H. A. KUHN.

MINING MACHINE.

APPLICATION FILED MAY 18, 1914.

1,425,103.

Patented Aug. 8, 1922.

4 SHEETS—SHEET 1.

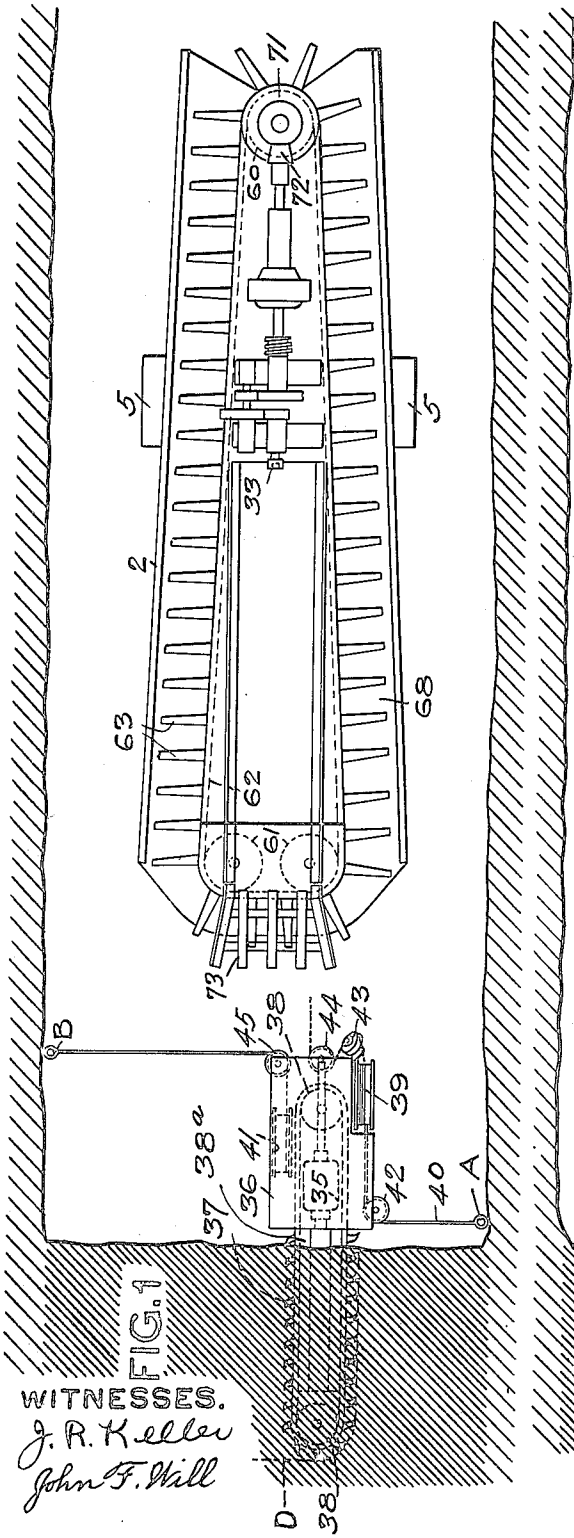


FIG. 1

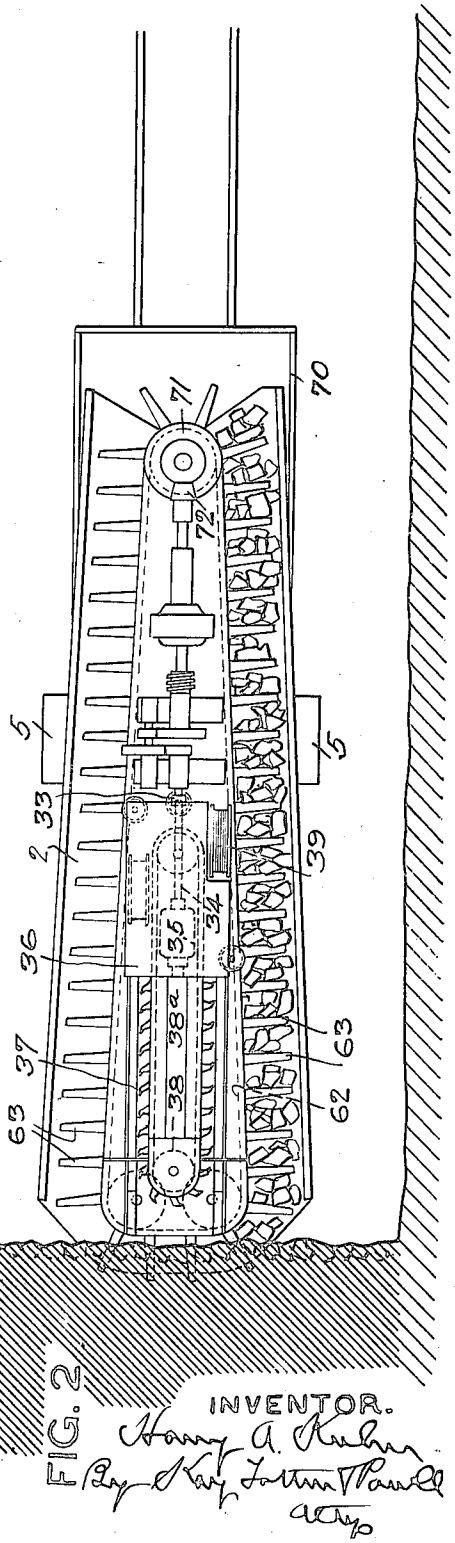


FIG. 2

WITNESSES.

J. R. Keller

John F. Hill

INVENTOR.

Harry A. Kuhn

By Kay, Fortun & Powell

Attys

of translucent tile elements, the peripheries of said elements being channeled, a concrete grid enclosing said tiles and filling said channels and a channeled concrete rim about the entire tile structure.

3. As a new article of manufacture, a composite building tile comprising a plurality of translucent tile elements, the peripheries of said elements being channeled, a reinforced concrete grid enclosing said tiles and filling said channels and a channeled concrete rim about the entire tile structure.

In testimony whereof, I affix my signature in the presence of two witnesses this fifth day of March, 1918.

FREDERICK L. KEPPLER.

Witnesses:
MAURICE KEANE,
ARTHUR S. BURTON.

H. A. KUHN.

MINING MACHINE.

APPLICATION FILED MAY 18, 1914.

1,425,103.

Patented Aug. 8, 1922.

