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J. R. DENMAN.

Art of Annealing Glass.

No. 229,976. Patented July 13, 1880.

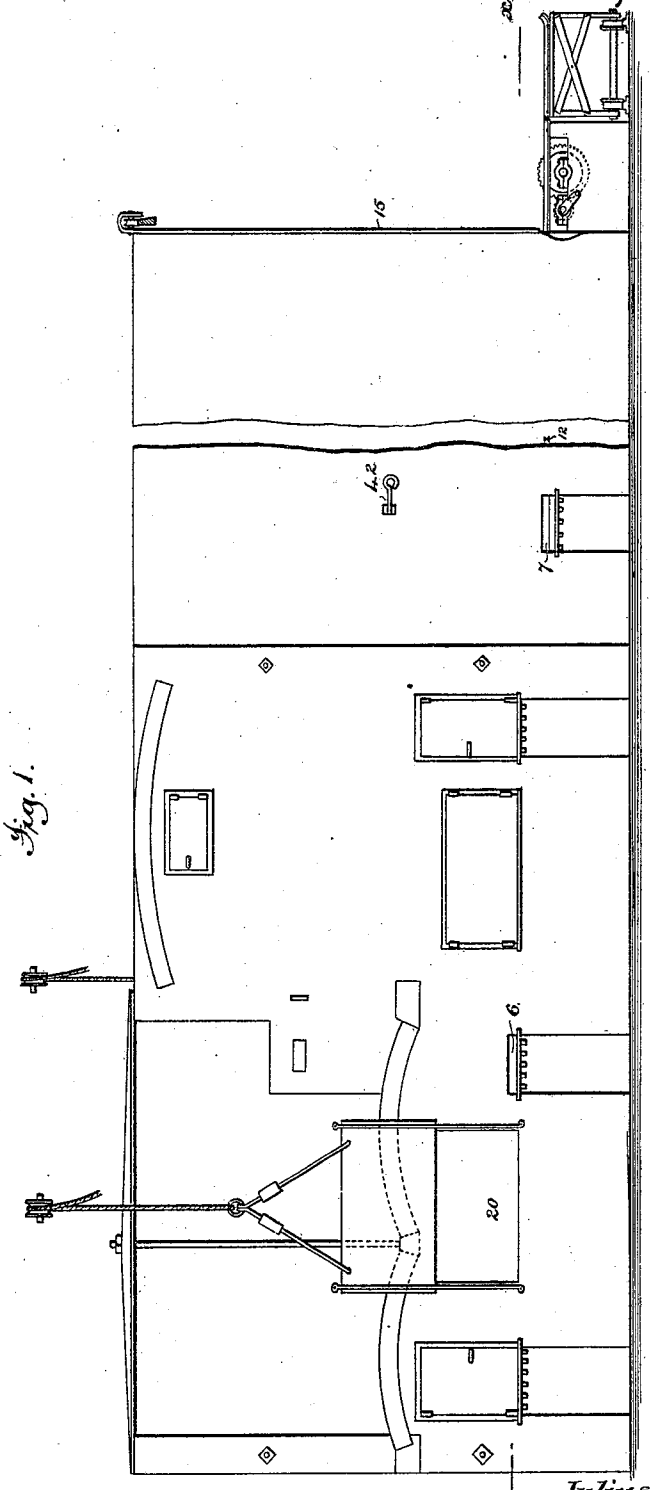


Fig. 1.

