

No. 743,604.

PATENTED NOV. 10, 1903.

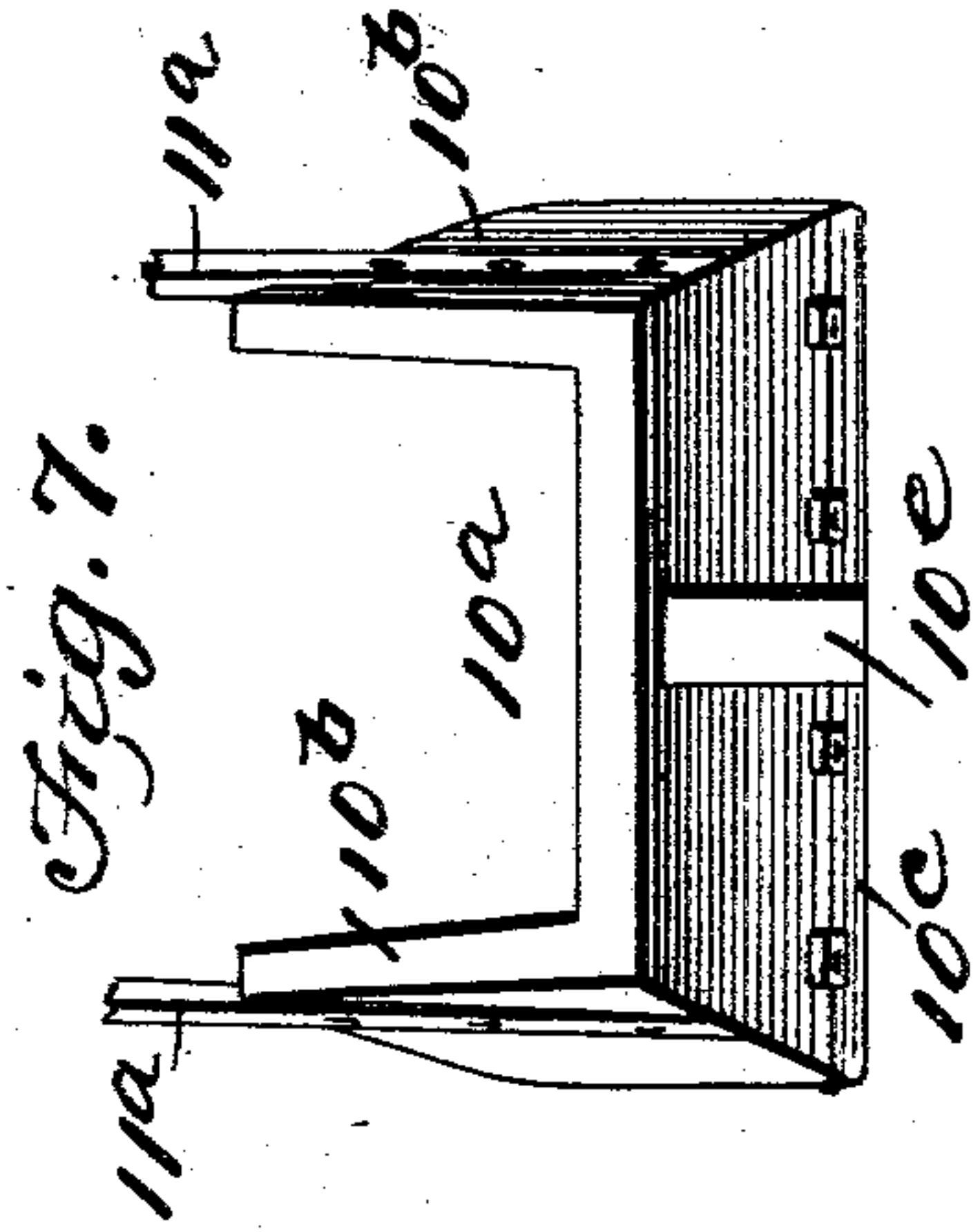
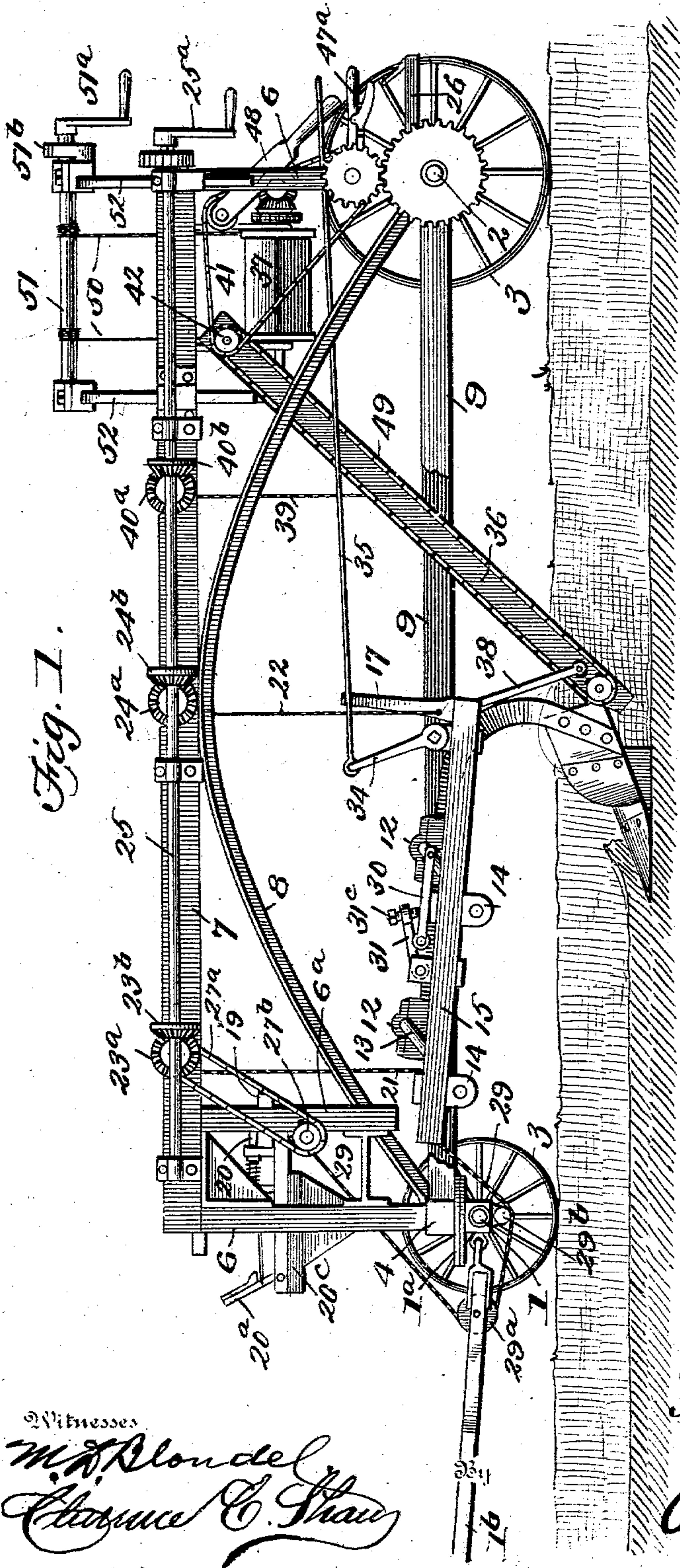
A. J. WILLIAMS & M. M. HEPTONSTALL.

