July 19, 1932. N. D. LEVIN 1,867,853

COAL CUTTING MACHINE

Filed Aug. 2, 1928 2 Sheets-Sheet 1

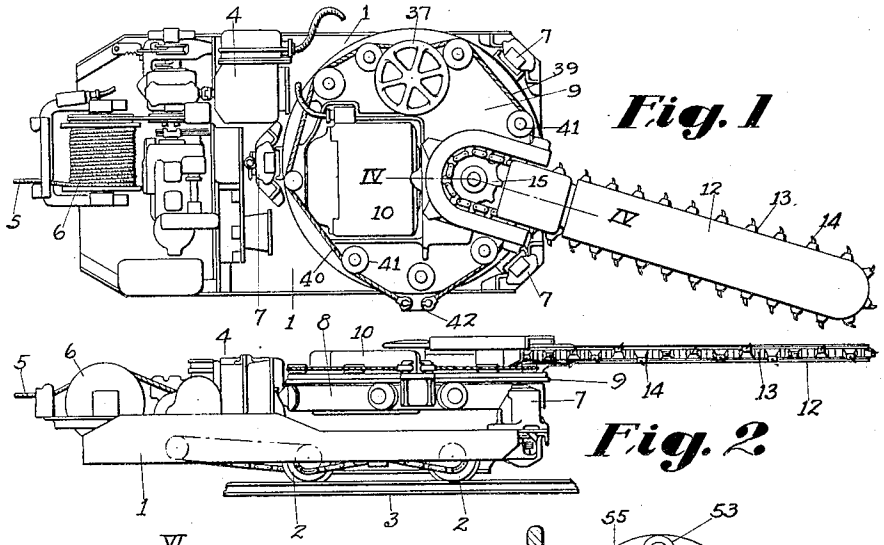


Fig. 1

Fig. 2

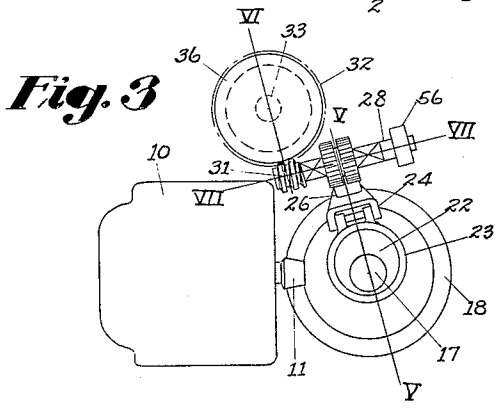


Fig. 3

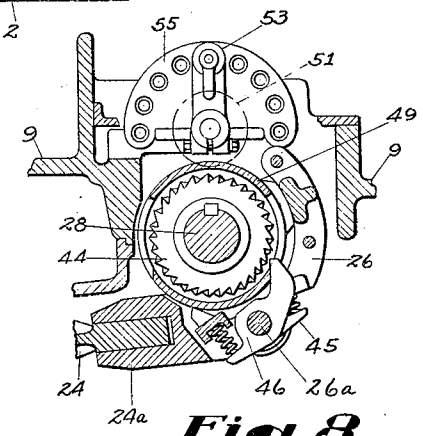


Fig. 8

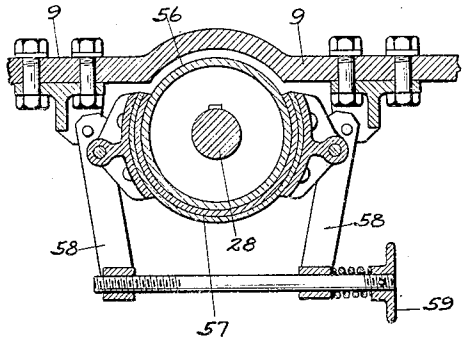


Fig. 10

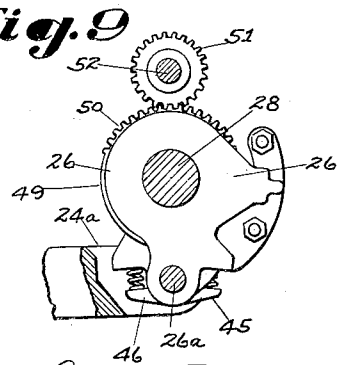


Fig. 9

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COAL CUTTING MACHINE

Filed Aug. 2, 1928 2 Sheets-Sheet 2

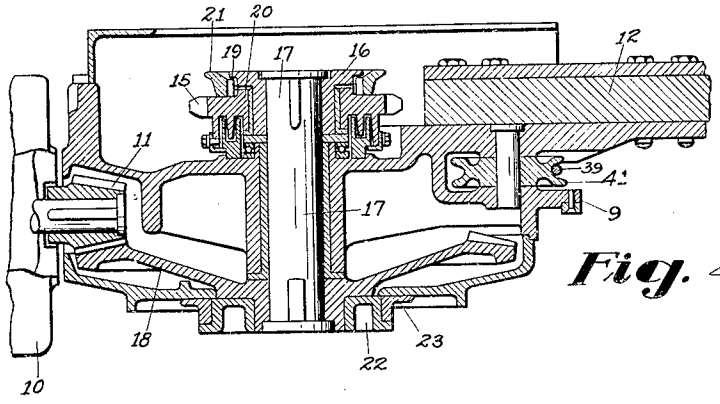


Fig. 4

