(No Model.)

5 Sheets—Sheet 1.

S. V. HUBER.

ROLLING MILL.

No. 529,124. Patented Nov. 13, 1894.

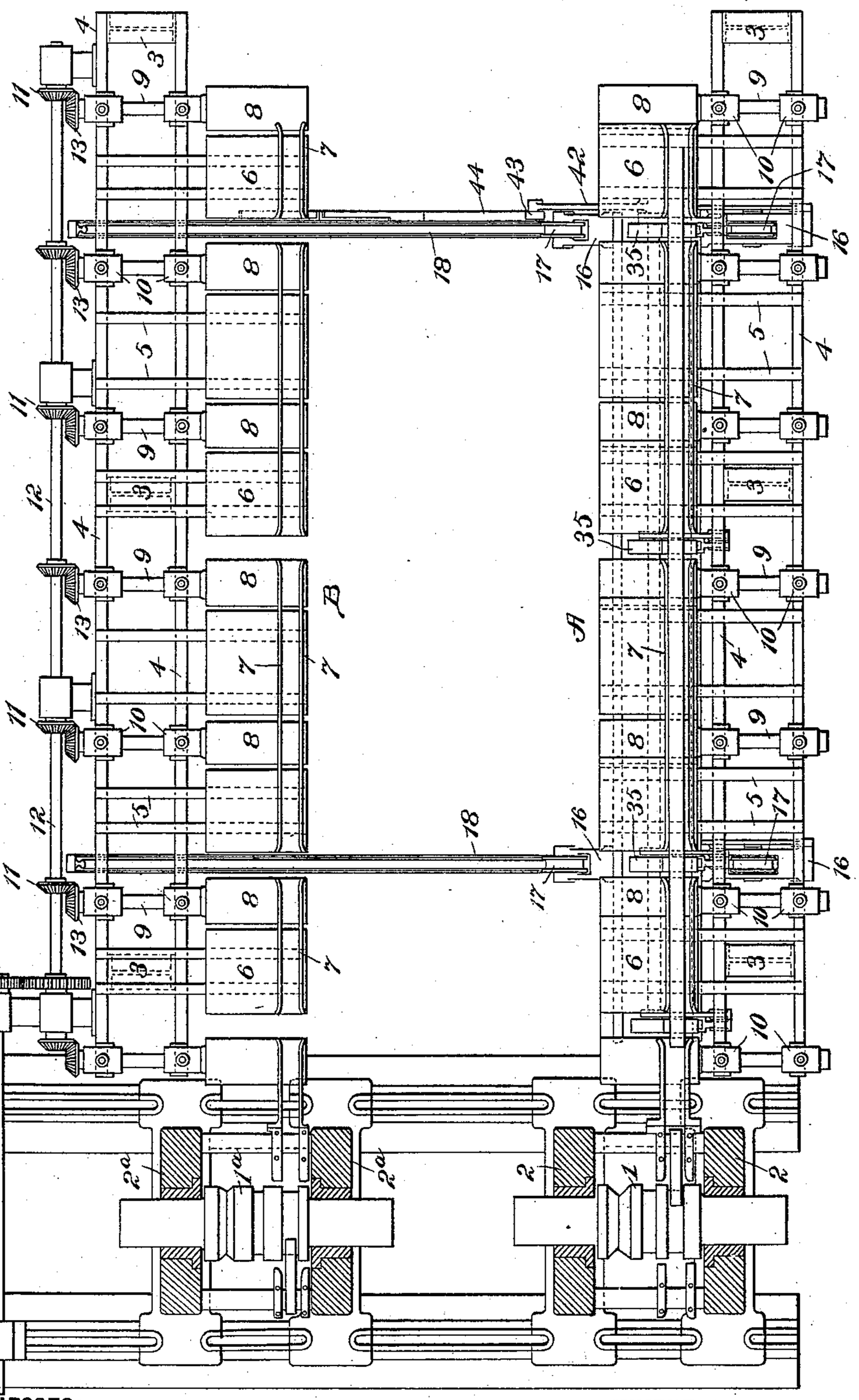

FIG. I.