DITCHING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



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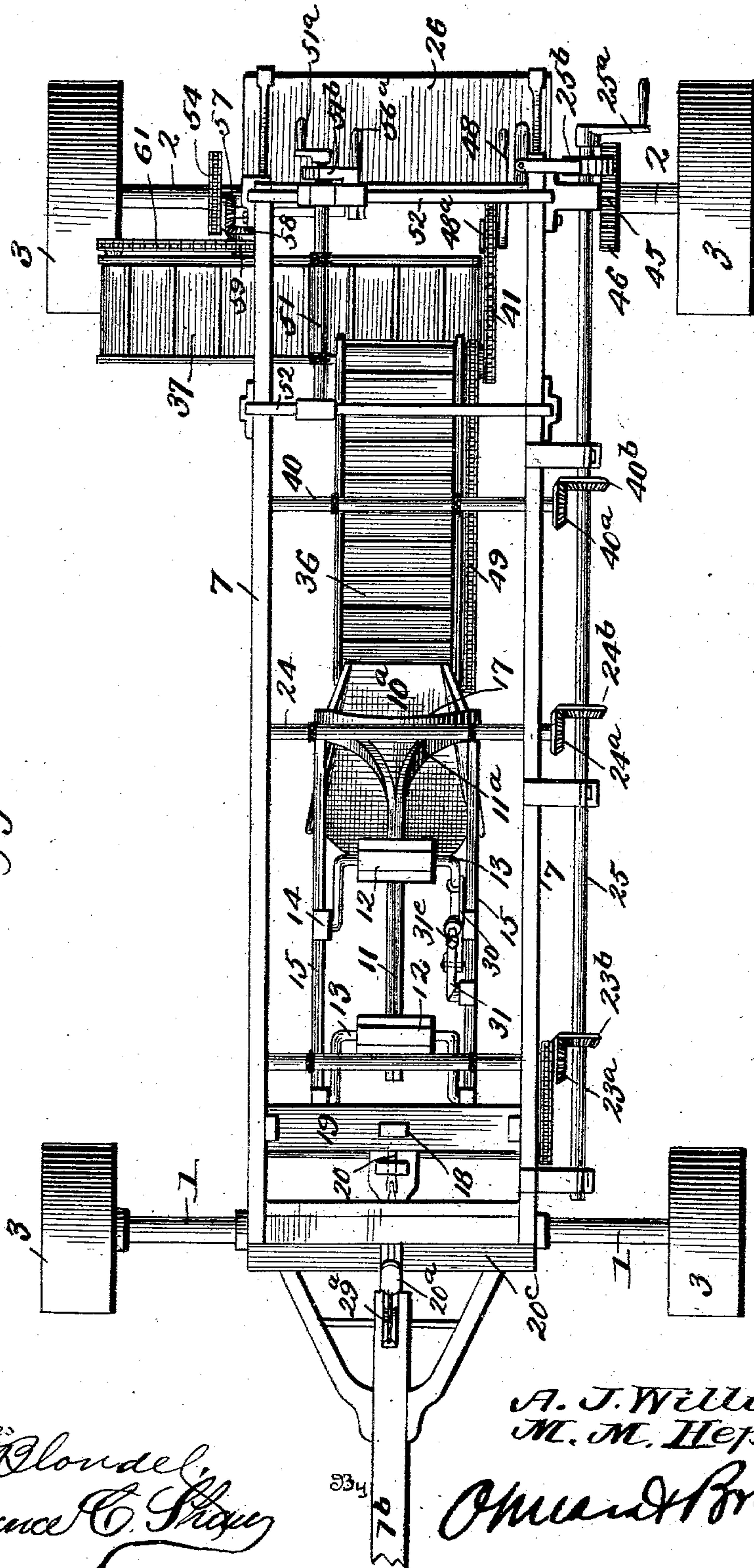
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5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3

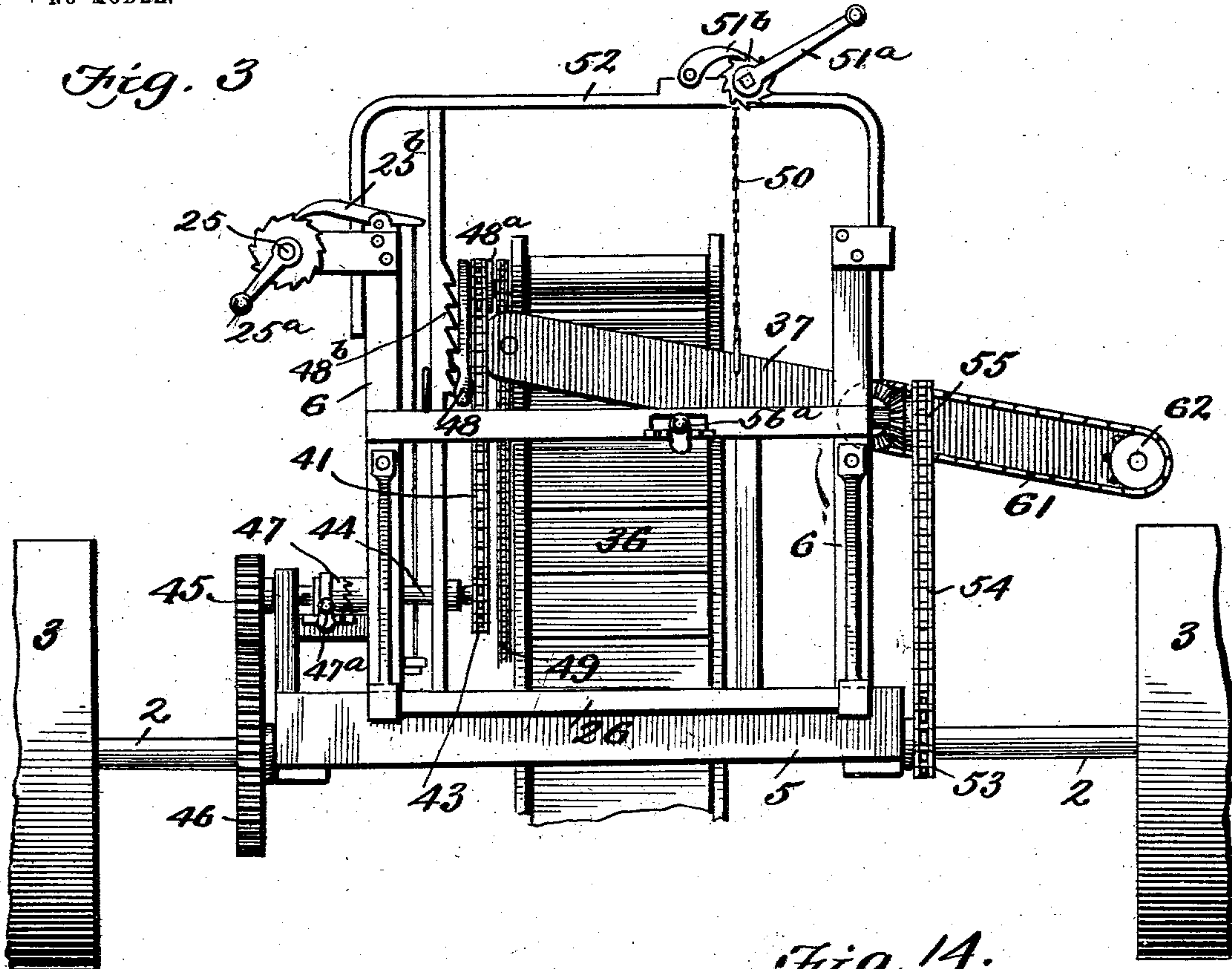


Fig. 14.

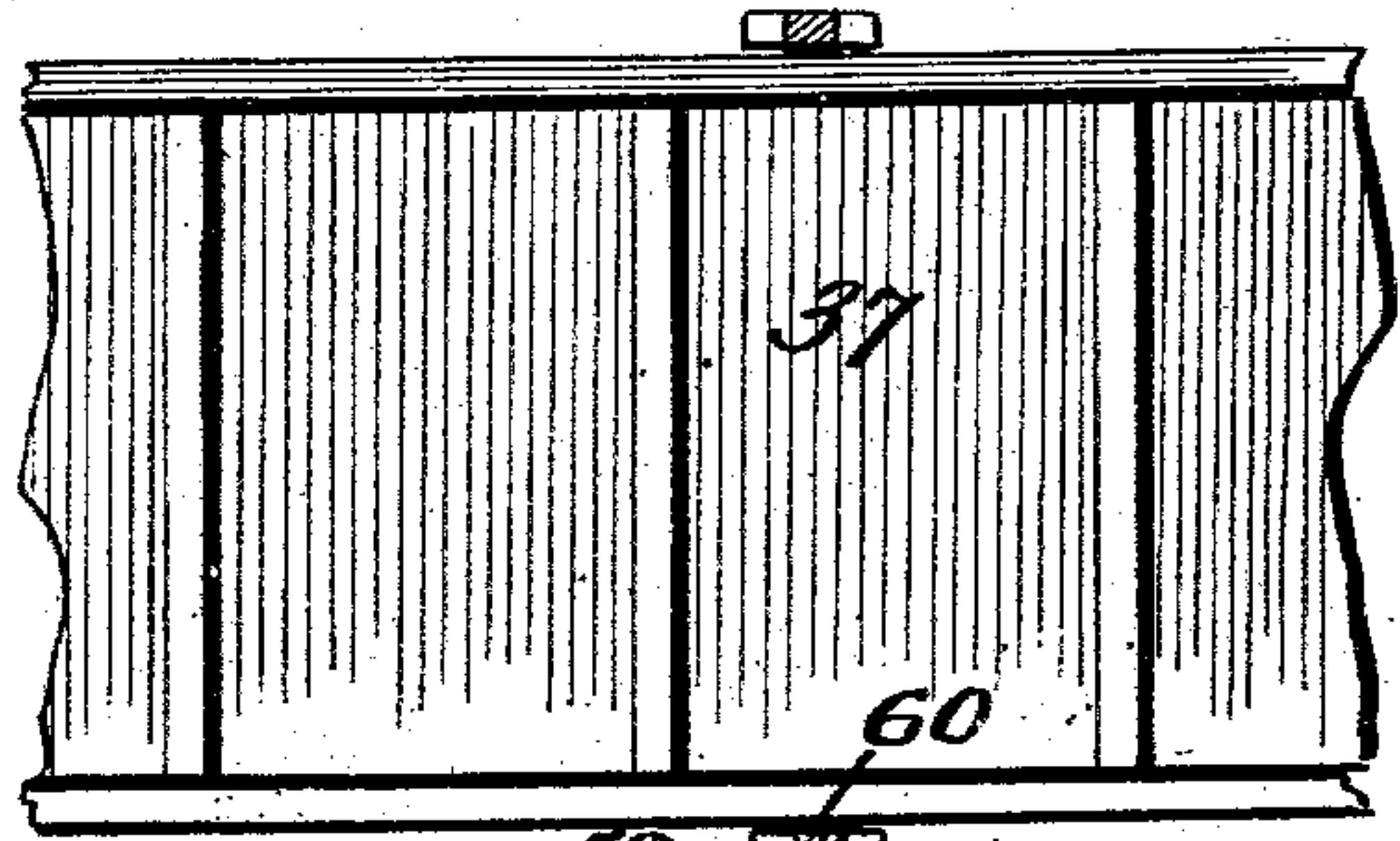


Fig. 16.

