

M. P. HOLMES.
MINING MACHINE.
APPLICATION FILED JUNE 5, 1916.

1,412,868.

Patented Apr. 18, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

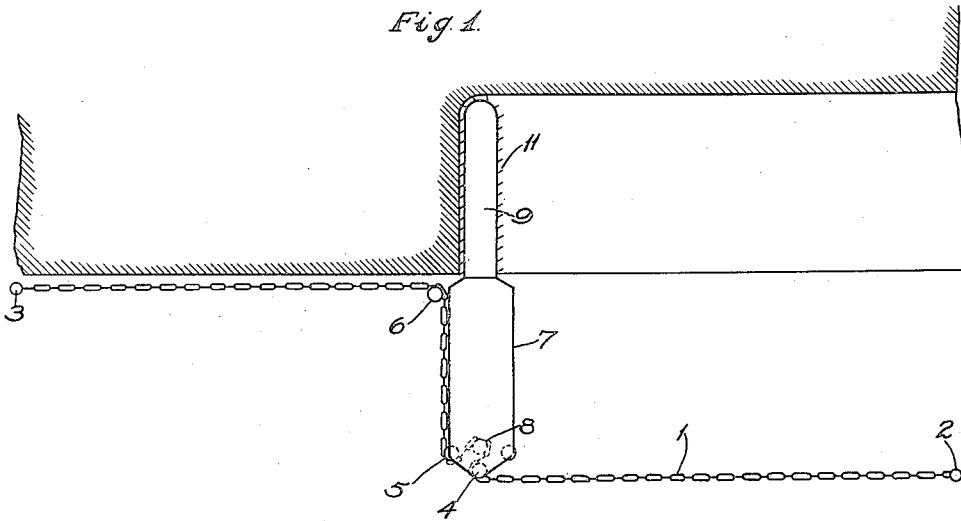
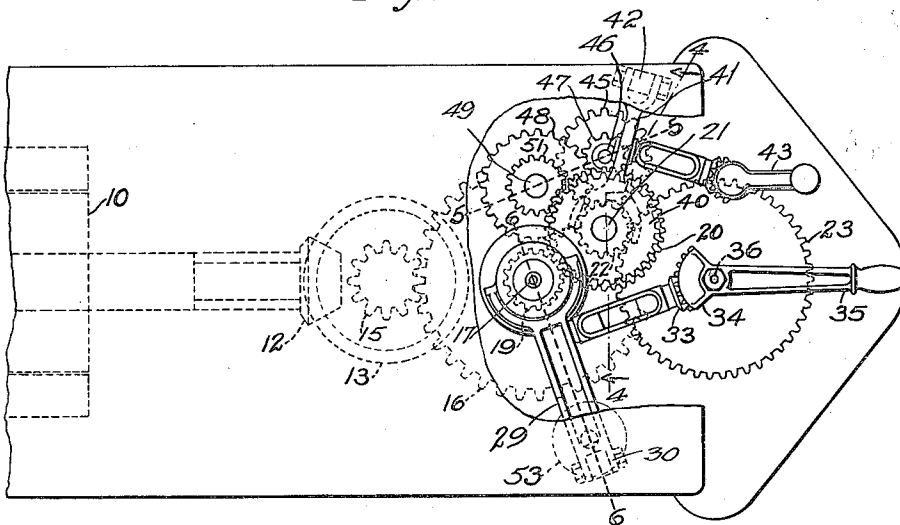


Fig. 2.



Inventor
Morris P. Holmes.
By *Wm. L. [Signature]*
Atty.

Patented Apr. 18, 1922.

2 SHEETS—SHEET 2.

1,412,868.

Fig. 6.

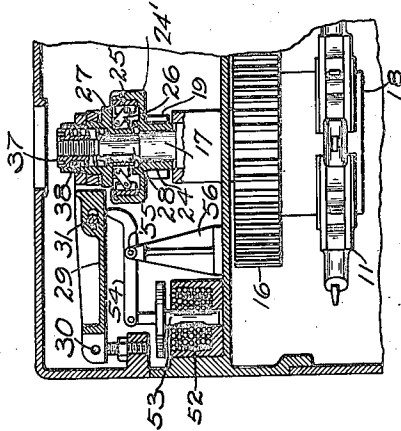


Fig. 7.

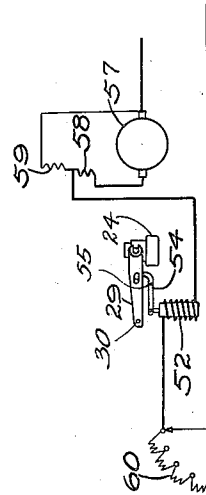


Fig. 5.

