

No. 710,972.

Patented Oct. 14, 1902.

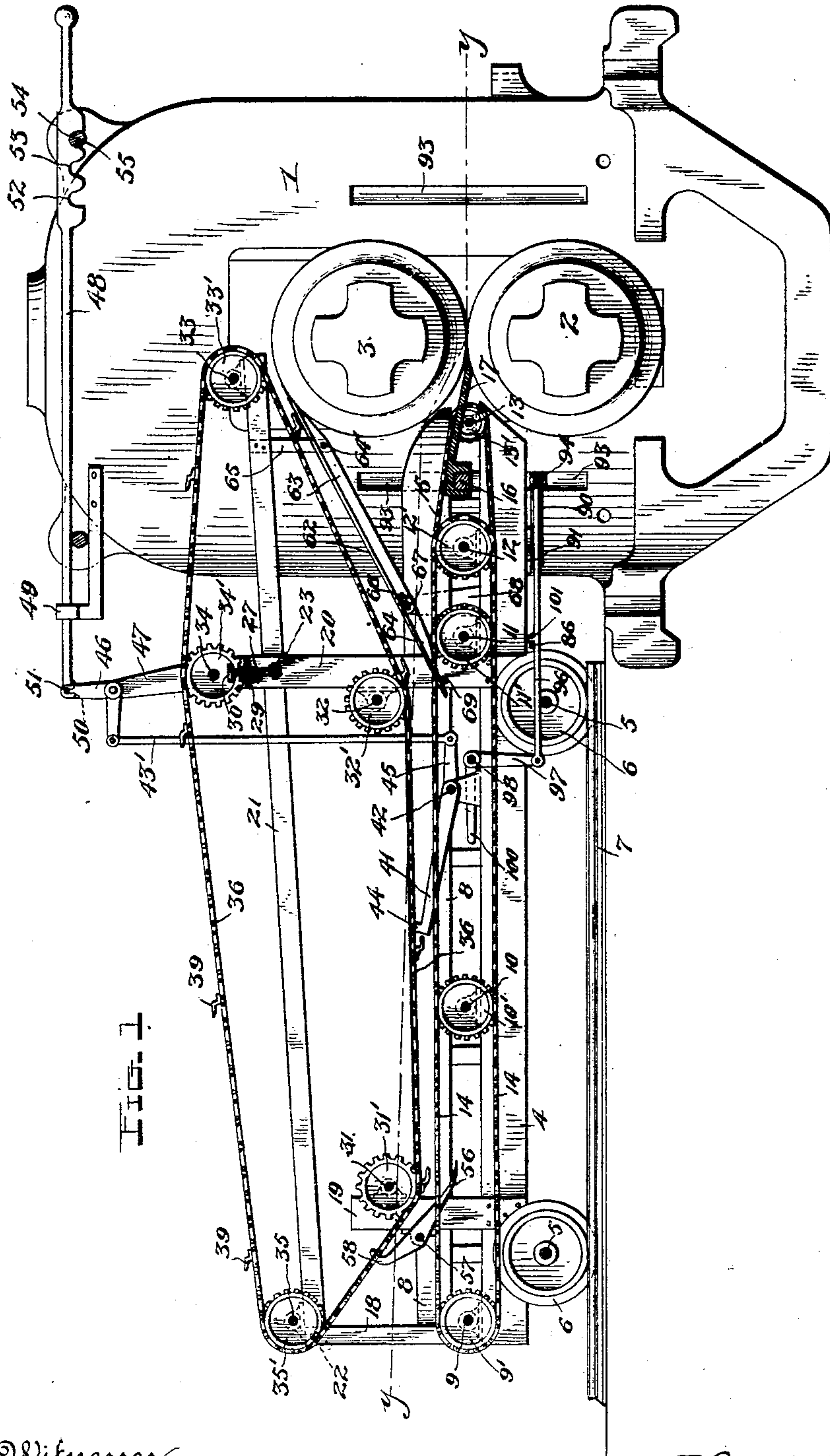
R. HARRIS.

CATCHING MACHINE FOR ROLLING MILLS.

(Application filed May 17, 1902.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses  
J. A. Griesbauer, Jr.  
Louis B. Fausner

Inventor  
Robert Harris  
By *Wm. P. Miller*  
Attorney

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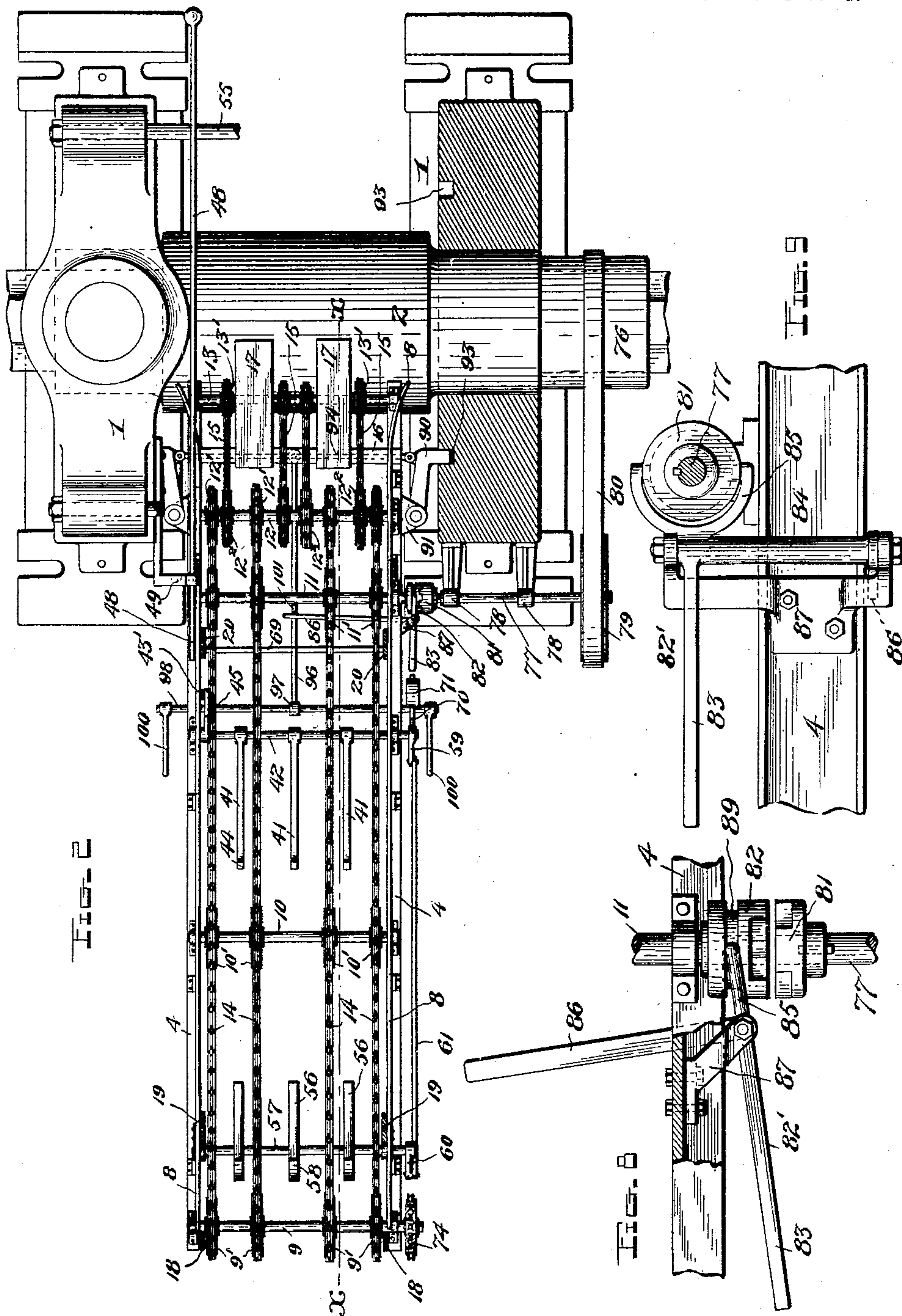
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(Application filed May 17, 1902.)

