L. H. MILLER & G. A. NEWCOMB.

TRAVELING CRANE.

APPLICATION FILED MAY 12, 1908.

903,601.

Patented Nov. 10, 1908.

5 SHEETS—SHEET 1.

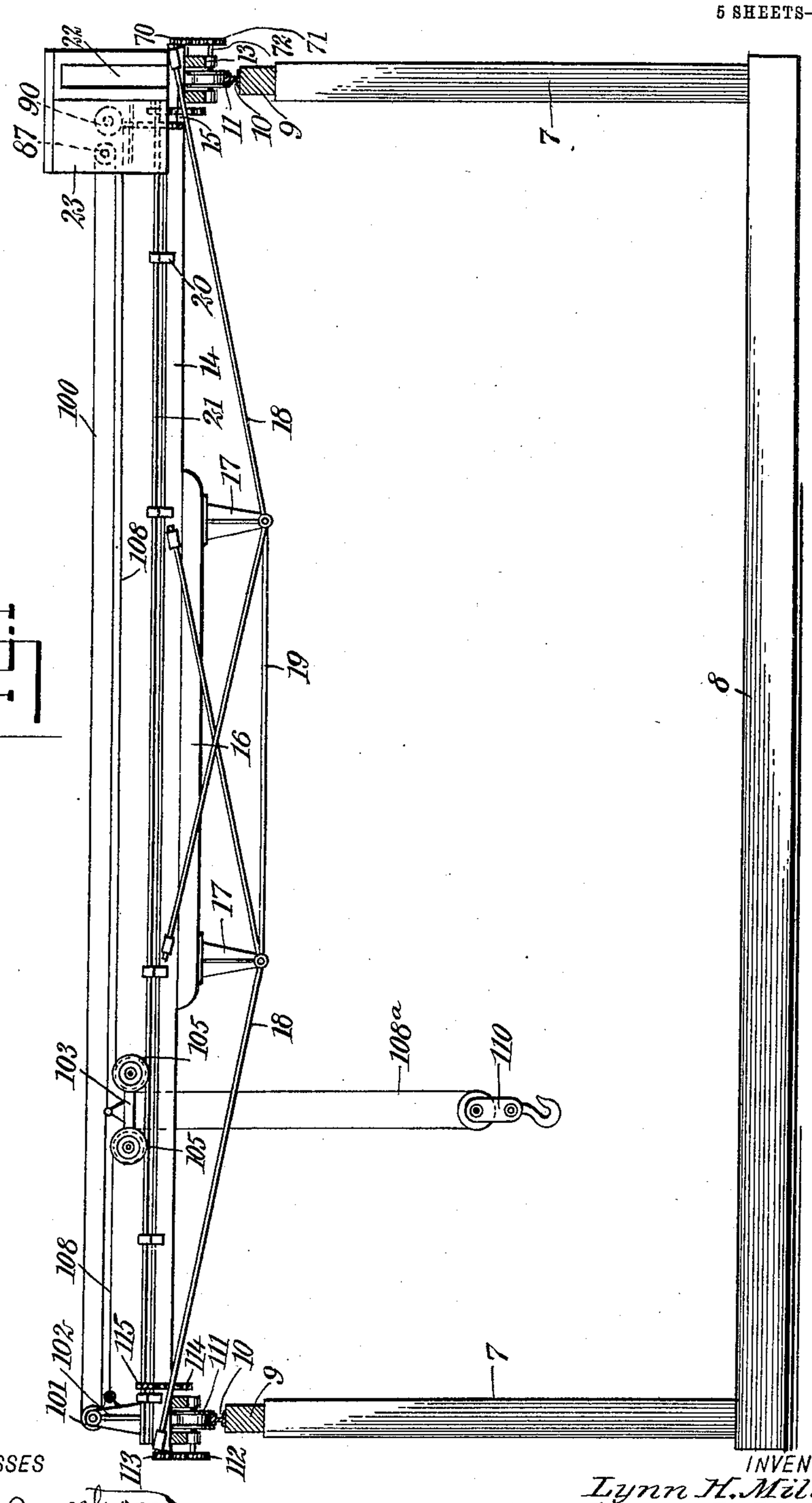

Fig. 1.

