March 12, 1929. E. C. MORGAN 1,704,918

MINING AND LOADING MACHINES

Filed May 24, 1921 2 Sheets-Sheet 1

FIG. 1

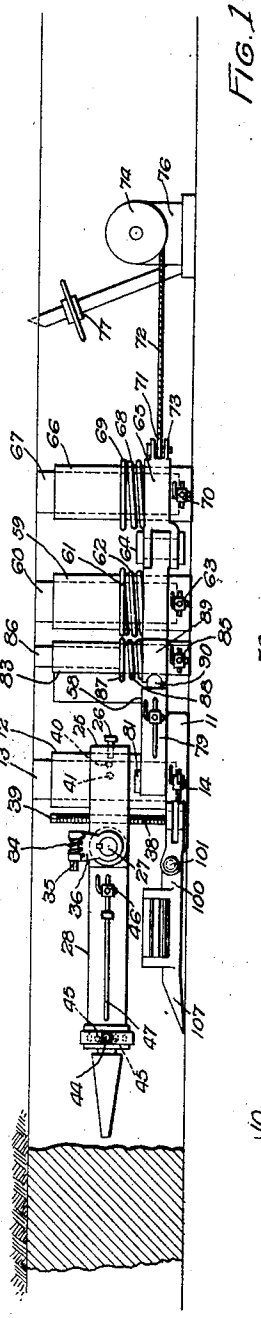
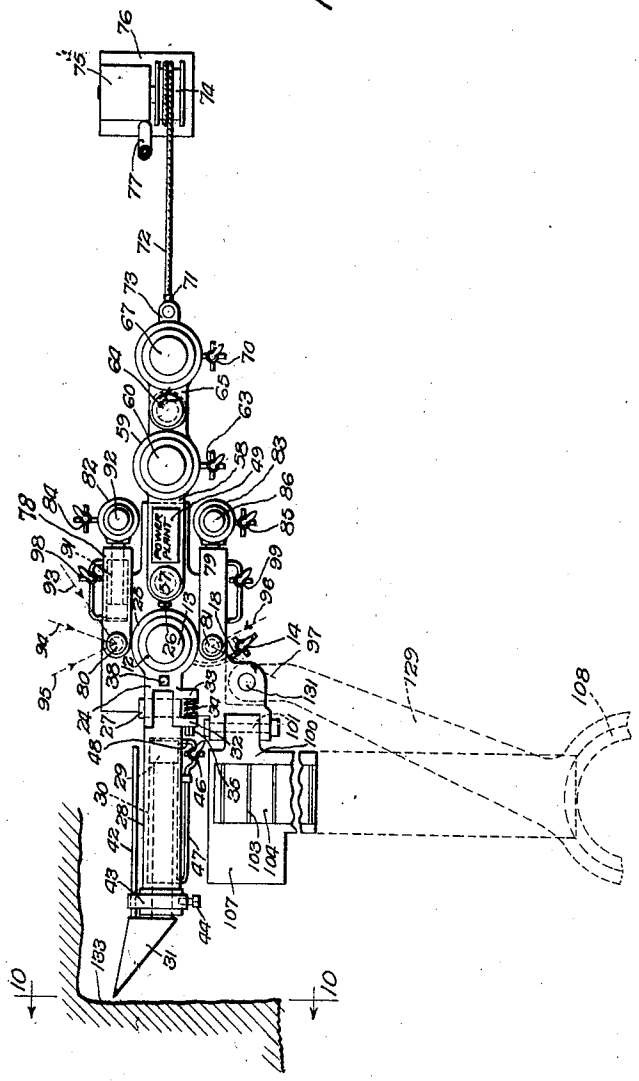


FIG 2



INVENTOR

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March 12, 1929. E. C. MORGAN 1,704,918

MINING AND LOADING MACHINES

Filed May 24, 1921 2 Sheets-Sheet 2

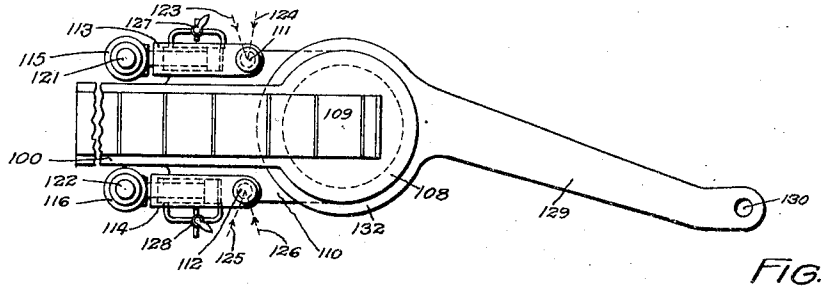


FIG. 3

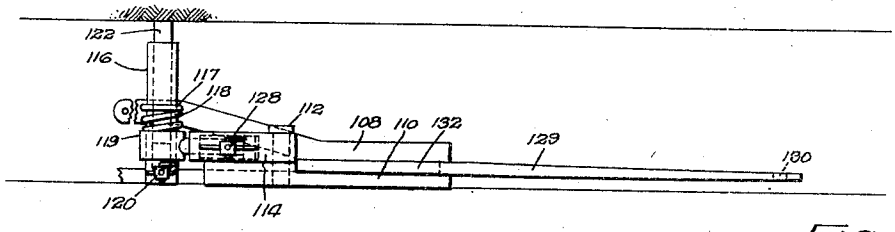


FIG. 4

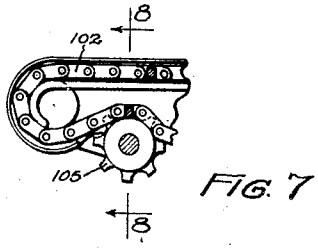


FIG. 7

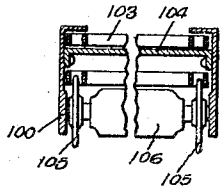


FIG. 8

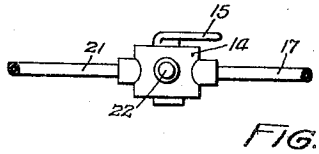


FIG. 6

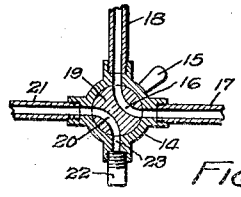


FIG. 5

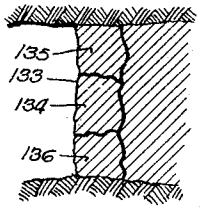


FIG. 10

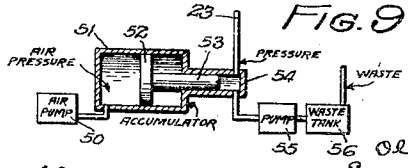


FIG. 9

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UNITED STATES PATENT OFFICE.

EDMUND C. MORGAN, OF NEW YORK, N. Y.; OLIVE EUGENIE MORGAN EXECUTRIX OF SAID EDMUND C. MORGAN, DECEASED.

MINING AND LOADING MACHINE.

Application filed May 24, 1921. Serial No. 472,049.

