

Feb. 14, 1956

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2,734,618

TABLES FOR FEEDING METAL BARS

Filed Aug. 10, 1951

3 Sheets-Sheet 1

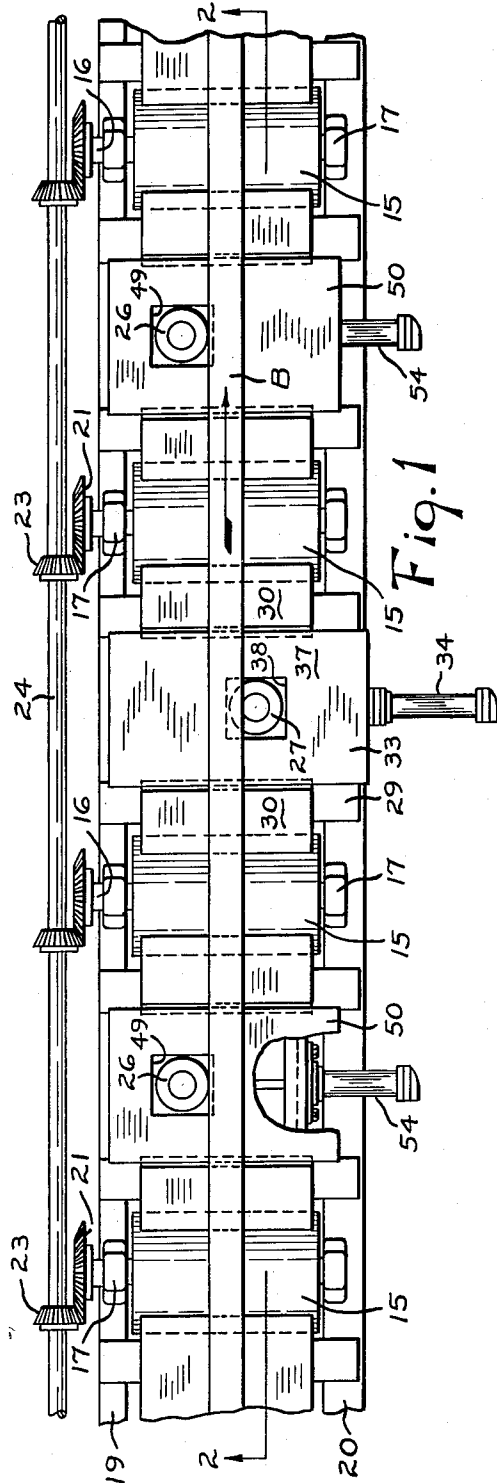


Fig. 1

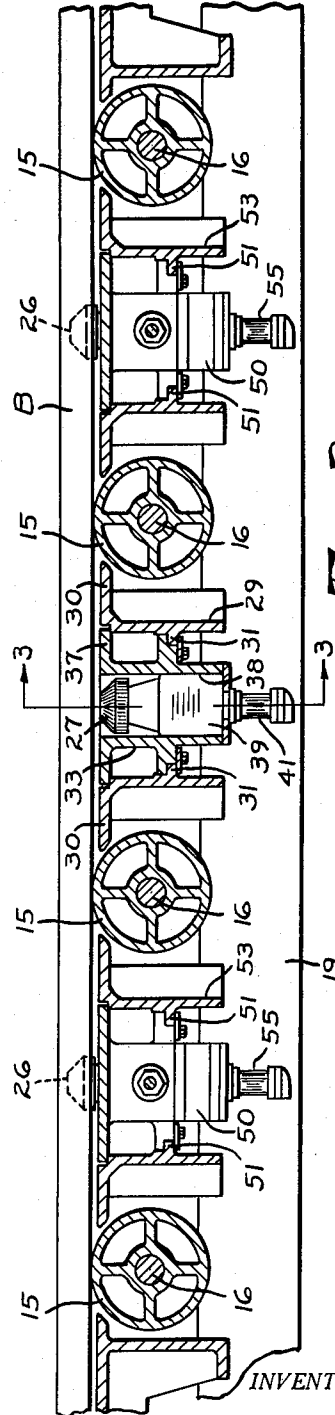


Fig. 2

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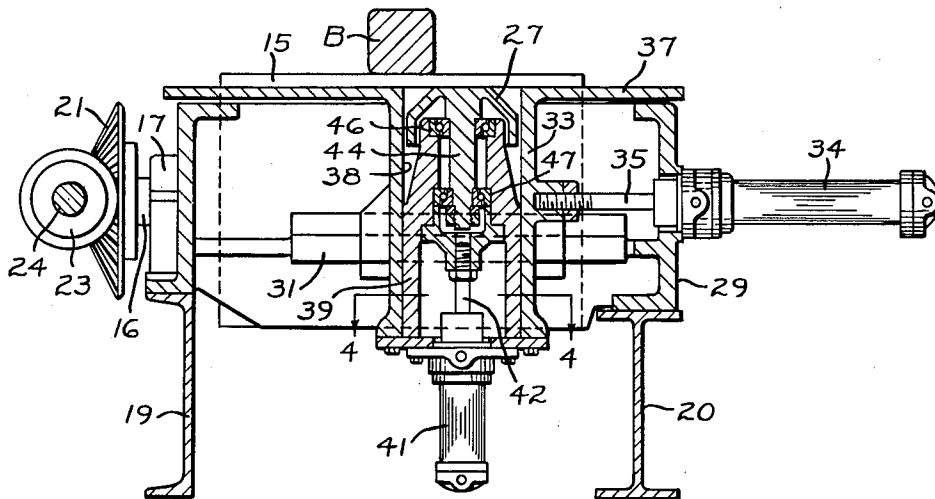


Fig. 3

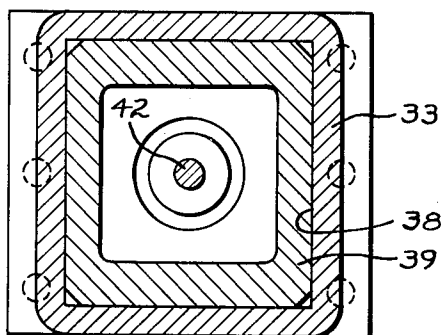


Fig. 4

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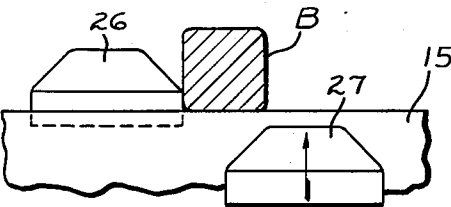


Fig. 5

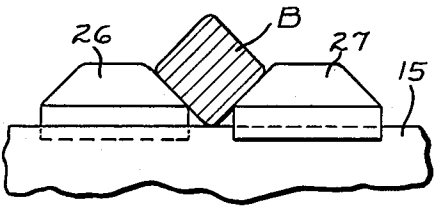


Fig. 6

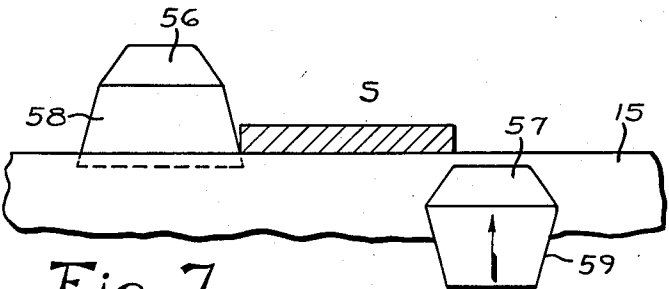


