No. 728,849. PATENTED MAY 26, 1903.

C. W. BRAY.

APPARATUS FOR ROLLING PLATES OR SHEETS.

APPLICATION FILED MAY 31, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.

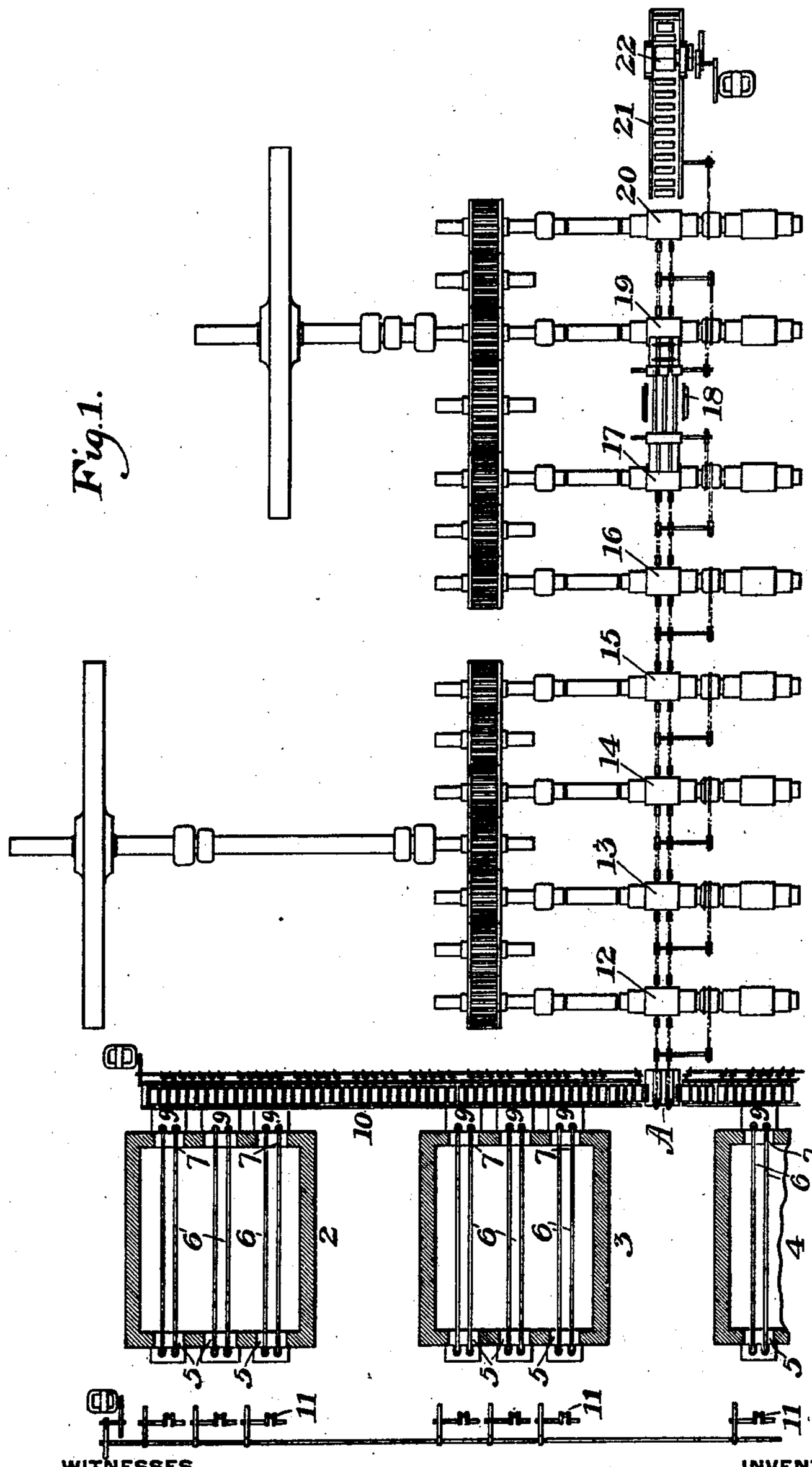
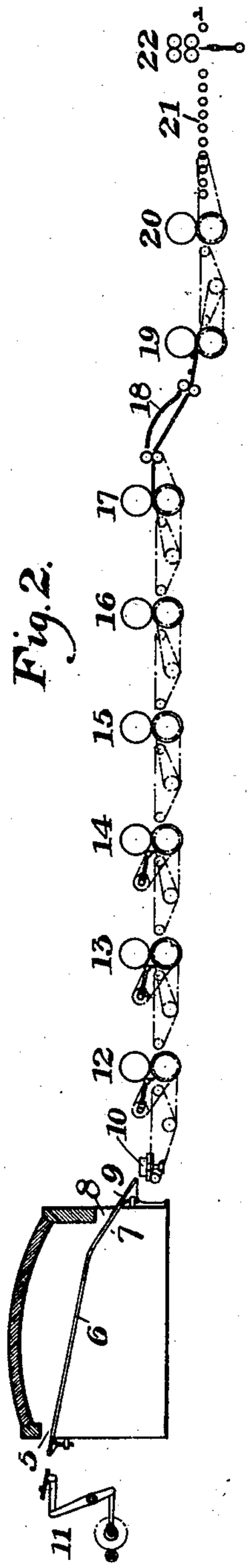


Fig. 2.



