(No Model.) 2 Sheets—Sheet 1.

P. PFEIFER.

DEVICE FOR CONVEYING SHEETS OF GLASS THROUGH THE ANNEALING TUNNEL.

No. 400,708. Patented Apr. 2, 1889.

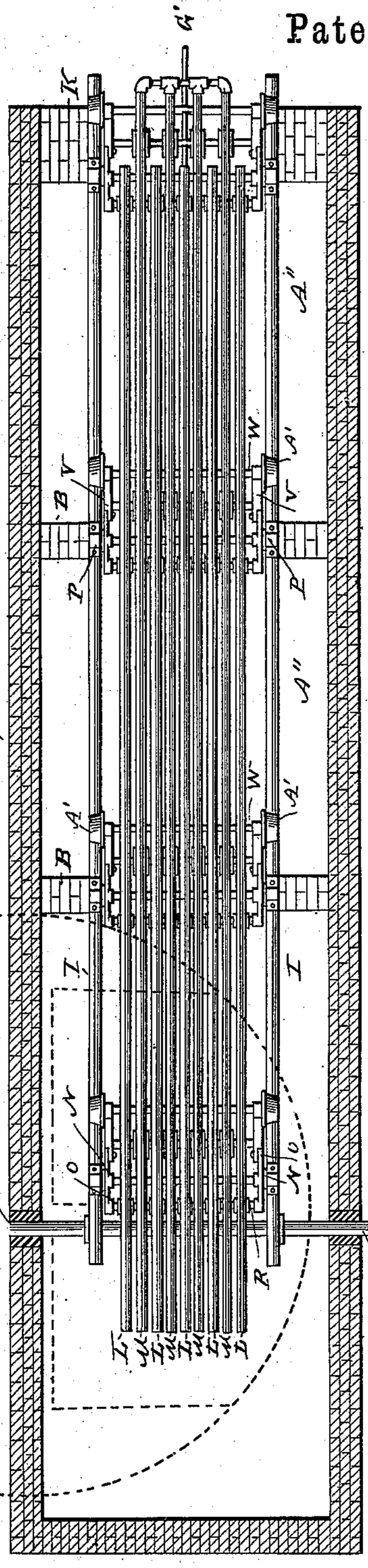


FIG. 2.

WITNESSES.

Edwin L. Yewell.

E. W. B. Phillips.

INVENTOR

Peter Pfeifer

By

L. W. Gwinnabaugh

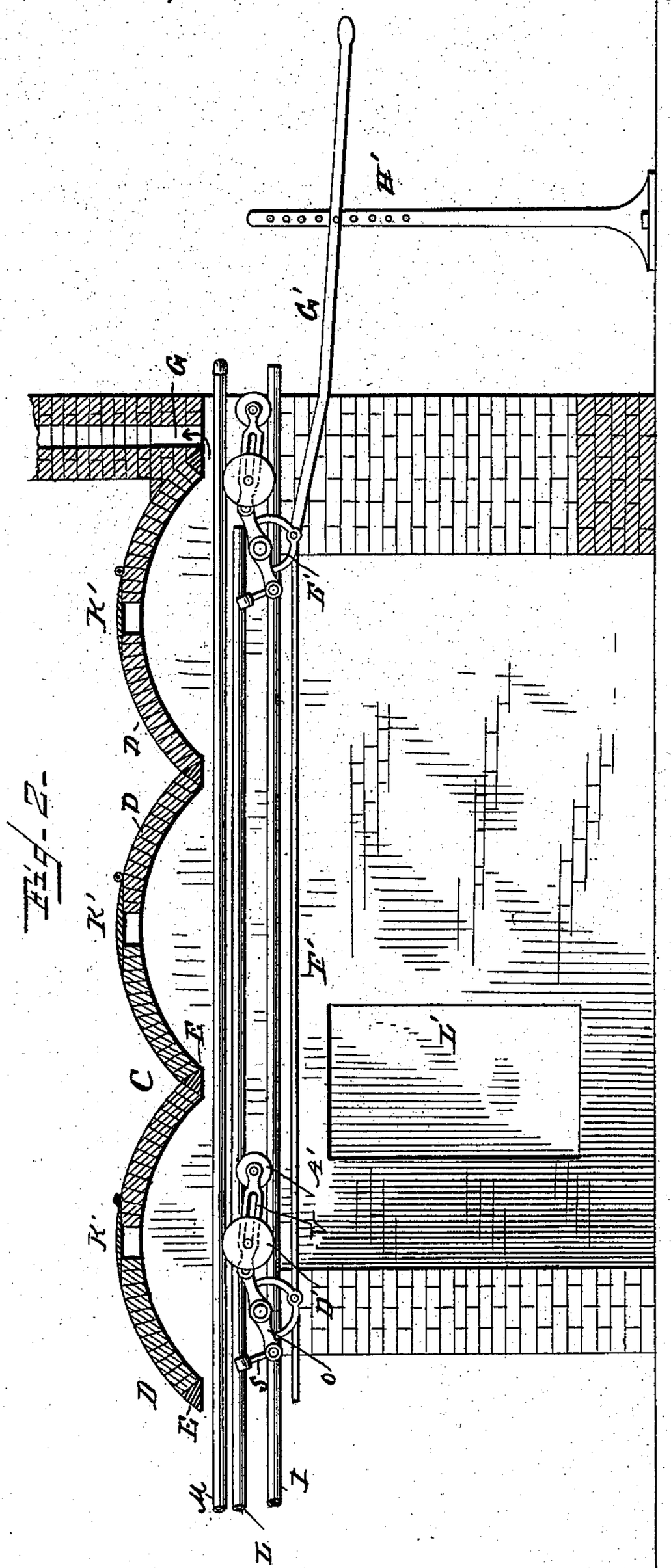
Attorney.

