March 5, 1963 M. MORGAN 3,080,044

RETRACTABLE STOP ADJACENT RUN-OFF ROLLERS

Filed June 29, 1961 2 Sheets-Sheet 1

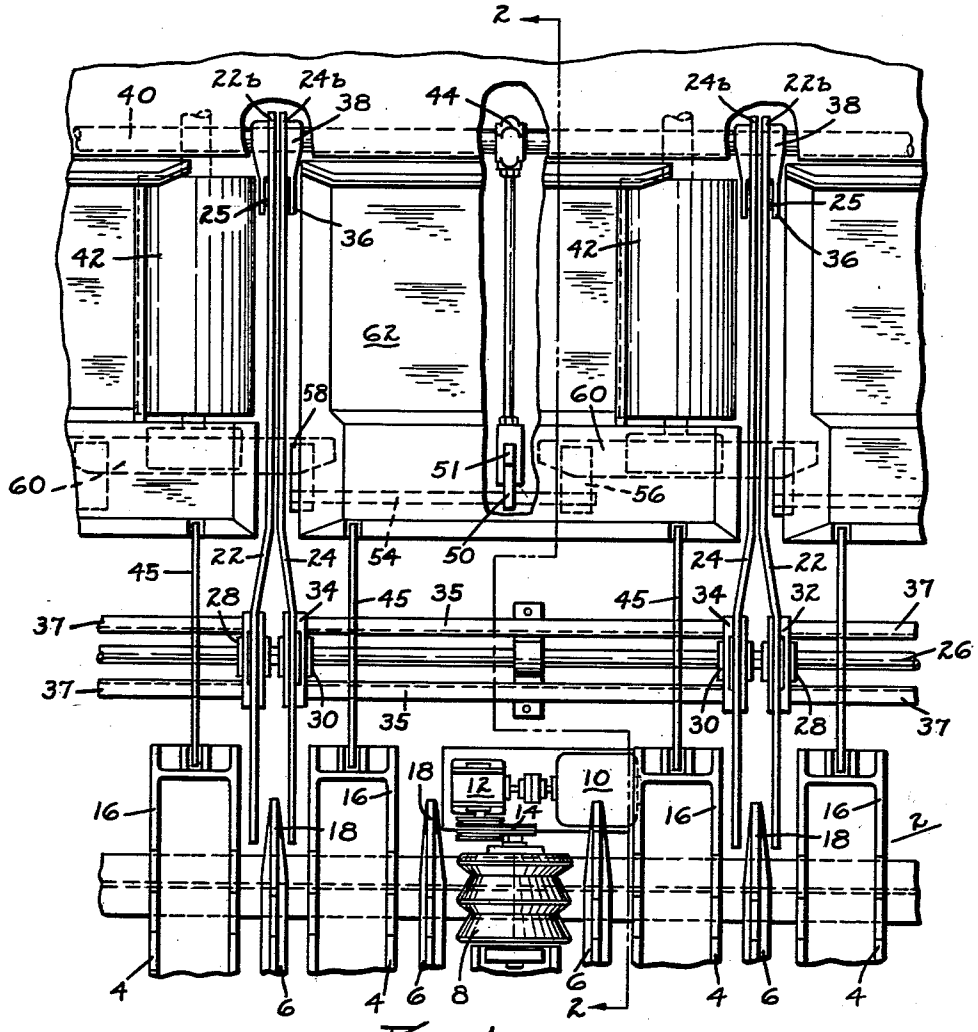

Fig. 1

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Fig. 2

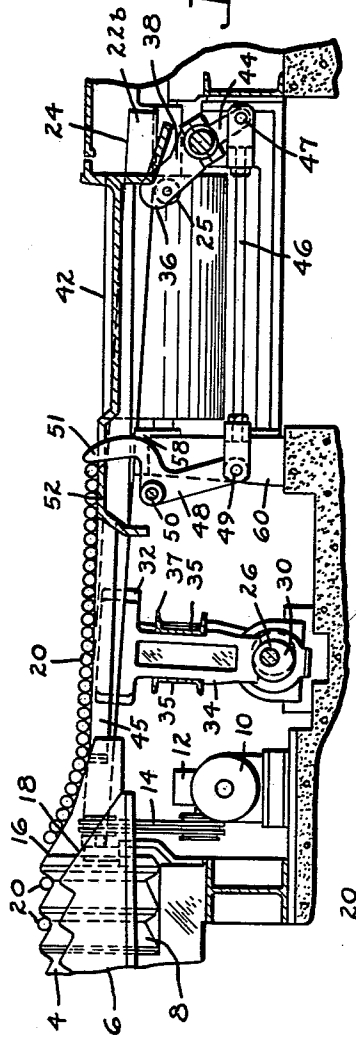


Fig. 3

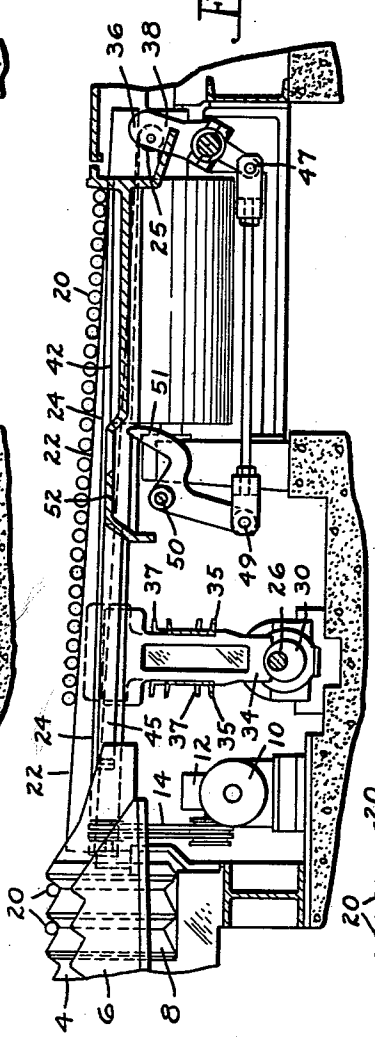
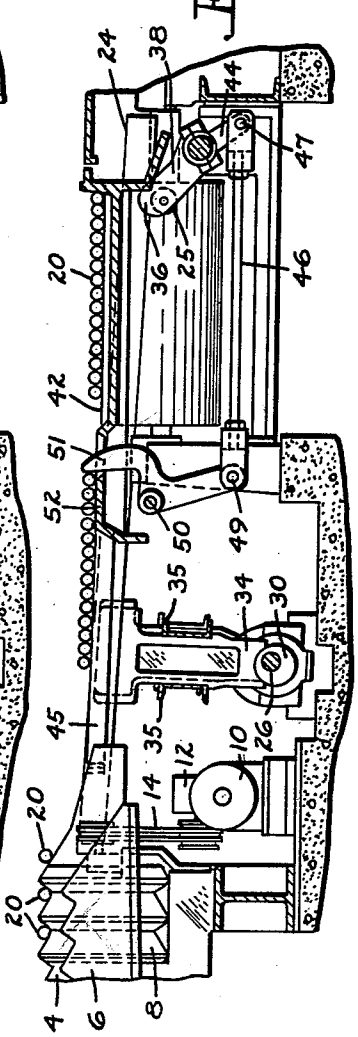


Fig. 4



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RETRACTABLE STOP ADJACENT RUN-OFF ROLLERS

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This invention is concerned with machinery used in moving long thin elements, such as bars or angles, for example, from one position to another. Its principal use will be found in the metal producing industries, ferrous or non-ferrous, in which a plurality of side-by-side bars or the like are to be conveyed by a plurality of aligned rollers from a position alongside a cooling bed to a storage position or to a shear location where they will be cut into shorter lengths.

In connection with the following description, reference will be made to the invention as related to a merchant mill, which normally produces bars and angles in various cross-sectional configurations, but it will be understood that the invention is equally applicable in other analogous situations.