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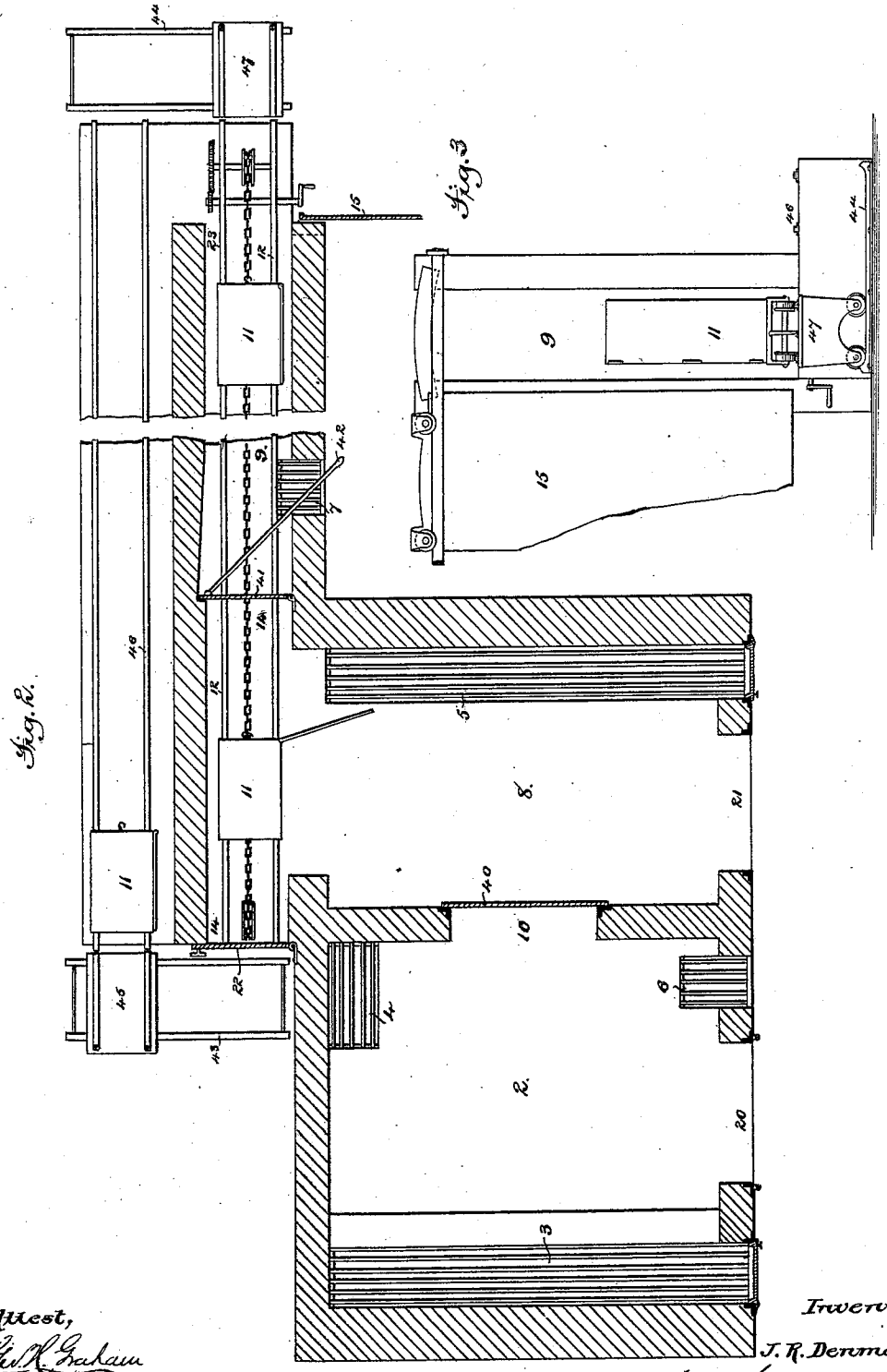
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Fig. 4.

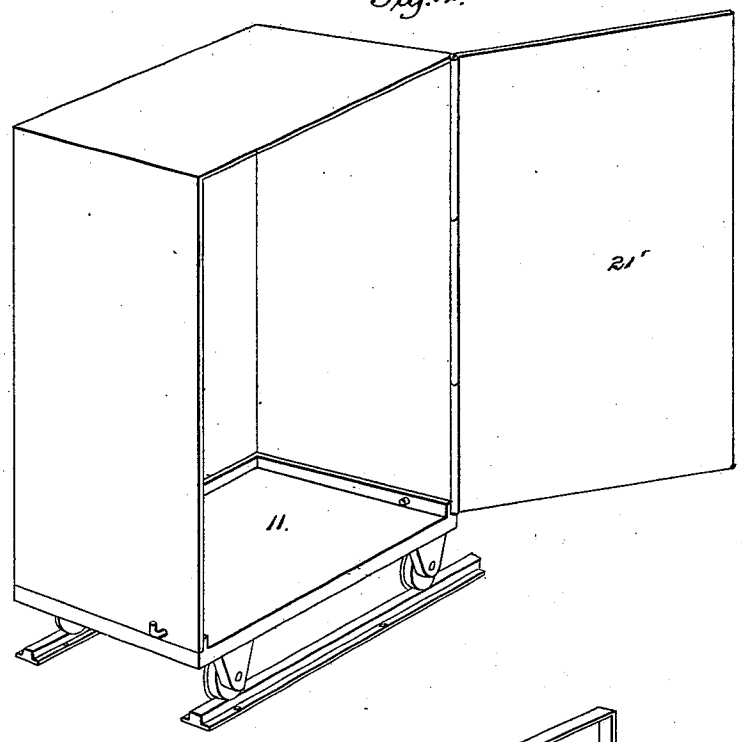


Fig. 6.

