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MINING AND LOADING MACHINE

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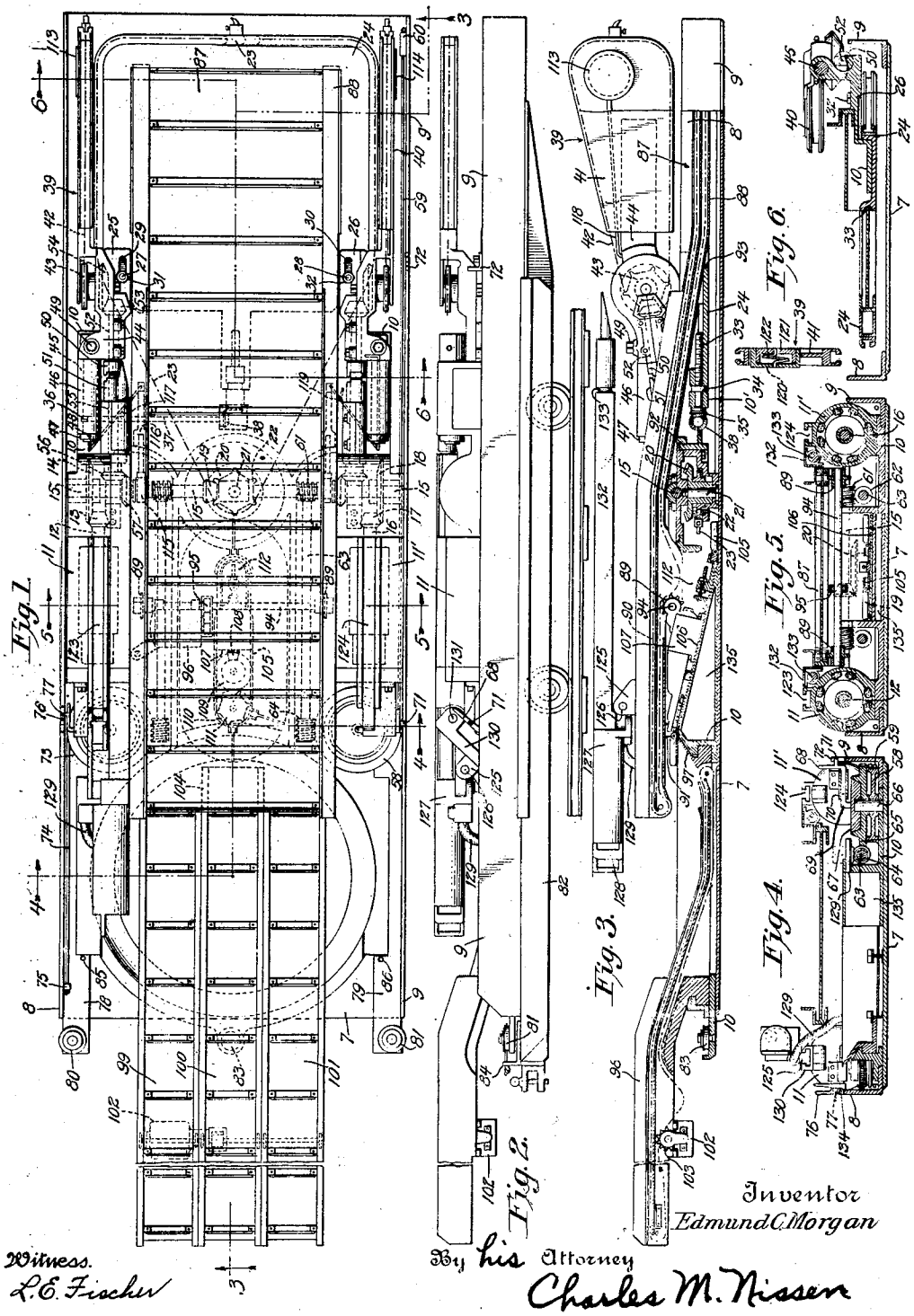


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Witness.
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UNITED STATES PATENT OFFICE.

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MINING AND LOADING MACHINE.

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My invention relates to mining and loading machines particularly adapted for mining and loading coal.

One of the objects of my invention is the provision of a mining and loading machine particularly adapted for mining and loading coal in low roof mine chambers.

A further object of the invention is the provision of mining mechanism the upper portion of which can be folded or moved to lower positions so that the machine may be transported to various places in the mine through entries having comparatively small overhead space on account of low roofs.

Another object of the invention is the provision of an improved and efficient mining and loading machine comprising an undercutter and a conveyer associated therewith to receive and transfer toward loading position cuttings from the under-cutter separately from the operation of the conveyer which receives the material dislodged from the mine wall.

Another object of the invention is the provision of mining apparatus comprising kerf-cutters and motors on opposite sides of the machine connected to the kerf-cutters for operating the latter.

A further object of the invention is the provision of spaced-apart upright kerf-cutters each provided with fluid pressure mechanism for dislodging the cut coal from the mine wall.

More particularly it is the object of the present invention to provide an improved and efficient mining and loading machine adapted for operation in comparatively low roof mine chambers and which comprises an under-cutter, spaced-apart upright side kerf-cutters each provided with fluid pressure breaking mechanism, motors at the sides of the machine for operating the kerf-cutters and the fluid pressure breaking mechanism combined with loading apparatus and an adjustable pick machine for assisting in dislodging the coal from the mine wall and breaking up the larger bodies of dislodged material into smaller pieces.

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

In the accompanying drawings,

Fig. 1 is a plan view of my improved mining and loading machine;

Fig. 2 is an elevational view of the mining and loading machine with the uppermost parts folded into their lower positions and mounted on a mine car for transportation in a mine;

Fig. 3 is a sectional elevation on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view of Fig. 1 on the line 4—4 looking in the direction of the arrows;

Fig. 5 is a sectional view on the line 5—5 of Fig. 1 looking in the direction of the arrows; and

Fig. 6 is a sectional elevation of Fig. 1 on the line 6—6 looking in the direction of the arrows.

Referring to Fig. 1, it will be seen that the mining and loading machine is mounted in a pan 7 which is rectangular in plan view and is provided with vertical side plates 8 and 9 which act as guideways for the main frame 10. The mechanism for sliding the main frame 10, together with the mining and loading mechanism mounted thereon, longitudinally along the pan 7, will be hereinafter described.

Secured to the sides of the frame 10, as shown in Fig. 5, are two electric motors 11 and 11′ which are connected together to act in unison. These electric motors are located intermediate the ends of the machine as shown in Fig. 1. I prefer to use two electric motors at opposite sides of the machine so that each may occupy a comparatively low position and each may be made smaller than if one electric motor alone were used. In other words, by the use of two spaced-apart electric motors the required operating power may be secured while at the same time the height of the machine is materially reduced, thereby enabling the construction of a mining machine, or of a combined mining and loading machine which requires little head room and can therefore operate in mine chambers having comparatively low roofs.

