(No Model.) 4 Sheets—Sheet 1

J. H. LUBBERS.

GLASS ANNEALING LEER.

No. 469,790. Patented Mar. 1, 1892.

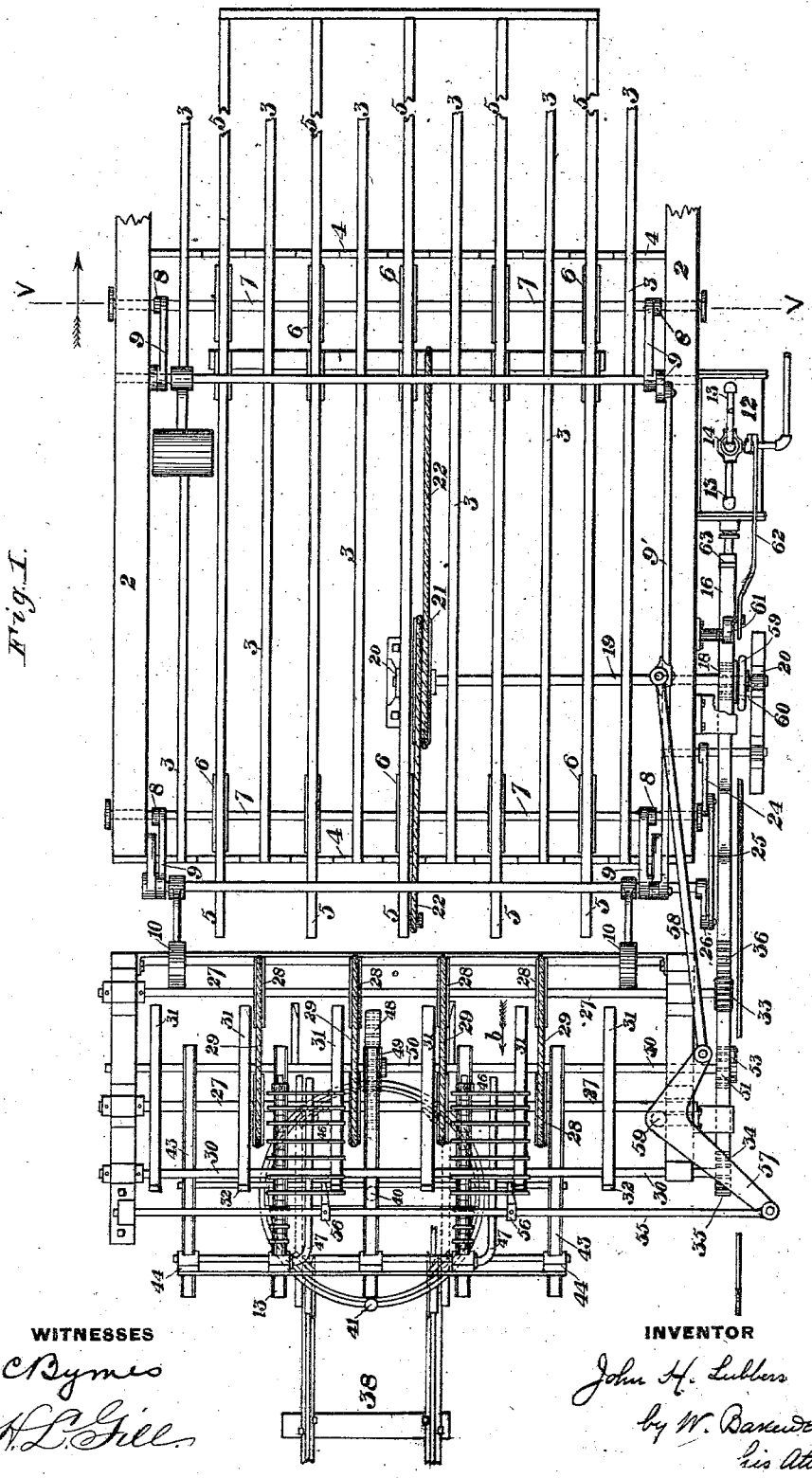

Fig. 1.