My invention relates to mining and loading machines and is an improvement on the mining and loading machines disclosed in my co-pending applications Serial No. 346,903, filed December 23rd, 1919, and Serial No. 424,050, filed November 15th, 1920.

One of the objects of my invention is the provision of simple and efficient anchoring and controlling mechanism for coal dislodging mechanism of the splitting type.

The further object of the invention is the provision of the improved loading apparatus for mining mechanism comprising coal splitting devices.

Another object of the invention is the provision of improved means for controlling the direction and position of coal splitting mechanism.

Another object of the invention is the provision of the improved upright anchoring devices particularly adapted for use in connection with coal splitting mechanism.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings, Fig. 1 is an elevation, of an embodiment of my invention; Fig. 2, is a plan view of the mining and loading machine, showing the relative positions of the various parts including the loading apparatus; Fig. 3 is a plan view of the loading conveyor adapted to be connected to the coal receiving conveyor of the loading apparatus; Fig. 4 is an elevation of the loading conveyor shown in Fig. 3; Fig. 5 is a detailed sectional view of the various valve devices adapted to be used for controlling the hydraulic motors and hydraulic roof jacks; Fig. 6 is an elevation of the valve shown in Fig. 5; Figs. 7 and 8 are enlarged detailed views of a scraper type of conveyor which may be used in the loading apparatus, including both the receiving conveyor, shown in Fig. 2, and the loading conveyor shown in Fig. 3; Fig. 9 is a diagrammatic illustration of the power plant indicated on Fig. 2; and Fig. 10 is a diagrammatic view illustrating an improved method of operation of the splitting mechanism shown in Figs. 1 and 2.

Referring to Figs. 1 and 2, 11 designates a supporting frame which is adapted to rest on and slide over the mine floor. Extending upwardly from the central portion of the base frame 11 is a cylinder 12, from the upper end of which projects a plunger 13 in position to engage the roof of the mine chamber to firmly anchor the base frame 11 in fixed and stationary position. The hydraulic roof jack comprising a cylinder 12 and plunger 13 may be controlled by a valve 14, the details and construction of which may be as shown in Fig. 5.

By turning the handle 15 to the position shown in Fig. 5, the passageway 16 will direct the supply of liquid from the supply pipe 17 to the pipe 18 which leads to the bottom of the cylinder 12. When the valve 19 is turned so that the passageway 20 connects the pipe 18 to the exhaust pipe 21, the weight of the plunger 13 will force the liquid out of the cylinder 12 and thus cause the roof jack to be released. It should be noted that when the valve shown in Fig. 5 is used for controlling the operation of a roof jack a plug 22 is inserted to cut off communication between the port 23 and the valve passages 16 and 20. It will thus be seen that for a hydraulic roof jack a three-way valve is used to effect control of such roof jack.

Mounted on the cylinder 12 for vertical adjustment along the same is a supplemental frame 24 comprising a cylindrical collar 25. The latter is provided with a set screw 26 in position to engage the cylinder 12 and hold the supplemental frame 24 against turning when in adjusted position.

Pivotally connected at 27 to the supplemental frame 24 is a hydraulic cylinder 28 in which is located a piston 29 having a piston rod 30 extending outwardly and forwardly therefrom, and carrying at its outer end the splitting tool 31 as shown in Figs. 1 and 2.

Secured to the supplemental frame 24 are spaced apart brackets 32 and 33 in which are journaled the end portions of a worm 34 which is provided with a squared head 35 for receiving a turning tool. The worm 34 meshes with a worm gear segment 36 which is keyed to a shaft 27 secured to the rear end of the cylinder 28. Therefore when the worm 34 is turned the splitting tool 31 may be adjusted in elevation on the horizontal axis of the shaft 27. The splitting tool may thus be inclined upwardly or downwardly or be adjusted to occupy a horizontal position.

The splitting tool may also be adjusted in elevation while its horizontal position is retained. For this purpose a screw-threaded vertical rod 38 is screw-threaded through the supplemental frame 24 as shown in Figs. 1 and 2. The upper end of the screw-threaded rod 38 is squared at 39 to receive a turning tool. The lower end of the screw-threaded rod 38 is adapted to rest on and slide arcuately over the upper surface of the base plate 11. When the set screw 26 is released the supplemental frame 24 together with the splitting tool mechanism may be turned about the cylinder 12 and secured in adjusted position as illustrated diagrammatically at 40 in Fig. 1, or the set screw may engage the cylinder 12 at the position designated 41 to hold the splitting tool inclined laterally in the desired direction. Such adjustment laterally can easily be effected because the lower end of the screw-threaded rod 38 slides arcuately over the base plate 11.

It should also be noted that when the set screw 26 is released the supplemental frame 24 together with the coal splitting mechanism carried thereby, may be adjusted in elevation by turning the screw-threaded rod 38 in one direction or the other, depending upon whether the coal splitting tool is to be lifted or lowered.

Extending rearwardly from the coal splitting tool 31 is a longitudinal rod 42 extending parallel to the cylinder 28 as shown in Fig. 2. This rod 42 extends through a hole in the collar 43 mounted on the outer end of the cylinder 28 and provided with a set screw 44 for securing the collar 43 in adjusted position. Spaced apart recesses 45 may be provided in the outer circumferential portion of the cylinder 28, for receiving the set screw 44. By loosening the set screw 44 and turning the collar 43 the rod 42 is carried with the latter since the piston rod 30 and the piston 29 are free to rotate in cylinder 28.

In order to control the operation of the splitting tool a valve 46 may be connected to the pipes 47 and 48 as shown in Fig. 2. The valve 46 may be constructed as shown in Fig. 5, but with the plug 22 removed, so that the port 23 may act as the pressure supply port for directing the liquid through the passage 20 and the pipe 47 into the cylinder 28 at the left of the piston 29, while at the same time the liquid at the right of the piston 29 will be exhausted through the pipe 48 and the passageway 16 to the exhaust pipe. It will thus be seen that when the valve structure shown in Fig. 5 is used for controlling the operation of a hydraulic motor comprising a piston movable back and forth in a cylinder the plug 22 is removed and all four ports 17, 18, 21 and 23 put into service. The port 23 becomes the pressure supply port, the pipes 17 and 21 lead to the ends of the cylinder at both sides of the piston and the pipe 18 becomes the exhaust port.

