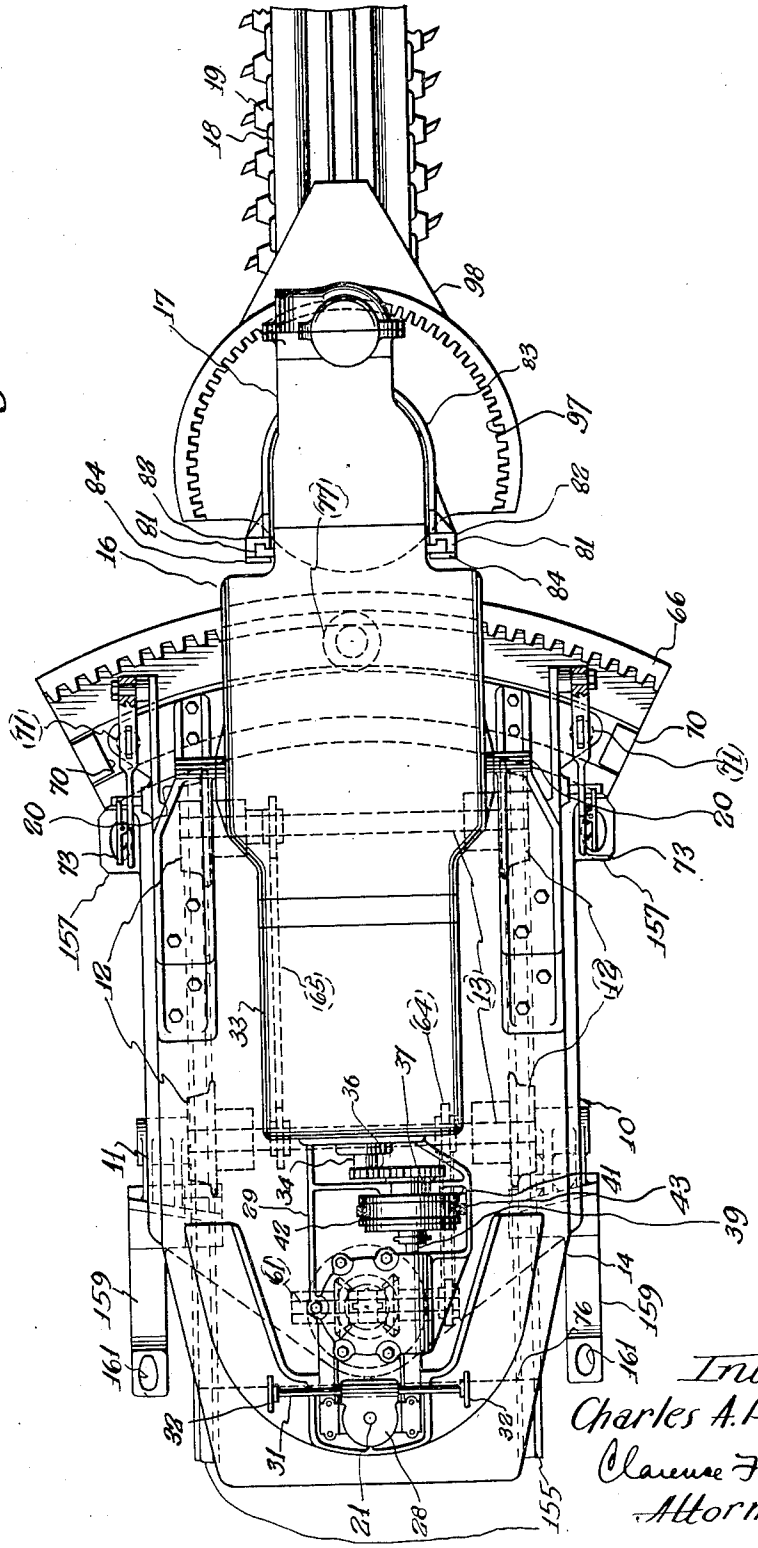
Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 1

Fig. 1



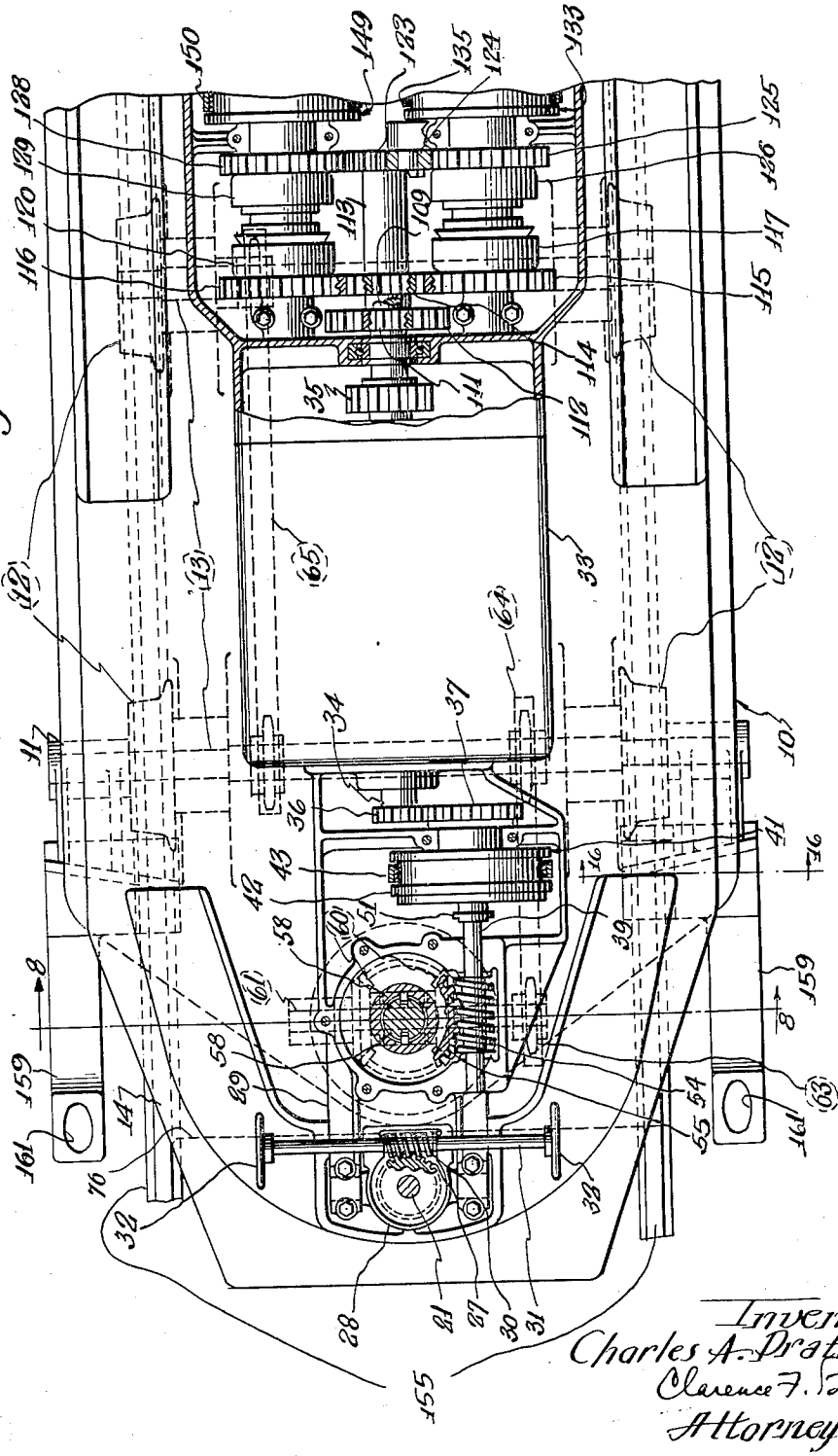
Inventor
Charles A. Pratt
Clarence F. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 2

Fig. 2



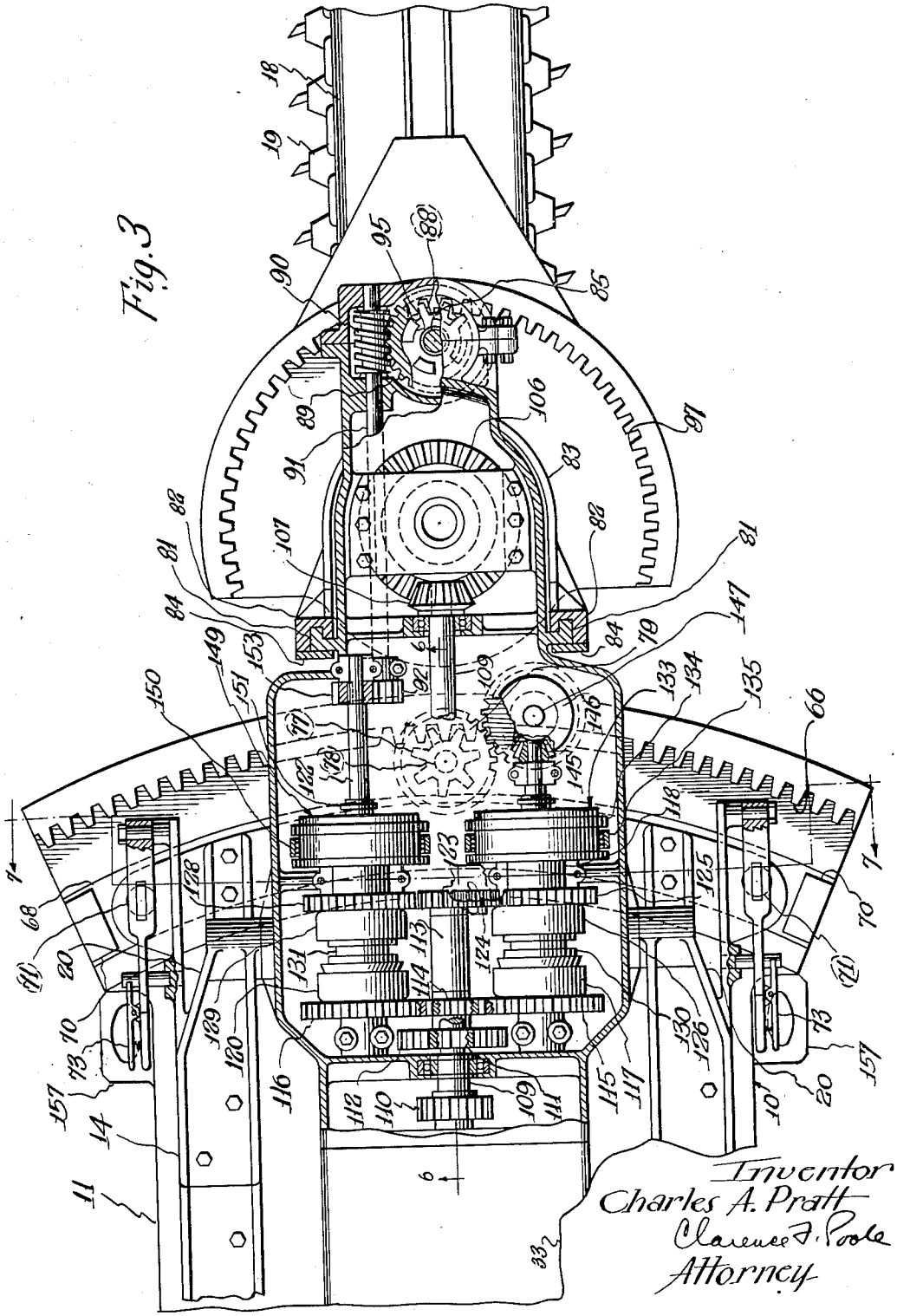
Inventor
Charles A. Pratt
Clarence F. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 3

