

Feb. 21, 1928.

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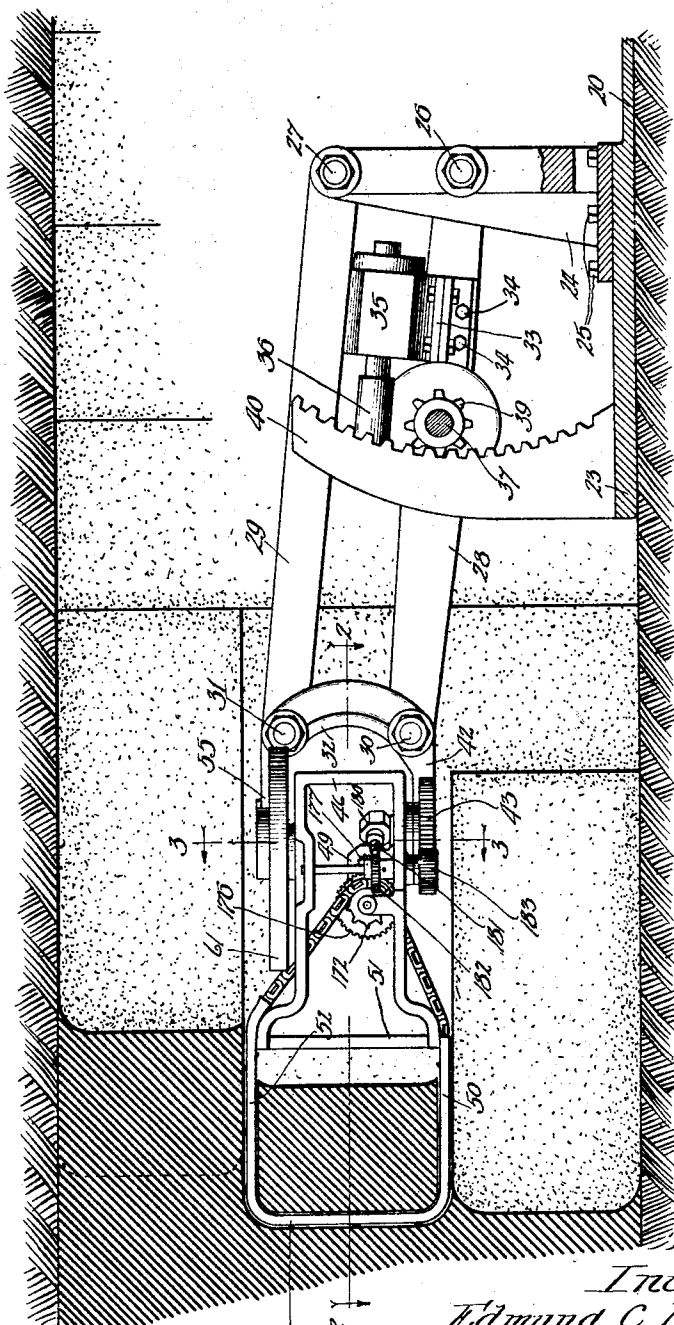
E. C. MORGAN

