Dec. 26, 1933. M. P. HOLMES 1,941,008

MINING MACHINE

Filed July 14, 1930 5 Sheets-Sheet 1

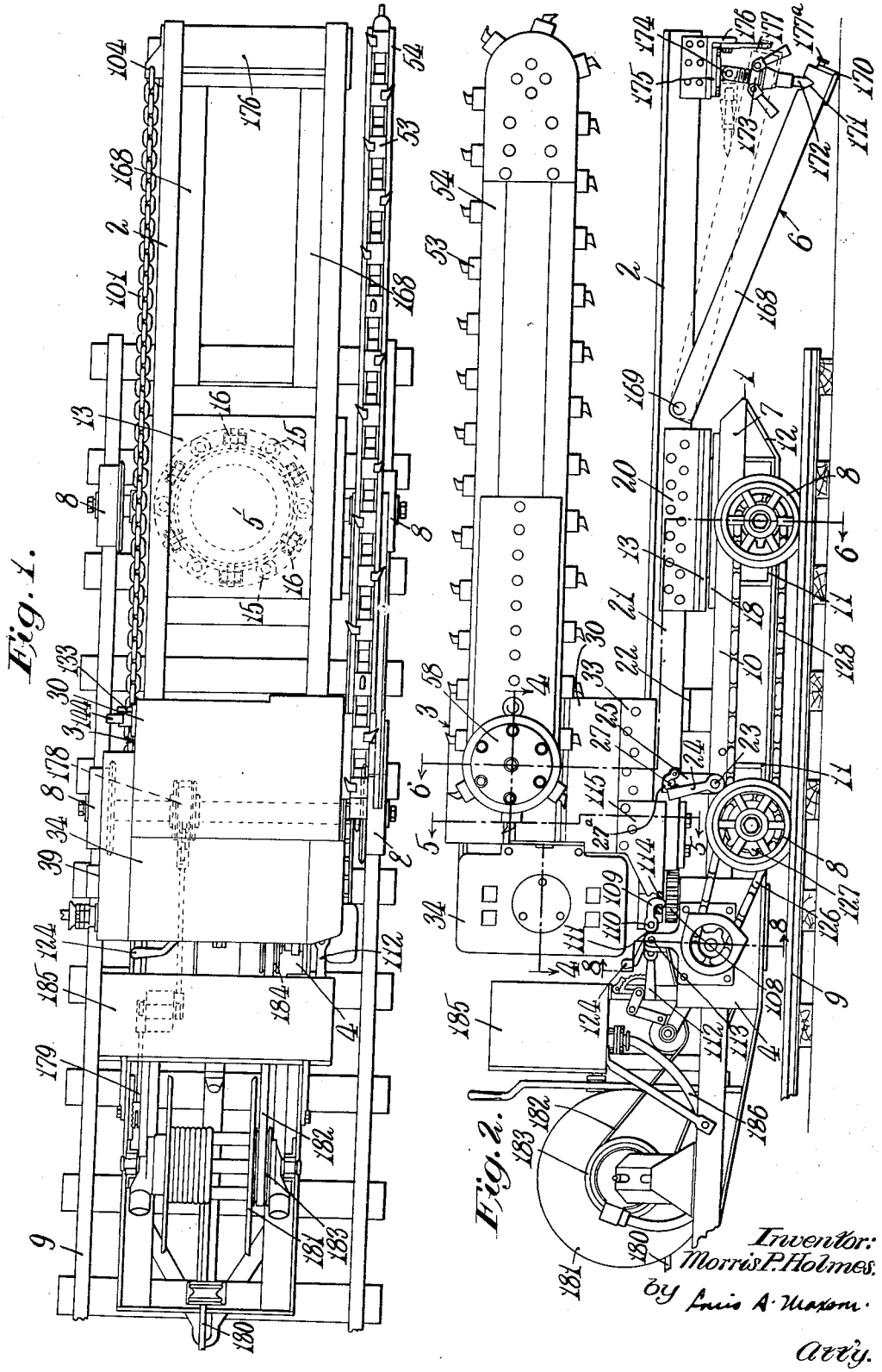


Fig. 1.

Fig. 2.

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MINING MACHINE

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Fig. 3.

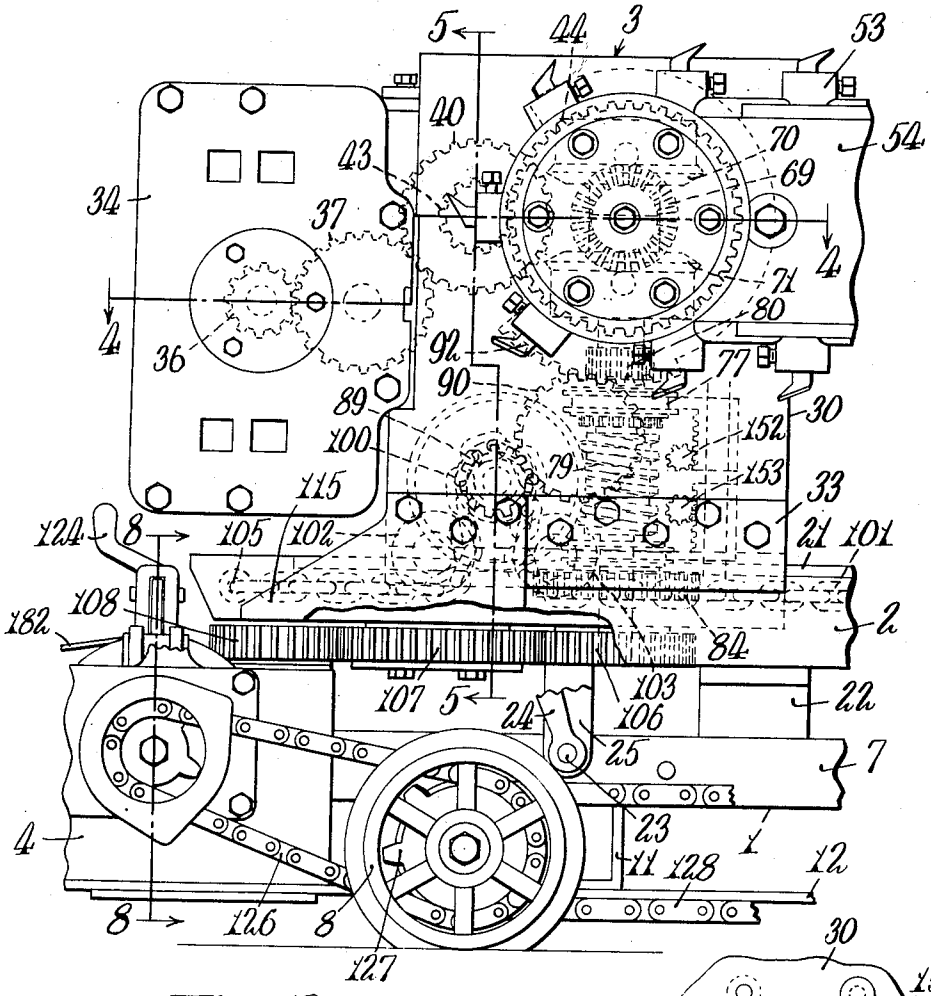


Fig. 12.