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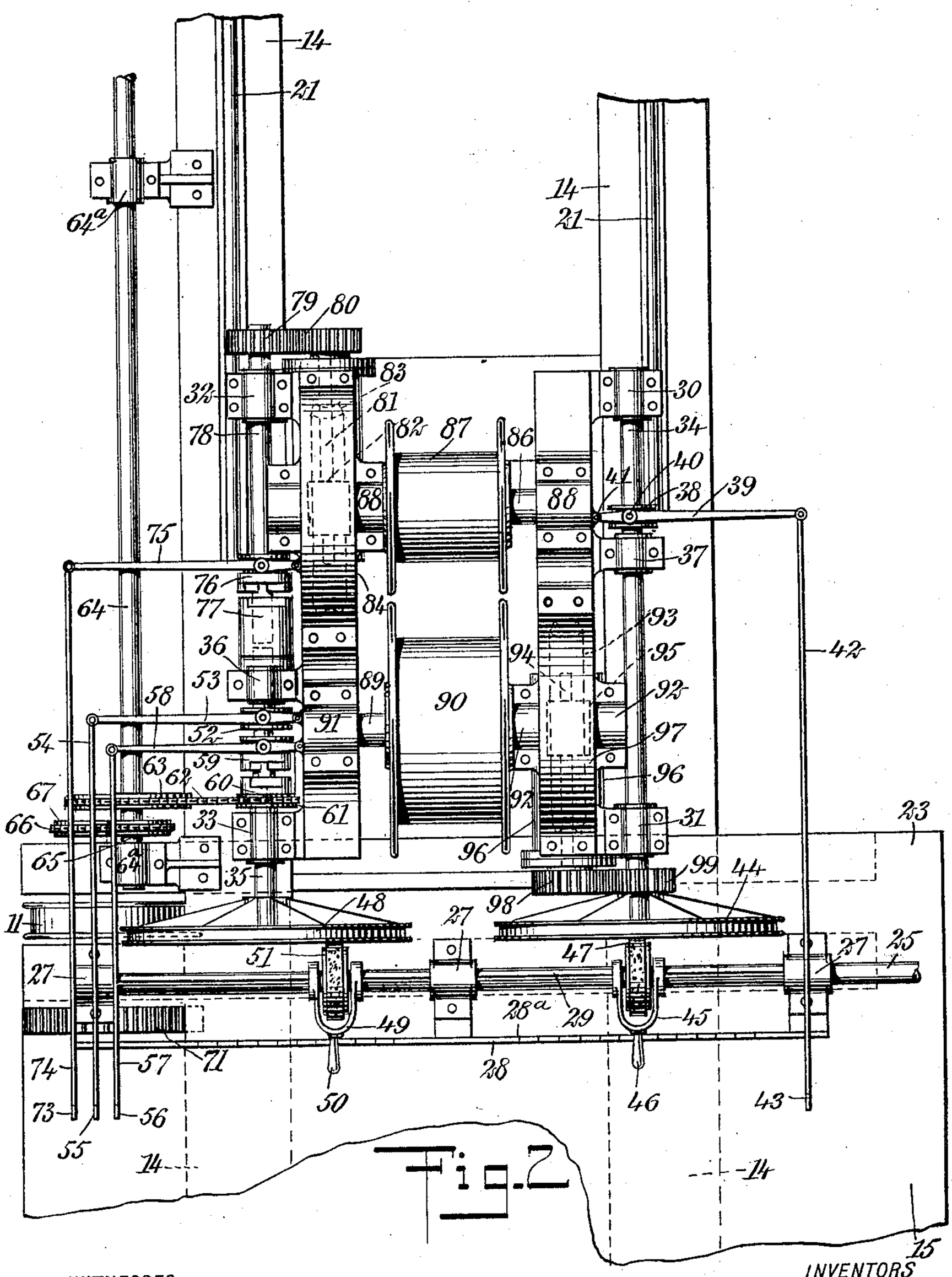

Fig. 2.

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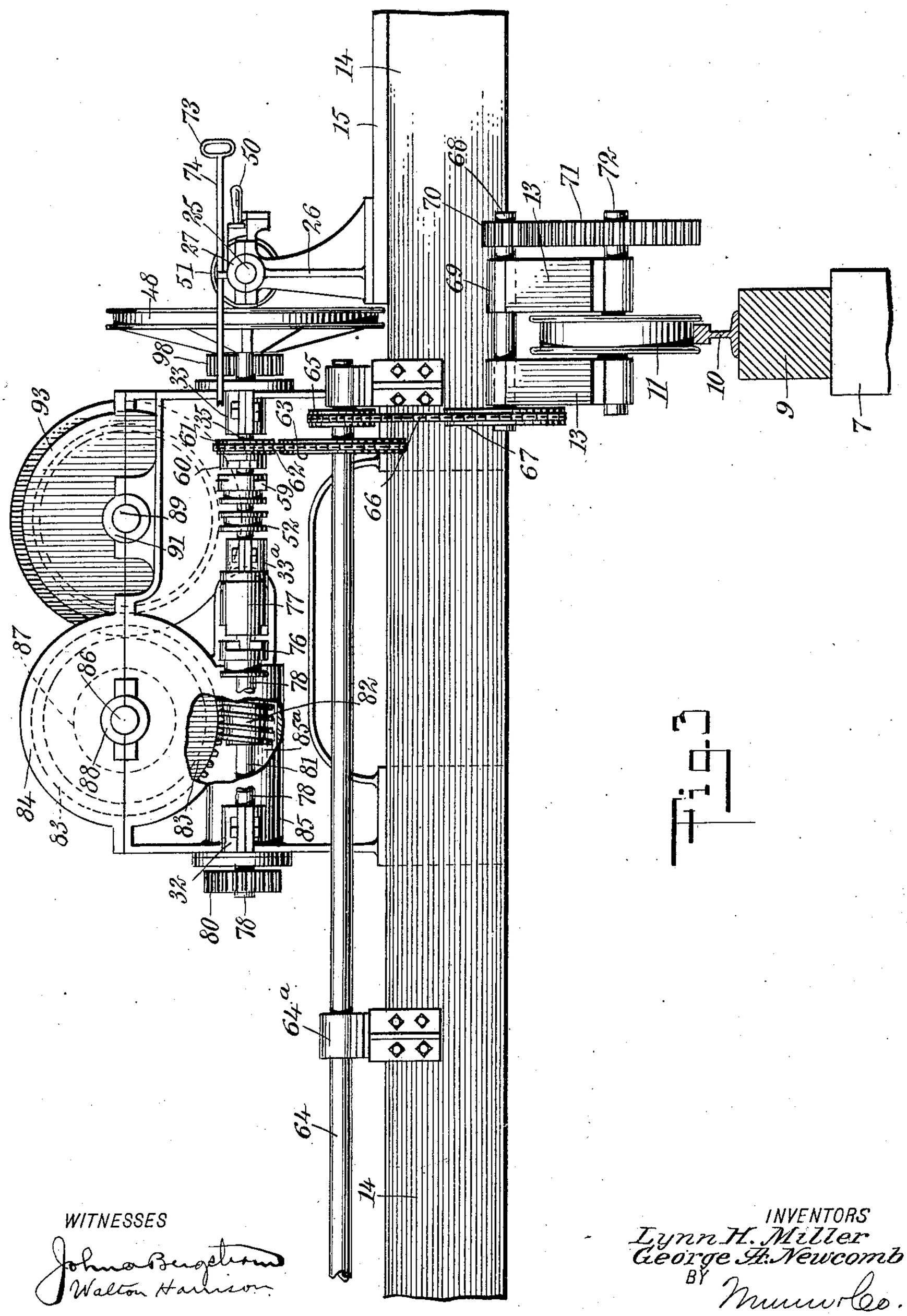