The motor shaft 12 is provided with a bevel gear pinion 13 which meshes with a bevel gear 14 on the transverse shaft 15, as shown in Fig. 1. In the same manner the

motor shaft 16 on the opposite side of the machine is provided with a bevel gear pinion 17 meshing with a bevel gear 18 on the transverse shaft 15. The latter is provided with a bevel pinion 19 which meshes with the horizontal bevel gear 20 loosely mounted on a vertical shaft 21; on a hub of the gear 20 is loosely mounted the sprocket 22 in mesh with the chain kerf-cutter illustrated at 23 in Fig. 1. It will thus be seen that when the spaced-apart electric motors 11 and 11′ are operated, power will be transmitted to the undercutting chain cutter 23 to drive the same.

The undercutter on which the cutter chain 23 is mounted comprises a cutter frame 24 detachably connected to the supporting framework so that when desired the frame 24 may be removed after two adjacent links of the chain 23 have been disconnected.

The cutter frame 24 may be supported from the side pieces 25 and 26 by means of the bolts 27 and 28 extending through the slots 29 and 30 and provided with nuts 31 and 32, as shown in Fig. 1. In order to adjust the slack in the chain 23, the cutter frame 24 may be moved forwardly or rearwardly after the nuts 31 and 32 have been loosened so that the bolts 27 and 28 may slide along the slots 29 and 30. This adjusting mechanism comprises a screw-threaded rod 33 threaded through the rear end of the cutter frame 24, as shown in Fig. 3. The rod 33 is mounted in a bearing in the cross piece 10′ which is secured to the main frame 10. A collar 34 secured to the rod 33 holds the latter in the cross frame 10′, so that when the bevel gear 35 is rotated the cutter frame 24 may be moved forwardly or rearwardly relatively to the frame 10′ and the main frame 10. The bevel gear 35 and consequently the rod 33 may be rotated by means of a manually operated socket wrench applied at the squared end 36 of the shaft 37, there being a bevel gear 38 at the end of the shaft 37 in position to mesh with the bevel gear 35.

It should be understood that the parts designated 25 and 26 in Fig. 1 are rigidly connected to the main frame which is shown at 10 in Fig. 3. By referring to Fig. 6, which is a sectional view of Fig. 1 on the line 6—6 looking in the direction of the arrows, it will be seen that the cutter frame 24 is supported in a low position relatively to the positions of attachment of the upright side cutters to the main frame. In other words, the supports 25 and 26 shown in Fig. 1 are located in horizontal planes below the supports for the upright side kerf-cutters.

The upright side kerf-cutters 39 and 40 are each mounted on the main frame 10 for operation in upright position and for folding to the horizontal position shown in Fig. 2 during transportation of the mining and loading machine. Inasmuch as the means for connecting the upright side kerf-cutters to the main frame is the same at both sides of the machine, I will describe the details of the supporting mechanism at one side. Referring to Figs. 1 and 3 it will be seen that the upright side kerf-cutter comprises a cutter frame 41 for receiving the cutter chain 42 which is connected to the sprocket 43. The cutter frame 41 is mounted on the supporting frame 44 the rear end of which is provided with a rod 45 projecting through the bearing 46 which is rigidly secured to the frame 10. This rod 45 projects through the rear end of the bearing 46 and is adapted to receive a collar 47 which may be connected to the rod 45 by a pin 48 so that the cutter supporting frame 44 can not be moved longitudinally relatively to the main frame 10 but may be turned to folded position on the axis of the rod 45. In order to hold the cutter supporting frame 44 in upright position a bolt 49 may be provided to pass vertically through the supporting frame 44 and screw-threaded into the main frame 10. When the upright kerf cutter is adjusted to operating position and held in adjusted position by the bolt 49 screw-threaded into the main frame 10, the clutch element 50 will be in alinement with the clutch element 51 so that when the latter is moved into engagement with the former, power may be transmitted through the shaft 52 carried by the supporting frame 44. When the shaft 52 is rotated motion will be transmitted to the bevel gears 53 and 54 to rotate the sprocket wheel 43 and thus drive the sprocket chain 42. Housing may be provided for the protection of the bevel gears 53 and 54. It will also be seen by referring to Fig. 1, that the clutch element 51 is mounted on a shaft 55 the rear end of which is provided with a bevel gear 56 meshing with a bevel gear 57 on the transverse shaft 15.

Therefore, when the spaced-apart side electric motors 11 and 11′ are operated the undercutting chain cutter, as well as both of the upright side chain kerf-cutters will be driven simultaneously.

In order to advance the mining machine to effect rectilinear feeding movement of the undercutting kerf-cutter and the spaced-apart side kerf-cutters, a rope winding device is provided at 58 for exerting a pull on a rope 59 the free end of which is anchored at 60 to the inner face of the vertical side plate 9 of the pan 7.

As shown in Figs. 1 and 5 the transverse shaft 15 is provided with a worm 61 which meshes with the worm gear 62 on the longitudinal shaft 63. The rear end of the latter is provided with a worm 64 which meshes with the worm gear 65, as shown in Figs. 1 and 4.

By referring to Fig. 4, it will be seen that

the worm 65 is mounted on a vertical shaft 66 and that on the latter is also mounted the rope drum 58 for receiving the rope 59. Power may be transmitted from the worm gear 65 to the rope drum 58 by operating the friction clutch 67. Such operation of the clutch 67 may be effected by grasping the handle 68 and turning the pressure finger 69 in the bearing 70.

Limit stop mechanism for automatically limiting the forward feeding movement of the kerf-cutters may be arranged by providing the handle 68 with a lateral projection 71, as shown in Fig. 4, in position to strike against the limit stop 72 on the forward portion of the vertical side plate 9 of the pan 7. Therefore, after the clutch 67 has been thrown in manually it may be left in applied position but when the kerf-cutting mechanism reaches the desired limit of its forward stroke, the limit stop 72 will effect an automatic release of the clutch 67 and thereby automatically stop the forward feeding movement of the kerf-cutting mechanism.

In order to retract the kerf-cutting mechanism along the pan 7, another rope winding mechanism 73 is provided at the opposite side of the machine as shown in Fig. 1, the free end of the rope 74 being adapted to be anchored at 75 to the inner face of the vertical plate 8 near the rear end of the latter. The mechanism for securing the forward feeding movement may be geared so as to be slow in accordance with the feeding movement desired, whereas the retracting movement may be much more rapid in order to save time in restoring the machine to its initial position in readiness for another cutting operation. The gearing for operating the rope winding mechanism 73 is similar to that already described in connection with the rope winding mechanism 58.

The rearward movement of the mining machine onto the pan 7 may be automatically stopped by limit stop mechanism comprising a vertical hinged stop block 76 projecting upwardly from the side plate 8 at the rear portion of the latter, as shown in Fig. 1, and in position to be engaged by the projection 77 of the lever for operating the clutch similar to that shown at 67 in Fig. 4 but controlling the winding drum 73.