WITNESSES

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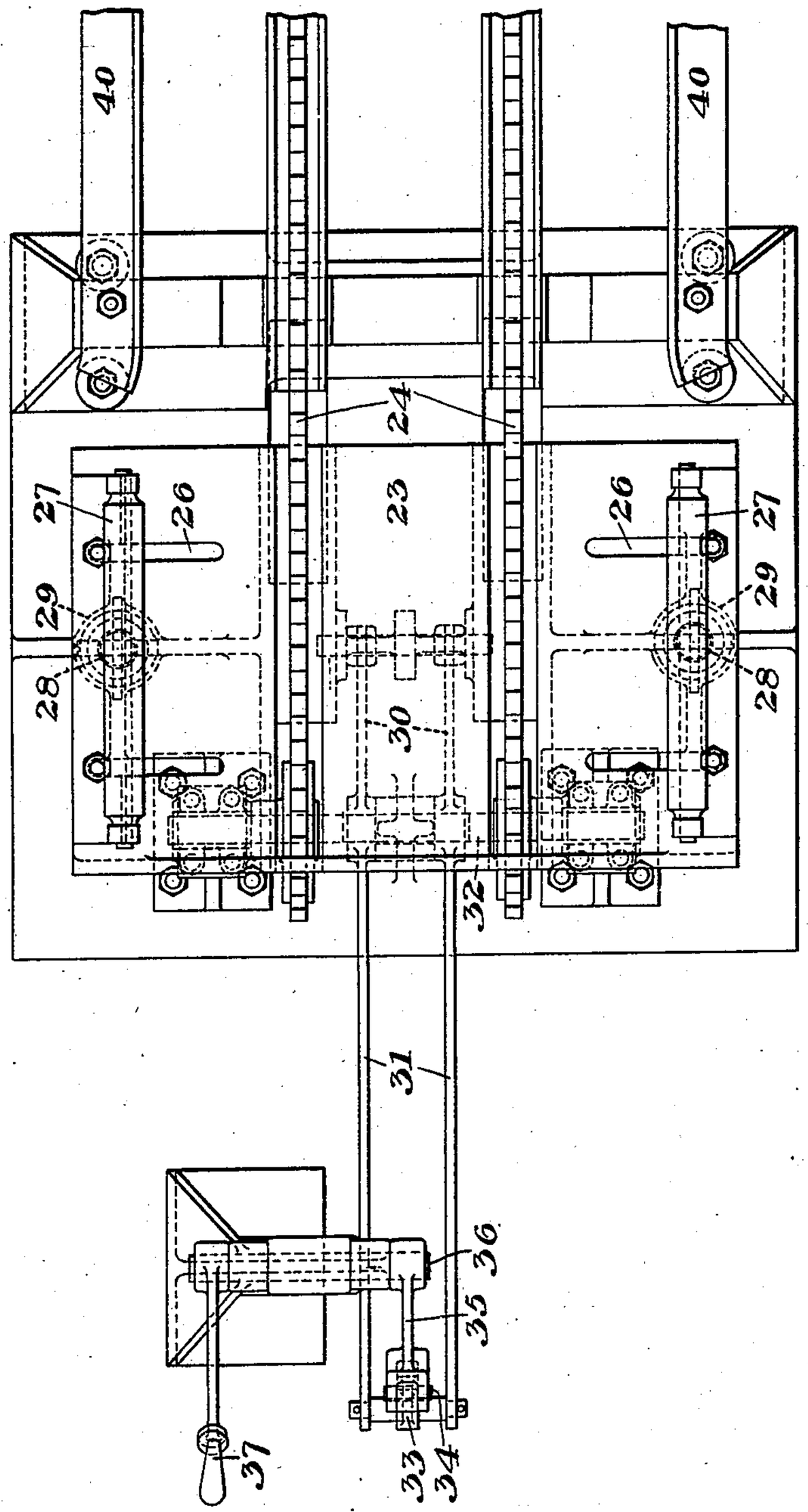
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 3.



