

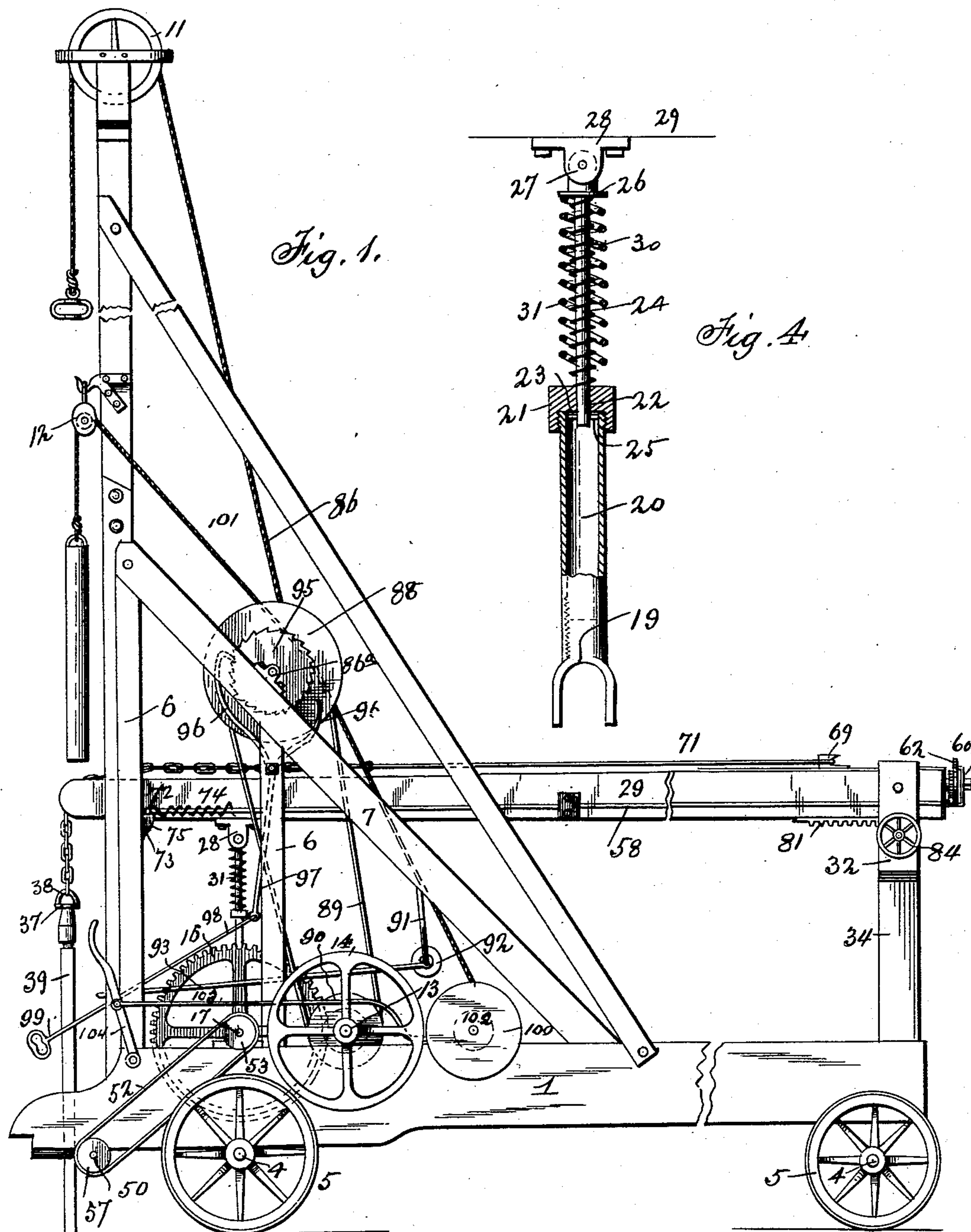
(No Model.)

4 Sheets—Sheet 1.

G. ZINK.
WELL BORING MACHINE.

No. 569,012.

Patented Oct. 6, 1896.



Witnesses:
H. L. Ourand
J. L. Coombs

Inventor:
George Zink
By Louis Duggan & Co.
Attorneys

(No Model.)

4 Sheets—Sheet 2.

G. ZINK.
WELL BORING MACHINE.

No. 569,012.

Patented Oct. 6, 1896.