Fig. 7

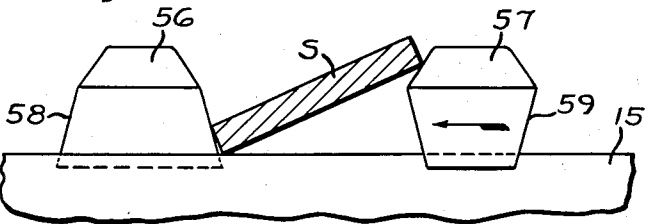


Fig. 8

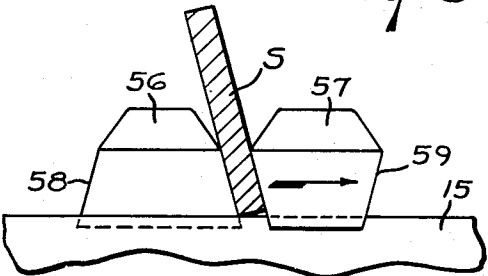


Fig. 9

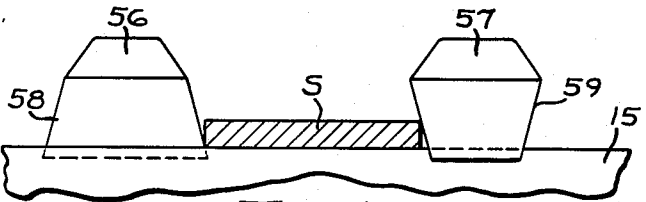


Fig. 10

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TABLES FOR FEEDING METAL BARS

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Application August 10, 1951, Serial No. 241,323

7 Claims. (Cl. 198—33)

This invention relates to tables for feeding metal bars, as employed for example in connection with rolling mills, and more particularly to roller tables for the type including a mechanism for shifting the position of a bar on the table.