Although a hydraulic pump may be connected directly to the supply port 23 I prefer to use a power plant including an accumulator system so that the splitting tool may be moved into position against the mine wall in a minimum time, and then slow and powerful pressure exerted to effect the operation of the splitting tool in accordance with the power necessary to effect dislodgment of the coal from the mine wall. Such a power plant may be located as indicated at 49 in Fig. 2 and may be arranged as illustrated digrammatically in Fig. 9; this accumulator system may consist of an air pump 50 for supplying air pressure to the cylinder 51 back of the piston 52 on the other side of which is an accumulator plunger 53 movable in a cylinder 54 of reduced diameter. The supply pressure port 23 may lead from the accumulator cylinder 54 to the valve 46 shown in Fig. 2. The pump 55 may be connected between the waste tank 56 and the accumulator cylinder 54 as shown in Fig. 9. By maintaining air pressure back of the piston 52 the liquid in the cylinder 54 will rush through the supply port 23 as soon as the valve 46 is operated to move the piston 29 to the left. The splitting tool 31 will therefore be moved quickly to the mine wall and as soon as this occurs the continued operation of the pump 55 will exert sufficient pressure on the liquid in the cylinder 28 to move the splitting tool into the mine vein to dislodge the coal. I prefer to have the accumulator system so arranged that when the valve 46 is opened to cause the piston rod 30 to move outwardly, the splitting tool will be moved very rapidly and with considerable force to make a stroke against the mine wall to split the material therefrom. In some instances where the coal is particularly hard the hydraulic pressure exerted by the accumulator may be increased by increasing the air pressure. In other words, the pressure in the accumulator system will be regulated by varying the air pressure in accordance with the nature of the coal to be dislodged.

It should also be understood that the splitting tool may also be operated with a slower movement after it engages the material without dislodging the same; then the continued operation of the pump will continue to exert powerful pressure back of the piston 29 to move the same forwardly, slowly but very powerfully, to dislodge the coal in the path of travel of the splitting tool 31.

Pivoted at 57 to the rear portion of the base frame 11 is a rearwardly extending frame 58, intermediate the ends of which may be mounted the roof jack comprising a

cylinder 59 and a plunger 60. The cylinder 59 is provided with a collar 61 which is adapted to rest on a spring 62 which in turn rests on the upper surface of the frame 58. This spring 62 tends to hold the cylinder 59 up off the floor when the plunger 60 is not in contact with the roof.

In order to control the operation of the roof jack on the frame 58, a valve 63 is provided similar to that shown in Fig. 5 with the plug 22 in place closing the passage to the port 23.

Pivotally connected to the rear end of the frame 58 at 64 is a frame 65 which is provided with another roof jack comprising a cylinder 66 and a plunger 67. The cylinder 66 is provided with a collar 69 resting on a spring 68 which is mounted on top of the frame 65. A valve 70, similar to the one designated 63, is provided for controlling the operation of the roof jack on the frame 65. When the plunger 67 is in its lower position, the spring 68 holds the cylinder 66 up off the ground.

It should be understood that in those locations where the floor and roof of the mine chamber are of sufficient strength, the roof jack on the frame 11 will be sufficient to hold the machine in proper position during operation of the splitting tool, but where the floor and roof, or either of them, tend to yield to the pressure of the roof jack, a plurality of roof jacks may be provided so as to distribute the pressure on the roof and floor, and thus obtain the requisite anchorage for the machine. Where a plurality of roof jacks are provided to secure this distributed pressure on the floor and roof I prefer to mount them on separate frames, such as those indicated 11, 58 and 65, flexibly connected together as indicated at 57 and 64, so that the frame 11 may be moved laterally on the pivot 57 when the hydraulic jack 12 is released, without releasing the hydraulic jacks 59 and 66. In the same manner both the frames 11 and 58 may be moved laterally on the pivot 64 when the plungers 13 and 60 are released, without releasing the plunger 67.

When all of the roof jacks, including those designated 12, 59 and 66, are released, the springs 62 and 68 will hold the roof jacks 59 and 66 cleared from the floor, thus facilitating free movement of the supporting framework to desired location in the mine.

In order to move the framework, together with the mining mechanism mounted thereon, rearwardly, the free end 71 of rope 72 is connected to the rear end 73 of the frame 65. This rope is connected to and wound on a rope drum 74, connected to a shaft of a motor 75 mounted on the frame 76. The latter may be anchored by means of the roof jack 77 inclined upwardly and forwardly from the frame 76 to the roof as shown in Fig. 1. Upon operation of the motor 75 in the proper direction, the rope 72 will be wound on the drum 74 to pull the framework together with the parts mounted thereon and connected thereto, rearwardly or to the right as viewed in Figs. 1 and 2.

In order to move the mining machine forward step by step to new locations for mining operations I have provided a pair of hydraulic motors 78 and 79, pivoted respectively at 80 and 81, to the upper surface of the frame 11. Each of these motors 78 and 79 is provided with a piston movable along a cylinder, each piston being provided with a piston rod extending out of the rear end of the cylinder and connected respectively to roof jacks 82 and 83. These roof jacks are respectively provided with controlling valves 84 and 85, each similar to that shown in Fig. 5, with a plug 22 in position to close communication to the port 23.

By referring to Fig. 1, it will be seen that the roof jack 83 comprises the cylinder with the plunger 86 extending out of the upper end thereof. The cylinder is provided with a collar 87 resting on a spring 88 which in turn rests on a collar 89 rigidly connected to the piston 90 of the motor 79. The roof jack 82 is similarly constructed by being provided with a collar resting on a spring which in turn rests on a collar connected to the piston rod 91 of the motor 78.

It should be particularly noted that each of the motors 78 and 79 may be swung laterally to various angular positions when the roof jacks 82 and 83 are in released position. This can readily be done because the springs 88 hold the roof jacks off the floor when the plungers 86 and 92 are in their lower positions. For instance, the motor 78 may be swung to the various positions indicated by the dotted lines 93, 94 and 95. In a similar manner the motor 79 may be swung to various angular positions such as those indicated by the dotted lines 96 and 97. After either motor 78 or 79 has been swung on its pivot 80 or 81 to the desired angular position, the roof jack 82 or 83 may be operated so as to be securely anchored between the floor and roof.

In order to move the machine forward, the roof jacks 12, 59 and 66 are released and the roof jacks 82 and 83 anchored in the positions shown in Fig. 2. The valves 98 and 99 each similar to that shown in Fig. 5, with the plug 22 removed, may then be operated to control the operation of the motors 78 and 79. When the cylinders of the motors 78 and 79 are moved forward or to the left, as viewed in Fig. 2, the frame 11 together with the splitting tool mounted thereon, will be moved to the left. It should be noted, however, that the valves 98 and 99 may also be operated to effect rearward movement of the frame 11 and the parts

connected thereto, while the roof jacks 82 and 83 remain anchored. When the machine is to be moved forward step by step, the roof jacks 82 and 83 are released and the motors 78 and 79 operated to move said roof jacks 82 and 83 forward to new positions, and then by anchoring the roof jacks and operating the motors 78 and 79 the forward movement of the frame 11 can be repeated.

The loading apparatus comprises a conveyor frame 100 pivotally connected at 101 to one side of the forward end of the frame 11. This conveyor frame may be provided with a scraper type of conveyor comprising spaced apart endless parallel chains 102 provided with cross flights 103 adapted to move along a fixed bed plate 104 on the conveyor frame 100 shown in Figs. 7 and 8. Sprockets 105 may be connected to the chains to drive the same and these sprockets may be operated by the motor 106.

The frame 100 may be provided with a scoop 107, as shown in Figs. 1 and 2, in position to scoop up from the floor the dislodged material and direct the same onto the scraper conveyor, which transfers the material laterally into the hopper 108 shown in Figs. 2, 3 and 4.