Fig. 3



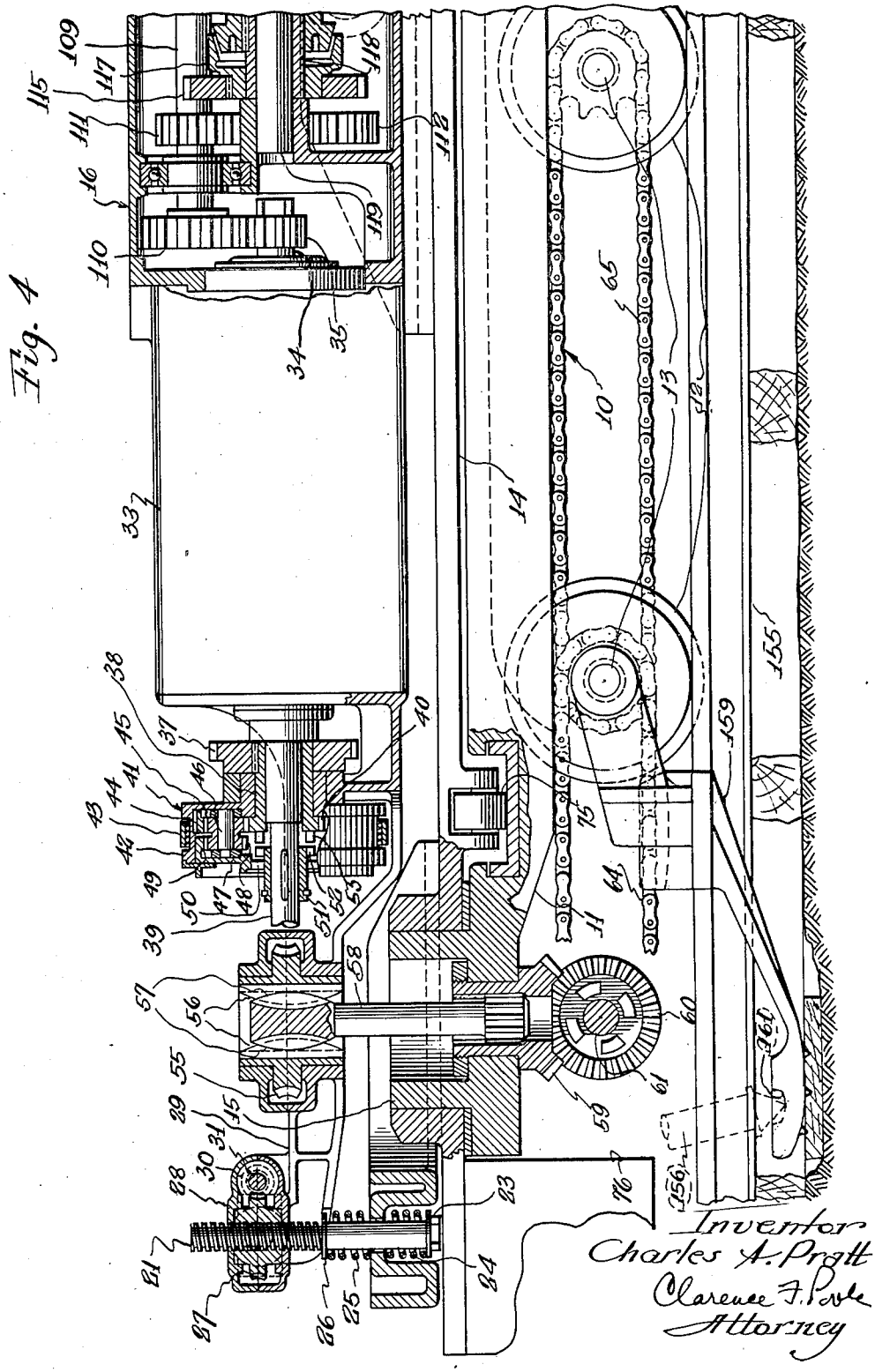
Inventor
Charles A. Pratt
Clarence J. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 4

Fig. 4

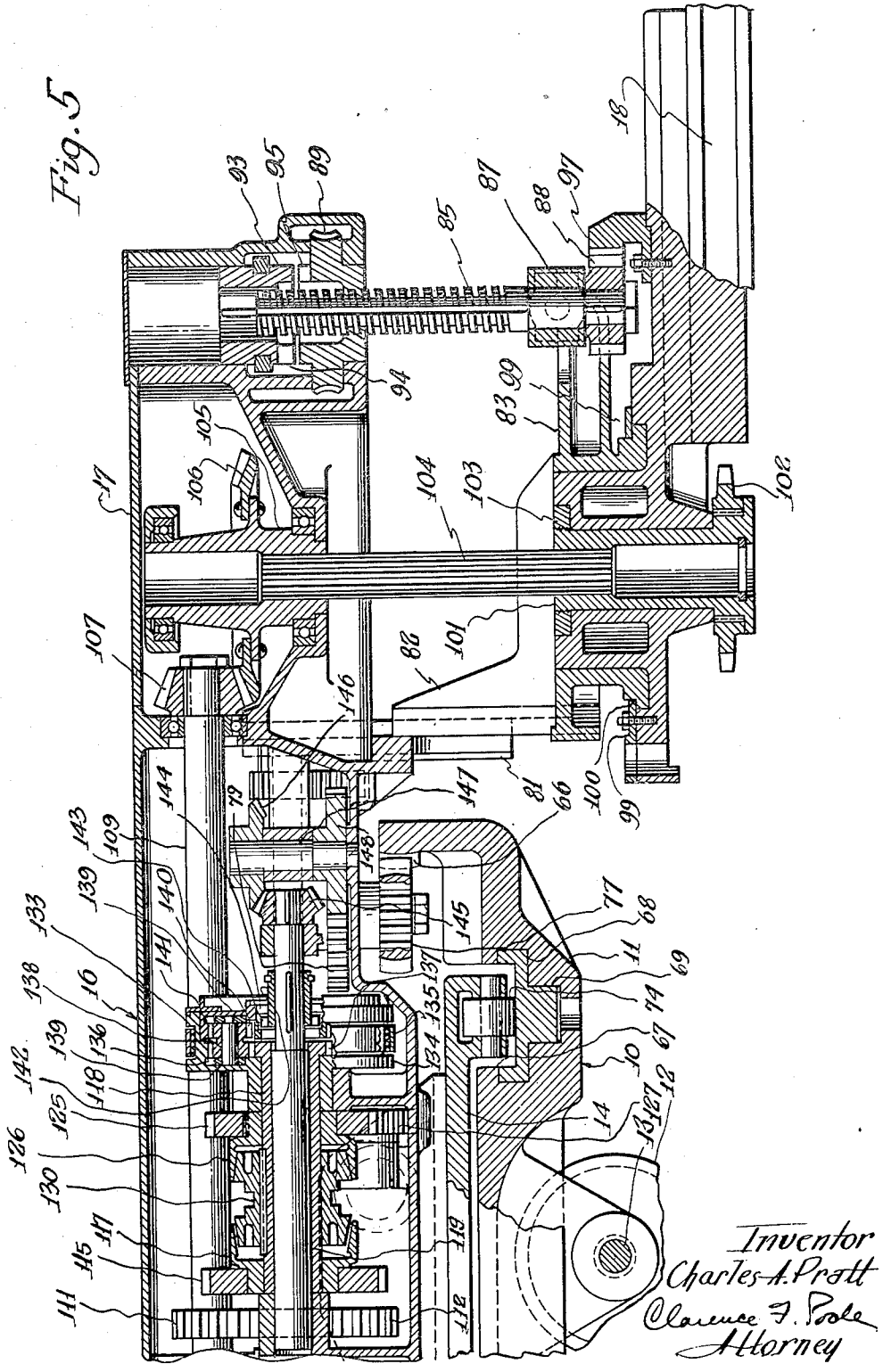


Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 5

Fig. 5



Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 6

Fig. 6

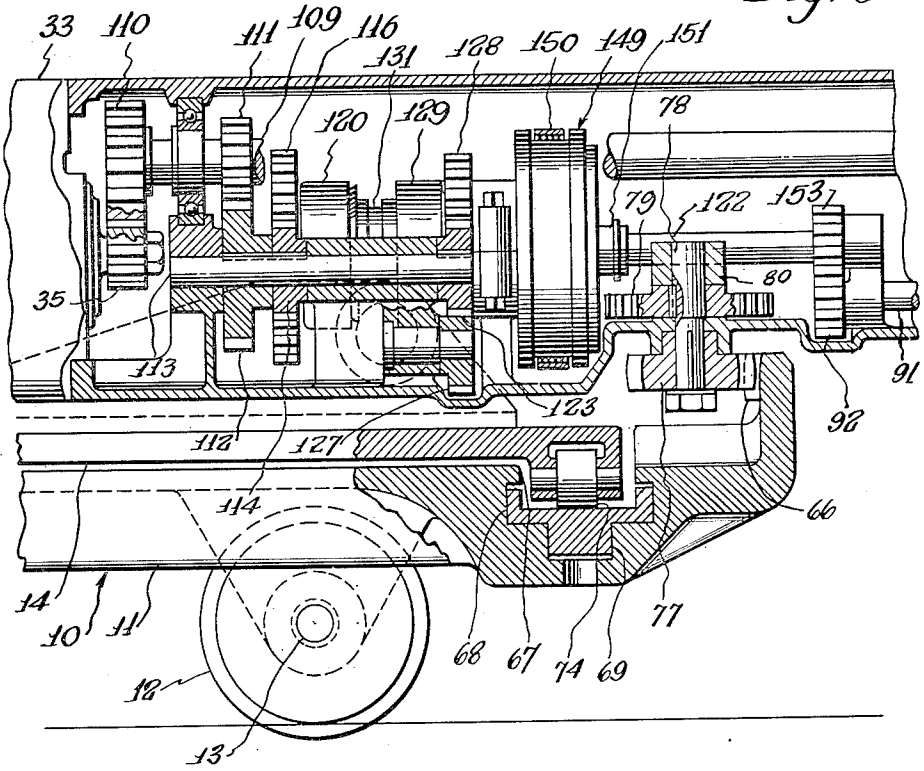
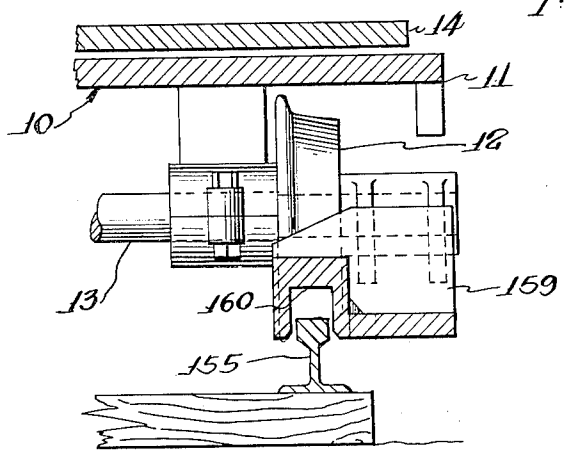


Fig. 16



Inventor
Charles A. Pratt
Clarence F. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 7

Fig. 7

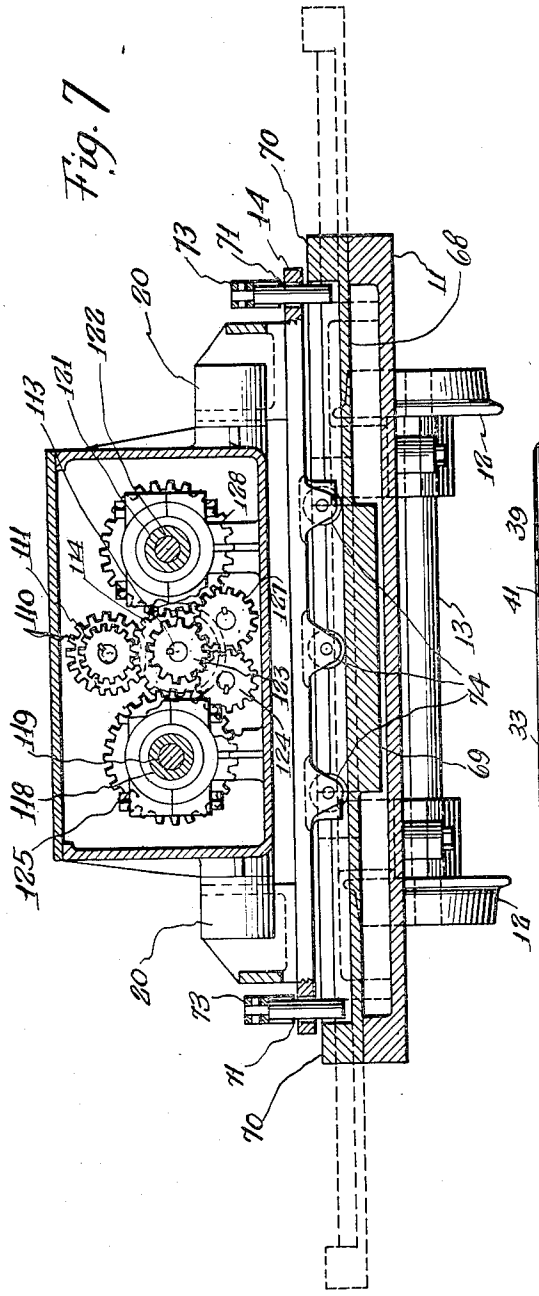
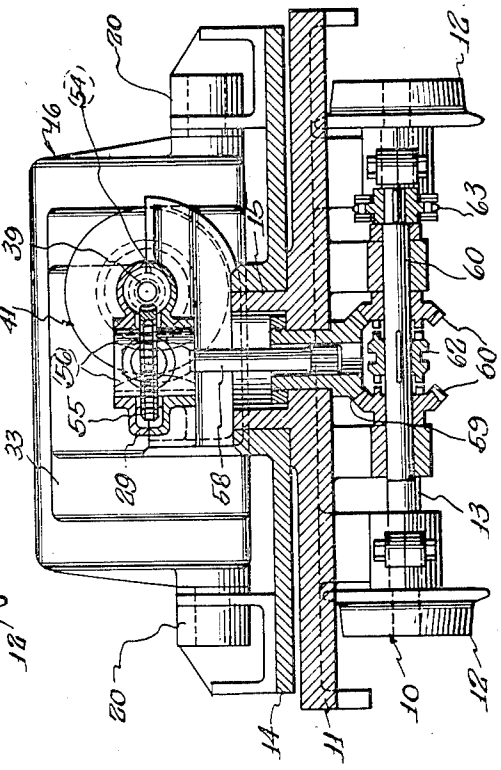


Fig. 8



Inventor
Charles A. Pratt
Clarence F. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 8