The principal function of an ordinary roller table is to support a bar and to move the bar longitudinally. In many cases, however, it is necessary to impart other movements to the bar. Thus, in the feeding of square billets to certain types of rolling mills, each billet must be turned approximately 45 degrees about its axis in order that it may enter the roll pass properly. In the feeding of slabs, which are of rectangular cross section, it is often desirable to turn each slab 180 degrees and thereby dump any scale or slag which may have accumulated on its upper surface or to arrange a bent slab with its convex side downward at the entrance to a furnace. At times it is desirable to move a bar broadside in order to align it properly with a roll pass, or perhaps to discharge the bar entirely from the table.

Various mechanisms have been provided heretofore for performing one or more of these operations upon a bar. In general, however, the prior mechanisms have been complicated, expensive, and somewhat unreliable. Furthermore, these mechanisms have usually been adapted to perform only one particular operation, and in some cases only upon a bar of a particular shape and size and in some cases they do not permit continuous operation. This has greatly limited their usefulness.

It is accordingly one object of the invention to provide a bar feeding table of a comparatively simple, inexpensive and dependable construction, which will not only move a bar longitudinally but also serve to shift the position of the bar in a desired manner.

It is a further object of the invention to provide a bar feeding table including a simple and rugged mechanism for turning square billets 45 degrees about their axes or for turning square slabs 180 degrees about their axes.

It is a further object of the invention to provide a bar feeding table including a mechanism of a relatively simple and dependable nature capable not only of turning bars about their axes but also of moving the bars broadside.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

In accordance with the invention there is provided a feeding table comprising a series of spaced horizontal rollers arranged to support a metal bar, the rollers preferably being driven by a suitable power means in order that the bar may be moved longitudinally.

Referring to the drawings illustrating one embodiment of the invention and in which like reference numerals indicate like parts,

Fig. 1 is a plan view of a table for feeding metal bars, showing a square billet in place thereon;

Fig. 2 is a view in section taken on the line 2—2 of Fig. 1;

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Fig. 3 is a transverse sectional view on an enlarged scale, taken on the line 3—3 of Fig. 2;

Fig. 4 is fragmentary sectional view on a still larger scale, taken on the line 4—4 of Fig. 3;

Fig. 5 and 6 are diagrammatic transverse views illustrating the operation of the table in turning a billet 45 degrees about its axis; and

Figs. 7 to 10 inclusive are diagrammatic transverse views illustrating the operation of a slightly modified form of the apparatus in turning a slab 180 degrees about its axis.

As shown particularly in Figs. 1 and 2, there is provided a table comprising a series of horizontal cylindrical rollers 15 arranged to support a generally horizontal metal billet B and to move the same longitudinally. The rollers are spaced from one another in the direction of billet travel, with their axes extending transversely of the billet. Each roller is provided with a central shaft 16 which is rotatably mounted in a pair of bearings 17—17 at opposite ends of the roller. These bearings are supported by two spaced parallel beams 19 and 20 extending lengthwise of the table. Each shaft 16 carries on one end thereof a bevel gear 21, these gears meshing with bevel pinions 23 mounted on a horizontal main drive shaft 24 which is rotated by a suitable electric motor or the like (not shown).

Under some circumstances it is necessary to shift the position of the billet B on the rollers 15 while it is traveling longitudinally over the rollers. Thus, when the table is being used to feed billets to a rolling mill, each billet may have to be turned 45 degrees about its axis so that it may enter the rolling mill in the proper position. For this purpose certain idler rollers are located between the table rollers 15 in position to engage the billet and to move it in the desired manner, these idler rollers being fully rotatable about axes which are generally upright and preferably substantially vertical, at opposite sides of the billet.

In the preferred embodiment illustrated there are shown two idler rollers 26 at one side of the billet, and one idler roller 27 at the other side of the billet and staggered with respect to the rollers 26. Each of the rollers 26 and 27 is freely rotatable about a vertical axis located midway between two of the table rollers 15. Each idler roller has an upper surface shaped as a frustum of a cone converging upwardly with an included angle of approximately 90 degrees. For adjustment to various sizes, shapes or positions of the billet B, and for manipulation of the billet in a desired manner, each idler roller is so supported that it can be moved not only vertically but also horizontally in a direction at right angles to the line of billet travel.

