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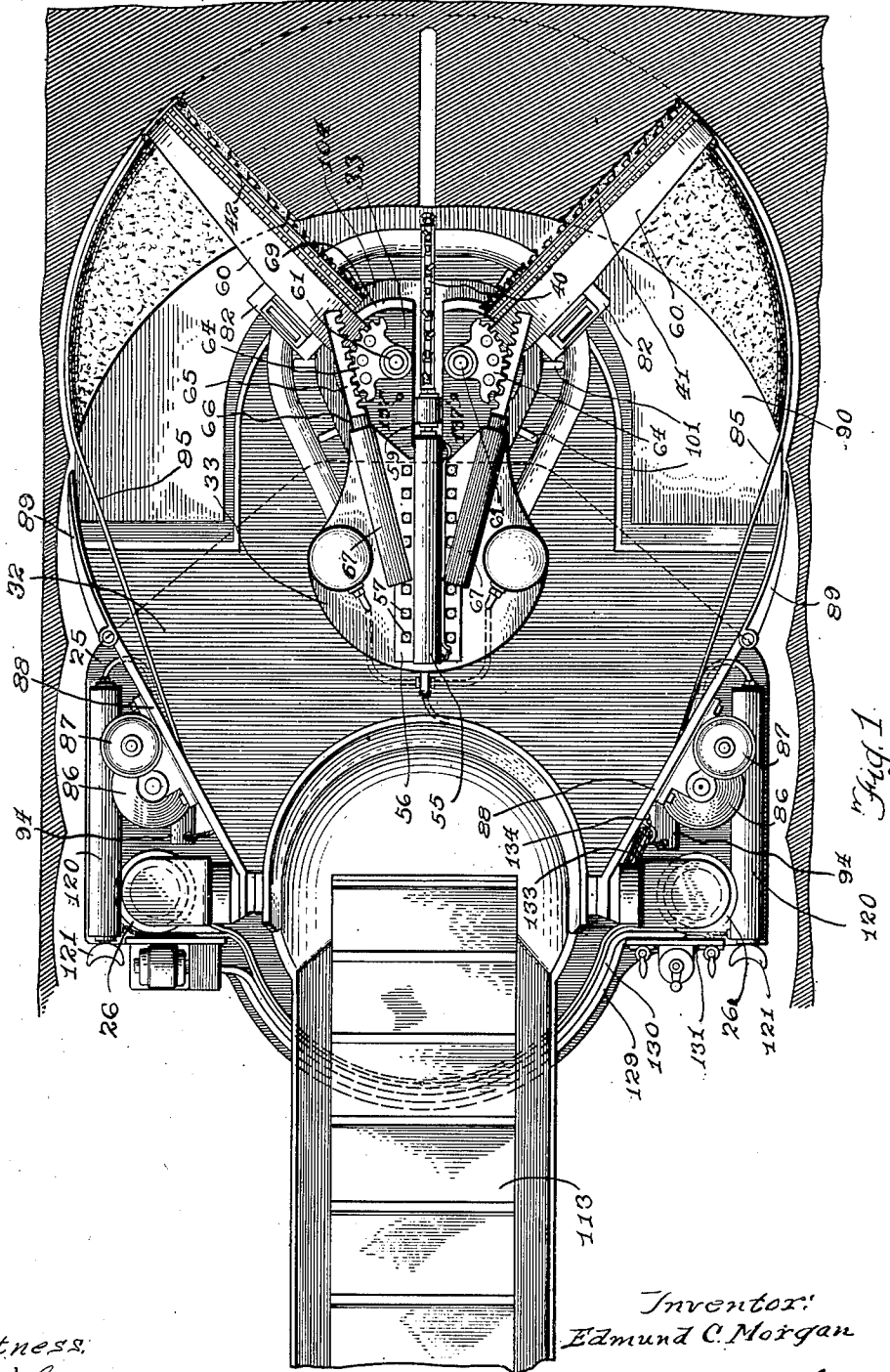
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E. C. MORGAN

MINING MACHINE

Filed Sept. 21, 1916

8 Sheets-Sheet 1



Witness:

L. B. Graham

Inventor:
Edmund C. Morgan

By Brown, Nissen & Sprinkle

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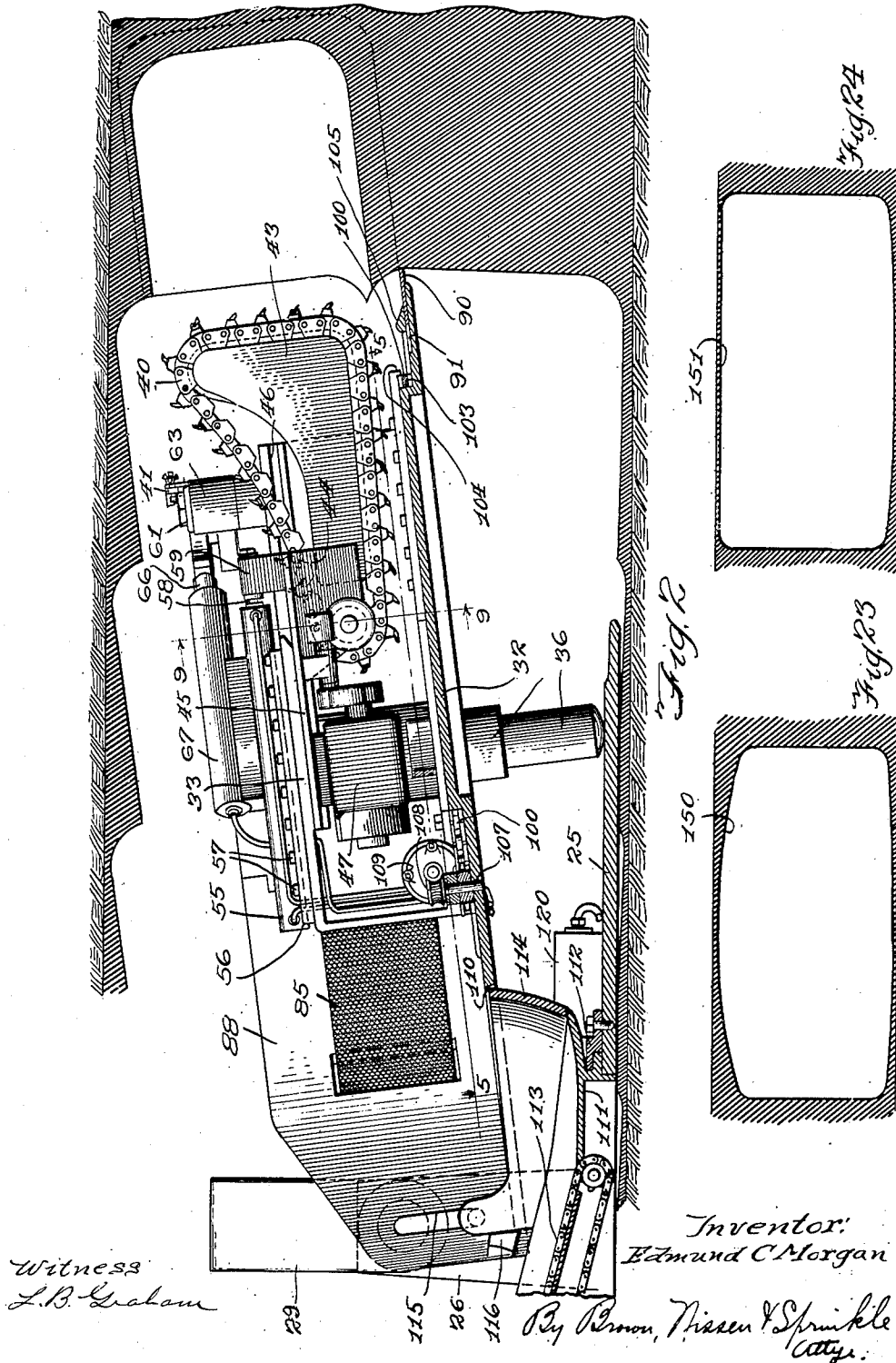
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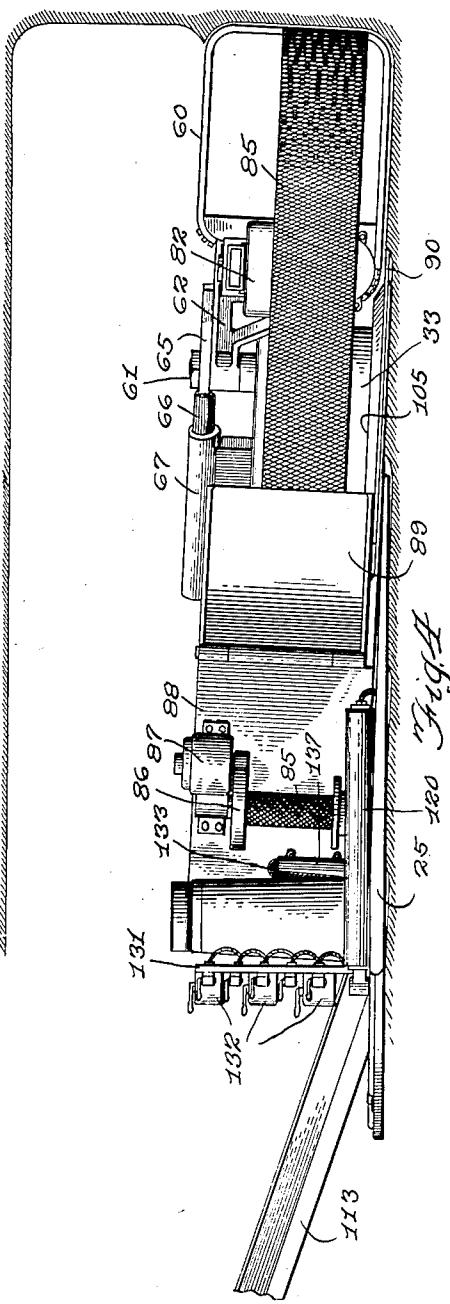
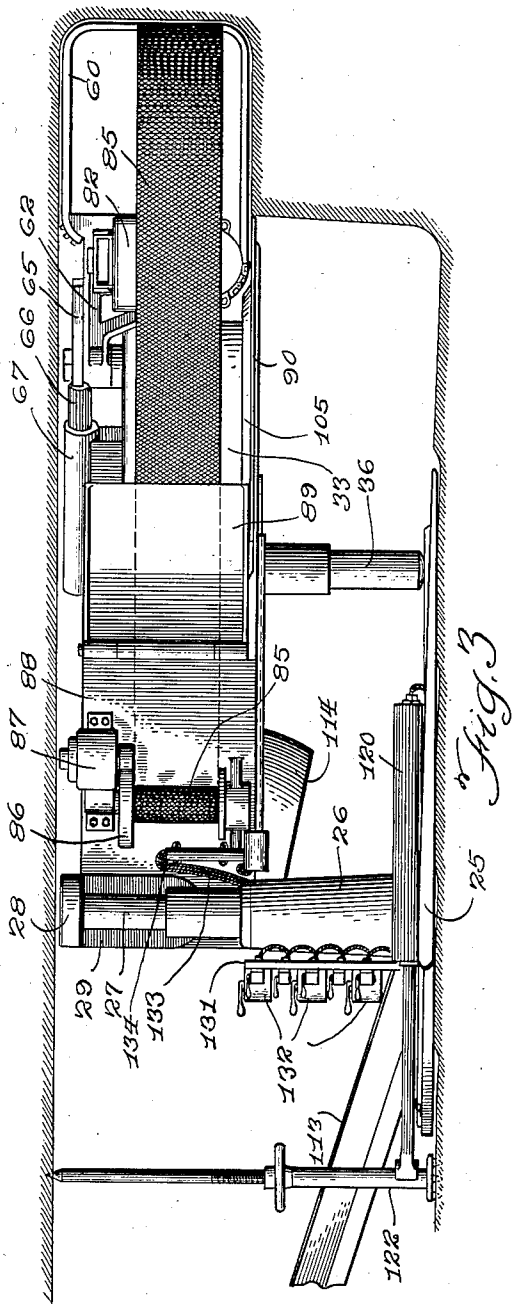
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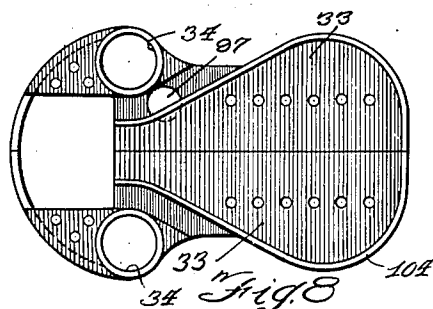
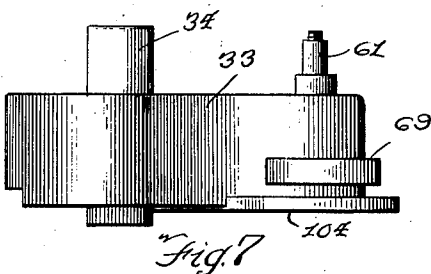
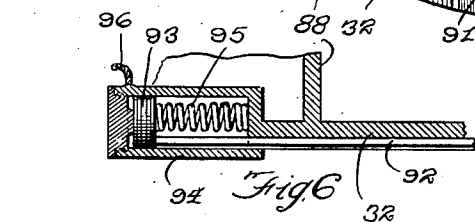
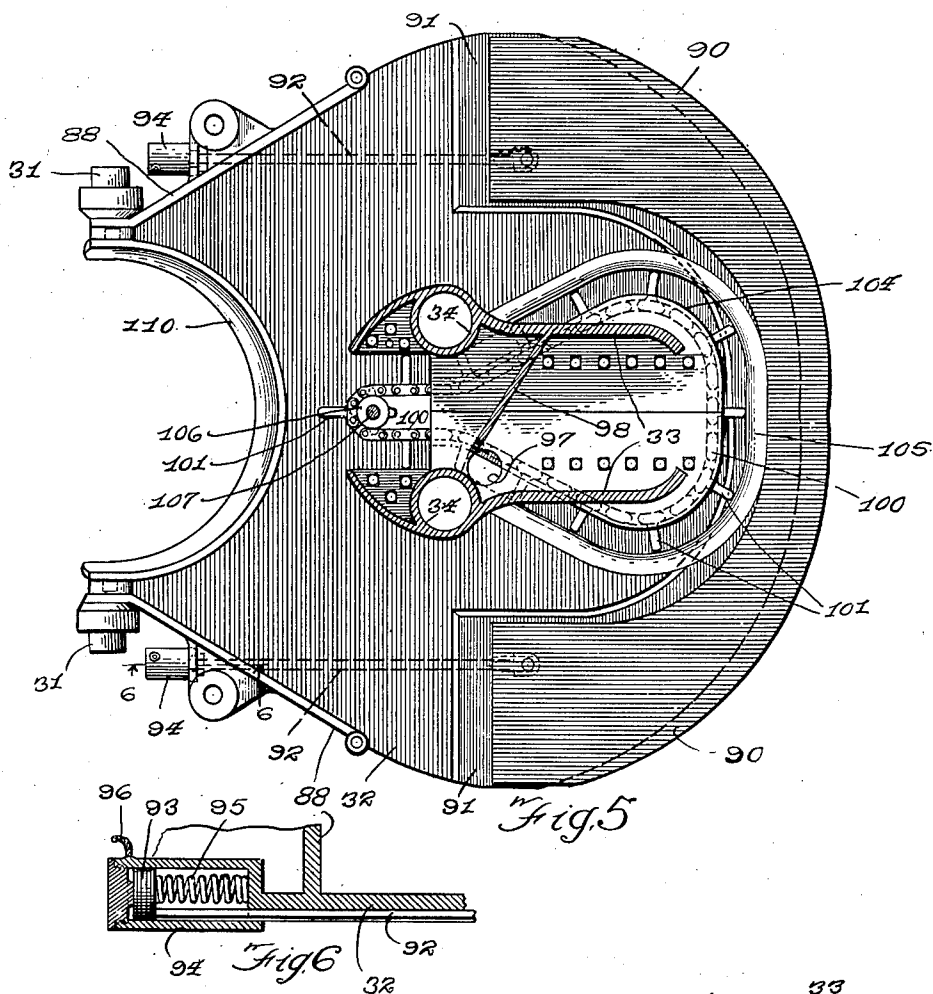
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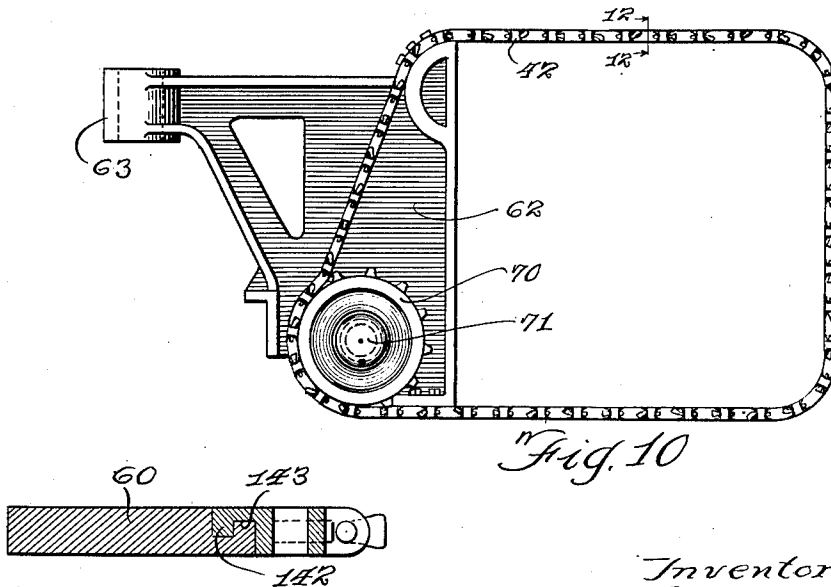
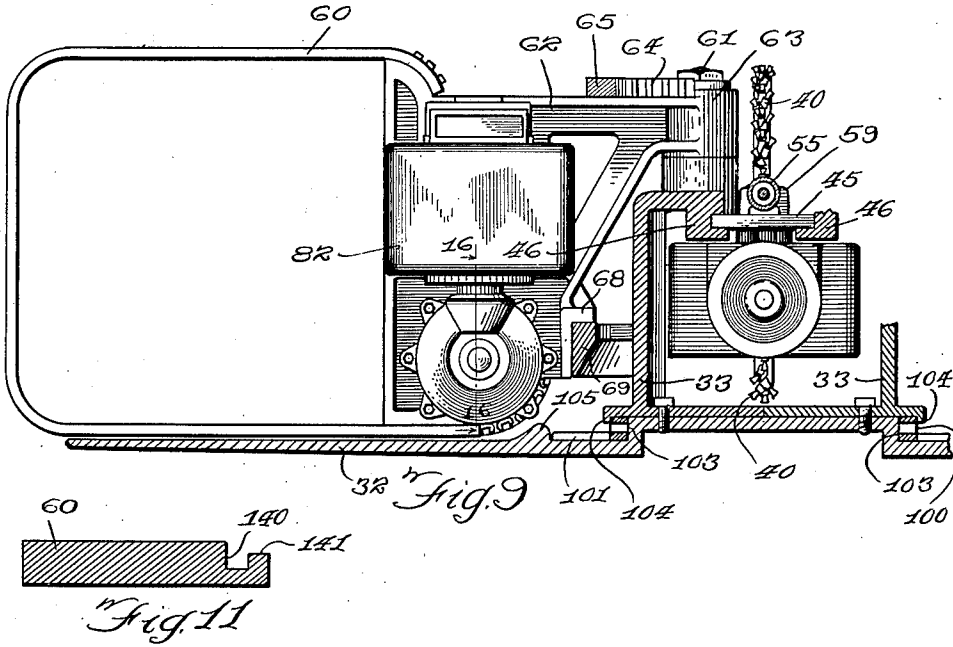
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Witness
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Fig. 12

