Feb. 16, 1954 F. J. WOOD 2,669,140

MATERIAL HANDLING DEVICE

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Fig. 1.

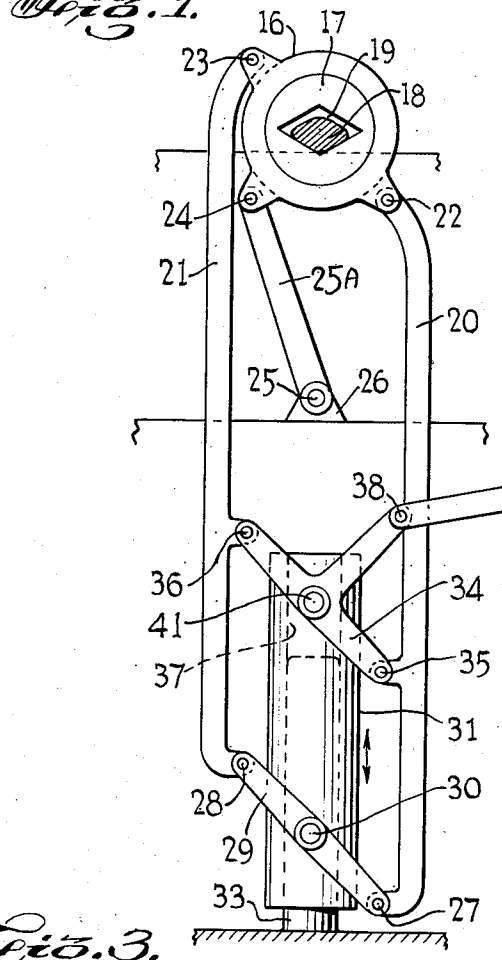


Fig. 4.

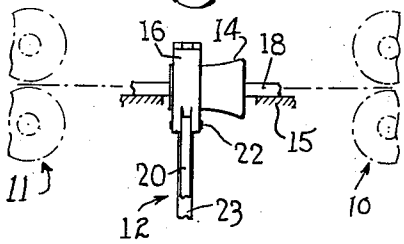


Fig. 2.

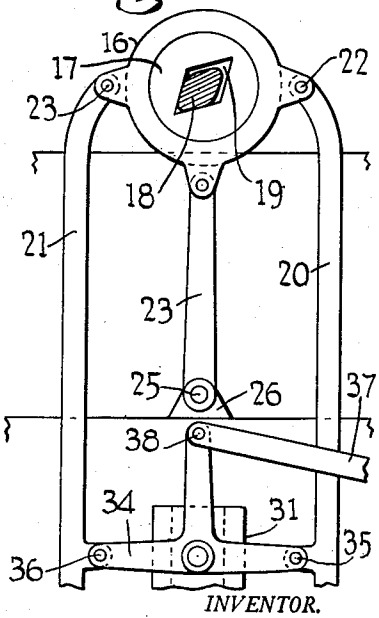
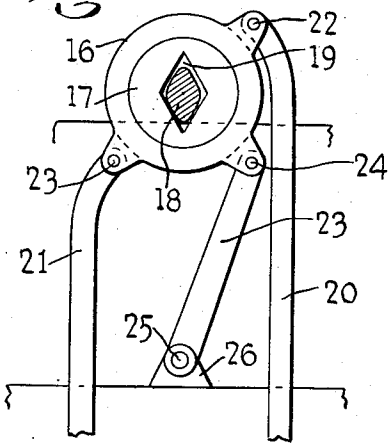


Fig. 3.



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MATERIAL HANDLING DEVICE

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4 Claims. (Cl. 80—53)

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This invention relates to a material handling apparatus and method suitable for use in conjunction with rolling mills and the like, and especially to an arrangement wherein a bar being rolled or shaped is turned around its axis before it is fed to the next roll or point of manipulation.

In conjunction with the usual merchant mill practice, especially where bars are being rolled which are other than round in shape, the bar must be rotated a predetermined angle, such as 90°, between passes. The bar usually is in heated condition at the time it must be turned so that a difficult handling problem is presented. In the past, the turning has usually been accomplished manually.

One of the objects of the present invention is to provide a method and apparatus for simplifying rotation of a bar about its longitudinal axis.