Fig. 3.

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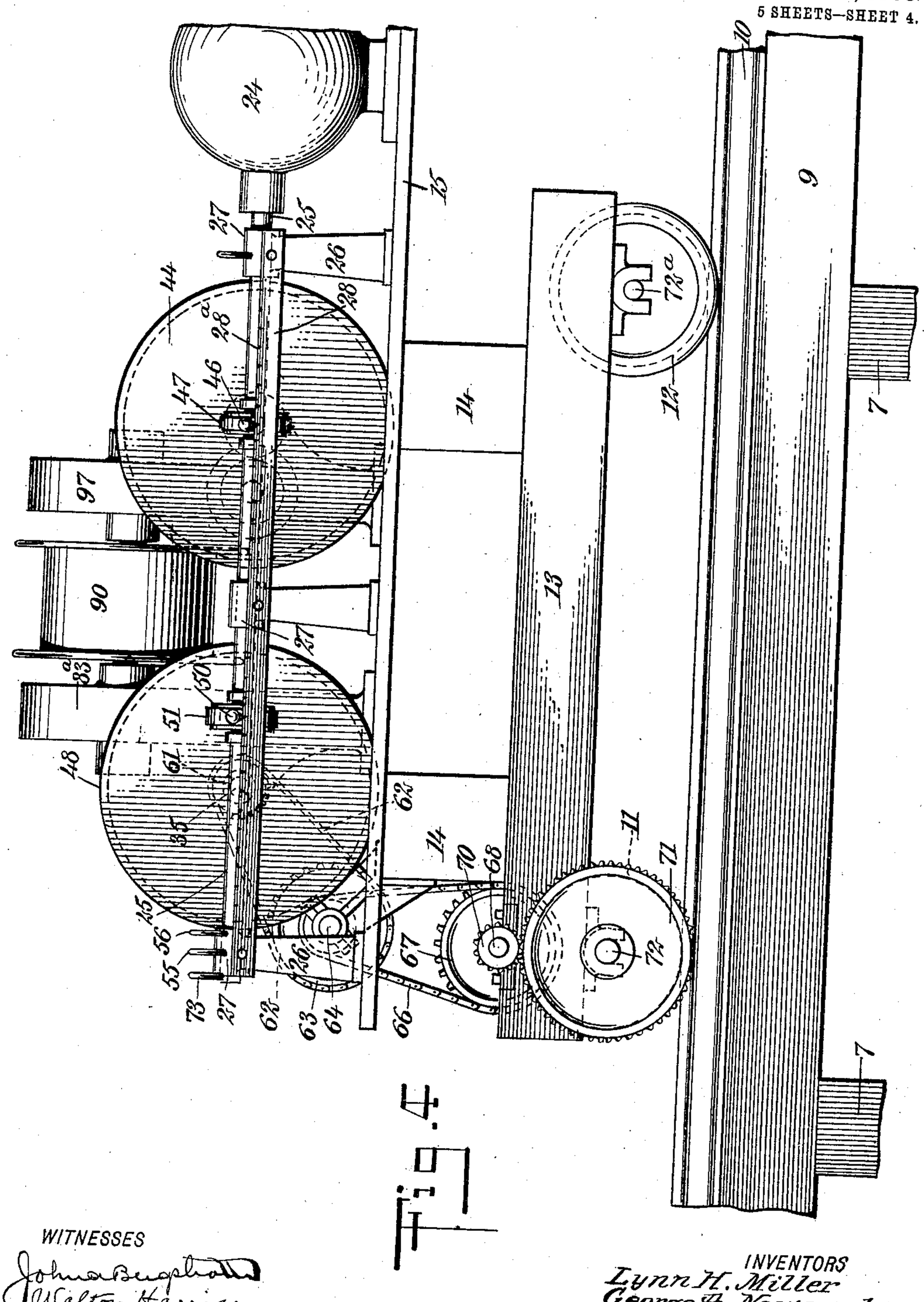

Fig. 4.

