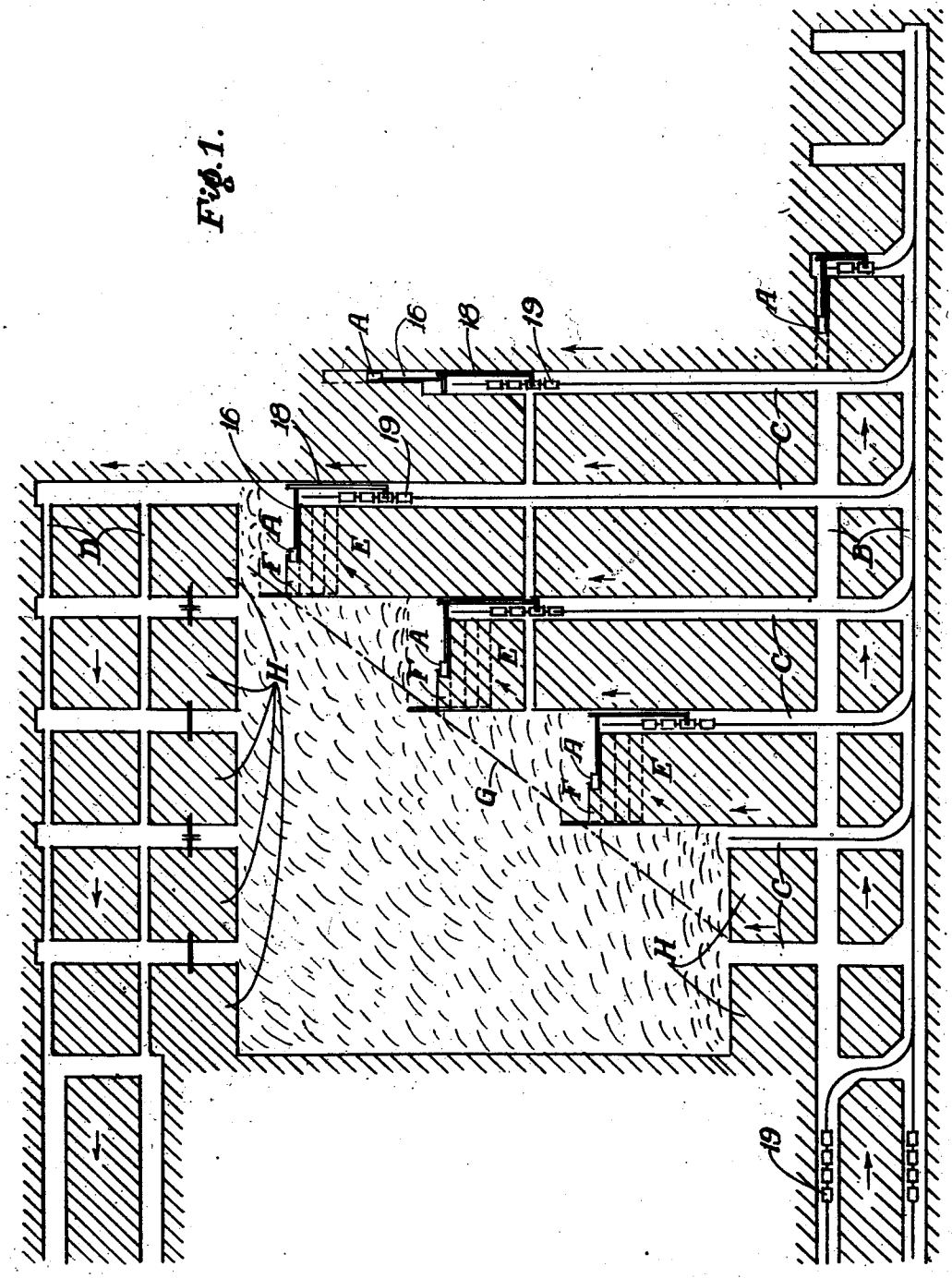
Feb. 6, 1945. F. B. MILLER 2,368,863

MINING MACHINE

Filed May 8, 1942 12 Sheets-Sheet 1

Fig. 1.



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Feb. 6, 1945. F. B. MILLER 2,368,863

MINING MACHINE

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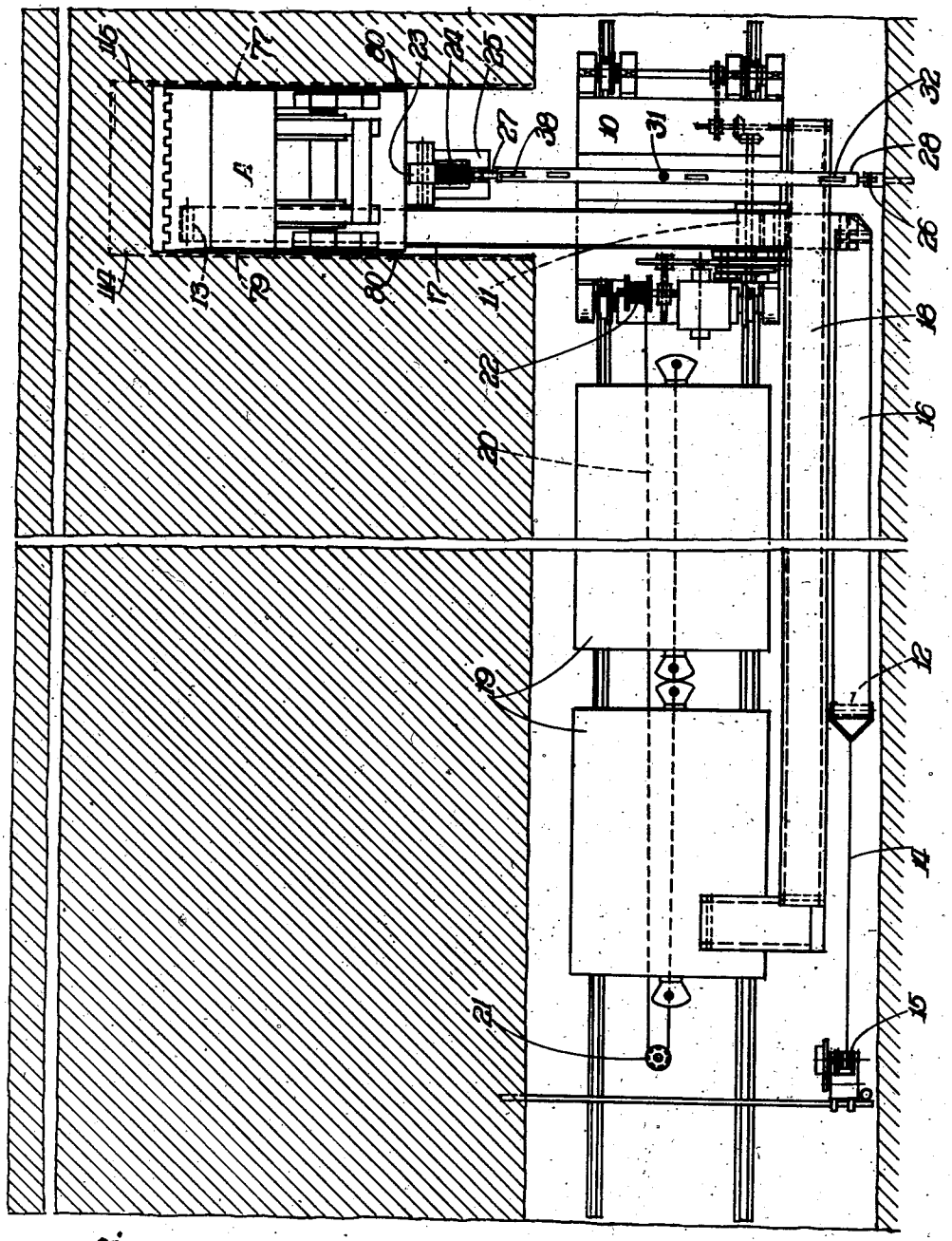

Fig. 2.

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MINING MACHINE

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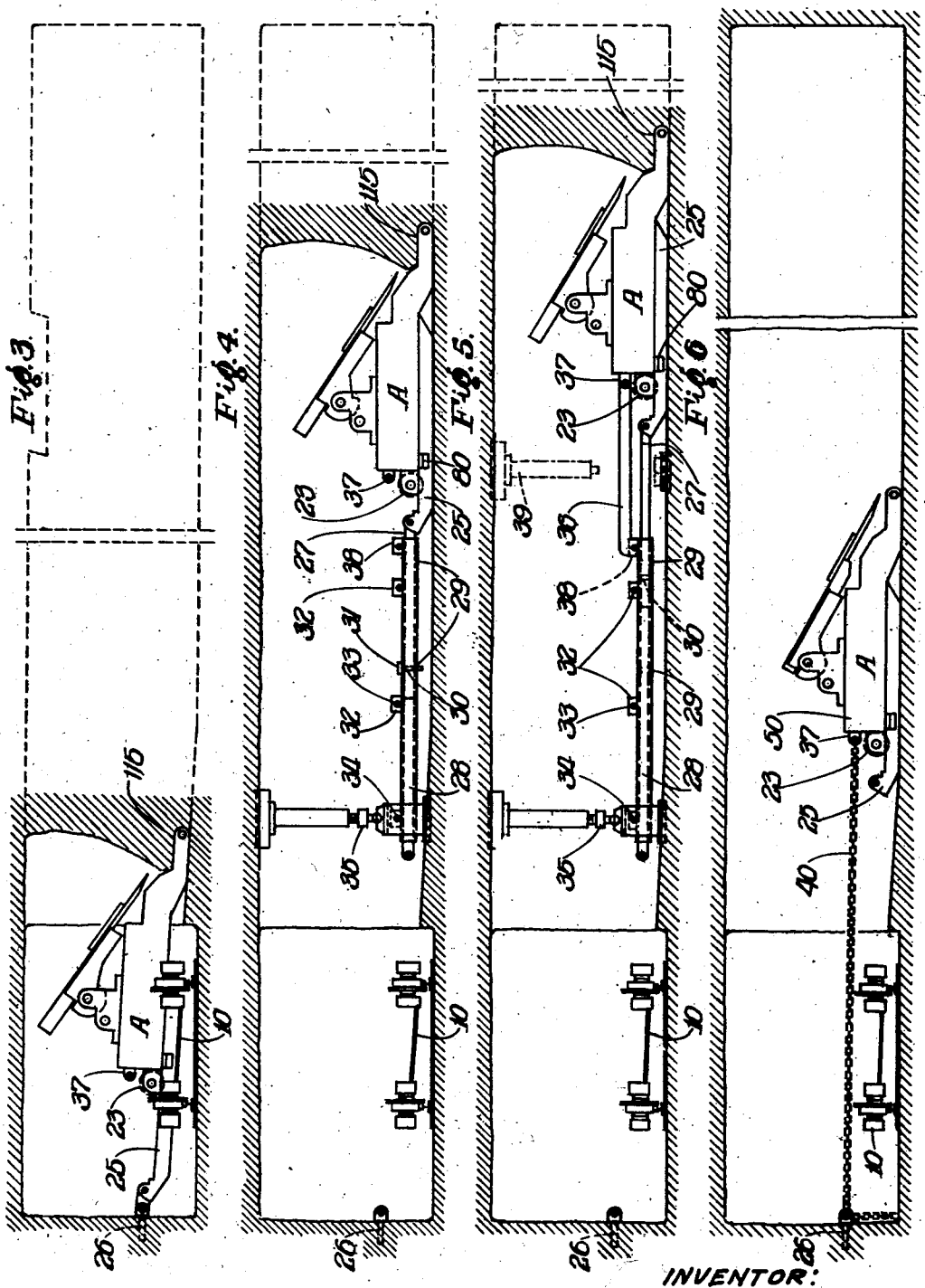

