Dec. 23, 1930. M. P. HOLMES 1,785,961

MINING MACHINE

Filed Sept. 24, 1926 8 Sheets-Sheet 1

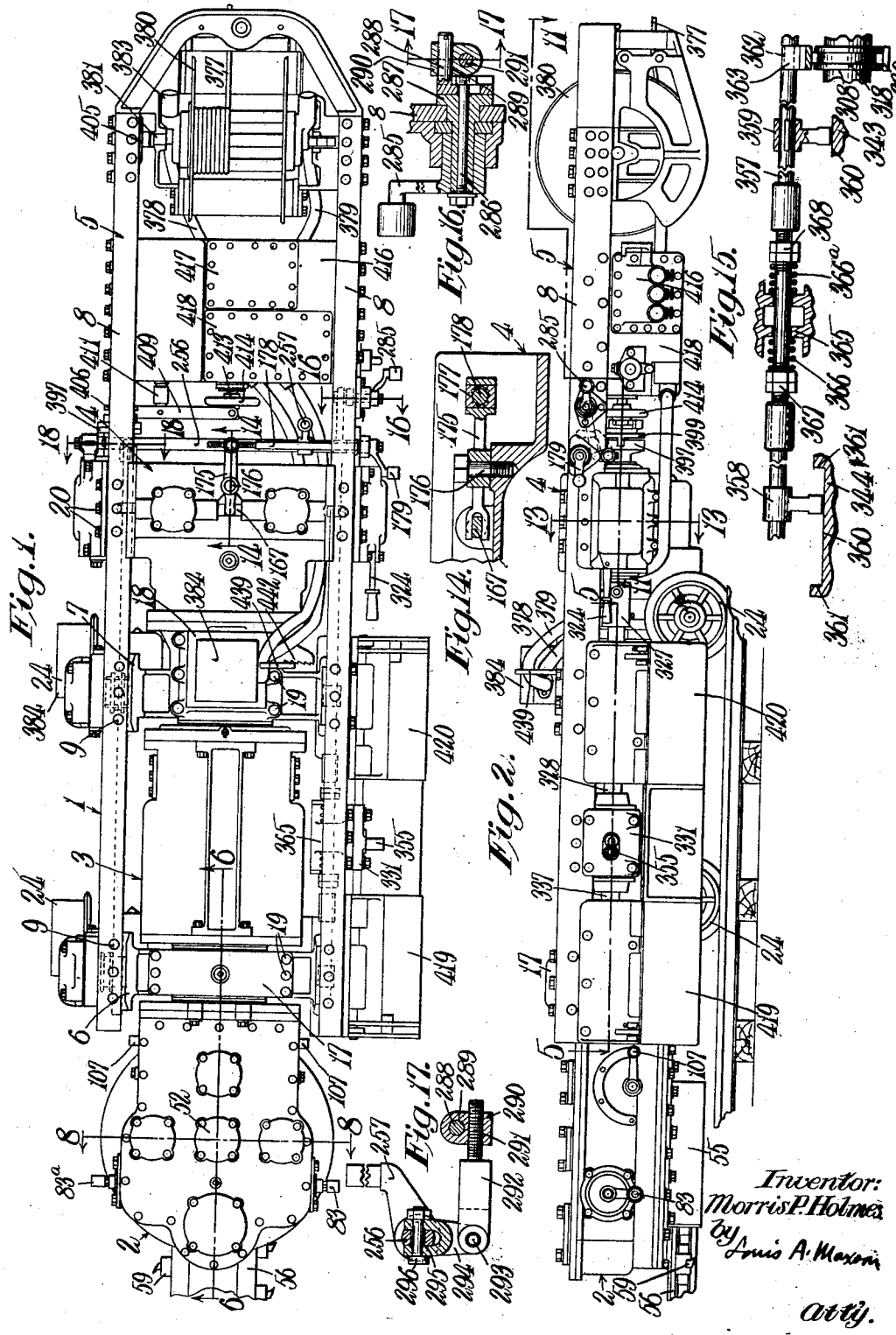


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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MINING MACHINE

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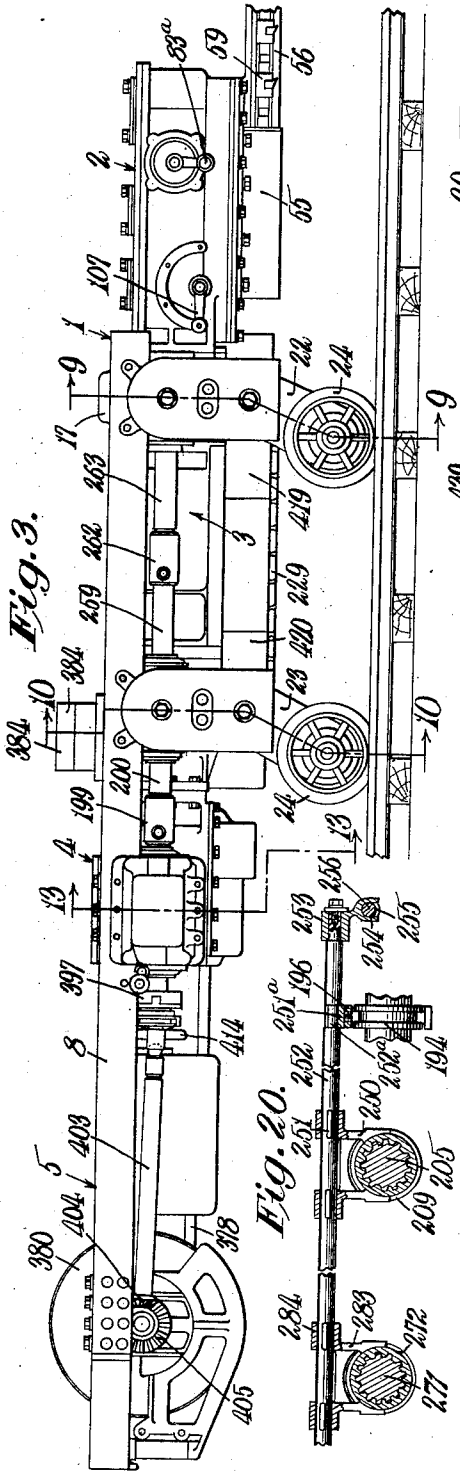


Fig. 3.

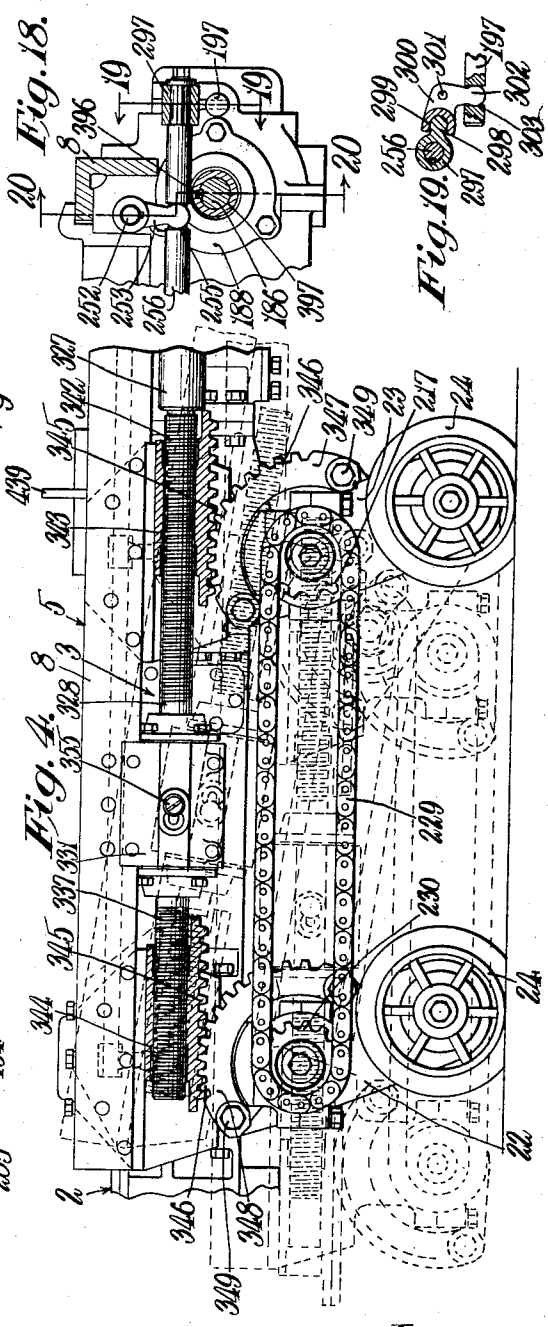


Fig. 4.

Fig. 18.

Fig. 19.

Fig. 20.

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MINING MACHINE

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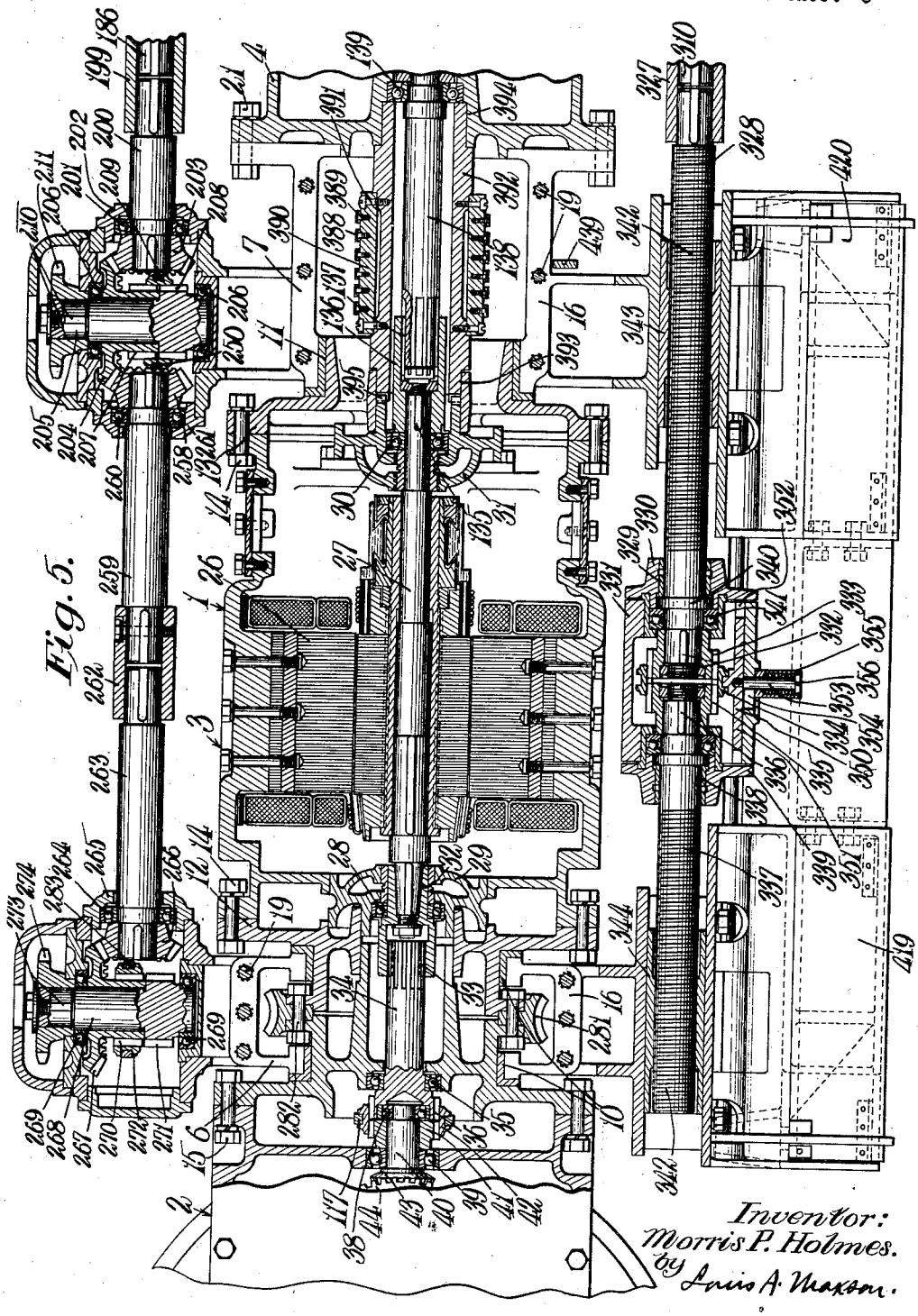


Fig. 5.

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MINING MACHINE

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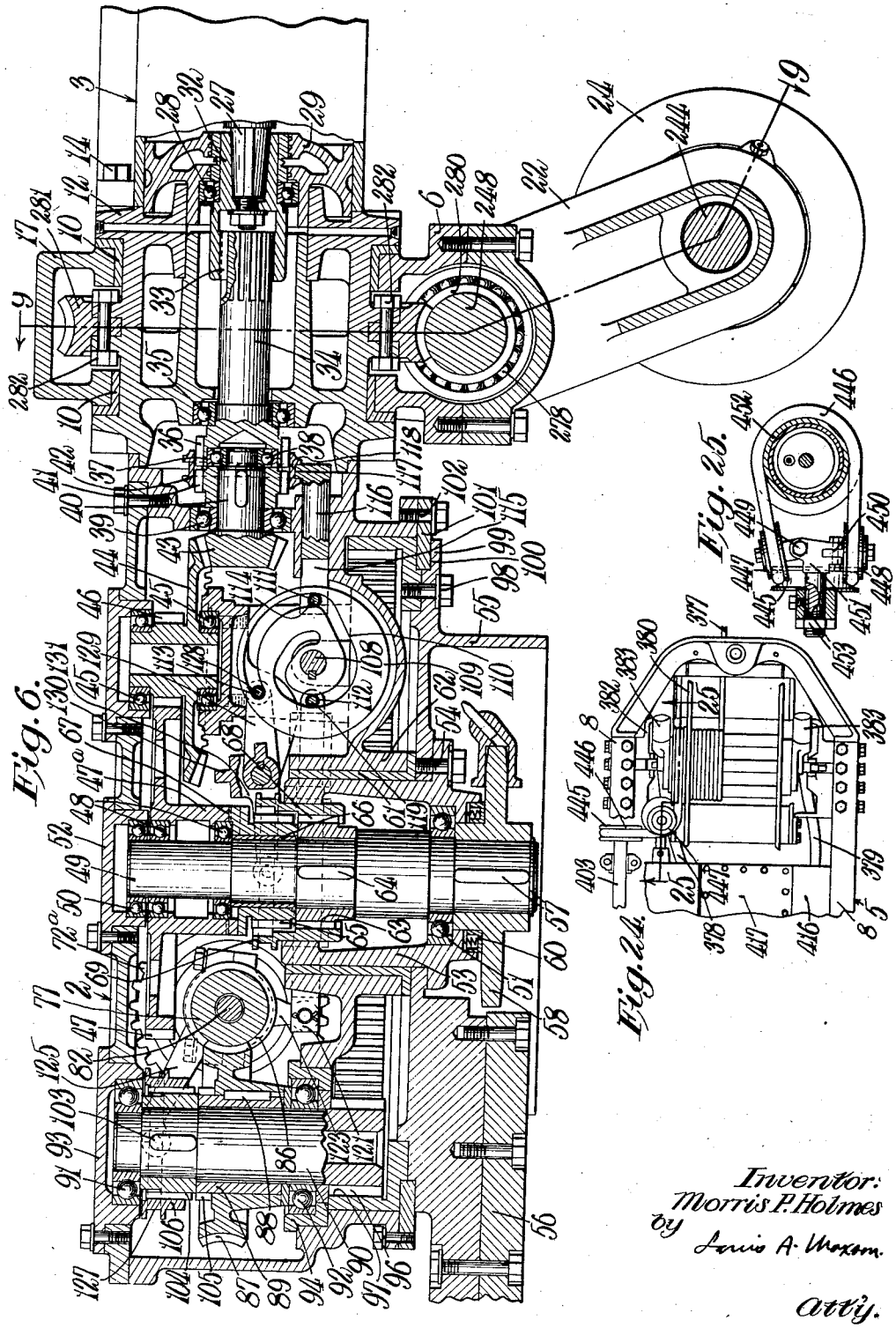


Fig. 6.

Fig. 24.

Fig. 25.

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MINING MACHINE

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Fig. 7.