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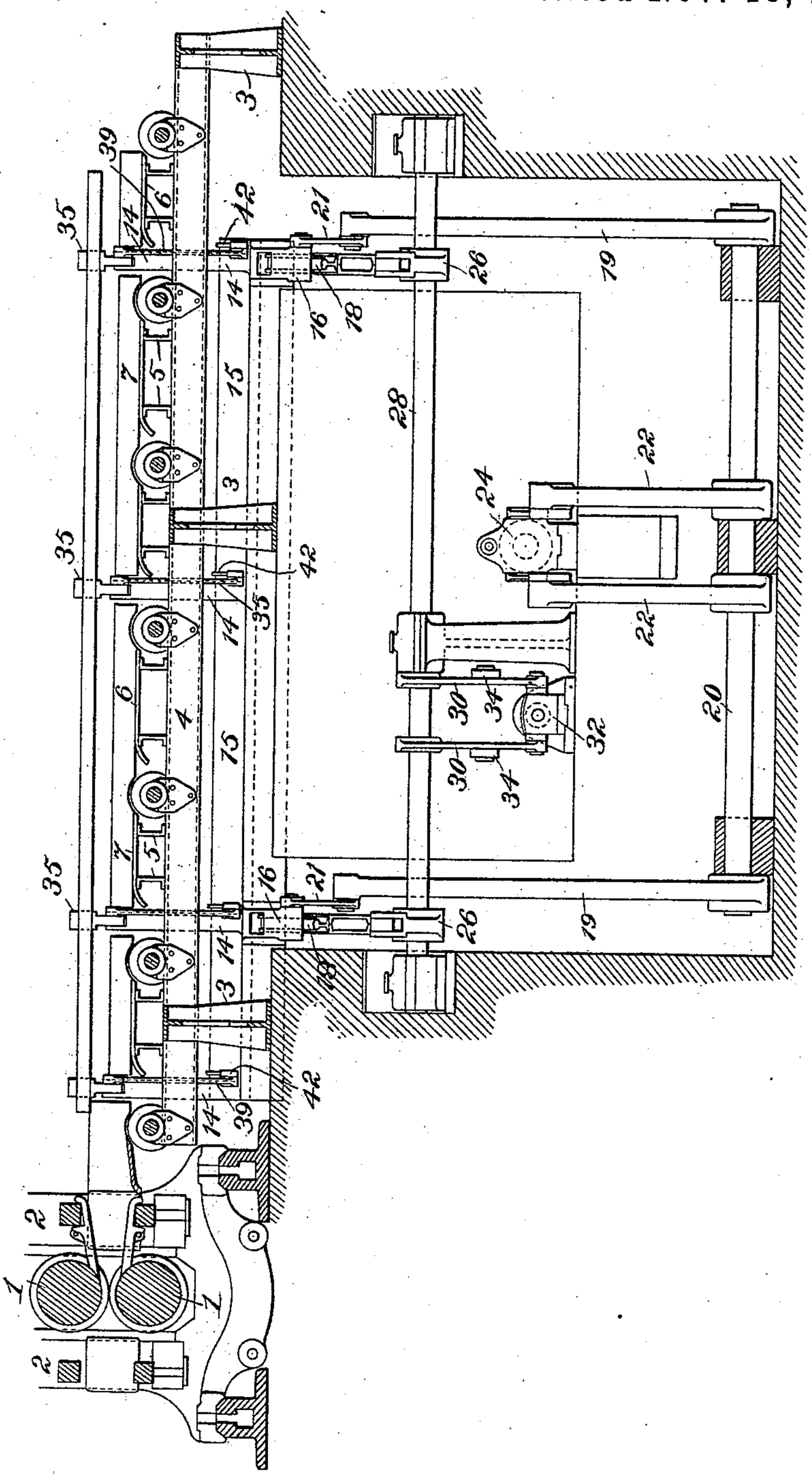
(No Model.) 5 Sheets—Sheet 2.

S. V. HUBER.

ROLLING MILL.

No. 529,124. Patented Nov. 13, 1894.

FIG. 2.



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5 Sheets—Sheet 3.

S. V. HUBER.

ROLLING MILL.

No. 529,124. Patented Nov. 13, 1894.