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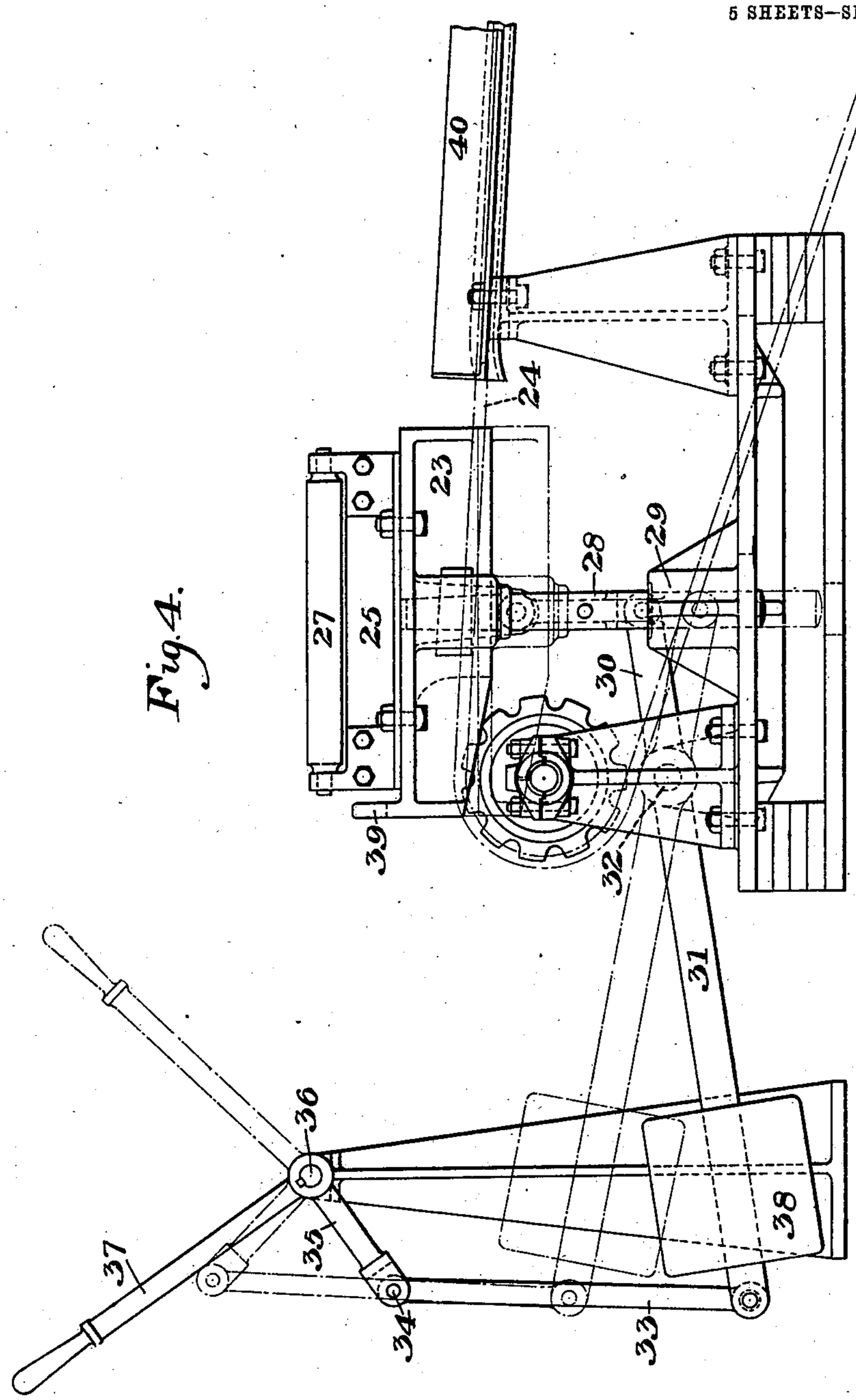
NO MODEL. 5 SHEETS—SHEET 3.

Fig. 4.



