

Dec. 23, 1930.

C. F. OSGOOD

1,786,259

MINING APPARATUS

Filed Oct. 9, 1926

2 Sheets-Sheet 1

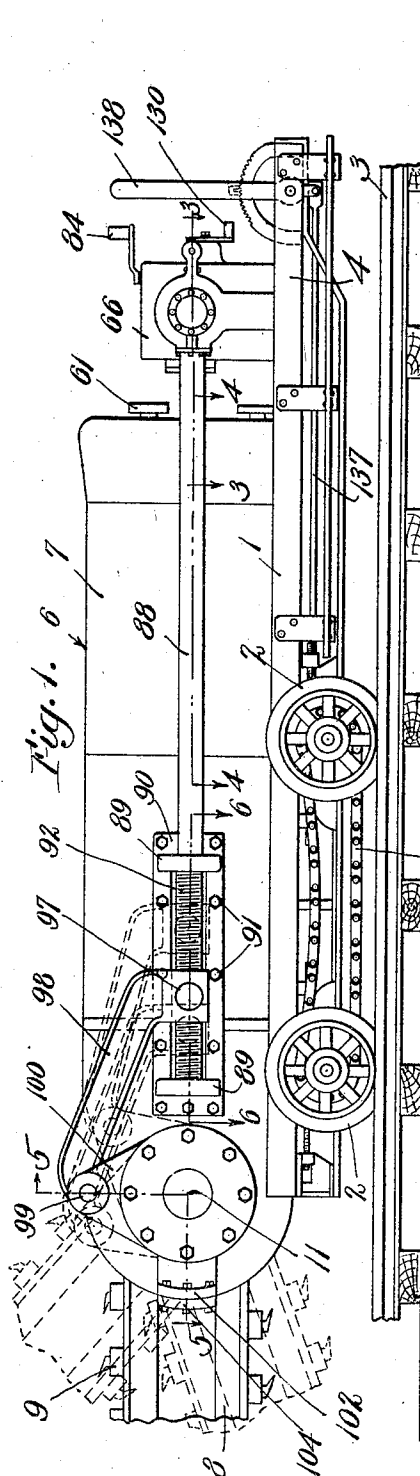
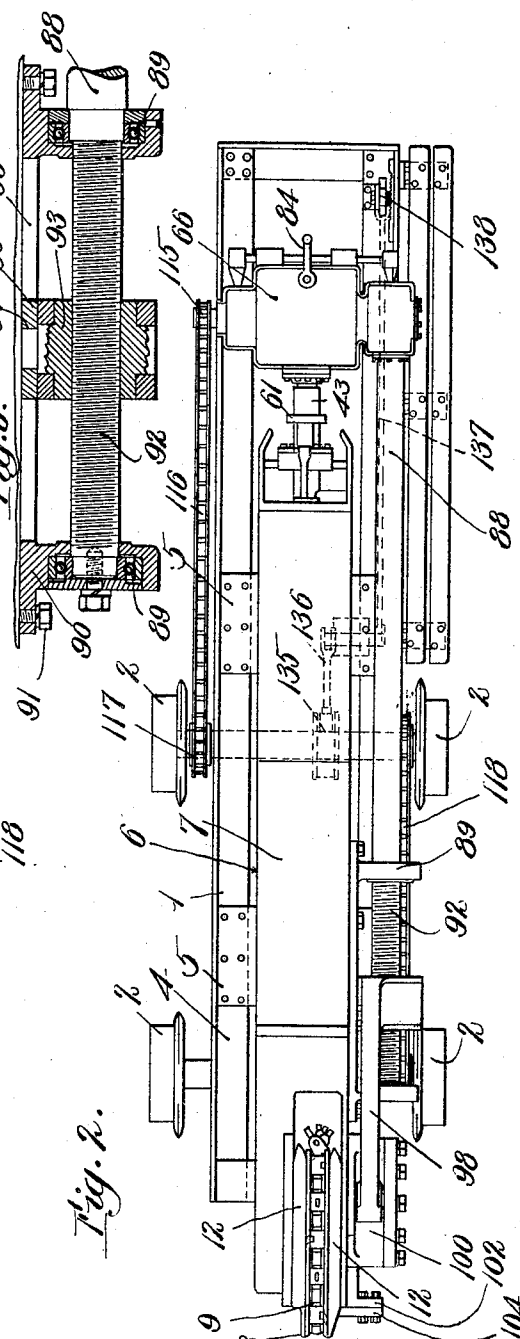


Fig. 1.



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Dec. 23, 1930.

