Jan. 4, 1938. H. S. HEICHERT 2,104,422

PLATE GLASS TRANSFER AND TURN-OVER APPARATUS

Filed Nov. 22, 1935 4 Sheets-Sheet 1

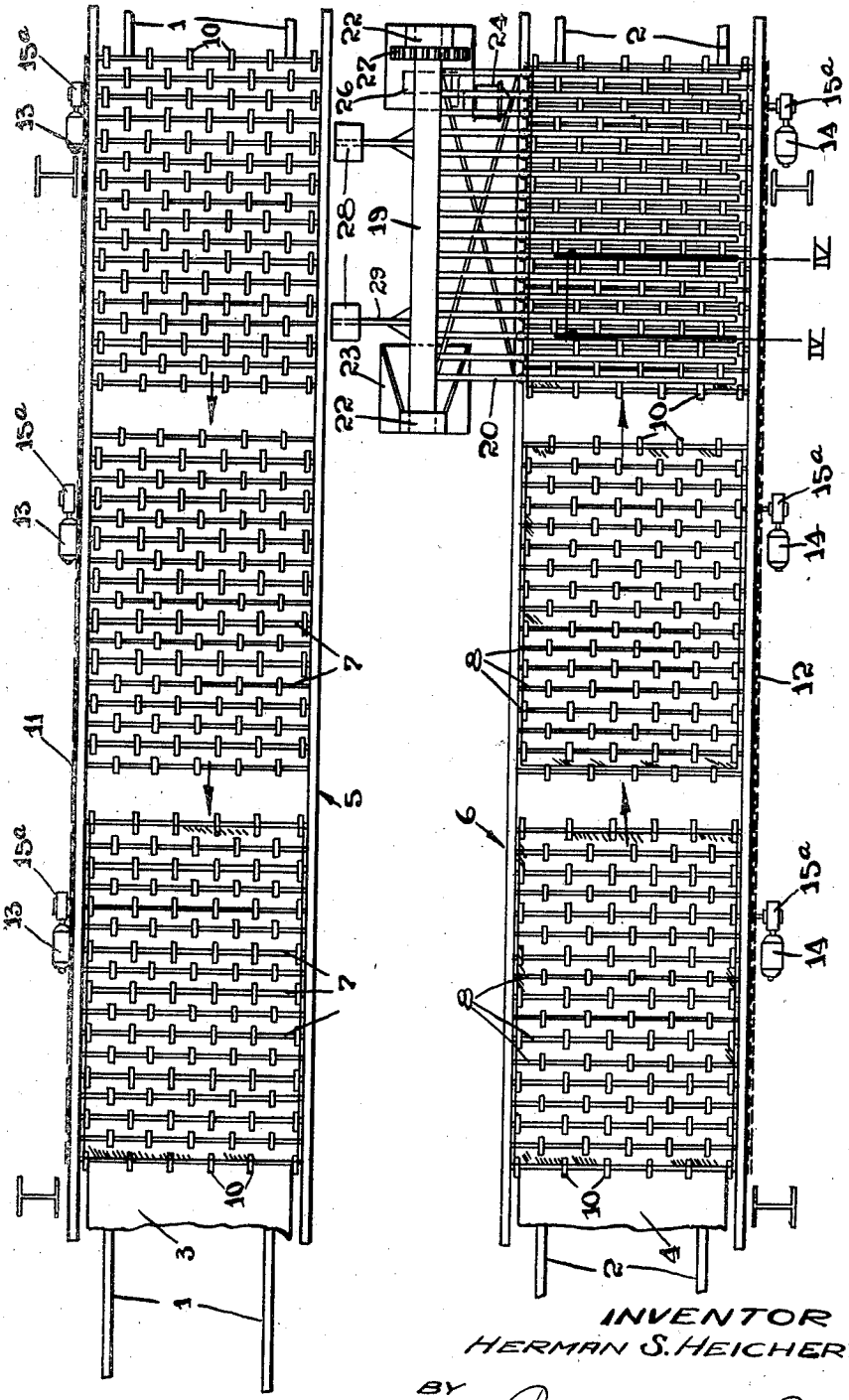


Fig. 1.

