No. 647,860. Patented Apr. 17, 1900.

F. McCLAIN.

ROLLING MILL.

(Application filed Jan. 3, 1898.)

(No Model.) 4 Sheets—Sheet 1.

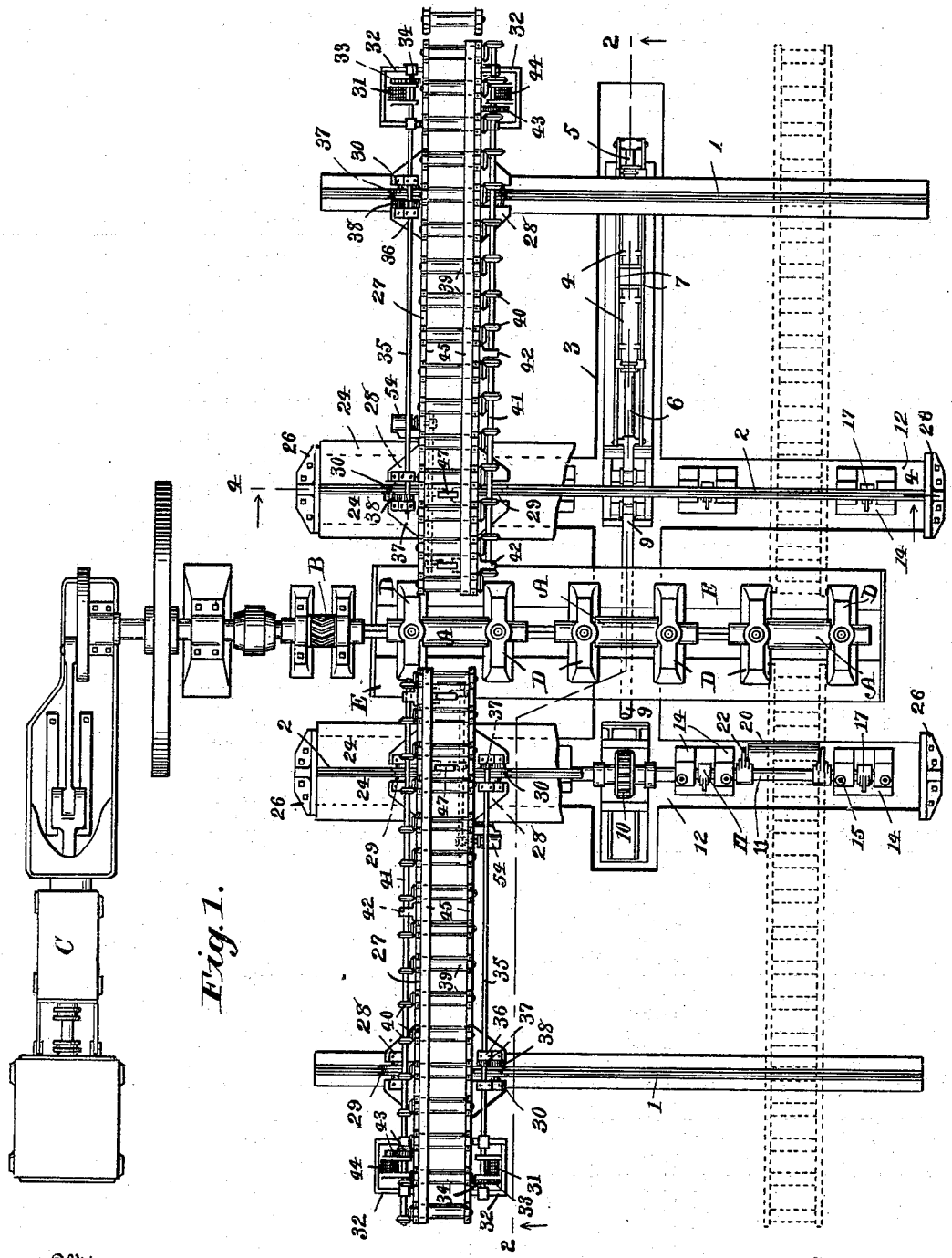

Fig. 1.

