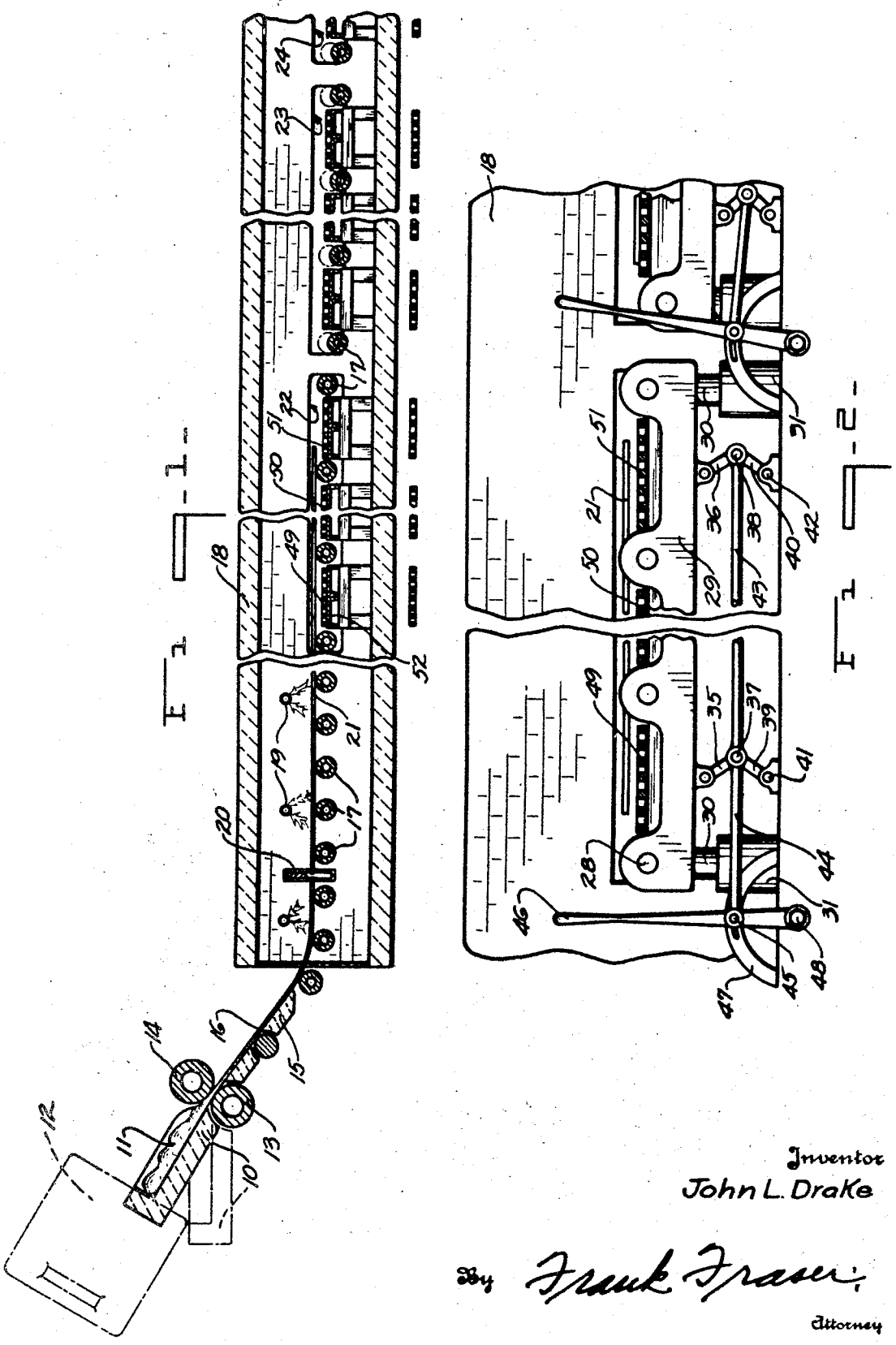
Aug. 16, 1932. J. L. DRAKE 1,872,424

APPARATUS FOR CONVEYING AND TRANSFERRING GLASS SHEETS OR PLATES

Filed May 13, 1929 2 Sheets-Sheet 1



F 1 - 1 -

F 1 - 2 -

