

H. A. KUHN.
MINING MACHINE.

APPLICATION FILED OCT. 12, 1907. RENEWED NOV. 21, 1908.

1,079,353.

Patented Nov. 25, 1913.

3 SHEETS—SHEET 1.

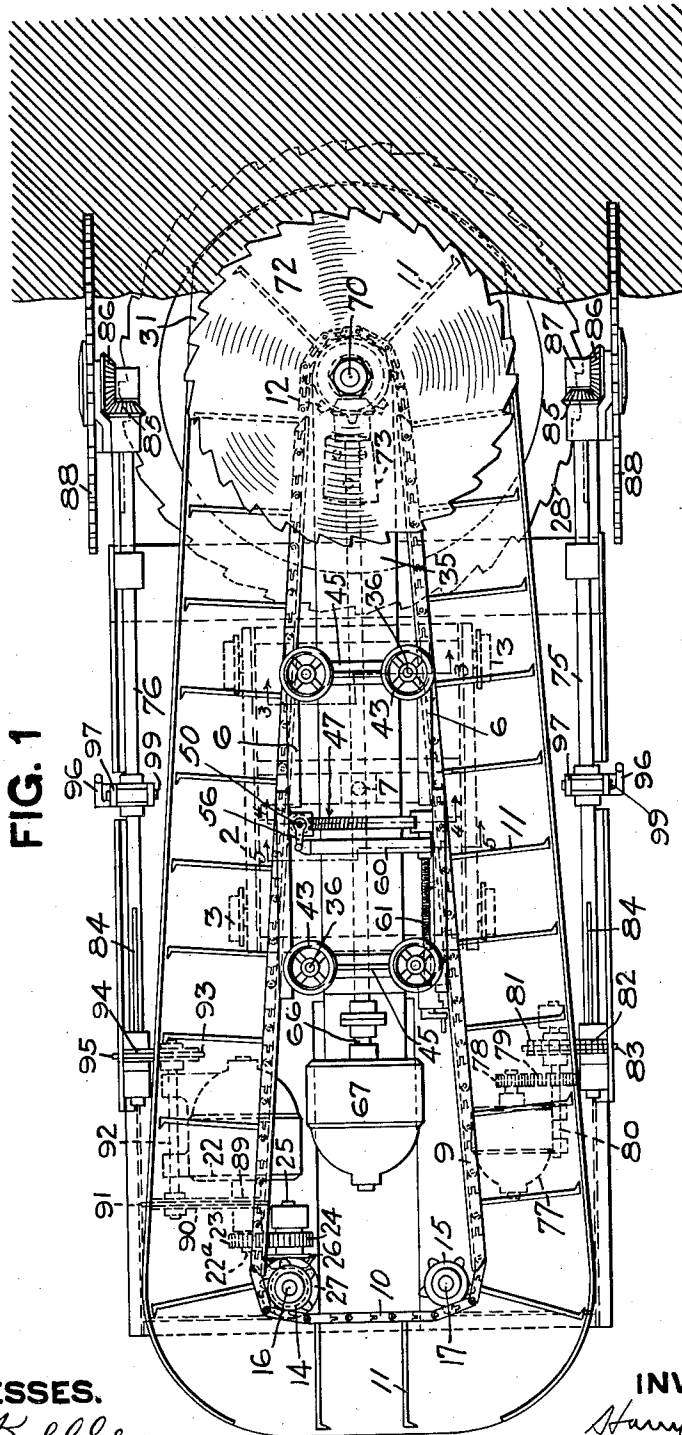


FIG. 1

WITNESSES.