Witnesses

Geo. E. Shackray

C. M. Newman

Inventor

Frederick McClain

By his Attorney

Cyrus Elder

No. 647,860. Patented Apr. 17, 1900.

F. McCLAIN.

ROLLING MILL.

(Application filed Jan. 3, 1898.)

(No Model.) 4 Sheets—Sheet 2.

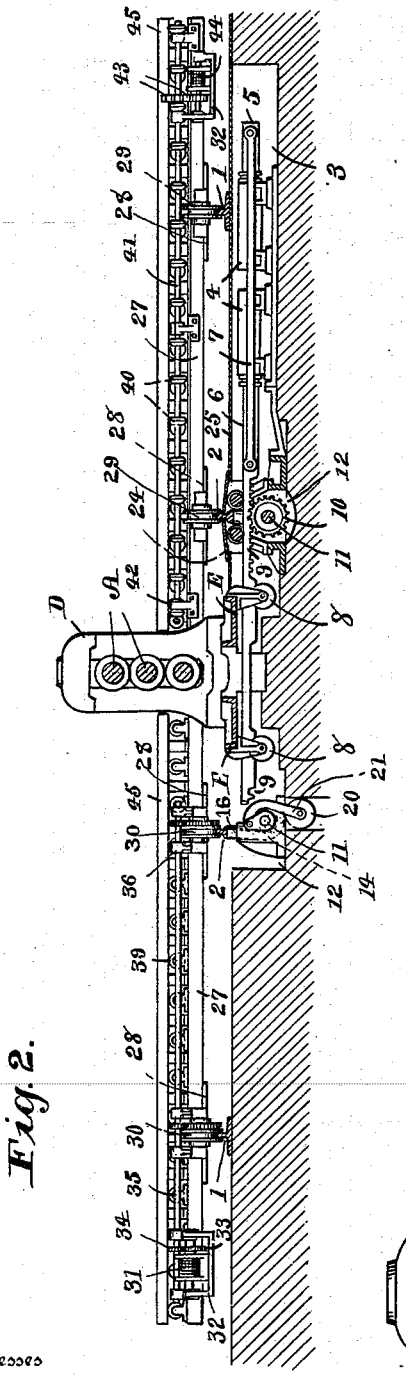

Fig. 2.

