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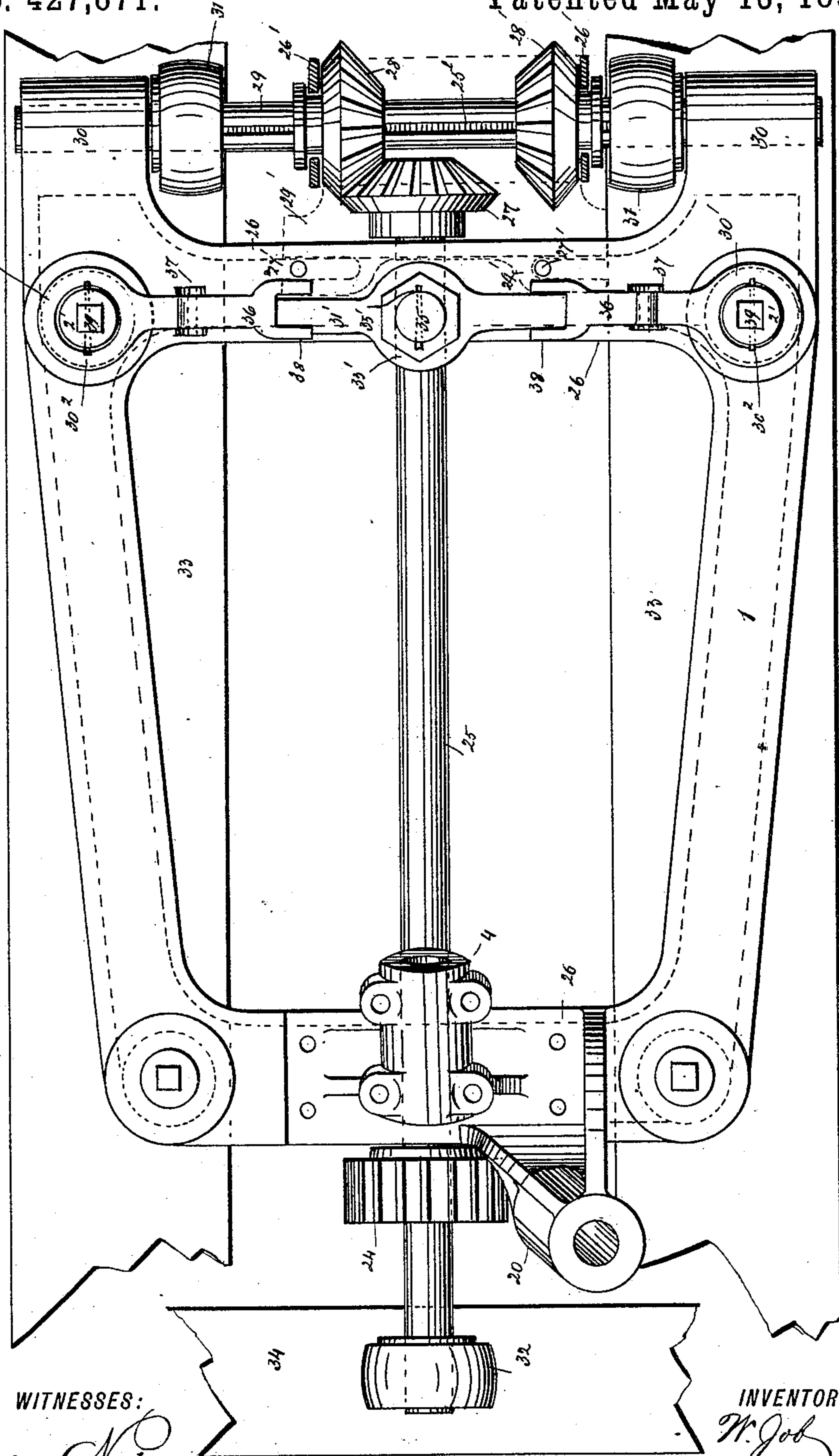
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W. JOB.
COAL MINING MACHINE.

No. 427,871.

Patented May 13, 1890.

Fig. 1.



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(No Model.)

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Fig. 2.

