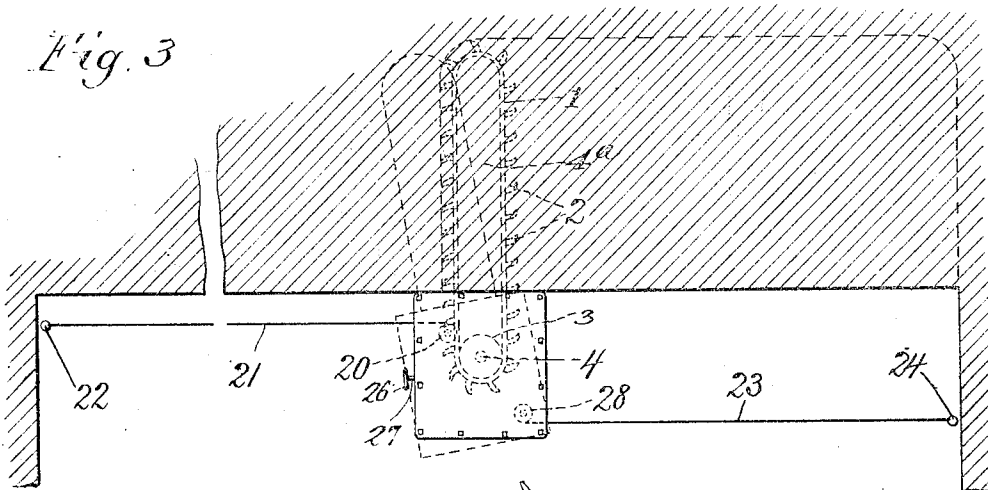
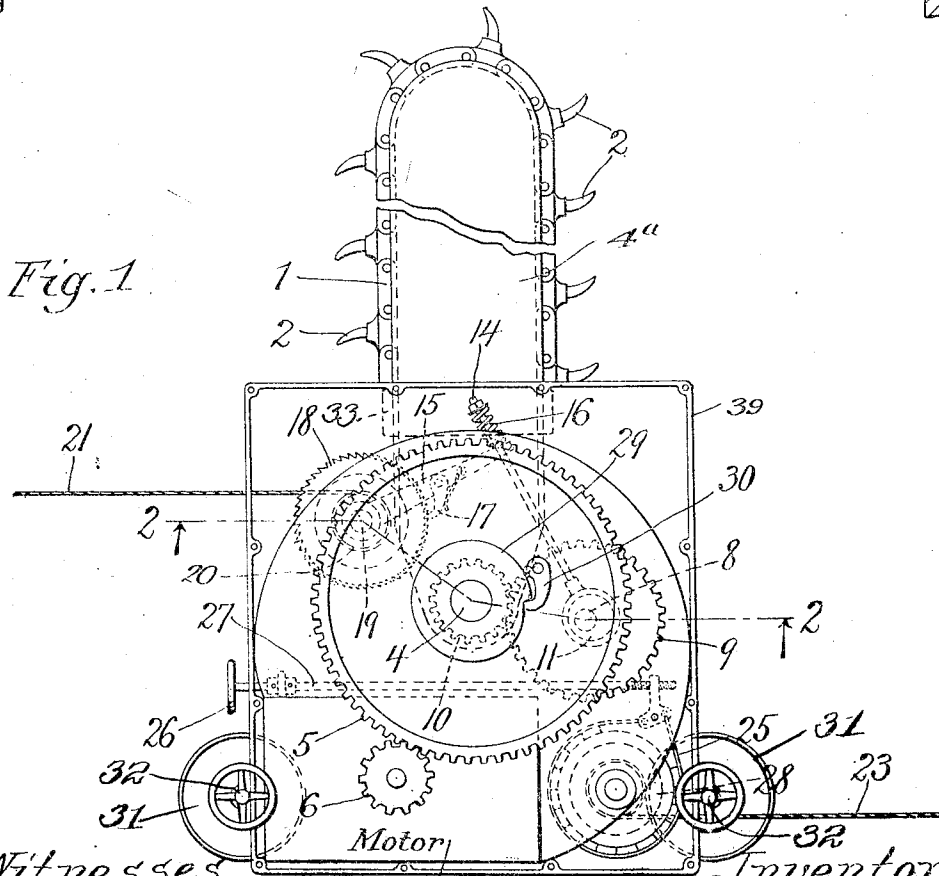


APPLICATION FILED SEPT. 30, 1907.