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MINING MACHINE

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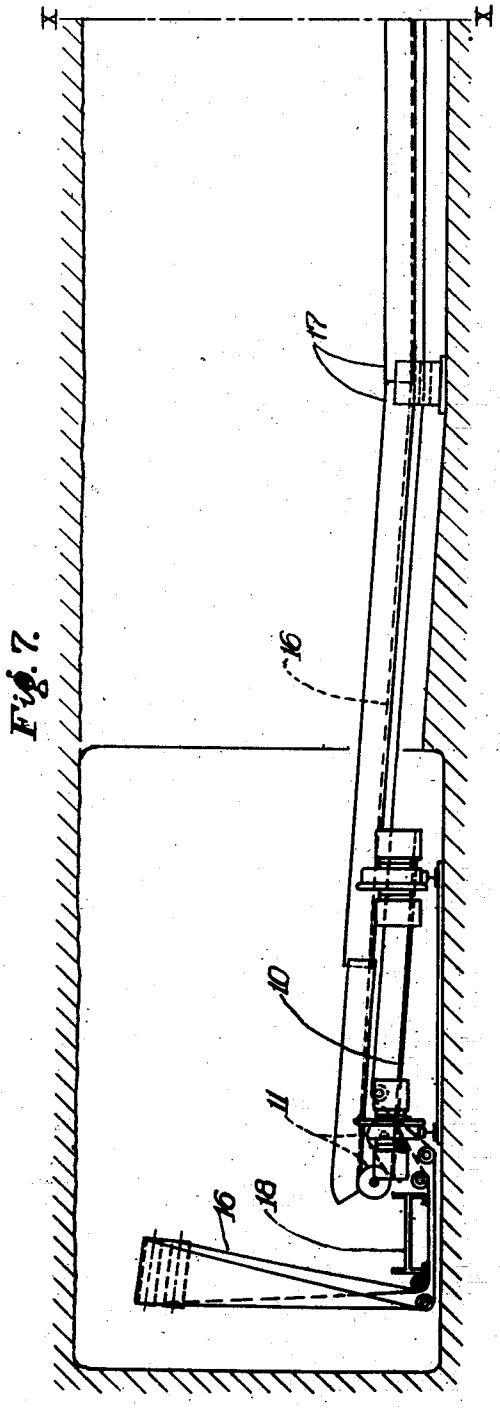

Fig. 7.

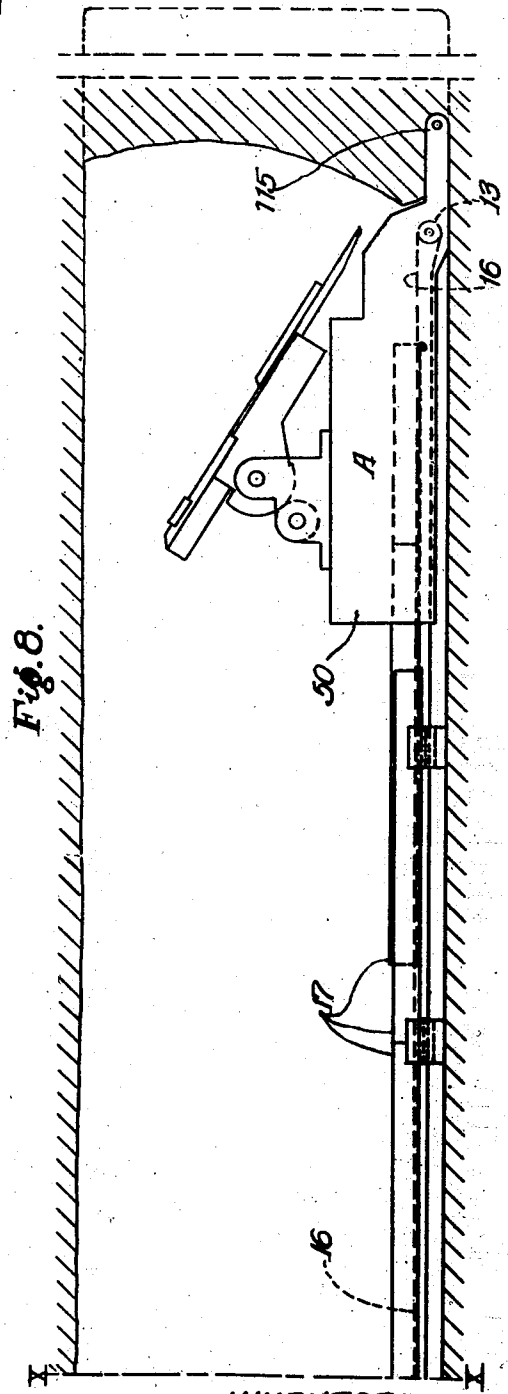

Fig. 8.

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MINING MACHINE

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Fig. 9.

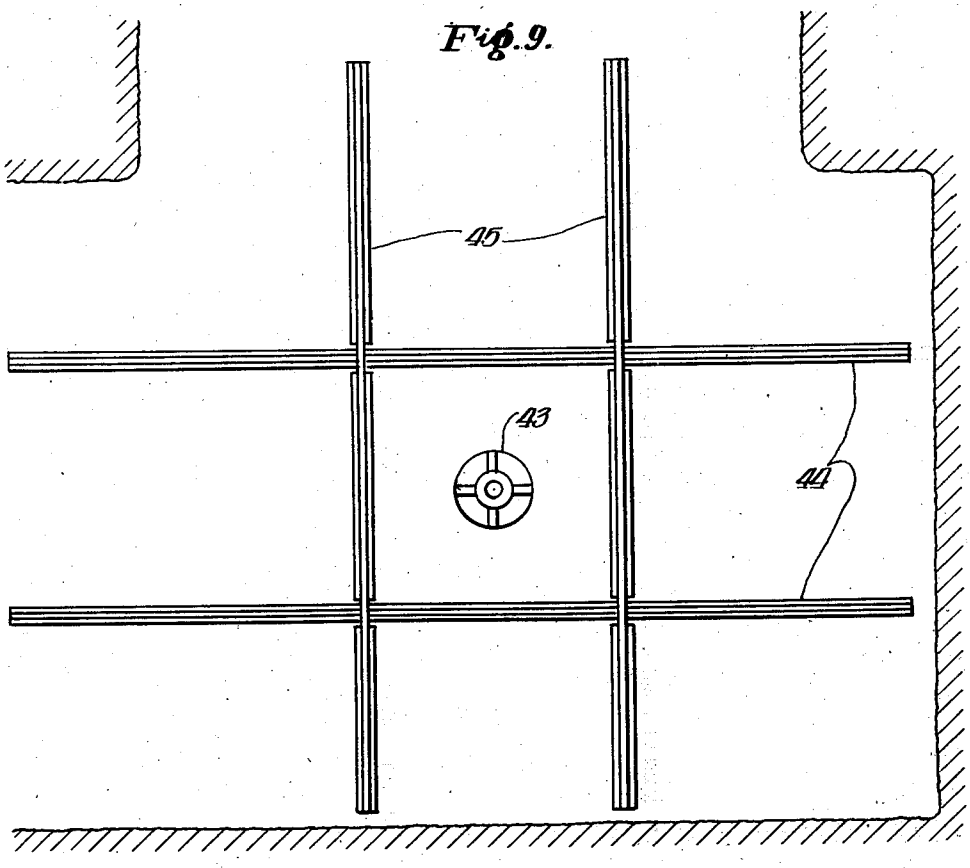
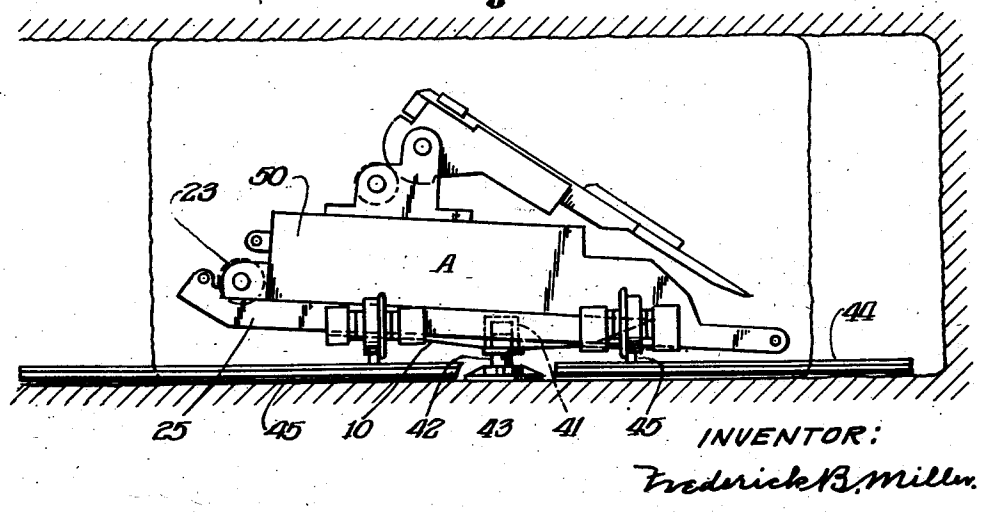


Fig. 10.



