

UNITED STATES PATENT OFFICE.

EDWIN HARRIS MILLS, OF COLUMBUS, OHIO, ASSIGNOR TO JOSEPH A. JEFFREY, OF SAME PLACE.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 635,174, dated October 17, 1899.

Application filed February 16, 1897. Serial No. 623,650. (No model.)

To all whom it may concern:

Be it known that I, EDWIN HARRIS MILLS, a citizen of the United States, residing at Columbus, in the county of Franklin, State of Ohio, have invented certain new and useful Improvements in Mining-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a plan view of a sufficient portion of a mining-machine to illustrate the manner of applying my improvements. Fig. 2 is a vertical longitudinal section. Fig. 3 shows in side view and top view a modified form of the rear stop on the bed. Fig. 4 is a plan view of some of the parts, showing a modified automatic reversing mechanism. Fig. 5 is a perspective of the pinion and the automatic lever connected therewith.

In the drawings I have shown those parts of a mining-machine of the form to which I have applied the present improvements; but it will be understood that I do not limit the improvements to a mechanism of exactly the character illustrated.

All the machines of the general class to which reference will be herein made comprise a bed-frame adapted to be temporarily stationary while the machine is being operated and also a carriage or sliding frame mounted upon, moving along, and guided by the bed-frame and provided with a cutting apparatus of one form or another, together with suitable gearing, shafting, and power devices. In most instances the carriage is caused to advance along the bed-frame by means of the feed mechanism having two elements, one of which is mounted on or secured to the bed-frame and the other of which is mounted on or secured to the carriage, engaging either continuously or intermittently with the said part on the bed.

In machines heretofore constructed use has been made of "throw-off" mechanism, having one part secured to the carriage and another part to the bed, said two parts being so arranged that as the carriage reaches the rear end of its travel on the bed these parts mutually engage and cause the unclutching of the feed mechanism from the power de-

vices, and, too, it has been heretofore proposed to combine with the bed, the carriage, and feed mechanism means situated at the front end of the bed for similarly disengaging the feeding device when the carriage reaches the forward part of its travel; but I do not know of any mechanism of this latter sort adapted to be successfully used in the manner that would be followed in employing that which I have devised.

The part referred to as a "bed" is generally indicated in the drawings by A, it comprising suitable longitudinally-arranged bars *a a* and cross bars or girths *a'*, some of the latter extending across the machine not only at the bottom but also at the top, as shown at *a²*.

The carriage or sliding frame is as a whole indicated by B. It comprises a rear portion C for supporting the gearing, shafting, and driving devices (when the latter are mounted on the machine) and also a forward portion, (indicated by *b'*), adapted to carry the cutting apparatus.

The feeding or carriage-moving mechanism in the construction as shown comprises as its main parts one or more racks C, secured to the bed, and the rotary reversible shaft C', mounted on the carriage and having pinions *c*, which engage with the racks C. The shaft C' can be rotated in either direction by suitable mechanism. As shown, it is provided with two loose wheels D D', one for rotating slowly and feeding the carriage forward and that at D' adapted to rotate in the opposite direction more rapidly and draw the carriage backward. These wheels are alternately connected rigidly to the shaft C' by means of the sliding clutch E. This clutch is thrown out by hand by means of a lever F, which is connected to the vertical shaft F', the latter having at its lower end a pinion *f*, which engages with a rack-plate G, carrying a clutch-pin *g*, that is fitted in the groove *e* of the clutch E. By a train of devices of this character the power applied by hand to the end of the lever F can be relatively greatly multiplied—that is, can be more powerfully applied because of the radius between the end of the lever and the axis of the shaft F' being much longer than that of the pinion *f*—

the speed and extent of motion of the latter being correspondingly less and therefore the power being more advantageously applied.

In using the machine the operator by lever
 5 F throws the clutch E into engagement with the wheel D, and then the driving device being in action the carriage is advanced slowly because of the rotation of the pinions *c* while meshing with the racks C C. Heretofore in
 10 such machines as that illustrated the custom has been when the carriage reaches the front end of its travel for the operator to by hand again move the lever F, but now in the opposite direction, so as to throw the clutch E
 15 away from the wheel D, and by continuing this motion of the lever he throws the clutch E toward the other side until it engages with the oppositely fast moving wheel D', whereupon the carriage commences to recede, the
 20 receding continuing until it reaches the rear end of the bed, and then generally it is stopped by means of automatically-acting devices which carry the clutch E out of engagement with the receding wheel D'. These devices
 25 are substantially such as illustrated, there being at H a lever which is pivoted to the vertical shaft F' and extending backward over the central part of the clutch E. This lever has a pin *h*, which also fits in the groove *e* of
 30 the clutch and the cam-like end *e'*, which is adapted to impinge upon a stationary cam at L, secured to the cross-bar *a*² on the bed. When the carriage nears the rear end of its travel, the pin *h* strikes that at I and the
 35 lever H is moved in such way as to throw the clutch E away from the wheel D', whereupon the shaft C' remains stationary, the wheels D and D' being distanced from each other in such way that the clutch can stand at a mid-
 40 way position between them without having its teeth engaged with either. Now to accomplish the automatic stoppage of the carriage at the opposite or front end of the bed I have combined with the mechanism above
 45 described the following device:

J is a sliding bar mounted upon the rear part of the carriage. It projects forward of this rear part somewhat, as shown at *j*. This projecting portion is adapted to strike some
 50 stationary portion of the front part of the bed—as, for instance, against the bar at K. The rear end of this bar J can impinge upon a lever or crank-arm L, which is cast with or connected to the pinion *f*. When the end *j*
 55 strikes the bar K, the part J stops relatively, and the advancing motion of the carriage causes the arm L to turn the pinion far enough to compel the rack G and pin *g* to move the clutch E away from the wheel D. Thereupon
 60 the forward motion of the carriage stops, and as soon as he desires the operator by hand imparts an additional movement to the clutch by the lever until it engages with the receding wheel D', whereupon the carriage com-
 65 mences to move backward and continues so doing until, as aforesaid, the lever H strikes the cam I.

In Figs. 3 and 4 I have shown a modification of the mechanism above described. In this case the entire reversing mechanism is
 70 simplified. The arm L is utilized for automatically disengaging the clutch both at the front and rear of the travel of the carriage. The lever H is dispensed with, and the cam or abutment I is arranged so as to project
 75 forward far enough to have the arm L impinge upon it.

It will be seen that the parts which accomplish the above-described purpose are arranged compactly and in such manner that
 80 great power can be exerted in small compass.

I am aware of the fact that a rack-and-pinion clutch has been heretofore used—as shown, for instance, in the Patent No. 374,900, to B. A. Legg; but in the construction therein
 85 illustrated there were not the several advantageous features which I have herein provided. In the construction shown in the said patent a single lever was provided, which could be placed high or low, as preferred. In the pres-
 90 ent construction I maintain the advantages incident to having a cross feed-shaft transverse to the frame and applying power uniformly across the carriage to the pinions and racks and to maintain the simple form of
 95 clutch it is true; but in my case there are practically three independent power devices for moving the clutch and two acting through the power-multiplying pinion and rack. The hand-lever F being rigid with the pinion-
 100 shaft and the rearwardly-acting throw-off H being pivoted thereto, they can be moved independently of each other when one or the other is moving the clutch. This enables me to provide a rigid fastener or holder for the
 105 clutch when engaged with the forward feeding-wheel, as the upper lever F can be utilized for this. At the same time the loose lever H, having independent connection with the clutch, can be depended upon to throw the
 110 clutch out from the pull-back wheel. The third lever L enables me to accomplish the other purpose of throwing the clutch when the carriage is at the forward limit of its throw. The trip-bar J is entirely discon-
 115 nected from the lever L, and therefore there is no interference with the movement of the clutch by means of the hand-lever at intermediate points of the travel of the carriage should the operator desire to reverse before
 120 reaching the front end. The third lever L acts through the pinion and rack, and therefore the power or back pressure received from the front abutment is relatively increased when it reaches the clutch and insures dis-
 125 engagement of the latter and stopping of the forward movement of the carriage. It is well known that when using such machines the clutch is bound or clamped to the forward feeding-wheel with great force, it being fre-
 130 quently impossible to disengage the clutch by the hand-lever because of the binding together of the clutch elements. To obviate this, the lever L is connected to the pinion.

I am also aware of the fact that use has been proposed of a clutch arranged to slide longitudinally of the machine, in combination with a pivoted shipping-lever and a longitudinally-sliding rod permanently connected to the shipping-lever, and I do not claim such subject-matter as of my invention.

What I claim is—

1. In a mining-machine of the character described, the combination with the bed-frame having a stop or abutment at the front end, a cam or abutment at the rear end, and feed-racks at the sides of the said bed, of the carriage having the transverse pinion-shaft C' with pinions *c* engaging with said racks, the loose wheels D, D', a transversely-sliding clutch for alternately engaging with said wheels, a sliding rack engaging with the clutch, a pinion engaging with the said sliding rack, a hand-lever rigidly connected with the said pinion, a supplemental lever connected with the said pinion, and means traveling in the line of the front stop on the bed for moving the supplemental pinion-lever automatically, and means moving with the carriage and adapted to engage with the said cam or stop at the rear of the bed to move the clutch, substantially as set forth.

2. In a machine of the character described, the combination with the bed-frame having a stop or abutment at the front end, and a cam or abutment at the rear end, and feed-racks at the sides of the said bed, of the transverse feed-shaft C' with pinions *c* engaging with said racks, the loose wheels D, D' on said feed-shaft, a transversely-sliding clutch for alternately engaging with said wheels, a lever vibratable transversely of the carriage and adapted to engage with the said stop or abutment at the rear end of the bed for stopping the carriage after it has moved back, longitudinally-sliding rods on the carriage adapted to engage with the stop or abutment at the front of the bed, a pinion and rack interposed between said sliding bar and the clutch, and a hand-lever rigidly connected to the said pinion for moving the clutch at will, substantially as set forth.

In testimony whereof I have hereunto set my hand, this 15th day of December, 1896, in the presence of two witnesses.

EDWIN HARRIS MILLS.

Witnesses:

OTTO R. EHRET,
A. D. SHAW.