March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 1

Fig. 1.

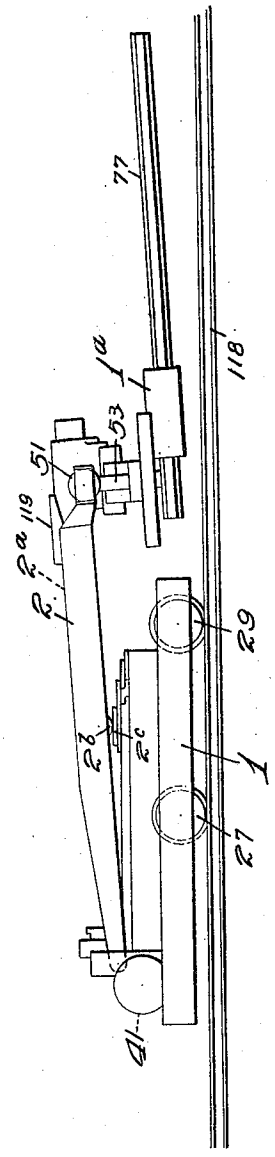
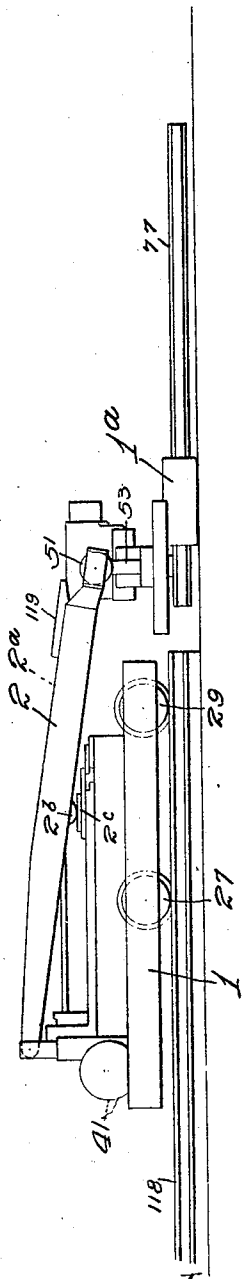


Fig. 2.



Witness:

Inventor;
Charles E. Davis,
By Richard Carter
His Attys.

March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 2

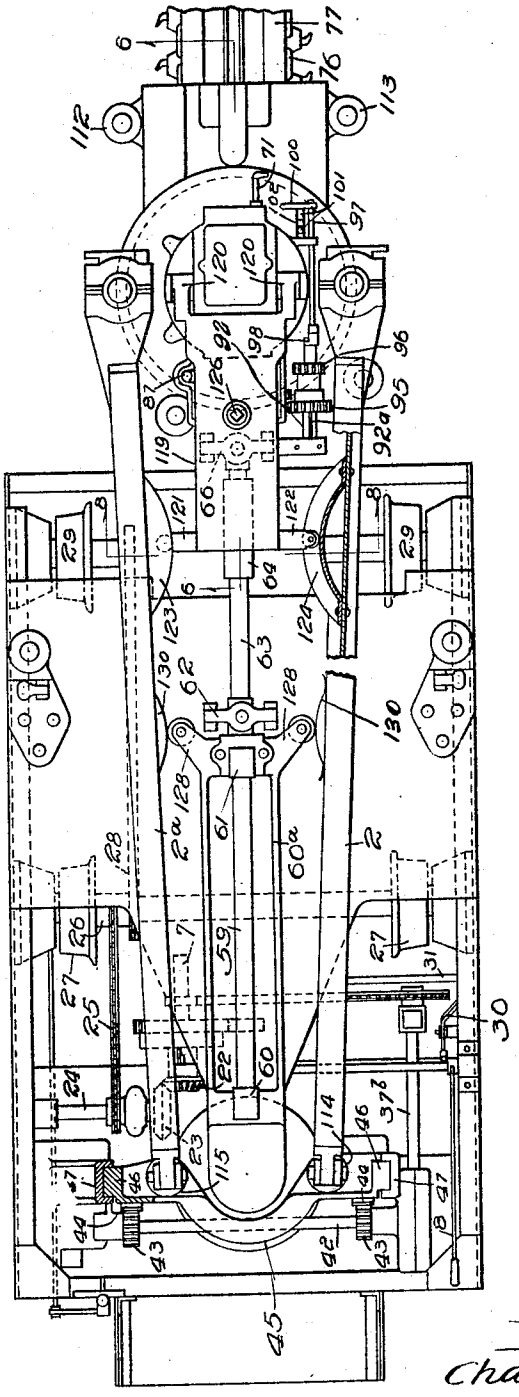


Fig. 3.

Inventor:
Charles E. Davis,

Witness:
C. A. Boutres

By Parker & Carter
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March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 3

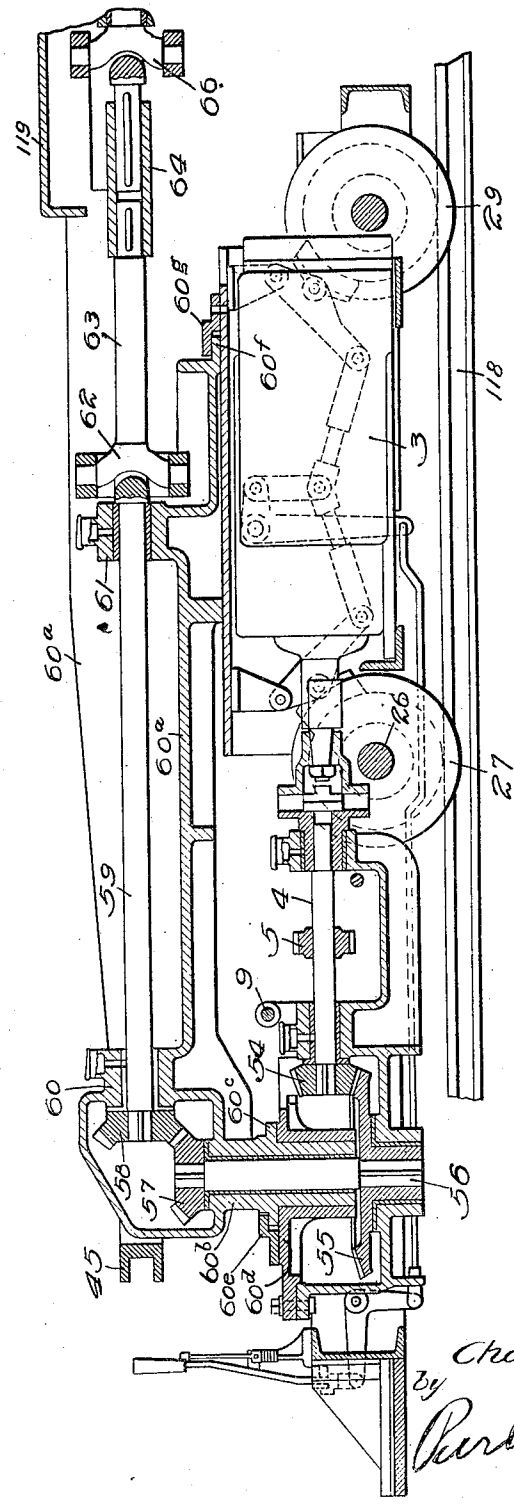


Fig. 4.