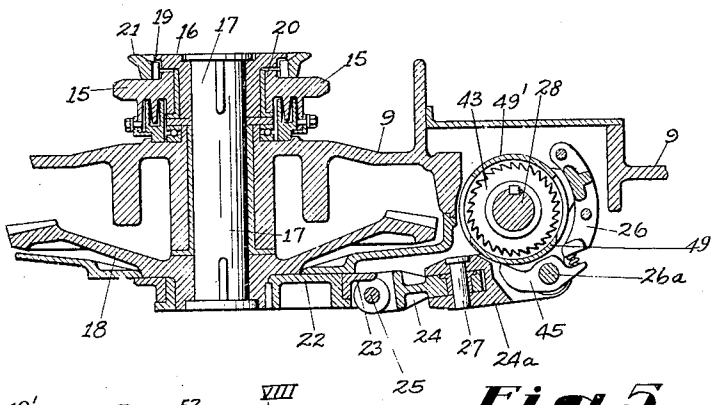


Fig. 5

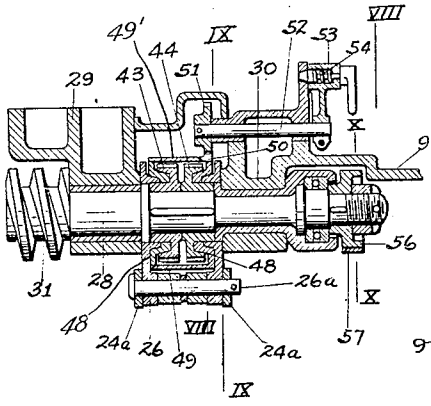


Fig. 7

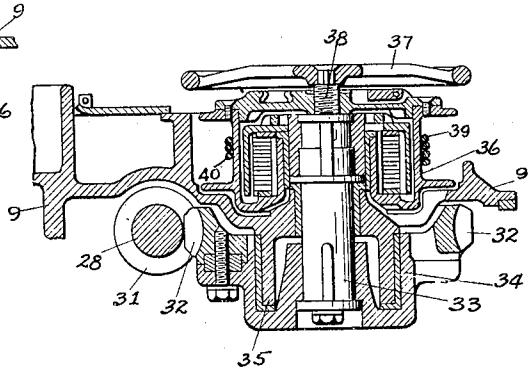


Fig. 6

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UNITED STATES PATENT OFFICE

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COAL CUTTING MACHINE

Application filed August 2, 1928. Serial No. 296,990.

The present invention relates to certain new and useful improvements in coal cutting machines of the type adapted to rest upon the mine track and be braced thereby during the cutting operation.