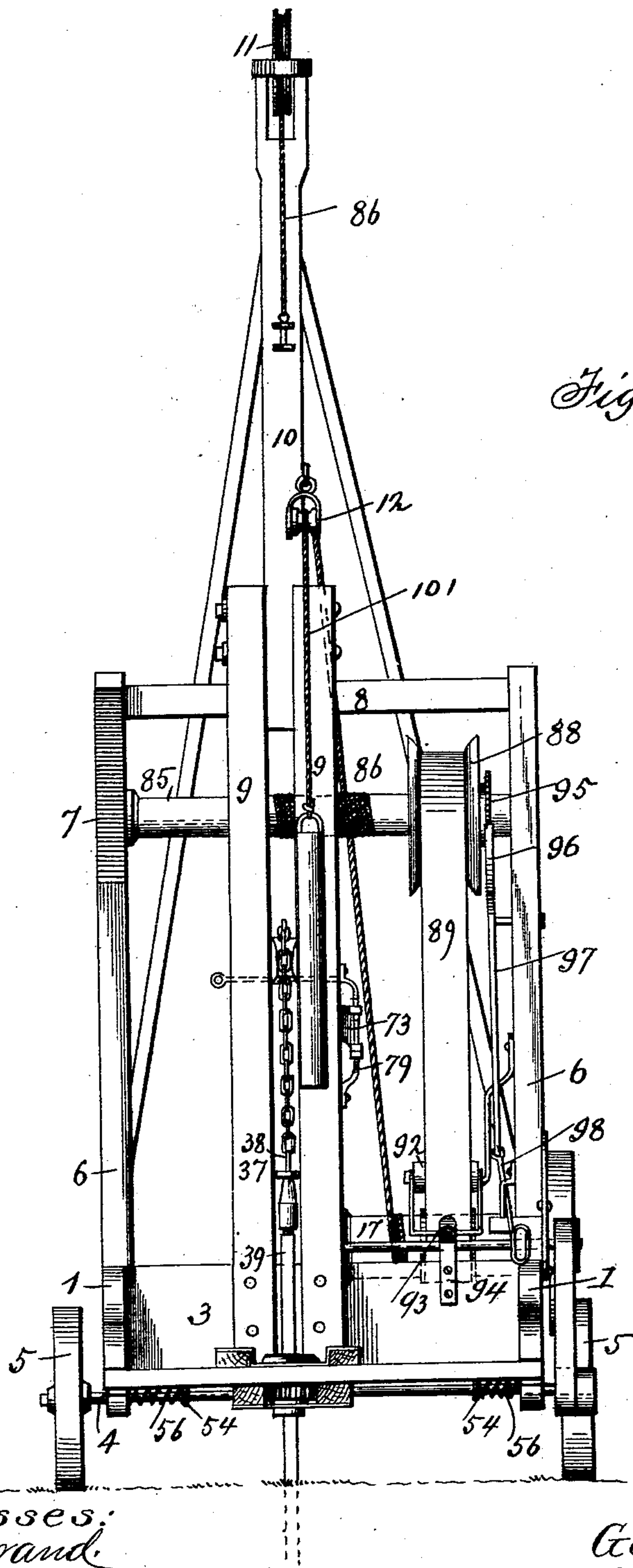


Fig. 2.

Witnesses:
H. L. Orvand
J. L. Cooney

Inventor:
George Zink,
by James P. Gayle & Co.
Attorneys.

(No Model.)

4 Sheets—Sheet 3.

G. ZINK.
WELL BORING MACHINE.

No. 569,012.

Patented Oct. 6, 1896.

Fig. 10.

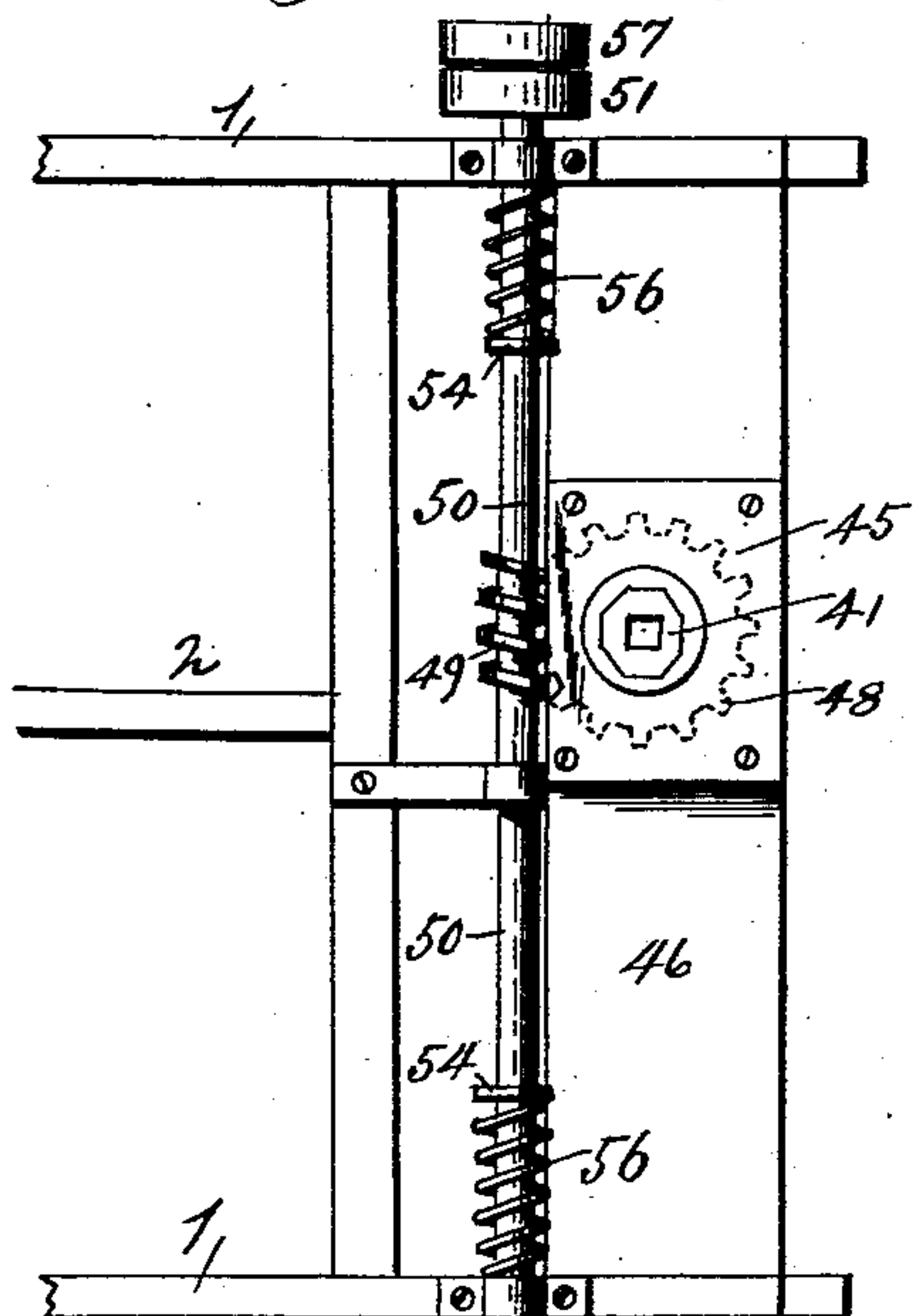


Fig. 9.