Witness:

Inventor:
Charles E. Davis,
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March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 4

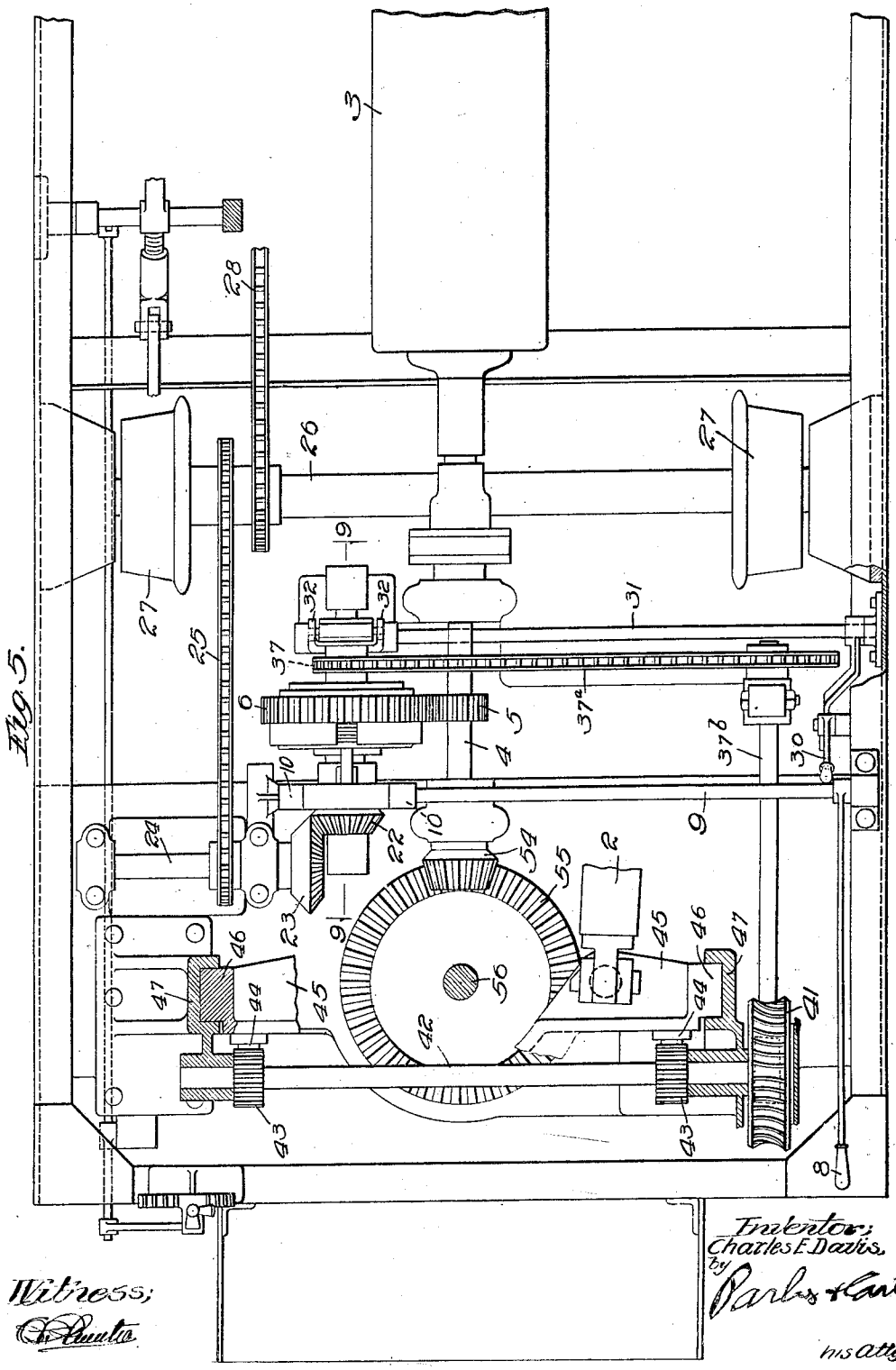


Fig. 5.

Witness;

Inventor;
Charles E. Davis
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March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 5

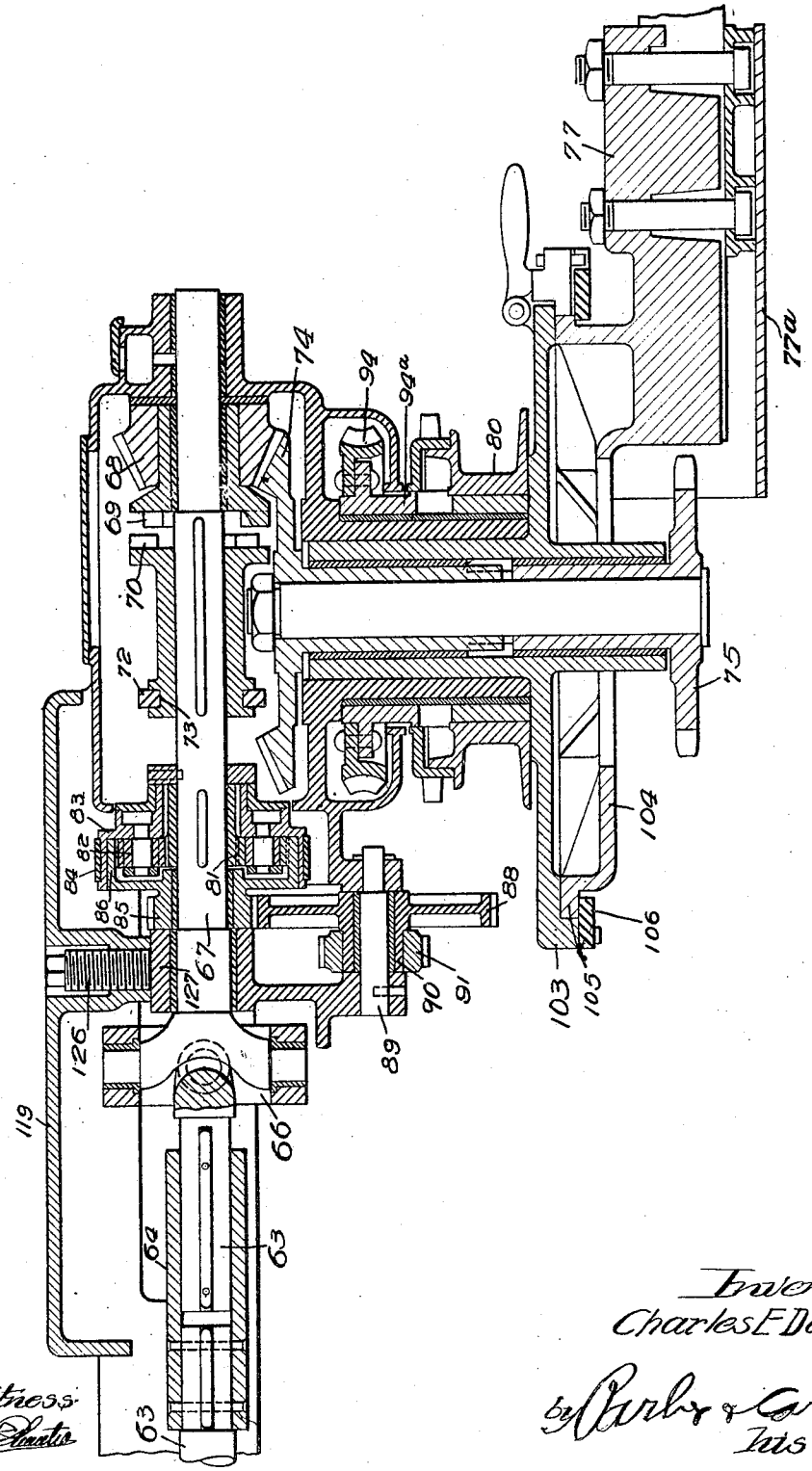


Fig. 6.

Witness:

Inventor;
Charles E Davis,
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his Attys.

