(No Model.)

C. TONDEUR.

GLASS FLATTENING FURNACE AND MEANS BY WHICH SHEETS OF GLASS ARE MOVED THROUGH THE LEER.

No. 303,195. Patented Aug. 5, 1884.

Fig. 1.

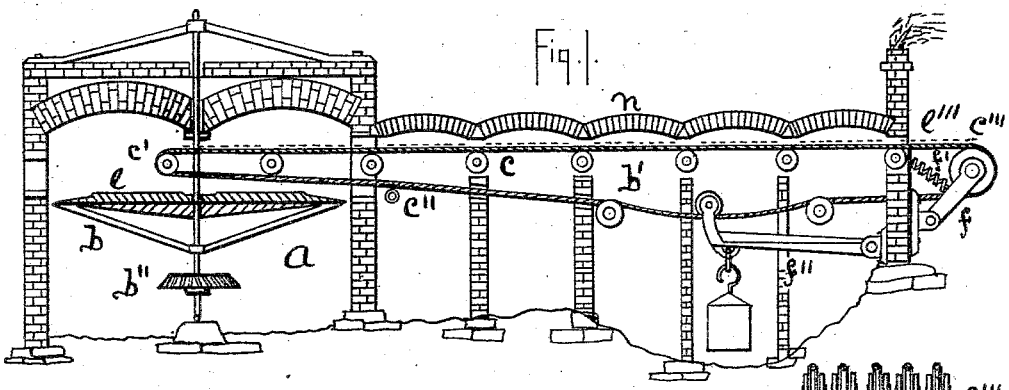


Fig. 5.

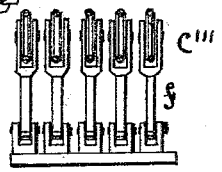


Fig. 2.

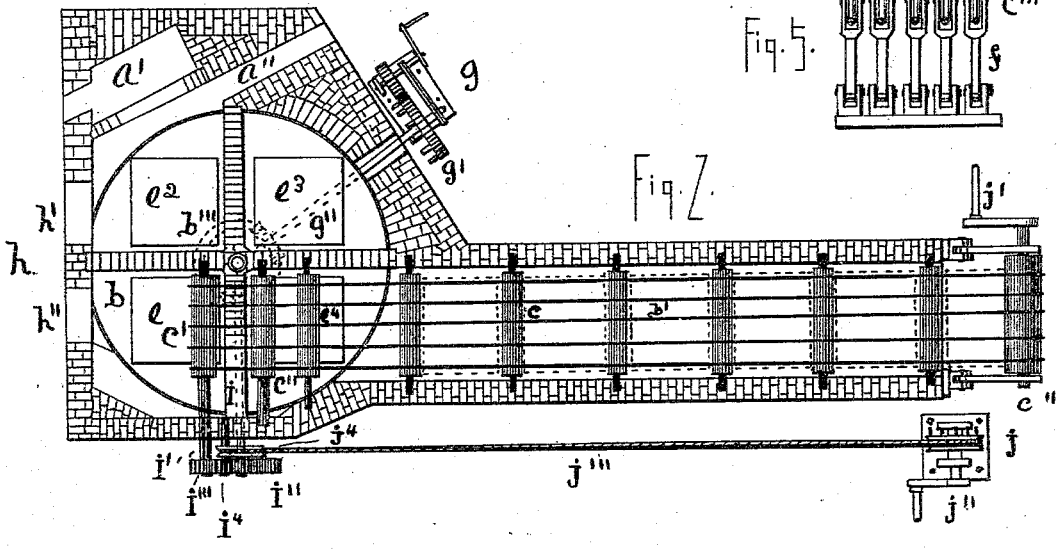


Fig. 3.

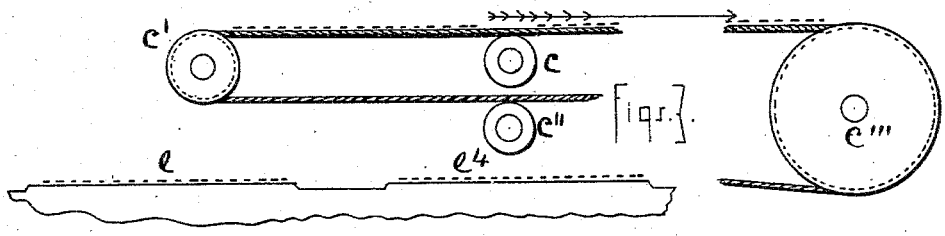
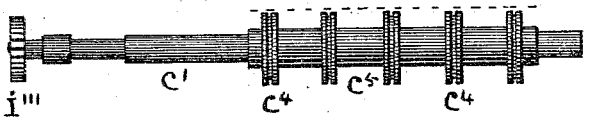


Fig. 4.