Patented Feb. 9, 1915.

3 SHEETS-SHEET 1.

1,127,784.



Witnesses,

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Edna K. Reynolds

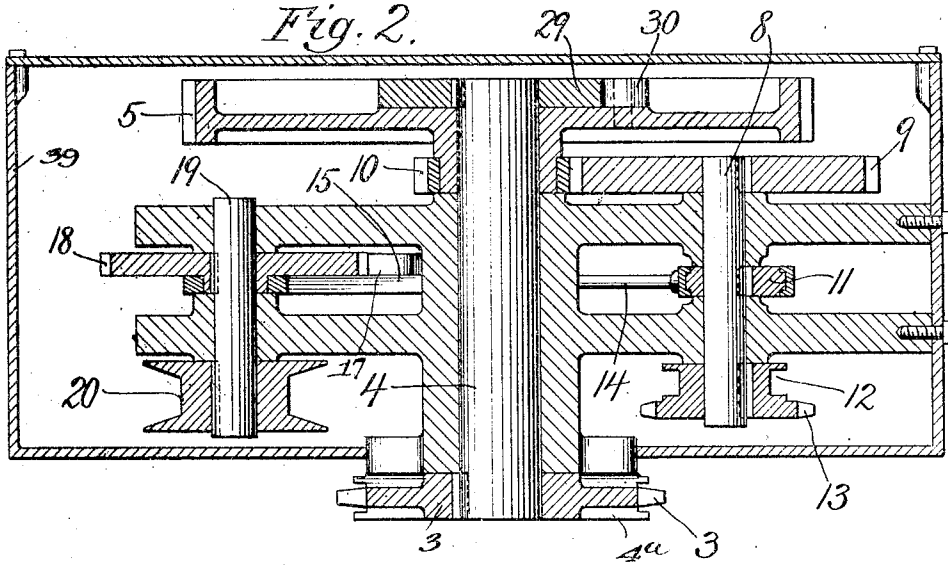
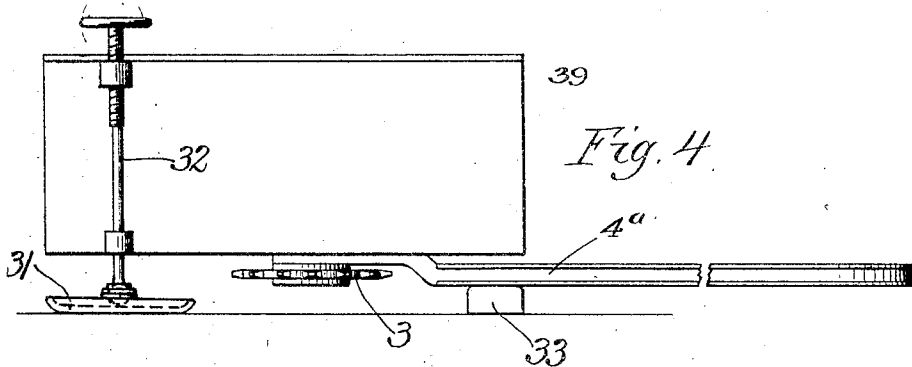
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3 SHEETS—SHEET 2.

Fig. 2.



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MINING MACHINE.

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3 SHEETS-SHEET 3.

Fig. 5.