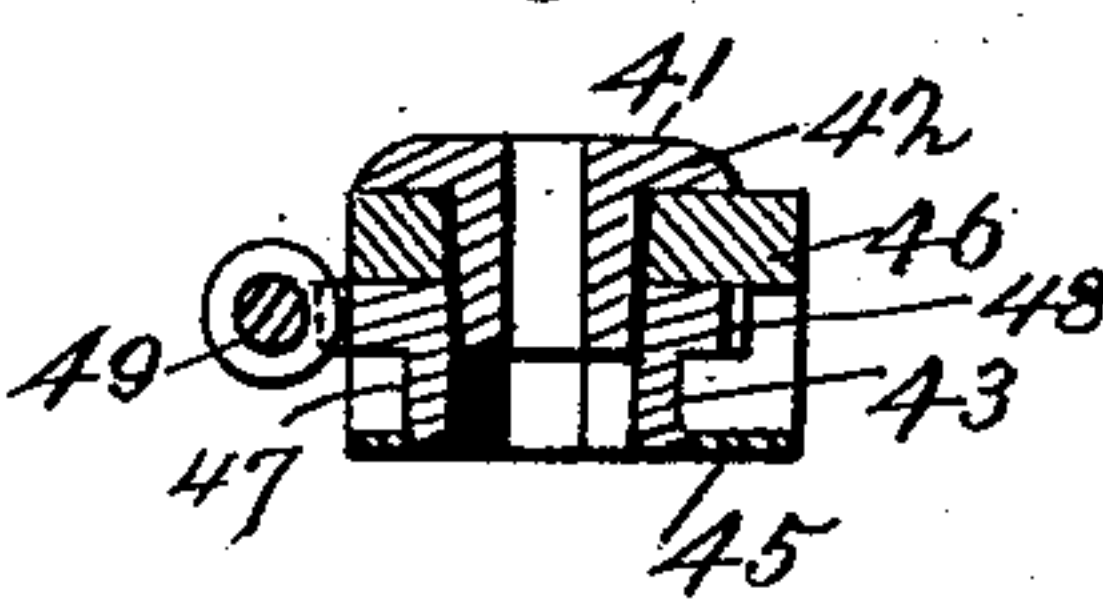
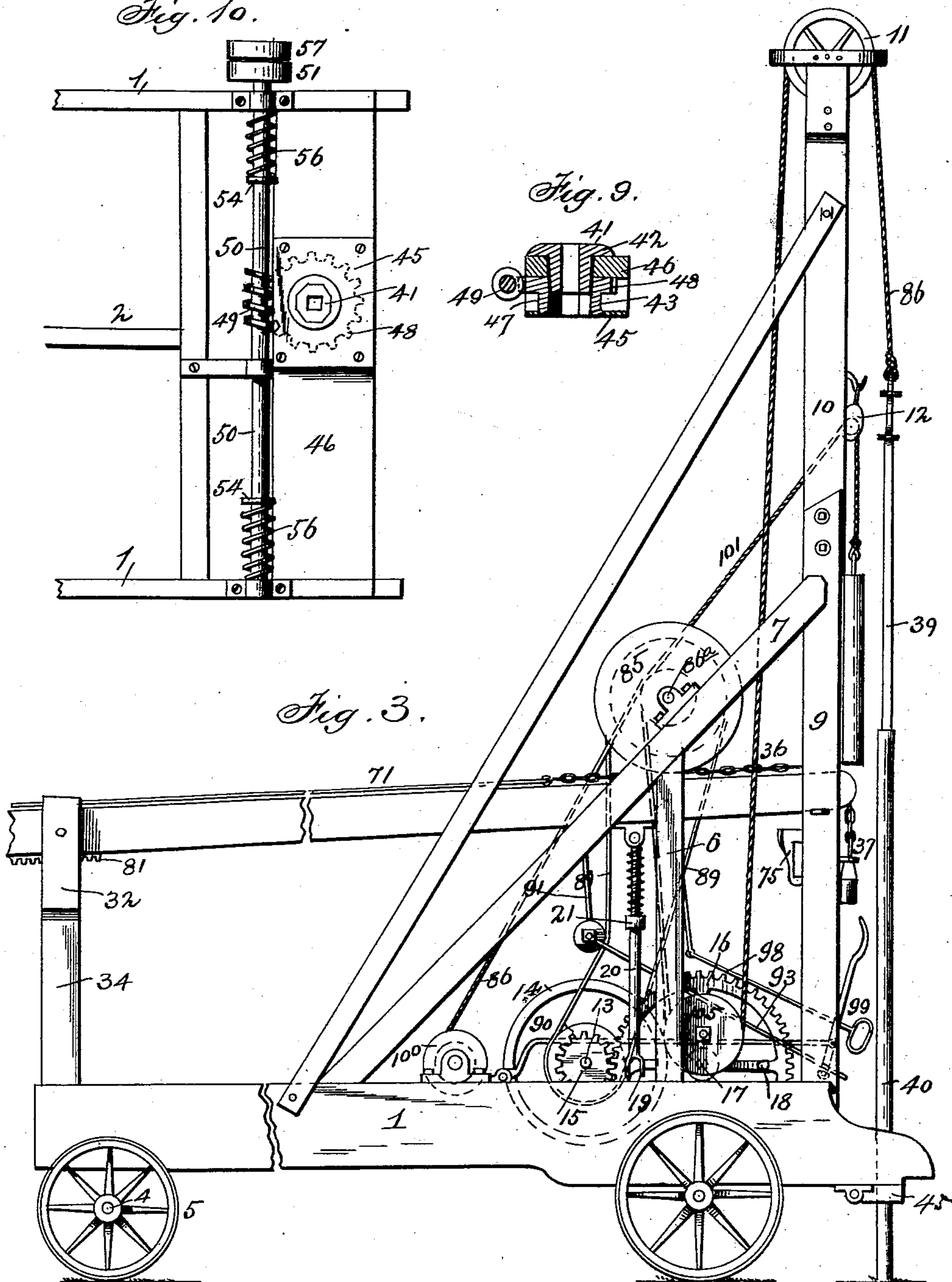


Fig. 3.



Witnesses:
H. L. Ouraud
J. L. Coombs

Inventor:
George Zink
by James Sagger & Co.
Attorneys.

(No Model.)

4 Sheets—Sheet 4.

G. ZINK.
WELL BORING MACHINE.

No. 569,012.