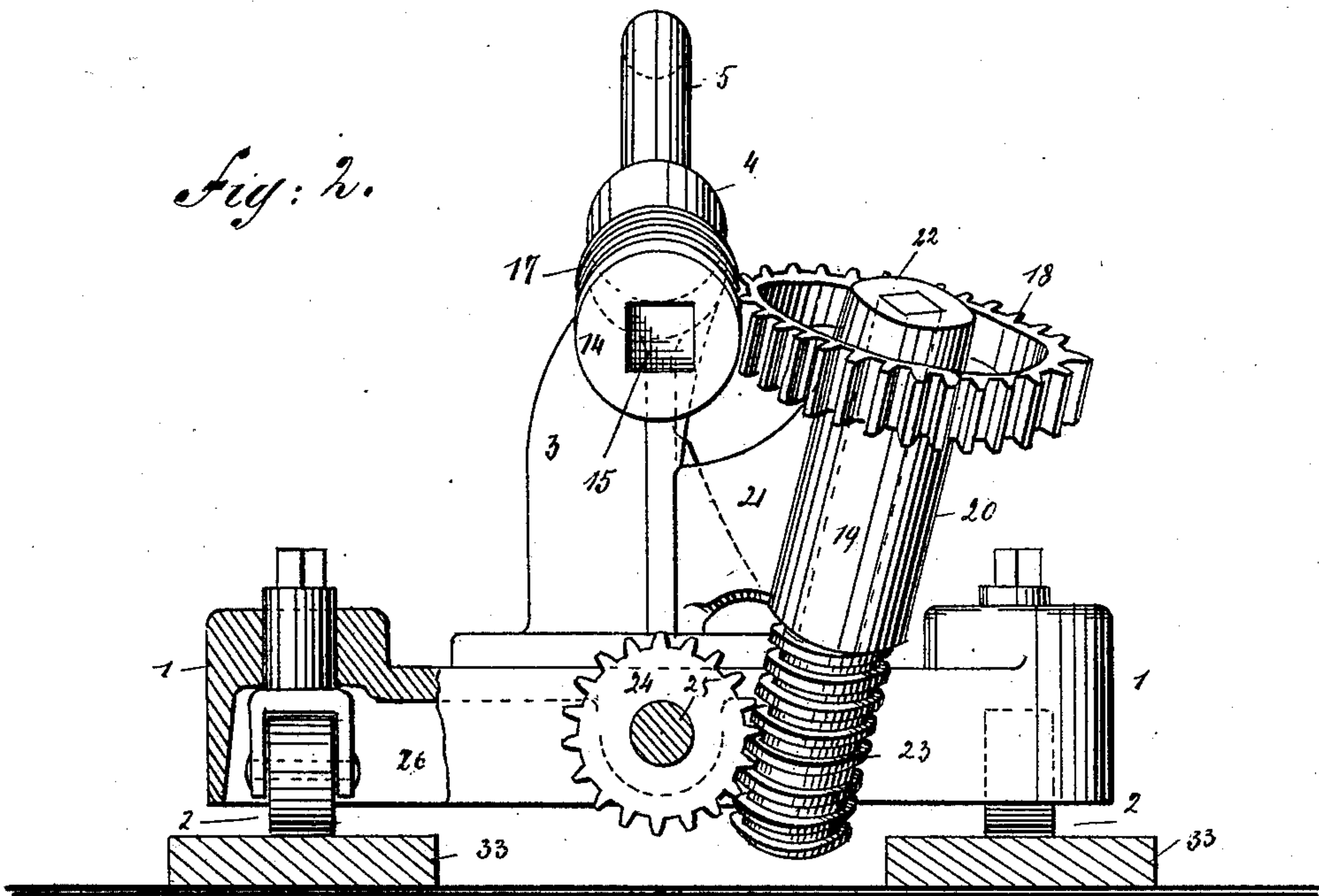