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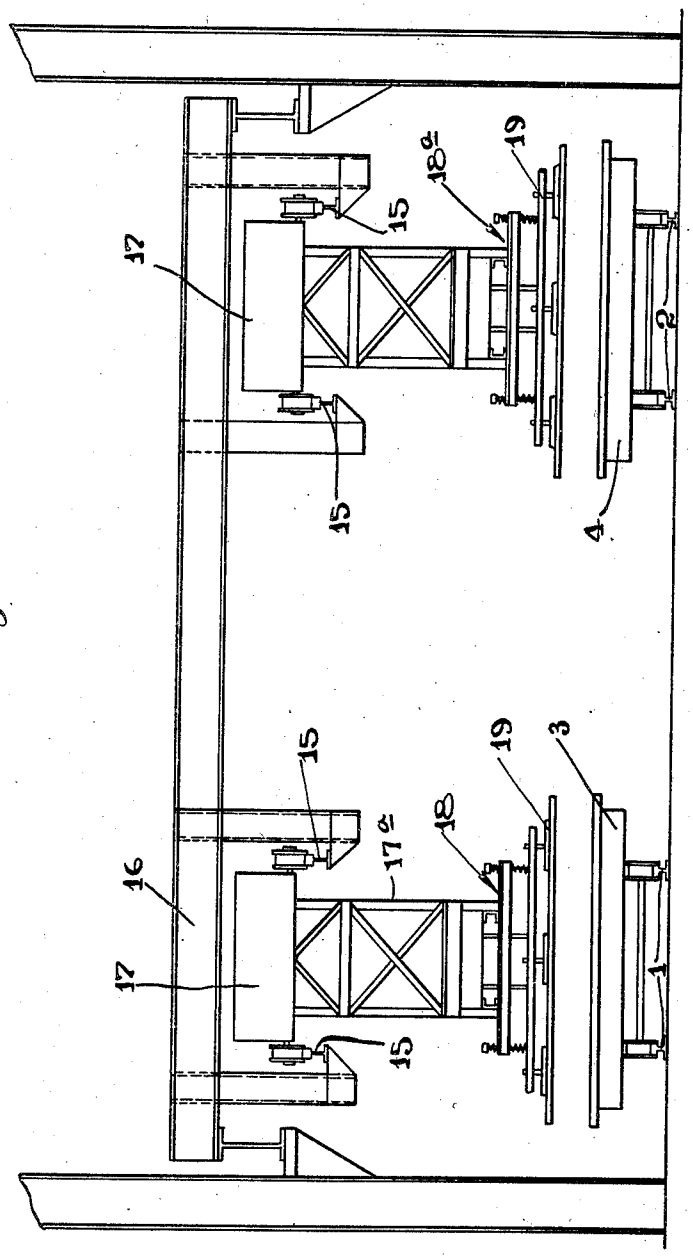


Fig. 2.

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Fig. 3.