The special object of this invention is to provide, in a machine of the class described, improved feeding mechanism whereby the cutting mechanism may be pivotally moved in either direction relative to the supporting frame.

A further object is to provide feeding mechanism, such as aforesaid, including optionally operable means to prevent pivotal movement of the cutting mechanism relative to the supporting frame.

These and other objects will appear in the following specification wherein reference is had to the accompanying drawings of which

Fig. 1 is a plan view of a coal cutting machine of the class to which my present invention relates.

Fig. 2 is a side elevation of the machine illustrated in Fig. 1.

Fig. 3 is a diagrammatic plan view of the gearing whereby the feeding and cutting mechanisms are actuated.

Fig. 4 is a fragmentary sectional view taken along the line IV—IV of Fig. 1.

Fig. 5 is a fragmentary sectional view taken along the line V—V of Fig. 3.

Fig. 6 is a fragmentary sectional view taken along the line VI—VI of Fig. 3.

Fig. 7 is a sectional view taken along the line VII—VII of Fig. 3.

Fig. 8 is a fragmentary sectional view taken along the line VIII—VIII of Fig. 7.

Fig. 9 is a fragmentary sectional view taken along the line IX—IX of Fig. 7.

Fig. 10 is a sectional view taken along the line X—X of Fig. 7.

Like numerals refer to similar parts in the several figures.

In the drawings I have shown a coal cutting machine of the well known Arcwall type comprising a truck frame 1 mounted upon the track wheels 2 which are adapted to rest upon and be braced by the rails 3 of the mine track during the cutting operation. Mounted upon the truck frame 1 is a motor 4 connected by suitable gearing with the wheels 2 to propel the machine along said rails. Power for the actuation of the motor 4 is received through the flexible conductor cable 5 from a convenient source of electric current supply, and an automatically acting cable reel 6 is provided to wind the cable as the machine moves toward the source of current supply and to pay it out as the machine moves in the opposite direction. These devices are all well known in the mining machine art, and as they form no part in the present invention, more complete illustration and description is not thought to be required at this time.

Fixed to the truck frame 1 are a plurality of upstanding pedestals 7 to which is attached a ring 8. Upon the ring 8 is mounted a circular plate 9 which is concentric with and rotatable upon the ring 8 to form a turntable upon which the cutting element of the machine is mounted. This plate 9 constitutes the main frame of the coal cutting element of the machine. Supported upon the frame 9 is an electric motor 10 which receives its actuating current from the cable 5 through connecting and controlling devices which are not shown in the drawings. This motor 10 is provided with a bevel pinion 11 whereby rotative power is supplied to the cutting and feeding elements of the machine as will be hereinafter fully described.

Fixed to the main frame 9 and projecting horizontally therefrom is a cutter frame 12 about the edges of which travels a cutter chain 13 having renewable cutter bits 14 adapted, when the cutter frame is presented edgewise toward the coal body, to cut a kerf therein. The cutter chain 13 engages a sprocket wheel 15 which is rotatably supported upon a sleeve 16 keyed to the vertical shaft 17. The shaft 17 is supported in suitable journal bearings of the main frame and is connected with the motor pinion 11 through a bevel gear 18 which is keyed to the lower end of said shaft. Formed on the sleeve 16 is an annular flange 19 on the periphery of which is formed clutch teeth adapted to register with similar clutch teeth formed on the hub 20 of the sprocket wheel 15. These clutch

teeth are adapted to engage similar clutch teeth formed on the inner surface of a ring 21 whereby the sprocket wheel 15 and sleeve 16 may be operatively connected together, ring 21 being axially slidable to engage or disengage the sprocket wheel and sleeve.