March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 6

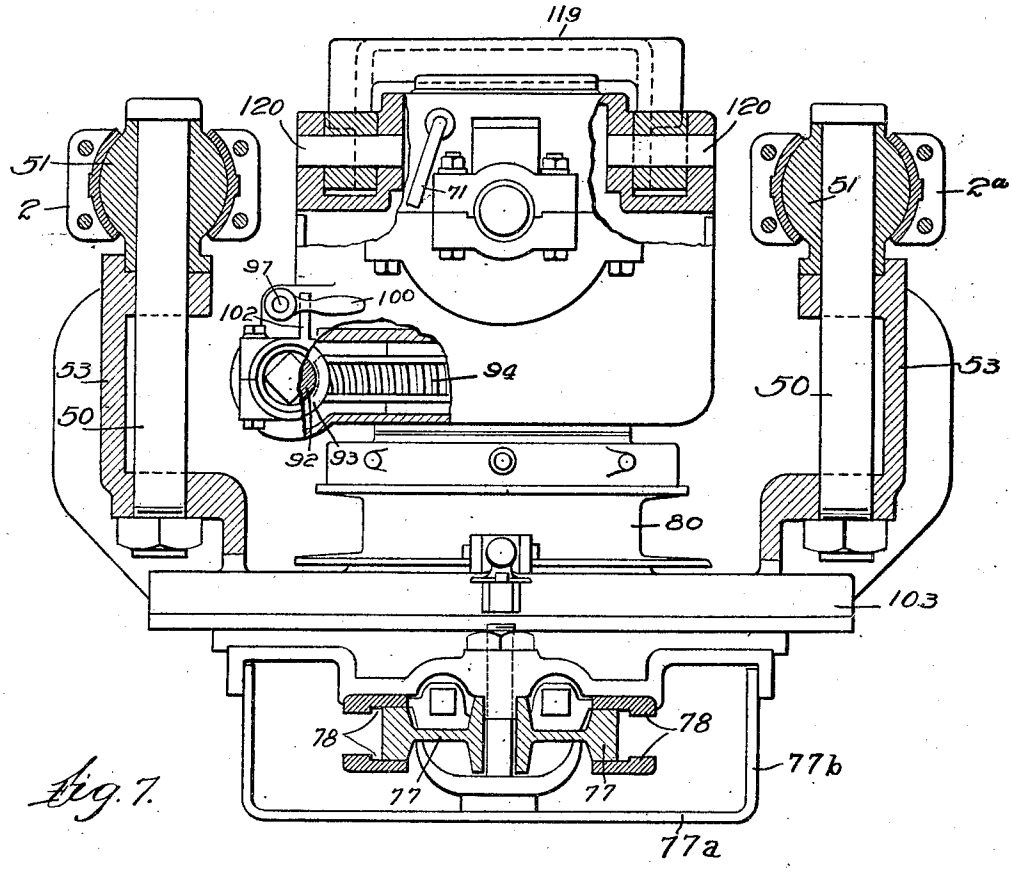


Fig. 7.

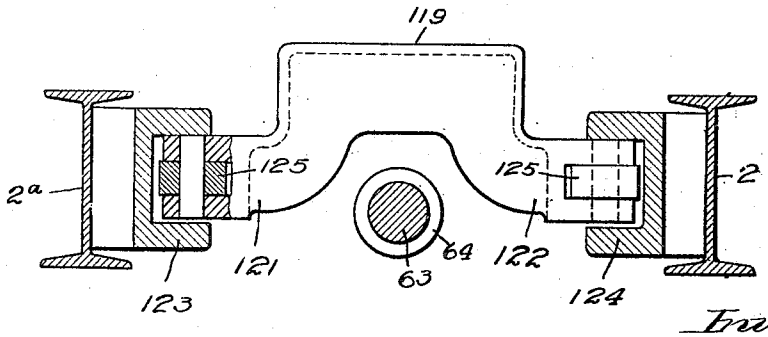


Fig. 8.

Inventor:
Charles E. Davis,

Witness:

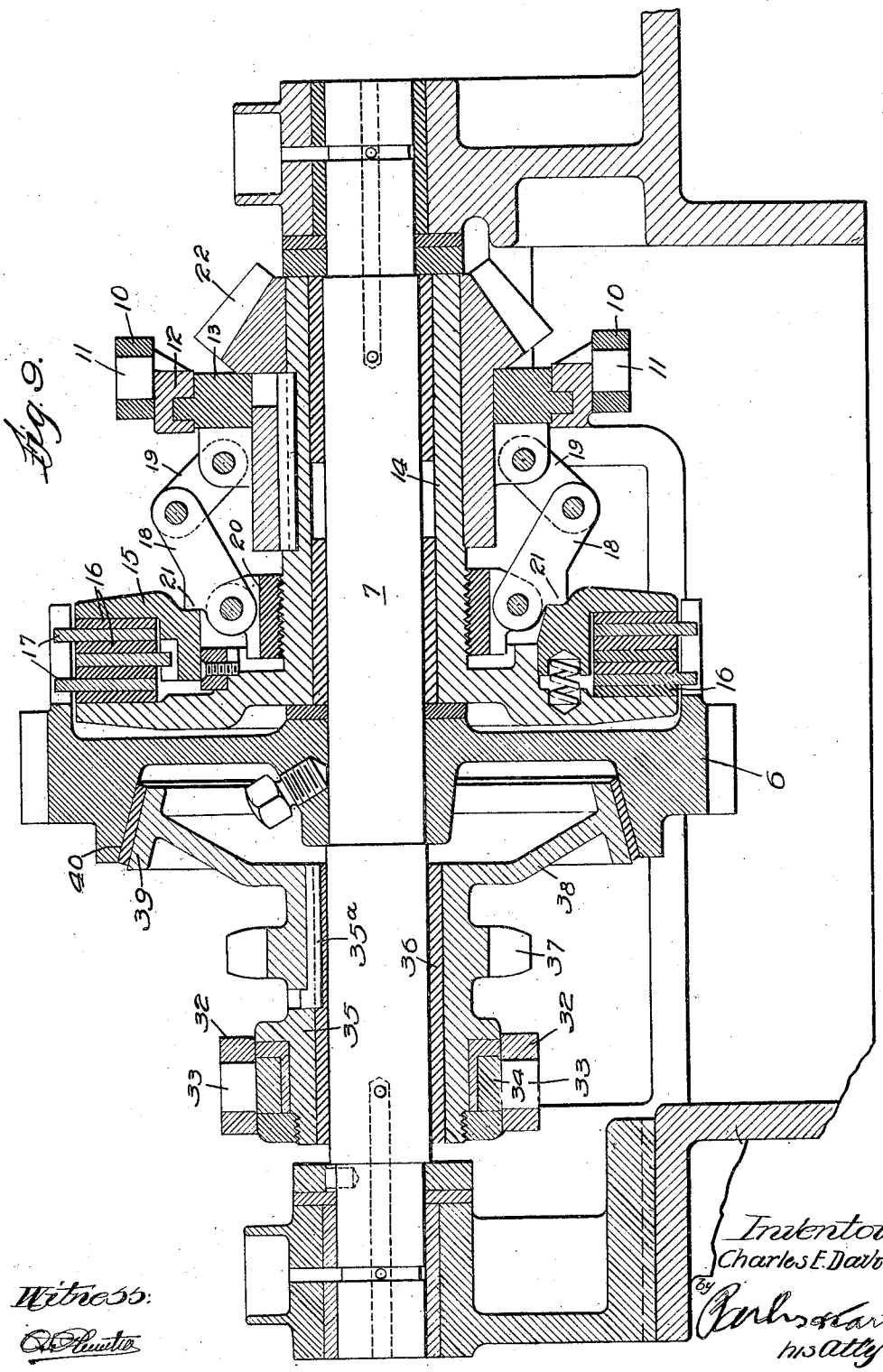
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March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 7

Fig. 9.



Witness:
C. Hunter

Inventor:
Charles E. Davis,
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March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 8