(No Model.)

5 Sheets—Sheet 2.



Witnesses  
*J. A. Grubauer, Jr.*  
*Louis D. Spamer*

Inventor  
*Robert Harris*  
By *Chas. A. Miller*  
Attorney



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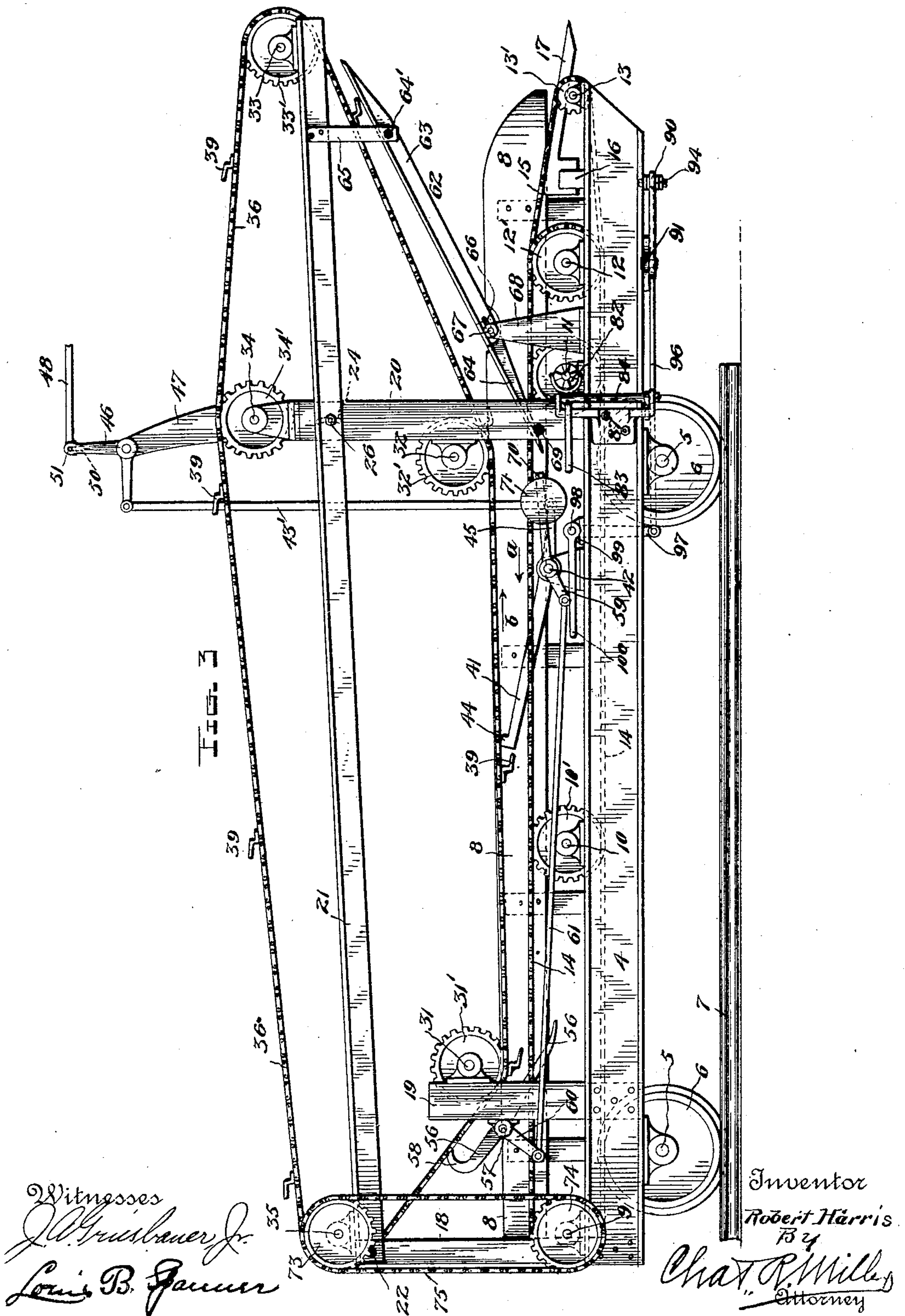
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5 Sheets—Sheet 4.

