

Aug. 21, 1934.

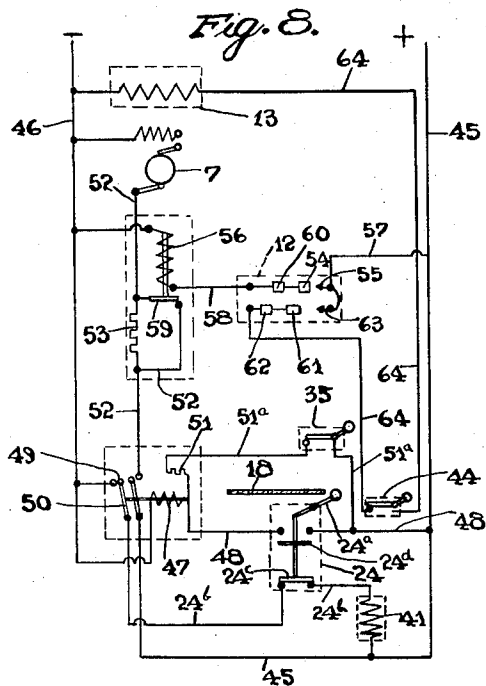
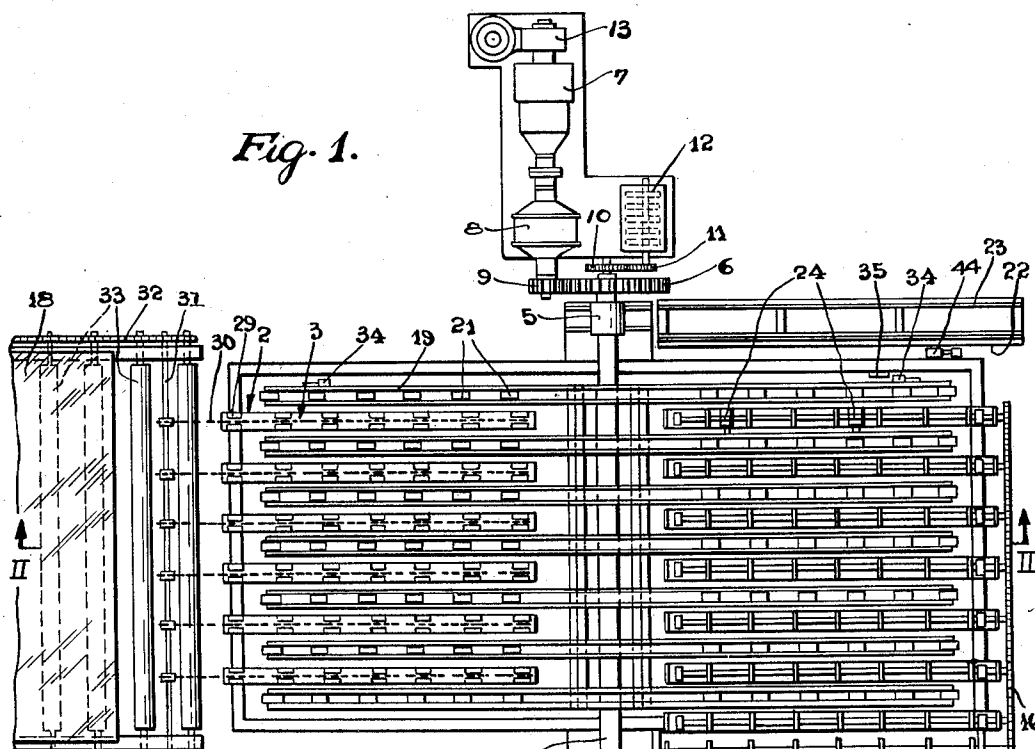
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1,970,749

GLASS HANDLING APPARATUS

Filed June 5, 1933

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 2.