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APPARATUS FOR CONVEYING AND TRANSFERRING GLASS SHEETS OR PLATES

Filed May 13, 1929 2 Sheets-Sheet 2

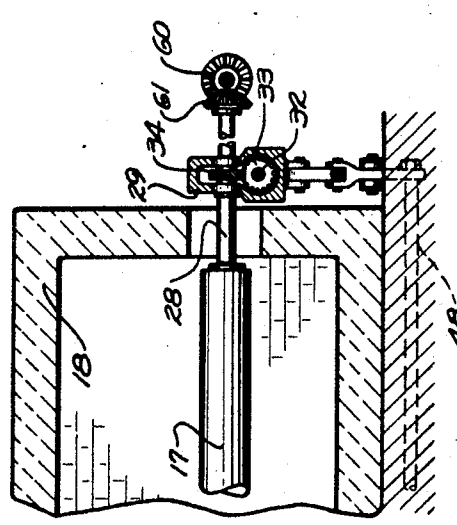


Fig. 4.

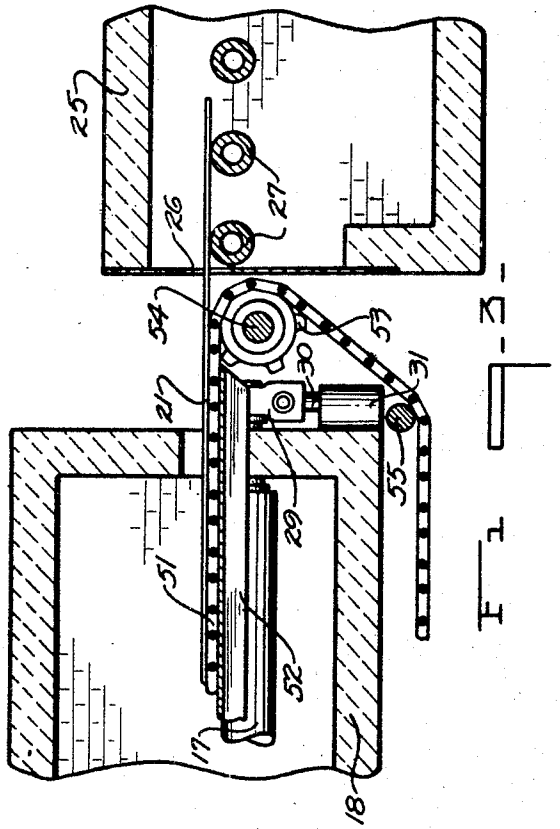


Fig. 3.