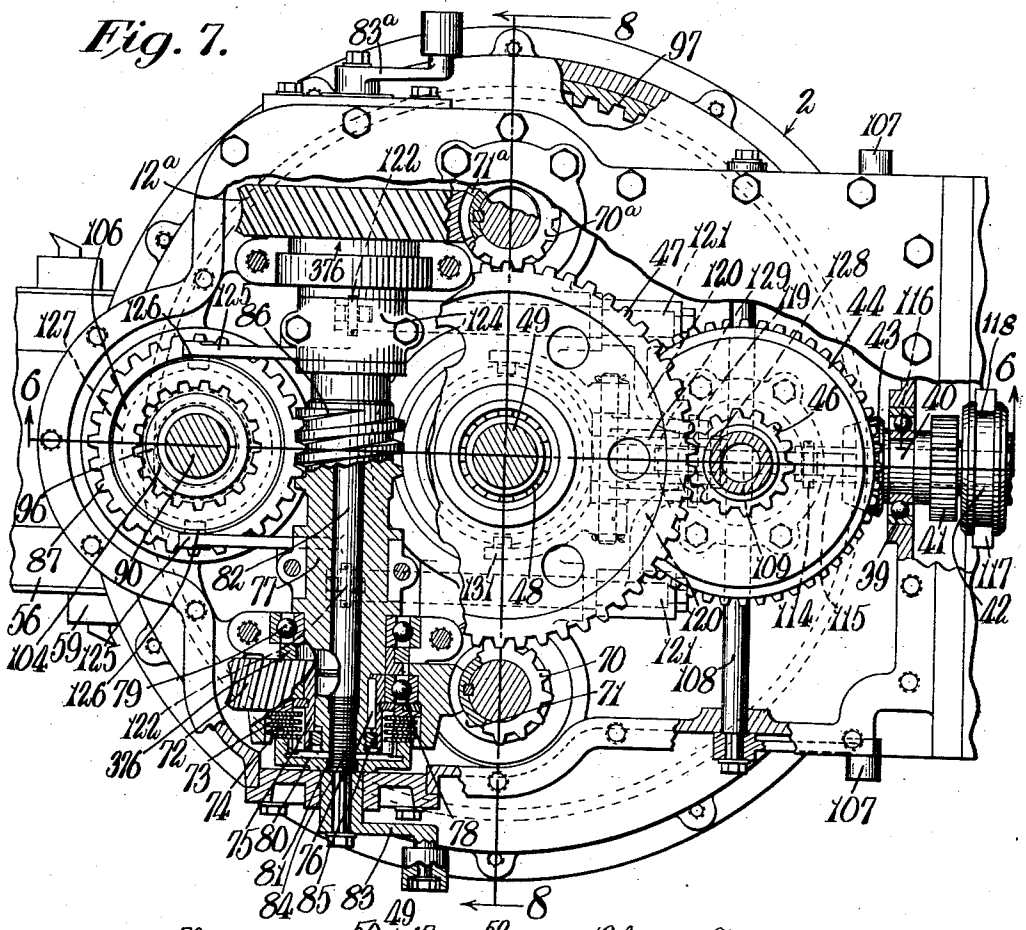
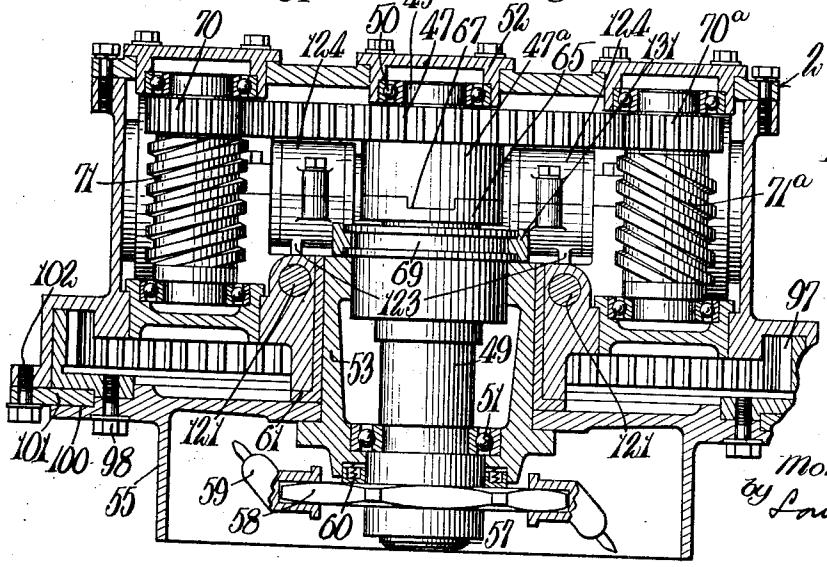


Fig. 8.



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MINING MACHINE

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Fig. 9.

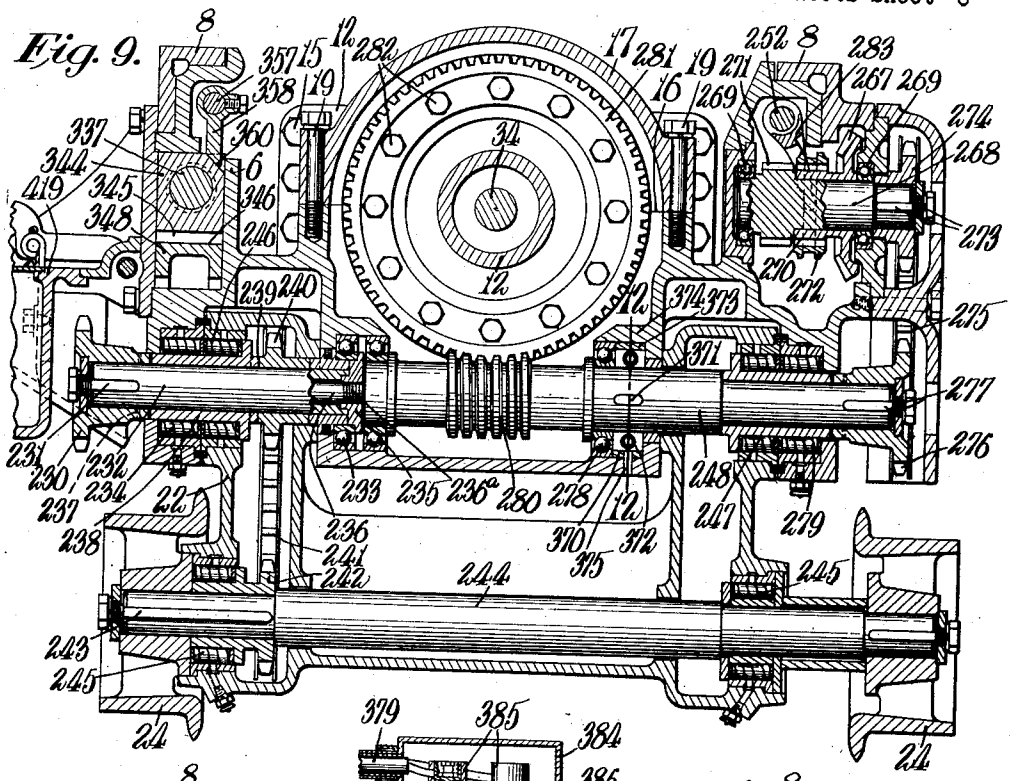
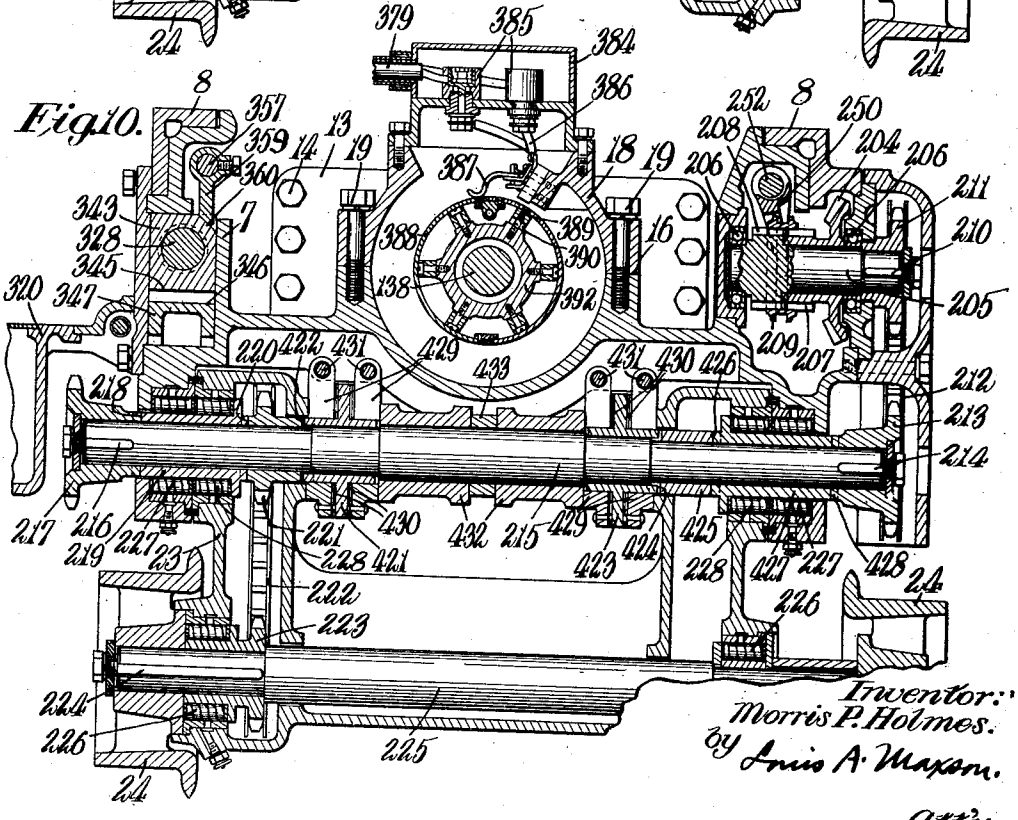


Fig. 10.



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MINING MACHINE

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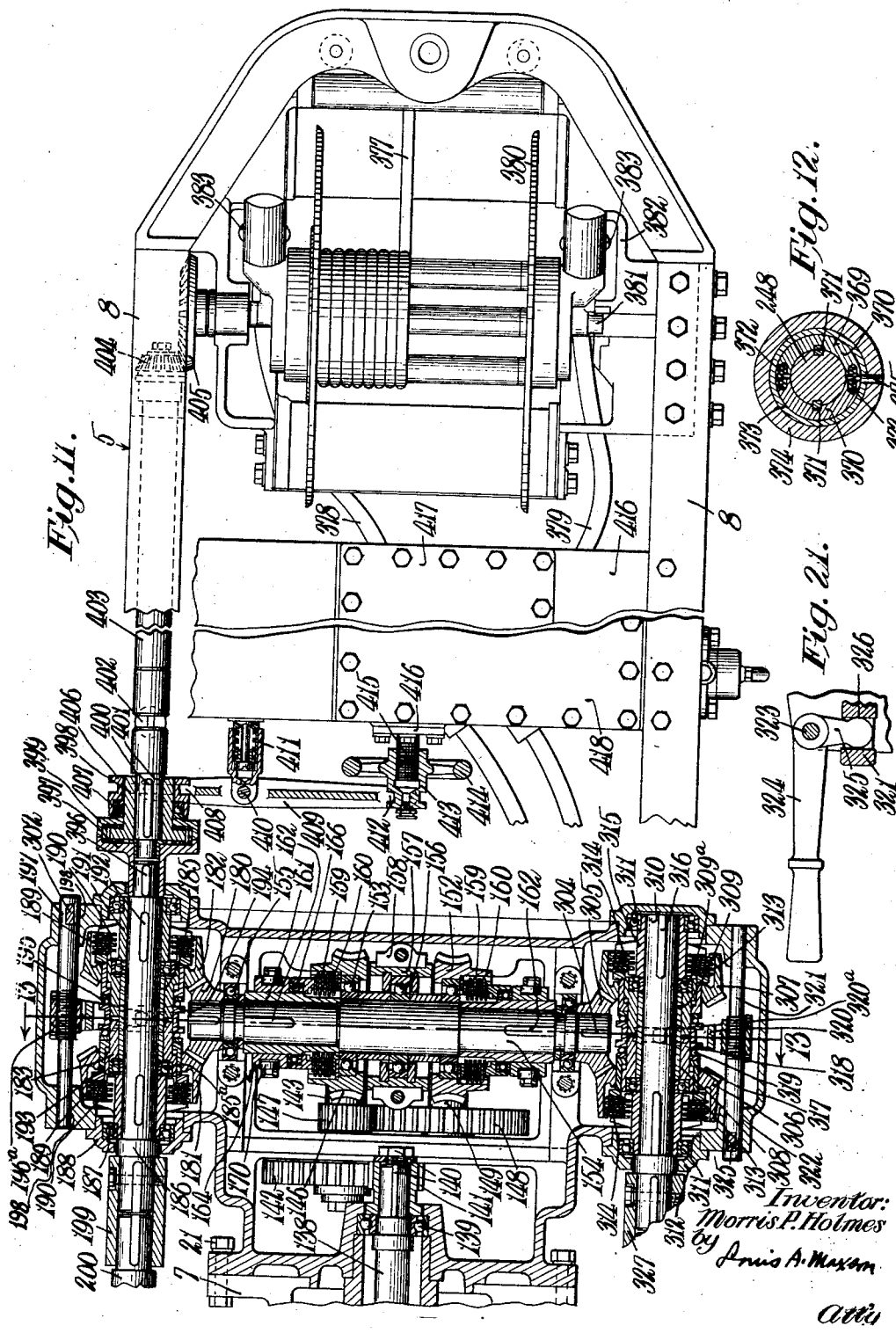


Fig. 11.

Fig. 12.

Fig. 21.

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MINING MACHINE

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Fig. 13.

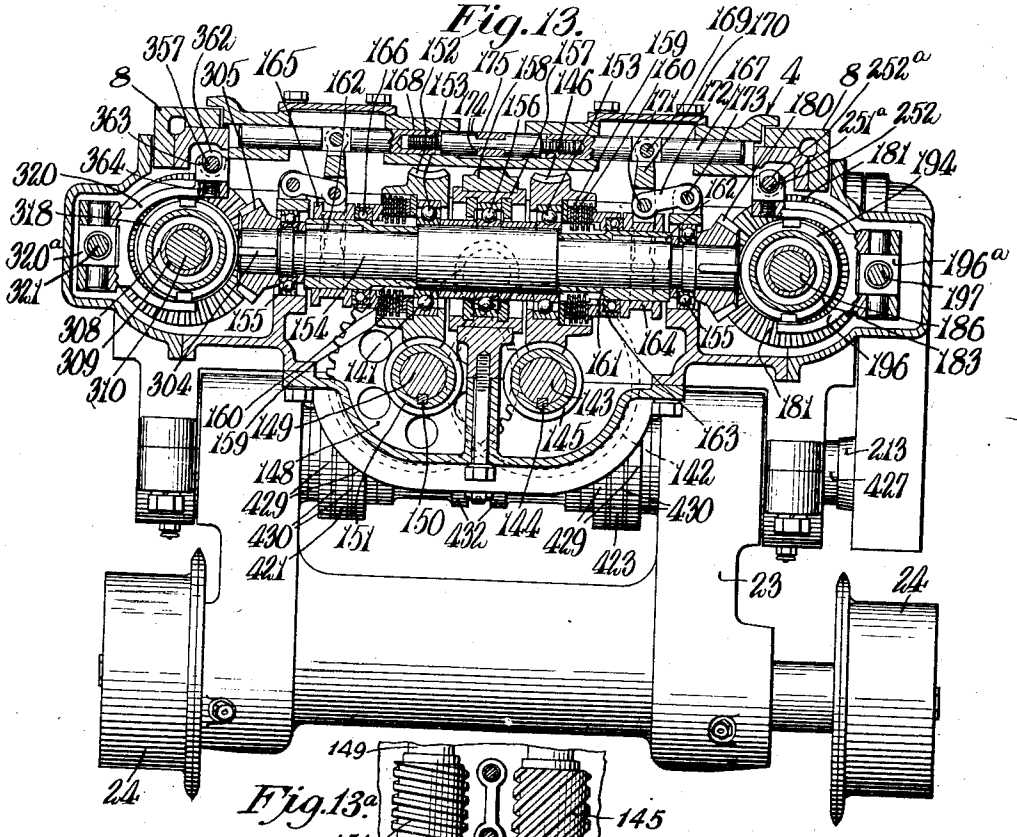


Fig. 13a.