Extending into the hopper 108 is a loading conveyor 109, the rear end of which may be elevated sufficiently for delivering the material into mine cars. The loading conveyor 109 may be constructed and arranged similarly to the conveyor 100 and as shown in detail in Figs. 7 and 8.

The loading conveyor 109 is mounted on a separate frame 110, adapted to rest on and slide over the mine floor. Pivotally connected at 111 and 112 are separate hydraulic motors 113 and 114 respectively, the piston rods of which are connected to roof jacks 115 and 116. The construction of each of these roof jacks is shown in elevation in Fig. 4. A collar 117 rests on a spring 118 which in turn rests on a collar 119 connected to the rear end of the piston rod. A valve 120 is provided for the purpose of controlling the operation of the roof jack.

When the plungers 121 and 122 are in their lower positions, the motors 113 and 114 may be swung on their pivots 111 and 112. For instance, the motor 113 may be swung to the dotted line positions 123 and 124. In a similar manner the motor 114 may be swung to the dotted line positions 125 and 126. When the motors 113 and 114 are in parallel relation, as shown in Fig. 3, and the hydraulic roof jacks 115 and 116 are anchored, the valves 127 and 128 may be operated to control the motors 113 and 114 to move the frame 110 forwardly or rearwardly. After the frame 110 has been moved forwardly, the roof jacks 115 and 116 may be released and the motors 113 and 114 operated to move such roof jacks forwardly to a new location.

When the roof jacks 115 and 116 are anchored in the positions shown in Fig. 3, the frame 110 will be held in such position that the loading conveyor 109 will be directed to a predetermined location of a mine car. In order to maintain this location for a period of time and to maintain the conveyor 100 in delivery communication with the hopper 108, I have provided a long arm 129 adapted to be pivoted at 130 to the frame 11 or secured thereto as indicated at 131 in Fig. 2. The arm 129 is provided with the ring 132 extending around the hopper 110 as shown in Figs. 3 and 4.

By means of this arrangement the mining machine may be adjusted to new locations step by step along a long arc, having as its center the center of the hopper 108. But it should also be noted that if the mining machine is moved substantially rectilinearly along a mine wall, the conveyor 100 may nevertheless be maintained in delivery communication with the hopper 108 although the loading conveyor is adjusted laterally relatively to the hopper and on the center thereof. For instance, when the mining machine is anchored in the position shown in Fig. 2, and the arm 129 is connected to the frame 11 at 131, the roof jacks 115 and 116 may be released and either of them moved to their dotted line positions so as to secure lateral movement of the loading conveyor 109 while the ring 132 remains stationary.

It will thus be seen that when the frame 110 is moved laterally the loading conveyor swings on the center of the hopper 108 within the ring 132, but in any event, whether the mining machine is turned about the hopper 108 or the loading conveyor is turned in the ring 132, delivery communication is maintained between the receiving conveyor 100 and the hopper 108 through an angle of 180 degrees or more. It should also be noted that the arm 129 is detachably connected at 131 to the frame 11 and that the conveyor frame 100 is detachably connected to the frame 11 at 101. When the entire mining and loading machine is to be transported to various places in the mine, or into and out of the mine, the arm 129 may be disconnected from the frame 11 and the frame 100 disconnected at 101, and the three units transported separately. Notwithstanding this arrangement, when the three units are connected together, the mining and loading operations may be carried on substantially automatically by dislodging the coal from the mine vein and delivering it into a mine car which may be located at either side of the hopper 108, or at the rear there-

of with the loading conveyor in alinement with the receiving conveyor.

In Fig. 10, I have illustrated in elevation the face 133 on which the splitting tool 31 is adapted to operate when the machine is in the position shown in Fig. 2. The preferred method of operation is to direct the splitting tool against the center of the face 133 to break out a block of coal as indicated at 134 in Fig. 10. Then it will be easier to dislodge the upper block of coal 135 after the splitting tool has been adjusted to a position adjacent the roof. Subsequently the splitting tool may be moved to a position near the floor to dislodge the block of coal indicated at 136 in Fig. 10. The splitting tool 31 is pointed and wedge shaped as shown in Fig. 2 and is comparatively narrow in thickness as shown in Fig. 1. The construction of this splitting tool with the power behind it are such as to dislodge the coal in comparatively large blocks or chunks with a minimum of slack, and while it is preferred to operate continuously along a mine wall to dislodge such large blocks the splitting mechanism may be swung laterally on the cylinder 12 and secured in adjusted position as indicated at 40 and 41, in Fig. 1, so that additional large pieces of coal may be dislodged along the face being operated on.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of my invention as defined by the claims hereto appended. I desire, therefore, not to be restricted to the precise construction herein disclosed.

Having thus fully described and illustrated an embodiment of my invention what I claim and desire to secure by Letters Patent of the United States is:—

1. In a mining machine, the combination with sectional framework, of a plurality of roof jacks distributed on the sections of said framework, pivotal connections between the sections of said framework to permit relative swinging movements of such sections, coal splitting mechanism connected to said framework, and means for operating said coal splitting mechanism to exert continuous forward pressure to effect dislodgment of the coal from the mine wall.

2. In a mining machine, the combination with a supporting frame, of coal splitting mechanism mounted thereon and comprising a motor adapted to be operated by liquid pressure, and means comprising a hydraulic pump and an air pressure accumulator system for operating said motor to secure a powerful forward stroke of the coal splitting mechanism to dislodge the coal in one continuous forward movement.

3. In a mining machine, the combination with a supporting frame, of a hydraulic roof jack thereon, coal splitting mechanism mounted on said hydraulic roof jack, a supplemental frame pivotally connected to said supporting frame, an additional hydraulic roof jack on said supplemental frame, a third frame, a third hydraulic jack on the last named frame, springs for holding the second named and last named hydraulic jack off the floor when in released position, and valves connected to the respective hydraulic roof jacks for controlling the same individually.

4. In a mining and loading machine, the combination with mining mechanism, of a receiving conveyor, detachably connected thereto, a delivery conveyor, and a removable connection between said mining mechanism and said delivery conveyor, said mining mechanism and said receiving conveyor and said delivery conveyor being transportable as separate units.

5. In a mining and loading machine, the combination with mining mechanism, of a conveyor frame pivotally connected thereto, a conveyor on said conveyor frame, a scoop on said frame in position to direct material from the floor onto said conveyor, and means for moving the mining mechanism to a new location and at the same time operating said scoop.

6. In a mining machine, the combination with a supporting frame, of a pair of fluid pressure motors connected to the sides thereof by being individually pivoted thereto, separate roof jacks for said motors, and means for controlling the operation of said motors to effect adjustment of the position of said supporting frame.

7. In a mining machine, the combination with a conveyor frame, of a pair of fluid pressure motors pivoted individually to the sides of said frame, individual anchoring jacks for said motors, and means for controlling said motors to swerve said frame to adjust the position thereof.