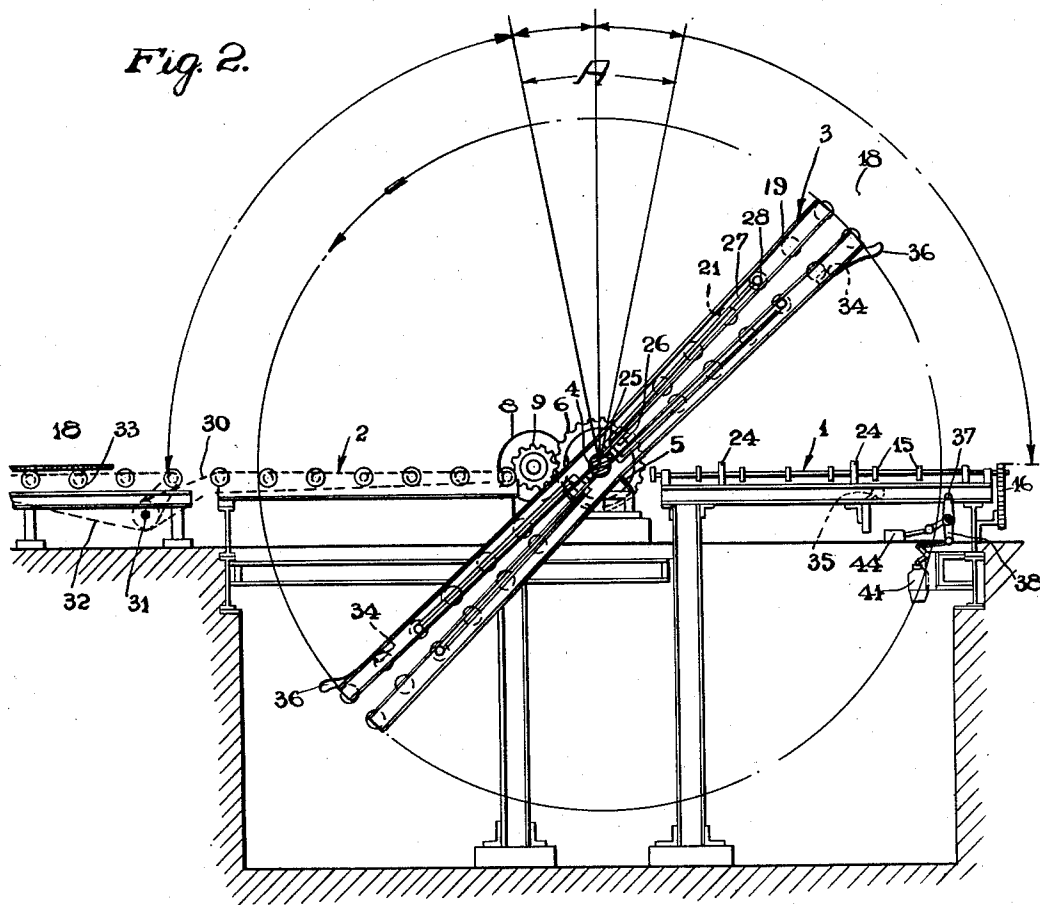
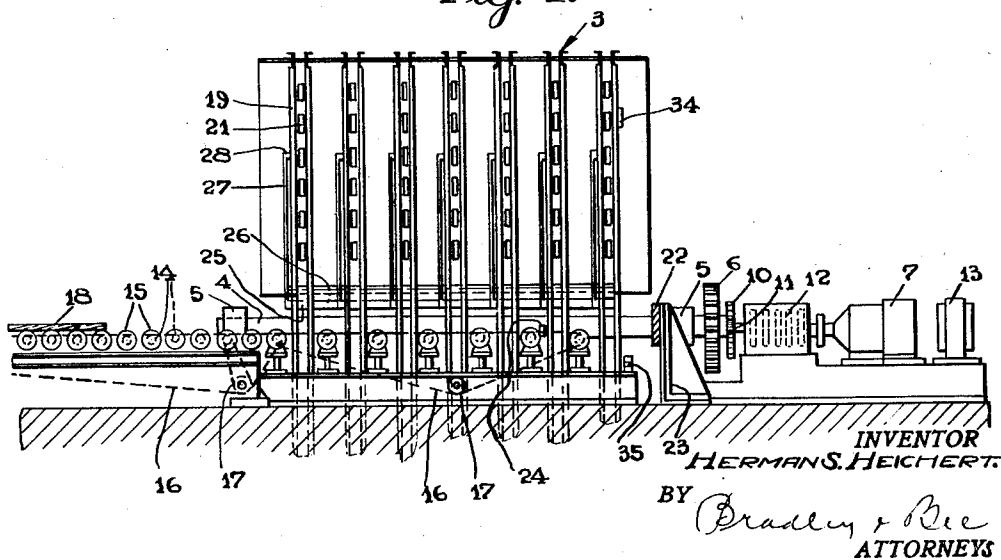