Fig. 22.

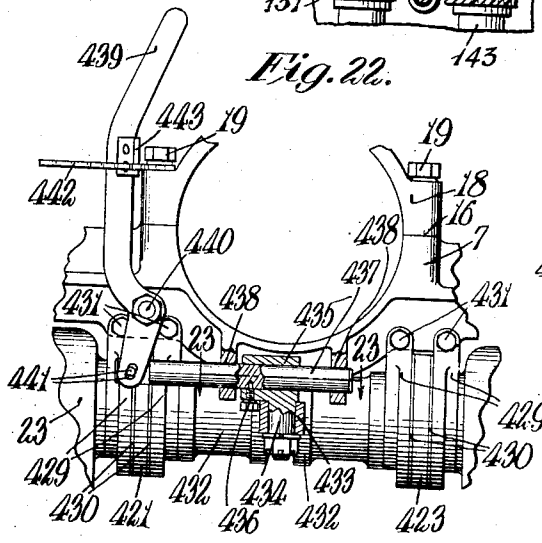
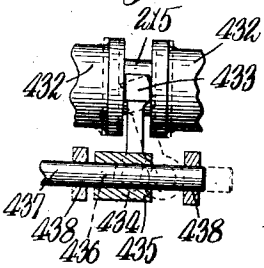


Fig. 23.



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UNITED STATES PATENT OFFICE

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MINING MACHINE

Application filed September 24, 1926. Serial No. 137,600.

This invention relates to mining machines and more particularly to mining machines of the wheel mounted type adapted to operate from the mine trackway.

An object of this invention is to provide an improved mining machine of the wheel mounted type. Another object of this invention is to provide an improved mining machine of the wheel mounted type adapted to operate either as a horizontal cutter or a vertical cutter. Still another object of this invention is to provide an improved mining machine of an exceedingly low compact character, especially adapted to use in mines having low head room, wherein improved and simplified driving mechanisms are provided for propelling the machine, for elevating and tilting the cutting mechanism, and for bodily rotating the cutter carrying head. A further object of this invention is to provide an improved mining machine of the combined horizontal and vertical cutter type wherein the cutter bar may be expeditiously adjusted into a plurality of operative positions. Still another object of this invention is to provide an improved mining machine of the wheel mounted type having improved elevating and tilting mechanism for the machine body whereby the elevation and angle of the cutter bar may be varied to suit different cutting conditions. Yet another object of this invention is to provide an improved mining machine of the wheel mounted type having a machine body carrying a motor and elevating means for said body and improved mechanism whereby the truck wheels may be driven from the motor irrespective of the elevation or angle of the machine body relative to the truck wheels. A still further object of this invention is to provide an improved simplified and exceedingly compact general arrangement of parts whereby the machine may be operated with facility and expeditiously in mines having narrow or low veins. Another object of the invention is to provide improved means for rotating the cutter carrying head. These and other objects and advantages of my invention will, however, hereinafter more fully appear.

Generally stated, the invention consists of the novel devices and combinations of devices hereinafter clearly described and defined in the appended claims.

In the accompanying drawings I have shown for purposes of illustration one form and a modification which my invention may assume in practice.

In these drawings,—

Fig. 1 is a top plan view of a mining machine constructed in accordance with an illustrative embodiment of my invention.

Fig. 2 is a side elevational view of the machine shown in Fig. 1, the machine being shown in its lowered position.

Fig. 3 is a side elevational view of the machine shown in Fig. 1 viewed from the opposite side thereof from that shown in Fig. 2, the machine being in its elevated position.

Fig. 4 is a somewhat diagrammatic view illustrating the elevating and tilting means for the machine body, different positions thereof being illustrated by dotted lines.

Fig. 5 is a horizontal longitudinally extending sectional view taken on line 5—5 of Fig. 2, parts being shown in plan.

Fig. 6 is a central vertical longitudinally extending sectional view taken on line 6—6 of Figs. 1 and 7.

Fig. 7 is a horizontal view of the mechanism shown in Fig. 6, the view being partially shown in section to illustrate details of construction.

Fig. 8 is a transverse vertical sectional view taken on line 8—8 of Figs. 1 and 7.

Fig. 9 is a transverse vertical sectional view taken on line 9—9 of Figs. 3 and 6.

Fig. 10 is a transverse vertical sectional view taken on line 10—10 of Fig. 3.

Fig. 11 is a horizontal longitudinally extending sectional view taken on line 11—11 of Fig. 2, the view being shown partially in plan.

Fig. 12 is a detail sectional view taken on line 12—12 of Fig. 9 illustrating the frictional device for preventing inadvertent rotation of the rotating mechanism for the cutter carrying head when the controlling clutches are released.

Fig. 13 is a transverse vertical sectional

view taken on line 13—13 of Figs. 2, 3, and 11.

Fig. 13ª is a detail view illustrating the fast and slow speed driving worms.

Fig. 14 is a detail sectional view taken on line 14—14 of Fig. 1.

Fig. 15 is a detail sectional view of the automatic clutch control for preventing excessive movement of the elevating and tilting mechanism for the machine body.

Fig. 16 is a detail sectional view taken on line 16—16 of Fig. 1 illustrating a portion of the operating connections for the bar rotating and truck drive controlling clutches and the reversing clutches therefor.

Fig. 17 is a detail setional view taken on line 17—17 of Fig. 16.

Fig. 18 is a detail sectional view taken on line 18—18 of Fig. 1.

Fig. 19 is a detail sectional view taken on line 19—19 of Fig. 18.

Fig. 20 is a detail sectional view taken on line 20—20 of Fig. 18, parts being omitted to facilitate illustration.

Fig. 21 is a detail view illustrating the control handle for the reverse controlling frictions of the elevating and tilting mechanism for the machine body.

Fig. 22 is a detail view, partially in section, illustrating the controlling connection for the truck wheel brake.

Fig. 23 is a detail sectional view taken on line 23—23 of Fig. 22.

Fig. 24 is a fragmentary plan view of a modified form of driving means for the reel for the electrical conductor cable.

Fig. 25 is a detail sectional view taken on line 25—25 of Fig. 24 illustrating the guide rolls for the cable reel drive rope.

In this illustrative embodiment of my invention I have shown a mining machine designated as an entirety by the reference character 1, the machine being of the so-called "universal" type mounted on wheels and operating from the mine trackway. The mining machine 1 generally comprises a section 2 housing the driving connections for the cutting mechanism, a motor section 3, and a section 4 housing the transmission means for the truck drive, for rotating the cutter carrying head, and for elevating and tilting the machine body, these sections 2, 3, and 4 being suitably mounted on a wheel mounted frame generally designated 5. The wheel mounted frame 5 includes longitudinally spaced transverse frames 6 and 7 held in rigid spaced relation by parallel longitudinally extending frame or angle members 8, the latter being suitably secured to the transverse frame members 6 and 7 as by screws 9, and the members 8 also support certain other portions of the machine as later described. As clearly shown in Figs. 5, 6, 9, and 10, the frame members 6 and 7 are respectively provided with semicircular bores which receive alined bearing sleeves 10 and 11 in which cylindrical portions formed on frame sections 12 and 13 are respectively rotatably mounted, the frame sections 12 and 13 being connected as by bolts 14 respectively to the opposite ends of the motor section 3, while the frame member 12 is also suitably connected as by bolts 15 to the rear end of the cutter carrying head 2. The transverse frame members 6 and 7 are each horizontally split, as at 16, and are provided with detachable cap members 17 and 18 respectively each held in position by suitable screws 19, these caps retaining the bearing sleeves 10 and 11 in position and permitting removal of the cutter carrying and motor frames from their bearings. As illustrated, the frame section 4 which houses the transmission mechanism for the truck drive, the machine body elevating and tilting mechanism, and head rotating mechanism is suitably rigidly secured to the longitudinally extending frame members 8 as by screws 20 and to the transverse frame member 7 by screws 21, the cutter carrying frame 2 and the motor frame section 3 being rotatable relative to the frame section 4 as hereinafter more fully described. As illustrated, suitably connected to the transverse frame members 6 and 7 are parallel supporting arms 22 and 23 which carry the truck wheels 24, the arms 22 and 23 and the wheels 24 constituting the supporting means for the machine.

In specifically describing my improved cutting mechanism generally designated 2 it will herein be noted that housed within the motor section 3 is a suitable driving motor 26 herein preferably of the usual reversible electric type having a longitudinally extending horizontal armature shaft 27 (see Fig. 5) journaled at its forward end within a ball bearing 28 supported by a detachable head member 29. The rear end of the armature shaft 27 is journaled in a ball bearing 30 supported by a detachable head member 31, the head members 29 and 31 being suitably supported within the frame section 3. The armature shaft 27 has suitably secured thereto at its forward end a member 32, the latter having a splined connection 33 with the rear end of a shaft 34 alined with the armature shaft and journaled at its forward end in a ball bearing 35 supported within the frame section 12, the rear end of the shaft 34 being supported by the ball bearing 28 for the forward end of the armature shaft 27. The shaft 34 has preferably formed integral therewith at its forward end and in front of the bearing 35, a clutch member 36. As shown, the clutch member 36 is internally bored as at 37 to receive a ball bearing 38 within which, and a ball bearing 39 suitably supported within the frame section 2, a shaft 40 is journaled, the shaft 40 being alined with shafts 34 and 27. The shaft 40 has suitably secured thereto at its rear end a clutch member 41 which is

adapted to be selectively connected by means of an axially movable clutch member 42 in driving relation with the clutch member 36. The clutch members 36, 41, and 42 constitute what will hereinafter be called the main power controlling clutch. The operating mechanism for this clutch will be subsequently fully described.

As illustrated, the shaft 40 has preferably formed integral therewith, at its forward end, a bevel pinion 43 which meshes with a large bevel gear 44 rotatable on an axis perpendicular to the axis of the shaft 40 and the gear 44 is journaled in suitable spaced alined ball bearings 45 suitably carried within the machine frame. The bevel gear 44 has preferably formed integral therewith a spur pinion 46, interposed between the gear 44 and the outer ball bearing 45, and this spur pinion meshes with a larger spur gear 47. The gear 47 is provided with an annular depending bearing sleeve 47ª journaled on spaced alined ball bearings 48 surrounding and supported by a cutter chain driving shaft 49 disposed on an axis parallel with the axis of the gear 44 and journaled respectively at its opposite ends within ball bearings 50 and 51, the former bearing 50 being supported within a detachable cover plate 52 secured to the frame section 2, while the latter bearing 51 is carried by a cylindrical bearing portion 53 secured as by screws 54 to a turntable or swivel mounting 55 for an elongated cutter bar 56. The shaft 49 has secured thereto at one end, as by a key and a radially expansible split washer connection 57, a cutter chain driving sprocket 58 of a well known form which is adapted to be driven through suitable connections hereinafter described by the motor driven gear 47. A cutter bit carrying cutter chain 59 is adapted to be circulated orbitally about the outer edges of the cutter bar 56 and is driven by the sprocket 58 in the usual manner. As illustrated, a resiliently positioned annular packing ring 60 is interposed between the cylindrical portion 53 and the adjacent plane surface of the cutter chain sprocket 58 and this member 60 prevents the entry of any foreign substance and thus prevents damage to and excessive wear of the drive sprocket shaft bearings and the cutter chain controlling clutch mechanism. This packing ring also prevents oil leakage from the casing. The cylindrical bearing portion 53 for the cutter bar is rotatably mounted within a bearing sleeve 61 supported by an annular portion 62 of the machine frame. As shown, the clutch for connecting the gear 47 and the sprocket 58 in driving relation comprises a clutch member 63 secured to the shaft 49 intermediate its ends as by a key 64. This clutch also includes a clutch member 65 rotatably mounted on a bearing sleeve 66 carried by the shaft 49 and the hub of this clutch member 65 is connected, as by a semi-permanent clutch 67, to the adjacent end of the bearing sleeve 47ª for the gear 47. These clutch members 63 and 65 are adapted to be connected in driving relation by means of a slidable clutch member 68 formed on a flanged shipper member 69 with which shipper mechanism later described may cooperate. It will thus be evident that by suitably actuating the clutch member 68 the sprocket 58 may be connected in driving relation with the motor or remain idle at the will of the operator, thus permitting the cutter chain to be moved in its orbit or remain idle.

In my improved bar swinging mechanism it will herein be observed that the cutter bar 56 is adapted to be swung or slued about its pivot by suitable mechanism hereinafter described of the same general type as that disclosed in my copending applications Ser. No. 694,139, filed Feb. 20, 1924 and Ser. No. 6,477, filed Feb. 2, 1925. This bar swinging mechanism includes means for swinging the bar at a slow cutting speed in one direction or at a fast bar positioning speed in the opposite direction. In specifically describing the mechanism for swinging the bar, it will be noted that the gear 47 meshes with spur pinions 70 and 70ª which have respectively secured thereto worms 71 and 71ª suitably journaled in the cutter carrying head as clearly shown in Fig. 8 and having teeth of different lead. These worms mesh with slow and fast feed worm gears 72 and 72ª respectively as clearly shown in Figs. 7 and 8. The worm gears 72 and 72ª are made hollow and each carries therein a series of clutch disks 73 which are interleaved with a corresponding series of clutch disks 74 carried by a clutch member 75 keyed, as at 76, to the ends of a shaft 77 disposed transversely of the machine. The worm gears 72 and 72ª are journaled on ball bearings 78 supported by the clutch members 75, while the shaft 77 is journaled at its opposite ends in ball bearings 79 supported within the cutter carrying head 2. Plate members 80 are provided for applying pressure to the friction disks and these members are provided with a central bore 81 through which an operating shaft 82 extends, the shaft 82 extending coaxially through the shaft 77 and having secured thereto at its opposite ends, operating handles 83 and 83ª. The shaft 82 is threadedly connected as at 84 to one end of the shaft 77. Each of the clutch members 75 is retained on the shaft 77 by means of a lock nut 85 threadedly connected to the shaft. The handles 83 and 83ª respectively engage the clutch shipper members 80. It will thus be evident that upon rotation of the rod 82 the latter is moved axially relative to the shaft 77 thereby forcing one plate 80 against an end clutch disk, applying the clutch and consequently connecting one or the other of the worm gears 72 and 72ª

to the shaft 77 to effect rotation of the latter in the desired direction at the desired speed. As illustrated, a worm 86 is preferably formed integral with the shaft 77 and meshes with a worm gear 87 (see also Fig. 6), keyed as at 88 to a member 89 loosely journaled on a shaft 90, the shaft 90 being disposed parallel with and in front of the shaft 49. The shaft 90 is journaled in suitable spaced alined ball bearings 91 and 92 at its ends, the former bearing 91 being carried within a detachable cover plate 93 secured to the frame section 2, while the latter bearing 92 is supported within a retaining member 94 also carried within the frame section 2. The shaft 90 has preferably formed integral therewith a spur pinion 96 which meshes with a large internal gear 97 disposed with its axis coincident with the axis of the sprocket 58 and bolted, as at 98, to the turntable or swivel mounting 55 for the cutter bar 56. This mounting also provides a guard for the machine end of the cutter bar. Furthermore, it will be observed, formed between the internal gear 97 and a radially flanged portion 99 formed integral with the cutter bar mounting 55 is a circumferentially extending groove 100 within which thrust ring 101 projects, the ring being suitably secured, as by bolts 102, to the frame section 2. The shaft 90 has secured thereto at the end thereof opposite from the spur pinion 96, as by a key 103, a clutch member 104, while the member 89 has preferably formed thereon a clutch member 105. The clutch members 104 and 105 are adapted to be connected in driving relation by means of an axially movable clutch member 106. Obviously upward movement of the clutch member 106 disconnects the clutch member 104 from the worm gear 87 and permits the free rotation of the latter and free swinging movement of the cutter bar.