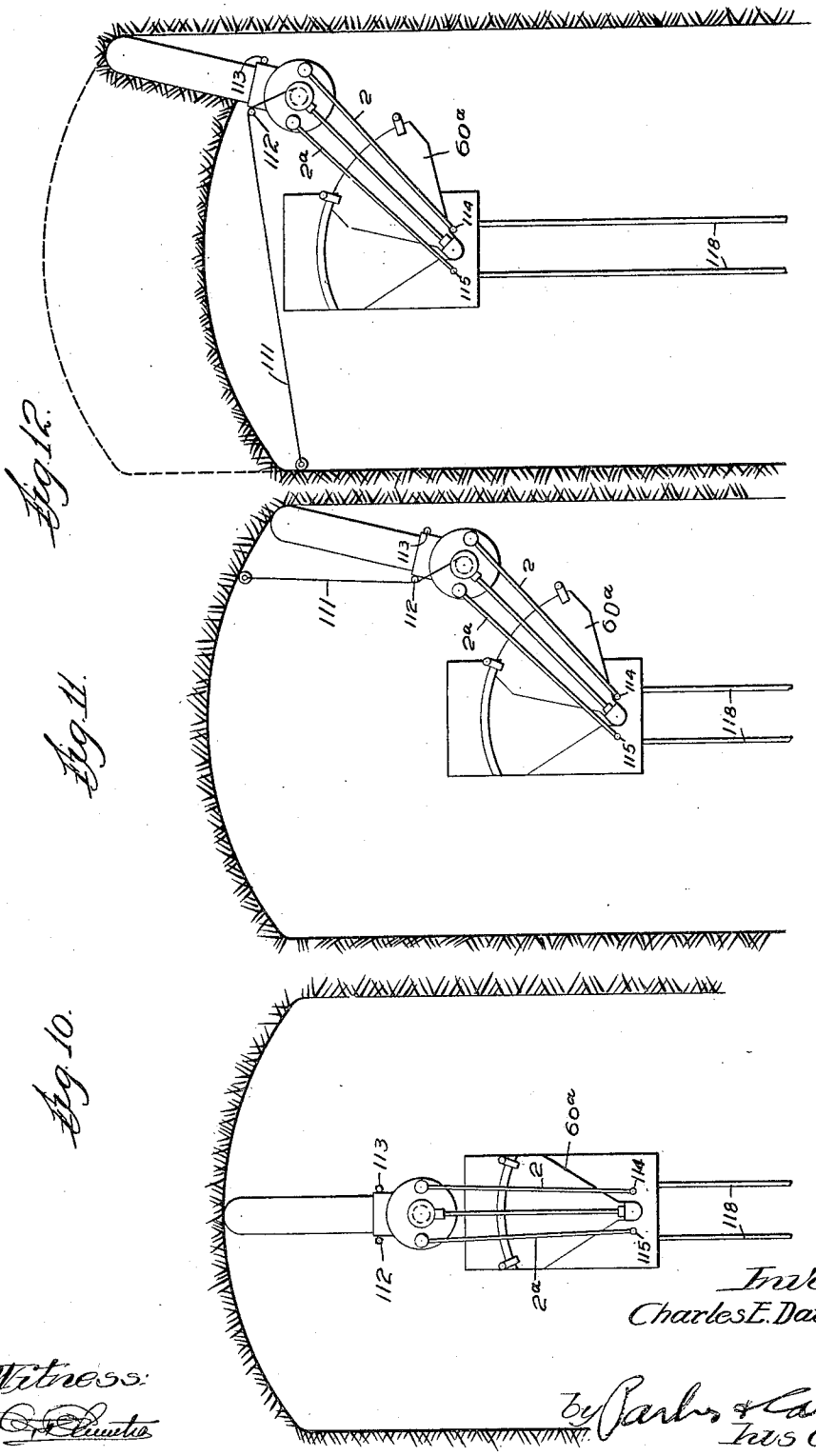


Fig. 12.

Fig. 11.

Fig. 10.

Witness:

Inventor:
Charles E. Davis,

By Parker & Carter
Their Attys.

March 3, 1931. C. E. DAVIS 1,794,367

MINING MACHINE

Original Filed June 16, 1919 9 Sheets-Sheet 9

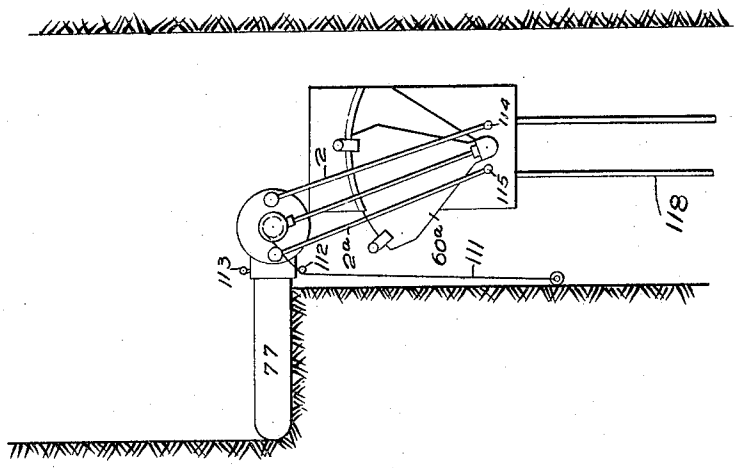


Fig 15.

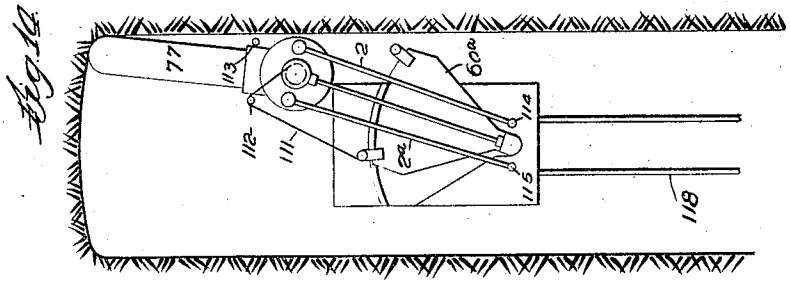


Fig 14.

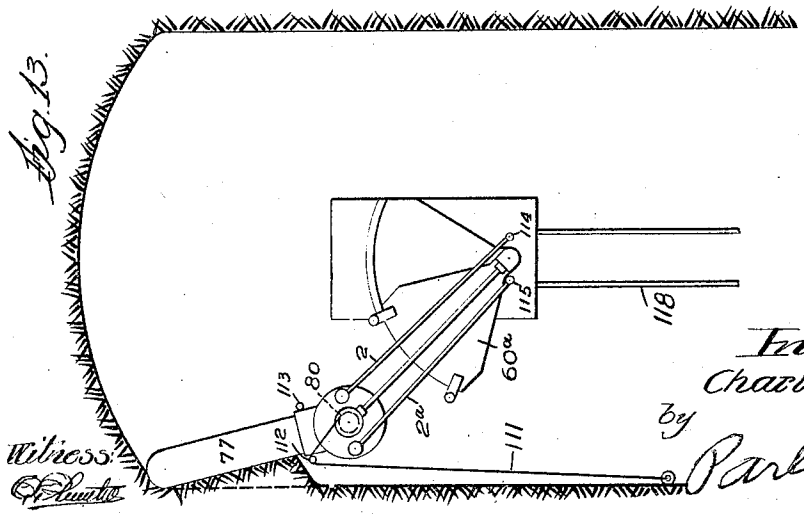


Fig 13.

Witness:

Inventor:
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his Attys.

Patented Mar. 3, 1931 1,794,367

UNITED STATES PATENT OFFICE

CHARLES E. DAVIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO GOODMAN MANUFACTURING CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

MINING MACHINE

Application filed June 16, 1919, Serial No. 304,400. Renewed May 2, 1929.

This invention relates to improvements in mining machines and has for its object to provide a new and improved machine of this description.

The invention has among other objects to provide a mining machine which has a main frame, preferably mounted upon wheels, and a cutting element separate from this main frame with a controlling connection between the cutting element and the main frame, this controlling connection arranged so that it can lift and lower the cutting element and so that it can move the cutting element laterally while it is cutting. The device may further be arranged so that the controlling connection while the machine is cutting does not support the machine, but only moves it laterally, the machine being supported freely upon the floor of the mine, so as to follow any unevenness thereof and being free of any vertically acting support during the cutting movement. This controlling connection may thus be used to lift the machine and carry it to the point of use and lower it to the floor and then the lifting action ceases and the machine is supported on the floor, thus giving it great freedom of movement so that it may cut around stones and other hard obstacles instead of cutting them and follow the floor of the mine whatever its shape, form and contour may be.

This invention permits a mining machine separate from a main frame or truck to be handled as though it were on the truck, and yet makes it unnecessary to unload it from the truck when being operated or loaded on the truck when being carried from point to point.

The invention has other objects which are more specifically pointed out in the specification and claims hereto attached.

The invention has other objects which are more particularly pointed out in the following description.

The invention is illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of one form of device embodying the invention showing the cutting element lifted for transportation;

Fig. 2 is a view similar to Fig. 1 showing the cutting element lowered to its cutting position;

Fig. 3 is a plan view of the device shown in Fig. 1 with parts omitted;

Fig. 4 is a vertical sectional view with parts omitted;

Fig. 5 is an enlarged plan view of the rear end of the machine with parts omitted;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 3;

Fig. 7 is a front view with parts broken away;

Fig. 8 is a sectional view taken on line 8—8 of Fig. 3;

Fig. 9 is a sectional view taken on line 9—9 of Fig. 5;

Fig. 10 is a diagrammatic view showing the machine in the position it occupys when first moved up to the face to be cut;

Fig. 11 is a similar diagrammatic view showing the position of the parts at the beginning of the sumping cut;

Fig. 12 is a view showing the position of the parts after the sumping part has been completed;

Fig. 13 is a view showing the position of the parts near the end of the cut;

Fig. 14 is a diagrammatic view showing the position of the parts at the beginning of the cut when the machine is used for a narrow cut;

Fig. 15 is a view showing the position of the parts when the machine is used to make a long wall cut.

Like numerals refer to like parts throughout the several figures.