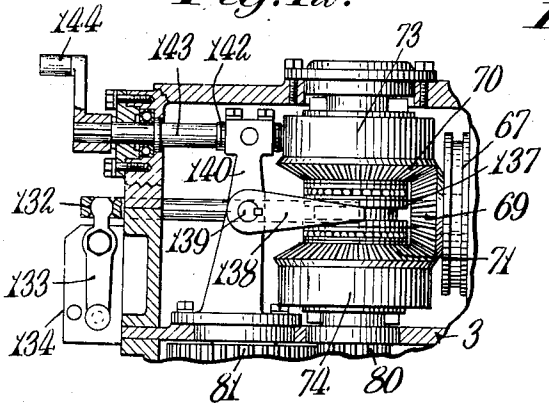
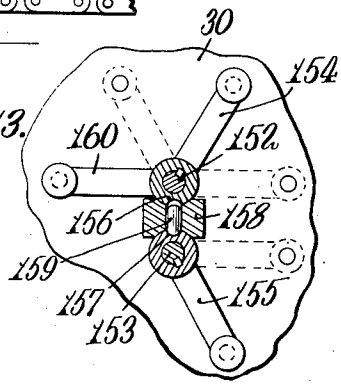


Fig. 13.



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MINING MACHINE

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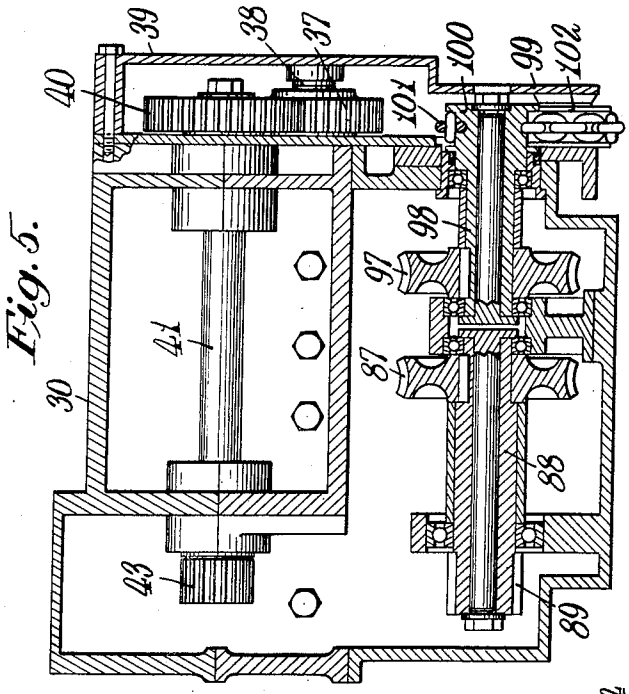


Fig. 5.

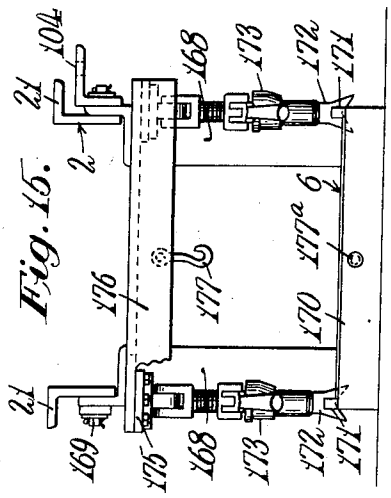


Fig. 15.

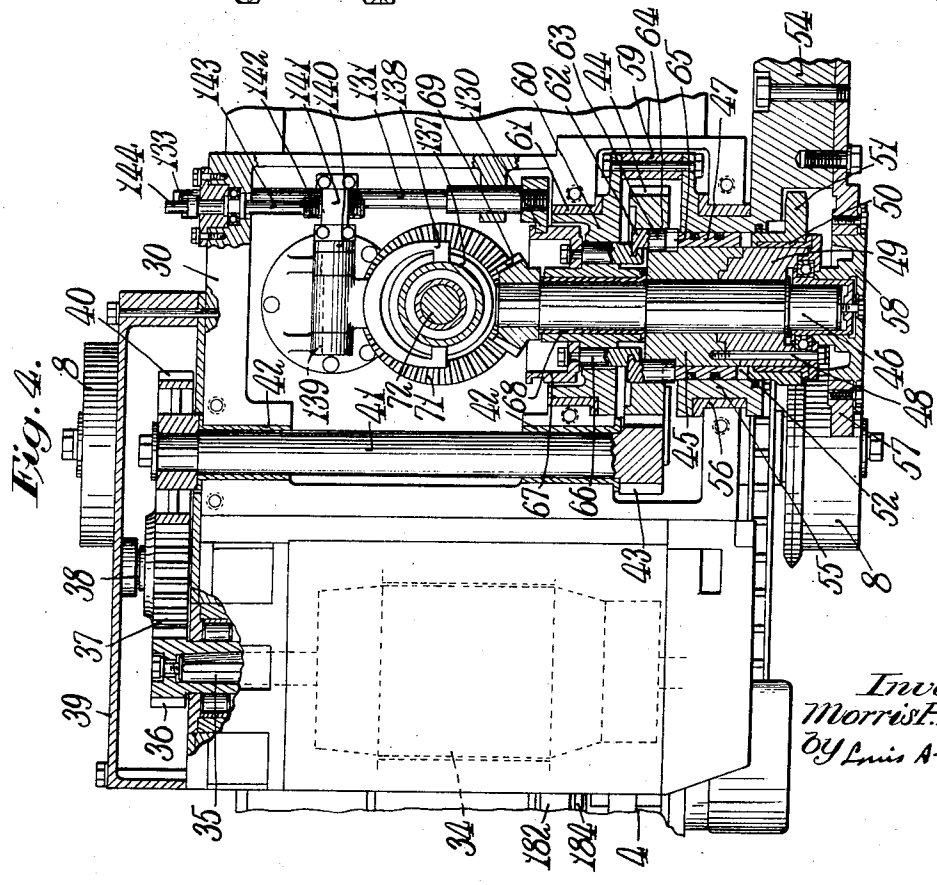


Fig. 4.

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MINING MACHINE

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Fig. 6.

