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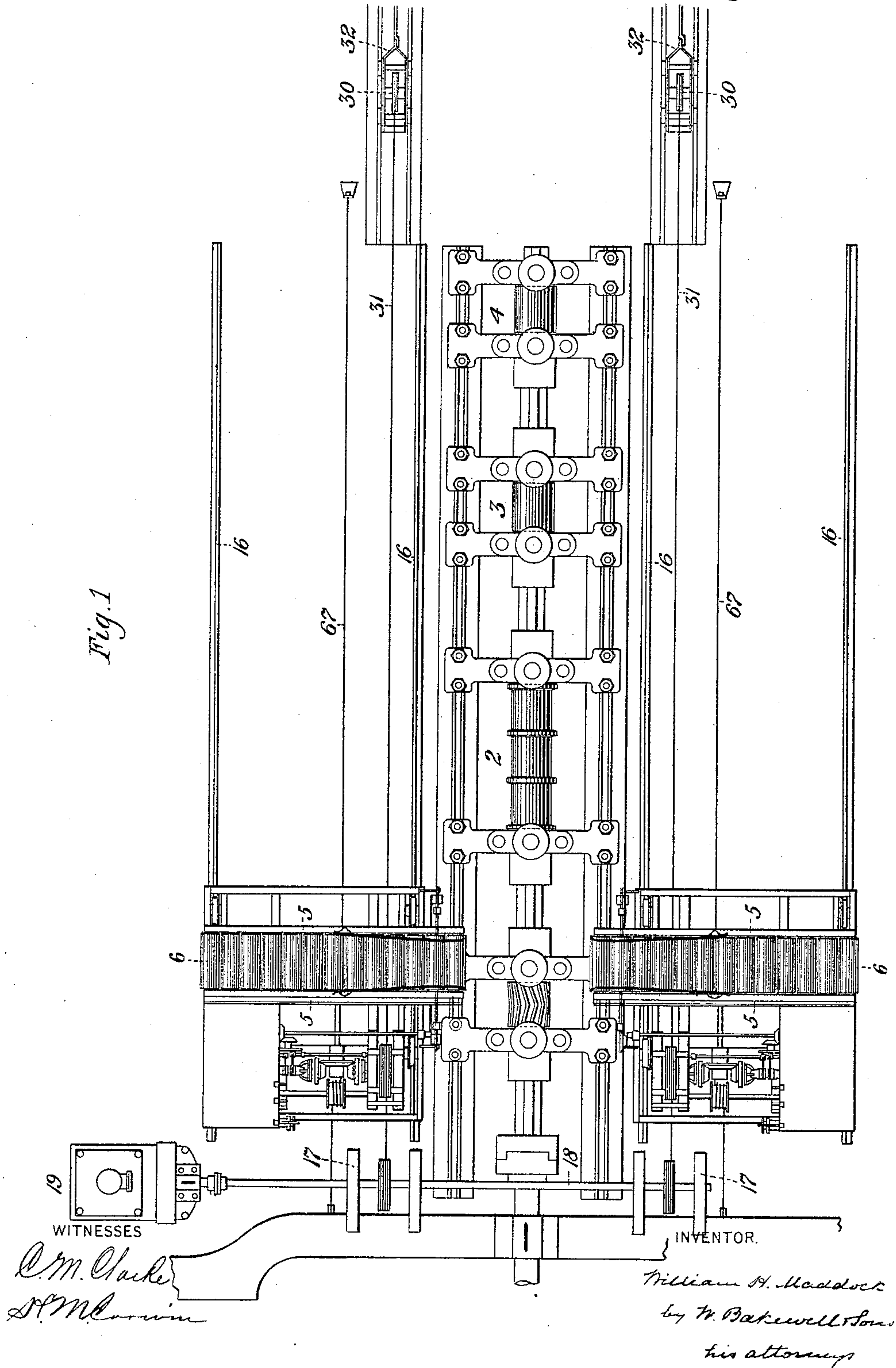
11 Sheets—Sheet 1.

W. H. MADDOCK.  
MILL APPLIANCE.

No. 480,200.

Patented Aug. 2, 1892.

Fig. 1



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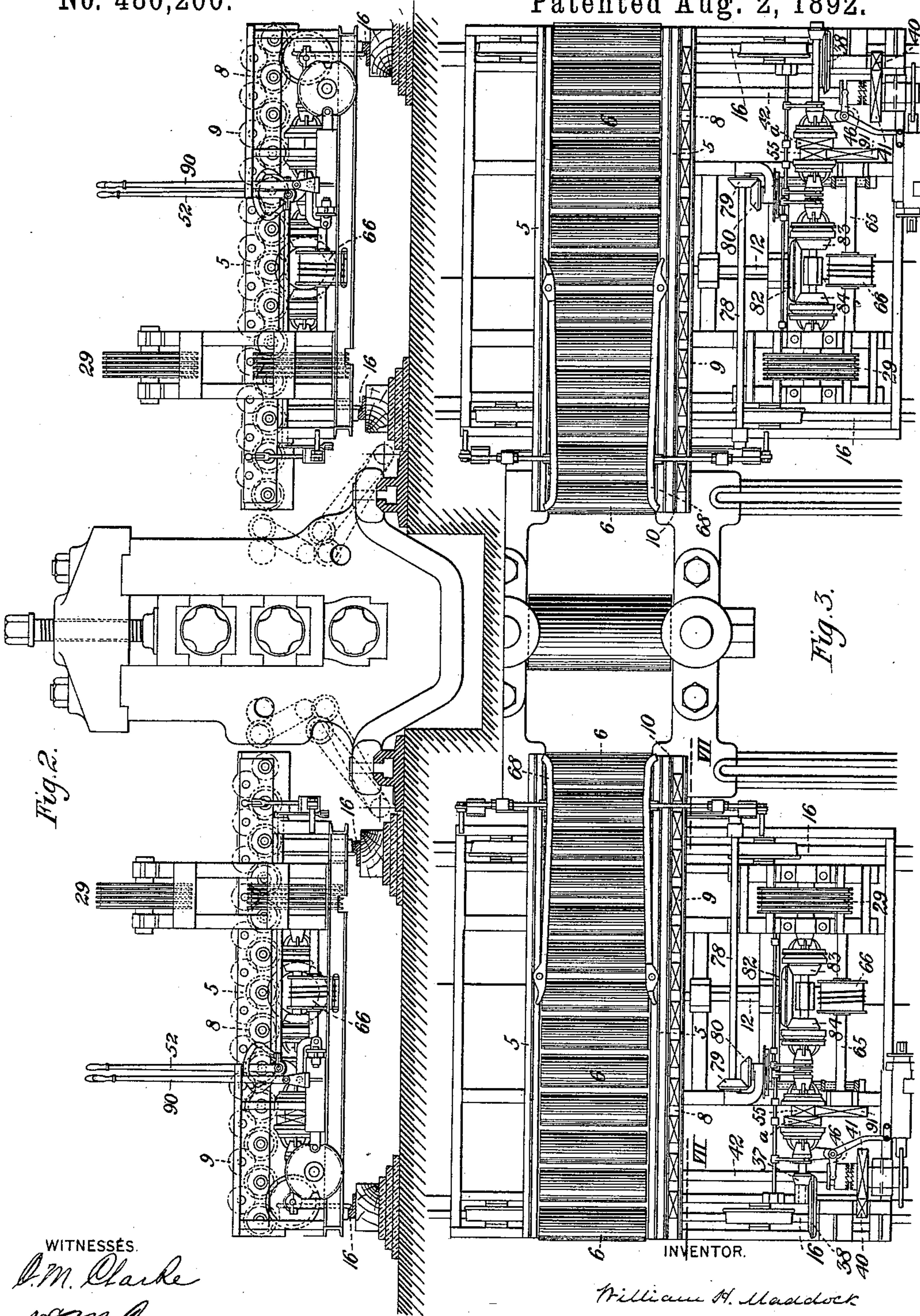


Fig. 2.

Fig. 3.

WITNESSES.