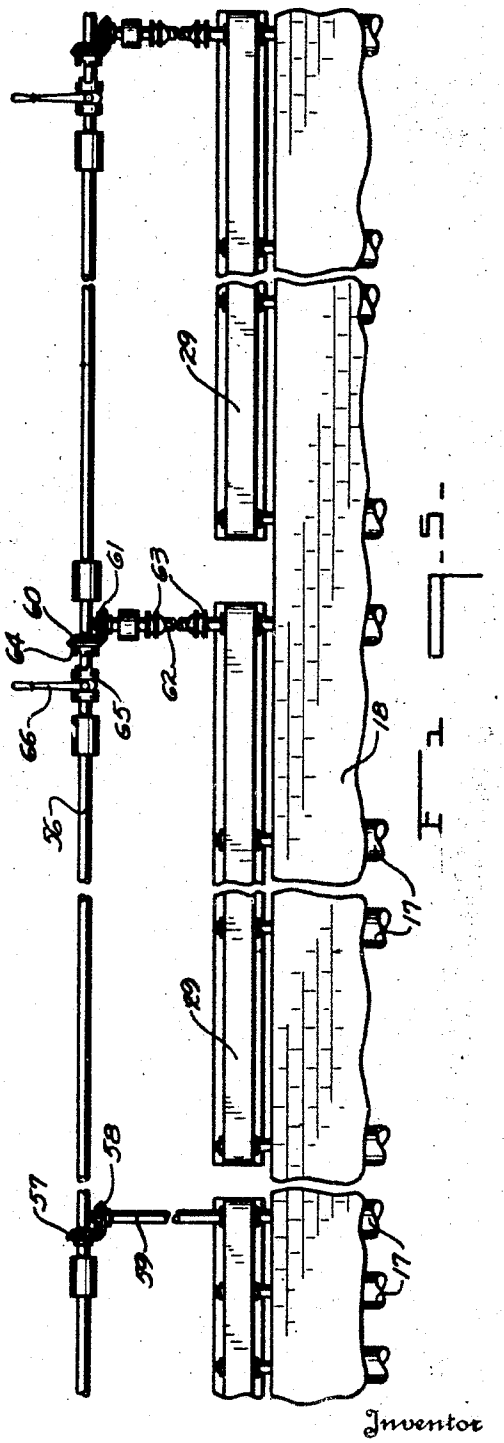


Fig. 5.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR CONVEYING AND TRANSFERRING GLASS SHEETS OR PLATES

Application filed May 13, 1929. Serial No. 362,472.

The present invention relates to improvements in apparatus for conveying and transferring glass sheets or plates.

The general object of the invention resides in the provision of such a process and apparatus wherein the glass sheets can be produced at a relatively high rate of speed and subsequently annealed while traveling at a speed relatively less than the forming speed.

The principal aim and object of the invention involves the provision of novel conveying mechanism for receiving the sheet from the forming rolls and effecting its transfer into the annealing leer, preferably in a direction transversely of its line of formation.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the drawings forming a part of this application and wherein like numerals are employed to designate like parts throughout the same,

Fig. 1 is a vertical longitudinal section through apparatus provided by the present invention.

Fig. 2 is an end elevation, partially in section, of the mechanism for transferring the sheet sections into the individual leers.

Fig. 3 is a transverse section showing a portion of the transfer mechanism.

Fig. 4 is a detail transverse section showing the means for effecting vertical movement of the sheet supporting rolls, and

Fig. 5 is a diagrammatic view of the driving means for the supporting rolls.

Referring to the drawings and particularly to Fig. 1, 10 designates a support or receptacle adapted to receive thereupon a mass or charge of molten glass 11 from a pot or other suitable container 12. Associated with one end of the support 10 is a pair of sheet forming rolls 13 and 14, arranged with respect to one another to create a sheet forming pass therebetween through which the molten glass 11 is adapted to be moved and reduced to a sheet of substantially predetermined and uniform thickness. An inclined runway 15 is mounted beneath the sheet forming pass in a manner to receive the sheet 16 issuing therefrom and for guiding the sheet downwardly.

As the sheet passes from the runway 15, it is deflected into the horizontal plane by and carried forwardly upon a series of supporting and conveying rolls 17 into a chamber 18. The temperature of the glass may be controlled within this chamber by the provision of a plurality of burners or the like 19 and the sheet 16 is adapted to be cut or severed transversely by means of suitable cutting mechanism 20 into a plurality of sheet sections 21.

The opposite side walls of the chamber 18 are provided with a plurality of pairs of spaced longitudinally extending opposed openings 22, 23, 24, etc., the number depending upon the number of leers to be employed as will be later apparent. Arranged at one side of the chamber 18 in opposition to each adjacent opening 22, 23, 24, etc., is an individual annealing leer 25 having an opening 26 in its front end wall for receiving the sheet section 21 therethrough from chamber 18, the sheet being supported and carried along within the leer upon a series of rolls or other conveying means 27.

The sheet supporting and conveying rolls 17 opposite each pair of opposed openings 22, 23, 24, etc., in chamber 18 are mounted upon shafts 28 journaled at their opposite ends in horizontal supporting members 29 extending longitudinally of the chamber, said members being provided at either end thereof with depending plungers 30 operating in cylinders 31, whereby said supporting members and the rolls carried thereby may be guided in their vertical movements. The supporting members 29 are substantially hollow as shown in Fig. 4, and have mounted therein a longitudinally extending shaft 32 carrying a plurality of spiral gears 33 meshing with spiral gears 34 keyed to the adjacent ends of the shafts 28 of rolls 17. The rolls 17 carried by each pair of supporting members 29 may be said to constitute a roller section and may be so designated in the claims.