Keyed to the hub of the gear wheel 18 is an eccentric 22 having an eccentric strap 23 pivotally attached to the link 24 by a horizontally extending pivot pin 25. The link 24 is formed in two parts 24 and 24*a*, joined together by the vertical pivot pin 27. The part 24*a* is connected with the rocker arm 26 by the horizontally extending pivot pin 26*a* thus providing the flexibility necessary for connection of the horizontally rotating eccentric 22 with the vertically rotating rocker arm 26. The rocker arm 26 is mounted upon the horizontal shaft 28, supported in bearings 29 and 30 of the main frame as shown in Fig. 7. Formed integral with the shaft 28 is a worm 31 which engages a worm wheel 32 keyed to the vertical shaft 33. The shaft 33 is journaled in the bearing 34 of the main frame as shown in Fig. 6. Additional support is provided for the shaft 33 and worm wheel 32 by an annular flange 35 formed on the main frame 9 the outer surface of which engages the inner surface of a recess of the worm wheel 32. Mounted upon the upper end of the shaft 33 is a winding drum 36 which is connectible to said shaft by a multiple friction clutch of the well known type. A hand wheel 37 attached to the pressure screw 38 affords means for the control of this friction clutch and the actuation of the winding drum 36. Attached to the winding drum 36 is flexible draft means comprising sections 39 and 40, which are conducted in opposite directions around the main frame 9 by guide sheaves 41. The arrangement of these parts is such that rotation of the drum 36 in one direction will wind section 30 and pay-out section 40 simultaneously, the section which is wound and that which is unwound, of course, depending upon the direction of rotation of the drum. Sections 39 and 40 may comprise the end sections of a single draft means having its intermediate portion engaged with the drum or they may consist of separate ropes with their ends secured to the drum. In any event, the free ends of the sections are secured to the bracket 42 fixed to the supporting ring, so that upon tensioning one section or the other, the frame 9 will be swung in the desired direction.

In order to get the maximum swing of the cutter bar in each direction, the cable lengths 40, it will be noted, are trained from adjacent points closely adjacent the turntable periphery to closely adjacent anchoring points external of the turntable. If the drum is set inwardly from the turntable edge for any distance, sheaves 41, as close together as the drum will permit, should be provided, as shown in Figure 1.

Keyed to the worm shaft 28, between the bearings 29 and 30, are two similar, but oppositely disposed, ratchet wheels 43 and 44 adapted to be engaged by oppositely disposed pawls 45 and 46 carried upon the pin 26*a* of the rocker arm 26. Rotatably mounted on the hubs of the ratchet wheels are similar annular flanged members 48 connected together by circumferentially spaced shields 49 and 49′. As shown in Figure 7, the shields are integral with one of the members 48 and may be secured to the periphery of the other member by any suitable means. The shield 49, which alone has an operative function, is adapted to be interposed between the pawls and ratchets to control their operative engagement. The parts are so proportioned that when the shield 49 is in one position, both pawls are held inoperative. Rotation of the shield to one side of the neutral line allows one of the pawls to engage its appropriate ratchet to rotate the shaft in one direction, and movement of said shield to the other side of the neutral line will permit the other pawl to engage its ratchet to cause rotation of the shaft 28 in the opposite direction. The speed of rotation of the shaft 28 may be controlled by the degree of rotation of the shield 49 permitting the pawls to pass over one or a plurality of teeth with each retrograde movement of the rocker arm 26.

To provide for the rotary adjustment of shield 49 the shield is provided with a series of integral teeth 50 which are engaged by a pinion 51 fixed on a shaft 52. The shaft 52 is supported in suitable bearings of the main frame and to its remote end is fixed a hand lever 53 having a spring detent 54 adapted to engage either of a plurality of apertures in the arcuate flange 55 of the main frame. By the manipulation of the hand lever 53 the shaft 28 may be controlled to revolve in either direction to wind one of the feed ropes and unwind the other to thereby swing the main frame 9 about its axis, thus affording convenient control of the direction and speed of swing.