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GLASS-FLATTENING FURNACE AND MEANS BY WHICH SHEETS OF GLASS ARE MOVED THROUGH THE LEER.

SPECIFICATION forming part of Letters Patent No. 303,195, dated August 5, 1884.

Application filed October 4, 1883. (No model.)

To all whom it may concern:

Be it known that I, CLEON TONDEUR, a citizen of the United States, and a resident of Ithaca, Tompkins county, New York, have invented an Improved Glass-Flattening Furnace and Means by which Sheets of Glass are Moved through the Leer, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to an endless apron, which is the means by which the sheets of glass are moved through the tunnel or "leer" of a flattening-furnace; and it consists, preferably, of a series of flexible wires, strips, or ribbons, which are stretched in the tunnel from over the flattening-wheel to the exit-opening of the tunnel. The means of support and motion of the structure thus made is also a part of my invention; and the whole will be apparent as I describe my invention.

Figure 1 is a side elevation of a furnace with my device in it. Fig. 2 is a view of the same looking down on it. Fig. 3 are separate parts enlarged and arranged to show the adjustment to the flattening-beds. Fig. 4 is the preferable form of the left hand or entrance end roller, and Fig. 5 is the divided form of the exit end roller.

In the figures, a is the wheel-chamber, a' the fire-chamber, and a'' the "push-hole" through which the cylinders of glass enter to the flattening-wheel b. Through the leer or annealing-tunnel b' are placed, longitudinally, a series of wires or wire ropes, which are sustained and moved by the rollers c. These reach from the flattening-beds, as each arrive at e, to the rear roller, c''', whence deflected under the upper series of rollers, the endless ropes making the apron return to the first roller over the beds e^4 e. One or two rollers, c'', keep the ropes above the glass on the flattening-beds. In this structure, which I have called a "glass-conveying apron," the main idea is that of any flexible moving surface similar to an endless band carrying the sheets of glass along at intervals from the flattening-chamber through the tunnel to its exit end e''' when laid on its upper surface; and hence it can be made of wire ropes, as seen in Figs. 1 and 3, or of wires, as seen in Fig. 2, or may be made of strips or ribbons of metal or other like articles. The rollers are so constructed that a sheet of glass shall rest at each interval of no motion between two rollers, as indicated by the dotted lines of Figs. 1 and 2, though the rollers may be so close to each other that the ropes or bands shall serve mainly or wholly to rotate the rollers, as shown at the left hand of Fig. 2, the glass in that case resting on the rollers. The left-hand roller, c', is made as large as can be conveniently used over the flattening-beds, that the wires, wire-ropes, or ribbon bands may bend easily about it, and it is grooved, as seen at c^4, Fig. 4, for holding the wires, ropes, or bands securely in place, and has broader, deeper grooves c^5 for the tines of the lifting-fork when it places the glass on the apron. The roller c'' and those to the right of it in Fig. 2 are smooth without grooves, and the last roller, c''', is quite large, with deep grooves for the wires or ropes or bands.

The ropes must have a stiff even tension, and in Fig. 1 two ways of maintaining this are shown. The last (right-hand) roller, c''', is shown supported and hinged by the arms f, with springs f', that thrust outward the roller, and thus give the necessary tension; but, least further experience may show that weights might be better, weighted hinged arms f'' are seen in the space under the tunnel, with pulleys or rollers on the ropes. The roller c''' may be divided into separate parts, one part for each wire, rope, or ribbon band, each on separate arms f, as seen in Fig. 5; and it is also best that each rope, wire, or band have independent pulleys for bearing, each on independent hinged arms f'', when the weighted arms are thus used to bear on the ropes, wires, or bands. I specify two devices, not that both are intended to be used at the same time, but that of any of many means of tension may be employed which it is best to use, such as screws taking up the slack of the parts of the apron in the lines of their length, &c.