Attached to the pan 7 and extending rearwardly therefrom are supports 78 and 79, as shown in Fig. 1. These supports are provided, respectively, with direction pulleys 80 and 81 for receiving the rope 74, the free end of which is anchored in suitable positions in the mine. By extending the rope 74 around the direction pulley 80 and anchoring the free end of the rope in the mine, the pan 7, together with the mining and loading machine mounted thereon may be slid laterally over the mine floor by operating the rope winding apparatus 73. In order to slide the apparatus in the opposite direction the rope 74 may be extended around the pulleys 80 and 81, its free end anchored in the mine and the rope winding mechanism 73 operated. By extending the rope 74 around pulleys 80 and 83 to an anchorage the machine may be slid back longitudinally.

When it is desired to pull the pan, together with the mining and loading machine thereon, onto the mine car 82 shown in Fig. 2, the rope 74 may be disconnected from its anchorage 75 and extended around the pulley 80 and thence around the pulley 83 which is mounted centrally at the rear end of the main frame 10, the free end of the rope being anchored at 84 to the rear end of the truck 82. Now upon operation of the rope-winding apparatus 73, the main frame will be pulled toward the truck, and by reason of the stop pins at 85 and 86 the pan 7 will be moved rearwardly with the main frame along the upper surface of the truck to the rear end thereof to the position shown in Fig. 2.

Mounted on the forward portion of the framework is a receiving conveyer 87 occupying a position in an approximately horizontal plane within the boundary of the forward portion of the undercutter and between the upright side cutters, as shown in Figs. 1 and 3. This conveyer comprises a frame 88 which is detachably mounted upon the main supporting framework in position to permit the driving sprockets 89, 89 to engage the sprocket chains of the endless conveyer 90, as illustrated in Fig. 3. The conveyer extends upwardly on an incline from the forward horizontal receiving portion and has an upper horizontal delivery portion as shown in Fig. 3, and the direction of rotation of the driving sprockets 89 is such as to provide for the slack portion of the conveyer to extend in advance of the driving sprockets 89, thereby increasing the length of engagement of the driving sprockets with the sprocket chains and keeping taut the carrying portions of the conveyer, as well as that portion which extends from the rear end of the conveyer to the sprockets 89. Inasmuch as the space above the conveyer 87 is entirely free and unobstructed this conveyer is entirely detachable and when in operating position it may be retained in place by its own weight resting on the main frame 10 at 91 and 92 and on the cutter frame 24 at 93.

The sprockets 89 are mounted on the transverse shaft 94, as shown in Figs. 1 and 3, and the latter is geared at 95 to an electric driving motor 96.

Pivotally connected to the rear end of the main frame 10 is a hopper 97. This hopper is mounted on the main frame 10 for swing-

ing movement on an upright axis. A conveyer frame 98 extends rearwardly from the hopper as shown in Fig. 3 and three parallel endless conveyers 99, 100 and 101 are mounted on the conveyer frame 98 for simultaneous operation by the electric motor 102 which is connected to the driving sprockets 103. The parallel conveyers 99, 100 and 101 extend into the hopper 97 but the central conveyer 100 is longer than the conveyers 99 and 101 so as to extend farther forward as shown at 104 in Fig. 1 so as to be in position to more readily receive the cuttings from the conveyer 105 when the conveyer frame 98 occupies a longitudinal position in alinement with the conveyer 87. The rear end of the conveyer 87 extends over all three conveyers 99, 100 and 101. However, even when the conveyer frame 98 is swung from one side to the other, the hopper 97 will maintain delivery communication between the conveyer 87 and the rear swinging multiple conveyer.

The slack conveyer or the conveyer for receiving the cuttings from the undercutter is detachably mounted on an inclined intermediate portion of the frame 10. The slack conveyer may be self-contained and detachably mounted on the incline so that when the conveyer 88 is tipped up or removed the slack conveyer may be removed in its entirety.

The slack conveyer comprises an endless chain provided with flights movable over a plate 106 on which is mounted an electric motor 107 connected by the gearing 108, 109 and 110 to the sprocket 111 for driving the chain of the conveyer 105. Provision may be made, as shown at 112, for regulating the tension of the chain of the conveyer 105.

From the foregoing it will be seen that while the two spaced-apart side motors 11 and 11′ are relied upon to transmit power to the undercutter, the side cutters and to the rope drums 58 and 73, separate motors are used for operating the conveyers, one for operating the conveyer 87, another for operating the conveyer 105, and still another for operating the rear swinging multiple conveyer. These various motors may be separately controlled and operated in a well known manner.

Each of the upright side kerf-cutters may be provided with hydraulic breaking devices 113 and 114 connected by means of pipes to pumps which are operated by eccentrics on the transverse shaft 15. Inasmuch as the pumping mechanism and the connections between the same and the hydraulic breakers are the same for both of the upright side kerf-cutters, a description of the mechanism located at one side will be sufficient. Referring to Fig. 1, an eccentric is shown at 115 for operating a pump 116 connected by means of the pipe 117 extending through the supporting frame 44, to the pipe 118 shown in Fig. 3.

If desired the pumps 116 may be pneumatic and the transmission of fluid therefrom to the breakers controlled by a valve 119 shown in Fig. 1. Therefore, the pumps may run idly during the operation of the undercutter and the side cutters until it is desired to effect the operation of the fluid pressure breakers 113 and 114. Then the valves 119 may be operated to direct the fluid pressure from the pumps to the fluid pressure breakers to effect relative expansion of the two parts 120 and 121 shown in Fig. 6. The part 120 will then press against the wall of the unmined mass and the part 121 will effect breaking down of the cutter between the side cutters and above the undercutter. A spring 122 is provided between the parts 120 and 121 to restore the same to their initial positions by drawing them together when the fluid pressure is released.

In some instances the nature of the coal is such that the fluid pressure breakers 113 and 114 will be sufficient to break down the coal in pieces of such sizes as are capable of being handled by the conveyer 87, but when desired the breaking of the coal may be assisted by means of the operation of one or more pick machines mounted on the frames of the motors 11 and 11′. Such pick machines are also useful to trim off the roof or to complete the mining of the coal vein and to provide sufficient clearance for continued passage of the machine into the mine.

The fluid pressure breakers 113 and 114 are described and claimed in my co-pending divisional application, Serial No. 222,479, filed September 28, 1927, for an improvement in breaker mechanism for mining machines the claims in the present application covering a machine with such fluid pressure breakers omitted.

As shown in Fig. 5, the upper sides of the frames of the motors 11, 11′ are provided with longitudinal dove-tail grooves 123 and 124 to receive a dove-tail connection of the support 125 which is connected by a universal joint 126 to the frame 127 of the pick machine.

The pick machine is provided with operating handles 128 by means of which the direction and operation of the pick machine may be controlled. Such pick machine is preferably of the reciprocating type and may be slid along the guideways 123 and 124 independently of each other and driven by compressed air through the pipes 129 in any position to which the pick machine is adjusted. By reason of the adjustment forwardly and rearwardly along the guide grooves 123 and 124 and by reason of the universal joint 126 the pick machines may each be used to command the large area of the mine wall or of the cut material between

the side cutters and above the undercutter, as well as at the roof above the range of operation of the side cutters.