Fig. 11

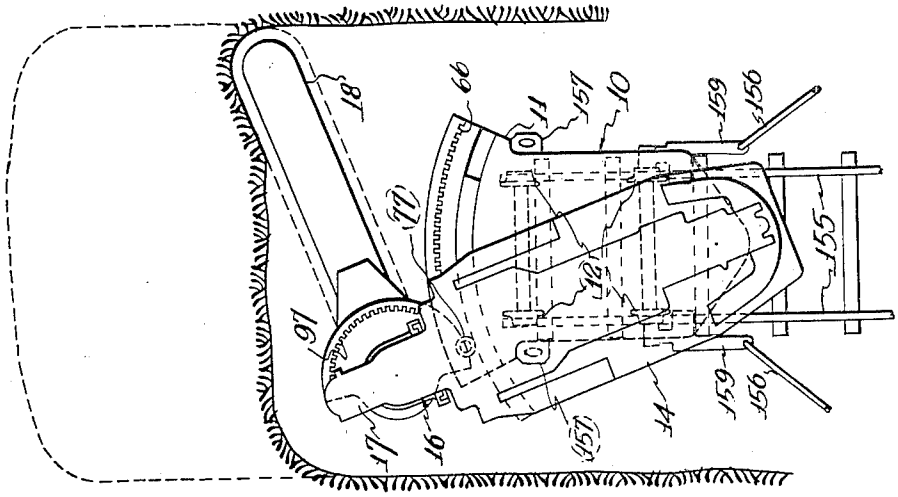


Fig. 10

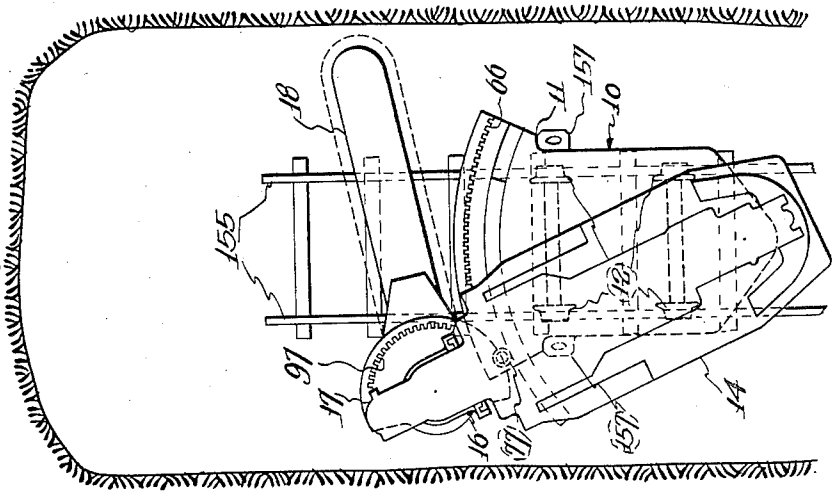
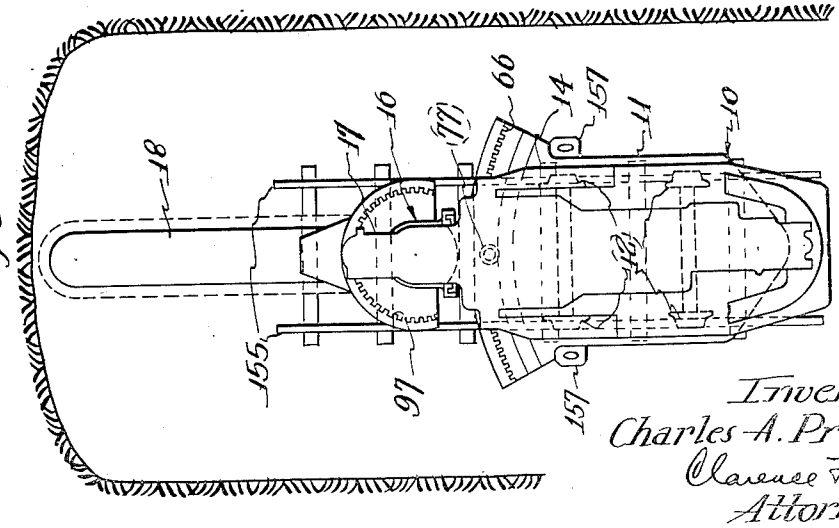


Fig. 9



Inventor
Charles A. Pratt
Clarence F. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 9

Fig. 14

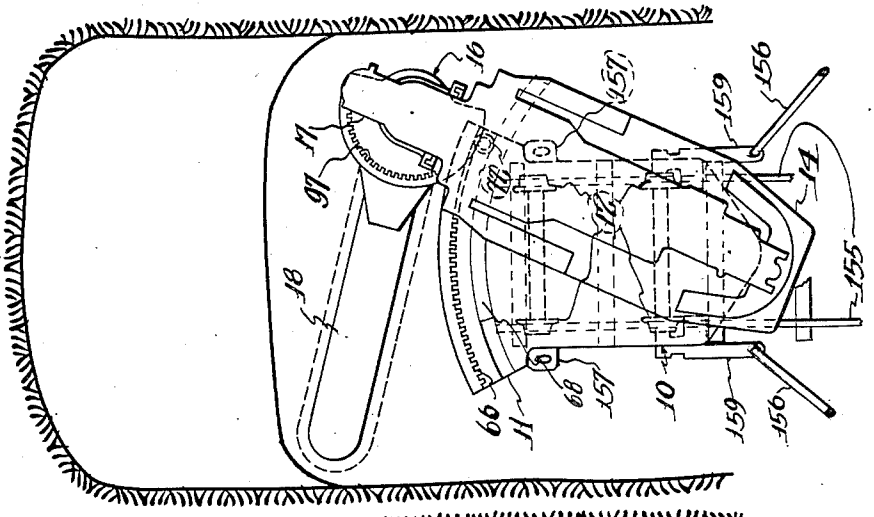


Fig. 13

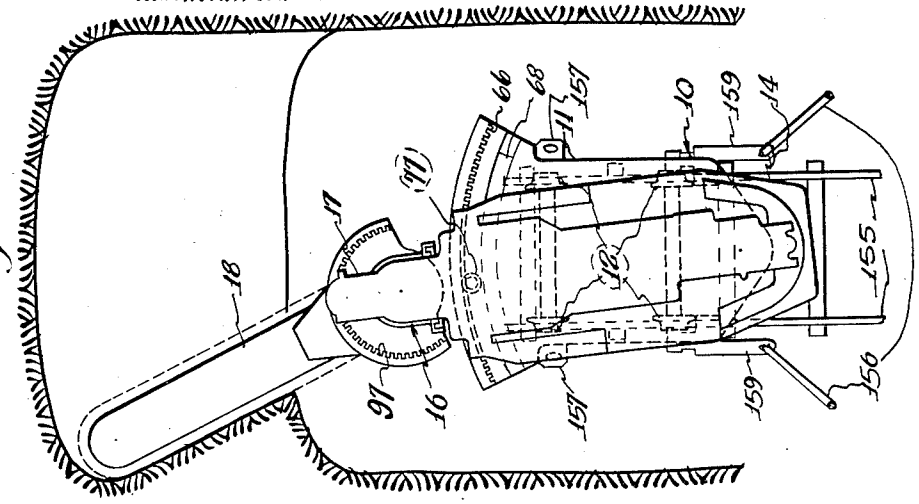
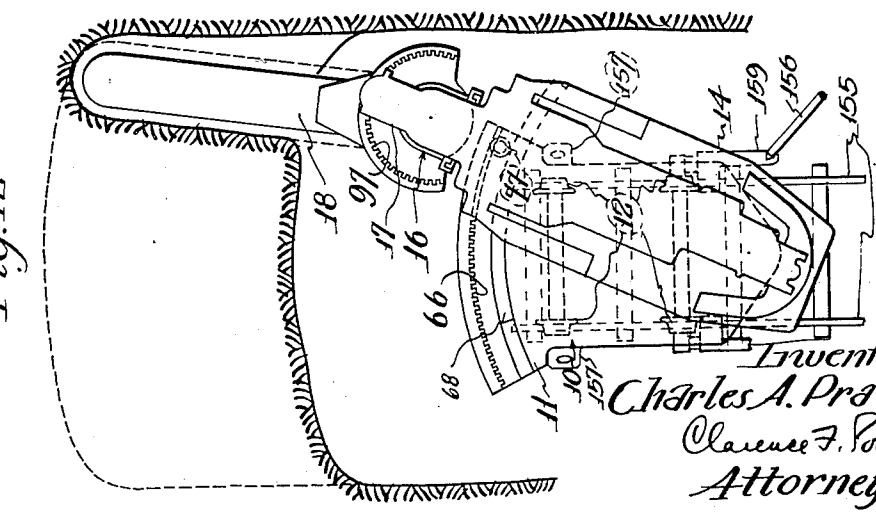


Fig. 12



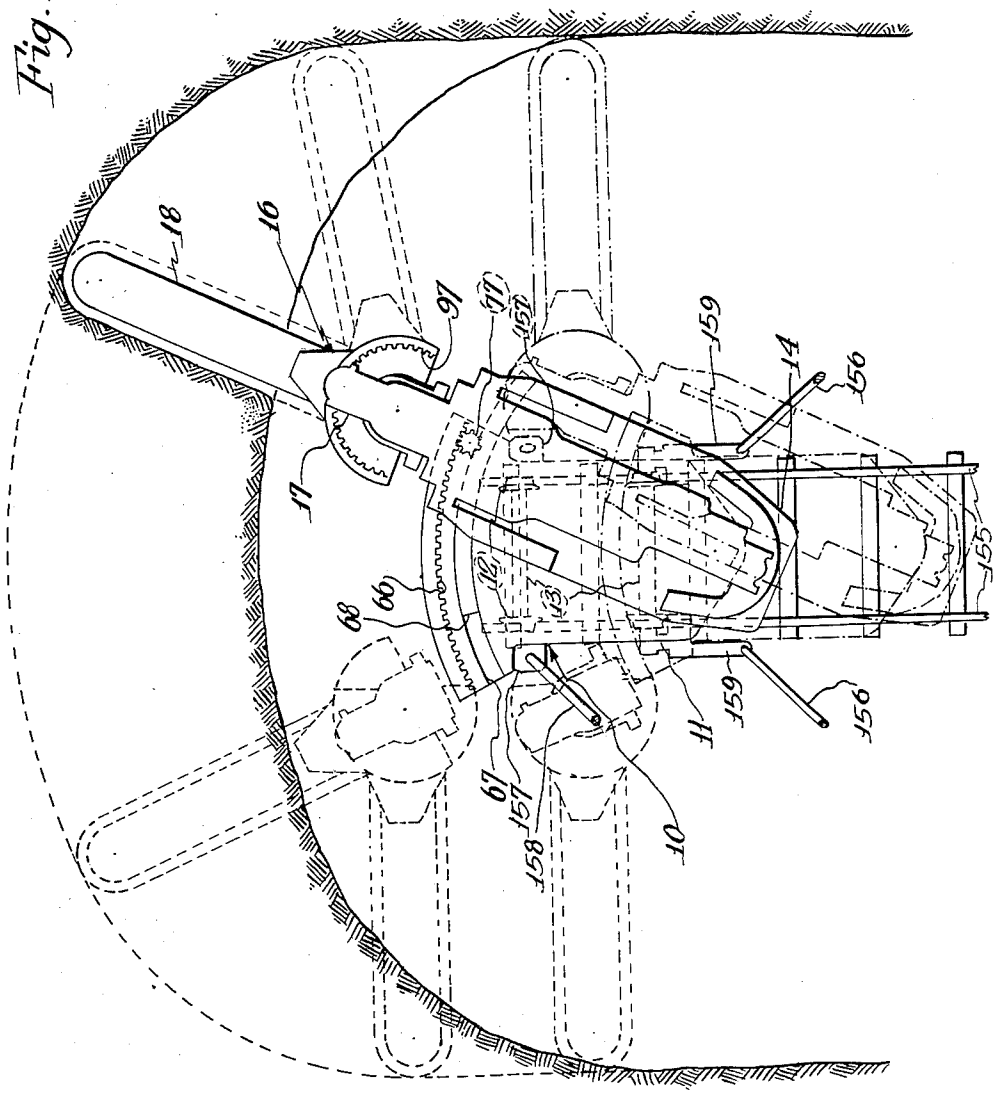
Inventor
Charles A. Pratt
Clarence F. Poole
Attorney

Oct. 30, 1934. C. A. PRATT 1,979,050

MINING MACHINE

Filed Nov. 23, 1931 10 Sheets-Sheet 10

Fig. 15



Inventor
Charles A. Pratt
Clarence F. Poole
Attorney.

Patented Oct. 30, 1934

1,979,050

UNITED STATES PATENT OFFICE

1,979,050

MINING MACHINE

Charles A. Pratt, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application November 23, 1931, Serial No. 576,635

48 Claims. (Cl. 262—28)

This invention relates to improvements in mining machines of the track mounted type adapted to cut a kerf along the mine bottom, or at various elevations with respect thereto, in front of and to each side of the track, and has among other objects to provide a new and improved self-contained mining machine of the class described wherein the feeding and cutting operations may be effected by the action of the cutting element itself independent of movement of the mining machine along the mine track, which machine is particularly adapted for operation in confined spaces and is constructed with a view towards overall efficiency, dependability, ease of operation, compactness and general ruggedness.