WITNESSES

C Byrnes

H. L. Gill

INVENTOR

John H. Lubbers

by W. Baxendell & Sons

his Attorneys.

(No Model.) 4 Sheets—Sheet 2.

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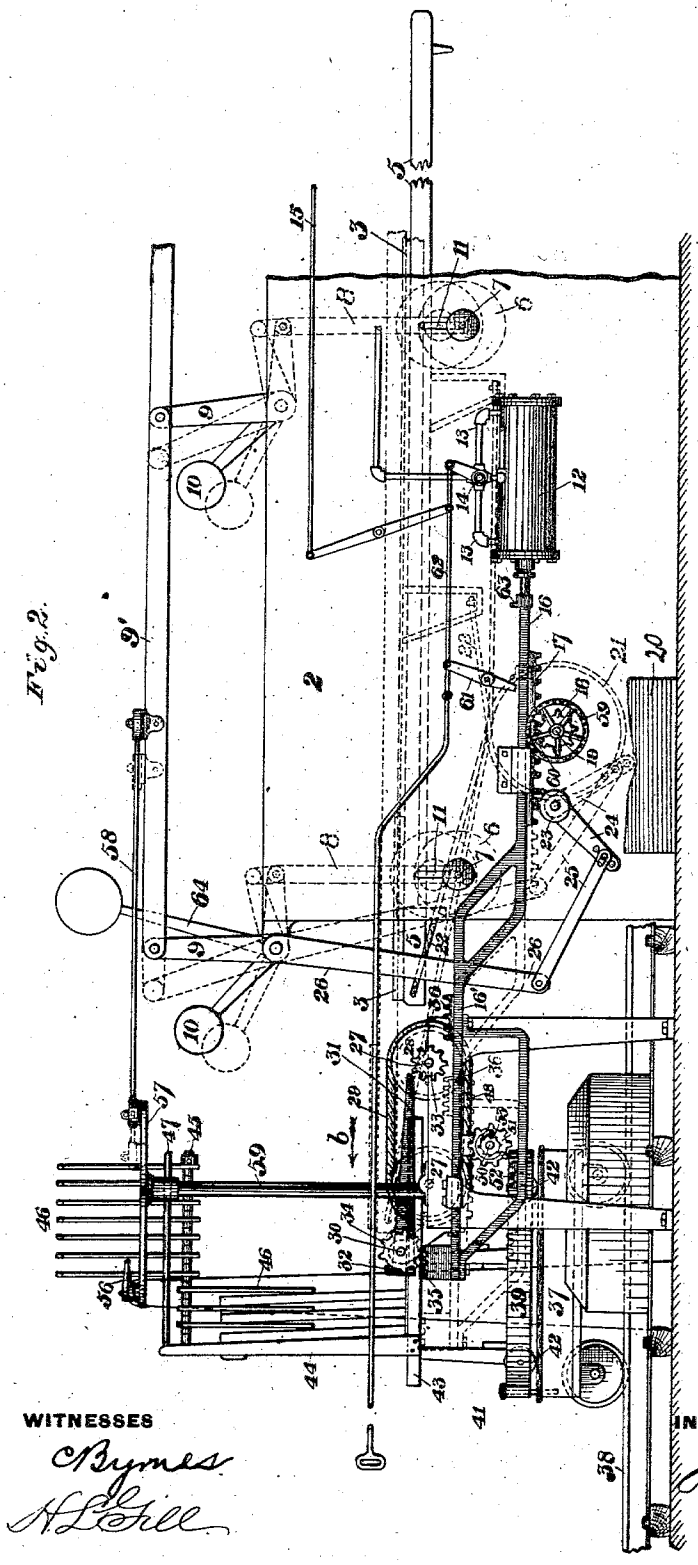
Fig. 2.



WITNESSES

C. Byrnes

H. L. Gill

INVENTOR

John H. Lubbers

by W. Baxewell & Son

his Attorneys.

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Fig. 4.