The structure for supporting and moving the roller 27 is shown in Figs. 1 to 4. A generally rectangular frame 29 is mounted on the beams 19 and 20 between two of the table rollers 15, this frame having two horizontal flanges 30 on its upper portion which are slightly below the billet and overlap the adjacent portions of the table rollers. The frame 29 provides two opposed horizontal rails 31 extending at right angles to the line of billet travel and forming a supporting guideway for a horizontally slidable carriage 33. For actuation of the carriage there is provided a double-acting fluid motor comprising a horizontal cylinder 34 attached at one end to the frame 29, with a reciprocable piston rod 35 connected to the carriage. The upper portion of the carriage 33 is in the form of a horizontal plate 37 lying between the two flange 30. The main body of the carriage provides a vertical guideway 38 of generally square cross section, within which a generally square hollow crosshead 39 is slidable vertically. This crosshead is actuated by a double-acting fluid motor comprising a

vertical cylinder 41 secured at its upper end to the bottom of the carriage 33, and a piston rod 42 connected at its upper end to the crosshead. The admission of pressure fluid to the ends of the cylinders 34 and 41, and the exhaust of the fluid therefrom, will be controlled in known manner by means of suitable four-way valves and connecting conduits (not shown). The conduits for the cylinder 41 will of course be of the flexible type to permit the cylinder to move with the carriage 33. The roller 27 is provided with a central supporting shaft 44 which extends downwardly into the upper portion of the crosshead 39, where the shaft is rotatably supported by suitable antifriction bearings 46 and 47.

Each of the idler rollers 26 is supported in a manner similar to that described above in connection with the roller 27. Thus each roller 26 is rotatably mounted on a crosshead (not shown) which is slidable vertically in a guideway 49 formed in a carriage 50. The carriage is slidable horizontally on rails 51 provided on a frame 53, which in turn is supported on the beams 19 and 20. The carriage can be moved along the rails 51 by a fluid motor 54, and the crosshead can be moved vertically in the guideway 49 by means of a fluid motor 55.

In the operation of this embodiment, the idler rollers 26 will ordinarily remain in the raised positions indicated, whereas the idler rollers 27 will be in the lowered position shown in Figs. 2, 3, and 5. As the billet B is moved longitudinally by the table rollers 15, it will travel with its left side close to the idler rollers 26 and its right side above the idler roller 27 (Fig. 5). After the front end of the billet has passed the second roller 26, the billet can be turned 45 degrees about its axis by merely raising the idler roller 27 to the position shown in Fig. 6. During this movement the rollers 26 will prevent the billet from sliding to the left, while the roller 27 will lift the right side of the billet until the 45 degree turn has been completed. At this time the lower corner of the billet preferably rests on the table rollers 15, which continue to advance the billet longitudinally, while the idler rollers 26 and 27 are free to rotate from the contact with the billet as they hold the billet in the correct position until its front end has entered the first stand of a rolling mill (not shown). Obviously, with the roller 27 lowered, a billet can be pushed broadside along the table rollers 15 by appropriate horizontal movement of the rollers 26.

If the table is to handle bars such as slabs, which in some cases must be turned 180 degrees about their axes, a somewhat modified shape is desirable for the idler rollers. For this purpose the rollers 26 and 27 are replaced by rollers 56 and 57, as shown in Figs. 7 to 10 inclusive. These rollers 56 and 57 as illustrated have upwardly converging frusto-conical upper portions. The lower portions 58 of the rollers 56 are likewise frusto-conical and converge at a rather small angle in the upward direction. The lower portion 59 of the roller 57 is also frusto-conical and converges at a similar small angle in the downward direction.

In the operation of this embodiment, the idler rollers 56 will ordinarily remain in their raised position. As a slab S approaches along the table rollers 15, it will travel with its left edge close to the rollers 56, with its right edge above the lowered roller 57 (Fig. 7).

To turn over the slab, the roller 57 will be raised to lift the right edge of the slab (Fig. 8) and then moved to the left to turn the slab slightly beyond the vertical position (Fig. 9). The angle of the lower surfaces 58 and 59 of the rollers will determine this position of the slab. The rollers 56 will now be moved to the left until the slab has tipped downward to the left, and the original upper surface of the slab is at the bottom and rests on the table rollers 15 (Fig. 10).

With the roller 57 lowered, a slab can be pushed broadside by means of the rollers 56. If it becomes necessary to push a slab to the left, the rollers 56 can be lowered

and moved to the right beneath the slab, whereupon they can be raised and moved to the left as required to produce the desired slab movement.