The machine of my present invention is similar in some respects to that disclosed in a prior application bearing Serial Number 559,869, filed by me August 28, 1931, especially insofar as it forms a support means for a cutter bar whereby the cutter bar may be moved across the front of a truck and simultaneously pivotally moved about a vertical axis with respect to said truck for feeding the cutter bar into the coal while the truck remains stationary, said pivotal movement of said cutter bar being independent of movement across the front of said truck. My present invention, however, includes a new and novel means for supporting the cutter bar for movement across the front of the truck and is of a more compact construction and may operate in measures of coal of less vertical dimensions than the machine of my prior invention.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a device embodying my invention;

Figure 2 is an enlarged plan view of the rearward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details thereof;

Figure 3 is an enlarged plan view of the forward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details thereof;

Figure 4 is an enlarged side elevation of the rearward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details thereof;

Figure 5 is an enlarged side elevation of the forward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details thereof;

Figure 6 is a partial fragmentary sectional view taken substantially on line 6—6 of Figure 3;

Figure 7 is a sectional view taken on line 7—7 of Figure 3;

Figure 8 is a sectional view taken on line 8—8 of Figure 2;

Figures 9, 10, 11, 12, 13, 14 and 15 are diagrammatic views showing the use and operation of the device embodying my invention; and

Figure 16 is a sectional view taken on line 16—16 of Figure 2.

Referring now in particular to the embodiment of my invention illustrated in the accompanying drawings, a truck 10 is provided which comprises a truck frame 11 mounted on track wheels 12 and axles 13. A pivotally movable frame 14 is supported on said truck frame for pivotal movement with respect thereto about a boss 15 disposed adjacent the rearward end of said truck frame on the longitudinal center line thereof and extending upwardly therefrom.

The pivotally movable frame 14 serves as a supporting means for cutting mechanism generally indicated by reference character 16, which cutting mechanism has a projecting cutting element extending forwardly of the truck 10. The cutting mechanism 16 includes a cutter frame 17 extending forwardly of the pivotally movable frame 14 and truck frame 11. A cutter bar 18 having a cutter chain 19 circulating thereabout is supported beneath the cutter frame 17 for pivotal movement with respect thereto about a vertical axis coaxial with the axis of the drive means for the cutter chain 19 which will hereinafter be more fully described. The cutter bar 18 is also supported by the cutter frame 17 for movement towards and away from said cutter frame in a plurality of parallel planes for adjusting the elevation of said cutter bar with respect to the mine bottom and enabling said cutter bar to cut above the mine bottom as well as adjacent the mine bottom.

The cutting mechanism 16 is supported on the pivotally movable frame 14 for movement about a horizontal transverse axis on trunnion supports 20 in a usual manner. Said trunnion supports are disposed adjacent the forward end of said pivotally movable frame 14 and form a means for adjusting the angle of the cutter bar 18 with respect to the mine bottom to compensate for an uneven bottom or coal seam.

Means are provided adjacent the rearward end of the pivotally movable frame 14 for moving the cutting mechanism 16 about its axis of pivotal connection to the trunnion supports 20 and yield-

ably supporting the rearward end thereof, which means herein comprise a threaded shaft 21 supported in and extending upwardly through a recessed underportion of said pivotally movable frame disposed adjacent the rearward end of said pivotally movable frame on the longitudinal central axis thereof. Said threaded shaft 21 has a nut and washer indicated at 23 secured to its lower end and has a compression spring 24 interposed between said nut and washer and the underside of the recessed portion of said pivotally movable frame. Another compression spring 25 abuts the upper portion of said pivotally movable frame and the underportion of a flange 26 secured to said threaded shaft adjacent the lower extremities of the threaded portion of said threaded shaft.

A worm gear 27 is threaded on the threaded shaft 21 and is completely enclosed by a housing 28 trunnioned in a frame member 29 extending rearwardly from and secured to the cutting mechanism 16. A worm 30 meshes with the worm gear 27 and is supported on and rotated by a transversely disposed shaft 31 journaled in the housing 28.

The transversely disposed shaft 31 may be rotated by any suitable means, which means is herein preferably shown as comprising hand wheels 32, each hand wheel 32 being secured to an end of said transversely disposed shaft. Thus rotation of either hand wheel 32 drives the worm 30 and rotates the worm gear 27 for moving the entire cutting mechanism 16 about its axis of pivotal connection to the trunnion supports 20 and thus forms a means for yieldably supporting said cutting mechanism for permitting the cutter bar 18 to conform to irregularities in the mine bottom or coal seam.

Suitable actuating means are provided on the cutting mechanism 16 for driving the cutter chain 19 about the cutter bar 18 and for performing the feeding operation of said cutter bar and for driving the truck about the mine on the track wheels 12, which means is herein preferably shown as being an electric motor 33. The casing for the motor 33 serves as a portion of the framework of the cutting mechanism 16 and is secured to the cutter frame 17 adjacent the rearward end thereof and its rearward portion serves as a support for the frame member 29. Said electric motor is provided with a longitudinally extending armature shaft 34 having an armature pinion 35 at the forward end thereof for driving the feeding and cutting mechanism. Said motor also has an armature pinion 36 at the rearward end thereof for driving the track wheels 12.

Referring now in particular to the drive for the track wheels 12 and means for driving the truck 10 about the mine for moving the mining machine from working place to working place, the armature pinion 36 meshes with and drives a spur gear 37 keyed on a sleeve 38 freely mounted on a longitudinally extending shaft 39.

The sleeve 38 has a sun gear 40 cut integral therewith which forms a drive means for a planetary gear reduction device indicated at 41. Said planetary gear reduction device is of an ordinary construction well known to those familiar with the art and comprises a frictionally controlled casing 42 freely mounted on the sleeve 38 rearwardly of the gear 40 and journaled on its hub in the frame member 29 for rotatable movement with respect thereto. Said casing is controlled by a suitable friction band 43 in a usual manner and has an internal gear 44 keyed thereto.

The internal gear 44 meshes with and is driven by planetary pinions 45 freely mounted on shafts 46 fixed at their ends in a cage 47. Planetary pinions 48 are cut integral with the planetary pinions 45 adjacent one side thereof and mesh with and drive an internal gear 49 freely mounted for rotation within the casing 42 and provided with clutch jaws 50.

A clutch member 51 is feathered on the longitudinally extending shaft 39 and is provided with clutch jaws 52 adapted to mesh with the clutch jaws 50 for driving said longitudinally extending shaft at a frictionally controlled low speed, or clutch jaws 53 integral with the sleeve 38 for driving said shaft at the speed of rotation of the sleeve 38.

The longitudinally extending shaft 39 has a worm 54 cut integral therewith which meshes with and drives a worm gear 55 journaled in and housed by the frame member 29. Said worm and worm gear are of the self-locking type for holding the truck 10 in a stationary position when it is not being driven by the motor 33 and said worm gear is provided with a bored hub having splines 56 therein. The said splines are curved towards the top and bottom sides of the hub of said worm gear and are adapted to mesh with splines 57 on the upper end of a vertically extending shaft 58. The splines on the upper end of the vertically extending shaft 58 are of an arcuate contour to conform to the contour of the splines 56 within the bore of the hub of the worm gear 55 to permit axial movement of said shaft with respect to said worm gear.

The lower end of the shaft 58 is splined and meshes with a splined bore of a bevel gear 59 journaled in a bore in the truck frame 11 coaxial with the axis of pivotal connection of the pivotally movable frame 14 with said truck frame. Said bevel gear meshes with opposing bevel gears 60 freely mounted on a transversely extending shaft 61. The bevel gears 60 are adapted to be selectively connected to the transversely extending shaft 61 so that either of said bevel gears may drive said shaft by means of suitable jaw clutch mechanism in a usual manner and indicated at 62.

A sprocket 63 is keyed to the outer right hand end of the transversely extending shaft 61 and has driving connections with the rearward truck axles 13 and track wheels 12 by means of a suitable chain and sprocket drive indicated at 64. The front and rear truck axles and track wheels are connected together by a suitable chain and sprocket drive indicated at 65.

It may thus be seen that the truck 10 may be moved about the mine at either a high speed or a low frictionally controlled speed in reverse directions without reversal of the motor 33 which provides a means for swiftly moving the mining machine about the mine and positioning said machine for cutting and provides ample power for propelling the mining machine at slow speeds for feeding or traveling where the track is rough or the grades are steep.

Referring now to several of the novel features of my invention, an arcuate rack 66 having its teeth facing toward the rearward end of the mining machine and having a radius, whose center is coaxial with the axis of pivotal connection of the pivotally movable frame 14 to the truck frame 11, is provided adjacent the forward end of said truck frame. Said arcuate rack extends across the forward end of said truck frame beyond the sides thereof and upwardly therefrom

so its upper side is disposed adjacent the axis of pivotal connection of the cutting mechanism to the trunnion supports 20. An arcuate shaped guideway 67 is formed in the truck frame 11 and is spaced rearwardly from said arcuate rack. Said arcuate shaped guideway is formed on a radius whose center is coaxial with the axis of pivotal connection of the pivotally movable frame 14 to the truck frame 11 and has a lower portion formed substantially in the shape of a T and a more restricted upper portion. This forms a guideway for an arcuate shaped support member 68 having a channeled upper portion and a depending central portion 69 adapted to register with the stem of the T, as may clearly be seen in Figures 5, 6 and 7, so said support may be moved along the guideway 67 in one direction or another upon movement of the pivotally movable frame 14.

A stop 70 is provided on each outer end of the arcuate shaped support member 68. Said stops are adapted to be engaged by pins 71 disposed adjacent each outer forward side of the pivotally movable frame 14 for moving the arcuate shaped support member 68 upon movement of said pivotally movable support member. Said pins are engaged with or disengaged from said stops by means of suitable hand levers 73 pivotally supported on said pivotally movable frame in a usual manner so arranged that said pins may be locked in a disengaged position from said stops when desired.

The forward end of the pivotally movable frame 14 is provided with a plurality of rollers 74 disposed on axes coaxial with radial lines extending from the axis of pivotal connection of said pivotally movable frame to the truck frame 11. Said rollers are adapted to ride in the channeled upper side of the arcuate shaped support member 68 for movement therealong. Likewise, similar rollers 75 support the rearward portion of said pivotally movable frame forwardly of the boss 15, and are adapted to ride in a suitable channeled guideway as may clearly be seen in Figure 4.

It may thus be seen that when the pivotally movable frame 14 is being moved across the front end of the truck 10 about its axis of pivotal connection to the truck frame 11 that the rollers 74 and 75 may ride in their respective guideways and that one or the other pin 71 may engage the respective upstanding portion 70 to move the arcuate shaped support member 68 along the guideway 67. Thus a support is provided for the forward portion of the pivotally movable frame 14 and cutting mechanism 16 when overhanging one side or the other of the truck frame 11.

Means are provided on the rearward end of the pivotally movable frame 14 to counteract the weight of the cutter frame 17 and cutter bar 18 when said cutter frame and cutter bar are on one side or the other of the center line of said truck. Said means herein comprises a counterweight 76 depending from the pivotally movable frame 14 rearwardly of the truck frame. Said counterweight is so arranged that it moves towards one side of said truck frame as the cutter frame 17 moves towards the opposite side of said truck frame in an obvious manner.

A spur pinion 77 keyed on a vertical shaft 78 adjacent its lower end and having its hub journaled within a boss extending downwardly from the frame portion of the cutting mechanism 16 meshes with the arcuate rack 66. The faces of the teeth of said spur pinion and arcuate rack are curved towards their outer edges and are relatively deep to permit clearance between the faces and root of each tooth so said teeth may mesh without binding in all positions of adjustment of the cutting mechanism with respect to the truck frame about the axis of the trunnion supports 20.

The vertical shaft 78 extends upwardly from the spur pinion 77 through a portion of the cutter frame 17 of the cutting mechanism and has a spur gear 79 keyed thereto adjacent the opposite or inner side of the cutter frame 17. A suitable bearing 80 is provided for the upper end of said vertical shaft. Suitable gear reduction means are provided for driving said spur gear and spur pinion from the motor 33 at a plurality of frictionally controlled speeds in reverse directions without reversal of said motor, which will hereinafter be more fully described. It may thus be seen that upon rotation of said spur pinion in one direction or another that the cutting mechanism 16 and pivotally movable frame 14 will be moved transversely across said truck frame about its axis of pivotal connection to said truck frame and that means have been provided for supporting said pivotally movable frame beyond the lateral extremities of said truck frame and for counterbalancing the weight of said cutter frame 17 and cutter bar 18 when so supported.

Referring now in particular to the means for supporting the cutter bar 18 below the cutter frame 17 for movement towards and away from said cutter frame, a pair of spaced guides 81 depend from opposite sides of the cutter frame 17 forwardly of the truck frame 11. Said spaced guides have a gibbed portion extending forwardly therefrom and are adapted to be engaged by corresponding spaced guides 82 extending upwardly from a support member 83. Retaining strips 84 abut the rearward side of the spaced guides 82 and 81 and are secured to the spaced guides 82 for holding said guides in engagement with the spaced guides 81 and permitting the support member 83 to be moved towards and away from the cutter frame 17. Suitable means may be provided for holding the retaining strips 84 to the rearward side of the spaced guides 82, which means may be of any form well known to those skilled in the art such as nuts and bolts (not shown).

The forward portion of the support member 83 is supported by an upwardly extending threaded shaft 85. Said threaded shaft is journaled in a member 87 trunnioned to the forward end of the support member 83 adjacent the longitudinal center line thereof and has a shoulder abutting the top portion of said member and a spur pinion 88 keyed to its lower end and abutting the lower portion of said member. Suitable means are provided on the lower end of the threaded shaft 85 to hold the spur pinion 88 from movement with respect to said threaded shaft as said threaded shaft is vertically moved with respect to the truck frame 11 to permit the support member 83 to be moved towards or away from the cutter frame 17 by means of said threaded shaft, which means is herein shown as being a nut threaded on the end of said shaft and abutting the lower side of said spur pinion.