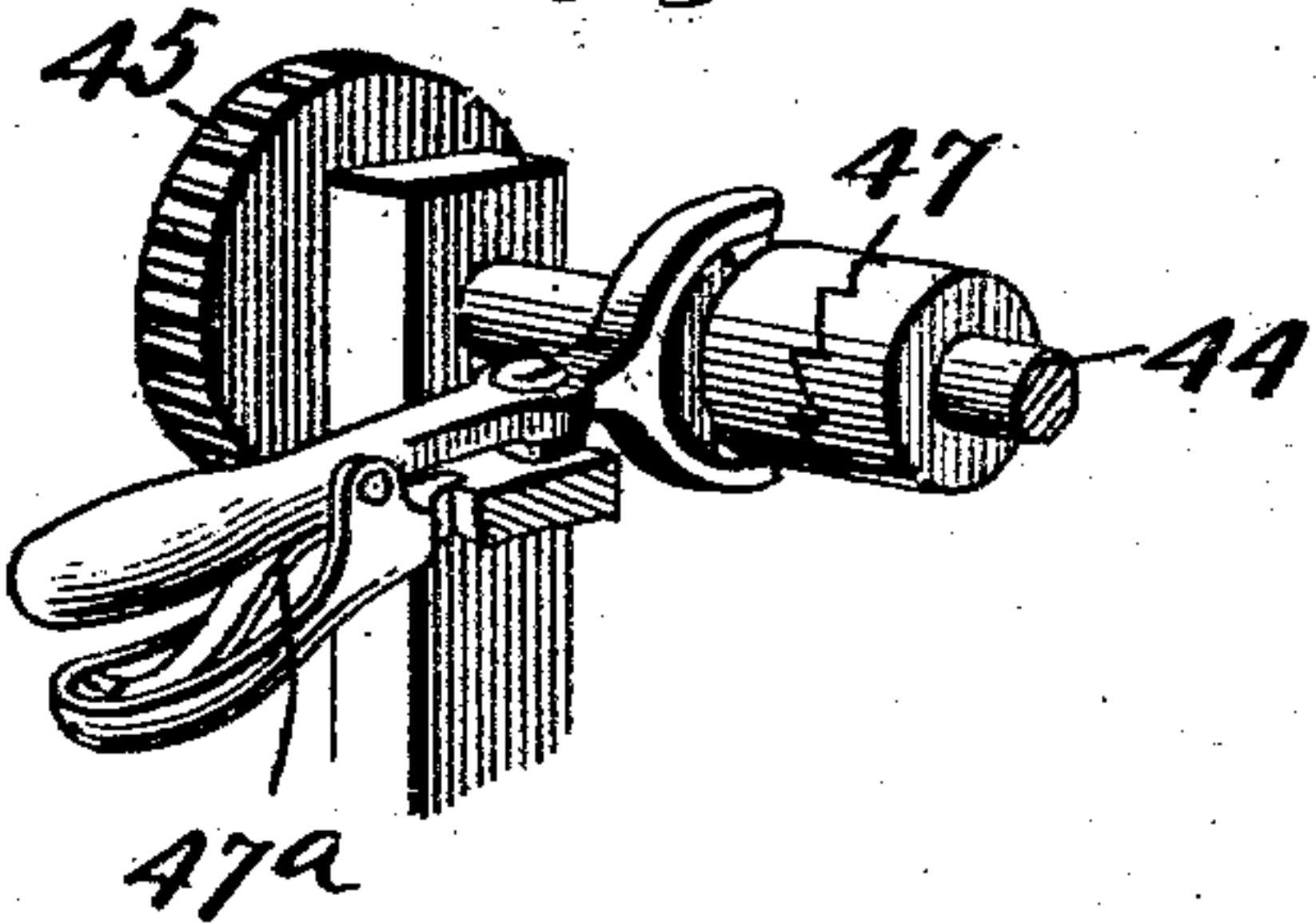
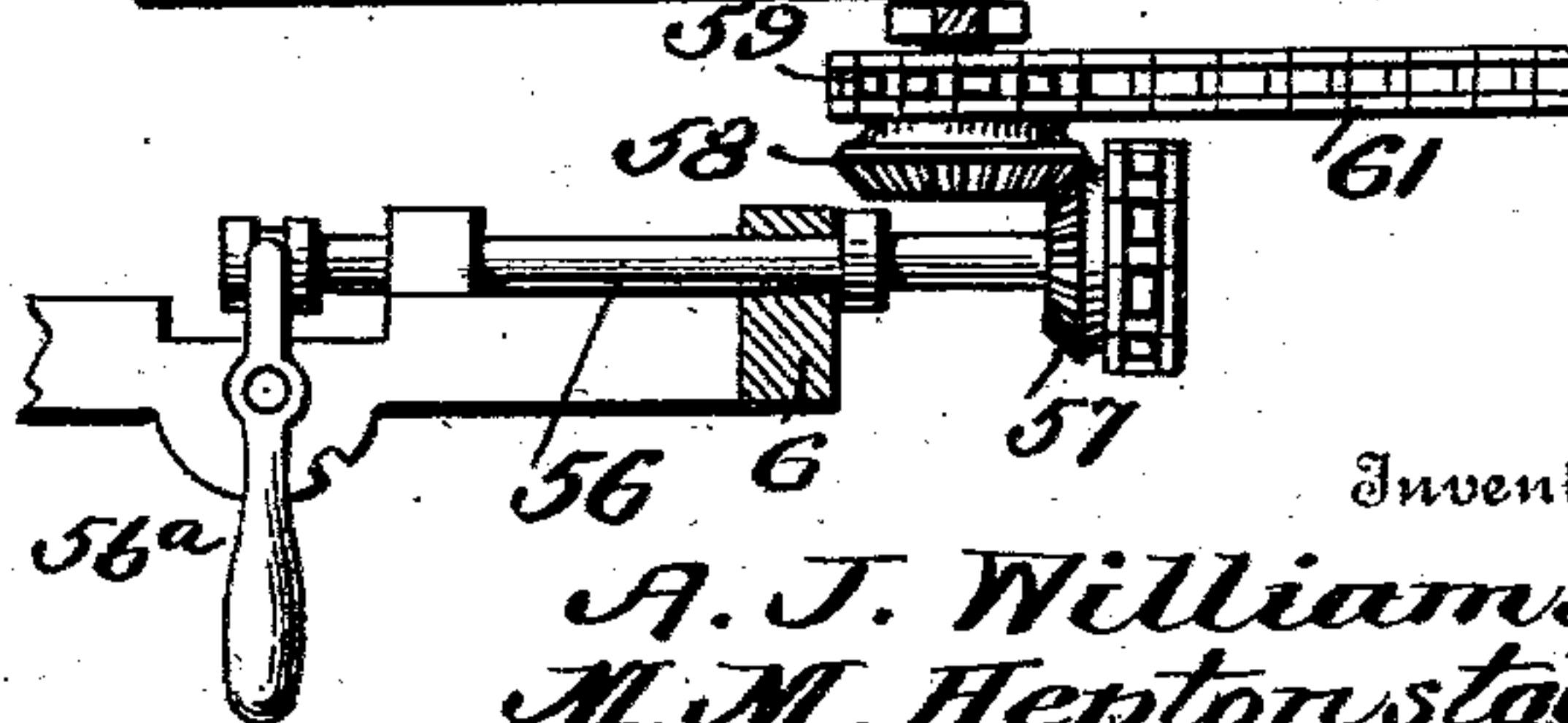
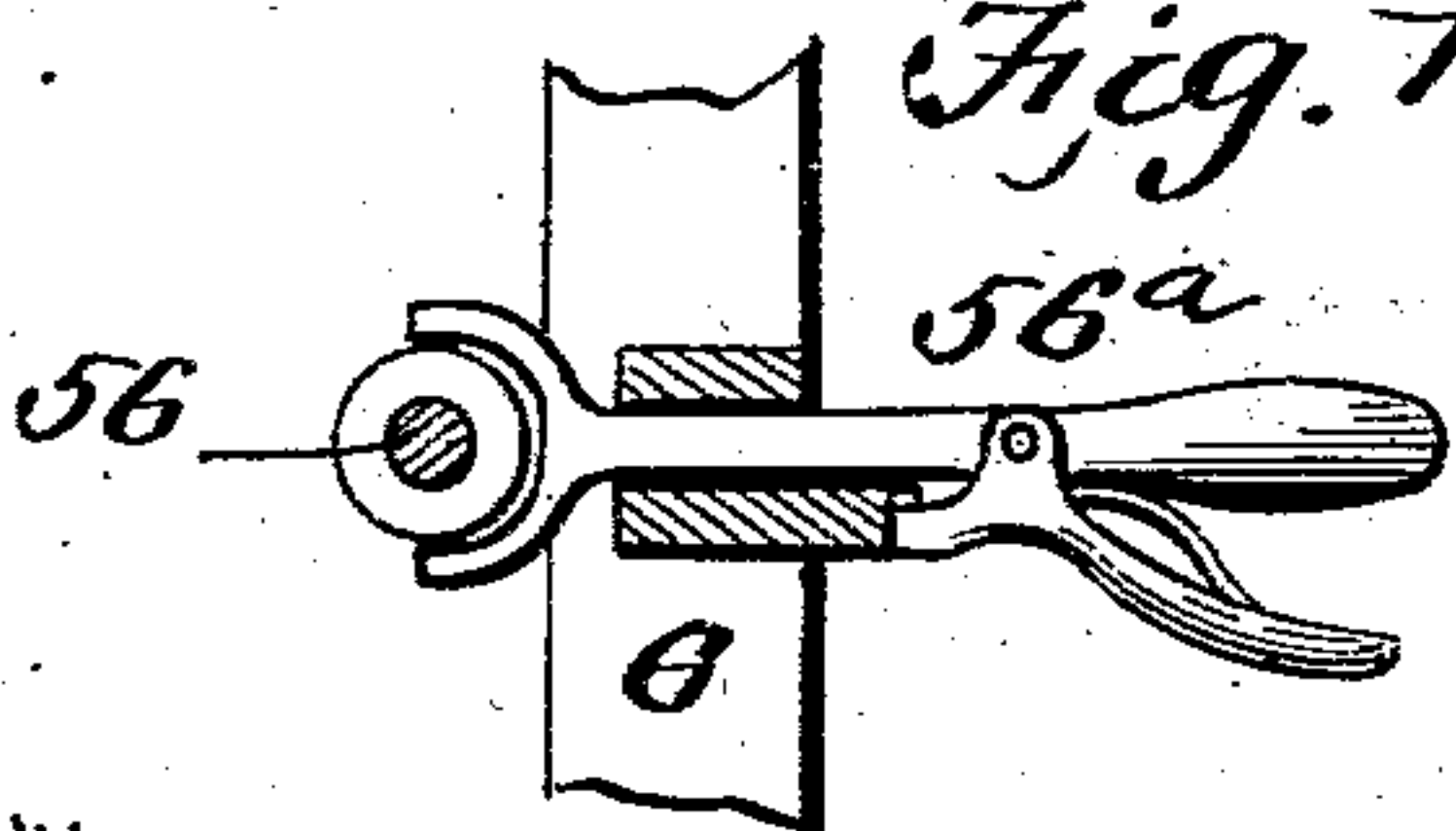