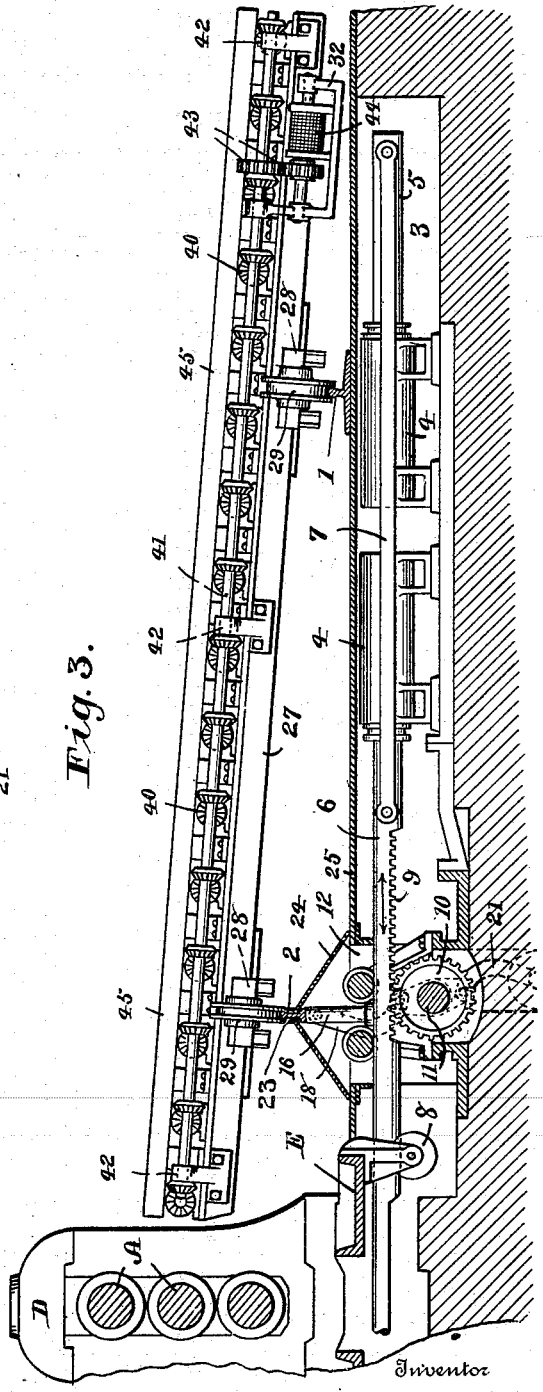

Fig. 3.

Witnesses

Geo. E. Shackray

C. M. Newman

Inventor

Frederick McClain

By his Attorney

Cyrus Elder

No. 647,860. Patented Apr. 17, 1900.

F. McCLAIN.

ROLLING MILL.

(No Model.) (Application filed Jan. 3, 1898.)

4 Sheets—Sheet 3.

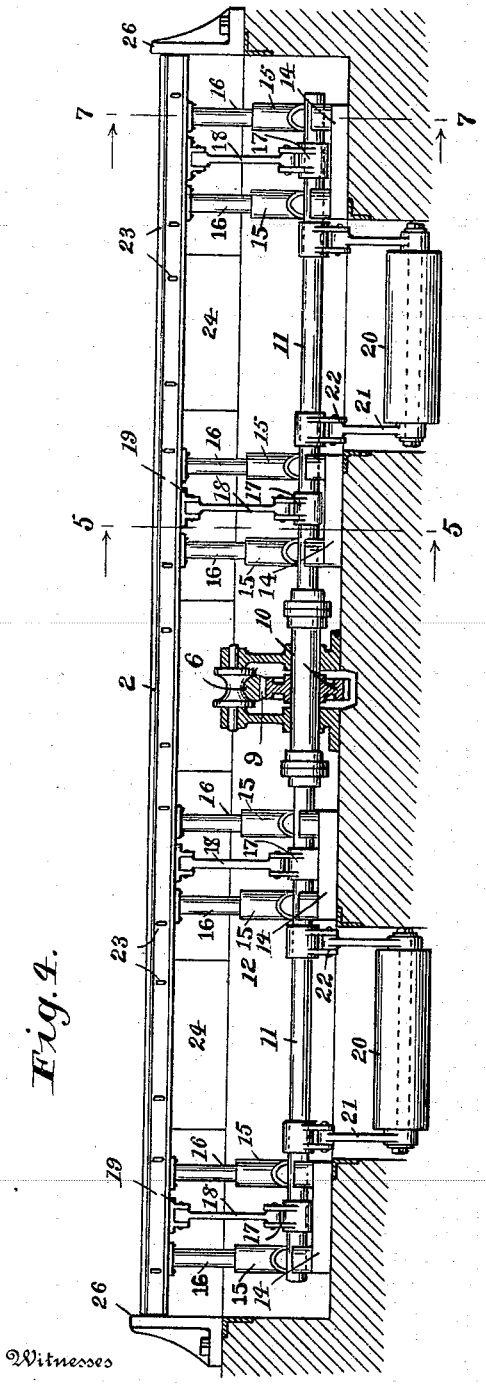

Fig. 4.

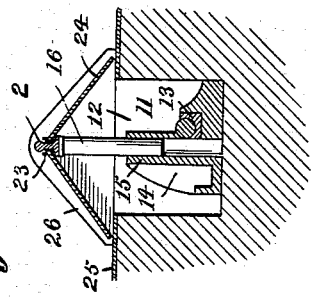

Fig. 7.