As illustrated in Figs. 1 and 2 the mining machine comprises a supporting frame 1 which is illustrated as a truck, a cutting element 1^a which may also be a feeding element, i. e., may contain in itself the feeding mechanism for feeding it to the coal and the supporting arm or arms 2, 2^a movably connect the cutting and feeding element with the main frame 1. Mechanism is provided for moving these supporting arms so as to lift the cutting and feeding mechanism 1^a to its transporting position as shown for example in Fig. 1 and for lowering such feeding and cutting mechanism to the cutting position as shown in Fig. 2. When the feeding and cut-

ting mechanism is elevated as shown in Fig. 1 it may be easily transported from place to place by moving the main frame 1 which is shown as a truck mounted on wheels running on rails. The main frame 1 is provided with a motor 3 which provides the power for operating all of the parts. There is a driving shaft 4 driven by this motor. The wheels of the truck are driven from this shaft by the following mechanism.

A pinion 5 on the shaft drives a gear 6 connected with a shaft 7 (see Figs. 5 and 9). A clutch shown as a friction clutch is associated with the gear 6 and is operated by means of a handle 8 connected with a rock shaft 9 to which are attached the clutch moving friction members 10, which members engage the pins 11 (see Fig. 9) on the ring 12 in which is rotatably mounted the controlling member 12 which is feathered to a sleeve 14 loosely mounted on the shaft 7. The sleeve 14 has attached thereto the clutch member 15 provided with the friction plates 16. The gear 6 is provided with the friction plates 17 adapted to be engaged by the friction plates 16 when the clutch member 15 is moved toward the gear. This movement of the clutch member is secured by means of the links 18 and 19. Links 19 are pivoted to the controlling member and to links 18, said links 18 being pivoted to the annulus 20 on sleeve 14. The links 18 are provided with the shoulder 21. When the controlling member 13 is pressed toward the clutch member 15, the shoulders 21 engage said clutch member 15 and press it toward the gear 6 so as to cause the friction plates 16 to engage the friction plates 17 and thus frictionally connect the rotating gear 6 with the sleeve 14 thereby causing such sleeve to rotate, the speed of rotation depending upon the pressure between the friction plates and the resistance offered by the truck wheels. The sleeve 14 is provided with a beveled gear 22 which engages a beveled gear 23 (see Fig. 5) on the shaft 24. This shaft is provided with a sprocket wheel which drives a sprocket chain 25, which chain drives another sprocket wheel on the axle 26 of the truck so as to drive the wheels 27. The axle 26 is provided with a sprocket wheel which drives the chain 28 which drives the axle of the other wheels 29 of the truck (see Fig. 3).

It will thus be seen that the truck can be driven at any desired speed.

The supporting arms 2 and 2^a are also moved by mechanism connected with the shaft 7 by means of a clutch mechanism controlled by the lever 30 (Fig. 5). The lever 30 controls the rock shaft 31 which has connected therewith the clutch controlling arms 32 which engage the pins 33, (see Fig. 9) on the ring 34 to which is rotatably connected the clutch controlling member 35, attached by the key 35^a to sleeve 36 slidably mounted on the shaft 7. Member 35 also has connected therewith a sprocket wheel 37 and a friction clutch member 38 having an inclined friction face 39 which engages the inclined friction face 40 on the gear 6.

It will be seen that when the clutch member 35 is moved toward the gear 6 the friction face is engaged thus causing the sleeve 36 and sprocket wheel 37 to be rotated, the speed of rotation depending upon the pressure between the friction faces and the clutch. The sprocket wheel 37 is provided with a chain 37^a (see Fig. 5) which drives a sprocket wheel on a shaft 37^b. The shaft 37^b is provided with a worm shown in dotted lines which meshes with the worm gear 41 on the shaft 42. This shaft is provided with the pinions 43 which engage the racks 44 on the movable frame 45 to which the arms 2 and 2^a are pivotally connected. This frame is provided with guides 46 which slide in vertical guideways 47 on the main frame. When the pinions 43 are rotated they move the guides 46 downwardly thus moving the ends of the arms 2 and 2^a downwardly so as to lift the cutting and feeding element 1^a. When the element is lifted the proper height the clutch is disconnected and the worm and worm gear hold the parts so as to keep the cutting and feeding element in its lifted transporting position. When it is desired to lower the cutting and feeding element the motor is reversed. The motor is provided with a controller which is of the usual form of such controllers and is not herein shown in detail, as such controller forms no part of this invention.

The outer ends of said arms 2 and 2^a are connected with the cutting element 1^a by a universal connection. This connection permits the relative movement of the arms and the cutting element. As herein shown, (see Fig. 7), the cutting element is provided with the vertical posts 50 which have connected therewith the balls 51 which fit into the ends of the arms 2 and 2^a the opening in said arms being shaped to receive the balls. This construction permits the necessary relative movement. The posts 50 are connected with the frame 53 of the cutting element. The cutting element is provided with a cutting device which is also driven from the motor 3 by the following mechanism.

The driven shaft 4 (see Fig. 4) is provided with a beveled gear 54 which engages a beveled gear 55 connected with the shaft 56. This shaft is provided at its upper end with a beveled gear 57 which engages a beveled gear 58 on the shaft 59 mounted in the bearings 60, 61. These bearings are connected with a movable frame 60^a which is carried by the truck. This movable frame is pivoted at one end. In the construction shown it is pivoted about the shaft 56. The frame 60^a is provided with the sleeve 60^b which surrounds

said shaft as shown (see Fig. 4) and which has a projection 60c which rests on the support 60d. This sleeve is free to rotate when the frame 60a is moved laterally, but is held against vertical movement by the guide 60e. The frame 60a has a sliding connection near its outer end, with the main frame or truck body, and its outer end 60f engages a guiding device 60g so as to prevent vertical movement of the movable frame. The arms 2 and 2a have a pivotal or rocking connection with the movable frame 60a so that they act as levers with a fulcrum intermediate their ends. Any suitable arrangement for this purpose may be used. As shown for example in Figs. 1 and 2 these arms are provided with rounded parts 2b which engage suitable supports 2c on the movable frame.

Connected with the shaft 59 by a universal joint 62 is a shaft 63. This latter shaft is provided with means for varying its length, which means as herein shown consists of a slip joint. The shaft is divided into two sections, the ends of which are inserted in a sleeve 64, the sections being connected with this sleeve so that one or both of them may slide longitudinally therein so that both sections will be rotated when the shaft 59 is rotated.

In the drawings (see Fig. 6) I have shown one section of the shaft as fastened to the sleeve by bolts or rivets the other section being feathered to the sleeve. The shaft 63 is connected by a universal joint 66 with the shaft 67 from which are driven the various mechanisms of the cutting and feeding element. The shaft 67 is provided with a beveled gear 68 loosely mounted thereon and having a clutch member 69. The shaft is also provided with a sliding clutch member 70 feathered to the shaft which when moved into engagement with the clutch member 69 connects the gear 68 with the shaft. This movable clutch member 70 is controlled by the lever 71 (see Figs. 3 and 7) which controls the clutch fork 72 (see Fig. 6) which works in the groove 73 in the clutch member 70.

The beveled gear 68 engages the beveled gear 74 (see Fig. 6) which latter beveled gear connects with the sprocket wheel 75 so as to drive it. This sprocket wheel drives the cutter chain 76 which extends around the cutter arm 77 working in the guides 78 thereof (see Fig. 7). This cutter chain may be of any of the usual forms.

When cutting along and supported by the floor, the cutting element rests upon the pan or shoe 77a extending beneath the rear end of the cutter arm 77. This shoe has upwardly extending side plates 77b forming enclosed channels or passageways on opposite sides of the cutter arm, for moving the cuttings rearwardly as they are brought out of the kerf by the cutter chain moving in the guides 78. This construction not only provides a support for the cutting mechanism to permit its sliding movement along the floor of the mine while cutting, but also provides a means for removing the cuttings as they are brought out of the kerf adjacent the forward end of the shoe 77a, said cuttings being discharged at the rear end of the cutter bar 77, rather than permitting the cuttings to accumulate in front of the cutter arm and its shoe 77a while the cutting element is advancing along the working face.

The machine is fed to the coal or other material to be cut by means of a rope or cable on a drum 80. This drum is also operated from the shaft 67 (see Fig. 6) there being some suitable clutch mechanism interposed between it and the shaft. I also prefer to provide means for running the drum at variable speeds.

In the construction shown I use a brake band and planetary gear construction for connecting the shaft 67 with the drum. In this construction the shaft 67 is provided with a pinion 81 which is engaged by a series of planetary gears 82 rotatably mounted upon the casing 83 which is itself rotatably mounted in position. The casing 83 has a brake strap 84 so that its rotation may be controlled.