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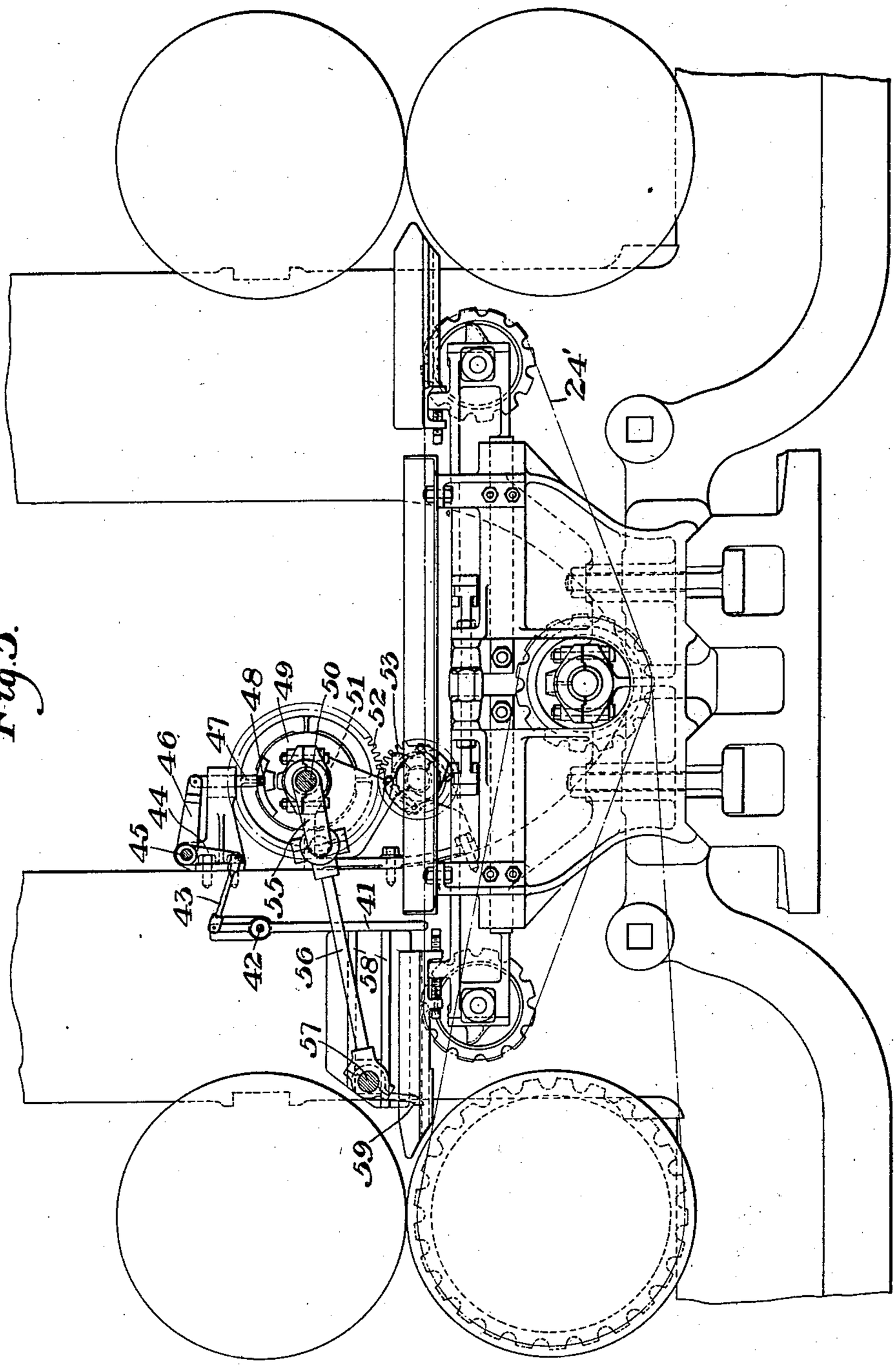
APPLICATION FILED MAY 31, 1902.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 5.



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APPLICATION FILED MAY 31, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 7.