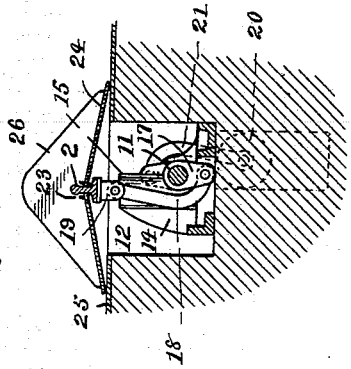

Fig. 6.

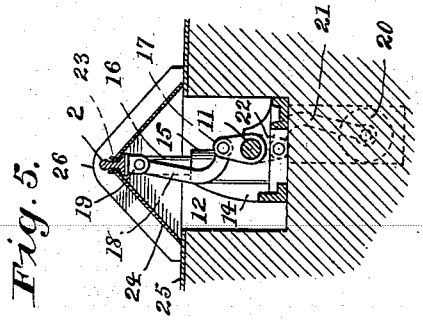

Fig. 5.

Witnesses

Geo. E. Mackray.

C. M. Newman

Inventor

Frederick McClain

By his Attorney

Cyrus E. Eder

No. 647,860. Patented Apr. 17, 1900.

F. McCLAIN.

ROLLING MILL.

(Application filed Jan. 3, 1898.)

(No Model.) 4 Sheets—Sheet 4.

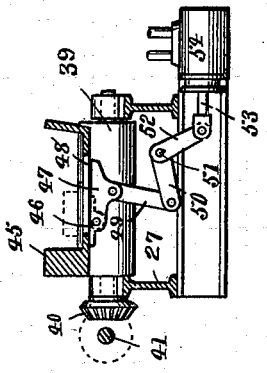

Fig. 10.

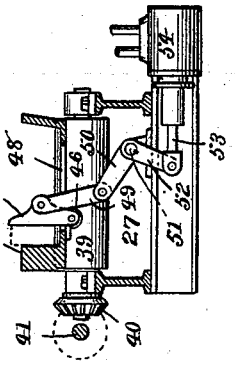

Fig. 11.

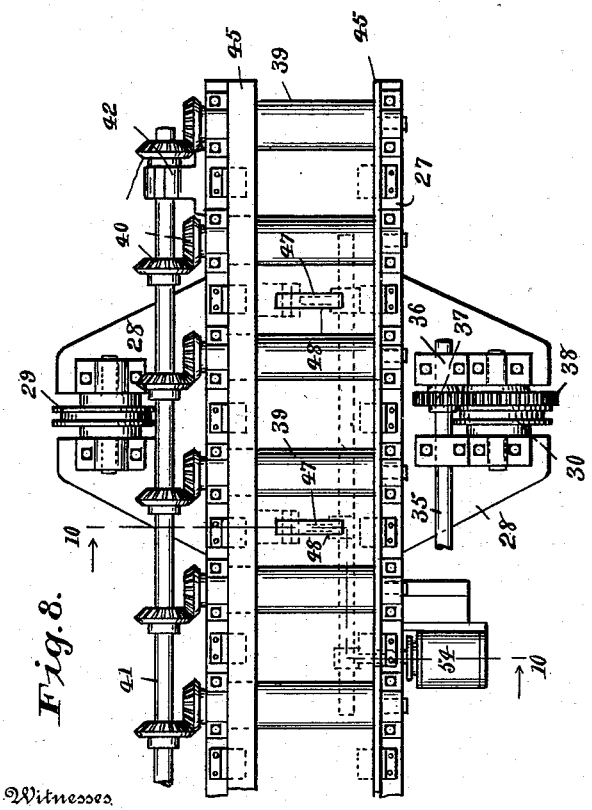

Fig. 8.

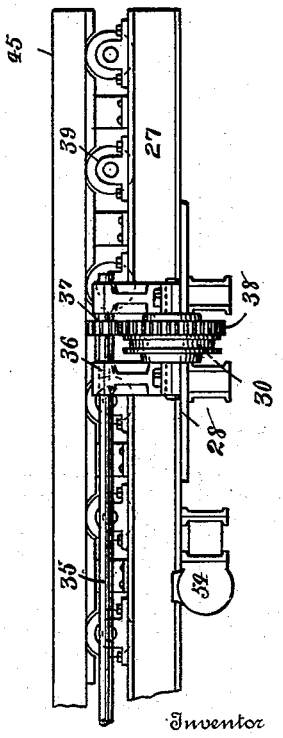

Fig. 9.