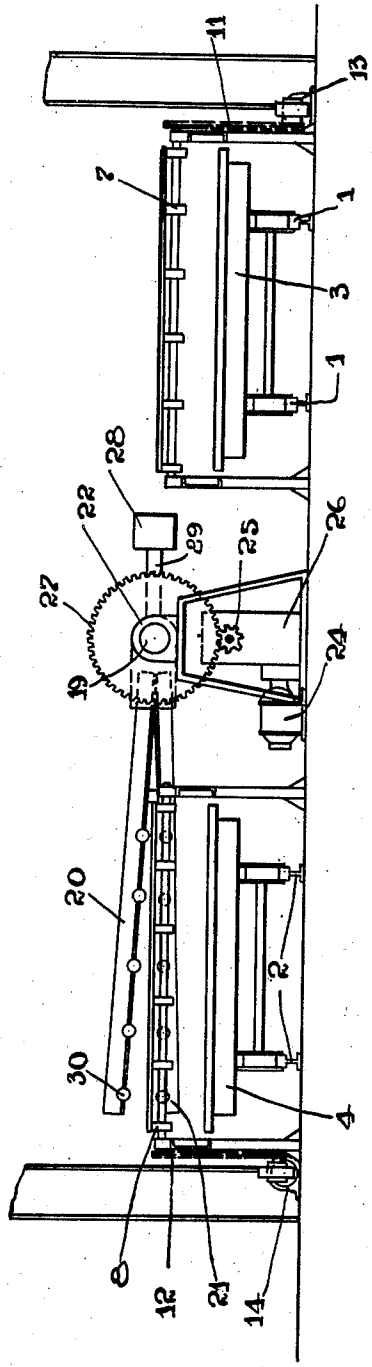
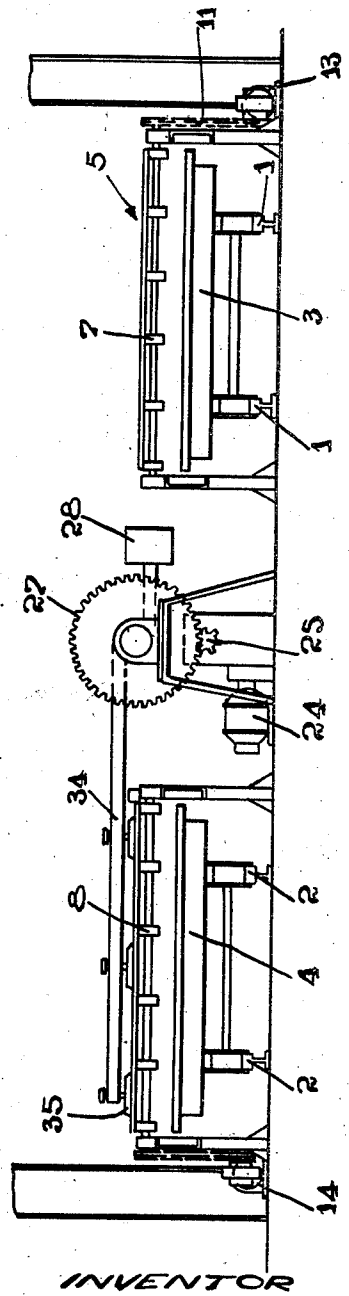


Fig. 5.



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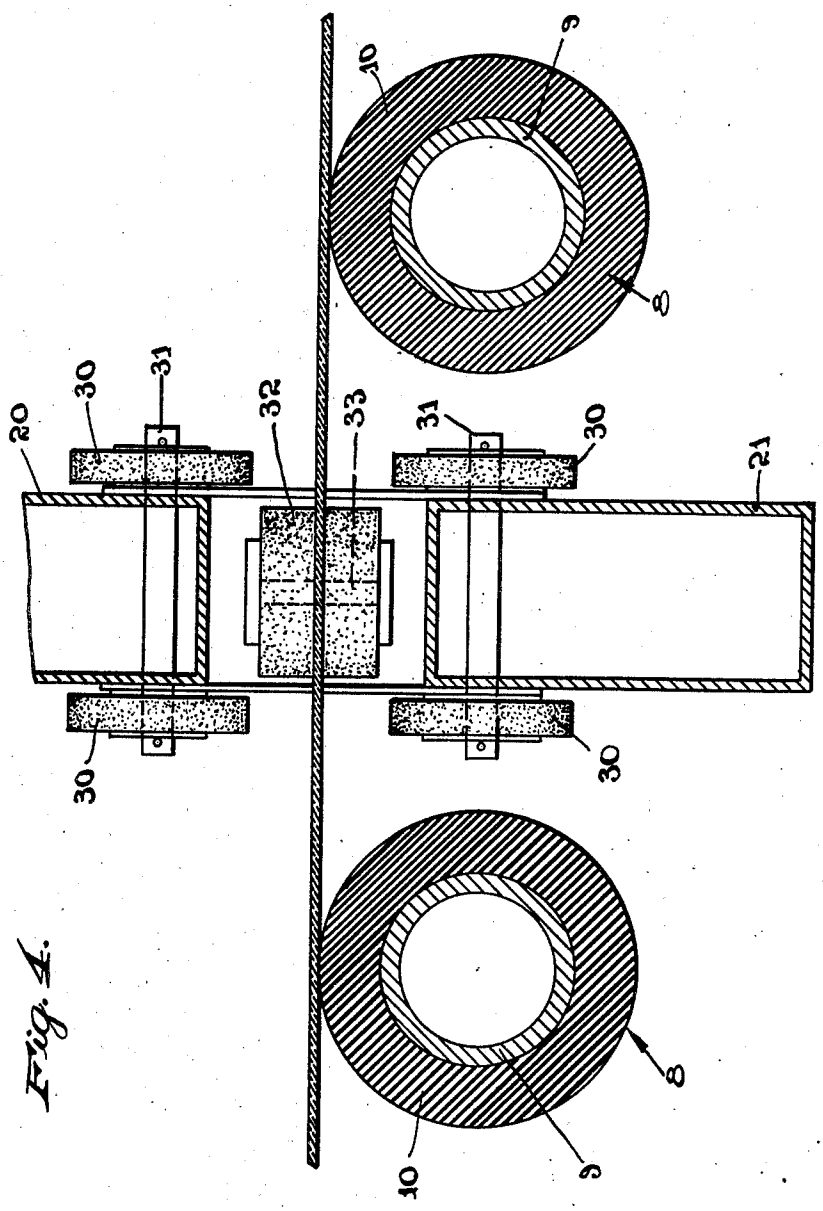