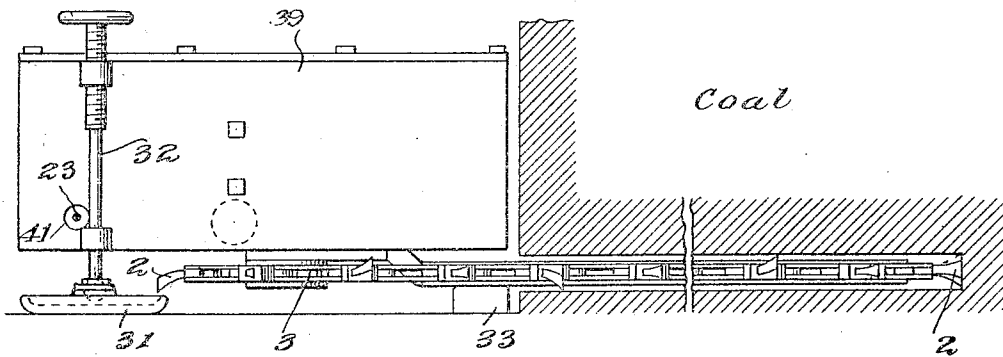
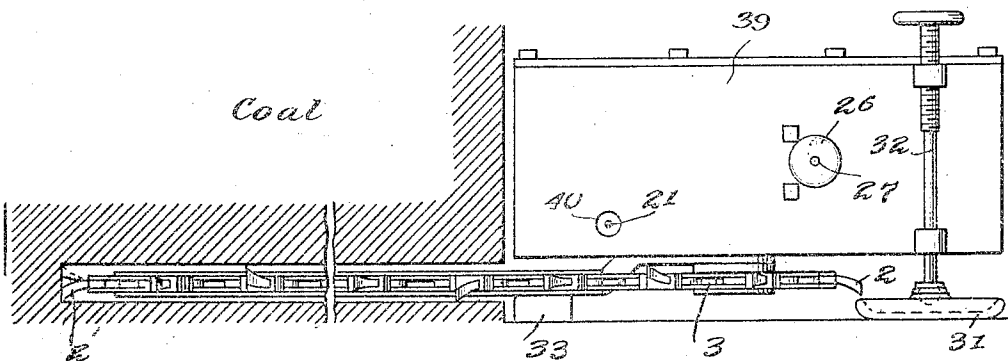


Fig. 6.



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MINING-MACHINE.

1,127,784.

Specification of Letters Patent.

Patented Feb. 9, 1915.

Application filed September 30, 1907. Serial No. 395,061.

To all whom it may concern:

Be it known that I, NILS D. LEVIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Mining-Machines, of which the following is a specification.

This invention relates to mining machines and particularly to "long-wall" or side cutting machines, that is machines having a cutting apparatus extending under the coal and a frame for power devices outside of the coal and moving along the coal face while at work.

The general object of the invention is the production of a machine of this character having improved means for guiding and controlling the machine as it advances along the face of the coal.

Referring now to the accompanying drawings: Figure 1 is a plan view of one form of machine embodying the invention; Fig. 2 is an enlarged vertical section taken on the line 2-2 of Fig. 1; Fig. 3 is a diagrammatic plan view, on a reduced scale, showing the machine in operation; Fig. 4 is a side elevation showing the vertically adjustable shoes or runners, some of the other parts being shown conventionally in outline and with details omitted; Fig. 5 is a side elevation of the rear or right hand side of the machine showing the relative positions of some of the detail parts more fully than they are shown in the other figures, and illustrating the cutting apparatus inserted into the coal; Fig. 6 is a side elevation of the side opposite to that in Fig. 5, some of the parts being shown in detail.

As illustrated in the drawings, the machine is provided with a cutter chain 1, having a series of cutting knives 2 coming into contact with the coal as the machine is moved along. This cutter chain engages a sprocket wheel 3 on the shaft 4 (see Fig. 2), and is supported and guided by a cutter bar 4^a which projects from the inner end of the main frame or body of the machine. The shaft 4 is provided with a gear wheel 5 which engages a pinion 6 connected with the armature of the motor 7. Any suitable motor may be used. A shaft 8 is connected

with the gear 5 by gear 9 and pinion 10. This shaft carries an eccentric wheel 11 and a drum or chain wheel 12, and it may also be provided with a sprocket wheel 13. An eccentric strap surrounds the wheel 11, and has connected thereto a rod 14. This rod is connected with an arm 15 by means of a suitable elastic connection of any desired description. As herein shown a spring 16 is interposed between the arm 15 and the end of the rod 14, said spring bearing against the end of the rod and the arm 15 so that when the rod is moved the force exerted thereby is transmitted to the arm 15 through the spring 16. Connected with the arm 15 is a pawl 17 which engages the teeth on a ratchet wheel 18 connected with a shaft 19 carrying the drum 20. Associated with the drum 20 is a flexible feeding device which may be a rope, chain, or any other suitable device. This feeding device is fastened at a distant point on the front side of the machine as at 22, Fig. 3, to a jack or other suitable holding device. When the shaft 8 is rotated it operates the ratchet wheel 18 by means of the eccentric and associated parts, and causes the drum to be rotated so as to wind up the feeding device 21 and thus pull the machine against the coal to be acted upon by the cutting chain. When the pawl 17 ceases its pushing action on the ratchet wheel 18, and while traveling through its return stroke the ratchet wheel and the machine stand still until the commencement of the next pushing action of the pawl, and because of this there is no necessity for positively locking the wheel. If, however, it is found under any circumstances that a positive lock for the wheel is helpful, use may be made of any of the ratchet locking devices well known to mining machine engineers, (as for example, those shown in Patent #878,976, to E. R. Merrill). And likewise, the details of structure and connection between the arm 15 and the eccentric rod 14 may be of any well known or suitable sort.