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MINING MACHINE

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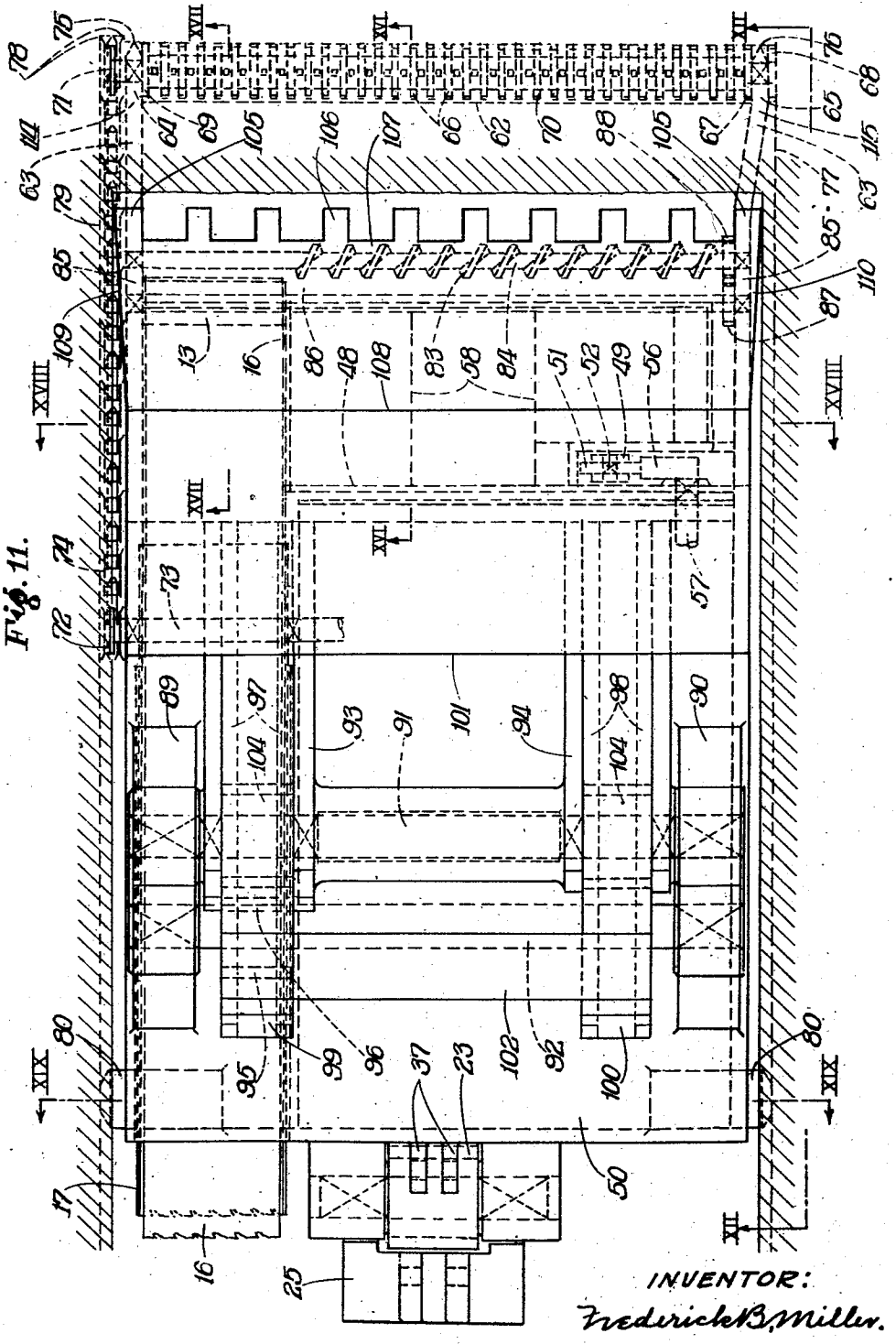

Fig. 11.

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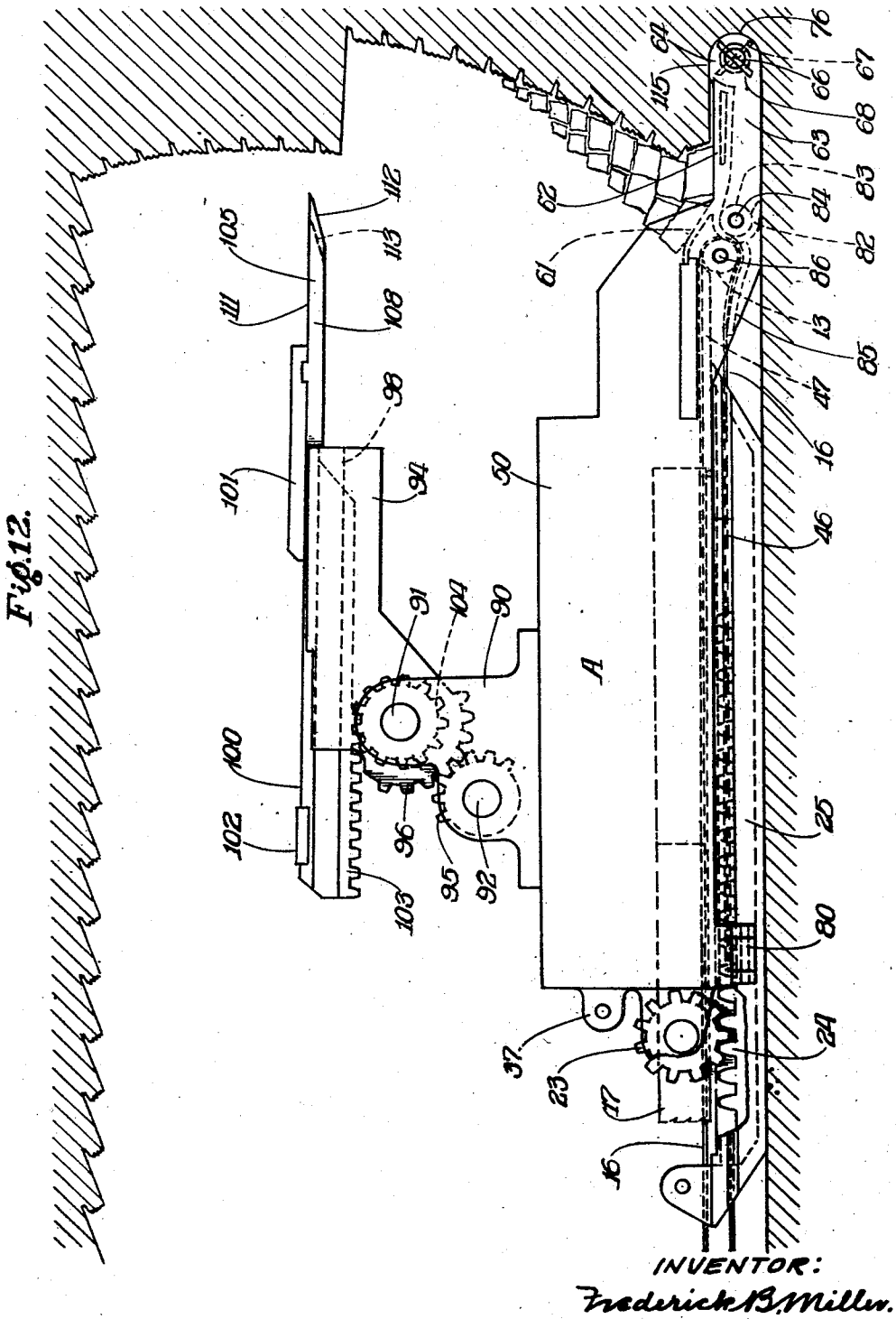

Fig. 12.

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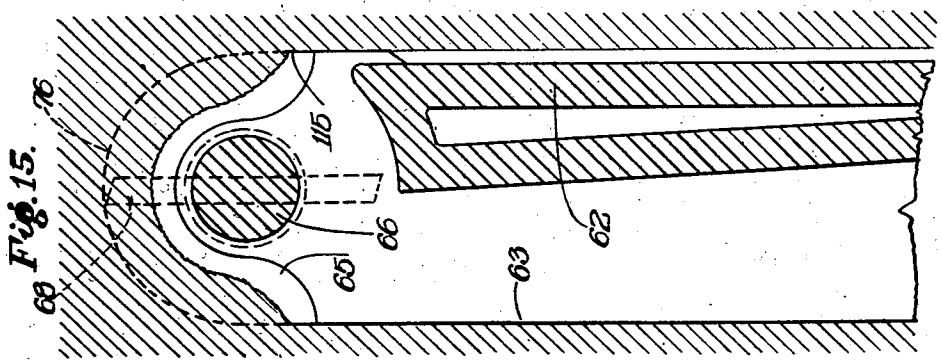

Fig. 15.

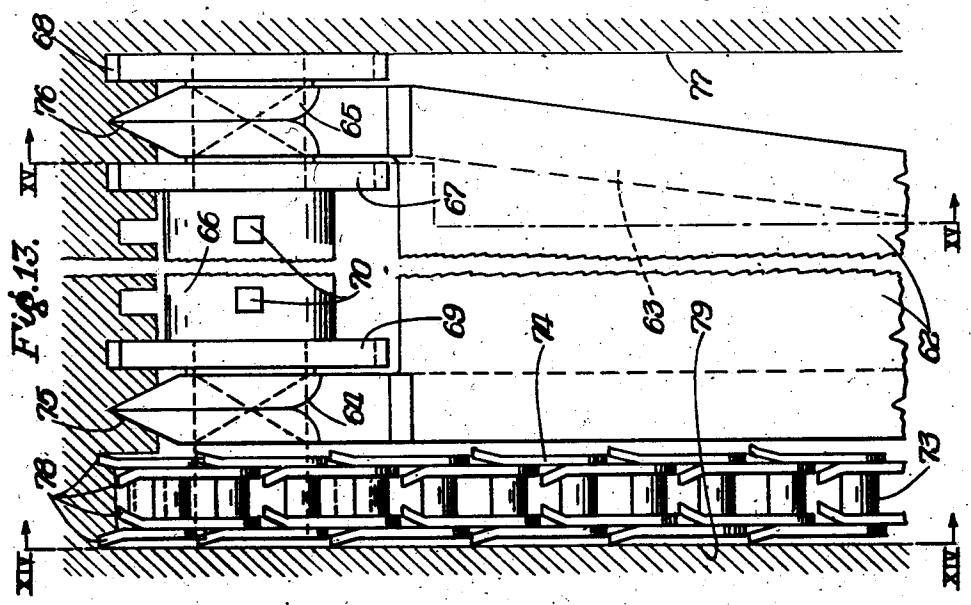

Fig. 13.

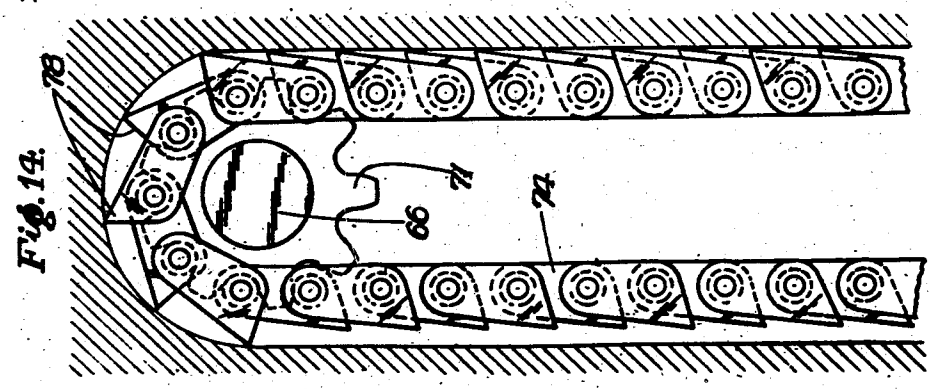

Fig. 14.