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*his attorney*



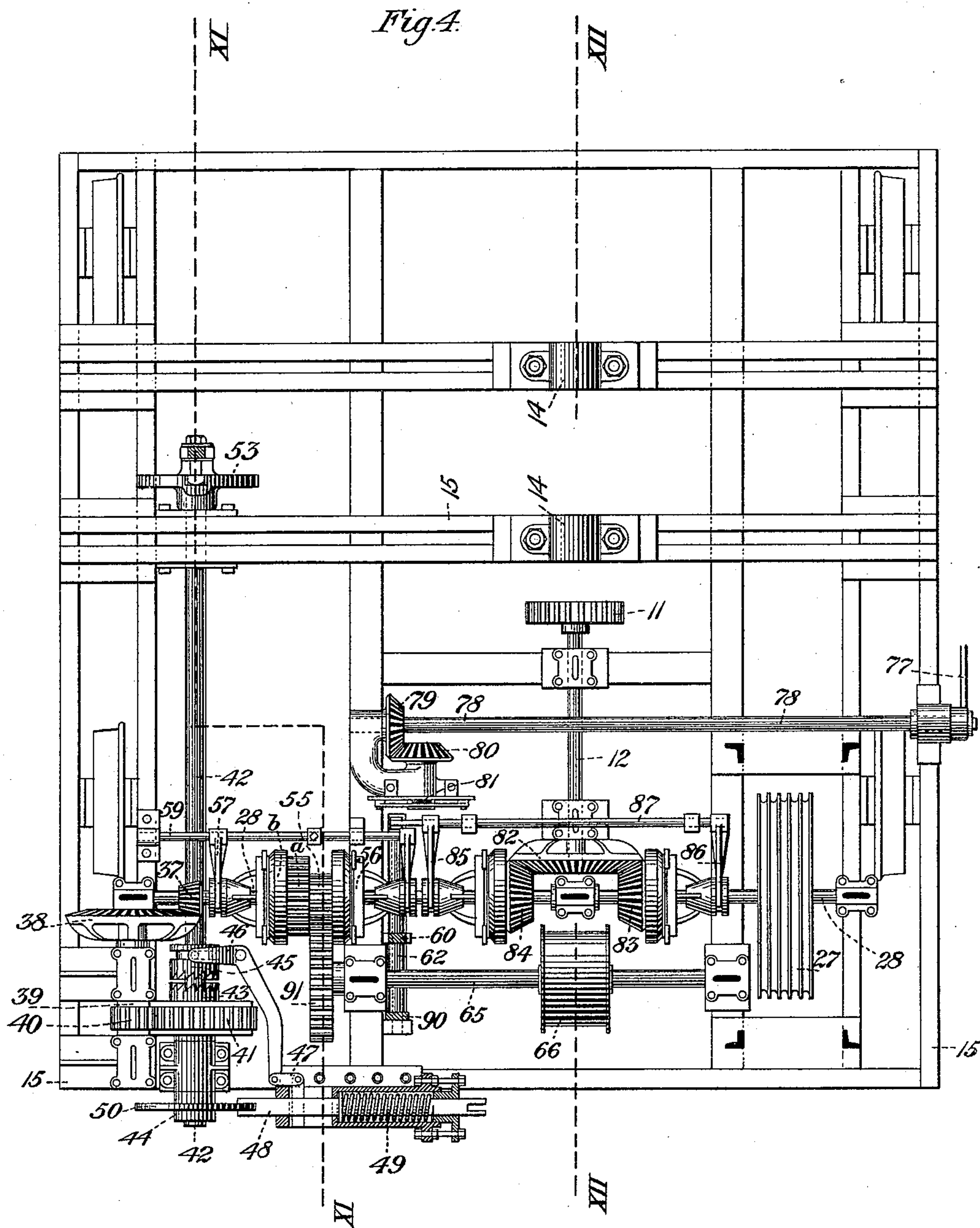
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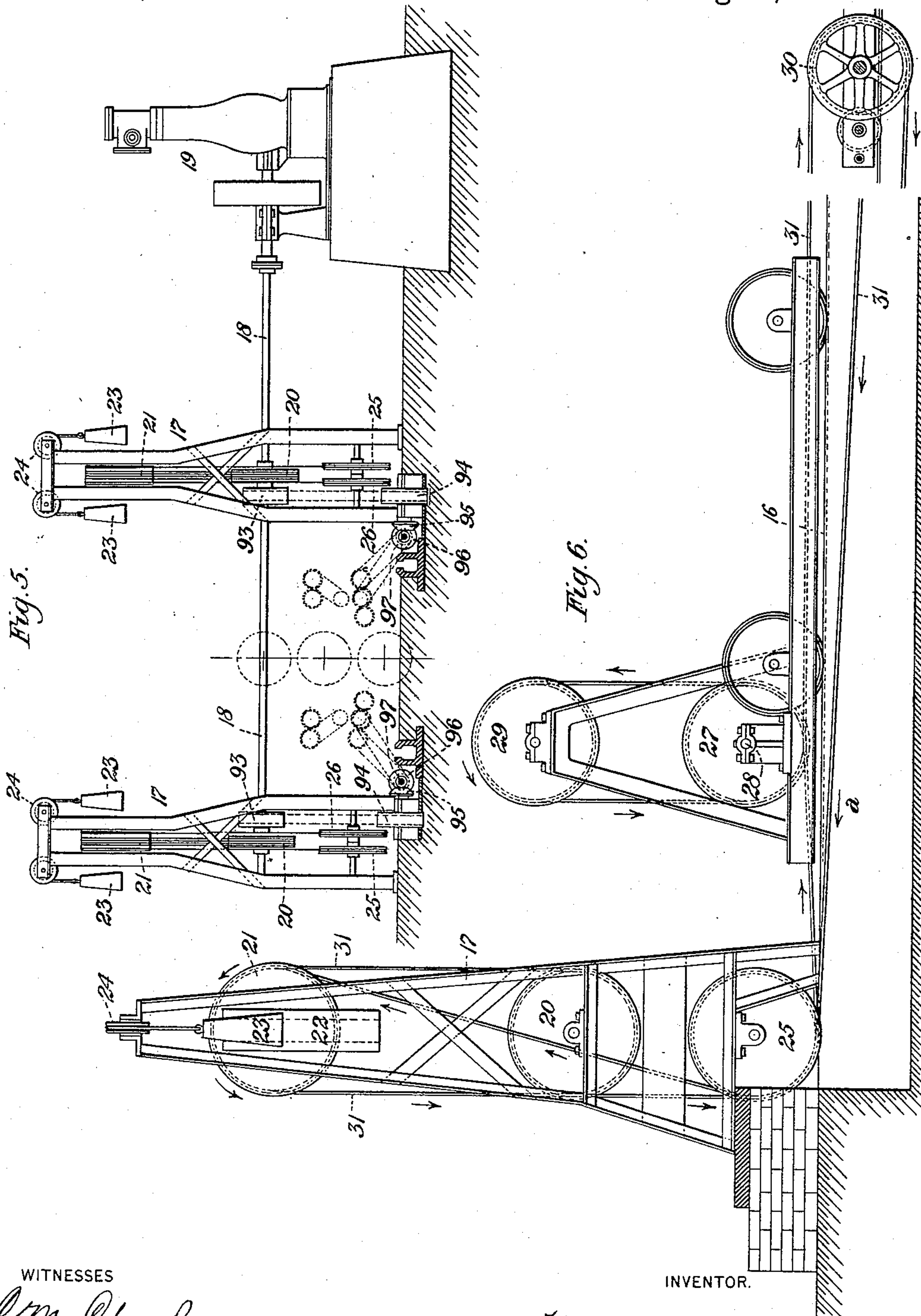
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Patented Aug. 2, 1892.



WITNESSES

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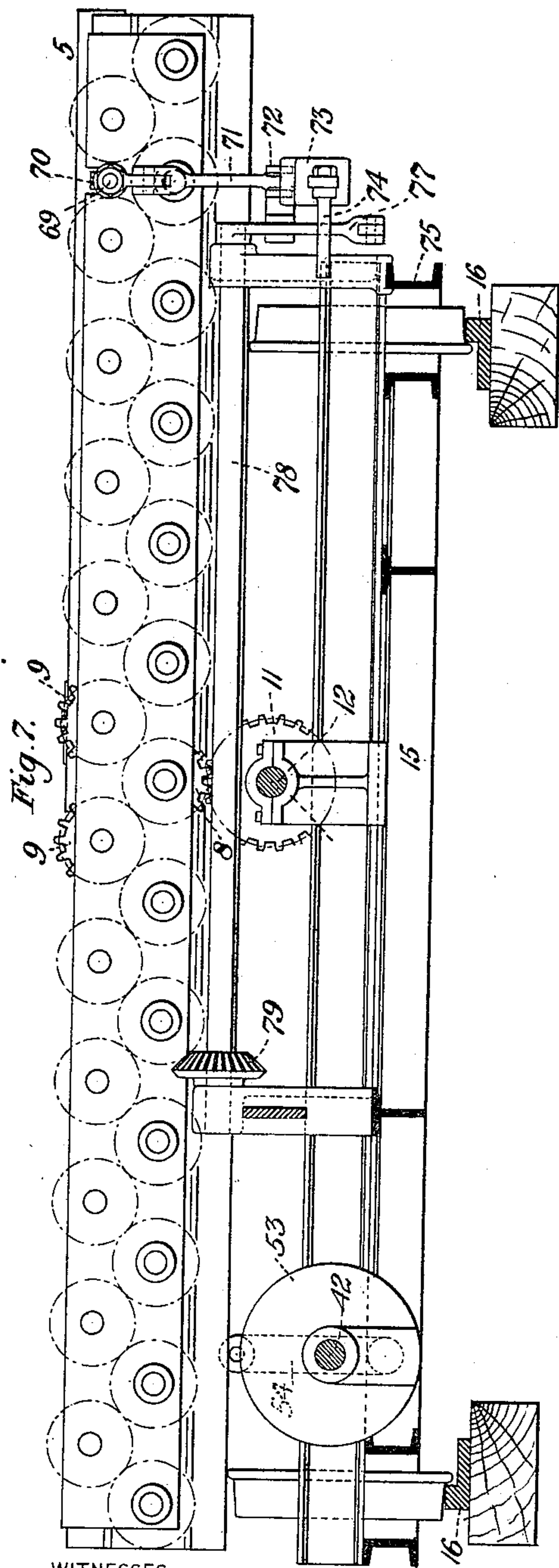
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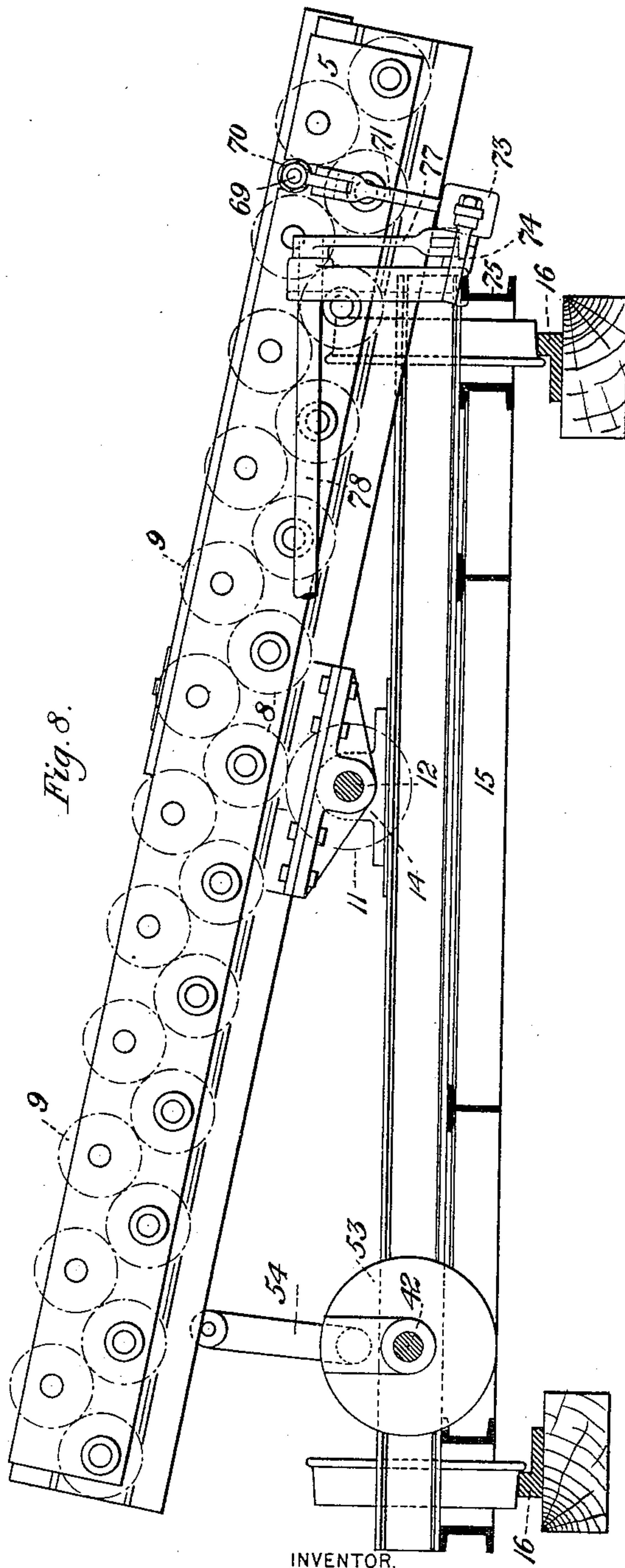
No. 480,200.