Wound upon the drum 28 is a flexible retarding device 23 which may be a chain or rope or any other flexible device. This retarding device is connected to a fixed holding

device on the rear side of the machine, such, for example, as the jack 24, it extending from the winding drum to the jack, in each case on a direct line as shown in Figs. 1 and 3.

5 The feeding device 21 and the retarding device 23 are out of alinement as shown in Fig. 3 so that by proper manipulation of these devices the machine may be held in proper position as it is moved across the face of the material to be cut. Associated with 10 the drum 28 is some suitable controlling device, such, for example, as the brake 25. This brake is here shown as a strap brake and is controlled by the hand wheel 26 attached to the rod 27. The drum 28 is not in 15 engagement with the motor and hence it can be controlled so as to retard the unwinding of the retarding device 23 sufficiently to secure the desired result. The drum 28 is located near the rear of the machine and is on 20 the side of the main shaft opposite to that where the drum 20 is located. It will further be seen that the feeding device and the retarding device are arranged to be controlled independently.

Some means is preferably provided for disconnecting the cutter chain from the driving mechanism. As shown, for example, in Fig. 2, there is connected with the shaft 4 a 30 disk 29. Connected with the gear 5 is a dog 30 which engages the disk 29 in any desired manner as shown, for example, in Fig. 1. When it is desired to disconnect the cutter chain from the driving mechanism it can be 35 done by simply moving the dog 30 out of engagement with the disk 29. Some means is provided for automatically disconnecting the driving mechanism from the chain when the load becomes too great. This may be done 40 by making the dog 30 of cast iron and of suitable size in which event it will break before the strain becomes sufficient to injure the apparatus.

Some suitable means is provided for changing the plane of the cut of the cutter chain. 45 This may be done in any desired manner. As shown in Fig. 4 the device is mounted upon the shoes 31 which are attached to the frame of the machine by the adjusting rods 32. It will thus be seen that by moving these adjusting rods one side of the machine may be 50 raised or lowered so as to tilt the machine in any desired degree. It will also be seen that by means of these adjustable rods the machine may be tilted about the shoe 33 to 55 change the plane of the cut. There are preferably two shoes 31 and two rods 32, one on each side of the machine, both located near the outer end thereof. The shoe 33 is located near the middle of the machine at the 60 inner end underneath the cutter frame.

It will be noted that the main upright shaft 4 is provided with a surrounding sleeve, and that the shafts 8 and 19 are substantially parallel to the shaft 4 and are 65

mounted upon supports fastened to the sleeve surrounding said shaft 4. I have indicated at 39 a frame, box or housing which can be so arranged as to more or less support and inclose the motor, the shafting, the 70 gearing, the rope drums and adjunct parts. It should be so constructed as to permit the feed rope and retarding ropes to pass from the drums, respectively, to their jacks, or vice versa, as shown in Figs. 1 and 3, without 75 their being deflected from straight lines as there illustrated. If the frame or housing is more or less continuous, as shown in Figs. 4, 5 and 6, suitable rope apertures or passageways can be formed, as at 40, 41, 80 and these can be of any shape or dimension that may be demanded.

I am aware that it has been proposed to combine with the feeding or advancing element (feed cable or chain) a yielding connection 85 between the driving or power part and the winding parts (drum, sprocket wheel, or the like), and I do not broadly claim such a device.

I do not claim the specific means shown 90 or referred to for permitting the passage of the feeding rope and retarding rope from the drums to their companion abutments or jacks, or any specific means for connecting the eccentric rod to the pawl arm; or any 95 specific lock for the ratchet wheel or the drum of the feeding rope, as none of these pertain to the essential features of the present invention, the latter relating to the employment of two separate sections of flexible 100 tension device, one for advancing the inner end of the machine and the other having an automatically acting friction control whereby it can retard the outer end. For each of the other assemblages of details that 105 are conventionally indicated or described any well known or preferred substitute can be employed.

