the flattening process by any suitable method. 14 designates grasping-pincers extending from the rear wall to the front wall of the furnace and provided at their extremities with small wheels 14<sup>a</sup>, which traverse the channels 12 of the rear and front slots 10 and 11, respectively, and which regulate and guide the position of the pincers 14 in connection with a wire rope or chain 15, engaging with a pulley 16, turning on a shaft having its bearings on a carrier-frame 17. 18 designates grooved pulleys having bearings on standards 18<sup>a</sup>, which rest on top of furnace and on which the carrier-frame 17 is moved back and forth, as will be shown. 19 designates horizontally-adjustable bars having beaks 19<sup>a</sup> at their feet for the purpose as will be shown. They are fastened to a shaft 20, which is operated by a handle 21. 22 designates horizontal bars which move upon suitable attached pulleys and upon which the sheets of glass are delivered from the bars 19 and which convey the sheets away by any suitable method. A designates the chamber of the furnace above the oven, with which it communicates by the slots 10, 11, and 6<sup>a</sup>.



Having thus described the construction generally of my furnace, and particularly the flattening-oven and its connections and internal and external machinery, I will now describe the method of operating the same for the purpose of flattening previously-prepared glass cylinders thoroughly and at a minimum cost, leaving both surfaces of the sheets smooth.

I first ignite the material, preferably crude petroleum, in the fire-box 1. The cylinders of glass 13, previously prepared with longitudinal splits 13<sup>a</sup>, are inserted through the entrances 9 of the flattening-oven and are placed on the concave surfaces of the benches 8. The heat, regulated by the dampers 3, passes through the four flues 2 into the oven, which is formed by the floor 4, walls 5, top 6, and septums 7, and permeates the entire space, including the inclosure formed by the floor 4 and septums 7. The cylinders 13 then become softened by the heat to which they are subjected to a sufficient degree. The pincers 14, attached to the rope 15, then descend, regulated by the wheels 14<sup>a</sup>, vertically traversing the channels 12 of the slots 10 and 11, and grasp the cylinder 13 at the split 13<sup>a</sup>, as is illustrated in Fig. 2, in which one of the cylinders after partial flattening is shown in the act of ascending. The pincers 14 and cylinder 13 are raised slowly by means of the rope 15 and the pulley 16. While being thus slowly raised the cylinder 13, being heated to a sufficient degree, takes on a flexible condition and gradually unrolls by means of its own weight and assumes a sheet form. As it unrolls it is drawn through the slot 6<sup>a</sup> in the top of the oven 6 and when entirely unrolled will be in the upper chamber A of the furnace over the oven, in which chamber by means of the cooler temperature the sheets of glass assume firmness. At this point the carrier-frame 17, and with it the pulley 16, rope 15, pincers 14, and its wheels 14<sup>a</sup>, will be advanced, the pincers within the horizontal extension of the slots 10 and 11, by means of the grooved pulleys 18 until it is in the position shown by dotted lines, Fig. 2, so that the flattened sheets of glass may recline on the bars 19, the beaks 19<sup>a</sup> of which will comprehend the lower edges of the sheets. The pincers are then disconnected from the sheets of glass, and the bars 19 19<sup>a</sup> are turned downward, by means of the shaft 20 and the handle 21, until the sheets of glass rest on the horizontal bars 22, which in turn carry the sheets of glass away by any of the usual appliances in vogue. It will be observed that when the bars 19 assume a horizontal position they alternate with bars 22 and are a short distance below the sheets on the bars 22, as shown in Fig. 5 of the drawings.

The material used in the construction of the furnace proper and its stationary equipment is of the usual suitable kind, and nothing is claimed by me by reason thereof.

My invention has many advantages over the

methods usually employed for flattening glass, but mainly in the fact that the perfect smoothness of the glass is preserved on both sides, which is impossible by the methods heretofore practiced of rubbing the sheets of glass upon flat stones.

I do not limit myself to the precise construction of parts herein described, as it is obvious that many deviations may be made without departing from the essence of my invention.

I am aware that many of the separate features of the entirety of what I have shown are not new; but

What I do claim as new, and desire to secure by Letters Patent, is—

1. In a furnace of the type set forth, the combination with the benches having concave surfaces for the reception of glass cylinders, of walls inclosing the benches, an oven and a chamber arranged thereabove with a communication between the two, and flues for conveying the heat from the fireplace to the oven.

2. A device of the type set forth comprising a fire-box, an oven arranged thereabove, flues connecting the fire-box to the said oven with means for controlling the passage of heat from the fire-box into the oven, a chamber located above the oven, with a slot in the floor of the chamber whereby communication is established with the oven, and means for elevating the material in the oven to said chamber through said slot.

3. A furnace of the type set forth comprising a fire-box with a flattening-oven arranged thereabove, a series of inclined flues leading from the fire-box into the oven, a top on the oven with a chamber arranged thereabove, said top and the oven forming the bottom of the chamber, said top being slotted to permit communication between the oven and the chamber, the front and rear walls of the furnace having vertical slots therein, with means guided in said walls for raising the material acted on from the oven to the chamber.

4. A furnace having a fire-box and an oven arranged thereabove, with means for the passage of the heat from the fire-box into the oven, a chamber over the oven, the bottom of the chamber constituting the top of the oven, said chamber-bottom having a slot therein communicating with the oven, walls in the oven with benches arranged therebeneath and supported by the oven-floor.

5. In a furnace of the type set forth, a fire-box having an oven thereabove with flues communicating with said oven and fire-box, a chamber over the oven with means of communication between the oven and chamber, the rear and front walls of the furnace having guides formed therein, and means for elevating the product from the oven into said chamber, said means being guided in said guides.

6. In a furnace of the type set forth, an oven with benches arranged therein, the front



and rear walls of the furnace having vertical slots therein, a chamber above the oven and communicating therewith, the pincers 14 guided in said slots of the front and rear furnace-walls, means for elevating the pincers into said chamber and means for advancing said pincers.

7. A furnace of the type set forth comprising an oven and a chamber with a communication therebetween, benches in the oven, means for elevating the material acted upon from said oven into the chamber, and means for removing the material after it assumes a sheet form from the furnace.

8. A furnace of the type set forth consisting of an oven, with a chamber arranged thereabove, means for elevating the material acted on from the oven to the chamber, and means supported on the roof of the furnace for advancing said elevating means after the

material has been elevated to the said chamber, with conveying means for advancing the material after flattening.

9. An apparatus of the type set forth consisting of an oven, means for delivering the material from said oven, means for advancing the material after flattening, and means for engaging said material during the advancement thereof after flattening comprising a series of pivotally-mounted bars, with means for operating the same, and further means located adjacent said bars for receiving the material therefrom.

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

CHARLES J. HURREL.

Witnesses:

PERCY S. WEBSTER,  
JOSHUA B. WEBSTER.