MINING MACHINE

Filed Oct. 23, 1922

2 Sheets-Sheet 1

Fig. 1



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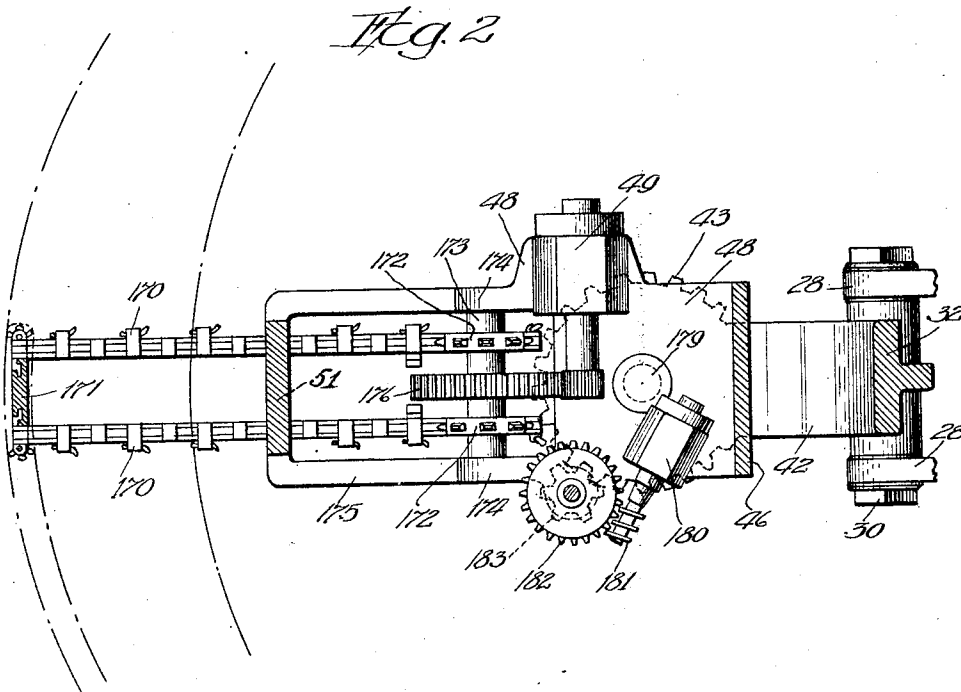
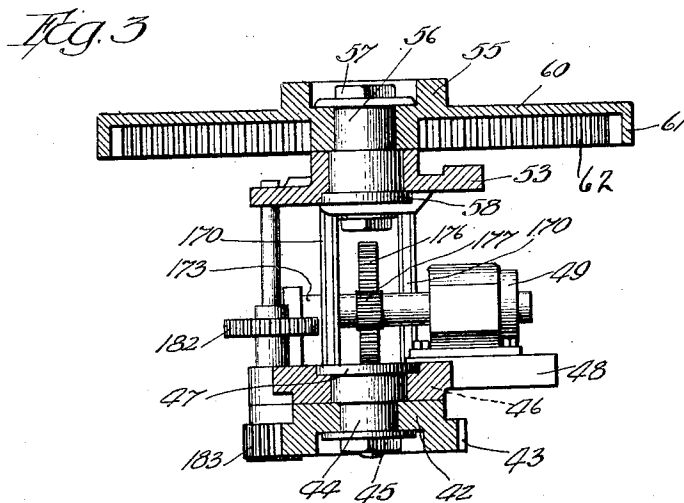
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UNITED STATES PATENT OFFICE.

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MINING MACHINE.

Original application filed April 24, 1916, Serial No. 93,048. Divided and this application filed October 23,
1922. Serial No. 596,214.

This invention relates to machines for mining coal and other similar substances and has for its object the provision of a device of the character named which shall be of improved construction and more efficient and economical in operation than devices heretofore known.

The present invention is a division of my copending application Serial No. 93,048, filed April 24, 1916, for an improvement in mining machines.

Other objects of the invention will appear hereinafter, the novel features and combinations being pointed out in the appended claims.

In the accompanying drawings,

Fig. 1 is an elevational view of my improved mining machine;

Fig. 2 is a sectional plan view taken on the line 2—2 of Fig. 1 and enlarged; and

Fig. 3 is a sectional elevational view taken on the line 3—3 of Fig. 1, looking in the direction of the arrows.

In the drawings the number 20 designates the main base plate, which may be of any size or dimensions or weight desirable for carrying the apparatus during its operation. This plate 20 is provided at its forward end with an extension 23 having a standard 24 projecting upwardly therefrom and secured to the plate 23 by means of cap screws 25, (Fig. 1). The standard 24 carries a pair of pivot bolts 26 and 27, which project from the standard at opposite sides thereof to form pivotal supports for the swinging arms 28 and 29, there being a pair of arms 28 supported on the lower bolt 26 and a second pair of arms 29 supported on the upper bolt 27. The arms 28 and 29 are pivoted at the forward ends on pivot bolts 30 and 31 respectively, which are carried by a link 32 extending between the pivot bolts 30 and 31 and holding the latter in fixed relation to one another. By means of this construction a vertically swinging arm is provided which constitutes a parallel motion device, arranged to hold the link 32 in a vertical position regardless of the angle of the swinging arm.

The arms 28 are connected near the pivot 26 by a plate 33 secured to the inner side of each arm by means of cap screws 34. The plate 33 constitutes a platform on which an electric motor 35 is mounted con-

nected by a worm and worm wheel enclosed in the casing 36, with a shaft 37 mounted in journals carried by the arms 28. The shaft 37 has secured thereto a pair of pinions 39, which mesh with the teeth of arcuate racks 40 secured to the base plate 23 and projecting upwardly therefrom as shown in Fig. 1. The operation of the motor 35 drives the pinions 39 and thus effects swinging of the arms 28 and 29 upwardly and downwardly about their pivots 26 and 27, the direction of the pivotal movement of the arms 28 and 29 depending upon the direction of rotation of the motor 35. This motor is governed by one of a series of controllers, which are connected with the various motors for driving the different parts of the machine, and such controllers are arranged to govern both the speed and direction of rotation of the motors which they respectively control.