It is desirable to first make a power connection of the cutting mechanism gearing, thereafter to effect bar swing if necessary and then finally to engage the clutch which effects cutter chain driving sprocket rotation. This predetermined sequence of operations is accomplished by rotation of operating handles 107 mounted upon a shaft 108 extending transversely of the machine. The shaft 108 carries thereon in non-rotative relation thereto a disk 109 provided with a cam groove 110. This cam groove comprises a plurality of arcuate or non-movement producing portions and a plurality of more nearly chordal portions producing movement of the elements controlled thereby and within the cam groove there are engaged three rollers 111, 112, and 113. The roller 111 is rotatably mounted upon a shaft 114 extending across the bifurcated end 115 of a longitudinally extending reciprocable clutch shipper rod 116. The rod 116 has a portion 117 engaging in the peripheral groove 118 of the clutch shipper gear 42 of the main power controlling clutch. The roller 112 is rotatably mounted upon a transversely extending shaft 119 which extends between the rearward ends of brackets 120 mounted upon the rearward ends of a pair of parallel longitudinally slidable actuating rods 121 which are pivotally connected at their forward ends as at 122 to depending arms 123 rotatably supported by means of sleeve journal members 124 upon the shaft 77. The journal members 124 also carry forwardly projecting parallel arms 125 having portions 126 engaging in the annular groove 127 of the clutch shipper gear 106. The roller 113 is journaled upon a shaft 128 connecting the spaced arms 129 of the clutch shipper yoke 130 whose fork 131 operatively engages in the annular groove 69 in the reciprocable cutter chain driving sprocket engaging clutch 68. From the foregoing it will be obvious that the movements of the roller 111 control the connection of the main power controlling clutch comprising the elements 36, 41, and 42, that the movements of the roller 112 control the connection of the clutch member 104 with the worm gear 87 and so determine whether the cutter bar shall be free for pivotal movement or shall be locked or swung by power as may be determined by the operation of the handles 83 and 83a, and the position of roller 113 determines whether or not the cutter chain driving sprocket shall be operatively connected to the driving gear 47. The operation of this improved common cam control for the clutches heretofore described is clearly described in my copending application, Ser. No. 109,740, filed May 17, 1926 and therefore further description herein is considered unnecessary.

In specifically describing my improved truck wheel propulsion mechanism it will herein be noted that the rear end of the armature shaft 27 has secured thereto as by a key 135 a member 136 which is splined as at 137 to a shaft 138, the front end of the shaft 138 being supported by the member 136, while the rearward end of this shaft is journaled in a ball bearing 139 suitably carried within the frame section 4 as clearly shown in Figs. 5 and 11. This shaft 138 has secured thereto at its rear end as by a key and bolt connection 140 a spur pinion 141 which meshes with a larger spur gear 142 suitably secured to a shaft 143 suitably journaled within the frame section 4, the shaft 143 being disposed parallel with the shaft 138 and slightly below the latter (see also Fig. 13). The shaft 143 has keyed thereto, as at 144, a fast feed worm 145 which meshes with a worm gear 146. Also secured to the shaft 143 between the worm 145 and the spur gear 142 is a spur pinion 147 which meshes with a larger spur gear 148 secured to a shaft 149 disposed parallel with the shaft 143 and

in the same transverse horizontal plane. The shaft 149 has keyed thereto, as at 150, a slow speed worm 151 which meshes with a worm gear 152. As shown, the worm gears 146 and 152 are journaled on ball bearings 153 carried by a horizontal shaft 154 disposed transversely of the machine and journaled at its opposite ends in ball bearings 155 suitably carried within the frame section 4, the central portion of the shaft 154 being journaled in a ball bearing 156 carried within a retaining member 157 suitably supported within an annular boss 158 formed within the frame section 4. As the clutch mechanisms for connecting the gears 146 and 152 to the shaft 154 to effect rotation of the latter at a fast or at a slow speed are substantially identical, detailed description of one will suffice for both. The gear 146 is made hollow and carries therein a series of clutch disks 159 which are interleaved with a corresponding series of clutch disks 160 carried by a clutch member 161 keyed, as at 162, (see Fig. 11) to the shaft 154. Encircling the clutch member 161 and axially slidable thereon is a clutch applying member 163. Also encircling the clutch members 161 and disposed at opposite ends of the shaft 154 are clutch shipper members 164 and 165, suitable ball thrust bearings 166 being interposed between the members 163 and the members 164, 165 respectively. As clearly shown in Fig. 13 disposed above the shaft 154 and parallel therewith is a plural-part actuating rod 167 slidably mounted in bores 168 formed within the frame section 4. Pivotally connected adjacent the opposite ends of the rod 167, as at 169, are clutch shipper yokes 170 cooperating respectively with the clutch shipper members 164 and 165. These clutch shipper yokes 170 are also pivotally connected, as at 171, to link members 172, these link members in turn being pivotally connected, as at 173, to a portion of the machine frame. As shown, the intermediate portion of the actuating rod 167 is transversely slotted at the top and bottom thereof, as at 174, and the bifurcated end of a pivoted lever 175 cooperates with these slots as clearly shown in Fig. 14. The lever 175 is pivoted, as at 176, on the machine frame and carries on its arm opposite from its bifurcated end a nut 177 which is threadedly connected to a rotatable operating rod 178, the latter carrying at its outer end an operating handle 179 (see Fig. 1). It will thus be evident that upon suitable manipulation of the handle 179 the rod 178 is rotated and consequently the nut 177 is moved axially relative to the rod, effecting swinging movement of the lever 175 and sliding the actuating rod 167 axially thereof, swinging the shipper yokes 170 about their pivots 171, consequently applying the desired friction clutch to connect either the fast speed or the slow speed worm gear in driving relation with the shaft 154. The shaft 154 is rotated in the same direction at a slow speed or at a fast speed at will. As clearly shown in Figs. 11 and 13 suitably secured to one end of the shaft 154 is a bevel pinion 180 which meshes with bevel gears 181 and 182, these gears 181 and 182 rotating in opposite directions and constituting a reversing mechanism as hereinafter fully described for driving the truck wheels and rotating the cutter carrying head in opposite directions. The gears 181 and 182 are each provided with a hub portion 183 journaled on a bearing sleeve 185 and ball bearings 185[a] carried by a shaft 186, this shaft being disposed perpendicular to the shaft 154 and extending longitudinally of the machine. As shown, the shaft 186 is journaled at its opposite ends on suitable ball bearings 187 carried within detachable cover plates 188 suitably secured within the frame section 4. Carried within each of the gears 181, 182 is a series of clutch disks 189 which are interleaved with a corresponding series of clutch disks 190, respectively carried by clutch members 191 keyed, as at 192, adjacent the opposite ends of shaft 186. Encircling the hubs of the gears 181, 182 are clutch applying members 193 having fingers, projecting through apertures formed in their respective gears into engagement with the clutch disks. Disposed intermediate the clutch applying members 193 and encircling the hubs of the bevel gears is a clutch shipper 194, suitable ball thrust bearings 195 being disposed between the clutch shipper member 194 and each of the clutch applying members 193. Cooperating with the peripheral groove formed on the clutch shipper member 194 is a clutch shipper yoke 196 pivotally connected to a nut member 196[a] adjustably mounted on an actuating rod 197, the latter being slidably mounted within alined bores 198 formed within the frame section 4. The operating mechanism for the clutch shipper yoke 196 will be subsequently described. It will thus be evident that when the clutch within one or the other of the bevel gears 181, 182 is applied, the shaft 186 may be rotated in one direction or the other and also at either a fast or a slow speed under the control of the friction clutches 159, 160 for the worm gears 146, 152. As shown, secured to the forward end of the shaft 186 as by a detachable coupling member 199 and alined therewith is a shaft 200 which is journaled at its forward end in a ball bearing 201 carried within a detachable cover member 202 suitably secured to the transverse frame member 7. The shaft 200 has secured thereto at its forward end a bevel pinion 203 which meshes with a larger bevel gear 204 rotatably mounted on a horizontal shaft 205 disposed perpendicular to the shaft 200 and extending transversely of the machine as clearly shown in Fig. 5. The shaft 205 is journaled at its opposite ends in alined ball bearings 206 suit-

ably carried by the transverse frame member 7. Herein preferably formed integral with the bevel gear 204 is a spur gear 207, while preferably formed integral with the shaft 205 is a spur gear 208 and these gears 207 and 208 are adapted to be connected in driving relation by means of an axially movable internal shipper gear 209. The actuating mechanism for the shipper gear 209 will be subsequently described. Secured to the outer end of the shaft 205 as by a screw and key connection 210, is a chain sprocket 211 and this chain sprocket is connected, as clearly shown in Fig. 10, by an endless chain connection 212 to a chain sprocket 213. The chain sprocket 213 is secured, as by a key and screw connection 214, to a horizontal shaft 215 extending transversely of the machine. Secured to the end of the shaft 215 opposite from the sprocket 213 as by a key 216 is a chain sprocket 217. Connected as by a semi-permanent clutch 218 to the inner end of the chain sprocket 217 is a sleeve member 219, this latter member in turn being clutched, as at 220, to a chain sprocket 221. The sprocket 221 is connected as by an endless chain connection 222 to a sprocket 223 keyed, as at 224, to one end of a horizontal axle 225 disposed below and parallel with the shaft 215 and by which the rear truck wheels 24 are carried. The axle 225 is journaled at its opposite ends in suitable roller bearings 226 carried within the lower end of the supporting arm 23. The shaft 215 is journaled at its opposite ends in suitable roller bearings 227 carried within the opposite sides of the transverse frame member 7. As shown, the upper end of each supporting arm 23 is rotatably mounted for swinging movement on roller bearings 228 supported by the shaft 215. In accordance with this invention the chain sprocket 217 is connected as by an endless chain connection 229 to a chain sprocket 230 secured as by a key and screw connection 231 to a horizontal shaft 232, the latter being journaled at its inner end in a ball bearing 233 while the outer end of this shaft is journaled in a roller bearing 234, these bearings being carried by the frame section 6. Axial displacement of the shaft 232 is prevented by means of a retaining disk 235 engaging the inner race of the ball bearing 233 and a bolt 236 extends coaxially through the shaft 232 and is threadedly connected, as at 236[a], to the disk 235. As clearly shown in Fig. 9 the chain sprocket 231 is connected as by a clutch connection 237 to a sleeve member 238 supported on the shaft 232 and this member 238 is in turn connected as by a clutch 239 to a chain sprocket 240. The chain sprocket 240 is connected, as by an endless chain connection 241, to a chain sprocket 242 keyed, as at 243, to the front truck axle 244, the latter being disposed parallel with the axle 225 heretofore described. The axle 244 carries the front truck wheels 24 and is journaled at its opposite ends in roller bearings 245 each carried within the lower end of the supporting arm 22. The upper end of the arm 22 is rotatably mounted for swinging movement on a roller bearing 246 supported at the side thereof adjacent the sprocket 230 on the shaft 232, while the other side is supported on a roller bearing 247 supported by a shaft 248 to be described later.

In this instance, the shipper gear 209 is adapted to be shifted axially by means of a shipper yoke 250 (see Figs. 10 and 20) keyed, as at 251, to a rotatable rod 252. The shipper yoke 196 has threaded thereto a bifurcated member 251[a] (see Figs. 13 and 20) which embraces a reduced portion 252[a] formed on the rod 252. The member 251[a] and the groove 252[a] form the fulcrum for the inner end of the shipper yoke. Further, the rear end of the rod 252 has secured thereto an arm 253 having a forked portion 254 embracing a circumferentially grooved portion 255 formed on a horizontal rod 256 disposed transversely of the machine and suitably guided thereon. Secured to the rod 256 as shown in Figs. 1 and 17 is a handle 257. The operator may grasp the handle 257 and slide the rod 256 axially, swinging the arm 253 and consequently rotating the rod 252, thereby effecting axial movement of the shipper gear 209. It will be evident that when the gears 207 and 208 are connected by the shipper gear 209, it being understood that the shaft 200 is rotating, the truck wheels may be driven. Furthermore, as the shaft 200 may be rotated in opposite directions and either at fast or slow speeds, it is also evident that the truck wheels may be rotated in opposite directions at either a fast or a slow speed.

In specifically describing the improved mechanism for bodily rotating the motor casing and cutter carrying head to vary the plane of the cutter bar, it will be noted that meshing with the bevel gear 204 (see Fig. 5) is a bevel pinion 258 secured to the rear end of a shaft 259 alined with the shaft 200 and journaled at its rear end in a ball bearing 260 carried by a detachable cover plate 261 suitably secured to the transverse frame member 7. The forward end of the shaft 259 is connected, as by a detachable coupling member 262, to the rear end of a shaft 263, the latter being journaled at its forward end in a ball bearing 264 carried within a detachable cover plate 265 suitably secured to the transverse frame member 6. As shown, the shaft 263 has secured thereto, at its forward end, a bevel pinion 266 which meshes with a bevel gear 267 rotatably mounted on a horizontal shaft 268 disposed parallel with the shaft 205 heretofore described. The shaft 268 is journaled at its opposite ends in alined ball bearings 269 carried by the transverse frame member 6. Herein preferably formed inte-

gral with the bevel gear 267 is a spur gear 270, while preferably formed integral with the shaft 268 is a spur gear 271 and these gears are adapted to be connected in driving relation by means of an axially movable internal shipper gear 272. It will further be noted that secured to the outer end of the shaft 268 as by a key and screw connection 273, is a chain sprocket 274 and this sprocket is connected by means of an endless chain connection 275 with a chain sprocket 276 secured as by a key and screw connection 277 to the outer end of the shaft 248. The shaft 248 is journaled in ball bearings 278 and a roller bearing 279 carried by the transverse frame member 6. As clearly shown in Figs. 6 and 9 the shaft 248 carries adjacent its inner end a worm 280 which meshes with a worm gear 281 (see also Fig. 5) secured by bolts 282 to the frame member 12 and disposed coaxially with the motor. It will be observed that the frame member 12 is preferably composed of two parts to facilitate manufacture, assembly and the dismantling of the machine. The gear 272 is adapted to be shifted axially by means of a shipper yoke 283 (see Figs. 9 and 20) keyed, as at 284, to the rotatable rod 252. The shipper yokes 250 and 283 are so arranged that when the shipper gear 209 is connected the shipper gear 272 is disconnected and vice versa. From the foregoing description it will be evident that when the gears 270, 271 are connected by the gear 272, it being understood that the shaft 263 is rotating, the worm gear 281 is consequently rotated and the cutter bar may thus be moved to operate in different planes, i. e. a horizontal plane or a vertical plane or in any desired intermediate plane. As shown in Figs. 16, 17, and 19 improved connections are provided to permit the rod 256 to also control the application of the clutches 189, 190 for alternatively connecting the reverse bevel gears 181, 182 in driving relation with the shaft 186. This mechanism comprises a lever 285 suitably secured as by a bolt 286 to a member 287 having adjustably mounted thereon an eccentric pin 288 which is disposed in a bore 289 formed in a member 290, the latter being threadedly connected, as at 291, to one end of a link 292. As shown in Fig. 17 the opposite end of the link 292 is pivotally connected at 293 to a member 294, the latter member having a bifurcated portion 295 connected by slot and bolt 296, to the rod 256. Secured to the end of the rod 256 adjacent the rod 252 as shown in Figs. 18 and 19 is an arm 297 having its projecting end 298 cooperating with a bifurcated portion 299 formed on a bell crank 300, the latter being pivotally mounted, as at 301, on the machine frame. The arm 302 of the bell crank 300 opposite from the bifurcated portion projects within an aperture 303 formed within the rod 197 (see also Fig. 11). From the foregoing, it will be evident that when the operator suitably manipulates the lever 285 and the rod 256 is rotated, the rod 252 remains stationary, the groove 255 in the rod 256 permitting free rotation of the latter relative to the shipper arm 253. As the rod 256 is rotated the arm 298 causes the bell-crank 300 to be swung about its pivot 301 thereby effecting axial movement of the rod 197 and the desired clutch 189, 190, controlling the connection of the gears 181, 182 to the shaft 186, is applied. It will also be noted that when the shaft 256 is moved axially to effect rotation of the rod 252 the projection 298 formed on the arm 297 merely slides within the bifurcated portion 299 of the bell-crank 300, thereby permitting the rod 197 to remain stationary.