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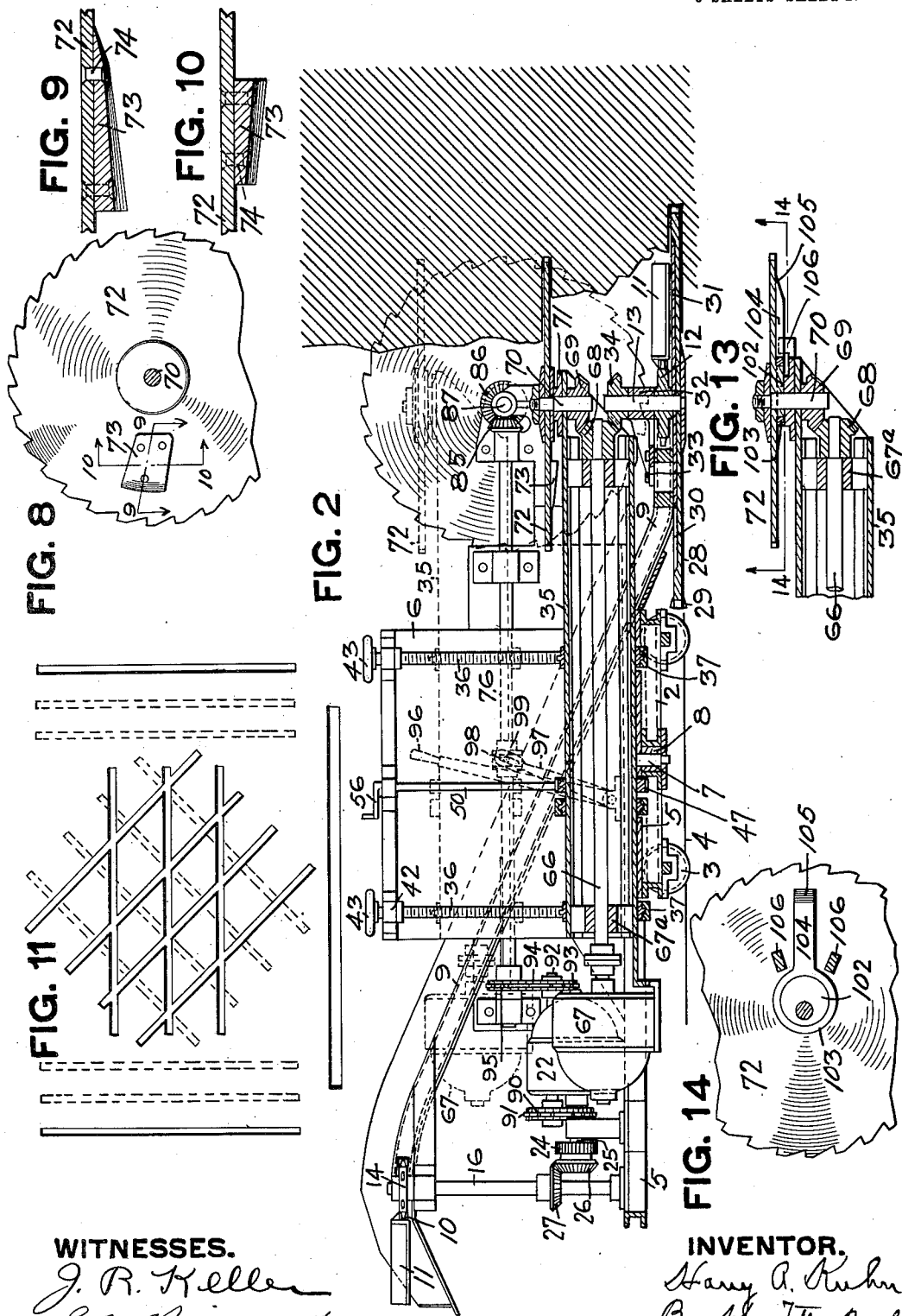
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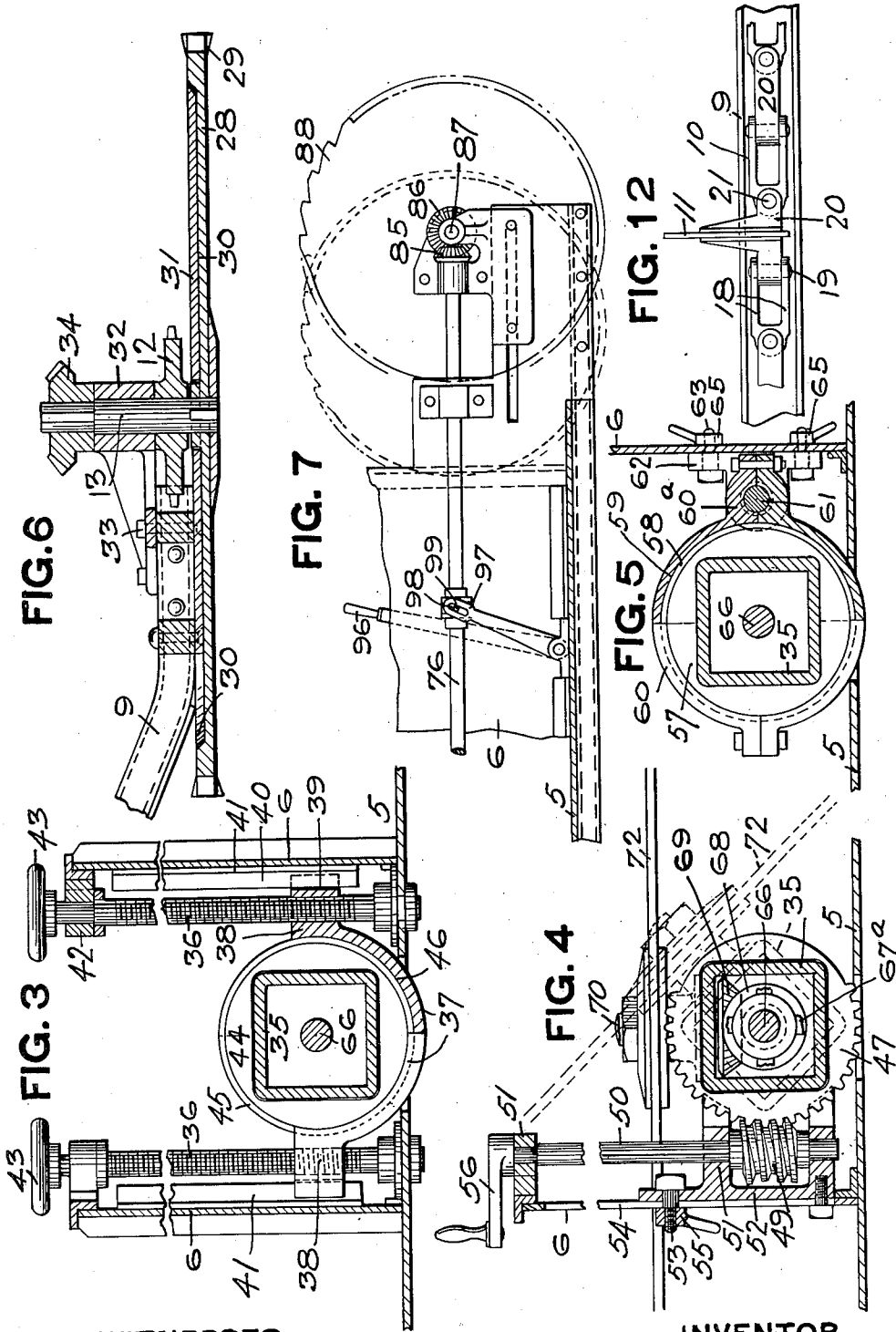
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WITNESSES.