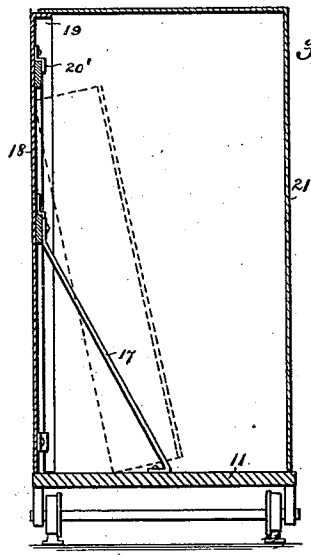
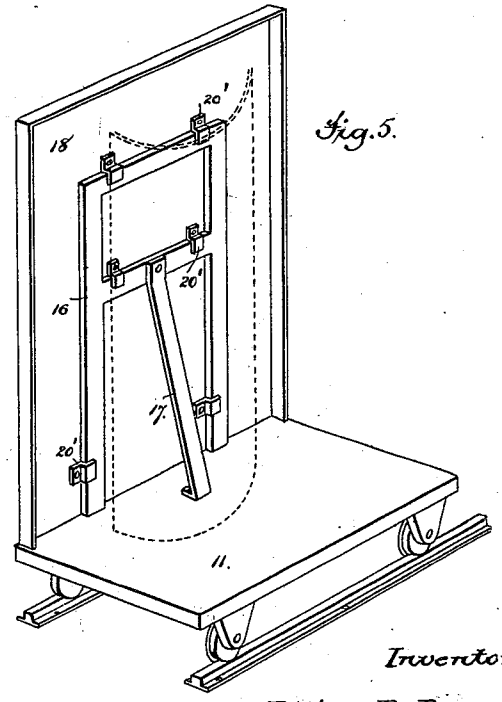


Fig. 5.



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UNITED STATES PATENT OFFICE.

JULIUS R. DENMAN, OF NEWARK, ASSIGNOR TO DANIEL A. VANHORNE, OF ORANGE, NEW JERSEY.

ART OF ANNEALING GLASS.

SPECIFICATION forming part of Letters Patent No. 229,976, dated July 13, 1880.

Application filed November 14, 1879.

To all whom it may concern:

Be it known that I, JULIUS R. DENMAN, of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in the Art of Annealing Glass; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to bend or flatten and anneal glass more economically than has heretofore been done, and with less danger of cracking or breaking the same.

My invention consists in a method of producing flattened or bent and annealed glass, consisting in first bending or flattening the plate of glass on a car in an oven of a proper temperature, then moving the car with the plate on it to an oven of a lower temperature, then transferring the plate to another car, and then, when the desired number of plates has been transferred to said car, moving the latter into an annealing-leer having a lower temperature than the last oven, and then transferring the car to the open air to remove the glass; also, in the method of obviating the breaking of the glass in annealing the same by standing it on its edge and covering the same; also, in the apparatus for carrying out such methods, all of which will be hereinafter more fully described and claimed.

In the drawings, Figure 1 is a side elevation of one form of furnace for carrying out my invention. Fig. 2 is a horizontal section of the same, taken on line *x x*, Fig. 1. Fig. 3 is an end elevation of the annealing-leer. Fig. 4 is a perspective view of a car with means for supporting the flattened or bent plates of glass on their edges and covering the same. Fig. 5 is a perspective view of a modification of the car shown in Fig. 4 with the cover removed. Fig. 6 is a cross-section of the same with the cover in place.

In the drawings, 2 and 8 represent ovens, having openings 20 21, controlled by dampers which can be raised and lowered, one of which, belonging to the opening 20, is shown in the drawings as raised. The oven 2 is heated to a temperature of about 1,500° Fahrenheit by the fire-holes 3, 4, and 6. The oven 8 is heated to a temperature of about 1,000° Fahrenheit by means of a fire-hole, 5.

The ovens 2 and 8 are connected by an opening, 10, controlled by a damper, 40. The oven 8 is also provided with an opening, 14, controlled by a damper or door, 22, and has leading from it an annealing-leer, 9, opening out of the oven 8, said opening being controlled by a damper or door, 41, operated by a rod, 42, extending through the side of the leer. The leer 9 also has an opening, 23, controlled by a door, 15.

Through the leer 9 and oven 8 is a railroad-track, 12, on which annealing-cars 11 stand and are moved, and at each end of the track 12 are tracks 43 44, having transfer-cars 45 47 for transferring the cars 11 from the annealing-leer 9 to a track, 46, parallel with it, and back to the track 12.

The leer 9 is heated by the fire-hole 7 to about 500° Fahrenheit.

The ovens and their fire-holes are constructed in accordance with my invention described in United States Patent No. 156,776, dated November 10, 1874.

Each car 11 is preferably made with a back, sides, top, and door, as shown in Fig. 4 of the drawings, to enable the glass to be supported on its edge and also be covered.