Fig. 4.



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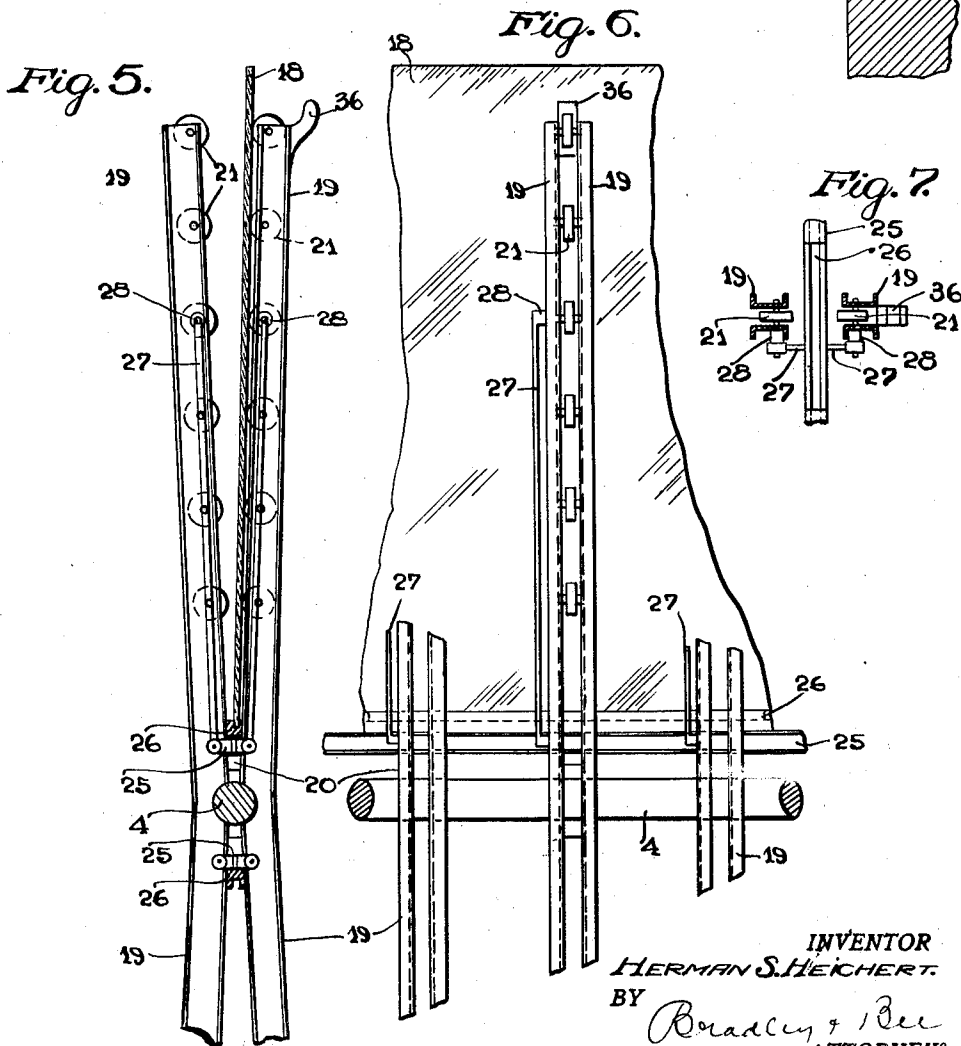
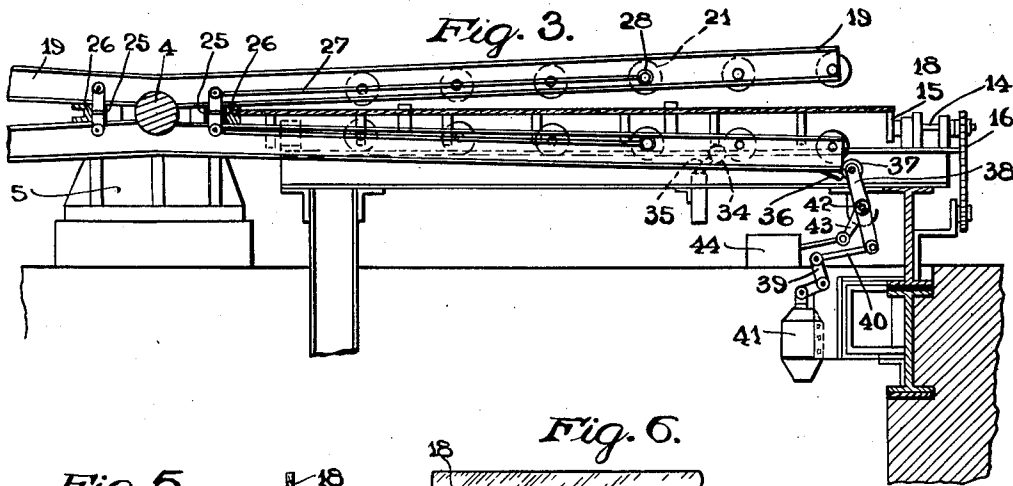
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GLASS HANDLING APPARATUS