Under some conditions of operation it is desirable to hold the cutter arm 12 in fixed relation to the truck frame, and to feed it to its work by propelling the machine along the mine track. The worm 31 and the worm wheel 32 are substantially non-overhauling and, when the shield 49 is in its neutral position serve to lock the cutter arm against rearward swinging motion. Due to the vibration of the machine and the strain upon the feed ropes the rotary effort of the winding drum 36 sometimes overcomes the locking effect of the worm 31 to such an extent as to permit a gradual unwinding of the feed rope, allowing the cutter arm to slowly

drift rearwardly relative to the truck frame.

To overcome this difficulty I have provided a brake wheel 56 fixed to the shaft 28 and engageable by a brake band 57 under the influence of the levers 58 and hand screw 59. By the manipulation of the screw 59 the brake band 57 may be made to engage the brake wheel 56, positively holding it against rotation and insuring perfect rigidity of the connection between the machine frame 9 and the truck frame.

By the arrangement of parts above described I have provided, in a coal cutting machine of the Arcwall type, means to swing the cutter bar optionally in either direction, to cut either from right to left or from left to right, or to hold said cutter bar rigidly in the preferred position of angular adjustment relative to the frame of the machine, said feeding mechanism being operable either while the cutter chain is running or not running.

What I claim is:

1. In a machine of the class described, the combination with a support, of a frame pivotally mounted thereon, a kerf cutter projecting horizontally from said frame, and means to rotate the frame in either direction around its pivotal support comprising a reversible winding drum mounted on said frame, a flexible draft means comprising two sections engaged with said drum, either of said sections being windable on the drums and the other simultaneously unwindable therefrom depending on the direction of rotation of the drum, a worm and worm wheel drive for the drum, and frictional braking means for the worm.

2. In a machine of the class described, the combination with a support, of a frame pivotally mounted thereon, a kerf cutter projecting from said frame, means to cause rotation of said frame about its pivotal support in either direction comprising a winding drum mounted upon said frame, a worm and worm wheel drive for the drum, optionally rotatable ratchets adapted to cause rotation of said worm in either direction, flexible draft means comprising two sections engaged with said drum, either of said sections being windable on the drum and the other simultaneously unwindable therefrom depending on the direction of rotation of the drum, the free ends of said sections being anchored to said support whereby the tensioning of one of said sections causes rotation of the frame in one directon, and the tensioning of the other section causes rotation of the frame in the other direction, and frictional braking means to prevent rotation of said worm and thereby lock said frame against rotation about its pivotal support as and for the purpose set forth.

3. In a machine of the class described, the combination with a wheel supported truck, a turntable mounted thereon, and a cutter bar supported by the turntable in projecting relation thereto, of swinging means for the turntable comprising a winding drum on the turntable, guide sheaves disposed around the edge of the turntable, anchoring means exterior to the turntable, cable lengths engaged with said drum and trained in opposite directions about the sheaves to be secured at closely adjacent points to said anchoring means, either of said lengths being windable on the drum and the other simultaneously unwindable therefrom depending on the direction of drum rotation, and means for rotating the drum in either direction.

4. In a machine of the class described, the combination with a wheel supported truck, a turntable mounted thereon, and a cutter bar supported by the turntable in projecting relation thereto, of swinging means for the turntable comprising a winding drum on the turntable eccentrically disposed relative thereto with a peripheral portion adjacent the edge of the turntable, guide sheaves disposed around the edge of the turntable, anchoring means exterior to the turntable, cable lengths engaged with said drum and trained in opposite directions about the sheaves to be secured at adjacent points to said anchoring means, either of said lengths being windable on the drum and the other simultaneously unwindable therefrom depending on the direction of drum rotation, and means for rotating the drum in either direction.

5. In a machine of the class described, the combination with a wheel supported truck, a turntable mounted thereon, and a cutter bar supported by the turntable in projecting relation thereto, of swinging means for the turntable comprising cable lengths guided about the turntable periphery from adjacent points closely adjacent the turntable periphery to closely adjacent anchoring points external of the turntable, winding means on the turntable and engaging the lengths to simultaneously and equally wind in one thereof and pay out the other, and means controllable at will for driving the drum in either direction.

In testimony whereof I have hereunto set my hand.

NILS D. LEVIN.