In a conventional merchant mill, the elongated elements, which, for convenience, will hereinafter be referred to as bars, are delivered from the roll stands to a cooling bed. At the cooling bed, the bars are moved laterally step-by-step across the cooling bed racks, from which they slide or roll down an incline to rest on the adjacent shuffle bars. Further movement of the bars at this time to the run-off rollers to which the shuffle bars extend has heretofore been prevented by a series of fixed stops which are positioned in a line adjacent the near ends of the run-off rollers. When enough bars have accumulated on the shuffle bars behind the stops, the shuffle bars are raised and actuated, causing the bars to travel along the shuffle bars over the stops to a position above the run-off rollers . The shuffle bars are then lowered and their motion stopped so that the bars rest on the run-off rollers, which are at once put into operation, causing the batch of bars on the rollers to travel to a subsequent desired position.

As the bars leave the cooling bed, they descend quite rapidly along the sloping ends of the racks of the cooling bed and travel quickly across the shuffle bars and the intermediate supports. Unless the stops are of sufficient height, the larger-sized bars rolling across the shuffle bars may occasionally jump over the stops, particularly near their ends, to cause subsequent difficulty when the next batch of bars is to be moved to the run-off rollers. Difficulty has also been encountered with the trailing ends of bars being caught on stops as the rollers go into operation, causing misalignment of the bars, which is troublesome at the shearing station. It has, therefore, been the practice to make the stops as high as possible to prevent bars from jumping over the stops, but at the same time the height of the stops is necessarily limited by the height to which the shuffle bars can be raised when they are put into operation. That is to say, if the top of the stop were higher than the highest position of the shuffle bars, then the bars could not be moved properly to their position above the run-off rollers. On the other hand, if the stops are too short, they may fail to stop the bars rolling across the shuffle bars toward the run-off rollers.

Accordingly, it is an object of this invention to provide a stop of new and novel construction which may be as high as necessary to prevent any travel of the bars beyond the stops as the bars initially leave the cooling bed and at the same time so arranged that when the shuffle bars are put into operation to move the bars to the run-off

rollers the stops will move downwardly a sufficient distance so that they will at this time be entirely below the upper surface of the shuffle bars. In this way there can be no interference with proper movement of the bars by the shuffle bars to the run-off rollers. After the bars have been moved to the run-off rollers by the shuffle bars, the shuffle bars, under the control of the operator, will cease their operation and be lowered below the level of the rollers, and at the same time the stops will ascend above the shuffle bars to check further movement of the bars now coming on from the cooling bed.

These and other objects of the invention will become more apparent as the description proceeds with the aid of the accompanying drawings in which:

FIG. 1 is a plan view of an installation including the present invention and showing the terminal ends of the racks of the cooling bed, two adjacent sets of shuffle bars, and two of the rollers of the run-off table;

FIG. 2 is a vertical section taken on the line 2—2 of FIG. 1 showing one of the stops in operative position to prevent further advance of the bars that have left the run-off table;

FIG. 3 is a view similar to FIG. 2 but with the shuffle bars in operation and the stop retracted;

FIG. 4 is a view similar to FIG. 2 in which the stop has been returned to normal position after a proper number of bars have been delivered by the shuffle bars to a position over the rollers of the run-off table.

Referring first to FIG. 1, which is a plan view of the terminal ends of the racks of the cooling bed, adjacent pairs of shuffle bars, and two of the rollers of the run-off table, the cooling bed is designated generally at 2 and comprises a plurality of fixed notched racks 4 and intermediate movable notched racks 6. Conventional aligning rolls 8, actuated by a motor 10, gearing 12, and belts 14, are shown for the purpose of further orienting the invention, but the aligning rolls are not part of the present invention and are not claimed.

As can be seen in FIGS. 2, 3 and 4, both the fixed and movable racks 4 and 6 terminate in sloping portions 16 and 18. As the bars, indicated at 20, are moved from the last notch of the fixed rack 4 of the cooling bed by the movable rack 6, they are deposited on the slope 16 to roll down that slope under gravity to land on the shuffle bars 22 and 24. The left ends of the shuffle bars, as viewed in FIGS. 2, 3 and 4, extend a sufficient distance toward and between the racks 4 and 6 so as to provide continuous supporting surfaces over which the bars may move.