The invention is relatively simple, inexpensive, and thoroughly dependable. It is adapted for handling bars of various shapes and sizes, and capable of imparting various movements to such bars.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A table for feeding metal bars of polygonal cross-sectional shape, comprising: a series of spaced, parallel, horizontal rollers for supporting a bar, means for rotating the rollers for feeding the bar longitudinally, idler rollers located on opposite sides of the line of travel of the bar, each idler roller being freely rotatable about a substantially vertical axis, a first means for moving one idler roller on one side of the bar vertically independently of a second roller on the other side of the bar, and a second means for moving the said one idler roller horizontally independently of the said second roller, the first and second means being operable independently of one another.

2. A table for feeding metal bars of polygonal cross-sectional shape, comprising: a series of spaced, parallel, horizontal rollers for supporting a bar, means for rotating the roller for feeding the bar longitudinally, idler rollers located on opposite sides of the line of travel of the bar, each idler roller being formed in its upper portion with a surface of upwardly-converging frusto-conical shape and being freely rotatable about a substantially vertical axis, a first means for moving one idler roller on one side of the bar vertically independently of a second roller on the other side of the bar, and a second means for moving the said one idler roller horizontally independently of the said second roller, the said first and second means being operable independently of one another.

3. A table for feeding metal slabs of elongated rectangular cross-section, comprising: a series of spaced, parallel, horizontal rollers for supporting a slab, means for rotating the rollers for feeding the slab longitudinally, idler rollers located on opposite sides of the line of travel of the slab, each idler roller being freely rotatable about a substantially vertical axis, means for moving an idler roller on one side of the slab vertically and laterally of the slab independently of the roller on the other side of the slab, the idler roller which is subject to vertical and horizontal movement being formed in part with a surface of downwardly-converging frusto-conical shape.

4. A table for feeding a metal bar of rectangular cross-section, comprising: a series of spaced, parallel, horizontal rollers for supporting the bar, means for rotating the rollers for feeding the bar longitudinally, idler rollers located on opposite sides of the line of travel of the bar, each idler roller being formed in its upper portion with a surface of upwardly-converging frusto-conical shape and being freely rotatable about a substantially vertical axis, means for moving an idler roller on one side of the bar vertically and laterally of the bar independently of the roller on the other side of the bar, the idler roller which is subject to vertical and horizontal movement being formed in its lower part with a surface of downwardly-converging, frusto-conical shape.

5. A table for feeding metal bars of polygonal cross-sectional shape, comprising: a series of spaced, parallel, horizontal rollers for supporting a bar, means for rotating the roller for feeding the bar longitudinally, idler rollers located on opposite sides of the line of travel of the bar, each idler roller being formed in its upper portion with a surface of upwardly-converging frusto-conical shape and being freely rotatable about a substantially vertical axis, a first double-acting hydraulic motor for moving one idler roller on one side of the bar vertically independently of a second roller on the other side of the bar, and a second double-acting hydraulic motor for moving the said one idler roller horizontally independently of the said second roller, the said first and

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second motors being operable independently of one another.

6. A table for feeding a metal bar of rectangular cross-section, comprising: a series of spaced, parallel, horizontal rollers for supporting the bar, means for rotating the rollers for feeding the bar longitudinally, idler rollers located on opposite sides of the line of travel of the bar, each idler roller being formed in its upper portion with a surface of upwardly-converging frusto-conical shape and being freely rotatable about a substantially vertical axis, means for moving an idler roller on one side of the bar vertically and laterally of the bar independently of the roller on the other side of the bar, the said idler roller which is subject to vertical and horizontal movement being formed in its lower part with a surface of downwardly-converging, frusto-conical shape, the said roller on the other side of the bar being formed in its lower part with a surface of upwardly-converging frusto-conical shape having a subtended angle considerably less than its upper portion.

7. A table for feeding a metal bar of rectangular cross-section, comprising: a series of spaced, parallel, hori-

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zontal rollers for supporting the bar, means for rotating the rollers for feeding the bar longitudinally, idler rollers located on opposite sides of the line of travel of the bar, each idler roller being formed in its upper portion with a surface of upwardly-converging frusto-conical shape and being freely rotatable about a substantially vertical axis, double-acting hydraulic motors for moving an idler roller on one side of the bar vertically and laterally of the bar independently of the roller on the other side of the bar, the said idler roller which is subject to vertical and horizontal movement being formed in its lower part with a surface of downwardly-converging, frusto-conical shape.

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