(No Model.)

G. R. WILLIAMS.

GLASS FLATTENING FURNACE.

No. 305,555. Patented Sept. 23, 1884.

Fig. 1.

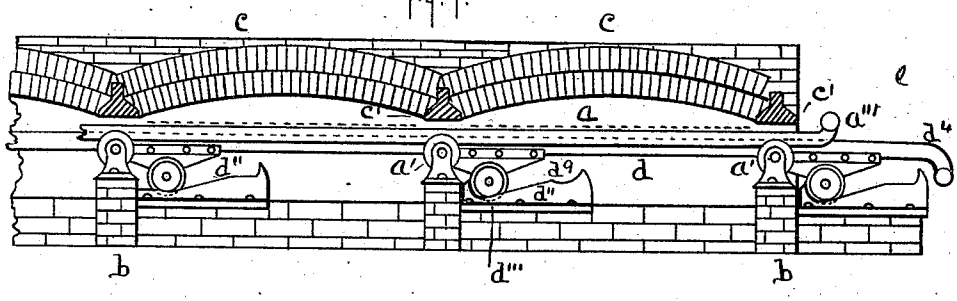
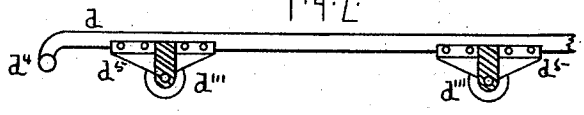
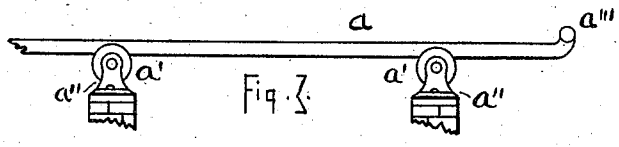
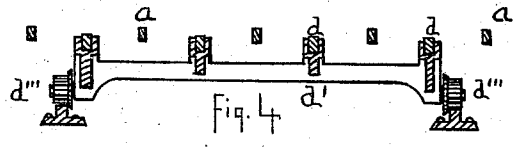
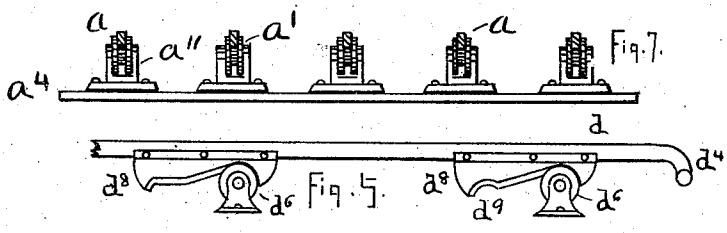


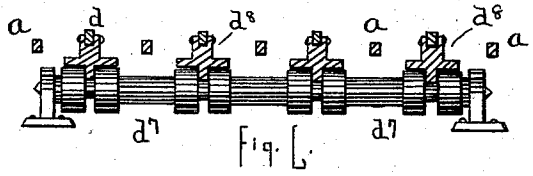
Fig. 7.











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UNITED STATES PATENT OFFICE.

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GLASS-FLATTENING FURNACE.

SPECIFICATION forming part of Letters Patent No. 305,555, dated September 23, 1884.

Application filed March 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. WILLIAMS, a citizen of the United States, residing at Ithaca, Tompkins county, New York, have invented an Improved Glass-Flattening Furnace, of which the following is a specification.

My invention relates to furnaces in the leer or tunnel of which are two sets of longitudinal bars, which are used to convey the sheets of glass at intervals through the leer; and my invention consists in the means by which I suspend and move the said bars, as will be apparent as I describe my invention.