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UNITED STATES PATENT OFFICE.

HARRY A. KUHN, OF PITTSBURGH, PENNSYLVANIA.

MINING-MACHINE.

1,079,353.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HARRY A. KUHN, a 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 mining machines.

The object of my invention is to provide a machine which will rapidly cut the coal and at the same time cut it in such a manner that the coal may be taken out in large blocks or lumps, thereby doing away with the necessity of blasting in order to break down the coal after the undercut has been made.

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

In the accompanying drawings Figure 1 is a plan view of my improved machine; Fig. 2 is a longitudinal section of the same; Fig. 3 is an enlarged section on the line 3-3 Fig. 1; Fig. 4 is an enlarged section on the line 4-4 Fig. 1; Fig. 5 is an enlarged section on the line 5-5 Fig. 1; Fig. 6 is an enlarged detail sectional view of the forward end of the stationary frame; Fig. 7 is a detail of the manner of feeding the vertical saws or cutters; Fig. 8 is a plan view of one of the horizontal cutters; Figs. 9 and 10 are details; Fig. 11 shows the front face of the coal after my improved machine has made the cuts; Fig. 12 is an enlarged view of a portion of chain; and Figs. 13 and 14 show modified forms of a breaking down device.

In the accompanying drawings the numeral 2 indicates a suitable truck mounted on wheels 3 which are adapted to travel upon a track 4 laid within the mine. This truck 2 may be built up by angle bars properly braced and riveted together and mounted on said truck is the platform 5 which carries the frame 6. This platform 5 is swiveled on the truck 2 so as to be turned thereon around a central point and said platform has the pivotal pin 7 extending down within the center plate 8 of the truck 2.