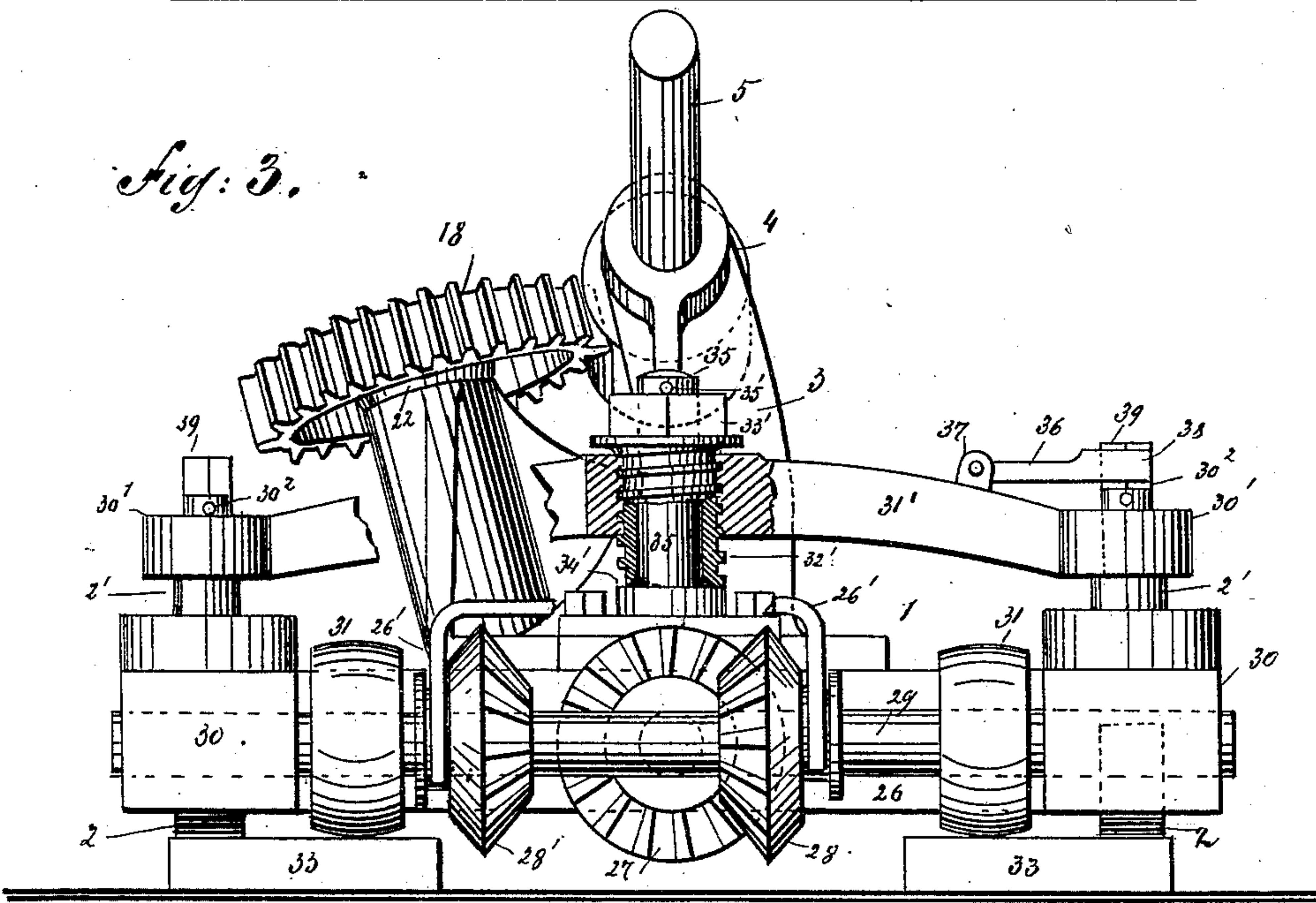


