

April 23, 1935.

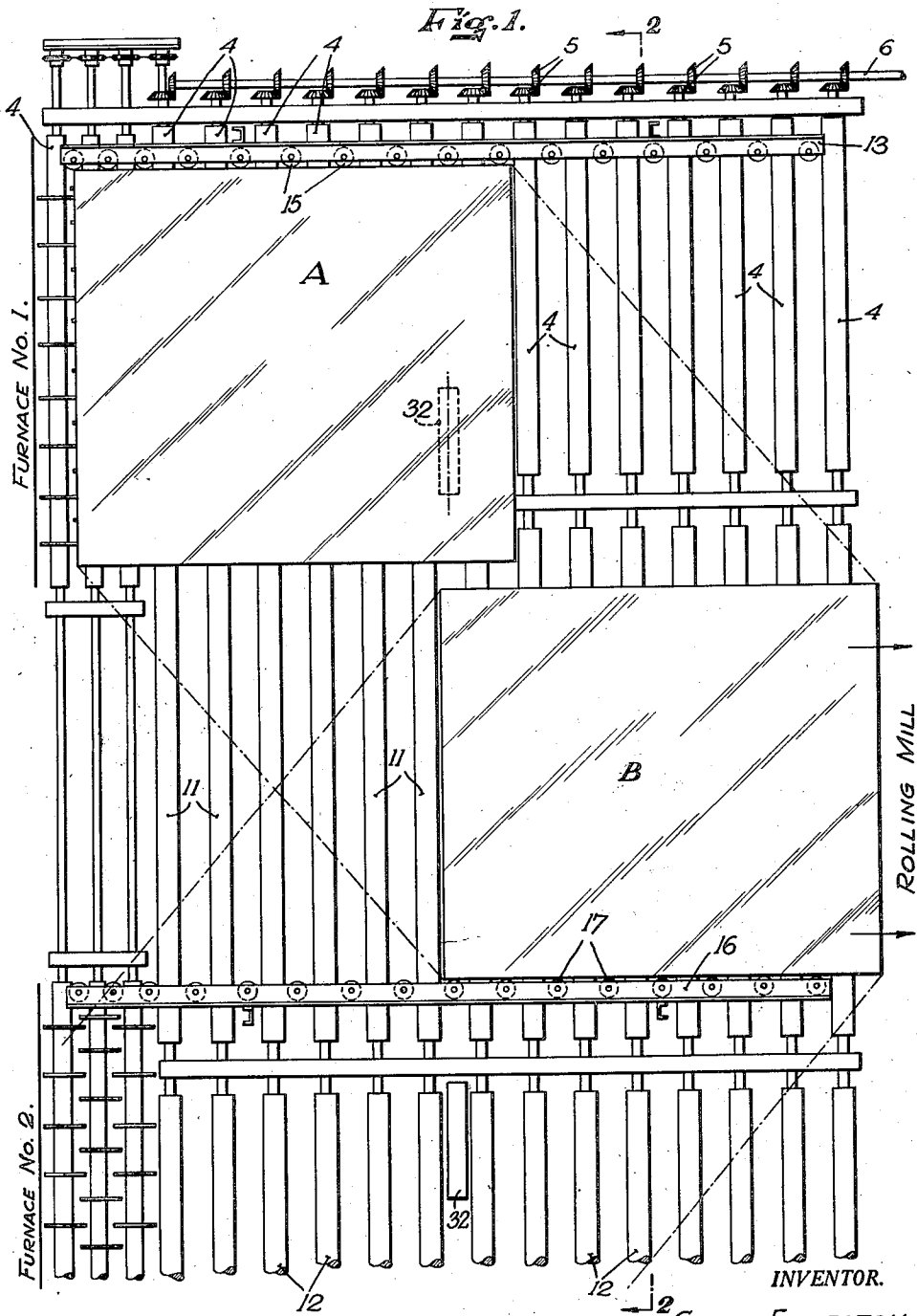
S. EGGLESTON

1,998,806

TRANSFER DEVICE

Filed March 16, 1933

2 Sheets-Sheet 1



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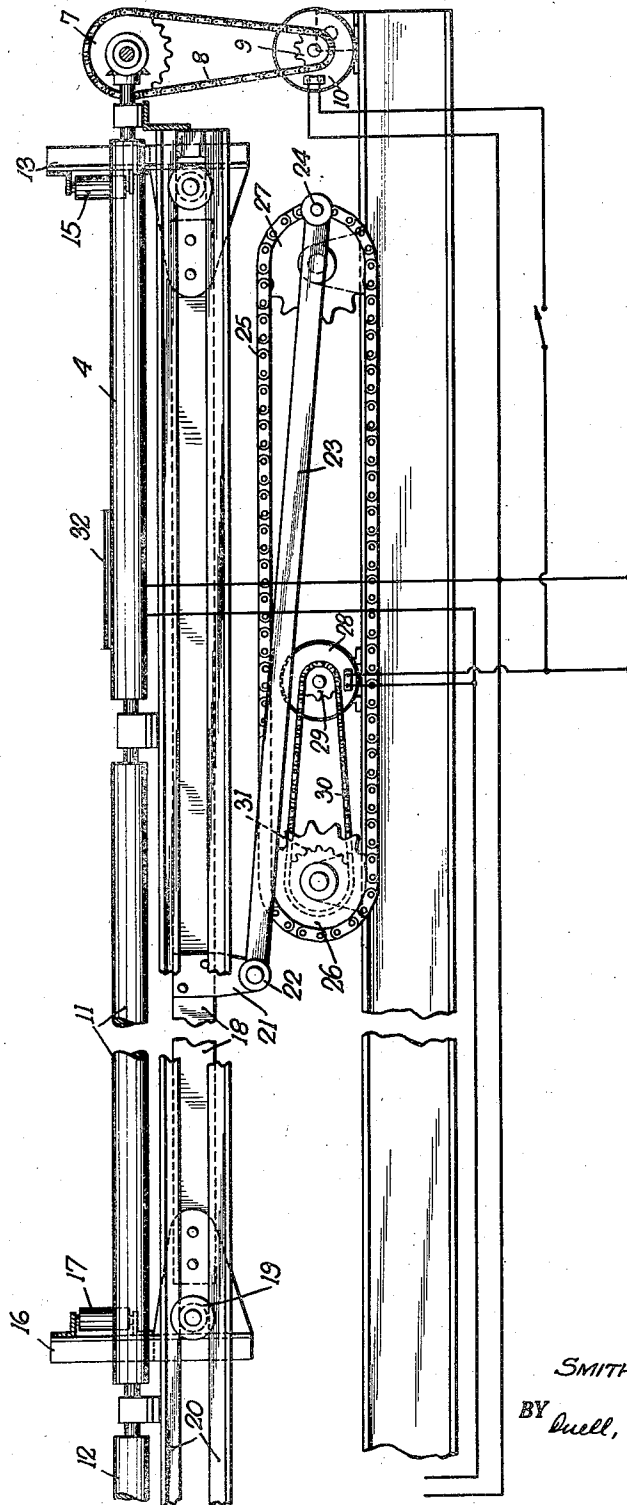
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2 Sheets-Sheet 2

Fig. 2.



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TRANSFER DEVICE

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11 Claims. (Cl. 198—32)

This invention relates to conveyors, and more particularly to a conveyor for transferring plates from a furnace of a rolling mill.

In sheet mills, the furnaces are usually in pairs with one rolling mill common to two furnaces and centered therebetween. Ordinarily, the two furnaces discharge the metal sheet plates alternately to the rolling mill. The most important consideration is speed in transferring sheets from the furnace to the mill, this, since loss of time in transfer cools the sheet and affects the rolling operation to disadvantage. Thus, it is important that the sheet be transferred from the furnace to the rolls in the shortest possible time. Another important requirement is that the sheets be in proper alignment in making the transfer to the rolls so that an extra operation of straightening the sheet is not required.

In the past, where a rolling mill is served with plates by a pair of furnaces operating alternately, the devices for transferring the plates from the furnaces to the rolling mill consisted of curved converging sections either of rollers, castors, or wheels. The disadvantages of the converging units is that it is difficult with them to place the sheets at the rolling mills in proper alignment and that the distance travelled by the plates from the furnace to the rolling mill is too great, and, as a result thereof, the time required for the transfer is too long, and the plates are cooled to a greater degree than is desirable.

