L. J. PIERCE AND W. FAMARISS.
LEER OPERATING MECHANISM.
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1,431,682. Patented Oct. 10, 1922.
10 SHEETS—SHEET 10.

Inventors

By (British, Indian, Indian)

their attorneys
To all whom it may concern:

Be it known that we, LONNIE J. PIERCE and WALTER FAMARIS, both residing at Pittsburgh, Allegheny County, Pennsylvania, have invented a new and useful Improvement in Leer-Operating Mechanisms, 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 longitudinal vertical section of a glass-flattening oven and annealing leer having our invention applied thereto;

Figure 2 is a side elevation of a portion of the rear or delivery end of the leer, a portion of the wall being broken away and in section;

Figure 3 is a rear elevation of the leer and actuating mechanism;

Figure 4 is a partial longitudinal vertical section of a portion of the leer;

Figure 5 is a partial transverse vertical section of a portion of the same;

Figure 6 is an end view showing the actuating gearing;

Figure 7 is a side view of the same;

Figure 8 is a detail face view of the cam and plunger actuated thereby;

Figures 9, 10 and 11 are detail views of the timing mechanism;

Figure 12 is a plan view partly broken away of the traveling leer rods and their actuating connections;

Figure 13 is a longitudinal vertical section of the rear or delivery portion of the leer showing a modification;

Figure 14 is a rear elevation of the leer and mechanism shown in Figure 13; and

Figure 15 is a wiring diagram showing the electrical connections for the actuating motor.

Our invention has relation to a device for mechanically operating leers, and is applicable to any leer which employs a series of longitudinally movable rods, termed "traveling" rods, and also a series of vertically movable rods, termed "lifting" rods.

The object of our invention is to provide means of simple, convenient and effective character which will greatly reduce the labor of leer operations by enabling the same to be performed to a large extent mechanically and by the simple control of a motor device.

In the accompanying drawings, we have shown our invention as applied to a glass-annealing leer in the manner now to be described, premising, however, that our invention is not limited to such application, and also that various changes can be made in the details of construction, arrangement and combination of the various parts, without departing from the spirit and scope of our invention as defined in the appended claims.

In these drawings, the numeral 2 (Figure 1) designates a glass-flattening oven of well known character having therein the usual flattening table 3, arranged to be rotated by the gear, indicated at 4. 5 designates an annealing leer communicating with the flattening oven and receiving the flattened sheets of glass therefrom.

The numeral 10 designates the traveling leer bars which are supported in the leer 75 on antifriction rollers 11, said rollers being placed at suitable intervals apart and being supported in the housings 12. A pair of channels 13 support the housings and rollers within the leer, the channels being seated in the side walls of the leer suitable distances apart, and each pair of channels supporting as many rollers as there are traveling leer bars 10, side by side, within the leer. The bars 10 are secured at their outer or delivery ends by a transverse bar 14, by means of which all the rods may be moved in unison.

The numeral 17 designates the vertically movable or lifting rods which are supported on the bars 15, and chairs 16, as is best shown in Figure 5. The bars 15 are supported at their ends by the depending rods 18, whose upper ends are hung to the arms of bell crank levers 19. These bell crank levers 95 are pivotally supported within brackets 20, upon the pins or bolts 21. The several bell crank levers 19 at each side of the leer are connected together by means of a rod or pipe 22. 23 is a shaft extending 100
transversely across the leer and to which are secured the bell cranks 19 and 19, to which the pipes 22 are also connected, so that by rocking the shaft 23, all the bell cranks on both sides of the leer will be operated in unison and the bars 15 will be raised or lowered to raise or lower the vertically movable bars 17.

The leer with its two sets of bars is designed to move any product to be annealed, in the present instance, sheets of glass, from the oven 2, step by step, to the rear end of the leer. This is accomplished in the following manner:

A sheet of glass is placed upon the portions 10 of the rods or bars 10, which extend within the flattening oven. The bars 10 are then moved a suitable distance rearwardly so as to bring the sheet of glass over the ends of the lifting bars 17. The shaft 23 is then rocked, causing the lifting bars 17 to lift the sheet of glass from the bars 10. While the sheet is so lifted, the bars 10 are moved backwardly in the opposite direction to their original position within the oven 2. The shaft 23 is again rocked in the opposite direction so as to lower the bars 17, and in their downward movement these bars leave the glass sheet upon the bars 10, but in an advanced position within the leer. These operations are repeated until the sheet of glass has been advanced to the rear end of the leer, with other glass sheets lying at regular intervals upon the rods 10 within the leer. When the rods 10 are next moved out, a sheet of glass is brought out of the leer and may be removed. Successive operations of the leer will continue to deliver glass sheets in a position for removal.

