E. C. MORGAN.

MINING MACHINE.

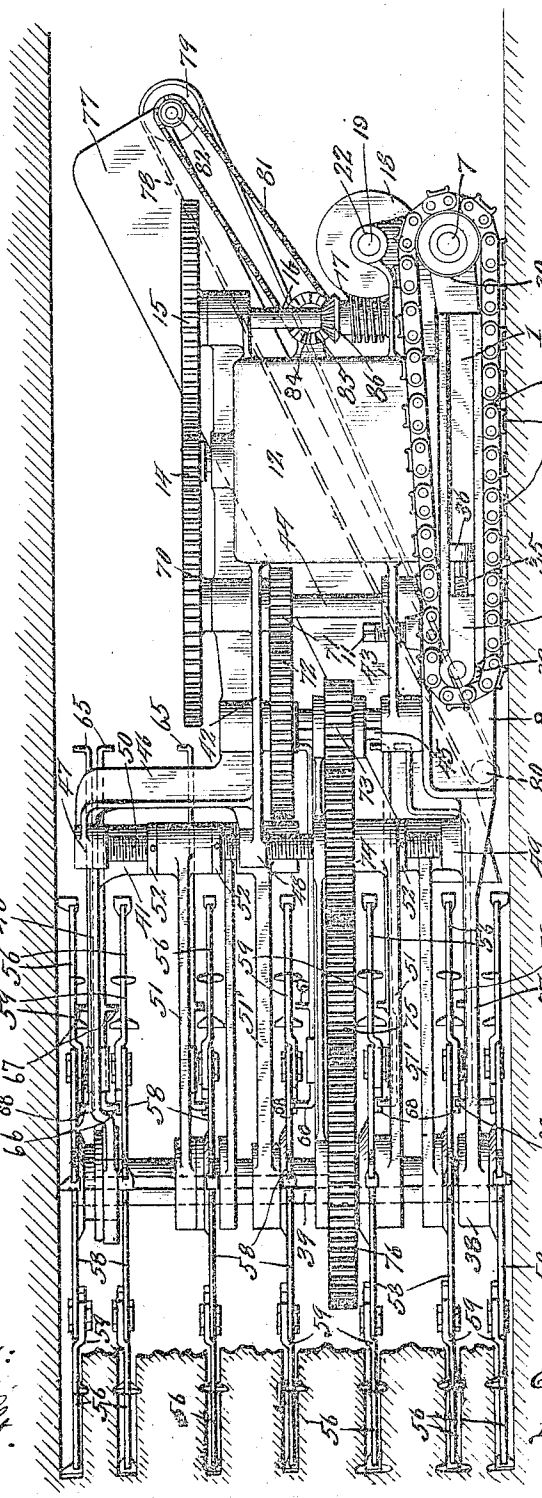
APPLICATION FILED JUNE 27, 1910.

1,175,071.

Patented Mar. 14, 1916.

5 SHEETS—SHEET 1.

Fig. 1.



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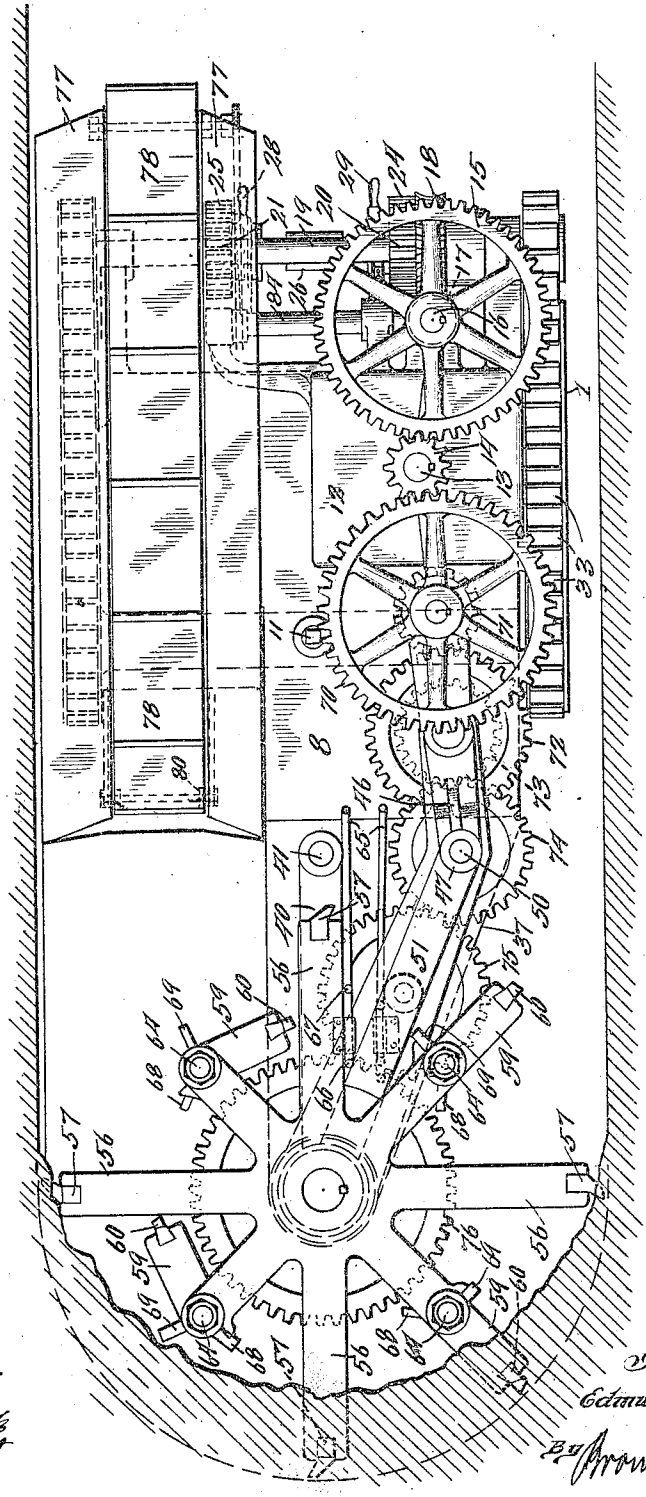
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5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3.