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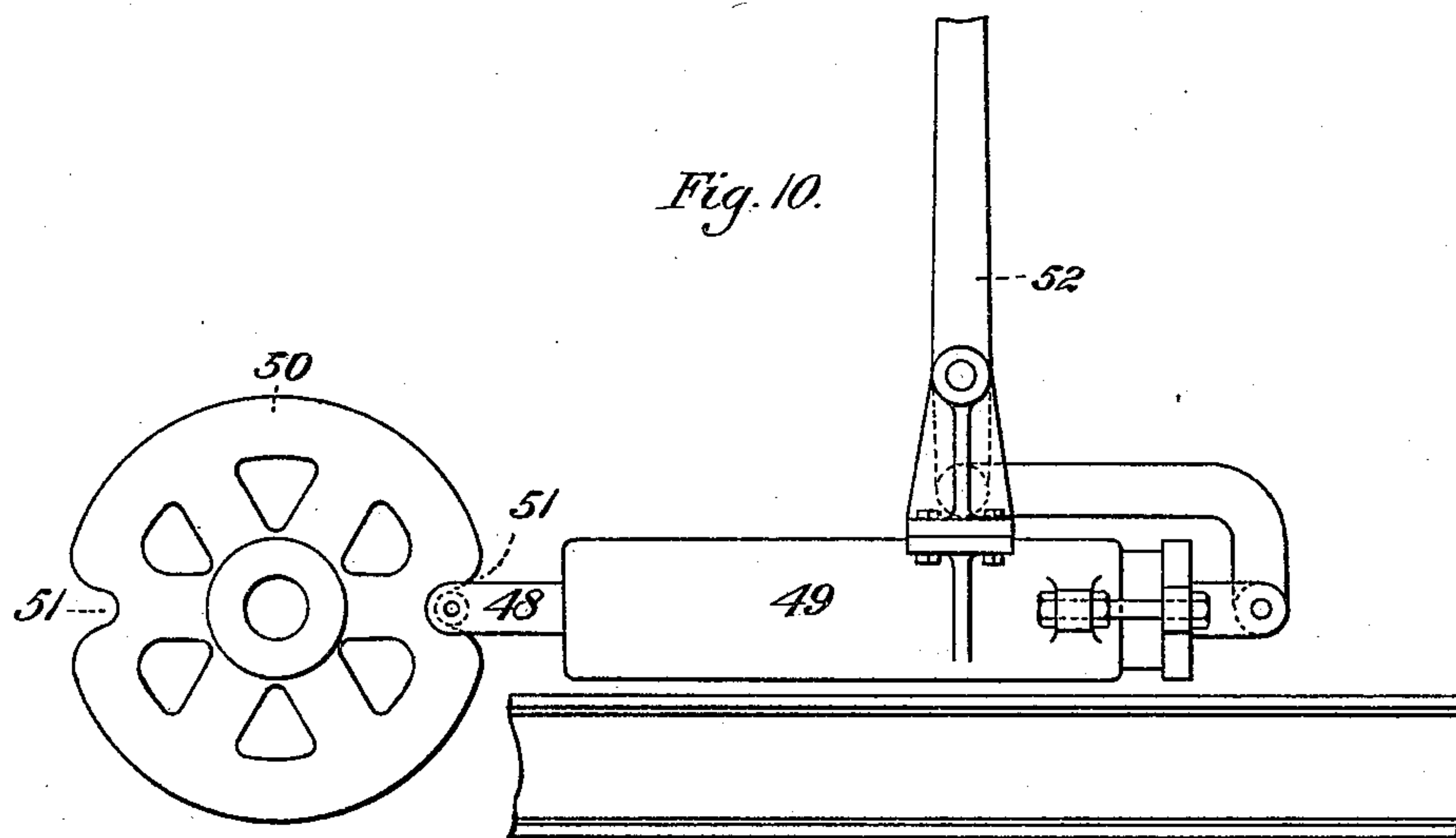
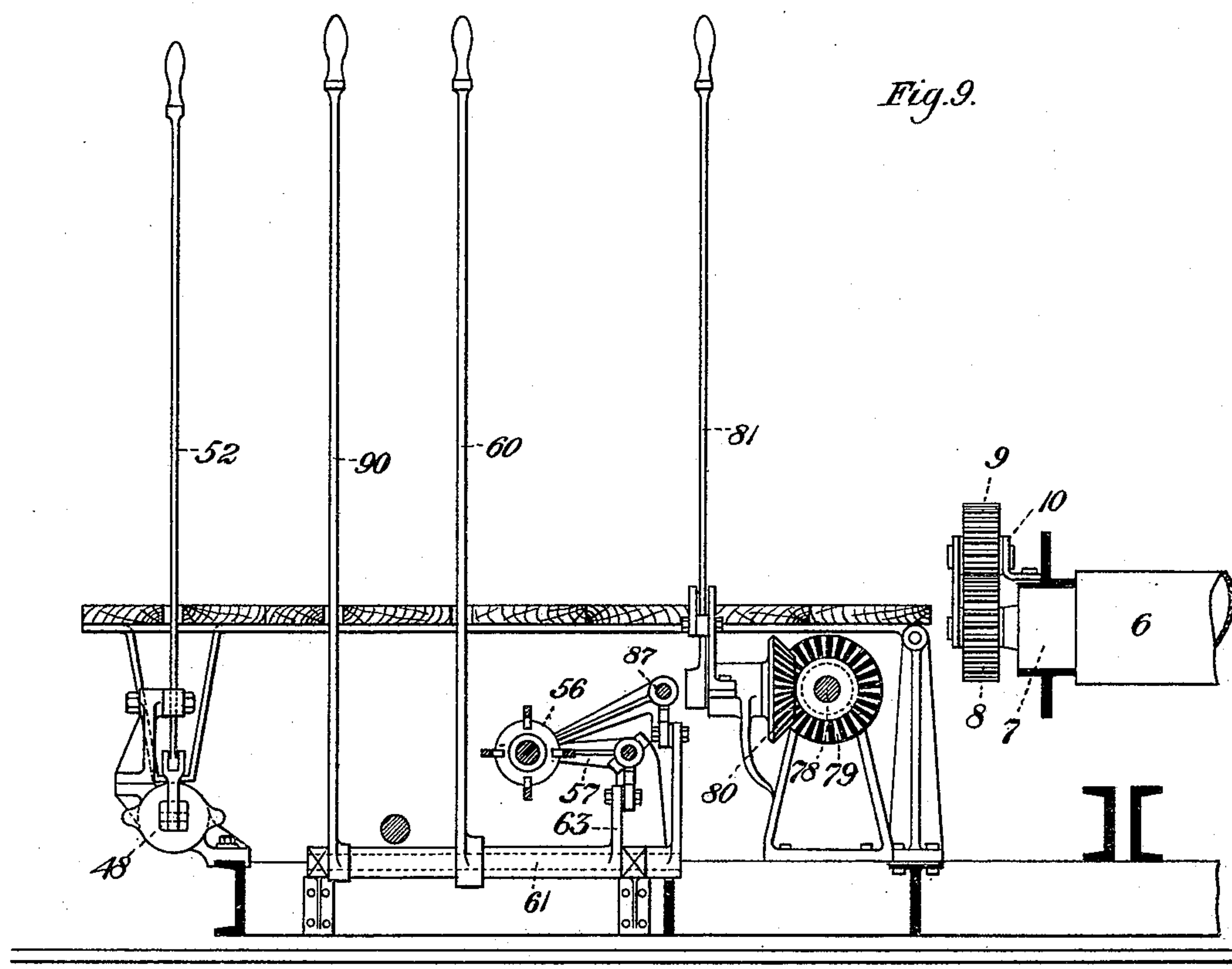
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(No Model.)

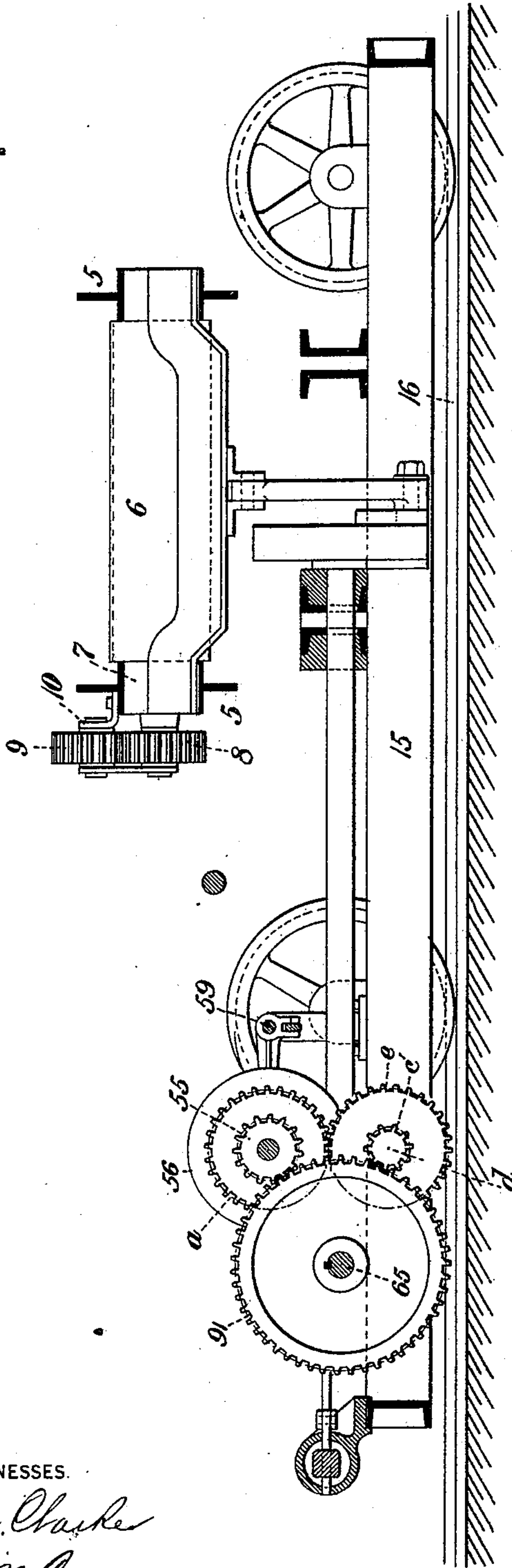
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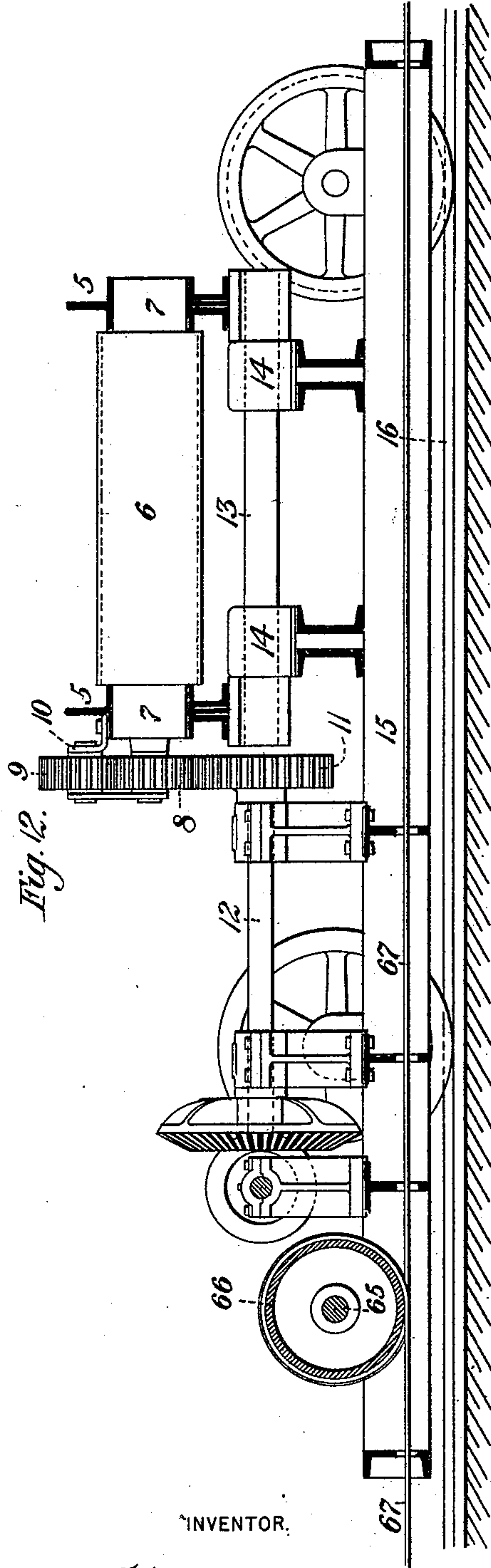
Fig. 11.