The cutter head for severing the material from the mine vein is carried by the link 32. Projecting forwardly in a horizontal direction on a line with the lower portion of the arm 28 and rigidly connected to the link 32 preferably by being made integral therewith is a supporting bracket 42, which is extended laterally to form a circular rack 43 which is rigid with the bracket 42. The center of the rack 43 is provided with an opening in which a bolt 44 is journaled for rotation, as shown in Fig. 3. This bolt is held in place by a nut 45, and the upper end of the bolt passes through a yoke member 46, which is arranged to rotate with the bolt 44 about the axis formed by the bearing of the bolt in the bracket 42. The bolt 44 is provided with a rim or head 47, which securely holds the yoke 46 in place. The lower member of the yoke 46 is extended laterally, as shown in Fig. 3, to form a supporting platform or table 48, on which is mounted an electric motor 49 for operating the mechanism on the cutter head. At the forward end of the platform 48 the yoke 46 is continued forwardly to form the lower run of a loop chain core-cutter which has an unobstructed core opening therethrough. The arm 50 of the cutter frame is offset downwardly from the level of the platform 48, as shown in Fig. 1. The connecting bar 51 projects upwardly from the arm 50 and is connected at its upper end with the upper cutter frame bar 52. As shown in Fig. 3,

the upper member 53 of the yoke 46 is secured to a bracket 55, which extends forwardly from the upper end of the link 32, being rigidly connected to the latter.

5 The arm 53 is held for pivotal movement relatively to the bracket 55 by means of a bolt 56, which is journaled in the bracket and held in place by a nut 57. The lower end of the bolt 56 is provided with a flange
10 or head 58 which holds the arm 53 in place relative to the bracket 55. The bolts 44 and 56 are in axial alignment with one another and together constitute the pivot about which the yoke 46 swings horizontally. The
15 bracket 55 is extended laterally to form a circular plate 60 having a down-turned flange 61 at its periphery provided with internal rack teeth 62, forming a circular rack. In the present application, I have shown
20 two chain cutters so that feeding may be effected for cutting purposes in both directions of arcuate swinging movement of the cutting mechanism, the latter being driven by one motor and fed arcuately by a separate
25 rate motor.

As shown in Fig. 2, a pair of cutter chains 170 is provided, one cutter chain at each side of the cutter frame 171, the latter being the vertical length of the loop chain core-cutter and connected to the lower length 50 and
30 the upper length 52 to form continuations of the latter as shown in Fig. 1. The endless chain cutters 170 are operated by sprocket wheels 172 mounted on the shaft 173 journaled in bearings 174 supported on
35 the lower arm 175 of the yoke 46. The shaft 173 is driven by a spur gear 176, which meshes with a pinion 177 driven by the motor 49.

40 The yoke 46 is rotated about its vertical axis 179 by means of an electric motor 180, also supported on the platform 48, and arranged to drive a worm 181 which meshes with a worm wheel 182. The latter is rigidly
45 connected to a pinion 183, which meshes with the fixed circular rack 43 secured to the lower bracket 42 of the link 32.

By means of this construction, since the rotation of the cutter frame is accomplished
50 by a motor independent of the motor which drives the chains, it is evident that the relative speed of the feed and of the driving of the cutter chains may be varied to comply with various conditions of operation. Also
55 the cutter may be made to operate while the cutter frame is being fed in either direction. This may be an advantage under some conditions, since it enables the operator to make a cut during both the forward and return
60 movement of the cutter frame. In this way a cut may be made at one level and while the cutter frame is being fed in one direction, and the cutter head may then be raised or lowered to a different level and a second
65 cut made during the return movement of

the cutter frame. It should also be noted that when unusually hard substances are encountered in the mine vein, feeding may be automatically slowed down if the feeding motor 180 is a series wound electric motor.
70 At the same time the speed of driving the cutter chains may be maintained until the hard substance has been cut through. When a single motor is used for both driving the chain and for feeding it, the slowing down
75 of the feed will also slow down the driving of the chain.

In operation, the machine may be located in a mine chamber as shown in Fig. 1 and the lower cut made across the mine wall.
80 The motor 35 may then be operated to lift the cutting mechanism to the position shown in Fig. 1, and another cut made across the mine wall by feeding movement in the opposite direction, so as to use the chain cutter on the opposite side of the cutter frame. After
85 this intermediate cut across the mine wall has been completed, the motor 35 may again be operated to adjust the kerf-cutting mechanism to make the cut along the roof. It should be particularly noted that by reason
90 of the parallel motion mechanism the floor kerf and the roof kerf will be in horizontally spaced apart parallel planes. It is desirable to have a uniformly level floor to facilitate
95 forward movement of the mining machine to a new location and to facilitate the locating and the operating of loading apparatus. The adjustments enable the apparatus to readily remove coal from veins of varying
100 thicknesses whether the vein pitches upwardly or downwardly either at the floor or at the roof. While a flat floor is more desirable than a flat roof, a flat roof is in some instances desired on account of facilitating the
105 use of certain kinds of roof props.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of my invention as defined by the claims hereto appended, and I wish therefore not to be restricted to the precise construction herein disclosed.