4 SHEETS—SHEET 3.

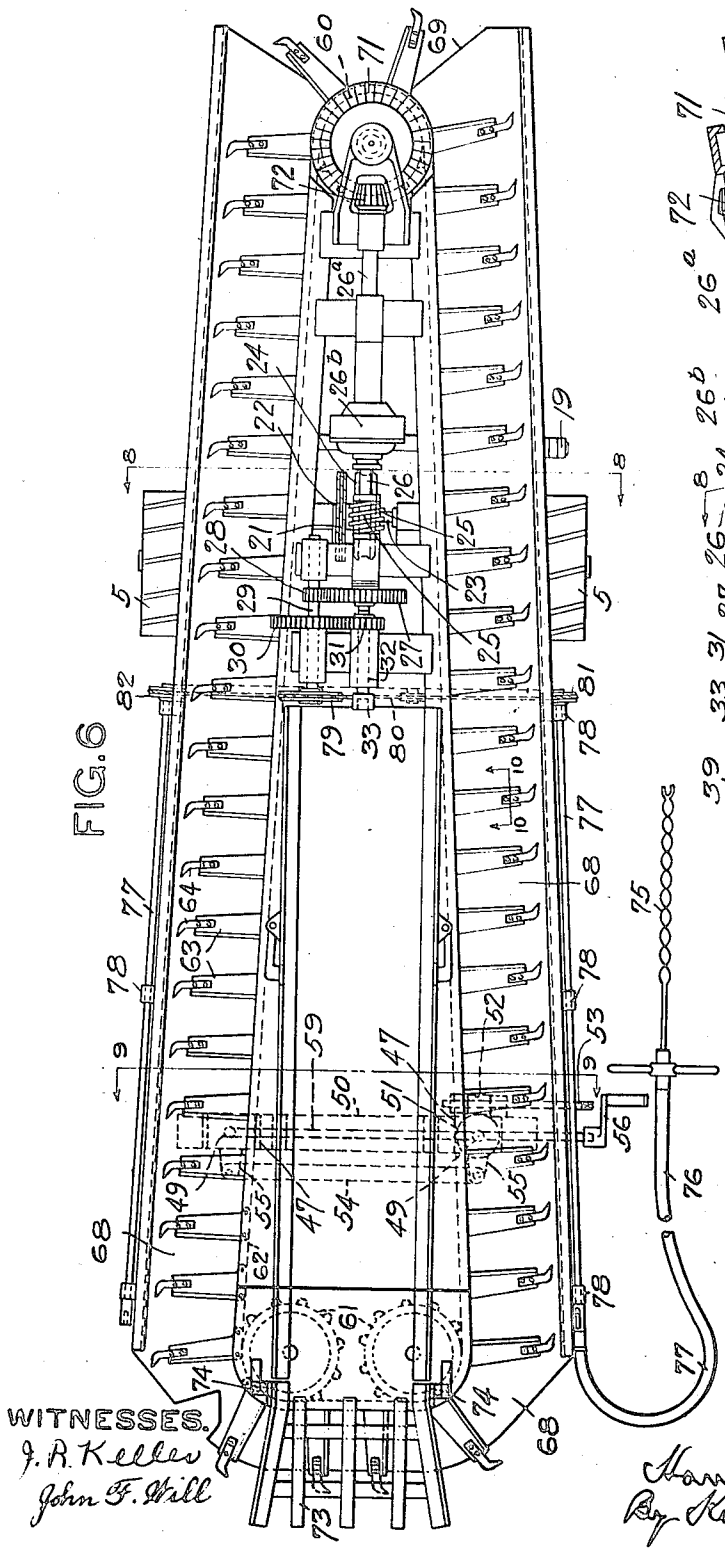


FIG. 6

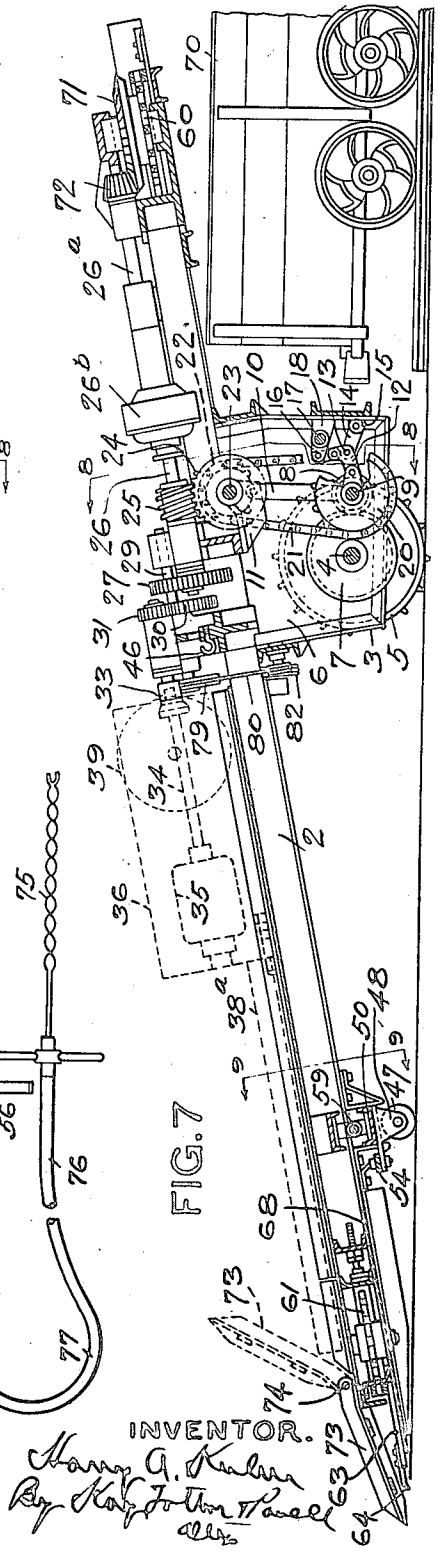


FIG. 7

WITNESSES.