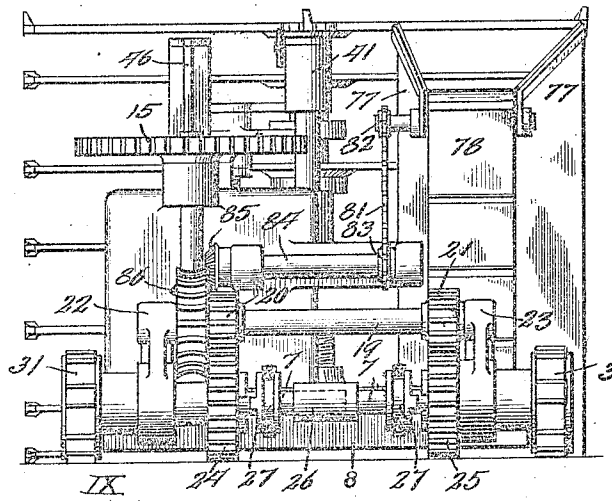


Fig. 8.

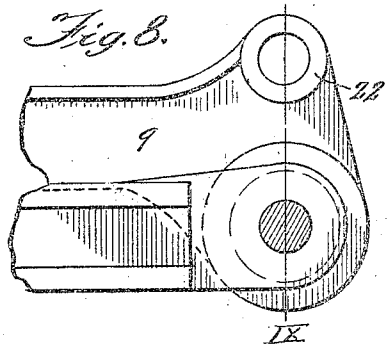


Fig. 9.

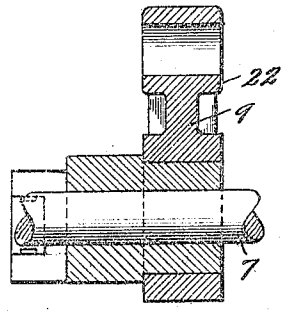
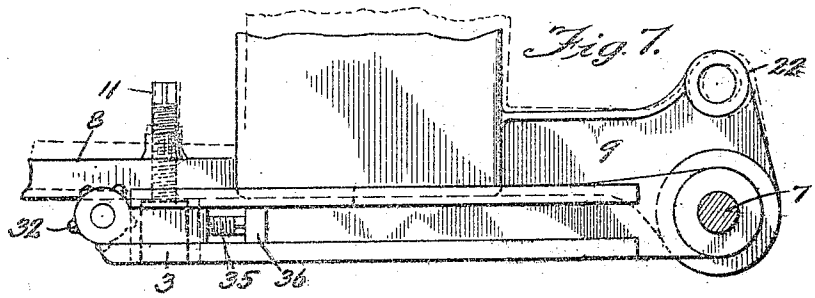


Fig. 7.



Witnesses:

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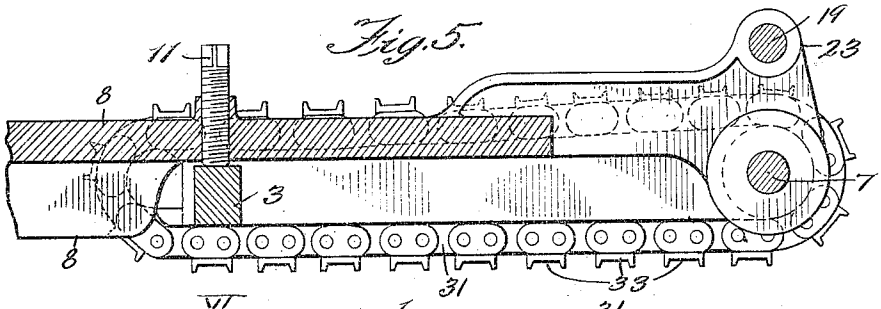
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Fig. 5.