Fig. 15



Witnesses

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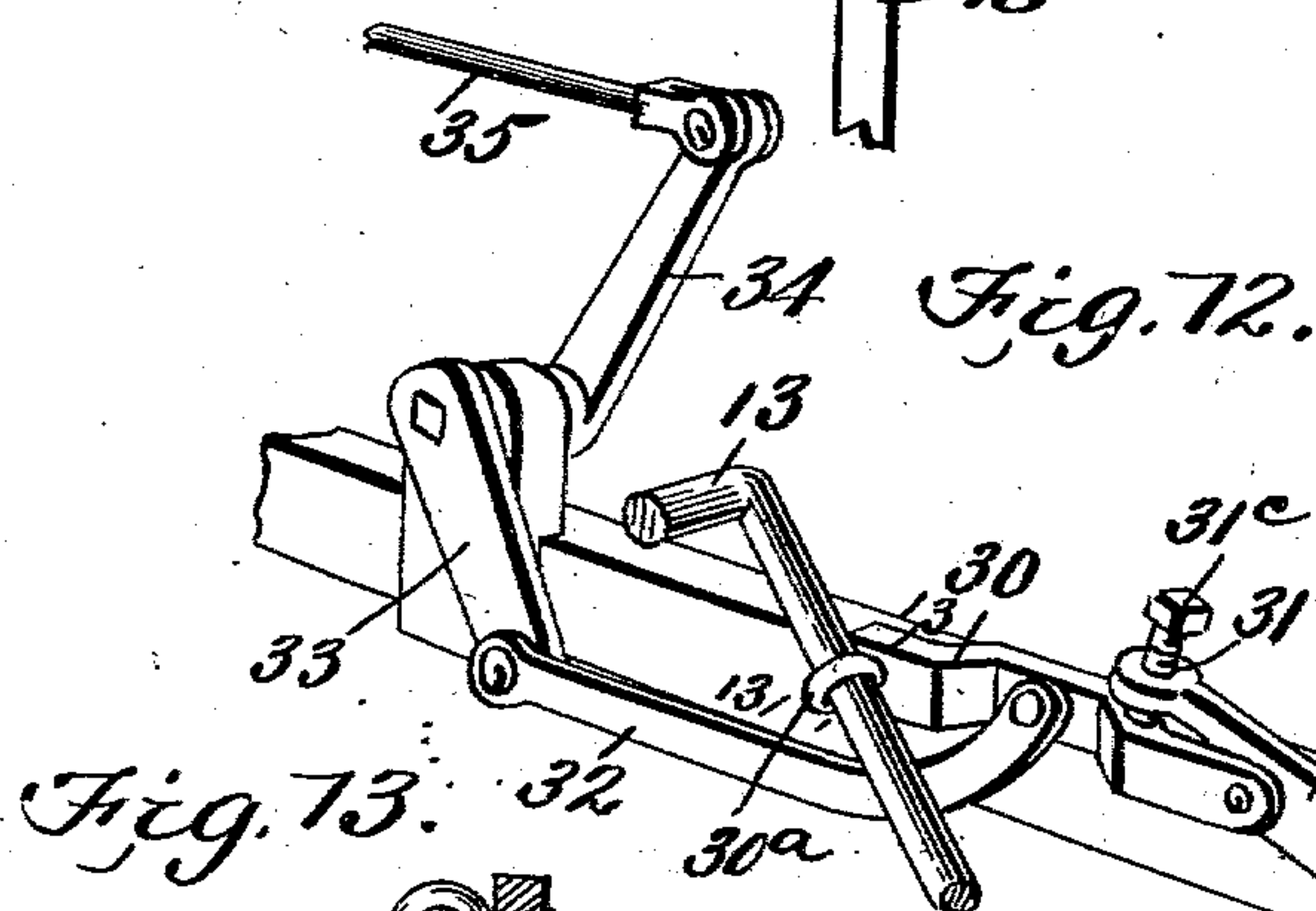
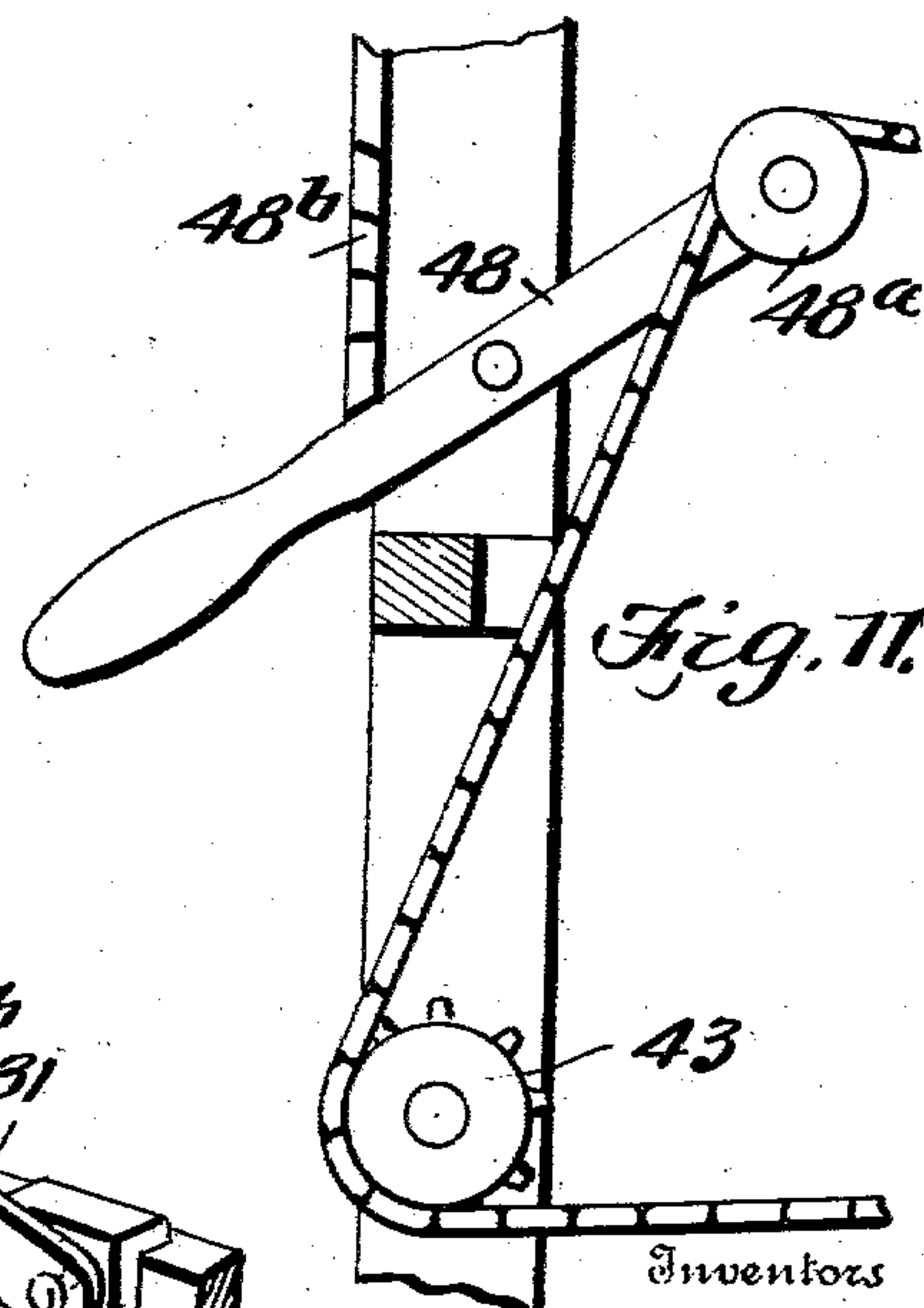