An object of this invention is to convey plates from a furnace to a rolling mill in the shortest possible time.

Another object of the invention is to provide a sheet metal transfer device which conveys a plate from a furnace to a rolling mill in the shortest possible path.

Another object of the invention is to provide a sheet metal transfer device which transfers the plate from the furnace to a rolling mill in exact alignment.

Another object of the invention is to provide a sheet metal transfer device which is automatically operated to transfer plates from a pair of furnaces to a single rolling mill along the shortest possible path in the shortest possible time and in exact alignment.

According to this invention, a series of parallel live rollers are placed at the discharge of each of a pair of furnaces. The series of rollers before furnace No. 1, for example, are rotated to form a live roller conveyor and act to remove the plate from furnace No. 1. Likewise, the series of rollers in front of furnace No. 2 are rotated

to serve as live rollers and convey the plate from furnace No. 2. As is customary, the rolling mill is centered between the two furnaces. A third series of rollers is placed between the series of rollers located at the discharges of the two furnaces and is in alignment with the rolling mill, and serves to convey the plates discharged alternately by the two furnaces to the rolling mill.

Associated with each of the live roller conveyors serving the furnaces is a push bar which is automatically placed in movement by the progress of a plate, and which moves transversely across its associated live roller conveyor to shift the plate under movement onto the central conveyor in exact alignment with the rolling mill. The two push bars are automatically operated. The push bar which serves to shift the plate from the furnace No. 1, for example, returns automatically when the plate it shifts is in alignment with the rolling mill, and the bar which serves to shift the plate from furnace No. 2, for example, comes automatically into play. The details of the arrangement will now be described with reference to the drawings, of which:

Fig. 1 is a plan view looking downwardly upon the sheet metal transfer device, constructed in accordance with this invention, and,

Fig. 2 is a sectional view along the lines 2—2 of Fig. 1.

Referring now to the drawings, at the discharge of what is designated as furnace No. 1 are the series of parallel live rollers 4 which are rotated through the intermediary of the bevelled gears 5, the shaft 6, the sprocket 7, chain 8, sprocket 9, and electric motor 10. A similar series of live rollers 4 are placed at the discharge of the furnace designated as furnace No. 2. These rollers, which are designated by the numeral 12, are connected one to each of the rollers 4 and are rotated therewith. It is intended, when the furnace is in operation, that the live rollers 4 and 12 shall be continuously operated. Another series of rollers 11 are placed between the two series of rollers 4 and 12, and, being connected with the rollers 4 and 12, are rotated simultaneously therewith. These rollers 11 are in alignment with the rolling mill and serve to discharge the plates which are shifted thereon from the series of rollers 4 and 12 to the rolling mill.

Associated with furnace No. 1 and its live rollers 4 is the push bar 13. This bar comprises a structural member 14 on which are mounted the plurality of rollers 15. Likewise, associated with furnace No. 2 and the rollers 12 is the deflector bar 16 on which are mounted the plurality of

rollers 17. The bars 13 and 16 are mounted on opposite ends of the truck frame 18. The truck frame, in turn, is mounted upon the truck wheels 19, which engage the track 20. Attached to the truck frame 18 is the bracket 21, to the lower portion 22 of which, is rotatably supported one end of the connecting rod 23. The other end of the rod 23 is rotatably supported by a pin 24 connected to the chain 25. The chain 25 rotates over the sprockets 26 and 27 from the driving force of the electric motor 28, which rotates its sprocket 29, chain 30, and sprocket 31, associated with sprocket 26. As the motor 28 is operated, the pair of push bars are shifted from one extreme position to the other by movement of the connecting rod 23 with the chain 25.