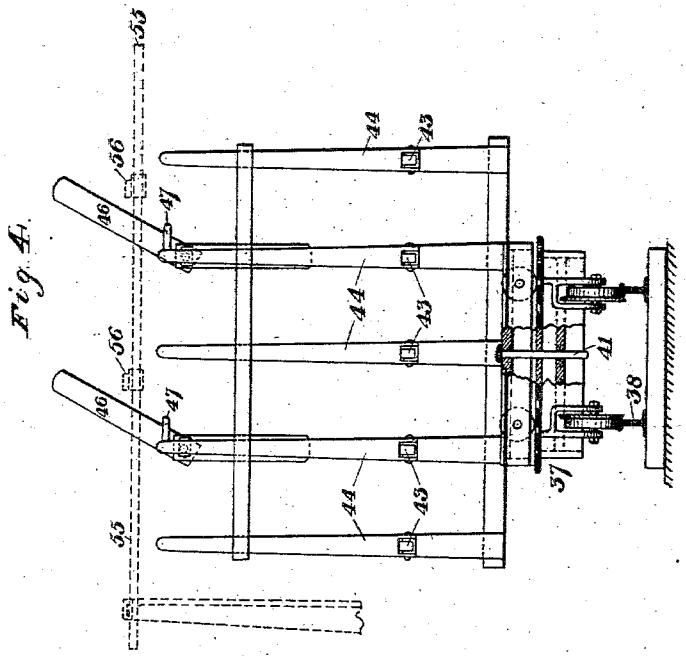
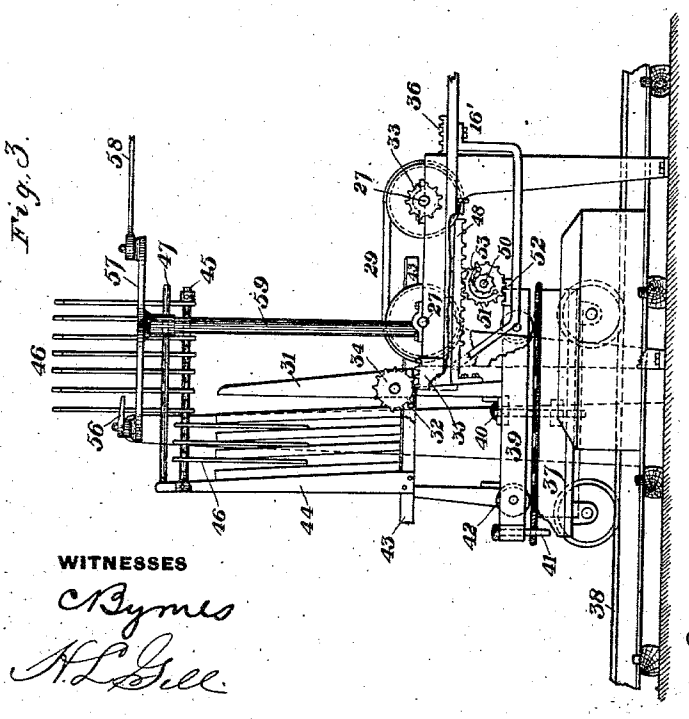


Fig. 3.



WITNESSES

C. Byrnes

H. L. Gill.

INVENTOR

John H. Lubbers

by W. Baxewell & Sons

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Fig. 6.