Fig. 3.



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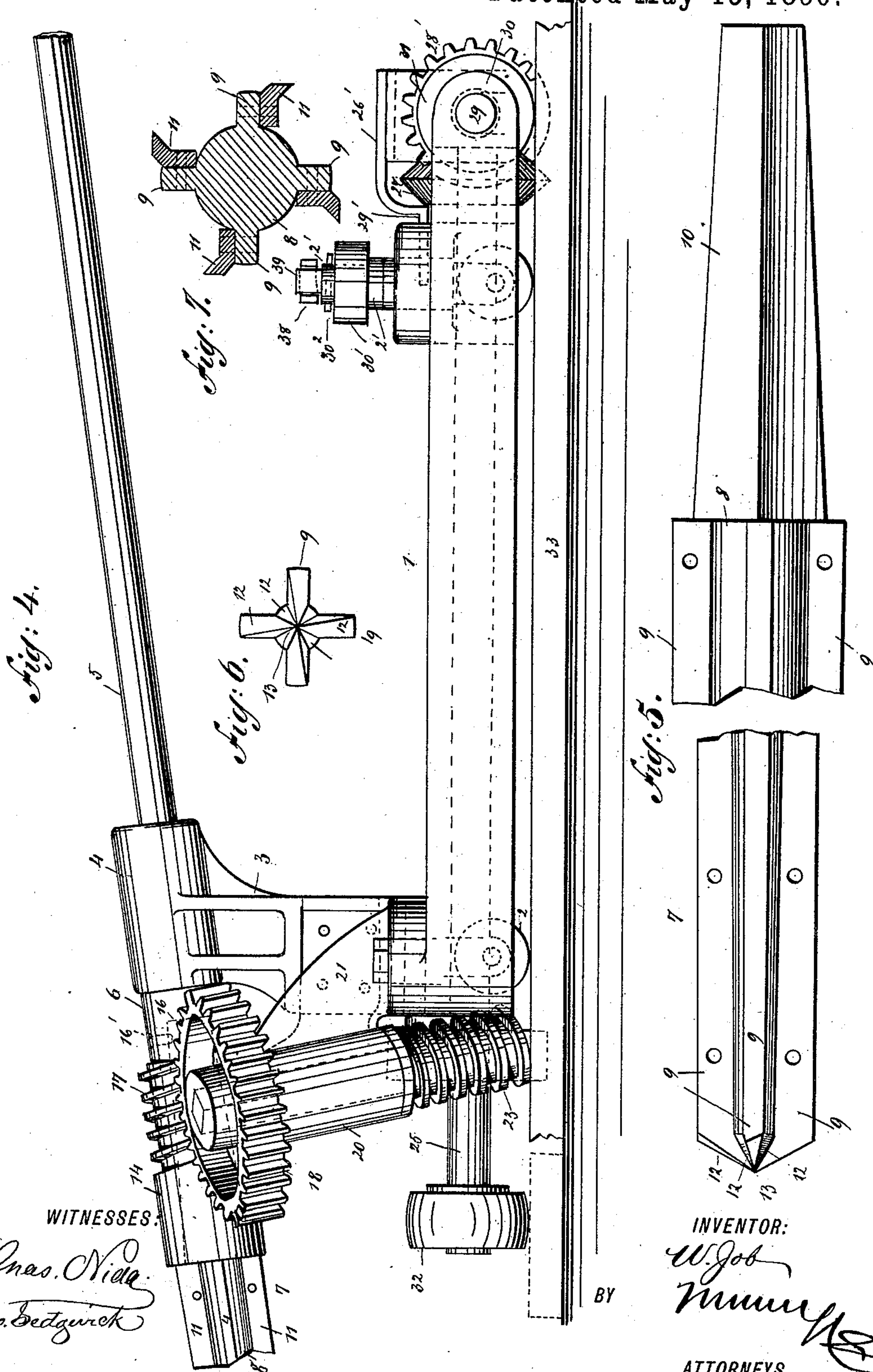
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UNITED STATES PATENT OFFICE.

WILLIAM JOB, OF COLUMBUS, OHIO.

COAL-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 427,871, dated May 13, 1890.

Application filed June 4, 1889. Serial No. 313,065. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JOB, of Columbus, in the county of Franklin and State of Ohio, have invented a new and Improved Coal-Mining Machine, of which the following is a full, clear, and exact description.

This invention relates to machines for mining coal, and has for its object to provide a coal-mining machine which will drill a hole and then cut a seam laterally therefrom, thereby saving time, labor, and expense.