By comparing Fig. 3 with Fig. 2, it will be seen that when the pick machine is in position to slide along the groove 123 it occupies an elevated position in planes above the conveyer 87. Therefore, when the picks are operated they may command a wide area at the mine wall without interfering with the operation of the conveyer. The rear ends of the guideways 123 and 124 are provided with pivoted sections illustrated at 130 in Fig. 2. This rear section is pivoted at 131 so that it may occupy a downwardly inclined position after the support 125 has been moved into the extension 130. In other words, by the provision of the rear pivoted section 130 the pick machine may be moved into this pivoted section and then let down into a lower or folded position where it will fit between the motor frame and the conveyer 87. The pick machine frame 127 may be provided with a forwardly extending angle-iron frame 132 for receiving the plunger rod 133 of the pick and therefore when the pick machines are lowered to their folded positions these angle-iron frames 132 and the rods 133 will occupy the positions illustrated in Fig. 5 between the frames of the motors 11 and 11′ and the conveyer 87. It will thus be seen by reference to Figs. 2 and 5, that when the pick machines are in their lower or folded positions they are approximately level with the upper surface of the frames of the motors 11 and 11′ and also approximately at the same elevation as the rear upper horizontal portion of the conveyer 87. This folding feature of the pick machines is particularly desirable during transportation of the mining and loading machine on a mine car from one part of the mine to another.

The upright side cutters may also be folded to lower positions during transportation by loosening the bolts 49 and turning the side cutters on the pivot pins 45. This is illustrated at the right hand portion of Fig. 6. It should be understood that both of the side cutters may be moved to such folded position and occupy such space as to afford approximately the same headroom as is afforded when the pick machines are folded to their lower positions. Fig. 2 represents both of the side cutters and the pick machines folded to their lower positions so as to reduce the height of the mining and loading machine to a minimum, thus making provision for transportation on a mine car through very low roof mine chambers.

It should be particularly noted that all of the operating parts of the mining and loading machine hereinbefore described, and as shown on the drawings, are symmetrically arranged so as to well balance the operating parts and the weights thereof as well as the weight of the entire mining and loading machine. This is true not only with respect to the side cutters and the parts mounted thereon and connected thereto, but also with respect to the spaced-apart side motors 11 and 11′, the rope winding devices and the slack conveyer which is centrally located. It should also be observed that two guide grooves 123 and 124 are provided, one on top of each of the motors 11 and 11′ so that when two pick machines are employed one on each side of the machine, the weights due to the pick machines will also maintain balanced weight of the entire machine and its operating parts.

The hinge stop block 76 is preferably mounted on the upper portion of the side plate 8 to swing on a longitudinal axis 134, as shown in Fig. 4, so that when desired this stop block may be manually grasped and moved laterally out of the way of the projection 77, thus permitting the application of the friction clutch of the rope winding mechanism 73 to effect the operation of the latter when desired. After the mining and loading machine has been moved rearwardly along the pan 7 and automatically stopped by the stop motion mechanism comprising the parts 76 and 77, it may be desired to extend the rope 74 to anchorages in the mine as hereinbefore described so as to shift the pan 7 together with the mining and loading machine thereon, to a desired location. By providing a hinge for the stop device 76 the clutch for the rope winding mechanism 73 may be applied without first moving the mining and loading machine forwardly along the pan 7, because as soon as the stop 76 is moved laterally, it is freed from the projection 77 and the clutch may then be applied.

It should also be noted that the space below the slack conveyer 105 may be provided with a closed compartment 135 for receiving compressed air for operating the pick machines. The compressed air stored in the compartment 135 may be conveyed to the pick machines through the outlet pipe 129′ and the flexible pipe 129. The use of this compartment 135 for the storage of compressed air for operating the pick machines, does not interfere with the arrangement or operation of the other parts of the mining and loading machine. It is preferable to use the compartment 135 for such purpose to secure compactness and economy of available space.

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

Having thus fully disclosed an embodiment of my invention, what I desire to secure by Letters Patent of the United States, is:

1. In a mining machine, the combination with a main frame, of an undercutting kerf-cutter mounted on said frame, spaced-apart upright kerf-cutters on the forward portion of said frame, and balanced and symmetrically arranged power transmission mechanism comprising spaced-apart motors at the sides of said frame for driving said kerf-cutters.

2. In a mining machine, the combination with a base frame adapted to rest on the floor of a mine chamber, of a main frame carried by and movable along said base frame, a horizontally arranged cutter mounted on said main frame at the forward end thereof, vertically arranged cutters mounted on opposite sides of the main frame at the forward end thereof, said cutters being adapted to operate in advance of said main frame, means on said main frame in position to receive material when dislodged from the space between said vertically arranged cutters above said horizontally arranged cutter, means for driving said cutters, a pair of rope drums mounted on opposite sides of said receiving means to rotate on vertical axes, and a pair of ropes wound respectively on said rope drums and adapted to have their free ends anchored to said base frame to secure feeding movement of said cutters.

3. In a mining machine, the combination with a base frame having longitudinal upright guiding flanges at its sides, of a supporting frame movable along said base frame between said flanges, kerf-cutting mechanism mounted on the forward end of said supporting frame, means for driving said kerf-cutting mechanism, rope winding mechanism comprising rope drums mounted at the bottom of said supporting frame and mounted at the sides of the latter to rotate on vertical axes with the ropes close to the bottom of said flanges while extending to anchorages fixed relative to said base frame, and means for operating said rope winding mechanism to secure feeding movement of said kerf-cutting mechanism by movement of said supporting frame along said base frame.

4. In a mining machine, the combination with a pan having spaced-apart longitudinal guideways, of a supporting frame mounted in said pan and movable longitudinally along the same, mining mechanism mounted on the forward end of said supporting frame, means for driving said mining mechanism, and rope winding mechanism comprising a pair of rope drums mounted at the bottom of said pan adjacent the lateral edges of the pan on vertical axes and ropes extending from the peripheries of said rope drums along the said lateral edges and along the bottom of the pan to anchorages at the sides of said pan for moving said supporting frame longitudinally along said pan to effect feeding movement of said mining mechanism and the retraction thereof.

5. In a mining machine, the combination with an elongated supporting frame, of mining mechanism mounted thereon to slide along the same, means for driving said mining mechanism, and two rope winding devices each pivotally mounted to occupy positions at the bottom of said supporting frame, one at one side thereof and the other on the other side thereof, and each comprising a rope adapted to extend along the said bottom and having its free end anchored in fixed position relative to said supporting frame to enable the mining mechanism to be fed longitudinally of said supporting frame.