Supported on the frame 6 is the conveyer trough 9 which is located on an incline and operating in connection with said conveyer trough is the conveyer chain 10

which is provided with the conveyer arms 11 adapted to move in the trough 9. The chain 10 passes around the sprocket wheel 12 which is mounted on the vertical shaft 13, and said chain then passes up and around the sprocket wheels 14 and 15 on the vertical shafts 16 and 17. As the chain 10 has to conform to the incline of the conveyer trough 9 and at the bottom thereof extends out on a substantially horizontal plane where it passes around the sprocket wheel 12 I prefer to employ the construction of chain shown in Fig. 12. This chain is made up of the forked links 18, to which are swiveled by means of a pin 19 the links 20. These links engage the forked end of the links 18 and are secured thereto by means of the pins 21. In this manner I provide a chain which has movement in a horizontal as well as an inclined plane so as to provide for the conforming of the chain to the course that it has to make in the conveyer trough as well as to the change in the direction to pass around the sprocket 12.

In order to provide for the travel of the chain 10 I employ the motor 22, the motor shaft 22^a carrying the gear wheel 23 which meshes with the gear wheel 24 on the shaft 25. A bevel gear 26 on the shaft 25 meshes with a bevel gear 27 on the vertical shaft 16 and in this manner power is imparted to rotate said shaft and provide for the travel of the chain 10 carrying the conveyer arms 11.

Secured to the shaft 13 is the circular saw or cutter 28, said cutter being provided on its periphery with removable cutting tools which may be arranged at an angle to project in such way as to cut wider than the thickness of the body of the cutter so as to give full clearance of the same in entering the coal. This cutter 28 is dished as at 30 to receive the plate 31, which is bolted or otherwise secured to the forward end of the conveyer trough 10. This plate is adapted to receive the fallen coal and the conveyer arms 11 passing over said plate carry the coal therefrom and convey it up the conveyer trough in the manner fully hereinafter set forth. The shaft 13 passes up through the bearing 32 which is bolted as at 33 to the conveyer frame and said shaft carries at its upper end the bevel pinion 34.

A hollow beam or girder 35 is supported by means of the threaded standards 36, said standards being supported by the platform

5. The straps or hangers 37 have the threaded lugs 38 with which the threaded standards 36 engage. These lugs 38 have the grooves 39 which are adapted to engage the flanges 40 projecting from the T-bars 41 which are secured to the frame 6. In this manner the upward movement of the lugs is guided by said T-bars. The upper ends of the standards 36 pass through the bearings 42 on the frame 6 and at the extreme upper ends of the said standards are the hand wheels 43 for rotating said threaded standards. The beam 35 is encircled by the flanges 44, said flanges having the beadings 45 which are adapted to engage grooves 46 formed to receive them in the hangers 37. The beam 35 is free to move longitudinally within the flanges 44. In this manner the upward movement of the beam 35 is obtained by turning the threaded standards 36 while at the same time said beam is adapted to be rotated or rocked in the straps or hangers 37.

In order to provide for the turning of the beam 35 I provide the following mechanism: Surrounding the said beam is the circular worm rack 47, said beam being free to move longitudinally in said rack. A worm 49 is adapted to engage a circular worm rack and said worm is mounted on the shaft 50 which is mounted in bearings 51 in the movable plate 52. This plate 52 is secured to the frame 6 by means of the screws 53 and said frame 6 is provided with a slot 54 with which said screws engage so as to allow for the upward or downward movement of the plate 52 with reference to the frame 6, when the beam is raised by the threaded standards 36. One of said screws 53 is provided with a thumb nut 55 by means of which the plate 52 may be tightened up and held in position on the plate 6. The upper end of the shaft 50 is provided with the handle 56 for rotating the worm 49. In this manner it will be apparent that a rotary movement may be imparted to the beam 35 by means of the worm 49. The bearings 51 are recessed or cut away so as to permit the entrance of the rack 47 to prevent the longitudinal movement of said rack when the beam inclosed thereby is moved longitudinally. To provide for this longitudinal movement of the beam I encircle said beam and attach thereto the ring 57 having the tongue 58 adapted to engage a groove 59 in the split ring 60. This ring rigidly holds the beam 35 so as to travel therewith. The bearing 60^a of the partible ring 60 is internally threaded and engaging therewith is the threaded bar 61. The bar 61 is mounted in a bearing 62 so as to be held against longitudinal movement. As this bar 61 is rotated, being held against longitudinal movement, it is apparent that by engaging the threaded opening 60 of the partible ring 57

that said ring and the beam held thereby will be given a longitudinal movement. In order to provide for the upward movement of the beam 35 when adjusted by the threaded standards 36, the bearing 60^a forms part of the plate 62 which is adjustable up and down by means of the screws 63 which move in slots formed in the frame 6. The screws 63 are provided with thumb nuts 65 by means of which said plates 62 may be released in order to allow for the upward movement of the bearing 60^a together with the beam 35.