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3 Claims. (Cl. 198—33)

The invention relates to an improved apparatus for turning sheets of glass upside down as a step incident to the movement of the glass from one point to another, as for instance in the movement of the sheets from the leer to the tables on which they are placed for grinding and polishing. The objects of the invention are the provision of a turn-over device, which operates automatically, which will not break the glass, which has a large capacity, which operates without the use of reversing devices and which is of relatively simple construction. One embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a plan view. Fig. 2 is a section on the line II—II of Fig. 1. Fig. 3 is a partial view on the line II—II of Fig. 1 on an enlarged scale. Fig. 4 is an elevation. Figs. 5, 6 and 7 are detail views of the turn-over device on an enlarged scale, Fig. 5 being a side elevation, Fig. 6 a front elevation, and Fig. 7 a plan view, and Fig. 8 is a wiring diagram.

Referring to the drawings, 1 and 2 are roller conveyors extending at right angles to each other and 3 is the turn-over device mounted on the axle 4 and comprising in the present instance a double U-frame. In starting position, the U-frame lies in horizontal position so that a sheet of glass may be run into it from the conveyor 1. After the sheet is run into the right hand end of the turn-over device (Fig. 2), such device is rotated through 180 degrees, thus turning the sheet upside down and bringing it into position on the conveyor 2. This movement brings the other side of the turn-over device in position to receive another sheet. The number of U-frames in this particular case is two, but any number may be used depending upon requirements.

The axle 4 which carries the turn-over device is mounted in suitable bearings 5, 5 and provided with a pinion 6. This pinion 6 is driven from an electric motor 7 through the intermediary of reduction gearing in the casing 8 and the spur gear 9 which engages the gear 6. The shaft 4 is also provided with a gear 10 engaging a gear 11 carried by the shaft of the switch drum 12. Such switch drum controls the movements of the turn-over device 3 as later described. The shaft of the motor 7 is also provided with a magnetic brake 13 which comes into play automatically under the control of the switch drum when the turn-over device approaches horizontal position and also when it passes through its vertical position, at which time the glass shifts from one side of the turn-

over frame to the other. The slowing down of the motor prevents too violent a shift which might cause breakage at this time, particularly with very large, heavy sheets.