In specifically describing the improved mechanism for elevating and tilting the machine body, it will herein be noted that secured as by a key 304 to the end of the shaft 154 opposite from the bevel gear 180 is a bevel pinion 305 (see Fig. 11) which meshes with bevel gears 306 and 307. The bevel gears 306 and 307 rotate in opposite directions and constitute a reversing mechanism. Furthermore the gears 306 and 307 are each provided with a hub portion 308 journaled on a bearing sleeve 309 and ball bearings 309ª carried by a shaft 310, this shaft being disposed perpendicular to the shaft 154 and extending longitudinally of the machine. As shown, the shaft 310 is journaled at its opposite ends on ball bearings 311 carried within detachable cover plates 312 suitably secured within the frame section 4. Carried within each of the gears 306 and 307 is a series of clutch disks 313 which is interleaved with a corresponding series of clutch disks 314 respectively carried by clutch members 315 keyed, as at 316, adjacent the opposite ends of the shaft 310. Encircling the hubs of the gears 306, 307 are clutch applying members 317 having fingers projecting through apertures formed in their respective gears into engagement with the end clutch disks. Disposed intermediate the clutch applying members 317 and encircling the hubs of the bevel gears is a clutch shipper member 318, suitable ball thrust bearings 319 being disposed between the clutch shipper member 318 and each of the clutch applying members 317. Cooperating with the peripheral groove formed on the clutch shipper member 318 is a clutch shipper yoke 320 pivotally connected to a nut member 320ª adjustably mounted on a rod 321, the latter being slidably mounted within alined bores 322 formed within the frame section 4. Pivoted on the machine frame, as at 323, (see Fig. 21) is an operating handle 324 in the form of a bell-crank and having one of its arms 325 projecting within an aperture 326 formed within the rod 321. It will thus be evident that when the operator suitably manipulates the handle 324 the rod 321 is moved axially

in the desired direction, thereby effecting application of the desired friction clutch and the shaft 310 is consequently rotated in one direction or the other. The forward end of the shaft 310 is connected, as by a detachable coupling member 327 (see Fig. 5) to the rear end of a screw threaded shaft 328, this shaft 328 being journaled at its forward end in the bearing sleeve 329 carried within a detachable cap member 330 suitably secured to a clutch housing 331, the latter in turn being rigdily secured to the adjacent frame member 8. As illustrated, secured to the forward end of the shaft 328 as by a key and lock nut connection 332 is a spur gear 333 which is adapted to be connected by means of an axially movable internal shipper gear 334 to a spur gear 335 secured by a key and lock nut connection 336 to the rear end of a similar screw threaded shaft 337 alined with the shaft 328 and this shaft 337 is journaled at its rear end in a bearing sleeve 338 carried by a detachable cap member 339 suitably secured to the clutch housing 331. Interposed between a flange 340 formed on each of the shafts 328, 337 and the hubs of each of the gears 333 and 335 is a ball thrust bearing 341 and these bearings absorb the thrust of the shafts 328 and 337 in either direction. The screw threaded shafts 328 and 337 are respectively threadedly connected as at 342 to nut numbers 343 and 344 of rectangular cross section slidably mounted in suitable guide ways, these members 343, 344 each having formed thereon at the bottom thereof, teeth 345 which cooperate with teeth 346 formed on arcuate members 347 and 348 secured as by screws 349 to the machine supporting arms 22 and 23, respectively. As shown in Fig. 5 the internal gear clutch member 334 is adapted to be shifted axially by means of a shipper yoke 350 having an elongated guide portion 351 slidably mounted in a slot or guide way 352 formed within the clutch housing 331. A screw 353 is threadedly connected to the shipper yoke 350 and projects outwardly through an elongated slot 354 formed in the gear housing 331 and this screw carries thereon a resiliently positioned operating member 355, a spring 356 being provided for yieldably maintaining the operating member 355 in engagement with locking apertures in the gear housing. From the foregoing description it will be evident that when the gears 333 and 335 are connected by the gear 334, it being understood that the shaft 310 is rotating, the screw threaded shafts 328 and 337 are also rotated and consequently the nut members 343 and 344 are moved axially in their guides thereby swinging the supporting arms 22 and 23 respectively about their supporting bearings 246, 247, and 228 and the machine body is consequently elevated or lowered as desired. Furthermore, it will be noted that if the gears 335 and 333 are disconnected the shaft 337 remeans stationary while the shaft 328 rotates, consequently effecting swinging movement of only the rear supporting arm 23 and tilting the machine body about the front truck axle 244. It is obvious that the arms 22 and 23 may be swung in opposite directions at either a fast or a slow speed.

Axial movement of the members 343 and 344 is limited by improved automatic stop and clutch release mechanism which comprises a reciprocable rod 357 disposed parallel with and above the shafts 328 and 337 as clearly shown in Figs. 9 and 10. The rod 357 has secured thereto at longitudinally spaced points stop or abutment members 358 and 359 having depending portions projecting within flattened or slotted portions 360 formed on the members 343 and 344 respectively. The ends of these slotted portions in the members 343 and 344 are each provided with abutments 361. The rear end of the rod 357 is circumferentially grooved at 362 and the reduced portion of this rod is embraced by a bifurcated member 363 (see Fig. 13) threadedly connected as at 364 to the shipper yoke 318 (see Fig. 11). The groove 362 and the member 363 form the fulcrum for the inner end of the shipper yoke 318. As clearly shown in Fig. 15 disposed on opposite sides of a relatively stationary abutment 365 formed on the upper portion of the clutch housing 331 and encircling the rod 357 are coiled springs 366 and 366a, respectively engaging adjustable collars 367 and 368 threadedly connected to the rod. These springs are adapted to normally maintain the clutch shipper member 318 in its neutral or inoperative position: From the foregoing it will be evident that before the nut members 343 and 344 reach their limit of movement in opposite directions the stop members 358 and 359 engage one or the other of the end abutments 361 formed on the members 343, 344 respectively and upon continued movement of these nut members the rod 357 is shifted axially and the clutch 313 and 314 connecting one or the other of the gears 306, 307 to the shaft 310 is automatically released, consequently preventing excessive movement of the members 343, 344. Therefore, the rotation of the screw threaded shafts 328, 337 is automatically discontinued when the machine body reaches its extreme elevated, lowered, or tilted positions.

To prevent inadvertent rotation of the shaft 248 carrying the worm 280 and consequently of the cutter carrying head a friction device generally designated 369 is provided (see Figs. 9 and 12) which comprises a plurality of semi-circular plate members 370 keyed to the shaft 248 as at 371, and reacting between these members 370 are suitable coiled springs 372 which force the members 370 outwardly against the inner surface of a sleeve

373, the latter being held in non-rotative relation with respect to an annular hub portion 374 formed on the frame section 6 by means of a radial pin 375. The frictional engagement between the sleeve 373 and the members 370 retards rotation of the shaft 248 and consequently the worm 280 when the clutches controlling rotation of the shaft 248 are released, thereby preventing unintentional rotation, due to vibration or other causes, of the gear 281 at that time. A similar friction retarding device generally designated 376 (see Fig. 7) is provided for the bar swing shaft 77 and this friction device resists rotation of the worm 86 when the bar swing controlling clutches are released. As this frictional device 376 is clearly described in my copending application Ser. No. 6,477 mentioned above, further detailed description of the same is herein deemed unnecessary.

As illustrated, electric current is adapted to be conducted to the electric driving motor 26 through suitable conductor cables 377, 378, 379 (see Fig. 11). The cable 377 is connected to a suitable cable reel 380 journaled, as at 381, upon a bracket member 382 suitably carried by the frame members 8. Suitable slip ring connections (not shown) are provided between the reel and connector plugs 383, the cables 378, 379 leading respectively from these connector plugs through certain electrical devices hereinafter described to a housing member 384 carried on top of the transverse frame member 7 (see Fig. 10). The wires housed within the conductor cables 378, 379 are connected through suitable terminals 385 and wires 386 to resilient contact members 387 suitably secured to the cap member 18. These contact members 387 slidably engage slip rings 388 (see also Fig. 5) secured as by screws 389 to a cylindrical member 390, the latter in turn being connected as by screws 391 to a member 392. The member 392 surrounds the shaft 138 and is journaled at its opposite ends within bores 393 and 394 formed within the frame sections 13 and 4 respectively. The forward end of the member 392 is connected as by a semi-permanent clutch 395 to the head member 31. It will thus be evident that the contact rings 388 rotate bodily with the motor and current is adapted to be supplied through these slip rings and the sliding contacts to the motor irrespective of the position of the motor frame relative to the frame 4. The cable reel 380 is adapted to be rotated by power in opposite directions and the mechanism for accomplishing this is clearly shown in Fig. 11. Secured as by a key 396 is a clutch member 397 which is adapted to be connected to a clutch member 398 by means of a clutch applying member 399 to be later described. The clutch member 398 is keyed at 400 to a shaft 401, the latter in turn being connected through a universel joint 402 of a well known form to a shaft 403. As shown, the shaft 403 has secured thereto at its rear end a bevel pinion 404 which meshes with a bevel gear 405 suitably secured to the reel drive shaft. The clutch applying member 399 is adapted to be shifted axially to effect frictional engagement between the members 397 and 398 by means of a shiftable member 406 encircling the hub of the member 398. Interposed between the member 399 and the member 406 is a ball thrust bearing 407. Cooperating with the grooved periphery of the member 406 is a shipper yoke 408 formed on one arm of a lever 409 pivoted at 410 on a yieldable mounting 411. The other arm of the lever 409 is provided with a bifurcated portion 412 which cooperates with the grooved periphery of a rotatable nut 413, the latter having formed thereon a hand wheel 414 and is threadedly connected, as at 415, to a stationary threaded member 416. It will thus be evident that when the hand wheel 414 is rotated it moves axially relative to the threaded member 416, consequently swinging the lever about its pivot 410 thereby causing a driving connection between the shaft 186 and the shaft 401 and the reel is consequently rotated. The mounting 411 is adapted to yield upon overload. Also mounted on the rear end of the supporting frame adjacent the reel is a main line switch and fuse box 416, a rheostat 417, and a controller 418, the uses of which are well known and need not herein be described other than to state that the cables 378, 379 lead into and from the same. It will also be observed from Figs. 1 and 2 that suitable sand boxes 419 and 420 are carried by the supporting frame for supplying sand to the track rails to lessen the possibility of slippage between the truck wheels and the rails, especially when the machine is moving up a steep incline.

Improved braking means is also provided for controlling rotation of the truck wheels and this means comprises a rotatable brake drum 421 (see Fig. 10) connected as by a semi-permanent clutch 422 to the chain sprocket 221 and this brake drum is supported by the shaft 215. A similar rotatable brake drum 423 is carried on the opposite side of the longitudinal vertical center of the machine and this drum is connected as by a semi-permanent clutch 424 to a collar 425 which is in turn connected by a clutch 426 to a sleeve member 427, the latter in turn being connected as by a clutch 428 to the chain sprocket 213. Disposed on opposite sides of each of the brake drums 421, 423 are brake shoes 429 having secured thereto at their inner adjacent faces friction braking material 430. These brake shoes 429 are loosely supported on the transverse frame member 7 by means of bolts 431, there being a slight clearance between the openings in the brake shoes and the supporting bolts to permit limited movement of

the brake shoes toward and from each other. It is evident that when the truck wheels rotate the brake drums 421, 423 simultaneously rotate therewith. To effect frictional engagement between the brake drums and the relatively stationary brake shoes axially movable applying members 432 are provided surrounding the shaft 215 and slidable longitudinally thereon. Interposed between the inner adjacent ends of the members 432 (see also Figs. 22 and 23) is a shipper yoke 433 pivotally connected, as at 434, to a member 435 secured as by a screw 436 to a horizontal rod 437 reciprocable transversely of the machine and slidably mounted in bores 438 formed in the machine frame. An operating lever 439 is provided pivotally mounted as at 440 on the machine frame and the lower end of this lever is connected as by a pin and slot connection 441 to the outer end of the rod 437. It will thus be evident that when the lever 439 is swung about its pivot the rod 437 is shifted axially and the shipper yoke 433 consequently fulcrums against the adjacent end surfaces of the members 432, thereby forcing them apart and applying the brakes. A notched segment 442 is provided for maintaining the lever 439 in its different adjusted positions, a dog 443 carried by the lever cooperating with the notches in the segment.

In the modification shown in Figs. 24 and 25 it will be observed that the driving connections between the shaft 403 and the cable reel 380 shown in the preferred form of my invention have been slightly modified. As clearly shown in Fig. 24, secured to the rear end of the shaft 403 is a pulley 445 with which a flexible endless belt or rope connection 446 cooperates, this flexible rope connection passing around guide sheaves 447 and 448 (see Fig. 25) adjustably mounted at 449 and 450 respectively on a detachable bracket 451 carried by the machine frame. The rope passes from these guide rolls 447, 448 around the pulley 452 suitably secured to the reel driving shaft. The bracket 451 is adapted to be held in different adjusted positions relative to the machine frame by means of a nut and screw connection 453.

The general mode of operation of the machine will now be described. It will be assumed that the machine is moving forwardly about the mine along the trackway in the main entry at a fast or transport speed under the control of the friction clutch 159, 160, connecting the fast feed worm gear 146 to the shaft 154 and the clutch 189, 190 connecting the bevel gear 181 to the shaft 186 and when the working face of the coal is reached, these clutches are then released. It is obvious that upon application of the clutch 189, 190 connecting the bevel gear 182 to the shaft 186 the machine may be propelled rearwardly at a fast speed. If an undercut is desired to be made, the main power controlling clutch 36, 41, 42, and the bar swing controlling clutch 104, 105, 106 are connected and the operator then manipulates the handle 83ª controlling the fast bar swinging friction and the bar is swung or slued about its pivot at a fast speed to a point adjacent the right hand rib, the fast feed bar swing clutch thereafter being released. The cutter chain controlling clutch 63, 65, 68 is thrown into operative driving relation and the cutter chain sprocket 58 is then actuated through transmission means from the motor. The friction clutch 159, 160 for connecting the slow speed worm 152 to the shaft 154 and the clutch 189, 190 connecting the bevel gear 181 to the shaft 186 are applied and the clutch 207, 208, 209 is connected and the bar is sumped or fed into the coal at a slow or cutting speed, the machine moving bodily along the trackway at that time. The worm 86 and worm gear 87 prevent rotation of the bar swinging mechanism and lock the cutter bar 56 in position at this time. When the sumping cut is completed, the operator swings the lever 439, effecting application of the brakes 421, 423, 429, preventing rotation of the shaft 215 and consequently rotation of the truck wheels. The handle 83 is then manipulated and the slow speed bar swing friction clutch is applied and the bar is swung about its pivot to effect the swinging cut at a cutting speed, the slow bar swinging clutch thereafter being released. The truck wheel brake is then released and the clutch 207, 208, 209 is connected and the clutch 189, 190 connecting the bevel bear 182 to the shaft 186 is applied, reversing the rotation of this shaft, and the cutter bar is withdrawn from the coal at a cutting speed, the worm 86 and the worm gear 87 maintaining the bar in locked position as the machine moves bodily rearwardly along the mine trackway. If it is desired to make a shear or vertical cut the clutch 270, 271, 272 is connected, causing rotation of the worm 280 and worm gear 281 and the cutter carrying head and motor casing are bodily rotated into a vertical position within the bearings 10 and 11. The worm 280 and worm gear 281 maintain the bar rotating mechanism in its adjusted position at this time. The cutter bar is then swung upwardly about its pivot at a fast speed to a point adjacent the mine roof. The cutter bar is thereafter sumped into the coal at a cutting speed, the machine moving bodily along the trackway. The bar is then swung downwardly at a cutting speed to the bottom of the mine, and the bar is thereafter withdrawn at a cutting speed from the coal in a manner substantially similar to that heretofore described in regard to the horizontal cut. If it is desired to vary the elevation of the cutter bar and the machine body the clutch 333, 334, 335 is connected, the friction clutch 313, 314 connecting the bevel gear 306

to the shaft 310 is applied, it being understood that the clutch 159, 160 connecting the slow speed worm gear 152 to the shaft 154 is still applied, and the screw threaded shafts 328, 337 are simultaneously rotated, sliding the nut elements 343, 344 in their guideways and swinging the toothed arcuate members and consequently moving the machine body upwardly to the desired elevation. If it is desired to lower the machine the friction clutch 313, 314 connecting the bevel gear 307 to the shaft 310 is applied and the toothed arcuate members are swung in the opposite direction consequently lowering the machine body. If it is desired to tilt the cutter bar the clutch 333, 334, 335 is disconnected and upon rotation of the screw threaded shaft 328 the threaded nut 343 is moved in its guideway while the nut member 343 remains stationary, thereby causing only the rear supporting arm 23 to be swung about its pivot, thereby swinging the machine about the front truck axle and thus varying the angle of the machine body relative to the horizontal and consequently the angle of the cutter bar relative to the mine bottom. It is obvious that upon application of the friction clutch 396, 398 the cable reel 380 may be rotated as desired. Other operations and advantages of my invention will be clearly apparent to those skilled in this art.