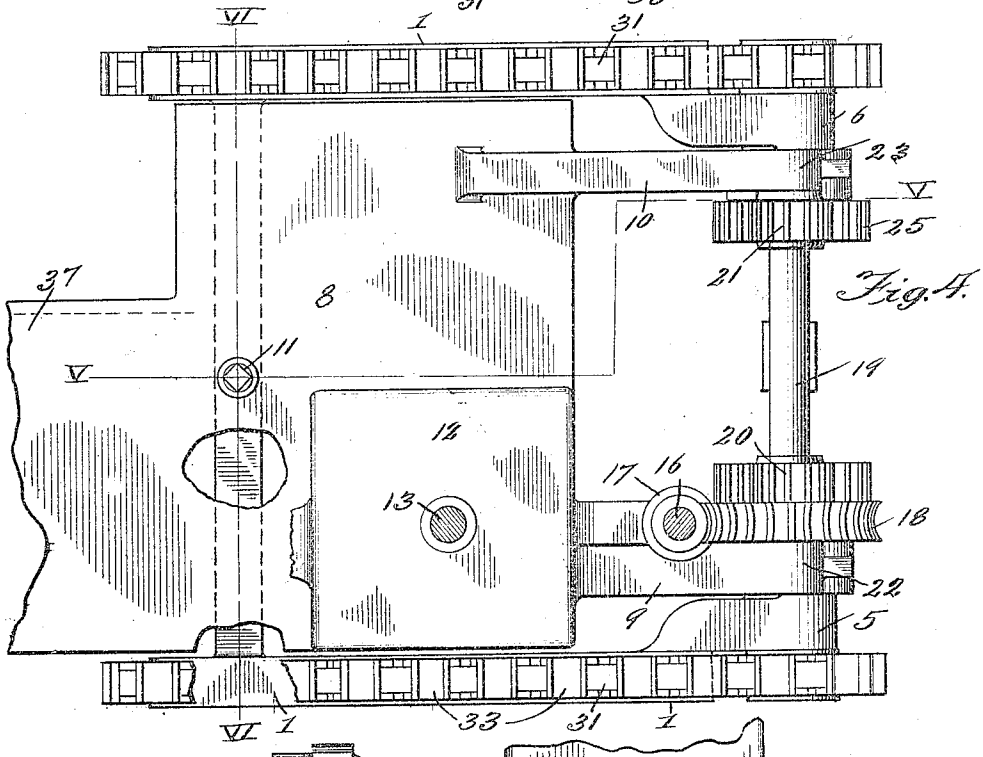


Fig. 4.

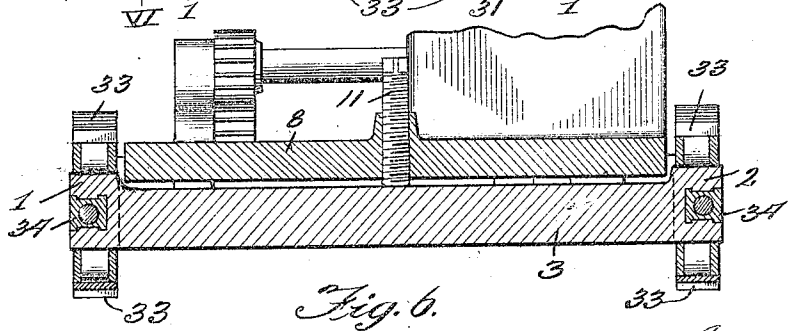


Fig. 6.

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APPLICATION FILED JUNE 27, 1910.

1,175,071.

Patented Mar. 14, 1916

5 SHEETS—SHEET 5.

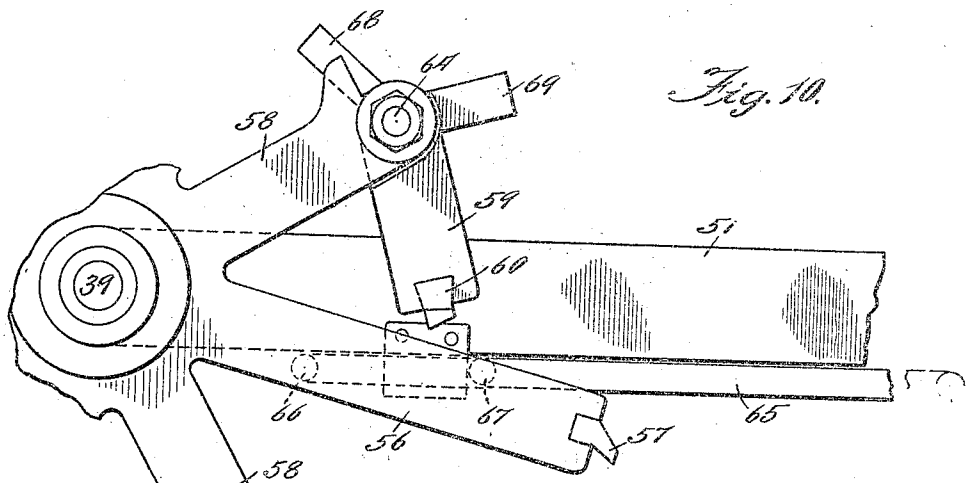


Fig. 10.