Patented Oct. 6, 1896.

Fig. 5

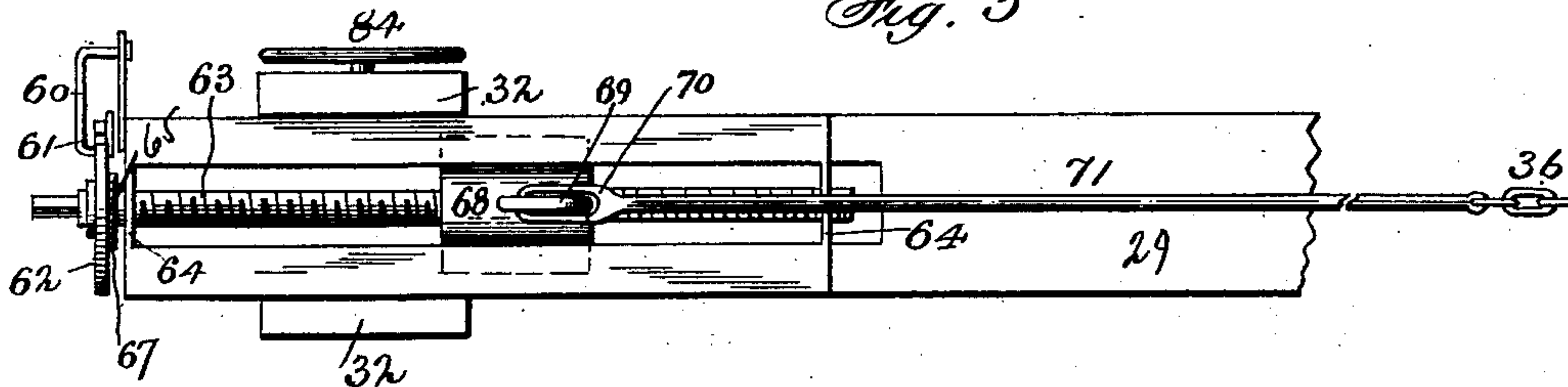


Fig. 6

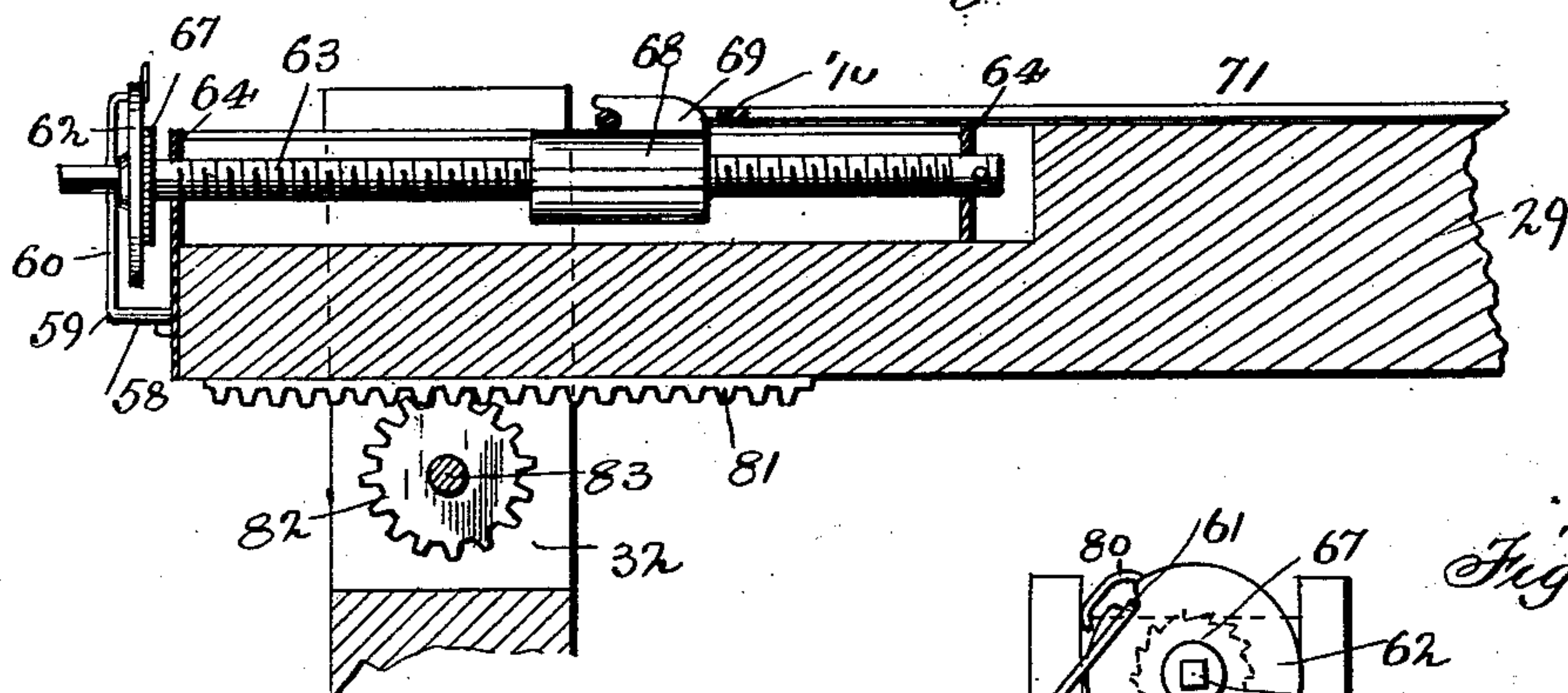