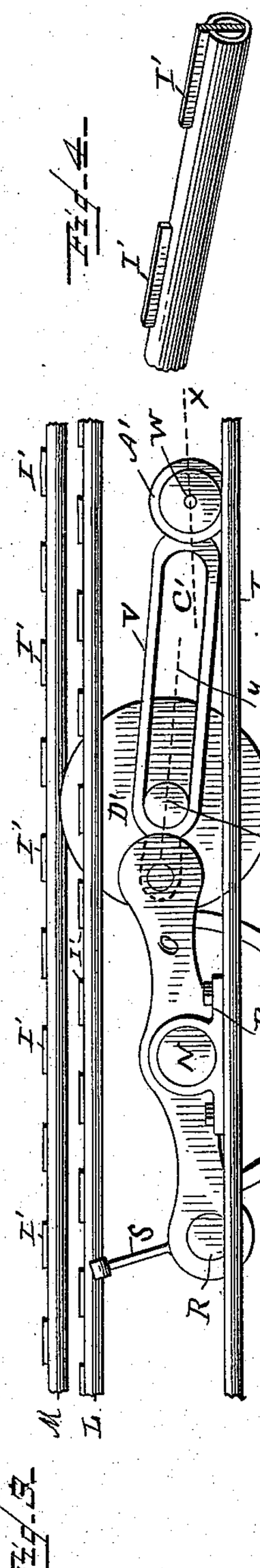
(No Model.) 2 Sheets—Sheet 2.

P. PFEIFER.

DEVICE FOR CONVEYING SHEETS OF GLASS THROUGH THE ANNEALING TUNNEL.

No. 400,708. Patented Apr. 2, 1889.





WITNESSES.

Edwin L. Yewell.

E. W. B. Phillips.

INVENTOR.

Peter Pfeifer

By

L. W. Ensabaugh.

Attorney.

UNITED STATES PATENT OFFICE.

PETER PFEIFER, OF DURHAMVILLE, NEW YORK.

DEVICE FOR CONVEYING SHEETS OF GLASS THROUGH THE ANNEALING-TUNNEL.

SPECIFICATION forming part of Letters Patent No. 400,708, dated April 2, 1889.

Application filed September 29, 1887. Serial No. 251,027. (No model.)

To all whom it may concern:

Be it known that I, PETER PFEIFER, a citizen of the United States of America, residing at Durhamville, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Devices for Conveying Sheets of Glass through the Annealing-Tunnel, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in devices for conveying sheets of glass from the flattening wheel or table through the annealing arch or tunnel.

The object of my invention is to provide a device by which the sheets of glass can be readily moved from the flattening table or wheel through the annealing-arch without breaking or injuring the same, and is an improvement on the devices shown, described, and claimed in Letters Patent No. 333,331, granted to me December 29, 1885.

Referring to the drawings, Figure 1 is a top or plan view of my improved leer with the roof or arches removed. Fig. 2 is a longitudinal sectional view of a portion of the arch and devices for moving the sheets of glass through the leer. Fig. 3 is a side view of a portion of the operating devices. Fig. 4 is a view in perspective of a portion of one of the glass-sustaining bars, showing the pieces of asbestus secured therein.

A indicates the leer proper, which is composed of side and end walls, and partition-walls B, which divide the lower portion of the leer or tunnel into chambers or compartments A″, which are of the full width of the tunnel.

C indicates the roof of the leer or tunnel, and is composed of a series of arches, D, which extend at right angles to the length of the tunnel, said arches being supported on the metal bars E, which in turn are supported by the side walls of the leer.

