No. 841,427. PATENTED JAN. 15, 1907.

E. NORTON & V. CHARTENER.

WORK REVERSING MECHANISM FOR ROLLING MILLS.

APPLICATION FILED APR. 8, 1905.

4 SHEETS—SHEET 1.

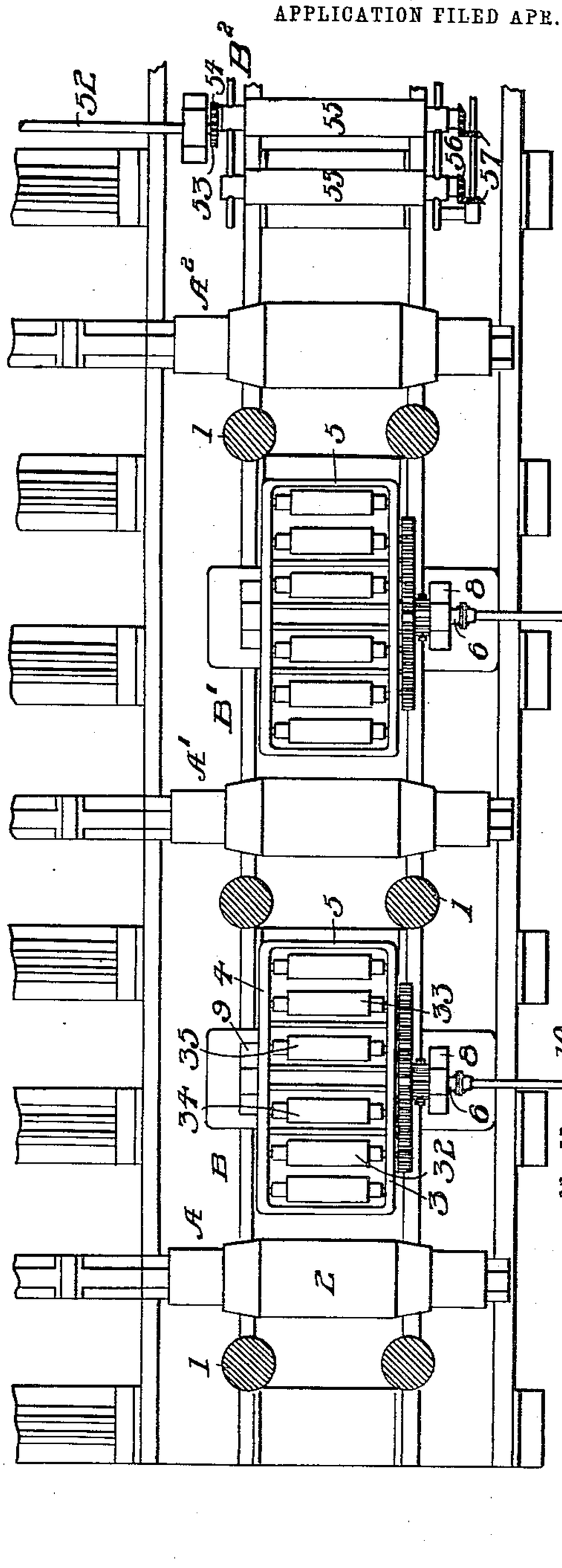


FIG. 1.