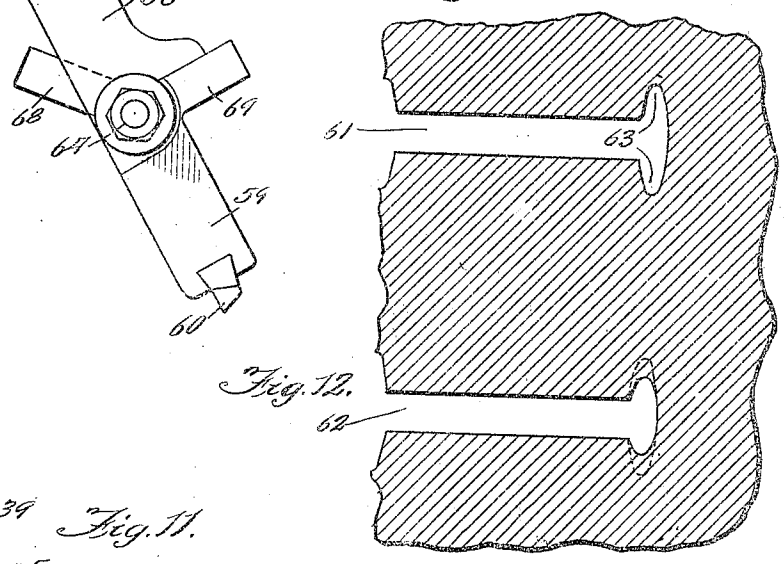


Fig. 12.

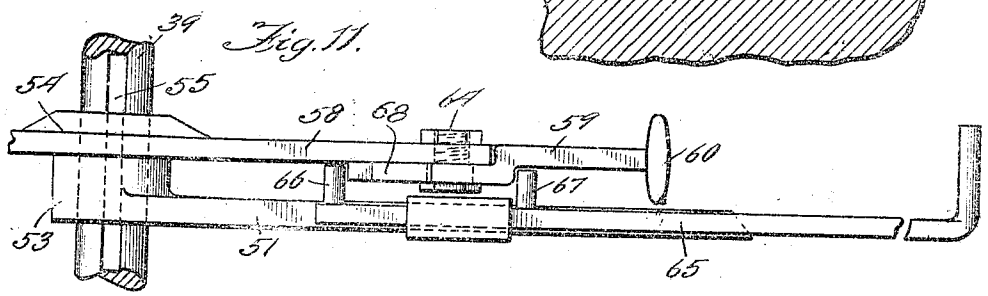


Fig. 11.

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UNITED STATES PATENT OFFICE.

EDMUND C. MORGAN, OF MORGAN PARK, ILLINOIS.

MINING-MACHINE.

1,175,071. Specification of Letters Patent. Patented Mar. 14, 1916.

Application filed June 27, 1910. Serial No. 569,169.

To all whom it may concern:

Be it known that I, EDMUND C. MORGAN, a citizen of the United States, residing at Morgan Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mining-Machines, of which the following is a specification.

This invention relates to mining machines, and more especially to that type of mining machines which are movably supported so that they may be driven into the drift or tunnel.

The primary object of this invention is to provide an improved construction, combination and arrangement of parts in a mining machine.

One of the objects of the invention is to provide improved means for cutting the coal or other material into slabs.

Another object is to provide improved means for feeding the machine to its work.

Another object is to provide improved means for adjusting the height of the cutters.

Other and further objects will appear in the specification and be more specifically pointed out in the claims, reference being had to the accompanying drawings exemplifying the invention, and in which—

Figure 1 is a side elevation of a mining machine constructed in accordance with the principles of this invention. Fig. 2 is a top plan view of the same. Fig. 3 is a rear end elevation of the same. Fig. 4 is a top plan view of the rear portion of the machine, parts being removed and parts broken away. Fig. 5 is a section on the line V—V of Fig. 4. Fig. 6 is a section on the line VI—VI of Fig. 4. Fig. 7 is a detail side elevation of a side arm and the movable base of the machine. Fig. 8 is an enlarged detail elevation of parts shown in Fig. 7. Fig. 9 is a section on the line IX—IX of Fig. 8. Fig. 10 is a top plan fragmentary view of a portion of the cutting apparatus. Fig. 11 is a side elevation of the same. Fig. 12 is a diagrammatic view in section of the material showing the cuts therein.