As thus far described, the construction and arrangement of the parts does not differ essentially from that which heretofore has been employed. It has been the practice, however, in so far as we are aware, to actuate the two sets of bars manually. Our invention is designed to render the operation largely mechanical and automatic. This is accomplished by the means now to be described.

Referring more particularly to Figures 2, 3, 6 and 7 of the drawings, 26 designates suitable housings secured to a bed plate 37, which, in turn, is secured to a suitable foundation 28, located in a convenient position relative to the leer. 29 and 30 designate two shafts, one above the other, which are mounted in suitable bearings in the housings 26. 31 is an electrically driven motor whose armature shaft carries a worm 32, which meshes with the worm wheel 33, keyed to the shaft 29. The shaft 29 also carries a pinion 34, and a gear 35, both keyed thereto, the pinion 34 meshing with a gear wheel 36, which is keyed to the shaft 30. 37 is a cam also keyed to the shaft 30, and which is designed to raise and lower a vertically movable plunger rod 38, the latter having a roller 39, which extends within the cam groove 40 of said cam (see also Figure 8).

The plunger 38 has therein the guide slots 43 and 46, through which the shafts 29 and 30, respectively, extend and which act to guide said rod in its vertical movement. A collar 41, keyed to the shaft 29, acts to prevent lateral movement of said rod. The upper end of this rod is connected to a pin 41, at the end of a rocker arm 42, which is, in turn, keyed at one end of the rocker shaft 23. When the plunger rod is reciprocated by the groove 40 of cam 37, it causes the rocker arm 42 to move up and down, thereby operating the rocker shaft 23, and through the mechanism previously described, to raise and lower all of the vertically movable leer rods 17. Mounted upon the lower end portion of the plunger rod 38 are two rollers 43, which support the flanges 44 of a rack frame 48. This rack frame carries the upper and lower rack bars 49, which are designed to engage the teeth of the gear wheel 35 in such a manner that when the upper rack bar is in engagement with gear wheel 35, the rack frame will be moved in one direction, and when the lower rack bar is in engagement with said gear wheel, the rack frame will be moved in the opposite direction. Connected to the rack frame is a rearwardly extending arm 50, which is drilled to receive a stud 51, secured to a rocking lever 52. This lever is, in turn, keyed to a rocker shaft 53, mounted in suitable bearings 54, secured to the pier 55, located at each side and near the back end of the leer. The shaft 53 passes under the leer and extends beyond its opposite side wall, as best shown in Figure 3, its opposite end portion having a second rocking lever 52, keyed thereto, and arranged in alignment with the lever 52. The free ends of these rocking levers are connected by pivots or studs 62 to the end portions of pitman rods 63. These pitman rods, together with the levers 52 and 53, are provided with a plurality of holes 61, for the stud or pivot 62. These holes being for the purpose of providing adjustment to allow for variation in length of movement of the pitman 63. The outer ends of the pitman 63 are pivotally connected to the ends of a bar or shaft 57, which is secured to the bar 14, (see Fig. 12). This bar 57 extends beyond both side walls of the leer to allow of its connection with a rod 63, which is held in place by means of the two collars 58.

The rocking levers 52 and 53 are provided with extending arms 59, to which are adjustably fastened counter-weights 60.
The motor is shown as having a thrust bearing 65, located between the motor bearing 66 and the worm 32, (see Figure 6).

A similar thrust bearing 67 is adjustably mounted in the bracket 68, which is secured to one of the housings 26, this thrust bearing being arranged to receive any thrust against the end of the shaft. The two thrust bearings act to take up the thrust in both directions and thus preserve the proper alignment of the worm 32.

The motor 31 is electrically controlled by means of suitable switches and cut-outs as now to be described, and which are illustrated diagrammatically in Figure 15. The power circuit for the motor is controlled from the mains 70, through the fused, double-pole, single-throw switch 71. One side of the line is fed to the controlling or starting switches 72 and 73, which may be of any suitable type of single-pole normally open switch. These switches 72 and 73 are arranged in parallel with the starting circuit, so that either switch may be used for the purpose of starting the motor 31. From the switches 72 and 73, the current passes over the conductor 74, through the solenoid magnet 76, of a controller 75. When this magnet is energized, its plunger 77 is caused to rise, and thereby close the circuit at the contacts 78. When these contacts are closed, the circuit is completed through the right hand contact 78 to the armature and field of the motor, and a magnetic circuit is completed and maintained through the coils of the magnet through the left hand contact and through a normally closed cut-out switch 80. A suitable ohmic resistance 81 is shown in series with the motor armature winding.

