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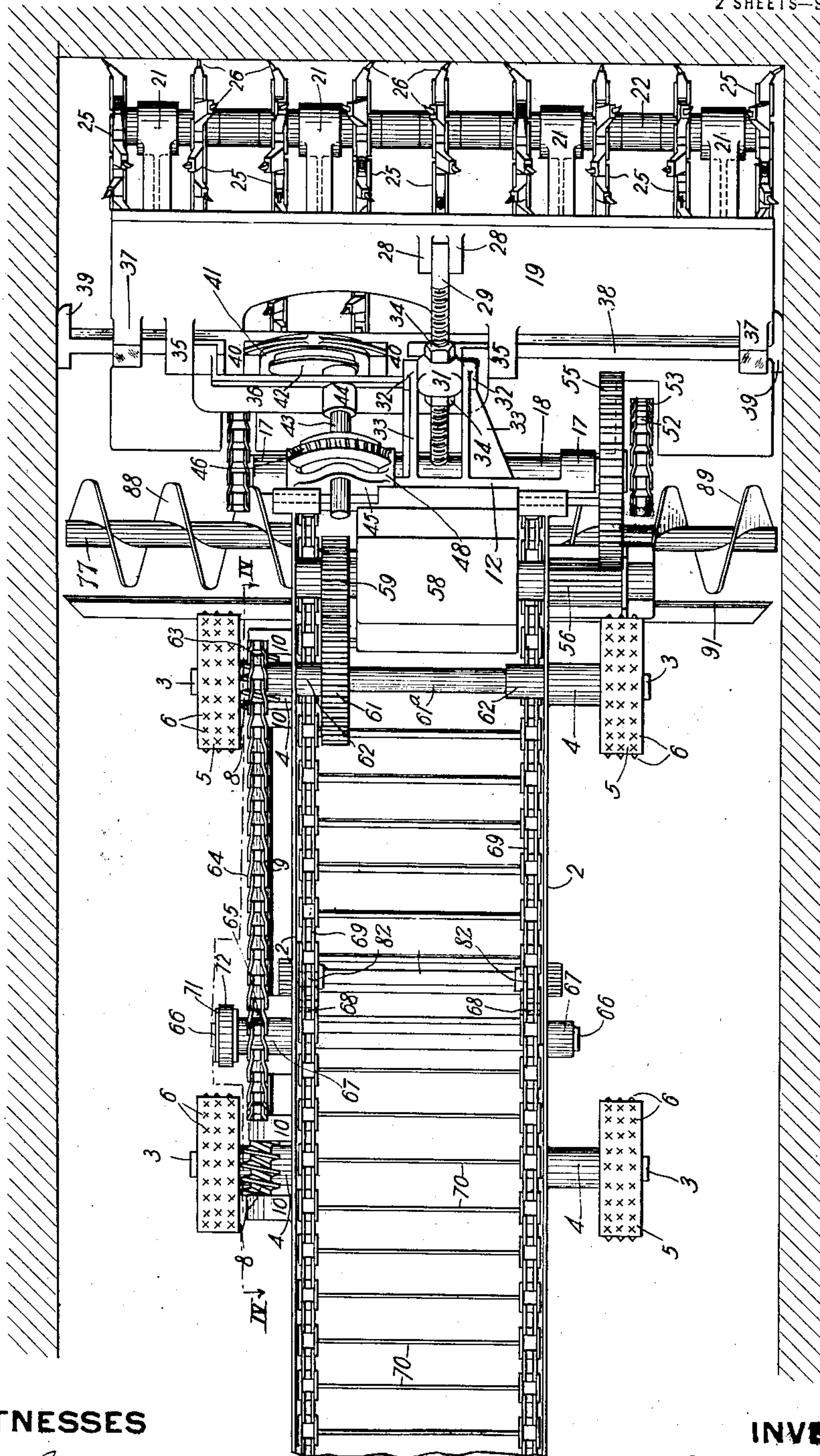
E. O'TOOLE,
MINING MACHINE.

APPLICATION FILED FEB. 24, 1913.

Patented Nov. 5, 1918.

2 SHEETS—SHEET 1.

FIG. 1



WITNESSES

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2 SHEETS—SHEET 2.