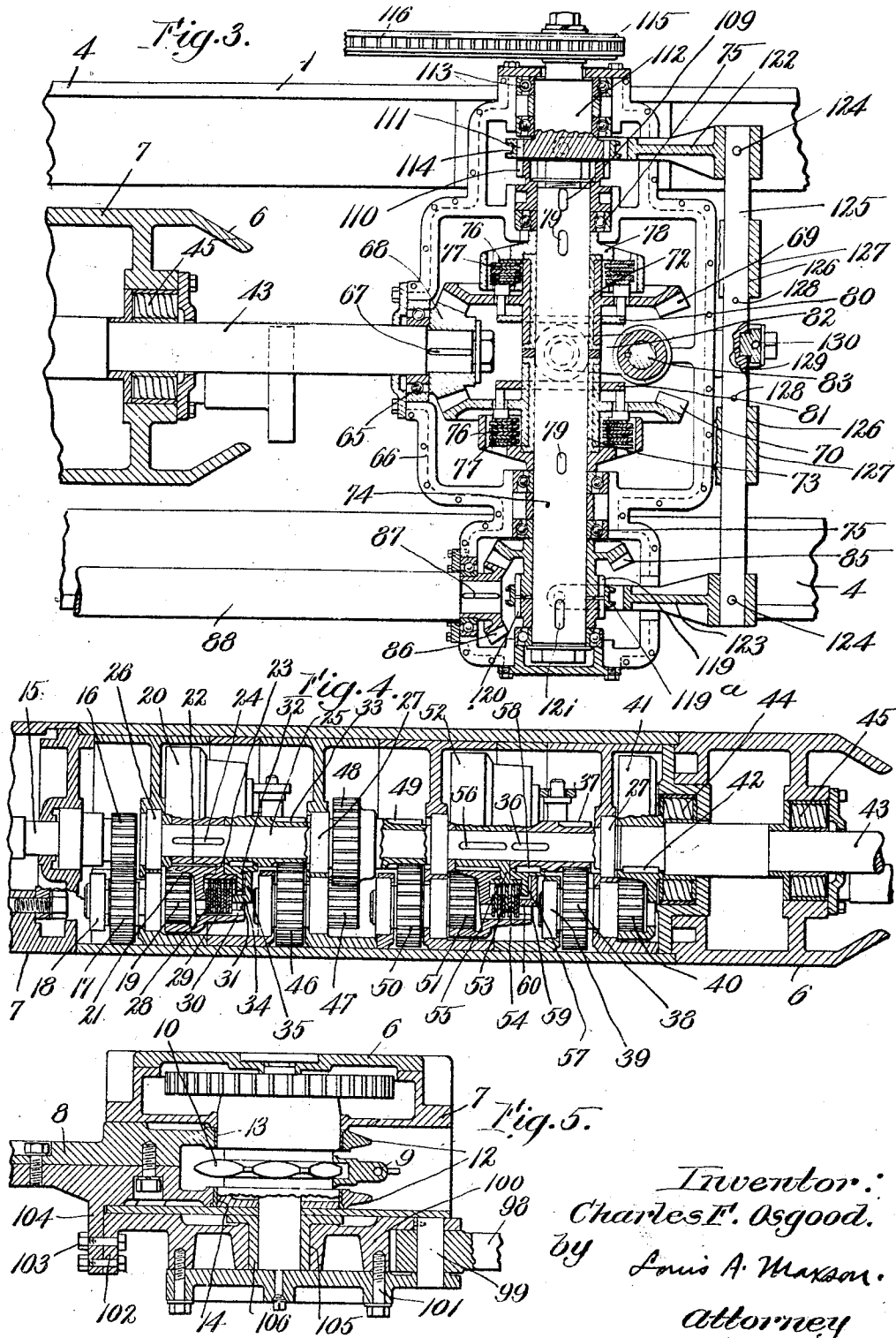
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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MINING APPARATUS

Application filed October 9, 1926. Serial No. 140,579.

This invention relates to mining apparatus and more particularly to a mining machine of the shear cutter type adapted to operate from the mine trackway.

5 An object of this invention is to provide an improved mining machine of the wheel mounted type wherein the mining machine is adapted to insert a shear or vertical cut in the coal face while mounted on the mine trackway. Another object of this invention is to provide an improved shearing machine having a pivoted cutter bar and improved and simplified mechanism for swinging the cutter bar about its pivot. A still further object of this invention is to provide an improved shearing machine having improved mechanism for driving the wheels of the truck. Yet another object of this invention is to provide an improved shearing machine having improved bar swinging mechanism and truck driving mechanism both driven from the motor driven plural speed transmission mechanism of the machine. These and other objects of my invention will, however, subsequently more fully appear.