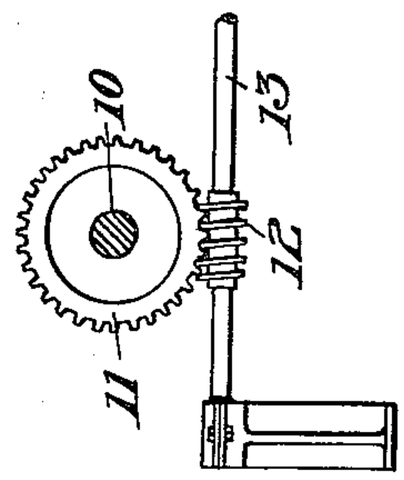
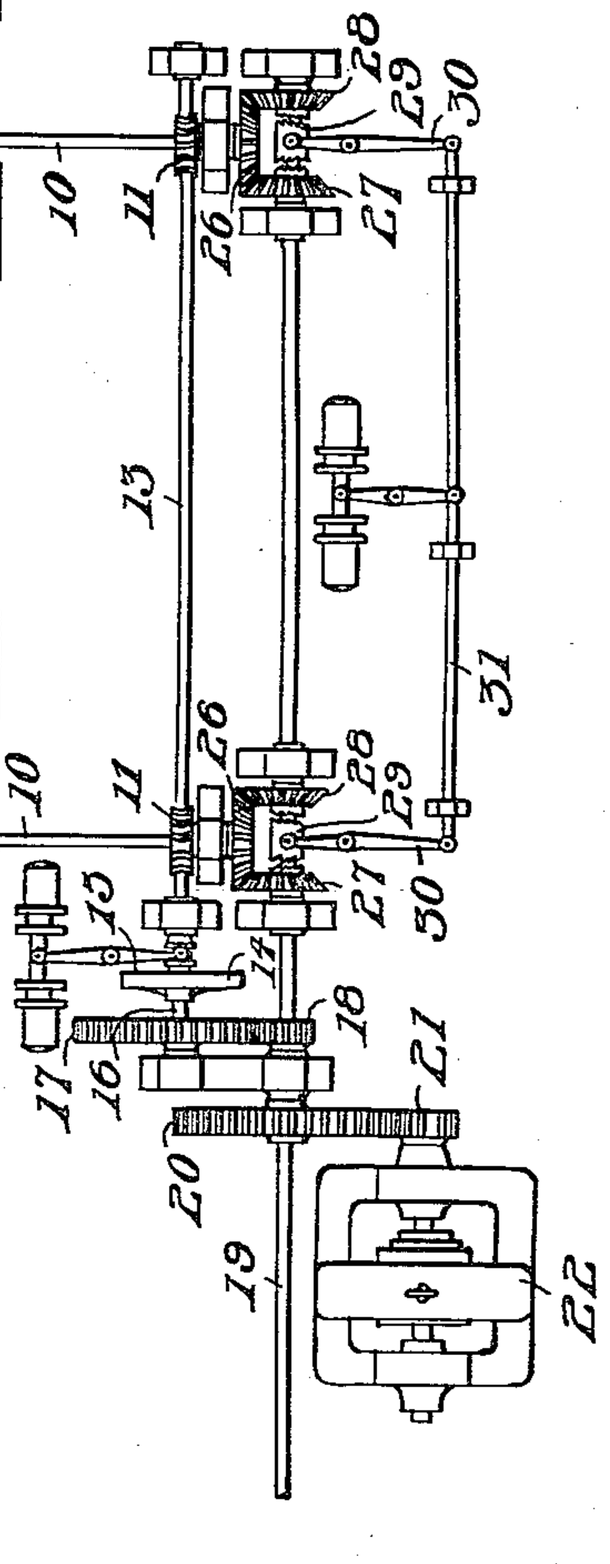


FIG. 1A.