Fig. 4.

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PLATE GLASS TRANSFER AND TURN-OVER APPARATUS

Herman S. Heichert, Pittsburgh, Pa., assignor to Pittsburgh Plate Glass Company, a corporation of Pennsylvania

Application November 22, 1935, Serial No. 51,121

3 Claims. (Cl. 214—1)

The invention relates to transfer and turnover apparatus for use in a grinding and polishing system, such as that shown in the Fox Patent No. 1,554,804, dated September 22, 1925, and has for its object the provision of a simple apparatus which can be operated rapidly to perform the desired function, and which can be employed with a minimum of breakage and with a requirement of no special skill on the part of the operator. The operation involving the use of the apparatus is briefly stated, as follows:

After a glass sheet has been ground on one side on one of the grinding and polishing lines, the table or car carrying it is returned to the starting end of the line and the sheet is released from the table, and transferred by a vacuum frame to a roller runway above the track on which the car or table is mounted. The turnover and transfer device then lifts the sheet from the runway and moves it onto a second parallel roller runway lying above the track at the entrance end of the other grinding and polishing line, the sheet being turned upside down during such transfer. The sheet is now picked up by a vacuum frame and moved to position over one of the cars on the track or line which lies beneath the second roller runway, where it is bedded in plaster, making it ready for the second grinding and polishing operation. The construction and operation will be clear from the accompanying drawings, wherein:

Figure 1 is a plan view of the apparatus. Fig. 2 is an end elevation at the left hand end of the apparatus of Fig. 1. Fig. 3 is an end elevation at the right hand end of the apparatus of Fig. 1. Fig. 4 is an enlarged section on the line IV—IV of Fig. 1. And Fig. 5 is an end elevation showing a modification of the apparatus of Fig. 3.

Referring to the drawings, 1 and 2 are work tracks which extend beneath the grinding and polishing lines, and 3 and 4 are two of the tables or cars on which the glass sheets, which have been ground and polished on one side, are mounted. Located above the level of the work tracks are a pair of roller runways 5 and 6 made up of the series of rolls 7 and 8, which are suitably driven, to carry the glass plates therealong, the rolls being driven so as to carry the sheets in the direction indicated by the arrows. These rolls preferably consist of metal tubes 9 on which are mounted the discs 10 of rubber or fiber. The rolls are provided at their ends with sprockets around which pass the chains 11 and 12 arranged in three sets and driven from the motors 13, 13, 13 and 14, 14, 14, through the intermediary of reduction gearing in the casings 15a, the drive being accomplished by sprockets having driving engagement with the chains 11 and 12.