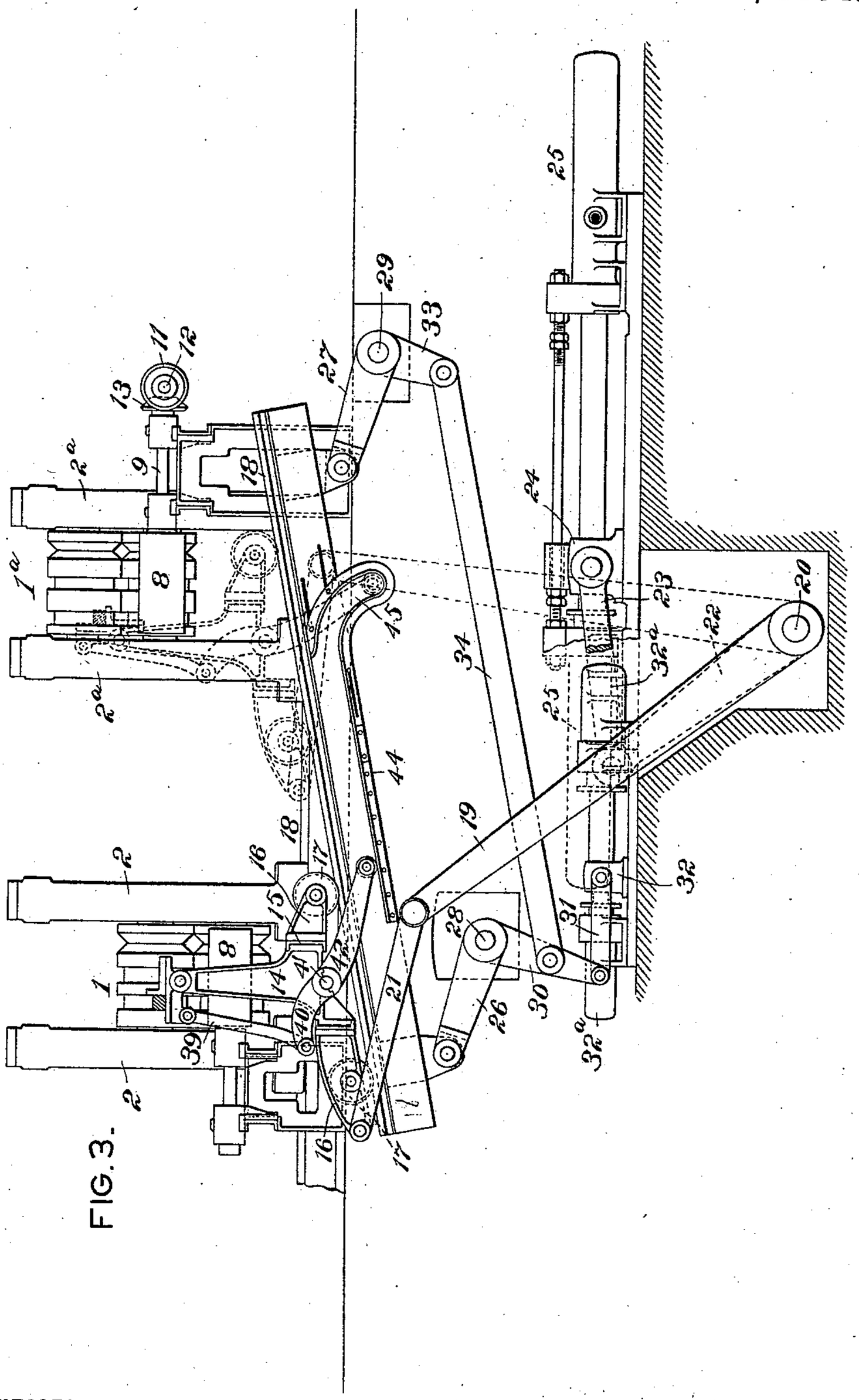

FIG. 3.

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(No Model.) 5 Sheets—Sheet 4.

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No. 529,124. Patented Nov. 13, 1894.

FIG. 5.