The conveyor 1 consists of a plurality of shafts 14 mounted in a suitable framework and each provided with a plurality of rollers 15, preferably provided with rubber tires. The shafts 14 are provided with sprockets at their ends over which pass the chains 16 having suitable take-up devices 17 and being driven from a motor which is not shown. The shafts 14 are rotated so that the plates 18 as they come from the leer are carried in the direction of the arrow (Fig. 1) to the end of the conveyor between the frames of the U-shaped turn-over device 3, which at this time occupies a horizontal position. Each of the frames of the turn-over device is made up of a plurality of spaced arms 19 preferably in the form of channels (Fig. 7) and secured together at their inner ends by means of hubs 20 and the shaft 4. These frame members are so spaced that when the device is in horizontal position, the arms 19 lie between the sets of rollers 15. When the frame is in receiving position, as indicated in Fig. 3, these rollers are out of contact with the glass sheet 18 which at this time rests upon the rolls 15 of the conveyor 1.

In order to stop the movement of the sheet when it reaches the end of the conveyor 1, the stop 22 (Fig. 4) is provided, preferably in the form of a board mounted on a series of brackets 23 secured to the floor. Just before the sheet of glass reaches the end of the conveyor 1, its edge strikes the roller of a switch 24 which controls the starting of the motor 7, so that at this time the motor comes into play to swing the turn-over device upward and thus lift the glass sheet from the rolls 15 of the conveyor 1. At this time the sheet rests upon one of the sets of rollers 21 carried by the arms 19. The turn-over frame is also provided with a transverse device for supporting the sheet at its lower edge when the turn-over frame approaches vertical position. This device comprises an I-beam 25 of small cross section carrying upon its upper side a grooved block 26 of wood (Figs. 5 and 6). This I-beam is supported by means of the rods 27 pivoted at their outer ends 28 to the arms 19. As the turn-over frame approaches vertical position, the glass plate slides down against the block 26 and when the frame passes vertical position this block with the sheet of glass carried thereby swings laterally so that the sheet is engaged by

the rollers 21 on the arms of the turn-over device, opposing the arms on which the sheet has been supported. This arrangement lessens the shock of shifting the glass from one set of arms to the other, the rollers also being provided with rubber tires in order to reduce the shock. To further minimize the impact incident to the shift of the glass at vertical position, the motor 7 is slowed down as the turn-over frame swings through the arc marked A of Fig. 2, at which time the frame approaches and passes through vertical position. This is accomplished from the switch drum 12 which controls the speed of the motor and the application of the magnetic brake.

The conveyor 2 to which the turn-over device delivers consists of a series of sets of rollers 29, each of which sets is driven from a chain 30 passing around a sprocket on the shaft 31. The shaft 31 is provided at its end with a sprocket and is driven from a chain 32 passing around sprockets on the ends of the rollers 33. The chain 32 is driven from a motor, which is not shown. The series of sets of rollers are spaced apart in the same way as the rollers on the conveyor 1 so that the arms of the turn-over member can pass down between them when the turn-over device is swung to delivery position lying in a horizontal plane. When the turn-over device swings to this position, the rollers 29 engage the glass sheet and lift it from the rollers 21 of the turn-over frame so that the glass is carried to the left (Fig. 1). As soon as the turn-over device arrives at horizontal position, the cam 34 carried thereby engages a limit switch 35 moving such switch so as to interrupt the current supplying the motor 7. The contact strips on the switch drum 12 are also so arranged that just before the turn-over frame reaches horizontal position, the motor is slowed down and the magnetic brake 13 is brought into action, thus slowing the frame down so that it stops without any noticeable impact or jar.