One of the features of the invention is an arrangement adapted to turn a bar which both raises and turns the bar; the raising of the bar being for the purpose of raising the same above the table or supports during the turning operation.

In one aspect, an aperture is provided in a guide and a turning link means connected therewith operable to turn the guide, raise the guide, and then again lower the guide as the bar reaches its turned position. The bar is then ready to be removed from the turning guide and moved to the next point which may be the next roll. The link system can be operated by means of a power operator such as a hydraulic piston, electric motor, or the like and the raising of the guide can be accomplished by a pivoted lever connected to the guide.

In a preferred embodiment, the guide has a pair of floating downwardly extending links pivotally connected to the guide at substantially diametrically opposite points, the downwardly extending links being joined adjacent their lower ends by suitable cross link means. Preferably, a separate lever or oscillatable crank arm is pivoted to the guide between the pivot connections therewith of the downwardly extending links, the other end of said oscillatable lever being pivoted at a relatively fixed point. Means can be provided to lower one link and simultaneously raise the other. When this is done, the guide will be rotated by the downward movement of one link and the upward movement of the other. The oscillatable lever arm will be rotated about its pivot point as the guide is turned. As the oscillatable lever arm approaches a mid-position, which can be about mid-point of the turning operation, the guide holder will be raised upwardly, thus raising the bar above the table surface so that the bar can be turned with ease. The bar usually does not have identical cross sectional dimensions in each direction so that it is necessary to raise the bar in order to turn the same with ease. It is to be understood that the terms "vertical," "downwardly extending," "raising," etc., are used in their relative meaning and that the device can be arranged to function in different directions than that described herein.

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The raising preferably takes place during the turning but the movement could take place in other manners.

These and other objects, features and advantages of the invention will become apparent from the following description and drawings which are merely exemplary:

In the drawings:

Figure 1 is an elevation view.

Figure 2 is a fragmentary elevation view showing the apparatus in a partially turned position.

Figure 3 is similar to Figure 2 with the turn completed.

Figure 4 is a schematic side view showing one manner in which the apparatus may be used.

The apparatus is particularly useful in conjunction with handling hot bars which have a non-circular cross section. As a bar comes from a rolling mill or other shaping point, it is frequently desirable to turn the same before it is carried to the next operation. In the case of rolling shapes having one axis longer than the other axis, either in its final form or during the rolling operation, the shape comes from one rolling mill and is turned 90° before being fed to the next mill or pass.

As an example of one use of the invention, a mill is indicated at 10 and a second mill at 11 with the apparatus of the present invention indicated generally at 12. The bar 18 coming from the first mill is slid into the directing guide 14 of the turning device, said bar being slid along the table top 15. The device 12 is then rotated 90° as will be explained hereafter so as to turn the metal bar so that it will be in readiness for further movement into the second mill or pass 11.

In the particular form shown, the guide is arranged for a bar having a diamond or similar shape. The bar 18 may be received with its longer cross sectional axis horizontally arranged

as seen in Figure 1, the guide 17 having a flared aperture so as to properly feed the bar into the aperture 19 of the guide. If the bar is turned so that the shorter axis is horizontal, the guide may be placed in the position shown in Figure 3 before insertion of the bar therein. Guide holder 16 may have a pair of link means 20, 21 pivoted at 22, 23 to guide holder 16. In the form shown, the two links extend downwardly, said links being pivoted at diametrically opposite points to the guide holder. One end of the oscillatable link 25A is pivoted at 25 to a fixed pivot point or support 26 and the other end at 24 to guide holder 16, the fixed pivot point being below the guide. Pivot point 24 preferably is located about midway between pivot points 22 and 23. The lower ends of links 20 and 21 are pivoted at 27, 28 to a cross link 29, said cross link 29 being pivoted at 30 to the floating sleeve or guide 31. Sleeve 31 can have an aperture 37 therein engageable with the fixed upright pin 33. It is evident that the floating movement of the lower end of links 20 and 21 can be guided in manners other than that specifically illustrated and that the floating sleeve can be arranged in other mechanical manners.

An operating link 34 is pivotally connected at 35 and 36 to links 20 and 21 and a link 37 is connected at one end to arm 38 of operating link 34. The other end of arm 38 can be connected to a piston rod 39, hydraulic cylinder 40 being employed to cause oscillation of the link 34.