Having thus fully disclosed an embodiment of my invention, what I claim and desire to have secured by Letters Patent of the United States, is:

1. In a mining machine, the combination with a supporting frame, of a loop-shaped core cutter, means for feeding said cutter
120 in different directions, means carried by said cutter, and operable for severing material in either direction of movement of said cutter, and means for adjusting said cutter as a whole relatively to said frame
125 into different cutting positions.

2. In a mining machine, the combination with the supporting frame, of a cutter support, a loop core-cutter frame carried by said cutter support, means for adjusting
130

said cutter support, together with the entire core-cutter frame relative to said supporting frame to different cutting positions, means for moving said loop core cutter-frame in opposite directions, and mechanism carried by said cutter-frame for severing material during movement of said cutter support in either of said opposite directions.

3. In a mining machine, the combination with a cutter-head frame having upper and lower spaced-apart arms, of a yoke pivoted between said arms for movement on an upright axis, a loop chain core-cutter having an unobstructed core opening therethrough and mounted on said yoke for movement therewith, means carried by said yoke for effecting feeding movement of said loop chain core-cutter in opposite directions, and means connected to said cutter-head frame for adjusting the elevation of said loop chain core-cutter in its entirety.

4. In a mining machine, the combination with a supporting frame, of double loop chain core-cutting mechanism adapted to cut a core in either direction of feeding movement, means for mounting said cutting mechanism on said supporting frame for adjustment in elevation relative thereto, means for feeding said cutting mechanism in opposite directions, and means for driving said cutting mechanism to effect the cutting of a core during such feeding movement in either direction.

5. In a mining machine, the combination with a supporting frame, of a loop-shaped core-cutter having an unobstructed core-opening therethrough, means for mounting said core-cutter on said supporting frame for adjustment in elevation relative thereto, means for feeding said core-cutter in opposite directions, and means for driving said core-cutter to effect severing of material during such feeding movement in either direction.

6. In a mining machine, the combination with a supporting frame, of a loop-shaped chain core-cutter, means for carrying said core-cutter on said frame for adjustment in elevation relative thereto, said core-cutter comprising a cutter frame having an unobstructed core-opening therethrough with chain cutters on opposite edges of said cutter frame surrounding said core-opening, means for feeding said core-cutter in opposite directions, and means for driving said chain cutters to sever material during feeding movement of said core-cutter in either direction.

7. In a mining machine, the combination with a supporting frame, of core-cutting mechanism having upper and lower runs rectilinear in elevation and comprising opposite chain cutters to cut during opposite feeding movements, and means for adjusting

the entire core-cutter relatively to said frame to secure the cutting of a plane kerf at the floor of the mine chamber in one operation in either direction of feeding movement and the cutting of a plane roof kerf in another operation in either direction.

8. In a mining machine, the combination with a supporting frame, of a loop-shaped cutter frame having an unobstructed core-opening therethrough, a pair of chain cutters one at one edge of said cutter frame and the other at the other edge thereof, means for supporting said cutter frame and chain cutters for adjustment as a whole in elevation relative to said supporting frame, and means for operating said chain cutters to cut in either direction of movement of said cutter frame.

9. In a mining machine, a supporting frame, a cutter-head thereon, means for holding said cutter-head in one position relative to said frame while a cut is being made, a loop cutter carried by said cutter-head and movable thereon in one direction during the making of said cut, means for holding said cutter-head in a second position relative to said frame, and means for operating said cutter in the opposite direction while said cutter-head is in said second position for making a second cut.

10. In a mining machine, the combination with a support, of a cutter-frame pivoted thereto, a chain cutter on said cutter-frame, an electric motor mounted on the cutter-frame for driving said chain cutter, and a separate electric motor mounted on said cutter-frame and connected to said support to move the cutter-frame relatively to said support to effect feeding of said chain cutter.

11. In a mining machine, the combination with a support, of a cutter-frame pivoted thereto, a chain cutter on said cutter-frame, means comprising an electric motor mounted on said cutter-frame for driving said chain cutter, an independent self-contained power-operated mechanism comprising a separate electric motor mounted on said cutter-frame and connected to said support to swing said cutter-frame relatively to said support to effect arcuate feeding movement of said chain cutter.