It is well known that the flattening-wheel b is turned by an assistant. It is desirable that he be able also to move the apron on the rollers, and that he shall move the apron exactly one space of the arches n, Fig. 1, while one flattening-bed changes for another. To do this, not only is the flattening-wheel treadle g' connected by the shaft g'' and a gear-wheel to the pinion b'', Fig. 1, but there is added a shaft, i, Fig. 2, (indicated by dotted lines,)

also geared into the pinion b'', on whose end is a cog-wheel, i'', which, with or without the intermediate wheel, i^4, gears into the pinion i''', which rotates the roller c', and thus moves the apron, which is composed of the material and supported as has been said. But the power required to turn the flattening-wheel and the wire ropes with the glass on them (the apron) may be greater than the assistant can use by the usual treadle-pins in the wheel g'; hence a crank and cog-wheel are added to the wheel g', by which the assistant moves both the flattening-wheel and the endless apron or wire ropes; or, to utilize the power of the tunnel-exit helper stationed at the exit end j of the "leer" or tunnel, he, at the order to "turn," usually given in a loud voice by the operator at the front of the furnace at h, takes hold of the crank-handle j', which rotates the exit-roller c''', and thus their united force changes both beds and the apron. But as time rolls on the heat of the tunnel may cause the friction to be great, or when a divided roller at c''' is used, or when from choice I see fit, I add the crank j'', with a pulley and a belt or rope, j''', and a pulley, j^4, or use a shaft with gearing from the crank j'' to the shaft i, and these may be arranged in or out side of the tunnel, as is thought best, and thus both assistants together change the flattening-wheel and apron simultaneously and with exactitude.

In using my device the cylinders of glass are flattened on the several beds when they are at e^2, then revolved to e^3 e^4, and to e, when through the opening h'' the operator introduces the lifting-fork, puts it under the sheet, lifts and draws the sheet toward himself, now cooled to be quite stiff, then shoves it upward and backward over the left-hand end (Fig. 2) of the apron, on which end he lays it, whence, as the arrow in Fig. 3 shows, at intervals it goes through the tunnel to the place indicated by the dotted lines seen next to the roller (or parted roller) c''', Fig. 2, when an assistant removes it. The sheets, when being lifted off of the beds, are quite rigid, though yet hot, and hence they allow some sagging of the apron between the rollers; but experience may show that double or triple the number of the rollers shown in the figures may be useful, as is in part seen at the left hand of the apron in Fig. 2, the glass resting on the apron by the aid of three rollers, and this extends my invention to the use of as many rollers as I consider fit, while the grooves may be deepened, so that the glass shall not rest on the apron, ropes, or wires, but on the rollers only, the use of the ropes and wires in that case being to rotate the rollers, and thus move the sheets through the tunnel. The other parts, as well as the advantages of my invention, are apparent.

I claim—

1. In a glass flattening and annealing furnace, a leer or tunnel provided with a bed or apron composed of a series of wires or metallic ropes or ribbons placed longitudinally in the leer on rollers or wheels which are transverse to the leer, and on which the said bed moves, the said bed having the sheets of glass resting directly on the said wires or metallic ropes or ribbons, substantially as shown and described.

2. A device consisting of shafts or their equivalents geared or adjusted to each other, connecting together the flattening-wheel and the glass-moving mechanism of the leer, whereby the relative movements of the flattening-wheel and the motion of the glass-conveying structure are made to be coadapted to and simultaneous with each other, as set forth.

3. A device of a crank or rotating or other wheel or wheels or gearing, or its equivalent similar structure, at or near the exit end of the leer of a flattening-furnace, in combination with a crank or treadle wheel or wheels, or similar equivalent device, to which power can be applied at or near the push-hole of the flattening-wheel, whereby the operators at said places of the furnace, one or both, aid in or produce the motions of the flattening-wheel and the motion of the glass-moving device of the leer contemporaneously, as set forth.

4. An apron made of wires or metallic ropes or ribbons, or wire-woven cloth, placed on and moved by a series of rollers, one or more of which rollers being placed over the flattening-wheel, and the others reaching to and out of the exit end of the leer, substantially as shown and described.

5. A series of rollers placed transversely to the length of the leer, and journaled in or through the side walls of the leer and in such close proximity to each other that sheets of glass, in their passage through the leer, pass over and rest on the said rollers, and are thereby moved onward through the leer, in combination with a wire rope or gearing, or equivalent, by which said rollers are rotated contemporaneously and to the same extent of motion be the rope or ropes or gearing inside or outside of the leer, as set forth.

6. In a glass-leer provided with a series of rollers transverse to the leer, and with a bed made of flexible wires, wire ropes, or ribbon, or woven-wire apron, on which the sheets of glass rest and are moved onward through the leer, the combination therewith of the hinged arms, actuated by springs or weights which keep a uniform tension on the said bed, substantially as set forth.

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