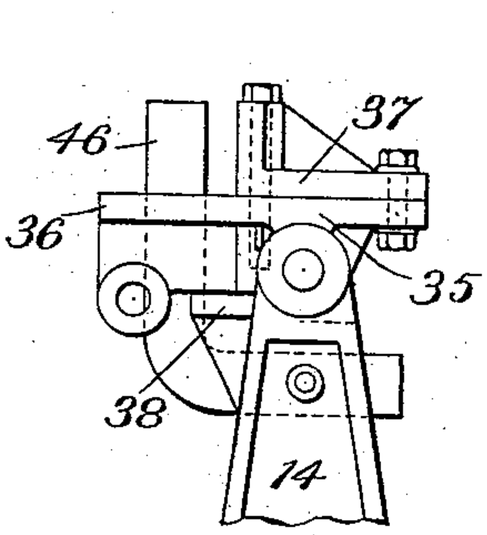
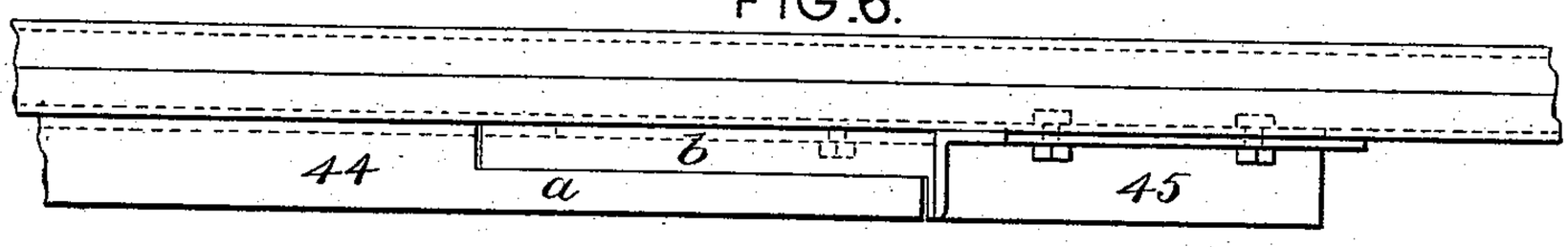
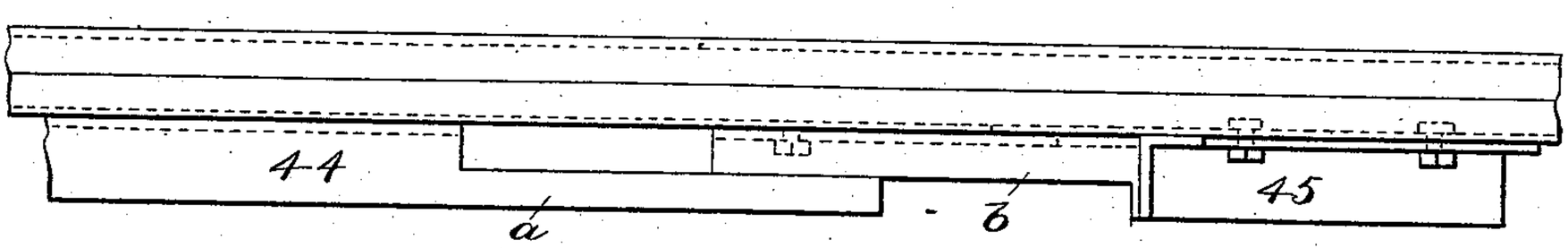


FIG. 4.

FIG. 6.





WITNESSES:

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(No Model.) 5 Sheets—Sheet 5.

S. V. HUBER.

ROLLING MILL.

No. 529,124. Patented Nov. 13, 1894.

FIG. 7.