6. In a mining machine, the combination with a supporting frame adapted to be supported adjacent the mine floor, of spaced-apart winding devices on opposite sides of said frame and having winding drums located at the bottom of same frame in position to pay out ropes along opposite edges of said frame, mining mechanism mounted on said frame, means for driving said mining mechanism, and limit stop mechanism for automatically stopping and limiting the movement of the mining mechanism.

7. In a mining machine, the combination with a pan adapted to rest on and slide over a mine floor, of a supporting frame mounted on said pan for movement longitudinally thereof, mining mechanism mounted on said frame to move bodily therewith, means for driving said mining mechanism, rope winding mechanism for feeding said mining mechanism and comprising rope winding drums on opposite sides of said frame in position to pay out ropes along the edges of said frame and said pan, and limit stop mechanism for automatically stopping and limiting the forward feeding movement of said mining mechanism.

8. In a mining machine, the combination with a base frame, of a supporting frame mounted thereon to move along the same, cutting mechanism mounted on the forward end of said supporting frame, means for driving said cutting mechanism, rope winding mechanism comprising a rope drum mounted with its periphery at one side of said frames to pay out a rope along one edge of said base frame, said rope being adapted to have its free end anchored to said base frame, means for operating said rope winding mechanism to effect forward feeding movement of said cutting mechanism, and limit stop mechanism for stopping and limiting the forward feeding movement of said cutting mechanism.

9. In a mining machine, the combination with a bed frame adapted to rest on and slide over a mine floor and having upright flanges at the sides thereof, of a carriage movable back and forth along said bed frame between said flanges, kerf cutting mechanism mounted on the forward end of said carriage, means for driving said kerf cutting mechanism, rope winding mechanism comprising rope drums mounted on said carriage in position to pay out ropes along the bottom sides of said bed frame and near said upright flanges, and means for operating said rope winding mechanism when the free ends of the ropes on the rope drums are anchored, to advance and retract the carriage with said kerf cutting mechanism along said bed frame.

10. In a mining machine, the combination with a base frame, of a supporting frame movable along said base frame, cutting mechanism mounted on said supporting frame, means for driving said cutting mechanism, a pair of rope winding devices mounted on opposite sides of said supporting frame and comprising rope drums adapted to pay out ropes to extend along the opposite longitudinal edges of said base frame, and means for automatically stopping and limiting the travel of said supporting frame along said base frame in both directions.

11. In a mining machine, the combination with a base frame, of a main frame mounted thereon and movable therealong, kerf-cutting mechanism mounted on the forward end of said main frame, means for driving said kerf-cutting mechanism, means for feeding said kerf-cutting mechanism, rope winding mechanism comprising a rope drum with a friction clutch associated with the upper side thereof, said rope winding mechanism comprising a rope adapted to have its free end anchored to said base frame to secure retraction of said main frame to move said kerf-cutting mechanism back from the mine wall, and means for automatically stopping said rope winding mechanism by lifting said clutch to limit the retracting movement of said kerf-cutting mechanism.

12. In a mining and loading machine, the combination with a base frame, of a main frame mounted on said base frame and movable along guideways thereon, a horizontal undercutter and spaced-apart upright side cutters mounted on the forward end of said main frame, means for driving said cutters, rope winding mechanism mounted on one side of said main frame and comprising a rope with its free end anchored to the forward portion of said base frame, means for operating said rope winding mechanism to secure forward feeding movement of said cutters by movement of said main frame along said base frame, additional rope winding mechanism mounted on the other side of said main frame and comprising a rope adapted to have its free end anchored to the rear portion of said base frame, means for operating said additional rope winding mechanism to secure rearward movement of said main frame along said base frame to retract said cutters from the mine wall, and loading apparatus associated with said cutters to receive dislodged material and transfer the same along said main frame toward the rear end thereof into position for loading into mine cars.

13. In a mining and loading machine, the combination with a pan having vertical spaced-apart side plates extending longitudinally thereof, a main frame mounted in said pan and guided along the latter between said side plates, an undercutting kerf-cutter and upright spaced-apart side kerf-cutters mounted on the forward end of said main frame and movable bodily with the latter, loading apparatus comprising a conveyer having a receiving portion associated with said cutters in position to receive dislodged material directly from the mine wall, rope-winding mechanism mounted on one side of said main frame and comprising a rope with its free end adapted to be anchored to the forward portion of one of said side plates, means for driving said undercutting kerf-cutter and said side kerf-cutters, means for operating said rope-winding mechanism to secure forward feeding movement of said kerf-cutters by the bodily forward movement of said main frame along said pan, additional rope winding mechanism mounted on the other side of said main frame and comprising a rope adapted to have its free end anchored to the rear portion of the other side plate of said pan, and means for operating said additional rope winding mechanism to secure rearward movement of said main frame along said pan and the withdrawal of said kerf-cutters from the mine wall.

14. In a mining machine, the combination with a base frame having upright longitudinal flanges, of a supporting frame movable longitudinally of said base frame between said flanges, cutting mechanism mounted on the forward end of said supporting frame, means for driving said cutting mechanism, feeding mechanism for said cutting mechanism comprising rope drums on the opposite sides of said supporting frame with the peripheries of said rope drums in position to pay out ropes along the bottom of said base frame near said flanges to anchorages, spaced-apart direction pulleys located at the rear end of said base frame, and an additional direction pulley at the rear end of said supporting frame intermediate the sides thereof, said direction pulleys being adapted to receive the ropes from said winding mechanisms.

15. The combination with a mining machine comprising a main frame, of a rope directing device occupying a middle position at the rear end of said main frame, a base frame for receiving said mining machine, an additional rope directing device for the rear end of said base frame, means for limiting the rearward movement of said mining machine along said base frame, rope winding mechanism mounted on said main frame and comprising a rope adapted to be extended around said rope directing devices and anchored to the remote end of a mine car, and means for operating said rope winding mechanism to secure longitudinal movement of said base frame together with the mining machine thereon along such mine car into position for transportation.

16. The combination with a mining machine comprising a main frame, of a base frame having guideways for said main frame, a pair of rope directing devices at the rear end of said base frame and at opposite sides thereof, an additional rope directing device at the rear end of said main frame, rope winding mechanism mounted on said main frame and comprising a rope adapted to have its free end anchored either to the base frame or distant therefrom, and means for operating said rope winding mechanism for moving said mining machine along said base frame when the free end of said rope is anchored to said base frame and for shifting said base frame together with said mining machine when said rope is extended around one or more of said rope directing devices and its free end anchored distant from said base frame.

17. The combination with a mining machine comprising a main frame, of a base frame for supporting said mining machine, rope winding mechanism mounted on said main frame and comprising a rope with its free end adapted to be anchored to said base frame, a clutch for controlling said rope winding mechanism, a hinged stop on said base frame, means in position to engage said stop to automatically release said clutch and limit the movement of said mining machine along said base frame, and means for operating said rope winding mechanism to effect movement of said mining machine along said base frame when the free end of said rope is anchored to said base frame and for moving said base frame together with said mining machine when said hinged stop is moved to one side to permit the application of said clutch and when the free end of said rope is anchored distant from said base frame.