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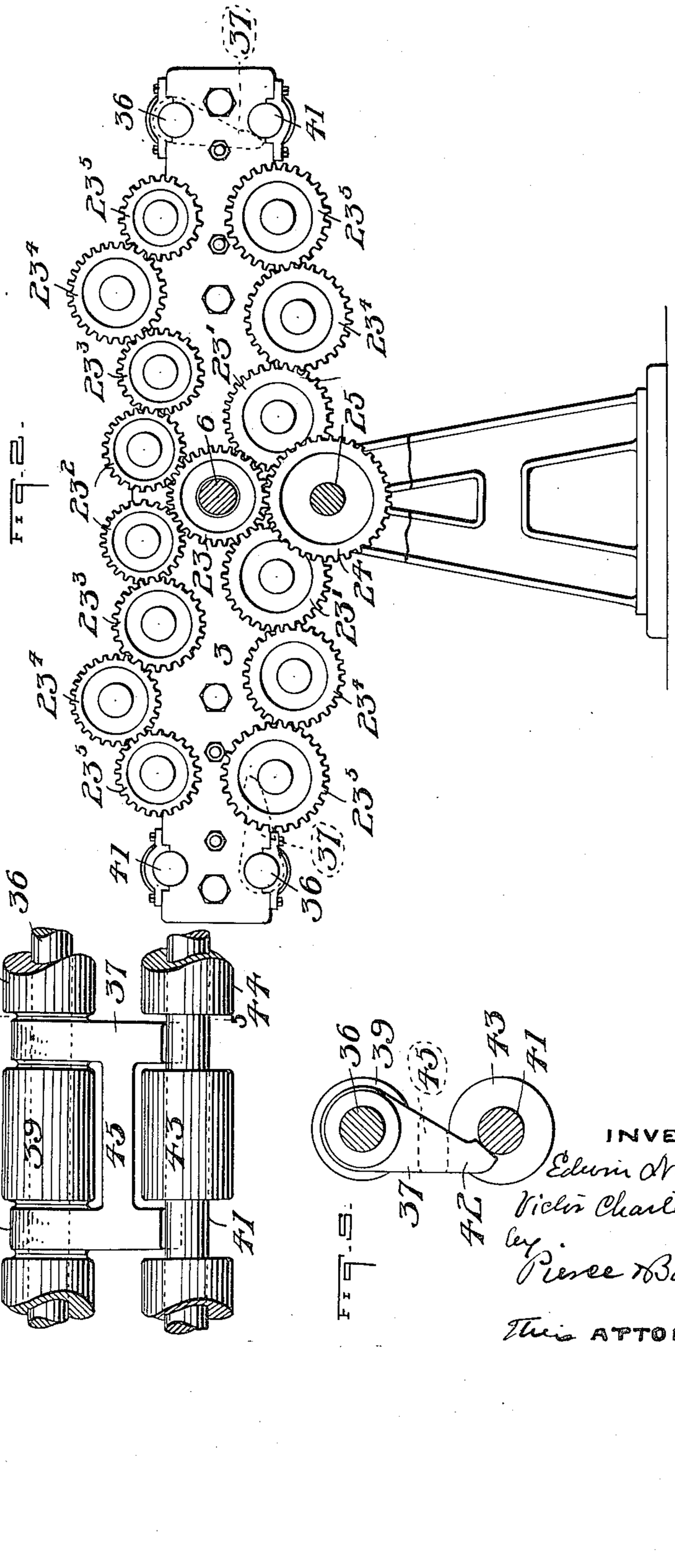

FIG. 2.

FIG. 4.

FIG. 5.

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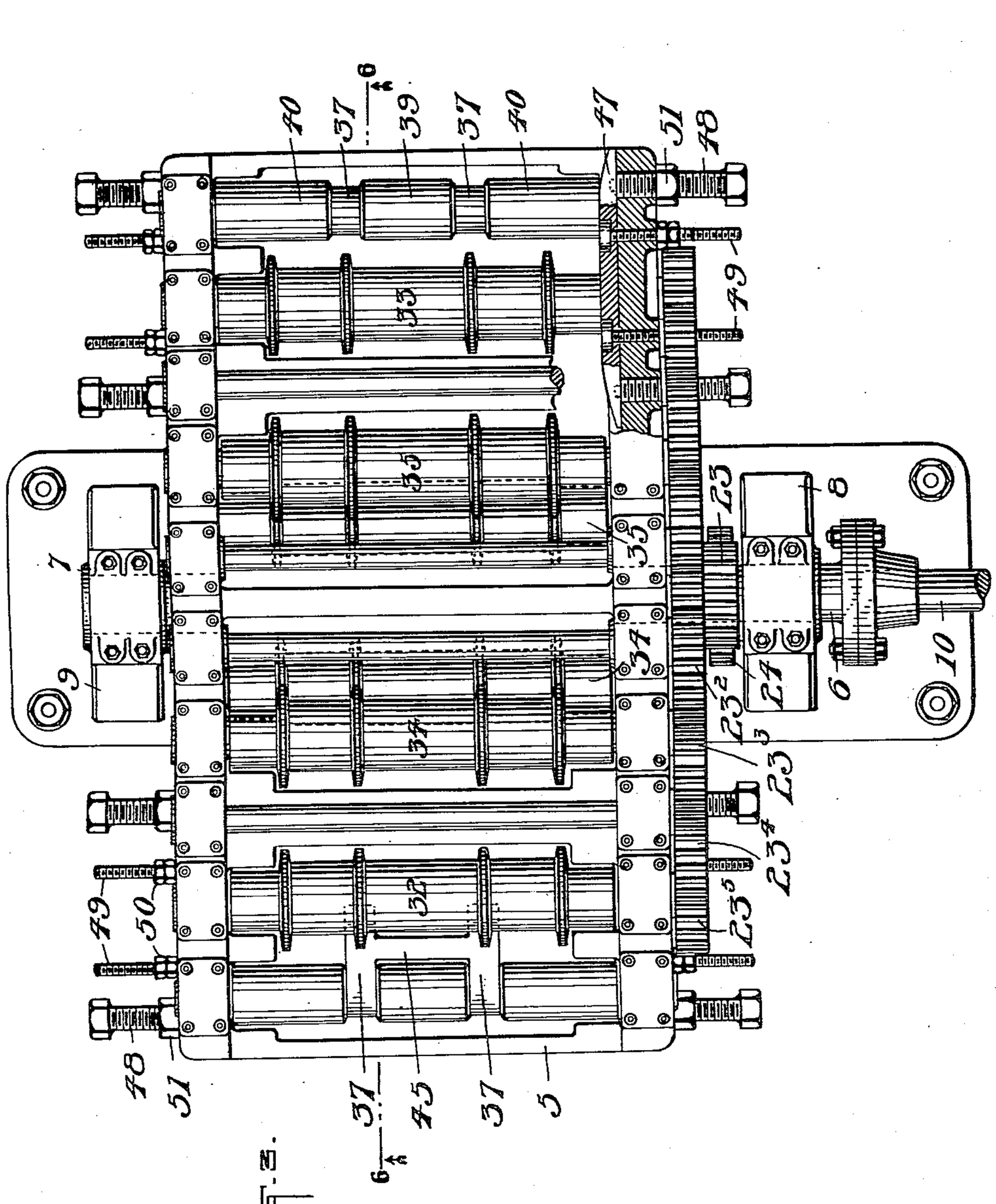