12. In a mining machine, the combination with a supporting frame, of a loop chain core-cutter frame having chain guides on opposite edges thereof, two loop chain cutters one mounted on one of said guides and the other mounted on the other guide for operation in opposite directions of feeding movement respectively, a supplemental frame mounted on said supporting frame for feeding movement relative thereto, means for mounting said cutter frame on said supplemental frame for bodily movement therewith, means on said supplemental frame for

driving said chain cutters, and means separate from said driving means for feeding said chain cutters in opposite directions.

13. In a mining machine, the combination
5 with core-cutting mechanism having an unobstructed core opening therethrough and capable of cutting in reverse directions of feeding movement, a swinging frame for supporting said core-cutting mechanism, a
10 motor mounted on said swinging frame, means connected between said motor and said core-cutting mechanism for actuating the latter, a separate motor mounted on said swinging frame, a frame for pivotally supporting said swinging frame, and gearing
15 connected between said second-named motor and said supporting frame for effecting the feeding of said core-cutting mechanism in reverse directions.

14. In a mining machine, the combination
20 with a supporting frame having spaced-apart arms, of a supplemental frame journaled to said arms and between the same for arcuate movement relative to said supporting frame, a chain cutter frame having an
25 unobstructed core-opening therethrough and mounted on said supplemental frame for bodily movement therewith, cutter chains carried by said cutter frame on opposite
30 sides thereof, driving sprocket mechanism for said chains and mounted on said supplemental frame, means on said supplemental frame for driving said cutter chains, and means mounted partly on said supporting
35 frame and partly on said supplemental frame for feeding the cutter chains in opposite directions.

15. In a mining machine, the combination
40 with a double loop chain core cutter for operation in opposite directions of feeding movement, a frame for supporting said core-cutter, a second frame for pivotally supporting said first-named frame, means mounted
45 on said first-named frame for actuating said core-cutter, a motor mounted on said first-named frame for driving said actuating means, a second motor mounted on said first-named frame, and gearing partly mounted on said first-named frame for feeding said
50 core-cutter in reverse directions.

16. In a mining machine, the combination
55 with core-cutting mechanism having an unobstructed core opening therethrough, and capable of cutting cores in reverse directions of feeding movement, of a frame for supporting said core-cutting mechanism, a second frame for carrying said first-named frame for pivotal movement on an upright
60 axis, means for feeding said core-cutting mechanism in reverse directions, and apparatus for moving said second-named frame up or down together with said first-named

frame while maintaining said first-named frame on an upright axis.

17. In a mining machine, the combination
65 with a main frame, of spaced-apart links pivoted at their rear ends in vertical alignment to said main frame, a cutter-head having pivotal connections in vertical alignment with the forward ends of said links, a loop chain
70 core-cutter frame having an unobstructed core opening therethrough, and mounted for pivotal movement on an upright axis on said cutter-head, chain cutters mounted on opposite sides of said core-cutter frame,
75 means mounted on said core-cutter frame for actuating both of said chain cutters, means mounted partly on said chain cutter frame and partly on said cutter head for effecting reverse feeding movements of said
80 chain cutter frame, and means connected to an intermediate portion of one of said links for adjusting the elevation of said cutter-head and the elevation of the chain cutters.

18. In a mining machine, the combination
85 with a supporting frame, of core-cutting mechanism having means for cutting in reverse directions, including spaced-apart parallel planes both of which are substantially horizontal, of a cutter-head for pivotally
90 supporting said cutting mechanism on a substantially upright axis, means for operating said cutting mechanism including the feed thereof in reverse directions, means for supporting said cutter-head together with
95 said cutting mechanism in various positions relative to said supporting frame while maintaining said axis upright and the spaced-apart cutting planes aforesaid substantially horizontal, and means for adjusting
100 the elevation of said cutter-head and holding the same at adjusted elevations relatively to said frame.

19. In a mining machine, a loop-shaped core-cutter, means for feeding said cutter in
105 different directions, means carried by said cutter and operable for severing material in either direction of movement of said cutter, and means for adjusting said cutter as a whole into different cutting positions.
110

20. In a mining machine, a cutter-head, a looped core-cutter carrier on said cutter-head, means for adjusting said cutter-head together with the entire core-cutter to different cutting positions, means for moving said
115 cutter in opposite directions, and mechanism carried by said cutter for severing material during movement of said cutter in either of said opposite directions.

In testimony whereof I have signed my
120 name to this specification on this 19th day of October, A. D. 1922.

EDMUND C. MORGAN