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Fig. 12.



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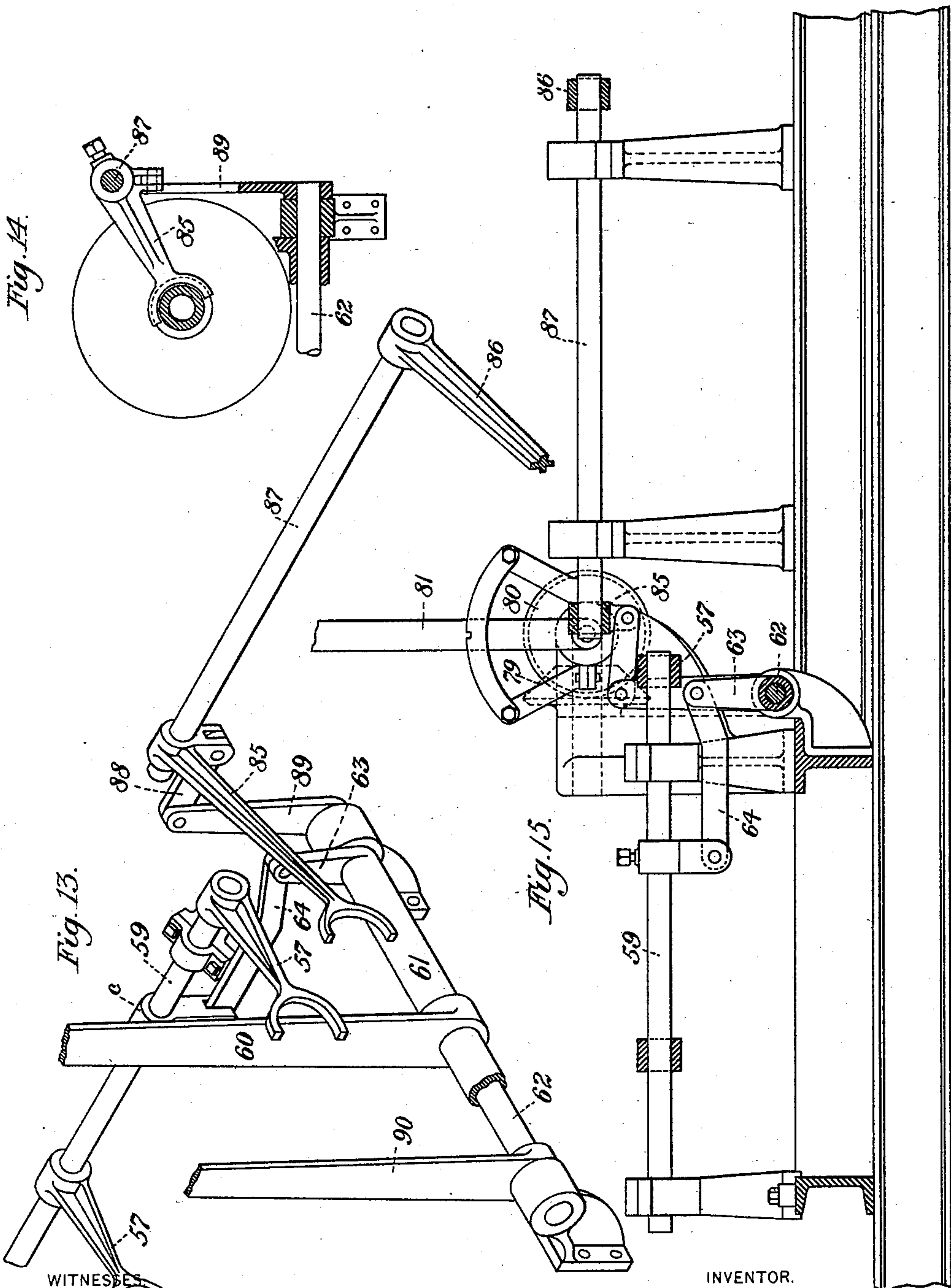
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No. 480,200.

Patented Aug. 2, 1892.



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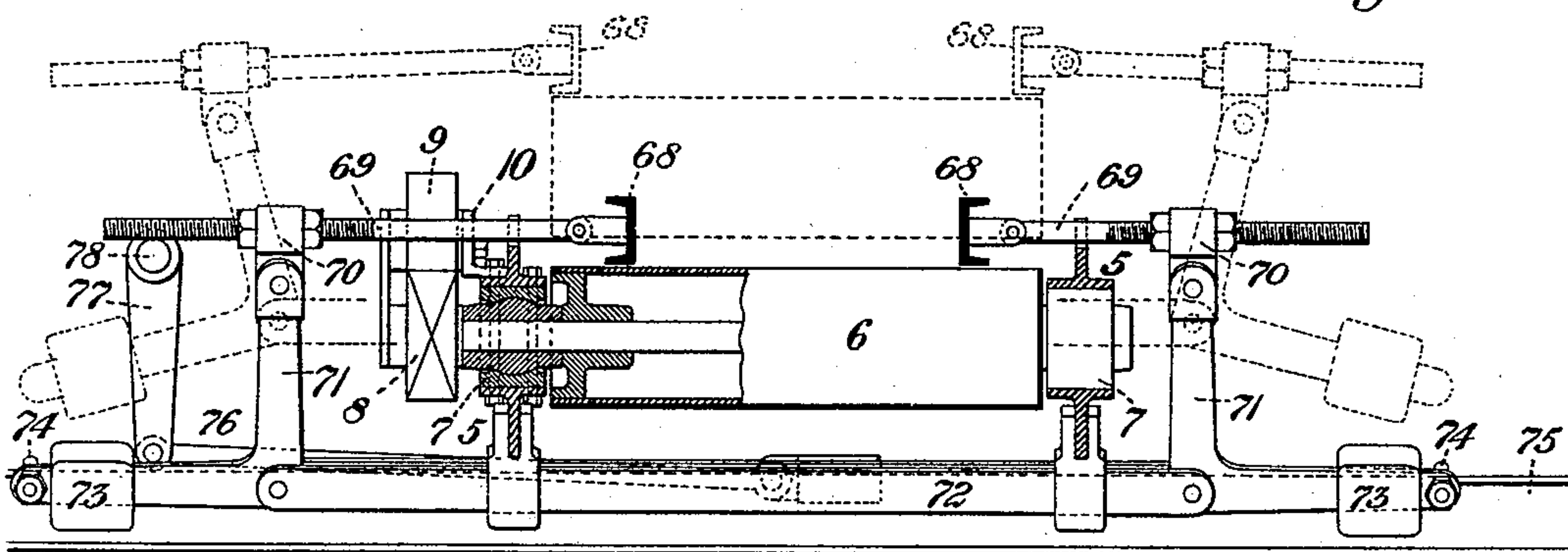
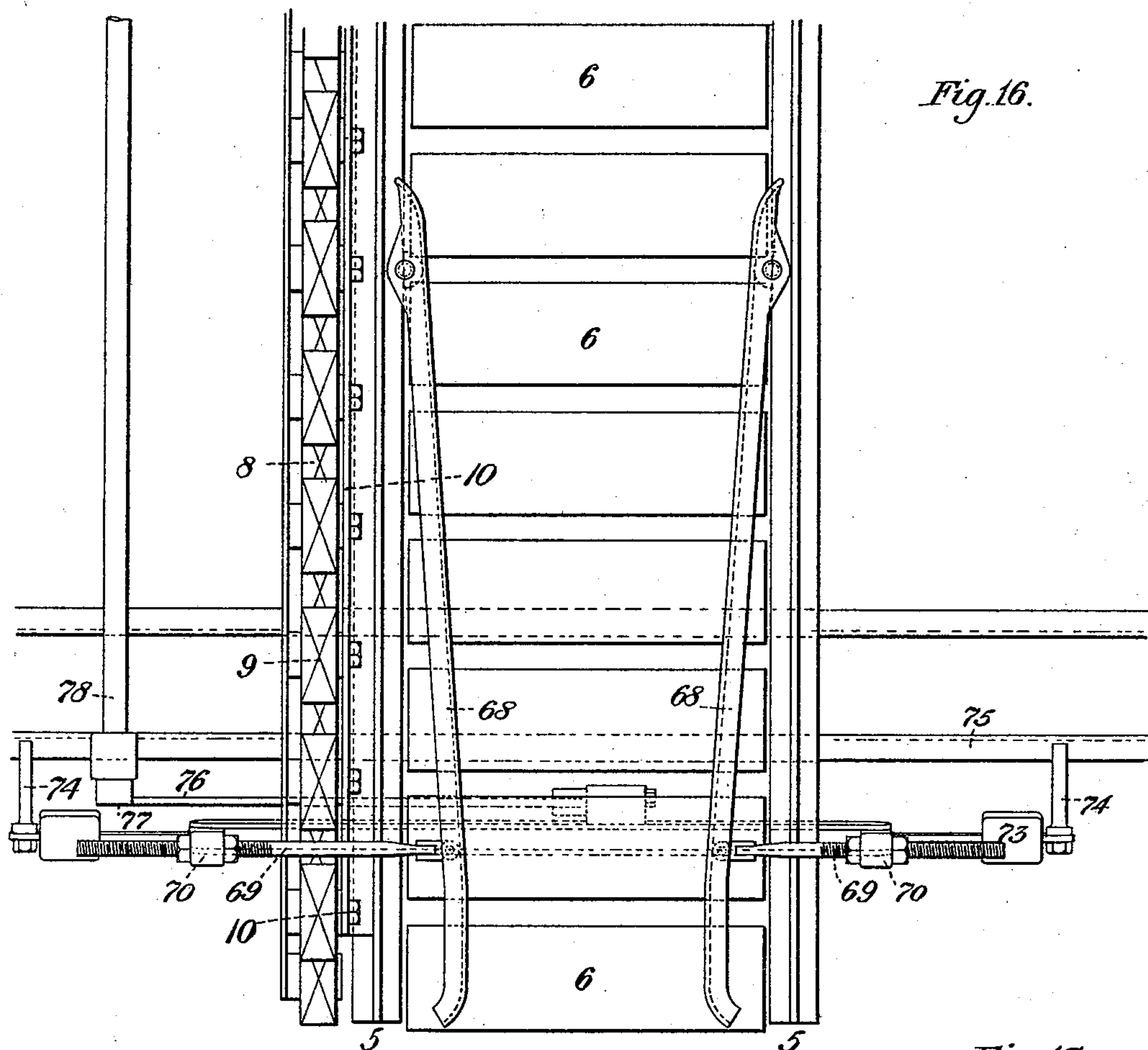
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MILL APPLIANCE.