Referring to the embodiment shown in the drawings, and first to Figs. 4, 5 and 6, the main truck frame of the machine comprises side rails 1 and 2 rigidly united, at their forward ends by a cross rail 3 and having rotatably mounted in suitable bosses 5 and 6 offset from their rear ends, a shaft 7 constructed in two sections. In order to provide a suitable platform or base which may be moved upwardly and downwardly, a base member or platform 8 is provided with rearwardly projecting arms 9 and 10 which are journaled on the drive shaft 7, thus adapting said platform 8 to be raised and lowered by an angular movement about said shaft. To impart this movement, a set screw 11 impinging upon the cross rail 3 is preferably employed, but any other suitable means may be employed for this purpose. Rigidly mounted upon the platform 8 is a motor 12 of any suitable design, said motor preferably being a reversible electric motor. A motor shaft 13 has keyed to its upper end a driving pinion 14 which meshes with a gear 15 keyed to the upper end of a vertical shaft 16. A worm 17 keyed to the lower end of the shaft 16 meshes with a worm wheel 18 keyed to a shaft 19, said shaft 19 being also provided with gears 20, 21 keyed thereto adjacent either end. The shaft 19 is preferably rotatably mounted in the bearing brackets or arms 22, 23, which form integral projections from the rear ends of the arms 9 and 10. The gears 20 and 21 mesh respectively with gears 24 and 25 free to rotate upon the respective sections of the shaft 7, whose sections are adapted to be rotated relatively to each other by having adjacent ends provided with a connecting sleeve 26. Each of the gears 24 and 25 is provided with a clutch element, as shown in Fig. 3, while splined upon each section of the shaft 7 is a clutch 27 which may be moved into and out of engagement with the clutch element of either of said gears 24 and 25, thus throwing the motor into driving connection with the respective sections of the shaft 7. To adapt said clutches 27 to be operated independently of each other, shifting levers 28 and 29 of the ordinary and well known construction are provided operatable preferably by hand. Upon the outer end of each of the shaft sections 7 is keyed a driving sprocket 30, which engages a ped-chain 31, the forward end of each of said ped-chains, which are endless, being supported by a sprocket 32. Carried by the ped-chain 31 are a plurality of feet or peds 33 adapted to impinge upon and grip the floor of the mine. To provide means for regulating the tension in the ped-chain 31, the forward sprockets 32 are mounted upon reciprocable supports 34 (see Figs. 1 and 6) provided each with an ad-

justing screw 35 having its head bearing against a rigid projection 36 on each side frame member 1 or 2.

The oscillable platform or base member 8 is provided with a forwardly projecting portion 37 narrowed at its extremity into a bearing base or support 38 (see particularly Fig. 1) for rotatably mounting a vertical cutter bar shaft 39. The upper end of the cutter bar shaft 39 is rotatably mounted in the forward end of a bracket arm 40 (see Figs. 1 and 2) which projects laterally from a vertical support or base 41 suitably mounted upon the platform or base member 8. Projecting forwardly from the housing of the motor 12 are a pair of bearing brackets or arms 42 and 43 provided with suitable bearing bosses for mounting the vertical shafts 44 and 45. The upper bracket 42 is provided with an extension 46 for supporting at its top a bearing 47 in axial alinement with other bearings 48 and 49 (see Fig. 1). Rotatably journaled in the bearing bosses 47, 48 and 49 is an adjusting screw 50, upon which are mounted the hubs of a plurality of intermediate cutter bar supports 51. In order to raise and lower the intermediate cutter bar supports 51, the hub portions of said supports are in abutment with threaded nuts 52, which may be rotated by spanner wrenches on the screw 50, and so caused to travel upwardly and downwardly. The detail construction of each of the cutter bar mechanisms may be understood from an inspection of Figs. 10, 11 and 12. Thus, in Figs. 10 and 11, one of the supporting arms 51 is shown provided with a hub portion 53, within which the shaft 39 rotates. Supported by the hub portion 53 is a hub 54 held against rotation on the shaft 39 by means of a spline fitting the splineway 55. Carried by said hub are a plurality of cutter arms of different kinds alternately arranged around the shaft 39. One series of these cutter arms may consist simply of a number of rigid arms 56, in the outer end of each of which is carried a cutter 57 for cutting the coal into slabs. Intermediately of each pair of the cutter arms 56 is a shorter arm 58 upon the outer end of which is pivotally mounted a swinging cutter arm 59 provided with a cutter 60 in the outer end thereof. The cutter arms 59 are designed to be used for making breaking down kerfs after completion of the slabbing kerfs 61, 62 (see Fig. 12). As shown in Fig. 11, each cutter 60 extends transversely of the arm 59 in such manner as to adapt it to cut the grooves 63 at the ends of the kerfs 61, 62. Said cutters 60 successively increase in size so that when they are passed through the coal or the material to be cut, the end of the kerf is first grooved, as shown in the lower portion of Fig. 12, and finally assumes the form shown in the upper portion of Fig. 12. In order to provide means for making the cutters 60 inactive while the cutters 57 are being forced into the coal wall, the cutter arms 59 are pivotally mounted by stud pivots 64 upon the outer ends of the arms 58. For moving the arms 59 into and out of operative position, a lever or bar 65 is slidably mounted on the support 51 and provided with vertically projecting pins 66, 67 adapted to be moved into and out of the path of movement of the projections 68 and 69 during the rotation of the cutter bars.

