

April 9, 1935.

A. D. EVANS

1,996,913

METHOD AND APPARATUS FOR FEEDING

Filed Dec. 15, 1933

Fig. 1.

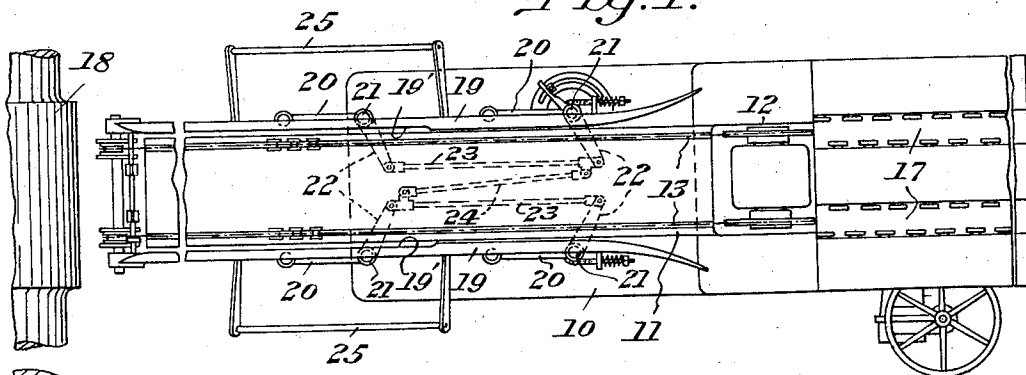


Fig. 2.

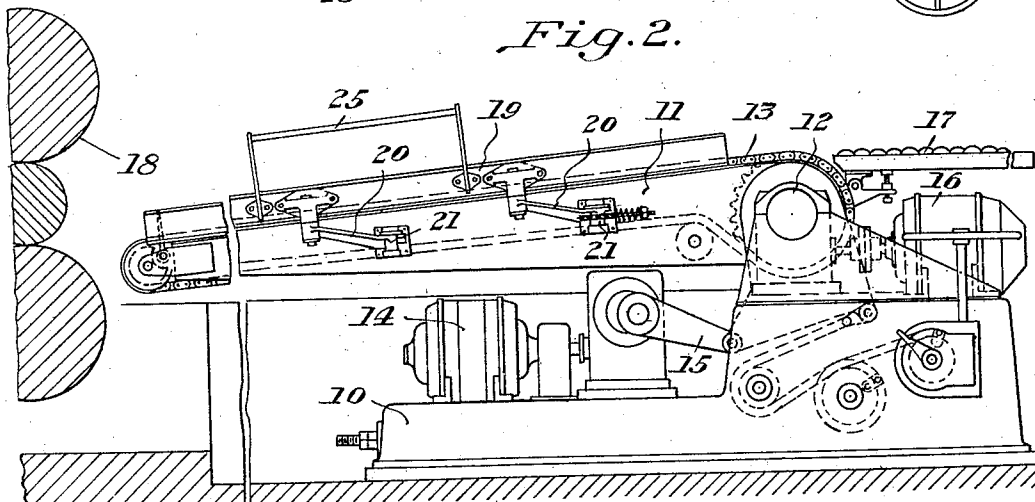
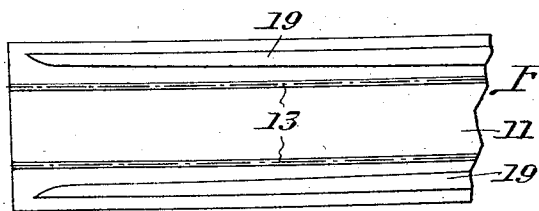
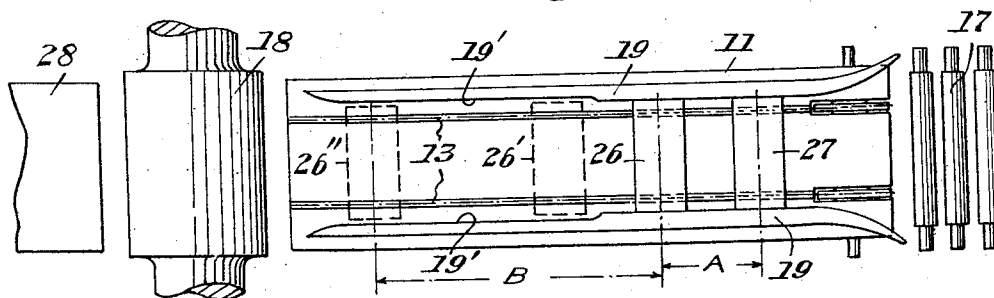


Fig. 3.