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(No Model.)

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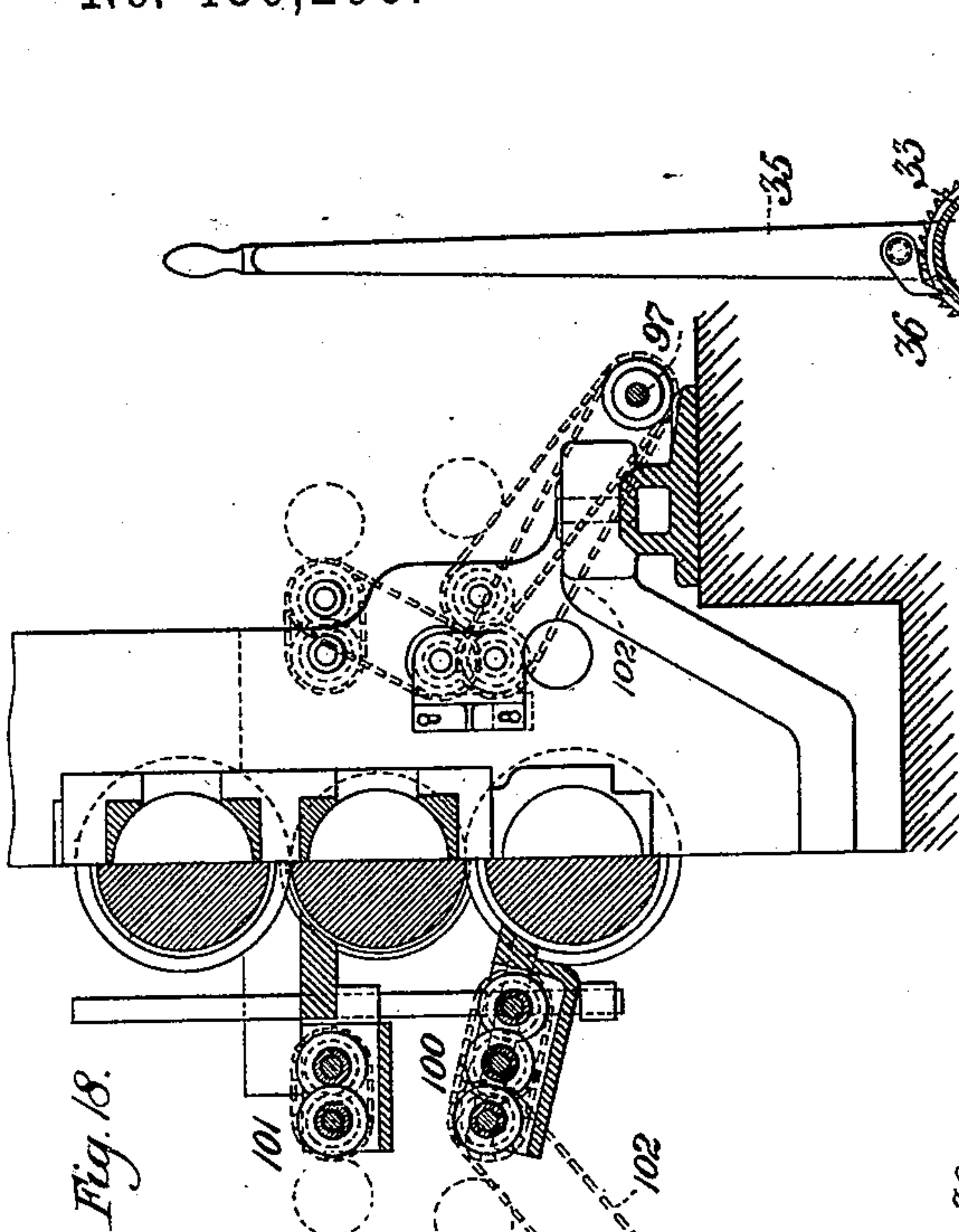


Fig. 18.

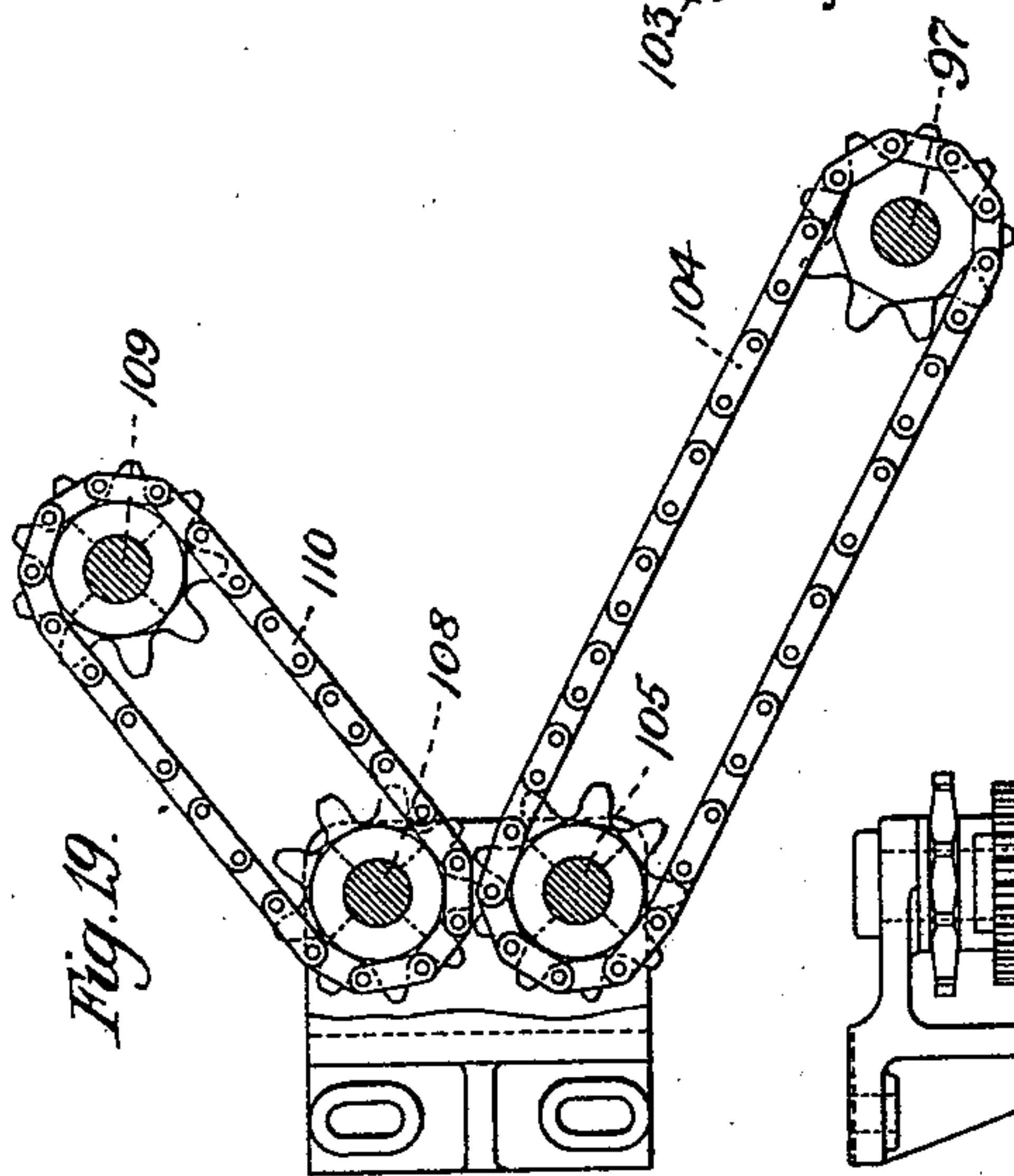


Fig. 19.