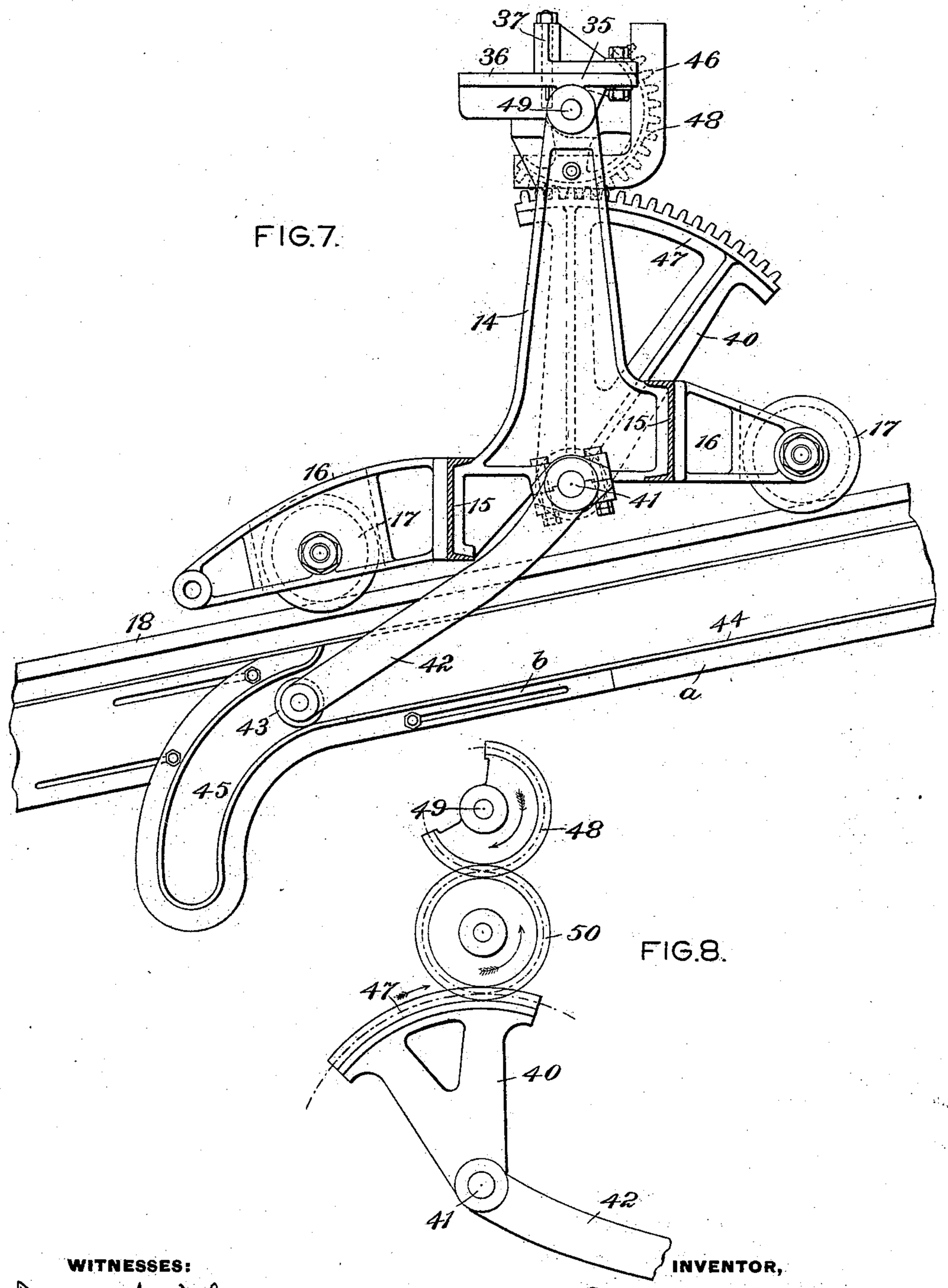

FIG. 8.

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UNITED STATES PATENT OFFICE.

SIGMUND V. HUBER, OF PITTSBURG, PENNSYLVANIA.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 529,124, dated November 13, 1894.

Application filed May 1, 1894. Serial No. 509,629. (No model.)

To all whom it may concern:

Be it known that I, SIGMUND V. HUBER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Rolling-Mills, of which improvements the following is a specification.

It has heretofore been customary in rolling mill practice where tables are employed for transferring the article being rolled from one pass to another in the same stand of rolls, or from a pass in one stand to a pass in another stand of rolls, to shift the table onto which the article is fed by the rolls. This practice results in considerable loss of time, as the first pass or stand of rolls must remain idle, while the table is being shifted to the next pass or stand and back again, and also while the article is passing through such second pass or rolls.

The object of the present invention is to provide for the transfer of the article from one pass or stand to another pass or stand without any movement of the table or tables, so that the first pass or stand can be used simultaneous with the second pass or stand, thereby nearly doubling the capacity of the mill.

It is a further object of said invention to provide for the axial rotation of the article and for its being raised or lowered during such transfer.

In general terms, the invention consists in the construction and combination substantially as hereinafter more fully described and particularly claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is a top plan view of a rolling mill having my improvements applied thereto. Figs. 2 and 3 are side and end elevations respectively of the mill. Fig. 4 is a detail view on an enlarged scale of the transferring carriage. Fig. 5 is a view showing certain modifications in the construction of the head of the transferring carriage. Fig. 6 illustrates the adjustable guideway in two positions thereof. Fig. 7 is a view similar to Fig. 4, showing a construction whereby a movement of the tilting head greater than ninety degrees may be obtained; and Fig. 8 is a detail view, illustrative of a modification of the device shown in Fig. 7.