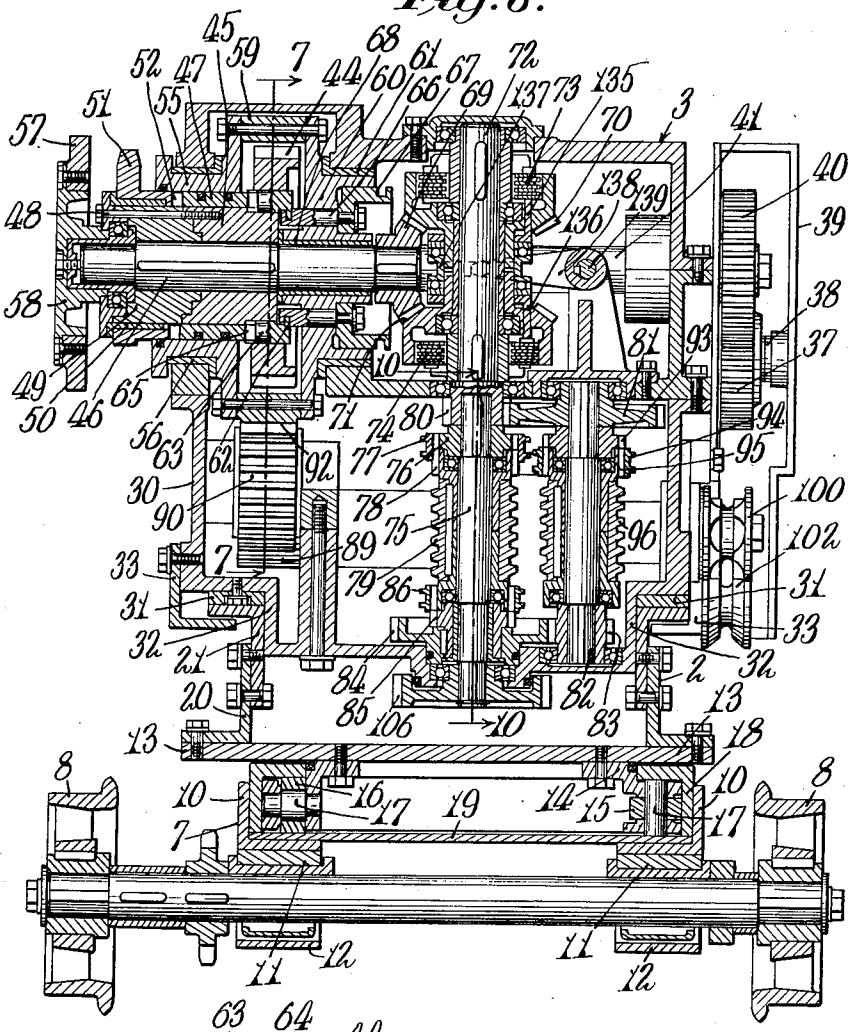


Fig. 7.

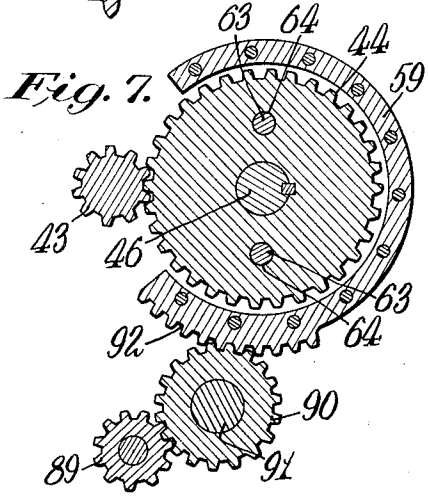
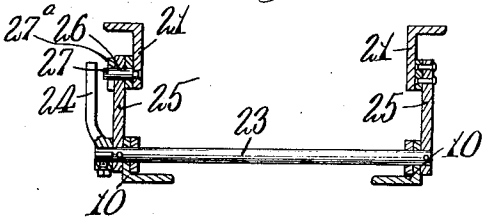


Fig. 14.



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Fig. 8.

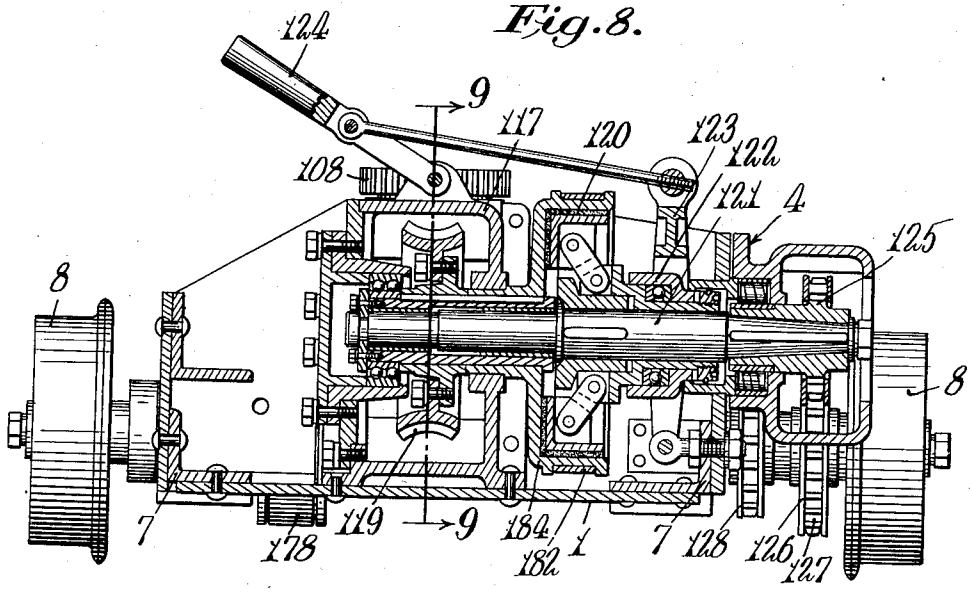


Fig. 9.

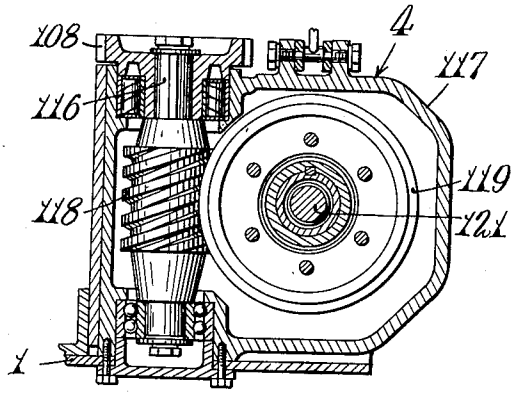
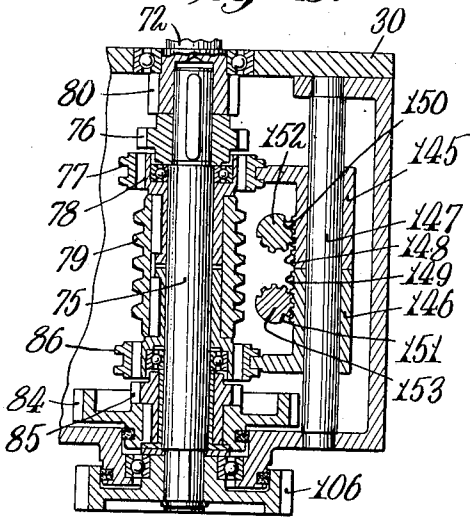


Fig. 10.