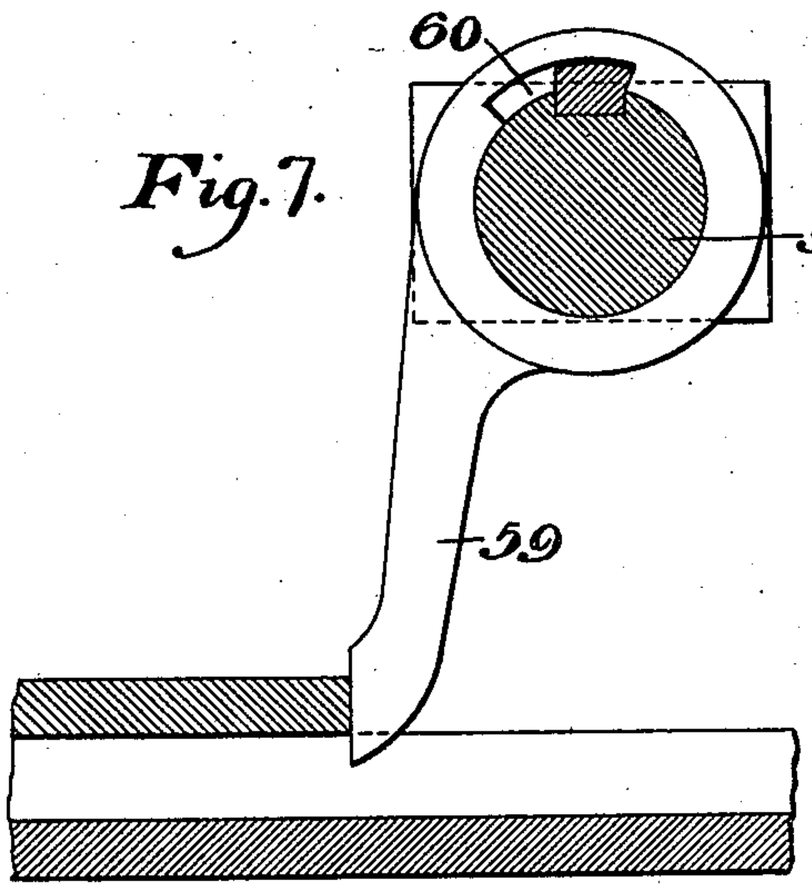


Fig. 8.

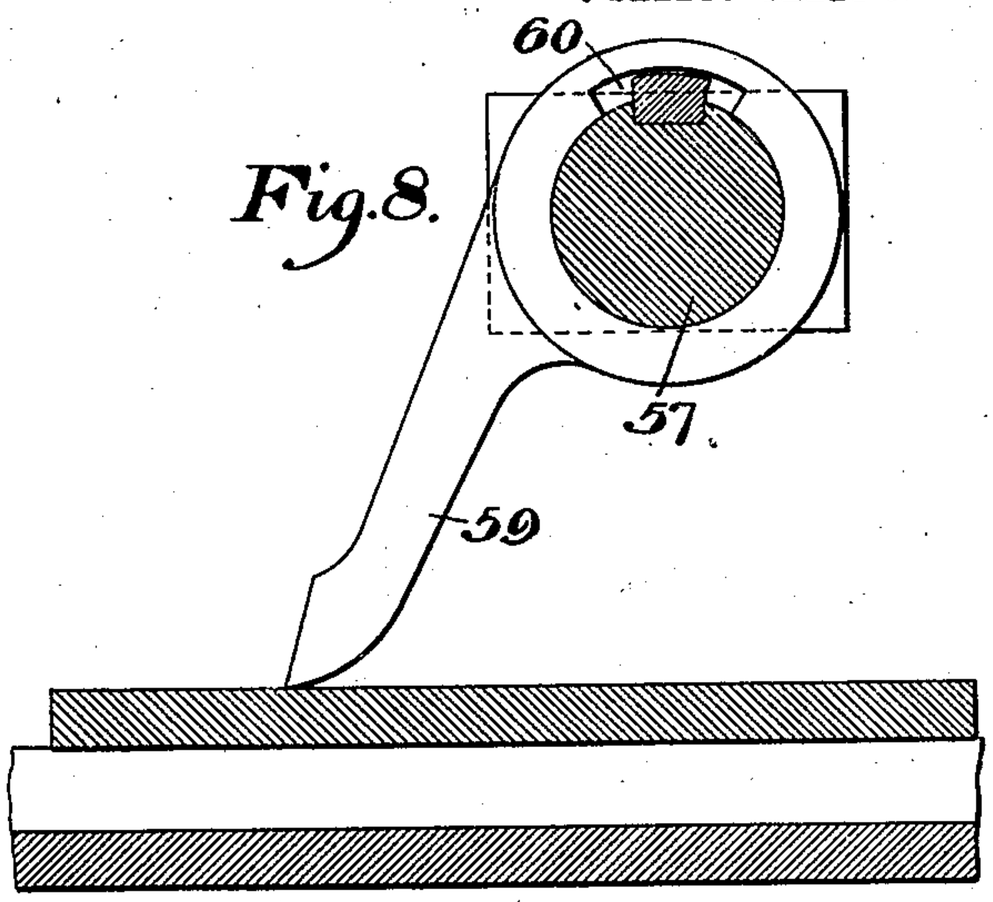
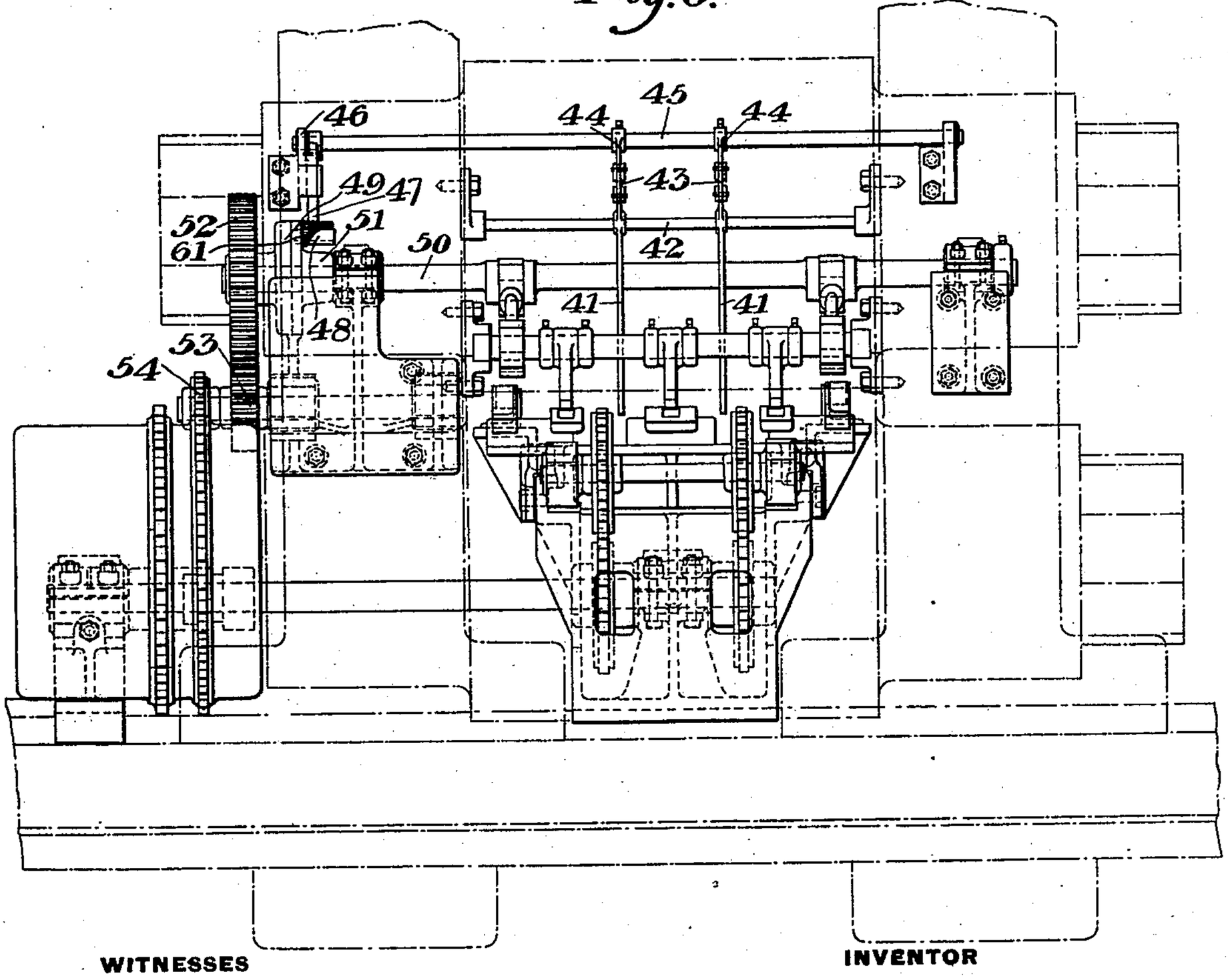