Each car 11 may be constructed, as shown in Figs. 5 and 6, with a fixed frame, 16, secured to its floor at one side, with a brace, 17, which is fastened to the same and to the floor of the car to give it greater strength. To this frame 16 is secured a removable back, 18, having flanges 19, and, as shown in the drawings, the removable back is secured to the frame 16 by means of ears 20′, which fit over and on the said frame, enabling the said back to be readily removed. A cover, 24, also removable, is provided to cover the remaining sides and top of the car 11, and the sides thereof fitting over the rims or flanges 19 of the removable back 18.

It will thus be seen that the interior of the car and the contents thereof will be entirely surrounded and covered by the back 18 and cover 21′.

By thus providing each car 11 with a removable back and cover the placing and securing thereto of backs varying in height is

allowed, and, if necessary, within narrow limits in the width thereof, to suit the size of the glass being annealed. It is also obvious that the frame 16 may be omitted entirely, and the back 18 be secured to the truck rigidly in its stead, such a construction being desirable where glass of only one size is made. It is also obvious that the flanges 19 may be extended to form the sides and top, and the cover made with flanges just wide enough to fit over the same.

Cars constructed as above described protect the lights of glass from any dirt, dust, or other foreign substances which may be in the air, and also from drafts of cold air, which would otherwise injure them. The cover, instead of being loose, may be hinged to the flanges 19 or back 18, if desired.

The cars 11 are propelled through the oven 8 and leer by a chain, to which they are hooked and which is turned by a windlass, (shown in the drawings.)

In carrying out or practicing my invention the ovens 2 8 and leer 9 are brought to the proper temperature by fires in the fire-holes 3 4 5 6 7, all the dampers and doors being closed. The damper of opening 20 is then raised and a plate of glass placed upon a car resting on the floor of the oven 2. It is then, while on the car, flattened, if window or picture glass is desired, or bent, if bent or curved glass is desired, in any well-known manner. The damper controlling the opening 10 between the ovens 2 and 8 is then raised and the car with its plate of glass pushed into the oven 8, the damper between said ovens being then closed and the damper controlling the opening 21 opened. The plate of glass is then removed from the car and transferred by forks inserted through the opening 21 onto a car, 11, which has been heated, either in the oven 8 or elsewhere, to the temperature of said oven, where said plate is stood on its edge upright, or nearly upright, resting against the back, or, if curved glass, standing alone on the bottom of the car 11. The damper controlling the opening 10 is then opened and the bending or flattening car moved back into the oven 2. The damper controlling the opening 21 is then closed and another plate of glass is placed through the opening 20 upon the car, where it is bent or flattened, the car being then again moved into oven 8 and the plate transferred to the car 11, as before described. When the car 11 has received its full complement of plates, varying from twenty to thirty, generally, the cover is then placed thereon, or the door closed, and the glass resting on its edge is completely covered. The door 41 is then opened and the car 11 is moved over the track 12 by the chain into the leer 9, when the damper or door 41 is closed, and after the proper time the glass is ready to be removed, with the car, through the opening controlled by the door 15 and handled.

To heat the cars 11, one or more empty ones may be kept in the oven 8, and when filled their places supplied with other ones that have stood empty while one has been filled.

The length of time required to anneal glass by my method is about from three to five minutes in the oven 2, from three minutes to five hours in the oven 8, depending on how many plates of glass are to be placed on each car 11, and from one-half hour to five hours in the leer 9.

By my improved method of annealing glass the fires of the furnaces have never to be drawn for the sake of removing the glass, which fact causes the capacity of furnaces constructed after the manner of my improvement herein described to be greatly increased thereby, and the glass is not so liable to crack or be broken.

I am aware that furnaces are old in which glass is flattened on a bed in one heated chamber and then transferred on edge to an open car that passes through another heated chamber, and that a close car in which the glass is laid flat, instead of on edge, is also old. I therefore make no claim herein to such devices.

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

1. The method of producing flattened or bent annealed glass, consisting in first bending or flattening the plate of glass on a car in an oven of a proper temperature, then moving the car with the plate on it to an oven of a lower temperature, then transferring the plate of glass to another car, and then, when the desired number of plates has been transferred to said car, moving the latter into an annealing-leer having a lower temperature than the last oven, and then transferring the car to the open air to remove the glass, substantially as described.

2. The method of obviating the breaking of glass by standing it on its edge and covering the same, substantially as described.

3. The combination of the bending or flattening oven 2 with the oven 8 and annealing-leer 9, substantially as described.

4. A car for receiving the bent or flattened glass, provided with means for supporting such glass on its edge and for covering the same, combined with the oven 8 and annealing-leer 9, substantially as described.

5. The combination, with a car, 11, provided with a supporting-frame, of a removable back and cover, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS R. DENMAN.

Witnesses:
JOHN BOLESCHKA,
GEO. H. GRAHAM.