Witnesses

Geo. E. Thackray

C. M. Newman

Inventor

Frederick McClain

By his Attorney

Lyons Elder

UNITED STATES PATENT OFFICE.

FREDERICK McCLAIN, OF JOHNSTOWN, PENNSYLVANIA.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 647,860, dated April 17, 1900.

Application filed January 3, 1898. Serial No. 665,299. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK McCLAIN, a citizen of the United States, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Rolling-Mills; and I do hereby declare the following to be a full and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in rolling-mills such as are employed to roll bars, beams, rails, slabs, billets, &c.

It is the object of my invention to simplify and improve mills of the above class by providing the same with novel table lifting and shifting mechanism, whereby a slab or other shape is passed back and forth through the rolls in order to reduce the same to the size and shape desired, and to so construct said mechanism as to greatly increase its speed, accuracy, efficiency, and otherwise generally improve the same.

It will be obvious that rapid and correct manipulation is particularly desirable in work of the above class for several reasons, and my invention provides for this by reason of the lightness of the moving parts of the tables and the impossibility of making mistakes in entering the piece.

My invention is applicable to three high continuously-driven mills, as shown, and can readily be used in connection with two high non-reversing mills, where the piece being rolled is returned idly over the top, or it can be used in three high reversing-mills, wherein the stock is passed in both directions through either top or bottom pass.

Upon the accompanying drawings, forming a part of this specification, the same characters of reference denote like or corresponding parts upon the several figures, and of which—

Figure 1 shows a plan view of a mill containing my improvements, part of the covering-plates being broken away to show the lifting mechanism. Fig. 2 is a vertical longitudinal section on line 2 2 of Fig. 1. Fig. 3 is an enlarged sectional view of one side of the mill, as shown in Fig. 2, the table being in an elevated position. Fig. 4 is an enlarged detail cross-sectional view of the lifting mechanism as seen on line 4 4 of Fig. 1, the parts being in their raised position to correspond with Fig. 3. Fig. 5 is a detail cross-section on line 5 5 of Fig. 4. Fig. 6 is a cross-section similar to Fig. 5, the parts, however, being in their lowered position. Fig. 7 is a detail cross-section on line 7 7 of Fig. 4. Fig. 8 is an enlarged detail plan of the inner end of one of the tables. Fig. 9 is a side elevation of the mechanism shown in Fig. 8. Fig. 10 is a cross-section on line 10 10 of Fig. 8, illustrating the mechanism for turning a bar. Fig. 11 is a cross-section similar to Fig. 10, the parts being in a different position.

I provide a pair of tables for delivering and receiving the stock, which are mounted upon suitable tracks, permitting said tables to operate to and fro to accommodate the several sets of rolls. The tables are also adapted to be raised and lowered to suit the various grooves of the different pairs of rolls in said sets. The construction of these tables and method of operation differ materially, however, from those generally employed in mills of this class, as will later be described. The tables in question, as well as their tracks and means of operation, are substantially duplicates on each side of the rolls, and therefore in the following description similar reference characters will refer to like parts in the two sets. The upward and downward movement of the two tables is simultaneous, deriving their power from the same source, as will later more fully appear.

Referring to the characters of reference marked upon the drawings, A represents the several sets of rolls included in the mills, which, as will be seen, are driven through gears B by a suitable engine C. (Shown in Fig. 1.) The housings D of the mills are mounted on base-plates E E, which in turn rest upon a suitable foundation.

1 indicates the outer track, which is laid upon and secured to the main floor and supports the outer end of the table.

2 indicates the inner or movable track, which carries the inner end of the table, as will be seen upon reference to Figs. 2 and 3.