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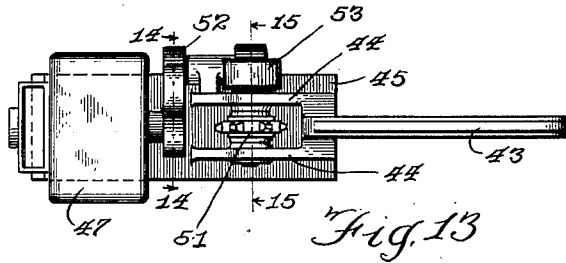


Fig. 13

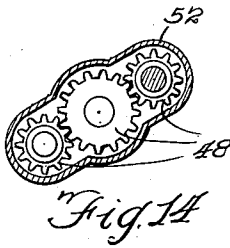


Fig. 14

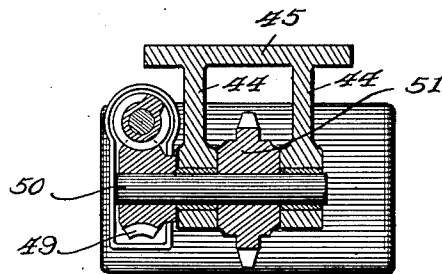


Fig. 15

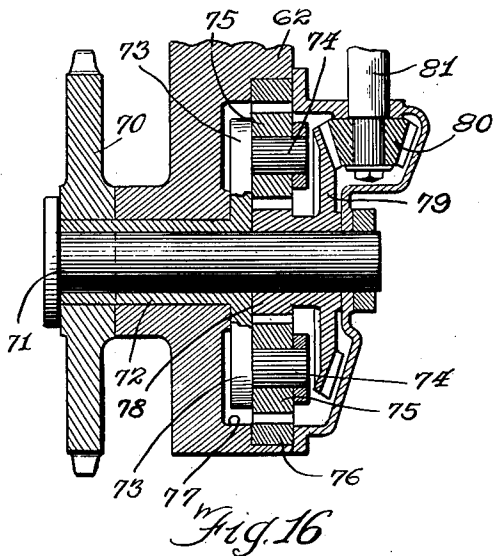


Fig. 16

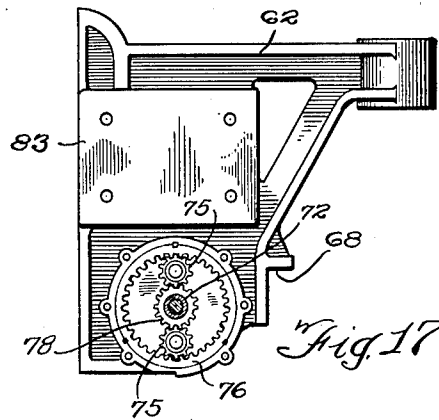


Fig. 17

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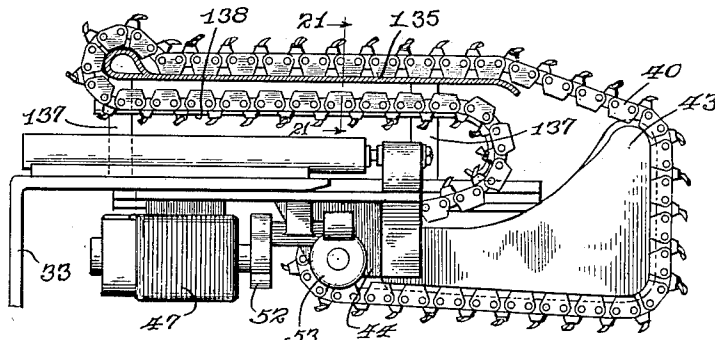