Extending through the beam 35 is the shaft 66 which is driven by the motor 67. This shaft 66 passes through bearings 67^a in the said beam 35 and at its outer end is secured to bevel gear 68 which meshes with the bevel gear 34 on the shaft 13 as well as the bevel gear 69 on the shaft 70. This shaft 70 is journaled in bearings 71 on the beam 35 and secured to the upper end of this shaft is the circular saw or cutter 72.

The saw or circular cutter 72 is provided on its lower face with the wedge or block 73 which is secured to said saw by means of the rivets 74. This wedge block is arranged at a suitable distance from the periphery of said saw and is wedge-shaped in two directions, as clearly indicated in Figs. 9 and 10. The purpose of this wedge block will be fully hereinafter set forth. The cutters 28 and 72, while illustrated as circular or disk shaped, are not necessarily round in form in the sense of forming a complete circle, but may be of other forms approaching the circular. It is only essential that they be flat with the cutters at their outer edges.

At the sides of the frame are the shafts 75 and 76 arranged in suitable bearings in the main frame. In order to drive the shaft 75 a motor 77 is provided, said motor having the gear wheel 78 meshing with the gear wheel 79 on the shaft 80. This shaft 80 has the sprocket wheel 81 thereon with a sprocket chain 82 extending around the sprocket wheel 83 on the shaft 75. This shaft 75 is longitudinally movable in its bearings and accordingly is provided with the feather 84. At the outer ends of the shafts 75 and 76 are the bevel gears 85 which mesh with the bevel gears 86 upon the studs 87 which carry the vertical saws or cutters 88.

The shaft 76 is driven from the motor 22, the motor shaft having the sprocket wheel 89 thereof and a sprocket chain 90 extending to the sprocket wheel 91 on the shaft 92. A shaft 92 has the sprocket wheel 93 and a chain 94 connects said sprocket wheel with the sprocket wheel 95 on the longitudinal shaft 76.

In order to provide for the longitudinal movement of the shafts 75 and 76 and the feeding in of the vertical saws 88 I provide

levers 96, said levers being secured to the arms 97 which are secured to the frame, the upper ends of said arms having the slots 98 with which the pins 99 on the shafts 75 and 76 engage. It is apparent by a movement of the levers 96 the shafts 75 and 76 may be moved forward or backward to feed or withdraw the cutters 88 independently of the horizontal cutters as fully hereinafter set forth.

When my improved machine is in operation the truck 2 is moved along the track 4 until the machine has been brought into position in front of the wall of coal to be cut, whereupon power is then applied to the motors to drive the horizontal cutters 28 and 72 and the vertical cutters 88 through the connections described from the several motors to said cutters. As the cutters cut into the coal the frame of the machine may be advanced in any suitable manner and the undercut will be made by the undercutter 28, and the cutter 72 will cut a horizontal cut at some distance above said undercut, while the vertical cutters 88 will cut at each side of and beyond the horizontal cuts. As the cutters are driven at a very high rate of speed they will readily cut into the coal and as the undercut is made the upper horizontal cut will be made at the same time by the cutter 72. The action of the wedge block 73 on the cutter 72 will be to jar or vibrate the under layer of coal at each rotation of said cutter 72 and the wedge action of said block will act to break down the coal, as said cutter advances, so that it will fall in large lumps upon the plate 31 to be carried therefrom by the conveyer arms 11 of the conveyer chain 10. This coal will be carried up the conveyer trough and delivered to the chute at the rear end of same to be discharged into a car or other suitable receptacle located there to receive it. The wedge block 73 being inclined in both directions will work its way readily into the coal, as the cutter rotates and through its wedging action will act to loosen and separate the coal above the undercut. When the machine has been operating until the undercutter 28 has cut its full depth, the machine may then be withdrawn and the upper cutter 72 raised so as to cut the coal at a higher level. To provide for this adjustment of the upper cutter it is necessary to elevate the beam 35. The operator accordingly turns the threaded standards 36 which act to lift the beam and disengage the bevel gear 68 from the bevel gear 34, which renders inoperative the undercutter 28. The threaded standards 36 are turned until the beam 35 has been raised to the proper height. In order to permit of this upward movement of the beam 35 the plates 52 must be loosened by the thumb nuts 55 to allow of the upward movement

of said plate in the slot 54 formed in the frame 6. In the same manner the plate 62 must also be released. When the beam 35 has been adjusted to the proper height the power is again applied to the motor 67, whereupon the cutter 72 is fed into the coal. In order to provide for the forward feed of this beam 35 carrying the cutter 72, the operator turns the threaded bar 61 which causes said beam 35 to move forward into the coal.