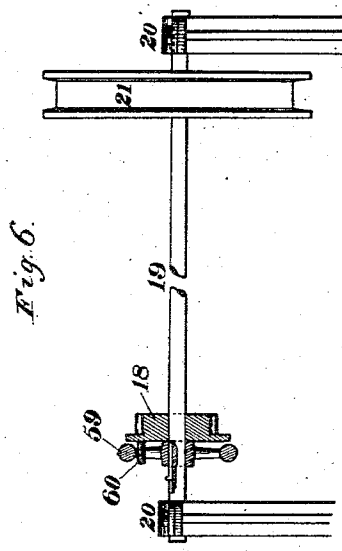
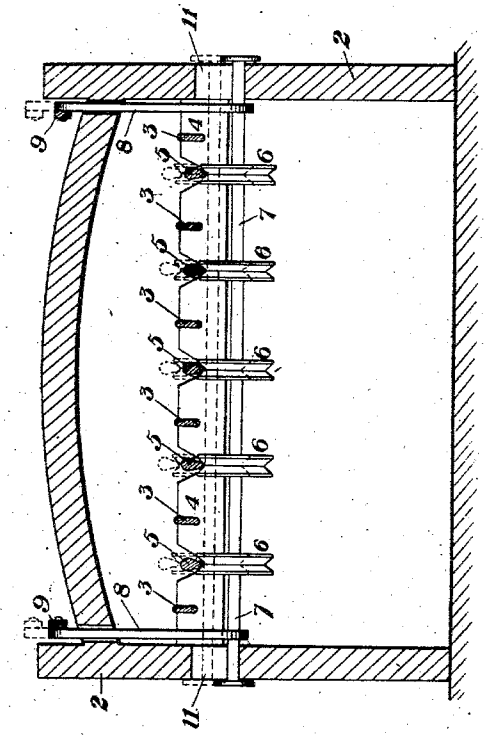


Fig. 5.



WITNESSES.

Byrnes

H. L. Gill

INVENTOR

John H. Lubbers

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his Attorneys.

UNITED STATES PATENT OFFICE.

JOHN H. LUBBERS, OF JEANNETTE, ASSIGNOR OF ONE-TENTH TO THE DIXON-WOODS COMPANY, OF PITTSBURG, PENNSYLVANIA.

GLASS-ANNEALING LEER.

SPECIFICATION forming part of Letters Patent No. 469,790, dated March 1, 1892.

Application filed April 20, 1891. Serial No. 389,544. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. LUBBERS, of Jeannette, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Glass-Annealing Leers, 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 plan view of the delivery end of a leer provided with my improved apparatus with the roof removed to show the interior mechanism. Fig. 2 is a side elevation thereof. In this figure the parts are shown in different positions by full and dotted lines, respectively. Fig. 3 is a side elevation of part of the apparatus at the delivery end. The parts of the mechanism in this figure are shown in different positions from those shown in Fig. 2. Fig. 4 is a rear elevation of the car for receiving the glass sheets and of part of the auxiliary mechanism. Fig. 5 is a vertical cross-section on the line V V of Fig. 1. Fig. 6 is an enlarged detail view, partly in section, showing the loose gear for operating the bars and causing them to be moved vertically before they are moved longitudinally.

In the drawings, 2 represents the leer, which consists of a long arched tunnel provided with conveying mechanism and having at one end a flattening furnace in which the glass cylinders, after being blown and cut longitudinally, are opened out into sheet form. After this they are passed through the leer and the gradually-decreasing temperature in the latter so anneals and tempers the glass that when the sheets are received at the delivery end they are in proper condition to be cut and made ready for use.

My invention relates to improved apparatus for manipulating the conveying mechanism of the leer and for automatically receiving the glass therefrom and stacking it upon a car, by which it may be removed to the cutting-room or first to a place where it is dipped into the usual chemicals to cleanse its surface and then to the cutting-room.

The form of conveying mechanism illustrated in the drawings consists of a set of movable bars combined with a set of stationary bars, the mechanism being so arranged that the glass is lifted from the stationary bars by the movable bars and is then advanced for a short distance by longitudinal motion of the latter. The movable bars are then depressed to deposit the glass upon the stationary bars and are pushed back to their original position, these alternate operations being continued until the glass has been carried step by step from the annealing-furnace to the delivery end of the leer. It should be understood, however, that my improvements may be applied, not only to leers constructed as thus described, but also to leers in which the bars are otherwise arranged. For example, they may be applied to the well-known hearth-leer, in which one set of reciprocating bars is used in combination with a masonry floor, or to a leer in which a second set of bars (stationary as regards longitudinal movement) is made susceptible of a slight vertical movement.

Referring to the drawings, 3 represents the stationary bars, which are arranged in parallel series and may be supported by suitable cross-bars or walls 4.