Loosely mounted on the shaft 67 is a gear 85 having a hollow hub 86 containing internal teeth which are engaged by the gears 82. When the casing 83 runs freely the gear 85 is not rotated. When the brake band is tightened so as to slow down the casing 83 the rotation of the gears 82 by engagement with the internal teeth on the hub 86 causes the gear 85 to rotate. The brake band 84 is controlled by the handle 87 (see Fig. 3) and is of usual brake band type. The gear 85 engages the gear 88 (see Fig. 6), said latter gear being mounted upon the shaft 89. The gear 88 is provided with a hub 90 to which is connected a similar gear 91 the gears 88 and 91 rotating together. A shaft 92 parallel with the shaft 89 is provided with a worm 93 (see Fig. 7) which engages a worm gear 94 which is connected with a sleeve 94a (Fig. 6) said sleeve being connected with the drum 80 so as to rotate said drum. This shaft 92 is provided with two gears 95 and 96 of different sizes (Fig. 3) but preferably connected together by a sleeve, the gears and sleeve sliding on the shaft 92 but rotating therewith because of the spline 92a on the shaft 92. When the gear 96 is in mesh with the gear 88 the worm wheel and drum 80 are rotated at one speed, and when the gear 95 is in mesh with the gear 91 they are rotated at a different speed. When the gears 88 and 91 are intermediate the gears 96 and 95 the device is in its neutral position and the shaft 92 and drum 80 are stationary. The gears 95 and 96 are controlled in any desired manner as by means of a sliding rod 97 which carries a fork 98 which engages a groove in the hub of the gear 96. The shaft

97 is controlled by the handle 100 which is slidably mounted thereon (see Fig. 3). The shaft is held in any desired position by dropping the handle in notches 101 on the bar 102. This bar is provided with three notches one in which the handle is dropped when the gear 95 is in mesh with the gear 91, another when the gear 88 is in mesh with the gear 96 and an intermediate one when the gears 95, 96 are in their neutral position.

The cutter arm 77 is arranged so that it may be moved to project in any desired direction. To secure this result it is rotatably connected with the base 103 of the frame of the cutting and feeding element (see Fig. 6) and can be rotated with relation to this base and fastened in any desired position without interferring with the connection between the driving sprocket 75 and the cutter chain. As shown in Fig. 6 the cutter arm is provided with the rearwardly projecting part 104 which has a flange 105 which fits in between the base 103 and the holding pieces 106, thus leaving the flange 105 free to rotate in the socket thus provided.

It will thus be seen that the cutter arm may be moved to project in any desired angle and then locked in this position. The cutter is fed to the material to be cut by means of the rope or cable 111 which has one end wound around the drum 80, the other end being connected to some fixed point outside of the machine. A cutter arm is provided with direction and changing devices or pulleys 112, 113 about which this cable may pass as required. When this cable is thus fastened to a fixed point and around upon the drum, the cutter arm, its support, the shaft 59, and the movable frame 60^a are moved about the shaft 56 as a pivot while the arms 2 and 2^a are moved about their pivotal ends 114 and 115 on opposite sides of the shaft 56. The arms 2 and 2^a are thus pivoted at both their inner and outer ends but the pivotal points at their inner ends are closer together than their pivotal points at their outer ends. The arms are therefore not parallel, but are diverging from their inner toward their outer ends.

When the machine is at the beginning of its cut the cutter arm projects to one side as shown for example in Fig. 12, and when it reaches the end of its cut it projects toward the other side as shown in Fig. 13. This operation of the arms 2 and 2^a automatically gives a movement to the cutter arm so as to bring about this condition, that is where the outer end projects at one side at the beginning of the cut and at the other side at the end of the cut.

By means of these arms arranged in this manner, a narrow cut can be made, that is to say the cutter of the machine can be pushed forward or sumped into the coal, and then moved laterally, and then withdrawn to make a narrow cut, such for example as shown in Fig. 14, without the cutting element striking the track 118. It will be seen that if these arms were not separated more widely at one end that at the other, this inclination of the cutting device could not be secured and on a narrow cut the cutting device when withdrawn, that is drawn backward would strike the end of the track. When the machine is being transported from place to place it is lifted by the arms 2 and 2^a. Since, however, the arms 2 and 2^a are connected with the cutting device by universal joints, it becomes necessary to provide some means for preventing or limiting the movement about these universal joints in order that the outer end of the cutting device may be kept lifted from the floor. In the construction shown this is accomplished by the following mechanism.

A frame 119 is provided near the outer end on the driving shaft (see Figs. 3, 6, 7 and 8). This frame is pivoted near its outer end by the pivots 120 to the frame of the cutting element (see Figs. 3 and 7). Near the other end of the frame are provided laterally projecting engaging parts 121 and 122 with means for engaging the arms 2 and 2^a so as to limit vertical movement of the frame. In the construction shown the arms 2 and 2^a are provided with guideways 123 and 124 (see Fig. 8) into which the laterally projecting parts 121 and 122 are received. These guideways permit relative longitudinal movement between the arms and the projections but limit the relative vertical movement. I prefer to provide these projections with friction rollers 125. Intermediate these projections 121 and 122 and the pivots 120 is an adjustable connection consisting of the screw 126 (see Fig. 6). This screw is adjustably connected with the frame 119 and engages a part 127 associated with the section 67 of the driving shaft. It will thus be seen that when the screw 126 is brought into contact with the part 127, the movement of the cutting element with relation to the arms 2 and 2^a due to the universal connection is limited and hence the outer end of the cutter element may be held up as shown for example in Fig. 1. This angle of the cutter 77 of the cutting element may be varied by adjusting the screw 126. When it is desired to move the machine from place to place this screw is tightened so as to hold the cutter 77 in some such manner as shown in Fig. 1 so that it cannot fall down upon the floor.

When it is desired to use the machine it is moved to the point of use and this screw may then be loosened to give a free movement between the cutting device and the arms 2 and 2^a. At the same time the arms 2 and 2^a are moved about their central pivotal points so as to lower the cutting device, and this movement is continued until the arms are lifted from their fulcrums 2^c. In this condition it will be seen that the cutting element is not

supported vertically by the wheel, but rests upon the floor of the mine, and when moved laterally by the arms is free to inequalities or unevenness of the floor of the mine so that it will follow along the bottom of the coal and so that it is free to pass under or over stones or hard substances without cutting through them.

I also provide means for holding the driving shaft 59 in an intermediate position between the arms 2 and 2ª. One means for doing this is to provide laterally extending engaging parts 128 connected with said shaft (see Fig. 3). These engaging parts may be arranged in any desired manner and as herein shown they are connected with the frame 60ª which has a portion which surrounds the shaft, the shaft rotating therein. These engaging parts engage the arms 2 and 2ª so as to keep the shaft substantially centrally located intermediately. In view of the fact that these arms moved about pivots on opposite sides of the pivotal point of the shaft 59, it will be seen that this brings about a condition that must be compensated for. To compensate for this condition I attach to the arms 2 and 2ª curved engaging parts 130 which are engaged by the projections 128. I prefer to connect friction rollers with these projections. When the arms 2 and 2ª are moved laterally these projections or the rollers on the ends thereof engage the curved engaging faces one engaging the face on one side of the center line, and the other on the other side of the center line so that the distance is equalized, and this construction is clearly shown in Fig. 3. The center line referred to is a line connecting the two curved engaging faces at their nearest opposed points.

I claim:—

1. In a mining machine, a supporting frame, a cutting element adapted to swing angularly across the front of said frame to cut a substantially horizontal kerf, and a controlling connection comprising a plurality of substantially horizontal arms pivotally supported on said frame and projecting beyond the same, and a pivotal connection between each of said arms and said cutting element whereby the angular position of said cutting element is controlled respective to said frame.

2. A mining machine comprising a supporting frame, a cutting element, a plurality of arms connected with said supporting frame and projecting beyond said supporting frame and engaging the supporting frame intermediate their ends, and a connection between said arms and said cutting element, a motor on said supporting frame, and a driving connection between said motor and said cutting element.

3. A mining machine comprising a supporting frame, two arms pivotally connected therewith at separated points and projecting beyond said supporting frame, a shaft intermediate said arms and having a pivotal connection with said frame, the arms and shaft adapted to be moved about their pivotal connections, a cutting and feeding element connected with said arms and provided with means affording slidable support on the ground independent of said frame and an operative connection between said shaft and said cutting and feeding device.