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

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

1. In a mining machine, supporting means, a machine body mounted thereon and carrying cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel pivoted arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and engaged concentric with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for simultaneously rotating said screws for moving said nut members axially relative thereto.

2. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentric with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

3. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentric with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating both of said screws in one or its opposite direction.

4. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentric with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating both of said screws in one or its opposite direction and at different speeds in either direction.

5. In a mining machine, a body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising separate shafts mounted on said body and movably connected to said arms at the other side of their pivots, and means for simultaneously adjusting said shafts.

6. In a mining machine, a body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising separate shafts mounted on said body and movably connected to said arms at the other side of their pivots, and means for simultaneously rotating said shafts.

7. In a mining machine, a body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms about their pivots comprising arcuate toothed members on said

arms concentric with their pivots, separate rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with the teeth on said members, and means for simultaneously rotating said shafts for effecting axial movement of said threaded members relative thereto.

8. In a mining machine, a body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms about their pivots comprising arcuate toothed members on said arms concentric with their pivots, a mechanical connection between said members including separate rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with the teeth on said arcuate members, and means for simultaneously rotating said shafts for moving said members axially.

9. In a mining machine, a body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms about their pivots comprising arcuate toothed members on said arms concentric with their pivots, a mechanical connection between said members including separate rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with said arcuate members, and means for rotating said shafts for adjusting said threaded members axially.

10. In a mining machine, a body including cutting mechanism and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms about their pivots comprising arcuate toothed members on said arms concentric with their pivots, a mechanical connection between said members including separate rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with said segments, and means for rotating said shafts for simultaneously adjusting said members axially.

11. In a mining machine, a body including cutting mechanism, pivoted arms on said body carrying supporting wheels, a motor in said body, a counter-shaft mounted on said body and having a reversible driving connection with said motor, a driving connection between said shaft and the wheels, arcuate toothed members on said pivoted arms concentric with their pivots, separate longitudinally extending rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with said gear segments, and means for imparting rotary movement to said longitudinally extending shafts by power from said counter-shaft for moving said members axially.

12. In a mining machine, supporting means, a machine body thereon carrying cutting mechanism, means for elevating said body relative to said supporting means comprising coaxially arranged screw members one of which is rotatable relative to the other, and means for connecting said members for simultaneous rotation.

13. In a mining machine, supporting means, a machine body thereon carrying cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel pivoted arms, and means for swinging said arms about their pivots comprising arcuate toothed members secured to said arms concentric with their pivots, axially movable toothed members meshing with said arcuate toothed members, screws cooperating with said last mentioned toothed members, and means for simultaneously rotating said screws for moving said nut members axially relative thereto.

14. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism, and means to vary the angle of said machine body relative to said cutting mechanism including parallel pivoted arms, and means for swinging said arms about their pivots comprising arcuate toothed members carried by said arms concentric with their pivots, members having teeth cooperating with said arcuate members, and means for effecting axial movement of one of said last mentioned toothed members relative to the other.

15. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, and means for rotating said head at a relatively high cutter positioning speed and at a relatively slow speed comprising coaxial fast and slow speed worm gears, a shaft arranged coaxially with said gears, said gears and shaft arranged with their axes parallel to a vertical plane extending transversely of the machine, and means for selectively connecting said gears to said shaft.

16. In a mining machine, supporting means, a cutter carrying head rotatably supported thereon, a motor having a casing rotatable and said head, and means driven by said motor for rotating said head comprising coaxial worm gears, a shaft arranged coaxially therewith, said gears and shaft arranged with their axes parallel to a vertical plane extending transversely of the machine, and means for selectively connecting said gears to said shaft.

17. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, said head carrying for rotation therewith a motor for actuating said cutter, and means driven by said motor for rotating said head relative to said supporting means comprising a worm gear encircling the head axis and secured to said head, a worm mesh-

ing therewith, and means for rotating said worm in opposite directions.

18. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor for actuating said cutter, and means driven by said motor for rotating said head relative to said supporting means at a relatively high cutter positioning speed and at a relatively slow speed comprising a worm gear encircling the head axis and secured to said head, a worm meshing therewith, and means for rotating said worm in opposite directions and at different speeds.

19. In a mining machine, supporting means, a machine body mounted thereon and carrying cutting mechanism, and means for elevating and tilting said body relative to said supporting means comprising parallel pivoted arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentric with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

20. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism and a driving motor, and means for elevating and tilting said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nuts, and means driven by said motor for simultaneously rotating said screws for effecting axial movement of said nut members relative thereto.

21. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism and a driving motor, and means for elevating and tilting said body relative to said supporting means comprising parallel pivoted supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nuts, and means driven by said motor for simultaneously rotating said screws in opposite directions to effect axial movement of said nut members in opposite directions.

22. In a mining machine, supporting means, a machine body mounted thereon carrying cutting mechanism and a driving motor, and means for elevating and tilting said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nuts, and means driven by said motor for simultaneously rotating said screws in opposite directions and at different speeds to effect corresponding axial movements of said nut members.

23. In a mining machine, a machine body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced arms, pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising separate alined shafts mounted on said body and respectively movably connected to said arms at the other side of their pivots, and means including a clutch for connecting said shafts for simultaneous adjustment.

24. In a mining machine, a machine body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising separate alined shafts mounted on said body and respectively movably connected to said arms at the other side of their pivots, and means including a clutch for connecting said shafts for simultaneous rotation.

25. In a mining machine, a machine body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms about their pivots comprising arcuate toothed members on said arms and arranged concentrically with their pivots, separate alined rotatable shafts mounted on said body and having threaded portions, cooperating threaded members having teeth connected to the teeth on said members, and means including a clutch for connecting said shafts for simultaneous rotation.

26. In a mining machine, a machine body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms about their pivots comprising arcuate toothed members on said arms and arranged concentrically with their pivots, separate alined rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with the teeth on said arcuate members, and means including a clutch for connecting said shafts for simultaneous rotation for moving said threaded members axially.

27. In a mining machine, a machine body including cutting mechanism, and vertically adjustable supporting means therefor comprising spaced pivoted arms, wheels on said arms, and means for swinging said arms

about their pivots comprising arcuate toothed members on said arms and arranged concentrically with their pivots, separate alined rotatable threaded shafts mounted on said body, cooperating threaded members having teeth in mesh with said arcuate members, and means for rotating said shafts for adjusting said threaded members axially.

28. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

29. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means including a clutch for connecting said screws for simultaneous rotation to effect axial movement of said nut members relative thereto.

30. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

31. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, means including a clutch for connecting said screws together for simultaneous rotation, and means driven by said motor for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

32. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws and in opposite directions to effect axial movement of said nut members in opposite directions relative thereto.

33. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws in opposite directions and at different speeds to effect corresponding axial movements of said nut members.

34. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate alined screws cooperating with said nut members, means for connecting said screws together, and means driven by said motor for simultaneously rotating said screws and in opposite directions to effect axial movement of said nut members in opposite directions relative thereto.

35. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising

parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate alined screws cooperating with said nut members, means for connecting said screws together, and means driven by said motor for simultaneously rotating said screws in opposite directions and at different speeds to effect corresponding axial movements of said nut members.

36. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate alined screws cooperating with said nut members, means including a clutch for connecting said screws together, and means driven by said motor for simultaneously rotating said screws and in opposite directions to effect axial movement of said nut members in opposite directions relative thereto.

37. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted on said supporting means, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate alined screws cooperating with said nut members, means including a clutch for connecting said screws together, and means driven by said motor for simultaneously rotating said screws in opposite directions and at different speeds to effect corresponding axial movements of said nut members.

38. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

39. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for simultaneously rotating said screws and in opposite directions to effect axial movement of said nut members in opposite directions relative thereto.

40. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for simultaneously rotating said screws in opposite directions and at different speeds to effect corresponding axial movements of said nut members relative thereto.

41. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

42. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrical-

ly with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, means for connecting said screws together, and means for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

43. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, means including a clutch for connecting said screws together, and means for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

44. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, means including a clutch for connecting said screws together, and means for simultaneously rotating said screws in opposite directions to effect axial movement of said nut members in opposite directions relative thereto.

45. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, means including a clutch for connecting said screws together, and means for simultaneously rotating said screws in opposite directions and at different speeds to effect corresponding axial movements of said nut members relative thereto.

46. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

47. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel supporting arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws and at different speeds to effect axial movement of said nut members relative thereto at different speeds.

48. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel pivoted arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for rotating said screws at different speeds to effect axial movement of said nut members relative thereto comprising fast and slow speed gearing, a shaft arranged coaxially therewith, and means for selectively connecting said gearing to said shaft.

49. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members,

and means driven by said motor for rotating said screws at different speeds to effect axial movement of said nut members relative thereto at different speeds including fast and slow speed gearing, a shaft coaxial therewith, and means for selectively connecting said gearing to said shaft.

50. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating and tilting said body relative to said supporting means comprising parallel arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for rotating said screws to effect simultaneous axial movement of said nut members relative thereto.

51. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating and tilting said body relative to said supporting means comprising parallel supporting arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for rotating said screws to effect axial movement of said nut members relative thereto.

52. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating and tilting said body relative to said supporting means comprising parallel supporting arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for rotating said screws in opposite directions to effect axial movement of said nut members relative thereto in opposite directions.

53. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating and tilting said body relative to said supporting means comprising parallel supporting arms pivoted between their ends and having wheels at one side of their pivots, and means for swinging said arms about their pivots comprising gear segments carried by said arms at the other side of their pivots and arranged concentrically with the latter, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for rotating said screws in opposite directions and at different speeds to effect axial movement of said nut members relative thereto.

54. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising parallel pivoted arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means for rotating said screws to effect axial movement of said nut members relative thereto including coaxial worm gears, a shaft arranged coaxial therewith, and means for alternatively connecting said gears to said shaft.

55. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means comprising parallel pivoted supporting arms, and means for swinging said arms about their pivots comprising gear segments carried thereby and arranged concentrically with their pivots, nut members having teeth cooperating with said gear segments, separate screws cooperating with said nut members, and means driven by said motor for rotating said screws to effect axial movement of said nut members relative thereto including coaxial worm gears, a shaft arranged coaxially therewith, and means for alternatively connecting said gears to said shaft.

56. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating and tilting said body relative to said supporting means comprising pivoted supporting arms, and means for swinging said arms about their pivots comprising arcuate toothed members carried thereby and arranged concentrically with their pivots, threaded nut members having teeth meshing with the teeth of said arcuate members, separate screws cooperating with said nut members, means for rotating one of said screws relative to the other to effect axial movement of one of said nut members, and means for connecting said screws for simultaneous rota-

tion to effect simultaneous axial movement of said nut members.

57. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising pivoted supporting arms, and means for swinging said arms about their pivots comprising toothed members carried thereby and arranged concentrically with their pivots, relatively movable separate axially movable toothed members cooperating with said members, and means for effecting movement of said toothed members.

58. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for tilting said body relative to said supporting means comprising pivoted supporting arms, and means for swinging said arms about their pivots comprising toothed members carried thereby and arranged concentrically with their pivots, separate axially movable toothed members cooperating with said members, and means for moving one of said last mentioned members axially relative to the other.

59. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means comprising pivoted supporting arms, and means for swinging said arms about their pivots comprising toothed members carried thereby and arranged concentrically with their pivots, separate axially movable toothed members cooperating with said members, and means for separately or simultaneously axially moving said last mentioned members.

60. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means including separate nut members slidable in guideways, separate screws cooperating with said nut members, and means for rotating said screws to effect sliding movement of said nut members relative thereto.

61. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for elevating said body relative to said supporting means including separate nut members slidable in guideways, separate screws cooperating with said nut members, means for connecting said screws for simultaneous rotation, and means for effecting rotation of said screws.

62. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism and a driving motor, and means for elevating said body relative to said supporting means including separate nut members slidable in guideways, separate screws cooperating with said nut members, and means driven by said motor for simultaneously rotating said screws to effect axial movement of said nut members relative thereto.

63. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head relative to said supporting means, and means for elevating said head relative to said supporting means, said rotating means and said elevating means including a common plural speed mechanism and a common transverse shaft driven thereby.

64. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head relative to said supporting means, and means for elevating said head relative to said supporting means, said rotating means and said elevating means including a common plural speed mechanism and a common transverse shaft driven thereby, and means for selectively connecting said head rotating and elevating means in driving relation with said shaft.

65. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor having a casing secured to said head and rotatable therewith, and feeding mechanism for the machine for propelling the latter at different speeds including a casing substantially bisected by a vertical plane including the axis of head rotation and housing plural speed transmission gearing and relative to which said head and motor casing are rotatable.

66. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for elevating said head relative to said supporting means, and mechanism for rotating said head, said elevating means and said rotating mechanism including parallel shafts extending longitudinally of the machine and a common transverse shaft connected to and driving both of said parallel shafts.

67. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor having a casing secured to said head and rotatable therewith, means for elevating said head relative to said supporting means, and mechanism for rotating said head, said elevating means and said rotating mechanism including parallel shafts extending longitudinally of the machine, a common transverse shaft connected to and driving both of said parallel shafts, and driving connections between said motor and said transverse shaft.

68. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor having a casing secured to said head and rotatable therewith,

means for elevating said head relative to said supporting means, and mechanism for rotating said head, said elevating means and said rotating mechanism including parallel shafts extending longitudinally of the machine, a common transverse shaft connected thereto, and driving connections between said motor and said transverse shaft including selectively operable fast and slow speed gearing.

69. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head including a controlling clutch, and means always automatically operative for resisting rotation of said head when said clutch is released.

70. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head including a controlling clutch, and means always automatically operative including a frictional device for resisting rotation of said head when said clutch is released.

71. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head including a transverse shaft and a clutch controlling rotation thereof, and means always automatically operative for resisting rotation of said shaft when said clutch is released.

72. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head including a transverse shaft and a clutch controlling rotation thereof, and means always automatically operative including a frictional device for resisting rotation of said shaft when said clutch is released.

73. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head including a worm gear secured thereto, a worm meshing therewith, a rotatable shaft to which said worm in secured, and a clutch for controlling rotation of said shaft, and means always automatically operative for resisting rotation of said worm when said clutch is released.

74. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, means for rotating said head including a worm gear secured thereto, a worm meshing therewith, a rotatable shaft to which said worm is secured, and a clutch for controlling rotation of said shaft, and means including a frictional device engaging said shaft always automatically operative for resisting rotation of said worm when said clutch is released.

75. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for elevating said body relative to said supporting means including a controlling clutch, and means for automatically releasing said clutch when the machine reaches its extreme elevated position.

76. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for elevating said body relative to said supporting means including controlling clutches, and means for automatically releasing said clutches when the machine reaches its extreme elevated or lowered positions.

77. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for tilting said body relative to said supporting means including a controlling clutch, and means for automatically releasing said clutch when the machine reaches its extreme tilted position.

78. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, means for adjusting said body relative to said supporting means, and means for automatically stopping said adjusting means when the body reaches its extreme limit of adjustment.

79. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, means for tilting said body relative to said supporting means, and means for automatically stopping said tilting means when said body reaches its extreme tilted position.

80. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for elevating said body relative to said supporting means including screws and cooperating axially movable nuts, and means engageable with one of said nuts for automatically stopping said elevating means when said body reaches its extreme limits of adjustment.

81. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for elevating said body relative to said supporting means including an element movable during elevation of said body, and means engageable with said element for automatically stopping said elevating means when said body reaches its extreme limit of adjustment.

82. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for tilting said body relative to said supporting means including an element movable during tilting of said body, and means cooperating with said element for automatically stopping said tilting means when said body reaches its extreme limit of adjustment.

83. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for elevating said body relative to said supporting means including an element movable during elevation of said body, and means engageable with said element for automatically stopping said ele-

vating means when said body reaches its extreme limit of adjustment, said means including a reciprocable rod and a stop member secured thereto.

84. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for elevating said body relative to said supporting means including an element movable during elevation of said body, and means engageable with said element for automatically stopping said elevating means when said body reaches its extreme limit of adjustment, said means including a reciprocable rod and a stop member secured thereto and means for normally maintaining said rod in its inoperative position.

85. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for adjusting said body relative to said supporting means including an element movable during adjustment of said body and a controlling clutch, and means engageable with said element for automatically releasing said clutch when said body reaches its extreme limit of adjustment.