F indicates the flattening wheel or table located at the front end of the leer or tunnel, said flattening wheel or table being of the usual and well-known construction, inclosed in a wall of masonry and provided with a suitable furnace (not shown) for heating the cylinders of glass so that they can be flattened, the products of combustion and the heat from the furnace passing through the leer or tunnel and out through the flues G into a suitable stack in the usual manner.

H is a shaft journaled in the tunnel and capable of being rotated by a crank-arm, *a*, mounted in suitable bearings in the side walls of the leer, on which are supported the front ends of the longitudinal bars I, the rear ends of said bars being supported in any suitable manner by the rear end wall, K, of the leer. The object of making the shaft H rotatable is that when it becomes warped or bent by the heat of the furnace it can be turned over, so as to straighten it. The bars I support the longitudinal bars L and M, and the devices for raising and lowering said bars, as will more fully hereinafter appear, and in order to strengthen the bars I they are caused to rest in suitable bearings or beds on top of the partition-walls B.

N are shafts mounted in suitable bearings, P, on the bars I, and to each end of which are secured the levers O. The front ends of the levers O are connected by means of the shaft R, on which are secured the brackets or supports S, said brackets being bifurcated at their upper ends to receive and support the longitudinal bars L. The rear ends of the levers O are pivoted to the front ends of the slotted links V, the rear ends of said slotted links being secured to the cross-bar or axle W, said axle being provided with wheels A′, which rest upon and are adapted to move back and forth on the bars I.

B′ are shafts adapted to roll back and forth in the slots C′ of the links V, said shafts being provided with disks D′, grooved on their periphery to receive and support the longitudinal bars M.

E′ are brackets secured to the inside of the levers O or to the shaft N, the lower end of which is secured to the rod F′.

G′ is a lever secured at one end to the rear bracket, E′, while the other end of said lever projects through the rear wall of the leer or tunnel to within convenient reach of the operator, and adapted to be held at any desired point by a pin which engages holes in the standard H′. The longitudinal bars L and M are made of tubing or gas-pipe, the advantages of which are fully set forth in my patent above referred to. The upper portions of the bars or tubes L and M are provided

with numerous slits or openings, about one foot (more or less) apart, to receive a strip or pad of asbestus felt, I′, or other soft fire-proof material, which prevents the sheets of glass from coming in contact with the metal tubes, and in this way a great loss of glass by breakage is obviated.

K′ are valves placed in the crown of the arches of the leer and adapted to open outward, so as to permit the excess of heat to escape from the tunnel or arches, said valves being automatically opened by the force of the overheated and highly-expanded air, and to be closed again by gravity when the pressure on the inside of the tunnel has diminished. Each chamber A″ of the tunnel is provided with a door, L′, so as to readily admit the workmen to make repairs and to clear the chambers of broken glass.

By making the trench below the bars deep and by dividing it by partition-walls and into rooms or compartments, the partition-walls being built up to within a short distance of the carrying-bars, said partitions act as stops to check the currents of air and regulate the temperature in each chamber. For example, the chamber nearest to the flattening-wheel would be at such a temperature as will allow the glass to cool down to a lower degree of temperature than when on the flattening-wheel, and when the sheets are moved on over the second chamber the temperature is still further reduced, and so on until it reaches the last chamber, where it is cool enough to be taken from off the carrying-bars. These chambers with their doors therefore are for a twofold purpose—viz., to form a large receptacle for the broken glass, which is allowed to drop entirely free of the bars or the other sheets, and also to admit the workmen to remove said broken glass or make repairs.

The rear ends of the bars M are connected in any suitable manner, so as to form a comparatively rigid frame and to prevent one bar from moving faster and farther than the other bars of the series.

It is understood that in this class of annealing-furnaces one set of bars, L, supports the glass, while the other set of bars, M, are depressed or lowered and moved forward over the flattening-wheel, so that the "flattener" can place a newly-flattened sheet thereon, the bars M being then raised to lift the glass from off the bars L and moved back toward the rear of the arch to allow the operator to remove therefrom the sheet of glass nearest the end of said bars, and the operation of my particular devices for raising, lowering, and moving the bars toward and from the flattening-wheel is as follows: The downward movement of the lever G′ turns the bracket E′, to which it is attached, to the right, and by the bar F′ all the brackets of the series are turned in the same direction. This movement raises the front ends of the levers O, carrying the shaft R and brackets S, and raises the bars L, so as to lift the sheets of glass off of the bars M. This movement of the brackets also depresses the rear ends of the levers O and the slotted side links, V, which carry down with them the shafts B′ and the longitudinal bars M to a position below the bars L, so that the bars M will be carried forward toward the flattening-wheel by the movement of the shaft B′ in the inclined slot, said slot having been inclined to the angle of inclination shown in dotted line *x*, Fig. 3. After the flattener has placed the newly-flattened sheet on the bars M the lever G′ is raised. This moves the rod F′ toward the rear of the arch or tunnel and the brackets E′ to the left, depressing the front ends of the levers O and lowering the links L, while at the same time the rear ends of the levers O and the front ends of the slotted bars V are raised to elevate the bars M and lift the sheets of glass from off the bars L, while the inclined angle of the slots C′ (shown in dotted lines at *y*, Fig. 3) allows the shafts B′ to roll backward down the inclined slot by the force of gravity, carrying with them the bars M and the sheets of glass supported thereon.