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UNITED STATES PATENT OFFICE

1,996,913

METHOD AND APPARATUS FOR FEEDING

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Application December 15, 1933, Serial No. 702,539

9 Claims. (Cl. 80-43)

My invention relates to the control of the movement of metal to be rolled to and through rolling mills and, in particular, to guides for tilting tables used in connection with conventional sheet mills, and to a method of feeding sheet bars to the mill thereby.

According to the conventional method of making sheets, sheet bars are first rolled singly, a pair of bars being put through the mill successively to form two breakdowns. These are then matched to form a pack. The two bars of a pair are withdrawn substantially simultaneously from a heating furnace and if manually handled, may even be seized with a single pair of tongs. Since the bars are rolled successively, they must be spaced apart on the feeding table before moving to the mill. Even if the bars are delivered successively to the table by a conveyor from the furnace, they will not be properly spaced for rolling. The necessity for spacing the bars for successive passage through the mill will be obvious from a consideration of the effect of entering the leading edge of the second bar before the top mill roll has dropped after the passage of the first bar. This would result in injuriously marking the rolls and the product.

Feeding tables for supplying heated sheet bars to roughing mills for rolling breakdowns, as heretofore constructed, have been provided with parallel, retractible side guides, for maintaining the bars in position on the conveyor chains traversing the tables, and also with retractible stops, usually in the form of fingers projecting up from the bottom of the table for positioning successive bars at the proper distance apart for successive entry into the mill. These guides and stops are manually operated and considerable skill and dexterity are required of the operator to insure the proper operation at the exact instant in the course of travel of the bars along the table conveyor. Unless the stops are properly manipulated, the sheet bars, usually fed from the furnace in pairs, will be in contact with each other, instead of spaced apart in the desired relation for successive passes through the mills, especially if the two bars of a pair are discharged from the heating furnace fairly close together in which case it is difficult or impossible to arrest one bar by a stop without also arresting the other bar. This means that it is necessary for the operator, after both the bars have finally been arrested by a single stop, to seize the rear bar with a pair of tongs and pull it back along the conveyor against the frictional force of the continuously moving chains

thereof, to the proper position behind another stop, in order to space the second bar from the first bar.

After the bars have reached the feeding table and been properly spaced, they must be edge-aligned by the guides, if skewed, and then guided along the table into the mill. This problem is complicated by the inevitable slight differences in the lengths of the bars, since it is necessary to engage the ends of the bars continuously to effect a proper guiding action, and if one bar is longer than its neighbor, the former will be engaged too firmly and the latter not at all.

The fact that the operator is required to control both the stops and the guides further complicates matters, with the result that the rolling operation is slowed down considerably, and the bars permitted to cool excessively before entering the mill.

In accordance with my invention, I employ guides having their portions nearest the mill spaced a greater distance apart than the portions remote from the mill, instead of the uniformly spaced guides which have heretofore been employed. By this construction, I am able to obtain the proper spacing of a pair of sheet bars advancing toward the mill, without the use of stops, since the guides aforementioned make it possible to frictionally grip one bar at its ends while the other bar is free to advance toward the mill. The guides thus exert a decreasing side pressure on the bars, and the difference in bar lengths becomes relatively unimportant.

For a complete understanding of the invention, reference is made to the accompanying drawing illustrating a preferred embodiment. In the drawing:

Figure 1 is a plan view, largely diagrammatic, showing a tilting table arranged to feed heated sheet bars from the furnace to a roughing mill;

Figure 2 is a side elevation;

Figure 3 is a diagrammatic plan view illustrating the operation of the invention; and

Figure 4 is a view similar to Figure 3, showing a modification.