Fig. 18

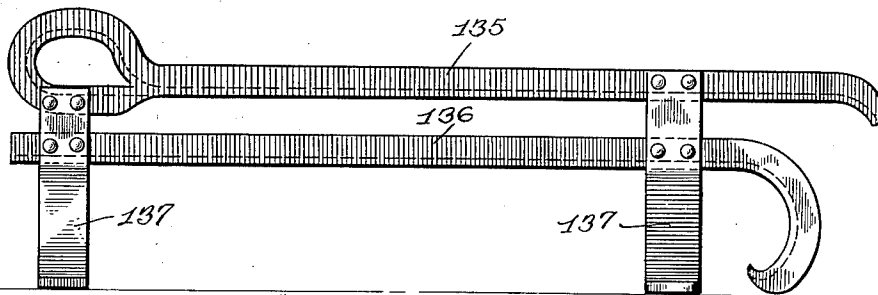


Fig. 19

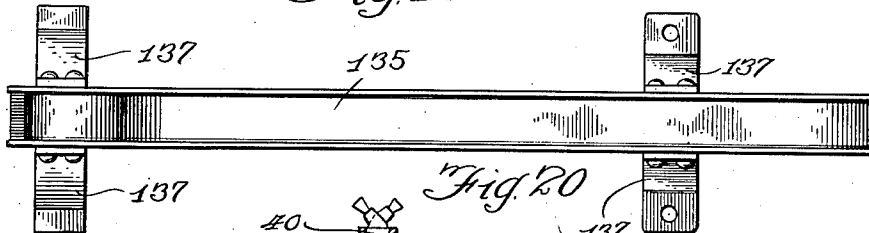


Fig. 20

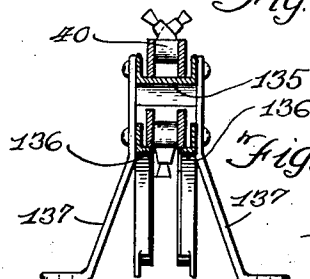


Fig. 21

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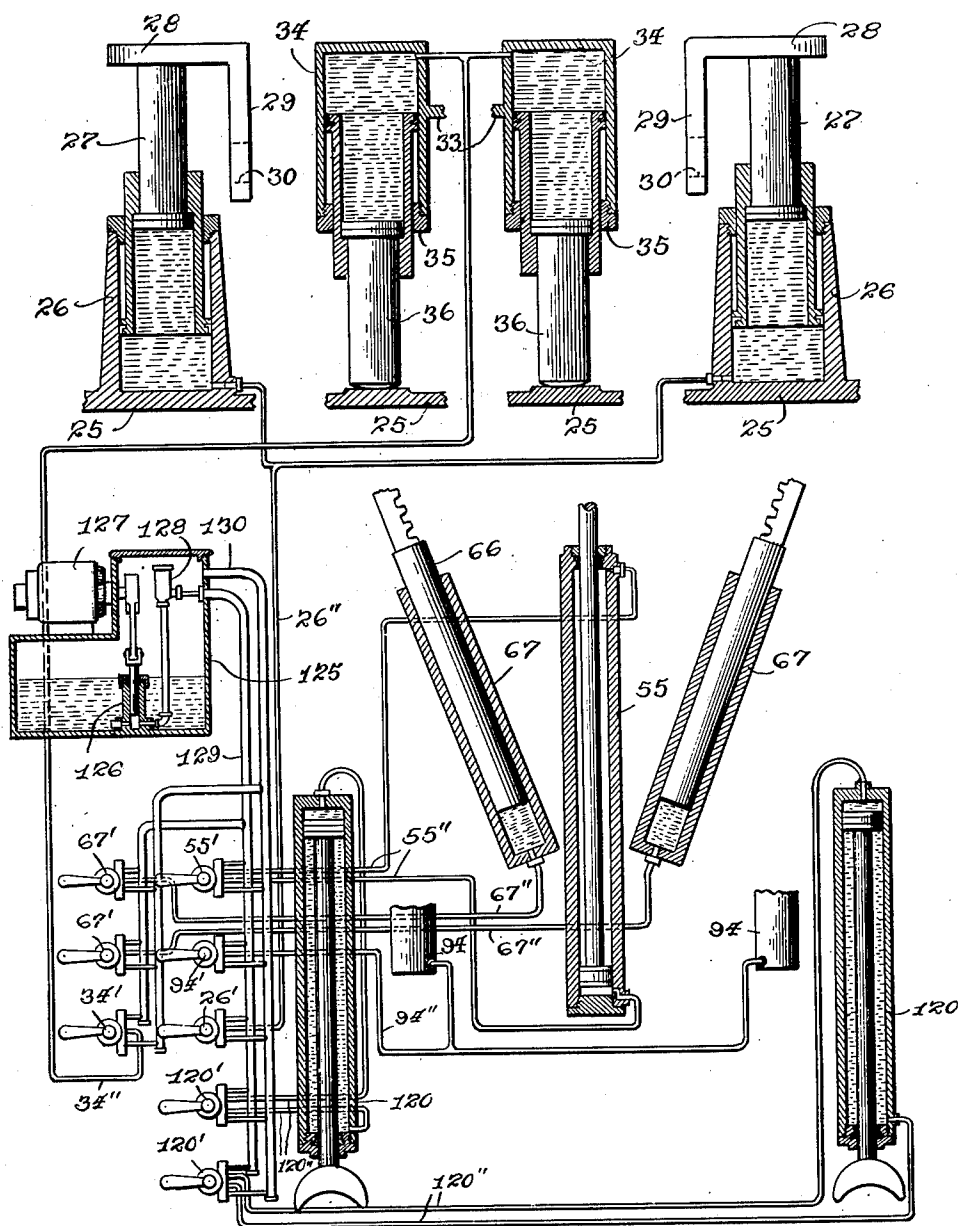


Fig. 22.

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UNITED STATES PATENT OFFICE.

EDMUND C. MORGAN, OF CHICAGO, ILLINOIS; OLIVE EUGENIE MORGAN EXECUTRIX
OF SAID EDMUND C. MORGAN, DECEASED.

MINING MACHINE.

Application filed September 21, 1916. Serial No. 121,359.

To all whom it may concern:

Be it known that I, EDMUND C. MORGAN, a citizen of the United States, residing at Chicago, 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 machines for mining coal and similar material, and has for its object the provision of a machine of the character named which shall be of improved construction and more efficient in operation than similar machines previously manufactured. The invention is exemplified in the combination and arrangement of the parts shown in the accompanying drawings and described in the following specification and it is more particularly pointed out in the appended claims:

In the drawings—

Fig. 1 is a horizontal sectional view through a portion of a mine chamber showing a machine embodying the present invention in top plan view.

Fig. 2 is a vertical sectional view through the mine chamber shown in Fig. 1, the section being taken on the center line of the mining machine.

Fig. 3 is a vertical sectional view through a mine chamber showing the mining machine in side elevation.

Fig. 4 is a view similar to Fig. 3, representing the mining machine in lowered position.

Fig. 5 is a fragmentary horizontal sectional view on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary sectional view on line 6—6 of Fig. 5.

Fig. 7 is a side elevation of a portion of the supporting frame-work for the severing mechanism.

Fig. 8 is a bottom plan view of the frame portion shown in Fig. 7.

Fig. 9 is a vertical sectional view approximately on line 9—9 of Fig. 2 but with the movable motor in its forward position.

Fig. 10 is a front elevation of one of the loop cutters.

Fig. 11 is a cross sectional view of a supporting bar for the chain cutter.

Fig. 12 is a transverse sectional view on line 12—12 of Fig. 10.

Fig. 13 is a top plan view of a movable frame and motor for one of the cutter chains.

Fig. 14 is a fragmentary sectional view on line 14—14 of Fig. 13.

Fig. 15 is a fragmentary sectional view on line 15—15 of Fig. 13.

Fig. 16 is a fragmentary sectional view on line 16—16 of Fig. 9.

Fig. 17 is a detail of one of the swinging brackets for supporting the loop cutter.

Fig. 18 is a fragmentary elevational view showing a supplementary frame in position for changing one of the chain cutters.

Figs. 19 and 20 are a side elevation and top plan view, respectively, of a supplementary chain replacing frame.

Fig. 21 is a sectional view on line 21—21 of Fig. 18.

Fig. 22 is a diagrammatic view showing the hydraulic system for operating various parts of the machine, and

Figs. 23 and 24 are diagrammatic views showing different cross sectional shapes of mine chambers formed by the mining machine illustrated in the other figures.

In the drawings, the numeral 25 designates a supporting base plate on which are mounted the various parts of a mining machine embodying the present invention. Extending upwardly from opposite sides of the rear portion of the base plate are two hydraulic cylinders 26 which, as shown in Fig. 22, are provided with extensible plungers 27, the heads 28 of which carry downwardly extending bearing members 29. The bearing members 29 are provided with openings 30 in which rest the pivotal journals 31 of a cutter head base plate 32. As shown in Fig. 5 the cutter head base plate 32 has rigidly bolted to its upper surface a two-part box shaped casting or supporting frame member 33; illustrated also in Figs. 7, 8 and 9. Each section of the box-shaped frame member 33, as shown in Figs. 5, 7, 8 and 22, carries a hollow cylinder 34 which is closed at its upper end and which is provided with a threaded stuffing ring 35 at its lower end. Telescopic pistons 36 cooperate with the cylinders 34 and bear at their lower ends upon the base plate 25. It is evident that operation of the hydraulic jack thus formed will raise or lower the box frame 33 and the operating parts mounted thereon. The rear-end of the cutter head base plate 32 may be similarly adjusted by operation of the hydraulic jacks 26. By combined action of the two sets of jacks

the cutter head may be adjusted vertically in the mine chamber with the cutter head base plate in a horizontal plane, or the head may be tilted to various angles, as indicated in Figs. 2, 3 and 4.

Mounted on the box frame 33 are three separate chain cutters 40, 41 and 42 as shown in Fig. 1. The cutter chain 40 is carried on a frame 43 which has a forward and backward sliding movement on the vertical central plane of the cutter head. The frame 43 is supported at its rear end by a pair of bracket members 44 which depend from a horizontal plate 45. The plate 45 is mounted to slide between ways 46 formed on the upper inner portions of the side members of the box frame 33, as shown in Figs. 2 and 9. Also supported by and depending from the plate 45 is a motor 47 connected by gears 48 and worm wheel 49 with a cross shaft 50 which carries a sprocket wheel 51, as shown in Figs. 14 and 15. The gears 48 are enclosed in a casing 52 (Fig. 13) and the worm wheel 49 is enclosed in a casing 53. The chain cutter 40, as shown in Fig. 2, slides on the frame 43 and passes around the sprocket 51 and is thus driven by the motor 47 which is mounted to slide forwardly and backwardly along the central plane in the machine together with the chain 40 and its supporting frame. Longitudinal reciprocation of the cutting mechanism thus formed is produced by a hydraulic cylinder 55 carried on a plate 56 secured by bolts 57 to the upper portion of the box frame 33. The piston rod 58 of the cylinder 55 connects with an upwardly extending lug 59 formed integral with the upper portion of the sliding plate 45, as shown in Figs. 1 and 2. It is evident that movement of the piston rod 58 in the cylinder 55 will reciprocate the cutter chain 40 in the longitudinal direction of the mining machine.

The cutter chains 41 and 42 are similar in construction and are carried by loop-shaped cutter frames 60 mounted for horizontal pivotal movement about upright axes 61 at opposite sides of the box frame 33. Since these two cutters are substantially alike in construction a description of one will suffice for both. The loop-shaped frame 60 is secured to the outer side of a swinging bracket 62 provided with a bearing 63 mounted on the journal 61 about which the loop-shaped cutter swings. A gear segment 64 is secured to the bracket 63 adjacent the pivotal supports 61 and meshes with a rack 65 provided by a plunger 66 fitting within a hydraulic cylinder 67 carried by the plate 56. The reciprocation of the plunger 66 in the cylinder 67 operates the gear segments 64 to swing the cutter 42 about the upright axis 61 to feed the cutter chain into the work. The bracket 62 is provided with

a shoulder 68 which bears upon an arcuate-shaped slideway 69 secured to the front portion of the box frame 33, as shown in Fig. 9. This slideway supports the bracket 62 and the loop core cutter as they are swung about the axis 61. The chain cutter 42, as shown in Fig. 10, is driven by a sprocket wheel 70 journaled for rotation on a shaft 71 in the bracket 62. As shown in Figs. 16 and 17 the sprocket 70 is driven by a sleeve 72 which is journaled in the bracket 62 and which has connected therewith on the side of the bracket opposite the sprocket wheel 70 a pair of arms 73 carrying studs 74 on which are mounted pinions 75. The pinions 75 mesh with a circular rack or internal gear 76 secured to the periphery of a recess 77 in the side of the bracket 62. The pinions 75 also mesh with the gear 78 journaled on the shaft 71 and having a beveled gear 79 formed integral therewith. The beveled gear 79 meshes with a beveled pinion 80 secured to the upright armature shaft 81 of a motor 82 which is bolted to a plate 83 (Fig. 17) carried by the side of the bracket 62.

By reason of this arrangement the motor 82 will effect transmission of driving power to the cutter chain 62 through the sprocket wheel 70; although the speed of the motor armature shaft is reduced the cutter chain will be driven at the requisite speed for efficient cutting.

The cutter frames 60 are each fed in one direction only; that is, in the forward or cutting direction by the rack 65. The return motion is produced by tension on belts or aprons 85 which are secured to the rear sides of upright portions of the frame 60 and are drawn into the kerf formed by the loop cutters. The rear ends of the aprons 85 are wound on reels 86 operated by motors 87 carried on upright side plates 88 extending upwardly from the outer edges of the rear portion of the cutter head base plate 32, as shown in Figs. 1 to 4 inclusive. It is apparent that tension on the apron 85 produced by the motors 87 will draw the cutter frames 60 backwardly carrying the material severed by the loop cutters backwardly with the cutter frames on to the upper surface of the cutter head base plate 32. The upright side walls 88 are provided with pivoted extensions 89 for preventing escape of the severed material and which may be swung inwardly a short distance to permit free movement of the machine into and out of the mining chamber.

The base plate 32 is provided with a sliding extension plate 90 for the purpose of forming a close contact between the forward edge of the plate and the wall of a mine chamber from which the material is being severed. This is desirable in order that there will be no opening left between the

plate and the wall of the chamber through which severed material may fall as it is being drawn backwardly by the belts 85 on to the cutter head base plate. The extension plate 90 is provided with a suitable depression 91 in the upper surface of the plate 32 in which it slides, the rear edge of the depression being beveled, as shown in Figs. 2 and 5, in order that no particles of material may be caught between the rear edge of the plate 90 and the shoulder formed by the depression 91. The plate 90 is connected by rods 92 to pistons 93 (Fig. 6) mounted to slide in cylinders 94 secured to the rear portion of the base plate 32. The plate 90 is normally drawn rearwardly by coil springs 95 within the cylinders 94 which may be moved forwardly against the tension of these springs by fluid introduced into the cylinders through hydraulic connections 96.