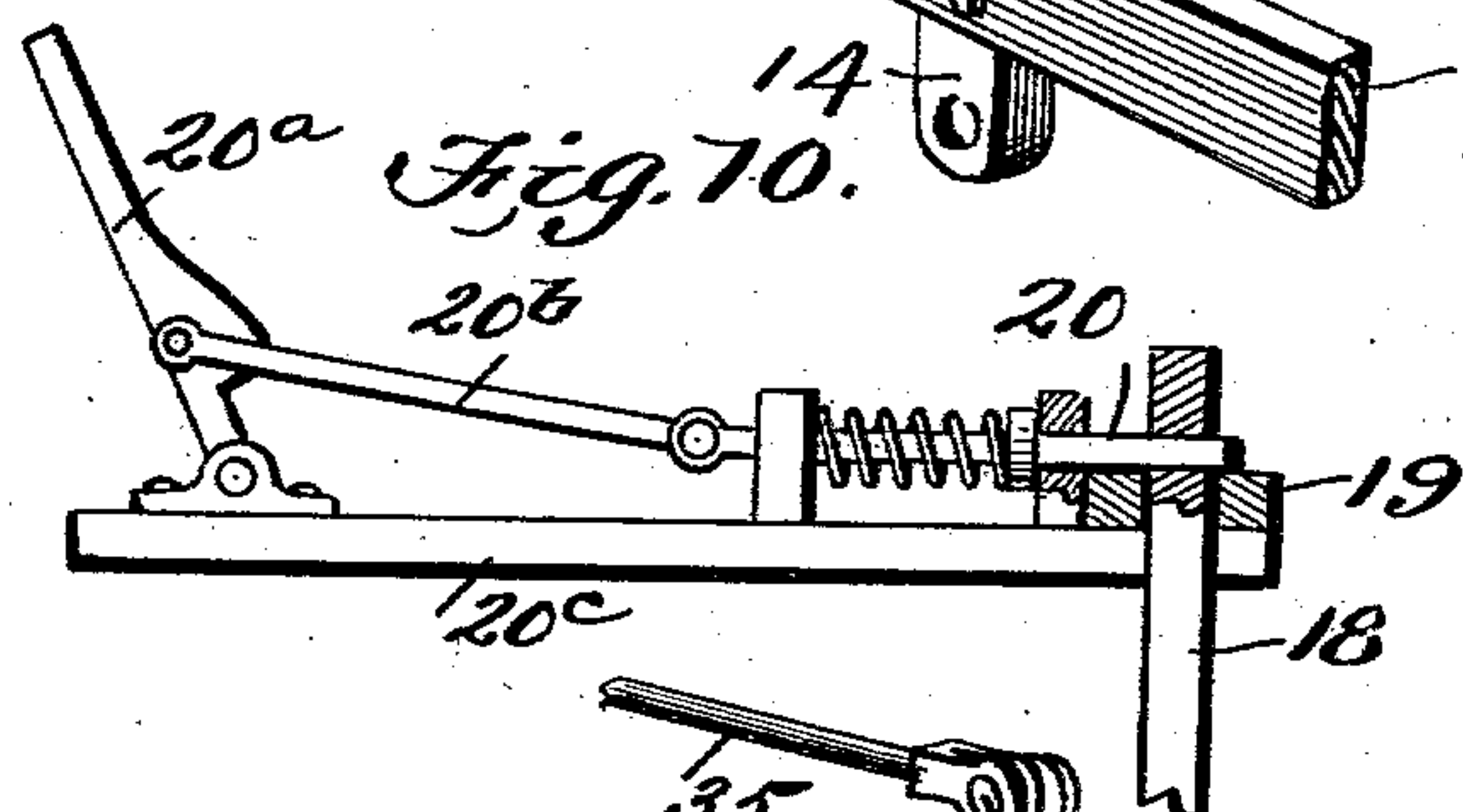
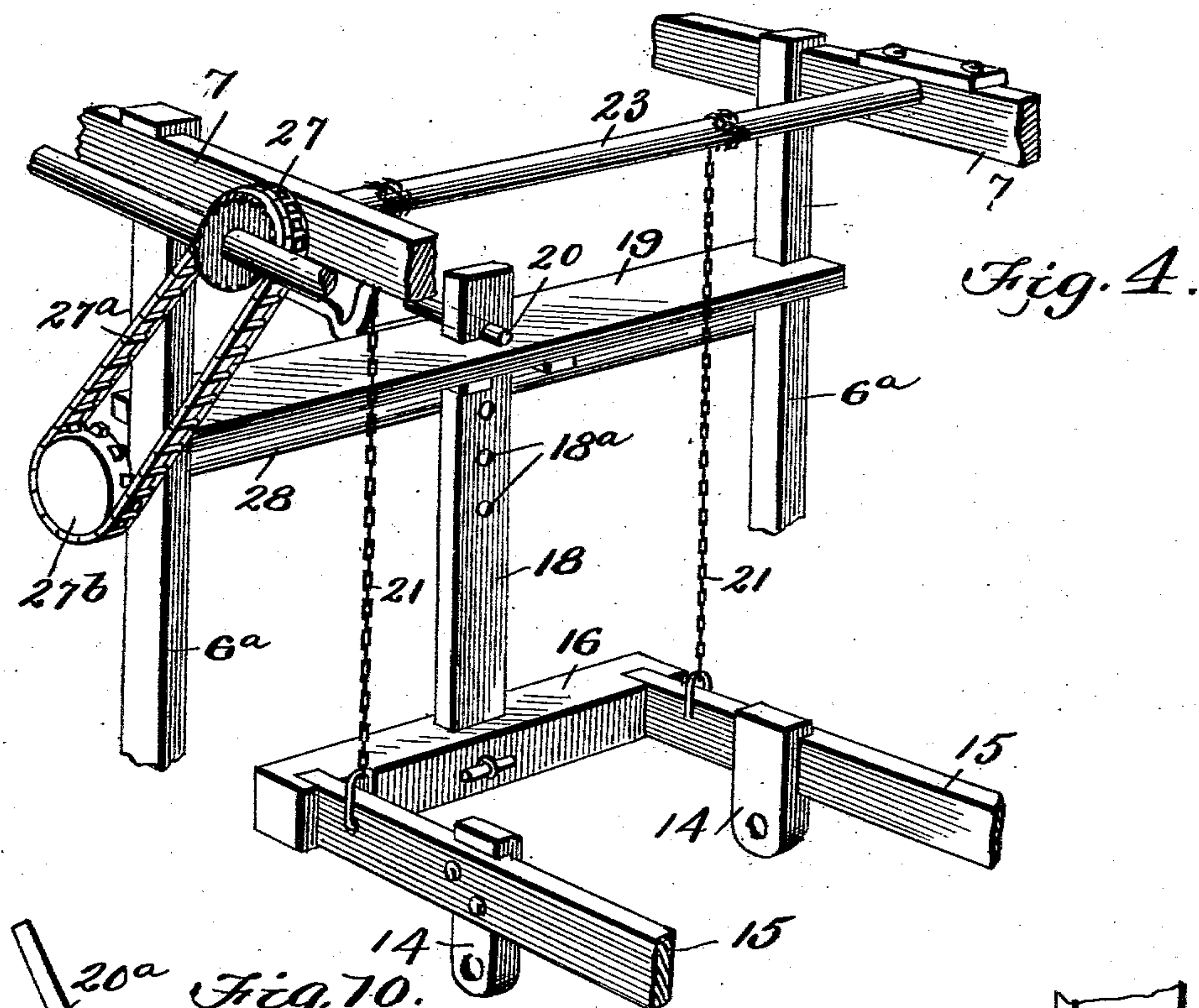
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5 SHEETS—SHEET 4.