Referring in detail to the drawing, in a co-pending application, Serial No. 605,599, filed April 16, 1932, for Feeding and catching table, I, jointly with Raymond J. Wean, have disclosed and claimed a feeding table comprising a base, a tilting frame pivoted thereto at having conveyor chains trained thereabout. Motors and driving mechanism are provided for tilting the table, and a motor for driving the conveyor chains. An auxiliary conveyor

conducts heated material, such as sheet bars, from a furnace (not shown) to the conveyor chains on the tilting frame 11 of the feeding table.

5 The course of the material moving along the conveyor chains 13 toward the roughing mill, indicated at 18, is controlled by retractible side guides 19. While I have illustrated the invention as applied to a three high mill, it is equally applicable to two-high mills. As disclosed in the
10 co-pending application, these guides are pivotally mounted on arms 20 which are swingably supported on the table frame at 21. A pair of arms 20 is provided for each guide. The arms of each
15 pair have inward projections 22 connected by a link 23. The shifting mechanism of the two guides is cross connected by a link 24 so that equal and opposite movement will be imparted to the two guides respectively at all times. Handles 25 permit manual operation of the guides.

In accordance with the present invention, instead of making the faces of the guides plane and parallel, I so form the faces that a greater space is provided between the guides adjacent the mill end thereof than at the end remote from the
25 mill. One way of producing this result is by machining or otherwise cutting away a portion of the guide faces, as indicated at 19 and 19'. Guides of this shape provide a spacing between guides toward the mill end of the table which is greater
30 than the spacing between the faces of the guides adjacent the end of the table remote from the mill. A similar result, of course, could be obtained otherwise, for example, by uniformly sloping the guide faces so that the spacing between guides increases toward the mill end thereof.

The operation of the invention may best be explained by reference to Figure 3, showing diagrammatically certain elements of the table shown in Figures 1 and 2. Generally, the guides 19 will be retracted as the sheet bars are advanced in pairs from the furnace (not shown) across the conveyor 17 toward the table frame 11. The spacing between the bars as they advance may
45 vary from little or nothing to a considerable distance, depending upon the manner of charging and discharging the heating furnace. If it is assumed that the bars are separated by a space A, as shown in Figure 3 between the bars indicated at 26 and 27, it will be apparent that it is possible to arrest movement of the bars in such spaced relation by closing the guides thereon. Both bars are then gripped frictionally at their ends by the guides 19 and are maintained stationary in spaced relation, regardless of the continued movement of the chains 13.

When the operator is ready to proceed with the rolling, he slightly spreads the guides 19, whereupon the bars 26 and 27 immediately advance on the conveyor chains, maintaining their previously spaced relation. When the bar 26 has reached the dotted line position 26', and the bar 27 has reached the position initially occupied by the bar 26, the operator then closes the guides on the latter to restrain it further. Because of the greater spacing between the guides at the mill end thereof, the bar 26 is free of frictional engagement of the guides at its ends and therefore proceeds to move along the table with the conveyor chains.
70 When the bar 26 has reached a position indicated in dotted lines at 26'', at which it is properly spaced from the bar 27 (now in the initial position of the bar 26 shown in solid lines), the operator again spreads the guides to release the
75 bar 27. The two bars then move in unison to-

ward and into the mill 18, being spaced apart by a distance B. After passing through the mill, the bars are raised on a catching table 28 of any suitable construction, and returned through or over the mill 18 to the table 11. The repeated
5 rolling of the bars into breakdowns is effected in the known manner. The feeding of more than two bars, e. g., three or more bars, may be similarly controlled.

In view of the fact that there may be slight differences between the lengths of successive sheet bars discharged from the furnace, it is necessary that the difference between the spacings of the guides at points adjacent the mill end and the opposite end be sufficient to permit the
15 guides to close upon the second of a pair of bars without engaging the first of the pair. In other words, the difference between the spacings between the guides at their opposite ends must be greater than the normal variation in the length
20 of sheet bars.

If it should happen that the sheet bars are fed from the furnace practically in contact, the method previously described may be employed with equal success to obtain the proper spacing
25 thereof before they move in unison toward the mill. The spacing of the bars when fed from the furnace may be greater than that shown, of course, in which case, a shorter delay of the movement of the second bar will suffice to bring
30 about the proper spacing thereof from the first bar.