I claim:

1. In a mining machine, the combination 110 of a main frame, power driven cutting apparatus projecting from the inner end thereof, power devices for feeding the machine along the face of the coal, and means for retarding the outer end of the machine comprising a cable, an anchor arranged at the 115 rear side of the machine to take the draft of said cable, means independent of said power feeding devices for paying out the cable, the last said means being mounted on the machine and adapted to automatically maintain a resistance to the lengthening of the operative part of said cable, and means 120 for varying the resistance automatically maintained as aforesaid.

2. In a mining machine, the combination 125 of a main frame, power driven cutting apparatus projecting from the inner end thereof, a draft cable acting on the inner end of the main frame, power actuated winding 130

means cooperating with said cable to feed the machine along the face of the coal, and means for retarding the outer end of the machine comprising a cable, an anchor arranged at the rear side of the machine to take the draft of said cable, means carried by the machine and independent of the power feeding devices for automatically paying out the retarding cable, said cable having the end part which is adjacent the machine movably secured to said paying out means, and means for varying the rate at which the retarding cable is automatically paid out.

3. A mining machine comprising in combination a frame, cutting devices extending from the inner end of the frame, feeding devices arranged to exert a forward propelling force on the frame, and retarding means arranged to exert an opposing force on the machine, in a line offset from that of the forward force, said retarding means comprising a flexible device, a rotatable part on the machine about which said flexible device is wound, and a braking mechanism on the machine for said part.

4. In a mining machine, the combination of a main frame, power driven cutting apparatus projecting from the inner end of said main frame, power devices for feeding the machine along the face of the coal, and means adapted to retard the outer part of the main frame comprising a cable, an anchor arranged at the rear side of the machine to sustain the draft of said cable, means on the machine independent of said power feeding devices arranged to cooperate with the cable to automatically effect the paying out of the cable, and manual means for varying the rate at which the cable is automatically paid out.

5. In a mining machine, the combination of a main frame, power driven cutting apparatus projecting from the inner end of said main frame, power devices for feeding the machine along the face of the coal, and means adapted to retard the outer part of the main frame comprising a cable, an anchor arranged at the rear side of the machine to sustain the draft of said cable, means independent of said power feeding devices arranged in fixed relation to the machine to cooperate with the cable to automatically effect the paying out of the cable, and manual means for varying the rate at which the cable is automatically paid out.

6. In a mining machine, the combination of a main frame, the cutting apparatus extending from the inner end thereof, means for moving the frame and cutting apparatus along the face of the coal, and means for guiding or alining the machine by exerting a retarding force on the outer part of the frame, said means comprising a flexible

member, an anchor arranged at the rear side of the machine to sustain the draft of said member, a rotary device mounted on the machine and engaging the said member and paying it out as the machine advances, and a friction brake device for controlling the rotation of the said rotary device.

7. In a mining machine, the combination of a main frame, the cutting apparatus extending from the inner end thereof, means for moving the frame and cutting apparatus along the face of the coal, and means for guiding or alining the machine by exerting a retarding force on the outer part of the frame, said means comprising a cable, an anchor arranged at the rear side of the machine to sustain the draft of said cable, a winding reel on the machine for the cable and having the cable end movably secured thereto, and a brake device for controlling the rotation of the reel.

8. In a mining machine, the combination of a main frame, cutting apparatus projecting from the inner end of said frame, a flexible draft device acting on the inner end of the main frame to propel the machine along the face of the coal, and means acting on the outer end of the machine for guiding the machine comprising a cable, an anchor arranged at the rear side of the machine to sustain the pull of the cable, a winding reel for the cable rigidly secured thereto and mounted on the main frame, and an adjustable brake device supported on the frame for controlling the rotation of said reel.

9. In a mining machine, the combination of the main frame, the cutting apparatus projecting from the inner end of said frame, means for moving the frame and cutting apparatus along the face of the coal, a winding reel mounted on the said frame, a cable on said reel, an anchor arranged at the rear side of the machine to sustain the draft of said cable, and a brake device on the frame for the reel adjustable at will to control the movement of the reel, said cable being arranged to exert a retarding action on the outer part of the machine frame.

10. In a mining machine, the combination of the main frame, the cutting apparatus projecting from the inner end of the said frame, the power driven winding reel on the said frame, a propelling cable on said reel, an anchor in advance of the machine to sustain the draft of said cable, a second winding reel on the main frame, a cable on said second reel, an anchor at the rear side of the machine to sustain the draft of the second cable, and a brake device for the last named reel adjustable at will to control the movement of said reel, the two cables being so disposed that the tension of the second cable is applied to the machine frame at a point nearer its outer end than is the tension of the propelling cable.