5 5 are the movable bars arranged alternately between the stationary bars and connected so as to form a grid or frame. In order that they may be longitudinally movable they are mounted on anti-friction wheels 6, which are fixed to cross-shafts 7, journaled at the side walls of the leer. The shafts 7 are vertically movable, so as to lift the wheels 6 and the bars 5, as shown by dotted lines in Fig. 5, said bars being thereby elevated above the level of the stationary bars. To effect this vertical movement I may employ hangers 8, in which the shafts 7 have bearings, and may move the hangers vertically by elbow-levers 9, which may be provided with suitable counterweights 10. The walls of the leer are slotted, as at 11, to permit the vertical motion of the shafts 7, and the levers 9 are connected by a rod 9′.

To operate the bars I employ a suitable motor, the use of which constitutes one of the items of my invention. The motor, as illustrated in the drawings, comprises a cylinder 12, having at its ends pipes 13 for the inlet of motive fluid, which may be steam, air, or water. A valve 14 is employed for controlling the admission of said fluid, admitting it to

either end of the cylinder or cutting it off altogether. 15 is a rod by which said valve may be operated by a workman standing at the flattening-oven. The piston of the cylinder 12 has a projecting rod 16, provided with a rack or toothed portion 17, in gear with a pinion 18, mounted loosely on a shaft 19, which extends within the leer below the level of the bars and is journaled in bearings 20. The pinion 18 is adapted to have a loose motion of short extent independently of the shaft 19, at the end of which motion it becomes operatively connected with the shaft and rotates the same. A convenient means for effecting this is shown in Fig. 6, in which a spoked wheel 59 is keyed to the shaft beside the pinion, and a pin 60 projects laterally from the pinion between the spokes of the wheel. The consequence of this construction is that during the first part of the forward and backward motions of the piston and rack no rotation is transmitted to the shaft until the pin engages one of the spokes and turns the wheel.

21 is a grooved pulley fixed to the shaft and provided with a cord or other connection 22, which enwraps it and the ends of which are attached to the frame of the movable set of bars at points on opposite sides of said shaft. The consequence of this construction is that if the piston-rod 16 be moved longitudinally it will rotate the pinion 18, shaft 19, and pulley 21, and by the cord 22 will move the bars forward or backward on the wheels 6, accordingly as the piston-rod is moved in one direction or the other.

In the operation of the leer the movable bars before being moved forward are raised somewhat, so as to lift the glass above the level of the stationary bars, and after being advanced to the extent of about the width of one sheet are lowered, so as to deposit the glass again upon the stationary bars. As before explained, the elbow-levers 9 and their auxiliary mechanism are employed to effect this vertical motion. To actuate these levers I employ a pinion 23, having one or more segmental teeth, to the shaft of which pinion is fixed a lever 24, connected by a pitman 25 to a lever 26, which is fixed to the shaft of one of the elbow-levers 9. By reason of the segmental character of the gear-teeth on the pinion the effect of the projection of the piston-rod 16 is to swing the lever 24 back from the position shown in full lines in Fig. 2 to that shown by dotted lines, thereby moving the lever 26 and through the levers 9 raising the movable bars, in which position the parts stay until the piston-rod reaches the end of its forward stroke. As soon as it begins its back-stroke the lever 24 is immediately moved back to its original position, thereby lowering the movable bars below the level of the stationary bars, in which position they stay until the bars finish their back motion and are again started on their forward motion by reversal of operation of the motor 12. The pinion 23 is allowed to rotate sufficiently, so that the teeth of the rack will move over the last tooth of the pinion. The jarring motion induced is taken up by the slotted link, while on the back motion the rack immediately engages the last tooth of the pinion and rotates it in a reverse direction. Because of the construction shown in Fig. 6 the movable bars are elevated above the stationary bars before their forward motion begins, and are lowered before the beginning of their back motion. The motor thus affords an efficient means for operating the leer independently of any manual work and constitutes an important item of invention. The valve 14 of the motor can be controlled to effect the motion of the piston in both directions by operation of the rod 15 or other hand mechanism; but after the piston and the bars have completed their forward strokes I prefer that they should be reversed automatically. To effect this, I employ a lever 61, connected by a rod 62 with the valve-lever, Fig. 2, and I form on the piston-rod a projection 63, which at the end of the piston's stroke engages and moves the lever, thereby reversing the valve and causing the piston to move back to the other end of its stroke, where it remains until the valve is operated again by hand.