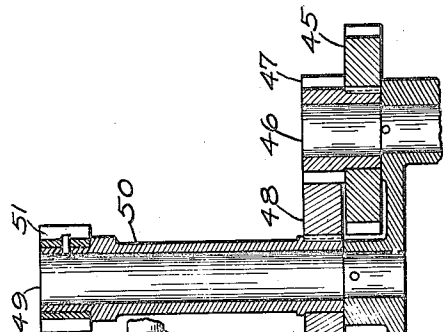


Fig. 4.

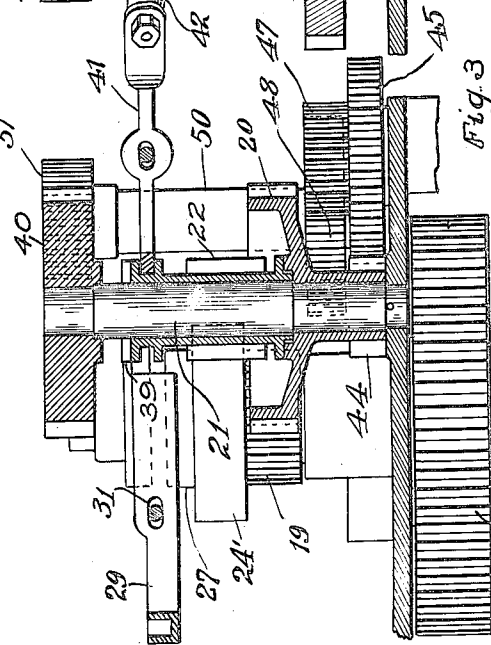
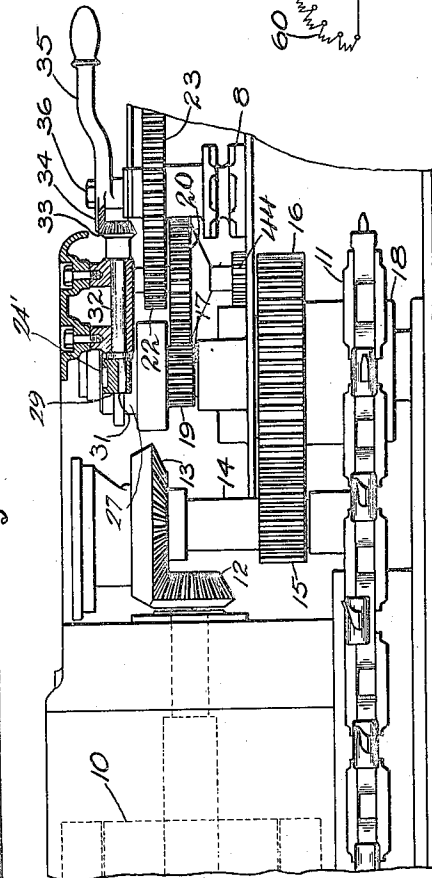


Fig. 3.



Inventor
Morris P. Holmes.
By *Wm. A. Holmes*
Atty.

UNITED STATES PATENT OFFICE.

MORRIS P. HOLMES, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE JEFFREY MANUFACTURING COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

MINING MACHINE.

1,412,868.

Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed June 5, 1916. Serial No. 101,728.

To all whom it may concern:

Be it known that I, MORRIS P. HOLMES, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Mining Machines, of which the following is a full, clear, and exact specification.

My invention relates to mining machines.

It has for its object to provide improved automatic feed controlling mechanism for a mining machine. A further object of my invention is to provide improved controlling mechanism whereby the feeding mechanism of such a machine is automatically released when the cutter chain strikes an obstruction, as for instance a sulphur band or the like, and wherein the machine may be automatically backed away therefrom and again automatically rammed into the coal in a vigorous manner adapted to tear out the obstruction and permit the continuous operation of the machine. These and other objects of my invention will hereinafter appear.

In the accompanying drawings I have, for purposes of illustration, shown one embodiment which my invention may assume in practice.

In these drawings,—

Fig. 1 is a diagrammatic view of a room and pillar machine when operating on the coal.

Fig. 2 is a plan view of the rear end of the machine, the cover plate being broken away to show the feed gearing and controlling mechanism.

Fig. 3 is a side elevation partially in section, showing the gearing illustrated in Fig. 2 and the cutter chain driving mechanism.

Fig. 4 illustrates a number of the gear elements in side elevation and other parts in vertical section on the broken line indicated by 4—4 on Fig. 2.

Fig. 5 is an enlarged vertical sectional view taken on line 5—5 of Fig. 2, showing another portion of the same gearing.