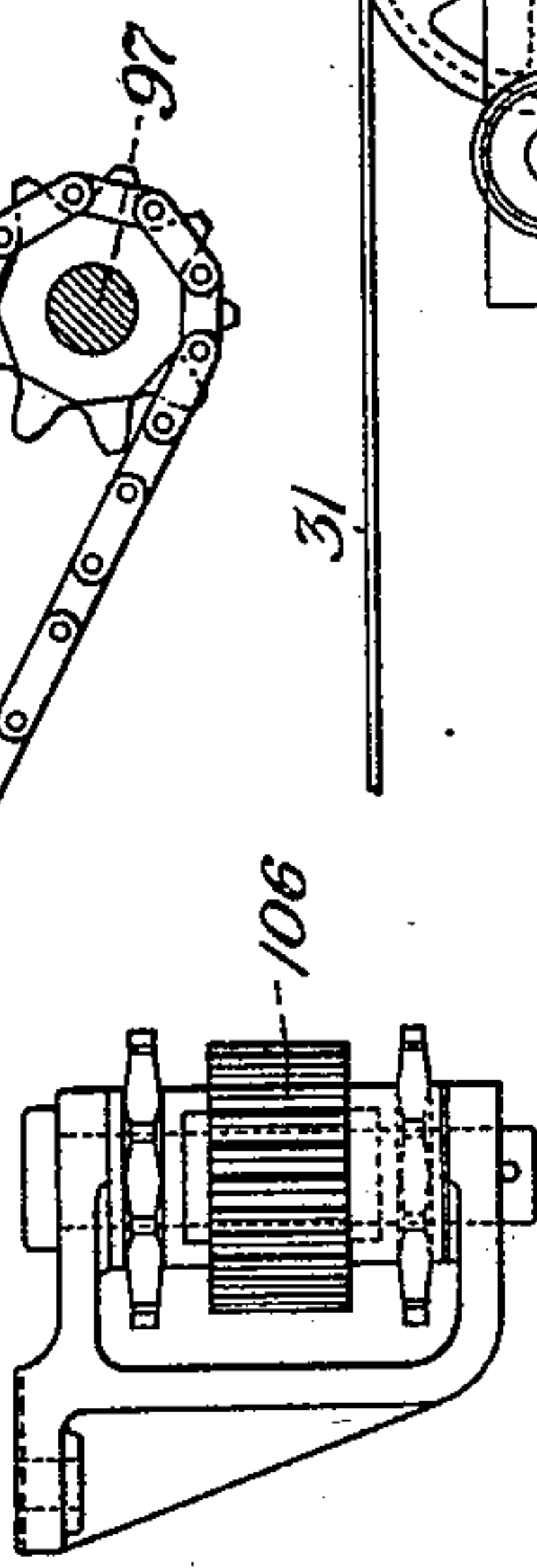


Fig. 20.

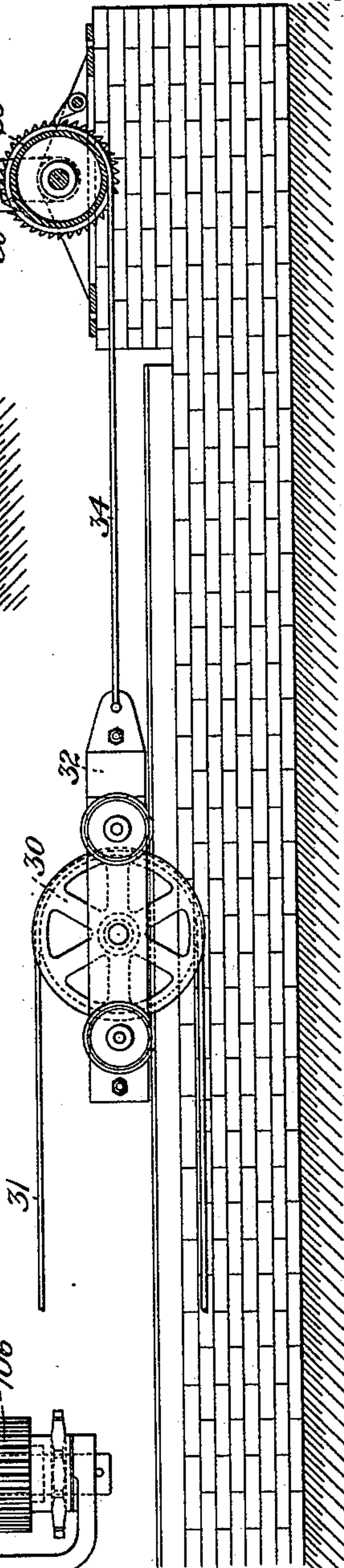


Fig. 21.

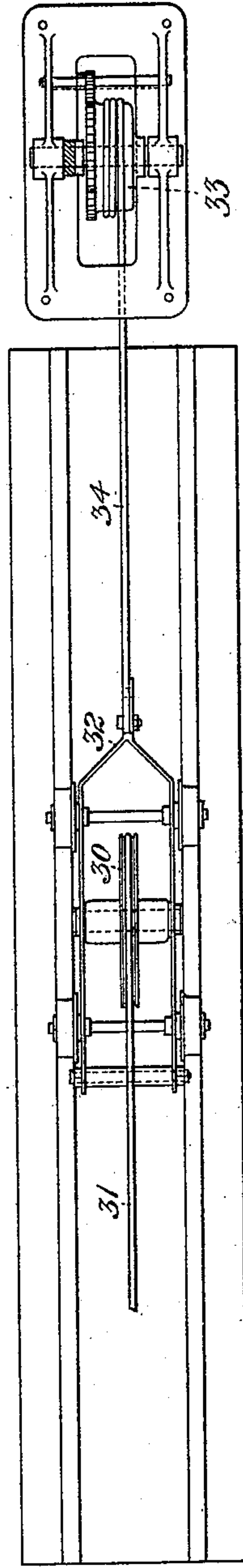


Fig. 22.

WITNESSES

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*H. M. Corwin*

INVENTOR.

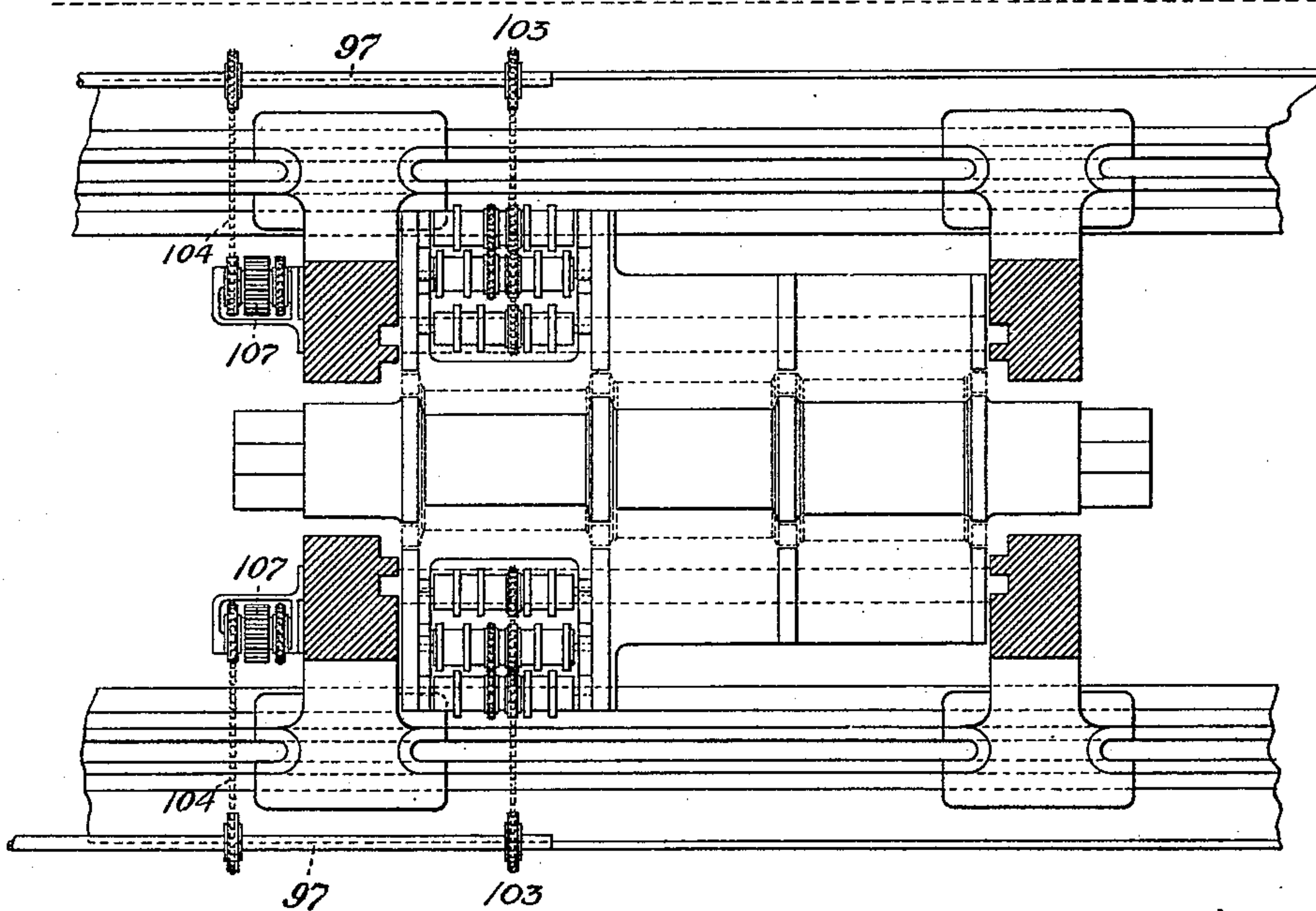
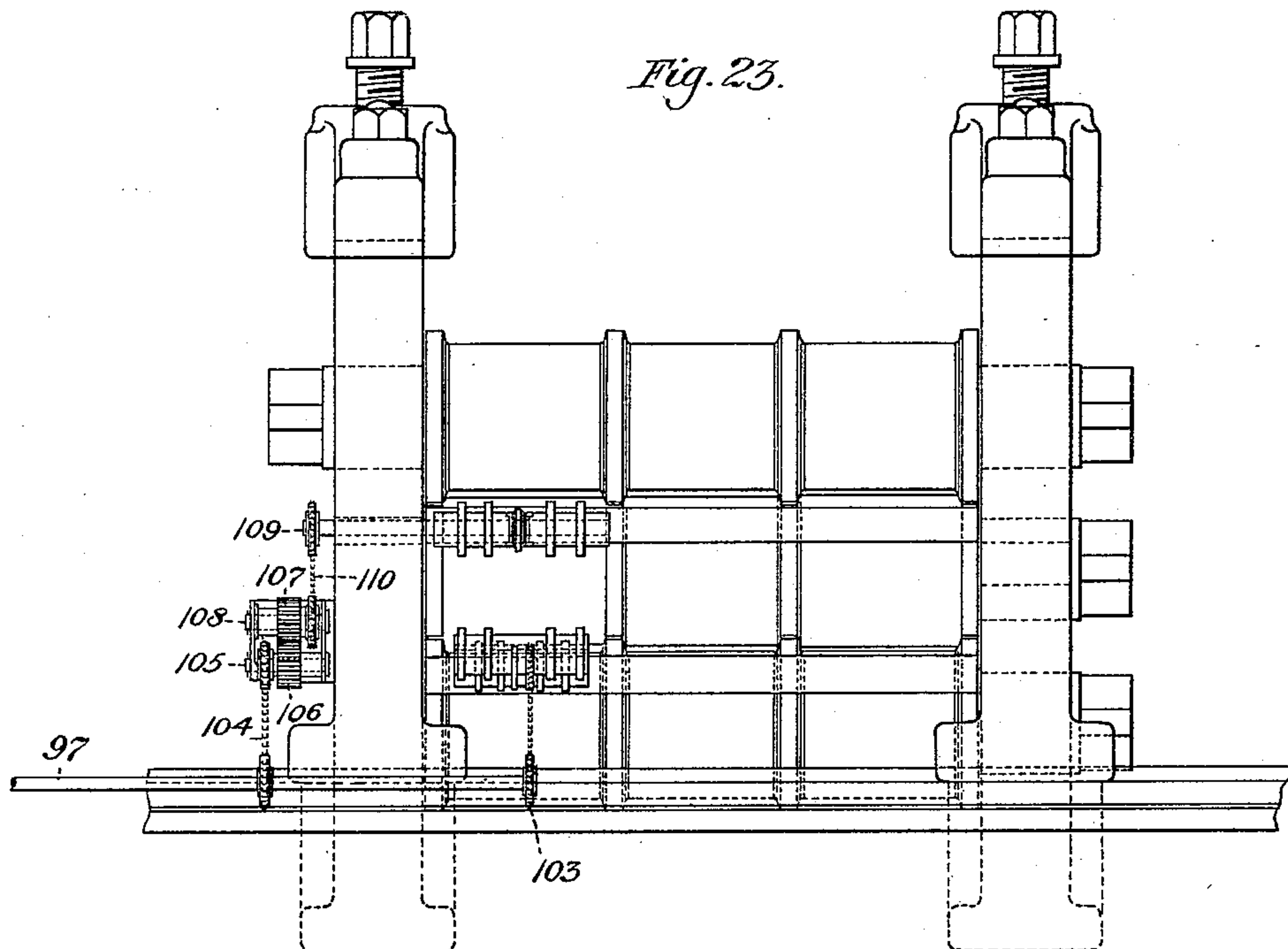
*William H. Maddock*  
*by T. B. Baskwell & Sons*  
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W. H. MADDOCK.  
MILL APPLIANCE.

