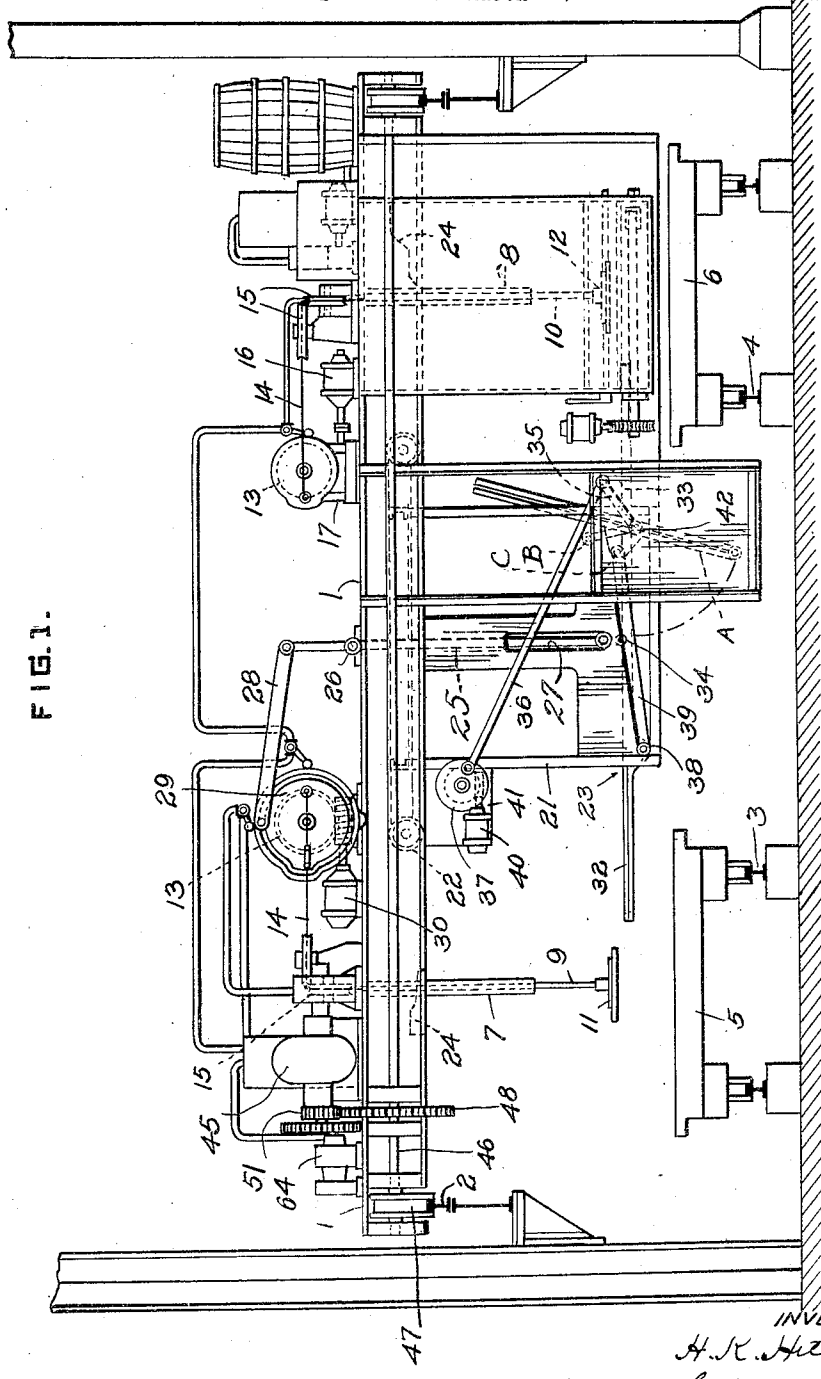
Nov. 29, 1927. 1,651,206

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GLASS TRANSFER APPARATUS

Original Filed March 27, 1924 3 Sheets-Sheet 1

FIG. 1.