In the same manner as above described the cutter 72 rotating at a high speed cuts into the coal and at the same time through the action of the wedge block breaks down the coal in lumps and deposits it upon the receiving plate 31 to be carried up the conveyer. In this manner a number of horizontal cuts may be made and the coal broken down without the use of explosives, and at the same time the coal is broken into such large lumps that very little slack results. If it is desired to shift the horizontal cutters 72 into an angular position to make cross cuts in the wall in addition to the horizontal cuts, it is only necessary for the operator to turn the handle 56 whereupon the worm 49 turns the worm rack 47 on the beam 35, and said beam may be rotated or tilted so as to bring the cutter 72 into the position indicated in Fig. 4. In this manner the cut is made at an angle to the horizontal cut and the coal when cross-sawed in this manner is readily removed (see Fig. 11). As the frame of the machine is swiveled on the truck the beam 35 may be swung around at different angles to the front face of the coal so as to make cuts on all sides. Owing to the rotary beam the cutter may be even swung around to a horizontal position instead of merely stopped at the angle indicated in Fig. 4, whereby the cutter is capable of being used at different levels.

In Figs. 13 and 14 I have shown a modified form of wedging device in which the saw or cutter 72 is provided with the eccentric hub 102. An eccentric strap 103 encircles said hub and said strap has the arm 104 projecting out therefrom with the beveled end 105. Guides or stops 106 are provided on the frame and it will be apparent that as the cutter rotates the eccentric will act to move the arm 104 back and forth and so give a jarring action to the coal, said guides preventing the rotation of the arm.

I wish to include within the scope of my invention other forms of cutters than those illustrated, as my invention is capable of a wide application and is in no way limited to the specific form of mechanism illustrated and described.

What I claim is:

1. In a mining machine, the combination

with a suitable frame or support, of a conveyer carried thereby, an undercutter at the forward end of said conveyer, said undercutter having a dished upper face, and a receiving plate in said dished upper face.

2. In a mining machine, the combination with a suitable frame or support, of a beam supported thereby, means for raising and lowering said beam, means for moving said beam longitudinally, a cutter carried by said beam and mechanism carried by said beam for driving said cutter.

3. In a mining machine, the combination with a suitable frame or support, of a beam carried thereby, means for moving said beam longitudinally, means for tilting or rocking said beam laterally, a cutter carried by said beam and mechanism carried by said beam for driving said cutter.

4. In a mining machine, the combination with a suitable frame or support, of a hollow beam, a shaft supported within said hollow beam, a motor for driving said shaft, means for raising and lowering said beam, means for moving the same longitudinally, a cutter carried by said beam and connections between said shaft and said cutter for driving the latter.

5. In a mining machine, the combination with a suitable frame or support, of a hollow beam, hangers supporting said beam, threaded standards engaging said hangers, a shaft extending through said beam, a motor driving said shaft, a cutter carried by said beam, connections between said shaft

and said cutter, and means for moving said beam longitudinally.

6. In a mining machine, the combination with a suitable frame or support, of a beam, a circular rack surrounding said beam, said beam being longitudinally movable therein, worm shafts engaging said rack, means for moving said beam longitudinally, a shaft extending through said beam, a motor for driving said shaft, a cutter carried by said beam and connections between said shaft and said cutter.

7. In a mining machine, the combination of a suitable frame, cutting mechanism supported thereby to make a horizontal cut, cutting mechanism to cut at an angle to the said first mentioned cut, and means for advancing said last named cutting mechanism independently of the first named cutting mechanism.

8. In a mining machine, the combination of a suitable frame, cutting mechanism supported thereby to make a plurality of horizontal cuts, cutting mechanism adapted to make a plurality of cuts at an angle to said first named cuts, and means for advancing said last named cutting mechanism independently of said first named cutting mechanism.

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

HARRY A. KUHN.

Witnesses:

ROBERT C. TOTTEN,
J. R. KELLER.