Means are provided for vertically moving the threaded shaft 85 and thus moving the support member 83 towards or away from the cutter frame 17, which means comprise a worm gear 89 journaled on its hub within the cutter frame 17 adjacent the forward end thereof on the longitudinal center line of said cutter frame. The said worm gear has a threaded bore and has the threaded shaft 85 threaded therein and is

driven by a worm 90 on a longitudinally extending shaft 91. Said worm and worm gear are of the self-locking type to prevent rotation of said worm gear except when driven by said worm and longitudinally extending shaft 91.

The longitudinally extending shaft 91 is journaled on each side of the worm 90 in the cutter frame 17 and extends rearwardly therefrom and has a spur pinion 92 keyed on its rearward end. A suitable bearing support is provided in the cutter frame 17 for the rearward portion of said longitudinally extending shaft forwardly of the spur pinion 92. Said spur pinion is adapted to be driven from the motor 33 at either a high or low frictionally controlled speed in reverse directions without reversal of said motor so that the worm gear 89 may be rotated in reverse directions without reversal of said motor for translationally moving the threaded shaft 85 therethrough.

A clutch collar 93 is journaled on its outer periphery within a forward portion of the cutter frame 17 for rotatable and vertical movement with respect thereto and is feathered on the threaded shaft 85. Clutch jaws 94 depend from said clutch collar and are adapted to engage clutch jaws 95 extending upwardly from the upper side of the worm gear 89 for rotating said threaded shaft upon rotation of said worm gear and thus driving the spur pinion 88. Said clutch collar is vertically moved along said threaded shaft by means of a suitable system of levers in an ordinary manner, which will not herein be described since it is no portion of my invention. When the clutch jaws 94 are engaged with the clutch jaws 95, the threaded shaft 85 and spur pinion 88 are driven by the worm gear 89 and when said clutch jaws are in a disengaged position said threaded shaft is translationally moved through said worm gear.

The spur pinion 88 is adapted to mesh with an inwardly facing arcuate rack 97 laid out on a radius having a center coaxial with the pivotal axis of the cutter bar. Said inwardly facing rack is secured to the top portion of a cutter bar supporting member 98. Said cutter bar supporting member is in turn supported within the support member 83 for pivotal movement with respect thereto. The teeth of the rack 97 are relatively deep and clearance is provided between the faces of said teeth and the roots of the teeth of the spur pinion 88 to allow said pinion to be axially moved with respect to said rack and permit a limited amount of axial movement of the threaded shaft 85 with respect to the cutter bar supporting member 98 during the cutting operation.

The cutter bar supporting member 98 serves to support the cutter bar 18 in a usual manner and is journaled within a bored section of the support member 83 for rotation with respect thereto about a vertical axis coaxial with the axis of the means for driving the cutter chain 19, which means will hereinafter be described.

A portion of the cutter bar supporting member 98 extends beyond the bored section of the support member 83 and a retaining strip 99 is secured thereto which abuts a shoulder 100 on the outer periphery of the lower portion of the support member 83 so said cutter bar supporting member may be held from vertical movement with respect to said support member and may be pivotally moved with respect to said support member by means of the arcuate rack 97, spur pinion 88 and threaded shaft 85.

It may thus be seen that the cutter bar 18 may be pivotally moved about a vertical axis by power and that said cutter bar may be locked in any desired angular position with respect to the cutter frame 17 when the clutch jaws 94 engage the clutch jaws 95 by means of the self-locking worm 90 and worm gear 89. While I herein preferably use the worm 90 and worm gear 89 to hold the cutter bar 18 in any desired fixed angular position with respect to the cutter frame 17, it may be understood that various other means may be used such as the usual pin and aperture lock commonly used on mining machines of the track mounted bottom cutting type.

Referring now in particular to the means for driving the cutter chain 19 about the cutter bar 18 from the motor 33, a sleeve 101 is journaled within the cutter bar supporting member 98 coaxial with the axis of rotation of said cutter bar supporting member and has a cutter chain sprocket 102 keyed thereon adjacent its lower end, which cutter chain sprocket meshes with and drives said cutter chain. Said sleeve is held from vertical movement with respect to said cutter bar supporting member by means of a threaded collar 103.

The upper portion of the inner surface of the sleeve 101 is splined and is adapted to be slidably engaged by a splined shaft 104. The axis of said splined shaft is coaxial with the axis of pivotal movement of the cutter bar 18 with respect to the cutter frame 17 and its upper end is adapted to be slidably engaged with the splined bore of a hub 105 of a bevel gear 106. Suitable means are provided on the top portion of the splined shaft 104 and within the sleeve 101 to limit vertical downward movement of said shaft with respect to said sleeve, and to move said shaft upwardly with said sleeve when the cutter bar 18 is moved towards the cutter frame 17 so the cutter chain 19 may be driven by the motor 33 in all positions of adjustment of said cutter chain with respect to said motor.

The bevel gear 106 is journaled in the cutter frame 17 in a suitable manner. A bevel pinion 107 is keyed on the forward end of a longitudinally extending shaft 109 and meshes with said bevel gear for driving said bevel gear. Said longitudinally extending shaft in turn is driven from the armature pinion 35 by means of a spur gear 110.

Referring now in particular to the plural speed frictionally controlled reverse drive for moving the pivotally movable frame 14 transversely of the truck frame 11 about its axis of pivotal connection to the boss 15 and simultaneously or independently moving the cutter bar 18 about a vertical axis coaxial with the axis of the splined shaft 104, a spur pinion 111 is keyed to the longitudinally extending shaft 109 forwardly of the spur gear 110 and meshes with and drives a spur gear 112 on a longitudinally extending centrally disposed shaft 113. A spur gear 114 is keyed on the shaft 113 forwardly of the spur gear 112 and meshes with and drives spur gears 115 and 116 on opposite sides thereof. The spur gear 115 is keyed on a suitable clutch member 117 freely mounted on a sleeve 118 adjacent the rearward end thereof. The sleeve 118 in turn is freely mounted on a longitudinally extending shaft 119 journaled adjacent its forward and rearward ends in bearing supports integral with the frame for the cutting mechanism 16.

Likewise, the spur gear 116 is keyed on a clutch member 120 which in turn is freely mounted on

a longitudinally extending sleeve 121 which is in turn freely mounted on a longitudinally extending shaft 122 parallel with the shaft 113 but on the opposite side of said shaft from the longitudinally extending shaft 119.

A spur gear 123 is keyed on the forward end of the longitudinally extending centrally disposed shaft 113 and meshes with an idler gear 124. Said idler gear meshes with and drives a spur gear 125 keyed on a clutch member 126 freely mounted on the longitudinally extending sleeve 118 adjacent its forward end. The spur gear 123 also meshes with and drives an idler gear 127 beneath said spur gear, which idler gear meshes with and drives a spur gear 128 keyed on a clutch member 129 freely mounted on the longitudinally extending sleeve 121 adjacent its forward end.

The clutch members 117 and 126 face each other and are adapted to be engaged by suitable opposite facing clutch members on a clutch collar 130 feathered to the sleeve 118 so said sleeve may be driven in one direction by the spur gear 116 or in an opposite direction by the spur gear 128 in an obvious manner. The clutch members 117 and 129 are herein shown as being friction clutch members of the cone type, well known to those skilled in the art, not herein shown or described in detail.

Likewise, the clutch members 120 and 129 face each other and are of an ordinary friction cone type and are adapted to be engaged by corresponding oppositely facing friction clutch members on a clutch collar 131 feathered on the longitudinally extending sleeve 121 for driving said sleeve in reverse directions without reversal of the motor 33 in an obvious manner.

Suitable means are provided for driving the longitudinally extending shaft 119 from the sleeve 118 at a plurality of frictionally controlled speeds in reverse directions without reversal of the motor 33, which means herein comprises a planetary gear reduction device generally indicated at 133. Said planetary gear reduction device is of an ordinary construction having a frictionally controlled high and low speed reduction and includes a casing 134 freely mounted on the sleeve 118 adjacent the forward end thereof and journaled on its hub in a suitable bearing support extending upwardly from the lower inner side of the frame for the cutting mechanism 16. Said casing is adapted to be engaged by a suitable friction band 135 on the outer periphery thereof and has an internal gear 136 cut integral therewith. A sun gear 137 is cut integral with the forward end of the sleeve 118 and meshes with and drives planetary pinions 138 meshing with the internal gear 136 and freely mounted on suitable shafts journaled in their ends in a cage 139. Planetary pinions 140 are cut integral with the planetary pinions 138 adjacent one side thereof. The planetary pinions 140 mesh with an internal gear 141 freely mounted within the casing 134 for rotatable movement with respect thereto.

A clutch member 142 having clutch jaws 143 thereon is feathered on the longitudinally extending shaft 119 adjacent the forward end thereof. Clutch jaws 144 extend inwardly from the web of the internal gear 141 and are adapted to be engaged by the clutch jaws 143 for driving the shaft 119 through said internal gear at a low speed, frictionally controlled by the friction band 135 in a usual manner.

Likewise, suitable clutch jaws (not shown in detail) are provided on the cage 139. The clutch jaws on said cage are adapted to be engaged by the clutch jaws 143 on the clutch member 142 for driving the longitudinally extending shaft 119 at a higher speed controlled by the friction band 135 in a usual manner.

A bevel pinion 145 is keyed on the forward end of the longitudinally extending shaft 119 and meshes with and drives a bevel gear 146 keyed on the upper end of a vertical shaft 147. Said vertical shaft is journaled intermediate its ends in a suitable bearing support integral with the inner side of the frame for the cutting mechanism 16 and is journaled at its lower end in a portion of the frame for said cutting mechanism. A spur gear 148 abuts the top portion of the inner side of the frame for said cutting mechanism and is keyed on and driven by the vertical shaft 147. Said spur gear meshes with and drives the spur gear 79 on the vertical shaft 78 for driving said vertical shaft and the spur pinion 77 and in turn pivotally moving the pivotally movable frame 14 about its axis of pivotal connection to the truck frame 11.

It may thus be seen that the pivotally movable frame 14 may be pivotally moved with respect to the truck frame 11 about a vertical axis adjacent the rearward end thereof at a plurality of frictionally controlled speeds in reverse directions without reversal of the motor 33. This affords a means for moving the cutter bar 18 across the end of the truck 10 at either a high or low frictionally controlled speed for positioning said cutter bar for cutting a kerf in the coal face or for feeding said cutter bar into or across the face of the coal independently of or simultaneously with pivotal movement of the cutter bar 18 with respect to the cutter frame 17 and pivotally movable frame 14.

A planetary gear reduction device generally indicated at 149 is journaled in a suitable bearing member extending upwardly from the bottom portion of the frame for the cutting mechanism 16 and is freely mounted on the longitudinally extending sleeve 121 adjacent the forward end thereof. A suitable friction band 150 is provided to control said planetary gear reduction device in a usual manner. Said planetary gear reduction device is constructed in the same manner as the planetary gear reduction device 133, so will not be described in detail, and affords a means for driving the longitudinally extending shaft 122 at either a high or low frictionally controlled speed by means of suitable clutch jaws (not shown) and a clutch collar 151 in the same manner the longitudinally extending shaft 119 is driven by the planetary gear reduction device 133 at either a high or low frictionally controlled speed.

The forward end of the longitudinally extending shaft 122 is journaled in the frame for the cutting mechanism 16 and a spur pinion 153 is keyed to said shaft adjacent the forward end thereof and rearwardly of the forward bearing support of said shaft in the frame for said cutting mechanism. Said spur pinion meshes with and drives the spur pinion 92 which in turn drives the worm 90 and worm gear 89.

It may thus be seen that when the clutch jaws 94 are engaged with the clutch jaws 95, that the threaded shaft 85 may be rotated at either a high or low frictionally controlled speed in reverse directions without reversal of the motor 33 which will cause rotation of the spur pinion 88 and pivotally move the cutter bar about a vertical axis coaxial with the axis of the splined shaft 15

104 in one direction or another. Thus said cutter bar may be fed into or across the face of the coal by means of the spur pinion 88 meshing with and driving the rack 97 at a low frictionally controlled speed or may be positioned for cutting at a higher frictionally controlled speed and movement of said cutter bar effected through the spur pinion 88 and rack 97 may be reversed without reversal of said motor. When the clutch jaws 94 are disengaged from the clutch jaws 95, said cutter bar may be moved towards or away from the cutter frame 17 at either a high or low frictionally controlled speed without reversal of the motor.

It may now be seen that means have been provided for pivotally moving the pivotally movable frame 14 about its axis of pivotal connection to the truck frame 11 at either a high or low frictionally controlled speed in reverse directions without reversal of the motor 33 and that other means have been provided for effecting pivotal movement of the cutter bar 18 about its axis of pivotal connection to the cutter frame 17 at either a high or low frictionally controlled speed in reverse directions without reversal of said motor independently of movement of said pivotally movable frame across the front of said truck frame. With such an arrangement the cutter bar 18 may cut a kerf in the coal face across the front of the truck by pivotal movement of the pivotally movable frame 14, said cutter bar usually being sumped into the coal by means of the truck 10 driven from the motor 33 at a low feeding speed in a manner usual with machines of the slabbing type. The cutter bar 18 may also be fed to cut a kerf in the coal face by combined pivotal movement of said pivotally movable frame about its axis of pivotal connection with the truck frame 11 and said cutter bar about its axis of pivotal connection to said cutter frame, said truck being held in a stationary position, or by pivotally moving said cutter bar about its axis of pivotal connection to the cutter frame 17, the pivotally movable frame 14 being stationary with respect to said cutter bar or by a combination of all three forms of feeding mechanisms if desired.