Figure 1 is a side elevation of the rear or exit end of a leer and a portion of its arches seen in section with my invention in it. Fig. 2 is a detached side view of one of the longitudinal bars which have an upward and downward motion; but the end is reversed, as indicated, to show that the opposite side of the bar is delineated from that seen in Fig. 1, and hence the cross-bar or frame is represented in divided section. Fig. 3 is a detached view of one of the longitudinal bars that have a motion longitudinally, but not an upward or downward motion. Fig. 4 is a side detached view of the cross-bar frame supporting the set of bars which have an upward and downward motion on truck-wheels, and with the position of the other set of longitudinal bars indicated. Fig. 5 is the equivalent of the incline planes of Fig. 1 reversed—that is, the inclined planes are attached to the longitudinal bars in a reversed position, in which case the truck-wheels are fixed or do not move with the bars, as shown in Figs. 1 and 2; Fig. 6, a view of a roller-support for the bars *d*, and Fig. 7 a view of the wheeled support of the bars *a*.

In the figures, *a* is one of two sets of longitudinally-arranged bars—namely, the set that in Fig. 4 are shown to be five in number, and which lie in grooves in the wheels *a'*, Fig. 1, which wheels are in standards or frames *a''*, fast to the cross-walls *b*. These cross-walls are the distances apart of the length or the width of a sheet of glass, as indicated by the dotted lines just above the bars *a* of Fig. 1. The arches *c*, which make the cover of the leer or tunnel, are supported on the iron cross-beams *c'*, and with the cross-walls *b* just beneath the beams make narrow throats to the leer for regulating, in part, the heat of the leer. Just below the set of bars *a* is the set of bars *d*, which, by the inclined planes seen in Fig. 1, have an upward and downward motion, and also a longitudinal motion to some extent. The longitudinal motion of these bars is not desirable, and is only had because inclined planes cannot be used to elevate and lower this set of bars without such longitudinal motion. To the under side of these bars, near each cross-wall, a little to the rear of said walls, is attached a cross-bar frame, *d'*, whose structure, by a side view in Fig. 4, is easily understood. It has the bars *d* fast in certain elevations, which are necessary in order that the cross-bar *d'* may not touch the bars *a* of the other set when they are elevated so high as to take the sheets of glass off of the sets of bars *a*. The variation of height of the bars *d* should be from about a half an inch below the bars *a* to a half of an inch above the bars *a*, or other extent of variable height that may be thought necessary. On each end of this cross-bar frame are truck-wheels, made similar to car-wheels, which run on the rails of the incline planes *d''*. In order to steady these bar-frames, there is an anterior and posterior bracing, d^5, Fig. 2, (seen in Figs. 1 and 2, extending along the bars,) and by which the cross-bar frames are bolted to the bars. Two handles, a little bent, *a''* upward and d^4 downward, when drawn upon, move backward and forward the two sets of longitudinal bars. Thus when the handles *a''* are drawn upon the bars *a* move outward from the exit end *e* of the leer to the extent of one sheet of glass, which is then taken off. When on the wheels *a'* the bars *a* are pushed back into the leer, to receive another sheet of glass on their ends next to or above the flattening-wheel of the furnace, the handle d^4 having in the meantime been drawn upon, which causes the wheels *d'''* to roll up the inclines *d''*, thus elevating the bars *d* above the bars *a*, and thereby the bars *d* receive all the sheets of glass then in the leer; and as soon as the bars *a* are back in the leer the distance which they were drawn out, the bars *d* are run down the inclined planes to their original or starting place, and this use of the two sets of bars is thus continued as long as the leer is operated or sheets of glass passed through it.

In Fig. 5 the bars *d* themselves are not changed, but the incline planes *d''* of Fig. 1

are represented as bolted to the bars, and the wheels d''' of Fig. 1 are shown as fixed in stationary frames, similar to the wheels a' of the set of bars a. The advantage of this arrangement is that there are no cross-bar frames necessarily fast to the bars d, and to be liable to damage by heat, nor any fixing of the bars to anything, so that the heat might unequally expand or warp them; but the bars d, like the bars a, lie loose in the grooved wheels that support them. In this case the grooves in the wheels should be as deep as possible, that these bars do not bend or turn over sidewise by the heat. Or the wheels d^6, which are in place of the wheels d''', Fig. 1, may be made in one roller, d', Fig. 6, in which case the planes d^8, Fig. 5, should be made flanged, as seen in Fig. 6, and bear on the rollers, as would be the case were the bars and inclines made of T-shaped bars, so generally in common use in bridges, roofing, and for other purposes.

