

No. 760,959.

PATENTED MAY 24, 1904.

T. W. CONNINGTON.  
APPARATUS FOR BENDING GLASS.

APPLICATION FILED JULY 20, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

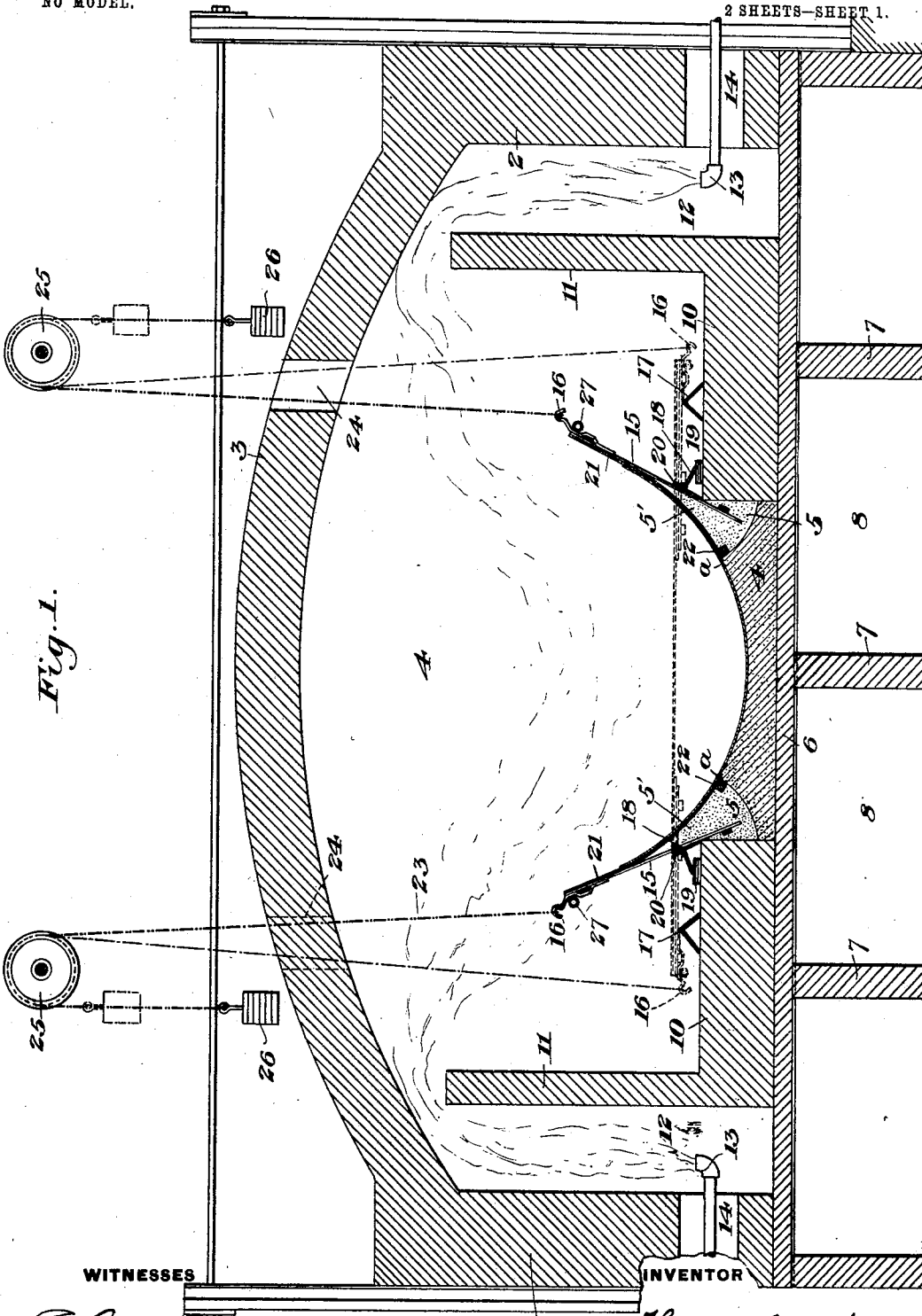


Fig. 1.