FIG. 3.

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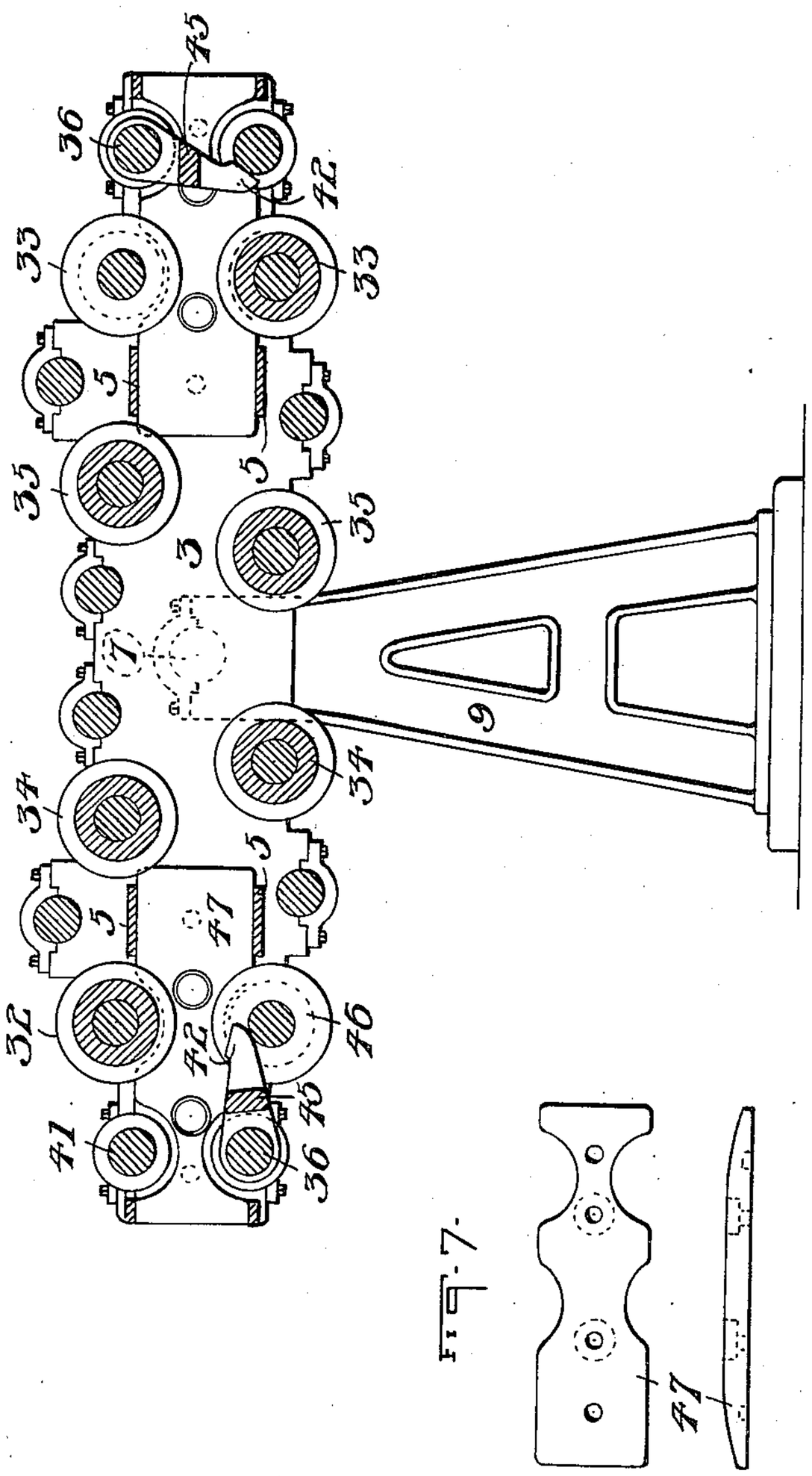