To hold the bars balanced in an elevated position after they have been raised, as above described, until they are again depressed by the motor, and also to hold them down after they have been depressed, I provide one or more of the cross-shafts of the elbow-levers 9 with weighted levers 64, Fig. 2, which when the bars are in middle position stand vertically, but when the bars are raised or depressed to their full extent are inclined from the vertical, and thus by gravity tend to hold them in such elevated or lowered position.

I shall now describe the means by which the glass sheets are delivered from the ends of the conveying-bars and are automatically stacked upon a receiving-car. At the end of the leer and at about the level of the bars is a receiving-table comprising parallel cross-shafts 27, provided with grooved pulleys 28, around the opposite members of which pass endless cords or belts 29. In advance of the second shaft 27 is a shaft 30, having radial transfer-arms 31, which normally lie in horizontal position between the adjacent pulleys, and at the ends of these arms are upwardly-projecting stops or shoulders 32. The end of one of the shafts 27 and the end of the shaft 30 are provided with pinions 33 34, adapted to mesh with short racks 35 and 36 on a bar 16′, which is an extension of the piston-rod 16. These parts are so located relatively to each other that the rack 35 shall engage the pinion 34 at about the end of the back-stroke of the piston-rod and shall turn the shaft 30, so as to lift the radial arms 31 into upright position, and that as the piston-rod begins its forward motion the arms shall be restored to their horizontal position, and that at the

time when by the forward motion of the piston the ends of the movable bars reach the pulleys of the first shaft 27 the short rack 36 shall engage the pinion 33 and shall cause the shafts 27 to rotate and their endless cords 29 to move in the direction reverse to that indicated by the arrow *b*, and that during a corresponding part of the back motion of the piston-rod the cords shall be caused by the same instrumentality to move in the reverse direction.

37 is the car-truck, whose wheels are mounted on a track 38, which extends beneath the shafts 27. The car-body 39 is secured to the truck by a vertical pivot 40, on which the body is rotatory in a horizontal plane, and a pin 41 is employed to lock it detachably in the position in which it is shown in Figs. 1 and 2. To diminish the friction of rotating the body 39, it is preferably provided with a series of wheels 42.

The rotary truck-body is provided with a frame-like superstructure comprising horizontal bars 43, situate a little below the level of the cords 29, and upright posts 44, two of which have at their upper ends horizontally-projecting rods 45, on which are mounted vertically-depending fingers 46, adapted to be turned axially on the rods into nearly upright positions against supporting-rods 47. The car with this frame-work is adapted to be moved under the shafts 27 into the position shown in Figs. 1 and 2, and when in such position a horizontally-projecting rack-bar 48 meshes with a pinion 49 on a shaft 50, which has at its end a pinion 51, adapted to be engaged and turned by a small rack 52 on the bar 16′ when the piston is at the beginning of its outstroke. The pinion 51 is not keyed to its shaft, but is connected therewith by a pawl-and-ratchet connection 53, which while transmitting motion of the pinion to the shaft when the piston is at the end of its back-stroke transmits no motion thereto on the forward stroke thereof. The consequence is that at the end of each back-stroke of the piston a partial rotation is imparted to the shaft and to the pinion 49, which acting on the rack-bar 48 moves the car forward a definite distance.

For the purpose of moving the fingers 46 successively from an elevated into a dependent position I employ a transverse reciprocatory bar 55, situate above the position of the car and having projections 56 adapted to engage said fingers. Said bar is reciprocated by an elbow-lever 57, pivoted to a post 59, and connected with the bar 9′ by a rod 58, as shown in Figs. 1 and 2.