No. 480,200.

Patented Aug. 2, 1892.



WITNESSES

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*Wm. Conner*

*Fig. 24.*

INVENTOR.

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*by T. B. Bakerwell Sons*  
*his attorneys*



# UNITED STATES PATENT OFFICE.

WILLIAM H. MADDOCK, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THE RIVERSIDE IRON WORKS, OF WHEELING, WEST VIRGINIA.

## MILL APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 480,200, dated August 2, 1892.

Application filed October 17, 1891. Serial No. 408,995. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. MADDOCK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mill Appliances, 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—

10 Figure 1, Sheet 1, is a general plan view of my improved feed-tables. Fig. 2, Sheet 2, is a side elevation of the feed-tables proper. Fig. 3, Sheet 2, is a plan view of the same. Fig. 4, Sheet 3, is a plan view, on an enlarged  
15 scale, of the operative mechanism of one of the tables. Fig. 5, Sheet 4, is an end elevation of the engine and cable towers, parts of the mill being shown in dotted lines. Fig. 6, Sheet 4, is a side elevation of one of the tow-  
20 ers and the table-framing, illustrating the arrangement of the cable. Fig. 7, Sheet 5, is a sectional view taken on the line VII VII of Fig. 3. Fig. 8, Sheet 5, is a similar view showing the table carrying the feed-rollers in an  
25 inclined position. Fig. 9, Sheet 6, is a front elevation showing the various operating-levers in their normal position. Fig. 10, Sheet 6, is a detail view, on an enlarged scale, showing the locking mechanism. Fig. 11, Sheet 7,  
30 is a cross-sectional view taken on the line XI XI of Fig. 4. Fig. 12, Sheet 7, is a similar view taken on the line XII XII of Fig. 4. Fig. 13, Sheet 8, is a perspective view of part of the clutch-shifting mechanism. Fig. 14,  
35 Sheet 8, is a detail view of one of the clutch-shifting arms and operating-shaft. Fig. 15, Sheet 8, is a view in elevation of the sliding shaft for operating the clutch-shifting arms. Fig. 16, Sheet 9, is a plan view of the manip-  
40 ulators. Fig. 17, Sheet 9, is an end elevation, partly in section, showing the feed-rollers and the automatic action of the manipulators. Fig. 18, Sheet 10, is an end view, partly in  
45 section, of the mill, showing the auxiliary feed-rollers. Fig. 19, Sheet 10, is a detail view, on an enlarged scale, of part of the driving mechanism of the auxiliary feed-rollers. Fig. 20,  
50 Sheet 10, is a plan view of the gear-framing. Fig. 21, Sheet 10, is a side elevation, partly in section, of the cable-tightening device. Fig. 22, Sheet 10, is a plan view of the same.

Fig. 23, Sheet 11, is a front elevation of one train of rolls provided with auxiliary feed-rollers and mechanism for operating the same. Fig. 24, Sheet 11, is a plan view, partly in  
55 section, of Fig. 23.

Like symbols of reference indicate like parts in each.

I will now describe my invention, so that others skilled in the art may manufacture and  
60 use the same.

I. *Construction of the feed-tables.*—Referring to the drawings, 2 3 4 represent sets of rolls arranged in line with each other and set in housings in the usual way. Some or all of  
55 these rolls are three high, and the function of the feed-tables is to carry the piece of metal to be rolled laterally from one set of rolls to the next in succession and to carry the piece from one pass of the three-high set or sets of  
70 rolls to the pass above or below the same. It will be understood, however, that my invention is not limited to any particular arrangement of the rolls, since the lateral motion of the table may be utilized in shifting the metal  
75 piece from one pass of a single set of rolls to another pass or passes at the side thereof. There are two feed-tables, one on each side of the rolls; but as these two tables are or  
80 may be similar in construction I shall describe only one of them, it being understood that the same description will apply to the other. The frame of each table is composed of parallel side beams or rails 5, which are  
85 connected by suitable braces which may be arranged in the manner heretofore commonly employed in the construction of rolling-mill feed-tables. The feed-rollers 6 are journaled in bearings 7 (see Fig. 17) in the side rails 5,  
90 and at the outer end of one of the necks of each roll is a spur-wheel 8, which is keyed to the neck and meshes with one or two of a series of connecting idler spur-wheels 9, which are situated above the level of the rolls and are  
95 journaled in brackets 10, which are mounted on the side rails 5. Situate below the spur-wheels 8, and at or about the middle of the length of the table, and meshing with one of the spur-wheels 8, is a spur-wheel 11, which is keyed  
100 to the power-shaft 12, as shown in Figs. 4, 7, and 12, and by this arrangement the feed-rollers 6 may be driven in either direction, as



the power transmitted by the spur-wheel 11 to the middle spur-wheel 8 of the series is transmitted to each of the spur-wheels 8 by the idlers 9. The table is pivoted at its middle on the transverse shaft 13, which is journaled in bearings 14 on the frame of the carriage 15, Figs. 8 and 12, so that the end of the table may be raised and lowered vertically or tilted, so as to deliver the piece of metal to a high or low pass of the rolls or to receive it therefrom. This carriage 15, which carries the feed-tables and their operating mechanism, is supported by wheels which are adapted to run on rails 16, extending laterally in front of the rolls, so that the carriage and table thereon may be moved laterally from one pass of the rolls to another by mechanism designed for that purpose, which will be hereinafter described.

II. *Power is applied to the operating mechanism of the feed-tables by endless cables.*—At one end of the train of rolls is a tower 17, (see Figs. 1, 5, and 6,) extending through which is a shaft 18, which is driven by the engine 19. Keyed to this shaft is a drum 20 and situate above the drum 20 is a drum 21, which is journaled in vertically-sliding housings 22 and is supported by the weights 23 and ropes, which pass over the sheaves 24. Near the base of the tower are two guide drums or wheels 25 26. In following the line of the cable 31, starting at the arrow *a*, Fig. 6, it passes under the guide-sheave 25 and thence to and around the drum 21 and thence to and around the drum 20, back to and around the drum 21 and thence to and under the second guide-sheave 26, to and around a drum 27, keyed to a shaft 28 on the carriage 15, thence to and around a second drum 29 on the carriage, back to and around the drum 27, and thence to and around the tightening-sheave 30 at the other end of the track 16, from which it returns to the point *a*. By this arrangement when power is applied to the shaft 18 and drum 20 the cable traveling over the drum transmits power to the shaft 28, to which the drum 27 is keyed, so that it may be caused to turn in either direction by reversing the motion of the engine. It is well understood that it is necessary to keep the cable 31 perfectly taut, and this is accomplished by the weights 23, which draw on the drum 21, and also by the tightening-sheave 30, which is journaled in traveling housings 32, as is shown in Figs. 21 and 22, the housings being in the form of a truck, which is connected with tightening-drum 33 by a rope 34, which is secured to the truck and to and around the drum. This drum 33 is connected with a hand-lever 35 by a ratchet and pawl 36, so that by the movement of the lever the rope 34 is tightened. Although I have described a certain number of turns of the cable 31 around the various drums, I do not desire to limit myself to the same, it only being necessary to give sufficient to prevent the cable from slipping.

III. *The lifting mechanism of the feed-tables.*—Referring to Fig. 4, it is seen that the shaft 28, to which power is applied by the drum 27, extends across the carriage 15 and is the main power-shaft of the feed-table mechanism. At the outer end of this shaft 28 is a bevel-wheel 37, which meshes with a bevel-wheel 38, which is keyed to the short shaft 39. Keyed to the shaft 39 is the spur-wheel 40, which meshes with a gear-wheel 41, which is keyed to a sleeve 44, which is mounted loosely on the shaft 42 and is provided with a toothed clutch-collar 43. Keyed to the shaft 42 by a feather and spline is a clutch-collar 45, around which collar rests a yoke 46, the arm of which is connected by a bell-crank 47 with a spring-rod 48, which rod is connected with a spring situate in a suitable box 49. At the outer end of the shaft 42 and keyed thereto is a wheel 50, (see Fig. 10,) having two indentations or slots 51 in its periphery at points opposite to and equidistant from each other. At the end of the rod 48 is a friction-roller, which is adapted to travel on the periphery of the wheel 50 and to fit in the indentations 51, the end of the rod 48 being kept in contact with the periphery of the wheel 50 by the force of the spring in the box 49. It should be noticed that the depth of the indentations 51 is sufficient to allow the end of the rod 48 to enter far enough to lock the wheel 50 and hold it stationary, and also that the corners of the indentations are rounded, so as to prevent jarring as the rod enters and leaves the indentations. The other end of the rod 48 is connected with a hand-lever 52, by means of which the rod 48 may be retracted, so as to withdraw it from the indentations 51. By retracting the rod 48, it being connected with the bell-crank 47, as is shown in Fig. 4, the yoke 46 connects the two parts 43 and 45 of the clutch, so that as the rod 48 releases the wheel 50 the shaft 42 is at the same time set in motion. Keyed to the inner end of the shaft 42 is a wheel 53, which is provided with a pitman 54, which is pivoted to the lower side of the feed-table, as is shown in Fig. 8. The table being pivoted in the bearings 14, as already described, and in the position shown in Fig. 7, the shaft 42 being set in motion the pitman 54 elevates the rear end of the feed-table and lowers the other to the position shown in Fig. 8. This is accomplished by a half-revolution of the shaft 42, and the wheel 50 revolving with the shaft the second indentation 51 is brought opposite the end of the rod 48, which immediately enters the indentation, owing to the force of the spring 49, the lever 52 having been released, and as the rod 48 is pushed forward by the spring the yoke 46, being actuated by the movement of the rod, separates the clutch 43 45, the movement of the shaft 42 ceases, and the table is locked in the position shown in Fig. 8. To lower the rear end of the table, the lever 52 is again drawn and



released and the pitman 54 brings the table back to the position shown in Fig. 7, where it is again locked by the rod 48.