Heretofore in mining coal a horizontal cut was made in the coal adjacent to the lower strata of clay or other foreign material by drilling holes and then removing the layer of coal next to the clay by hand with picks. The block of coal to be removed was then detached from the coal-bed above by drilling holes and blasting.

In the foregoing-described method of mining coal the operation was slow and the blocks of coal when detached dropped down vertically in the space beneath cleared by the picks and required to be drawn out from the bed of coal, which was accomplished with difficulty.

This invention has for its object to avoid these objections and difficulties in the manner and by the machine above referred to.

The invention consists in a coal-mining machine and in details thereof constructed and arranged as hereinafter described and claimed.

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

Figure 1 is a plan view of the invention with parts removed and partly broken away. Fig. 2 is a view of the front end thereof with parts removed and partly broken away and in section. Fig. 3 is a view of the rear end. Fig. 4 is a side view. Fig. 5 is a side view of the drill-stock with a part broken away and enlarged. Fig. 6 is an end view thereof, and Fig. 7 is a transverse sectional view of the combined drill and cutter.

This invention comprises in its general features a combined drill and cutter shaft to be operated by a suitable motor, a combined drill and cutter, and a traveling frame supporting the drill and cutter shaft and geared

therewith to move forward with the drill and cutter shaft and then laterally.

In the construction of this invention I provide a metallic frame 1 of suitable length and width and mounted at its corners upon swiveled rollers 2, so as to permit the frame 1 to travel lengthwise or laterally. The frame 1 is constructed at its forward end with a vertical bracket 3, having a sleeve 4, through which passes a drill and cutter shaft 5, connected with a suitable motor, (not shown,) which is preferably mounted on and secured to the frame 1. The shaft 5 is held against the rearward thrust in drilling by means of a shouldered end piece 6, abutting against the sleeve 4.

7 indicates a combined drill and cutter, consisting of the head 8, formed with longitudinal ribs 9, of suitable length, and an angular shank 10 for mounting the drill and cutter in place. The head 8 is provided with longitudinal knives 11, either made integral therewith or, as here shown, bolted to the ribs 9. The outer ends of the ribs 9 and knives 11 are formed with the beveled faces 12 to form a diamond drill-point 13. While the knives 11 are shown as straight, they may be made twisted or spiral, if desired, so as to bring several knives into action at the same time.

The combined drill and cutter 7 is mounted directly upon the end of shaft 5 by means of a coupling-sleeve 14, having an angular socket 15, through which the angular shank 10 extends, the projecting end of shank 10 being located in angular socket 16 in the shouldered end piece 6 and secured in place by a pin 16' or other suitable means.

In order to provide a forward or lateral feed movement for the frame 1, the shaft 5 is geared with a mechanism on the frame 1, as follows: The sleeve 14 is formed with a worm 17, which gears with a cog-wheel 18. The cog-wheel 18 is mounted on a shaft 19, (shown in dotted lines in Fig. 2,) which extends through a sleeve 20 on a bracket 21, projecting from frame 1, the hub 22 of wheel 18 resting on the upper end of sleeve 20. The lower portion of shaft 19 is formed with a worm 23, which gears with a cog-wheel 24, as shown in Fig. 2. The cog-wheel 24 is mounted on a shaft 25, extending through the cross-bars 26 of frame 1

and having a beveled gear-wheel 27, meshing with a bevel gear-wheel 28 on a transverse shaft 29, mounted in the rear projections 30 of frame 1. Upon the shaft 29 is also mounted
 5 a bevel gear-wheel 28', which with the gear-wheel 28, is adapted to slide on the shaft 29 by means of a spline engaging the groove or slot 25' in the shaft 29. The gear-wheels 28 and 28' are connected together by frame 26',
 10 so as to move together, and are alternately moved in and out of gear with the gear-wheel 27 to reverse the motion of the shaft 25, and held by the set-screws 27', projecting through the slotted arms 29' of frame 26', engaging the
 15 rear cross-bar 26, as shown in dotted lines in Fig. 1, and clamping the frame 26' to cross-bar 26. Upon the shaft 29 are also mounted traction-wheels 31, which serve to propel the frame 1 forward. The forward end of shaft 25
 20 is provided with a roller 32, which is employed, as hereinafter set forth, to move the frame 1 laterally, and is normally held up out of contact with the ground or other foundation with which it is brought into contact to
 25 move the frame laterally.