As shown in Figs. 5 and 8 the base plate of the box frame 33 has an opening 97 extending through it and a guard wall 98 extends angularly across the base plate from one side of the box frame to a point adjacent the opening 97. As cuttings are deposited by the chain 40 in front of the guard wall 98 they will be gradually worked rearwardly and guided by the guard wall to the opening 97 through which they will fall by gravity on to the upper surface of the cutter head base plate 32. In order to move the cuttings formed by the cutter chains rearwardly to a position from which they may be conveyed away, a conveyor chain 100 having flights 101 is mounted to move over the upper surface of a portion of the base plate 32 adjacent the discharge end of the cutter chains 40, 41 and 42. The chain 100 is guided, as shown in Figs. 2 and 9, by a shoulder 103 formed on the base plate 32 and by an overhanging flange 104 formed on the lower surface of the box frame 33. An upwardly extending ridge 105 having its outer edge gradually sloping extends around the outer periphery of the path of movement of the flights 101 to prevent escape of material as it is carried by the movement of these flights. As shown in Fig. 2, a portion of the ridge 105 is spaced slightly from the base plate 32 to permit movement of the extension plate 90 beneath it. The chain 100 is driven by a sprocket wheel 106 carried on an upright shaft 107 and connected by worm gearing 108 with a motor 109 mounted on the base plate 33.

As shown best in Figs. 1, 2 and 5, the cutter head base plate 32 is cut away at its rear portion in the shape of an arc of a circle, as indicated at 110, and through the opening thus formed the material escapes as it is drawn backwardly by the aprons 85. The material thus discharged is received in a hopper 111 held by a flanged plate 112 to the base plate 25 and free to rotate thereon

about an upright axis. An endless conveyor belt 113 is arranged to carry material from the hopper 111 rearwardly to a position in which it may be discharged into a car or other transporting medium. A guard plate 114 is provided for bridging the opening between the cutter head base plate 32 and the upper edge of the hopper 111. This plate 114 is pivoted in slots 115 in the side plates 88 and normally rests in the position shown in Fig. 2, it being held from further downward pivotal movement by stops 116. It is evident that the entire plate 114 may move upwardly between the side walls 88 when the cutter head frame is moved to the lowered position indicated in Fig. 4. When the cutter head frame is in this position material cannot be discharged from the base plate 32 on to the conveyor 113 but must remain on the base plate until the cutter head is again raised to bring the upper edge of the plate 114 in alignment with the upper surface of the plate 32.

For the purpose of advancing the machine forwardly in the mine a pair of hydraulic cylinders 120 is secured to the base plate 25, one at each side thereof, the piston rods of which are provided with heads 121 arranged to bear against jacks 122 which may be secured between the floor and roof of the mine chamber, as shown in Fig. 3. The hydraulic motors 120 are independently operable so that the entire machine may be moved forwardly in a straight line or its position may be shifted in the mine chamber by operating one of the cylinders at a time.

The means for operating the various hydraulic cylinders by which the different parts of a machine are moved will best be understood from Fig. 22. A supply chamber 125 is provided for the operating fluid and within this chamber a pump 126 is mounted which is driven by an electric motor 127. Liquid is forced by the pump 126 through a pressure regulator or safety valve 128 into a supply pipe 129. A return pipe 130 is provided for conducting the liquid from the various hydraulic cylinders back into the supply chamber 125. The various cylinders may be connected with either the supply pipe 129 or the return pipe 130 by suitable valves, there being a valve provided for controlling each of the cylinders. For instance, the valve 67' is connected by a pipe 67'' with the cylinder 67 and by means of this pipe and valve the interior of the cylinder may be connected at the will of the operator either with the supply pipe 129 or with the exhaust pipe 130. When the cylinder is connected with the supply pipe it is evident that the plunger 66 will be forced outwardly to feed the cutter frame 60 forwardly through the material to be severed. The speed of the feeding movement may be controlled by the amount the

valve 67' is opened. After the cut is completed the valve is reversed to connect the cylinder with the exhaust pipe 130, thus leaving the plunger 66 free to be moved backwardly by tension on the belt 85. In a similar manner the cylinders 34 may be simultaneously raised by opening the valve 34' and may be held in their adjusted positions when the valve 34' is set to close the pipe 34''. The cylinders may also be lowered by setting the valve to connect the cylinder 34 with the exhaust pipe 130. The cylinders 26 are similarly controlled by valve 26' and the cylinders 94 by valve 94'. The cylinder 55 and the cylinders 120 are arranged for positive movement in both directions and hence the valves 120' and 55' must be arranged for alternatively connecting opposite ends of their corresponding cylinders with the supply and exhaust pipes respectively. These valves are so arranged that the pipes leading to both ends of the cylinders may be simultaneously closed or may be connected with either the supply or the exhaust pipes, the arrangement being such that when one is connected with the supply pipe the other is simultaneously connected with the exhaust pipe. The valves for controlling the various hydraulic cylinders are all conveniently located on an upright plate or board 131, as shown in Figs. 1, 3 and 4. This board also carries the controllers 132 for the various electric motors used in operating the machine. The conduits connecting the valves on the board 131 with the cylinders mounted on the cutter head frame are carried in a bundle 133 to a duct 134 secured to the wall 88 of the cutter head frame.

From time to time during the operation of a mining machine of this character it is necessary to replace or sharpen the bits of the cutting chain. For this purpose the loop chain cutter frames 60 may be swung rearwardly into position where they are accessible, but it is evident that it is quite difficult to reach the chain 40. In order, therefore, that this chain may be removed and a duplicate chain substituted having fresh cutting bits a device illustrated in Figs. 18 to 21 inclusive, is provided. This device consists of a frame having an upper chain guide 135 and a lower chain guide 136. Supporting legs 137 are provided for the frame which may be placed upon the pins 137' on the upper surface of the box frame 33 in the manner indicated in Fig. 18. In this view the unshaded links represent the old chain to be removed from the frame 43 and the shaded links carried on the guides 135 and 136 representing the chain which is to replace the used chain. As shown in this view two of the links of the used chain are separated and the ends of the chain thus formed are connected with

ends of the chain to be substituted. After this is done the motor 47 is operated to cause the two chains to interchange places after which the old chain is disconnected and removed and the free ends of the new chain connected thus leaving the new chain in position to continue the cutting operation. When the interchange is completed the supplementary chain carrier is removed from the top of the machine and the operation proceeds as before. The structure shown in Figs. 18 to 21, inclusive, is described and claimed in the co-pending application, Serial No. 593,727, filed October 11, 1922, for an improvement in chain cutter renewing mechanism.

In order that the chains 41 and 42 may be readily removed from their guide frames, these frames as shown in Figs. 11 and 12, are provided with notches in which the chains slide, the notches being of such shape that the chains when loosened may be moved bodily in an outward direction away from the cutter frame bars without the removal of any retaining strips or similar devices. The cutter frame bars 60 are provided with notches 140 and peripheral flanges 141 which cooperate respectively with flanges 142 and notches 143 formed in the links of the cutter chains. It is clear that when the chains are stretched about their respective frames the tension in the chains will prevent them from moving outwardly away from their guide frames, but when it is desired to remove the chains they may be sufficiently slackened either by an adjustment in the frames or by disconnecting the links of the chains so that the chains will move readily in an outward direction from the frames a sufficient amount to permit the removal of the chains from the frames.

Briefly, the operation of the machine is as follows: The plate 25 is positioned on the floor of a mine chamber and the valves controlling the proper hydraulic cylinders are operated to raise the forward end of the cutter head frame into position to make the uppermost cut. The frame may be inclined, as shown in Fig. 2, or may be held in a horizontal position, as shown in Fig. 3. If the frame is inclined it is evident that the cuts made by the loop core cutters 41 and 42 will be higher at the central portion of the chamber than at the sides and that the roof of the chamber will be formed in the shape of an arch, as shown at 150 in Fig. 23. If the cutter head is held in a horizontal position, as shown in Fig. 3, the loop core cutters will operate on the same level during their entire movement and the roof of the chamber will be flat, as indicated at 151 in Fig. 24. Under some conditions the arch-shaped roof 150 is more desirable as it forms a better support for the material above the chamber, but where such support is not

necessary the flat roof 151 may be preferred as the material may be more completely removed when this shape of roof is formed.

In making the cut the chain 40 is fed forwardly by the hydraulic cylinder 55 while the motor 47 operates the chain to form an upright central kerf. Either while this kerf is being formed or subsequently the loop core cutters 41 and 42 are swung about their axes by the hydraulic cylinder 67, their chains being driven by the motors 82 carried upon the loop cutter frames. In this way a crescent-shaped cut is made from the base of a mine wall, the material severed being divided into two sections by the upright kerf formed by the cutter 40. During the forward movement of the loop core cutters the aprons 85 are left free to be drawn into the kerfs which they form. The cuttings formed by the cutter chains are carried backwardly and deposited upon the flights of the conveyor chain 100 which discharges them at the rear of the base plate 32 from which they are gradually fed into the hopper 111. After the half crescent-shaped sections of material have been entirely disconnected the aprons 85 are wound upon their respective drums and the loop core cutters drawn backwardly, thereby carrying the severed material with them and depositing it upon the rear portion of the plate 32. The material brought backwardly after each cut forces the material already upon the plate into the hopper 111 from whence it is carried by the conveyor 113 and loaded into any convenient form of transports. Ordinarily the contact of the aprons 85 and the loop cutter frame 60 with the severed material will be sufficient to cause the material to move backwardly with these parts. In order to insure close contact between the mine wall and the plate 62 the extension plate 90 is forced outwardly by the hydraulic motors 94 into firm contact with the mine wall before the cutting operation is begun. During the cutting operation the extension plate is held in this position by the liquid in the cylinders, the control valves being set to retain the liquid in the cylinders until the cutting operation is completed.

After the upper cut has been made the cutter head is lowered to rest on the bottom of the mine chamber and the operation is repeated to form the lower cut. It will be apparent, however, that the severed material cannot be discharged in the hopper 111 while the cutter head is in its lowermost position because of the fact that the guide plate 114 will extend upwardly through the opening 110 and interfere with movement of material over the plate 32 into the hopper. It will be necessary, therefore, after the severed material has been drawn backwardly onto the plate 32 to elevate the cutter head

before the material thereon is discharged into the hopper. The machine is moved forwardly into the mine chamber whenever necessary by operation of the hydraulic cylinders 120.

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

I claim:

1. A mining machine comprising a supporting frame, loop-shaped core-cutters each having an unobstructed core-opening therethrough, means for operating said cutters to sever a section of material in a mine vein, and means mounted on said supporting frame in position for dividing the severed section of material into separate parts.

2. A mining machine comprising supporting framework, means mounted on said framework for cutting a single core section in a mine vein, and additional cutting means separate from said first-named cutting means but in position on said framework for transversely cutting said section into separate parts.

3. A mining machine comprising supporting framework, of a loop core-cutter having an unobstructed core-opening therethrough and mounted on said framework in a position to cut a horizontal core of material in a mine vein from one side of said framework toward the longitudinal axis thereof, and additional cutting means mounted on said framework in position to cut an upright kerf to transversely sever the cut core into separate parts.

4. A mining machine comprising a supporting frame, a plurality of loop core-cutters each having an unobstructed core-opening therethrough and mounted on said frame in position to cut a core section in a mine vein, and means also mounted on said frame in position for transversely severing said section into separate parts, and means for operating said cutting means and said transverse severing means to dislodge from the mine vein a core section divided into separate parts.

5. A mining machine comprising a supporting frame, a pair of loop core-cutters each having an unobstructed core-opening therethrough and each mounted on said frame for lateral swinging movement relatively thereto, means for operating said cutters to cut a core section in a mine vein adjacent said frame, and means also mounted on said frame in position to transversely sever the core section into separate parts.