11. In a mining machine, the combination of the main frame, the cutting apparatus projecting from the inner end of said frame, a power driven winding reel mounted on the inner end of said frame, a propelling cable on said reel, an anchor arranged in advance of the machine to sustain the draft of said cable, a second winding reel mounted on the outer end of the main frame, a cable on said second reel, an anchor arranged at the rear side of the machine to sustain the draft of the second cable, and a brake device for the last named reel adjustable at will to control the movement of said reel.
12. In a mining machine, the combination of the main frame, the cutting apparatus projecting from the inner end of said frame, means for moving the frame and cutting apparatus along the face of the coal, a winding reel mounted on the frame, a cable mounted on said reel, an anchor arranged at the rear side of the machine to sustain the draft of said cable, a flexible brake band on the reel, and means for adjusting the tension of said brake band to vary the tension of said cable, said cable being arranged to exert a retarding action on the outer part of the machine frame.
13. In a mining machine, the combination of a main frame, the cutting apparatus extending from the inner end thereof, means for moving the frame and cutting apparatus along the face of the coal, and means for guiding or alining the machine comprising stationary holding means on the rear side of the machine and, interposed between said holding means and the outer part of the machine frame, a flexible retarding member, a rotary device connected rigidly to the retarding member and paying it out as the machine advances, and a brake device for controlling the rotation of said rotary device, said rotary device and said brake device being mounted on the frame.
14. In a mining machine, the combination of a main frame, the cutting apparatus extending from the inner end thereof, means for moving the frame and cutting apparatus along the face of the coal, and means for guiding and alining the machine comprising a retarding device extending approximately parallel to the face of the coal, means for anchoring said retarding device, a rotary device mounted on the outer part of the machine frame and engaging the retarding device, and a brake device for controlling the rotation of the said rotary device.
15. In a mining machine, the combination of a main frame, the cutting apparatus extending from the inner end thereof, means for moving the frame and cutting apparatus along the face of the coal, and means for guiding or alining the machine comprising a stationary holder and, interposed between said holder and the frame of the machine, a cable, a winding reel therefor, and a brake device for controlling the rotation of the reel, the cable being arranged to exert a retarding force on the outer part of the machine frame, said reel and brake device being both held in fixed relation to the machine.
16. In a mining machine, the combination of a main frame, the cutting apparatus extending from the inner end thereof, means for moving the frame and cutting apparatus along the face of the coal, and means for guiding or alining the machine comprising a stationary holder and, interposed between said holder and the frame of the machine, a cable, a winding reel therefor, a brake device for the reel, and means for adjusting the brake device to vary its retarding effect, the cable being arranged to exert a retarding force on the outer part of the machine frame, said reel and brake device being both mounted on the machine.
17. In a mining machine, the combination of a main frame, cutting apparatus projecting from the inner end of said frame, power devices for feeding the machine along the face of the coal comprising a winding reel and a cable having one end fixed to the winding reel and its other end adapted to be secured to a stationary holder, a retarding cable separate from the feed cable and adapted to have one end secured to a stationary holder, means on the machine arranged to cooperate with the retarding cable to automatically effect the paying out thereof, and manual means for varying the rate at which the cable is automatically paid out, the force of the retarding cable acting upon the machine frame at a point nearer the outer end thereof than does the forward propelling force of the feed cable.
18. In a mining machine, the combination of a main frame, cutting apparatus projecting from the inner end of said frame, means for feeding the machine along the face of the coal comprising a winding reel and a cable having one end fixed to the reel and its other end adapted to be secured to a stationary holder, a retarding cable adapted to have one end secured to a stationary holder, and means on the machine frame cooperating with the retarding cable to cause a frictional resistance to the paying out of the said cable as the machine advances along the face of the coal, the force of the retarding cable acting upon the machine frame at a point nearer the outer end thereof than does the forward propelling force of the feed cable.
19. In a mining machine, the combination of a main frame, cutting apparatus projecting from the inner end of said frame, means for feeding the machine along the face of

the coal comprising a winding reel and a cable having one end fixed to the reel and its other end adapted to be secured to a stationary holder, a retarding cable adapted to have one end secured to a stationary holder, and means on the machine frame cooperating with the retarding cable to cause a frictional resistance variable at will to the paying out of the retarding cable as the machine advances along the face of the coal. 10

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