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

In these drawings,—

30 Fig. 1 is a side elevation of the improved shearing machine, the cutter bar and swinging connections therefor being shown in a plurality of positions as indicated by dotted lines.

35 Fig. 2 is a plan view of the machine shown in Fig. 1.

Fig. 3 is a transverse horizontal sectional view taken on line 3—3 of Fig. 1.

40 Fig. 4 is a central longitudinally extending transverse sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a developed transverse sectional view taken on line 5—5 of Fig. 1.

45 Fig. 6 is a detail sectional view illustrating a portion of the bar swinging mechanism, the view being taken on line 6—6 of Fig. 1.

In this illustrative embodiment of my invention I have shown a truck frame 1 mounted on wheels 2 adapted to run along a mine trackway 3 in the usual manner. The truck

frame 1 specifically comprises parallel longitudinally extending angle members 4 held in rigid spaced relation by means of transverse plates 5, the latter being spaced longitudinally of the truck frame 1. The angle members 4 carry in a suitable manner the running gear of the truck wheels 2. As shown, a mining machine generally designated 6 is mounted on the truck and includes a generally rectangular elongated machine frame or body 7 rigidly secured to the angle members 4 and plates 5 of the truck frame. Further, the machine body 7 has pivotally mounted thereon an elongated plane cutter bar 8 movable in a vertical plane and about the outer edges of which an endless cutter bit carrying cutter chain 9 is adapted to be circulated, the cutter chain orbit fixed by said bar. The cutter chain is adapted to be driven by means of a usual drive sprocket 10 as clearly shown in Fig. 5. The cutter chain drive sprocket 10 is disposed at the front end of the machine frame 7 and is rotatable about a horizontal axis extending transversely of the machine frame. As shown, the elongated cutter bar 8 is pivoted as at 11 on an axis coincident with the axis of the cutter chain sprocket 10 and has secured integral therewith cylindrically bored bearing members 12 disposed at opposite sides of the sprocket, the members 12 respectively engaging bearing surfaces 13 and 14. The sprocket 10 is adapted to be driven from the forward end of the driving motor (not shown), the horizontal longitudinally extending armature shaft of which is clearly shown in Fig. 4 at 15, through plural speed transmission gearing similar to that clearly described in a pending application of one Morris P. Holmes Ser. No. 619,839, filed Feb. 19, 1923, the mining machine 6 being of the same general type as that disclosed in the above mentioned application. As the specific driving connections between the motor and the cutter chain drive sprocket 10 do not enter into this invention, further detailed description of the same is deemed unnecessary other than to state that the sprocket 10 may be either connected to or disconnected from the motor at will.

In specifically describing the improved

mechanism for swinging the cutter bar 8 about its pivot 11, it will herein be observed that the rear end of the armature shaft 15 of the driving motor (see Fig. 4) has suitably secured thereto a spur pinion 16 which is adapted to drive the truck wheel driving mechanism and the improved mechanism for swinging the cutter bar about its pivot and includes transmission gearing and controlling clutches, substantially similar to those described in the pending application mentioned above, at a slow speed in one direction or at a fast speed in the opposite direction without reversing the motor. In specifically describing the fast feed transmission mechanism, it will be noted that pinion 16 meshes with a spur gear 17 suitably journaled within bearings 18 carried by the machine frame 7. The gear 17 has secured thereto and rotatable therewith a spur pinion 19 which meshes with a larger internal gear 20. The hub 21 of the gear 20 is herein also journaled on a suitable bearing sleeve 22 on a sleeve clutch member 23 keyed as at 24 to a longitudinally disposed horizontal main gear driving or transmission shaft 25 journaled at its opposite ends in suitable bearings 26 and 27 suitably carried within the machine frame. Moreover, it will be noted that the clutch member 23 carries a series of friction clutch discs 28 which are interleaved with a corresponding series of clutch discs 29 carried by the sleeve of the internal gear 20. As shown, the sleeve of this internal gear is also provided with a plurality of radially located longitudinally extending slots 30 receiving radial fingers 31 formed on an interlocking member 32 keyed to the hub of a pinion 33 freely rotatable on the shaft 25. Interposed between these fingers 31 are friction clutch operating fingers 34 carried by an axially movable cylindrical plane clutch operating member 35 disposed coaxially with and encircling the hub of the member 32. These fingers 34 extend longitudinally into contact with the adjacent end clutch disc of the clutch 28, 29. As shown, the rear end of the shaft 25 has secured thereto as by a key 36 a spur pinion 37 which meshes with a spur gear 38 journaled within suitable bearings 39 carried by the machine frame. The spur gear 38 has secured thereto and rotatable therewith a spur pinion 40 which meshes with a larger internal gear 41 keyed as at 42 to a longitudinally extending horizontal shaft 43 disposed coaxially with the transmission shaft 25. The shaft 43 is journaled in spaced aligned roller bearings 44 and 45 suitably carried by the machine frame. It will thus be evident that rotation of the armature shaft 15 will be transmitted to the pinion 16, gear 17, pinion 19, internal gear 20, friction clutch discs 28, 29, clutch member 23, shaft 25, pinion 37, gear 38, pinion 40, internal gear 41, to the shaft 43 to rotate the latter at a predetermined high or fast speed whenever the