8. In a mining and loading machine, the combination with a supporting frame, of means for anchoring the same, coal splitting mechanism comprising a liquid pressure motor for dislodging the coal by continuous forward powerful pressure, a receiving conveyor pivotally connected to said supporting frame, a scoop for directing dislodged material onto said conveyor, a loading conveyor, means for anchoring said loading conveyor in adjusted position through a range of 180 degrees or more relative to the delivery end of said receiving conveyor, a circular hopper between said conveyors, and an arm connected to said supporting frame and comprising a ring surrounding said hopper to maintain said receiving conveyor in delivery communication with said hopper through-

out the various relative adjustments of the mining mechanism and the loading apparatus comprising both said conveyors.

9. In a mining machine, the combination with supporting framework, of a plurality of distributed roof jacks for firmly anchoring said framework in stationary position to form a rigid abutment, coal-splitting mechanism mounted on said framework and comprising a wedging tool adapted to penetrate the coal in its native bed and by wedging action split such coal from the unmined mass in comparatively large lumps, and means for operating said coal-splitting mechanism by very powerfully pressing said tool into the coal by continuous forward movements against such abutment.

10. In a mining and loading machine, the combination with a portable supporting frame, of mining mechanism mounted thereon, a receiving conveyer, a delivery conveyer, a hopper between said conveyers, and a long arm detachably connected to said supporting frame and extending therefrom to said hopper to maintain said receiving conveyer in delivery communication with said hopper.

11. In a mining machine, the combination with a supporting frame, of a fluid pressure motor pivotally connected to said frame to swing laterally relatively thereto, a roof jack for anchoring the outer end of said motor in adjusted position to effect movement of said frame upon the operation of said motor, an additional roof jack for anchoring said supporting frame to form a rigid abutment, a penetrating wedging tool adapted to operate rectilinearly to dislodge coal from an upright mine wall, an additional fluid pressure motor for operating said tool when said frame is anchored by said additional roof jack, and means for controlling the operation of said last-named fluid pressure motor.

12. In a mining machine, the combination with framework comprising a plurality of sections flexibly connected together, of a plurality of roof jacks distributed on the sections of said frame work, coal-splitting mechanism connected to said framework, and means for operating said coal-splitting mechanism to exert continuous forward pressure to effect dislodgment of the coal from the mine wall while said roof jacks are anchored between the floor and roof of the mine chamber to form a rigid abutment for such coal-splitting mechanism.

13. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism mounted thereon and comprising a motor adapted to be operated by fluid pressure, and means for operating said motor to cause said coal-splitting mechanism to move quickly to its work and thereafter be automatically moved with powerful continuous forward pressure to effect dislodgment of the coal from the mine wall.

14. In a mining machine, the combination with a supporting frame, of a roof jack therefor, dislodging mechanism mounted on said supporting frame, means for operating said dislodging mechanism, an additional roof jack, means for holding said additional roof jack off the floor when in released position, means for controlling the operation of said additional roof jack to anchor the same between the floor and roof of the mine chamber, and a motor connected between said additional roof jack and said supporting frame to effect adjustment of the latter when said first-named roof jack is in released position.

15. In a mining machine, the combination with a supporting frame, of mining mechanism mounted thereon, a roof jack, a spring for holding said roof jack off the floor when in released position, and a motor connected between said roof jack and said supporting frame for adjusting the position of the latter and the mining mechanism mounted thereon.

16. In a mining machine, the combination with a supporting frame, of mining mechanism mounted thereon, a motor pivotally connected to said supporting frame, a roof jack connected to said motor to act as an abutment for the latter when shifting the position of said supporting frame together with the mining mechanism mounted thereon, and a spring for automatically holding said roof jack off the floor when in released position to permit said motor to be swung freely relatively to said supporting frame.

17. In a mining machine, the combination with a supporting frame, of mining mechanism mounted thereon, a pair of fluid pressure motors connected to opposite sides of said supporting frame, and a pair of roof jacks connected respectively to said motors to act as abutments for the latter when operated to shift the position of said supporting frame together with the mining mechanism mounted thereon.

18. In a mining machine, the combination with a supporting frame, of an auxiliary frame having an opening extending vertically therethrough, a roof jack extending through said opening, a lateral extension from said roof jack, and a resilient support engaging said lateral extension for holding the roof jack off the floor when said roof jack is in released position.

19. In a mining machine, the combination with a hydraulic roof jack comprising a hydraulic cylinder having an annular flange intermediate its ends, a plunger in said cylinder, and a resilient support under said flange for holding the cylinder off the floor when the roof jack is in released position.

20. In a mining machine, the combination

with a main frame, of a supplemental frame comprising a ring, a hydraulic roof jack extending through said ring, and a resilient support for said hydraulic roof jack for supporting the latter on said ring off the floor when the roof jack is in released position.

21. In a mining machine, the combination with a main frame, of a supplemental frame pivoted thereto for swinging movement laterally on an upright axis, a roof jack connected to the swinging end of said supplemental frame, and resilient means for automatically supporting said roof jack off the floor when the roof jack is in released position to enable said supplemental frame to be swung freely relatively to said main frame.

22. In a mining and loading machine, the combination with mining mechanism, of a receiving conveyor detachably connected thereto, a delivery conveyer having a hopper at its receiving end, an arm connected directly between said hopper and said mining mechanism to maintain delivery communication between said receiving conveyer and said hopper by holding the hopper spaced a predetermined distance from the receiving end of said receiving conveyer, and a removable connection between said arm and said mining mechanism, said mining mechanism and said receiving conveyer and said delivery conveyer being transportable as separate units.

23. In a mining and loading machine, the combination with mining mechanism, of means for operating said mining mechanism, a conveyer frame pivotally connected to said mining mechanism on an axis extending transversely to the path of movement thereof, a traveling conveyer on said conveyer frame in position to operate transversely of the path of travel of the mining mechanism, a scoop on said frame in position to direct material from the floor onto said conveyer, and means for moving the mining mechanism to a new location and at the same time operating said scoop.

24. In a mining and loading machine, the combination with a supporting frame, of means for anchoring said supporting frame to form a rigid abutment, coal-splitting mechanism, means for operating said coal-splitting mechanism while said frame is anchored to form such abutment, a conveyer connected to said frame, gathering means for directing material on said conveyer, and means for operating said gathering means by moving said supporting frame to a new location.

25. In a mining machine, the combination with a supporting frame, of a pair of motors connected to the sides of said frame by being individually pivoted thereto, separate roof jacks for said motors, means for automatically holding said roof jacks off the floor when in released position, and means for controlling the operation of said motors to effect adjustment of the position of said supporting frame.

26. In a mining machine, the combination with a conveyer frame, of a pair of motors pivoted individually to the sides of said frame, individual anchoring jacks for said motors, means for automatically holding said anchoring jacks off the floor when in released position, and means for controlling said motors to swerve said frame to adjust the position thereof.