In Fig. 6 the bars d are shown at their highest point, the bars a being below them, and, consequently, the flanged planes bolted to the bars d in that figure are at their extreme height above the roller d', which roller is grooved and supported at its ends by standards which are fixed fast in the bottom of the inside of the leer. While thus speaking of the possibilities of my invention in its form reversed from Fig. 1, it will be seen to be clear that instead of a roller, d', each bar of the series d may be supported on a framed wheel, such as those at a'', Fig. 3, only that the top bearing of each wheel is made amply wide, as is shown in the roller. Of course it is apparent that if the inclined planes be made fast to the bars d the wheels or rollers just described must be placed, not just to the right hand of each cross-wall, but just to the left hand of the cross-wall shown in Fig. 1.

In Fig. 1 two stops at the foot of the planes are shown, but not very clearly in the two right-hand planes or those next the exit end of the leer, while the left-hand plane has none, as are also those to the left. (Not represented.) This is because the two right-hand planes are quite cool and little affected by expansion by heat, while those next the flattening-wheel are hotter and more affected by heat. The same is seen of the two right-hand stops in the reversed form of planes in Fig. 5. In either form the use of these stops at the foot of the planes is to limit the return of the bars d into the leer. Another stop is seen at d^9, Fig. 5, and also at d^9, Fig. 1. The use of this cavity-stop is to hold the bars d at the head of the planes. It is now thought that two of the foot-stops are all that are necessary; but as any accident that might cause the bars d to descend the planes violently would be attended with breaking of sheets of glass, the one concave stop shown may not be sufficient, and therefore as many as safety requires must be used; or a hook or other device may be employed to hold the bars d at the head of the planes while the operator of the leer returns the bars a to their previous inward place.

That the invention I have made, when legitimately extended into details, admits of varieties of form is not only apparent by the reversed planes just described, but the form in Fig. 6 shows that long rollers with grooves for the lower projecting upright part of the inclined planes and the bearing-surfaces for the lateral flanges may be used in a similar manner for the bars a when they are T or cruciform shaped. In that case both sets of bars would run on sets of grooved rollers, or one set on grooved long rollers and the other on separated wheels—such as are seen in Fig. 1—the forms of Figs. 6 and 7 being either of them used in both, or one for one set of bars and the other for the other set as one pleases. The other parts, as well as the advantages and uses of my invention, are apparent.

I claim—

1. A glass-conveying set of longitudinal bars set to move in or upon wheels or rollers, which wheels or rollers are fixed in one and a uniform and unvarying level in the leer or tunnel by fastening them in studs or frames, which studs or frames are immovably fast to cross-walls or structures in the leer, as shown and described.

2. A glass elevating and lowering set of longitudinal bars, which are elevated and lowered by inclined planes on which there are wheels which move on the planes and support the bars, and this whether the wheels be attached to the bars or are fixed in immovable fixtures or foundations, on which the bars and wheels rest, and this whether the planes are fast to independent foundations or to the bars, substantially as set forth.

3. The stops or stop and rest cavities made in the tops and bottoms of the planes for the wheels to rest in, whereby the extremes of motion are fixed, and secure resting-places are made, as set forth.

4. A series of cross-bar frames, to which the longitudinal bars that are elevated and lowered are attached at intervals in the length of the leer, the said frames being structures between the wheels that move on the planes, and the bars, in combination with the inclined planes, as set forth.

5. The cross-bar handles, each handle-bar made fast to the exit end of one set of the longitudinal bars, one set of bars curving upward near their ends, and the other curving downward, thereby enabling the bars which move the glass onward through the leer on stationary wheels to move fully out at the exit end of the leer, without interference with the lesser motion of the bars that rise and fall on the planes, as set forth.

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