clutch controlling member 35 is operated to connect the clutch 28, 29. It will further be noted that this speed may be lowered at will by slipping the friction discs 28, 29 of the clutch.

Now referring specifically to the slow speed transmission, it will be noted that when the clutch operating member 35 is in inoperative position and the clutch 28, 29 is released, power will still be transmitted through the interlocking member 32 and the pinion 33 which is freely rotatable on the shaft 25. This pinion 33 in turn meshes with a gear 46 disposed coaxially with the gear 17 and this gear has secured thereto and rotatable therewith a pinion 47 which meshes with a spur gear 48 disposed coaxially with and rotatable on the shaft 25. This gear 48 has secured thereto and rotatable therewith a spur pinion 49 which meshes with a spur gear 50 arranged coaxially with the gear 46 and this gear has secured thereto and rotatable therewith a spur pinion 51. The spur pinion 51 meshes with an internal gear 52 substantially similar to the internal gear 20. The internal gear 52 also houses a friction clutch substantially similar to the clutch heretofore described in connection with the clutch discs 28, 29 and this clutch includes series of interleaved clutch discs 53 and 54, certain of which are carried on a clutch member 55 keyed as at 56 to the shaft 25, while others are carried by a sleeve formed on the internal gear 52. A clutch retaining member 57 is provided keyed as at 58 to the hub of the spur pinion 37 and this clutch member in this instance has no interlocking function and is only a disc retaining member. An axially movable cylindrical plane clutch operating member 59 surrounds the hub of the clutch member 57 and is provided with longitudinally extending fingers 60 which are adapted to engage the adjacent end disc of the clutch 53, 54. The clutch operating members 35 and 59 may be operated alternatively to apply their respective clutches by means of suitable shipper mechanism which is clearly described in the pending application mentioned above and includes an operating handle 61 conveniently located at the rear end of the machine (see Figs. 1 and 2). As a result of this slow speed mechanism above described, although the clutch 28, 29 is disconnected, rotation will constantly be imparted through the pinion 33, gear 46, pinion 47, gear 48, pinion 49, gear 50, pinion 51, internal gear 52, clutch discs 53, 54, clutch member 55, pinion 37, gear 38, pinion 40, internal gear 41, to the shaft 43 so that when the clutch 53, 54 is connected the shaft 43 will be rotated at a slow speed in an opposite direction or reverse direction from the fast feed previously described. Here it will also be evident that by slipping the friction discs 53, 54 of the slow speed clutch, this speed may be reduced at will.

As clearly shown in Fig. 3, the shaft 43 is journaled at its rear end on ball bearings 65 suitably carried within a housing or casing 66 rigidly secured in a suitable manner to the angle members 4 of the truck frame 1. The shaft 43 has secured thereto at the rear end thereof as by a key 67, a bevel pinion 68 which constantly meshes with larger bevel gears 69, 70 rotatably mounted on bearing sleeves 72, 73, respectively, surrounding and supported by a horizontal shaft 74 disposed transversely of the truck frame and journaled at its opposite ends in ball bearings 75 suitably carried by the housing 66. The bevel gears 69, 70 rotate in opposite directions and constitute a reversing mechanism for the shaft 74. Carried within each of the bevel gears 69, 70 is a series of clutch discs 76 which is interleaved with a corresponding series of clutch discs 77 carried by each of the clutch housing members 78 keyed as at 79 to the shaft 74. Interposed between the bevel gears 69 and 70 and encircling the hubs thereof are axially movable clutch applying members 80, 81 each having fingers projecting within the bevel gears into engagement with the adjacent end disc of the series of clutch discs 76, 77. As shown, a roller equipped shipper yoke 82 is provided, the rollers of which engage the adjacent plane surfaces of the clutch applying members 80 and 81 and this shipper yoke is keyed to a vertically disposed shaft 83, suitably rotatably mounted within the housing 66. The shaft 83 has secured thereto at its upper end an operating lever 84 (see Figs. 1 and 2). It will thus be evident that when the operator suitably swings the lever 84 about its pivot the shipper yoke 82 is consequently swung and the desired clutch 76, 77 is applied, thereby connecting one or the other of the bevel gears 69, 70 in operative driving relation with the shaft 74, rotating the latter selectively in opposite directions. The shaft 74 may also be rotated at either a fast or at a slow speed under control of the clutches 28, 29 and 53, 54 described above under the control of the operating member 61.