The shuffle bars 22 and 24 are of conventional construction and are actuated in the usual manner by a shaft 26, eccentrics 28 and 30, and their respective eccentric straps 32 and 34, the upper ends of which are fastened to their respective shuffle bars. The straps 34 of shuffle bars 24 are connected together by channels 35, while the straps 32 of shuffle bars 22 are connected by channels 37. The eccentrics 28 and 30 are set 180 degrees apart. In this manner, shuffle bars 24 move together in their normal circular and sliding path, as do the shuffle bars 22, lagging 180 degrees.

The other ends of the shuffle bars, indicated at 22*b* and 24*b*, are supported on rollers 25 mounted in the forked ends 36 of the shuffle bar lifting levers 38. These lifting levers are secured to a lifting lever drive shaft 40 which, when rotated to the right as viewed in FIG. 2, causes the lifting levers 38 to shift their position from that shown in FIG. 2 to that in FIG. 3. When lifting lever 38 is in the position of FIG. 3, the remote ends 22*b* and 24*b* of the shuffle bars are lifted to a height where they will be at all times above the upper surfaces of the aligned rollers 42 and the permanent supports 45 so that the shuffle bars

in their usual manner can cause the bars resting thereon to be conveyed to a position above the rollers.

All that has been discussed thus far is conventional. The new inventive feature which acts in combination with the other mechanism will now be explained. A crank arm 44 is affixed to lifting lever drive shaft 40 at a position intermediate the shuffle bar lifting levers 38. To this crank arm is pivotally attached at 47 a connecting rod 46 which at its other end is pivotally attached at 49 to a bell crank 48 pivoted at 50. The upper portion of the bell crank indicated at 51 constitutes a stop. When the shuffle bar lifting lever 38 is in the position shown in FIG. 2, the stop 51 will extend upwardly above that portion of the table 52 to a height sufficient to prevent any of the bars 20 passing the series of aligned stops 51 as they move along the shuffle bars toward the cooling bed.

When the lifting levers 38 are swung to the position of FIG. 3, each stop 51 is swung downwardly to a position below table 52 and below the top surfaces of the shuffle bars 22 and 24 so that, as the shuffle bars pursue their customary movement to shift the leading group of bars 20 from the position shown in FIG. 2 to the position shown in FIG. 3, there will be no interference whatsoever by the stops 51.

When the operator determines that enough bars have been delivered to a location over the rollers 42, he then causes lifting lever drive shaft 40 to be actuated in the opposite direction, returning lifting lever 38 to the position of FIGS. 2 and 4, which in turn causes the immediate raising of the stop 51 to the position of FIG. 4, to cut off further movement of any of the bars that may then be on the shuffle bars and traveling in the direction of the rollers. As the shuffle bars are lowered, the bars 20 over rollers 42 are likewise lowered to rest on the rollers, which are then put into operation, moving the bars longitudinally away to a new position of storage or to a shearing station. As soon as the bars on the rollers have been moved away, the operator may then actuate the lifting lever drive shaft 40 in a clockwise direction from the position of FIG. 2 to the position of FIG. 3, thus raising the ends 22*b* and 24*b* of the shuffle bars as they go into operation to move another batch of bars to a position over the rollers 42. Again, as this happens, the stop 51 swings down to retracted position, where it cannot interfere with the movement of the bars to the rollers.

The pivoted bell crank 48 may be rotatably mounted in any convenient manner. As shown, however, it is carried by a shaft 54, the ends of which are carried in brackets 56 and 58, which in turn are mounted on the upper parts of the roller support stands 60.

Conventional horizontal plates 62, lower than the tops of rollers 42, are located between the rollers 42. These plates cover and protect the connecting rods 46.

It is my intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

I claim:

1. In combination with a plurality of delivery rollers for moving elongated elements, such as bars, angles or the like, longitudinally away from a cooling bed, a plurality of shuffle bars for moving said elements transversely from the cooling bed to the rollers, a plurality of movable stops aligned with the near ends of said rollers, said stops normally extending above the shuffle bars and being high enough to prevent elements from jumping thereover as they approach the said rollers on said shuffle bars, means for raising the remote ends of said shuffle bars to a height such that the upper surfaces of said shuffle bars will be above the said rollers but not above the top portions of said stops, and means operating in timed relation with the means for raising the remote ends of said shuffle bars, for causing said stops to drop below the upper surfaces of said raised shuffle bars, whereby movement of said elements to said rollers will then be unimpeded.