86. In a mining machine, supporting means, a machine body thereon including cutting mechanism, means for adjusting said body relative to said supporting means including an element movable during adjustment of said body and a controlling clutch, and means engageable with said element for automatically releasing said clutch when said body reaches its extreme limit of adjustment and including means for normally maintaining said clutch in its inoperative position.

87. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor having a casing secured to and rotatable with said head, a relatively stationary frame substantially bisected by a vertical plane including the axis of head rotation and housing transmission mechanism, driving connections between said motor and said transmission mechanism, and mechanism driven through said transmission mechanism for rotating said head and motor casing.

88. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for adjusting said body relative to said supporting means including alined screws, clutch members secured to said screws at the adjacent ends thereof, a sliding clutch member for either connecting or disconnecting said clutch members at will, and means for effecting rotation of said screws together or one independently of the other.

89. In a mining machine, supporting means, a machine body mounted thereon including cutting mechanism, and means for adjusting said body relative to said supporting means including alined screws, clutch members secured to said screws at the adjacent ends thereof, a sliding clutch member for either connecting or disconnecting said clutch members at will, and means for rotating said screws.

90. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, an electric motor having a casing secured to and rotatable with said head, driving connections between said motor and head for rotating the latter, said connections including a relatively stationary frame housing transmission gearing, and electrical connections between said frame and said rotatable motor casing.

91. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, an electric motor having a casing secured to and rotatable with said head, driving connections between said motor and head for rotating the latter, said connections including a relatively stationary frame housing transmission gearing, and electrical connections between said frame and said rotatable motor casing including slip rings rotatable with said casing and cooperating resilient contacts carried by said frame.

92. In a mining machine, a wheeled support, a cutter carrying head rotatably mounted thereon and having a pivoted cutter bar, a motor, means for rotating said head to vary the position of said bar to enable the latter to cut in different horizontal planes and in vertical planes, means for driving the wheels of said support, and means for only alternatively connecting said head rotating means and said wheel driving means to said motor, one of said first and second mentioned means being disconnected from said motor while the other is connected to said motor.

93. In a mining machine, a wheeled support, a cutter carrying head rotatably mounted thereon and having a pivoted cutter bar, a motor having a casing secured to and rotatable with said head, means for rotating said head to vary the position of said bar to enable the latter to cut in different horizontal planes and in vertical planes, means for driving the wheels of said support, and means for only alternatively connecting said head rotating means and said wheel driving means to said motor.

94. In a mining machine, an electric motor, means for conducting electrical energy to said motor including a cable reel, and driving connections between said motor and said reel including a reversing mechanism for changing the direction of rotation of said reel without reversing said motor, and a clutch between said reversing mechanism and said reel.

95. In a mining machine, an electric motor, means for conducting electrical energy to said motor including a cable reel, and driving connections between said motor and reel

including fast and slow speed gearing, and a clutch between said gearing and said reel.

96. In a mining machine, an electric motor, means for conducting electrical energy to said motor including a cable reel, and driving connections between said motor and reel including coaxial fast and slow speed worm gears, a shaft coaxial therewith, said gears and shafts arranged with their axes parallel to a vertical plane extending transversely of the machine and means for alternatively connecting said gears to said shaft.

97. In a mining machine, supporting means, a machine body thereon including cutting mechanism, and means for elevating said body relative to said supporting means including separate screws, means for rotating said screws in opposite directions including a reversing mechanism coaxial with said screws.

98. In a mining machine, supporting means, a machine body thereon including cutting mechanism, and means for elevating said body relative to said supporting means including separate screws, means for connecting said screws together, and means for rotating both of said screws in one or its opposite direction including a reversing mechanism coaxial with said screws.

99. In a mining machine, supporting means, a machine body thereon including cutting mechanism, and means for elevating and tilting said body relative to said supporting means including separate screws, means for rotating both of said screws in one or its opposite direction including a reversing mechanism coaxial with said screws.

100. In a mining machine, supporting means, a machine body thereon including cutting mechanism, and means for elevating and tilting said body relative to said supporting means including separate screws, means for connecting said screws together, and means for rotating both of said screws in one or its opposite direction including a reversing mechanism coaxial with said screws.

101. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor having a casing secured to and rotatable with said head, and means driven by said motor for rotating said head in opposite directions relative to said supporting means including a shaft arranged parallel with the axis of rotation of said head and operatively connected to said head at a point in advance of said motor and a reversing mechanism coaxial with said shaft.

102. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism driven thereby, and means driven by said motor for driving the wheels of said support in opposite directions including a shaft extending longitudinally of the machine and connected at its forward end to drive the support wheels, and a reversing mechanism disposed coaxially with said shaft.

103. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism and driven thereby, and means driven by said motor for driving the wheels of said support in opposite directions including a shaft extending transversely of the machine, a shaft extending longitudinally of the machine and connected to said shaft, said longitudinally extending shaft being connected at its forward end to drive the support wheels and a reversing mechanism arranged coaxially with one of said shafts.

104. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism driven thereby, and means driven by said motor for driving the wheels of said support in opposite directions including a shaft extending transversely of the machine, a shaft extending longitudinally of the machine and connected to said shaft, said longitudinally extending shaft being connected at its forward end to drive the support wheels, and a reversing mechanism arranged coaxially with said longitudinally extending shaft.

105. In a mining machine, supporting means, a cutter carrying head rotatably mounted thereon, a motor having a casing secured to said head and rotatable therewith, and mechanism driven by said motor for rotating said head and for feeding the machine at different speeds including a casing substantially bisected by a vertical plane including the axis of the head and housing plural speed transmission gearing and relative to which said head and motor casing are rotatable.

106. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism driven thereby, means driven by said motor for driving the wheels of said support in opposite directions including a shaft and a reversing mechanism disposed coaxially with said shaft, and means driven by said shaft for effecting rotation of said body relative to said support, the connections between said shaft and said wheel driving and body rotating means lying at the same end of said reversing mechanism.

107. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism driven thereby, means driven by said motor for driving the wheels of said support in opposite directions including a shaft extending longitu-

dinally of the machine and connected at its forward end to drive the support wheels, and a reversing mechanism disposed coaxially with said shaft, mechanism driven by said shaft for effecting rotation of said body relative to said support.

108. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism driven thereby, means driven by said motor for driving the wheels of said support in opposite directions including a shaft extending transversely of the machine, a shaft extending longitudinally of the machine and connected to said shaft, said longitudinally extending shaft being connected at its forward end to drive the support wheels, and reversing mechanism arranged coaxially with one of said shafts, and mechanism driven by said longitudinal shaft for effecting rotation of said body relative to said support.

109. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis including a motor and cutting mechanism driven thereby, means driven by said motor for driving the wheels of said support in opposite directions including a shaft extending transversely of the machine, a shaft extending longitudinally of the machine and connected to said shaft, and a reversing mechanism arranged coaxially with said longitudinally extending shaft, and mechanism driven by said longitudinally extending shaft for effecting rotation of said body relative to said support, said wheel driving means and said body rotating mechanism being driven from the same end of said longitudinally extending shaft.

110. In a mining machine, a wheeled support, a cutter carrying head rotatably mounted thereon, a motor, and means driven by said motor for rotating said head at different speeds comprising a relatively high cutter positioning speed and a relatively slow speed including coaxial fast and slow speed worm gears rotating on transversely extending axes and selectively operable to effect rotation of said head.

111. In a mining machine, a wheeled support, a cutter carrying head rotatably mounted thereon, a motor, and means driven by said motor for rotating said head at different speeds and for driving the wheels of said support including selectively operative coaxial fast and slow speed worm gears rotating on transversely extending axes.

112. In a mining machine, a wheeled support, a cutter carrying head rotatably mounted thereon, a motor, and means driven by said motor for rotating said head at different speeds including selectively operative coaxial fast and slow speed worm gears rotating on transversely extending axes, and a manually controllable friction clutch for controlling rotation of each of said gears.

113. In a mining machine, a wheeled support, a cutter carrying head rotatably mounted thereon, a motor, and means driven by said motor for rotating said head at different speeds and for driving the wheels of said support including selectively operative coaxial fast and slow speed worm gears rotating on transversely extending axes, and a manually controllable friction clutch controlling rotation of each of said gears.

114. In a mining machine, a wheeled support, a machine body rotatably mounted thereon, a cutter carrying head carried by said body, a motor in said body, and mechanisms driven by said motor for elevating and tilting said body, for rotating said body, and for driving the wheels of said support.

115. In a mining machine, a wheeled support, a machine body rotatably mounted thereon, a cutter carrying head carried by said body, a motor in said body, and mechanisms driven by said motor for elevating and tilting said body, for rotating said body, and for driving the wheels of said support including common transmission mechanism operatively connected to the rear end of said motor.

116. In a mining machine, a wheeled support, a machine body rotatably mounted thereon, a cutter carrying head carried by said body, a motor in said body, and mechanisms driven by said motor for elevating and tilting said body, for rotating said body, and for driving the wheels of said support including selectively operative coaxial fast and slow speed worm gears through which all of said mechanisms are driven.

117. In a mining machine, a wheeled support, a machine body rotatably mounted thereon about a longitudinal axis, a cutter carrying head carried on said body, a motor in said body having its power shaft extending longitudinally of the machine, mechanism driven from the forward end of said motor for actuating said cutter, and mechanism driven from the rear end of said motor for elevating and tilting said body, for rotating said head, and for driving the wheels of said truck.

118. In a mining machine, a wheeled support, a motor carried thereby, driving connections between said motor and the wheels of said support, and means for braking the wheels of said support including a plurality of braking devices, oppositely movable operating members therefor, and a common actuating element for said operating members to effect simultaneous movement of the latter.

119. In a mining machine, a wheeled support, a motor carried thereby, driving connections between said motor and the wheels of said support including a transmission shaft, and means for braking the wheels of

said support including rotatable braking members secured to said shaft, braking members cooperating therewith, oppositely movable operating elements for said braking members arranged coaxially with said shaft, and a common operating element for effecting simultaneous opposite movement of said operating members.

120. In a mining machine, a wheeled support, a body thereon carrying a motor and a rotatable cutter carrying head, mechanism driven by said motor for effecting rotation of said head including a controlling clutch, mechanism driven by said motor for driving the wheels of said support including a controlling clutch, a reversing mechanism for controlling the direction of rotation of said head and for reversing the drive of said truck wheels including reversing clutches, and controlling means for said clutches including a clutch actuating rod, means for sliding said rod in opposite directions to alternatively connect said two first mentioned clutches, and means for rotating said rod in opposite directions to alternatively apply said reversing clutches.

121. In a mining machine, a wheeled support, cutting mechanism thereon including a motor and a rotatable cutter carrying head, mechanism driven by said motor for effecting rotation of said head including a controlling clutch, mechanism driven by said motor for driving the wheels of said truck, and reversing mechanism including friction clutches for reversing the direction of rotation of said head and for reversing the drive of said truck wheels, and controlling means including a rotatable and axially movable actuating rod, said rod being slidable in opposite directions to alternatively connect said two first mentioned clutches and rotatable in opposite directions to alternatively apply said reversing friction clutches.

122. In a mining apparatus, a body carrying a motor and a cutter carrying head rotatable about a substantially horizontal axis extending longitudinally of the apparatus, mechanism driven by said motor for actuating said cutter and for rotating said head about its axis, adjustable wheeled supporting means for said body driven by said motor for elevating and tilting said body, and mechanism driven by said motor for driving the wheels of said supporting means.

123. In a mining apparatus, a body rotatable about a substantially horizontal axis extending longitudinally of the apparatus, and carrying a motor and a cutter carrying head, mechanism driven by said motor for actuating said cutter and for rotating said body about its axis, adjustable wheeled supporting means driven by said motor for elevating and tilting said body, and means driven by said motor for driving the wheels of said support.

124. In a mining machine, a motor, a cable reel, and driving mechanism between said motor and reel including a friction clutch, and operating means for said clutch including a pivoted lever, a yieldable pivotal mounting for said lever, and means for swinging said lever about its pivot to apply or release said clutch, said pivotal mounting for said lever being adapted to yield upon overload of said clutch.

125. In a mining machine, a motor, a cable reel, and driving mechanism between said motor and reel including a friction clutch, and operating means for said clutch including a pivoted lever, a yieldable pivotal mounting for said lever, and manually operable screw and nut means for swinging said lever about its pivot to apply or release said clutch, said pivotal mounting for said lever being adapted to yield upon overload of said clutch.

126. In a mining apparatus, a machine body rotatable about a substantially horizontal axis extending longitudinally of the apparatus, adjustable front and rear wheeled supports for said body on which the latter is rotatably mounted, a motor carried by said body, cutting mechanism carried by said body including a pivoted cutter bar, mechanism driven by said motor for actuating said cutting mechanism and for swinging said bar about its pivot, mechanism driven by said motor for simultaneously adjusting said supports to vary the elevation of said body and for adjusting one of said supports independently of the other to tilt said body about a substantially transverse axis, and mechanism driven by said motor for driving the wheels of said supports.

127. In a mining apparatus, a machine body rotatable about a substantially horizontal axis extending longitudinally of the apparatus, adjustable front and rear wheeled supports for said body on which the latter is rotatably mounted, a motor carried by said body, cutting mechanism carried by said body including a pivoted cutter bar, mechanism driven by said motor for actuating said cutting mechanism and for swinging said bar about its pivot, mechanism driven by said motor for simultaneously adjusting said supports to vary the elevation of said body and for adjusting one of said supports independently of the other to tilt said body about a substantially transverse axis, and mechanism driven by said motor for driving the wheels of said supports irrespective of the elevation and angle of said body relative to said supports.

128. In a mining machine, wheeled supporting means adapted to run along a mine trackway, a cutter carrying head rotatably mounted thereon, a motor, and means driven by said motor for rotating said head and for driving the wheels of said supporting means in opposite directions including a common reversing mechanism and a shaft driven there-

by, and means for only alternatively connecting the head rotating and truck wheel driving means in driving relation with said shaft.

129. In a mining machine, supporting means, a machine body thereon carrying cutting mechanism, and means for elevating said body relative to said supporting means comprising alined screw members, one of which is rotatable relative to the other, and means for effecting simultaneous rotation of said screw members.

130. In a mining machine, supporting means including relatively adjustable front and rear supports, a machine body thereon carrying cutting mechanism, and means for elevating and tilting said body relative to said supporting means comprising alined screw members respectively operatively connected to said adjustable front and rear supports, means for effecting rotation of one of said screw members relative to the other to effect tilting of said body, and means for effecting simultaneous rotation of said screw members to effect simultaneous adjustment of said supports to change the elevation of said body.

131. In a mining machine, cutting mechanism, supporting means therefor including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate members connected to move said arms, and means for actuating said members simultaneously to effect raising or lowering of said cutting mechanism or for actuating one of said members relative to the other to effect tilting of said cutting mechanism.

132. In a mining machine, cutting mechanism, supporting means therefor including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate axially movable toothed members, toothed members carried by said supporting arms and cooperating with said axially movable members, and means for actuating said axially movable members simultaneously to effect raising and lowering of said cutting mechanism or for actuating one of said members relative to the other to effect tilting of said cutting mechanism.

133. In a mining machine, cutting mechanism, supporting means therefor including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate shafts mounted on said cutting mechanism and movably connected with said arms at one side of the pivots thereof, and means for actuating said shafts simultaneously to effect raising or lowering of said cutting mechanism or for actuating one of said shafts relative to the other to effect tilting of said cutting mechanism.

134. In a mining machine, cutting mechanism, supporting means therefor including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate screw threaded shafts connected to move said arms, axially movable nut members connected to said supporting arms and cooperating with said screw threaded shafts, and means for actuating said shafts simultaneously to effect raising or lowering of said cutting mechanism or for actuating one of said shafts relative to the other to effect tilting of said cutting mechanism.

135. In a mining machine, a machine body carrying a driving motor and cutting mechanism, supporting means for said body including pivoted supporting arms, and means driven by said motor for swinging said arms about their pivots including separate members connected to move said arms, and means for actuating said members simultaneously to effect raising or lowering of said body or for actuating one of said members relative to the other to effect tilting of said body.

136. In a mining machine, a machine body carrying a driving motor and cutting mechanism, supporting means for said body including pivoted supporting arms, and means driven by said motor for swinging said arms about their pivots including separate axially movable toothed members, toothed members carried by said supporting arms and cooperating with said axially movable members, and means for actuating said axially movable members simultaneously to effect raising or lowering of said body or for actuating one of said members relative to the other to effect tilting of said body.