In this instance, the shaft 74 has journaled thereon and connectible thereto a bevel gear 85. The mechanism for connecting the bevel gear 85 to the shaft 74 will be later described. The bevel gear 85 meshes with a bevel gear 86 keyed as at 87 to a horizontal shaft 88 extending longitudinally of the machine and disposed at one side thereof. The shaft 88 is disposed parallel with the shaft 43. The forward end of the shaft 88 is journaled in spaced aligned ball bearings 89 carried by a bracket member 90 rigidly secured as by screws 91 to the machine frame 7. The forward end of the shaft 88 is also provided with screw threads 92 which threadedly engage a nut member 93. As clearly shown in Fig. 6, the nut 93 is pivotally connected as at 94 to a sliding block 95, the latter being guided

within an elongated horizontal slot 96 formed within the bracket 90. Pivotally connected to the nut 93 as at 97 is a connecting link 98, the forward end of this link in turn being pivotally connected as at 99 to a radial arm 100. The arm 100 is preferably composed of two parts held together by screws 101 (see Fig. 5) and one of these parts has formed thereon a bent-up end portion 102 to which is secured as by bolts 103 a lateral projection 104 formed integral with the cutter bar 8. The arm 100 is pivotally mounted on the machine as at 105 on a projecting bearing member 106 suitably rigidly secured to the machine frame. From the foregoing description it will be evident that when the shaft 43 is connected in driving relation with the motor and when the shaft 74 is connected to one of the bevel gears 69, 70, the screw 92 may be rotated moving the nut 93 axially and consequently swinging the cutter bar at either a fast or slow speed about its pivot. When the shaft 74 is connected to the other of the bevel gears 69, 70, the screw 92 may be rotated in an opposite direction at either a fast or at a slow speed and consequently the cutter bar may be swung about its pivot in the opposite direction.

In specifically describing the improved means for driving the truck wheels from the motor of the machine 6, it will be observed that secured to the shaft 74 opposite the bevel gear 85 as by a key 109 is a clutch member 110. Arranged coaxial with the clutch member 110 is a clutch member 111 preferably formed integral with a shaft 112 aligned with the shaft 74 and journaled in spaced aligned ball bearings 113 suitably carried by the housing 66. The clutch member 111 is connectible in driving relation with the clutch member 110 by means of an axially movable internal shipper gear 114. As clearly shown in Fig. 3, the shaft 112 has secured thereto at its outer end a chain sprocket 115 which is connected by means of an endless drive chain 116 with a sprocket 117 suitably rigidly secured to the rear truck axle. As shown in Figs. 1 and 2, the front and rear truck axles are connected together by means of a chain and sprocket connection 118. Again referring to Fig. 3 it will be observed that the bevel gear 85 has preferably formed integral therewith at the outer end thereof a clutch member 119 which is connectible by means of an axially movable internal shipper gear 119^a to a clutch member 120 keyed as at 121 to the shaft 74. The mechanism for alternatively connecting the clutch members 111 and 119 to the shaft 74 will now be described. Cooperating with the peripheral grooves in the internal shipper gears 114 and 119^a respectively are shipper yokes 122 and 123 secured as by pins 124 at the opposite ends of an actuating rod or shaft 125 slidably mounted within bores 126 formed within

lateral lugs 127, the latter being formed integral with the housing 66. As shown, longitudinally spaced stop pins 128 are carried by the rod 125 and are adapted to alternatively engage the adjacent inner sides of the lugs 127, thereby preventing excessive movement of the shipper gears in either direction. The rod 125 is vertically slotted intermediate its ends as at 129 and cooperating with this slot is a shipper lever 130 pivoted on the gear housing. It will thus be evident that when the lever 130 is grasped by the operator and swung about its pivot to effect axial movement of the rod 125 in one direction, the clutch members 110, 111 are connected by the shipper gear 114 while the clutch members 119, 120 are disconnected by the shipper gear 119^a. When the shipper rod 125 is shifted axially in the opposite direction the clutch members 110, 111 are released and the clutch members 119, 120 are connected. It is obvious that the clutch members 111 and 119 may only be alternatively driven.