4. A mining machine comprising a supporting frame, two arms pivotally connected therewith at separated points and projecting beyond said supporting frame, a shaft having a pivotal connection intermediate said arms, the arms and shaft adapted to be moved about their pivotal points, a cutting and feeding element connected with said arms and provided with a cutting device and a flexible draft feeding device for feeding the same, and an operative connection between said shaft and said cutting device during all of the various positions of said arms.

5. A mining machine comprising a supporting frame, a cutting device, and two substantially horizontal arms pivotally connected between said frame and said cutting element and movable with the latter during its cutting operation, said arms being more widely separated at one end than at the other.

6. A mining machine comprising a supporting frame, a cutting device, two arms connected between said frame and said cutting device and movable with the latter during its cutting operation, said arms being more widely separated at one end than at the other, a shaft mounted on said frame and located intermediate said arms, a cutter carried by said cutting device, and an operative connection between said shaft and said cutter.

7. A mining machine comprising a supporting frame, a cutting element, a plurality of arms movably connected at one end with said supporting frame, a connection between said arms and said cutting element, an intermediate support for said arms, and means for rocking said arms about said intermediate support.

8. A mining machine comprising a supporting frame, two arms separated more widely at one end than at the other, said arms provided at one end with pivotal connections said pivotal connections being movably connected with said supporting frame so that they may be moved up and down, a power device for moving said pivotal connections, a cutting device separate from said supporting frame and a connection between said arms and said cutting device.

9. A mining machine comprising a supporting frame, two arms separated more widely at one end than at the other said arms being pivotally connected at one end to said supporting frame, an intermediate support

for each of said arms, means for moving said arms about said intermediate supports, a connecting device separate from said supporting frame, a movable connection between said arms and said cutting device and means for moving said arms laterally about said pivotal connections to vary the position of the cutting device.

10. A mining machine comprising a supporting frame, a cutting element, two arms more widely separated at one end than at the other, a pivoted frame carried by the supporting frame, said arms supported on said movable frame intermediate their ends, a pivotal connection between each of said arms and said supporting frame, a cutting element, a connection between said arms and said cutting element, and means for moving said arms in a substantially horizontal direction about their pivotal connections to vary the position of the cutting element.

11. A mining machine comprising a supporting frame, two arms, each of said arms having two pivotal connections with said frame so that it may be moved both vertically and horizontally, a cutting element, a connection between said arms and said cutting element, and means for moving said arms about one of said pivotal connections to move the cutting element vertically, and means for moving said arms about their other pivotal connection to move the cutting device laterally.

12. A mining machine comprising a main frame, a cutting and feeding element separate from said main frame and slidably supportable on the mine floor in front of it, and a controlling connection between said cutting and feeding element and said main frame, said controlling connection permitting longitudinally tilting of said cutting and feeding element but maintaining it in predetermined angular position during its movement across the front of said main frame.

13. A mining machine comprising a main frame, a cutting and flexible draft feeding element separate from said main frame and located in front of it, a connection between said cutting and feeding element and said main frame, controlling the angular position of said cutting and feeding element relative to said frame, and means on the main frame for moving said controlling connection to lift and lower the cutting and feeding element.

14. A mining machine comprising a main frame, a motor on said frame, a cutting and feeding element separate from said frame and movable bodily in different horizontal planes in front of said frame, said cutting and feeding element provided with a movable cutter for cutting the material, a controlling connection between said cutting and feeding element and said main frame for controlling the angular position of the cutting and feeding element relative to said main frame, and controlling connections mounted upon the main frame, and a driving connection between said motor and said cutter adapted to drive the cutter in the various positions of the cutting and feeding device.

15. A mining machine comprising a main frame, a cutting element separate from said main frame, and located in front thereof, two arms movably connected with said main frame and with said cutting element, a motor on said main frame, a shaft intermediate said arms and operatively connected with said motor, said shaft having a driving connection with said cutting device, oppositely projecting engaging parts carried by said shaft and engaging said arms so as to hold said shaft in an intermediate position between said arms when the arms and shaft are moved laterally.

16. A mining machine comprising a main frame, a cutting element separate from said main frame and located in front thereof, two arms movably connected with said main frame and with said cutting element, a motor on said main frame, a shaft intermediate said arms and operatively connected with said motor, said shaft having a driving connection with said cutting device, oppositely projecting engaging parts carried by said shaft and engaging said arms so as to hold said shaft in an intermediate position between said arms when the arms and shaft are moved laterally, said arms provided with curved engaging faces which are engaged by said projecting engaging parts.

17. A mining machine comprising a main frame, a cutting element separate from said main frame and located in front thereof, two arms movably connected with said main frame and with said cutting element, a motor on said main frame, a shaft intermediate said arms and operatively connected with said motor, said shaft having a driving connection with said cutting device, a frame near the outer end of said shaft, said frame pivotally connected with the cutting element, laterally projecting engaging parts on said frame and means on said arms for engaging said laterally projecting engaging parts to limit the movement of said frame.

18. A mining machine comprising a main frame, a cutting element separate from said main frame and located in front thereof, two arms movably connected with said main frame and with said cutting element, a motor on said main frame, a shaft intermediate said arms and operatively connected with said motor, said shaft having a driving connection with said cutting device, a frame near the outer end of said shaft, a connection between said frame and said arms which limit the vertical movement of the frame at the point where the connection is located, a connection

between said frame and said cutting element, an intermediate adjustable engaging part on said frame, a bearing for said shaft engaged by said intermedite engaging part.

19. A mining machine comprising a main frame, a cutting element separate from said main frame and located in front thereof, two arms movably connected with said main frame and with said cutting element, a motor on said main frame, a shaft intermediate said arms and operatively connected with said motor, said shaft having a driving connection with said cutting device, a frame near the outer end of said shaft, laterally projecting parts on opposite sides of said frame, guideways on said arms into which said laterally projecting parts are received, said guideways permitting relative longitudinal movement between said arms and said projections, but limiting relative vertical movement between them, a pivotal connection between said frame and said cutting element, and an intermediate adjustable connection on said frame adapted to engage a part mounted on said shaft.

20. A mining machine comprising a main frame, a kerf cutting element disposed in front of said frame slideably supportable on the mine floor independently of said main frame, supporting connections interposed between said frame and said cutting element movable to lift the latter from the ground, a motor on said frame, and driving connections between said motor and said cutting element operable to drive the latter while supported on the ground independently of said supporting connections.

21. A mining machine comprising a main frame, a kerf cutting element disposed in front of said frame slideably supportable on the mine floor independently of said frame, means for controlling the angular relationship of said cutting element to said frame in planes horizontal to the ground, supporting connections interposed between said frame and said cutting element movable to lift the latter from the ground, a motor on said supporting frame, and driving connections between said motor and said cutting element operable to drive the latter while supported on the ground.

22. A mining machine comprising a main frame, a kerf cutting element disposed in front of said frame slideably supportable on the main floor independently of said frame, a plurality of arms supported on said frame and connected at their forward ends with said cutting element, pivotal means on said frame permitting lateral movement of said arms with said cutting element while the latter is supported on the ground, and cooperating means on said frame for bodily lifting said arms and said cutting element from supporting engagement with the ground.

23. A mining machine comprising a main frame, a kerf cutting element disposed in front of said frame slideably supportable on the mine floor independently of said frame, a plurality of arms supported on said frame and connected at their forward ends with said cutting element, pivotal means on said frame permitting lateral movement of said arms with said cutting element while the latter is supported on the ground, cooperating means on said frame for bodily lifting said arms and said cutting element from supporting engagement with the ground, a motor on said supporting frame, and flexible driving connections between said motor and said cutting element.

24. A mining machine comprising a main frame, a kerf cutting element disposed in front of said frame slideably supportable on the mine floor independently of said frame, a plurality of arms supported on said frame and connected at their forward ends with said cutting element, pivotal means on said frame permitting lateral movement of said arms with said cutting element while the latter is supported on the ground, cooperating means on said frame for bodily lifting said arms and said cutting element from supporting engagement with the ground, a motor on said supporting frame, and flexible driving connections between said motor and said cutting element, including a shaft disposed substantially in the same horizontal plane as said supporting arms.

25. In a mining machine, a wheeled track guided truck providing a base, a supporting frame pivotally mounted adjacent the rear end of said base to swing in a horizontal plane, a kerf cutting element disposed in front of said base and said frame and slideably supportable on the mine floor independently of said frame and base, supporting connections interposed between said frame and said cutting element movable to lift the latter from the ground, a motor carried by said base, and driving connections between said motor and said cutting element operable to drive the latter in all permissible positions thereof.