The rolls 1 and 1^a are mounted in the usual or any suitable manner in the housings 2 and 2^a, which are arranged alongside of each other, as shown in Fig. 1. In front of each stand of rolls I arrange a receiving table, consisting of a series of columns or supports 3, secured to a suitable foundation and longitudinal channel plates or other structural shapes 4, riveted to the upper ends of the columns. As shown in Figs. 1 and 3, the columns with the beams are arranged to one side of the line of feed of the rolls in the two stands or sets, and on the longitudinal beams are secured channel bars or I-beams 5, arranged transversely of the beams 4 and projecting across the line of feed of the reducing rolls. On these transverse channel bars are secured plates 6, forming the beds of the tables, and on the plates are bolted angle bars 7 forming guides for the articles being rolled. By forming a series of holes in the plates 6, the angle bars can be arranged in line with any of the passes in the reducing roll.

The plates 6 forming the beds of the tables are placed a sufficient distance apart to permit of the arrangement of the feed rollers 8 between them. These feed rollers are provided on one end with journals 9, which are so mounted in suitable bearings 10, secured to the longitudinal beams 4, that portions of the rollers will project slightly above the surfaces of the plates 6, in order that the article being rolled will rest upon the rollers rather than on the plates.

It will be observed by reference to Figs. 1 and 2, that the tables A and B are of the overhanging type, and afford space beneath them for the mechanism of the transfer carriage. It will also be observed that the overhanging tables face each other or project inwardly from their supporting columns 3, which are arranged in line or approximately in line with the outer members of the housings, so that a clear space is provided for the movements of the transfer carriage, from the line of feed of one pass or stand of rolls to the line of feed of the other pass or stand of rolls.

It will be understood by those skilled in the art, that a set of tables similar to those de-

scribed will, in practice, be arranged on each side of each stand or set of rolls, one table of each set being a receiving table and the other a delivery table. In the arrangement shown in the drawings, A is the receiving table, and B the delivery table. As the article is pushed onto the receiving table A by the reducing rolls, its rollers 8 need not be positively driven, but as the article has to be shifted along the delivery table to the reducing rolls, its rollers 8 are positively driven by bevel pinions 11 on the shaft 12, intermeshing with corresponding pinions 13 on the ends of the journals 9. It will be understood that the rollers 8 of the receiving table may be positively driven, in the same manner as the rollers of the delivery table, if desired.

The transfer mechanism consists of a series of two or more posts or standards 14, having their lower ends secured to a longitudinal beam preferably consisting of two channel plates 15, which form the body of the transfer mechanism or carriage. Two sets of brackets 16 are secured to opposite sides of the channel plates or body of the carriage and in these brackets are mounted the wheels 17, which are adapted to traverse the rails 18, arranged between the receiving and delivery tables and projecting under the same as shown in Figs. 1 and 3. Arms 19 keyed to a rock shaft 20, are connected by links 21 to the carriage and on the rock shaft are keyed arms 22, which are connected by links 23, to a slide 24, operated by the pistons of fluid pressure cylinder or cylinders 25.

In order to obtain a vertical movement of the carriages when required, the rails on which the carriage moves are attached to any suitable lifting mechanism, such, for example, as that shown in Figs. 2 and 3 of the drawings, wherein the rails are shown secured at or near their ends to two sets of arms 26 and 27, which are keyed to shafts 28 and 29, respectively. On one of the shafts as 28, are keyed arms 30 having their ends connected by links 31, to a suitable operating mechanism, as, for example, a block 32, which is reciprocated by double acting fluid pressure cylinders 32^a. In order to impart a simultaneous movement to the shaft 29, an arm or arms 33 are keyed to the shaft 29, and are connected by links 34 to the arms 30, on shaft 28.

On the upper ends of the posts or standards 14 are pivotally mounted heads 35, having shelves or flat portions 36 for supporting the article to be transferred, and guide lugs 37, bolted to the shelves. These shelves are normally supported in a horizontal position by shoulders 38 formed on or attached to the posts or standards.

In order to turn the heads 35 to impart the desired axial rotation to the article being rolled, the heads are connected by links 39 to one end of arms 40, keyed to a shaft 41 extending the entire length of the transfer carriage and mounted in suitable bearings on the posts or standards 14, as shown in Figs. 3 and 4. One of the arms 40 is formed with an extension 42, on the opposite side of the shaft 41, provided at its end with a lateral projection preferably in the form of an anti-friction roller 43, adapted to ride upon a ledge 44, on the side of one of the rails 18. At one end, the ledge is provided with a curved groove 45 into which the roller 43 enters, thereby lowering the end of the extension 42 and so shifting the shaft 41 and arms 40, as to tilt the heads 35. The degree to which the heads are tilted will depend upon the depth to which the roller enters the groove.