Each end of the turn-over frame is provided with an indexing plate 36 (Fig. 2) adapted to be engaged by the indexing roller 37 when the frame arrives at horizontal position. The indexing roller is carried by a lever 38 having one end connected to the bell crank lever 39 by means of the rod 40. The bell crank lever is operated from the solenoid 41 which normally tends to swing the rollers 37 to the left to engage the indexing plate. The rotation of the shaft 42 when the roller 37 is moved to the left moves the arm 43 to the right and opens a switch 44 which lies in the circuit of the winding of the magnetic brake 13 so that when the indexing device operates, the brake 13 is released. The indexing device serves to position the turn-over frame properly and to lock it against movement during the period preliminary to receiving a glass sheet from the conveyor 1. When the winding of the solenoid 41 is interrupted, the bar thereof which is of substantial weight swings the upper end of the bell crank lever 39 to the left, thus causing the upper end of the lever 38 to move to the right releasing the indexing plate. The circuit through the winding of the solenoid is broken by the actuation of the switch 24 when the edge of the glass sheet moving into the turn-over device strikes such switch, such switch being arranged to perform the two functions of interrupting the circuit through the winding of the solenoid and of completing the circuit to the motor 7 so that such motor starts to rotate the turn-over device.

Briefly stated, the complete operation of the device is as follows: Starting with the turn-over device in horizontal position, a sheet of glass 18 moved in on the conveyor device 1 strikes the switch 24, thus releasing the indexing device by interrupting the circuit through the winding of the solenoid 41, and starts the motor 7 by completing the circuit by means of which such motor is supplied with current. The operation of the motor rotates the axle of the turn-over device, swinging it in a counterclockwise direction. The upward movement of the right hand side of the turnover device lifts the glass sheet due to the engagement of the rollers 21 on the arms 19 of the device. This turning movement continues at a relatively rapid rate until the turn-over frame reaches the portion of its rotation marked A on Fig. 2, at which time the switch drum 12 reduces the speed of the motor by switching in resistance and also brings into play the magnetic brake 13. The turn-over device is thus slowed up during the period in which the glass sheet shifts so that it is transferred from the rollers on one set of arms of the turn-over device to the rollers on the other set of arms. At this time the lower edge of the sheet is resting upon the block 26 (Fig. 5) and the swinging frame made up of the block 26 and the arms 27 swings to the left (Fig. 5) transferring the sheet with a relatively slow movement to the other side of the turn-over device. After passing the zone of rotation A, the motor again speeds up due to the control of the switch drum 12 and to the release of the magnetic brake which is controlled from the drum and such relatively fast movement continues until the turn-over device approaches horizontal position. At this time the drum 12 again slows up the motor by switching in resistance and the magnetic brake 13 is brought into play so that the turn-over device as it reaches horizontal position is moving at a relatively slow rate. When the turn-over device arrives at horizontal position, the cam 34 strikes the limit switch 35 and interrupts the supply of current to the motor. At the same time the roller 37 on the lever 38 engages one of the indexing plates 36 carried by the rotating frame, thus positively stopping the turn-over device in horizontal position ready to receive the next sheet of glass, the movement of the shaft 42 upon which the indexing lever is mounted also moving the arm 43 to open the switch 44 and interrupt the circuit through the magnetic switch 13 so that such brake is released to permit the starting of the turn-over frame in the next operation. The operation is thus made automatic throughout so that all the operator has to attend to is the starting of the conveyor 1 to cause one of the sheets 18 to move into the turnover device. The conveyors 1 and 2 are shown as roller conveyors, but may be of any type divided into sections so that the spaced arms 19 of the turn-over device can move therebetween in interfitted relation.