6. In a mining machine, the combination with a supporting frame, of a pair of loop

- chain core-cutters each having an unobstructed core-opening therethrough and mounted for pivotal movement about separate axes spaced from one another, and means for operating said cutters including feeding movement thereof about said axes simultaneously and toward each other to cause each to cut a core section in a mine wall.
7. A mining machine comprising a supporting frame, a pair of loop cutters mounted on said frame for pivotal movement about spaced upright axes, means for operating said cutters including the feed thereof toward each other about said axes, and a separate cutter mounted on said frame in position for severing the material disconnected by said loop cutters.
8. A mining machine comprising a supporting frame, a pair of loop core-cutters mounted on said frame and each having an unobstructed core-opening therethrough, means for operating said cutters including pivotal movement thereof relatively to said frame to sever a section of material from the mine vein, an additional cutter mounted on said frame in position for a feeding path of travel between said loop core-cutters, and means for operating said additional cutter to divide the core cut by said loop core-cutters.
9. In a mining machine, a pair of loop cutters mounted for pivotal movement about spaced upright axes, and a third cutter movable in a vertical plane between said axes.
10. In a mining machine, the combination with a supporting frame, of means mounted thereon in position for cutting a core section in a mine vein provided with a vertical kerf for division of the core section, and means mounted on said frame for moving the separate portions of said section from the mine wall along separate paths toward loading position.
11. In a mining machine, the combination with a supporting frame, of means for cutting a core section in a mine vein, operator-controlled power-operated mechanism mounted on said supporting frame in cooperative relation with said cutting means for dividing the cut core section, and means for moving separate portions of the cut section away from one another and toward loading position.
12. In a mining machine, the combination with a supporting frame, of means mounted thereon for cutting a core section in a body of material, mechanism mounted on said supporting frame in cooperative relation with said cutting means for dividing the core section into substantially half portions, and means for engaging such half portions and moving them oppositely over different paths toward loading position.
13. In a mining machine, the combination with a supporting frame, of a double core-cutter mounted on said frame in position for movement from the end of the core to the center thereof, means for operating said double core-cutter to cut a core section in a mine vein, means mounted on said supporting frame in position to act on the center of said core to divide the same approximately in halves, and means mounted on said frame for moving the respective halves from their intermediate positions toward loading position along opposite sides of said supporting frame.
14. In a mining machine, the combination with a supporting frame, of means mounted thereon in position to cut a crescent-shaped core-section from a mine vein adjacent said frame, means mounted on said frame in position to act transversely of said core-section to divide the same into two parts while still retaining its original position in the mine vein, and means mounted on said frame in position to take the two parts of the core-section from the positions assumed thereby after being completely cut out from the mine vein toward loading position.
15. In a mining machine, the combination with a supporting frame, of a pair of loop chain core-cutters each having an unobstructed core-opening therethrough and mounted on said frame for pivotal movement relatively thereto on upright axes, means for operating said loop chain core-cutters including swinging feeding movement thereof about said upright axes toward one another to cut a core-section extending through said unobstructed core-openings in opposite directions, means mounted on said frame between said core-cutters in position to cut the core-section in two, and means mounted on said frame to act on the cut core-sections in positions assumed thereby after being completely cut out from the mine vein and taking the respective portions of said core along opposite sides of the frame toward loading position.
16. In a mining machine, a pair of loop cutters mounted for pivotal movement about spaced upright axes, means for swinging said cutters toward one another to cause each of said cutters to disconnect a portion of a crescent-shaped core section from a mine vein, an upright cutter movable between said axes to separate the portions of said core section, and means for moving said portions away from one another and from their severed position toward loading position.
17. In a mining machine, a pair of loop chain core cutters each mounted for pivotal movement on its own separate axis. and

means for operating said core cutters including simultaneous feeding movements toward each other to cut core sections in a mine wall.

18. In a mining machine, a pair of loop chain cutters, means for swinging said cutters about upright axes toward and away from one another, and motors carried by said cutters and movable therewith for operating the chains thereof.

19. In a mining machine, the combination with a supporting frame, of a loop chain core-cutter comprising a cutter chain and a frame for supporting the same in loop formation with an unobstructed core-opening therethrough, a motor carried by said cutter frame and movable therewith for driving said cutter chain, and hydraulic power mechanism for feeding said cutter chain by swinging said cutter frame about an upright axis and locking said cutter frame against retrograde movement.

20. In a mining machine, the combination with a supporting frame, of a loop chain core cutter comprising a cutter chain and a cutter frame having an unobstructed core-opening therethrough, a gear segment attached to said cutter frame for rotation therewith about an upright axis, a rack in mesh with said gear segment, a hydraulic plunger for operating said rack to effect forward feeding movement of said cutter chain, and mechanism for preventing retrograde movement of said plunger to lock the cutter chain in the forward position to which it has been fed and prevent retrograde movement of said cutter chain.

21. In a mining machine, the combination with a supporting frame, of a pair of loop chain core-cutters mounted thereon for swinging feeding movements on spaced-apart axes and each comprising a chain cutter and a frame for supporting said chain in loop formation, means for operating said cutters including feeding movement thereof by swinging the said cutter frames toward one another to sever a core section from a mine vein of material readily broken, and two aprons one attached to one of said cutter frames and the other attached to the other of said cutter frames, and means for pulling said aprons to break the core material in two and move the respective portions rearwardly toward loading position.

22. In a mining machine, a pair of loop chain cutters mounted for pivotal movement toward and away from one another about upright axes, means for swinging said cutters toward one another to cause said cutters to co-operate to sever a core section from a mine vein, means for severing from one another the portions of said core sections severed by said cutters, and means for moving each of said cutters, together with the portion of material severed thereby, rear-

wardly to move said material away from the severed position toward loading position.

23. In a mining machine, a cutter head, a pair of loop cutters mounted for pivotal movement about upright axes on said head, means for swinging said cutters toward one another to sever a section of material from a mine vein, a third cutter for dividing into two sections the material severed from said loop cutters, aprons secured to each of said loop cutters and arranged to move therewith into the kerf formed thereby, and means for exerting tension on said aprons to draw said loop cutters backward together with the material severed thereby to move the disconnected portions of said material over separate paths from its native position toward loading position.

24. A mining machine comprising a supporting frame, two chain core-cutters mounted on said frame and each comprising a cutter frame and having an unobstructed core-opening therethrough and an endless chain-cutter mounted thereon, means for operating said chain core-cutters including feeding movement thereof to cut core sections in continuation of each other to form a single core in a mine wall, and operator-controlled power-operated mechanism mounted on said frame in cooperative relation with said core-cutters to divide the core while on said frame to facilitate the handling thereof.

25. In a mining machine, the combination with a supporting frame, of cutting mechanism, a bracket for supporting said cutting mechanism, an upright pivotal support for said bracket, a rack and pinion for rotating said bracket about said axis to effect feeding movement of said cutting mechanism, a sprocket wheel on one side of said bracket for driving said cutting mechanism, a motor carried by said bracket on the side thereof opposite said sprocket wheel, driving connections between said motor and said sprocket wheel, and means for operating said rack and pinion to effect feeding movement of said cutting mechanism.

26. A mining machine comprising a supporting frame, two cutter frames each having an unobstructed core-opening therethrough and each mounted on said supporting frame for swinging movement toward and away from the other cutter frame, chain cutters one for each of said cutter frames means for driving said chain cutters along said cutter frames, and means for swinging said cutter frames contemporaneously in opposite directions respectively on spaced-apart axes during the driving of said chain cutters to cut arcuate sections of the core in a mine wall in arcuate alignment with each other.

27. In a mining machine, the combination

with a pair of pivotally mounted swinging cutter-frames, each having an unobstructed core-opening therethrough, of endless chains mounted on said cutter-frames and provided with cutting devices for cutting core sections in the face of a mine wall, means for driving said chains, means for swinging said cutter-frames from a diverging position toward a parallel position, and mechanism mounted in position to cut a kerf transversely of the core section when said first-named cutters are in diverging relation.

28. In a mining machine, the combination with a supporting frame, of an elevated slideway thereon, a horizontal plate movable along said slideway, an upright frame suspended from said plate, an endless chain cutter mounted on said upright frame to travel around the periphery thereof while suspended from said plate, means for moving said plate along said slideway to feed said chain cutter into the material to be operated upon, and a motor carried by said plate and movable therewith in position to drive said chain cutter in all of the positions which it assumes relative to said supporting frame while suspended from said plate.

29. In a mining machine, the combination with a supporting frame, of a chain kerf cutter comprising an upright frame and adapted to cut a plane kerf, means for driving said chain cutter with its lower run traveling toward said supporting frame after emerging from the mine wall adjacent said supporting frame, means for feeding said chain cutter rectilinearly along lines in the plane of said upright frame to cut a kerf in the plane of said chain kerf cutter, and a conveyor mounted on said supporting frame in fixed relation thereto adjacent the lower run of said chain cutter in position for removing cuttings delivered to it by said lower run.

30. In a mining machine, the combination with a supporting frame, of a plane kerf cutter comprising an upright frame and a cutter chain traveling about the periphery of said frame in the upright plane of the latter, means for driving said chain cutter in an upright plane to cut an upright plane kerf, means for feeding said kerf cutter along lines in its own plane with a lower run of the cutter chain emerging from the mine wall to deliver cuttings to the said supporting frame adjacent said lower run and a conveyor on said supporting frame in fixed relation thereto with its path of travel adjacent the various positions of the lower run of said chain cutter where it emerges from the mine wall.

31. In a mining machine, the combination with a supporting frame, of a plurality of chain cutters each having a separate pivot and each having relatively upper and lower

runs, means for driving said chain cutters with their lower runs emerging from the mine wall adjacent the forward end of said supporting frame to effect the delivery of cuttings from the mine wall to said supporting frame, and a single conveyor mounted on said supporting frame for movement along the forward portion thereof in position to receive the cuttings from the lower runs of said chain cutters as said lower runs emerge from the mine wall and remove such cuttings toward loading position.

32. In a mining machine, the combination with a supporting frame having an upper forward extension with an unobstructed space beneath the same, of a guideway extending along said upper forward extension, a supplemental frame movable along said guideway, an upright cutter frame carried by said supplemental frame and movable therewith, an endless chain cutter mounted on said upright frame to travel around the periphery thereof, means mounted on said supporting frame for moving said supplemental frame along said guideway to effect a rectilinear feeding movement of said chain cutter to cut an upright plane kerf in the material to be operated upon, and a motor carried by said supplemental frame and movable therewith in position to drive said chain cutter in all the positions which the latter assumes relative to said supporting frame.

33. In a mining machine, the combination with a supporting frame, having an upper forward extension with an unobstructed space beneath the same, of guideways on said upper forward extension, a kerf cutting machine mounted on said extension for feeding movement along said guideways in position to cut an upright plane kerf in a mine vein, a lower forward extension on said supporting frame beneath said unobstructed space, and a conveyor on said lower extension in position to receive cuttings from said kerf cutting machine and convey such cuttings toward loading position.

34. A mining machine comprising a pair of core-cutting devices, a pair of supports one for each of said core-cutting devices, means for initially advancing said core-cutting devices into the work while operating the same and for continuing such movement of said cutting devices in opposite directions respectively and in directions transverse to their initial advance while continuing to operate said cutting devices, and operator-controlled power-operated mechanism mounted in position to act on the core transversely thereof to divide the same to facilitate handling thereof.

35. A mining machine comprising two cutter frames each having an unobstructed core opening therethrough, chain cutters one for each of said cutter frames, separate

pivotal mountings for said cutter frames, and means for contemporaneously swinging said cutter frames on said pivotal mountings in opposite directions while operating both of said chain cutters.

36. A mining machine comprising two cutter-frames each having an unobstructed core-opening therethrough, chain-cutters one for each of said cutter-frames, means for swinging said cutter-frames contemporaneously in opposite directions respectively while operating said chain-cutters respectively, and means mounted on the machine in position to act transversely of the core to divide the same to facilitate handling.

37. A mining machine comprising two cutter frames each having an unobstructed core opening therethrough, means for supporting said cutter frames with their openings opposite each other, chain cutters one for each of said cutter frames, means for swinging said cutter frames contemporaneously in opposite directions respectively, means for operating said chain cutters while thus being fed to entirely sever from a mine wall oppositely extending cores, and a plane kerf-cutter on said frame in position to divide the core.

38. In a mining machine, the combination with a base plate adapted to rest on the floor of a mine chamber, of spaced-apart hydraulic jacks mounted on said base plate in position to engage the roof of a mine chamber and thereby anchor said base plate, core-cutting mechanism, a supporting frame for said core-cutting mechanism, pivotal connections between the rear portion of said supporting frame and said spaced-apart hydraulic jacks, and additional hydraulic mechanism connected between said base plate and an intermediate portion of said supporting frame for adjusting the inclination of said supporting frame on its pivotal connections to said hydraulic jacks and thereby adjust the elevation and inclination of said core-cutting mechanism.

39. In a mining machine, the combination with a base frame, of spaced-apart hydraulic cylinders mounted on said base frame, plungers vertically movable one in each of said cylinders, a supporting frame, a core-cutter mounted on said supporting frame for pivotal movement on an upright axis in advance of one end of said supporting frame, means for pivotally supporting the opposite end of said supporting frame on said plungers for movement up and down therewith, means for controlling the lifting and lowering of said plungers by a pressure medium in said cylinders to vary the elevation of the rear end of said supporting frame, and means for operating said core-cutting mechanism including the feeding movement thereof relatively to said supporting frame on said upright axis.

40. In a mining machine, the combination with a frame, of cutting apparatus mounted on said frame, a pivotal support for the rear portion of said frame, spaced-apart upright hydraulic motors for adjusting rectilinearly and in an upright direction the elevation of said pivotal support, and separate hydraulic mechanism connected to an intermediate portion of said frame and controllable independently of said hydraulic motors for varying the inclination of said frame and said cutting apparatus and also co-acting with said hydraulic motors for varying the elevation of the said frame and said cutting apparatus as a whole rectilinearly in an upright direction.

41. In a mining machine, the combination with a frame, of a core cutter mounted on said frame for feeding movement on an upright axis, a pivotal support for one end of said frame, spaced apart hydraulic jacks applied directly to said pivotal support for adjusting the height thereof, and spaced apart hydraulic jacks applied to an intermediate portion of said frame spaced from said pivotal support for swinging said frame together with said core cutter about said pivotal support.