Fig. 7

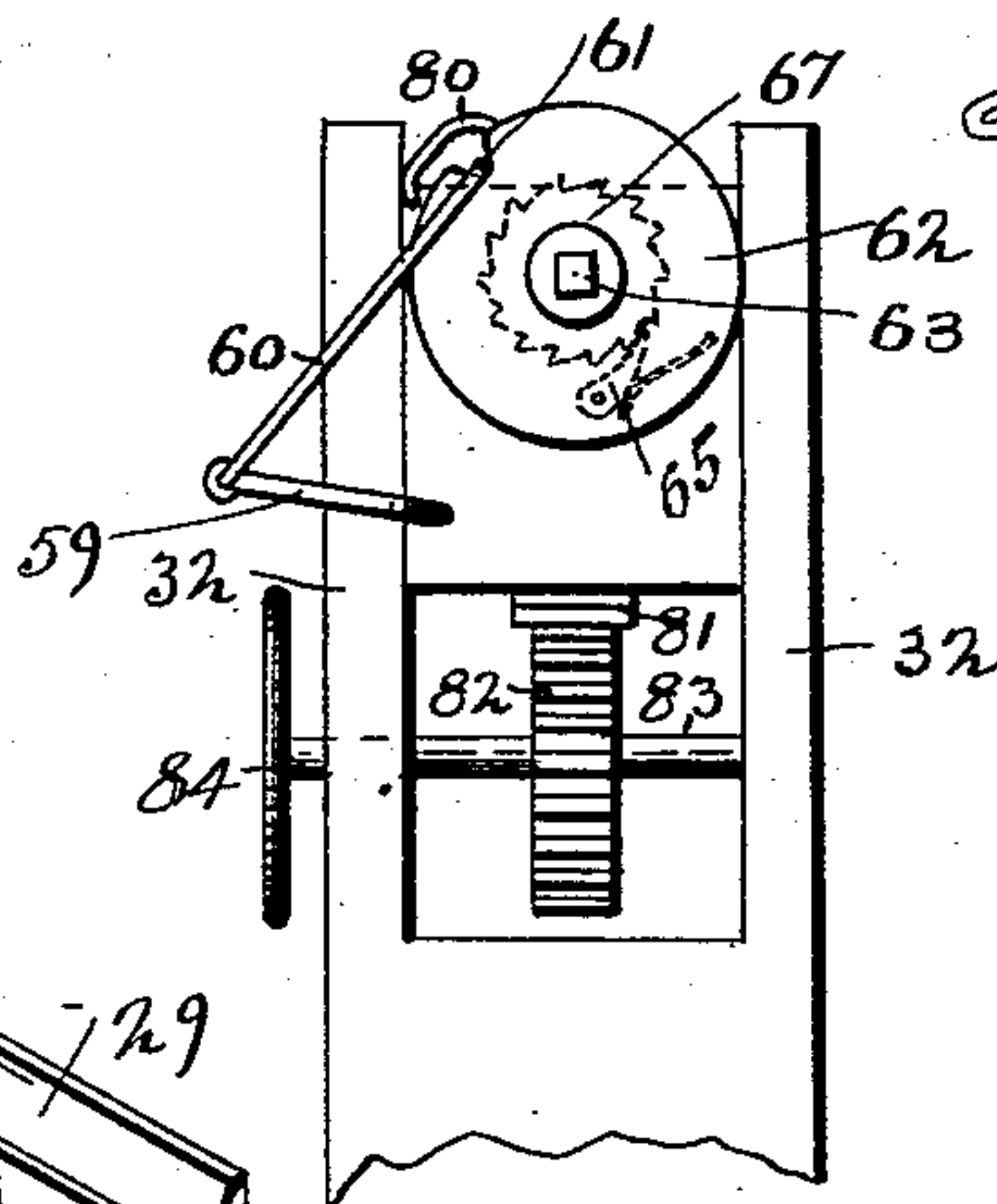
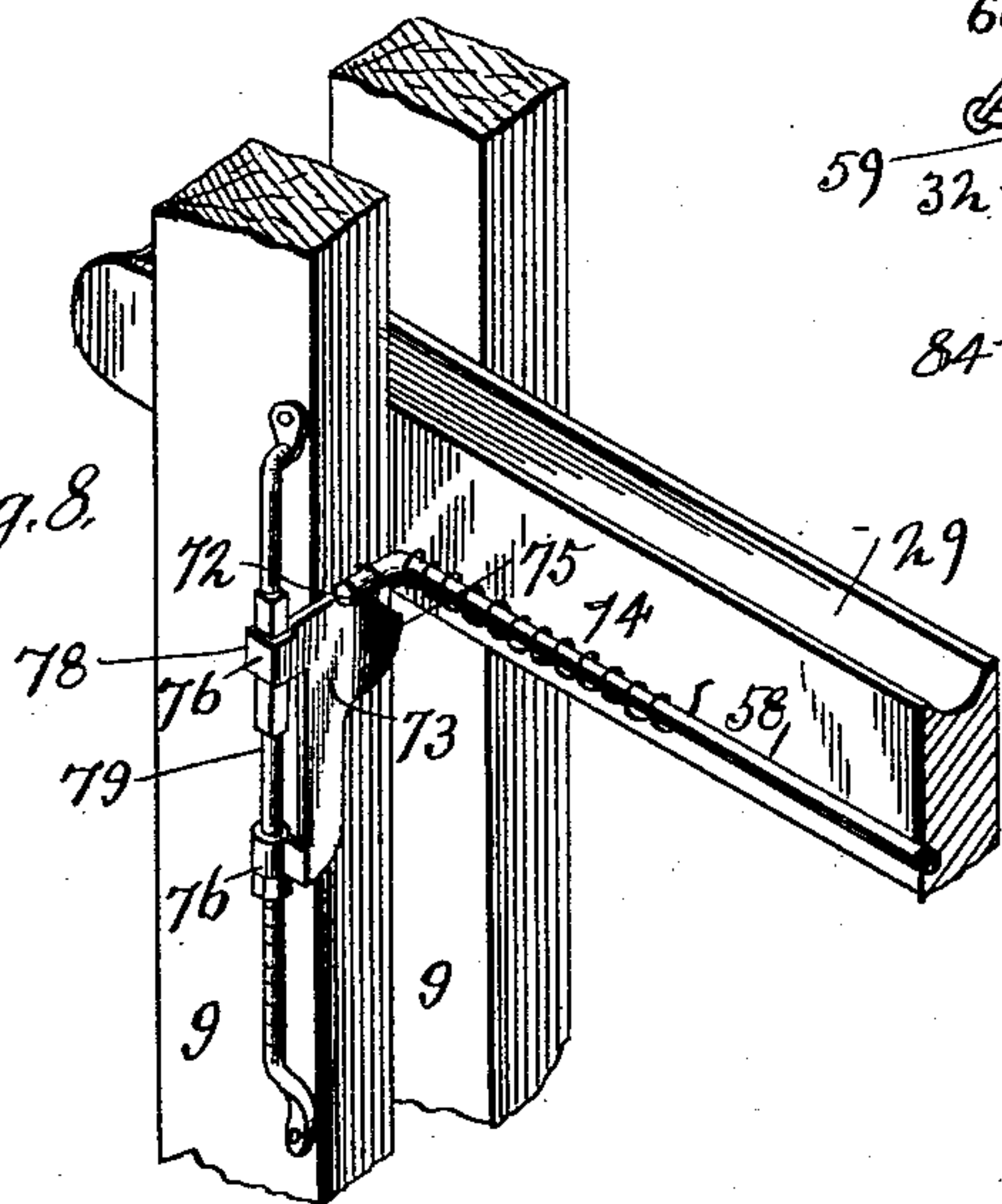