WITNESSES

INVENTOR

*T. W. Connington*  
*St. M. Connington*

Thomas W. Connington  
by *Osmondell Rogers*  
his Attorneys

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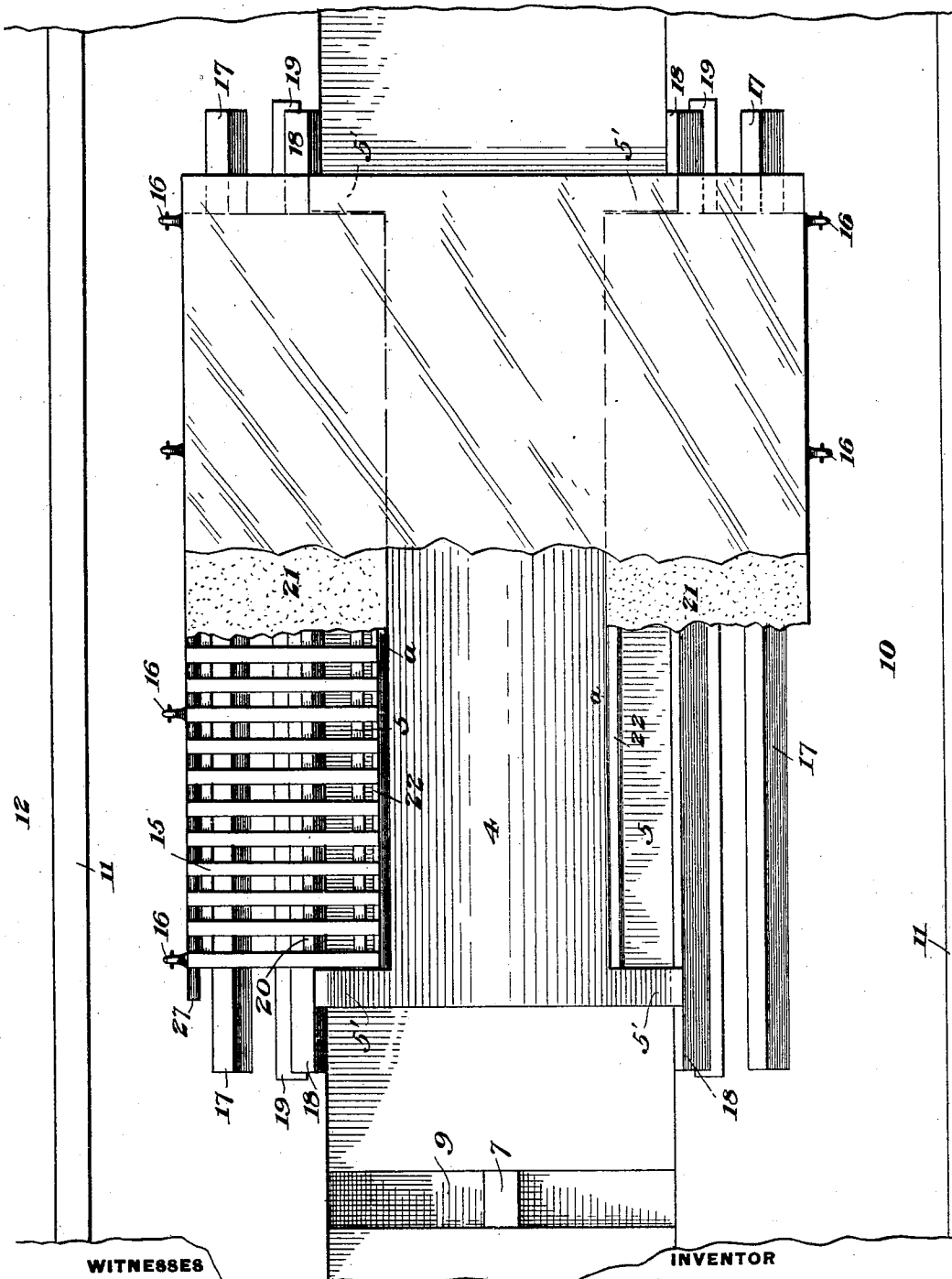
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2 SHEETS—SHEET 2.