18. In a mining machine, the combination with a main frame, of a horizontal undercutting kerf-cutter on the forward portion of said frame, spaced-apart upright kerf-cutters on the forward portion of said frame, and balanced and symmetrically arranged power transmission mechanism comprising spaced-apart motors at the opposite sides of said main frame for driving said kerf-cutters.

19. In a mining machine, the combination with a main frame, of a pair of motors having parallel shafts extending longitudinally of said frame at the sides thereof, a transverse shaft, gearing for transmitting power from said motors to said transverse shaft, an undercutting kerf-cutter mounted on the forward end of said main frame, and means for transmitting power from said transverse shaft to said undercutting kerf-cutter.

20. In a mining machine, the combination with a main frame, of a pair of spaced-apart motors mounted on said main frame on opposite sides thereof in relatively low positions adjacent the lower surface of said main frame and extending longitudinally thereof, a transverse driven shaft operatively connected to said motors, an undercutting kerf-cutter mounted on the forward end of said main frame, and means at the central portion of said transverse shaft for transmitting power to said undercutting kerf-cutter.

21. In a mining machine, the combination with a main frame, of mining mechanism mounted thereon, means comprising a motor for operating said mining mechanism, and a pick machine mounted on top of said motor in position to break up material adjacent said mining mechanism.

22. In a mining machine, the combination with a supporting frame, of a pick machine mounted thereon, and collapsible mechanism connected between said pick machine and said supporting frame for permitting movement of said pick machine to a relatively low position when not in operation.

23. In a mining machine, the combination with a supporting frame, of a conveyer extending longitudinally thereof, a pair of pick machines one mounted on one side of said conveyer and the other mounted on the other side thereof, and means for supporting said pick machines in relatively low positions on opposite sides of said conveyer when said pick machines are out of operation and for directing said pick machines to elevated positions for operation.

24. In a mining machine, the combination with a supporting frame, of a guideway pivoted thereto, a pick machine, and a supplemental support between said pick machine and said guideway for directing the pick machine to a relatively low position when out of operation and for supporting said pick machine in an elevated position during operation when said supplemental support is moved from said guideway onto said frame.

25. In a mining machine, the combination

with a main supporting frame, of a supplemental support movable into position on said main frame, a pick machine mounted on said supplemental support, and a guideway pivotally connected to said main frame in position to receive said supplemental support and direct it downwardly to permit the pick machine to be supported in a relatively low position.

26. In a mining machine, the combination with a main supporting frame, of guiding mechanism having a forward fixed section and a rear pivoted section, the latter being adapted to be inclined downwardly, a supplemental support movable along said guiding mechanism including the pivoted section, and a pick machine mounted on said supplemental support to occupy an elevated position on the fixed section of said guiding mechanism and to occupy a relatively low position when said supplemental support is on the pivoted section and the latter is tilted downwardly.

27. In a mining machine, the combination with a main frame, of mining mechanism mounted thereon, a motor, means connected between said motor and said mining mechanism for driving the latter, a guideway extending longitudinally of said motor, and a pick machine mounted on said motor for longitudinal adjustment along said guideway.

28. In a mining machine, the combination with a main frame, of mining mechanism mounted thereon, a pair of spaced-apart motors on said main frame and operatively connected to said mining mechanism, longitudinal guides one on top of each of said motors, and a pick machine adapted to be mounted on top of either of said motors for adjustment along the guideway on top thereof.

29. In a mining machine, the combination with a main frame, of a guideway extending longitudinally thereof, a slide block movable along said guideway, and a pick machine universally mounted on said slide block.

30. In a mining and loading machine, the combination with a conveyer, of a main frame for supporting said conveyer, said main frame comprising a casting integral therewith and provided with a compartment under said conveyer adapted to store compressed air in an available space under said conveyer, of a pick machine mounted on said main frame, and a connection between said compartment in said casting and said pick machine for directing compressed air from said compartment to said pick machine.

31. In a mining machine, the combination with a traveling conveyer, of a supporting frame for said conveyer and comprising a casting integral therewith and provided with a compartment under said conveyer adapted to store compressed air, a pick machine adjustably mounted on said main frame, and a flexible connection between said pick machine and said compartment for directing compressed air to said pick machine.

32. In a mining machine, the combination with a main frame, of an upright kerf-cutter, means for driving said kerf-cutter, and mechanism for supporting said kerf-cutter in upright position relative to said main frame during operation of said kerf-cutter and for permitting the folding of said kerf-cutter on a longitudinal axis parallel to the longitudinal center line of the machine but spaced laterally therefrom so that said kerf-cutter may occupy a relatively low position when out of operation without disconnecting the kerf-cutter from said main frame.

33. In a mining machine, the combination with a supporting frame, of an upright kerf-cutter comprising a cutter frame, means for pivotally connecting said cutter frame to said supporting frame for movement relatively thereto on a longitudinal axis extending through the plane of said cutter frame to permit the movement of said kerf-cutter to a horizontal or folded position, and means for securing said cutter frame to said main frame to occupy an upright position while in operation.

34. In a mining machine, the combination with a main frame, of power transmission mechanism comprising a clutch element mounted on said main frame, a kerf-cutter comprising a cutter frame, means for pivotally connecting said cutter frame to said main frame for movement relatively thereto on a longitudinal axis to permit change of position of said kerf-cutter from an upright operating position to a horizontal folded position, means for holding cutter frame in fixed position relative to the main frame when said kerf-cutter is in upright position, and additional power transmission mechanism between said kerf-cutter and the first-named power transmission mechanism, said additional power transmission mechanism comprising another clutch element in alinement with the first-named clutch element when said kerf-cutter is in upright position.

35. In a mining machine, the combination with a main frame, of a kerf-cutter comprising a cutter frame, a motor on the main frame, power transmission mechanism partly on the main frame and partly on said cutter frame and comprising one clutch element on the main frame and another on said cutter frame adapted to be completely separated but located on alined shafts when said kerf-cutter is in upright position, means for pivotally supporting said cutter-frame for swinging movement relative to said main frame on a longitudinal axis, and means for

securing said cutter frame to said main frame when said kerf-cutter is in upright position.

36. In a mining machine, the combination with a main frame, of spaced-apart side kerf-cutters each pivotally connected to said main frame to swing relatively thereto on longitudinal parallel axes from upright position to approximately horizontal folded position, and means for transmitting power to drive said kerf-cutters when the latter are in upright position.

37. In a mining machine, the combination with a supporting frame, of an upright shearing plane kerf-cutter comprising a cutter frame, a pivotal connection at the cutter frame and between the latter and said supporting frame to permit movement of said kerf-cutter on a longitudinal axis at the cutter frame relatively to said supporting frame from an upright shearing position to an approximately horizontal folding relation with said supporting frame, said longitudinal axis being located adjacent the cutter-frame both when the cutter is in upright cutting position and when in folding position, and power transmission mechanism connected between said supporting frame and said kerf-cutter.