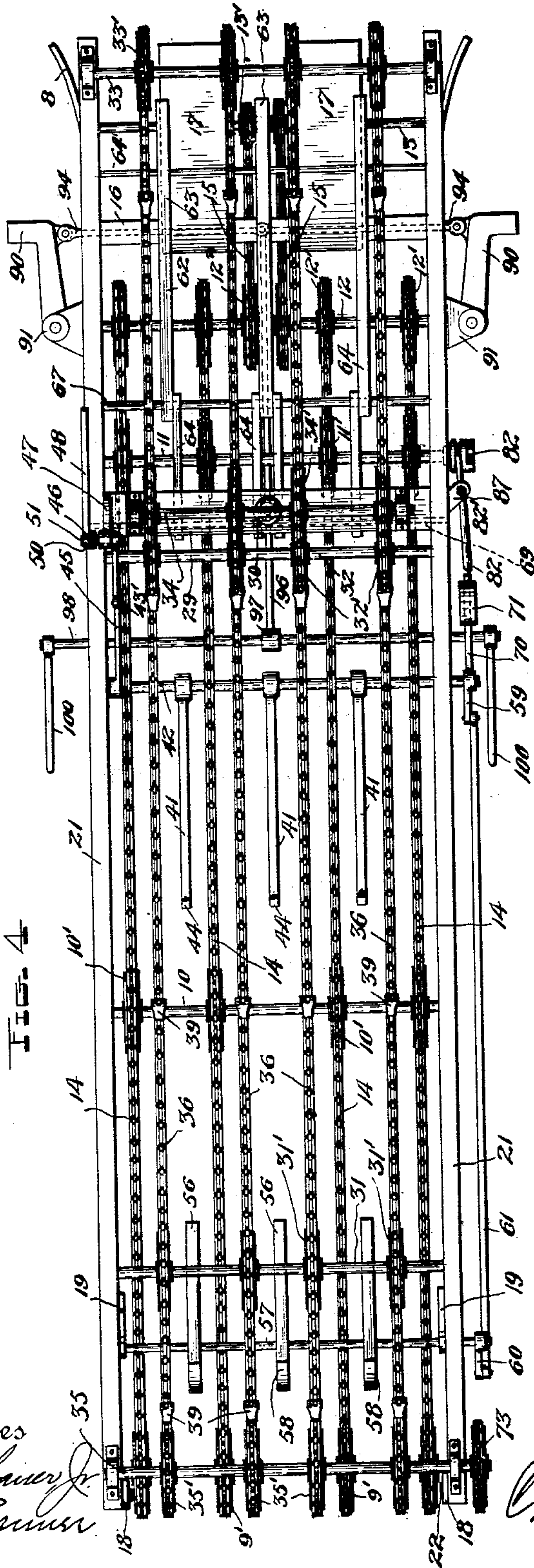


FIG. 4

FIG. 12

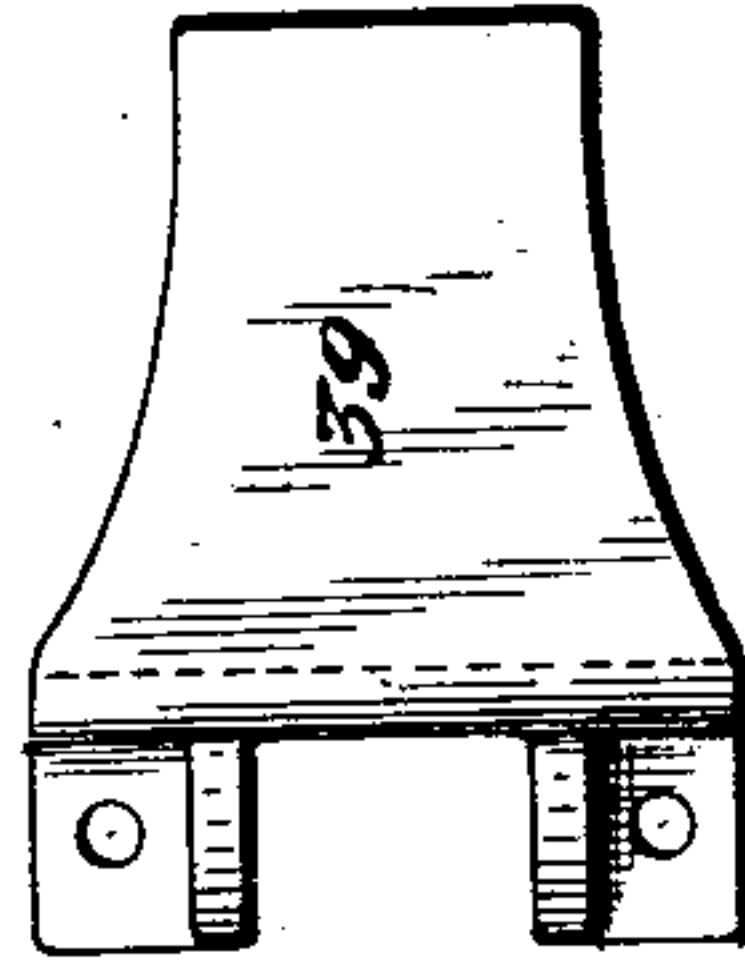