The mechanism for operating the movable tracks consists as follows: Within a suitable

pit 3, extending lengthwise of the table, is placed a pair of hydraulic or other pressure cylinders 4 4, having piston-rods 5 and 6, which are connected by means of links 7 7 upon each side. The piston-rod 6 is of extra length and is hung in suitable roller-bearings 8, mounted in brackets secured to the bed-plate E before mentioned. Upon the under side of said rod 6 are formed two racks 9 9, which mesh with the gears 10 10 upon rock-shaft 11 11 for the purpose of operating the latter, which in turn imparts movement to the movable tracks 2.

Referring to Sheets 1 and 3, it will be seen that the rock-shafts 11 and connecting parts are suitably located in pits 12, which are arranged at a right angle to the pit 3, containing the cylinders before mentioned. Said shafts are journaled in bearings 13, mounted in a suitable casting 14, which is also provided with guides 15 15, forming ways for guide-posts 16, the upper ends of which are secured to the tracks. (See Figs. 4 and 7.) The axes of the guides and posts are arranged in a position slightly inclined from the vertical and approximately on the chord of the arc of travel of the inner truck of the table. The shaft 11 is further provided with arms 17, having link connections 18 with lugs 19 of the track 2. (See Figs. 5 and 6.) I also provide said shaft with a counterbalancing device comprising a weight 20, suspended by links 21 from arms 22, secured to said shaft, as shown in Fig. 4.

From the above construction it will be apparent that as the piston 6 is operated in and out the gear 10, together with its shaft, will be rocked to and fro, thus lowering and raising the track through the link connections 18 referred to. It will further be obvious that the inner ends of the tables are raised and lowered with the movement of the tracks 2 and by the action of the cylinders 4, while the outer trucks pivot on the stationary tracks.

In order to inclose the pit and mechanism contained therein, I provide upon each side of the track 2 a number of small hooks 23, to which are hung sheet-metal plates 24, the free outer ends of which rest and slide upon plate 25, constituting the floor. At each end of the tracks 2 and series of movable plates is provided a bracket-plate, which incloses the openings at said ends and serves to complete the covering of the pit. From the above it will be obvious that the plates rise and fall with the movement of the track in such a manner as to at all times completely cover the pit and mechanism contained therein.

The tables, as before stated, are substantially duplicates of each other and consist of a suitable frame 27, mounted on trucks 28, having wheels 29 and 30 for engagement with the tracks 1 and 2. The power for moving the tables upon the tracks is preferably derived from an electric motor 31, which is mounted on a suitable platform 32, secured to the outer end of the tables, as shown. Power is conveyed from said motors, through gears 33 and 34, shaft 35, journaled in bearings 36, and gears 37 and 38, to the driving-wheels 30. By the use of electric power applied as above the tables can be quickly and conveniently operated and are at all times under perfect control of the operator, who may be located at any convenient point, either on the table or elsewhere.

Within the table-frame is journaled a number of rolls 39, by means of which the bars are fed to the forming-rolls A. These feed-rolls are driven, through bevel-gears 40, shaft 41, journaled in bearings 42, and gears 43, from an electric motor 44, which is also mounted upon the platform 32, and its connections may be so arranged as to be under the control of the same operator as driving-motor 31.

In addition to the mechanism above described for passing a bar back and forth between the forming-rolls and shifting it from one set to another I also provide mechanism for turning the bar upon its edge while upon either table and for the purpose of passing it through the mill in said position. This mechanism is clearly illustrated on Sheets 1 and 4 and will next be described. Upon each side of the top face of the feed-rolls 39 are secured guides 45, against one of which the bars may be turned by the following mechanism: To the under side of the floor, constituting a part of the table-frame, are secured two brackets 46, (see Figs. 10 and 11,) to each of which is hung a lever 47, normally horizontal with the floor and directly in line with the orifice 48 thereof. Said levers are connected, by means of a link 49, to an arm 50, secured to a common rock-shaft 51, journaled in bearings of the main frame. The rock-shaft is in turn provided with a similar pair of arms 52, which are deflected at substantially a right angle to those before mentioned. Each of these arms is operatively connected to piston-rods 53 of pressure-cylinders 54, which latter serve to provide the power necessary to tilt the lever 47 up on end, as seen in Fig. 11, thereby turning a bar from its flat side (see dotted lines, Fig. 10) upon its edge for the purpose of rolling the latter. After the bar has been turned as stated the pressure is applied to the opposite side of piston-head and the lever 47 is moved back to its normal position, as seen in Fig. 10.