42. In a mining machine, a frame, a pair of loop chain core cutters mounted for pivotal movement about upright axes located adjacent one another on said frame, means for supporting said frame for movement about a horizontal axis at a point removed from said loop cutters, means for adjusting the position of said horizontal axis, and means for swinging said frame vertically about said horizontal axis.

43. In a mining machine, the combination with a hopper, of a conveyer for receiving material from said hopper and moving the same toward loading position, a supporting frame associated with said hopper, kerf-cutting mechanism mounted on said supporting frame in position to cut in an upright plane, means for operating said kerf-cutting mechanism including the feed thereof into a mine wall, and means for directing the cuttings from said cutting mechanism into said hopper.

44. In a mining machine, the combination with a base frame, a conveyer having a receiving portion mounted on said base frame, a supporting frame comprising a plate having a delivery opening therein, a guide plate for directing material from said supporting frame plate onto said conveyer, said guide plate being movable relatively to said supporting frame to permit the latter to be brought into proximity to said base frame, cutting mechanism mounted on said supporting frame in position to operate in an upright plane, and means for conveying cuttings from said cutting mechanism along

said supporting frame through said delivery opening into said directing guide plate and onto said conveyer.

45. A mining machine comprising a supporting frame, a double core-cutter mounted on said frame in position to simultaneously cut the opposite ends of a single core, means for operating said double core-cutter including feeding movement thereof relatively to said supporting frame, a kerf-cutter mounted on said frame in position to divide the core, and means mounted on said frame for directing the dislodged core of material away from the mine wall.

46. In a mining machine, a cutter head comprising a base plate having an arcuate notch formed at the rear thereof through which material is discharged, said plate extending upwardly at the edges of said base plate, a guide plate extending downwardly from said discharge notch, sliding pivotal connections between said guide plate and said side plates, stops for limiting the downward movement of said guide plate, said guide plate being movable upwardly to a position above said base plate.

47. In a mining machine, a supporting base, a cutter head mounted on said base and adjustable vertically relative thereto, said cutter head comprising a base plate having a discharge opening, a guide plate for directing material from said discharge opening, said guide plate being pivotally mounted on said cutter head and normally extending below said base plate but being movable to a position above said base plate to permit said cutter head to move downwardly to a position adjacent said supporting base.

48. In a mining machine, the combination with a frame adapted to receive material directly from a mine wall at various elevations, the forward edge of said frame being curved to approximately fit the curved coal face, of means for adjusting the elevation and inclination of the said forward edge of said frame, a movable extension at the forward edge of said frame and also having a curvature corresponding to the curvature of said frame, said extension being movable beyond the forward edge of said frame to abut against the coal face and fill the gap between the said frame and said coal face when the said frame is varied in elevation and inclination, and hydraulic mechanism for adjusting said movable extension relative to said frame.

49. In a mining machine, the combination with a supporting frame, of apparatus mounted on said frame for dislodging material from a mine wall, of means for operating said dislodging apparatus including feeding movement thereof relatively to said supporting frame, an extension fixed to said frame and having a forward edge conform-

ing to the path of feeding movement of said dislodging apparatus and adapted to fit the coal face left after operation of said dislodging apparatus, a movable extension mounted on said fixed extension, resilient means for holding said movable extension normally in retracted position, and hydraulic mechanism for moving the movable extension against the action of said resilient means to abut directly against the mine wall below such dislodging apparatus to fill the gap between said fixed extension and the mine wall while said frame and said fixed extension remain stationary.

50. In a mining machine, the combination with a supporting frame, of cutting apparatus mounted on said frame, means for pivotally supporting said frame and said cutting apparatus for adjustment in elevation and inclination, an adjustable extension for the forward end of said frame in a position to abut against the mine wall below the cutting apparatus to fill the gap between said frame and the mine wall for various elevations of said cutting apparatus, resilient means normally retracting said extension member, and means for positively moving said extension member forwardly against the tension of said resilient means and for holding said extension member stationary in its extended position during the operation of said cutting apparatus above said extension.

51. A mining machine comprising supporting framework, a plurality of hydraulic motors for adjusting the position of said framework, cutting apparatus mounted on said framework, means comprising a plurality of hydraulic motors for operating said cutting apparatus, a continuously operable pump for supplying a fluid pressure medium to all of said hydraulic motors, a safety valve for controlling the pressure of said medium, and a plurality of control valves for governing said positioning motors independently of the governing of said hydraulic motors for said cutting apparatus.

52. A mining machine comprising supporting framework, a plurality of kerf cutters each comprising a cutter frame with an endless chain cutter thereon, a plurality of fluid pressure devices, one connected to each of said cutter frames for giving the chain cutters feeding movements relatively to said supporting framework, means for controlling the operation of said fluid pressure devices independently of each other and a plurality of independent motors one connected to each of said chain cutters for driving the same independently.

53. In a mining machine, the combination with a supporting frame, of loop-chain core-cutting mechanism comprising a cutter frame having an unobstructed core-opening therethrough and an endless chain

mounted thereon, means for supporting said core-cutting mechanism for feeding movement on an upright axis, a motor connected to said cutter frame to effect feeding movement of said core-cutting mechanism relatively to said supporting frame on such upright axis, an additional motor separate from and independent of said feeding motor for driving said endless chain, said additional motor being connected to said cutter frame to move bodily therewith, and means for controlling said feeding motor independently of said driving motor.

54. In a mining machine, the combination with a supporting frame, of core-cutting mechanism comprising a cutter chain and a cutter frame having an unobstructed core-opening therethrough mounted on said supporting frame for swinging movement relatively thereto, a motor for swinging said cutter frame relatively to said supporting frame on an upright axis to effect arcuate feeding movement of said chain cutter in a general horizontal direction, an individual motor for driving said cutter chain, said driving motor being separate from and independent of said feeding motor, and means for controlling said feeding motor independently of the operation of said driving motor.

55. In a mining machine, the combination with a supporting frame, of an upright plane kerf-cutter mounted thereon for feeding movement relatively thereto in an upright plane midway between the sides of said frame and in advance thereof, said plane kerf-cutter comprising a plane cutter-frame and an endless chain-cutter mounted thereon to cut such kerf extending in the plane of said cutter-frame, a motor for effecting feeding movement of said plane kerf-cutter relatively to said supporting frame while the latter remains stationary, a separate and independent motor for driving said chain-cutter independent of its feeding movement, and means for controlling said feeding motor independently of the operation of said driving motor.

56. In a mining machine, the combination with a supporting frame, of a pair of loop chain core-cutters each having an unobstructed core-opening therethrough and mounted for swinging movements toward and from each other on upright axes on said supporting frame, two motors, one on each of said core-cutters for driving the same independently of each other and independent of feeding movements thereof, two feeding motors, one connected to each of said core-cutters for swinging the latter toward each other to effect feeding movement thereof, and means for controlling said feeding motors independently of each other and independently of the operation of either of said driving motors.

57. In a mining machine, the combination with a supporting frame, of a plurality of loop chain core-cutters, each having an unobstructed core-opening therethrough and mounted on said frame for swinging feeding movement relatively thereto, a plane kerf-cutter mounted on said frame for feeding movement relatively thereto, a plurality of driving motors, one for each of said core-cutters and one for said plane kerf-cutter, each operable independently of the others to drive said core-cutters and said plane kerf-cutter independently of each other and independently of the feed of the respective cutters, a plurality of feeding motors one connected to each of said cutters, and means for controlling each of said feeding motors independently of the other feeding motors and also independently of the operation of each of said driving motors.

58. In a mining machine, the combination with a pair of loop chain core cutters, of a frame on which said core cutters are mounted for movement toward each other, means for operating said core cutters including the feed of each toward the other for cutting a section from the wall of the mine, and a kerf-cutter for separating the section into smaller sections.

59. In a mining machine, the combination with a pair of loop chain core cutters, of a frame for carrying said core cutters for movement toward each other, means for operating said core cutters including feeding movements toward each other to sever a section of material from a mine wall, and means in position to act on the central portion of the sections for breaking the section into smaller sections.

60. A mining machine comprising a supporting frame, a pair of core-cutters mounted thereon, means for operating said core-cutters to cut oppositely extending core sections in a mine wall while said frame occupies a predetermined position adjacent the mine wall, and means mounted on said frame in position to act on the core sections at the mine wall to break the same into smaller sections.

61. In a mining machine, the combination with a pair of core cutters separately pivoted, of means for operating said core cutters to cut oppositely extending core sections in a mine wall, and means for breaking the core sections into smaller sections and for returning said core cutters.

62. In a mining machine, the combination with two independent loop chain core cutting mechanisms, of independent means for moving said cutting mechanisms toward each other to cut a core section from the wall of a mine, independent belts attached to said cutting mechanisms, and means for operating said belts to break the section into

smaller sections and to move the latter away from the mine wall.

63. In a mining machine, the combination with cutting mechanism, of a belt connected to said cutting mechanism, means comprising a fluid pressure motor for operating said cutting mechanism and drawing said belt into the mine wall, means for controlling said fluid pressure motor to prevent retrograde movement of said cutting mechanism, means for exerting a pull on said belt to break the cut material from the mine wall while said cutting mechanism is locked against retrograde movement, said pulling means also being capable of restoring said cutting mechanism to initial position when said fluid pressure motor is released, and means for directing the dislodged material toward a predetermined position.

64. In a mining machine, the combination with a supporting frame, of multiple loop core-cutting mechanism mounted thereon, means for operating said multiple loop core-cutting mechanism to sever material en bloc from a mine wall adjacent said supporting frame, means for adjusting the height of said multiple loop core-cutting mechanism, and mechanism mounted on said supporting frame adjacent said core-cutting mechanism in position to act on the core in its native position in the mine vein to effect division thereof to facilitate handling.

65. In a mining machine, the combination with a supporting frame, of a pair of core-cutters mounted on said frame in position for entirely severing from a mine wall a crescent-shaped block of material adjacent said frame, means for operating said core-cutters to sever such crescent-shaped block of material, mechanism mounted on said frame adjacent said core-cutters in position to act on the crescent-shaped mass in its native position to divide the same, and power-operated mechanism mounted on said frame in position for engaging the divided sections in cut positions and move the same back from the mine wall toward loading position.

66. In a mining machine, the combination with a supporting frame, of a plurality of loop chain core-cutters mounted on said frame each in a position to cut a section of an entire core in a mine wall adjacent said frame, means for operating said core-cutters to dislodge such an entire core in a mine wall adjacent said frame, an additional plane kerf-cutter mounted on said frame adjacent said core-cutters, means for operating said plane kerf-cutter to cut a kerf transversely of the core during the operation of the core-cutters and retract such plane kerf-cutter before the completion of the feeding movements of the first-named core-cutters, and means for engaging the severed material in the position assumed

thereby after being dislodged and moving such severed material back from the mine wall.

67. In a mining machine, the combination with a supporting frame, of a pair of cutting devices mounted thereon, on spaced pivots, means for operating said cutting devices including the feed thereof toward each other, and means separate from said cutting devices in position on said supporting frame for receiving the cuttings from said cutting devices and transferring such cuttings back from the mine wall.

68. In a mining machine, the combination with a supporting frame, of a pair of cutting devices mounted thereon for feeding movement relatively thereto on spaced apart axes, means for operating said cutting devices, including feeding movement thereof toward each other, means for reversing the movements of said cutting devices to engage the cut material and move the same away from its cut position, and mechanism connected to said cutting devices and coacting with portions of said supporting frame to constitute spaced-apart chutes on opposite sides of said frame to direct the dislodged material from the mine wall toward loading position.

69. In a mining machine, the combination with a supporting frame, of a pair of loop chain core cutters movable on said frame toward each other on separate pivots, means for operating said core cutters including feed toward each other to cause each to produce a U-shaped kerf in a mine wall, and means mounted on said frame in position for moving back from the mine wall the material severed by said cutters.

70. A mining machine comprising a supporting frame, a plurality of separate core-cutting mechanisms mounted on said frame in position to operate on a mine wall adjacent said frame in spaced-apart positions but cooperatively related by acting on adjacent bodies of material toward each other to sever a single continuous core-section of material from the mine wall, independent means for operating and controlling said cutting mechanisms, and means mounted on said frame in position for moving the dislodged material from the mine wall toward loading position.

71. In a mining machine, the combination with a supporting frame comprising a platform, of a conveyor operable approximately in the plane of said platform, kerf-cutting mechanism having upper and lower portions and mounted on said supporting frame in a position entirely separated from said conveyor, means for operating said kerf-cutting mechanism including driving thereof by causing the lower portion thereof to emerge from the mine wall above the forward portion of said platform onto said conveyor,

and independent means for driving said conveyor to remove the cuttings received thereby from said separate kerf-cutting mechanism.

72. In a mining machine, the combination with a supporting frame, of loop chain core-cutting mechanism having an unobstructed core-opening therethrough mounted on said frame for swinging movement relatively thereto, hydraulic mechanism for swinging said core-cutting mechanism in feeding direction, a motor for driving said core-cutting mechanism independently of said hydraulic feeding mechanism, a flexible member connected to said core-cutting mechanism, and means for exerting a pull on said flexible member to retract said cutting mechanism.