FIG. 11

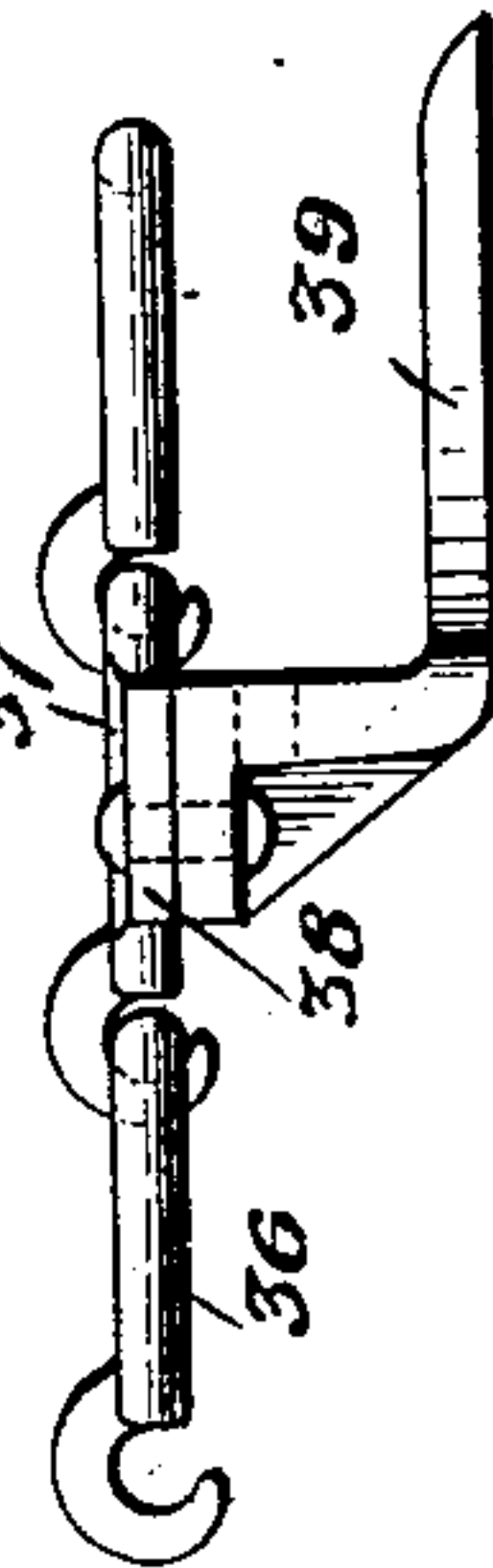
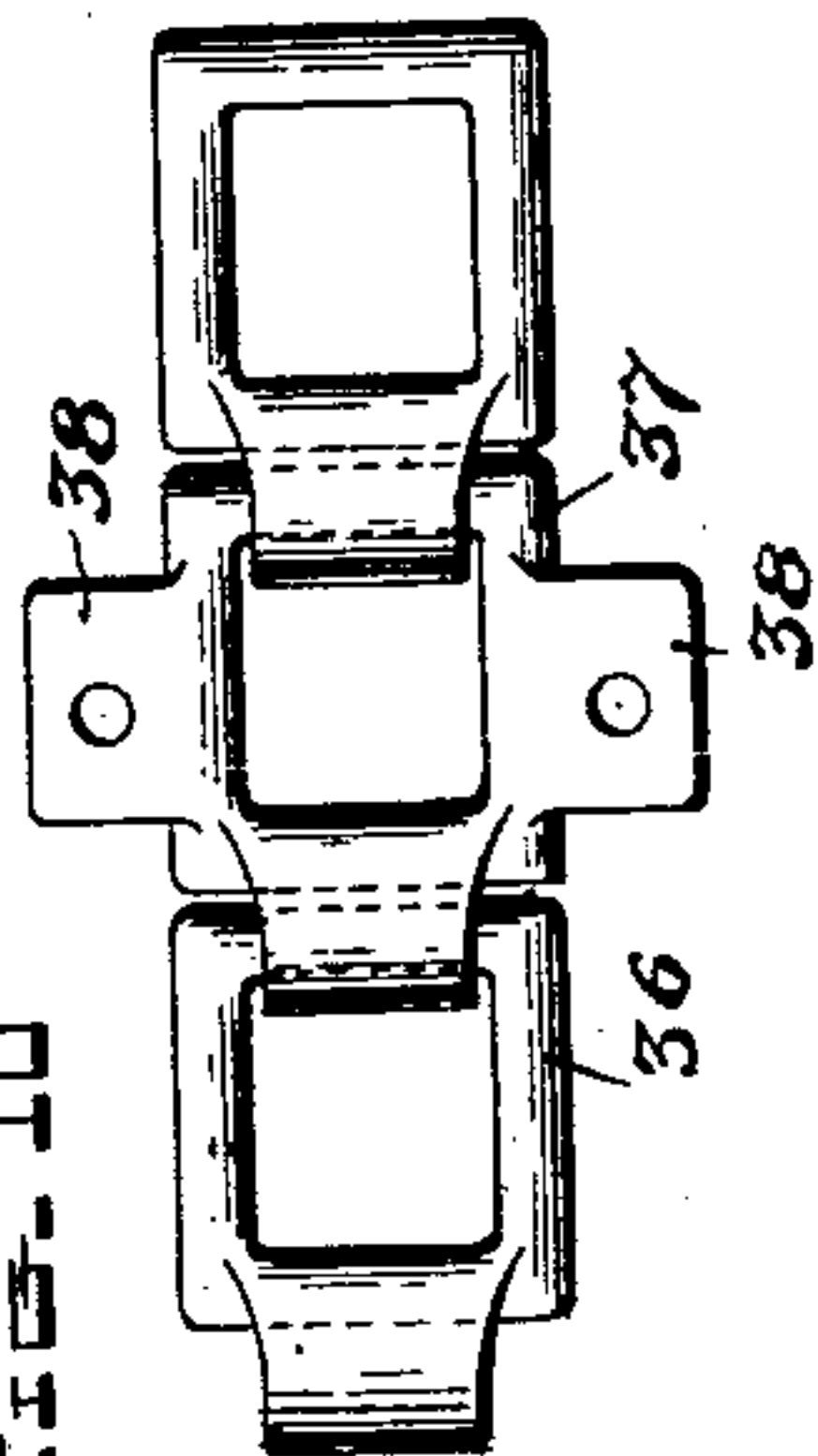