The cut-out may be of any suitable type of normally closed switch, arranged to be operated by a movable operating arm. It is illustrated in Figures 6 and 7 as being supported on an angle bracket 82, which is bolted to the opposite face of one of the housings 26. This angle bracket is provided with slots 83, to receive clamping bolts 84, and thus allow for up and down adjustment of the cut-out switch 80 and its operating arm 85, which projects out of the switch box and is provided at its outer end with the roller 86.

The numeral 87 designates a switch-operating arm (see Figures 2, 3, 6, 7 and 9) which is adjustably secured at the outer end portion of the shaft 30, and is so positioned that the studs 88 located upon the two members of the arm will pass over, and in their movement come in contact with, the roller 86, and thereby act to open the switch contacts of the switch 80. The shaft 30 is provided with a supporting head 89 (shown in detail in Figures 10 and 11) for the arm 87.

This head is keyed to the end portion of the shaft 30 and is provided with a slot 91, through which and through a hole 90 in said arm a bolt 92 extends, said bolt being provided with a suitable clamping nut, whereby a proper adjustment may be secured.

The operation is as follows: The traveling rods of the leer being in the position shown in Figure 1, after the flattener, who is operating the flattening oven, has piled a sheet of glass upon the portions 10 of the said rods, he grasps the operating handle 95 (see Figure 15), which is located in a convenient position in front of the flattening oven, and through a chain or other suitable connection, actuates the switch 72, to close its contacts. This closes the circuit through the magnet 76 of the controller 75, which in turn, closes the contacts at 78, thus completing the circuit through the motor armature and field and maintaining the circuit through the cut-out switch 80 and the coil 76. The motor 31 will then start and continue to operate, and the contacts at 78 will remain closed. At this time, the upper rack bar 49 will be in engagement with the gear 90, and the rack will be moved out until its teeth have all passed over said gear wheel. The rack frame will then come to rest and the traveling leer bars will be moved outwardly through the medium of levers 52, 53, rocker shaft 53, and connecting rods 63. The switch-operating arm 87 is so adjusted that at this time one of the studs 88 will come in contact with roller 86 of the cut-out switch 80, and thereby momentarily break the circuit through the magnet 76, allowing the plunger 77 to drop, opening the contacts at 78, and thus opening the motor circuit and causing the motor to come to rest. The operating levers and cut-out should be so adjusted that the natural drift of the motor and operated mechanism will allow the stud 88 to pass over and free from the roller 86, allowing the contacts of cut-out switch 80 to close, thus permitting the motor to be started again upon the closing of either of the switches 72 or 73. If, by reason of improper adjustment, the switch 80 should not be closed in this manner before the motor comes to rest, the operating switch 72 or 73 must be held closed until the arm 87 drifts past the roller of the switch-operating lever 85.

Assuming that the leer bars are loaded with glass sheets from end to end, a sheet of glass will be lying on the traveling leer bars and exposed without the leer as said bars come to rest. The leer tender removes the sheet from the bars and then operates the handle 97 (Figure 15), which operates through the cord or chain 98 to close the switch 73. The motor then starts to operate as before, at which time the cam 37 is in
position to operate the cam roller 39, to cause the plunger rod 38 to rise, whereby, through the connections previously described, the lifting bars 17 will be operated to lift all the glass off from the traveling bars 10. As the plunger rod 38 nears the end of its upward movement, it lifts the lower rack 49 into engagement with the lower face of the gear wheel 35, so that the rack frame will be moved in a direction opposite to that previously described, causing the lever bars 10 to be moved back into the lever and their forward end portions 10a to be again extended within the flattening oven in position to again receive a sheet of glass from the flattening stone. The mechanism continues in motion and as soon as the teeth of the lower rack pass out of engagement with the gear 35, the rack frame comes to rest. At the same time, the cam groove of cam 57 comes into such position that its subsequent motion causes the plunger rod 38 to move downwardly, thereby lowering the vertically movable lever bars 17 to deliver the glass upon the bars 10. The bars 17 finally come to rest with their upper surfaces a suitable distance below the upper surface of the bars 10. At the same time, the rack frame is lowered, being carried on the rollers 43, until the upper rack bar 49 comes into engagement with the teeth of gear 35. At this time, the stud 88 on the other arm of the lever 87 strikes the roller 86 of the cut-out switch 80 and the whole machine comes to rest. The operation may then be repeated in the manner above described, as desired.