In order to provide for a regulation of the time at which the heads should be tilted and also the degree of movement to be imparted to the head, the ledge supporting the roller 43 is made adjustable as regards its length. The track or rail 18 preferably consists of the rail proper and the supporting member formed of two channel plates placed face to face. The ledge 44 formed of angle iron is made in two sections *a* and *b*, the section *a* being riveted to the supporting portion of the rail 18, while the other section *b* is adjustably attached to the supporting portion of the rail, as shown in Fig. 6. The adjacent ends of the sections are made in the form of tongues which overlap forming a continuous support for the roller 43 even when the sections are adjusted apart to the greatest extent required. It will be readily understood that by moving the section *b*, carrying the curved groove 45, toward and from the section *a*, the time at which and the depth to which the roller 43 will enter the groove, for a given moment of the transfer carriage, can be readily regulated.

In operating my improved plant, the rails 18 and with them the carriage, are lowered and the latter shifted, until the shelves 36 of the heads 35 are in line with, but below the guide trough on the receiving table. As soon as the article being rolled has passed out of the reducing rolls and into the guide trough, the rails and carriage are raised, the heads 35 passing through suitable openings in the table, lifting the article out of the trough. Fluid pressure is then admitted to the cylinders 25, so as to shift the slide 24 and thereby through the mechanism described, shift the carriage carrying the article, along the rails 18 to the delivery table B. As the carriage is shifted, its posts or standards 14 pass into suitable slots or openings in the table B, the heads 35 being raised above the table sufficiently far to bring the article carried by the head into a vertical plane through that groove in the reducing rolls through which the article is to pass. During the movement of the carriage along the rails, the roller 43 enters the curved groove 45, thereby turning the head 35, through an arc whose angularity is dependent upon the adjustment of the section *b* of the ledge 44, as hereinbefore described. It will be understood that in case it is desired to further reduce the article without axial rotation, the section *b* of the ledge

44 will be so adjusted that the roller 43 will not enter the curved groove 45, or a straight section will be substituted for the one carrying the curved groove. As soon as the article has been carried into the desired vertical plane, the rails 18 and carriage are lowered, depositing the article on the table B, and the downward movement of the carriage is continued until it can be returned to table A, without disturbing the article deposited on the table B.

It will be readily understood from the foregoing, that, as soon as the article has been lifted from table A by the carriage and the latter moved out of line with the guide trough on the table A, that another article can be fed through the reducing rolls 1 without waiting for the return of the carriage. And further, after the carriage has deposited an article upon the table B, it can be returned to table A, without waiting for the article to pass off table B.

While the delivery table is shown higher than the receiving table A, this arrangement can be reversed or both tables can be arranged on the same level.

In order to provide for a proper presentation of an article to the delivery table or rolls 1^a, suitable stops 46 are provided. This stop is made in the form of an angle and is secured upon the post 14, as shown in Figs. 4 and 5. If in rolling slabs, the wide pass is in the rolls 1, so that the slab will rest upon its side in the guide trough of the table and on the shelves of the transfer carriage, the stops 46 are arranged as shown in Fig. 4, so that when the heads 35 are tilted, the slab will be prevented by contact with the stops, from turning through an arc of one hundred and eighty degrees. When the edging pass is in the rolls 1, the stops 46 are arranged as shown in Fig. 5, so as to prevent the slab from falling onto its side on the shelves, as in case it should turn onto its side before the tilting of the head, it would be delivered onto the table B on its edge, when the head is tilted.

As shown in Fig. 4, the transfer carriage consists of the channel plates 15, having the wheel carrying brackets secured on the faces thereof, the posts or standards 14 forming the connecting member between the channel plates, and the rock shaft 41, whose bearings are formed in the lower end of the posts or standards. While only one intermediate post or standard is shown, it will be readily understood as many more as desired may be easily and quickly secured between the channel plates without disturbing those already in place.

When it is desired to obtain a movement of the tilting head, greater than ninety degrees, the links 39 are omitted and the arm 40 has its outer end constructed of a toothed segment 47, with which a toothed segment 48 keyed to the pivot pin 49 of the tilting head 35, intermeshes, as shown in Fig. 7. By properly proportioning the toothed segments 47 and 48, any desired degree of rotation of the tilting head can be obtained. As shown in Fig. 8, an idler 50 may be interposed between the toothed segments 47 and 48.