Fig. 6.



WITNESSES

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No. 728,849. Patented May 26, 1903.

UNITED STATES PATENT OFFICE.

CHARLES W. BRAY, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE AMERICAN TIN PLATE COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR ROLLING PLATES OR SHEETS.

SPECIFICATION forming part of Letters Patent No. 728,849, dated May 26, 1903.

Application filed May 31, 1902. Serial No. 109,730. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. BRAY, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Apparatus for Rolling Plates or Sheets, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic top plan view of a rolling plant constructed in accordance with my invention. Fig. 2 is a diagrammatic side elevation of the same, partly in section. Fig. 3 is an enlarged top plan view of the receiving and feeding table to which the heated bars are taken. Fig. 4 is a side elevation of the mechanism of Fig. 3. Fig. 5 is a side elevation showing one of the intermediate feed devices between the first sets of rolls. Fig. 6 is a front elevation of the apparatus of Fig. 5, and Figs. 7 and 8 are detail views showing different positions of the pusher-fingers.

My invention relates to the rolling of bars or plates of metal, such as tin-plate bars, into sheets or packs, and is designed to provide an improved mill wherein the manual operations are reduced to a minimum and the metal reduced in a continuous manner to such a gage that it can be afterward reduced at one operation to the lighter gages used for tin-plate with one heating. The mill may also be used for other purposes, such as finishing heavier gages at one heat.

The invention relates more particularly to the mill set forth in my pending application, Serial No. 90,379, filed January 20, 1902, for apparatus for rolling sheet and tin plate.

In the drawings, in which I show the preferred form of my invention, referring to Figs. 1 and 2, 2, 3, and 4 represent part of a set of heating-furnaces through which tin-plate bars are fed in a continuous manner. The bars pass in through rear openings 5 upon inclined supports 6. The general plane of these supports is upon a downward angle less than the angle of repose, and the front portions 7 are more sharply inclined, so that as each bar reaches this portion it will slide down and pass out the front opening 8 and over a guide-plate 9 upon a roller-table 10. There are two of these roller-tables shown, both of which extend in front of a row of furnaces and are arranged to feed the heated bars to a common receiving-table, (shown at A.)