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5 SHEETS—SHEET 5.

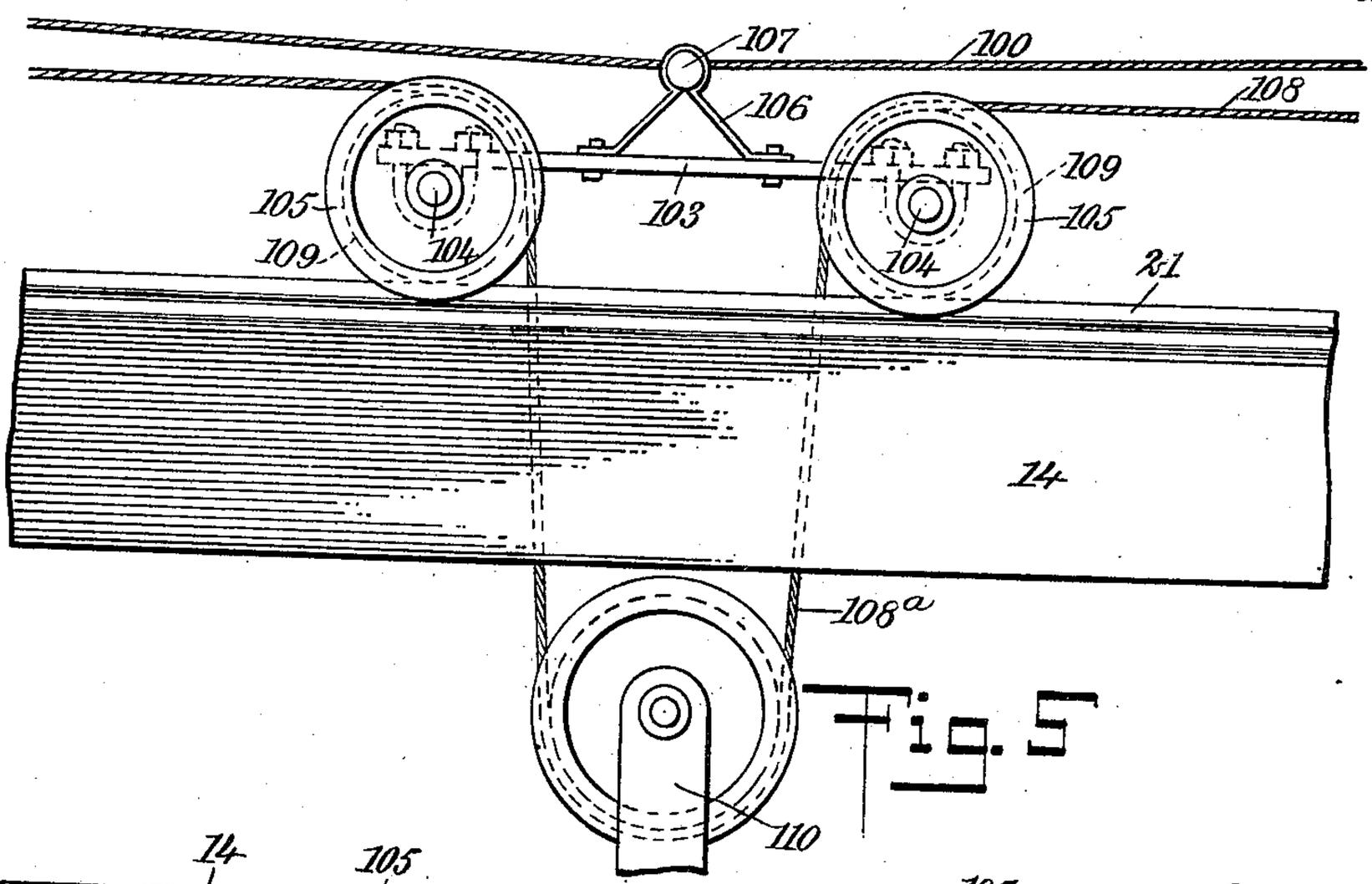

Fig. 5

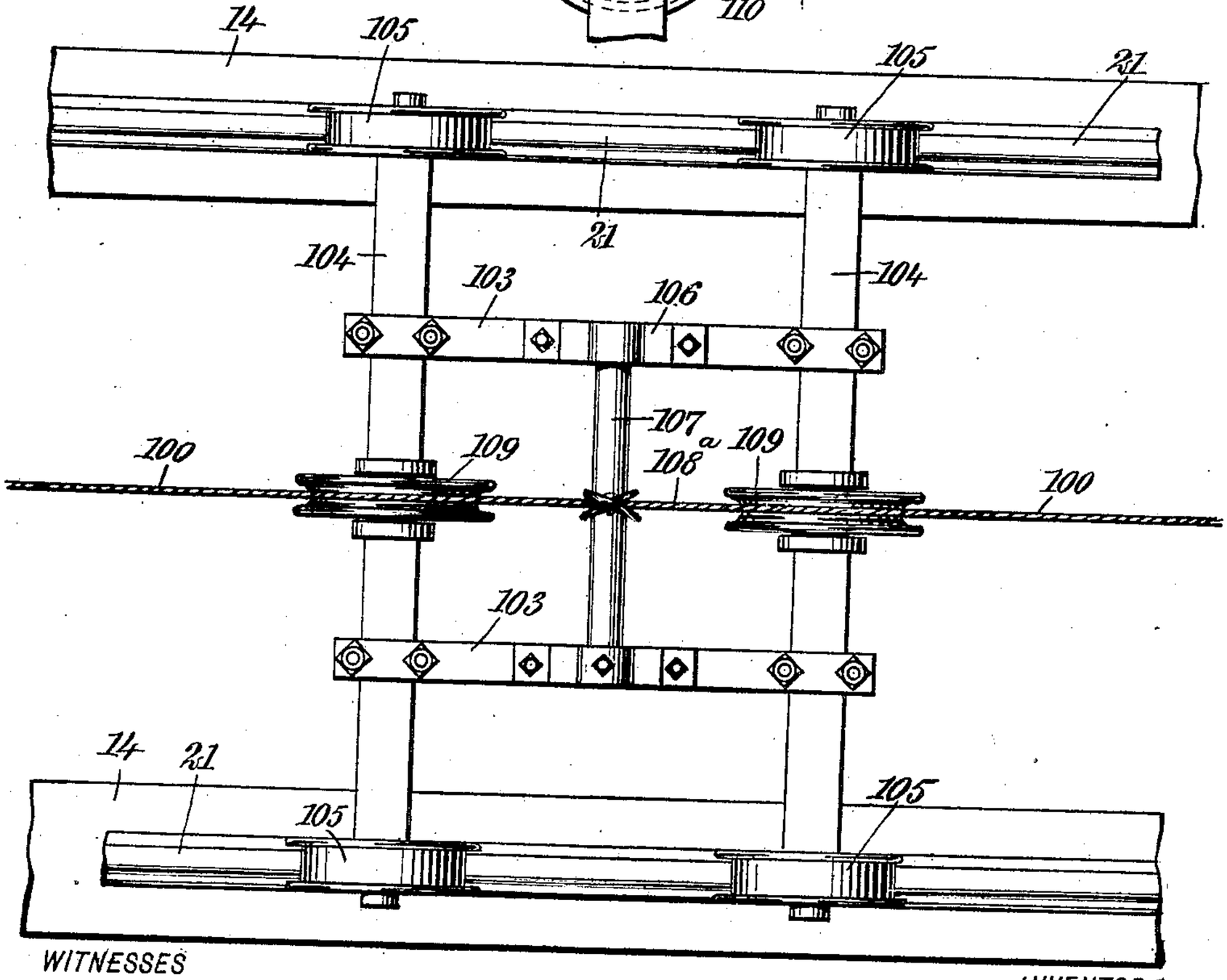

Fig. 6

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UNITED STATES PATENT OFFICE.

LYNN H. MILLER AND GEORGE A. NEWCOMB, OF TACOMA, WASHINGTON.

TRAVELING CRANE.

No. 903,601. Specification of Letters Patent. Patented Nov. 10, 1908.

Application filed May 12, 1908. Serial No. 432,370.

To all whom it may concern:

Be it known that we, LYNN H. MILLER and GEORGE A. NEWCOMB, both citizens of the United States, and residents of Tacoma, in the county of Pierce and State of Washington, have invented a new and Improved Traveling Crane, of which the following is a full, clear, and exact description.

Our invention relates to traveling cranes, our more particular purpose being to provide a crane having quite a variety of independent movements all reversible and readily controllable at will by an operator.

More particularly stated, the invention comprises mechanism to accomplish the following objects:

I. To reverse the direction of the application of power so as to use the power for lowering the load as well as for raising it.

II. To carry the load in either of two directions by the application of power to an endless line wound over a revolving drum at one point, and being wound upon a sheave at another point, the load being hung from the lower half of the endless line. The weight of the load, however, rests upon tracks for the purpose.