**WITNESSES**

INVENTOR

L.A. Compton  
J. A. Compton  
Fig. 2.

Thomas W. Connington  
by Baxendell & Byrnes  
his attorneys

# UNITED STATES PATENT OFFICE.

THOMAS W. CONNINGTON, OF PARNASSUS, PENNSYLVANIA, ASSIGNOR TO  
THE AMERICAN GLASS BENDING COMPANY, LIMITED, OF NEW KEN-  
SINGTON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## APPARATUS FOR BENDING GLASS.

SPECIFICATION forming part of Letters Patent No. 760,959, dated May 24, 1904.

Application filed July 20, 1903. Serial No. 166,210. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS W. CONNINGTON, of Parnassus, Westmoreland county, Pennsylvania, have invented a new and useful Apparatus for Bending Glass, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical cross-section showing a bending-kiln constructed in accordance with my invention; and Fig. 2 is a top plan view of the same, partly broken away.

My invention relates to the bending of glass plates or sheets, and particularly to those of large size; and the object of the invention is to provide improved apparatus for bending plates or sheets of glass, by which large plates may be easily and rapidly bent or curved.

In the drawings, 2 represents the side walls, and 3 the roof, of a bending-kiln, and 4 a bending-mold which extends longitudinally and centrally of the kiln. I have shown this mold as formed of plaster-of-paris or other suitable material and having a bending-face extending between the points *a a*, beyond which the sides of the mold are cut away through the portions 5 for a part of their length. The end portions 5' of the mold form extended molding-faces to shape the glass beyond the parts shaped by the intermediate portion of the mold. This mold is shown as resting upon a tile or brick floor 6, carried on longitudinal piers 7, between which are formed longitudinal flues 8 for the products of combustion, which pass down through the ports 9 at one end of the kiln.

The mold sits between two longitudinal piers 10, having outer vertical longitudinal baffle-walls 11 extending parallel with the side walls and forming flues 12 for the passage of the flame and gases into the oven. I have shown gas-burners 13 projecting into the flues 12 through the open ports 14, by which air passes in and burns with the gas to give the bending heat.

Along each side of the walls and overhanging it are two oppositely-located grids 15,

each preferably built up of iron or steel bars and having a series of hooks 16 secured along its outer edge. These racks rest upon angle-bars 17 and 18, lying longitudinally of the piers, of which the angles 18 serve as hinge members upon which the racks 15 turn. I have shown one leg of the angle 18 as resting on a series of plates 19, by which the angle of the front face of the other flange or leg may be adjusted to a tangent to the curve on which the sheet is to be bent or to any desirable angle. The longitudinal intermediate bars 20 of the grids bear against the angles 18 and prevent the grids from sliding downwardly as they tilt during the bending operation.

I preferably cover each grid with a layer of asbestos board 21 or similar material, which projects at its front end beyond the grid and engages a stationary longitudinal bar 22 at the inner edge of the recess 5 in the mold. The hooks 16 are engaged by wire ropes, chains, or other flexible connections 23, which extend up through holes 24 in the roof of the kiln and pass over exterior pulleys 25. The outer ends of these connections are provided with adjustable weights 26 to assist in swinging the grids or swinging supports during the latter part of the bending. I have shown the racks or grids as having tubular weights 27 extending along their outer edges to hold them from tipping until the glass begins to sink into the mold.