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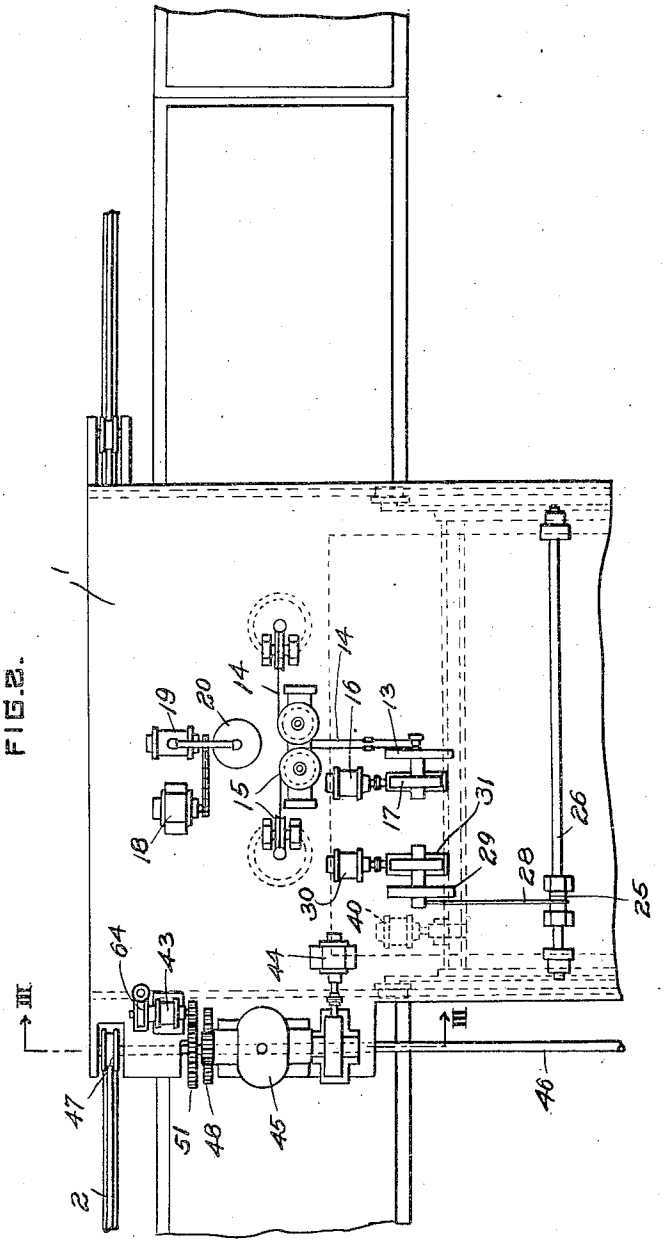
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GLASS TRANSFER APPARATUS

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FIG. 2.



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GLASS TRANSFER APPARATUS

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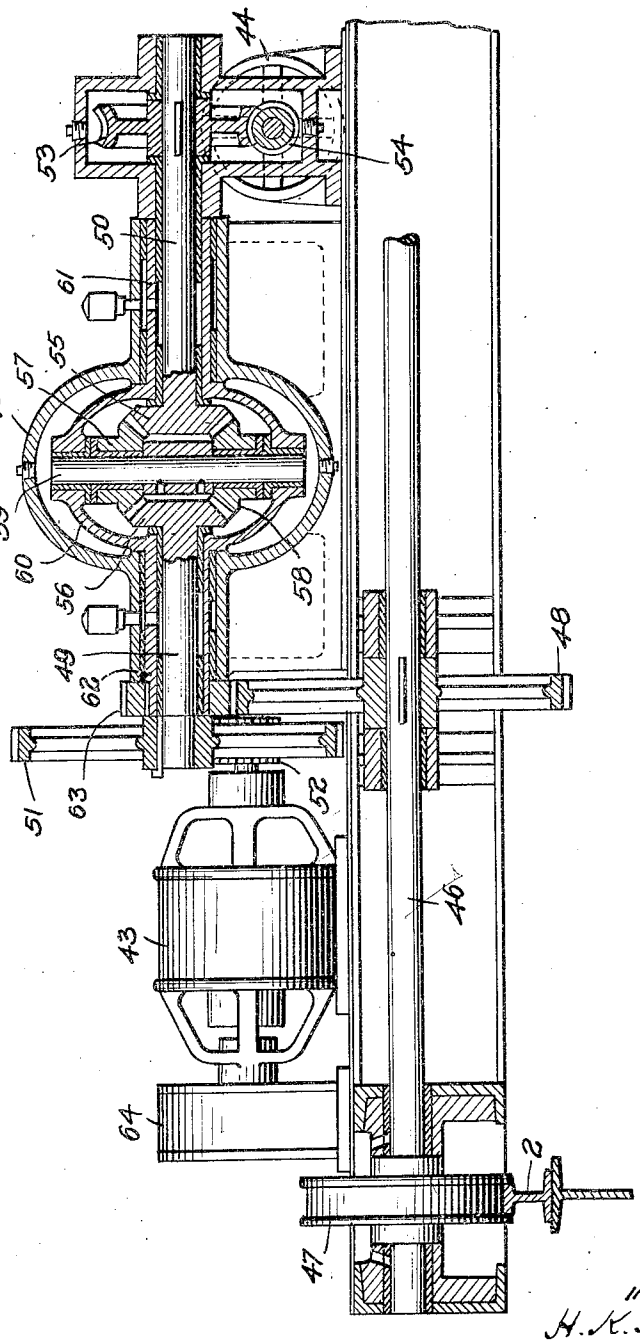