38. In a mining machine, the combination with a supporting frame, of an undercutting kerf-cutter mounted on the forward end thereof, an upright shearing kerf-cutter comprising a cutter frame, a rock shaft extending rearwardly from the lower portion of said cutter frame to support the said shearing kerf-cutter for tilting movement to a folding relation with said undercutter and said supporting frame, and power transmission mechanism between said supporting frame and said shearing kerf-cutter to drive the latter when in upright position.

39. In a mining machine, the combination with a supporting frame comprising a casting integral therewith and provided with a compartment at its bottom adapted to store compressed air, of a pick machine mounted on said supporting frame, and a connection between said compartment in said casting and said pick machine for directing compressed air from said bottom compartment to said pick machine.

40. In a mining machine, the combination with a supporting frame, of an undercutting kerf-cutter mounted on the forward end thereof, a multiple conveyer mounted on the rear end thereof, and a symmetrically arranged intermediate conveyer for receiving the cuttings from said kerf-cutter and transferring such cuttings to said multiple conveyer.

41. In a mining and loading machine, the combination with a supporting frame, of a pair of motors mounted on said frame to extend longitudinally thereof, one on one side of said frame and the other on the other side thereof, an undercutting kerf-cutter mounted on the forward end of said supporting frame, a conveyer mounted on said frame between said motors with its way approximately at the same elevation as the tops of the motors, said conveyer having a receiving end in position to receive coal dislodged from the mine wall above said undercutter.

42. In a mining machine, the combination with a supporting frame, of kerf-cutting mechanism mounted thereon, a main conveyer having a forward receiving end in position to receive material dislodged adjacent said cutting mechanism, a rear swinging conveyer for receiving dislodged material from said main conveyer, and a symmetrically arranged additional conveyer in position to receive the cuttings from said kerf-cutting mechanism independently of said main conveyer and transferring such cuttings to said swinging conveyer independently of the transfer of dislodged material by said main conveyer to said swinging conveyer.

43. In a mining and loading machine, the combination with a supporting frame, of an undercutting kerf-cutter, spaced-apart upright side kerf-cutters, a balanced system of power transmission mechanism comprising motors on opposite sides of said supporting frame for driving said kerf-cutters, and loading apparatus comprising a conveyer extending from the range of operation of said kerf-cutters longitudinally of said supporting frame and between said motors.

44. In a mining and loading machine, the combination with a supporting frame, of an undercutting kerf-cutter, spaced-apart upright side kerf-cutters, loading apparatus comprising a conveyer extending longitudinally and symmetrically along said supporting frame, a pair of motors one mounted on one side of said supporting frame and the other on the other side thereof at opposite sides of said conveyer, and power transmission mechanism between said motors and all of said kerf-cutters for driving the latter simultaneously upon the operation of said motors.

45. In a mining and loading machine, the combination with a supporting frame, of an undercutting kerf-cutter, spaced-apart upright side kerf-cutters, loading apparatus extending longitudinally and centrally of said supporting frame, and a balanced system of symmetrically arranged power transmission mechanism comprising motors on opposite sides of the machine for operating said kerf-cutters including the feeding thereof.

46. In a mining and loading machine, the combination with a supporting frame, of an undercutting kerf-cutter mounted on the

forward end thereof, a pair of motors mounted on opposite sides of said frame on the bottom thereof, a main conveyer extending rearwardly along a space located directly between said motors, and a supplemental conveyer under said main conveyer and extending rearwardly from a receiving position adjacent the rear end of said kerf-cutter.

47. In a mining and loading machine, the combination with a supporting frame, of a kerf-cutter mounted on the forward portion thereof, a rear swinging conveyer having a hopper on the forward end thereof, a forward conveyer extending from said kerf-cutter rearwardly to said hopper, means comprising motor mechanism for operating said kerf-cutter, a separate motor for driving said forward conveyer, another separate motor for driving said swinging conveyer, an additional conveyer under said forward conveyer for receiving cuttings from said kerf-cutter and delivering such cuttings to said hopper, and a separate motor for driving the cuttings conveyer.

48. In a mining and loading machine, the combination with a bed frame, of a carriage mounted thereon for advancing and retracting movements, an undercutting kerf-cutter on the forward end of said carriage, a traveling conveyer having a receiving end adapted to enter the kerf produced by said kerf-cutter, means for dislodging the material above the under kerf onto said conveyer, a supplemental conveyer under said first-named conveyer in position to gather the cuttings from said kerf-cutter and move the same rearwardly, and means comprising motor mechanism at the bottom of said carriage and at the sides of the rear portion of said first-named conveyer for operating said kerf-cutter and said dislodging means while the space above the first-named conveyer remains free and unobstructed and the conveyer way between the motors is no higher than the height of said motors.

49. In a mining machine, the combination with a supporting frame, of mining mechanism mounted on the forward portion thereof, a pair of motors on said supporting frame at the opposite sides thereof, power transmission mechanism between said motors and said mining mechanism, a pair of rope winding devices on opposite sides of said supporting frame back of said motors, and power transmission mechanism for said rope winding devices.

50. In a mining and loading machine for low roof mine chambers, the combination with a supporting frame, of an undercutting kerf-cutter, spaced apart upright side kerf-cutters, means for connecting said upright side kerf-cutters to said supporting frame to permit movement of said cutters to approximately horizontal or folded positions, balanced and symmetrically arranged power transmission mechanism comprising spaced-apart motors at the sides of said supporting frame for driving said kerf-cutters, a pick machine, means for supporting said pick machine in elevated position for operation on the material between said side cutters and above said undercutter, means for supporting said pick machine in a relatively low position or folded position, and loading apparatus comprising a conveyer extending from said kerf-cutting mechanism rearwardly between said motors and toward loading position.

51. In a mining machine, the combination with a frame having a flat bottom adapted to be supported adjacent the mine floor, of spaced-apart motors on opposite sides of said frame and secured to the bottom thereof, kerf-cutting mechanism mounted on the forward end of said frame, and means driven by said motors for operating said kerf-cutting mechanism.

52. In a mining machine, the combination with a frame having a flat bottom adapted to be supported adjacent the mine floor, of a pair of symmetrically arranged motors on opposite sides of said frame and secured to the bottom thereof, a horizontal undercutting kerf cutter on the forward portion of said frame, spaced-apart upright kerf cutters on the forward portion of said frame, and means for driving said kerf cutters from said low-positioned motors.

53. In a mining machine, the combination with a supporting frame having a bottom adjacent the mine floor, of mining mechanism mounted thereon, means for driving said mining mechanism, and two rope winding devices each pivotally connected to said bottom on opposite sides of said frame on upright axes to have their outer sides adjacent the longitudinal edges of said frame.

54. In a mining machine, the combination with a main frame comprising a casting having a compartment for storing compressed air and an inclined plane on its outer surface, of an undercutting kerf cutter, means operated by said compressed air for breaking down the coal above said kerf cutter, and a conveyer mounted on said inclined plane for receiving the cuttings from said kerf cutter and transferring such cuttings toward loading position.