137. In a mining machine, a machine body carrying a driving motor and cutting mechanism, supporting means for said body including pivoted supporting arms. and means driven by said motor for swinging said arms about their pivots including separate shafts mounted on said cutting mechanism and movably connected with said arms at one side of the pivots thereof, and means for actuating said shafts simultaneously to effect raising or lowering of said body or for actuating one of said shafts relative to the other to effect tilting of said body.

138. In a mining machine, a machine body carrying a driving motor and cutting mechanism, supporting means for said body including pivoted supporting arms, and means driven by said motor for swinging said arms about their pivots including separate screw threaded shafts connected to move said arms, axially movable nut members connected to said supporting arms and cooperating with said screw threaded shafts, and means for actuating said shafts simultaneously to effect raising or lowering of said body or for actuating one of said shafts relative to the other to effect tilting of said body.

139. In a mining machine, a machine body carrying cutting mechanism, supporting means therefor including pivoted supporting

arms, and means for moving said supporting arms about their pivots including separate members connected to move said arms, and means for actuating said members simultaneously to effect raising or lowering of said body or for actuating one of said members relative to the other to effect tilting of said body and including means for connecting said members for joint movement, or for disconnecting the same to permit movement of one while the other remains stationary.

140. In a mining machine, a machine body carrying cutting mechanism, supporting means therefor including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate axially movable toothed members, toothed members carried by said supporting arms and cooperating with said axially movable members, and means for actuating said axially movable members simultaneously to effect raising and lowering of said body or for actuating one of said members relative to the other to effect tilting of said body and including means for connecting said members for joint movement, or for disconnecting the same to permit movement of one while the other remains stationary.

141. In a mining machine, a machine body carrying cutting mechanism, supporting means for said body including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate shafts mounted on said body and movably connected with said arms at one side of the pivots thereof, and means for actuating said shafts simultaneously to effect raising or lowering of said body or for actuating one of said shafts relative to the other to effect tilting of said body and including means for connecting said shafts for joint movement, or for disconnecting the same to permit movement of the one while the other remains stationary.

142. In a mining machine, a machine body carrying cutting mechanism, supporting means therefor including pivoted supporting arms, and means for moving said supporting arms about their pivots including separate screw threaded shafts, axially movable nut members connected with said supporting arms and cooperating with said shafts, and means for actuating said shafts simultaneously to effect raising or lowering of said body or for actuating one of said shafts relative to the other to effect tilting of said body and including means for connecting said shafts for joint movement, or for disconnecting the same to permit movement of the one while the other remains stationary.

143. In a mining machine, a machine body carrying cutting mechanism, a motor carried by said body, supporting means therefor including pivoted supporting arms, and means driven by said motor for moving said supporting arms about their pivots including separate members connected to move said arms, and means for actuating said members simultaneously to effect raising or lowering of said body or for actuating one of said members relative to the other to effect tilting of said body and including means for connecting said members for joint movement, or for disconnecting the same to permit movement of one while the other remains stationary.

144. In a mining machine, a machine body carrying cutting mechanism, a motor carried by said body, supporting means therefor including pivoted supporting arms, and means driven by said motor for moving said supporting arms about their pivots including separate axially movable toothed members, toothed members carried by said supporting arms and cooperating with said axially movable members, and means for actuating said axially movable members simultaneously to effect raising and lowering of said body or for actuating one of said members relative to the other to effect tilting of said body and including means for connecting said members for joint movement, or for disconnecting the same to permit movement of one while the other remains stationary.

145. In a mining machine, a machine body carrying cutting mechanism, a motor carried by said body, supporting means for said body including pivoted supporting arms, and means driven by said motor for moving said supporting arms about their pivots including separate shafts mounted on said body and movably connected with said arms at one side of the pivots thereof, and means for actuating said shafts simultaneously to effect raising or lowering of said body or for actuating one of said shafts relative to the other to effect tilting of said body and including means for connecting said shafts for joint movement, or for disconnecting the same to permit movement of the one while the other remains stationary.

146. In a mining machine, a machine body carrying cutting mechanism, a motor carried by said body, supporting means therefor including pivoted supporting arms, and means driven by said motor for moving said supporting arms about their pivots including separate screw threaded shafts, axially movable nut members connected with said supporting arms and cooperating with said shafts, and means for actuating said shafts simultaneously to effect raising or lowering of said body or for actuating one of said shafts relative to the other to effect tilting of said body and including means for connecting said shafts for joint movement, or for disconnecting the same to permit movement of the one while the other remains stationary.

147. In a mining machine, cutting mechanism, supporting means therefor including

pivoted supporting arms, and means for moving said supporting arms about their pivots including separate axially alined shafts connected to move said arms, and means for actuating said shafts simultaneously to effect raising or lowering of said cutting mechanism or for actuating one of said shafts relative to the other to effect tilting of said cutting mechanism and including clutch members secured to the adjacent ends of said shafts and a sliding clutch member for connecting or disconnecting the clutch members on said shafts.

148. A mining machine comprising a supporting means, cutting mechanism carried thereby and including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, and means for adjusting said head about said axis including a motor supported for rotation with said cutter head, and mechanism driven by said motor and including connections extending longitudinally of the machine and operatively connected to said cutter head at a point in advance of said motor.

149. A mining machine comprising a supporting means and a cutting mechanism carried thereby and including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, and means for adjusting said head about said axis including a motor supported for rotation with said cutter head, and mechanism driven by said motor and including connections extending longitudinally along one side of the machine in offset relation to the longitudinal axis and operatively connected to said cutter head at a point in advance of said motor.

150. A mining machine comprising a wheeled supporting means and a cutting mechanism carried thereby and including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, and means for adjusting said head about said axis including a motor supported for rotation with said cutter head, and mechanism driven by said motor and including connections extending longitudinally of the machine and operatively connected respectively at points adjacent the opposite ends of said motor to said cutter head and said support wheels.

151. A mining machine comprising a wheeled supporting means and a cutting mechanism carried thereby and including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, and means for adjusting said head about said axis including a motor supported for rotation with said cutter head, and mechanism driven by said motor and including connections extending longitudinally along one side of the machine in offset relation to the longitudinal axis and operatively connected respectively at points adjacent the opposite ends of said motor to said cutter head and said support wheels.

152. A mining machine comprising a wheeled supporting means and cutting mechanism carried thereby and including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, mechanism for adjusting said head about said axis including a motor supported for rotation with said cutter head, and mechanism driven by said motor including connections extending longitudinally of the machine, said connections including shafting extending longitudinally along one side of the machine from a point at the rear of said motor to a point in advance thereof, and connections from said shafting connectible to adjust the cutter carrying head and to drive the support wheels.

153. A mining machine comprising a wheeled supporting means and cutting mechanism carried thereby and including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, mechanism for adjusting said head about said axis including a motor carried by said supporting means, and mechanism driven by said motor including connections extending longitudinally of the machine, said connections including alined longitudinally extending shafts one of which is driven from the motor and the other of which is connectible to effect adjustment of the cutter carrying head, a connection between said shafts whereby one is driven by the other, and means releasably connectible with said connection for driving by the latter through which the support wheels may be driven.

154. In a mining machine, cutting mechanism including a cutter carrying head adjustable about a horizontal axis extending longitudinally of the machine, adjustable supporting means for said cutting mechanism whereby the latter may be adjusted to different elevations, and mechanism for adjusting said head about its axis, a motor carried by said supporting means, and mechanism driven by said motor for actuating said elevating means and said head adjusting mechanism including connections extending longitudinally along opposite sides of the machine and operatively connected to said supporting means and said cutter head respectively.

155. In a mining machine, cutting mechanism including a rotatable cutter carrying head, means for effecting rotation of said head including a controlling clutch, and means always automatically operative when said clutch is released for resisting rotation of said head.

156. In a mining machine, cutting mechanism including a rotatable cutter carrying head, means for effecting rotation of said head, and means associated with said head rotating means and always automatically

operative when said head rotating means is inoperative for resisting rotation of said head.

157. In a mining machine, cutting mechanism, adjustable supporting means for said cutting mechanism, power operated means for adjusting said supporting means to vary the elevation of said cutting mechanism, and means automatically operative when said supporting means reaches its extreme limit of adjustment for interrupting operation of said power operated adjusting means.

158. In a mining machine, cutting mechanism, adjustable supporting means for said cutting mechanism, power operated means for adjusting said supporting means to effect tilting of said cutting mechanism, and means automatically operative when said tilting means reaches its extreme limit of adjustment for interrrupting operation of said power operated adjusting means.

159. In a mining machine, cutting mechanism including a cutting device, an electrical driving motor therefor, supporting means for said cutting mechanism and said motor, said motor having a casing rotatable relative to said supporting means on an axis coincident with the motor axis, and electrical connections between said supporting means and said motor including contact elements carried by said supporting means and cooperating contact elements rotatable with said motor casing.

160. In a mining machine, cutting mechanism including a cutting device, an electrical driving motor therefor, supporting means for said cutting mechanism and said motor, said motor having a casing rotatable relative to said supporting means about an axis coincident with the motor axis, and electrical connections between said supporting means and said motor including slip rings rotatable with said casing and cooperating resilient contact elements engaging said slip rings and carried by said supporting means.

161. In a mining machine, cutting mechanism including a rotatable cutter carrying head, adjustable supporting means for said cutting mechanism, means for effecting adjustment of said supporting means for varying the elevation of said cutter head, and means for effecting rotation of said cutter head relative to said supporting means, said elevating means and head rotation means including a driving motor and common transmission mechanism driven thereby, said transmission mechanism including independently operable parallel shafts extending longitudinally of the machine and driving said elevating and head rotating means respectively.

162. In a mining machine, cutting mechanism including a rotatable cutter carrying head, adjustable supporting means for said cutting mechanism, means for effecting adjustment of said supporting means for varying the elevation of said cutter head, and means for effecting rotation of said cutter head relative to said supporting means, said elevating means and head rotation means including a driving motor and common transmission mechanism driven thereby, said transmission mechanism including parallel shafts extending longitudinally of the machine, one shaft being disposed at one side of the machine and the other at the other side thereof.

163. In a mining machine, supporting means, cutting mechanism thereon including a rotatable cutter carrying head, a motor having a casing secured to and rotatable with said head, feeding mechanism driven by said motor for feeding said cutting mechanism including a relatively stationary casing substantially bisected by a vertical plane including the axis of head rotation and housing transmission mechanism and relative to which said head and motor casing are rotatable, and means driven by said transmission mechanism for effecting rotation of said head and motor casing.

164. In a mining machine, supporting means, cutting mechanism thereon including a rotatable cutter head carrying a pivoted cutter bar, a horizontal motor having its axis extending longitudinally of the machine and including a motor casing secured to and rotatable with the cutter head, mechanism driven from one end of said motor for driving said cutting mechanism and for swinging said cutter bar about its pivot, and mechanism driven from the opposite end of said motor for feeding the cutting mechanism during cutting and including a relatively stationary casing substantially bisected by a vertical plane including the axis of head rotation and housing transmission mechanism and relative to which said head and motor casing are rotatable.

165. In a mining machine, supporting means, cutting mechanism thereon including a rotatable cutter head carrying a pivoted cutter bar, a horizontal motor having its axis extending longitudinally of the machine and including a motor casing secured to and rotatable with the cutter head, mechanism driven from one end of said motor for driving said cutting mechanism and for swinging said cutter bar about its pivot, mechanism driven from the opposite end of said motor for feeding the cutting mechanism during cutting and including a relatively stationary casing substantially bisected by a vertical plane including the axis of head rotation and housing transmission mechanism and relative to which said head and motor casing are rotatable, and mechanism driven through said transmission mechanism for effecting rotation of said head and motor casing relative to said supporting means.

166. In a mining machine, a wheeled support, cutting mechanism thereon including a rotatable cutter carrying head, a motor, means for effecting rotation of said head relative to said support, means for effecting drive of the support wheels, and means for only alternatively connecting said head rotation means and said support wheel driving means to said motor including clutch devices shiftable into one position to effect head rotation and into another position to disconnect said head rotation means from said motor and to connect said support wheel driving means thereto, one of said clutch devices being released always when the other clutch device is connected.

167. In a mining machine, supporting means, cutting mechanism thereon including a rotatable cutter carrying head and a driving motor for said cutting mechanism and including a motor casing secured to and rotatable with said head, and mechanism driven by said motor for effecting rotation of said head and motor casing relative to said supporting means including a gear encircling the head axis and interposed between said motor and head, and a driving gear meshing with said gear.

168. In a mining machine, supporting means, cutting mechanism thereon including a rotatable cutter carrying head and a driving motor for said cutting mechanism and including a motor casing secured to and rotatable with said head, and mechanism driven by said motor for effecting rotation of said head and motor casing relative to said supporting means including a worm wheel encircling the head axis and a worm meshing therewith.

169. In a mining machine, cutting mechanism, adjustable supporting means therefor including pivoted supporting arms, a driving motor for said cutting mechanism, and mechanism driven by said motor for effecting swinging movement of one of said arms relative to the other to tilt said cutting mechanism about a horizontal axis.

170. In a mining machine, cutting mechanism, supporting means therefor including relatively adjustable front and rear supports, a driving motor for said cutting mechanism, and mechanism driven by said motor for adjusting said supports to effect tilting movement of said cutting mechanism about a transverse horizontal axis.

171. In a mining machine, cutting mechanism, adjustable supporting means therefor including relatively adjustable front and rear supports, a driving motor for said cutting mechanism, and mechanism driven by said motor for adjusting said supports simultaneously to vary the elevation of said cutting mechanism and for adjusting one of said supports relative to the other to effect tilting of said cutting mechanism about a transverse horizontal axis.

172. In a mining machine, cutting mechanism including an adjustable cutter head disposed at the front end of the machine, a driving motor disposed at the rear of and rotatable with said cutter head and having its power shaft extending longitudinally of the machine, and mechanism driven from the rear end of said motor and connected to said head between the latter and said motor for adjusting said cutter head.

173. In a mining machine, cutting mechanism including an adjustable cutter head disposed at the front end of the machine, a driving motor disposed at the rear of and rotatable with said adjustable cutter head and having its power shaft extending longitudinally of the machine, driving connections between the forward end of said motor and said cutting mechanism, and mechanism driven from the rear end of said motor and connected to said head between the latter and said motor for adjusting said cutter head.

174. In a mining machine, cutting mechanism including an adjustable cutter head disposed at the front end of the machine, a driving motor disposed at the rear of and rotatable with said cutter head and having its power shaft extending longitudinally of the machine, and mechanism driven from the rear end of said motor for adjusting said cutter head including a worm wheel secured to said head and surrounding the axis thereof and a worm meshing therewith.

175. In a mining machine, cutting mechanism including an adjustable cutter head disposed at the front end of the machine, a driving motor disposed at the rear of and rotatable with said adjustable cutter head and having its power shaft extending longitudinally of the machine, driving connections between the forward end of said motor and said cutting mechanism, and mechanism driven from the rear end of said motor for adjusting said cutter head including a worm wheel secured to said head and surrounding the axis thereof and a worm meshing therewith.

176. In a mining machine, cutting mechanism, adjustable supporting means including relatively adjustable front and rear supports, and motor driven means for adjusting said supports simultaneously to vary the elevation of said cutting mechanism or one relative to the other to tilt said cutting mechanism about a transverse horizontal axis including a motor carried by said supporting means, and mechanism driven by said motor and including connections extending longitudinally of the machine and operatively connected to said front and rear supports.

177. In a mining machine, cutting mechanism, adjustable supporting means including relatively adjustable front and rear supports, and motor driven means for adjusting said

supports simultaneously to vary the elevation of said cutting mechanism or one relative to the other to tilt said cutting mechanism about a transverse horizontal axis including a motor carried by said supporting means, and mechanism driven by said motor and including connections extending longitudinally along one side of the machine in offset relation to the longitudinal axis and operatively connected to said front and rear supports.

In testimony whereof I affix my signature.

MORRIS P. HOLMES.

CERTIFICATE OF CORRECTION.

Patent No. 1,785,961. Granted December 23, 1930, to

MORRIS P. HOLMES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 8, line 104, strike out the colon and insert a period; page 11, line 50, claim 1, for the word "engaged" read arranged; page 12, line 114, claim 16, for "and" first occurrence read with; page 13, line 77, claim 23, after "arms" strike out the comma; page 21, line 9, claim 96, for "shafts" read shaft, and line 11, same claim, after the word "machine" insert a comma; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of October, A. D. 1931.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.