FIG. 3.

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UNITED STATES PATENT OFFICE.

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GLASS-TRANSFER APPARATUS.

Original application filed March 27, 1924, Serial No. 702,260. Divided and this application filed December 29, 1925. Serial No. 78,038.

The invention relates to apparatus for turning over and transferring glass plates, and constitutes a division of my application, Serial No. 702,260, filed March 27, 1924. The apparatus is designed particularly for picking up glass sheets from cars or tables upon one track, carrying such sheets to other cars or tables on a second parallel track, and depositing them on such other cars or tables. The two tracks pass beneath two series of grinding and polishing machines, such as shown in the United States Patent to J. H. Fox, No. 1,554,804, and during the transfer of the sheets from the cars on one track to those on the other, it is desirable to maintain an uninterrupted forward movement of the cars corresponding to their movement under the grinding and polishing machines. The present invention has for its object the provision of improved means for giving the crane carrying the turnover and transfer means a constant forward movement corresponding to that of the cars, while at the same time permitting an independent backward and forward movement of the crane by means of a shifting motor.

Briefly stated, this is accomplished by the use upon the crane of a constant speed electric motor arranged so as to move the crane ahead at the same rate of speed as the tables carrying the glass, which motor is used on the crane in conjunction with a second series wound electric motor for moving the crane in both directions at any desired speed, gearing being provided between the motors and crane including a differential. This permits the constant speed motor to run continuously without interfering with the back and forth movement of the crane as secured by the series wound motor. One embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is an end elevation of the complete apparatus. Fig. 2 is a partial plan view of the apparatus of Fig. 1. And Fig. 3 is a section on an enlarged scale on the line III—III of Fig. 2.

Referring to the drawings, 1 is a platform mounted upon a track 2 extending longitudinally of the tracks 3 and 4 upon which are mounted the carriers or cars 5 and 6, such cars being adapted to carry the glass sheets which are to be ground and polished beneath the series of grinders and polishers heretofore referred to. Carried by the framework of the platfom 1 are a pair of guide frames 7 and 8, in which are mounted the pipes 9 and 10, constituting supporting framework of the vacuum frames 11 and 12 located over the cars. These vacuum frames are raised and lowered by means of crank discs 13, 13 connected to cables 14, 14 passing around sheaves 15, 15. The crank discs themselves are rotated from the motors 16, operating through reducing gearing in the casings 17, 17. A vacuum producing unit is mounted upon the platform and includes the motor 18, the pump 19 and the tank 20 connected to the vacuum cups of the frames 11 and 12 by means of suitable piping provided with valves, as more fully set forth in my application heretofore referred to.