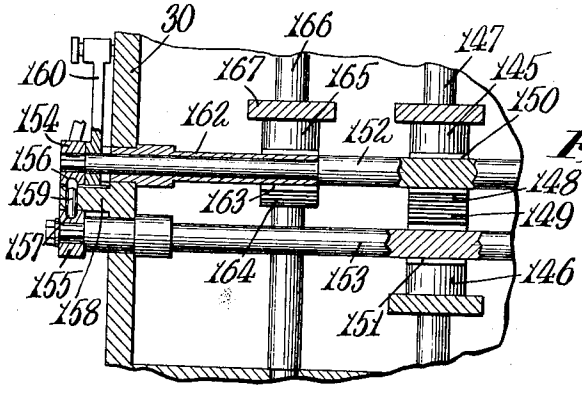


Fig. 11.

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1,941,008

UNITED STATES PATENT OFFICE

1,941,008

MINING MACHINE

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Application July 14, 1930. Serial No. 467,791

20 Claims. (Cl. 262—28)

This invention relates to mining machines and more particularly to coal mining machines of the shear cutter type adapted to cut vertical kerfs in the coal.

An object of this invention is to provide an improved coal mining machine. Another object is to provide an improved coal mining machine of the wheel mounted, track cutting type adapted to insert vertical or shear cuts in the coal. Still another object of this invention is to provide an improved track cutting mining machine having improved kerf cutting mechanism and improved means for operating the kerf cutting mechanism, for guiding the cutting mechanism during the cutting operation, and for propelling the machine about the mine. A still further object is to provide an improved shearing machine of the self-propelled, truck mounted type wherein improved means are provided for moving and guiding the shear cutting mechanism relative to the truck during the cutting operation and for propelling the truck along the mine trackway during transport. Yet another object is to provide an improved shearing machine of the pivoted kerf cutter type having improved means for moving the kerf cutter about its pivot and for feeding the kerf cutter relative to the coal during the cutting operation. These and other objects of the invention will, however, hereinafter more fully appear.

The invention is exemplified in the novel combinations and arrangements of parts shown in the accompanying drawings and described in the following specification and as more particularly pointed out in the appended claims.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings,—

Fig. 1 is a plan view of an illustrative embodiment of the improved mining machine.

Fig. 2 is a side elevational view of the machine shown in Fig. 1.

Fig. 3 is an enlarged fragmentary side elevational view of the machine shown in Fig. 2.

Fig. 4 is a horizontal sectional view taken substantially on line 4—4 of Figs. 2 and 3.

Fig. 5 is a transverse vertical sectional view taken substantially on line 5—5 of Figs. 2 and 3.

Fig. 6 is a transverse vertical sectional view taken substantially on line 6—6 of Fig. 2.

Fig. 7 is a detail sectional view taken substantially on line 7—7 of Fig. 6.

Fig. 8 is a transverse vertical sectional view taken substantially on line 8—8 of Figs. 2 and 3.

Fig. 9 is a detail sectional view taken on line 9—9 of Fig. 8.

Fig. 10 is a detail sectional view taken on line 10—10 of Fig. 6.

Fig. 11 is a detail sectional view illustrating a portion of the clutch controlling mechanism.

Fig. 12 is a detail sectional view illustrating the control mechanism for the reverse frictions.

Fig. 13 is a detail sectional view illustrating the interlock mechanism for the speed control handles.

Fig. 14 is a detail sectional view illustrating the locking mechanism for preventing tilting and lateral movement of the guiding frame.

Fig. 15 is an end elevational view illustrating the guiding frame and the adjustable support therefor.

In this illustrative embodiment of the invention there is shown a coal mining machine of the wheel mounted, shear cutter type adapted to operate while supported by a mine trackway and generally comprising a wheeled truck 1, an elongated swiveled guiding frame 2 arranged horizontally on the truck, kerf cutting mechanism generally designated 3, and truck propelling mechanism 4. The guiding frame 2 is mounted at the forward end of the truck for horizontal swinging movement about a vertical axis at 5 and there is provided for supporting the forward end of the guiding frame an adjustable support generally designated 6. The guiding frame 2 is adapted to be swiveled into different angular positions relative to the truck and the kerf cutting mechanism is guided for movement longitudinally of the frame during the cutting operation. The cutting mechanism also is adapted to drive, when in its transport position on the truck, the truck propelling mechanism 4.

Now referring to the wheeled truck 1 it will be observed that the same herein comprises a truck frame 7 supported by wheels 8 adapted to travel along a mine trackway 9. The truck is herein of a fabricated construction and includes parallel longitudinally extending angle members 10 suitably braced by transverse trusses and having adjustable axle box supports 11 and girder-like bracing structure 12. Supported at the forward end of the truck frame 7 herein directly above the front truck wheel axle is a swivel plate 13 having secured thereto beneath the same an annular frame or swivel bearing 14 carrying series of horizontal and vertical rollers 15 and 16 journaled on pins 17 carried by the frame 14. The horizontal rollers 15 engage the inner periphery of an annular guide or bearing housing 18

secured to the angle members 10 of the truck, while the vertical rollers 16 engage the upper surface of a horizontal plate 19 likewise secured to the angle members 10. These elements form a horizontal turntable structure on which the guiding frame 2 is mounted for horizontal swinging movement relative to the truck. As shown in Figs. 2 and 6, rigidly attached to the swivel plate 13 at the outer sides thereof are angle members 20 having vertical flanges rigidly secured to the depending flanges of the parallel longitudinally extending angle members 21 of the guiding frame 2. These angle members 21 extend a substantial distance forwardly and rearwardly of the turntable structure with the rearwardly extending portions thereof overlying, when the parts are in the position in Fig. 1, the truck.

For holding the elongated guiding frame 2 against vertical tilting movement and lateral swinging movement relative to the truck when the guiding frame is in the position shown in Fig. 1, i. e. the transport position, there is provided as shown in Figs. 2 and 14, a transverse supporting member or support abutment 22 carried by the truck and on which the rear end of the guiding frame 2 rests when the frame is in its central longitudinal position shown. Suitably journaled within bearings carried by the angle members 10 of the truck is a transverse rod or shaft 23 having secured thereto an operating handle 24 conveniently located at the side of the truck. Also attached to this rod are vertical stop plates 25 which, when the parts are swung in the position shown in Fig. 14, engage the outer surfaces of the depending flanges of the angle members 21 of the guiding frame, and these stop members when so positioned prevent lateral swinging movement of the guiding frame relative to the truck. When the stop members are swung downwardly out of engagement with the guiding frame the latter may be swung horizontally relative to the truck as hereinafter described. To prevent vertical tilting movement of the guiding frame relative to the truck there is provided in one of the stop plates 25 a slot 26 adapted to engage a projecting pin 27 secured to one of the angle members of the guide frame and this slotted member and pin hold the guiding frame down in position against the transverse support abutment 22. A latch 27a carried by the stop plate which is slotted is adapted releasably to cooperate with the pin 27 to hold the stop plates in position.