Although the device of my invention may cut a kerf by means of pivotally moving the pivotally movable frame 14 while the cutter bar 18 is held stationary, or by pivotally moving the cutter bar 18 about its axis of pivotal connection with respect to the cutter frame 17 and said cutter bar may be sumped into the coal by movement of the truck 10 along the track, it is preferred that the kerf be cut by combined movement of the pivotally movable frame 14 about its axis of pivotal connection to said truck and cutter bar 18 about its axis of pivotal connection to said cutter frame, said truck being stationary on the mine track, especially where the working faces are narrow. In order to effect the cutting of such a kerf, movement of said pivotally movable frame about its axis of pivotal connection to the truck frame is timed so as to move in timed relation with respect to pivotal movement of said cutter bar about the axis of the splined shaft 104. The timing of movement of said cutter bar and pivotally movable frame is effected by properly proportioning the ratio of the gear trains for pivotally moving said pivotally movable frame with respect to the truck 10 and for pivoting said cutter bar 18 about the axis of the splined shaft 104. Variations in cutting due to hard spots in the coal may be compensated for by means of the frictionally controlled planetary gear reduction devices 133 and 149 in an obvious manner. Movement of said cutter bar and pivotally movable frame is further manually controlled by varying the pressure of the friction bands on the respective independently operable planetary gear reduction devices and by the reverse mechanism interposed between the motor 33 and said planetary gear reduction devices.

Referring now in particular to Figures 9 to 15, inclusive, and the use and operation of the device of my invention, the mining machine is herein shown as being positioned on mine rails 155 laid into the working place. In Figure 9 the cutter bar is shown extending longitudinally of the truck above the mine rails 155 with its forward end adjacent the face of the coal. Said cutter bar being so located is positioned to make its initial cut by moving the pivotally movable frame about its axis of pivotal connection to the truck frame towards the opposite rib from which it is desired to make the sumping cut. Positioning movement of said pivotally movable frame is preferably effected at a high frictionally controlled speed by means of the hereinbefore described gear train connected with the motor 33 which includes reverse gearing and the plural speed planetary gear reduction device 133. The cutter bar is simultaneously moved about its axis of pivotal connection to the cutter frame 17 in a direction opposite to the direction of movement of the pivotally movable frame 14 preferably at a high frictionally controlled speed by means of the hereinbefore described gear train connected with the motor 33 which includes reverse gearing and the planetary gear reduction device 149. Pivotal movement of said pivotally movable frame and cutter bar is continued until said pivotally movable frame and cutter bar are positioned so said cutter bar extends across the front of the truck with its forward end adjacent the rib along which it is desired to make the sumping cut. The mining machine is then moved forwardly along the rails 155 until the cutter bar overhangs said mine rails when it is vertically adjusted to the desired cutting position which is usually below the mine rails adjacent the mine bottom.

It should herein be noted that when the device of my invention is cutting a kerf while the truck remains stationary, that means must be provided for holding said truck in a stationary position on the track during the cutting operation. In cases where heavy rails are used and the track is laid permanently into the working place, said truck may be locked in a stationary position with respect to the mine rails by means of the self-locking worm 54 and worm gear 55. In cases where the adhesion of the track wheels 12 to the mine rails 155 is not sufficient to hold the truck from movement with respect to the mine rails 155 during the cutting operation and in cases where the rails are laid temporarily into the working place and are light and liable to slide along the bottom during the cutting operation, suitable means must be provided for holding said truck and the mine rails from movement.

As herein shown a pair of jacks 156 have been provided adjacent the rear end of the truck adapted to be interposed between suitable means connected to said truck and the mine roof to hold said truck and the rails 155 from movement with respect to the mine bottom during the cutting operation. Jack sockets 157 are provided adjacent the forward end of the truck frame 11 to receive

jacks 158. Said jacks are adapted to be interposed between said sockets and the mine roof for use where necessary to aid in holding the track or forward end of the truck frame from movement with respect to the working place. Said jacks are preferably used only while cutting wide places although they may be used while cutting narrow places where desired. Due to the fact that the pivotally movable frame overhangs one or the other side of the truck frame during the cutting operation, said jacks must be shifted as the cutting operation proceeds.

Referring now in particular to the means for jacking down the rearward end of the machine to the mine bottom and mine rails, members 159 are provided. Said members are adapted to fit on the outer ends of the rear axle 13 so as to be pivotally movable with respect thereto. Each member 159 extends rearwardly and downwardly from an outer end of said rearward axle and is provided with a guide slot 160 adapted to register with the flange of one of the mine rails 155 (see Fig. 16). It should be noted that said guide slot is of ample dimensions to permit said member to be used on various sizes of rails and to permit the rearward end of said member to engage an uneven mine bottom. Said member extends outwardly, rearwardly and downwardly from the guide slot 160 and has a socket 161 formed in its top surface adjacent the rearward end which is adapted to receive the jack 156, (see in particular Figs. 1, 2 and 4) and a bottom surface which is adapted to engage the ground or suitable block placed on the ground if desired. It may thus be seen that when the jacks 156 are interposed between the mine roof and the sockets 161 that the truck is held from movement with respect to the mine rail and that the mine rails 155 are also held from movement with respect to the mine bottom.

When the truck has been securely jacked in a stationary position with respect to the mine bottom and the cutter bar is adjusted to the desired position for cutting, which is usually a position in which its forward end is adjacent the right hand rib and its rearward end is adjacent the left hand forward side of the machine, the pivotally movable frame is moved at a slow frictionally controlled feeding speed about its axis of pivotal connection to the truck frame and the cutter bar is simultaneously moved at a slow frictionally controlled feeding speed about its axis of pivotal connection to the cutter-frame 17. Thus simultaneous pivotal movement of said pivotally movable frame and cutter bar sumps said cutter bar into the coal so that its forward portion moves in a substantially straight line along the rib as is shown in Figure 12.

The cutter bar being sumped into the coal to the desired depth, pivotal movement of said cutter bar with respect to the cutter frame 17 is usually stopped and said cutter bar is held in a fixed angular position with respect to said cutter frame by means of the self-locking worm 90 and worm gear 89. The pivotally movable frame 14 is then moved about its axis of pivotal connection to the truck frame 11 in an opposite direction than during the sumping operation. This feeds the cutter bar across the face of the coal. When said cutter bar has cut to the desired width, which is regulated by the width of the working face and length of the rack 66, the direction of movement of the pivotally movable frame 14 is reversed and said cutter bar is simultaneously pivotally moved with respect to the cutter frame 17 in the same direction as during the sumping operation. This withdraws the cutter bar from the kerf so that said cutter bar may cut a substantially straight kerf along the left hand rib. Upon completion of this operation the cutter bar is elevated to a position above the mine rails, the jacks 156 are removed from the sockets 161 and the members 159 are either removed from the ends of the rearward axle 13 or are disengaged from the ground and rails 155 and held in such a position by any suitable means (not shown) and the machine is backed from the working place. The cutter bar may then be moved into a longitudinal position with respect to the truck as is shown in Figure 9 when the machine is ready to move on its own power to the next working place.

While the cutter bar is herein shown as cutting a kerf from right to left, it may be understood that the direction of cutting may be reversed by reversing the direction of rotation of the cutter chain 19 and reversing the bits in said chain.

While I have herein described the use and operation of the device of my invention in narrow working places such as mine entries; it may readily be seen that the device of my invention may be used to cut wide entries as efficiently as narrow entries. Due to the fact that the cutter bar may be fed into the coal by means of the truck, or pivotal movement of the cutter bar with respect to the cutter frame 17 effected by the pinion 88 and rack 97 or combined pivotal movement of said cutter bar and the pivotally movable frame 14 with respect to each other, and due to the fact that said cutter bar may be reversely moved independently of said pivotally movable frame which is also capable of reverse movement, it may be seen that the device of my invention can readily be adapted for cutting in wide working places, in places wherein props are positioned close to the face of the coal and around obstructions in the coal such as rock or sulphur balls.

Figure 15 illustrates one method in which the device of my invention may cut a wide room. In cutting a wide room the pivotally movable frame 14 is moved to an extreme overhanging position with respect to the truck frame so the cutter bar may be lowered to one side of the track, preferably to a position adjacent the mine bottom. The cutter bar may then be positioned so its forward end is adjacent the rib of the working place. As shown by dotted lines in Figure 1, this position is such that said cutter bar is at right angles to the truck although the position of said cutter bar may vary according to the width of the place it is desired to cut. When the cutter bar is in such a position and the cutter chain is being driven about said cutter bar, said cutter bar is preferably moved into the coal at a slow feeding speed by means of the truck moved by the track wheels 12 driven from the rearward end of the motor 33 at a slow frictionally controlled speed through the frictionally controlled planetary gear reduction device 41. When the cutter bar has been moved into the coal to the desired depth and to a position so that it may clear the forward end of the mine rails 155 when cutting along the mine bottom, the truck and rails 155 are held in a rigid position with respect to the mine bottom by means of the jacks 156 interposed between the sockets 161 on the member 159 and the mine roof adjacent the rearward end of said truck and a jack 158 at the forward end thereof interposed between the mine roof and a socket 157 disposed on the opposite side of the

truck frame from which the initial cut is being made.

After the machine has been securely jacked in position, the cutter bar is preferably pivotally moved with respect to the cutter frame 17 at a low feeding speed. Such movement moves said cutter bar into the coal to its full depth and this movement is continued until said cutter bar is positioned so as to extend longitudinally of the pivotally movable frame 14. It may be understood, however, that this position may be varied where working conditions are different. The cutter bar is then locked in a stationary angular position with respect to said cutter frame by means of the self-locking worm 90 and worm gear 89 and moved across the face of the coal by pivotal movement of said pivotally movable frame. As said cutter bar is moved across the face of the coal and the end of said pivotally movable frame approaches the jack 158, said jack is removed and placed in the socket 157 at the opposite side of said machine. When said pivotally movable frame has moved to an extreme position on the truck frame, pivotal movement of said frame is stopped and the cutter bar is pivotally moved with respect to the cutter frame until its forward end reaches a position adjacent the opposite rib. The jacks 156 and 153 are then removed from their respective sockets and the cutter bar is then fully withdrawn from the coal by movement of the truck along the mine rails 155, it being understood that the operations herein described may vary according to the difference in width of working places. The cutter bar may then be elevated and positioned for movement about the mine as is shown in Figure 9.

It may be seen that due to the fact that the pivotally movable frame 14 is capable of being moved in reverse directions without reversal of the motor at either a high or low variable frictionally controlled speed and the cutter bar is capable of being pivotally moved independently of said pivotally movable frame in reverse directions without reversal of the motor at either a high or low variable frictionally controlled speed, that a flexible, compact and efficient cutting machine has been provided which is readily adapted for cutting in either narrow or wide working places and is adapted for cutting various types of kerfs around obstructions or formations in the coal itself and which is so arranged that the cutter bar may be sumped into the coal and moved across the face of the coal and withdrawn therefrom by power operated means independent of movement of the truck. It may thus be seen that I have provided a new and improved mining machine wherein the cutting operation is entirely independent of movement of the truck, but which is so arranged that the cutting operation may be performed by movement of the truck when desired.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction and arrangement of the parts may be altered without departing from the spirit and scope of my invention. I do not, therefore, wish to be understood as limiting myself to the specific construction illustrated herein excepting as specifically limited in the appended claims.

I claim as my invention:

1. In a mining machine, a support, a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent the rearward end of said support, cutting mechanism carried by said pivotally movable frame and wholly supported thereby including a cutting element extending beyond the forward boundaries of said support having a projecting cutter bar disposed forwardly thereof, means for pivotally moving said cutter bar about a vertical axis disposed forwardly of said support and power transmission mechanism having operative connection with the forward portion of said support for moving said pivotally movable frame about a vertical axis independently of pivotal movement of said cutter bar.

2. In a mining machine, a support, a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent the rearward end of said support, a cutting element carried by said pivotally movable frame and wholly supported thereby including a motor, a cutter frame disposed forwardly of said motor, a cutter bar carried by said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said support, means driven by the forward end of said motor for pivotally moving said cutter bar, and other means driven by the forward end of said motor for moving said pivotally movable frame about said axis of pivotal connection to said support in reverse directions without reversal of said motor including power transmission mechanism carried by said pivotally movable frame and having operative connection with the forward portion of said support.

3. In a mining machine, a support, a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent the rearward end of said support, a cutting element carried by said pivotally movable frame and wholly supported thereby including a motor, a cutter frame disposed forwardly of said motor, a cutter bar carried by said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said support, means driven by the forward end of said motor for pivotally moving said cutter bar, and other means driven by the forward end of said motor for moving said pivotally movable frame about said axis of pivotal connection to said support in reverse directions without reversal of said motor including a rack on the forward end of said support and a pinion carried by said pivotally movable frame meshing therewith.

4. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor beyond the boundaries of said truck, a cutter bar supported by said cutter frame for movement towards and away from said cutter frame and for movement about a vertical axis disposed forwardly of said truck and power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack, reverse gearing, and plural speed reduction mechanism.

5. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith includ-

ing a motor, a cutter frame extending forwardly of said motor beyond the boundaries of said truck, a cutter bar supported by said cutter frame for movement towards and away from said cutter frame and for movement about a vertical axis disposed forwardly of said truck, and power connections from said motor for pivotally moving said pivotally movable frame including reverse gearing, a plural speed planetary gear reduction device and a pinion meshing with said arcuate rack.

6. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor beyond the boundaries of said truck, a cutter bar supported by said cutter frame for movement towards and away from said cutter frame and for movement about a vertical axis disposed forwardly of said truck, power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack and reverse gearing and plural speed gear reduction mechanism interposed between said motor and said pinion, and other power connections from said motor for pivotally moving said cutter bar simultaneously with pivotal movement of said pivotally movable frame including reverse gearing and plural speed gear reduction mechanism.

7. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor beyond the boundaries of said truck, a cutter bar supported by said cutter frame for movement towards and away from said cutter frame and for movement about a vertical axis disposed forwardly of said truck, power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack and reverse gearing and plural speed gear reduction mechanism interposed between said motor and said pinion, and other power connections from said motor for pivotally moving said cutter bar independently of pivotal movement of said pivotally movable frame and for moving said cutter bar towards and away from said cutter frame comprising reverse gearing and plural speed gear reduction mechanism.

8. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end thereof, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor, a cutter bar supported by said cutter frame for movement with respect thereto about a vertical axis disposed forwardly of said truck, and power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack, reverse gearing, and plural speed gear reduction mechanism.

9. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end thereof, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor, a cutter bar supported by said cutter frame for movement with respect thereto about a vertical axis disposed forwardly of said truck, and power connections from said motor for pivotally moving said pivotally movable frame including reverse gearing, a plural speed planetary gear reduction device and a pinion meshing with said arcuate rack.

10. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end thereof, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor, a cutter bar supported by said cutter frame for movement with respect thereto about a vertical axis disposed forwardly of said truck, and power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack and reverse gearing and plural speed gear reduction mechanism interposed between said motor and said pinion, and other power connections from said motor for pivotally moving said cutter bar simultaneously with pivotal movement of said pivotally movable frame including reverse gearing and plural speed gear reduction mechanism.

11. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end thereof, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor, a cutter bar supported by said cutter frame for movement with respect thereto about a vertical axis disposed forwardly of said truck, and power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack and reverse gearing and plural speed gear reduction mechanism interposed between said motor and said pinion, and other power connections from said motor for pivotally moving said cutter bar independently of pivotal movement of said pivotally movable frame including reverse gearing and plural speed gear reduction mechanism.

12. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end thereof, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor, a cutter bar supported by said cutter frame for movement with respect thereto about a vertical axis disposed forwardly of said truck, and power connections from said motor for pivotally moving said pivotally movable frame including a pinion meshing with said rack and reverse gearing and plural speed

gear reduction mechanism interposed between said motor and said pinion, and other power connections from said motor for pivotally moving said cutter bar simultaneously with or non-simultaneously of pivotal movement of said pivotally movable frame including reverse gearing and plural speed gear reduction mechanism.

13. In a mining machine, a support, a cutter bar, and means for feeding the forward end of said cutter bar longitudinally into the face of the coal, laterally across the face of the coal and thence withdrawing said cutter bar from the coal while said support remains in a fixed position with respect to the face of the coal comprising a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent one end of said support and extending along said support toward the opposite end thereof, means wholly supported on said pivotally movable frame for supporting said cutter bar for pivotal movement about an axis disposed forwardly of an opposite end of said support including a cutter frame extending beyond the boundaries of said support, means carried by said pivotally movable frame and operatively connected with the forward portion of said support for pivotally moving said pivotally movable frame across the front of said support in reverse directions, and other means for simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame.

14. In a mining machine, a support, a cutter bar, and means for feeding the forward end of said cutter bar longitudinally into the face of the coal, laterally across the face of the coal and thence withdrawing said cutter bar from the coal while said support remains in a fixed position with respect to the face of the coal comprising a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent one end of said support and extending along said support toward the opposite end thereof, means wholly supported on said pivotally movable frame for supporting said cutter bar for pivotal movement about an axis disposed forwardly of an opposite end of said support including a cutter frame extending beyond the boundaries of said support, means carried by said pivotally movable frame and operatively connected with the forward portion of said support for pivotally moving said pivotally movable frame across the front of said support in reverse directions, and other means for independently moving said cutter bar about its axis of pivotal connection with said cutter frame in one direction.

15. In a mining machine, a support, a cutter bar, and means for feeding the forward end of said cutter bar longitudinally into the face of the coal, laterally across the face of the coal and thence withdrawing said cutter bar from the coal while said support remains in a fixed position with respect to the face of the coal comprising a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent one end of said support and extending along said support toward the opposite end thereof, means wholly supported on said pivotally movable frame for supporting said cutter bar for pivotal movement about an axis disposed forwardly of an opposite end of said support including a cutter frame extending beyond the boundaries of said support, means carried by said pivotally movable frame and operatively connected with the forward portion of said support for pivotally moving said pivotally movable frame across the front of said support in reverse directions, and other means for simultaneously or non-simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame.

16. In a mining machine, a support, a cutter bar, and means for feeding the forward end of said cutter bar longitudinally into the face of the coal, laterally across the face of the coal and thence withdrawing said cutter bar from the coal while said support remains in a fixed position with respect to the face of the coal comprising a pivotally movable frame wholly supported on said support for movement about a vertical axis disposed adjacent one end of said support and extending along said support toward the opposite end thereof, means wholly supported on said pivotally movable frame for supporting said cutter bar for pivotal movement about an axis disposed forwardly of an opposite end of said support including a cutter frame extending beyond the boundaries of said support, means carried by said pivotally movable frame and operatively connected with the forward portion of said support for pivotally moving said pivotally movable frame across the front of said support in reverse directions, and other means for simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame or holding said cutter bar in fixed relation with respect to said cutter frame.

17. In a mining machine, a support comprising a truck having wheels and axles thereon, a pivotally movable frame wholly supported on said truck for pivotal movement about a vertical axis disposed rearwardly of said rearwardmost truck axles, cutting mechanism mounted on said pivotally movable frame and wholly supported thereby for movement therewith comprising a motor, a cutter frame extending forwardly of said truck and a cutter bar pivotally connected to said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said truck, and means for moving the forward end of said cutter bar longitudinally forwardly of said support a distance equal substantially to the length of said cutter bar, laterally across the forward end of said support and thence rearwardly longitudinally of said support while said truck is held in a stationary position on the mine track comprising means driven by said motor for pivotally moving said pivotally movable frame at the same speed in reverse directions without reversal of said motor and simultaneously moving said cutter bar about its axis of pivotal connection to said cutter frame.

18. In a mining machine, a support comprising a truck having wheels and axles thereon, a pivotally movable frame wholly supported on said truck for pivotal movement about a vertical axis disposed rearwardly of said rearwardmost truck axles, cutting mechanism mounted on said pivotally movable frame and wholly supported thereby for movement therewith comprising a motor, a cutter frame extending forwardly of said truck and a cutter bar pivotally connected to said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said truck, and means for moving the forward end of said cutter bar longitudinally forwardly of said support a distance equal substantially to the length of said cutter bar, laterally across the forward end of said support and thence rearwardly longitudinally of said support while said truck is

held in a stationary position on the mine track comprising means driven by said motor for pivotally moving said pivotally movable frame at the same speed in reverse directions without reversal of said motor and simultaneously moving said cutter bar about its axis of pivotal connection to said cutter frame or holding said cutter bar in fixed relation with respect to said cutter frame.

19. In a mining machine, a support comprising a truck having wheels and axles thereon, a pivotally movable frame wholly supported on said truck for pivotal movement about a vertical axis disposed rearwardly of said rearwardmost truck axles, cutting mechanism mounted on said pivotally movable frame and wholly supported thereby for movement therewith comprising a motor, a cutter frame extending forwardly of said truck and a cutter bar pivotally connected to said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said truck, and means for moving the forward end of said cutter bar longitudinally forwardly of said support a distance equal substantially to the length of said cutter bar, laterally across the forward end of said support and thence rearwardly longitudinally of said support while said truck is held in a stationary position on the mine track comprising means driven by said motor for pivotally moving said pivotally movable frame at the same speed in reverse directions without reversal of said motor and independently moving said cutter bar about its axis of pivotal connection to said cutter frame in one direction.

20. In a mining machine, a support comprising a truck having wheels and axles thereon, a pivotally movable frame wholly supported on said truck for pivotal movement about a vertical axis disposed rearwardly of said rearwardmost truck axles, cutting mechanism mounted on said pivotally movable frame and wholly supported thereby for movement therewith comprising a motor, a cutter frame extending forwardly of said truck and a cutter bar pivotally connected to said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said truck, and means for moving the forward end of said cutter bar longitudinally forwardly of said support a distance equal substantially to the length of said cutter bar, laterally across the forward end of said support and thence rearwardly longitudinally of said support while said truck is held in a stationary position on the mine track comprising means driven by said motor for pivotally moving said pivotally movable frame at the same speed in reverse directions without reversal of said motor and other means driven by said motor for moving said cutter bar about its axis of pivotal connection with said cutter frame in one direction while said cutter frame is moving in reverse directions.

21. In a mining machine, a support comprising a truck having wheels and axles thereon, a pivotally movable frame wholly supported on said truck for pivotal movement about a vertical axis disposed rearwardly of said rearwardmost truck axles, cutting mechanism mounted on said pivotally movable frame and wholly supported thereby for movement therewith comprising a motor, a cutter frame extending forwardly of said truck and a cutter bar pivotally connected to said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said truck, and means for moving the forward end of said cutter bar longitudinally forwardly of said support a distance equal substantially to the length of said cutter bar, laterally across the forward end of said support and thence rearwardly longitudinally of said support while said truck is held in a stationary position on the mine track comprising means driven by said motor for pivotally moving said pivotally movable frame at the same speed in reverse directions without reversal of said motor and other means driven by said motor for moving said cutter bar about its axis of pivotal connection to said cutter frame in one direction for feeding the forward end of said cutter bar longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck.

22. In a mining machine, a support comprising a truck having wheels and axles thereon, a pivotally movable frame wholly supported on said truck for pivotal movement about a vertical axis disposed rearwardly of said rearwardmost truck axles, cutting mechanism mounted on said pivotally movable frame and wholly supported thereby for movement therewith comprising a motor, a cutter frame extending forwardly of said truck and a cutter bar pivotally connected to said cutter frame for pivotal movement with respect thereto about a vertical axis disposed forwardly of said truck, and means for moving the forward end of said cutter bar longitudinally forwardly of said support a distance equal substantially to the length of said cutter bar, laterally across the forward end of said support and thence rearwardly longitudinally of said support while said truck is held in a stationary position on the mine track comprising means driven by said motor for pivotally moving said pivotally movable frame at the same speed in reverse directions without reversal of said motor and other means driven by said motor for independently moving said cutter bar about its axis of pivotal connection with said cutter frame in reverse directions without reversal of said motor.

23. In a mining machine of the class described, a support comprising a truck, a pivotally movable frame supported on said truck for pivotal movement with respect thereto about a vertical axis, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor and a cutter frame extending beyond the boundaries of said truck having a projecting cutter bar disposed forwardly of said truck and pivotally connected with said cutter frame forwardly of said truck for movement about a vertical axis, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck at either a high or low frictionally controlled speed in reverse directions and simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame in one direction for feeding the forward end of said cutter bar longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck.

24. In a mining machine of the class described, a support comprising a truck, a pivotally movable frame supported on said truck for pivotal movement with respect thereto about a vertical axis, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor and a cutter frame extending beyond the boundaries of said truck having a projecting cutter bar disposed forwardly of said truck and pivotally connected with said cutter frame for movement about a vertical axis, and

drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection with said truck at either a high or low frictionally controlled speed in reverse directions without reversal of said motor and simultaneously or non-simultaneously moving said cutter bar about its axis of pivotal connection with said cutting frame in one direction for moving the forward end of said cutter bar longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck.

25. In a mining machine of the class described, a support comprising a truck, a pivotally movable frame supported on said truck for pivotal movement with respect thereto about a vertical axis, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor and a cutter frame extending beyond the boundaries of said truck having a projecting cutter bar disposed forwardly of said truck and pivotally connected with said cutter frame for movement with respect thereto about a vertical axis, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection with said truck in reverse directions without reversal of said motor and simultaneously or non-simultaneously moving said cutter bar at either a high or low frictionally controlled speed about its axis of pivotal connection with said cutter frame in reverse directions without reversal of said motor for moving the forward end of said cutter bar longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck.

26. In a mining machine of the class described, a support comprising a truck, a pivotally movable frame supported on said truck for pivotal movement with respect thereto about a vertical axis, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, and a cutter frame extending beyond the boundaries of said truck having a projecting cutter bar disposed forwardly of said truck pivotally connected with said cutter frame for movement about a vertical axis, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said cutter bar about its axis of pivotal connection with said cutter frame at either a high or low frictionally controlled speed or holding said cutter bar in a fixed position with respect to said cutter frame and independently moving said pivotally movable frame about its axis of pivotal connection to said truck at either a high or low frictionally controlled speed in reverse directions without reversal of said motor for moving the forward end of said cutter bar longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck.