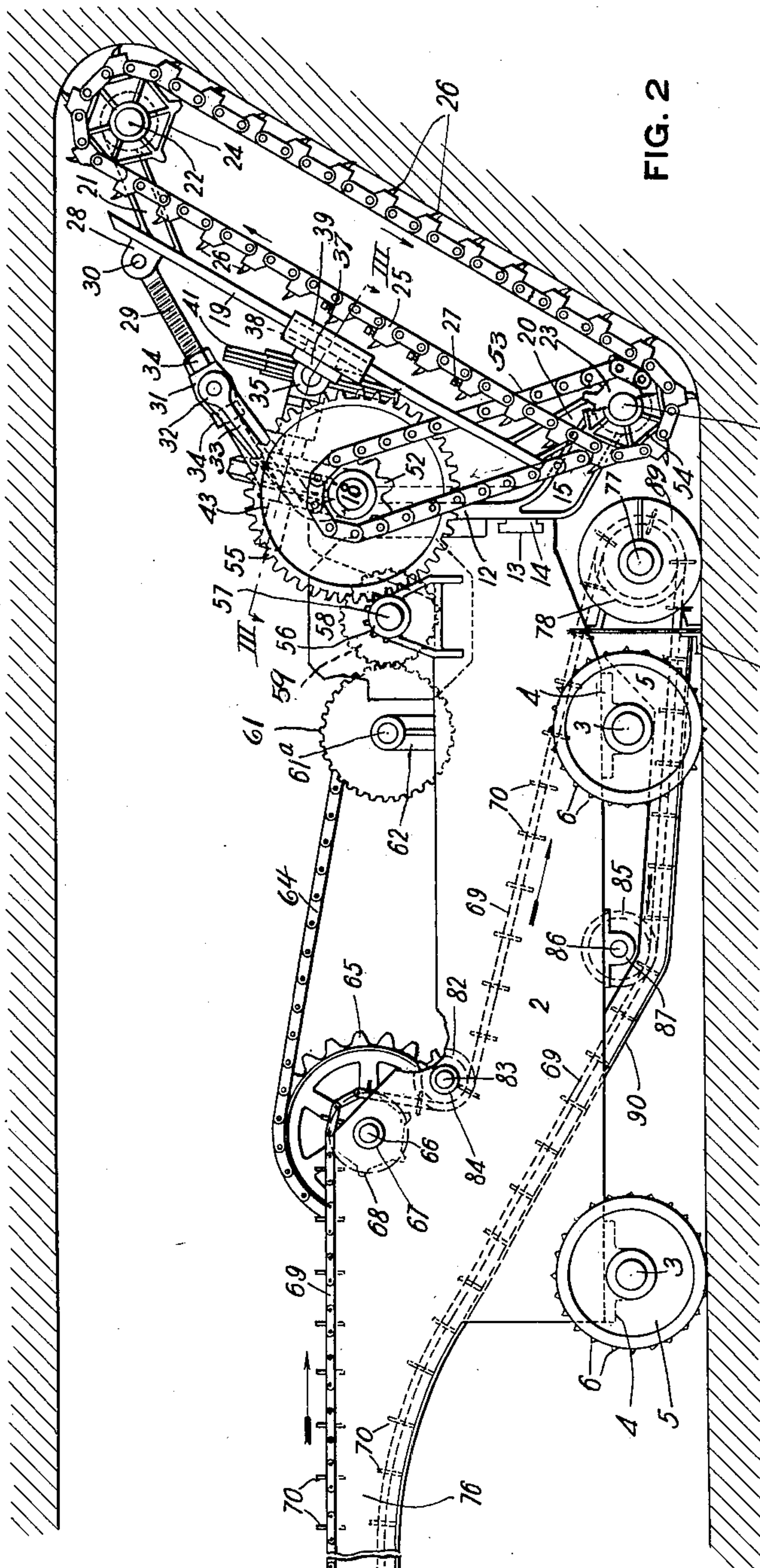


FIG. 2

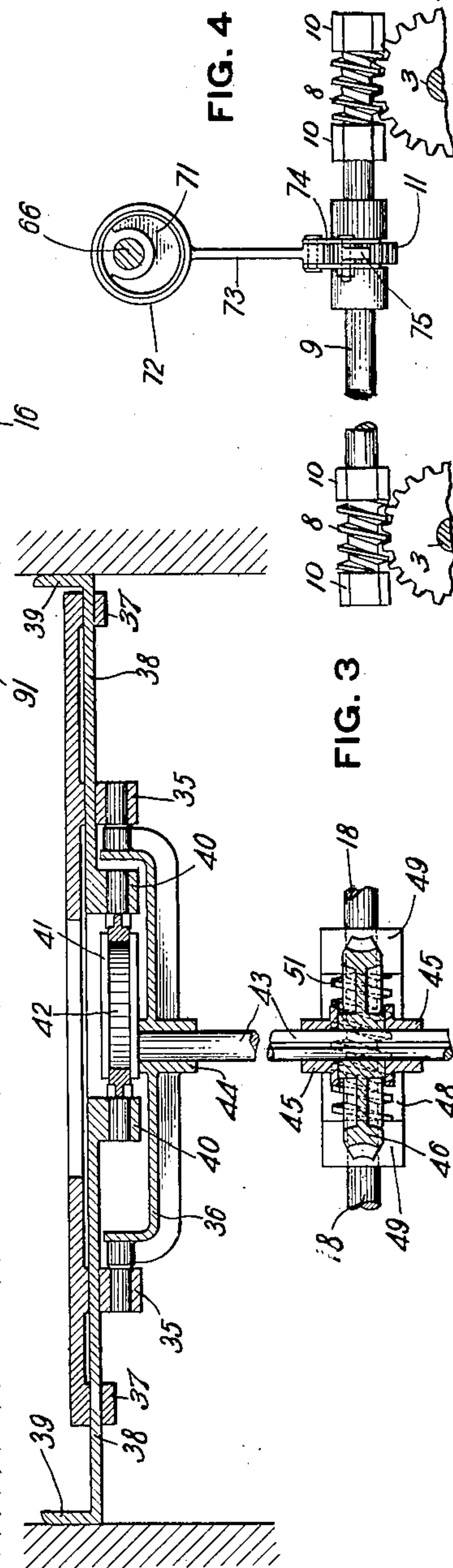


FIG. 3

FIG. 4

WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD O'TOOLE OF GARY, WEST VIRGINIA.

MINING-MACHINE.

1,283,880.

Specification of Letters Patent.

Patented Nov. 5, 1918.

Application filed February 24, 1913. Serial No. 750,213.

To all whom it may concern:

Be it known that I, EDWARD O'TOOLE, a citizen of the United States, and resident of Gary, in the county of McDowell and State of West Virginia, have invented a new and useful Mining-Machine, of which the following is a specification.

My invention relates to mining machines used in mining coal and similar materials and the invention more particularly relates to the construction and arrangement of the cutter heads, the conveyers and the operating mechanism by which the apparatus is actuated, forming part of the mining machines.

One object of this invention is to provide a mining machine having a cutter head of improved construction operatively mounted thereon and having novel means whereby the cutter head is actuated to remove the coal and cut the clearance in the coal seam necessary to admit the advancing mining machine.

Another object of the invention is to provide a mining machine having a cutter head of improved construction mounted thereon and having novel means whereby the machine is maintained in operative position while the cutter head is being actuated during the coal cutting operations, and still further objects of my invention will appear as the invention is more fully described and claimed hereinafter.

Referring to the drawings, forming part of this specification, Figure 1 is a plan showing a mining machine having a cutter head thereon constructed and arranged in accordance with my invention.

Fig. 2 is a side elevation of the apparatus shown in Fig. 1.

Fig. 3 is a sectional detail showing the construction of the stop mechanism and the cutter head reciprocating mechanism, the section being taken on the irregular line III—III of Fig. 2.

Fig. 4 is a sectional side elevation taken on the line IV—IV of Fig. 1 showing a detail of the ratchet mechanism by which the traction wheels are actuated in moving the mining machine forwardly and backwardly.

In the accompanying drawings the numeral 2 designates the side frames of the carriage of a mining machine provided with axles 3—3 which are rotatably mounted in

suitable bearings 4 fastened to the side frames.

Traction wheels 5—5 are provided on the ends of the axles 3 by which the mining machine is supported and is caused to move into and out of the entry of the mine from which the coal or other material is being removed, and the peripheral surfaces of the traction wheels 5 are provided with projections or spikes 6 to increase their tractive force in moving the carriage and in holding the cutters or picks in operative engagement with the face of the coal seam.