J. R. Keller

John F. Will

INVENTOR.

Harry A. Kuhn

By Kerr, Fulton & Parker

Attys

H. A. KUHN.

MINING MACHINE.

APPLICATION FILED MAY 18, 1914.

1,425,103.

Patented Aug. 8, 1922.

4 SHEETS—SHEET 4.

FIG. 8

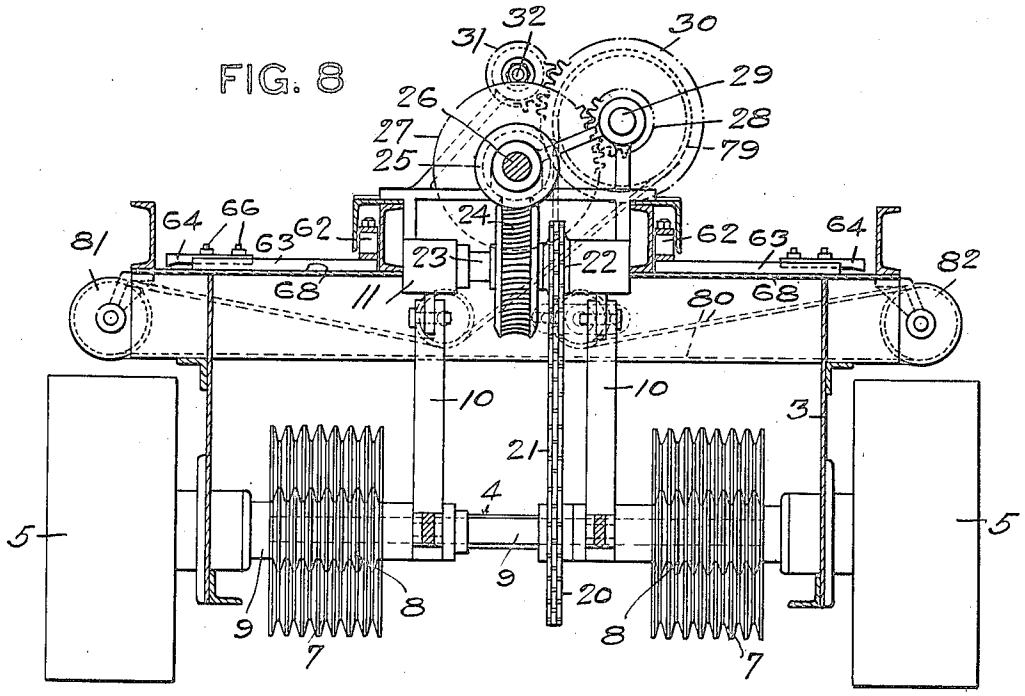


FIG. 9

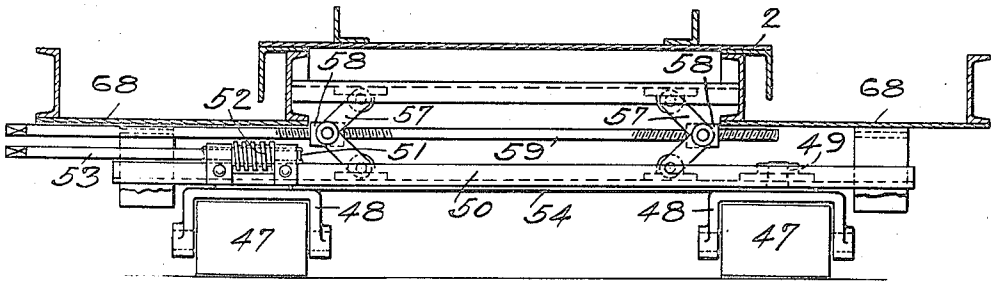


FIG. 10

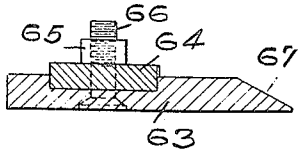


FIG. 11

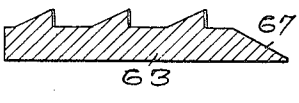
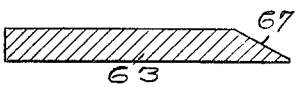


FIG. 12



WITNESSES.