The counterweight 60 of the levers 52 and 52a are for the purpose of steadying the motion of the machine against any sudden jars incident to the starting of the motor and the traveling lever bars, and to overcome the inertia of said bars in bringing them to rest at the ends of their movements.

The bell crank levers 19 are preferably provided with counterweights 99, in order to properly balance the vertically movable lever rods.

In Figures 13 and 14, I have shown a modified form of mechanism for operating the traveling lever bars. This modification is designed more particularly for use with levers which are so constructed that it would be inconvenient to pass the shaft 53 through and under the lever to receive a rocking lever, such as the lever 52 at the opposite side thereof. This condition often occurs, being due to the fact that the levers are either so close together that there is not sufficient separating space for such equipment or where there is a party wall common to two levers built side by side as a unit.

In the construction shown in Figures 13 and 14, the shaft 53a is a short shaft carry.
the actuating connections for the traveling rods including a motion-reversing device, substantially as described.

3. In leer-operating mechanism, the combination with a set of traveling leer rods and a set of lifting leer rods, of motive means, and actuating connections between the motive means and the two sets of rods for mechanically operating said rods in alternate timed relation to each other, said connections having means for automatically rendering the motive means inoperative at predetermined times, substantially, as described.

4. In leer-operating mechanism, the combination with a set of traveling leer rods, of a motive device, actuating connections between said device and the said rods, said connections including motion-reversing means, and means for rendering the motive device inoperative after certain predetermined movements of said connections, substantially as described.

5. In leer-operating mechanism, the combination with a set of lifting rods, of a motive device, connections between said device and the said rods for periodically operating the same, and means operated by said connections for rendering the motive device inoperative after predetermined movements of said connections, substantially as described.

6. In leer-operating mechanism, the combination with a set of traveling leer rods and a set of lifting leer rods, other actuating connections between said device and the traveling rods, the latter connections including a motion-reversing means, and a cut-out device for the motive means arranged to be operated at predetermined times by the movement of said connections, substantially as described.

7. In leer-operating mechanism, the combination with a set of traveling leer rods and a set of vertically moving leer rods, of an electric motor, gearing driven by said motor, a plunger member actuated by said gearing and having actuating connections with the lifting rods, and other actuating connections between the motor and the traveling rods, the said connections including a motion-reversing device operated by the movement of said plunger member, together with a cut-out device for interrupting the circuit of said motor and actuated by said gearing, substantially as described.

8. In leer-operating mechanism, the combination with a set of lifting rods, of a motor, gearing driven thereby, a cam driven by said gearing, and a plunger member actuated by the cam and operatively connected with the lifting rods, substantially as described.

9. In leer-operating mechanism, the combination with a set of lifting rods, of a motor, gearing driven thereby, a cam driven by said gearing, and a plunger member actuated by the cam and operatively connected with the lifting rods, substantially as described.

10. In leer-operating mechanism, the combination with a set of traveling leer rods, of a motor, gearing driven thereby, a shiftable rack frame arranged to be engaged by said gearing, and means actuated by the gearing for shifting said frame, substantially as described.

11. In leer-operating mechanism, the combination with a set of traveling leer rods, of a motor, gearing driven thereby, a shiftable rack frame arranged to be engaged by said gearing, and means actuated by the gearing for shifting said frame, together with means actuated by said gearing for controlling the operation of said motor, substantially as described.

12. In leer-operating mechanism, the combination with a set of traveling leer rods and a set of lifting leer rods, of motive means, and actuating connections between the motive means and the two sets of rods for automatically operating said rods in alternate timed relation to each other, substantially as described.

13. In leer-operating mechanism, the combination with a set of traveling leer rods and a set of lifting leer rods, of motive means, and actuating connections between the motive means and the two sets of rods for automatically operating said rods in alternate timed relation to each other, the actuating connections for the traveling rods including a motion-reversing device, substantially as described.

In testimony whereof, we have hereunto set our hands.

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