The guiding frame 2 forms an elongated guideway or track for the kerf cutting mechanism 3 along which the latter moves during the cutting operation, and this kerf cutting mechanism includes a frame or sliding support 30 having guide plates or shoes 31 attached to the lower portion thereof for slidably engaging the upper plane surfaces of the horizontal flanges of the angle members 21 of the guide frame 2. The frame or support 30 has a depending portion presenting parallel lateral guide surfaces 32 engaging the inner vertical surfaces of the angle members 21 as shown in Fig. 6. For holding the sliding support 30 in position on the guiding frame, that is to prevent vertical displacement of the support from the guide, there is provided angle members 33 secured to the sides of the support 30 and having inwardly projecting horizontal flanges underlying the outwardly extending horizontal flanges of the angle members 21 of the guiding frame. It will thus be seen that the structure described above forms a sliding support for the kerf cutting mechanism and is slidable longitudinally of the guiding frame 2 between the ends thereof as hereinafter described. It will be evident that, if desired, suitable antifriction rollers may be provided between the sliding support 30 and guiding frame and that various other arrangements may be employed for guiding the cuttting mechanism on the guide.

Now referring to the improved kerf cutting mechanism per se and more particularly to the driving mechanism for the cutting mechanism, it will be observed that mounted on the frame or sliding support 30 at the rear thereof, as clearly shown in Fig. 3, is a horizontal motor 34 having its power shaft 35 horizontally disposed and extending transversely of the support as shown in Fig. 4. Attached to one end of the motor power shaft is a spur pinion 36 meshing with an intermediate or idler gear 37 journaled on a stub shaft 38 suitably supported within a gear housing 39 attached to one side of the support 30. This idler gear 37 meshes with a spur gear 40 keyed to a horizontal shaft 41 arranged parallel with the motor shaft and suitably journaled within bearings 42 carried by the support 30. Herein formed integral with the shaft 41, at the opposite end thereof from the spur gear 40, is a spur pinion 43 meshing with a large spur gear 44 which herein constitutes the main driving gear for the cutting mechanism. This gear has a hub portion 45 mounted on a horizontal transversely extending shaft 46 arranged parallel with and in advance of the shaft 41. Surrounding the hub 45 of the gear 44 is a sleeve 47 which also forms a part of the bearing structure for the driving parts. Secured to the hub 45 by bolts 48 is the hub of a bearing member 49 supporting a bearing sleeve 50 on which a chain sprocket 51 is journaled. This chain sprocket is connected by a semi-permanent clutch 52 to the sleeve 47 and engages and drives an endless cutter bit carrying cutter chain 53 mounted for orbital movement on the margin of an elongated plane cutter bar 54. This cutter bar is adapted to swing in a vertical plane and is arranged to move in planes at one side of the guiding frame 2, as shown in Fig. 1. In the present construction the cutter bar 54 is provided with an annular hub portion 55 supported for rotative movement within a bearing sleeve 56 suitably carried by the support 30. Also attached to the outer surface of the cutter bar is a plate 57 which is attached to a cylindrical bearing member 58 rotatably supported on the outer extremity of the transverse shaft 46. Secured to a flange-like portion of the hub 55 secured to the cutter bar is a frame member 59 in turn secured to a bearing member 60 rotatably mounted in a bearing sleeve 61 likewise mounted within the support 30. It will thus be seen that the frame members 55, 58 and 60 form a horizontal pivotal support for the cutter bar. As illustrated, the spur gear 44 is connectible to the sleeve 47, to which the chain sprocket 51 is connected, by means of a sliding pin clutch 62 including clutch pins 63 slidably mounted in apertures 64 formed in the hub of the gear 44. These pins when in their connected position (as shown in Figs. 4 and 6) project within sockets 65 formed in the inner surface of the bearing sleeve 47. For sliding the clutch pins in and out there is provided reciprocable shipper members 66 guided within suitable bores formed within the bearing frame 60 and interlocked at their outer ends with inwardly projecting flanges formed on the clutch pins 63. The members 66 are attached to an an-

nular shipper member 67, the shifting means of which will be later described. It will thus be seen that when the pin clutch 62 is in its connected position as shown in Fig. 4 the cutter chain 53 may be operatively connected to the motor through the spur gearing 36, 37, 40, 43 and 44. Upon release of the pin clutch 62 the cutter chain may remain idle during running of the motor.

In specifically describing the improved mechanism for swinging the cutter bar about its pivotal axis, it will herein be noted that the hub 45 (see Figs. 4 and 6) is keyed to the shaft 46 and drives the latter. This shaft is journaled within a bearing sleeve 68 supported within the cutter bar support 60 and has fixed thereto at its inner end a bevel pinion 69 meshing with reverse bevels 70 and 71. These reverse bevels are journaled on anti-friction bearings supported by a vertical shaft 72 in turn journaled within anti-friction bearings carried by the sliding support 30. The reverse bevels 70, 71 are selectively connectible to the shaft 72 by multiple disc clutches 73 and 74 respectively, these clutches having suitable operating means as hereinafter described so that when one is applied the other is released. The lower end of the vertical shaft 72 is keyed to an alined shaft 75 suitably journaled within the support 30. Keyed to the shaft 75 is a clutch member 76 which is connectible by a sliding dental clutch 77 to a clutch member 78 keyed to a worm 79. When the clutch 77 is connected the worm 79 is driven at a relatively fast speed directly by the shaft 72 and in either of opposite directions under the control of the clutches 73, 74. To effect drive of the worm 79 at a relatively slow speed there is formed integral with the shaft 72 a spur pinion 80 meshing with a spur gear 81 keyed to a vertical shaft 82 arranged parallel with the shaft 75 and likewise suitably journaled within the support 30. Keyed to the lower end of the shaft 82 is a spur pinion 83 meshing with a spur gear 84 arranged coaxially with the shaft 75 and suitably journaled within the support 30. Keyed to the hub of the gear 84 is a clutch member 85 which is connectible by a sliding dental clutch 86 to a clutch member keyed to the worm 79. It will thus be seen that when the clutch 86 is connected and the clutch 77 released, the worm 79 may be driven in either of opposite directions, under the control of the reverse clutches 73, 74, at a relatively low speed through the spur gearing 80, 81, shaft 82, spur gearing 83, 84. The worm 79 meshes with a worm wheel 87 (see Fig. 5) keyed to a horizontal shaft 88. This shaft extends transversely of the support 30 parallel with the shafts 41, 46 and is likewise suitably journaled within the support. Herein formed integral with the shaft 88 is a spur pinion 89 meshing with an intermediate or idler gear 90 suitably journaled on a stub shaft 91 supported by the frame 30. The idler gear 90 meshes with the teeth of a gear segment or arcuate rack 92 herein formed integral with the frame 59 secured to the pivotal supporting frames 55, 60 for the cutter bar 54. From the foregoing description it will be evident that the cutter bar 54 may be swung in either of opposite directions at a relatively high bar positioning speed or at a relatively slow speed appropriate for cutting.