III. To provide a spanning frame mounted upon truck wheels at each of its ends, these wheels engaging parallel rails for the purpose of moving the spanning frame both ways by the application of power.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side view of the traveling crane complete, showing the spanning frame provided with track wheels resting upon two parallel rails disposed widely apart, the spanning frame being in turn provided with a track extending longitudinally of the frame and supporting a carriage movable relatively to the latter, this carriage being provided with drums, and lines being partially wound upon these drums for the purpose of supporting the weight, the carriage thus having virtually two movements, one due to the travel of the spanning frame and the other due to the relative travel of the carriage upon its frame; Fig. 2 is a fragmentary plan of the mechanism located at one end of the spanning frame and controllable by the operator (see upper right hand corner of Fig. 1) for the purpose of moving the various mechanical parts of the crane; this view showing particularly the changeable speed friction disks and the various handles associated therewith for applying power through these friction disks to the various parts to be moved; Fig. 3 is a fragmentary side elevation of the mechanism indicated in Fig. 2, and showing the same as viewed from the left thereof, and partly broken away for the purpose of exhibiting the clutches and gearing used for actuating various parts under control of the operator; Fig. 4 is a rear elevation of the mechanism appearing in Figs. 2 and 3, and shows in addition the electric motor for applying power to the system; Fig. 5 is a detail showing in fragmentary elevation the load carriage, which is movable in the general direction of the length of the spanning frame, as will be understood from Fig. 1; and Fig. 6 is a detail showing in fragmentary plan the carriage appearing in Fig. 5.