J. R. Keller

John F. Hill

INVENTOR.

Harry A. Kuhn

By Stacy Tolin & Powell

Attys

UNITED STATES PATENT OFFICE.

HARRY A. KUHN, OF PITTSBURGH, PENNSYLVANIA.

MINING MACHINE.

1,425,103. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed May 18, 1914. Serial No. 839,325.

To all whom it may concern:

Be it known that I, HARRY A. KUHN, a citizen of the United States, and resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mining Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to machines for mining coal or like substances.

The object of my invention is to provide a simple form of apparatus by means of which the coal is dislodged and removed without the digging by hand as in the method now most commonly employed, and at the same time reducing the risk of loss of life and in addition greatly reducing the cost of mining.

To these ends my invention comprises the novel features hereinafter set forth and claimed.

In the accompanying drawings, Fig. 1 is a plan view showing the kerf-cutting mechanism making the original cut in the coal and the cutting and conveying mechanism in the rear thereof; Fig. 2 is a plan view showing the kerf-cutting mechanism in normal position on the frame and the cutting and conveying mechanism advancing to remove the coal; Fig. 3 is a side elevation of the cutting and conveying mechanism in operation, the coal having been shot and settled into the original kerf; Fig. 4 is a face view of the wall of coal after it has been undercut and before shooting; Fig. 5 is a like view showing the coal after it has been shot and expanded along its cleavage lines ready to be removed; Fig. 6 is an enlarged plan view of the cutting and conveying mechanism; Fig. 7 is a longitudinal section of same; Fig. 8 is a cross section on the line 8—8 Figs. 6 and 7 looking in the direction of the arrows; Fig. 9 is a cross section on the line 9—9 Figs. 6 and 7, looking in the direction of the arrows; and Figs. 10, 11 and 12 are sectional views of different forms of cutters and flights.

In an application filed by me on the 21st day of October 1913, Serial No. 796,497, I have set forth and claimed a method of mining coal and in connection therewith illustrated a form of apparatus similar to that shown in the drawings of the present application, and which I now propose to cover by Letters Patent.

The numeral 2 designates a suitable frame which may be composed of a number of different parts united together to form a strong, rigid construction. This frame is illustrated as supported in an inclined position, its rear end being carried by the truck 3 which is provided with the axle 4 upon which the traction-wheels 5 are mounted, and the wheels 5 and the mechanism for driving the same are housed in the housing or casing 6. Within the casing 6 on the axle 4 are the grooved friction sheaves 7 which are engaged by the grooved friction sheaves 8 on the shaft 9. This shaft 9 is suspended from the bars 10 which are pivoted to the bracket 11. The toggle-member 12 is connected to the shaft 9 and said toggle is pivoted at 13 to the link 14 which is pivoted to lug 15 on the casing. The other end of the toggle is connected to the crank-arm 16 on the stud-shaft 17 mounted on the bracket 18. To the outer end of the stud-shaft 17 is connected the operating lever 19. It is apparent that by operating the lever 19 the toggle-member 12 is operated to move the friction-sheaves 8 into or out of contact with the friction-sheaves 7 to transmit power to the driving-axles 4, as fully hereinafter set forth.