Now referring to the improved mechanism for moving the cutting mechanism 3 forwardly and rearwardly along the guiding frame 2, it will herein be noted that keyed to the shaft 82 is a clutch member 93 connectible by a sliding dental clutch 94 to a clutch member 95 secured to a worm 96. This worm is suitably journaled on the shaft 82 and meshes with a worm wheel 97 (see Fig. 5) keyed to a horizontal shaft 98 alined with the shaft 88 and likewise suitably journaled within the support 30. Herein formed integral with the shaft 98 at the outer end thereof and enclosed within a depending portion 99 of the gear housing 39 is a feed operating member 100, herein in the form of a feed sprocket, directly engaging a flexible feeding element, herein in the form of a loose-link feed chain 101. Arranged at opposite sides of and below the feed sprocket are guide sprockets or sheaves 102 and 103 which guide the feed chain 101 relative to the feed sprocket 100. The feed chain is herein in the form of a single continuous element and extends around the feed sprocket and the guide sprockets forwardly and rearwardly along the guiding frame as shown in Fig. 1 and is attached at its forward end to a suitable abutment 104 secured to one side of the forward end of the guiding frame 2. The rear end of this feed chain is secured to a similar abutment 105 secured to one side of the rear end of the guiding frame. It will thus be seen that when the clutch 94 is connected the feed sprocket may be driven in either of opposite directions under the control of the reverse frictions 73, 74 at a relatively slow speed to feed the cutting mechanism forwardly or rearwardly along the guiding frame 2 at a relatively slow speed appropriate for cutting.

The truck propelling mechanism 4 for propelling the machine about the mine at a relatively high transport speed herein comprises a spur gear 106 (see Fig. 6) keyed to the lower end of the shaft 75. This spur gear meshes with an intermediate or idler gear 107 suitably journaled on a stub shaft carried by the sliding support 30 and this idler gear in turn meshes with the initial driving gear 108 of the truck driving mechanism on the truck. It will thus be seen that when the sliding support 30 of the cutting mechanism is in its rearmost position as shown in Figs. 2 and 3 the idler gear 107 on the sliding support 30 is meshed with the initial driving gear 108 on the truck. For holding the gears 107 and 108 in meshing engagement there is provided a hook 109 pivotally connected at 110 to a suitable toggle link 111. This toggle link is operated by a handle 112 pivoted at 113 on an upstanding bracket secured to the side of the truck. This hook, when the parts are in the position shown in Fig. 2, is adapted to engage an aperture 114 formed in the rearwardly projecting portion of a housing frame 115 attached to the sides of the cutting mechanism support 30. It will thus be seen that when the hook 109 is positioned within the aperture in the frame, the cutting mechanism support is held in its rearmost position on the guiding frame 2.

The driving connections between the initial driving gear 108 on the truck and the truck wheels will now be described. The gear 108 is keyed to a vertical shaft 116 suitably journaled within a gear housing 117 and supported by the truck frame. Fixed to the shaft 116 is a worm 118 meshing with a worm wheel 119 suitably journaled within the gear housing. This worm wheel is connectible by a friction clutch 120 of the internal expanding type to a horizontal shaft 121 arranged transversely of the truck and suitably journaled within the gear housing. The operating means for the clutch 120 includes an axially movable clutch applying member 122 having a cooperating pivoted shipper member

123 connected by a link to a pivoted operating handle 124. As shown in Fig. 8, keyed to one end of the shaft 121 is a chain sprocket 125 connected by an endless chain 126 to a chain sprocket 127 secured to the rear truck wheel axle. The front and rear truck wheel axles are connected in driving relation by a chain and sprocket connection 128 as shown in Fig. 2. It will thus be seen that when the clutch 120 is applied, the truck wheels may be driven at a relatively high transport speed from the motor 34 through the spur gearing 36, 37, 40, 42 and 44, bevel gear 69, one or the other of the reverse bevels 70, 71 (depending upon which of the reverse frictions 73, 74 is applied), shaft 72, shaft 75, spur gear 106, 107, 108, worm gearing 118, 119, transverse shaft 121, and the chain and sprocket connection 125, 126, 127 connected to the truck wheels.

The operating means for the various clutches will now be described. It will be noted that the annular clutch shifting member 66 for the pin clutch 62 is suitably grooved for the reception of a projection of an element 130 secured to a transversely disposed actuating rod 131. This actuating rod as shown in Fig. 12 is provided with a suitable aperture or slot 132 for the reception of one end of an operating lever 133 pivoted on a bracket 134 secured to one side of the sliding support 30. The operating means for the reverse frictions 73, 74 includes clutch applying elements 135, 136 and a central shipper element 137. Connected to this shipper element is a shipper yoke 138 keyed to a transverse operating rod or shaft 139. Also keyed to this shaft or rod is an arm 140 carrying a trunnion nut 141 threadedly connected to a screw 142 formed on an operating shaft 143. The shaft 143 has secured thereto at its outer end an operating handle 144. Means are provided for connecting one of the clutches 77, 86 only when the other is released and for shifting the clutch 94 and herein include clutch shifting elements 145, 146 connected to the sliding elements of the clutches 77, 86 respectively. These elements 145, 146 are slidably guided on a vertical rod 147 and have teeth or gear segments 148, 149 with which gear elements 150, 151 respectively mesh. These gear elements are carried by parallel operating rods or shafts 152, 153 respectively, and these shafts have secured at their outer ends operating handles 154, 155. As shown from Fig. 13, the hub portions of these handles are notched at 156 and 157, while slidably guided within a bracket 158 is an interlocking pin 159. It will thus be seen that when one of the handles is in its released position, for instance the handle 155 as shown in Fig. 13, the interlock pin 159 is projected within the notch 157 in the handle while the interlock pin is released from the notch in the handle 154, thereby enabling the latter to be operated to actuate its respective clutch. If it is desired to operate the handle 154 or 155, the handle 154 must first be moved into its neutral position as shown in Fig. 13, thereby permitting the handle 155 to be turned, sliding the interlock pin 159 into engagement with the notch 156 in the handle 154, preventing movement of the latter when the other clutch handle is in its clutch applying position. The clutch 94 is provided with an operating handle 160 secured to a hollow shaft 162 rotatably mounted on the shaft 152. Formed integral with the shaft 162 is a gear element 163 meshing with the teeth of a gear segment or rack 164 formed on a clutch shifting member 165 slidably guided on a vertical rod 166. This element 165 is provided with a projecting portion 167 engaging the groove in the shiftable element of the clutch 94.

As mentioned above improved means are provided for supporting the forward end of the elongated guiding frame 2 during operation of the cutting mechanism. This improved supporting means, which has hereinbefore been generally designated at 6, comprises angle members 168 pivoted at 169 at the sides of the guiding frame 2. These angle members are connected at their forward ends by a transverse angle member 170 forming a shoe adapted to engage the mine floor when the supporting means is in its adjusted supporting position. The upstanding flanges of these angle members 168 are notched at 171 for engagement with the feet 172 of adjustable screw jacks 173 of a usual design. These jacks are swivelly mounted at 174 for universal movement and are supported by plates 175 attached to the transverse angle member 176 connected to the forward ends of the angle members 21 of the guiding frame 2. It will thus be seen that when the angle members 168 are swung downwardly with the shoe 170 engaging the mine floor and the jacks 173 are in their operative position as shown in Fig. 2, the forward end of the guiding frame is supported against downward tilting movement. During transport of the machine about the mine, the jacks 173 are swung up out of the way, the angle members 168 swung upwardly (as shown in dotted lines in Fig. 2) and held in this inoperative position by a pivoted hook 177 engaging a pin 177a carried by the transverse angle member 170 of the support.