Fig. 8



Witnesses:
H. L. Ourand
J. L. Leomby

Inventor:
George Zink,
By *Lawrence C. Cugg* & Co.,
Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE ZINK, OF CLEAR SPRING, MARYLAND.

WELL-BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 569,012, dated October 6, 1896.

Application filed May 4, 1896. Serial No. 590,167. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ZINK, a citizen of the United States, and a resident of Clear Spring, in the county of Washington and State of Maryland, have invented certain new and useful Improvements in Well-Boring Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to well-boring machines, and its object is to provide improved means for alternately raising and dropping the drill-rod and drill and automatically feeding the same according to the progress of the work; means for intermittently rotating the drill-rod, so that the drill-rod will be presented in a different position with respect to the material being operated upon at each stroke, the construction being such that should the drill become jammed from any cause the rotating devices will be thrown out of operative condition, thus avoiding straining or breaking of the drill-rod; means whereby the drill-rod can be readily disengaged from the operating mechanism and the tool-raising mechanism connected therewith and thrown into operative condition to raise the drilling-tools, and also to provide a yielding pitman, which operates the walking-beam for raising and lowering the drill, whereby the jar or concussion caused by the downstroke of the drill is taken up, thereby obviating liability of the pitman being broken.

There are also other objects, which will hereinafter appear, whereby I secure important advantages with respect to efficiency in operation.

The invention consists in the novel construction and combination of parts hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a well-drilling machine constructed according to my invention. Fig. 2 is a front view of the same. Fig. 3 is a side elevation looking from the opposite side of Fig. 1 and showing the pitman disconnected from the walking-beam and fly-wheel and the pulley connected with the wrist-pin of

the latter for operating the drill-rod and drill until the well is deep enough to allow the drill-rod to be connected with the walking-beam. Fig. 4 is a detail sectional view of the two-part pitman. Fig. 5 is a detail plan view of the feeding mechanism at the rear end of the walking-beam. Fig. 6 is a longitudinal sectional view of the same. Fig. 7 is an end view. Fig. 8 is a detail perspective view of the adjustable dog at the front of the machine, which operates the feeding mechanism. Fig. 9 is a sectional view showing the means for rotating the drill-rod. Fig. 10 is a bottom view of the same.

In the said drawings the reference-numeral 1 designates two side beams, 2 an intermediate beam, and 3 a front cross-beam, rigidly connected together and forming the base of the machine. A similar cross-beam (not shown) is provided at the rear end of the machine.

Near each end the side beams have journaled thereto axles 4, provided with wheels 5 to enable the machine to be transported from place to place.

Secured to each side beam at the front thereof is a frame consisting of vertical bars 6 and inclined bars 7, the front bars 6 being connected at their upper ends by a cross-bar 8.

Secured to the front and cross-bar 3 and to the cross-bar 8 are two uprights 9, to the upper ends of which is secured a vertical post 10, provided with a pulley 11 at the upper end, over which passes the rope for elevating the drill-bar and drill, and has also secured to it, intermediate the ends, a sheave 12, around which passes the sand-pump rope.

Journaled in bearings secured to the side beams 1 is a shaft 13, provided at one end with a pulley 14, which is connected by a belt (not shown) with a steam-engine or other motor by which the shaft is rotated. The other end of this shaft is provided with a pinion 15, which meshes with a cog-wheel 16 on a transverse shaft 17. This cog-wheel is provided with a wrist-pin 18, with which engages the slotted or bifurcated arm 19, fitting in the lower end of a tubular rod 20, (see dotted lines, Fig. 4,) preferably of gas-pipe, which is screw-threaded to receive the correspondingly-threaded inner end of said arm. This

rod forms the lower part of a two-part pitman, and its upper end is exteriorly screw-threaded to receive a removable collar 21, having a bore or opening 22 at the upper end somewhat smaller than the bore of said tube, forming an annular shoulder 23. (See Fig. 4.) Passing through this collar is a rod 24, forming the upper part of the pitman, which telescopes in said tube and is provided with a diametric pin 25, which engages with said shoulder and holds the tube and rod to each other. The tube and rod may be disconnected, however, when desired, by unscrewing the collar, when the rod can be slipped out of the tube. The upper end of said rod is provided with a cap 26, which is removably and pivotally connected with lugs 27 of a bracket 28, secured to the under side of a walking-beam 29. Confined between said cap and collar and embracing the rod 24 is a coiled spring 30, which is surrounded by a similar but somewhat shorter spring 31.

The object of spring 30 is to take up the jar or concussion caused by the fall of the drill and walking-beam, while the spring 31 acts as a reinforce for spring 30 to prevent the latter from being unduly compressed, so that its coils will not come in contact with each other, which would tend to break the same. The said springs also yield and allow the walking-beam to come in contact with the dog or stop, hereinafter described, to operate the feeding mechanism.