It is not necessary, of course, that both the bars of a pair be stopped. It is entirely possible that the second bar may be delayed in reaching
35 the table. If the operator is otherwise ready to proceed with the rolling, the first bar may be moved continuously along the table, if it is properly aligned, and the second bar only stopped to provide the desired spacing between the two bars
40 of the pair.

In case of a slight difference in the lengths of the two bars of a pair, the leading bar, if the shorter of the two, will continue to move even after the guides have engaged the longer bar.
45 The proper spacing of the second bar may easily be obtained, however, in the manner just described. If the second bar of the pair is shorter, it will move into engagement with the first if the latter is arrested, and proper spacing may
50 be obtained in accordance with the operation first explained above.

Figure 4 illustrates a modified form of guides mentioned above, providing a uniformly tapering pass therebetween. In guides of this type,
55 the increase in the width of the space between the guides should be about $\frac{1}{16}$ " per foot of length. Since the tables are usually about twelve feet long, the total difference approximates $\frac{3}{8}$ ". This figure may also be followed in designing
60 guides of the type shown in Figures 1 and 3, and provides ample accommodation for any ordinary differences in the lengths of the bars.

It will be apparent from the foregoing description that the invention provides means for obtaining the proper spacing of the two bars of a pair advancing toward the roughing mill without the use of stops, as employed heretofore. The number of manual operations which the operator is required to make is thus reduced and
70 his efficiency is generally improved, with a resulting increase in the production rate. The operator may confine his attention to the guides since stops are not employed, the guides serving not only as heretofore to line up the bars for
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edgewise entry into the mill, but also for insuring the proper spacing thereof. If a mechanical stop is desired adjacent the mill end of the table to prevent excessive spacing between the two successive bars of a pair, it may be employed and provided with the usual manual operating mechanism. This necessitates, of course, that the operator withdraw the stop when he spreads the guides for simultaneously moving the two bars of a pair toward and into the mill.

Although I have illustrated and described but one preferred embodiment and practice of the invention, it will be apparent that numerous changes therein may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. The combination with a feeding table for advancing heated material to a rolling mill, of guides extending along the table adjacent opposite edges, said guides being movable and arranged to provide a space therebetween of greater width at the mill end of the table than at the other in all positions.

2. In a feeding table for rolling mills, spaced side guides extending therealong, said guides being movable and shaped to provide a space therebetween adjacent the mill end of the table of greater width than the space between the guides at the other end of the table in all positions of the guides.

3. Guides for a rolling-mill feeding table comprising members extending therealong providing a free space therebetween, said members diverging outwardly toward the mill end of the table, when in position to guide material into the mill.

4. In a method of advancing material to a rolling mill, the steps including moving a plurality of pieces in succession toward the mill, stopping the pieces, releasing one piece for further movement, restraining another piece, until a predetermined

spacing exists between pieces, and then releasing said other piece and moving said pieces simultaneously toward the mill.

5. In a method of advancing material to a rolling mill, the steps including moving a plurality of pieces in succession toward the mill, gripping said pieces adjacent their edges to edge align them and arrest said movement, releasing one piece and continuing its movement toward the mill, restraining another piece, and then releasing said last mentioned piece and moving it in unison with the aforementioned piece.

6. In a method of advancing material to a rolling mill, the steps including moving a plurality of pieces in succession toward the mill, stopping one piece at a distance from the mill by engaging its side edges while continuing to move another toward the mill until a predetermined spacing therebetween has been attained, and then moving the pieces in unison toward the mill.

7. In a method of advancing material to a rolling mill, the steps including moving a plurality of pieces in succession toward the mill, and exerting a progressively decreasing side pressure on the pieces as they move.

8. Feeding-table guides for a rolling mill comprising a pair of spaced members extending lengthwise of the table toward the mill, said members being movable and having a wider space therebetween at the mill end than at the other, when in position to guide material into the mill.

9. In a feeding table for a rolling mill, spaced movable side guides extending therealong, said guides having portions providing spaces therebetween of different widths, the portions providing spaces of greater width being adjacent the mill end of the table when in position to guide material into the mill.

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