73. A mining machine comprising two pivotal cutter-frames each having an unobstructed core-opening therethrough, cutting mechanism mounted on each of said frames, means for swinging said frames contemporaneously in opposite directions respectively and simultaneously operating said cutting mechanism to cut oppositely extending cores in a mine wall, additional cutting mechanism for cutting an upright kerf in a mine wall to effect the division of the core mass, and means for effecting retraction of said cutter-frames and moving the dislodged material towards loading position.

74. A mining and loading machine comprising a supporting frame, a pair of swinging kerf-cutters mounted on said supporting frame for arcuate swinging feeding movement, means for operating said kerf-cutters to swing the same from a diverging relation to a forwardly extending relation in close proximity to each other, mechanism mounted on said frame in position to act on the mine wall to cut a kerf transversely of the planes of the kerfs cut by said first-named kerf-cutters, and mechanism mounted on said supporting frames in position for removing severed material from the face of coal where cut and transferring such severed material towards loading position.

75. A mining and loading machine comprising a supporting frame, two cutter frames mounted on said supporting frame for swinging movement relatively thereto on separate upright axes, cutter chains one mounted on each of said cutter frames, means for swinging said cutter frames contemporaneously in opposite directions respectively, means for controlling said swinging means to stop the swinging of one of said cutter frames, and apparatus mounted on said supporting frame in position for taking the severed material directly from the position assumed thereby after being severed and moving such material toward loading position.

76. In a mining machine, the combination

with a supporting frame, of a plane kerf cutter comprising a cutter frame and a cutter chain thereon, a loop chain core cutter comprising a cutter frame having an unobstructed core-opening therethrough and a chain cutter on said cutter frame, means for supporting said plane kerf cutter for rectilinear feeding movement relatively to said supporting frame, means for pivotally supporting said core cutter on a fixed axis for swinging feeding movement relatively to said supporting frame, and means for controlling the starting, feeding, stopping, and reverse movements of said cutters independently of each other.

77. In a mining machine, the combination with a supporting frame comprising a platform, of dislodging mechanism mounted on said frame for operation at a mine wall above said platform, an adjustable extension on said platform and movable relatively thereto to abut against the mine wall to close the gap between the forward end of said platform and said mine wall, a pair of fluid pressure motors connected to said extension to move the latter against the mine wall, and a pair of springs for moving said extension to initial position on said platform away from the mine wall when the pressure in said motors is relieved.

78. A mining machine comprising a supporting frame, a cutter bar pivotally mounted on said supporting frame at the front end thereof, cutting devices carried by said cutter bar, means for actuating said devices, a second cutter bar pivotally mounted on said supporting frame adjacent the first-named bar on a separate axis, cutting devices carried by said second cutter bar, means for actuating the last-named cutting devices, means for swinging said bars whereby they may be swung in opposite directions to feed the cutting devices into the coal while tending to neutralize feeding strains, and means mounted on said supporting frame in position for removing the severed material from the position assumed thereby after being severed and while said supporting frame remains in the position which it occupied during the operation of said cutting devices.

79. A mining and loading machine comprising a supporting frame, two chain cutters each comprising a cutter bar, and a cutter chain, and each being pivotally mounted on said supporting frame, means for advancing said cutter bars bodily into the work while said cutter bars are held in fixed relation to said supporting frame and in substantial balanced relation to the axis of advancing movement, swinging means for subsequently swinging said chain cutters in opposite directions to cut an arcuate kerf in advance of said supporting frame, and loading apparatus mounted on said support-

ing frame in position for removing the severed material from the position assumed thereby after being severed and while said supporting frame remains in the position it occupied during the swinging of said chain cutters.

80. A mining and loading machine comprising supporting framework, two chain cutters mounted thereon for swinging movement relatively thereto, means for swinging said chain cutters contemporaneously in opposite directions respectively, means for driving said chain cutters, means for advancing the chain cutters bodily toward the work, and loading apparatus mounted on said supporting framework in position for taking the dislodged material from the position assumed thereby after being severed and effecting the transfer of such dislodged material toward loading position.

81. A mining and loading machine comprising a supporting frame, a pair of cutter frames pivotally mounted on said supporting frame for swinging movement relatively thereto on spaced-apart axes, endless chains for said cutter frames provided with cutting devices for making a cut in the face of the coal, means for driving said chains, means for swinging said cutter frames from a diverging position to a substantially parallel position, and loading apparatus mounted on said supporting frame in position for effecting the transfer of dislodged material along said supporting frame toward loading position from the position assumed by said material immediately after being dislodged.

82. A mining and loading machine comprising a supporting frame, a pair of cutting devices mounted thereon, a pair of supports, one for each of said cutting devices, means for driving said cutting devices, means for initially advancing said cutting devices into the work while driving said cutting devices, means for subsequently imparting feeding movement to each of said supports in opposite directions respectively and in a direction transverse to the direction of their initial advance while continuing to drive said cutting devices, and loading apparatus in position on said supporting frame for effecting transfer toward loading position of the severed material from the position where left after being dislodged by the operation of said cutting devices.

83. A mining and loading machine comprising a supporting frame, two chain-cutters each comprising a cutter-frame and a cutter-chain, swinging means for swinging said chain-cutters contemporaneously in opposite directions respectively, disconnecting means for disconnecting one of said chain-cutters from said swinging means, additional cutting mechanism mounted on said frame, means for operating said additional cutting mechanism including rectilinear feed there-

of transversely of the mine vein near the range of operation of said chain-cutters, and loading apparatus mounted on said supporting frame in position for removing severed material toward loading position directly from the position assumed thereby after being severed and while said supporting frame remains adjacent the coal face operated on.

84. In a mining machine, the combination with a supporting frame, of a pair of core cutters mounted for pivotal movement on said frame, means for swinging said cutters toward one another to cause each of said cutters to disconnect a portion of a crescent-shaped core section from a mine vein, an upright cutter between said core cutters, and means for operating said upright cutter to separate the portions of said core section.

85. In a mining machine, the combination with a supporting frame, of a pair of core cutters pivotally mounted on said frame, means for swinging said cutters toward and away from each other, and motors carried by said cutters for operating the same, said motors being bodily movably with the bodily movement of said cutters.

86. In a mining machine, the combination with a supporting frame, of a plane kerf-cutter mounted near one end of said supporting frame in position to cut an upright kerf in a mine wall, a pair of additional kerf-cutters mounted on said supporting frame for feeding movement relatively thereto toward and from said upright kerf-cutter, means for operating said kerf-cutters including the feed thereof, and a conveyor on said supporting frame in position to receive cuttings from all of said kerf-cutters during the operation thereof at the mine wall.

87. A mining and loading machine comprising a supporting frame, dislodging mechanism mounted thereon, conveyor mechanism extending rearwardly from said mining machine, a hopper comprising a movable extension for connecting the mining machine with said conveyor mechanism and means for adjusting the position of said mining machine while said frame remains operatively connected by means of said hopper to said conveyor mechanism.

88. A mining and loading machine comprising a mining machine having a supporting frame with dislodging apparatus thereon in position to operate on an upright mine wall between the floor and roof of the mine chamber, a hopper in position to receive dislodged material from said mining machine, an extension member between said mining machine and said hopper, means for adjusting the elevation of said mining machine to various positions including a position adjacent the floor of the mine chamber, and means for supporting said extension member to prevent the latter from interfering

with the adjustments in elevation of said mining machine, said extension being automatically restored to delivery communication between said mining machine and said hopper when the rear end of said mining machine is elevated to a predetermined position.

89. A mining and loading machine comprising a supporting frame with cutting mechanism mounted thereon in position to cut the material in an upright mine wall between the floor and roof of the mine chamber, means mounted on said frame to receive the dislodged material, means for adjusting the elevation and inclination of said frame together with said cutting mechanism and said receiving means, conveyer mechanism, a base frame for supporting said conveyer mechanism with its receiving end adjacent the roof of the mine chamber, a hopper for the receiving end of said conveyer, means for connecting said receiving means with said hopper, and means for supporting said connecting means on the rear end of the first-named frame for movement relative thereto to permit the mining machine to occupy a position extending horizontally along the floor of the mine chamber and adjacent said floor.

90. A mining and loading machine comprising a base frame, a conveyer pivotally connected to said base frame, a hopper at the receiving end of said conveyer, a mining machine comprising dislodging mechanism and a supporting frame therefor, means for varying the elevation of said mining machine, means mounted on said supporting frame for directing dislodged material into said hopper, and mechanism for supporting said directing means for movement relatively to said supporting frame to permit the latter to occupy an approximately horizontal position extending along the floor of the mine chamber.

91. A mining and loading machine comprising a main frame, a supplemental frame, cutting mechanism mounted on said supplemental frame in position to cut material in an upright mine wall between the floor and roof of a mine chamber, means for adjusting the elevation of said supplemental frame, conveyer mechanism mounted on said main frame, means comprising a connecting device extending downwardly from an opening in said supplemental frame to direct dislodged material from said supplemental frame to said conveyer, and a pin and slot connection between said connecting device and said supplemental frame to prevent said connecting device from interfering with the lowering of said supplemental frame to a position adjacent the floor of the mine chamber.

92. In a mining machine, the combination with a main frame, of a hopper pivotally

connected to the rear end of said main frame, an endless belt conveyer connected to said hopper and swingable therewith on said main frame, a supplemental frame having a semi-circular opening at its rear end, an arcuate connector fitting on the rear portion of said hopper and fitting into the semi-circular opening of said supplemental frame for directing material from the latter into said hopper, spaced apart arms extending from said connector and connected to vertical spaced apart slots at the rear end of said supplemental frame, means for adjusting the elevation of the rear end of said supplemental frame and carrying said arms with said supplemental frame above a predetermined position, said slots permitting said connector to rest on said hopper when said supplemental frame is below a certain predetermined position, means for adjusting the elevation of the forward portion of said supplemental frame, and dislodging apparatus mounted on said supplemental frame to dislodge material from a mine wall and transfer the same along said supplemental frame over said connector to said hopper and said conveyer.

93. In a mining machine, the combination with a pair of loop chain core cutters each having an unobstructed core opening therethrough and mounted for pivotal movement about spaced upright axes, and a third cutter movable in a vertical plane between said axes.

94. In a mining machine, the combination with a pair of kerf-cutters each comprising an endless chain cutter and each mounted for bodily arcuate feeding movements, and a third kerf-cutter comprising an endless chain cutter mounted for feeding movement in a plane extending transversely of the planes of the kerfs cut by said pair of kerf-cutters.

95. In a mining machine, the combination with a supporting frame, of a pair of loop chain core cutters mounted on said frame for swinging feeding movement relatively thereto, and a plane kerf cutter mounted on said frame in position to cut a plane kerf between the feeding paths of travel of said core cutters.

96. In a mining machine, the combination with a supporting frame, of a pair of loop chain core cutters each having an unobstructed core opening therethrough and mounted on said frame for pivotal movement relatively thereto, means for swinging said core cutters toward each other to cause each of said cutters to cut a portion of a crescent shaped core from a mine vein, a plane kerf cutter mounted on said frame in position to separate the portions of the core, and means for moving the separated portions of the core from their severed positions toward loading position.

97. In a mining machine, the combination with a supporting frame, of a pair of kerf cutters pivotally mounted thereon for movement relatively to said supporting frame, means for swinging said kerf cutters toward and away from each other, and motors one carried by each of said cutters and bodily movable therewith during their swinging movements relatively to said supporting frame, said motors swingable with said kerf cutters being connected thereto to drive the same.

98. In a mining machine, the combination with a supporting frame, of a pair of loop chain core cutters mounted on said frame for pivotal movement toward and away from one another relatively to said frame, each of said cutters having an unobstructed core opening therethrough, means for operating said core cutters including feeding movement thereof by swinging said cutters toward one another to cause the same to cooperate to separate a core section from a mine vein, means for severing from one another the portions of said core section severed by said cutters, and means for moving each of said cutters together with the portion of material severed thereby rearwardly along said frame to move said material away from the severed positions toward loading position.

99. In a mining machine, the combination with a supporting frame, of a pair of kerf cutters pivotally mounted on said frame, means for swinging said cutters toward one another to sever a section of material from a mine vein, a third cutter for subdividing said severed section, and means for removing the subdivided sections from their severed positions toward loading position.

100. In a mining machine, the combination with a supporting frame, of a pair of loop chain core cutters pivotally mounted on said frame for swinging movement relatively thereto, each of said cutters having an unobstructed core opening therethrough, means for swinging said cutters toward one another to sever a complete core of material from a mine vein, a plane kerf cutter mounted on said frame in position for dividing said complete core into two sections, aprons one secured to each of said core cutters to move therewith back of the section of core cut thereby, and means for exerting tension on said aprons to draw said core cutters backward together with the material severed thereby to move the disconnected portions of said core along separate paths relative to said frame from the native positions of said core sections toward loading positions.