The front end of the walking-beam projects between the standards or uprights 9 (see Figs. 1 and 2) and is pivoted at its rear end to brackets 32, secured to the upper end of a post 34, secured to the rear cross-beam 3 of the base of the machine.

The numeral 36 designates the drill-chain, provided at its lower end with a swivel 37, having a bail 38, with which the lower link of the chain is connected. This chain passes over the front end of the walking-beam. The lower end of this swivel is formed with a screw-threaded socket to receive the correspondingly-threaded upper end of a drill-rod 39, provided with a drill 40. This drill-rod is square or angular and passes through a corresponding aperture in a polygonal and tapering block 41, formed at its upper end with an annular flange 42. (See Figs. 9 and 10.) Said block fits a correspondingly-formed hole or opening in a rotatable hub 43, which in turn fits in and is rotatable in a circular opening in a plate 45, located below a transverse bar 46, secured to the front ends of the side beams 1. The block 41 passes through an aperture in this bar and is supported therein by the flange 42, and just below said flange is made circular, so as to rotate in said opening.

The hub 43 is formed with an annular flange 47, which rests on plate 45 and holds the hub in place thereon, and is formed with a number of peripheral teeth or cogs 48, which engage with a worm 49 on a transverse shaft 50,

connected by a pulley 51 and belt 52 with a pulley 53 on the shaft 17, by which means the drill-rod is rotated, the swivel with which it is connected turning freely in the bail 38, so as to prevent the chains from twisting.

The shaft 50 is movable laterally and intermediate its ends is provided with collars 54, between which and the side beams 1 are interposed coiled springs 56, and on the end of said shaft and in close proximity to the fixed pulley 51 is a loose pulley 57. The object of this construction is to stop the movement of the shaft 50, if the drill should become jammed by striking soft rock or from any other cause which would otherwise have a tendency to twist or break the drill-rod. This stopping of the shaft is accomplished automatically, as follows: In normal position the said shaft is pushed outward or toward the left by the tension of the springs, so that the belt 52 will engage with the fixed pulley 51 and rotate the shaft. So long as the drill is free to rotate the worm on the shaft will rotate the block and hub and drill-rod; but should the drill become jammed, so that the block cannot rotate, the shaft will be moved inward or toward the left, throwing the belt off the fixed onto the loose pulley and causing the rotation of the shaft to stop. When the drill is released, the springs will throw the shaft into normal position, shifting the belt, so that it will again be rotated.

Journaled to one side of the walking-beam is an oscillating rod or shaft 58, provided at its rear end with a crank 59, to which is pivoted a rod 60, having its free end bent at an angle and engaging with a notch 61 in the periphery of a disk 62, loosely mounted on a screw-shaft 63, journaled in bearings 64, located in a slot or recess in the upper side of the rear end of the walking-beam. This disk is provided with a spring-pawl 65, which engages with a ratchet-wheel 67, fixed to the screw-shaft. Carried by said screw-shaft is a correspondingly-threaded block or cross-head 68, having a lug 69, with which is connected an eye 70 on one end of a rod 71, to the other end of which the drill-chain is secured. The front end of the shaft 58 is provided with an arm or crank 72, which, as the walking-beam descends, strikes an adjustable dog or stop 73, which causes the rod to be turned, a torsional spring 74 returning the rod to normal position when the walking-beam ascends. By this means the said shaft 58 is oscillated. This said dog consists of a metal plate having one end formed with a lug 75, which forms the stop for the arm or crank 72, and is also formed with two hinges 76, the upper one of which has a square or angular opening 78, which engages with a correspondingly-squared portion of a vertical rod 79, secured to one of the standards or uprights 9. When thus engaged, the lug 75 will lie in the path of the arm 72 and the dog or plate will be prevented from turning. The rod above said squared portion is somewhat

smaller and made cylindrical, so that if the squared hinge is pushed up into engagement therewith the dog can be turned, so as to throw the lugs or stop out of the way of the arm 72.

Below the squared portion the rod 79 is screw-threaded, and engaging therewith is a correspondingly-threaded nut or collar for adjusting the dog vertically, so as to cause the arm 72 to strike the stop or lug sooner or later, as may be desired, so as to vary the feed of the drill-chains.

The operation of this part of the machine is as follows: As the walking-beam ascends the arm 72 will strike the lug or stop, causing the rod or shaft 58 to be turned in its bearings and, through the means of the crank 59 and rod 60, the disk to be turned, carrying with it the pawl 65, which, engaging with the ratchet 67, will turn the screw-shaft to which it is secured, causing the block or cross-head to be moved forward, thus automatically feeding the drill-chain, which is connected therewith. As before said, the dog 73 is adjustable, so as to vary the throw or movement of the shaft 58 and consequently vary the feed of the drill. A spring 80 holds the rod 60 in the notch in disk 62. The screw-shaft 63 has its outer end squared to engage with a correspondingly-shaped socket in a crank, (not shown,) whereby it may be turned by hand to return the block or cross-head when it has reached the limit of its forward movement, and an additional length of chain is connected with the drill-chain.

The walking-beam, on its under side near the rear end, is provided with a rack-bar 81, with which engages a pinion 82 on a rotatable shaft 83, provided with a hand-wheel 84, for the purpose of moving the walking-beam backward when it is desired to withdraw the drill from the well, the pivot of the walking-beam being removed to allow such movement.

The numeral 85 designates a shaft or drum to which the rope 86, for elevating the drill from the well, is secured, journaled in bearings 86^a, secured to the inclined bars 7. This shaft or drum is provided with a flanged pulley 88, connected by a loose belt 89 with a pulley 90 on the driving-shaft of the machine. Pivoted to one of the bars 7 is a downwardly-depending rod 91, having its free end bent at a right angle, and journaled therein is a roller 92, adapted to be pressed against the belt and tighten the same, so as to cause the drum or shaft to be rotated and the hoisting-rope wound thereon. This belt-tightener is caused to approach to and recede from the drum by a hand-operated yoke 93, consisting of a rod bent to form parallel arms, which are journaled or pivoted to the bent end of rod 91. This yoke is adapted to engage with a bracket 94, secured to the front cross-beam 3, so as to hold the roller out of contact with belt 89.