A gear 70 keyed to the upper end of the vertical shaft 44 receives motion from the driving pinion 14 on the motor shaft 13. A pinion 71 also keyed to the shaft 44 meshes with a gear 72, which is keyed to the vertical shaft 45. Also keyed to the shaft 45 is a driving pinion 73, which, by means of intermediate gears 74 and 75, transmits motion to a large gear 76, which is keyed to the shaft 39, thus driving the cutter bars 56 and 58. The gear 75 is preferably supported from one of the supports 51.

The operation of the machine will now be readily understood and briefly described, is as follows: The sprockets 30 and 32 on the side rails 1 and 2, when driven by the motor 12, travel along the lower band of the endless chain 31, just as though upon a continuous rack, the forward sprocket 32 continuously disposing the links of the chain in advance of said sprockets. By means of the adjusting nuts 52, on the adjusting screw 50, the cutter bar supports 51 may be adjusted relatively to each other, and to the projecting arms 37 and 40 to correspond to any arrangement of kerfs desired. Should it be desired to raise or lower all of the cutters together, the adjusting screw 11 threaded within the platform 8 and impinging upon the cross rail 3, may be rotated to raise and lower the platform 8 relatively to the supporting base frame comprising the members 1, 2, 3, 7, etc. This having been done, the cutter bars may be set in motion and the machine fed bodily toward the coal wall by means of the ped-chains 31.

To one side of the machine is mounted a chute 77, within which travels a conveyer 78 carried by pulleys 79 and 80. Said conveyer and chute are disposed directly across the path of the rotating cutters as they emerge from the coal, so that when the coal is broken down during the rotary movement of the cutters, it will be ejected in front of the lower end of the conveyer, and as said conveyer is advanced by the travel of the machine, the coal will be passed rearwardly and upwardly to be loaded in the usual manner. For driving the conveyer 78, an endless chain 81 is mounted to travel about a sprocket 82 and a second sprocket 83 mounted on a transverse shaft 84. The

transverse shaft 84 is provided with a bevel gear 85 keyed thereto, which meshes with a bevel gear 86 on the shaft 16, from which it derives its motion directly from the motor 12.

What I claim is:

1. The combination with a main frame, of a supplemental frame pivoted to said main frame, cutting mechanism carried by said supplemental frame, and a bolt threaded through one of said frames to engage the other to adjust the inclination of said supplemental frame and the height of said cutting mechanism.

2. In a mining machine, the combination with a main frame, of a supplemental frame, cutting mechanism carried by said supplemental frame, and a vertical screw-threaded bolt passing through one of said frames and engaging the other to adjust the position of said supplemental frame together with the cutting mechanism mounted thereon.

3. In a mining machine, the combination with a main frame, of a supplemental frame pivoted to the rear portion of said main frame, a bolt threaded through one of said frames and engaging the other to adjust the position of said supplemental frame, and kerf-cutting mechanism carried by said supplemental frame.

4. In a mining machine, the combination with a supporting frame, of two independent shafts journaled in said supporting frame, tractive means connected to said shafts, cutting mechanism mounted on said frame, and means for operating said shafts independently of each other to shift said frame and cutting mechanism to one side or the other.

5. In a mining machine, the combination with cutting mechanism, of a frame for supporting said cutting mechanism, two shafts mounted on said frame to rotate independently of each other, tractive means connected to said shafts to effect forward movement of said cutting mechanism, and means for driving either shaft independently of the other to vary the path of forward travel of said cutting mechanism.

6. In a mining machine, the combination with cutting mechanism, of a supporting frame therefor, two shafts journaled in the rear end of said frame in alinement with each other but rotatable independently of each other, tractive means connected to said shafts, power transmission gearing between said motor and said shafts, and means operable from a position to the rear of said supporting frame for establishing driving connections with respect to said power transmission gearing to effect rotation of either shaft independently of the other or of both simultaneously.

7. In a mining machine, the combination with a main frame, of a supplemental frame, cutting mechanism mounted on said supplemental frame, two shafts mounted on said main frame for rotation independently of each other, tractive means connected to said shafts, power mechanism for driving said shafts and said tractive means, means for controlling said power means from a position at the rear of said main frame for operating either shaft alone or both simultaneously, and means for moving the supplemental frame relatively to said main frame to adjust the height of said cutting mechanism.