In operation, assume, for example, that a plate is discharged by furnace No. 1 onto the live rollers 4. When the plate reaches a certain position where it is almost totally discharged from the furnace, it rides over and depresses a raised roller 32, or similar device, which closes an electrical contact connecting the driving motor 28 with electrical power through its associated supply wire. When this happens, the push bar 13 is started in movement to shift the plate A from the position indicated to the position occupied by plate B. It is seen that the plate, when first discharged from the furnace, moves in a straight line across the transfer device through the rotation of the live rollers 4. When the contact closing device 32 is closed by the progress of the plate, the push bar starts to move, causing the plate to travel in two directions simultaneously, that is, transverse of the device by rotation of the live rollers 4, and longitudinal of the device by movement of the push bar 13, the resultant path taken by the plate being indicated by the dash-dot lines extending from opposite corners of plate A to plate B.

In the position of the apparatus shown by Fig. 1 of the drawings, plate B has just been shifted by push bar 16 from the live rollers 12 completely onto the live rollers 11, where it is in exact alignment with the rolling mill and is in the process of being discharged thereto by movement of the live rollers 11. The push bar 16, together with its rollers 17, holds the plate B in exact alignment with the rolling mill. The plate designated as A has just completely emerged from the furnace No. 1 and as soon as the end of the connecting rod connected to the chain 25, is carried past the dead center of the sprocket 27, the push bar 13 will be started in movement to shift the plate A to the position shown as occupied by plate B, the latter plate being simultaneously moved by the rollers 11 into the rolling mill.

A similar contact device 32 is associated with furnace No. 2 and the live rollers 12, so that, regardless of which furnace first starts the discharge of plates, the transfer device is started in operation to shift the plates when they are in position to be transferred.

It is seen that, according to this invention, no time is lost during the movement of the hot plate, since it continues its forward movement without slackening while it is being moved by the push bar to the center section to be placed in alignment with the rolling mill. As soon as the plate has reached the proper position for going into the rolling mill, the one push bar is automatically returned to its normal position and the other bar simultaneously acts to place a hot plate from the other furnace in position for feeding to the rolling mill.

As previously described, ordinarily the two furnaces discharge alternately. Sometimes, however, it is desirable that a number of sheets be taken successively from one furnace and, in that event, a by-pass switch may be provided, this to be operated by the attendant at the rolling mill. However, the arrangement described is intended for normal operation where the sheets are alternately discharged from the two furnaces.

While in illustrating this invention a single driving device has been described as operating both push bars simultaneously, obviously each bar could be separately operated without departing from the spirit of the invention which contemplates broadly all systems wherein the hot sheets are moved simultaneously in two directions, substantially as described.

Whereas one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the details described, but many departures may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. A sheet metal transfer device comprising three separate live roller conveyors in parallel relation, common means for rotating the rollers in said conveyors, the outer of said conveyors being arranged in front of each of a pair of furnaces for conveying the hot plate discharged therefrom, and the central conveyor being in alignment with a rolling mill, said furnaces discharging hot plates alternately, and a single means alternately operated for shifting the hot plates from the outer conveyors onto the central conveyor while maintaining the axis of the plates parallel to the direction of the feed of the conveyors.

2. A sheet metal transfer device comprising three separate live roller conveyors in parallel relation, means for rotating the rollers in said conveyors at the same speed, the outer of said conveyors being arranged in front of each of a pair of furnaces for conveying the hot plate discharged therefrom, and the central conveyor being in alignment with a rolling mill, said furnaces discharging hot plates alternately, and common means alternately operated for shifting a hot plate from one outer conveyor onto the central conveyor, and then shifting another hot plate from the other outer conveyor onto the central conveyor and means forming a part of said transfer device whereby the said axes of said plates are maintained parallel to the direction of feed of the conveyors during such shifting.

3. A sheet metal transfer device comprising three separate live roller conveyors in parallel relation, means for rotating the rollers in said conveyors, the outer of said conveyors being arranged in front of each of a pair of furnaces for conveying the hot plate discharged therefrom, and the central conveyor being in alignment with a rolling mill, said furnaces discharging hot plates alternately, and means automatically operated by the movement of the hot plates for shifting a hot plate from one outer conveyor onto the central conveyor, and then shifting another hot plate from the other outer conveyor onto the central conveyor and means forming a part of said transfer device whereby the said axes of said plates are maintained parallel to the direction of feed of the conveyors during such shifting.