INVENTOR:
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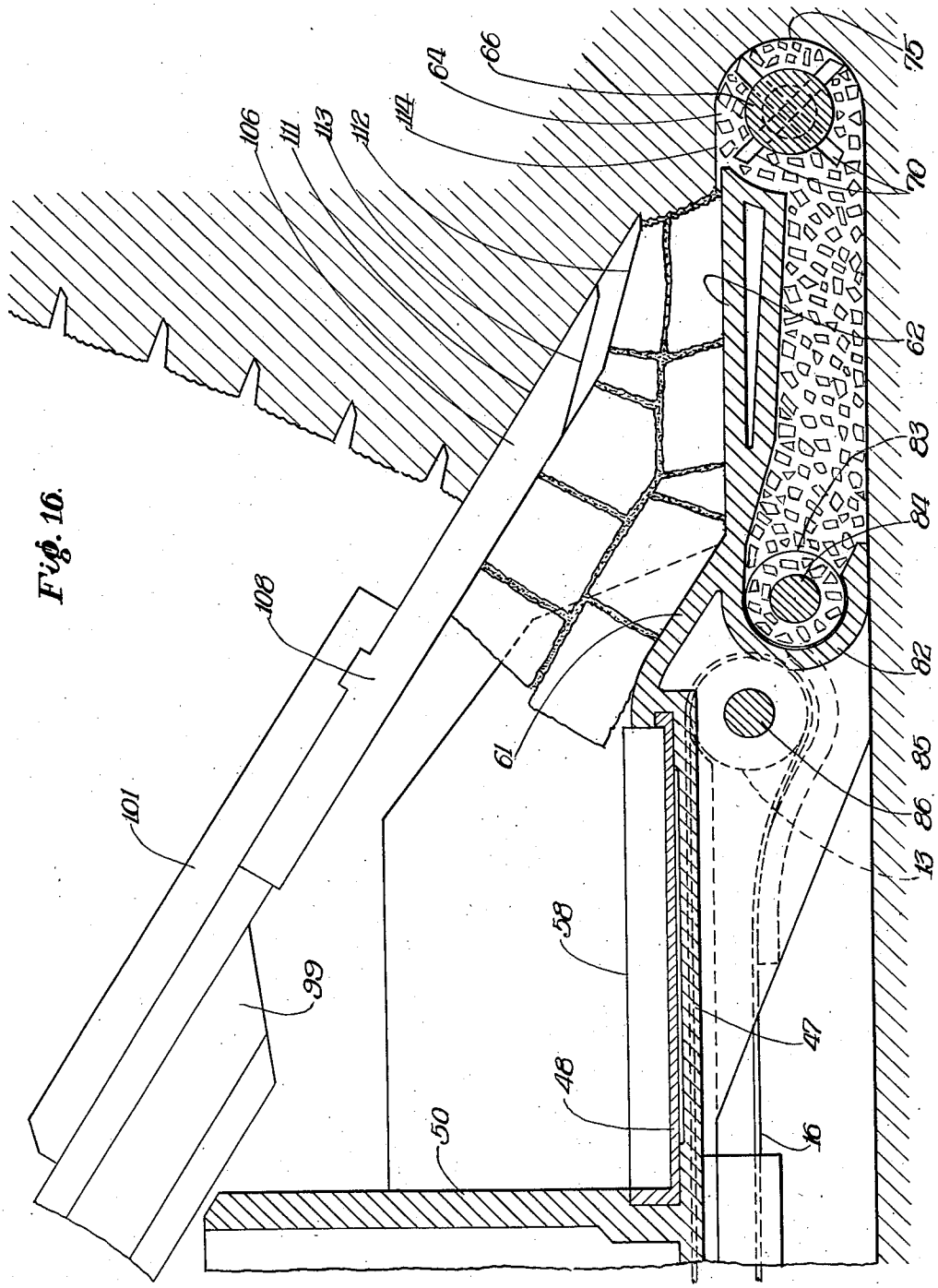

Fig. 16.

INVENTOR:
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MINING MACHINE

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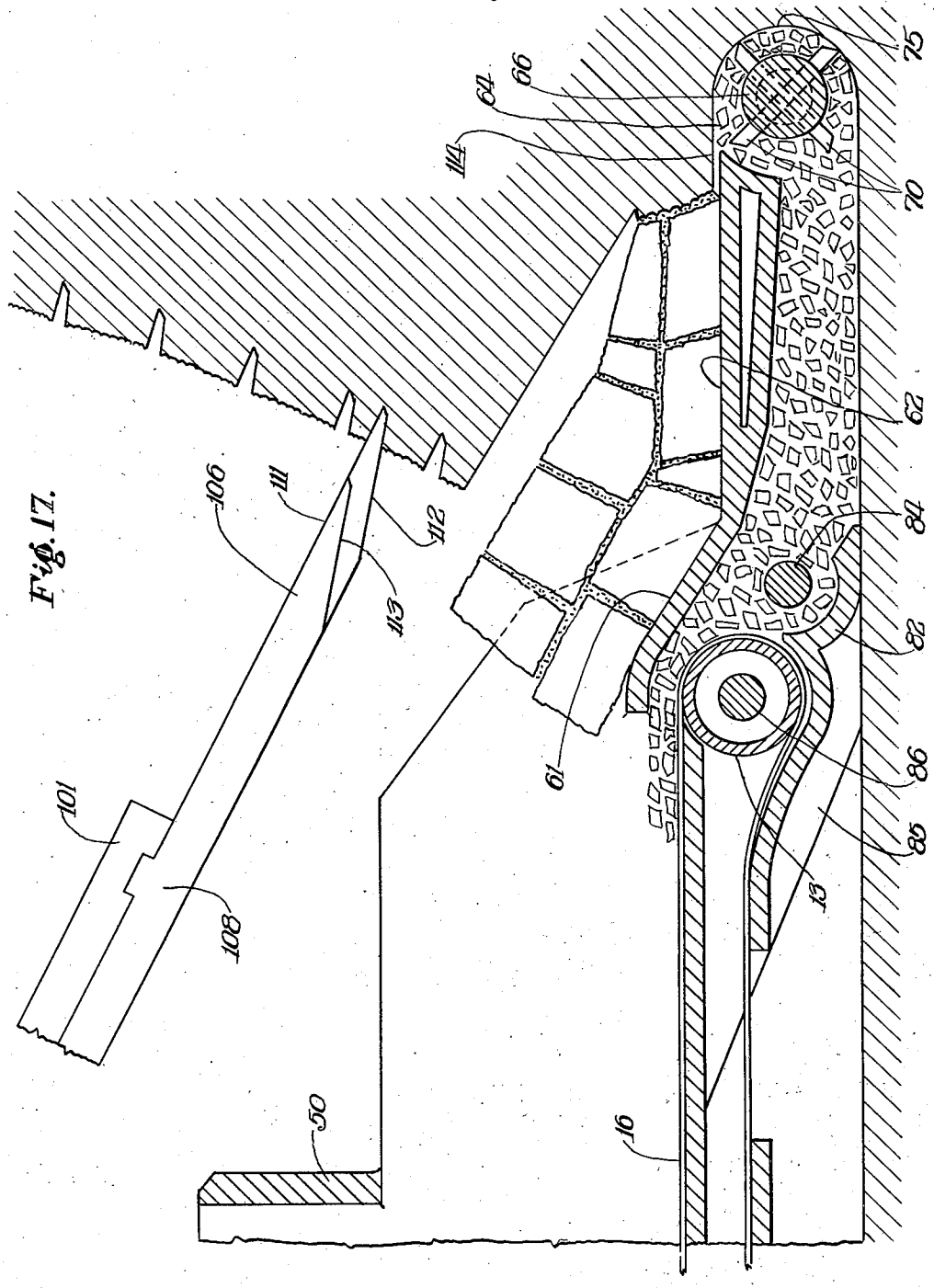

Fig. 17.

INVENTOR:
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MINING MACHINE

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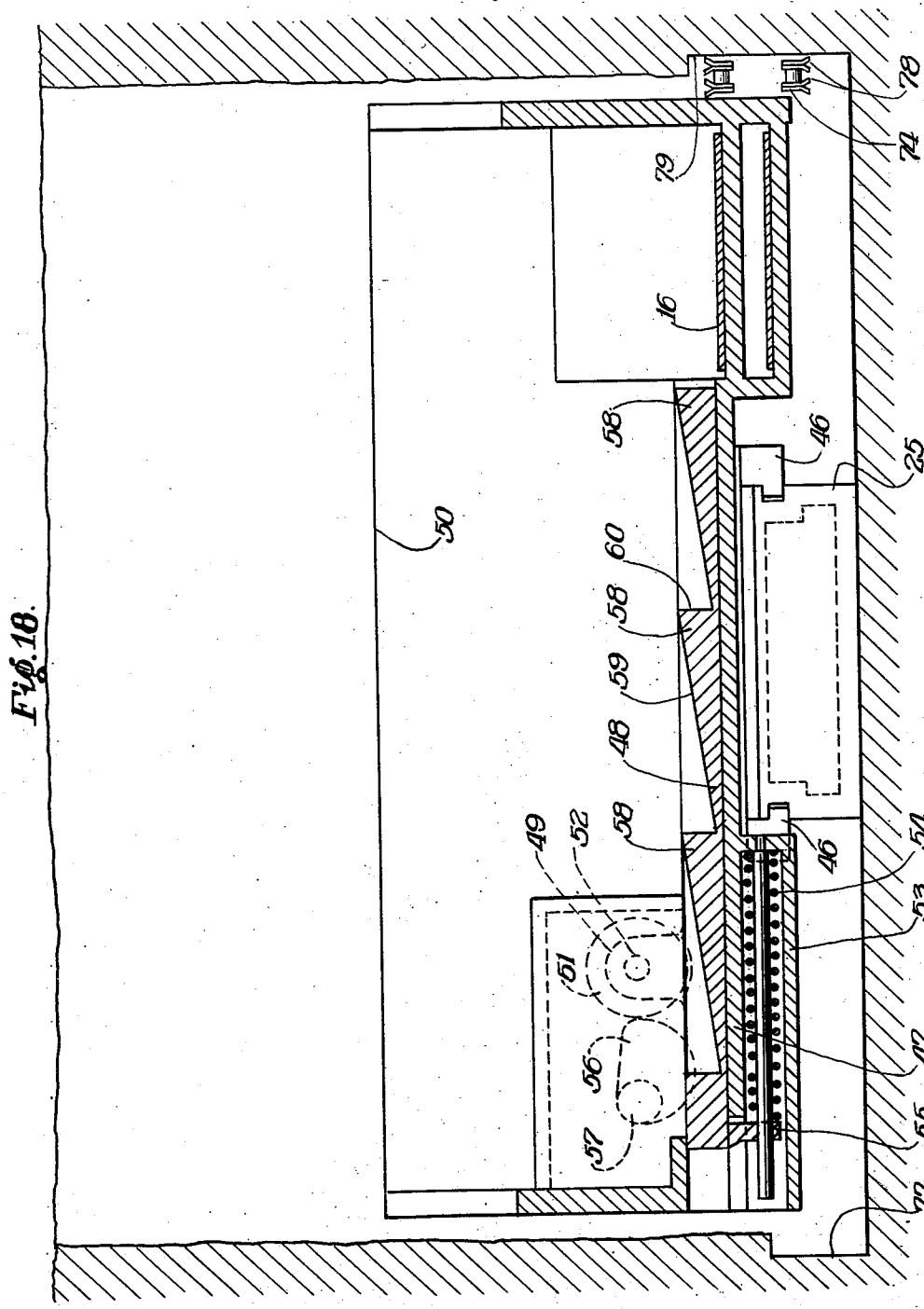

Fig. 18.