A worm wheel is provided on each of the axles 3—3, these worm wheels meshing with and being actuated by the worms 8—8 on the horizontal shaft 9. The worms are conveniently located near the ends of the horizontal shaft 9, between the pairs of bearings 10—10, 10—10 which are secured on one side frame 2 of the carriage and in which the shaft 9 is rotatably mounted. The shaft 9 is also provided with a ratchet wheel 11 by which it is rotated to actuate the worms 8 and turn the traction wheels 5 in the operation on the mining machine.

On the forward or front end of the carriage 2 is a reciprocating slide 12 comprising part of the horizontally reciprocating cutter-head forming part of this invention, the top and bottom of the front end of the carriage and contacting face of the slide 12 having registering T-shaped slots 13 and grooves 14 by which the slide is secured in place on the carriage so as to be horizontally movable.

The lower end of the slide 12 is provided with bracket bearings 15—15 in which the shaft 16 is mounted and bearings 17—17 are provided on the upper end of the slide 12 for the drive shaft 18.

The head plate 19 forming a part of the cutter head is provided on its upper end with a series of bracket bearings 21 (see Figs. 1 and 2) in which the sprocket wheel shaft 22 is rotatably mounted, and a series of similarly constructed bracket bearings 20 formed integrally on the lower end of the head plate 19, the shaft 16 passing through these bearings to pivotally secure the head plate at its lower end to the bottom of the slide 12.

The shaft 16 has a series of sprocket wheels 23 keyed, or otherwise fastened there-

on at separated intervals in its length, and the shaft 22, a similar series of wheels 24, these wheels being arranged to rotate with the shafts. Around the pairs of opposite socket wheels 23, 24 are endless sprocket chains 25 and alternate links in the chains 25 are provided with transverse recesses or holes in which the removable picks or cutters 26 are adjustably held in position by set screws 27 or equivalent means.

The upper end of the head plate 19 has lugs or ears 28 to which a screw threaded eye-bolt 29 is pivotally secured by a pin 30 and the screw threaded end of the eye-bolt 29 projects through a swivel eye 31 which is pivotally secured in bearings 32 located on the outer ends of brackets 33 which project angularly upward and outward from the top of the slide 12. A nut 34 on the screw threaded portion of the bolt 39 engages each side of the swivel eye 31 and provides means for adjusting and holding the head plate 19 in angularly adjusted position with respect to the slide 12.

The head plate 19 is also provided with short lugs or ears 35, 35 forming bearings in which the ends of the U-shaped bracket 36 are pivotally secured. These lugs 35 and also the lugs 37 on the head plate 19 have slots or recesses therein through which the stop bar 38 projects. The stop bar extends lengthwise across the face of the head plate 19 and is provided with shoes 39—39 on its ends arranged to engage with the opposite sides of the mine entry and prevent sidewise movement of the carriage 2 of the mining machine.

Pivotally mounted in lugs or bearings 40—40 on the stop bar 38 is an eccentric strap 41 and operatively engaging with the eccentric strap is an eccentric 42 which is fastened to one end of the shaft 43. The shaft 43 extends through the bearing 44 on the bracket 36 lengthwise at right angles to the length of the stop bar. The shaft 43 also extends through the bearings 45—45 and has a worm wheel 46 splined thereon, this worm wheel being positioned between the bearings 45—45 on the worm wheel bracket 48 which is pivotally mounted on the shaft 18. The shaft 18 extends through bearings 49—49 on the bracket 48 by which the worm 51 is held in position between the ends of the bearings 49—49 so as to mesh with and drive the worm wheel 46.

On the outer end of the shaft 18 is a sprocket wheel 52 which is connected by a sprocket chain 53 with a sprocket wheel 54 for driving the shaft 16. The shaft 18 is also provided with a spur gear wheel 55 arranged to mesh with a wide faced pinion 56 on one end of the armature shaft 57 of the driving motor 58 which is mounted on the carriage 2 of the mining machine. The wide faced pinion 56 permits of the relative

sidewise movement of the spur gear 55 necessary in operating the cutter head while positively rotating the chains 25 and picks or cutters 26 forming part of the cutter head.