FIG. 6.

FIG. 7.

FIG. 8.

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UNITED STATES PATENT OFFICE.

EDWIN NORTON, OF NEW YORK, N. Y., AND VICTOR CHARTENER, OF PITTSBURG, PENNSYLVANIA.

WORK-REVERSING MECHANISM FOR ROLLING-MILLS.

No. 841,427. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed April 8, 1905. Serial No. 254,579.

To all whom it may concern:

Be it known that we, EDWIN NORTON, residing at New York, in the county of New York and State of New York, and VICTOR CHARTENER, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented or discovered new and useful Improvements in Work-Reversing Mechanism for Rolling-Mills, of which the following is a specification.

Our invention relates to rolling-mills, and more particularly to mechanism for reversing the work between successive stands of rolls.

It is the object to provide a straightaway feeding mechanism for use with universal or other types of rolling-mills wherein the work is fed in the same direction through the rolls, which always run in the same direction and which need thereby be but two high, the work being reversed before entering the passes of the successive rolls or of such rolls as it is deemed desirable to reverse the work.

We have discovered that when metal is rolled by passing the same end foremost through the rolls the molecules of the iron are strained or displaced in such a manner as not to produce as desirable and as uniform quality of plates as when the metal is fed during a portion of the rolling process with one end foremost and during another portion thereof with the opposite end foremost. Accordingly, we have devised a table to which the metal is fed by one set of rolls and by which it is turned end for end and fed into the next set of rolls. We have illustrated means for reversing the feeding means carried by the table and for reversing the table; but the specific means shown for doing these things, as well as the construction of the table itself, may be departed from without sacrificing our invention.

Referring to the drawings which accompany this specification, Figure 1 is a plan of the preferred form of our invention, details being omitted to avoid confusion; Fig. 1ª, a detail showing the driving connection between the shafts 10 and 13; Fig. 2, an end elevation of one of the tables by which the work is reversed and transferred from one set of rolls to another; Fig. 3, a plan view of one of said tables, a part being broken away to show one of the side gages; Fig. 4, an end elevation of the middle portion of the table; Fig. 5, a vertical section on the line 5 5 of Fig. 4; Fig. 6, a vertical section on the line 6 6 of Fig. 3; Fig. 7, a side view of one of the gages, and Fig. 8 a top plan of the same.

Referring now to Figs. 1 to 8, 1 represents the vertical rolls, and 2 the horizontal rolls, of a universal rolling-mill. We have shown three sets of rolls of this character; but it is to be understood that any number of sets may be used alone or in connection with horizontal rolls. We have shown no mechanism for driving either the horizontal or the vertical rolls; but this may be readily supplied by those familiar with rolling-mills. For convenience we have designated the sets of rolls as A, A′, and A². Between the sets A and A′ of rolls we place one of our reversing feeding-tables B and between the sets A′ and A² of rolls another of our said tables B′. To the right of the set A² of rolls we have shown a portion of a stationary table B², which forms no part of the present invention, but is shown for the purpose of showing a combination with which the reversing-tables may be connected. As each table B and B′ is constructed the same, a description of one will be sufficient. The table, as B, has two side plates 3 and 4, secured together by the cross-bars 5 or otherwise and mounted centrally on the horizontal trunnions 6 and 7, which turn in bearings on the standards or housings 8 and 9.