I have indicated at 11 portions of a feed mechanism for feeding the bars sidewise into the openings 5 and pushing along the row of bars within the furnace.

From the common receiving-table A the bars pass in series through a tandem L, having sets of rolls, of which I have shown six, though any desired number may be used. These successive sets are numbered 12, 13, 14, 15, 16, and 17. The rolled bars, which are thus reduced to preferably about eighteen gage, pass from the set of rolls 17 to a matching device 18, and after a pile is formed by matching plates therein this plate then passes through further sets of rolls, of which I have shown two, numbered 19 and 20, though any desired number may be used. The rolled pack then passes over feed-table 21 to a doubling apparatus 22, which is preferably of the type described in my United States Patent No. 695,873, dated March 18, 1902. The doubled pack is then ready for reheating and finishing. If thicker sheets are desired, these sheets are either removed before reaching the doubler or pass directly through the doubler, whose stop is removed.

The general plan above described is of the type set forth in my copending application above referred to.

I will now describe the receiving and feeding table A, which is arranged to receive the sheets from the roller-tables on either side and start them into the first set of rolls. The table consists of a vertically-movable bed portion 23, which is transversely slotted to allow passage of sprocket-chains 24. At each end of the bed is an adjustable bracket 25, secured by bolts within slots 26, these brackets containing bearings for loose transverse rollers 27. Each of these rollers is normally on substantially the same level as the upper surface of the roller-tables 10, so that the bar fed from either roller-table will pass over the roller 27 and drop upon the intermediate table portion. The other roller and its support

act as a stop for the sheet, the sheets thus being stopped when coming from either side. The table is provided with depending end guides consisting of rods 28, which slide vertically in stationary guides 29 beneath the table. The central portion of the table is connected by links 30 with levers 31, pivoted to the shaft 32. The outer ends of these levers are connected by links 33 to a stub-shaft 34, connected by lever 35 with a rock-shaft 36. This rock-shaft is operated by handle 37. The links 31 are provided with adjustable counterweights 38, which normally hold the table in elevated position. The table is provided at its rear side with an upper guide-flange 39, which is at a suitable level to allow the table to move down to such a position that the chains 24 will engage the metal. The operator having swung the rock-shaft 36, and thus lowered the table, the bar is carried forward and sidewise by the chains 24 between flaring guides 40 and to a position near the first set of rolls 12.

As the metal is not of sufficient width to allow its being fed sidewise into the rolls by the chain, I employ automatic pushers, which are shown in Figs. 5 and 6, for this purpose. These pushers are used in front of the first set of rolls and between the succeeding sets up to a point where the metal has been widened by rolling to such an extent that it may be fed by the ordinary chains. Referring to this automatic pushing mechanism of Figs. 5 to 8, inclusive, the chains 24′ feed the bar forwardly between the side guides until its front end strikes a latch device. This latch device I have shown as consisting of two depending levers 41, whose lower ends normally lie in the path of the metal between the chains. These levers are pivoted to a cross-shaft 42, and their upper ends are connected by pivotal links 43 to lever-arms 44, projecting from a rock-shaft 45. The rock-shaft carries at one end a lever-arm 46, provided with a depending link 47, to whose lower end is secured the pin 48 of an ordinary pin-clutch. This pin-clutch is arranged to clutch together a disk 49, which is loose on the shaft 50, and a disk 51, which is secured to said shaft. The disk 49 is secured to or formed as part of a toothed wheel 52, intermeshing with a pinion 53, mounted on a stub-shaft and driven by sprocket-chain 54, so that the disk 49 is constantly rotated. The shaft 50 is provided with two crank-arms 55, having connecting-rods 56, which lead to wrist-pins surrounding a shaft 57, having cross-heads movable in side guides 58. The shaft 57 is provided with depending fingers 59, of which I have shown three, which are loosely keyed to the shaft by lost-motion connections, (shown at 60 in Figs. 7 and 8.) This connection allows the fingers to tilt loosely from the position of Fig. 7 to that of Fig. 8 as the fingers are drawn back over the metal bar, while on the forward movement the fingers will be held in the position of Fig. 7 to push the bars forwardly. In the operation of this portion of the feed mechanism as the bar is fed sidewise by the carrying-chains its forward edge strikes the depending levers 41, and thus forces the clutch-pin inwardly and the crank-shaft begins its rotation. In the first portion of this rotation the push-fingers are drawn rearwardly and slide over the top of the metal, as shown in Fig. 8. During the second portion of the revolution the fingers which have dropped behind the rear edge of the piece are moved forwardly and force the bar between the side guides into the bite of the rolls. After one revolution the pin engages the incline 61, Fig. 6, is moved sidewise, and automatically stops the rotation of the shaft, the push-fingers and levers resuming their normal position, as shown in Fig. 5. After the metal has thus been fed through the first sets of rolls it is fed on over ordinary chain-tables to the preceding sets in line. After passing through the set 17 the plates are matched, the packs then fed over suitable feed-tables through the succeeding sets 19 and 20, and if further reduction is desired the pack is doubled by the doubler (shown at 22) and then taken to the reheating-furnace and finishing-rolls.