55. In a mining machine, the combination with a main frame having a flat bottom adapted to be supported adjacent the mine floor, said frame also comprising a casting having a compartment therein with its bottom formed by a portion of the bottom of said frame, said compartment being adapted to store compressed air, of an undercutting kerf cutter mounted on the forward end of said frame, means operated by

the compressed air from said compartment for dislodging material above said under cutter, and a conveyer mounted on top of said compartment for receiving cuttings from said kerf cutter and transferring such cuttings rearwardly toward loading position.

56. A loading machine including a truck, a carriage mounted for reciprocating movement, an elevating conveyer mounted on said carriage by which the material to be loaded is taken up, a hopper pivoted vertically on the carriage into which the elevating conveyer discharges, a loading conveyer carried by the pivoted hopper taking the material from said hopper extending to discharge to the point of loading, rope winding mechanism on said carriage, a rope connected thereto and wound thereon, and a guide at the rear center of said carriage for directing the rope to an anchorage on said truck.

57. A loading machine adapted for loading to a car located adjacent the machine, including a truck, a carriage mounted for advancing and return movement, an elevating conveyer mounted on said carriage to take up material as the carriage is advanced, a hopper on the carriage into which the elevating conveyer discharges, a loading conveyer associated with said hopper to take the material from the hopper and to load and distribute the material within the car as the carriage is advanced, rope winding mechanism on said carriage, a rope connected thereto and wound thereon, and guides comprising a guide at the rear center of said carriage for directing the rope to an anchorage on said truck.

58. In a mining machine, the combination with a main frame, of two spaced-apart motors one on one side of said frame and the other on the other side of said frame, an undercutting kerf-cutter on the forward portion of said frame, spaced-apart upright kerf cutters on the forward portion of said frame, and means for driving all of said kerf cutters from both of said motors.

59. In a mining machine, the combination with a base frame, of a main frame carried by and movable along said base frame, a horizontally arranged kerf cutter mounted on the forward end of said main frame, upright kerf cutters mounted on opposite sides of the forward end of said main frame, said cutters being adapted to operate in advance of said main frame, means on said main frame in position to receive material when dislodged from the space between said upright cutters above said horizontally arranged cutter, means for driving said cutters, a pair of rope drums mounted on opposite sides of said receiving means to rotate on upright axes in position to pay out ropes to extend along the bottom and outer edges of said base frame, and a pair of ropes wound respectively on said rope drums and adapted to have their free ends anchored in the mine.

60. In a mining machine, the combination with a supporting frame, of a conveyor extending longitudinally thereof, a pair of pick machines one mounted on one side of said conveyor and the other mounted on the other side thereof, and folding mechanism for said pick machines to support them for transportation in low positions relatively to the conveyor and at the sides thereof and directing such pick machines to elevated positions for operation at the mine heading above said conveyor.

61. In a mining machine, the combination with a frame, of spaced-apart motors on opposite sides of said frame at the bottom thereof, kerf-cutting mechanism on the forward end of said frame and comprising spaced-apart upright side kerf-cutters, and an undercutting kerf-cutter between the side kerf-cutters in position to cut a U-shaped kerf in a mine wall, and interconnected means connected between said motors and said kerf-cutters for operating all of the latter.

62. In a mining and loading machine, the combination with a frame, of kerf-cutting mechanism on the forward end thereof, a pair of motors one on one side of said frame and the other on the other side thereof to leave a wide space between them, a conveyor extending from said kerf-cutting mechanism along said wide space between said motors with the space above the conveyor free and unobstructed, and means for driving said kerf cutting mechanism from both of said motors.

63. In a mining machine, the combination with a frame, of a pair of motors on opposite sides of said frame at the bottom thereof, a horizontally arranged kerf cutter on the forward portion of said frame, spaced-apart upright kerf cutters on the forward portion of said frame, and means for driving said cutters from said low positioned motors.

64. In mining apparatus, the combination with an elongated supporting frame, of mining mechanism mounted on said supporting frame to slide longitudinally thereof, means for driving said mining mechanism, and two rope winding devices each pivotally connected to the mining mechanism in positions to have their outer sides adjacent the longitudinal sides of said frame to effect sliding of the mining mechanism longitudinally along said supporting frame during feeding movement of the mining mechanism forward and retraction thereof rearward.

65. The combination with a mining machine comprising a main frame, of a rope directing device occupying a middle position

at the rear end of said main frame, a base frame for receiving said mining machine, an additional rope directing device for the rear end of said base frame, rope winding mechanism mounted on said main frame and comprising a rope adapted to be extended around said rope directing devices and anchored to the remote end of a mine car, and means for operating said rope winding mechanism to secure longitudinal movement of said base frame together with the mining machine thereon along such mine car into position for transportation.

66. In a mining and loading machine, the combination with a supporting frame, of an undercutting kerf-cutter, spaced-apart upright kerf-cutters, loading apparatus extending longitudinally and centrally of said supporting frame, and a balanced system of power transmission mechanism comprising motors on opposite sides of the machine for operating said kerf-cutters.

67. In a mining machine, the combination with a supporting frame, of mining mechanism mounted on the forward portion thereof, a pair of motors on said supporting frame on opposite sides thereof, power transmission mechanism between said motors and said mining mechanism, a pair of rope winding devices on opposite sides of said supporting frame, and power transmission mechanism for said rope winding devices.

68. In a mining and loading machine for low roof mine chambers, the combination with a supporting frame, on an undercutting kerf cutter, spaced-apart upright side kerf cutters, means for connecting said upright side kerf cutters to said supporting frame to permit movement of said cutters to approximately horizontal or folded positions, power transmission mechanism comprising spaced-apart motors at the sides of said supporting frame for driving said kerf cutters, a pick machine, means for supporting said pick machine in elevated position for operation on the material between said side cutters and above said undercutters, means for supporting said pick machine in a relatively low position or folded position, and loading apparatus comprising a conveyor extending from said kerf cutting mechanism rearwardly between said motors and toward loading position.

69. In a mining and loading machine, the combination with a supporting frame, of a conveyor extending longitudinally thereof along its central portion, mining mechanism on the forward end of said frame at the sides of the forward end of said conveyor leaving the space above the forward end of said conveyor free and unobstructed, and means comprising a motor extending longitudinally of said conveyor at one side thereof to operate said mining mechanism while the space above said conveyor along the longitudinal central portion of the machine remains free and unobstructed.

70. In a mining and loading machine, the combination with a supporting frame, of a conveyor extending longitudinally thereof, mining mechanism on the forward portion of said frame, and means comprising motors on opposite sides of said conveyor for driving said mining mechanism, the load on the motors being divided and the motors being adjacent the lower sides of the conveyor to adapt the machine for operation in low roof mine chambers while the space between the motors remains free and unobstructed over a wide area.

In testimony whereof I have signed my name to this specification on this 5th day of June, A. D. 1920.

EDMUND C. MORGAN.