A number of wooden posts 7 are mounted upon a floor beam 8, and resting upon these posts are two beams 9. Two rails 10 are mounted upon the beams 9 and are parallel with each other, these rails (see Fig. 1) being spaced apart by a considerable distance. Track wheels 11, 12 engage the rails 10 and are journaled upon a frame 13 which supports the adjacent ends of two beams 14, the latter being of considerable length, as will be understood from Fig. 1. A platform 15 rests upon the beams 14 at the end thereof represented by the right of Fig. 1. This platform is adapted to be occupied by the operator.

A stiffening plate 16 (see Fig. 1) is mounted upon the under side of each beam 14. Brackets 17 are mounted upon the ends of the plate 16 and depend therefrom. Brace rods 18, 19 engage these brackets and are connected with the ends of the beams 14. The parts just mentioned constitute a truss for stiffening the beams 14 and supporting the same particularly at their centers. The bracing of the beams 14 is quite important, owing to the length of these beams and their natural tendency to sag.

Mounted upon the beams 14 and adjacent to guards 20 are two rails 21 forming a pair and extending directly across the rails 10. The rails 21 are comparatively close together and of course travel with the beams 14 as the latter are moved. A housing 23 provided with a door 22 (see upper right

hand corner of Fig. 1) covers the mechanism shown in Fig. 2 and the platform 15. This housing is merely for the purpose of shielding the various working parts and protecting the operator.

An electric motor (see Fig. 4) is shown at 24 and is connected with a driving shaft 25 for the purpose of supplying power. This driving shaft is mounted in bearings 27 supported upon pedestals 26. A bar 28 is supported upon the pedestal 26 and is provided upon its upper surface with notches 28ª for a purpose hereinafter described. The driving shaft 25 is provided with a spline 29 extending throughout a considerable portion of its length.

Mounted upon the beams 14 (see Fig. 2) are bearings 30, 31, 32, 33, 36, 37. Journaled within the bearings 30, 31, 37 is a shaft 34, and a shaft 35 is journaled within the bearings 33, 36. A flanged collar 38 is mounted rigidly upon the shaft 34 and turns therewith. A forked lever 39 is provided with rollers 40 engaging this collar, the forked lever being journaled upon a stationary pin 41 as a center. A rod 42 is connected with the lever 39 and is provided with a handle 43 for the purpose of actuating this lever.

A friction disk 44 is secured firmly upon the shaft 34 and is engaged by a friction wheel 47, this friction wheel being loosely mounted upon the driving shaft 25 by aid of the spline 29, being thus free to slide in the general direction of the length of the shaft. A U-shaped hook 45 provided with a handle 46 is used for moving the wheel 47. The handle 46 is adapted to enter any of the notches 28ª upon the bar 28. The operator, by sliding the handle 46 to the right or to the left and resting it in any one of the notches 28ª, can regulate the distance between the wheel 47 and the shaft 34. In doing this he can control the relative degree of speed conferred upon the friction wheel 44 through the medium of the wheel 47, the latter turning always at approximately a constant rate of speed. The operator, by pushing and pulling the handle 43, thereby moves the shaft 34 endwise toward and from the shaft 25 so as to press the friction disk 44 with any desired degree of tension against the friction wheel 47. Another friction disk 48, quite similar to the friction disk 44, is mounted upon the shaft 35 and is used to drive the latter. A hook 49 and handle 50 are used for controlling a friction wheel 51 which engages the friction disk 48.

Mounted rigidly upon the shaft 35 (see left of Fig. 2) is a flanged collar 52 movable by aid of a forked lever 53, the latter being connected with a rod 54 having a handle 55. The operator, by pushing and pulling this handle moves the flanged collar 52 and consequently the shaft 35. In doing this he forces the friction disk 48 with a greater or lesser degree of pressure against the friction wheel 51 so as to regulate the degree of slip allowed between these two friction members.