26. A mining machine comprising a base, a supporting frame pivotally mounted on said base, a kerf cutting element disposed in front of said base and frame and movable transversely thereof during the cutting operation, said kerf cutting element being slideably supportable on the mine floor independently of said frame and base, a plurality of arms supported on said frame and connected at their forward end with said cutting element, and cooperating means on said frame for bodily lifting said arms and said cutting element to varying positions above the ground.

27. A mining machine comprising a base, a supporting frame pivotally mounted on

said base adjacent the rear end thereof, a kerf cutting element disposed in front of said base and frame and movable transversely thereof during the cutting operation, said kerf cutting element being slideably supportable on the mine floor independently of said frame and base, a plurality of arms supported on said frame and connected at their forward end with said cutting element, and cooperating means on said frame for bodily lifting said arms and said cutting element to varying positions above the ground.

28. A mining machine comprising a base, a supporting frame pivotally mounted on said base, a kerf cutting element disposed in front of said base and frame and movable transversely thereof during the cutting operation, said kerf cutting element being slideably supportable on the mine floor independently of said frame and base, a plurality of arms supported on said frame and connected at their forward end with said cutting element, cooperating means on said frame for bodily lifting said arms and said cutting element to varying positions above the ground, and adjustable means for controlling the angular relation of said cutting element and said arms in a vertical plane.

29. A mining machine comprising a base, a supporting frame pivotally mounted on said base, a kerf cutting element disposed in front of said base and frame and movable transversely thereof during the cutting operation, said kerf cutting element being slideably supportable on the mine floor independently of said frame and base, a plurality of arms supported on said frame and connected at their forward end with said cutting element, cooperating means on said frame for bodily lifting said arms and said cutting element to varying positions above the ground, and means affording limited longitudinal tilting movement of said cutting element relative to said arms when said cutting element is supported on the ground.

30. A mining machine comprising a main frame, a horizontally swinging frame pivoted on said frame, a kerf cutting element disposed in front of said frame and slideably supportable on the mine floor independently of said main frame, a plurality of arms extending over and movable horizontally with said swinging frame and having their rear ends pivotally connected to said main frame, said arms having pivotal connection with said cutting element at their forward ends, feeding means on said cutting element, and means associated with said arms for lifting said cutting element bodily relative to the ground.

31. A mining machine comprising a supporting frame, a cutting element supportable in sliding engagement on the mine floor independent of said frame, said cutting element including a forwardly projecting cutter arm, two arms connected with the supporting frame and the cutting element, means on said frame for moving said arms so as to lift and lower the cutting element, and means for adjusting the angular position of the cutter arm relative to said arms in a vertical plane when the cutting element is moved to various positions.

32. A mining machine comprising a supporting frame, a cutting element, a plurality of arms movably connected at one end with said supporting frame, a connection between said arms and said cutting element, an intermediate support for said arms, means for rocking said arms about said intermediate support, and a separate feeding mechanism for feeding the cutter of the cutting element to the material being cut.

33. A mining machine comprising a supporting frame, two arms separated more widely at one end than at the other, said arms provided at one end with pivotal connections, said pivotal connections being movably connected with said supporting frame so that they may be moved up and down, a power device for moving said pivotal connections, a cutting device separate from said supporting frame, a connection between said arms and said cutting device, and means for moving the outer ends of said arms laterally.

34. A mining machine comprising a cutting element having a cutter arm projecting therefrom, two arms pivotally connected with said cutting element to permit angular movement transversely thereof, a support with which said arms are connected and from which the arms project at a predetermined angle, means for connecting the cutting element with said arms so that the cutter arm projects at an angle with respect to the surface on which the machine rests, and a base upon which said support is mounted for horizontal angular movement different from the angle of the supporting arms.

35. A mining machine comprising a truck adapted for movement on rails, the rails extending in proximity to the wall of material to be cut, a cutting element having a bottom support, movable arms connecting the cutting element with the truck, means for lowering the cutting element at one side of and below the top of the track so that its bottom will be supported on the mine floor independently of said truck, means for then moving the cuttting element forward to make the sumping cut and for moving it laterally to make the cross cut, and means for moving the cutting element back at one side of the rails with its bottom portion still supported on the ground below the top of the rails to finish the cut, whereby a narrow entry may be cut.

36. A mining machine comprising a truck adapted for movement upon rails, a cutting element normally supported by said truck,

means for lowering the cutting element at one side of the rails so that its cutting portion will be below the top of the rails with its bottom slideably supported on the ground when in cutting position, means for moving the entire machine forward to make the sumping cut, and means for moving the cutting element across in front of the rails to make the lateral cut with the cutting element slidably supported on the ground whereby a narrow entry may be cut.

37. A mining machine comprising a supporting frame, two arms pivotally connected therewith at separated points and projecting beyond said supporting frame, a shaft having a pivotal connection intermediate said arms, the arms and shaft adapted to be moved about their pivotal points, a cutting and feeding element connected with said arms and provided with a cutting device and a flexible draft feeding device for feeding the same, and an operative connection between said shaft and said cuttting device during all of the various positions of said arms.

38. A mining machine comprising a supporting frame, two arms pivotally connected therewith at separated points and projecting beyond said supporting frame, a shaft having a pivotal connection intermediate said arms, the arms and shaft adapted to be moved about their pivotal points, a cutting and feeding element connected with said arms and provided with a cutting device and a flexible draft feeding device for feeding the same, and an operative connection between said shaft and said cutting and feeding devices during all of the various positions of said arms.

39. A mining machine comprising a main frame, a horizontally swinging frame pivoted on said frame, a kerf cutting element disposed in front of said frame and slideably supportable on the mine floor independently of said main frame, a plurality of arms extending over and movable horizontally with said swinging frame and having their rear ends pivotally connected to said main frame and adapted to swing in a vertical plane to lift and lower said cutting element, a motor carried by said main frame, a drive shaft disposed between said arms and movable vertically therewith, and operable connections between said motor and said drive shaft and between said drive shaft and said cutting element whereby the latter may be driven in the several permissible positions of said cutting element relative to said main frame.

40. A mining machine comprising a main frame, a cutting element comprising a cutter arm having a cutter chain movable thereabout, means for moving said cutting element bodily along the floor to cut a kerf, an auxiliary supporting shoe for said cutting element, and upright walls on said supporting shoe forming a rearwardly extending passageway for the removal of cuttings from adjacent the margin of the kerf.

41. In combination with a truck mounted mining machine having a depending cutter head, a chain carrying cutter bar projecting forwardly therefrom and adapted to cut a kerf adjacent the mine bottom, and means extending along the advance side of said machine and cutter adjacent the rear end of said cutter bar and cooperating with said cutter chain for expelling the cuttings discharged from the kerf toward the rear end of said cutter bar.

42. In combination with a truck mounted mining machine having a depending cutter head, a chain carrying cutter bar projecting forwardly therefrom and adapted to cut a kerf adjacent the mine bottom, and means for expelling the cuttings discharged from the kerf to a point farther removed toward the rear end of said cutter bar comprising a closure member closing the advancing side of said cutter chain from a point substantially adjacent the mine face when said cutter bar is sumped thereunder.

43. In combination with a truck mounted mining machine having a depending cutter head, a chain carrying cutter bar projecting forwardly therefrom and adapted to cut a kerf adjacent the mine bottom, and means forming a slidable support for said cutter head for engagement with the mine bottom. and for expelling the cuttings discharged from the kerf to a point farther removed toward the rear end of said cutter bar comprising a closure member closing the advancing side of said cutter chain from a point substantially adjacent the mine face when said cutter bar is sumped thereunder.

In testimony whereof, I affix my signature this 28th day of May 1919.

CHARLES E. DAVIS.

CERTIFICATE OF CORRECTION.

Patent No. 1,794,367. Granted March 3, 1931, to

CHARLES E. DAVIS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 21, for the misspelled syllable "ing" read ing; page 2, line 20, for the numeral "12" read 13; page 4, line 69, for "that" read than, and line 112, for the word "cutter" read cutting; page 7, line 4, claim 18, for the misspelled word "intermedite" read intermediate, and line 55, claim 22, for "main" read mine; page 9, line 74, claim 41, after the word "cutter" insert the word bar; 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 21st day of April, A. D. 1931.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.