FIG. 10



Witnesses  
*L. H. Giesbauer Jr.*  
*Levi B. Spurr*

Inventor  
*Robert Harris*  
By *Chas. A. Miller*  
Attorney



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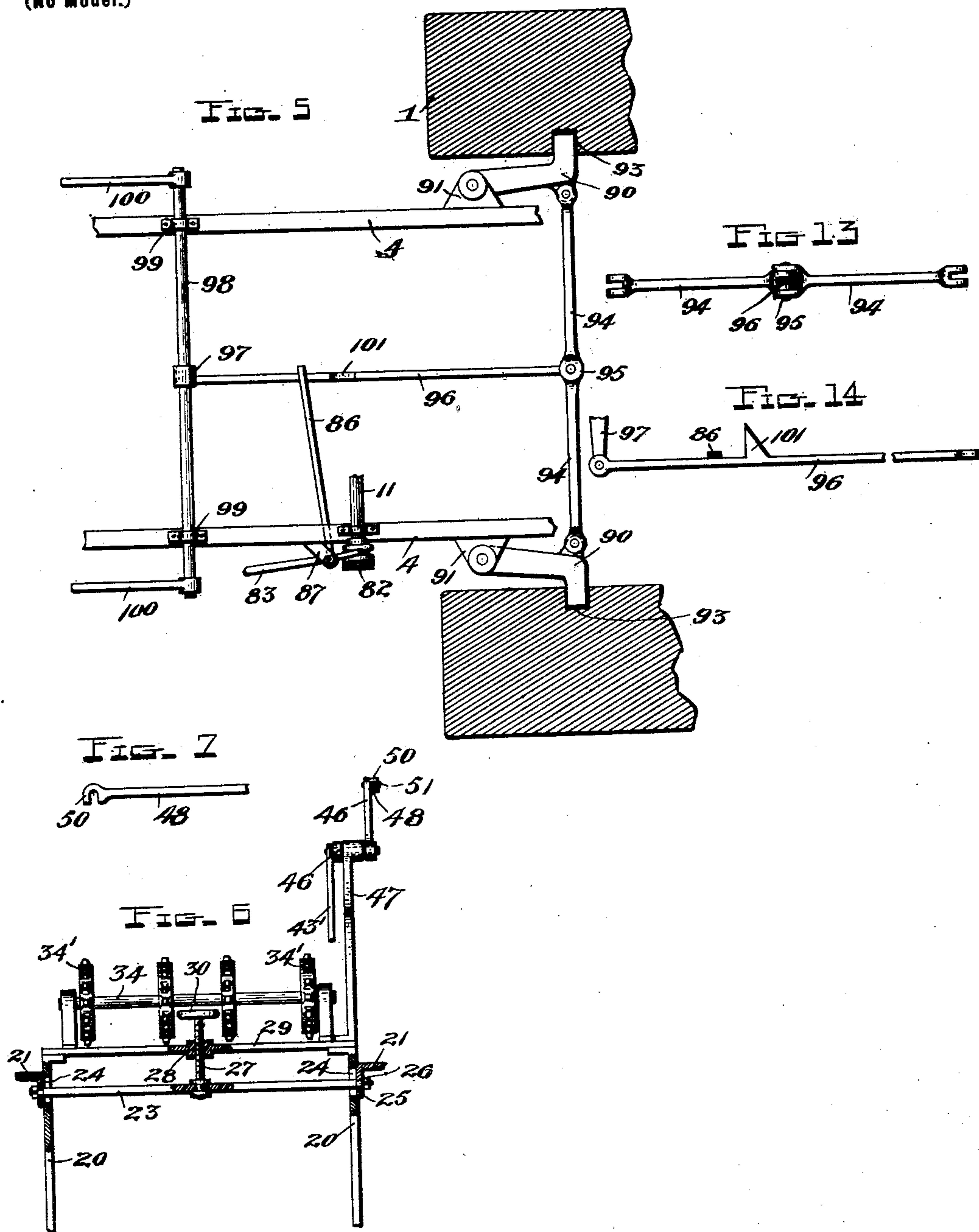
R. HARRIS.

CATCHING MACHINE FOR ROLLING MILLS.

(Application filed May 17, 1902.)

5 Sheets—Sheet 5.

(No Model.)



Witnesses  
*J. H. Griesbauer, Jr.*  
*Louis B. Spanner*

Inventor  
*Robert Harris*  
*Chas. P. Miller* <sup>By</sup>  
Attorney

# UNITED STATES PATENT OFFICE.

ROBERT HARRIS, OF CANAL DOVER, OHIO.

## CATCHING-MACHINE FOR ROLLING-MILLS.

SPECIFICATION forming part of Letters Patent No. 710,972, dated October 14, 1902.

Application filed May 17, 1902. Serial No. 107,867. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT HARRIS, a citizen of the United States, residing at Canal Dover, in the county of Tuscarawas and State of Ohio, have invented new and useful Improvements in Catching-Machines for Rolling-Mills, of which the following is a specification.

The invention relates to sheet-metal-catching machines for rolling-mills.

The object of the invention is to provide a machine of this character for receiving the sheets from the rolls of the rolling-mill as they pass through the same and for returning them a desired number of times forwardly to a point in advance of the rolls for rerolling; furthermore, to provide a machine of this character for conducting the finished sheets from the mill to the receiving-table or carrying-off truck; furthermore, to provide a machine of this character which may be easily and conveniently adjusted and locked to rolling-mills of different heights; furthermore, to provide a machine of this character with means for simultaneously disconnecting it from the mill and cutting off the power from the machine, and, finally, to provide a machine of this character which shall be simple of construction, durable in use, comparatively inexpensive of production, efficient in action, and possessing a great working capacity.

With these and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, which will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view on line *xx* of Fig. 2, showing the machine connected to a rolling-mill and in position to receive the sheets from the rolls thereof. Fig. 2 is a horizontal sectional view on the irregular dotted line *yy* of Fig. 1, showing the machine locked to the rolling-mill. Fig. 3 is a detail side elevation of the machine on an enlarged scale, one of the side boards thereof being removed in order to more clearly illustrate the invention. Fig. 4 is a top plan view, on an enlarged scale, of the complete machine. Fig.

5 is an enlarged top plan view of the locking and clutch-operating mechanism. Fig. 6 is a fragmentary end view, partly in section, illustrating the means for adjusting the side bars. Fig. 7 is a detail view of the rear end of the stop-shifting rod. Fig. 8 is an enlarged top plan view of the clutch and its operating-lever. Fig. 9 is a side elevation of the same. Fig. 10 is a plan view of three joined links of one of the endless chains of the return-conveyer, the intermediate being constructed to engage the catcher lug or hook. Fig. 11 is a side elevation showing the catcher lug or hook detached. Fig. 12 is a plan view of the catcher lug or hook. Fig. 13 is a side elevation of the toggle-arms connected to the locking-bolts; and Fig. 14 is a side elevation of the link connecting the toggle-arms to the rock-shaft, showing in section one end of the clutch-lever that is actuated by the movement of the link.

Referring more particularly to the drawings, 1 denotes a rolling-mill which may be of the well-known or any approved construction.