The links, cross link, and operating link are seen to be joined so as to form a parallelogram wherein the downwardly extending links remain substantially parallel as do also the cross and operating links.

When it is desired to turn a bar which has been moved into guide aperture 19, hydraulic cylinder 40 may be energized so as to cause rotation of link 34 in a counterclockwise direction from the point illustrated in Figure 1. As link 34 is oscillated, link 20 will be raised and link 21 will be moved downwardly causing rotation of ring 16. Because of the location of lever arm 25A, guide holder 16 and guide 17 will be raised as turning proceeds, upward movement of the link system being made possible by the slidable sleeve 31. As the guide holder reaches the half way or 45° position of Figure 2, the guide 16 will have reached its maximum raised position because of the action of lever arm 25A moving the floating system upwardly as the turning proceeds. When in the maximum raised position, a bar located in aperture 19 will be lifted clear of the table. Continuing further rotation of guide holder 16 will lower the guide and bar so that the bar will again rest on the table surface as seen in Figure 3 upon completion of the turning thereof through 90°. The pivot points 30 and 41 of cross links 29 and 34 respectively are connected to the floating slidable sleeve 31 so that the system can move as the bar is turned and raised.

The aperture 19 of the guide is so shaped and dimensioned relative to the bar to be turned as to cause turning of the bar as the guide is turned. The aperture also is dimensioned relative to the table top or guide surfaces so that the bar can be picked up off the guide surface and redeposited thereon following the turning, there being sufficient play present to allow for the difference in cross sectional dimensions.

Variations may be made in the details illustrated without departing from the spirit of the invention except as defined in the appended claims.

What is claimed is:

1. In a material turning device, a guide means, turning links pivotally mounted on opposite sides of said guide means, said links being joined by a cross link at a point remote from their connection with the guide means to form a parallelogram, means reciprocating said links, an oscillatable lever pivotally connected at one end to said guide means between the pivot points of said turning links, said lever being pivoted at the other end to a relatively stationary point between said links and being normally angularly disposed relative to the plane passing through the center of the guide means and the pivot of said lever at said relatively stationary point so that when said links move in opposite directions to turn said guide means, said lever will be oscillated and move said guide means and links upwardly as the lever passes through said plane passing through the center of the guide means and the pivot of said lever at said relatively stationary point, so that an article held in said guide means will be turned and raised as the turning progresses, the guide means returning to approximately the same vertical position at the end of the material turning operation.

2. In a material turning device adapted to rotate elongated bars, the combination comprising a guide means having an aperture therein for receiving a bar, a pair of substantially parallel links connected pivotally to said guide means on opposite sides thereof at a guide means pivot, a cross link pivotally connected to said parallel links, the distance from the cross link pivot to the guide means pivot for each of said parallel links being substantially equal, an operating cross link pivotally mounted at each end to said parallel links, said cross links and parallel links forming parallelograms, and a lever pivotally connected to said guide between said guide means pivots and said parallel links and connected to a relatively stationary support raising and lowering said guide as it is turned.

3. In a material turning device adapted to rotate elongated bars, the combination comprising a guide means having an aperture therein for receiving a bar, a pair of substantially parallel links connected pivotally to said guide means on opposite sides thereof at guide means pivots, a cross link pivotally connected to said parallel links, the distance from the cross link pivot to the guide means pivot for each of said parallel links being substantially equal, an operating cross link pivotally mounted at each end to said parallel links, said cross links and parallel links forming parallelograms, a lever pivotally connected to said guide and to a relatively stationary support between said parallel links raising and lowering said guide as it is turned said guide returning to approximately the same vertical position each time, sleeve means slidably mounted on a fixed guide, and connections between said cross links and said sleeve means.

4. In a material turning device for turning elongated articles and the like at one station, the combination including a rotatable guide having an article receiving aperture therein, a pair of spaced link means pivotally connected to opposite sides of said guide, said link means being movable relative to each other in opposite directions to rotate said guide through a predetermined angle, means reciprocating said links, and oscillatable lever means having one end piv-

otally mounted in a fixed vertical location and the other end pivotally connected with said guide between the pivoted connections of the link means thereto, said lever means raising said guide upwardly from a normal position during turning and returning it to approximately its initial vertical position upon completion of the material turning as the guide is turned by reciprocation of said first mentioned link means.

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