27. In a mining and loading machine, the combination with a supporting frame, of means for anchoring the same, coal-splitting mechanism mounted on said frame, a receiving conveyer pivotally connected to said supporting frame, a scoop movable with said conveyer on said pivotal connection for directing dislodged material from the floor onto said conveyer, a loading conveyer, means for adjusting the position of said loading conveyer relative to said receiving conveyer, a hopper between said conveyers, and a connection between said hopper and said supporting frame.

28. In a mining machine, the combination with a portable frame, of dislodging apparatus mounted thereon to move bodily therewith and comprising coal-splitting mechanism, and means comprising walking roof jacks for moving said frame rectilinearly along an upright mine wall to effect the operation of said dislodging apparatus.

29. In a mining machine, the combination with a frame, of coal-splitting mechanism mounted thereon to move bodily therewith, a pair of roof jacks, fluid pressure motors between said roof jacks and said frame, and means for controlling the operation of said roof jacks and of said fluid pressure motors to cause said roof jacks to be moved forward to anchoring positions and to cause said frame to be moved forward step by step to force said coal-splitting mechanism along rectilinear lines into engagement with the coal to split the latter from the unmined mass.

30. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism comprising a penetrating wedging tool, means for operating said coal-splitting mechanism by moving said penetrating wedging tool along the face of the mine vein with a steady forward pressure while maintaining the wedging tool continuously in contact with the unmined mass along the forward path of travel, means for mounting said coal-splitting mechanism for arcuate adjustment relative to said frame on an unright axis to enable the coal-splitting mechanism to be operated a number of times against the coal in its native bed to each time dislodge coal from the unmined

mass in comparatively large lumps, and means for securing said coal-splitting mechanism in its adjusted position in fixed relation to said frame in advance of each forward penetrating stroke of said wedging tool.

31. In a mining machine, the combination with sectional framework with the sections arranged in series in a straight line, of a plurality of roof jacks distributed on said framework, a pivotal connection between each section and next adjacent section of said framework to permit relative swinging movements of said sections into or out of a straight line, dislodging mechanism connected to said framework, and means for operating said dislodging mechanism while said framework is anchored between the floor and roof of the mine chamber by means of said roof jacks.

32. In a mining and loading machine, the combination with mining mechanism, of a receiving conveyer detachably connected thereto, a delivery conveyer, and an arm detachably connected to said mining mechanism and having a ring at its opposite end for location at the place where said receiving conveyer delivers material to said delivery conveyer, said mining mechanism and receiving conveyer and said arm and said delivery conveyer being transportable as separate units.

33. In a mining machine, the combination with supporting framework, of a plurality of roof jacks distributed on said framework in spaced-apart relation for anchoring the latter to form an abutment, coal-splitting mechanism connected to said framework and comprising a penetrating wedging tool adapted to enter the solid of a mine vein and by moving along the same splitting and tearing the coal from the face over a wide area and in large lumps, means for operating said coal-splitting mechanism to exert continuous forward pressure on such penetrating wedging tool while kept in contact with the coal during such continuous forward pressure, and means for adjusting the penetrating tool to various elevations to enable the coal-splitting mechanism to command an area extending from the floor to the roof of the mine chamber.

34. In a mining and loading machine, the combination with a supporting frame, of coal-splitting mechanism mounted thereon, a traveling conveyer pivoted to said frame for up and down tilting movements on an axis extending transversely of the path of travel of the machine, and a scoop connected to said conveyer to move bodily therewith and travel over the floor when the machine is moved forward and thereby direct material from the floor onto said conveyer.

35. In a mining and loading machine, the combination with coal-splitting mechanism comprising a pointed wedging tool adapted to enter the solid coal in its native bed and tear the same from the unmined mass, of means for operating said coal-splitting mechanism by exerting a continuous forward pressure along rectilinear lines on said tool while moving the same continuously forward in contact with the coal to be dislodged, a conveyer mounted in position for receiving dislodged coal, and means for gathering the dislodged coal and directing it onto said conveyer by movement of the machine over the mine floor.

36. In a mining machine, the combination with a supporting frame, of a supplemental frame connected thereto for adjustment laterally relatively to said supporting frame, coal-dislodging mechanism comprising a penetrating wedging tool and mounted on said supplemental frame for adjustment up and down relatively thereto, means for adjusting said wedging tool up or down, and means for adjusting the elevation of said supplemental frame in its various positions relative to said supporting frame to effect adjustment in elevation of said wedging tool to enable the latter to dislodge a plurality of layers of coal from a mine vein between the floor and roof of the mine chamber.

37. In a mining machine, the combination with framework comprising a plurality of sections flexibly connected together, of a plurality of roof jacks distributed on the sections of said framework, mining mechanism connected to said framework, and means for operating said mining mechanism while said roof jacks are anchored between the floor and roof of the mine chamber to form a rigid abutment.

38. In a mining and loading machine, the combination with a supporting frame, of mining mechanism connected thereto, a receiving conveyer pivotally connected to said frame on an axis extending transversely thereof, a scoop having a beveled edge adapted to rest on and slide over the mine floor on that side of said conveyer opposite its pivotal connection to said frame, and means for moving the machine along the floor and cause said scoop to direct material from the floor to said conveyer.

39. In a mining and loading machine, the combination with a supporting frame, of mining mechanism connected thereto, an elongated traveling conveyer connected to said frame to extend transversely of its longitudinal length and its path of forward travel, and a bevel edged scoop connected to said conveyer in position to direct material from the floor onto said conveyer when the machine is advanced along the longitudinal length of said supporting frame.

40. In a mining machine, the combination with sectional framework, of a plurality of

roof jacks distributed on the sections of said framework, pivotal connections between the sections of said framework to permit relative swinging movements of such sections, mining mechanism connected to said framework, and means for operating said mining mechanism while said framework is anchored by said distributed roof jacks.

41. In a mining machine, the combination with a hydraulic roof jack comprising a hydraulic cylinder having a collar intermediate its ends, of a plunger in said cylinder, and a resilient support engaging said collar for holding said cylinder off the floor when the roof jack is in released position.

42. In coal mining apparatus, the combination with a main frame, of means for anchoring said main frame to hold it stationary, a radius frame mounted on and swingable relatively to said main frame on an upright axis, a single penetrating wedging device mounted on the other end of said radius frame with the space in advance thereof free and unobstructed, means for securing said radius frame in adjusted positions to permit said penetrating wedging device to command a wide area over a plurality of layers of coal at the mine wall, and means for operating said penetrating wedging device to penetrate the coal in its native bed along lines approximately parallel to the coal face and split and tear the coal from the unmined mass along upright cleavages spaced back from the mine wall.

43. In a mining and loading machine, the combination with a supporting frame, of a single penetrating wedging tool, means for operating said wedging tool by imparting rectilinear movements thereto, means for supporting said wedging tool on said frame for swinging adjustment in elevation and also rectilinear adjustment in elevation, and loading apparatus connected to said frame with its receiving end adjacent the range of operation of said penetrating wedging tools.

44. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism comprising an elongated wedge adapted to penetrate the coal in its native bed and tear the same asunder to dislodge large blocks from the face of the mine vein, means for mounting said coal-splitting mechanism on said frame in position to operate along the face of a mine vein above the floor of a mine chamber, and means for arcuately adjusting the coal-splitting mechanism on a horizontal axis extending transversely of said frame to enable said coal-splitting mechanism to dislodge the coal from the entire mine wall area between the floor and the roof of the mine chamber.

45. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism comprising a splitting tool adapted to penetrate the native coal in its bed and by wedging action split and tear the coal away from the unmined mass in comparatively large pieces, means for adjusting said coal-splitting mechanism arcuately relatively to said frame on a transverse axis extending in a general horizontal direction to enable said splitting tool to penetrate the coal and dislodge the same from the entire face of the mine vein extending from the floor to various elevations, and non-percussive means for operating said coal-splitting mechanism by steady, continuous forward movements of the splitting tool.

46. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism comprising an elongated wedge adapted to penetrate the coal in its native bed and split the same therefrom in large lumps, means for mounting said coal-splitting mechanism on said supporting frame for arcuate adjustment relatively thereto on a horizontal axis to vary the range of operation of the coal-splitting mechanism from the floor to the roof of the mine chamber in dislodging coal from the entire face of the mine vein, and non-percussive means for operating said coal-splitting mechanism by imparting to said elongated wedge a steady, continuous forward movement for each stroke thereof.

47. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism comprising a penetrating wedging tool adapted to move along the upright face of the mine wall to split the coal from such upright face in comparatively large lumps, means for operating said coal-splitting mechanism to cause said wedging tool to penetrate along lines spaced back from the upright face to secure upright lines of cleavage and thereby dislodge layers of coal from the face, means for mounting said coal-splitting mechanism for arcuate adjustment both vertically and horizontally relatively to said supporting frame to enable said penetrating wedging tool to command the entire area of the mine wall between the floor and roof of the mine chamber within the range of operation of the mining machine, and non-percussive means for moving the wedging tool continuously forward to effect a dislodging stroke thereof.

48. In a mining machine, the combination with a supporting frame, of a mining tool adapted to penetrate coal in its native bed and by wedging action split the same from the unmined mass in large blocks, a supplemental frame for supporting said mining tool, means comprising a screw-threaded rod threaded through said supplemental frame and resting on to abut against said supporting frame for adjusting the elevation of the mining tool irrespective of its angular position relative to said supporting frame, means

for holding said mining tool in adjusted angular position relative to said supporting frame, the lower abutting end of said screw-threaded rod being adapted to slide over said supporting frame, and means for operating said mining tool by moving the same along a mine wall approximately parallel thereto to dislodge coal from the upright face of the mine vein from the floor to the roof of the mine chamber in accordance with the adjustments in elevation of said mining tool by said adjusting means.

49. In a mining machine, the combination with a supporting frame, of a supplemental frame pivotally mounted thereon for adjustment laterally on an upright axis, coal-splitting mechanism carried by said supplemental frame to move bodily therewith and comprising a penetrating wedging tool adapted to tear the coal from the face of the mine vein in large lumps, means for operating said coal-splitting mechanism to secure penetrating movement of said wedging tool approximately parallel to the coal face while spaced back from such coal face, and means comprising a rod screw-threaded to said supplemental frame and abutting against said supporting frame at its lower end for sliding movement over said supporting frame, to adjust the elevation of said supplemental frame in its various angular positions to enable said coal-splitting mechanism to command an increased area of dislodgment of the coal from the face of the vein from the floor to the roof of the mine chamber.

50. In a mining machine, the combination with a supporting frame, of a supplemental frame pivotally connected thereto for adjustment laterally on an upright axis, coal dislodging mechanism comprising a penetrating wedging tool and mounted on said supplemental frame for adjustment angularly up and down relatively thereto on a transverse axis extending in a general horizontal direction, worm gearing for adjusting the wedging tool up or down on said transverse axis, and elevating mechanism for said supplemental frame having a sliding engagement with said supporting frame for adjusting the elevation of said supplemental frame in its various angular positions relative to said supporting frame to effect adjustment in elevation of said wedging tool to enable the latter to dislodge a plurality of layers of coal from a mine vein between the floor and roof of the mine chamber.

51. In a mining machine, the combination with an elongated wedging tool adapted to penetrate the upright face of a mine vein and by wedging action strip the coal therefrom, of non-percussive means for reciprocating said wedging tool including a continuous forward penetrating movement parallel to the coal face and spaced back therefrom, and mechanism for adjusting the position of said wedging tool arcuately to enable such tool to strip the coal from the face of the mine wall at various elevations between the floor and roof of the mine chamber.

52. In a mining machine, the combination with a supporting frame, of means for holding said frame stationary, coal-splitting mechanism mounted on said frame and comprising a single penetrating elongated wedging tool, locking worm gearing for adjusting said tool by swinging the same up or down on a horizontal axis to enable said tool to command a wide area of the face of the mine vein, means for operating said coal-splitting mechanism by exerting a continuous forward pressure on said tool to cause it to penetrate the mine vein back from the face thereof to split material therefrom in comparatively large pieces, and means for controlling said operating means.

53. In a mining machine, the combination with a portable frame, of a hydraulic roof jack comprising a cylinder extending loosely through said frame and adapted to have its lower end engage the floor, the upper end of the plunger being adapted to engage the roof, a collar secured to said cylinder intermediate its ends and in a position spaced above said frame, and a spring between said frame and said collar for automatically holding the cylinder off the floor when the roof jack is in released position.

54. In a mining machine, the combination with a supporting frame, of dislodging mechanism comprising a single pointed penetrating wedging tool adapted to penetrate the solid face of the coal in its native bed and split and tear the same from the unmined mass in large pieces with a minimum production of fine particles of coal, means for operating said dislodging mechanism to give said wedging tool a powerful pushing action rectilinearly approximately parallel to the coal face to dislodge the coal from such face, and a pivotal support for said operating means for adjustment in elevation of said penetrating wedging tool.

55. In a mining and loading machine, the combination with a supporting frame, of coal-splitting mechanism mounted on said frame for movement along a mine wall in rectilinear lines substantially parallel to the coal face and spaced back therefrom, said coal-splitting mechanism comprising a penetrating wedging tool, non-percussive mechanism for operating said coal-splitting mechanism by actuating said penetrating wedging tool with a continuous forward penetrating movement, a traveling conveyor connected to said frame near the range of operation of said coal-splitting mechanism, means for gathering the dislodged material and directing it onto said conveyer, and means for simultaneously operating said coal-splitting mechanism and said conveyer.

56. In coal mining apparatus, the combination with a supporting frame, of a supplemental frame mounted thereon for swinging movement relatively thereto on an upright axis, a tertiary frame mounted on said supplemental frame for swinging movement relatively thereto on a horizontal axis, a single penetrating wedging dislodging tool adapted to penetrate the coal in its native bed and by wedging action split and tear the coal away from the unmined mass in large pieces, non-percussive means on said tertiary frame for operating said dislodging tool by thrusting the same along rectilinear lines in its adjusted position on said upright axis and on said horizontal axis, and means for securing the said tertiary frame in adjusted positions relative to said upright and horizontal axes to enable said dislodging tool to effect operations to dislodge coal from an upright mine wall over an area extending from the floor to the roof of the mine chamber and at various distances from the exposed face of the mine vein.