2 denotes the lower roll, and 3 the upper roll, between which rolls is adapted to be fed in any suitable manner, not necessary here to illustrate or describe, the bars to be rolled.

Arranged at the rear of the mill in a position to receive the sheets from the rolls is my improved machine, which I will now proceed to describe.

The main frame of the machine consists of the side pieces 4, mounted upon axles 5, carrying wheels 6, which roll upon a rail 7. The side pieces are provided with side boards 8, the forward ends of which are flared and adapted to guide the sheet as it leaves the rolls in proper position to my improved machine.

9, 10, 11, 12, and 13 denote shafts journaled transversely across the frame of the machine in suitable bearings, and upon these shafts are mounted, respectively, sprocket-wheels 9', 10', 11', 12', and 13'. On the shaft 12 is mounted a separate set of sprocket-wheels 12<sup>2</sup>.

14 and 15 denote the sprocket-chains of the receiving-conveyer, the sprocket-chains 14 being engaged with the sprocket-wheels 9', 10', 11', and 12' and are much longer than the



sprocket-chains 15, which latter chains alternate with the chains 14 and engage the sprocket-wheels 12<sup>2</sup> and 13'.

16 denotes a cross-piece secured to the forward ends of the side pieces of the main frame, and 17 denotes inclined receiving-shelves connected to the cross-pieces and projecting forwardly between the rolls and arranged between the sprocket-chains 15 and immediately in advance of the shaft 12 and are designed to receive the sheet as it passes from the rolls and in conjunction with the flared ends of the side boards to guide it upon the receiving-conveyer, the upper run of which is moving rearwardly in the direction indicated by the arrow *a*. (Shown in Fig. 3 of the drawings.)

18, 19, and 20 denote posts or standards connected to the main frame and projecting upwardly therefrom and made of any suitable material.

21 denotes side bars, of any suitable material, preferably angle-iron, having their rear ends pivoted to the upper ends of the posts 18, as shown at 22, Fig. 3, and vertically adjustably connected to the posts 20 by a cross-bar 23, the ends of which extend through curved apertures 24, formed in said posts, and through holes 25, formed in said bars, and are provided with nuts 26.

27 denotes a screw working through a threaded aperture 28, formed in a cross-bar 29, secured to the posts 20 above the bar 23 and provided at its upper end with a hand-wheel 30 and has its lower end swiveled to the bar 23. By rotating this screw the forward ends of the side bars 21 may be raised or lowered to adjust the machine to rolling-mills the upper rolls of which are in different planes.

31 and 32 denote shafts journaled in bearings secured to the posts 19 and 20.

33 denotes a shaft journaled in bearings secured to the forward ends of the side bars 21.

34 denotes a shaft journaled in bearings secured to the cross-bar 29.

35 denotes a shaft journaled in bearings secured to the rear ends of the side bars 21.

31', 32', 33', 34', and 35' denote sprocket-wheels fixed to said shafts.

36 denotes the endless sprocket-chains forming the return-conveyer, said chains being engaged with said sprocket-wheels and being kept taut in the adjustment of the side bars 21, owing to the peculiar mounting of the sprocket-wheels. At predetermined points in the length of each conveyer-chain a peculiar-shaped link 37 is used, which differs from the other links in that it is provided with laterally-projecting flanges 38, to which are bolted or riveted or otherwise fixedly secured angular catcher hooks or lugs 39. (Shown in detail in Figs. 11 and 12 and in operative position in Figs. 1 and 3.)

The return-conveyer is mounted directly above the receiving-conveyer, and the adjacent runs of these conveyers move in opposite directions, the upper run of the receiv-

ing-conveyer moving in the direction of the arrow *a* and the lower run of the return-conveyer moving in the direction of the arrow *b*, Fig. 3.

The sheet of metal after leaving the rolls is conveyed rearwardly by the receiving-conveyer and at a certain point in its rearward movement is stopped and slightly elevated to present its rear edge in the path of movement of the catcher hooks or lugs 39, so that said catcher hooks or lugs may engage said edge and carry the sheet forwardly and return it over the top of the upper roll of the mill in a position to be rerolled. In the accompanying drawings I have shown two sets of stops for limiting the rearward movement of the sheet. The advance set of stops consists of arms 41, fixed to a rock-shaft 42, journaled in suitable bearings 43, secured to the side pieces of the main frame and projecting rearwardly in an inclined direction, as more clearly shown in Figs. 1 and 3 of the drawings, and having their rear ends provided with stop-lugs 44.

45 denotes a crank-arm secured to the rock-shaft 42 and pivotally connected by a link 43' to a bell-crank lever 46, pivoted to a bracket 47, secured to the cross-bar 29 at one end thereof. The bell-crank lever 46 is actuated by a stop-shifting rod 48, which is mounted to slide in a bracket 49, secured to one of the side pieces or standards of the mill, and has a forked end 50 to engage a stud 51, projecting from the vertical limb of the bell-crank lever 46. The forward end of the rod 48 is provided with notches 52, 53, and 54, which are adapted to engage a cross stud or pin 55 to hold the lever in longitudinal adjustment.

56 denotes the rear set of stops. These stops each consists of an arm fixed intermediate its ends to a rock-shaft 57 and having its lower end projecting below the upper run of the receiving-conveyer and provided with a stop lug or hook 58 at its upper end. These stops are arranged in an inclined plane, the same as the stops 41. The forward and rear sets of stops are connected together in any suitable manner, preferably by securing to the shaft 42 a crank 59 and securing to the shaft 57 a crank 60 and connecting these two cranks by a pivoted link 61.

62 denotes the inclined return-bars for actuating the sheet of metal carried by the return-conveyer up over the upper roll of the mill. Each one of these bars comprises two parts 63 and 64, the upper forward end of the part 63 being pivoted to a cross-rod 64', supported in brackets 65, depending from the forward ends of the side bars 21, and the lower end of said part being formed with a slot 66, through which projects a rod 67, mounted in bearings 68, secured to the side pieces of the main frame. The part 64 of each of the inclined return-bars has its lower rear end projecting below the path of movement of the upper run of the receiving-conveyer and supported upon a cross-bolt 69 and



extends parallel with the part 63 and is capable of swinging upwardly to permit the rearwardly-moving sheets to pass under it, and at the instant said sheets pass from under its end it will fall into its normal position, (illustrated in Fig. 3 of the drawings,) so that after the said sheets have been stopped in their rearward movement, engaged by the catcher hook or lug and moved forwardly, the forward edges of said sheets will engage the part 64 of the inclined return-bars, and thus be guided upwardly in an inclined direction and fed over the upper roll of the mill in a position to be inserted between the rolls and be rerolled.