To the trunnion 6 is coupled the shaft 10, having secured to its outer end the worm-wheel 11, driven by the worm 12 on the shaft 13, the latter being common to the worms which drive the worm-wheels 11 of the tables B and B′. The shaft 13 is provided with the clutch member 14, which may be of any approved type and is coöperable with the corresponding clutch member 15 on the shaft 16. The latter is provided with the gear-wheel 17, driven by the spur-gear 18 on the shaft 19, which in turn carries the gear-wheel 20, meshing with the pinion 21 on the shaft of the motor 22. The trunnion 6 is provided with a long loose pinion 23, whose inner portion meshes with the spur-gear 24, lying beneath the same and secured to the shaft 25, supported in the standard 8. The shaft 25 has secured to its outer end the bevel-wheel 26, in mesh with the two bevel-wheels 27 and 28, loose on the shaft 19. Be-

tween the wheels 27 and 28 is a clutch member 29, fixed to the shaft 19 and operable by the lever 30 into driving engagement with either the wheel 27 or 28, so as to drive the shaft 25 in either direction. The levers 30 for each clutch member 29 are connected together by the link or sliding rod 31, operated in any desired manner.

At each side of the transverse center of the table and journaled in the side plates 3 and 4 are preferably two sets of rolls, the end ones being designated by the numerals 32 and 33 and the intermediate ones by the numerals 34 and 35, each set consisting of two parallel rollers between which the metal is fed from one set of rolls, as A, and into another set, as A′. The rollers of each set are preferably reduced, so as to leave the annular friction-surfaces for feeding the work into and from the table. The rollers are driven by the loose pinion 23, whose outer portion meshes with the gear-wheels 23′ on the necks of the rolls 34 and 35 on one side of the pass and with the idle gears 23^2 in mesh with the gear-wheels 23^3 on the necks of the rollers 34 and 35 on the other side of the pass. The gear-wheels 23′ and 23^3 drive the idlers 23^4, which drive the gear-wheels 23^5 on the necks of the rollers 32 and 33.

On the shafts 36 at the ends of the table are loosely mounted the dogs or stops 37, each having a pair of hinge-like eyes 38 hung on the shafts and spanned by the roller-spacers 39 on the said shafts. Other roller-spacers 40 lie between the side plates and the eyes. The shafts 36 lie one above the pass between the feed-rollers and at the end of the table farthest from the work-receiving end thereof and the other below the said pass and at the end of the table nearest the receiving end thereof.

Parallel with each shaft 36 and on the opposite side of the work-feeding pass in the table is the shaft 41, against which the depending fingers 42 of the stops rest when the shaft 41 is beneath the bar 36, as shown in Figs. 2, 4, and 5. On the shaft 41 beneath the roller 39 is the roller 43, and beneath the rollers 40 are the rollers 44. The fingers 42 are preferably connected by cross-piece 45 and lie in the spaces between the rollers 43 and 44, as shown in Figs. 4 and 5. As shown in Fig. 2, the fingers engage the side of the shaft 44 toward the infeeding stand of rolls A or A′. The roller 32 on the same side of the pass as the nearest shaft 36 is provided with the reduced portions 46, in which lie the fingers of the stop nearest the feeding-in end of the table, as shown in Fig. 6, the fingers lying below the path of feed in the table. The upper roller 33 at the opposite end of the table has similar reduced portions 46 to receive the fingers when the table has been rotated one hundred and eighty degrees.

At each end of the table are gages which lie at opposite sides of the pass therein. The gages consist of plates 47, movable transversely of the table by the screws 48, which are threaded through the plates 3 and 4 and bear against the outer sides of the plates 47. The gages are held from inward movement by the bolts 49, having their heads in recesses in the inner faces of the gages and their bodies in holes through the plates 3 and 4. On the bolts are the nuts 50, which bear against the said plates.

51 represents jam-nuts on the screws 48.