The opposed supporting members 29 of each roller section and the rolls 17 carried thereby are adapted to be raised and lowered at predetermined intervals in the sheet forming operation and while any desired means may be utilized for this purpose the means herein provided is as follows: Pivotally carried by each supporting member 29 adjacent the front and rear ends thereof are the depending links 35 and 36 pivotally connected at their lower ends to transverse pins 37 and 38 respectively. Also, pivotally connected to the pins 37 and 38 are the links 39 and 40 pivoted at their lower ends as at 41 and 42 respectively. Extending between and connecting the pins 37 and 38 is a connecting rod 43 while pivotally associated with the pin 37 is a pitman 44 pivoted as at 45 to a lever 46 associated with segment 47. This lever projects downwardly beneath the chamber 18 and is connected, by means of a transverse cross rod 48, with a similar lever and raising and lowering mechanism at the opposite side of the chamber so that the supporting members 29 at opposite sides of chamber 18 may be raised and lowered simultaneously to effect an equal vertical movement of the opposite ends of rolls 17. When the rolls 17 are in their raised position, the parts of the apparatus assume the position indicated in Fig. 2. However, when the rolls are to be lowered, the lever 46 is swung to the right so as to cause a folding or collapsing of the links 35, 39 and 36, 40 in accordance with the well known principle of the toggle joint.

Arranged between the rolls 17 of each roller section or, in other words, between the rolls carried by opposite supporting members 29 is a conveyor table consisting of a plurality of spaced parallel sections 49, 50 and 51. Each table section is of a continuous endless belt formation and may be composed of a plurality of pivotally associated links as shown in Fig. 3. The upper run or flight of each table section is horizontally disposed and is adapted to slide or travel along upon the stationary supporting rails or the like 52 positioned between adjacent rolls 17. The endless table sections project through the opposite openings 22, 23 or 24, and are trained about sprockets or drums 53 mounted upon shafts 54, the lower flight of each table section being trained or returned beneath the chamber 18 and guided in its movement by a plurality of rollers 55. Upon rotation of the shaft 54, the table sections will be driven as a unit and the upper surfaces thereof are in substantial horizontal alignment with the leer rolls 27 so that the sheet section may be fed from the table sections into the leer in the manner indicated in Fig. 3.

In operation, and at the beginning of the sheet forming cycle, the supporting members 29 of the several roller sections are adapted to be raised so that the rolls 17 carried thereby will be disposed above the conveying tables and in horizontal alignment with the remaining rolls 17 disposed between the cutter and the vertically movable rolls. The conveying tables are preferably continuously driven in a clockwise direction so that their upper flights move toward the leers. The mass or charge of molten glass 11 deposited upon receiver 10 is then moved to the forming rolls 13 and 14 and rolled or reduced thereby to a sheet 16. This sheet then passes downwardly over the runway 15 onto the conveyor rolls 17 and is cut transversely at predetermined intervals by the cutting means 20 into a plurality of sheet sections 21. When the sheet sections are brought to a position above the conveying tables, the rotation of the rolls 17 is stopped and the rolls of the several roller sections are then lowered so as to bring the sheet sections to rest upon the respective conveying tables. The conveying tables will then aid to feed the sheet sections transversely of their line of formation into their respective annealing leers 25.

The sheet 16 is adapted to be formed at a relatively high rate of speed and after it is cut into sections, the individual sections 21 are adapted to be advanced at a speed relatively faster than the speed of formation of the sheet until they are in their proper positions adjacent the respective leers whereupon their travel is stopped momentarily during the lowering of the rolls 17 after which they are fed transversely into the leers at a speed relatively slower than the speed of formation and carried through the leers at this speed. The sheet 16 can be cut into any preferred number of sheet sections and it is desired that a separate leer be provided for each section so that the first section will be carried forwardly to the right to a position adjacent the last or end leer, the next section to the second leer and each successive section to each succeeding closer leer as will be apparent. In this manner, all of the sheet sections can be transferred into their respective leers substantially simultaneously whereby production can be greatly accelerated. The forming and annealing of the sheets in this manner also results in various other advantages which have been enumerated hereinabove in setting forth the objects of the invention.