I claim herein as my invention—

1. In a rolling mill, the combination of rolls having two passes in different vertical planes and adapted for simultaneous operation on articles moving in opposite directions, a receiving mechanism arranged in line with one pass, a feed or delivery mechanism arranged in line with the other pass mechanism for transferring the article being rolled from the receiving to the feed mechanism means whereby the transfer mechanism is movable into operative position with relation to the feed and receiving mechanisms, while articles are being fed and received by said mechanisms, thereby permitting of the simultaneous reduction in both passes and the movement of the transfer mechanism from the receiving to the feed mechanism and return during such reduction, substantially as set forth.

2. In a rolling mill, the combination of rolls having two passes in different vertical planes and adapted for simultaneous operation on articles moving in opposite directions, a receiving mechanism arranged in line with one pass, and a feed or delivery mechanism arranged in line with the other pass, mechanism for transferring the article from the receiving to the feed mechanism and rotating the article axially during such transfer, and means whereby the transfer mechanism is shifted into operative relation to the feed and receiving mechanisms, while articles are being fed and received by said mechanisms substantially as set forth.

3. In a rolling mill, the combination of two stands of rolls, a receiving table arranged in line of feed of one stand of rolls, and a feed or delivery table arranged in line of feed of the other stand of rolls, mechanism for laterally transferring the article being rolled from one table to the other and axially rotating the article during such transfer, and means whereby the transfer mechanism is shifted into operative relation to the feed and receiving mechanisms, while articles are being fed and received by said mechanisms substantially as set forth.

4. In a rolling mill, the combination of two stands of rolls, a receiving table arranged in the line of feed of one stand of rolls, a feed or delivery table arranged in line of feed of the other stand of rolls, said tables being provided with overhanging rollers on their inner or adjacent sides, and a transfer carriage operative between the tables, substantially as set forth.

5. In a rolling mill, the combination of a stand of rolls, a table arranged in the line of feed of said rolls, and provided with overhanging rollers and a transfer table movable under the overhanging rollers, substantially as set forth.

6. In a rolling mill, the combination of two lines of feed mechanisms for delivering and receiving articles to be rolled to and from the reducing rolls, vertically movable rails or tracks arranged between the feed mechanisms, a carriage provided with means for supporting the articles being rolled and means for moving the carriage along said rails or tracks, into operative position with relation to the feed and receiving mechanisms while articles are being fed and received by said mechanisms, substantially as set forth.

7. In a rolling mill, the combination of two lines of feed mechanisms for delivering and receiving articles to be rolled to and from the reducing rolls, vertically movable rails or tracks arranged between the feed mechanisms, a carriage movable along said rails or tracks and provided with means for supporting the article to be rolled and means operated by the carriage during its movement for axially rotating the article, substantially as set forth.

8. A transfer carriage for rolling mills having in combination a longitudinal beam, two or more posts or standards arranged on said beam, and supporting brackets secured on to the sides of the beam, substantially as set forth.

9. In a rolling mill, the combination of two lines of feed mechanisms for delivering and receiving articles to be rolled to and from the reducing rolls, a carriage movable between such feed mechanisms, heads for supporting the article to be rolled pivotally mounted on the carriage and means for turning said heads, substantially as set forth.

10. A transfer mechanism for rolling mills having in combination a pair of rails, a carriage movable along the rails, heads for supporting the article to be rolled, pivotally mounted on the carriage, a ledge or guide provided with a curved groove at one end thereof, and a lever pivoted to the carriage, one end of the lever connected to the heads and the opposite end bearing upon the ledge or guide, substantially as set forth.

11. A transfer mechanism for rolling mills having in combination a pair of rails, a carriage movable along the rails, heads for supporting the article to be rolled, pivotally mounted on the carriage, a ledge or guide having an adjustable section provided with a curved groove and a lever pivoted to the carriage, one end of the lever connected to the heads, and the opposite end bearing upon the ledge or guide, substantially as set forth.

12. The combination of a movable carriage, heads pivotally mounted on the carriage, means for turning said heads, and stops for preventing any axial movement of articles supported by the heads, independent thereof, substantially as set forth.

In testimony whereof I have hereunto set my hand.

SIGMUND V. HUBER.

Witnesses:
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F. E. GAITHER.