Fig. 6 is a partial transverse sectional view taken on line 6—6 of Fig. 2, showing the friction mechanism and my improved controlling means therefor.

Fig. 7 is a diagrammatic view of the electrical connections for the machine.

In these drawings, while my improvement is not limited to such use, I have illustrated a room and pillar type machine of a stand-

ard make, and adapted to be fed into the coal and operate along the face of the same on a flexible member 1 such as a chain or cable, the latter being fixed at points 2 and 3 at the opposite ends of the cut and extending around guiding pulleys 4, 5, and 6 on the frame 7 of the machine, the machine being fed thereon by a driving member 8 in turn driven by a suitable motor carried on the machine, all in a well known manner and with the result that the cutter bar 9 of the machine is held in under the coal while the body of the machine is held in the desired position with respect to the face, as it moves across the same.

As is usual in constructions of this type, the machine frame 7 carries a motor 10, and this motor is connected through suitable driving connections with a cutter chain 11 carried on the cutter bar 9, a preferred form of driving connections including a bevel gear 12 carried on one end of the armature shaft and meshing with a corresponding bevel gear 13 carried on a vertical shaft 14 mounted on the machine frame 7 and carrying a lower pinion 15 meshing with a larger gear 16 carried on a second vertical shaft 17 and connectible through suitable clutch mechanism (not shown) with a chain driving sprocket member 18 on which the inner end of the cutter chain 11 is carried.

As is usual in a preferred form of such machines, the same motor 10 also provides the power for rotating the driving member 8 for the feed chain 1, a plurality of series of gears being provided between the motor and the member 8 in order to permit the machine to be moved relatively rapidly when being transported about the mine, and to be operated at a slower speed during its cutting operation. As shown, the high speed gearing includes a pinion 19 carried on the shaft 17 and meshing with a gear 20 on a vertical stud 21, which in turn carries a vertically adjustable pinion 22, hereinafter more specifically described, and meshing with a larger gear 23 fixed to the driving member 8 and rotatable therewith, both the driving member and gear being suitably journaled at the rear of the frame.

Disposed above the pinion 19 is the friction mechanism for controlling the connection of that pinion to the shaft 17. As shown, this friction mechanism includes a sleeve 24', preferably integral with the

pinion 19, having housed therein a friction band 25 controlled by radially disposed toggle members 26 which are in turn connected to a member 27, vertically adjustable upon the reduced end 28 of the shaft 17 to vary the grip between the band 25 and the housing 24'. In a preferred form, this member 27 is adjustable by a pivoted lever 29 pivoted at 30 at the side of the frame and suitably connected to the member 27 at its opposite end in such a manner as to raise and lower the latter when the member 29 is moved about its pivot. In order to move this member 29 about its pivot, the latter is also preferably carried on an eccentric pin 31 provided on a shaft 32 which in turn carries at its rear end a bevel gear 33 meshing with an arcuate rack 34, the latter being operable by and carried on a lever 35 pivoted at 36 on the rear of the frame. As in the usual construction, an adjustable nut 37 is also provided on the end of the shaft 17 to vary the tension of a spring 38 and thereby adjust the friction mechanism.

The low speed gearing, i. e. that which is used during the cutting operation, is also connected to the pinion 19, the same comprising speed reducing gearing connected between the motor shaft and the pinion 22. This gearing is thrown into operation by shifting a double ended clutch member 39, reciprocable on the stud 21 and carrying the pinion 22, from the position shown in Fig. 4 into engagement with an upper gear 40 carried on the stud 21, by means of a suitable clutch shipper 41 pivoted at 42 on the frame and adapted to be operated in the same manner as the friction controlling member 29 above described, through an eccentric (not shown) and a lever 43. With the clutch member 39 in this position, the gear 20 is rotated by the pinion 19, and a pinion 44, carried on the lower end of the stud and preferably integral with the gear 20, is driven in such a manner as to rotate a cooperating gear 45 mounted on a stud 46 on the frame and having rotatable with it a pinion 47 meshing with a cooperating gear 48 carried on a vertical stud 49. As shown, this gear 48 is preferably provided with a sleeve 50 fixed to a pinion 51 at the upper end of the stud, which in turn meshes with the gear 40 to drive the latter, and therefore the pinion 22 which is then clutched thereto.