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MINING MACHINE

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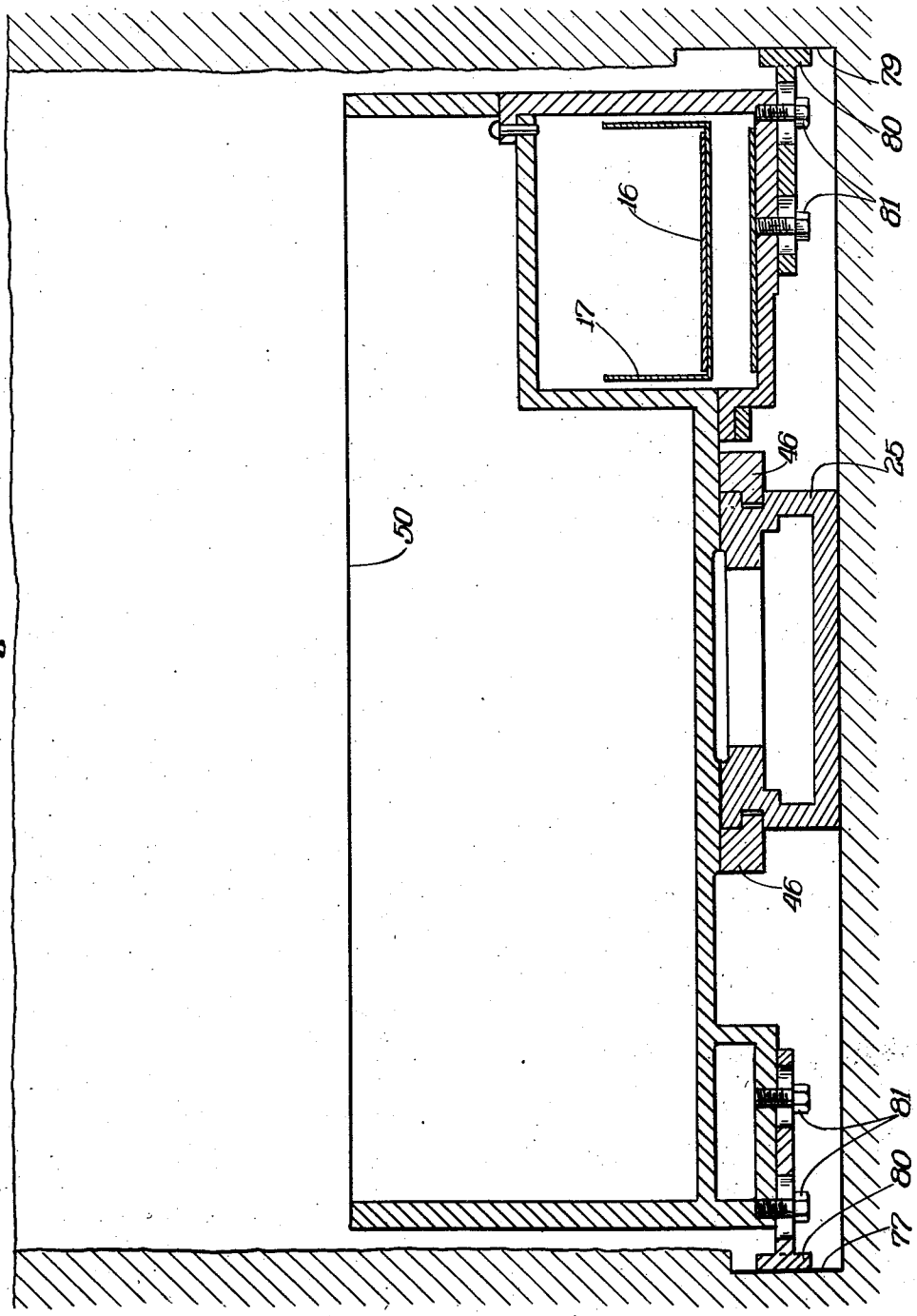

Fig. 19.

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Patented Feb. 6, 1945 2,368,863

UNITED STATES PATENT OFFICE

2,368,863

MINING MACHINE

Frederick B. Miller, Chicago, Ill.

Application May 8, 1942, Serial No. 442,165

32 Claims. (Cl. 262—9)

This invention relates to a machine adapted to undercut coal, wedge down the coal undercut, load the coal cuttings from the undercut and the coal wedged down over the undercut.

One object of this invention is to provide a machine that is capable of operation in comparatively low seam.

Another object is to provide a machine of comparatively narrow width, capable of operation for mining entries, rooms, splits and cutovers of comparatively narrow width, thereby attaining relatively narrow roof span that is self sustaining.

Another object is to provide a machine capable of being positioned for operation at any angle across a comparatively narrow entry, the width of which is restricted by physical conditions restricting the roof span.

Another object is to provide a machine having a novel rotary cutter bar capable of cutting a kerf in the coal which serves as a backing to resist lifting of the foreward end of the machine by the forces exerted undercutting and wedging down the coal.

Another object is to provide a machine with adjustable shoes bearing against the vertical solid sides of the parallel recesses cut in the coal adjacent to sides of the machine by a novel rotary cutter bar for holding and guiding the machine in path of the coal to be mined.

Another object is to provide a machine with a novel screw conveyor mounted to rear of a novel rotary cutter bar for crowding the coal cuttings onto a belt conveyor.

Another object is to provide a machine of this class with a plurality of wedge bars for operation in conjunction with a novel rotary cutter bar capable of wedging down coal in such uniform size that can be conveyed through the machine on a comparatively narrow extensible conveyor discharging onto a comparatively narrow loading conveyor extending along side of an entry and cars for loading a succession of cars.

A further object is to provide a machine that is capable of operation in entries, rooms, splits and cutovers without the use of track.

A still further object is to provide a plurality of machines of this class, capable of co-ordination to carry out a system of mining whereby continuous operation is attained to complete a cycle that does not require removal of the machines from their respective working faces.

These and other objects will be apparent after referring to the accompanying drawings, in which:

Figure 1 is a system of mining showing the operating position of a plurality of machines in entries, rooms, splits and covers.

Figure 2 is a plan view of an area of coal showing the machine in a split at right angle to a room in which a loading conveyor is positioned for receiving coal from the machine conveyed by the extensible conveyor.

Figure 3 is a side elevation showing the machine positioned across a room on a truck in state of operation.

Figure 4 is a side elevation showing a jack and a telescopic anchor bar for anchoring the machine in advanced position.

Figure 5 is a similar view showing the skid base advanced by the machine.

Figure 6 is a similar view showing an anchored chain attached to the machine for accomplishing a succession of backward movements of the skid base on which the machine is retracted to position on truck.

Figure 7 is a side elevation showing an extensible conveyor driven by tandem pulleys mounted on the truck and extending from the loading conveyor.

Figure 8 is a similar view of the extensible conveyor continuing from line X—X to the machine in advanced position.

Figure 9 is a plan view showing track and cross rails between which a bearing plate is centrally seated.

Figure 10 is a side elevation showing the machine mounted on a truck and a hydraulic jack with piston partially extended and seated in the bearing plate on which the truck is turned for railment on the cross rails.

Figure 11 is a plan view of the machine used in carrying out the system of mining shown in Figure 1.

Figure 12 is a side elevation of the machine taken on the line XII—XII of Figure 11.

Figure 13 is a fragmentary enlarged plan showing the rotary cutter bar and cutter chain for driving the rotary cutter bar.

Figure 14 is a side elevation taken on line XIV—XIV of Figure 13.

Figure 15 is a sectional elevation taken on line XV—XV of Figure 13.

Figure 16 is an enlarged sectional elevation taken on line XVI—XVI of Figure 11 showing the screw conveyor in relation to the rotary cutter bar and tail end of the extensible conveyor, also showing the top side of the rotary cutter bar housing bearing against the coal undercut.

Figure 17 is an enlarged sectional elevation

taken on line XVII—XVII of Figure 11 showing the platform shrouding the coal mined by the rotary cutter bar, also showing coal mined by the wedge bars resting on the platform in state of being crowded from the platform by reason of the platform entering a successive kerf.

Figure 18 is an enlarged transverse sectional elevation taken on line XVIII—XVIII of Figure 11 showing the feeder plate in relation to the receiving end of the extensible conveyor.

Figure 19 is an enlarged transverse sectional elevation taken on line XIX—XIX of Figure 11 showing adjustable shoes bearing against solid vertical sides of parallel recesses cut in the coal.

Referring to Figure 1 of the drawings, a plurality of mining machines A (to be described) are arranged to carry out a system of mining having an air intake entry B from which a succession of rooms C are extended to an air return entry D providing pillars E. From the end of the pillars E cutovers F are mined in step on a rib line G at an angle to the room C. Portion of pillars E adjacent to the entries B and D not mined, provide barriers H for protecting the entries. In the entries, rooms, splits and cutovers are positioned the plurality of machines A timed to advance in step and adapted to be moved in step from last cutover in each successive pillar E to a position in the air intake entry B, extended mining of the air intake entry the distance between successive room centers, extend the mining of a successive room C, extend the mining of the air return entry D and mine a succession of cutovers F across end of a successive pillar E from a point adjacent the air intake entry D to a point adjacent the air intake B thereby completing one of a series of mining cycles.

In carrying out that part of the system of mining pertaining to means for conveying and loading the coal mined by the machine A, I use an extensible conveyor like that shown and described in my prior United States Patent No. 1,858,933, dated May 17, 1932, comprising a self-propelled truck 10, tandem drive pulleys 11 mounted on the truck and an idler pulley 12 yieldably anchored at a point to the rear of and distant from the truck in same plane with a pulley 13. Idler pulley 12 is connected to one end of a cable 14, the other end of which is connected to a constant torque reel 15 to pull the cable 14 away from pulley 13 under constant tension thereby forming a yieldable retractable anchor for idler pulley 12. A single endless conveyor belt 16 is trained over the pulleys 12 and 13, tandem drive pulleys 11 and through telescopically arranged troughs 17 extending between the truck 10 and the pulley 13 mounted in the machine through which the conveyor belt 16 travels. As the coal is mined, the machine loads the coal onto the extensible conveyor which in turn conveys and delivers the coal onto a loading conveyor 18 and this last named conveyor delivers the coal into the cars 19 attached to a cable 20 trained over an anchored sheave 21 and adapted to wrap on a power driven drum 22 mounted on the truck 10 for moving cars when being loaded.