4. A sheet metal transfer device comprising

three separate live roller conveyors in parallel relation, means for rotating the rollers in said conveyors, the outer of said conveyors being arranged in front of each of a pair of furnaces for conveying the hot plate discharged therefrom, and the central conveyor being in alignment with a rolling mill, the direction of feed of said central conveyor being parallel to the direction of feed of the outer conveyors, said furnaces discharging hot plates alternately, means for shifting a hot plate from one outer conveyor onto the central conveyor, and then shifting another hot plate from the other outer conveyor onto the central conveyor, the axes of such plates remaining parallel to the direction of feed of the conveyors during such shifting and means associated with each of said outer conveyors for actuating said last mentioned means through the movement of the plates.

5. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of said furnaces for conveying the hot plate from the furnaces, a central conveyor to receive plates from such outer conveyors and means for alternately shifting hot plates from said outer conveyors transversely thereof onto said central conveyor, said plates having their axes maintained parallel to the direction of feed of such conveyors during such shifting.

6. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of said furnaces for conveying the hot plate from the furnaces, a central live roller conveyor in alignment with said rolling mill the direction of feed of all of such conveyors being parallel to each other, and means for alternately shifting hot plates from said outer conveyors transversely thereof onto said central conveyor, and for placing the shifted plate in correct alignment for discharge to said rolling mill such shifting means maintaining the axes of such plates parallel to the direction of feed of the conveyors during such shifting.

7. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of said furnaces for conveying the hot plate from the furnaces, a central live roller conveyor in alignment with said rolling mill the direction of feed of all of such conveyors being parallel to each other, a push bar associated with each of said outer conveyors and arranged substantially parallel to the line of movement of the plate thereon for shifting the hot plate alternately from the outer conveyors onto the central conveyor, and means for moving said push bars transversely of said outer conveyors whereby such plates will have their axes maintained parallel to the direction of feed of such conveyors during such shifting.

8. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of said furnaces for conveying the hot plate from the furnaces, a central live roller con-

veyor in alignment with said rolling mill the direction of feed of all of such conveyors being parallel to each other, a push bar associated with each of said outer conveyors and arranged substantially parallel to the line of movement of the plate thereon for shifting the hot plate alternately from the outer conveyors onto the central conveyor whereby to maintain the axes of such plates parallel to the direction of feed of such conveyors during such shifting, means for moving said push bars transversely of said outer conveyors, and means operated by the discharge of the plates from the furnaces for placing said last mentioned means into operation.

9. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of said furnaces for conveying the hot plate from the furnaces, a central live roller conveyor in alignment with said rolling mill, a push bar associated with each of said outer conveyors and arranged substantially parallel to the line of movement of the plate thereon for shifting the hot plates alternately from the outer conveyors onto the central conveyor, and means for moving said push bars transversely of said outer conveyors, said bars being commonly connected so that while one is shifting a plate from its associated outer conveyor, the other is returning to receive a plate to be shifted from the other outer conveyor.

10. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of the furnaces, a central live roller conveyor in alignment with the rolling mill, all of the rollers in each of said conveyors being connected to rollers in the other conveyors so as to be commonly rotated at the same speed all of such conveyors having a direction of feed parallel to each other, means for rotating said rollers, and means alternately operated for shifting the hot plates from the outer conveyors onto the central conveyor such shifting occurring while the axes of such plates are maintained parallel to the direction of conveyor feed.

11. A sheet metal transfer device for conveying hot plates from a pair of alternately operated furnaces to a common rolling mill, comprising a pair of outer live roller conveyors, one in front of each of said furnaces for conveying the hot plate from the furnaces, a central live roller conveyor in alignment with said rolling mill, a push bar associated with each of said outer conveyors and arranged substantially parallel to the line of movement of the plate thereon for shifting the hot plates alternately from the outer conveyors onto the central conveyor, means for moving said push bars transversely of said outer conveyors, said bars being commonly connected so that while one is shifting a plate from its associated outer conveyor, the other is returning to receive a plate to be shifted from the other outer conveyor, and automatic means operated by the movement of the plates on the two outer conveyors for controlling the movement of said last mentioned means.