If desirable, I can use a longer shaft 51 and connect with the same a greater number of turning-levers 47; but in practice I find that two, as shown, are quite sufficient for ordinary work.

A further or general description of the operation of my machine is not thought to be necessary, inasmuch as the several movements have been described separately and are thought to be fully and sufficiently set forth.

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

1. In a rolling-mill table the combination of the cylinders, connections thereof with a rock-shaft, arms on said rock-shaft bearing link connections with a movable track supporting one end of said table, movable posts secured to said track and provided with guides in which to operate, substantially as shown and described.

2. In a rolling-mill table the combination of fixed and movable tracks upon which said table is mounted, mechanism for raising and lowering the inner track, a pit in which said mechanism is located, plates covering said pit and attached to the track in a manner to move therewith, substantially as shown.

3. In a rolling-mill table the combination of the fixed and movable tracks, means for operating the table on said tracks, mechanism for raising and lowering said movable track together with the table mounted thereon, plates attached to said movable track in a manner to operate therewith and cover the raising mechanism aforesaid.

4. In a rolling-mill of the class described, the combination with the forming-rolls, of laterally-movable tables adjacent thereto, means for simultaneously raising and lowering the ends of said tables the same comprising a pair of cylinders bearing connections with a rack, rock-shafts and gears operated by said rack, a movable track parallel with the axis of the rolls, connections between said rock-shaft and track for operating the latter and its table, substantially as described.

5. In a rolling-mill of the class described, the combination with forming-rolls, of laterally-movable tables adjacent thereto, means for simultaneously raising and lowering one end of said tables, the same comprising a pair of cylinders bearing connections with a rack, rock-shafts and gears operated by said rack, a weight swung from said shafts to counterbalance the weight of the tables aforesaid, a movable track parallel with the axis of the rolls, connections between said rock-shaft and track for operating the latter and its table, substantially as shown and described.

6. In a rolling-mill table the combination of cylinders, connections thereof with a rock-shaft, arms on said rock-shaft bearing connections with a movable track supporting one end of said table, movable posts secured to said track and guides in which said posts operate, substantially as described.

7. In a rolling-mill table the combination with fixed and movable tracks, of a table mounted thereon, mechanism for raising and lowering said movable track comprising an operative rock-shaft, arms on said shaft, a series of links connecting said track and arms, posts secured to said movable track, guides in which said posts operate, substantially as described.

8. In a rolling-mill appliance the combination of forming-rolls, fixed and movable tracks and tables mounted thereon, means for operating said tables on said tracks, mechanism for raising and lowering the movable tracks, together with the tables mounted thereon, movable plates attached to said tracks for the purpose of covering the lifting mechanism, means for turning a bar while on said table and feeding it to the forming-rolls.

9. In a rolling-mill of the class described, the combination with one or more sets of forming-rolls, of a feed-table provided with wheels at each end mounted in supports rigidly secured to said table, a movable and a fixed track parallel to the rolls upon which said wheels operate, means for lifting and lowering the movable track, and independent mechanism for operating the table upon the tracks.

10. In a rolling-mill of the class described the combination with the forming-rolls of feed-tables adjacent thereto, provided with wheels at each end mounted in supports rigidly secured to said tables, movable tracks parallel and adjacent to the rolls upon which the forward wheels of the tables are supported, fixed tracks parallel to and at a distance from the rolls upon which the rear wheels of the tables are supported, said fixed tracks and the wheels engaging same acting as a pivot for the upward and downward movement of the tables, means for lifting and lowering the movable tracks and the ends of the tables thereon, and independent mechanism for operating the tables upon the tracks.

In testimony whereof I affix my signature in the presence of two witnesses.

FREDERICK McCLAIN.

Witnesses:
D. J. JONES,
GEO. F. MOORE.