27. In a mining machine of the class described, a support comprising a truck, a pivotally movable frame supported on said truck for pivotal movement with respect thereto about a vertical axis, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, and a cutter frame extending beyond the boundaries of said truck having a projecting cutter bar disposed forwardly of said truck pivotally connected with said cutter frame for movement with respect thereto about a vertical axis and for vertical adjustment with respect thereto in a plurality of substantially parallel planes including a plane adjacent the mine bottom, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said cutter bar about its axis of pivotal connection with said cutter frame at a plurality of frictionally controlled speeds in reverse directions without reversal of said motor or holding said cutter bar in fixed relation with respect to said cutter frame including a frictionally controlled planetary gear reduction device, and another drive connection for simultaneously or non-simultaneously moving said pivotally movable frame about its axis of pivotal connection to said truck at a plurality of frictionally controlled speeds in reverse directions without reversal of said motor including a planetary gear reduction device.

28. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and said cutter bar about its axis of pivotal connection with said cutter frame for feeding the forward end of said cutter bar longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck including a longitudinally extending shaft driven by said motor, a plurality of frictionally controlled gear reduction devices driven thereby, a selective connection from one of said gear reduction devices to said pivotally movable frame, and another selective connection from said other gear reduction device to said cutter bar.

29. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck in reverse directions without reversal of said motor and simultaneously or non-simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame for moving the forward end of said cutter bar at a plurality of frictionally controlled speeds longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck including a longitudinally extending shaft driven by said motor, a parallel shaft, reverse gearing connecting said shafts, a plural speed gear reduction device driven thereby, another parallel shaft drive by said longitudinally extending shaft, a plural speed gear reduction device driven thereby, a drive connection for selectively connecting said first-mentioned plural speed gear reduction device with said pivotally movable frame, and another drive connection for

selectively connecting said second-mentioned plural speed gear reduction device with said cutter bar.

30. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for pivotal movement with respect thereto about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and said cutter bar about its axis of pivotal connection with said cutter frame for feeding the forward end of said cutter bar at a plurality of frictionally controlled speeds in reverse directions without reversal of said motor longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck including a longitudinally extending shaft driven by said motor, a shaft parallel to said longitudinally extending shaft, reverse gearing for driving said second-mentioned shaft from said first-mentioned shaft, a plural speed gear reduction device connected therewith, another parallel shaft disposed on the opposite side of said first-mentioned longitudinally extending shaft, reverse gearing for connecting said second-mentioned parallel shaft with said first-mentioned shaft, a plural speed gear reduction device driven thereby, a selective connection from said first-mentioned gear reduction device to said pivotally movable frame and another selective connection from said second-mentioned gear reduction device to said cutter bar.

31. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck in reverse directions without reversal of said motor and simultaneously or independently moving said cutter bar about its axis of pivotal connection with said cutter frame in reverse directions without reversal of said motor or for holding said cutter bar in fixed relation with respect to said cutter frame for feeding the forward end of said cutter bar at a plurality of speeds longitudinally of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck including a pair of parallel disposed shafts independently driven by said motor in reverse directions without reversal of said motor, a plural speed gear reduction device driven by each of said shafts, a selective connection from one of said plural speed gear reduction devices to said pivotally movable frame and another selective connection from said other plural speed gear reduction device to said cutter bar including a self-locking worm and worm gear.

32. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and said cutter bar about its axis of pivotal connection with said cutter frame for feeding the forward end of said cutter bar at a plurality of speeds longitudinally forwardly of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck including a plurality of plural speed planetary gear reduction devices.

33. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and said cutter bar about its axis of pivotal connection to said cutter frame for feeding the forward end of said cutter bar at a plurality of frictionally controlled speeds longitudinally of said truck and transversely across the front of said truck and thence rearwardly longitudinally of said truck including a plurality of frictionally controlled planetary gear reduction devices.

34. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and simultaneously or non-simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame for feeding the forward end of said cutter bar at a plurality of frictionally controlled speeds longitudinally forwardly of said truck, transversely across the front of said truck and thence rearwardly longitudinally of said truck including a longitudinally extending shaft driven by said motor, a plurality of frictionally controlled gear reduction devices driven thereby, a selective connection from one of said gear reduction devices to said pivotally movable frame and another selective connection from said other gear reduction device to said cutter bar.

35. In a mining machine of the class described, a track mounted truck, a pivotally movable

frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and simultaneously or non-simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame for feeding the forward end of said cutter bar at a plurality of speeds longitudinally forwardly of said truck, transversely across the front of said truck and thence rearwardly longitudinally of said truck including a longitudinally extending shaft driven from the forward end of said motor, planetary gear reduction mechanism arranged on one side of said shaft and having selective connection with said pivotally movable frame and other planetary gear reduction mechanism arranged on the other side of said shaft and driven therefrom having selective connection with said cutter bar.

36. In a mining machine of the class described, a track mounted truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending beyond the boundaries of said truck having a cutter bar supported thereon for movement about a vertical axis disposed forwardly of said truck, and drive connections from said motor to said pivotally movable frame and cutter bar for moving said pivotally movable frame about its axis of pivotal connection to said truck and simultaneously or non-simultaneously moving said cutter bar about its axis of pivotal connection with said cutter frame for feeding the forward end of said cutter bar at a plurality of speeds in reverse directions without reversal of said motor longitudinally forwardly of said truck, transversely across the front of said truck and thence rearwardly longitudinally of said truck including reverse gearing and frictionally controlled plural speed planetary gear reduction mechanism.

37. In a track mounted mining machine, a truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a cutter frame extending beyond the forward extremities of said truck having a cutter bar supported thereon, means for pivotally moving said pivotally movable frame beyond the lateral extremities of said truck including an arcuate shaped rack disposed on the forward end of said truck and a pinion connected with said pivotally movable frame and meshing with said rack, and means for guiding said pivotally movable frame during pivotal movement with respect to said truck and supporting said pivotally movable frame when beyond the lateral extremities of said truck comprising a movable support member engaged by the forward end of said pivotally movable frame for supporting the forward end of said pivotally movable frame, and means on said pivotally movable frame for engaging said support.

38. In a track mounted mining machine, a truck, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a cutter frame extending beyond the forward extremities of said truck having a cutter bar supported thereon, means for pivotally moving said pivotally movable frame beyond the lateral extremities of said truck including an arcuate shaped rack disposed on the forward end of said truck and a pinion connected with said pivotally movable frame and meshing with said rack, and means for guiding said pivotally movable frame during pivotal movement with respect to said truck and supporting said pivotally movable frame when beyond the lateral extremities of said truck comprising an arcuate guide, a guiding and supporting member movable in said guide, said guiding and supporting member supporting the forward end of said pivotally movable frame for movement with respect to said truck and means on said pivotally movable frame for selectively engaging said support and moving said support with said pivotally movable frame beyond the lateral extremities of said truck as said pivotally movable frame is moved beyond the lateral extremities of said truck.

39. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor beyond the boundaries of said truck, a cutter bar supported by said cutter frame for movement towards and away from said cutter frame and for movement about a vertical axis disposed forwardly of said truck, power connections from said motor for pivotally moving said pivotally movable frame including reverse gearing and a plural speed planetary gear reduction device interposed between said motor and said rack and other power connections from said motor for pivotally moving said cutter bar simultaneously with or non-simultaneously of pivotal movement of said pivotally movable frame and for moving said cutter bar towards or away from said cutter frame comprising reverse gearing and a plural speed planetary gear reduction device.

40. In a track mounted mining machine, a truck having an arcuate shaped rack on the forward end thereof, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a motor, a cutter frame extending forwardly of said motor beyond the boundaries of said truck, a cutter bar supported by said cutter frame for movement towards and away from said cutter frame and for movement about a vertical axis disposed forwardly of said truck, power connections from said motor for pivotally moving said pivotally movable frame including reverse gearing and a frictionally controlled planetary gear reduction device interposed between said motor and said rack, and other power connections from said motor for pivotally moving said cutter bar independently of pivotal movement of said pivotally movable frame comprising reverse

gearing and a frictionally controlled planetary gear reduction device.

41. In a mining machine, a support, a pivotally movable frame supported on said support for movement about a vertical axis, cutting mechanism supported on said pivotally movable frame comprising a motor disposed forwardly of the axis of pivotal connection of said pivotally movable frame with said support, a cutting element having a projecting cutter bar pivotally connected thereto for movement about a vertical axis, power means for pivotally moving said pivotally movable frame about its axis of pivotal connection to said support and independently moving said cutter bar about its axis of pivotal connection to said cutting element for feeding the forward end of said cutter bar longitudinally forwardly of said support, and transversely across the front of said support and thence rearwardly longitudinally of said support, and counterbalancing means on said pivotally movable frame rearwardly of said motor and the axis of pivotal connection of said pivotally movable frame to said support.

42. In a mining machine, a support comprising a truck, a pivotally movable frame supported on said truck for movement about a vertical axis, cutting mechanism supported on said pivotally movable frame forwardly of the axis of pivotal connection of said pivotally movable frame to said truck comprising a motor disposed forwardly of the axis of pivotal connection of said pivotally movable frame to said truck, a cutting element having a projecting cutter bar pivotally connected thereto for movement with respect thereto about a vertical axis, power means for pivotally moving said pivotally movable frame about its axis of pivotal connection to said truck and simultaneously or independently moving said cutter bar about its axis of pivotal connection to said cutting element for feeding the forward end of said cutter bar longitudinally forwardly of said support and transversely across the front of said support and thence rearwardly longitudinally of said support, and counterbalancing means on said pivotally movable frame disposed rearwardly of said cutting element and motor and disposed on the side of the axis of pivotal connection of said pivotally movable frame to said truck opposite from said motor.

43. In a mining machine, a support comprising a truck, a pivotally movable frame supported on said truck for movement about a vertical axis, cutting mechanism supported on said pivotally movable frame forwardly of the axis of pivotal connection of said pivotally movable frame to said truck comprising a cutting element having a projecting cutter bar pivotally connected thereto for movement with respect thereto about a vertical axis, power means for pivotally moving said pivotally movable frame about its axis of pivotal connection to said truck and simultaneously or independently moving said cutter bar about its axis of pivotal connection to said cutting element for feeding the forward end of said cutter bar longitudinally forwardly of said support and transversely across the front of said support and thence rearwardly longitudinally of said support, and counterbalancing means on said pivotally movable frame rearwardly of the axis of pivotal connection of said pivotally movable frame to said truck, and rearwardly of the rearwardmost boundaries of said truck.

44. In a mining machine, a track mounted truck having wheels and axles thereon, said wheels being adapted to be moved along mine rails, a projecting cutting element supported on said truck, and means for holding said truck from movement during the cutting operation comprising a jack socket pivotally mounted on an outer end of one of said truck axles, said jack socket being adapted to have engagement with the mine rail and ground, and a jack adapted to be interposed between said jack socket and the mine roof.

45. In a mining machine, a track mounted truck having wheels and axles thereon, said wheels being adapted to be moved along mine rails, a projecting cutting element supported on said truck and means for holding said truck from movement during the cutting operation comprising a plurality of jack sockets, each of said jack sockets being pivotally mounted on each outer end of an axle of said truck, said jack sockets being adapted to have engagement with the mine rail and ground, and a jack adapted to be interposed between each of said jack sockets and the mine roof.

46. In a mining machine, a track mounted truck having wheels and axles thereon, said wheels being adapted to be moved along mine rails, a projecting cutting element supported on said truck, and means for holding said truck from movement during the cutting operation comprising a jack socket detachably and pivotally mounted on an outer end of one of said truck axles, said jack socket being adapted to have engagement with the mine rail and ground, and a jack adapted to be interposed between said jack sockets and the mine roof.

47. In a mining machine of the class described, a truck supported on axles and track wheels and adapted to be moved about the mine on a track, a pivotally movable frame supported on said truck for movement about a vertical axis disposed adjacent the rearward end of said truck, cutting mechanism supported on said pivotally movable frame for movement therewith including a projecting cutter bar supported for pivotal movement about a vertical axis, power means for pivotally moving said cutter bar about a vertical axis simultaneously with or independently of pivotal movement of said pivotally movable frame, and means for holding said mining machine from movement with respect to the track during the cutting operation comprising a plurality of members having connection with the rearwardmost axles of said truck and extending rearwardly from said axle and having a portion adapted to engage the mine track and a jack socket adjacent the rearward end adapted to receive a jack which may be interposed between each of said jack sockets and the mine roof.

48. In a mining machine, a support comprising a truck supported on axles and track wheels adapted to be moved about the mine on a track, a pivotally movable frame supported on said truck for movement about a vertical axis, cutting mechanism supported on said pivotally movable frame forwardly of the axis of pivotal connection of said pivotally movable frame to said truck comprising a cutting element having a projecting cutter bar pivotally connected thereto for pivotal movement with respect thereto about a vertical axis, power means for pivotally moving said pivotally movable frame about its axis of pivotal connection to said truck and simultaneously or independently moving said cutter bar about its axis of pivotal connection to said cutting element for feeding the forward end of said cutter bar longitudinally forwardly of said track, and transversely across the front of said support and

thence rearwardly longitudinally of said support, counterbalancing means on said pivotally movable frame rearwardly of the axis of pivotal connection of said pivotally movable frame to said truck, and rearwardly of the rearwardmost boundaries of said truck, and means for holding said mining machine from movement with respect to said track during the cutting operation comprising a plurality of jack sockets extending rearwardly of the rearwardmost axles of said truck having a portion adapted to engage the mine track, and a jack adapted to be interposed between each of said jack sockets and the mine roof.

CHARLES A. PRATT.