The other end of the motor armature shaft 57 is provided with a spur pinion 59 which meshes with a spur gear 61 on the countershaft 61^a mounted in bracket bearings 62—62 on the carriage 2. The outer end of the countershaft 61^a also has a sprocket wheel 63 thereon which is connected by the sprocket chain 64 with sprocket wheel 65 on the end of the shaft 66 mounted in the bearings 67—67 on the carriage 2. The shaft 66 is provided with sprocket wheels 68—68 which engage with the conveyer chains 69—69 and drive the conveyer formed by the chains 69—69 and flights 70 positioned therebetween at intervals in the length of the chain.

The conveyer driving shaft 66 is also provided on its outer end with an eccentric 71 which is connected by an eccentric strap 72 and rod 73 with the ratchet lever 74. The ratchet lever is pivoted on the shaft 9 and is provided with a ratchet pawl 75 which engages with the teeth of the ratchet wheel 11 to rotate the shaft 9 and, through the worms 8 on the ends of this shaft, and worm wheels meshing therewith, turn the axles 3 and traction wheel 5 in advancing and retracting the mining machine to move the cutters or picks 26 into and out of engagement with the face of the coal seam.

The carriage 2 has a rearwardly extending tail or apron 76 which is formed so as to be supported by the carriage above the floor of the mine entry.

On the lower front end of the frame 2 is a sprocket shaft 77 having sprocket wheels 78—78 thereon and the rear end of the apron or tail 76 of the carriage 2 has a shaft 79 secured in bearings 80—80 thereon, and provided with sprocket wheels 81—81.

At intermediate points in the length of the frame 2 are sprocket wheels 82—82 which are mounted on the shaft 83 secured in the bearings 84—84 on the sides of the mining machine carriage 2, these idler sprocket wheels being employed to change the angular direction of travel of the endless conveyer chains 69—69.

Sprocket wheels 85—85 on a shaft 86 which is supported in bearings 87—87 on the bottom of the carriage frame at a point between the traction wheels 5, provide means for changing the angle of travel of the conveyer formed by the sprocket chains 69—69 and flights 70 extending therebetween.

The shaft 77 for the sprocket wheels 78—78 of the flight conveyer has right and left hand spiral conveyers 88, 89 mounted on the ends thereof which extend approximately to the sides of the entry formed in

mining the coal, these conveyers being made right and left hand to cause the cut coal to be conveyed from the sides to the center of the mine entry in position in front of the flight conveyer.

The bottom 90 of the carriage frame, below the lower side of the lowermost conveyer flights forms a flat surface between the sides of the carriage 2 over which the coal is pulled or drawn when the conveyer is operating to deliver coal from in front of the machine to the rear end thereof, the conveyer moving in the direction shown by the arrows in Fig. 2.

On each side of the carriage 2 behind the spiral conveyers 88 and 89, with the lower edges thereof extending horizontally at the floor level, is a scraper 91 by which the cut coal is moved and held in position to be engaged by the rotating screw conveyers 88 and 89 during the operation of the mining machine.

In the operation of my improved mining machine the cutter head is adjusted to bring the picks 26 and chains 25 forming part of the cutter head into the desired angular position with respect to the face of the coal seam from which coal is to be removed, and the motor 58 is started.

Such operation of the motor causes the shafts 16 and 22 to rotate, and through the eccentric 42 engaging with the eccentric strap causes the cutter head to reciprocate sidewise. By rotating the shafts 16 and 22 the cutters or picks 26 on the sprocket chains 25, (which preferably move in the direction indicated by the arrows) are caused to engage with the face of the coal seam and remove the coal from the face of the seam.

The operation of the motor 58 also causes the shaft 66 to rotate and drive the flight conveyer formed by the chains 69 and flights 70, and, through the chains of this conveyer, to rotate the shaft 77 and the screw conveyers 78 thereon.

When the motor 58 is operating, the eccentric 71 on the shaft 66, through the connecting ratchet mechanism, rotates the shaft 9 and by means of the worms 8 and the worm wheels on the axles 3 actuates the traction wheels 5 so as to cause the mining machine to move forwardly and maintain the cutters or picks 26 in operative engagement with the face of the coal seam.