A handle 56 is mounted upon a rod 57, the latter being pivoted to a clutch lever 58. This clutch lever engages a clutch member 59 which is secured rigidly upon the shaft 35 and turns with it. A mating clutch member 60 is mounted upon the shaft 35 and is loose relatively to it. The loose clutch member 60 carries a sprocket wheel 61 which engages a sprocket chain 62. A sprocket wheel 63, engaged by this sprocket chain, is secured upon a shaft 64 for the purpose of driving the latter, said shaft being mounted on bearings 64ª. Another sprocket wheel 65 is mounted upon the shaft 64, and a sprocket chain 66 connects the sprocket wheel 65 with a sprocket wheel 67, which is mounted upon a stub shaft 68. This stub shaft is journaled in bearings 69 (see Fig. 3), and carries a pinion 70, which meshes with a gear 71 carried by a stub shaft 72, upon which one of the track wheels 11 is secured, as will be understood from Fig. 3. In order, therefore, to connect the track-wheel in question with the shaft 35, the operator pulls upon the handle 56, thereby locking the clutch members 59, 60. A handle 73 (lower left-hand corner of Fig. 2) is mounted upon a rod 74, which is pivoted to a clutch fork 75, the latter controlling a clutch member 76 so as to move it into and out of engagement with a mating clutch member 77, which is secured rigidly to the shaft 35 and revoluble therewith.

The clutch member 76 is mounted upon a shaft 78 and is fixed relatively thereto so that the shaft 78 is driven only when the clutch members 76, 77 are in engagement. Secured upon the shaft 78 is a gear pinion 79 which meshes with a gear pinion 80, the latter being secured upon a revoluble shaft 81 which carries a worm 82 revoluble with it. Engaging this worm is a worm wheel 83, which is inclosed by a casing 84 and is driven slowly by the worm 82.

The worm 82 (see Fig. 3) is inclosed within a cylinder 85 partially filled with oil 85ª for purposes of lubrication. The worm wheel 83 is mounted upon a shaft 86 which rests in bearings 88, as will be understood from Fig. 2. A winding drum 87 is mounted rigidly upon the shaft 86. This drum is normally idle but may be driven from the shaft 35 by the operator moving the handle 73 so as to bring the clutch member 76 into engagement with the clutch member 77.

A shaft 89 (see Fig. 2) is disposed parallel with the shaft 86 and carries a drum 90 somewhat larger than the drum 87. The shaft 89 is supported in bearings 91, 92. A worm wheel 93 is disposed adjacent to a shaft 94, the latter carrying a worm 95 for the purpose of turning the worm wheel. A cylinder

96 incloses the worm 95 and shaft 94, this cylinder being similar to the cylinder 85 (see Fig. 3), and the shaft 94, worm 95 and worm wheel 93 being similar to the shaft 81, worm 82 and worm wheel 83.

Mounted upon the shaft 94 is a gear pinion 98 which meshes with another gear pinion 99, the latter being secured to the shaft 34. When the friction disk 44 is turned, causing the rotation of the shaft 34, power is transmitted through the gear pinions 99, 98, shaft 94, drum 95 and worm wheel 93, to the shaft 98 and drum 90.

A line 100 (see Fig. 1) is wound partially around the drum 87 and extends longitudinally of the rails 21. At the end of the beams 14, represented by the left of Fig. 1, is mounted a drum 101, this drum being revolubly supported upon a pedestal 102, which rests directly upon the beams 14. A carriage 103 is provided with axles 104, and upon these are journaled track wheels 105, which engage the rails 21, thereby supporting the carriage. Spiders 106 are mounted upon the carriage and are connected together by a cross bar 107, the line 100 being connected directly to this cross bar, as will be understood from Fig. 6. Another line 108 is connected with the pedestal 102 and is wound partially upon the drum 90. This line is provided with a loop 108^a, which loop is made by passing the line 108 over pulleys 109 carried by the carriage 103, as will be understood from Fig. 5. A traveling sheave 110 is carried by the loop 108^a and is used for handling the load. A track wheel 111 is in every way similar to the track wheel 11 and is driven substantially the same way. Various gear members, 112, 113, 114, 115 (corresponding to the various gear members shown in the lower right-hand corner of Fig. 3) are used for communicating power from the shaft 64 to the track wheel 111. In other respects the mechanism shown in the upper left-hand corner of Fig. 1 is similar to that shown in the upper right-hand corner of said figure.

The operation of our device is as follows: The operator takes up his position upon the platform 15 and controls the apparatus practically by the various handles shown. The shaft 25 turns constantly, being driven directly by the motor 24. If the two friction wheels 47, 51 are located in alinement with the shafts 34, 35, no power can be transmitted. If, however, the operator, by aid of the handle 46, moves the wheel 47 to the right or left of its position thus indicated, motion is communicated to the friction disk 44 which turns in the one direction or in the other, according to the direction in which the handle 46 is slid relatively to the shaft 34. The number of turns of the friction disk 44 as compared with the number of turns of the shaft 25, the speed of the latter being constant, may thus be apportioned within reasonable limits. In the meantime the operator, by pulling or pushing the handle 43, may move the shaft 34 in the general direction of its length, thereby controlling the degree of pressure exerted by the friction wheel 47 upon the friction disk 44, and consequently governing the degree of slip, if any be desired, between these members. It is obvious that if the friction disk 44 be turning in a given direction and the friction wheel 47 be moved to the center of the shaft 34, and its motion continued past such center, the direction of travel of the friction disk 44 is first brought to a stop and then reversed, and since the drum 90 is controlled through gearing actuated by the friction disk 44, it follows that the drum 90 is thus brought completely under control of the operator. He can make this drum travel at a high rate of speed or at a low rate of speed and in either of two directions.