Mounted on the shaft 9 is the sprocket-wheel 20, the chain 21 passing around a sprocket-wheel 22 on the shaft 23 mounted in the frame. Mounted on the shaft 23 is the worm-wheel 24 which is connected with the worm 25 on the shaft 26. This shaft 26 has the gear-wheel 27 which is engaged by the pinion 28 on the countershaft 29. The gear-wheel 30 is mounted on the shaft 32. The shaft 32 has the clutch-box 33 adapted to receive the squared end of the shaft 34 of the motor 35. This motor, which in the present case may be an electric motor, is the driving power for the kerf-cutting mechanism 36 which may be of any suitable construction, comprising the chain cutter 37 passing around the sprocket-wheels 38 at the forward and rear ends of the frame 38^a, said cutter chain being driven by power transmitted from the motor 35 to the rear driving sprocket wheel 38. When this kerf-cutting mechanism is in position on the main frame 2, the motor-shaft 34 engages the clutch-box 33 and power is transmitted from the motor to the mechanism for driving the traction-wheels as well as the cutting and conveying mechanism, all as fully hereinafter set forth.

The kerf-cutting mechanism is provided with feed and tail-ropes in the ordinary manner, and by means of said ropes and the customary jacks or anchors, this mechanism drags itself off the frame 2 and back thereon as well as into and across the cut when in position for cutting. The numeral 39 indicates the rope-drum around which the feed-rope 40 passes and the numeral 41 designates the drum around which the tail-rope passes. Customary pulleys 42, 43, 44 and 45 for the guiding of the feet and tail-ropes are provided. The frame 2 is provided with a hook 46 (Fig. 7) to which the feed-rope 40 is connected when the kerf-cutting mechanism is to be dragged upon the frame 2, as indicated in Fig. 3. The kerf-cutting mechanism when up in this position with its motor-shaft 34 in engagement with the clutch-box 33 forms a power-plant for operating the cutting and conveying mechanism. The kerf-cutting mechanism and the cutting and conveying mechanism illustrate one form of mechanism for mining coal in accordance with the method forming the subject matter of the application for Letters Patent above referred to.

The forward end of the frame 2 is supported upon the rollers 47 mounted on the swivel-brackets 48. The studs 49 on said swivel-brackets pass up through the beam 50. The stud 49 of one of the rollers has the worm-wheel 51 which is engaged by the worm 52 on the shaft 53. In order to operate both rollers simultaneously in the steering of the apparatus; the rollers are connected by the bar 54 which is connected to the arms 55 secured to the studs 49. It will be apparent that on turning the shaft 53 by applying a suitable handle 56 thereto, the worm-wheel 51 will be turned and the rollers 47 moved either to the right or the left according to the direction to be given to the machine.

In the operation of the machine it may be found desirable and necessary to raise the forward end thereof where an obstruction is encountered in the floor of the mine or to raise the nose of the machine for other purposes such as digging upwards in the coal and I have accordingly provided apparatus to effect this result. The toggles 57 are connected to the frame 2 and to the beam 50. These toggles are provided with the threaded nuts 58 with which the threaded bar 59 engage. It would be apparent that by turning the bar 59 by means of a handle applied to one end thereof, the toggles will operate to raise and lower the front end of the frame 2 for the purpose set forth.

At the rear end of the frame 2 is the sprocket-wheel 60 and at the forward end of said frame are the sprocket-wheels 61. The chain 62 passes around said sprocket-wheels, and said chain carries the flights 63 secured at their inner ends to said chain at intervals. The outer end of the flights 63 are formed with integral cutters, or are provided with detachable cutters 64 as illustrated in the drawings which are adapted to cut into or under the body of coal which has been displaced by shooting as fully hereinafter set forth. As clearly shown in Fig. 10 the cutters 64 are secured to the flights by means of nuts and bolts 65 and 66, respectively, which project above the cutters and aid in dislodging the coal. Furthermore, the front edges of the flights are beveled to an edge as at 67 to enable them to more readily pass into and under the coal and effect a lifting of the overlying mass.

A pan 68 is secured to the frame 2 below the flights 63 and said flights are adapted to travel above the surface on said pan and convey the coal which is dislodged onto said pan by the action of the cutters 64. The rear end of the pan 68 is cut away as at 69 to permit the coal to be dislodged into the pit wagon 70 which is located in proper position to receive the coal discharged from said pan. The cutting points project in front in advance of the nose plate or pan and thus clear a way for the nose plate or pan.