Suitably secured to the rear truck axle is a frictional braking device 178 including a brake drum and a cooperating brake band, and this braking device is adapted to be operated through connections 179. The braking device is adapted to control rotation of the truck wheels when the mining machine is moving along a steeply inclined trackway, and also to lock the truck wheels against rotation during the cutting operation. Electrical energy is adapted to be conducted to the motor 34 through a usual flexible conductor cable 180 wound upon a cable reel 181 driven through an endless belt connection 182 connecting a pulley 183 secured to a reel and to a pulley 184 formed on the housing element of the friction clutch 120 (see Fig. 8). As the machine moves along the mine trackway the cable reel is adapted to wind in or pay out the flexible conductor cable 180 in the manner well understood in the art. Mounted on the rear end of the truck frame is a usual controller box 185 connected in the usual manner through flexible conductor elements 186 to the flexible conductor cable on the cable reel and through suitable connections to the motor 34.

The general mode of operation of the improved mining machine will now be briefly described. The machine is propelled about the mine at a relatively fast transport speed, it being understood that the elements of the machine are in the position shown in Fig. 1 at that time with the cutting mechanism support held in its rearward position by the hook 109 and with the final driving gear on the cutting mechanism support 30 in mesh with the initial driving gear 108 on the truck. The fast feed truck drive is controlled by the reverse clutches 73, 74 and the truck may be propelled in either of opposite directions at a relatively high transport speed upon

application of one or the other of the clutches 73, 74. As the machine is transported about the mine the guiding frame is in its central alined position and is locked against vertical tilting and lateral swinging movements by the stop plates 25 and at that time the adjustable front support 6 is in its raised inoperative position. When the working face is reached the friction clutch 120 controlling the high speed truck drive is released and the frictional braking device 178 set, locking the truck wheels against rotation. If it is desired to insert a shear cut in the coal face directly in advance of the guiding frame 2 when the parts are in the position shown in Figs. 1 and 2, the operator detaches the hook 177 from the pin 177a of the adjustable front support and drops the latter into its lowermost position with the angle member 170 engaging the mine floor. The screw jacks 173 are then positioned and suitably adjusted. The hook 109 is then released and the handle 154 is manipulated, connecting the clutch 77. Upon application of the friction clutch 73 the cutter bar 54 is swung upwardly at a bar positioning speed through the bar swing gearing 89, 90 and the gear segment 92 attached to the cutter bar to a position wherein its outer extremity is adjacent the mine roof at the face. The operator then actuates the handle 133 to connect the cutter chain clutch 62, thereby connecting the cutter chain in driving relation with the motor and as a result the cutter chain 53 is rapidly circulated about the margin of the cutter bar 54. The handle 160 is then manipulated, connecting the worm 96 to its drive and upon application of the friction clutch 73 the feed sprocket 100 is slowly rotated, moving the sliding cutting mechanism support together with the cutter bar carried thereby rectilinearly along the guideway 2 relative to the feed chain 101 at a cutting speed to effect sumping of the cutter bar within the coal. Upon the completion of the sumping cut the clutches 73 and 94 are released and the clutch 86 connected, and upon application of the friction clutch 74 the cutter bar is swung downwardly in its plane at a cutting speed to effect its vertical swinging cut, the clutches 86, 74 thereafter being released. The clutch 94 is then again connected and upon application of the friction clutch 74 the cutting mechanism support is slid rectilinearly rearwardly along the guideway 2 at a cutting speed, withdrawing the cutter bar from the coal. The clutches 94 and 74 are then released and the clutch 77 connected, and upon application of the friction clutch 73 the cutter bar is swung upwardly into its transport position as shown in Fig. 2. The cutter supporting frame is then slid into its rearmost position, bringing the truck driving gears 107, 108 into meshing engagement and the support is locked into position by the hook 109. The adjustable front support is then moved into its uppermost inoperative position, and upon application of the friction clutch 74 and the clutch 120, the machine is propelled rearwardly away from the coal face at a relatively fast transport speed. If it is desired to insert a shear cut at various angles relative to the central longitudinal vertical plane of the machine, this may be accomplished simply by releasing the stop plates 25, 25, moving the cutting mechanism support 30 slightly forwardly to bring the truck driving gears 107, 108 out of mesh and swinging the guiding frame 2 horizontally about the turntable axis until the parts assume the desired angularly related position. The adjustable support 6 is then moved into its operative supporting position and the cutter bar is swung upwardly, then fed rectilinearly to effect the sumping cut, swung downwardly and thereafter moved rectilinearly rearwardly to effect its withdrawal cut in the same manner as that described above. These and other operations of the improved mining apparatus will be clearly apparent to those skilled in the art.

As a result of this invention it will be noted that an improved mining machine is provided which is capable of inserting a shear or vertical cut in the coal face and having improved adjustable guiding means whereby a kerf may be cut in the coal while the machine is mounted on a curved track, a feature especially desirable when cutting room necks. It will further be noted that an improved coal mining machine is provided wherein the kerf cutting mechanism is supported on a guideway carried by a wheeled truck thereby enabling the cutting mechanism to operate while the truck remains stationary. This feature is extremely advantageous when the track is uneven or when pitching seams or rolling bottoms are encountered. It will further be noted that by providing the kerf cutting mechanism mounted on a separate guiding frame which is adjustable relative to the truck, it is possible to insert vertical kerfs in the coal at various angles relative to the longitudinal dimension of the machine and under certain conditions kerfs may be cut in the coal at substantially right angles to the longitudinal dimension of the machine. These and other advantages and novel results attainable by the improved mining machine will be obvious to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration, and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a mining machine, a wheeled truck adapted to travel along a trackway, a guiding frame pivotally mounted on said truck for horizontal swinging movement relative thereto, kerf cutting mechanism mounted on said guiding frame and including a sliding support and a kerf cutter pivotally mounted thereon, a horizontal motor carried by said support and arranged transversely thereof, devices driven by said motor for moving said cutting mechanism relative to said guiding frame, and devices driven by said motor for swinging said kerf cutter about its pivot.

2. In a mining machine, a wheeled truck adapted to travel along a trackway, a guiding frame pivotally mounted on said truck for horizontal swinging movement relative thereto, kerf cutting mechanism mounted on said guiding frame and including a sliding support and a kerf cutter pivotally mounted thereon, a horizontal motor carried by said support and arranged transversely thereof, devices driven by said motor for moving said cutting mechanism relative to said guiding frame, devices driven by said motor for swinging said kerf cutter about its pivot, and devices driven by said motor for driving the truck wheels to propel the machine.

3. In a mining machine, a portable support, a guiding frame pivotally mounted thereon for horizontal swinging movement relative thereto,

said guiding frame extending horizontally a substantial distance in advance of said support, kerf cutting mechanism mounted on said guiding frame for movement therealong and including a pivoted kerf cutter, and adjustable supporting means for the forward end of said guiding frame including an element pivoted on said guiding frame and engageable with the mine floor, and an adjustable screw jack for holding said element in its adjusted supporting position.