IV. *The mechanism for moving the tables laterally.*—Referring to Figs. 4 and 11, loosely mounted on the shaft 28 is a pinion 55, which is provided with a clutch 56, which is secured to the shaft 28 by a feather and spline and so arranged as to be moved laterally on the shaft 28 into connection with the pinion 55 for the purpose of imparting the motion of the shaft thereto. Next to the pinion 55 is a gear-wheel *a*, which is also loosely mounted on the shaft 28 and is provided with a clutch *b*, similar to the clutch 56. These clutches 56 and *b* are operated by the fingers 57, (see Figs. 13 and 14,) which engage with the clutches and are secured to the sliding bar 59. Secured to the bar 59 is a collar and short arm *c*, to which is pivoted the arm 64, the other end of which is pivoted to a short arm 63, which is secured to the sleeve 61, which is mounted on the shaft 62. Secured to the sleeve 61 is a hand-lever 60. Owing to this arrangement the pinion 55 and gear-wheel *a* may be alternately thrown into connection with the shaft 28 by the movement of the lever 60. Keyed to the shaft 65 (see Figs. 4 and 11) is a gear-wheel 91, which meshes with the pinion 55 and also meshes with a pinion *c'*, which is keyed to a short shaft *d*. Keyed to the shaft *d* and meshing with the gear-wheel *a* is a gear-wheel *e*. When the pinion 55 is thrown into connection with the shaft 28, it imparts motion to the gear-wheel 91 and the shaft 65, the gear-wheel *a* traveling loosely on the shaft 28. When the gear-wheel *a* is thrown into connection with the shaft 28 and the pinion 55 out of connection, power is transmitted to the wheel 91 and shaft 65 in the opposite direction by the gear-wheels *a* and *e* and pinion *c'*. Midway on the shaft 65 and keyed thereto is a drum 66, around which passes by several turns a cable 67, (see Fig. 12,) which cable is anchored at each end beyond each end of the track 16. (See Fig. 1.) Owing to the cable 67 being tightly wound on the drum 66, when motion is imparted to the drum the carriage 15 will be drawn along the track 16 in accordance with the direction in which the shaft 65 is being driven.

V. *The manipulator.*—In the drawings I have shown each of the feed-tables provided with a manipulator for shifting the metal laterally and centering it properly with relation to the pass of the rolls; but in most cases but one of the feed-tables is so provided. Referring to Figs. 3 and 16, 68 are movable guide-bars whose rear ends are pivotally connected to the frame of the feed-table at a point about midway in the series of feed-rollers and extend above the feed-rollers to a point adjacent to the rolls. Pivotaly connected to each of the bars 68 are arms 69, extending horizontally at right angles to the bars and provided with threads on

their outer ends, which engage with threaded nuts to the heads 70, which heads are pivotally connected with the rock-levers 71. (See Fig. 17.) These rock-levers are pivoted to and connected with each other by the transverse bar 72, situate below the level of the rolls 6. At the outer ends of the rock-levers 71 are weights 73 and short arms 74, which arms project over the rail 75 of the frame of the carriage. These parts rise and fall with the table and, referring to Figs. 7, 8, 16, and 18, their operation is as follows: When the table is brought to a level position, as shown in Fig. 7, the arms 74 are lifted off the rail 75 and the weights 73 drop down, as is shown by the dotted lines in Fig. 17, and thereby move the bars 68 laterally away from each other, thus opening the guide-bars into position to receive between them the metal piece as it emerges from the rolls. When the front end of the table descends to the position shown in Fig. 8, the arms 74 again come in contact with the beam 75, which lifts the arms and brings the guide-bars 68 toward each other, so as to automatically center the piece of metal in front of the rolls. By means of the threads on the rods 69 the distance between the bars 68 may be adjusted. When the manipulator is employed on both tables, or when it is desired to have the guide-bars open when the front end of the table is depressed and to close when the table is brought on a level, the weighted arms of the rock-levers may be reversed in position, so as to cause the rock-lever to act in a reverse direction to that described. Pivoted to the bar 72 is a bar 76, the other end of which is pivoted to the crank-arm 77, which is keyed to the shaft 78. This shaft 78 extends partly across the table, being journaled in suitable bearings in the frame of the table, and at its other end is a miter-wheel 79, which meshes with a miter-wheel 80, which is operated by the hand-lever 81. (See Figs. 3 and 9.) By moving the lever 81 the bar 72 is pushed or pulled in either direction by the arm 76, and the guide-bars 68 are moved accordingly, thereby centering the metal independently of the movement of the table.

VI. *The feed-roller-driving mechanism.*—As already described, the feed-rollers 6 are provided with spur-wheels 8, which are connected by the idlers 9, and driven by the gear-wheel 11 on the shaft 12. (See Fig. 7.) Referring to Fig. 4, this shaft 12 is journaled in suitable bearings on the frame of the carriage 15, and at its other end a bevel-wheel 82 is keyed. Mounted on the shaft 28 are the bevel-wheels 83 84, provided with clutches, which are moved by the arms 85 86, so as to bring the wheels 83 and 84 alternately in such connection with the shaft 28 as to rotate therewith and impart motion to the bevel-wheel 82. These clutch-arms 85 86 are keyed to the sliding shaft 87, (see Figs. 13, 14, and 15,) which shaft is connected with the shaft 62 by the



crank-arms 88 89 and is operated by the hand-lever 90, so as to throw the gear-wheels in and out of connection with the power-shaft 28. The feed-rollers will by these means be  
 5 driven in either direction, according to which of the wheels 83 84 is brought in connection with the shaft and will remain stationary when both wheels are out of connection.

VII. *The auxiliary feed-rollers and mechanism for operating the same.*—Where short pieces of metal are to be rolled, these auxiliary feed-rollers may be employed in conducting the metal from the tables to the rolls. Referring to Figs. 2 and 5, keyed to the shaft 18,  
 15 which is driven by the engine, is a belt-wheel 93, which is connected by a belt with the belt-wheel 94 at the base of the towers 17. This belt-wheel 94 is keyed to a shaft which is provided with a miter-wheel 95, which meshes  
 20 with a miter-wheel 96, which is keyed to a shaft 97, which extends in front of the rolls 2 3 4. (See Figs. 23 and 24.) Situate in front of the rolls are the auxiliary feed-rollers 100 101, (see Fig. 18,) which are journaled in suitable housings. The lower set of feed-rollers  
 25 100 are driven by sprocket-chains 102, which gear with a sprocket-wheel 103 on the shaft 97, and a sprocket-wheel on the front roller of the series. (See Fig. 23.) The three rollers  
 30 forming the lower series are connected with each other by sprocket-chains, so that the power communicated to the front roller from the shaft 97 is transmitted to the other rollers. The upper series of rollers 101 is driven  
 35 by a sprocket-chain 104, extending from the shaft to a sprocket-wheel on the short shaft 105, which is provided with a pinion 106, which gears with a pinion 107 on the short shaft 108. (See Fig. 19.) Extending from  
 40 a sprocket-wheel on the short shaft 108 to a sprocket-wheel on the spindle 109 of one of the upper series of rollers is a sprocket-chain 110. The two rollers forming the upper series are connected with each other by a sprocket-  
 45 chain. By these means the upper and lower series of feed-rollers are driven in opposite directions.

Having thus described my invention, what I claim is—

50 1. The combination of the traveling feed-table, feed-rollers mounted thereon, a drum mounted on the table, and mechanism for driving the rollers, an endless cable encircling the drum and passing to and around an anchored wheel, and an anchored power-drum,  
 55 substantially as and for the purposes described.

2. The combination of the traveling feed-table having feed-rollers, a driving-drum  
 60 mounted on the table and connected with the rollers by suitable mechanism, an endless cable encircling the drum, an anchored wheel, an anchored power-drum, and a tautening-

drum, substantially as and for the purposes described.

3. The combination of the traveling feed-table having feed-rollers, a power-drum 27 and friction-drum 29, mounted thereon, an endless cable, an anchored wheel, and an anchored power-drum, substantially as and for  
 70 the purposes described.

4. The combination, with the pivoted feed-table, of a lifting-pitman connected thereto, a wheel on the pitman-shaft, a reciprocating rod arranged to engage the wheel and lock the  
 75 table in its various positions, and a clutch arranged to engage the pitman-shaft and raise and lower the table, substantially as and for the purposes described.

5. The combination, with the pivoted feed-table, of a shaft carrying a pitman, arranged to raise and lower the table, a locking-wheel upon said shaft, a reciprocating locking-rod arranged to engage the locking-wheel, a clutch upon the pitman-shaft, and operative connections between the clutch and the locking-rod,  
 80 85 substantially as and for the purposes described.

6. The combination, with the laterally-movable feed-table, of a drum carried thereon, a  
 90 cable wound about the drum and secured at each end, a power-shaft upon the carriage, clutches upon the power-shaft, and mechanism engaging the clutches and drum-shaft and arranged to turn the drum-shaft in opposite  
 95 directions, substantially as and for the purposes described.

7. The combination, with the feed-table, of a manipulator mounted thereon, a pivoted rock-arm connected to the manipulator, said  
 100 arm being arranged to contact with a stationary portion as the table is lowered, and thereby shift the manipulator, and means for raising and lowering said table, substantially as  
 105 and for the purposes described.

8. The combination, with the movable feed-table mounted on rails, of the manipulator-bars pivotally mounted thereon and rock-arms connected to said bars and having projecting portions arranged to contact with sta-  
 110 tionary parts as the table is lowered, and thereby move the manipulator-bars inwardly, substantially as described.

9. The combination, with the pivoted feed-table and feed-rollers thereon, of the two sets  
 115 of auxiliary feed-rollers between the table and the rolls and sprocket-wheel connections arranged to rotate the sets of auxiliary rollers in opposite directions, substantially as and  
 120 for the purposes described.

In testimony whereof I have hereunto set my hand this 6th day of October, A. D. 1891.

WILLIAM H. MADDOCK.

Witnesses:

W. B. CORWIN,  
 H. M. CORWIN.