In my improved construction, I have provided means for controlling the friction whereby the machine during the cutting operation is made to function entirely automatically, thereby eliminating the necessity for any attention on the part of the operator. These means include a solenoid winding 52 connected in the armature circuit of the motor and controlling a core or plunger 53 which is in turn connected to one end of a pivoted lever 54 pivotally mounted at 55

at a point intermediate its ends on a standard 56, and having its opposite end engageable with the under side of the friction controlling lever 29 in such a manner that when the plunger 53 is moved downward on the passage of current through the coil 52, the lever 29 is raised and the friction clutch thereby thrown out. As shown in Fig. 7, the motor is preferably a compound wound machine, provided with an armature 57, a series field 58 and a shunt field 59, and controlled by a suitable controller 60. Obviously, since the coil 52 is connected in the armature circuit of this motor, it consequently must be energized to pull down its core and operate the lever 54 when the load on the motor reaches any predetermined amount.

In considering the operation of my improved construction, let us assume that the machine is cutting across the face. When the cutter chain 11 strikes an obstruction, as for instance a sulphur band, the load on the motor necessarily increases, thereby causing increased current to flow through the solenoid coil 52 and eventually pulling in the plunger of that solenoid to release the friction. When the friction is released, due to the mounting of the machine on its chain 1, the natural result is for the machine to jump backward in the cut, the gears of the feeding mechanism then rotating freely in a reverse direction. When this occurs, of course the load on the motor is removed and the solenoid core is released, permitting the friction controlling member 29 again to assume its normal position and connect the friction, whereupon the machine is again driven forward in such a manner as to ram the coal and enable the cutter chain to tear out the obstruction. Obviously, if in a single effort the obstruction is not removed, this sequence of operation will be repeated until any obstruction of average character is torn out.

It will be noted that in my improved construction means are provided for automatically controlling the friction, and therefore the action of the machine, in the same manner that the friction is now manually controlled, thereby enabling the machine to be put through the required operations of backing out of the coal and ramming the same in order to remove an obstruction, without requiring any attention on the part of the operator. It will, of course, also be evident that whenever desired, as, for instance, when shifting the machine in the mine, the friction may be adjusted manually by means of a hand lever 35 without in any way interfering with the operation of the controlling mechanism therefor. Attention is also directed to the fact that by my improved construction it is possible to utilize a machine of standard construction and obtain

an automatic control thereof by the addition of a single small solenoid or other equivalent controlling element, without in any way materially increasing the cost of the machine or providing a bulky mechanism to complicate further the already delicate problem of disposing the driving and feeding mechanism in the small space available in such machines. These and other advantages of my improved construction will, however, be clearly apparent to those skilled in the art.

While I have in this application specifically described one embodiment which my invention may assume in practice, it is to be understood that this form of the same is used only for purposes of illustration, and that the invention itself may be modified and embodied in other forms without departing from its spirit, it being my intention to include all such modifications within the scope of the appended claims. I am aware that it has been proposed heretofore to make machines for several purposes, each to contain two sets of devices so related that the speed of one will be caused to vary in correspondence with variations in the speed of the other; but I am not aware of any mining machine of the class of that herein having a cutter and a cutter carrier both movable bodily and the cutter movable relatively to the carrier together with power devices for effecting the movements, and with parts so arranged that the movement of the carrier and cutter, bodily, will be automatically stopped, for example, at times when the cutters strike an obstruction and this movement, bodily, will be automatically started again after the passage from or overcoming of such obstruction.

In the present mechanism the feed devices are disconnected from the cutting mechanism and from the power mechanism upon meeting an obstruction, and it is not connected again to the power mechanism until

the cutters are at their normal speed and are ready to be again advanced bodily toward and against their work.

What I claim as new and desire to secure by Letters Patent is:—

1. In a mining machine, a motor, cutting mechanism operatively connected thereto, feeding mechanism, operative connections between said feeding mechanism and motor including a clutch, a pivoted clutch controlling member, manually operable means for adjusting the same, and electro responsive means for adjusting the same connected in the motor circuit.

2. In a mining machine, the combination of a cutter, a driving motor therefor, a vertical shaft in the rear of the motor, a chain driving wheel at the lower end of said shaft, a feed mechanism, a friction clutch mounted on the upper end of said shaft and having a vertically axially movable member, a manually controlled lever for actuating the movable member of the clutch, a supplemental lever bearing against the lever aforesaid, and automatic means responsive to the load upon the motor for moving both of the said levers.

3. In a mining machine, the combination of a cutter, a motor, a vertical shaft in the rear of the motor, a cutter driving wheel at the lower end of the shaft, a feeding device, a clutch for throwing said feeding device into and out of operation and mounted on the said vertical shaft at its upper end, a vertically swinging lever engaging with the movable element of said clutch, a second vertically swinging lever below the first lever aforesaid and loosely engaging therewith, an electro magnetic mechanism in the motor circuit and connected directly to the second of said levers and adapted to vary the positions of the first lever and of the clutch.

In testimony whereof I affix my signature.
MORRIS P. HOLMES.