8. In a mining machine, the combination with a supplemental frame, of a plurality of parallel kerf-cutters mounted on said supplemental frame, means for operating said kerf-cutters, a main frame, and pivotal connections between said main frame and said supplemental frame, two shafts journaled in the rear portion of said main frame in alinement with each other but for rotation independently of each other, tractive means connected to each of said shafts, a motor, power transmission gearing between said motor and said shafts, means for establishing driving connections with respect to said power transmission gearing to effect rotation of either shaft independently of the other, and means for lifting and lowering said supplemental frame on its pivotal connections to adjust the height of said kerf-cutters.

9. In a machine of the character described, the combination with a base frame, of a plurality of superposed horizontal kerf cutters operatively carried thereby, means for adjusting said cutters relatively to each other, and means for raising and lowering all of said cutters together.

10. In a machine of the character described, the combination with a base frame, of rotary cutters operatably carried thereby and superposed to make horizontal kerfs, means for raising and lowering said cutters relatively to each other, and means for raising and lowering them together.

11. In a machine of the character described, the combination with a base frame, of a platform mounted on said frame, a shaft rotatably mounted on the forward end of said platform and having its axis vertical, a plurality of cutter bars rotated in horizontal planes by said shaft to cut a drift wider than the machine, a gear mounted on said support for driving said shaft, and a conveyer disposed on that side of the machine on which the cutter bars emerge from the coal.

12. In a machine of the character described, the combination with a base frame, of a plurality of cutters carried by said frame and arranged to operate in horizontal planes and adapted to cut a drift wider than the machine, means disposed on one

side of said frame for driving said cutters, and a conveyer on the other side of said frame in the path of said cutters as they emerge from the coal.

13. In a machine of the character described, the combination with a base member, of a vertical shaft, a plurality of cutters mounted thereon to revolve in parallel planes about said shaft, means for adjusting said cutters along said shaft and means for adjusting said shaft longitudinally.

14. In a machine of the character described, the combination of a traveling frame, a platform pivotally mounted on the frame, mining tools mounted on said platform to rotate in horizontal planes, and means for swinging said platform about its pivotal axis.

15. In a machine of the character described, the combination of a traveling frame, a platform pivotally mounted on the frame, a mining tool mounted on said platform to rotate in a horizontal plane, means for swinging said platform about its pivotal axis, and means for shifting said frame horizontally.

16. In a machine of the character described, the combination of a traveling frame comprising lateral propelling members and front and rear transverse members connecting said propelling members, a platform pivotally mounted on the rear transverse member, a mining tool mounted on the platform, power mechanism mounted on the platform, and adjusting means carried by said platform and engaging the front transverse member to raise and lower said platform.

17. In a machine of the character described, the combination of a traveling frame comprising lateral propelling members, a propelling shaft extending across the rear of the machine and in driving connection with said propelling members, a platform pivotally mounted on the said propelling shaft, a cross bar connecting the forward ends of the propelling members, an adjusting screw mounted in said platform and impinging the cross bar, and a mining tool mounted on said platform.

18. In a mining machine, the combination with a main frame, of means for moving said main frame slowly forward, a supplemental frame pivoted to said main frame, cutting mechanism mounted on said supplemental frame, mechanism for operating said cutting mechanism while said main frame is being moved slowly forward, and means on one of said frames to engage the other frame to adjust the inclination of the supplemental frame and the height of said cutting apparatus.

19. In a mining machine, the combination with a main frame, of means comprising lateral propelling members for moving said main frame, a supplemental frame pivoted to said main frame, cutting mechanism mounted on said supplemental frame, and adjusting means carried by said supplemental frame and engaging the main frame to raise and lower said cutting mechanism.

20. The combination with a main frame, of propelling mechanism therefor, a supplemental frame pivoted to said main frame, an adjusting screw for tilting said supplemental frame on its pivotal connection with the main frame, cutting mechanism carried by said supplemental frame, and means for operating said cutting mechanism while said propelling mechanism is being operated.

21. In a mining machine, the combination with a supporting frame, of a plurality of cutter-bars mounted to rotate in horizontal planes, means on one side of said frame for operating said cutter bars, and a conveyer on the other side where the cutter-bars emerge from the material being cut.

22. In a mining machine, the combination with means for producing a plurality of parallel kerfs in a mine wall, of apparatus for breaking down the material between said kerfs, and a conveyer for receiving and conveying back from the mine wall the material broken down.

23. In a mining machine, the combination with a frame, of cutting means carried thereby to make a plurality of slits in a mine wall, means also carried by said frame for applying a breaking force to a cut section of material, and a conveyer connected to said frame and adapted to receive the material broken down from the mine wall and convey it backwardly therefrom.

24. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon for making a plurality of kerfs in a mine wall, means for breaking down the slabs of material between said kerfs, and a conveyer mounted on said frame to receive the broken-down material and convey it back from the mine wall.

25. In a mining machine, the combination with a carriage, of means for moving said carriage forward, mechanism for regulating such forward movement to effect the turning of the carriage in either direction, cutting mechanism mounted on said carriage for making a plurality of kerfs in a mine wall, means for breaking down the slabs of material between said kerfs, a conveyer mounted on said carriage to receive the material broken down and convey it toward the rear of said carriage, and means for simultaneously operating said cutting mechanism and said conveyer.

26. In a mining machine, the combination with a carriage, of means connected to said carriage for moving the same into a mine entry or tunnel, a frame pivotally supported on said carriage on an axis extending trans-

versely across the same, a bolt for adjusting said frame up and down on said pivot whereby it may be made to rise and fall at one end, an upright shaft journaled in the end of said frame opposite its pivotal connection with said carriage, cutters mounted on said shaft to rotate in a substantially horizontal plane, and means mounted on said frame and connected with said shaft to rotate the same.

27. In a mining machine, the combination with a supporting frame, of a plurality of kerf-cutters spaced apart and carried by said frame to cut kerfs in a mine wall in parallel planes, and means for moving said cutters relatively to each other to adjust the distances between the planes of their operations.

28. In a mining machine, the combination with a kerf-cutter, of means for supporting said kerf-cutter, mechanism for operating said kerf-cutter, and means for adjusting the position of said kerf-cutter on its support and holding it in adjusted position.

29. In a mining machine, the combination with a plurality of rotary cutters superposed and spaced apart, of means for moving said cutters toward or away from each other, and means for operating said cutters.

30. In a mining machine, the combination with a supporting frame, of a plurality of cutters mounted thereon to rotate in parallel planes, a shaft for said cutters, and means for adjusting the position of said cutters on said shaft longitudinally.

31. In a mining machine, the combination with a plurality of kerf-cutters spaced apart, means for rotating said kerf-cutters, a plurality of horizontal arms for supporting said kerf-cutters, and means for adjusting the positions of said arms to vary the positions of said kerf-cutters.

32. In a mining machine, the combination with a kerf-cutter, of means for operating said kerf-cutter, a screw-threaded shaft, a supporting arm connected to said kerf-cutter and mounted on said screw-threaded shaft, and nuts for adjusting the position of said arm along said screw-threaded shaft to vary the position of said kerf-cutter.

33. In a mining machine, the combination with a frame, of a vertical screw-threaded shaft mounted thereon, a plurality of arms mounted on said screw-threaded shaft, a plurality of nuts on said screw-threaded shaft for lifting or lowering said arms and holding the same in adjusted position, a plurality of kerf-cutters one supported by each of said arms, and means for rotating said kerf-cutters to produce kerfs in a mine wall in planes parallel to each other.

34. In a mining machine, the combination with a shaft, of means for rotating the same, a plurality of cutter-carrying frames, means for lifting and lowering said cutter-carrying frames to adjust the same longitudinally on said shaft, cutters secured in each of said frames for forming kerfs in a mine wall, and wedges also secured in said frames for wedging into said kerfs and breaking down the slabs of material between the same.

35. In a mining machine, the combination with a supporting frame comprising parallel forwardly extending arms of a vertical shaft journaled in bearings at the outer ends of said parallel arms, a plurality of rotary kerf-cutters mounted on said vertical shaft and spaced apart, a vertical screw-threaded rod on said frame, a plurality of additional arms connected between said screw-threaded rod and said vertical shaft, and nuts on said screw-threaded rod for lifting and lowering said additional arms together with the kerf-cutters carried thereby.

36. In a mining machine, the combination with a supporting frame, of a plurality of forwardly extending parallel arms rigidly connected to said frame and each provided with a bearing at its outer end, a vertical shaft journaled in said bearings, a plurality of rotary kerf-cutters splined to said vertical shaft, a plurality of additional arms for supporting said kerf-cutters, a screw-threaded shaft for supporting said additional arms, and nuts on said screw-threaded rod for adjusting the height of said additional arms together with the kerf-cutters carried thereby.

37. In a mining machine, the combination with a supporting frame, of a vertical shaft journaled in bearings rigidly connected to said supporting frame, a kerf-cutter splined to said shaft to rotate therewith but free to move up or down thereon, means for rotating said shaft to rotate said kerf-cutter, a vertical screw-threaded rod on said supporting frame, a horizontal arm connected between said screw-threaded rod and said kerf-cutter to support the latter, a nut on said screw-threaded rod for lifting and lowering said arm to adjust the vertical position of said kerf-cutter, and means on said screw-threaded rod to lock said arm in adjusted position.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 21st day of June A. D. 1910.

EDMUND C. MORGAN.

Witnesses:
CHARLES W. MILLER,
G. E. MCKINLEY.