The operation of the machine as thus far described is as follows: The bar after passing through the rolls is of sheet form, and this sheet is received upon the shelves 17 and carried by the upper run of the receiving-conveyer rearwardly and in its rearward movement tilts upwardly the parts 64 of the return-bars and passes under the same and moves along until it is arrested by the stops 41, which also lift the rear edge of the sheet to a position within the path of movement of the catcher hooks or lugs, so that the rear edge of the sheet will be grasped by the catcher lugs or hooks and the sheet be moved forwardly by the return-conveyer. In its forward movement the forward edge of the sheet will engage the parts 64 of the inclined return-bars and the sheet be directed upwardly and forwardly, the upper ends of said return-bars being in such relation to the upper roll that after the sheet passes off of said return-bars it is discharged over the roll in position to be refed to the rolls. In repeating this operation the sheet becomes gradually longer and longer, and its length would soon be greater than the distance between the lower end of the part 64 of the return-bars and the lugs 44, and in that event if said sheet were stopped in its rearward movement by the stop-lugs 44 it would be impossible to return it up over the rolling-mill, for the reason that its forward edge would not be in a position to engage and ride up on the part 64 of the inclined bars. Therefore as the sheet becomes longer and it becomes apparent to the operator that its forward edge will not free the lower end of the part 64 of the inclined return-bars before its rear edge comes in contact with the stop-lugs 44, he grasps the free end of the rod 48 and moves the rod forwardly to engage its notch 53 with the stud 55. This movement of the rod rocks the shafts 42 and 57 and throws the stops 41, with their lugs 44, below the upper run of the receiving-conveyer and slightly rocks the stops 56, but not to such an extent as to throw their lower ends out of position to engage the rearwardly-moving sheet. The sheet now has a free rearward movement to the rear end of the machine and engages the inclined stops 56 and is arrested by the lugs or hooks 58 at the ends of the stops 56 and is thus held in

position to be engaged by the catcher lugs or hooks 39, which move the sheet forwardly up over the upper roll of the mill in the manner hereinbefore described. After the sheets have been rolled the desired amount they may be formed into packs and run through the rolls upon the receiving-conveyer and be carried rearwardly and discharged from the rear end of the machine upon a table or carrying-off truck arranged in position to receive the pack, it of course being understood that the rod 48 is first adjusted to engage its notch 52 with the stud 55, and by this adjustment the stops 56 have had their forward ends elevated above the upper run of the receiving-conveyer, so as to permit of the free passage of the plates under the ends. If desired, I may counterbalance the weight of the stops by securing to the rock-shaft 42 a crank-arm 70, to which is secured a weight 71, thus enabling the rod 48 to be more easily adjusted. Any suitable means may be employed for moving the two endless conveyers. As shown in the drawings, the movement of one is transmitted to the other by fixing a sprocket-wheel 73 to the shaft 35 and fixing a sprocket-wheel 74 to the shaft 9 and connecting these two sprocket-wheels by a sprocket-chain 75. The receiving-conveyer preferably receives its motion from one of the rolls, and I have shown in the drawings means for transmitting the motion from the lower roll to said conveyer, and this means I will now proceed to describe.

76 denotes a pulley secured to the axis of the lower roll, and 77 denotes a shaft mounted in bracket-bearings 78, secured to one of the side pieces or standards of the mill and having fixed to one end a band-wheel 79, with which and the wheel 76 is engaged a belt 80. Any other suitable means may be employed, however, for transmitting motion from one of the rolls to the shaft 77. The inner end of the shaft 77 is provided with a clutch member 81, with which is adapted to engage a sliding clutch member 82, splined to the shaft 11, and thus locking said shaft 11 to the clutch member 81.

82' denotes a clutch-shipping lever consisting of a handle 83, a vertical portion 84, a forked portion 85, and a crank-arm 86. The vertical portion 84 is pivoted in a bracket 87, bolted or otherwise secured to one of the side pieces of the main frame, and the forked portion 85 engages an annular groove 89, formed in the clutch member 82. By operating the handle 83 the clutch member 82 will be moved into and out of engagement with the clutch member 81 and my improved machine started and stopped at will.

The improved machine may be attached to a rolling-mill in any suitable manner, but that shown in the accompanying drawings preferably consists of fastening means in the form of hooks, which are pivoted to brackets 91, projecting laterally from the side pieces of the main frame and adapted to engage keepers 93, formed on the inner faces of the



standards or side pieces of the rolling-mill. These keepers are preferably in the form of vertical grooves, as shown. 94 denotes toggle-arms pivoted together at 95 and pivoted to said hooks, and 96 denotes a link, one end of which is pivotally connected to the toggle-arms at their point of connection with each other and the other end of which is pivoted to a crank-arm 97, fixed to a rock-shaft 98, journaled in bearings 99, secured to the side pieces of the frame. The rock-shaft is provided with operating-handles 100, by means of which the fastening means may be actuated to engage them with or disengage them from their keepers. The link 96 is provided with a trip-lug 101, which is adapted to engage the crank-arm 86 of the clutch-shipping lever and actuate the clutch member 82 to disengage it from the clutch member 81. The operation of this part of the invention is as follows: In connecting my improved machine to a rolling-mill it is moved into position, with the shelves 17 between the rolls and the shaft 33 above the upper roll and the free ends of the locking means 90 directly opposite the keepers 93. One of the handles 100 is grasped and moved to straighten or parallel the toggle-arms 94, which movement throws the free ends of the locking means 90 into the keepers 93. This movement of the handle 100 throws the link 96 forwardly. The locking means having engaged their keepers, the handle 83 is grasped and operated to throw the clutch member 82 into engagement with the clutch member 81. This movement throws the free end of the crank-arm 86 against the trip-lug 101. This position of parts will not in any wise interfere with the shipping of the clutch member 82 to lock it into or unlock it from engagement with the clutch member 81 at will, but provides means whereby when the clutch member 82 is in engagement with the clutch member 81 should the operator desire to disconnect the machine from the rolling-mill at the very instant he retracts the hooks 90 from their keepers he automatically ships the clutch member 82 from engagement with the clutch member 81, by reason of the fact that when said clutch member 82 is in engagement with the clutch member 81 and the hooks project in the keepers of the rolling-mill standards the crank-arm 86 abuts against the trip-lug 101, and when the handle 100 is operated this trip-lug 101 is drawn rearwardly, engages the crank-arm 86 of the clutch-shipping lever, and throws the clutch member 82 from engagement with the clutch member 81. It will thus be seen that the clutch member 82 is independently operatable under all conditions and that it is automatically operatable upon the retracting of the locks from their keepers, so that should the attendant or operator fail or neglect to first disengage the clutch member 82 from its clutch member 81 before disconnecting the machine from the rolling-mill no damage is done to the machine, for the reason that in the act of disconnecting