In carrying out that part of the system of mining pertaining to the means for advancing and retracting the machine A, it is slidably mounted on an anchored skid base similar to that shown and described in my prior United States Letters Patent No. 1,766,395, dated June 24, 1930. The machine is provided with a rack pinion 23 meshed with a rack 24 integral with the skid base 25. The rack pinion 23 is adapted to be driven in reverse direction by the power drive of the machine (not shown). The skid base 25 positioned across a room or entry on the truck 10 is connected to an expansion bolt 26 anchored in solid coal for anchoring the skid base 25 on which the machine is advanced in the coal from position on the truck 10 as shown in Figure 3. When the machine is in advanced position, one end of a telescopic anchor bar is connected with the skid base 25, the other end of which is connected to the expansion bolt 26. The telescopic anchor bar comprising an inner bar 27 and a tubular bar 28 provided with holes 29 respectively adapted to be registered with the holes 30 in the inner bar 27 to receive a removable pin 31 which serves to lock the bars against telescoping movement. The tubular bar 28 is provided with lugs 32 in which are holes 33 to receive the pin 34 for locking or securing the tubular bar to the jack 35 as shown in Figure 4. When the machine has reached its forward limit of travel on the skid base 25, the strut 36 is mounted between a pair of spaced lugs 37 provided at rear end of the main frame 50 and the lug 38 on the tubular bar 28. With the pin 31 removed, the pinion 23 is operated in reverse direction to pull the skid base 25 and the inner bar 27 forwardly as shown in Figure 5. After the skid base 25 and inner bar 27 are advanced, the strut 36 will be removed and the tubular bar 28 released from the jack 35 and advanced until the holes 29 and 30 again register. A second jack 39 will be previously placed in advance of the first jack 35 for locking the tubular bar 28. The machine having advanced a predetermined distance from the truck 10 as described, the main frame 50 is connected to the chain 40 anchored in solid coal by the expansion bolt 26. With the chain 40 holding the main frame 50 against forward movement, the skid base 25 is moved toward the truck 10 by operation of the pinion 23 after which the main frame 50 is moved toward the truck 10 by operation of the pinion 23 in reverse direction. With the slack in the chain 40 taken up, the main frame 50 again is anchored for movement of the skid base 25 toward the truck. A succession of movements of the skid base 25 and main frame 50 retracts the machine to position on the truck 10 as shown in Figure 6.

In carrying out that part of the system of mining pertaining to the means for turning the machine A in rooms C or entries B for operation at right angle to same, comprises a hydraulic jack having a cylinder 41 fixed to bottom side of the truck 10. The piston 42 extending from cylinder 41 is pivotally seated on the bearing plate 43 centrally seated between rails 44 and cross rails 45. The piston 42 is further extended by forcing fluid in the cylinder 41 which lifts the truck 10 sufficiently to clear the flanges of the wheels for turning the truck with machine positioned on same for railment on cross rails 45.

The machine A used in carrying out the system of mining comprises a main frame 50 slidably mounted on an anchored skid base 25 described. Guides 46 fixed to bottom side of the main frame 50 serve to guide the main frame on the skid base 25. Forward to the main portion of the main frame is a portion in form of a base 47, in which a feeder plate 48 is reciprocally mounted for conveying or feeding the mined coal across the machine onto the single endless belt 16 of

the extensible conveyor described. Integral with the feeder plate 48 is a pair of spaced lugs 49 between which is mounted a roller 51 journaled on the pin 52. In a housing 53 integral with the underside of the base 47 is seated a spring 54 arranged to exert pressure against the lug 55 integral with bottom side of the feeder plate 48. Pressure exerted by the spring 54 holds the roller 51 in contact with the cam 56 integral with the shaft 57 journaled in the main frame 50 for rotation by source of power (not shown) whereby the cam is actuated imparting forward movement to the feeder plate 48 and compression to the spring. Comparable to the forward movement, a faster backward movement of the feeder plate 48 is effected by the spring 54 maintaining the roller 51 in contact with that portion of the cam 56 which is shaped to provide a comparable faster backward movement. Top side of the feeder plate 48 is provided with triangular bars 58, the inclining top sides 59 slip under the coal by reason of the rapidity of backward movement of the feeder plate, while the vertical sides 60 of the triangular bars push the coal toward and onto the endless belt 16 (described.)

The forward end of the base 47 terminates in an inclined portion 61 from which extends a platform consisting of a web 62 between ribs 63 extending from the main portion of the main frame 50. Integral with the forward end of the ribs 63 are housings 64 and 65 in which is journaled a rotary cutter bar comprising a shaft 66 provided with bits 67, 68, 69 and 70. Integral with the shaft 66 is a sprocket 71. To the rear and in alignment with the sprocket 71 is a sprocket 72 fixed to a power driven shaft 73 (source of power not shown) journaled in main frame 50. A cutter chain 74 in a plane parallel to side of the main frame 50 trained over sprockets 71 and 72, drives the rotary cutter bar adapted to undercut and form a kerf in the coal to be mined. The forward side of the housings 64 and 65 are formed to provide wedges 75 and 76. Adjacent to the sides of the wedge 76 are bits 67 and 68. The bit 68 is adapted to cut a recess in the coal with a side face 77 in a plane parallel to the side of the main frame 50 opposite to cutter chain 74. Adjacent to the sides of the wedge 75 is a bit 69 and a cutter chain 74 carrying teeth 78. The cutter chain teeth 78 are adapted to cut a recess in the coal with a side face 79 in a plane parallel to the side of the main frame 50. Adjustable shoes 80 secured to backward underside of the main frame 50 by adjusting bolts 81 are adapted to bear against the solid side faces 77 and 79 of the recesses cut by the bit 69 and cutter chain teeth 78 for guiding and holding the machine in alignment. To the rear of the rotary cutter bar, integral with the underside of the inclined portion 61 is a semi-circular trough 82 with an open side toward the rotary cutter bar. Concentric within the trough 82 is a conveyor screw comprising a screw 83 integral with the periphery of a shaft 84 journaled in the ribs 85 integral with the main frame 50. Adjacent and parallel to the shaft 84 is a shaft 86 journaled in the ribs 85 on which the pulley 13 is keyed. Fixed to the shaft 86 is a gear 87 meshed with a gear 88 fixed to the shaft 84 driven by the endless belt 16 trained over the pulley 13 (described) imparting rotation to the conveyor screw.

A pair of spaced upright supporting brackets or bearings 89 and 90 are mounted on the main frame 50 and a pair of horizontal shafts 91 and 92 are journaled therein. A pair of carriage guide members 93 and 94 are pivotally mounted at their backward ends on the shaft 91. Quadrant gear 95 keyed to the shaft 92 is meshed with quadrant gear 96 mounted radial from the shaft 91 and integral with the guide members 93 and 94 so that rotation of the shaft 92 (by source of power not shown) will cause a swinging movement to the carriage guide members about the shaft 91. Guide members 93 and 94 are provided with bearing portions 97 and 98 respectively, on which ram bars 99 and 100 forming the sides of the carriage are slidably mounted. The ram bars 99 and 100 are tied together to complete the carriage by a base plate 101 and cross member 102. The ram bars 99 and 100 are adapted to reciprocate on the bearing portions 97 and 98, and are provided with rack portions 103 meshed with rack pinions 104, keyed to the shaft 91 which is power driven in reversible directions (source of power not shown). A plurality of staggered wedge bars 105, 106 and 107 are arranged parallel in a horizontal plane on the tilting and reciprocating carriage.

The wedge bars 105, 106, and 107 are integral with a cross member 108 secured to that portion of the carriage base plate 101 extending beyond the ends of the ram bars 99 and 100. The outward sides 109 and 110 of the side wedge bars 105 taper inwardly from forward end. Top sides 111 of the wedge bars 105, 106, and 107 are flat and in the same plane the carriage reciprocates or is rammed forward, with flat bottom sides 112 and 113 tapering downward in relation to top sides. Wedge bars 107 with a flat top side 111, are recessed or staggered in relation to wedge bars 105 and 106. The flat top side of wedge bars 107 in same plane as the flat top side of wedges 105 and 106, with flat bottom side 113, tapering downward in relation to the flat top side.

In operation, the main frame 50 is fed forward engaging the rotary cutter bar bits 67, 68, 69 and 70, wedge portions 75 and 76 of the cutter bar housings 64 and 65 and the cutter chain teeth 78 with the coal to be mined. The bits 67 and 68 cut away the coal adjacent the wedge 76, while the bit 67 and cutter chain teeth 78 cut away the coal adjacent the wedge 75. The wedges 75 and 76 penetrate and crowd the coal at the forward side of the housings 64 and 65 into the kerfs cut adjacent to the wedges, which coal is brushed rearward by the bits 67, 68 and 69 and the cutter chain teeth 78 thereby providing space for advancing the housings. Cuttings from the rotary cutter shrouded by the web 62 are pushed back into the semicircular trough 82 in which the screw 83 is concentrically mounted for cross conveying and packing the cuttings against that portion of the belt 16 backed by the pulley 13 over which the belt is trained to facilitate the removal of the cuttings on the extensible conveyor described.

Mounted on the main frame 50 is a carriage carrying a plurality of wedge bars 105, 106, and 107 geared for reciprocatory movement and vertical swinging movement. The forward movement of the carriage drives the wedge bars into the coal face undercut by the rotary cutter bar. At end of each backward movement, the carriage is automatically elevated for wedging off successive portions of coal to a predetermined height, after which the carriage is automatically lowered to a predetermined position for repeating the wedging operation on the advanced coal face undercut during the preceding period

required to wedge off successive portions of coal to a predetermined height. Coal wedged from the coal face above the kerf cut by the rotary cutter bar falls to the platform. By reason of the platform entering the successive kerf being cut by the rotary cutter bar, the coal resting on the platform backed by that portion of the coal face to be mined over the successive kerf is crowded from platform onto the feeder plate 48 and the endless conveyer belt 16. Successive portions of coal wedged from the coal face above that portion wedged from the coal face over the kerf flows to the feeder plate 48 and to the endless conveyor belt 16 by reason of gravity. The coal that is crowded and flows on the feeder plate 48 described is fed onto the endless conveyor belt described. Top sides 114 and 115 of the housing 64 and 65 bear against the top side of the undercut which provides backing at the forward end of the main frame 50 for resisting the upward force exerted by the rotary cutter bar undercutting the coal and the upward force exerted driving the wedge bars into the coal. Adjustable shoes 80 secured to backward underside of the main frame 50 bear against the solid side faces 77 and 79 of the recesses cut in the coal by the bit 68 and cutter chain teeth 78. The adjustable shoes 80 backed by the solid side faces 77 and 79 serve to hold the wedge portions 75 and 76 of the cutter bar housings 64 and 65 in proper alignment for guiding the machine in path of the coal to be mined when fed forward on the skid base 25. The solid side faces 77 and 79 against which the adjustable shoes 80 bear also provides backing for resisting side force exerted to either side at times the pressure exerted by the carriage on wedge bars 105, 106, and 107 is not uniform due to impurities in the coal or irregular penetration of the wedge bars in the coal.