57. In a mining machine, the combination with a supporting frame, of a single piercing wedging device mounted thereon for adjusted operating positions on a horizontal axis to command an area of the mine wall extending from the wall to the roof thereof, worm gearing for adjusting the position of said wedging device and locking it in adjusted position, and non-percussive means for operating said single piercing device at its adjusted elevation to split large portions of the material from the mine wall above and below the points of penetration by continuous forward strokes.

58. In a mining machine, the combination with a supporting frame, of coal-splitting mechanism comprising a pointed wedge adapted to penetrate coal in its native bed and tear the same way from the unmined mass in comparatively large lumps in front of the wedge and above and below the same, means for mounting said coal-splitting mechanism on said frame for arcuate adjustment in elevation of said wedge for operation between the floor and roof to dislodge coal from the entire face of the vein, means for holding the coal-splitting mechanism in its adjusted position, and non-percussive means for operating said coal-splitting mechanism by imparting continuous long rectinlinear strokes to said wedge.

59. In a mining machine, the combination with a main frame, of a supplemental frame mounted thereon for vertical adjustment relatively thereto and also swinging adjustment relatively thereto on an upright axis, a single piercing wedging device mounted on said supplemental frame for up and down swinging adjustments to command an area along an upright mine wall extending between the floor and roof the mine chamber, locking worm gearing for effecting the up and down swinging adjustments of said wedging device, a rod screw threaded through said supplemental frame and abutting at its lower end against the main frame for sliding contact with the latter, said rod being adapted to adjust the elevation of the supplemetnal frame together with the wedging device thereon, and means for operating said piercing wedging device in its adjusted position relative to said main frame to penetrate the mine wall substantially back of the face thereof to rip off comparatively large pieces of material from the unmined mass along a plurality of layers without changing the position of said main frame.

60. In a system of mining coal, the method which consists in applying at a single point a penetrating wedging action midway between the floor and the roof of the mine chamber at the base of a mine vein to secure wedging actions on the solid of the mine vein in opposite directions above and below such single point of penetrating wedging action and toward the upright face of the mine wall to produce cleavages in the unmined mass and dislodge the coal in large lumps from the middle portion of the coal face, and repeating such penetrating and wedging action toward the roof and toward the floor with each application at a single point of penetration.

61. In a system of mining, the method which consists in applying a continuously forward steady digging and wedging action on the mineral in its native bed at a single point of penetration and dislodging such mineral in large lumps and repeating the single point application above and below the initial point of application to secure dislodgement of mineral in large lumps over an extended area.

62. The method of mining coal from the solid of a mine vein which consists in the individual continuously forward steady application of a penetrating and wedging tool at distributed points successively across the mine vein each time at a single point of penetration to tear the coal from the unmined mass over an area extending across such mine vein.

63. The method of mining coal from the solid of a mine vein which consists in applying continuously forwardly a moving force to a single coal-splitting tool while held continuously in engagement with the coal to effect a tearing away of a large portion of the coal face by single point penetration, and repeating such application of the coal-splitting tool by single point penetrations to effect dislodgement of the coal in comparatively large lumps over an area extending across the mine vein.

64. The method of mining coal from the solid of a mine vein which consists in rip-

ping away the coal face by applying a single penetrating and wedging force at single points successively spaced from the face of the mine vein and distributed over an area extending across the mine vein to dislodge the coal in large lumps from such area by such single point applications.

65. The method of mining coal from the solid of a mine vein which consists in applying a single penetrating and wedging force to the coal at distributed points successively but each time at a single point of application, and exerting each time a continuous forward pressure on said tool while backed by an abutment to rip or tear the coal face from the unmined mass over an area extending across the mine vein.

66. In a mining machine, the combination with a mining tool, of means for advancing said tool with a steady forward pressure and retracting said tool in readiness for another operation, an exterior rod connected to said tool to reciprocate therewith, and an arcuate adjustable device mounted on said advancing means in position to engage said rod to confine the advance and retraction of said tool along a predetermined path.

67. In a mining machine, the combination with a hydraulic motor comprising a piston and a cylinder with a single rod connected to the piston, of a splitting tool connected to the piston rod, a collar at the outer end of said cylinder and movable circumferentially thereon, a rod connected to said splitting tool exteriorly of the motor and in sliding engagement with said collar to effect arcuate adjustment of said splitting tool when said collar is movable circumferentially on said cylinder, and means for securing said collar in adjusted position.

68. In a mining machine, the combination with a mining tool comprising a wedge adapted to pierce coal in its native bed and tear the same from the unmined mass, of a hydraulic motor connected to said wedge for operating the same, a collar mounted on said motor, means for securing said collar in circumferentially adjusted position on said motor, and a rod connected to said wedge and engaging said collar exteriorly of the motor to confine the wedge to a predetermined path of travel.

69. In a mining machine, the combination with a fluid pressure motor comprising a cylinder, of a dislodging tool connected to said motor for operation thereby, a guiding device movable arcuately on said cylinder, a rod connected to said dislodging tool and associated with said guiding device, said rod being separate and independent of said fluid pressure motor, and means for securing said guiding device in adjusted position relative to said cylinder.

70. In a mining machine, the combination with a supporting frame, of a coal-splitting mechanism comprising a long-faced wedge adapted to penetrate the coal in its native bed and tear the same away from the unmined mass in compartively large pieces in front of the wedge and above and below the same, means for mounting said coal-splitting mechanism on said frame for rectilinear adjustment in elevation for operation between the floor and the roof of the mine chamber to dislodge coal from the entire face of the mine vein, means for holding said coal-splitting mechanism at adjusted elevation, and an auxiliary pivotal support for the coal-splitting mechanism for swinging adjustment of the latter in elevation.

71. In a mining machine, the combination with a supporting frame, of a single pointed penetrating wedging tool adapted to penetrate the solid face of a mine vein and by wedging action split large pieces of coal from the unmined mass with a minimum production of fine particles of coal, a supplemental frame slidable up and down on said supporting frame, a pivotal support on said supplemental frame for said wedging tool, a fluid pressure motor connected to said tool for exerting powerful pressure thereon to push said tool rectilinearly into the coal in its native bed to penetrate and split and tear the same from the unmined mass, means for adjusting the motor together with said tool on said pivotal support to vary the inclination and elevation of the said tool, and means for adjusting the elevation of said supplemental frame together with said motor and said tool on said supporting frame to adjust the elevation of said motor and said tool.

72. In a mining machine, the combination with a mining tool, of a motor having a reciprocating rod connected to said mining tool, an additional rod connected to said mining tool in parallelism with said reciprocating rod but independent of said motor, and a collar circumferentially adjustable relatively to said motor and adapted to engage said additional rod to guide said mining tool along a predetermined path.

This specification signed at New York city in the county of New York and State of New York this 21st day of May, 1921.

EDMUND C. MORGAN.