The advantages of my invention result from the peculiar arrangement of the receiving-table A, which is arranged to receive the bars and then change their course and start them into the mill; also, from the automatic pusher mechanism for feeding the bar into the first set or sets of rolls, and, further, from the general arrangement and construction of the plant.

Many changes may be made in the form and arrangement of the furnaces, the transfer mechanism, the mills, &c., without departing from my invention.

I claim—

1. The combination with a mill, of feed mechanism arranged to feed the metal thereto, a receiving-table coöperating with the feed mechanism, connections for changing the level of the table and the feed mechanism relatively to each other, feed-tables on opposite sides of the receiving-table, and stop mechanism arranged to stop the bars on the receiving-table coming from either direction; substantially as described.

2. The combination with a mill, of feed mechanism arranged to feed the metal thereto, a vertically-movable table coöperating with the feed mechanism, mechanism for raising and lowering the table, a feed-table leading to the receiving-table, and stops for checking the entering metal on the table; substantially as described.

3. The combination with a mill of feed mechanism arranged to feed the metal thereto, a vertically-moving receiving-table coöperating with the feeding mechanism and having stops arranged to check the bars thereon coming from either direction, and feed-tables leading to the opposite sides of said receiving-table; substantially as described.

4. The combination with a mill of feed mechanism arranged to feed the metal thereto, a vertically-movable receiving-table coöperating with the feed mechanism, said table having stops at opposite sides above the level of the table, mechanism for raising and lowering the table, and feed-tables leading to opposite sides thereof; substantially as described.

5. In feeding mechanism for rolls, a feed-table arranged to convey the piece to the front of the rolls, side guides, and a plurality of mechanically-operated pushers arranged to move the piece into the bite of the roll after the feed-table has ceased to move the piece; substantially as described.

6. The combination with rolls, of a positive feed device having pushers arranged to move the metal forward into the bite of the roll, and an element actuated by the moving metal and arranged to operatively connect the feed mechanism with the driving-shaft for actuating the same; substantially as described.

7. The combination with rolls and feeding mechanism therefor, of a second feeding device having pushers, and an element actuated by the moving piece and arranged to operatively connect the second feed mechanism with a driving-shaft for actuating the same; substantially as described.

8. The combination with rolls and feeding mechanism therefor, of a second feeding device having pushers arranged to move the metal into the bite of the rolls, and automatic mechanism arranged to be actuated by the moving metal to start the second feeding device into action; substantially as described.

9. The combination with rolls and a normally inactive feed mechanism having pushers, of mechanism for actuating said feed mechanism, an automatic stop mechanism arranged to stop the movement of said feed mechanism after the piece has entered the bite of the rolls; substantially as described.

10. The combination with rolls and a normally inactive feed mechanism having push-fingers, of an element actuated by the moving metal and arranged to start said feed mechanism into action, and automatic stop mechanism for said feed mechanism; substantially as described.

11. The combination with rolls and feed mechanism therefor, of a second normally inactive feed device, and mechanism for automatically starting said second mechanism and for stopping it after it has fed the metal into the bite of the rolls; substantially as described.

12. The combination with rolls and feed mechanism therefor, of normally inactive push-fingers, a clutch device arranged to throw the fingers into action, a latch device actuated by the metal and arranged to operate the clutch, and mechanism for automatically throwing the clutch out of action; substantially as described.

13. The combination with a tandem mill having a series of sets of rolls, of feed mechanism arranged to feed the metal to a point near the bite of the first set of rolls, side guides, and a second automatic feed mechanism having a plurality of fingers arranged to push the metal forwardly into the bite of the rolls; substantially as described.

14. The combination with a tandem mill having a series of sets of rolls, of feed mechanism arranged to feed the metal to a point near the bite of the first set of rolls, a second automatic feed mechanism arranged to push the metal forwardly into the bite of the rolls, and mechanism for automatically starting and stopping said second feed mechanism; substantially as described.

In testimony whereof I have hereunto set my hand.

C. W. BRAY.

Witnesses:
H. M. CORWIN,
L. M. REDMAN.