A machine as described above is particularly adapted for carrying out a system of mining described in the forepart of this specification, whereby the coal is mined from a face in open end cutovers across end of pillars to be worked, by undercutting, wedging down the undercut coal and simultaneously loading the mined coal.

I claim—

1. In a mining machine having a main frame, at least two housings extending from said main frame, a shaft journaled in said housings, a wedge at forward end of each of said housings, teeth projecting radially from said shaft adjacent said wedges, a sprocket fixed to said shaft adjacent to side of at least one of said housings, a drive sprocket journaled in said main frame in alignment with said sprocket filled to said shaft, a chain carrying bits trained over said sprocket fixed to said shaft and said drive sprocket for rotating said shaft, means for moving said housings forwardly to force said wedges and said teeth and said bits aaginst the material to be mined, said bits being adapted to cut a kerf in the material to be mined in path of said chain, said teeth adjacent said wedges being adapted to cut a kerf in the material to be mined in path of said shaft adjacent said wedges, said wedges being adapted to simultaneously crowd the material at forward side of said housings in the kerf mined by said teeth and said bits providing a kerf in the material to be mined in path of said housings, sides of said housings parallel to said shaft enter and bear against sides of said kerf thereby resisting the reactive force exerted by said bits and said teeth, means for guiding said wedges in path of the material to be mined and means for disposing the material mined.

2. In a mining machine having a main frame slidably mounted on a skid base with means for anchoring said skid base, a rotary cutter bar journaled in forward end of said main frame, means for rotating said rotary cutter bar, means for moving said main frame forwardly on said skid base to force said rotary cutter bar against the material to be mined, said rotary cutter bar being adapted to cut a kerf in the material to be mined, forward portion of said main frame being adapted to enter said kerf, sides of said kerf providing backing for resisting the reactive force exerted by said rotary cutter bar to cut said kerf, means for guiding said main frame in path of the material to be mined, means for disposing the material to be mined by said rotary cutter bar comprising a platform on top side of said forward portion of said main frame to rear of said rotary cutter bar, a conveyor screw trough in said main frame to rear of said platform, a conveyor screw journaled for rotation in said conveyor screw trough, a pulley mounted in said main frame adjacent to end of said conveyor screw with face of said pulley adjacent to rear end of said platform, an endless conveyor belt being adapted to be trained over said pulley, said platform being adapted to shroud the material mined by said rotary cutter bar, said conveyor screw being adapted to feed the material shrouded by said platform in path of said conveyor screw to path of said endless conveyor belt, said endless conveyor belt being adapted to dispose said material in path of said endless conveyor belt.

3. In a mining machine having a main frame slidably mounted on a skid base with means for anchoring said skid base, a carriage mounted for vertical swinging movement relative to said main frame, a plurality of wedge bars mounted on said carriage, a rotary cutter bar journaled in forward end of said main frame, means for rotating said rotary cutter bar, means for moving said main frame forwardly to force said rotary cutter bar against the material to be mined, said rotary cutter bar being adapted to cut a kerf in the material to be mined, means for moving said carriage forwardly under pressure for driving said wedge bars into the material to be mined, forward portion of said main frame being adapted to enter said kerf, sides of said forward portion of said main frame being adapted to bear against sides of said kerf, sides of said kerf providing backing for resisting the reactive force exerted by said rotary cutter bar and the reactive force exerted by said carriage driving said wedge bars into the material to be mined above said kerf, means for disposing the material mined by said rotary cutter bar and means for disposing the material wedged down by said wedge bars above said kerf comprising a platform on top side of said forward portion of said main frame to rear of said rotary cutter bar, a base in said main frame to rear of said platform, a pulley mounted in said main frame adjacent to end of said base with face of said pulley adjacent to rear end of said platform, an endless conveyor belt being adapted to be trained over said pulley, a feeder plate mounted in said base for reciprocatory movement, said platform being adapted to enter said kerf, said wedge bars being adapted to wedge down the material to be mined over said platform onto said platform, said rotary cutter bar being adapted to cut a successive kerf, said material to be mined

adjacent to said platform adapted to provide backing for the material resting on said platform, said platform being adapted to enter said successive kerf thereby simultaneously crowding the material resting on said platform from said platform onto said endless conveyor and said feeder plate, said feeder plate being adapted to feed onto said endless conveyor belt the material crowded on said feeder plate.

4. In a mining machine having a main frame, at least two housings extending from said main frame, a shaft journaled in said housings, a wedge at forward end of each of said housings, teeth extending from said shaft adjacent said wedges, means for rotating said shaft and means for moving said housings forwardly to force said teeth and said wedges against the material to be mined, said teeth and said wedges being adapted to cut a kerf in the material to be mined, said housings being adapted to enter and bear against sides of said kerf thereby providing backing for resisting the reactive force exerted by said teeth and said wedges.

5. In a mining machine having a main frame with a carriage mounted on said main frame for vertical swinging movement relative to said main frame, at least two housings extending from said main frame, a wedge at forward end of each of said housings, a shaft journaled in said housings, teeth projecting radially from said shaft adjacent said wedges, means for rotating said shaft and means for moving said main frame forwardly to force said wedges and said teeth against the material to be mined, said teeth and said wedges being adapted to cut a kerf in the material to be mined, said housings being adapted to enter said kerf, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly for driving said wedge bars into the material to be mined above said kerf, said housings being adapted to bear against sides of said kerf to provide backing for resisting the reactive force exerted by said teeth and said wedge bars.

6. In a mining machine having a main frame slidably mounted on a skid base, at least two housings at forward end of said main frame, a shaft journaled in said housings, a wedge at forward end of each of said housings, a plurality of teeth extending from periphery of said shaft of which are teeth adjacent to said wedges, means for rotating said shaft and means for moving said main frame on said skid base to force said wedges and said plurality of teeth against the material to be mined, said teeth adjacent to said wedges being adapted to cut a kerf in the material to be mined adjacent to said wedges, said wedges being adapted to crowd the material to be mined at forward end of said housings into said kerf thereby removing the material to be mined in path of said housings.

7. In a mining machine having a main frame, at least two housings extending from said main frame, the forward end of each of said housings being adapted to engage the material to be mined in path of said housings, a shaft journaled in said housings, teeth extending from said shaft adjacent said housings, means for rotating said shaft and means for moving said housings forwardly to force said teeth and said forward end of each of said housings against the material to be mined, said teeth being adapted to provide voids in the material to be mined adjacent said housings, said forward end of each of said housings being adapted to crowd the material to be mined in path of said housings into said voids, thereby providing a kerf, said housings being adapted to enter said kerf and bear against at least one side of said kerf for resisting the reactive force exerted by said teeth.

8. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, at least two housings extending from said main frame, the forward end of each of said housings being adapted to engage the material to be mined in path of said housings, a shaft journaled in said housings, teeth extending from said shaft adjacent said housings, means for rotating said shaft and means for moving said housings forwardly to force said teeth and said forward end of each of said housings against the material to be mined, said teeth being adapted to provide voids in the material to be mined adjacent said housings, said forward end of each of said housings being adapted to crowd the material to be mined in path of said housings into said voids, thereby providing a kerf, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge bars into the material to be mined above said kerf, said housings being adapted to enter and bear against at least one side of said kerf for resisting the reactive force exerted by said wedge bars.

9. In a mining machine having a main frame, at least two housings extending from said main frame, a wedge at forward end of each of said housings, a cutter bar journaled in said housings, means for rotating said cutter bar and means for moving said housings forwardly to force said wedges and said cutter bar against the material to be mined, said cutter bar and said wedges being adapted to provide a kerf in the material to be mined, said housings being adapted to enter and bear against at least one side of said kerf for resisting the reactive force exerted by said cutter bar.

10. In a mining machine having a main frame, at least two housings extending from said main frame, a shaft journaled in said housings, a wedge at forward end of each of said housings, teeth extending from said shaft adjacent said wedges, a sprocket fixed to said shaft adjacent to side of at least one of said housings, a drive sprocket journaled in said main frame in alignment with said sprocket fixed to said shaft, a chain carrying bits trained over said sprocket fixed to said shaft and said drive sprocket, means for driving said chain to rotate said shaft, means for moving said main frame forwardly to force said wedges and said teeth and said bits against the material to be mined, said wedges and said teeth and said bits being adapted to provide a kerf in the material to be mined, said housings being adapted to enter said kerf and bear against at least one side of said kerf for resisting the reactive force exerted by said bits and said teeth.

11. In a mining machine having a main frame, at least two housings extending from said main frame, a shaft journaled in said housings, a wedge at forward end of each of said housings, teeth extending from said shaft adjacent said wedges, means for rotating said shaft and means for moving said main frame forwardly to force said wedges and said teeth against the material to be mined, said teeth and said wedges being adapted to provide a kerf in the material to be mined, means for disposing the material mined by said teeth and said wedges comprising a plate extending from said main frame to said teeth, said plate being adapted to enter said kerf to

provide a shroud over the material mined by said teeth and said wedges, and a conveying mechanism carried by said main frame in path of the material shrouded by said plate, said conveying mechanism being adapted to gather and convey the material shrouded by said plate.

12. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, at least two housings extending from said main frame, a shaft journaled in said housings, a wedge at forward end of each of said housings, teeth extending from said shaft adjacent said wedges, means for rotating said shaft and means for moving said main frame forwardly to force said wedges and said teeth against the material to be mined, said teeth and said wedges being adapted to provide a kerf in the material to be mined, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge bars into the material to be mined, means for disposing the material mined by said teeth and said wedges, and means for disposing the material mined by said wedge bars above said kerf comprising a plate extending from said main frame to said teeth, top side of said housings and said plate providing a platform, said platform being adapted to enter said kerf, said wedge bars being adapted to break down the material to be mined over said platform onto said platform, a conveyor carried by said main frame in path of the material resting on said platform, said teeth and said wedges being adapted to provide a successive kerf, material to be mined adjacent said platform being adapted to provide backing for the material resting on said platform, said platform being adapted to enter said successive kerf, whereby the material resting on said platform is pushed onto said conveyor.

13. In a mining machine having a main frame, a transverse shaft journaled at the forward end of said main frame, a wedge positioned in advance of said shaft, teeth extending from said shaft adjacent said wedge, means for rotating said shaft, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined, said wedge being adapted to penetrate the material to be mined, shoes at rear end of said main frame disposed laterally in opposite directions from said main frame, said shoes being adapted to bear against material not mined longitudinally of said main frame, whereby said shoes hold and guide said main frame in said kerf to maintain direction of penetration by said wedge in path of the material to be mined.

14. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, a transverse shaft journaled at the forward end of said main frame, a wedge positioned in advance of said shaft, teeth extending from said shaft adjacent said wedge, means for rotating said shaft, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined, said wedge being adapted to penetrate the material to be mined, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge bars into the material to be mined above said kerf, shoes at rear end of said main frame disposed laterally in opposite directions from said main frame, said shoes being adapted to bear against material not mined longitudinally of said main frame, whereby said shoes hold and guide said main frame in said kerf to maintain direction of penetration by said wedge in the path of the material to be mined.

15. In a mining machine having a main frame, a transverse shaft journaled at the forward end of said main frame, a wedge positioned in advance of said shaft, teeth extending from said shaft adjacent said wedge, means for rotating said shaft, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined, said wedge being adapted to penetrate the material to be mined, means at rear end of said main frame for resisting lateral movement of rear end of said main frame, whereby direction of penetration by said wedge is maintained in path of the material to be mined.

16. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, a transverse shaft journaled at the forward end of said main frame, a wedge positioned in advance of said shaft, teeth extending from said shaft adjacent said wedge, means for rotating said shaft, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined, said wedge being adapted to penetrate the material to be mined, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge bars into the material to be mined above said kerf, means at rear end of said main frame for resisting lateral movement of rear end of said main frame, whereby said main frame is maintained in alignment relative to the direction of penetration by said wedge in path of the material to be mined.

17. In a mining machine having a main frame, a plurality of housings extending from said main frame, a journal box fixed to the forward end of each of said housings, a transverse rotatable shaft journaled in said journal boxes, a sprocket fixed to said shaft, a drive sprocket positioned at rear of said sprocket fixed to said shaft, endless chain cutters trained over said sprockets, teeth extending from said shaft, means for moving said main frame forwardly to force the operative sections of said endless chain cutters and said teeth against the material to be mined, operative sections of said endless chain cutters and said teeth being adapted to provide a kerf in the material to be mined, means for guiding said main frame forwardly to extend said kerf in substantially the same horizontal plane comprising a shoe projecting from each of said housings adapted to enter said kerf and bear against the under-side of the material undercut for resisting the upward reactive force exerted by the operative sections of said endless chain cutters and said teeth engaging the material to be mined.

18. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, undercutting means positioned at the forward end of said main frame adapted to be moved forwardly to provide a kerf in the material to be mined, a plurality of wedge bars mounted on said carriage in a single transverse row including the extreme wedge bars having an outer side face,

means for moving said carriage forwardly to drive said wedge bars into the material to be mined, said wedge bars being adapted to break down the material above said kerf whereby an irregular face is formed at the opposite sides of said machine, said extreme wedge bars having an outer side face being adapted to shear said irregular faces when said carriage is rocked thereby providing clearance for advancing said machine, means for resisting the reactive force exerted rocking said carriage to cause said extreme wedge bars having an outer side face being adapted to shear said irregular faces comprising shoes disposed from said main frame adapted to bear against the underside of the material undercut and bottom side of said kerf.

19. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, undercutting means positioned at the forward end of said main frame adapted to be moved forwardly to provide a kerf in the material to be mined, a transverse wedge plate mounted on said carriage, means for moving said carriage forwardly to drive said wedge plate into the material to be mined, said wedge plate being adapted to break down the material above said kerf whereby an irregular face is formed at the opposite sides of said machine, opposite ends of said wedge plate being adapted to shear said irregular faces when said carriage is swung downwardly thereby providing clearance for advancing said machine, means for resisting the upward reactive force exerted by the swinging of said carriage downwardly to cause the opposite ends of said wedge plate to shear said irregular faces comprising a shoe disposed from said main frame adapted to bear against the underside of the material undercut.

20. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, undercutting means positioned at the forward end of said main frame adapted to be moved forwardly to provide a kerf in the material to be mined, a transverse wedge plate consisting of a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge plate into the material to be mined, said wedge plate being adapted to break down the material above said kerf whereby an irregular face is formed at the opposite sides of said machine, opposite ends of said wedge plate being adapted to shear said irregular faces when said carriage is swung upwardly thereby providing clearance for advancing said machine, means for resisting the reactive force exerted by the swinging of said carriage upwardly to cause the opposite ends of said wedge plate to shear said irregular faces comprising a shoe disposed from said main frame adapted to enter said kerf and bear against the bottom side of said kerf.

21. In a mining machine having a main frame, a plate extending from said main frame, undercutting means positioned at the forward end of said plate adapted to be moved forwardly to provide a kerf in the material to be mined, said plate being adapted to enter said kerf, breaking down mechanism mounted on said main frame adapted to break down the material above said kerf onto said plate, means for disposing the material resting on said plate, and means for disposing the material mined by said undercutting means simultaneously with the disposal of the material resting on said plate, said plate being adapted to provide a shroud over the material emerging from said undercutting means to a conveying mechanism in path of the material emerging from under said plate.

22. In a mining machine having a main frame, a platform extending from said main frame, a transverse rotatable shaft positioned at the forward end of said platform, teeth extending from said shaft, means for moving said main frame forwardly to force said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined, means for disposing the material mined by said teeth comprising at least one shoe disposed from said platform adapted to enter said kerf and bear against the underside of the material undercut for resisting upward reactive force exerted by said teeth, whereby said platform is guided in said kerf to provide a shroud over the material emerging from said teeth to a conveying mechanism in path of the material emerging from said teeth.

23. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, a platform extending from said main frame, a transverse rotatable cutter bar positioned at the forward end of said platform, means for moving said main frame forwardly to force said cutter bar against the material to be mined, said cutter bar being adapted to provide a kerf in the material to be mined, said platform being adapted to enter said kerf, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge bars into the material to be mined, said wedge bars being adapted to break down the material over said platform onto said platform, material to be mined adjacent said platform being adapted to provide backing for the material resting on said platform, means projecting from said platform adapted to bear against the underside of the material undercut and bottom side of said kerf for guiding said cutter bar to provide a successive kerf in substantially the same plane as the preceding kerf, whereby said platform enters the successive kerf and cause the material resting on said platform, to be moved away from the material mined by said wedge bars, and means for disposing the material mined by said cutter bar.

24. In a mining machine having a main frame, a platform extending from said main frame, undercutting means positioned at the forward end of said platform adapted to be moved forwardly to provide a kerf in the material to be mined, breaking down mechanism mounted on said main frame, said breaking down mechanism being adapted to break down the material to be mined over said platform onto said platform, material to be mined adjacent said platform being adapted to provide backing for the material resting on said platform, shoes projecting from said platform adapted to bear against the underside of the material undercut and the bottom side of said kerf for guiding said undercutting means forwardly to provide a successive kerf in substantially the same plane as the preceding kerf, whereby said platform enters the successive kerf and cause the material resting on said platform to be moved away from the material mined by said breaking down mechanism, and means for disposing the material mined by said undercutting means.

25. In a mining machine having a main frame, undercutting means positioned at the forward end

of said main frame adapted to be moved forwardly to provide a kerf in the material to be mined, breaking down mechanism mounted on said main frame adapted to break down the material above said kerf, means disposed from said main frame adapted to bear against the underside of the material undercut and bottom side of said kerf for guiding said undercutting means forwardly to provide a successive kerf in substantially the same plane as the preceding kerf, whereby said breaking down mechanism is adapted to break down the material above said preceding kerf simultaneously said undercutting means is cutting the successive kerf.

26. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, undercutting means positioned at the forward end of said main frame adapted to be moved forwardly to provide a kerf in the material to be mined, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly to drive said wedge bars into the material to be mined above said kerf, shoes disposed from said main frame adapted to bear against the underside of the material undercut and bottom side of said kerf for guiding said undercutting means to provide successive kerfs in substantially the same plane, whereby the successive faces of the material to be mined above each successive kerf are maintained in same relation to the vertical swinging movement of said carriage.

27. In a mining machine having a main frame, at least one journal box positioned at the forward end of said main frame, a rotatable shaft journaled in said journal box, a wedge at the forward end of said journal box, teeth extending from said shaft adjacent the opposite sides of said wedge, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined adjacent the opposite sides of said wedge, said wedge being adapted to crowd the material to be mined in path of said journal box into the kerf adjacent the opposite sides of said wedge thereby providing a kerf in path of said journal box.

28. In a mining machine having a main frame, at least one journal box positioned at the forward end of said main frame, a rotatable shaft journaled in said journal box, a wedge at the forward end of said journal box, teeth extending from said shaft adjacent the opposite sides of said wedge, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined adjacent the opposite sides of said wedge, said wedge being adapted to crowd the material to be mined in path of said journal box into the kerf adjacent the opposite sides of said wedge thereby providing a kerf in path of said journal box, opposite sides of said kerf in path of said journal box being adapted to provide backing for guiding said journal box forwardly in substantially the same plane.

29. In a mining machine having a main frame, at least one journal box positioned at the forward end of said main frame, a rotatable shaft journaled in said journal box, teeth extending from said shaft adjacent said journal box, means for moving said main frame forwardly to force the forward end of said journal box and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined adjacent the opposite sides of said journal box, the forward end of said journal box being adapted to crowd the material to be mined in path of said journal into the kerf adjacent the opposite sides of said journal box thereby providing a kerf in path of said journal box, opposite sides of said kerf in path of said journal box being adapted to provide backing for guiding said journal box forwardly in substantially the same plane.

30. In a mining machine having a main frame, a transverse rotatable shaft having trunnions positioned at the forward end of said main frame, a housing intermediate said trunnions, teeth extending from said shaft adjacent said housing, said housing being adapted to house a portion of said shaft between said teeth, a wedge at the forward end of said housing, means for moving said main frame forwardly under pressure to force said wedge and said teeth against the material to be mined to provide a kerf in the material to be mined, said housing being adapted to bear against the underside of the material undercut and bottom side of said kerf for resisting reactive force exerted by said wedge and said teeth.

31. In a mining machine having a main frame, a carriage mounted for vertical swinging movement relative to said main frame, a transverse rotatable shaft having trunnions positioned at the forward end of said main frame, a housing intermediate said trunnions, teeth extending from said shaft adjacent said housing, said housing being adapted to house a portion of said shaft between said teeth, a wedge at the forward end of said housing, means for moving said main frame forwardly under pressure to force said wedge and said teeth against the material to be mined to provide a kerf in the material to be mined, a plurality of wedge bars mounted on said carriage, means for moving said carriage forwardly under pressure to drive said wedge bars into the material to be mined above said kerf, said housing being adapted to bear against the underside of the material undercut and bottom side of said kerf for resisting reactive force exerted by said wedge bars.

32. In a mining machine having a main frame, a transverse rotatable shaft having trunnions positioned at the forward end of said main frame, a housing intermediate said trunnions, teeth extending from said shaft adjacent said housing, said housing being adapted to house a portion of said shaft between said teeth, a wedge at the forward end of said housing, means for moving said main frame forwardly to force said wedge and said teeth against the material to be mined, said teeth being adapted to provide a kerf in the material to be mined, said wedge being adapted to penetrate the material to be mined whereby the tapered sides of said wedge is backed by the material to be mined for resisting lateral reactive force exerted by said teeth when said teeth engage material of an uneven texture.

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