In using the apparatus according to my invention the racks are placed in the horizontal position shown in dotted lines in Fig. 1, and the sheet or plate of glass is carried in through the end door of the kiln and laid on the grids with its intermediate portion over the mold. At this time few, if any, weights are applied to the outer ends of the flexible connections 23. The kiln being then closed, the heat is applied through the burners or any suitable source of heat, and the flame and gases circulate upwardly over the baffle-walls, through the bending-chamber to the end ports 9, and thence back through the floor-flues to the outlet. As the glass reaches the bending

heat its central portion will sag down, and as this takes place the racks will begin to swing upwardly under the weight of the sagging glass. When the intermediate part of the  
 5 glass sheet sinks into and takes the shape of the mold-cavity, the asbestos shields will rest at their inner ends on the bars 12 and seal the intermediate part of the glass to prevent the  
 10 gases entering between it and the mold and heating and melting this part of the sheet. The grids swing down into the recesses 5 at the sides of the mold-cavity proper and assume a position which is determined by the front inclined faces of the hinging angles.

15 To insure the complete bending of the side portions of the glass, weights may be added to the outer ends of the flexible connections to swing up the outer ends of the grids to their final position, especially when very wide  
 20 sheets are bent. The weights are proportioned to the weight of the glass. The position of the weight will show the amount of bending, or any other desired indicator device may be used on the exterior portion of the flexible  
 25 connections to show the amount of bending at different stages of the bending operation. By varying the angle of the faces for the hinge members, which form stops for the grids, I insure the bending of the outer portion  
 30 of the glass to a tangent or to any angle desired.

The advantages of my invention result from the capability of bending large sheets or plates of glass. Heretofore in the bending of glass  
 35 sheets it has been impossible to employ, unless of a very shallow bend, sheets beyond eight or nine feet in width, as the glass will crack when this is exceeded; but by supporting the side parts of the sheet on the swing-  
 40 ing frames or members I am enabled to bend any width or length or depth of plate desired. The mold is of course changed according to the curve or shape of plate desired.

The swinging support or grid may be used  
 45 at one side only of the mold, and the apparatus may be varied widely without departing from my invention, since I consider myself the first to bend glass of greater width than the mold by supporting and carrying the projecting portion upwardly during the bending  
 50 operation.

I claim—

1. In glass-bending apparatus, a bending-

kiln, a mold therein, and a swinging support for the glass sheet at one side of the mold; 55 substantially as described.

2. In glass-bending apparatus, a bending-kiln, a mold therein, a swinging support at one side of the mold, and an indicating device extending from the swinging support to the  
 60 outside of the kiln; substantially as described.

3. In glass-bending apparatus, a bending-mold having a recess at one side, and a swinging support overhanging the recess and arranged to enter it as the glass sinks into the  
 65 mold; substantially as described.

4. In glass-bending apparatus, a bending-kiln, a mold therein, a tilting support for the glass at one side of the mold, and a stop arranged to limit the tilting movement of the  
 70 support; substantially as described.

5. A glass-bending oven, a bending-mold therein, a tilting support at one side of the mold, and a flexible connection leading from the tilting frame to a point outside the kiln; 75 substantially as described.

6. A bending-mold having a recess at one side, and a shaping portion extending beyond the recess, and a tilting side support for the glass arranged to swing within the recess; 80 substantially as described.

7. A glass-bending mold having a recess at one side for a part of its length, and a tilting support movable within the recess; substantially as described. 85

8. A glass-bending mold having a swinging side support and an adjustable stop to limit the movement of the support; substantially as described.

9. A bending-mold, a tilting side support, 90 and a flexible flap arranged to seal the side portion of the glass sheet; substantially as described.

10. In glass-bending apparatus, a bending-kiln, a bending-mold therein having oppositely-located tilting supports at its side and arranged to support the side portions of the glass during bending; substantially as described. 95

In testimony whereof I have hereunto set  
 my hand. 100

THOS. W. CONNINGTON.

Witnesses:

L. M. REDMAN,  
 H. M. CORWIN.