As thus constructed the operation of the apparatus is as follows: The car being in its most advanced position, all the fingers are elevated by the operator against the supporting-bar 47. The workman at the flattening-oven as the glass cylinders are opened and flattened on the flattening-stone, places them successively on the movable bars, and as each sheet is so placed the motor is operated to raise the bars and advance them about the width of one sheet, thus moving the sheets step by step through the leer. When finally one of the sheets reaches the delivery end of the leer, the operation of stacking on the car begins. Then the car is brought into position at the end of the leer, so that the rack 48 shall engage the pinion 49, when as the movable bars are projected they advance and carry the glass over the cords 29 of the receiving-table and are lowered, so as to deposit the sheets thereon. Then as the bars move back, as before explained, the cords move in the direction of the arrow *b*, so as to move the glass against the projections 32 and straighten the sheets if for any reason they should not be lying straight on the receiving-table. When the leer mechanism nears the end of its reverse motion, the rack-segment 35 engages the pinion 34, thereby rotating its shaft, turning the radial transfer-arms, and lifting the glass sheet into upright position on the frame of the car against the uprights 44, and immediately afterward the engagement of the rack 52 with the pinion 51 turns the shaft of the latter pinion, and by means of the pinion 49 moves the car forward a short distance. Then on the next forward motion of the bars the rod 55 is moved and the projections 56 engage the most advanced of the then upright fingers 46 and move them into dependent positions back of the glass sheet, which is upheld thereby on the car-frame, and the transfer-arms are moved back to horizonal position on the receiving-table. The operation just described is repeated as each glass sheet is delivered by the bars upon the car, the car moves forward a step as each sheet is received, and is supported by overturning of the fingers 46, until finally the car-frame has received its full load of sheets. The car may then be moved on its track to the cutting-room or cleansing apparatus and another car put at the end of the leer to replace it. In order to economize space I find it desirable to turn the body of the car after it has left the leer, so that the planes of the glass sheets shall extend longitudinally of the car-truck and not crosswise.

The advantages of my invention in saving labor in operating the leer and correspondingly lessening the expense will be appreciated by those skilled in the art. The leer is made almost entirely automatic in its action, and as the motions are more accurate than when performed by hand the glass is better handled and there is less breakage. This automatic action I believe is altogether new, and therefore within the scope of my invention, as herein claimed. The mechanism may be varied in many ways without essential change of principle.

I claim—

1. In a glass-annealing leer, the combination, with a support for the glass, of vertically-movable bars, levers supporting the same, a motor connected to the levers, and connect-

ing mechanism between the motor and bars constructed to move them longitudinally, substantially as and for the purposes described.

2. In a glass-annealing leer, the combination, with a support for the glass, of vertically-movable bars, supporting-levers by which they are actuated, connecting mechanism constructed to move the bars longitudinally, and a motor constructed to operate the levers before the operation of said connecting mechanism, substantially as and for the purposes described.

3. In a glass-annealing leer, the combination, with a support for the glass, of vertically-movable bars, levers by which the bars are supported, connecting mechanism constructed to move the bars longitudinally, a motor arranged to actuate the levers and connecting mechanism, a valve controlling the motor, and mechanism constructed to engage and reverse said valve at the end of the forward movement of the bars, substantially as and for the purposes described.

4. In a glass-annealing leer, the combination, with a support for the glass, of movable bars, levers by which they are supported, and a motor connected with the levers by mechanism comprising a mutilated gear-wheel and rack engaging therewith and constructed to move the same to raise and lower the bars, and also connected with the bars and constructed to move them longitudinally, substantially as and for the purposes described.

5. In combination with a glass-annealing leer, a receiving-table situate at the delivery end of the leer and constructed to receive the glass sheets therefrom, transfer-arms movable in slots in the table and by which the sheets are lifted and placed on a car, and mechanism for operating the transfer-arms, substantially as and for the purposes described.

6. In combination with a glass-annealing leer, a receiving-table situate at the delivery end of the leer and constructed to receive the glass sheets therefrom, a car, transfer-arms movable between the table and the car by which the sheets are lifted and placed on the car, mechanism for operating the transfer-arms, and mechanism for moving the car after a sheet is placed thereon, substantially as and for the purposes described.