One method of supporting and driving the conveying and supporting rolls 17 is illustrated diagrammatically in Fig. 5. Arranged longitudinally along one side of the chamber 18 is a lay-shaft 56 positively driven in any suitable manner from any preferred source of power or prime mover. The conveying rolls 17 following the cutter 20 but in advance of the roller sections or vertically movable rolls 17 are driven from the lay-shaft through the intermeshing gears 57 and

58 and the shaft 59. The rolls 17 of each roller section are also driven from the lay-shaft 56 preferably through intermeshing gears 60 and 61 and shaft 62, said shaft 62 being connected to or being an extension of the shaft 28 of one of the rolls 17. One of the rolls of each roller section is therefore positively driven and the remaining rolls are driven through the intermeshing spiral gears 33 and 34 as will be apparent. The rolls 17 in advance of the roller sections may also be driven from the shaft 59 in this manner.

Each shaft 62 may consist of a plurality of sections connected together by means of universal couplings or joints 63 to permit raising and lowering of the rolls. The gear 60 is loosely mounted upon the lay-shaft 56 and is provided with a clutch section 64 adapted to be engaged by the clutch section 65 slidably mounted upon the shaft and operable by lever 66. Thus, the lay-shaft 56 and rolls 17 in advance of the roller sections are continuously driven while the vertically movable rolls are intermittently driven and may be started and stopped upon engagement or disengagement of the clutch sections 64 and 65.

From the above, it will be understood that the forming rolls 13 and 14 are driven at a relatively high rate of speed to rapidly reduce the molten glass 11 to sheet form. The rolls 17 are driven at a relatively faster peripheral speed than that of the forming rolls so that the sheet will be carried forwardly after being cut at a speed greater than that at which it was formed. When the sheet sections are brought to a position above the conveying or shifting tables the rotation of the vertically movable rolls is stopped after which the said rolls are lowered to bring the sheet sections to rest upon the conveying tables which are driven to effect the transfer of the sheet sections into their respective annealing leers. The rolls 17 in advance of the cutting means 20 are preferably idler rolls although they may be positively driven if desired.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a speed changing apparatus for glass sheets, the combination of a plurality of horizontally spaced roller sections in substantial alignment with one another, each including a plurality of conveying rolls for carrying the sheets in a predetermined direction, shifting means interposed between the conveying rolls of each roller section and driven in a direction at substantially right angles to the direction of rotation of said conveying rolls and at a relatively slower speed, means for raising and lowering the conveying rolls of each roller section with respect to the shifting means, a common drive means for the conveying rolls of the several roller sections, clutch means for effecting the starting and stopping of the conveying rolls of each roller section, and means for independently driving the shifting means of each roller section.

2. In a speed changing apparatus for glass sheets, the combination of a longitudinally extending chamber provided with a plurality of spaced longitudinally extending openings in one side wall thereof, a plurality of horizontally spaced roller sections positioned within said chamber in substantial alignment with one another and in opposition to said openings, each including a plurality of conveying rolls for carrying the sheets in a predetermined direction, shifting means interposed between the conveying rolls of each roller section and driven in a direction at substantially right angles to the direction of rotation of said conveying rolls and at a relatively slower speed to pass the sheets through said openings, separate means for independently raising and lowering the conveying rolls of each roller section with respect to the shifting means, means for independently driving the shifting means of each roller section, and a common drive means for the conveying rolls of the several roller sections.

3. In a speed changing apparatus for glass sheets, the combination of a longitudinally extending chamber provided with a plurality of spaced longitudinally extending openings in one side wall thereof, a plurality of horizontally spaced roller sections positioned within said chamber in substantial alignment with one another and in opposition to said openings, each including a plurality of conveying rolls for carrying the sheets in a predetermined direction, shifting means interposed between the conveying rolls of each roller section and driven in a direction at substantially right angles to the direction of rotation of said conveying rolls and at a relatively slower speed to pass the sheets through said openings, separate means for independently raising and lowering the conveying rolls of each roller section with respect to the shifting means, means for independently driving the shifting means of each roller section, and a common drive means for the conveying rolls of the several roller sections, including a line shaft, operative connections between the line shaft and the rolls of each roller section, and clutch means for independently effecting the starting and stopping of the conveying rolls of each roller section.

Signed at Toledo, in the county of Lucas and State of Ohio, this 8th day of May, 1929.

JOHN L. DRAKE.