The electric control and wiring will be seen by reference to Fig. 8, wherein 45 and 46 are the positive and negative leads from a source of current supply. When the glass sheet 18 strikes the roller on the switch arm 24a of the switch 24, the switch bar 24c is opened, thus interrupting the circuit 24b through the coil of the solenoid 41, which controls the indexing arm 37 so that such arm is released. The movement of the switch arm 24a also closes the bar 24d and completes a circuit through a solenoid coil 47 via the wires 48. This closes the switch bar 49 and opens the bar 50. The bars 49 and 50 are held in this position by

the holding circuit including the coil 47 and the coil 51 after the bars 24c and 24d move back to the position shown and when the removal of the glass 18 releases the arm 24a. The holding coil circuit includes the limit switch and the wires 51a, 51a.

The closing of the arm 49 completes the circuit through the motor 7, such circuit including the wires 52, 52, and the relay arm 59, so that such motor is rotated and with it the switch drum 12. When the turnover frame approaches mid-position, the contact 54 on the drum engages the brush 55, thus putting current through the solenoid coil 56 via wires 57 and 58 and opening the switch arm 59, which causes the current to the motor to traverse a resistance coil 53 to slow up such motor. This same result occurs later when the turnover frame approaches the end of its movement, at which time the contact 60 on the drum again causes the actuation of the relay arm 59 to switch in the resistance 53 and slow down the motor.

The coil of the magnetic brake 13 is also brought into play by the drum 12 when the turnover frame approaches vertical and horizontal positions in order to help slow down the movement of the frame at such time. This is accomplished by the contacts 61 and 62 which engage the brush 63 and switch in the coil of the brake 13 via the circuit including wire 57, brush and drum contacts, wire 64 and switch 44, which as heretofore explained is finally opened by the indexing device in order to release the magnetic brake when the turnover frame reaches horizontal position.

When the turnover frame reaches its horizontal delivery position, the cam 34 (Fig. 1) strikes the limit switch 35 and interrupts the current through the holding circuit including the coil 47 and the coil 51, so that the relay arm 49 opens interrupting the circuit to the motor and re-establishing a circuit through the coil 41 of the indexing device. The switches 35, 44, and 24 all move to the positions shown by spring action or gravity when not acted upon. Similarly, the switch arm 49 moves to open position and 59 moves to closed.

What I claim is:

1. In combination in glass sheet handling apparatus, a conveyor comprising a series of spaced driven sections, a turn-over device of U-shape comprising a pair of spaced adjacent frames each made up of a plurality of arms adapted to

pass between said spaced sections of the conveyor and pivoted for rotation about an axis lying at the level of said conveyor, a second conveyor lying on the other side of said axis of rotation and having sections spaced to receive said arms, means for driving the sheet engaging means of both conveyors so as to move the glass sheets to and from the turn-over device, power means for rotating the turn-over device about its axis, and automatic means for slowing up the movement of rotation of the turn-over device as it approaches and passes its vertical position.

2. In combination in glass sheet handling apparatus, a conveyor comprising a series of spaced driven sections, a turn-over device of U-shape comprising a pair of spaced adjacent frames each made up of a plurality of arms adapted to pass between said spaced sections of the conveyor and pivoted for rotation about an axis lying at the level of said conveyor, a second conveyor lying on the other side of said axis of rotation and having sections spaced to receive said arms, means for driving the sheet engaging means of both conveyors so as to move the glass sheets to and from the turn-over device, an electric motor and driving connections for rotating the turn-over device about its axis, and means including a rotating switch operated by the motor for slowing down the speed of the motor as the turn-over device approaches and passes its vertical position.

3. In combination in glass sheet handling apparatus, a conveyor comprising a series of spaced driven sections, a turn-over device of U-shape comprising a pair of spaced adjacent frames each made up of a plurality of arms adapted to pass between said spaced sections of the conveyor and pivoted for rotation about an axis lying at the level of said conveyor, a set of rollers on each of said arms, a swinging carrier of U-shape having the ends of its arms pivoted to said frames adjacent their outer ends and adapted to support the edge of the glass sheet as the turn-over swings past vertical position, a second conveyor lying on the other side of said axis of rotation and having sections spaced to receive said arms, means for driving the sheet engaging means of both conveyors to move the glass sheets to and from the turn-over device and a means for rotating the turn-over device about its axis of rotation.

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