Mounted above the track 1 in parallel therewith is a track 15 supported from a superstructure 16 on which rides a crane 17. This crane is suitably driven for moving it along the track 15 and is provided with a depending frame 17a. Mounted for vertical movement in this frame is a vacuum frame 18 provided with the vacuum cups 19. This vacuum frame serves as a transfer means between the roller runway 5 and the tables 3. Mounted above the other work track 2 and similarly controlled and operated is a vacuum frame 18a which is operated to remove the glass sheets from the table 4 and place them upon the roller runway 6.

In operation the tables 4 carrying the glass sheets which have been ground and polished on one side are brought to position opposite the end of the roller runway 6, and after the sheets have been released from the plaster in which they are embedded, they are lifted by the vacuum frame 18a and placed upon the roller runway 6, which serves to carry them from the left hand end of the runway to the right hand end thereof where they are received by the turnover frame, later described and shown in Fig. 3, and transferred to the runway 5, such transfer serving to turn them upside down. This runway 5 then carries the sheets to its left hand end where they are picked up by the vacuum frame 18 and transferred to the tables 3 where they are imbedded in plaster and then carried to the left through the second grinding and polishing line.

The turnover apparatus for transferring the sheets from the runway 6 to the runway 5 will be understood by reference to Figs. 1 and 3. The turnover frame consists of a pipe shaft 19 extending longitudinally of the runways and provided with the pairs of arms 20 and 21. The pipe shaft is mounted for rotation in suitable bearings 22, 22 carried by the base members 23, 23 and a rotation of the frame is secured by means of the motor 24 which drives a pinion 25 through the intermediary of reduction gearing in the casing 26. The pinion 25 meshes with a spur gear 27 which is keyed to the pipe shaft 19. The frame is preferably counterbalanced by means of weights 28 mounted on brackets 29 which are in turn secured to the pipe shaft 19. The pairs of arms 20 and 21 are spaced so that they interfit with the rollers 7 and 8 of the roller runways. This permits the arms to be moved to the position shown in Fig. 3, so that the glass sheet to be transferred, which rests on the rollers 8, may pass along the runway to the transfer position without interference from the lower arms 21. After the sheet arrives in this position, the motor 24 is operated to swing the frame through an angle of 180 degrees and deposit it upon the rollers or runway 5, which rollers then carry the sheet to the left (Fig. 1) to the left hand end of the runway, where it may be engaged by the

vacuum frame 18 and deposited upon one of the tables 3, as heretofore described.

In order to support the glass sheet in the transfer arms without scratching or injury, these arms are provided with the pairs of rubber rolls 30 mounted upon the pins 31, as indicated in Fig. 4, such pins extending through the arms 20 and 21, which are preferably in the form of rectangular tubes, as shown in Fig. 4. In order to engage the inner edge of the glass sheet during the turnover operation, the series of rolls 32 are provided, such rolls being mounted upon the pins 33 and being formed of rubber to prevent injury to the edge of the sheet. After a sheet has been transferred from the runway 6 to the runway 5, as above described, the turnover frame is returned to the position shown in Figs. 1 and 3, and another glass sheet is fed into position between the pairs of arms 20 and 21. An apparatus of this kind has relatively large capacity and may be easily operated to take care of the transfer of the glass sheets without the necessity of haste on the part of the operators when the grinding and polishing lines are operating at a maximum capacity. The turnover operation is also of such a character that there is no danger of breakage or injury to the operators.