Mounted for movement transversely of the cars 5 and 6 and carried by the platform 1 is the trolley frame 21 having wheels 22 engaging a suitable track upon such platform. This trolley frame carries the turnover table 23, adapted to receive the glass plates from the vacuum frame 11, turn such plates upside down, and move them laterally beneath the frame 12. In order to move the turnover table vertically when it comes under the vacuum frames 11 and 12, the track on which the wheels 22 are mounted is provided with the raised portions 24, 24. The trolley frame is moved back and forth to bring the turnover table beneath the two vacuum frames by means of the lever 25, pivoted at 26 to the platform framing and having its lower end pivoted to a slide 27 guided for vertical movement in a guideway carried by one of the members of the trolley frame 21. The other end of the lever is swung back and forth by means of the connecting rod 28 pivoted to the crank disc 29 which is operated from the motor 30 with an interposed gear reduction in the casing 31. The operation of the lever 25 moves the turnover table 23, so that in one extreme of movement, the section 32 of the table lies beneath the vacuum frame 11, while in another extreme of movement, the other section 33 of the tables lies beneath the vacuum frame 12. The two sections or halves of the table are pivoted together at 34, and the full lines in Fig. 1 show the table in open central position, while the dotted lines at A indicate the table in folded position, the table being

moved to such folded position in order to turn the sheet over, so that when the frame is opened again, the sheet will be reversed in position.

The section 33 of the table carries a crank 35, and this crank 35 is connected by means of the rod 36 with the crank disc 37. The table section 32 has mounted on its lower side a transverse shaft carrying at its ends the rollers 38 mounted in the guide slots 39 in the side plates of the frame 21. The crank disc 37 is driven from the motor 40 through the intermediary of suitable reduction gearing, the motor and operating parts being all seated upon a bracket 41 carried by the trolley frame 21. The section 33 of the table has secured across its lower side the shaft 42 mounted at its ends in the side plates of the frame 21. The rotation of the crank disc 37 through approximately 180 degrees brings the crank 35 to the dotted line position marked B, thus rotating the table sections to the position marked A, and closing such sections with the rollers 38 at the right hand end of the guide slots 39, as indicated in dotted lines at C. The slots 39 during such movement serve to guide the section 32 laterally, while the pivotal connection 34 between the two sections is swung downward to the position indicated in dotted lines. This movement brings the frame past a vertical position, so that when it is opened by reversing the motor 40, the glass sheet will rest upon the section 33, with its rough side, which was formerly down, facing up. The suction for the vacuum cups is operated by suitable automatic release mechanism, more fully shown and described in my application heretofore referred to, and it will be understood that the particular means here shown and described for transferring the glass sheets from the tables 5 to the tables 6 and turning them upside down during the transfer constitutes no part of the invention claimed in the present application, such application being directed primarily to the means for giving the platform 1, or crane, the movements which are desired during the transfer of the glass sheets from the table 5 to the table 6 and intermediate such transfer. Such mechanism will now be described.

Two motors are employed for shifting the platform 1 along the crane runway or track 2, namely, the main shifting motor 43, which is of the series wound type for moving the crane back and forth along the runway independent of the movement of the cars or tables 5 and 6, and an auxiliary motor 44, which is of the shunt wound constant speed type for giving the crane a forward movement, which is exactly the same as that of the cars or tables which move forward continuously during the operation of laying the glass on the tables. This constant forward movement of the cars is relatively slow, corresponding, of course, to the speed at which the cars are moving beneath the series of grinding and polishing machines. It will be understood that any desired means may be employed for giving the cars this uniform forward movement. The two motors operate through a differential 45, so that the motor 43 can operate to shift the crane in either direction without stopping the motor 44, such latter motor being allowed to operate continuously, so that when the operation of the motor 43 is discontinued, the motor 44 automatically takes up the work of moving the crane forward at the same speed as the glass carrying the cars or tables therebeneath, thus relieving the operator of the work of moving switches to stop and start the auxiliary motor, such as would be required if separate motors without the differential were employed. Worm reducing gearing is preferably employed between the auxiliary motor and the differential, with the worm of a pitch such that the worm wheel cannot be rotated backwardly by the worm. This prevents the shifting motor from running the auxiliary motor backward instead of moving the crane when the auxiliary motor is not running. The main driving motor is equipped with the usual magnetic brake to stop it quickly so that it will not be run backwardly (when not operating) by the auxiliary motor.