7. In combination with a glass-annealing leer, a receiving-table situate at the delivery end of the leer and constructed to receive the glass sheets therefrom, a car, transfer-arms movable between the table and car by which the sheets are lifted and placed on the car, mechanism for operating the transfer-arms, mechanism for moving the car after a sheet is placed thereon, and retaining-fingers mounted on the car, substantially as and for the purposes described.

8. In combination with a glass-annealing leer, a receiving-table situate at the delivery end of the leer and constructed to receive the glass sheets therefrom, a car, transfer-arms movable between the table and car by which the sheets are lifted and placed on the car, mechanism for operating the transfer-arms, mechanism for moving the car after a sheet is placed thereon, retaining-fingers mounted upon the car, and mechanism constructed to move said retaining-fingers successively, substantially as and for the purposes described.

9. In combination with a glass-annealing leer, a receiving-table situate at the delivery end of the leer and constructed to receive the glass sheets therefrom, transfer-arms movable between the table and a car by which the sheets are lifted and placed on the car, mechanism for operating the transfer arms, moving cords in the table frame-work by which the sheets are straightened on the table before being lifted by the transfer-arms, and means for supporting and moving said cords, substantially as and for the purposes described.

10. In glass-annealing mechanism, the combination of a leer, a receiving-table situate at the end of the leer, a support for the glass, longitudinally and vertically movable conveying-bars situate in the leer and constructed to move over the table and to deposit the glass thereon, and mechanism constructed to operate said bars, substantially as and for the purposes described.

11. In glass-annealing mechanism, the combination of a leer, a receiving-table situate at the end of the leer, a support for the glass, longitudinally and vertically movable conveying-bars situate in the leer and constructed to move over the table and to deposit the glass thereon, transfer mechanism for transferring the glass from the table to a car, a motor and connecting mechanism between the motor, the conveying-bars, and the transfer mechanism for moving the bars and for moving the transfer mechanism, substantially as and for the purposes described.

12. In glass-annealing mechanism, the combination, with a leer and a receiving-table situate at the end of the leer, having a support for the glass, of longitudinally-movable conveying-bars situate in the leer and constructed to move over the table and to deposit the glass thereon, a receiving-car, transfer mechanism for transferring the glass from the table to the car, mechanism for moving the car after a sheet is deposited thereon, and a motor having intermediate mechanism connected with the leer-bars, the transfer mechanism, and car and constructed to move the same, substantially in the order specified.

13. In glass-annealing mechanism, the combination of a leer, a receiving-table situate at the end of the leer, a support for the glass, longitudinally and vertically movable conveying-bars situate in the leer and constructed to move over the table and to deposit the glass thereon, transfer-arms having stops and pivoted in the table, pulleys journaled in the table-frame, a belt moving over the pulleys on the table, constructed to be moved to advance the glass sheets against the stops and to straighten the same, a motor for operating

the bars, and a rack operated by the motor and connected by gearing with the cords and pulleys and with the transfer-arms and constructed to operate the same, substantially in the order specified.

14. In glass-annealing mechanism, the combination of a leer, a receiving-table situate at the end of the leer, a support for the glass, longitudinally and vertically movable conveying-bars situate in the leer and constructed to move over the table and to deposit the glass thereon, a receiving-car, transfer mechanism for transferring the glass from the table to the car, mechanism for moving the car after a sheet is deposited thereon, pivoted fingers supported by the car and constructed to be dropped to separate the glass sheets, and a motor connected with the leer-bars, the transfer mechanism, car, and fingers and constructed to move the same, substantially in the order specified.

15. The combination, with a glass-annealing leer, of a car having retaining-fingers and adapted to receive the glass sheets from the leer in substantially upright positions, said car having a pivoted body, substantially as and for the purposes described.

16. In a glass-annealing leer, the combination, with a support for the glass, of movable bars, levers by which the bars are supported, connecting mechanism constructed to move the bars longitudinally, a motor connected to the levers and connecting mechanism and constructed to actuate the levers before the connecting mechanism, and a weight connected to the levers, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 11th day of April, A. D. 1891.

JOHN H. LUBBERS.

Witnesses:
W. B. CORWIN,
THOMAS W. BAKEWELL.