To restate the operation briefly in complete form, the tables or cars 4 are returned to the entrance end of the work track 2 and the glass sheets loosened from their bedding of plaster. The vacuum frame 18a is now operated to lift a glass sheet from the table 4 and place it upon the runway 6 whose rolls carry it to the right and between the pairs of arms 20 and 21 of the turnover frame. This turnover frame is now rotated about its axis through an angle of 180 degrees so that the glass sheet is deposited upon the rolls of the runway 5, which are rotated to carry the glass sheet to the left and thus release the turnover frame so that it may move back to starting position. When the glass sheet upon the runway 5 arrives at the left hand end of the runway, the vacuum frame 18 is operated to pick up the sheet and place it upon one of the tables 3 where it is bedded in plaster preliminary to carrying the table to the right through the grinding and polishing line, where the second side of the glass is surfaced in a manner well known in the art.

Fig. 5 illustrates a modification of the turnover device of Fig. 3. In this apparatus only one set of arms 34 is employed instead of the pairs of arms 20 and 21. These arms carry the vacuum cups 35, which engage the upper surface of the glass sheet which is positioned on the roller runway therebeneath. After the vacuum cups have engaged the glass sheet, the arms 34 are rotated through an angle of 180 degrees, thus depositing the sheet upon the runway 5 in an upside down position. In order to permit the placing of the sheet upon the runway 5, it is of course necessary to arrange the spacing of the arms 34 as heretofore described in connection with the arms 20 and 21 so that such arms fit down between the rolls of the runway 5. In other respects the construction and operation is similar to that heretofore described in connection with the apparatus of Fig. 3, and similar numerals are employed. The apparatus of Fig. 3 is preferred as compared with that of Fig. 5 since it is safer and better adapted to handle sheets of varying sizes.

What I claim is:

1. In glass sheet turnover and transfer apparatus for a grinding and polishing system comprising a pair of parallel work tracks carrying cars on which the glass sheets are ground and polished, a pair of roller runways lying above the work tracks in parallel therewith, overhead vacuum lifting means for transferring the sheets between the tables of each line and the roller runway lying thereabove, a turnover and transfer frame having its axis of rotation intermediate the runways in parallel with the center lines thereof and at approximately the level of the runways and comprising a series of parallel arms spaced to interfit between the rolls of the runways and adapted to pick up a glass sheet from one runway, swing it through an angle of 180 degrees and deposit it upside down on the rolls of the other runway, and means for driving the rolls of the runways so that the rolls of one runway carry the glass sheets toward the turnover and transfer frame and the rolls of the other runway carry the sheets away from such frame.

2. In glass sheet turnover and transfer apparatus for a grinding and polishing system comprising a pair of parallel work tracks carrying cars on which the glass sheets are ground and polished, a pair of roller runways lying above the work tracks in parallel therewith, overhead vacuum lifting means for transferring the sheets between the tables of each line and the roller runway lying thereabove, a turnover and transfer frame having its axis of rotation intermediate the runways in parallel with the center lines thereof and at approximately the level of the runways and comprising a series of pairs of parallel arms having the members of each pair closely adjacent but spaced apart, such pairs of arms being spaced longitudinally as the axis of rotation of the frame so as to interfit between the rolls of the runways and adapted to receive a sheet of glass on one runway and swing through an angle of 180 degrees to deposit the sheet on the rolls of the other runway, and means for driving the rolls of the runways so that the rolls of one runway carry the glass sheets toward the turnover and transfer frame and the rolls of the other runway carry the sheets away from such frame.

3. In glass sheet turnover and transfer apparatus for a grinding and polishing system comprising a pair of parallel work tracks carrying cars on which the glass sheets are ground and polished, a pair of roller runways lying above the work tracks in parallel therewith, overhead vacuum lifting means for transferring the sheets between the tables of each line and the roller runway lying thereabove, a turnover and transfer frame having its axis of rotation intermediate the runways in parallel with the center lines thereof and at approximately the level of the runways and comprising a series of parallel arms spaced to interfit between the rolls of the runways and provided on one side with a series of vacuum cups for engaging and lifting the glass sheets, said frame being adapted to swing through an angle of 180 degrees so that the glass sheet which is lifted from one runway is deposited upside down on the rolls of the other runway, and means for driving the rolls of the runways so that the rolls of one runway carry the glass sheets toward the turnover and transfer frame and the rolls of the other runway carry the sheets away from such frame.

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