Referring to Fig. 3, 46 is a shaft extending transversely of the crane or platform and carrying the crane wheels 47. This shaft is provided with the spur gear 48 driven from both motors 43 and 44 through the intermediary of the differential 45, which may be of any approved form. As illustrated, this differential comprises a pair of shafts 49 and 50, the first of which has keyed to its outer end, the spur gear 51 driven from the pinion 52 of the main shifting motor 43, while the second of which has keyed to its outer end the worm wheel 53 driven from the worm 54 carried by the shaft of the motor 44. The two shafts have the gears 55 and 56 integral with their inner ends, and these gears mesh with the bevel pinions 57 and 58 mounted on the shaft 59. This shaft is carried in suitable bearings in the spider 60, such spider having integral therewith the sleeves 61 and 62, the latter of which has keyed to it the pinion 63, which drives the gear 48 keyed to the shaft 46.

The motor 44 is of the shunt wound constant speed type, which is set so as to drive the crane forwardly through the differential gear (when the motor 43 is not operating) at the same speed at which the cars beneath the crane are moving, thus facilitating the glass lifting and laying operations. At such time the magnetic brake 64 on the shaft of the motor 43 prevents such shaft from being run

backwardly. On the other hand, the motor 43 can, by reason of the differential, run the crane back and forth without any interference from the continuous drive of the motor 44, such motor being, of course, adapted to run at a much higher speed than the motor 44, so that the crane can be moved backwardly despite the constant forward drive of the motor 44. The operator is, therefore, relieved of stopping and starting the constant speed motor 44, as would be the case if it were not for the differential. The pitch of the worm 54 is such that it acts as a lock to prevent the backward rotation of the worm wheel 53 when the motor 43 is operating and the current to the motor 44 is cut off, thus dispensing with the requirement of a brake or some equivalent device to prevent the rotation of the shaft 50 under such conditions, as such rotation would, of course, render the motor 43 ineffective to move the crane in either direction.

What I claim is:

1. In combination with a moving grinding table adapted to receive a sheet of material to be ground or surfaced, a laying frame mounted above the said table for movement in the same direction, and two driving means for moving the frame, one means being adapted to move the frame in the same direction and at the same speed as that of the table, and the other adapted to move the frame in either direction and at a variable speed greater than that of the table.

2. In combination with a moving grinding table adapted to receive a sheet of material to be ground or surfaced, a laying frame mounted above the said table for movement in the same direction, and two driving means for moving the frame, one means being adapted to move the frame in the same direction and at the same speed as that of the table, and the other adapted to move the frame in either direction and at a variable speed greater than that of the table, the said driving means operating through a differential, so that they can both be operated together and the variable speed drive thrown into and out of operation without discontinuing the other drive.

3. In combination with a moving grinding table adapted to receive a sheet of material to be ground or surfaced, a laying frame mounted above the said table for movement in the same direction, a constant speed electric motor adapted to move the frame ahead at the same rate of speed as the table, and a second series wound motor for moving it in both directions.

4. In combination with a moving grinding table adapted to receive a sheet of material to be ground or surfaced, a laying frame mounted above the said table for movement in the same direction, a constant speed electric motor adapted to move the frame ahead at the same rate of speed as the table, a second series wound motor for moving it in both directions, and means whereby the constant speed motor is permitted to operate continuously without interfering with the back and forth movement of the frame by the second motor.

5. In combination with a moving grinding table adapted to receive a sheet of material to be ground or surfaced, a laying frame mounted above the said table for movement in the same direction, and means for moving the frame, said means including a pair of motors and differential gearing, one of such motors being of the constant speed type adapted to move the frame in the direction of travel of the table and at the same rate of speed, and the other being a series wound motor adapted to move the frame in both directions at a higher rate of speed than the first motor.

6. In combination with a moving grinding table adapted to receive a sheet of material to be ground or surfaced, a laying frame mounted above the said table for movement in the same direction, means including differential gearing for moving the frame, a constant speed electric motor having a worm wheel and worm connection to the differential gearing and adapted to move the frame through such differential in the direction of travel of the table and at the same speed as the table, and an electric shifting motor also connected to the differential to move the frame through the differential in either direction regardless of the operation of the first motor.

In testimony whereof, I have hereunto subscribed my name this 28th day of December, 1925.

HALBERT K. HITCHCOCK.