Witnesses

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5 SHEETS—SHEET 5.

Fig. 8.

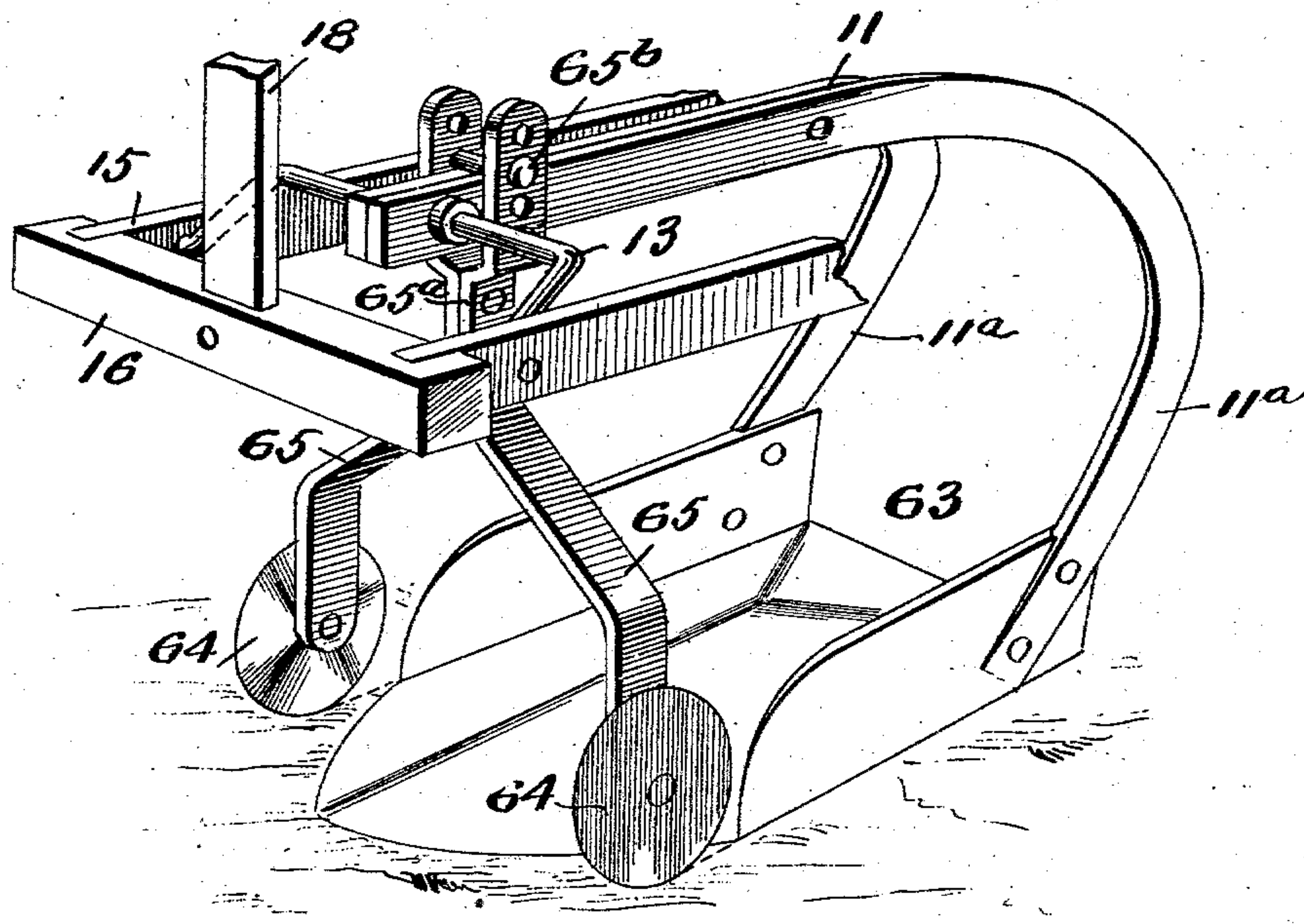
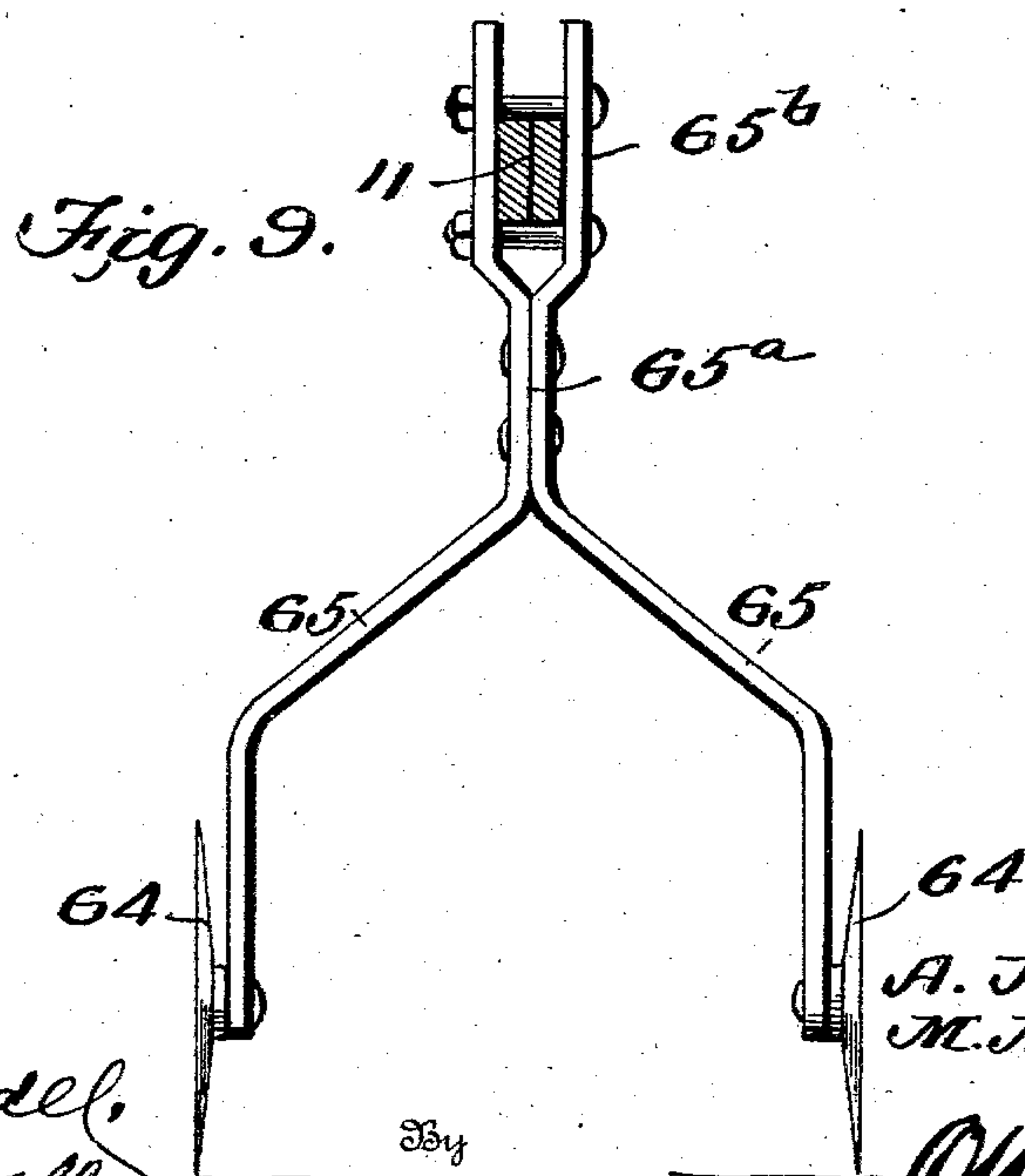


Fig. 9.



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UNITED STATES PATENT OFFICE.

ANDREW J. WILLIAMS, OF GILMORE CITY, AND MYRON M. HEPTONSTALL,
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DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 743,604, dated November 10, 1903.

Application filed February 28, 1903. Serial No. 145,585. (No model.)

To all whom it may concern:

Be it known that we, ANDREW J. WILLIAMS, residing at Gilmore City, in the county of Humboldt, and MYRON M. HEPTONSTALL, residing at Pioneer, in the county of Pocahontas, State of Iowa, citizens of the United States, have invented a new and useful Ditching-Machine, of which the following is a specification.

10 This invention relates generally to ditching-machines, and more particularly to that class thereof known as "tile-ditchers" or one intended to cut a narrow trench in the earth.