The links V, together with the slots C′, may be of any desired length; but I prefer to make the slots about nine inches long, the diameter of the rolling shaft B′ being about one inch, while the wheels D′ are about eight inches diameter, so that when the shaft B′ revolves once in the slot on space of about three inches the wheels D′ will be revolved and carry the bars M about twenty-four inches, and thus by two or three revolutions of the shaft B′ the bars M will be moved the length of a sheet of glass, and at each alternate movement of said bars allow alternately a sheet of glass to be put on the front end of the bars and a sheet of glass to be removed from the rear end of said bars.

I disclaim the following, viz: In an annealing-leer for annealing window-glass, the mechanism, substantially as described, for transporting the glass through the leer, said mechanism being faced with asbestus, as I am not the first inventor thereof.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a device for conveying sheets of glass through the annealing-tunnel, the combination, with the tunnel, of horizontal bars extending longitudinally therethrough, connected levers pivoted centrally upon said bars, a series of longitudinal conveying-rods supported at their ends by one end of said levers, links, each link being pivoted at one of its ends to the other end of one of the aforesaid levers, a second set of bars, disks carried by the links to support the last-named bars, and devices for rocking the levers, as set forth.

2. In a device for conveying sheets of glass through the annealing-tunnel, the combination, with the tunnel, horizontal bars extending longitudinally through the tunnel, rocking levers pivoted centrally upon the bars,

links, each link pivoted to one end of the levers, and the free end of the link resting upon the aforesaid bars, said links having carrying-disks loosely mounted therein, and a series of longitudinal conveying-rods supported by the disks, and devices adapted to operate the levers in unison, as set forth.

3. In a device for conveying sheets of glass through the annealing-arch, the combination of horizontal bars extending longitudinally in the tunnel, rocking levers pivoted on said bars, links connected at one end to the rocking levers and loosely supported on the horizontal bars at the other, horizontal axles supported loosely by said links, disks or wheels mounted upon said axles, a series of longitudinal conveying-rods supported by said disks or wheels, and devices for operating the levers, as set forth.

4. In devices for conveying sheets of glass through the annealing-tunnel, the combination of the tunnel, horizontal bars extending through the tunnel, cross-shafts pivoted on said longitudinal bars, levers pivoted on each end of said shafts, slotted links pivoted at one end to one end of the levers and resting loosely at the other end on the horizontal bars, a series of horizontal axles supported loosely by said links and adapted to roll therein in the direction of the length of the tunnel, a series of wheels centered upon said axles and a series of longitudinal conveying-rods supported upon said wheels, and devices for operating the levers in unison, as set forth.

5. In a device for conveying sheets of glass through the annealing-tunnel, the combination, with the tunnel, of horizontal bars extending longitudinally therethrough, connected levers centrally pivoted upon said bars, a series of longitudinal conveying-rods supported by one end of said levers, a series of links, each link being pivoted at one of its ends to the other end of one of the aforesaid levers, the free end of the links resting on the aforesaid bars, a series of horizontal axles supported loosely by said links and adapted to roll thereon in the direction of the length of the tunnel, a series of wheels centered upon said axles, a second series of longitudinal conveying-rods supported upon said wheels, and devices to operate the aforesaid levers in unison, as set forth.

6. In devices for conveying sheets of glass through the annealing-tunnel, the combination, with the tunnel, of horizontal bars extending longitudinally therethrough, connected levers centrally pivoted upon said bars, a series of longitudinal conveying-rods supported by one end of said levers, a series of links, each link being pivoted at one of its ends to the other end of one of the levers, wheels connected to the free end of the links and resting upon the bars, a series of horizontal axles supported loosely by said links and adapted to roll therein in the direction of the length of the tunnel, a series of wheels or disks centered upon said axles, a second series of longitudinal conveying-rods supported upon said wheels, and devices for operating the levers in unison, as set forth.

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

PETER PFEIFER.

Witnesses:

JAMES FITZPATRICK,

WILLIAM H. PARMELEE.