The set B^2 of the feed-tables may rotate, as do the tables B and B′; but we have shown a stationary table with one end broken off. The shaft 52, driven in any manner, has thereon the gear-wheel 53, meshing with the wheel 54 on the roller 55, which has thereon the bevel-gear 56, in mesh with the bevel-gear 57 on the shaft 58, provided with bevel-gears to drive the other rollers of the table, as shown. The set B^2 is not essential for all purposes, as it, as well as the set B′, may be omitted or their place supplied by other devices.

The operation is as follows: The table B is supposed to stand as shown in Fig. 2, where the work is supposed to be coming from the left. The stop at the left, being below the pass, is horizontal with the fingers 42 thereof in the recesses 46 of the adjacent roller 32 or 33. The stop at the right, being above the pass, is pendent and lies directly across the pass, with its fingers against the front side of the adjacent shaft 41. The motor 22 is set in motion, and the rod 31 is shifted so as to drive the bevel-gears 26 in the proper direction to feed the work from rolls A to A′, the rolls A, A′, and A^2 being already started. The work, which may be supposed to be packs of hot plates, is fed through the rolls A and into the pass between the upper and lower rollers of the table B. The pack will be stopped by the stop 37 at the farther end of the table, the rear end of the pack lying above the stop at the other end of the table. The clutch member 14 is now operated to cause the shaft 16 to drive the shaft 13, which in turn rotates through worms 12 and worm-wheels 11, the shaft 10 causing a revolution of the tables B and B′, which are stopped at a semirevolution by means of the clutch member 14, operated by hand or automatically. The feed-rolls of the tables B and B′, which were preferably stopped by hand or automatically when the pack was fed into the table B, are reversed by moving the rod 31 so as to drive the wheel 26 in the direction opposite to its former rotation. This causes a reverse rotation of the rollers in the tables B and B′ and a consequent feeding of the pack in the table B into the pass between the rolls of the set A′, which in turn feeds the pack into the table B′, which receives them the same as the table B did. As the pack of

plates left the table B the stop, which was previously supported in a horizontal position by the pack, immediately swings down into the vertical position to stop a second pack of plates, which we may suppose has been fed to the walls A and is entering the table B while the previously-rolled pack is entering the table B′. As soon as the packs are within the tables B and B′ the tables are reversed as before, and the pack in table B is fed to the rolls A′ and into the table B′, and the pack in the table B′ is fed to the rolls A^2 and to the table B^2, whence they pass to such other mechanism or place as is deemed best.

We do not restrict our reversing-table to the construction shown and described or to its being an element of the combination with which it has been shown and described, as it may be variously constructed and used without departing from the principles thereof. We desire our claims to be given the largest scope that the state of the art will permit irrespective of the mechanical elements and combination we have used.

Having described our invention, we claim—

1. In a rolling-mill, two sets of rolls, a table arranged between them and capable of receiving the work alternately at opposite ends, stops arranged to limit the feed of the work from each end of the table, and means for reversing the table end for end, the stop at the feeding-in end of the table nearest the first set of rolls adapted to permit the entrance to the table of a second piece of work from said first set of rolls and the stop at the opposite end of the table being constructed to move so as to stop the incoming work after the discharge of the outgoing work.

2. A table arranged to receive work alternately at opposite ends, means carried by the table for feeding the work, means for reversing the table so that the work may be fed from the table from the feeding-in end thereof, means for reversing the feeding means, and means to limit the feed of the work on the table.

3. A vertically-reversible table having thereon feeding-rollers arranged to form a pass, means for reversing the rotation of said rollers, and gravity-stops at each end of the table arranged to enter the said pass from opposite sides.

4. In a rolling-mill, a rotatable table having therein a work-feeding pass and a stop at each end of the pass, the stop normally at the feeding-out end of the table tending to close said pass but restrained from doing so by the work while therein.

5. In a rolling-mill, a table rotatable in a vertical plane having therein a work-feeding passage and a movable gravity-stop for said passage at each end thereof, one mounted above and one below the same.

6. In a rolling-mill, a table rotatable in a vertical plane having therein a work-feeding passage, a pivoted gravity-stop for said passage at each end thereof, one mounted above and the other below the same.

Signed by EDWIN NORTON, at New York city, this 1st day of February, A. D. 1905.

EDWIN NORTON.

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WM. L. PIERCE.

Signed by VICTOR CHARTENER, at Pittsburg, Pennsylvania, this 10th day of March, 1905.

VICTOR CHARTENER.

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SUZANNE S. BEATTY.