15 The object of the invention is to provide a strong, durable, and efficient ditching-machine which can be regulated to dig or cut ditches of any convenient depth desired; and another object of the invention is to provide a ditching-machine in which the strain will be evenly distributed; and a still further object is to provide a machine in which the plow will be pivotally swung in an open frame, whereby free rearward and vertical movement of the plow is permitted when an obstruction is encountered.

25 Another object of the invention is to provide a machine embodying the characteristics herein mentioned which will only require the attention of two men for the purpose of manipulating the same—one man serving as driver and the other one serving to effect the adjustments of the various parts, all of which are effected from the rear of the machine.

35 With these various objects in view the invention consists in the novel construction of the frame for carrying the various parts of the machine, in the novel means for adjusting the plow, the conveyer, and the discharge-belt, and in the novel means for throwing the plow upwardly whenever an obstruction is encountered by the said plow.

45 The invention consists also in certain details of construction and novelties of combination, all of which will be fully described hereinafter and pointed out in the claims.

50 In the drawings forming part of this specification, Figure 1 is a side elevation of a machine constructed in accordance with our invention, certain parts being removed or broken away to more clearly show the details of construction. Fig. 2 is a top plan view of

the machine. Fig. 3 is an end view taken from the rear, certain parts being broken away. Fig. 4 is a detail perspective view showing the means for raising and lowering the plow. Fig. 5 is a detail perspective view of the plow. Fig. 6 is a longitudinal sectional view of said plow, and Fig. 7 is a rear end view of said plow. Fig. 8 is a perspective view showing the plow and the rotary colters arranged in advance thereof. Fig. 9 is a view illustrating the colters and the standard to which they are attached. Fig. 10 is a detail view showing the lever and bolt for controlling the plow-carrying frame. Fig. 11 is a detail view showing the belt-tightener adapted to operate upon the belt or chain which drives the elevator for the purpose of taking up the slack in said belt or chain. Fig. 12 is a detail perspective view of the means employed for elevating the plow from the rear of the machine or whenever said plow encounters an obstruction. Fig. 13 is a detail section on the line 13 13 of Fig. 12. Fig. 14 is a sectional plan view showing a portion of the discharge-belt, together with means for operating the same. Fig. 15 is a detail sectional view on the line 15 15 of Fig. 14, and Fig. 16 is a detail view of the clutch mechanism for throwing the machine into and out of operation.

In carrying out our invention we employ a frame which is supported upon the front axle 1 and rear axle 2, carrying the wheels 3. The front axle is movable after the manner of an ordinary front wagon-axle, being provided with a fifth-wheel 1^a and has a draft-pole 1^b connected thereto. Front and rear bolsters 4 and 5 are arranged above the front and rear axles, respectively, said bolsters having the upright standards 6 connected thereto and extending upwardly therefrom, said standards being connected at their upper ends by means of the horizontal longitudinal beams 7, said beams being braced by means of arched truss-bars 8, said truss-bars being preferably constructed of angle-iron and rest upon the front and rear bolsters, as most clearly shown in Fig. 1. These front and rear bolsters are also connected by parallel horizontal beams 9, which beams may be of wood or metal, as preferred.

The plow 10 is made substantially in the form of a scoop open at the rear end and comprises the bottom 10^a and sides 10^b, the bottom being provided with a detachable point 10^c, and the sides are provided with detachable cutting edges 10^d. A foot-piece 10^e is arranged upon the under side of the bottom. This plow is connected to a standard 11, which is bifurcated adjacent its rear end, each member 11^a being connected to one side of the plow, as most clearly shown. This combination plow standard and beam 11 has two or more journal-boxes 12 arranged transversely thereon, and passing through the said journal-boxes are the arched bails 13, the ends of said bails being journaled in bearings 14, connected to the parallel side bars 15 of a frame intended to carry the plow, said parallel side bars being connected at their forward ends by means of a cross-piece 16 and at their rear ends are connected by means of a yoke 17, said yoke being curved or arched sufficiently to permit the free movement of the plow and its standard or beam. A flat upright bar 18 is connected centrally to the cross-piece 16 and extends upwardly through a strip 19, connecting the front uprights 6^a, the upper end of said flat bar having a plurality of horizontal apertures 18^a, through which a spring-actuated locking-bolt 20 is adapted to pass above the strip 19, said spring-actuated bolt being connected to a foot-lever 20^a by means of a link-rod 20^b, said lever being pivoted upon a platform 20^c, arranged below the driver's seat and between the front standards 6. By operating the foot-lever the bolt can be thrown into or out of engagement with the apertured bar 18, thereby locking the plow-carrying frame in any desired adjustment. In order to raise and lower this plow-carrying frame, we employ front cables or chains 21, connected to the side bars 15 adjacent their forward ends, and the rear cables or chains 22, connected to the rear ends of the side bars. The chains or cables 21 are connected to a horizontal shaft 23, journaled in the frame, and the rear cables or chains are connected to a horizontal shaft 24, journaled also in the frame, said shafts 23 and 24 having their ends extending through the frame at the left side thereof and are provided with the beveled gears 23^a and 24^a, respectively, which gears mesh with beveled gears 23^b and 24^b, respectively, said gears 23^b and 24^b being mounted upon a shaft 25, which extends parallel to the beam 7 and is journaled in brackets extending laterally from said beam, said shaft being operated by a crank 25^a, mounted upon the rear end of the shaft, said crank being arranged conveniently for the operator, who stands upon a platform 26, projecting rearwardly from the frame. An ordinary pawl-and-ratchet mechanism 25^b is connected to the shaft 25 adjacent the rear end for the purpose of holding said shaft locked after it has been properly adjusted and also for the purpose of permitting intermittent

rotation of said shaft in one direction. It will thus be seen that by operating the crank-handle the shaft 25 will be rotated and will impart motion to the winding-shafts 23 and 24, so that the plow-carrying frame will be raised or lowered as desired, it being understood, of course, that the locking-bolt has been previously disengaged from the bar 18 by pressing upon the foot-lever 20^a. The shaft 23 also carries a sprocket-wheel 27, over which passes a chain 27^a, which drives a sprocket 27^b, which is mounted upon the end of the shaft 28, carried by the uprights 6^a, said shaft having a chain or cable 29 connected to the center of the same, said chain or cable passing around a pulley 29^a, carried by the draft-beam under an antifriction-roller 29^b, arranged beneath the front axle, the lower end of the chain or cable being connected to the cross-piece 16 of the plow-carrying frame. By means of this chain or cable 29 the full force of the draft can be applied directly to the front end of the plow-carrying frame, and by having the upper end of the said chain or cable connected to the shaft 28, which in turn is connected with the winding-shafts 23 and 24, it is obvious that as the plow-carrying frame is raised or lowered the draft chain or cable is let out or taken up, so that the proper tension upon the draft chain or cable is always maintained.

One of the bails 13 is connected to a bow-shaped bar 30 by means of an eyebolt 30^a, said bow-shaped bar being pivotally connected to an arm 31, pivotally connected to a bracket 31^a, connected to one of the side bars 15 of the plow-carrying frame, said arm having a threaded eye 31^b at its free end, through which passes an adjusting-screw 31^c, the end of which is adapted to bear upon the bow-shaped bar 30, as most clearly shown in Fig. 12. A curved link-arm 32 is pivotally connected to the bowed portion of the bar 30, the rear end of said link-arm being connected to the crank-arm 33, which is operated by the crank-lever 34, to which the rod 35 is connected, said rod extending to the rear end of the machine, and by pulling upon said rod the plow can be raised whenever desired, inasmuch as the upward and forward movement of the link-arm 32 will cause the bar 30 to be lifted, carrying with it the bail 13, which supports the plow. In case the plow should encounter an obstruction the said plow will be thrown upwardly and rearwardly, the pivotal connection between the arm 31 and bar 30 permitting such movement, and the regulating-screw is employed to regulate the tension at which point the said parts will break upwardly to permit the plow to swing clear of the obstruction. An endless conveyer 36 is arranged with its lower end directly at the rear of the plow, so that the dirt will be discharged directly upon the upwardly-traveling flight of the said endless conveyer, and the earth so elevated is dumped upon an endless discharge-conveyer 37, the upper end of

which is arranged directly beneath the upper end of the endless elevator, and the lower end of said discharge-conveyer projects laterally beyond the frame, so that the excavated earth can be discharged alongside of the ditch as the machine progresses. The forward end of the elevator 36 is connected to the rear end of the plow - carrying frame by means of link-arms 38, so that as the plow-carrying frame is raised or lowered the forward ends of the conveyer will be correspondingly raised or lowered. Chains or cables 39 are connected to the sides of the elevator adjacent the rear end, said chains or cables being connected to a horizontal shaft 40, which has a beveled gear 40^a mounted upon its projecting end, which gear meshes with a gear 40^b, mounted upon the shaft 25, so that as the said shaft 25 is operated to raise or lower the plow the shaft 40 will be operated to raise or lower the rear end of the elevator 36. The endless conveyer is operated by means of a sprocket-chain 41, which passes around a sprocket-wheel 42, mounted upon the end of the conveyer-roller, said sprocket-chain receiving its motion from a sprocket-wheel 43, mounted upon the end of a shaft 44, carrying a gear 45 at its opposite end, which gear meshes with a larger gear 46, mounted upon the rear axle.