Secured to the pulley 88 is an escapement-

wheel 95, with which is adapted to engage the curved arms 96 of an escapement-lever 97, pivoted to one of the vertical bars 6. Pivoted to the lower end of the lever is a rod 98, having a handle 99, by which the lever is operated. When said lever is actuated so that said curved arms are out of engagement with the escapement-wheel, the drum or shaft 85 is free to turn in either direction. When it is actuated, however, to throw one of said arms into engagement with the escapement-wheel and the other out of engagement therewith, the drum or shaft can turn to the hoisting-rope, but cannot turn in the opposite direction, the operation being similar to that of an ordinary pawl and ratchet. By reciprocating the rod 98 back and forth, so that said arms will alternately engage with the escapement-wheel, the drum or shaft will be intermittently rotated, allowing the rope thereon to be fed out by a step-by-step movement. This operation is similar to that of a clock-escapement.

The numeral 100 designates the sand-pump drum, to which the sand-pump rope 101 is secured. One end of this drum is movable and is provided with a friction-pulley 102 and a rod 103, pivoted to a lever 104, for throwing the pulley into and out of contact with the driving-pulley, so as to elevate and lower the sand-pump. The numeral 105 designates a wheel adapted to be placed on the wrist-pin 18 of the cog-wheel 16 for a purpose hereinafter explained.

The operation is as follows: At the beginning of the work the drill-rod is secured to the hoisting-rope 86, the walking-beam having been first carried rearwardly out of the way by means of the rack-bar and pinion, and the pitman disconnected therefrom. The wheel 105 is then placed on the wrist-pin and the hoisting-rope passed around the under side thereof, as seen in Fig. 2, and the machine set in motion. The cog-wheel provided with the wrist-pin will now be rotated and the wheel 105 carried around in a circle concentric with the axis of said wheel, which will alternately raise and lower the drill-rod, the drum or shaft 85 remaining stationary, except when the hoisting-rope is being fed or paid out. The feeding is accomplished by the escapement-wheel and lever. The well will thus be gradually dug until it is sufficiently deep to allow the top of the drill-rod to come below the end of the walking-beam, when the wheel 105 is disconnected from the pitman, the walking-beam pushed forward, and the pitman connected therewith and with the wrist-pin. The walking-beam will now be alternately raised and lowered to raise and drop the drill-rod and drill, which will be fed downward as the work progresses by the means before described. The principal object of the two-part pitman and spring 30 is to allow the pitman to yield and the walking-beam to strike the stop or dog to feed the drill-chain, as, if the drill-chain were too short

to permit the drill to strike bottom and the pitman unyielding, the walking-beam would not come in contact with the stop; but by making the pitman as described the weight of the drill-rod will depress the walking-beam until it strikes the dog or stop, the pitman yielding for such purpose.

Having thus fully described my invention, what I claim is—

10 1. In a well-digging machine, the combination with the base, and the pivoted walking-beam, of the two-part pitman detachably connected therewith comprising the rod provided with a transverse pin, the screw-threaded collar through which said rod passes having an interior annular shoulder, the long and short coiled springs on said rod, the tube to which said collar is secured, the bifurcated or slotted arm at the lower end thereof, the pitman
15 and the driving-wheel; substantially as described.

2. In a well-digging machine, the combination with the base and the pivoted walking-beam, of the oscillating rod or shaft journaled to one side thereof, the crank at the rear end thereof, the pivoted rod, the oscillating notched disk, the screw-shaft on which said disk is loosely mounted, the spring-pawl pivoted to said disk, the ratchet-wheel fixed to the screw-shaft with which said pawl engages, the screw-threaded block or cross-head, the rod and drill-chain, the arm at the front end of said oscillating shaft, the torsional spring and the dog or stop with which said arm engages; substantially as described.
30

3. In a well-digging machine, the combination with the pivoted walking-beam, of the oscillating rod or shaft journaled to the side of the walking-beam, the crank at the rear end thereof, the rod connected therewith, the disk with which said rod is connected, the rotatable screw-shaft on which said disk is loosely mounted, the spring-pawl pivoted to said disk, the ratchet-wheel fixed to said screw-shaft, the screw-block or cross-head on said screw-shaft, the rod and drill-chain connected therewith, the arm at the front end of said oscillating shaft, and the vertically-adjustable and swinging or hinged dog or stop;
40 50 substantially as described.

4. In a well-digging machine, the combination with the base, the standards or uprights, the pivoted walking-beam, the oscillating rod or shaft journaled to one side thereof having an arm and torsional spring at one end, the crank at the other end, the rod and notched disk, the spring-pawl and ratchet, the rotatable screw-shaft, the screw-block or cross-head, and the rod and drill-chain, of the vertical rod secured to said standards, made cylindrical at the upper part, screw-threaded at the lower part, and angular intermediate of said parts, the dog having hinges one of which has an angular bore, the stop or lug formed with said dog, and the screw-nut on said rod; substantially as described. 55 60 65

5. In a well-digging machine the combination with the base, the transverse bar at the base, the rotatable hub having peripheral teeth and an angular bore, and the rotatable block fitting therein having an angular bore for the passage of the drill-rod, of the worm, the rotatable and laterally-movable shaft upon which it is fixed, the collars therein, the coiled springs and the fast and loose pulleys; substantially as described. 70 75

6. In a well-digging machine, the combination with the base, the uprights, the pivoted walking-beam, the two-part yielding and detachable pitman connected therewith, the wrist-pin with which the forked end of said pitman engages, the cogged driving-wheel, the pulley thereon, the driving-shaft and pinion and the driving-pulley, of the transverse bar at the front of the machine, the rotatable hub journaled thereto having an angular bore and peripheral cogs, the rotatable block fitting therein having an angular bore for the passage of the drill-rod, the rotatable and laterally-movable shaft having a worm engaging with said cogs, the collars thereon, the coiled springs, the fast and loose pulleys, and the belt; substantially as described. 80 85 90 95

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

GEORGE ZINK.

Witnesses:

AUGUST PETERSON,
BENNETT S. JONES.