101. In a mining machine, the combination with a supporting frame, of a loop chain core cutter having an unobstructed

core opening therethrough and pivotally mounted on said frame for swinging movement relatively thereto on an upright axis, means for operating said core cutter including swinging movement thereof on such upright axis and the driving of the cutter chain with its lower run emerging from the mine wall adjacent said frame, a base plate on said frame with a forward contour conforming to the path of travel of the emerging run of said cutter chain, and a conveyor mounted on said base plate along a path of travel conforming to the forward portion of said base plate and the path of the emerging run of said cutter chain in position to receive the cuttings from said cutter chain and convey such cuttings continuously away from the mine wall during the swinging feeding movement of said cutter.

102. In a mining machine, the combination with a supporting frame, of a plurality of kerf cutters mounted thereon each to have a swinging feeding movement relatively thereto on a separate axis, means for operating said kerf cutters including swinging feeding movement thereof relatively to said frame while the latter remains stationary, the cuttings from said kerf cutters being ejected from the mine wall onto said frame, and a conveyor mounted on said frame and extending across the front portion thereof in position to receive the cuttings from said kerf cutters throughout the ranges of movement of the latter and convey such cuttings toward loading position during the operation of said cutters and while said frame remains stationary.

103. In a mining machine, the combination with a supporting frame, of core cutting mechanism mounted thereon and having an unobstructed core opening therethrough, and a plane kerf cutter mounted on said frame and confined to a feeding movement along a path parallel to the longitudinal length of the machine to act on the core transversely to sever the core from the unmined mass.

104. In a mining machine, the combination with a supporting frame, of core cutting mechanism mounted thereon and having an unobstructed core opening therethrough, and a plane kerf cutter mounted on said frame and confined in its feeding movement to a position to extend longitudinally of the machine and across the path of feeding travel of said core cutting mechanism to completely sever from the mine wall the core cut by said core cutting mechanism.

105. In a mining machine, the combination with a supporting frame, of core cutting mechanism having an unobstructed core opening therethrough and pivotally mounted on said frame on a pivot shaft for swinging movement relatively thereto

means for operating said core cutting mechanism to cut an arcuate core, and a plane kerf cutter mounted on said frame and movable relatively thereto adjacent said core cutting mechanism to cut the core transversely and sever the same completely from the unmined mass.

106. In a mining machine, the combination with a supporting frame, of a pair of chain cutters each comprising an upright frame mounted on said supporting frame for arcuate feeding movements on spaced-apart axes, means for driving said chain cutters with their lower runs traveling toward said supporting frame after emerging from the mine wall adjacent said supporting frame, and a conveyor mounted on said supporting frame adjacent the lower runs of said chain cutters in condition for removing the cuttings delivered to it by said lower runs.

107. In a mining machine, the combination with a supporting frame, of a pair of chain cutters on separate pivots on said frame and each comprising a frame and a chain traveling about the periphery thereof in an upright plane, means for driving said chain cutters in upright planes with the lower runs emerging from the mine wall to deliver cuttings to said supporting frame adjacent said lower runs, and a conveyor on said supporting frame with its path of travel adjacent the positions of the lower runs of said chain cutters where they emerge from the mine wall.

108. In a mining machine, the combination with a supporting frame, of loop chain core-cutters each having an unobstructed opening extending laterally therethrough, means for driving said chain cutters, means for swinging said cutters about spaced-apart upright axes to feed said cutters relatively to said supporting frame, and a flight conveyor mounted on said supporting frame in position to travel along an arcuate path to receive the cuttings from said cutters as the latter are swung in their feeding movement about said upright axis.

109. In a mining machine, the combination with a supporting frame comprising a platform, a dislodging mechanism mounted on said frame for operation on a mine wall above said platform, an adjustable extension on said platform adapted to be moved relatively to said platform to abut against the mine wall to close the gap between the forward end of said platform and said mine wall, a pair of loop chain core-cutters mounted on spaced pivots on said frame each having an unobstructed opening therethrough and each with its lower runs adjacent said platform and said extension, and means for operating said core-cutters including feeding movement thereof relatively to said platform.

110. In a mining machine, the combination with a pair of swinging frames on spaced pivots and each having an unobstructed opening therethrough, of separate cutting mechanisms mounted on said swinging frames, means for operating said cutting mechanism including the swinging of said frames in an arcuate path in a mine wall, and flexible draft devices acting on the outer ends of said frames to swing the same back toward initial position.

111. In a mining machine, the combination with a pair of loop chain core-cutters, of means for swinging said core-cutters about spaced-apart upright axes, a base plate over which said cutters move, a conveyor arranged to travel over said base plate and having horizontally extending flights secured thereto, the path of said conveyor being arranged adjacent the path of the ends of the return runs of said cutters as the latter move about their axes, and a ridge formed on said base plate extending around the periphery of the path of said conveyor to prevent the escape of material from said conveyor.

112. In a mining machine, the combination with a supporting frame, of a pair of kerf cutters pivotally mounted on said frame, means for swinging said cutters toward one another to sever a section of material from the mine vein, a third cutter for subdividing said severed section, and means for removing the subdivided sections from their severed positions toward loading position.

113. In a mining and loading machine, the combination with a supporting frame, of a pair of core-cutters each having an unobstructed core-opening therethrough and mounted on spaced pivots on said supporting frame in position for entirely severing from a mine wall a crescent-shaped block of material, means for operating said cutters including feed thereof, and means mounted on said supporting frame in position for moving the dislodged material from the mine wall along said frame toward loading position.

114. In a mining and loading machine, the combination with a plurality of loop chain cutters, of a frame for supporting said loop chain cutters on spaced-apart pivots in position for operating on an upright mine wall in advance of said frame, means for operating said chain cutters including the feed thereof to effect the dislodgment of material from such upright mine wall, and power operated mechanism mounted on said supporting frame in position to act on the material where dislodged and move such dislodged material along said frame toward loading position while said frame remains stationary.

115. A mining and loading machine comprising a supporting frame, a pair of cut-

ting devices mounted on said frame for movement to and from each other on spaced-apart upright axes, means for operating such cutting devices including feed thereof toward each other to effect the dislodgment of a section of material from an upright mine wall, and means on said supporting frame in position to act on the material to move the same from its native position along said frame toward loading position.

116. A mining and loading machine comprising a supporting frame, a pair of loop chain cutters mounted on spaced-apart pivots on said frame in position to operate on an upright mine wall, means for operating said chain cutters including feed thereof relatively to said supporting frame to effect the dislodgment of a section of material from such upright mine wall, and means in position on said frame for acting on the dislodged material at the mine wall and moving such material from the mine wall along said frame toward loading position.

117. A mining and loading machine comprising a supporting frame, a pair of loop chain core-cutters each having an unobstructed core opening therethrough and mounted on said frame for feeding movement toward each other on spaced-apart upright axes, independent means for operating said chain cutters each to produce a U-shaped kerf in a mine wall, and means mounted on said supporting frame to act on the material in the position assumed thereby after being dislodged and move such material from the mine wall along said frame toward loading position.

118. In a mining machine, the combination with a supporting frame, of a pair of loop chain core-cutters mounted on said frame to swing toward and from each other on spaced-apart upright axes, means mounted on said frame and connected to said pair of loop chain core-cutters to move the same in feeding direction toward each other, said means being incapable of moving said core-cutters away from each other, and separate means mounted on said frame and connected to said core cutters and capable of moving the latter only in retracting direction.

119. In a mining machine, the combination with a supporting frame, of a pair of swinging cutter frames each having an unobstructed core-opening therethrough and each separately pivotally mounted on said supporting frame, endless chains for said cutter frames provided with cutting devices for making cuts in the face of the coal, means for driving said chains around the unobstructed core-openings of said cutter-frames, and means for swinging said cutter frames from a diverging position to a substantially parallel position while said chains are being driven.

120. In a mining machine, the combina-

tion with a supporting frame, of a pair of core-cutting devices each comprising a cutter frame having an unobstructed core opening therethrough and each mounted on said supporting frame to swing on its own separate axis, means for initially advancing said core-cutting devices into the work while driving said core-cutting devices, and means for subsequently imparting movement to each of said cutter-frames in opposite directions respectively and in directions transverse to the direction of their initial advance while continuing to drive said cutting devices, to effect the cutting of cores extending in opposite directions.

121. In a mining machine, the combination with a supporting frame, of a pair of core-cutters each comprising a cutter frame and a cutter chain, means for swinging said cutter frames on spaced-apart axes contemporaneously in opposite directions respectively and relatively to said supporting frame, and disconnecting means for operatively disconnecting one of said cutter frames from said swinging means to enable the cutting of a single core with one of said core-cutters.

122. In a mining machine, the combination with a supporting frame, of a pair of swinging cutter-frames separately pivotally mounted on said supporting frame and each having an unobstructed core-opening therethrough, said cutter-frames being movable to positions immediately adjacent one another and into parallel relation with the unobstructed core-openings in said cutter-frames registering with each other, cutter-chains on said cutter-frames having their cutter bits bridging the gap between said cutter-frames when the latter are in parallel relation, means for swinging said cutter-frames from diverging to parallel relation and means for driving said cutter chains during such swinging movement to effect the cutting of a crescent-shaped core of material from a mine wall.

123. In mining apparatus, the combination with a supporting frame, of spaced-apart fluid pressure motors adapted to engage anchored abutments in a mine, a pair of cutting devices mounted on said frame, means for controlling said fluid pressure motors to move said frame to initially advance said cutting devices into the work and means for subsequently moving said cutting devices in opposite directions respectively and in a direction transverse to the direction of their initial advance.

124. A mining machine comprising supporting framework, a loop chain core cutter having an unobstructed core opening therethrough and mounted on said framework in position for feeding movement relatively thereto, means for operating said core cutter including such feeding movement, and

additional cutting means mounted on said framework confined in position to cut a kerf parallel to the longitudinal length of the machine to sever the core from the unmined mass.

125. In a mining machine, the combination with a supporting frame, of means mounted thereon in position for cutting a core section in a mine vein, a plane kerf cutter for cutting a kerf to separate the core section from the unmined mass, and means independent of said plane kerf-cutter mounted on said frame for moving the separated core section toward loading position.

126. In a mining machine, the combination with a supporting frame, of means mounted thereon in position to cut a core section in a mine vein adjacent said frame with one end of said core section integral with the unmined mass, means mounted on said frame in position to act transversely of said core section adjacent such integral end thereof, and flexible means mounted on said frame in position to coact with said core-cutting means to take the severed core section from the position assumed thereby after being completely cut out from the mine vein and moving such severed section toward loading position.

127. In a mining machine, the combination with a supporting frame, of an upright plane kerf-cutter mounted thereon and comprising a vertical flat cutter-frame and a cutter-chain mounted thereon, a motor for driving said cutter-chain, means for supporting said kerf-cutter for feeding guiding movement midway between the sides of the frame and in advance thereof, a separate motor for giving said vertical plane kerf-cutter rectilinear feeding movement relatively to said supporting frame and midway between the sides thereof and in advance thereof independently of the driving of said cutter-chain, and means for controlling said feeding motor independently of the operation of said driving motor.

128. In a mining machine, the combination with a supporting frame, of core-cutting mechanism comprising an endless cutter chain and a cutter frame having an unobstructed core-opening therethrough, means for mounting said core-cutting mechanism for arcuate feeding movement relatively to said supporting frame on an upright axis, a motor for effecting feeding movement of said core-cutting mechanism arcuately on

such upright axis relatively to said supporting frame, a separate motor for driving said cutter chain, and means for controlling said feeding motor independently of the operation of said driving motor.

129. A mining machine comprising supporting framework, of a loop core-cutter having an unobstructed core-opening therethrough and mounted on said framework in a position to cut a horizontal core of material in a mine vein, and additional cutting means mounted on said framework on approximately the longitudinal center line of the length of the machine in position to cut an upright kerf to transversely sever the cut core.

130. The combination with two loop chain cutters each having an unobstructed core-opening therethrough, of mechanism for supporting said chain cutters with predetermined lengths thereof in the same plane, means for operating said chain cutters to produce a plurality of kerfs in a mine wall around cores respectively projecting through said cutters, and means acting between said cutters to divide the core.

131. In a mining machine, the combination with a main frame, of a supplemental frame movably mounted thereon, multiple core-cutting mechanism mounted on said supplemental frame, means for operating said core-cutting mechanism to cut at the back and sides of a body of material at an upright mine wall to form a plurality of cores of material extending transversely of the mine heading, and means in position to act on the middle portion of the core to divide the same into smaller sections.

132. A mining machine comprising supporting framework, core-cutting mechanism mounted thereon for arcuate feeding movement relatively thereto in position to cut a core from one side of the machine toward the front center thereof, said core-cutting mechanism having an unobstructed core-opening therethrough, means for operating said core-cutting mechanism including arcuate feeding movement thereof relatively to said supporting framework, and additional cutting mechanism for cutting a kerf to sever the cut core from the unmined mass.

In testimony whereof I have signed my name to this specification, on this 19th day of September A. D. 1916.

EDMUND C. MORGAN.