It will be observed that the drill and cutter shaft 5 is mounted at an incline, whereby, when the cutter has been carried into the bed of coal and the frame 1 is moved laterally,
 30 an inclined cut will be made and a wedge-shaped piece cut from under the coal, allowing the coal above to drop down and forward and permitting it to be easily removed.

In order to raise and lower the rear of frame 1 and bring the roller 32 on shaft 25 into and
 35 out of contact with the ground or other foundation, the posts 2' of rear rollers 2, projecting above the frame 1, extend through the perforated ends 30' of a cross-bar 31', having
 40 a central threaded opening, through which extends a cylindrical nut 32', having a flanged square head 33', and resting at its lower end on a shoulder 34' of a vertical post 35, extending through the nut 32'. The nut 32' is
 45 held from vertical movement on the post 35 by means of a pin 35' in the upper end of post 35, having its ends projecting over the square head 33'. Stop-pins 30² in the upper
 50 portion of posts 2' limit the upward movement of bar 31'. By turning the square head 33' with a wrench the nut 32' may be rotated in one direction to raise the rear of frame 1 and in the other direction to lower it, the frame 1 moving vertically on the posts 2'.
 55 The rear rollers 2 may be held to travel in the particular direction desired by means of locking-arms 36, hinged to lugs 37 on the bar 31' and having angularly-perforated ends 38, engaging the square heads 39 of posts 2'.

60 In using the machine it is placed in position with the rollers 2 resting on the planks 33, extending lengthwise with frame 1. Upon motion being communicated to the shaft 5 from the motor or driving-power the drill 7
 65 is carried into the bed of coal, against which its point is presented by the action of worm 17, cog-wheel 18, worm 23, and cog-wheel 24,

which communicate motion, through shaft 23, bevel gear-wheels 27 and 28, and shaft 29, to traction-wheels 31, whereby through the en- 70
 gagement of the latter with the plank 33, causing the frame 1 to be moved forward. By means of the slow motion communicated to the frame 1 from shaft 25 through the work- 75
 gearing a steady and gradual forward movement is given to the drill 7. In this forward movement of the frame 1 the roller 32 on the shaft 25 is held up out of the way and simply rotates with the shaft. As the drill 7 is ad- 80
 vanced by the forward movement of the frame 1 to bore a hole of the required depth the rear portion of the frame 1 is gradually raised by means of the nut 32', operating on the cross- 85
 bar 31', connected with the vertical post 2' of the rear rollers 2, thereby lifting the traction-wheels 31 out of engagement with the ground and lowering the roller 32 into contact with a plank 34, laid crosswise beneath it. In these combined forward and tilting movements of the frame 1 the drill and cutter 7 not only drills 90
 a hole, but also cuts out one side of the hole vertically to bring the drill and cutter into a more inclined position. The frame 1 requires to be raised at its rear end only a very slight distance. In this tilted position of the 95
 frame 1 the latter will be supported on the rear rollers 2 and the roller 32 at its forward end. In the further movement of the shaft 5 motion will be communicated, as before, to shaft 25, and the roller 32, being rotated, will 100
 travel along the plank 34, thereby causing the frame 1 to be moved laterally, and with it the shaft 5 and drill and cutter 7. The knives 11 on the revolving head 8, being thus moved laterally, will form a cut of the de- 105
 sired length for a block of coal as the frame 1 is moved laterally. After the cut has been made the frame 1 is lowered at its rear end, thereby bringing the traction-wheels 31 into contact with the planks 33 and raising the 110
 roller 32 out of contact with the plank 34. In this movement the drill is moved to its normal position, the knives cutting out a recess as the drill changes its position. The bevel-wheel 28 is then moved on the shaft 29, 115
 out of mesh with the bevel-wheel 27, and the bevel-wheel 28' is moved into mesh with the latter by means of loosening the screws 27' and sliding the frame 26' laterally on the shaft 29. Upon the movement of the shaft 5 being 120
 continued motion is communicated to the shaft 29 to reverse the movement of the traction-wheels 31, and the frame 1 is carried back, drawing the drill and cutter 7 out of the cut in the coal. As the frame 1 is moved 125
 back the drill and cutter 7, owing to its changed position, cuts downward vertically through the wedge or filling of coal formed by the lateral cut and resting on the clay. This wedge may then be removed by picks 130
 and the block detached by drilling and blasting. As the block of coal is detached it will fall forward from its place in its bed, owing to its inclined lower end having its fulcrum

on the clay bed at the rear lower corner of the block.