4. In a mining machine, a portable support, a guiding frame pivotally mounted thereon for horizontal swinging movement relative thereto, said guiding frame extending horizontally a substantial distance in advance of said support, kerf cutting mechanism mounted on said guiding frame for movement therealong and including a pivoted kerf cutter, and adjustable supporting means for the forward end of said guiding frame including elements pivotally connected to said guiding frame at the sides thereof and engageable with the mine floor, and cooperating adjustable screw jacks arranged at the opposite sides of said guiding frame and engaging said elements for holding the latter in their adjusted supporting position.

5. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a shaft driven by said driving element, a vertical shaft driven by said shaft, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, and mechanism driven by said vertical shaft for swinging said kerf cutter about its pivot.

6. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a shaft driven by said driving element, a vertical shaft, connections between said shafts including reverse gearing, mechanism driven by said vertical shaft for swinging said kerf cutter about its pivot in opposite directions, and mechanism driven by said vertical shaft for feeding the machine in opposite directions at a cutting speed.

7. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, and constantly operative mechanism driven by said motor and operable at will for swinging said kerf cutter about its pivot in opposite directions at different speeds including reverse gearing, a vertical shaft driven thereby, and driving connections between said vertical shaft and said kerf cutter including plural speed gearing, said reverse gearing being at the upper end of said shaft and said plural speed driving connections at the lower end thereof.

8. In a mining machine, a frame, a kerf cutter mounted on said frame, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a shaft driven by said driving element, a vertical shaft, gearing connecting said shafts, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, and mechanism driven by said vertical shaft for propelling the machine at a high transport speed.

9. In a mining machine, a frame, a kerf cutter pivotally mounted on said frame, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a shaft driven by said driving element, a vertical shaft, gearing connecting said shafts, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, mechanism driven by said vertical shaft for propelling the machine at a high transport speed, and mechanism driven by said vertical shaft for swinging said kerf cutter about its pivot.

10. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, mechanism driven by said motor for swinging said kerf cutter about its pivot including a shaft alined with the kerf cutter pivot, a vertical shaft driven thereby, a vertical worm on said vertical shaft, a worm wheel meshing therewith and connections between said worm wheel and said kerf cutter for swinging the latter, and mechanism driven by said motor for feeding the machine at a cutting speed including a second vertical worm, a worm wheel meshing therewith, and a feed member driven by said worm wheel.

11. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, mechanism driven by said motor for swinging said kerf cutter about its pivot including a vertical worm, a worm wheel meshing therewith and connections between said worm wheel and said kerf cutter for swinging the latter, and mechanism driven by said motor for feeding the machine at a cutting speed including a second vertical worm, a worm wheel meshing therewith, and a feed member driven by said worm wheel and arranged coaxially therewith.

12. In a mining machine, a frame, a kerf cutter mounted on said frame, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a horizontal shaft driven by said kerf cutter driving element, a bevel gear fixed to said shaft, a vertical shaft, reverse bevels coaxial with said vertical shaft and meshing with said bevel gear, clutches for selectively connecting said reverse bevels in driving relation with said vertical shaft, and mechanism driven by said vertical shaft for feeding the machine at a cutting speed.

13. In a mining machine, a frame, a kerf cutter mounted on said frame, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a horizontal shaft driven by said kerf cutter driving element, a bevel gear fixed to said shaft, a vertical shaft, reverse bevels coaxial with said vertical shaft and meshing with said bevel gear, clutches for selectively connecting said reverse bevels in driving relation with said vertical shaft, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, and mechanism driven by said vertical shaft for propelling the machine at a high transport speed.

14. In a mining machine, a frame, a kerf cutter pivotally mounted on said frame, a motor on said frame, driving connections between said motor and said kerf cutter including a kerf cutter driving element, a horizontal shaft driven by said kerf cutter driving element, a bevel gear fixed to said shaft, a vertical shaft, reverse bevels coaxial with said vertical shaft and meshing with said bevel gear, clutches for selectively connecting said reverse bevels in driving relation with said vertical shaft, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, and mechanism driven by said vertical shaft for swinging said kerf cutter about its pivot.

15. In a mining machine, a frame, a kerf cutter mounted thereon, a motor on said frame, and driving connections between said motor and said kerf cutter including a horizontal transversely extending shaft, a kerf cutter driving element, and gearing connecting said shaft and driving element in driving relation, a parallel shaft driven by said gearing, a vertical shaft, gearing connecting said parallel shaft and said vertical shaft, and mechanism driven by said vertical shaft for feeding the machine at a cutting speed.

16. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, and driving connections between said motor and said kerf cutter including a horizontal transversely extending shaft, a kerf cutter driving element, and gearing connecting said shaft and driving element in driving relation, a parallel shaft driven by said gearing, a vertical shaft, gearing connecting said parallel shaft and said vertical shaft, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, and mechanism driven by said vertical shaft for swinging said kerf cutter about its pivot.

17. In a mining machine, a frame, a kerf cutter mounted thereon, a motor on said frame, and driving connections between said motor and said kerf cutter including a horizontal transversely extending shaft, a kerf cutter driving element, and gearing connecting said shaft and driving element in driving relation, a parallel shaft driven by said gearing, a vertical shaft, gearing connecting said parallel shaft and said vertical shaft, mechanism driven by said vertical shaft for feeding the machine at a cutting speed, and mechanism driven by said vertical shaft for propelling the machine at a high transport speed.

18. In a mining machine, a frame, a kerf cutter mounted thereon, a motor on said frame, driving connections between said motor and said kerf cutter including a horizontal transversely extending shaft, a kerf cutter driving element and gearing connecting said shaft and said driving element in driving relation, a parallel shaft driven by said gearing, a vertical shaft, connections between said parallel shaft and said vertical shaft including reverse gearing for effecting rotation of said vertical shaft in either of opposite directions, and mechanism driven from said vertical shaft for feeding the machine in opposite directions at a cutting speed.

19. In a mining machine, a frame, a kerf cutter pivotally mounted thereon, a motor on said frame, driving connections between said motor and said kerf cutter including a horizontal transversely extending shaft, a kerf cutter driving element and gearing connecting said shaft and said driving element in driving relation, a parallel shaft driven by said gearing, a vertical shaft, connections between said parallel shaft and said vertical shaft including reverse gearing for effecting rotation of said vertical shaft in either of opposite directions, mechanism driven from said vertical shaft for feeding the machine in opposite directions at a cutting speed, and mechanism driven by said vertical shaft for swinging said kerf cutter in opposite directions about its pivot.

20. In a mining machine, a frame, a kerf cutter mounted thereon, a motor on said frame, driving connections between said motor and said kerf cutter including a horizontal transversely extending shaft, a kerf cutter driving element and gearing connecting said shaft and said driving element in driving relation, a parallel shaft driven by said gearing, a vertical shaft, connections between said parallel shaft and said vertical shaft including reverse gearing for effecting rotation of said vertical shaft in either of opposite directions, mechanism driven from said vertical shaft for feeding the machine in opposite directions at a cutting speed, and mechanism driven by said vertical shaft for propelling the machine in opposite directions at a high transport speed.

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