The coal as removed from the face of the seam by the picks 26 falls to the bottom of the entry and the coal lying at the sides of the entry in front of the screw conveyers 88 and 89 is moved sidewise by these conveyers toward the center of the entry into position in front of the flight conveyer 69—70, and this coal, together with that which falls in front of the conveyer 69—70 is transferred by the flight conveyer 68

over the bottom 90 of the mining machine carriage to the rear end of the machine from which it is discharged into suitable carriers positioned beneath the tail 76 at the discharge end of the mining machine.

Preferably, a car or buggy is positioned to receive the coal as it is delivered from the end of the tail 76 of the machine by the flight conveyer.

The advantages of my invention will be apparent to those skilled in the art. The apparatus is simple and is easily kept in repair.

Modifications in the construction and arrangement of the parts may be made without departing from my invention. The sidewise reciprocating cutter head may be employed with mining machines constructed otherwise than as shown. The construction of the picks and holders therefor may be changed, and other changes may be made within the scope of the appended claims.

I claim:—

1. A mining machine comprising in combination, a wheeled carriage, a horizontally reciprocating cutter head having vertically movable picks thereon, an endless flight conveyer on said carriage for conveying the mined material to the rear of the mining machine, and a screw conveyer for gathering and delivering the mined material in front of said carriage into position to be engaged by the flight conveyer, a driving motor on the carriage for actuating the cutter head, means operatively connecting said motor with the flight and screw conveyers, and means on said carriage projecting sidewise from each side thereof into engagement with the sides of the mine to prevent sidewise movement of the carriage when the cutter head is reciprocated.

2. A mining machine comprising in combination, a wheeled carriage, a horizontally reciprocating cutter head having vertically movable picks thereon, an endless flight conveyer on said carriage for conveying the mined material to the rear of the mining machine, and a screw conveyer for gathering and delivering the mined material in front of said carriage into position for engagement by the flight conveyer, a driving motor on the carriage for actuating the cutter head, means operatively connecting said motor with the flight and screw conveyers, and means operatively connecting said motor and the carriage wheels for moving the carriage, said cutter head and carriage moving simultaneously with the cutting operation.

3. A mining machine comprising in combination a wheeled carriage, a horizontally reciprocating cutter head movably secured on the carriage, said cutter head having vertically movable picks thereon, an endless flight conveyer on the carriage for convey-

ing the mined materials from below the cutter head to the rear of said carriage, a motor on the carriage for actuating the cutter head, and means operatively connecting said motor with the flight conveyer.

4. A mining machine comprising in combination a wheeled carriage, a horizontally reciprocating cutter head movably secured on the carriage, said cutter head having vertically movable picks thereon, an endless flight conveyer on such carriage for conveying the mined materials from below the cutter head to the rear of said carriage, a motor on the carriage for actuating the cutter head, means operatively connecting said motor with the flight conveyer, and means operatively connecting said motor with the carriage wheels for moving the carriage.

5. A mining machine comprising in combination, a wheeled carriage, a cutter head having picks thereon and adapted to deposit the mined coal on the mine floor, a conveyer upon said carriage below said cutter head arranged to collect and heap the mined coal on the mine floor in front of the carriage, a second conveyer on the carriage arranged to transfer the heaped coal to the rear of the mining machine, and means on said carriage for actuating said cutter head and conveyers.

6. A mining machine comprising in combination, a wheeled carriage, a cutter head having picks thereon and adapted to deposit

the mined coal on the mine floor, a conveyer on said carriage below said cutter head arranged to collect and heap the mined coal on the mine floor in front of the carriage, a second conveyer on the carriage arranged to transfer the heaped coal to the rear of the mining machine, a driving motor on the carriage, and means operatively connecting the motor to said cutter head and conveyers, and the wheels of said carriage.

7. A mining machine comprising in combination, a wheeled carriage, a cutter head laterally reciprocable on said carriage and having picks thereon and adapted to deposit the mined coal on the mine floor, a conveyer upon said carriage below said cutter head arranged to collect and heap the mined coal on the mine floor in front of the carriage, a second conveyer on the carriage arranged to transfer the heaped coal to the rear of the mining machine, means engaging the sides of the mine for preventing sidewise movement of the mining machine during the operation thereof, and means on said carriage for actuating said cutter head and conveyers.

In testimony whereof, I have hereunto set my hand.

EDWARD O'TOOLE.

Witnesses:

C. P. GROVES,
GABE BRUNER.