The sprocket-wheel 60 is power driven being connected up to the motor 35 in the following manner: A bevel-wheel 71 on said sprocket-wheel is engaged by the bevel-pinion 72 on the shaft 26^a which as hereinbefore described is connected up by gearing with the motor-shaft 34.

At the front end of the frame 2 is a skid 73 which is hinged to said frame at 74 so that when said skid is not in use it may be thrown up into position indicated in dotted lines, Fig. 7. This skid is employed in dragging the kerf-cutting mechanism off or on the frame 2.

To provide for the drilling of holes in the seam of coal for the introduction of an explosive or other substance, to expand the coal along its lines of cleavage, the drills 75 are employed. These drills are connected up to a flexible shaft 77 arranged in bearings 78 at the side of the frame 2. Where shafts 77 are arranged at both sides of the machine they are driven simultaneously by a system of sheaves. The main sheave 79 is driven by shaft 29 connected by suitable gearing with the motor-shaft. The belt 80 passes around said sheave and around the sheaves 81 and 82 to drive the shafts 77 simultaneously.

In the mining of coal with my improved apparatus, the kerf-cutting mechanism is dragged off the frame 2 by its own power, the jacks A and B having been properly located to effect this result in the ordinary

manner. The jacks A and B are then located as indicated in Fig. 1 for feeding the cutter into and across the coal, so as to form the undercut D as shown in Fig. 4. When this undercut has been made the feed rope 40 is connected up to the hook 46 on the frame 2 and by starting the motor 35 the kerf-cutter drags itself over the skid 73 and up onto the frame 2, as indicated in Figs. 2 and 3. In some seams the coal is not cut along the floor to form the undercut D but the cut is made elsewhere in the seam such as at the top or side and the coal is loosened from its bed by explosives and expanded into the space made by the cut wherever it may be. It will be noted that the kerf-cutting mechanism lends itself to any plan of cutting whether horizontal or vertical, as it is small and flexible with power to move and cut in any direction the rope end is anchored.

The cut having been made, and in this case an undercut, the holes 90 and 91 are then drilled into the face of the coal by the drills 75 one hole at approximately the middle point of the wall, and one at each upper corner extending upwardly at an angle. After these shot holes have been drilled, the charge of powder or other explosive is introduced and the coal is blasted first in the middle and then at the corners in succession. The effect of this shooting or blasting will be to cause the coal to expand along its lines of cleavage as indicated in Figs. 3 and 5, and the lower coal expanded from the center shot will settle down on the floor formed by the undercut D. The upper coal when shot will expand into the space made by the settling of the lower coal, a portion of the coal in front falling in loose lumps on the floor in substantially the position indicated in Figs. 3 and 5. The frame 2 is now advanced to bring the cutters and conveying mechanism in position for work and to do this the lever 19 is operated to throw the sheaves 8 into frictional contact with the sheaves 7, and, through the connections described, power is transmitted from the motor shaft 34 to the axle 4 to rotate the traction wheels 5. In this way the machine is advanced to the work and when brought up in proper position with reference to the coal the clutch 26^b is operated to connect the shaft 26^a up with the motor-shaft through the connections described and power is transmitted to the driving sprocket-wheel 60. In this way motion is imparted to the chain 62. The advance of the machine together with the traveling of the chain will cause the cutters 64 to cut into and under the coal as shown in Fig. 3 to form a crevicelike opening. The first coal to be removed will be that which has fallen down in lumps and which will be moved by the flights 63 along the pan 68 until its discharge at the cut-out portion 69 into the pit-car 70. As the machine continues its work the cutters will continue to cut under and dislodge the coal which has been expanded along its lines of cleavage, the cutters working along the floor on the line of the original undercut, until the coal which has been expanded is dislodged and drops onto the pan 68 to be carried off by the flights 63 which have the beveled edges passing readily underneath the mass and acting to lift the overlying mass. The nuts and bolts 65 and 66 which secure the cutters to the flights act to aid in the disintegration or dislodging of the coal and furthermore as the machine works on an inclined position there is a certain wedging action upwardly as the cutters advance in under the coal. In this manner practically a second undercut is made in the coal after it has been moved or lowered into the original undercut by the shooting of the coal which is above, and the coal is dislodged and dropped onto the conveyer.