A clutch 47 is arranged upon the shaft 44, which clutch is operated by means of a lever 47^a, so that the mechanism can be thrown into or out of engagement when desired. A belt-tightening lever 48, carrying a pulley 48^a, takes up the slack in the sprocket-chain 41 whenever the endless elevator is adjusted, said lever being held in a locked position by means of a ratchet-bar 48^b, with which the said lever contacts, as most clearly shown in Figs. 11 and 3. If desired, both the upper and lower rollers of the elevator may be provided with sprocket-wheels and a sprocket-chain 49 passed thereover, so that the elevating-apron will be positively operated from both the upper and lower ends.

The discharge-conveyer 37 is supported in its proper position by means of chains or cables 50, connected to a longitudinally-arranged horizontal shaft 51, journaled upon a supplemental frame 52 and provided with an operating-crank 51^a, and a pawl-and-ratchet mechanism 51^b is arranged in connection with the said shaft for the purpose of locking it in any desired adjustment. It will be noted that the shaft 51 and chain are arranged to one side of the endless elevator, as most clearly shown in Figs. 2 and 3. The endless apron of the discharge-conveyer is operated from a sprocket-wheel 53, mounted upon the rear axle and driving a sprocket-chain 54, which in turn drives a sprocket 55, mounted upon a short shaft 56, journaled at the rear end of the frame, and this sprocket 55 has a gear 57 integral therewith, which meshes with a beveled gear 58, integral with the sprocket 59, mounted upon the shaft 60, which passes through the conveyer-frame and is

journaled in the depending ends of the supplemental frame, said shaft serving as a pivot for the conveyer-frame. The sprocket-wheel 59 drives the sprocket-chain 61, which drives the sprocket 62, mounted upon the end of the lower roller of the discharge-conveyer, so that as the machine moves forwardly the discharge-belt will be operated. The shaft 56 is capable of a longitudinal movement by means of a hand-lever 56^a, and by throwing the said shaft outwardly the gears 57 and 58 can be thrown out of mesh, thereby stopping the operation of the discharge-conveyer. It will of course be understood that the hand-lever 56^a is provided with a suitable latch mechanism for holding the same locked in the proper adjustment.

In Figs. 8 and 9 we have shown a slight modification in the construction of the plow, said plow 63 being in the form of a scoop; but it is not constructed with the removable point and side pieces. In connection with this construction of plow we employ two colter-disks 64, which travel directly in front of the sides of the plow, said colter-disks being pivoted to the lower ends of the bent standards 65, which are connected to each other at 65^a and to the plow-beams 11 at 65^b. It will also be noted that the bails 13 pass directly through the plow-beam, thereby dispensing with the boxes 12.

In operation the machine is arranged in alinement with the ditch or trench to be dug, and the plow is inserted in the earth and the machine drawn forwardly, and as the machine moves forwardly the plow will cut into the earth a definite depth, which depth is regulated by the position of the plow-carrying frame, and ordinarily the plow is adjusted so that it will cut about one-half the total depth of the ditch, and after cutting the ditch one-half the proper depth the plow-frame is lowered, so that the plow will cut the remaining depth of the ditch. As the plow scoops out the earth the said earth passes out through the open end of the plow onto the upwardly-moving endless belt of the elevator, from which it is discharged upon the endless apron of the discharge-conveyer, which is moving outwardly, carrying the earth and discharging the same to one side of the ditch or trench. The plow-frame is raised or lowered from the rear of the machine by turning the crank-handle 25^a, and simultaneous with the movement of the plow-frame are the movements of the draft chain or cable and the chains or cables supporting the elevator-conveyer. The inclination of the discharge-conveyer can be quickly and easily adjusted by means of the crank 51^a, and the entire operating mechanism, with the exception of the plow, can be thrown out of operation by means of a clutch 47 and lever 27^a. The plow can be raised whenever desired by pulling upon the rod 35, and by connecting one of the bails to the bar 30 and arm 31 the plow will be automatically lifted whenever it encounters an obstruction.

The plow-carrying frame is locked or unlocked by the operation of the foot-lever 20^a, which is under the control of the driver, and all of the adjustments are effected by the operator, who stands upon the rear platform 26, all of the operating cranks and levers being within easy reach of said operator when standing upon the said platform. The main frame, carrying the plowing, elevating, and discharge mechanisms, is thoroughly braced and the strain evenly distributed.

It will thus be seen that we provide a simple and efficient construction of ditching-machine capable of carrying out all of the objects and purposes hereinbefore referred to.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a device of the kind described, a plow comprising an inclined bottom and vertical sides, the bottom having a detachable point connected thereto, the sides having detachable cutting edges and a triangular vertical foot-piece centrally arranged upon the lower side of the bottom, as set forth.

2. The combination with a main wheeled frame, of a vertically-movable, rectangular, open frame carried by the wheeled frame, a plow having an upwardly and forwardly curved standard extending between the members of the vertically-movable frame whereby the plow has rearward and vertical movement relative to both frames.

3. In a device of the kind described, the combination with the main frame, of the plow-carrying frame and means for adjusting and locking said frame, bails pivotally connected to said plow-carrying frame, the plow-beam attached to said bail, and the plow connected to the beam, as specified.

4. In a device of the kind described, the combination with the main frame, of the adjustable plow-carrying frame and plow connected thereto, means for adjusting and locking the said frame, the draft appliance connected to the main frame, and the adjustable draft chain or cable connected at one end to the plow-carrying frame and at the opposite end to a shaft carried by the main frame, said chain passing over idle pulleys in advance of and below the plane of the plow-carrying frame together with means for winding or unwinding said draft chain or cable as the plow-carrying frame is raised or lowered.

5. The combination with the main frame braced as described, of the adjustable plow-carrying frame and the plow connected therewith, the adjustable elevator-conveyer, and the adjustable discharge-conveyer, together with means for simultaneously raising and lowering the plow-frame and elevator, and means for adjusting the discharge-conveyer, as set forth.

6. In a device of the kind described, the combination with the main frame, of the plow-carrying frame and plow connected thereto, the chains or cables for raising and lowering

the plow-carrying frame, the horizontal shafts to which the chains are connected and the longitudinal shaft together with gearing devices for operating the horizontal shafts to which the chains or cables are attached, together with means for locking the plow-carrying frame, as set forth.

7. In a device of the kind described the combination with the main frame, of the plow-carrying frame and plow connected thereto, the elevator pivotally connected to the plow-carrying frame, the chains or cables connected to the plow-carrying frame and also to the elevator, the transverse horizontal shafts to which the chains or cables are connected, said shafts carrying beveled gears at their ends, the longitudinal horizontal shaft provided with gears adapted to mesh with the afore-said gears together with means for moving and locking the said longitudinal horizontal shaft as set forth.

8. In a device of the kind described the combination with the main frame, of the adjustable plow and elevator, the supplemental frame arranged upon the main frame adjacent the rear end, the discharge-conveyer pivotally mounted upon the main frame, and means carried upon the supplemental frame for adjusting the discharge-conveyer, as set forth.

9. In a device of the kind described the combination with the main frame, of the plow-carrying frame, the upright rod connected thereto and having apertures adjacent to its upper end, the horizontal strip through which the apertured bar passes, the spring-actuated bolt and the foot-lever connected thereto, as set forth.

10. In a device of the kind described the combination with the plow and the beam connected thereto, of the plow-carrying frame, the bails pivotally connected to the frame and plow-beam, an arm pivotally connected to the plow-carrying frame, a bow-shaped bar pivotally connected to the said arm, a curved arm pivotally connected to the bow-shaped bar, the compound crank arranged upon the plow-carrying frame, the curved arm being connected to the lower arm thereof and an operating-rod connected to the upper end thereof, and the adjusting-screw carried by the arm pivoted to the plow-carrying frame, and an eyebolt for connecting the bow-shaped bar to one of the bails, as set forth.

11. In a device of the kind described, the combination with the main frame having a seat and a platform at the forward end, and a platform at the rear end, said main frame being braced as described, of the adjustable plow-carrying frame and plow connected thereto, the adjustable endless elevator, the adjustable discharge-conveyer, the supplemental frame arranged upon the main frame adjacent the rear end thereof, the chains or cables connected to the plow-carrying frame, elevator, and discharge-conveyer, the shafts to which the said chains or cables are connected, the longitudinal rotary shaft jour-

naled upon the main frame and provided
with means for rotating the shafts to which
the chains or cables are connected, the driv-
ing mechanism connected with the rear axle
5 for operating the elevator, and the driving
mechanism connected with the rear axle for
operating the discharge-conveyer, together
with means for throwing said mechanisms
into or out of operation, a belt-tightener ar-
10 ranged in connection with the elevator-driv-
ing mechanism, the spring-actuated locking
means for locking the plow-carrying frame,

and the adjustable draft chain or cable con-
nected to the plow-carrying frame, and a
shaft carried by the main frame, together 15
with means for operating said shaft simulta-
neously with the raising and lowering of the
plow-carrying frame, substantially as de-
scribed.

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