Suitably secured to the rear truck axle is a frictional braking device 135 (see Fig. 2) and this braking device is adapted to be operated through suitable connections 136 and 137, the rear end of the latter connection being connected to an operating lever 138. This frictional braking device is adapted to control rotation of the truck wheels when the mining apparatus is moving over an inclined trackway and is also adapted to lock the truck wheels against rotation during the cutting operation.

In the operation of my improved shearing machine it will be noted that when the latter is moving rapidly about the mine the clutch 76, 77 is applied connecting the bevel gear 69 in driving relation with the shaft 74 and the clutch members 110 and 111 are connected by the clutch shipper gear 114, it being understood that the motor is running and the fast speed clutch 28, 29 is applied and consequently the shaft 43 is rotated at a high speed. When it is desired to drive the mining machine rearwardly along the trackway at a high speed, the bevel gear 69 is disconnected from the shaft 74 and the bevel gear 70 is connected to the shaft by means of its controlling clutch 76, 77, and consequently the truck wheels are driven in an opposite direction. When the machine is disposed adjacent the working face the operator disconnects the bevel gear 70 from the shaft 74 and shifts the rod 125 axially, disconnecting the truck drive clutch members 110, 111 and connecting the bar swing clutch members 119, 120 in driving relation with the shaft 74 by means of the shipper gear 119^a. The clutch 76, 77 is then applied, connecting the bevel gear 69 and the shaft 74, it being understood that the shaft 43 is still rotating at a high speed. The screw 92 is consequently rotated at a

fast speed and the nut 93 is moved rearwardly relative to the screw 92, consequently swinging the cutter bar 8 from the full line position shown in Fig. 1 to the upper dotted line position in that figure, the screw 92 thereafter being disconnected by means of shipper gear 119^a. The operator then suitably connects the cutter chain drive sprocket 10 to the motor and the cutter chain 9 is rapidly circulated about the outer edges of the cutter bar 8 in a usual manner. The rod 125 is then shifted axially disconnecting the bar swing clutch members 119, 120 and connecting the truck drive clutch members 110, 111. The fast speed clutch 28, 29 is then released and the slow speed clutch 53, 54 is applied, and the shaft 43 is consequently rotated in an opposite direction at a slow speed. The clutch 76, 77 is then applied connecting the bevel gear 70 to the shaft 74 and the cutter bar 8 is then sumped into the coal, the apparatus moving bodily along the trackway at that time. After the sumping cut is completed the truck drive clutch members 110, 111 are disconnected and the bar swing clutch members 119 and 120 are connected, the bevel gear 69 disconnected from and bevel gear 70 connected to shaft 74, and the screw 92 is rotated at a slow speed moving the nut 93 forwardly axially relative to the screw 92 and consequently swinging the cutter bar 8 downwardly about its pivot to the dotted line position shown in Fig. 1. The gear 70 is then disconnected from the shaft 74, the bar swing clutch members 119, 120 disconnected, and the truck drive clutch members 110, 111 are connected. The bevel gear 69 is then connected to the shaft 74 and consequently the cutter bar is withdrawn from the face at a cutting speed. The cutter bar is thereafter swung upwardly to the full line position shown in Fig. 1 and the machine is moved rearwardly at a high speed along the trackway and away from the working face. These and other operations and advantages of my improved shearing machine will be clearly apparent to those skilled in this art.

While I have in this application specifically described one form 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 apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor on said truck having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, constantly operative means connected to said kerf cutter and driven from the opposite end

of said motor for swinging positively said kerf cutter about its pivot in opposite directions, said bar swinging means including a reciprocable element movable bodily in one direction relative to said motor to effect swinging of said kerf cutter in one direction and movable bodily in the opposite direction relative to said motor to effect swinging of said kerf cutter in the opposite direction, and mechanism for propelling the apparatus bodily along the mine trackway in opposite directions to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

2. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor on said truck having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of the motor, constantly operative means connected to said kerf cutter and driven from the rear end of said motor for swinging positively said kerf cutter about its pivot in opposite directions, said bar swinging means including a reciprocable element movable bodily in one direction relative to said motor to effect swinging of said kerf cutter in one direction and movable bodily in the opposite direction relative to said motor to effect swinging of said kerf cutter in the opposite direction, and mechanism for propelling the apparatus bodily along the mine trackway in opposite directions to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

3. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means operatively connected to said kerf cutter and driven from the opposite end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements and connections between one of said elements and said kerf cutter, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

4. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means operatively connected to said kerf cutter and driven from the rear end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including

relatively rotatable screw and nut elements and connections between one of said elements and said kerf cutter, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

5. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means operatively connected to said kerf cutter and driven from the opposite end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements, connections between one of said elements and said kerf cutter and means for rotating said screw, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

6. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means operatively connected to said kerf cutter and driven from the rear end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements, connections between one of said elements and said kerf cutter and means for rotating said screw, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

7. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means operatively connected to said kerf cutter and driven from the opposite end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

8. In a mining apparatus, a wheeled truck

adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means operatively connected to said kerf cutter and driven from the rear end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

9. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means operatively connected to said kerf cutter and driven from the opposite end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions and at different speeds, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

10. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism mounted thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means operatively connected to said kerf cutter and driven from the rear end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including relatively rotatable screw and nut elements, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions and at different speeds, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

11. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means driven from

the opposite end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, and connections between one of said elements and said kerf cutter, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

12. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means driven from the rear end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, and connections between one of said elements and said kerf cutter, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

13. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means driven from the opposite end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, connections between one of said elements and said kerf cutter and means for rotating said screw, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

14. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means driven from the rear end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, connections between one of said ele-

ments and said kerf cutter and means for rotating said screw, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

15. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means driven from the opposite end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

16. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means driven from the rear end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

17. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from one end of said motor, means driven from the opposite end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions and at different speeds, and mechanism for propelling the apparatus bodily in opposite di-

rections along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

18. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a driving motor having its axis extending longitudinally of the apparatus, said cutting mechanism being driven from the front end of said motor, means driven from the rear end of said motor and operatively connected to said kerf cutter for swinging said kerf cutter about its pivot while the latter remains stationary including cooperating relatively rotatable screw and nut elements supported along one side of the apparatus, connections between one of said elements and said kerf cutter and means for rotating said screw selectively in opposite directions and at different speeds, and mechanism for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

19. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor, constantly operative means driven by said transmission mechanism and including a reciprocable element connected to said kerf cutter and reciprocable relative to the pivot of the latter and movable in opposite directions at different speeds for positively swinging said kerf cutter about its pivot in opposite directions and at different speeds, and mechanism driven through said transmission mechanism for driving the truck wheels to effect bodily movement of the apparatus along the mine trackway at a cutting speed.

20. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor, means operatively connected to said kerf cutter and driven by said transmission mechanism for swinging said kerf cutter about its pivot while the latter remains stationary at different speeds, said swinging means including cooperating relatively rotatable screw and nut elements and connections between one of said elements and said kerf cutter, and means for propelling the apparatus bodily in opposite directions along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

21. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor and including a shaft rotatable in opposite directions and at different speeds, constantly operative means connected to said kerf cutter and driven by said shaft for imparting direct pushing and pulling forces to said kerf cutter at a point offset from its pivot for positively swinging said kerf cutter about its pivot in opposite directions, and mechanism driven by said shaft for driving the truck wheels to propel the apparatus bodily along the mine trackway in opposite directions during cutting.

22. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor and including a shaft rotatable in opposite directions and at different speeds, constantly operative means connected to said kerf cutter and driven by said shaft for imparting direct pushing and pulling forces to said kerf cutter at a point offset from its pivot for positively swinging said kerf cutter about its pivot in opposite directions, said kerf cutter swinging means including a reciprocable element operatively connected to said kerf cutter and movable in opposite directions to effect swinging of said kerf cutter in opposite directions, and mechanism driven by said shaft for driving the truck wheels to propel the apparatus bodily along the mine trackway in opposite directions during cutting.

23. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor, means driven by said transmission mechanism for swinging said kerf cutter about its pivot in opposite directions including cooperating relatively rotatable nut and screw elements, means for rotating one of said elements for effecting axial movement of the other element, and connections including a link pivotally connected to said axially movable element and said kerf cutter, and mechanism for propelling the apparatus bodily along the mine trackway to effect op-

posite rectilinear sumping and withdrawal movements of said kerf cutter.

24. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor, means driven by said transmission mechanism for swinging said kerf cutter about its pivot in opposite directions including cooperating relatively rotatable nut and screw elements, means for rotating one of said elements for effecting axial movement of the other element, and connections including a link pivotally connected to said axially movable element and said kerf cutter, and mechanism driven through said transmission mechanism for propelling the apparatus bodily along the mine trackway to effect opposite rectilinear sumping and withdrawal movements of said kerf cutter.

25. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, mechanism driven from the rear end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including a shaft extending longitudinally of the apparatus at one side thereof, relatively rotatable screw and nut elements one of which is rotated by said shaft, and connections between said other element and said kerf cutter, and mechanism for propelling the apparatus bodily along the mine trackway in opposite directions to effect sumping and withdrawal movements of said kerf cutter at a cutting speed.

26. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism thereon including a pivoted kerf cutter, a motor having its axis extending longitudinally of the apparatus and driving from its forward end said cutting mechanism, mechanism driven from the rear end of said motor for swinging said kerf cutter about its pivot while the latter remains stationary including a shaft extending longitudinally of the apparatus at one side thereof, relatively rotatable screw and nut elements one of which is rotated by said shaft, and connections between said other element and said kerf cutter, and mechanism driven from the rear end of said motor for propelling the apparatus bodily along the mine trackway in opposite directions to effect sumping and withdrawal movements of said kerf cutter at a cutting speed.

27. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cut-

ting mechanism including a frame mounted on and rigidly and permanently secured to said truck and a kerf cutter pivotally mounted on said frame for swinging movement relative thereto, a driving motor carried by said frame and having its axis extending longitudinally of the apparatus and driving from one end said cutting mechanism, a plural speed transmission mechanism operatively connected to the opposite end of said motor and having its terminal element rotatable on an axis extending longitudinally of the apparatus, constantly operative means connected to said kerf cutter and driven through said transmission mechanism for positively swinging said kerf cutter about its pivot in opposite directions and at different speeds, said kerf cutter swinging means including a reciprocable element movable in one direction to effect swinging of said kerf cutter in one direction and movable in the opposite direction to effect swinging of said kerf cutter in the opposite direction, and mechanism driven through said transmission mechanism for driving the truck wheels to propel the apparatus bodily along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

28. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism including a frame mounted on and rigidly and permanently secured to said truck and a kerf cutter pivotally mounted on said frame for swinging movement relative thereto, a driving motor carried by said frame and having its axis extending longitudinally of the apparatus and driving from the front end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor and having its terminal element rotatable on an axis extending longitudinally of the apparatus, constantly operative means connected to said kerf cutter and driven through said transmission mechanism for positively swinging said kerf cutter about its pivot in opposite directions and at different speeds, said kerf cutter swinging means including a reciprocable element movable in one direction to effect swinging of said kerf cutter in one direction and movable in the opposite direction to effect swinging of said kerf cutter in the opposite direction, and mechanism driven through said transmission mechanism for driving the truck wheels to propel the apparatus bodily along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

29. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism including a frame mounted on and rigidly and permanently secured to said truck and a kerf cutter pivotally mounted on said frame for swinging movement relative thereto, a driving motor car-

ried by said frame and having its axis extending longitudinally of the apparatus and driving from one end said cutting mechanism, a plural speed transmission mechanism operatively connected to the opposite end of said motor and having its terminal element rotatable on an axis extending longitudinally of the apparatus, constantly operative means connected to said kerf cutter and driven through said transmission mechanism for positively swinging said kerf cutter about its pivot in opposite directions and at different speeds, said kerf cutter swinging means including cooperating relatively rotatable screw and nut elements and connections between one of said elements and said kerf cutter, and mechanism driven through said transmission mechanism for driving the truck wheels to propel the apparatus bodily along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

30. In a mining apparatus, a wheeled truck adapted to run along a mine trackway, cutting mechanism including a frame mounted on and rigidly and permanently secured to said truck and a kerf cutter pivotally mounted on said frame for swinging movement relative thereto, a driving motor carried by said frame and having its axis extending longitudinally of the apparatus and driving from the front end said cutting mechanism, a plural speed transmission mechanism operatively connected to the rear end of said motor and having its terminal element rotatable on an axis extending longitudinally of the apparatus, constantly operative means connected to said kerf cutter and driven through said transmission mechanism for positively swinging said kerf cutter about its pivot in opposite directions and at different speeds, said kerf cutter swinging means including cooperating relatively rotatable screw and nut elements and connections between one of said elements and said kerf cutter, and mechanism driven through said transmission mechanism for driving the truck wheels to propel the apparatus bodily along the mine trackway to effect opposite rectilinear movements of said kerf cutter at a cutting speed.

In testimony whereof I affix my signature.
CHARLES F. OSGOOD.

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