The line 108 (see Fig. 1) being partially wound upon the drum 90, it follows that the sheave 110 for carrying the load is raised or lowered at will so that the lift of the load is naturally under control of the operator both as to its direction up or down and its speed rapid or slow. It is also obvious that the load can be stopped at any point in mid-air without stopping the rotation of the shaft 25. Similarly the operator, by manipulating the handles 50 and 55, can control the speed of the friction disk 48 relatively to that of the friction wheel 51 and can also control the direction of travel of the friction disk 48. By pulling or pushing the handle 56 the operator can bring the clutch member 59 into and out of engagement with its mating clutch member 60 so as to connect and disconnect relatively to the shaft 35 the gearing for turning the track wheel 11. By manipulating the handle 56, therefore, the operator can cause motion to be transmitted from the shaft 64 to the track wheels 11, 111, and this moves the beams 14 together with their appurtenances in a direction lateral to their general length. These beams and their accompanying parts are usually designated as the "span" and the movement last mentioned as the "lateral travel of the span." As the handle 56 merely connects and disconnects the clutch members 59, 60, however, no motion can be conferred upon the span unless the friction disk 48 is rotated, and this, of course, depends upon the position of the friction wheel 51 as controllable by the handle 50, and also upon the tension of the friction disk 48 against the friction wheel 51, this tension being controllable by aid of the handle 55. It is now that, by aid of the handle 55, the friction disk 48 is pressed against the friction wheel 51 and is turning at a satisfactory speed, and that the op-

erator wishes to raise or lower the load. The direction of rotation of the disk 48 determines whether the load is to be lifted or lowered and is in turn controlled by the position of the wheel 51. By shifting the handle 50 to the right or left, as the case may be, the operator confers upon the disk 48 rotation in the proper direction for the operator's purpose. He now pulls the handle 73 bringing the member 76 into engagement with the member 77. The shaft 78 normally idle now begins to rotate, and through the medium of the pinions 79, 80 confers upon the shaft 81 a rotary movement. This shaft, operating through the worm 82 and worm wheel 83, causes the drum 87 to turn in the one direction or the other, as the case may be. In doing this (see Fig. 1) the endless line 100 is moved, with the result that the carriage 103 is drawn along the rails 21, this movement being entirely independent of the raising or lowering of the load. By proper manipulation of the various handles, a load can be raised or lowered, and at the same time moved horizontally so that the load described a path oblique to the general direction of the track 21. Moreover, while this is taking place the entire span may be moved in a direction lateral to its general length. The mechanism thus places within control of the operator at least six different functions to be performed relatively to the load.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. The combination of a track, a span movable relatively to said track and provided with track wheels engaging the same, a motor mounted upon said span, gearing connecting said motor with said track wheels for the purpose of turning the latter, and speed changing mechanism interposed intermediate said motor and said track wheels for the purpose of changing the speed of said track wheels relatively to the speed of said motor.

2. The combination of a driving shaft, means for actuating the same, a friction wheel mounted upon said driving shaft and movable along the general length thereof, a friction disk for engaging said friction wheel, means controllable at will for pressing said friction disk against said friction wheel in order to enable said friction wheel to drive said friction disk, and mechanism controllable by said friction disk for raising or lowering a load.

3. The combination of a track, a traveling member mounted thereupon for carrying a load, a line connected with said traveling member for moving the same along said track, a drum engaging said line, a revoluble shaft, gearing connecting the same with said drum in order to turn the latter, a driving shaft, and a change speed mechanism located intermediate said driving shaft and said first-mentioned shaft in order to control the transfer of power therebetween.

4. The combination of a drum for hauling a line, a shaft for supporting said drum, worm gearing for turning said shaft, a driving shaft, and means for communicating power from said driving shaft to said worm gear, said means including a change speed device for limiting the speed of said drum relatively to the speed of the driving shaft.

5. The combination of a driving shaft, a change speed gear, a shaft driven by said change speed gear, a plurality of clutches mounted upon said last-mentioned shaft, and gearings connected with and controllable by said clutches for the purposes of handling a load.

6. The combination of a track, a traveling member mounted thereupon, a line supported by said traveling member for raising a weight, a drum for hauling said line, power-controlled mechanism for turning said drum, said power-controlled mechanism including a friction disk, a driving shaft disposed across the axis of said disk, and a revoluble member slidably mounted upon said driving shaft and engaging said friction disk for changing the speed thereof.

7. The combination of a track, a car resting upon said track and movable along the same for carrying a load, a line connected with said car for moving the same relatively to said track, a drum engaging said line for the purpose of displacing it and thereby moving said car, a hoisting drum mounted upon said car, a driving shaft, variable speed mechanism for transmitting power from said driving shaft to said first-mentioned drum, and variable speed mechanism for transmitting power from said shaft to said second-mentioned drum.

8. The combination of a hauling drum, a hoisting drum, a driving shaft, separate sets of gearing for transmitting power from said driving shaft to said hoisting drum and said hauling drum, said separate sets of gearing each including a changeable speed gear controllable at will.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

LYNN H. MILLER.
GEORGE A. NEWCOMB.

Witnesses:
C. E. PETERSON,
C. E. BAILEY.