it from the rolling-mill the clutch member 82 is disconnected from the clutch member 81 on the power-shaft.

From the foregoing description, taken in connection with the accompanying drawings, the construction, mode of operation, and advantages of the invention will be readily understood without requiring an extended explanation.

Various changes in the form, proportion, and details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

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

1. In a machine of the character described, the combination with an endless conveyer for receiving sheets from a rolling-mill and carrying them rearwardly therefrom, of a second endless conveyer the lower run of which is arranged above and adjacent to the upper run of the first-named conveyer and moves in a direction reverse thereto, and means carried by the second-named conveyer for engaging the sheets carried rearwardly by the first-named conveyer and conveying them forwardly for rerolling, substantially as set forth.

2. In a machine of the character described, the combination with an endless conveyer for receiving sheets from a rolling-mill and carrying them rearwardly therefrom, of a second endless link conveyer the lower run of which is arranged above and adjacent to the upper run of the first-named conveyer and moves in a direction reverse thereto, and catcher lugs or hooks carried by the second conveyer for engaging the sheets carried rearwardly by the first-named conveyer and conveying them forwardly for rerolling, substantially as set forth.

3. In a machine of the character described, the combination with an endless conveyer for receiving sheets from a rolling-mill and carrying them rearwardly therefrom, of a second endless conveyer the lower run of which is arranged above and adjacent to the upper run of the first-named conveyer and moves in a direction reverse thereto, and catcher lugs or hooks carried by the second conveyer, and a stop for arresting the movement of the sheets in their rearward movement and elevating their rear edge into the path of movement of said catcher lugs or hooks of the upper conveyer, substantially as set forth.

4. In a machine of the character described, the combination with an endless conveyer for receiving sheets from a rolling-mill and carrying them rearwardly therefrom, of a second endless conveyer the lower run of which is arranged above and adjacent to the upper run of the first-named conveyer and moves in a direction reverse thereto, catcher lugs or hooks carried by the second conveyer, two sets of stops connected together and one arranged in advance of the other for arresting the move-



ment of the sheets in their rearward movement and elevating their rear edge into the path of movement of said catcher lugs or hooks of the upper conveyer, and means for  
 5 operating the stops for throwing them into and out of the path of movement of the catcher lugs or hooks of the upper conveyer, substantially as set forth.

5. In a machine of the character described,  
 10 the combination with an endless conveyer for receiving sheets from a rolling-mill and carrying them rearwardly therefrom, of a second endless conveyer the lower run of which is arranged above and adjacent to the upper run  
 15 of the first-named conveyer and moves in a direction reverse thereto, means carried by the second-named conveyer for engaging the sheets carried rearwardly by the first-named conveyer and conveying them forwardly and  
 20 upwardly over the upper roll of the mill for rerolling, and an inclined bar for supporting the forward edge of the sheet in its upward movement, substantially as set forth.

6. In a machine of the character described,  
 25 the combination with an endless conveyer for receiving sheets from a rolling-mill and carrying them rearwardly therefrom, of a second endless conveyer the lower run of which is arranged above and adjacent to the upper run  
 30 of the first-named conveyer and moves in a direction reverse thereto, means carried by the second-named conveyer for engaging the sheets carried rearwardly by the first-named conveyer and conveying them forwardly and  
 35 upwardly over the upper roll of the mill for rerolling, and an inclined bar for supporting the forward edge of the sheet in its upward movement, said inclined bar consisting of two sections, the lower edge of the lower section  
 40 of which projects within the path of movement of the forward edge of the forwardly-moving sheet to direct it upwardly and is free to swing upwardly to permit of the sheets passing thereunder as they are moved rear-  
 45 wardly upon the first-named conveyer, substantially as set forth.

7. In a machine of the character described, the combination with a receiving-conveyer for receiving and conducting rearwardly the sheets from the rolling-mill, of a return-con- 50  
 veyer for catching the sheets moving rearwardly, carrying them forwardly and discharging them at a point in advance of the rolls for rerolling, and means for locking the machine to the rolling-mill, said means consist- 55  
 ing of pivoted locks, toggle-arms connected to said locks, a rock-shaft provided with a crank, a link connecting the toggle-arms of the rock-shaft, and a handle for operating the rock-shaft, substantially as set forth. 60

8. In a machine of the character described, the combination with a receiving and a return conveyer, the former to receive the sheets from the rolls of a rolling-mill and the latter for returning the sheets to a point in advance 65  
 of the roll for rerolling, of a shaft for receiving motion to drive the conveyers and provided with a clutch member, means for locking the machine to the frame of a rolling-mill, and means for shipping one clutch mem- 70  
 ber into and out of engagement with the other clutch member, the latter means being independently operatable and also automatically operatable by the locking and unlocking means, substantially as set forth. 75

9. In a machine of the character described, the combination with a receiving and a return conveyer, the former to receive the sheets from the rolls of a rolling-mill and the latter for returning the sheets to a point in advance of 80  
 the roll for rerolling, and means for vertically adjusting the return-conveyer to adapt it to rolls of different heights and diameters, substantially as set forth.

In testimony whereof I have hereunto set 85  
 my hand in the presence of two subscribing witnesses.

ROBERT HARRIS.

Witnesses:

E. W. RODERICK,  
 FRANK TREPAGE.