2. In a machine for moving elongated elements, such as bars, angles or the like, away from a cooling bed, a plurality of parallel shuffle bars adjacent said cooling bed, a plurality of aligned rollers for receiving bars delivered thereto by said shuffle bars, a plurality of aligned movable stops adjacent the near ends of said rollers for normally limiting movement of elements along said shuffle bars, said stops having their upper ends at a height above that to which the upper surfaces of said shuffle bars are raised during delivery of elements to said rollers, means for simultaneously raising the remote ends of said shuffle bars above said rollers and means acting in timed relation thereto for causing downward movement of said stops for a distance to place said stops below the raised upper surfaces of the shuffle bars, whereby said shuffle bars can then move said elements laterally to a position above said rollers.

3. In a machine for longitudinally moving elongated elements, such as bars, angles or the like, away from a cooling bed, a plurality of aligned rollers, a plurality of shuffle bars extending from said cooling bed to said rollers, said shuffle bars being in spaced groups with each group located between successive rollers, a plurality of aligned movable stops, each stop positioned between adjacent groups of shuffle bars and between adjacent rollers, means for raising said shuffle bars above said rollers but not as high as the tops of said stops, each of said stops being pivotally mounted and having a crank arm connected thereto, means connected to said shuffle bar raising means for periodically actuating said crank arm to swing said stop downwardly to a position below said raised shuffle bars so that said elements may be moved unimpeded by said shuffle bars to said rollers.

4. For use in a conveying machine including aligned delivery rollers and transversely extending shuffle bars for transporting elongated elements from a cooling bed to said rollers, a plurality of aligned pivoted stops having their upper ends extending substantially above the upper surfaces of said shuffle bars when the latter are in highest position, and means for simultaneously raising the remote ends of said shuffle bars and turning said stops about said pivots to lower the said stops to a position below the upper surfaces of the shuffle bars when the latter are in said raised position, thereby insuring non-interference of said stops with elements being moved transversely on said shuffle bars past the line of stops to said rollers.

5. In a machine for moving a group of elongated elements, such as bars, angles or the like, laterally and then longitudinally, a plurality of aligned rollers, shuffle bars between said rollers, said shuffle bars supported by eccentrics at one end and by lifting levers at the other end, aligned stops extending above said shuffle bars for preventing movement of said elements to a position toward said rollers when the shuffle bars are below said rollers, means for rotating said lifting levers to raise the said other ends of said shuffle bars above said rollers and to simultaneously lower said stops, the means for lowering said stops comprising a crank arm movable with said lifting levers, a pivot for said stop, an arm for swinging said stop about said pivot, and means for connecting said crank arm to said stop arm.

6. Means for shifting elongated elements, such as bars, angles or the like, from a cooling bed to a plurality of aligned rollers, said means comprising shuffle bars extending from the ends of the racks of the cooling bed to the remote ends of said rollers, a plurality of aligned stops between said racks and said rollers to stop movement of elements along said shuffle bars when the latter are in inoperative position below said rollers, means for raising the remote ends of said shuffle bars to a position in which the upper surfaces of said shuffle bars will be above said rollers but not as high as the upper ends of said stops and means acting in timed relation to said shuffle bar raising means for simultaneously lowering said stops so that the stops will be below the lowest positions said

upper surfaces assume during operation of said shuffle bars.

7. In a run-off table, a plurality of aligned rollers, a lifting lever drive shaft paralleling the ends of said rollers, a plurality of shuffle bar lifting levers secured to said drive shaft, a plurality of crank arms affixed to said drive shaft, a plurality of stops aligned at the other ends of said rollers, and means actuated by said crank arms to cause lowering of said stops when said drive shaft is rotated to raise said shuffle bar lifting levers.

8. The construction set forth in claim 7, each said stop being pivoted and including an operating arm, said means actuated by each said crank arm comprising a link running from each said crank arm to each said operating arm.

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