The kerf-cutting mechanism in the present case is supported and carried by the same frame as the cutting and conveying mechanism and its motor acts as the power-plant for said cutting and conveying mechanism, and furthermore, said kerf-cutting mechanism may be drawn up out of the way of the cutting and conveying mechanism so that said last named mechanism can be brought quickly into working position. It is not necessary to withdraw the kerf-cutting mechanism from the entry before the cutting and conveying mechanism can be brought into working position and thus co-operates with the cutting and conveying mechanism not only in forming a power-plant for said mechanism but in addition making the preliminary cut which makes possible the cooperation of the cutting and conveying mechanism. The result sought and secured is the removal of the coal from the solid mass to the pit wagon and all of the mechanism shown must act cooperatively and as one complete machine to secure this result.

What I claim is:

1. In apparatus for extracting coal, a frame supported on power-driven wheels, means to raise the forward end of said frame, an endless chain, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage, means carried by said chain to dislodge the coal adjacent to said opening, and means carried by said chain to convey away the dislodged coal.

2. In apparatus for extracting coal, a frame supported on power-driven wheels, means to swing the frame vertically about a pivot, an endless chain, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage,

means carried by said chain to dislodge the coal adjacent to said opening, and means carried by said chain to convey away the dislodged coal.

3. In apparatus for extracting coal, a frame supported on power-driven wheels, means serving to adjust said frame to swing the frame about horizontally, an endless chain, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage, means carried by said chain to dislodge the coal adjacent to said opening, and means carried by said chain to convey away the dislodged coal.

4. In apparatus for extracting coal, a frame supported on power-driven wheels, means to swing the frame vertically, means to adjust said frame for horizontal movement, an endless chain, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage, means carried by said chain to dislodge the coal adjacent to said opening, and means carried by said chain to convey away the dislodged coal.

5. In apparatus for extracting coal, a frame supported on power-driven wheels, means to swing the frame about the axle of said wheels, an endless chain, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage, means carried by said chain to dislodge the coal adjacent to said opening, and means carried by said chain to convey away the dislodged coal.

6. In apparatus for extracting coal, a frame supported on power-driven wheels, means serving to adjust said frame to swing the frame horizontally about said wheels as a center, an endless chain, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage, means carried by said chain to dislodge the coal adjacent to said opening, and means carried by said chain to convey away the dislodged coal.

7. In apparatus for extracting coal, the combination of a suitable frame, cutting mechanisms supported thereon adapted to make a horizontal cut, a pan extending across the front end of said frame, an endless conveyer operating in connection with said pan, dislodging means carried by said conveyer, supported by said pan and reacting against the floor of said pan.

8. In apparatus for extracting coal, a frame, a pan on said frame, an endless chain mounted on said frame, means carried by said chain to form a crevicelike opening in the coal expanded along its lines of cleavage, means carried by said chain to dislodge the coal, said dislodging means comprising a bevel member adapted to force the coal from its normal position in the mass.

9. In apparatus for mining coal, the combination of suitable frame, a pan carried by said frame, and extending across the front of same, an endless chain mounted on said frame, means for driving said chain, flights carried by said chain, and moving over said pan, and cutters carried by said flights.

10. In apparatus for mining coal, the combination of a frame, a pan carried thereby, and extending across the front of same, an endless chain mounted on said frame, means for driving said chain, flights on said chain, the front edges of said flights being beveled, said flights moving over said pan, and cutters carried by said flights.

In testimony whereof, I the said HARRY A. KUHN have hereunto set my hand.

HARRY A. KUHN.

Witnesses:
JOHN F. WILL,
ROBT. D. TOTTEN.