The frame 1 may be transported to any desired point and located to drill and cut a piece of coal and the operation of drilling and cutting repeated in the manner hereinbefore described.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a mining-machine, a frame having swiveled rollers and traction-rollers at opposite ends of the machine at right angles to each other, and mechanism for throwing either the forward or rear traction-wheels down into action and rotating them to propel the machine forwardly or laterally, substantially as set forth.

2. In a mining-machine, a frame having opposite swiveled rollers and front and rear traction-rollers the shafts of which are at right angles to each other, gearing connecting said shafts, and means for bringing either the forward or rear traction-wheels into action, according to the direction in which the frame is to move, in combination with the drill-shaft geared to one traction-wheel shaft, substantially as set forth.

3. In a mining-machine, a frame having opposite swiveled rollers, means for locking the rollers in position for forward or lateral movement, forward and rear traction-rollers the shafts of which are at right angles to each other, the forward or rear wheels being normally elevated out of action, and means for bringing either the front or rear traction-wheels into action parallel with the adjusted positions of the swiveled rollers, substantially as set forth.

4. In a machine for mining coal, a traveling frame movable longitudinally and laterally and mounted on swiveled rollers and adjustable vertically at an incline on its rear rollers, a longitudinal shaft on the frame with a roller at its forward projecting end normally raised from the ground, traction-wheels mounted on a transverse shaft at the rear of the frame geared with the longitudinal shaft, and a drill and cutter driving shaft having a worm-gear meshing with a cog-wheel on the shaft, and a second worm-gear engaging a cog-wheel on the longitudinal shaft, substantially as shown and described.

5. The drill and cutter 7, consisting in the

cylindrical head 8, formed with straight longitudinally-extending peripheral ribs 9, and detachable knives 11, secured at their inner sides to the forward sides of the ribs and having their outer longitudinal edges bent at an angle and projecting beyond the outer edges of the said ribs, the outer end of the head, ribs, and knives being beveled to form a diamond drill, substantially as set forth.

6. In a coal-mining machine, a frame mounted on rollers and movable lengthwise and laterally, a drill and cutter driving shaft, a drill and cutter, a coupling-sleeve connecting the drill and cutter with the driving-shaft and formed with a worm, and a mechanism on the movable frame geared with the worm on the coupling-sleeve for moving the frame lengthwise and laterally, substantially as shown and described.

7. A coal-mining machine consisting of a frame mounted on swiveled rollers, a longitudinal shaft mounted on the frame with its forward end projecting beyond the frame and having a roller on its outer end and a cog-wheel adjacent to the frame, a transverse shaft on the rear end of the frame adjustably geared with the longitudinal shaft and having traction-rollers, mechanism on the rear end of the frame for raising and lowering the frame on the bearings of the rear swiveled rollers, a drill and cutter driving shaft mounted on the forward end of the frame, a drill and cutter, a sleeve coupling the drill and cutter with the driving-shaft and formed with a worm, and a shaft having a cog-wheel at one end geared with the worm and a worm at the other end geared with the cog-wheel on the longitudinal shaft of the movable frame, substantially as shown and described.

8. In a coal-mining machine, a frame provided with rollers adapted to run forward or laterally, and front and rear traction-wheels, either of which is normally elevated out of operative position, and having their shafts at right angles to each other, means for bringing either the front or rear wheels into action, gearing for rotating the said shafts, a reversing mechanism, and a drill and cutter shaft mounted in permanently-inclined bearings on said frame, substantially as set forth.

WILLIAM JOB.

Witnesses:

E. W. CODY,
EDGAR TATE.