(No Model.)

F. M. LECHNER.

Mining Machine.

No. 239,516 **Patented March 29, 1881.**

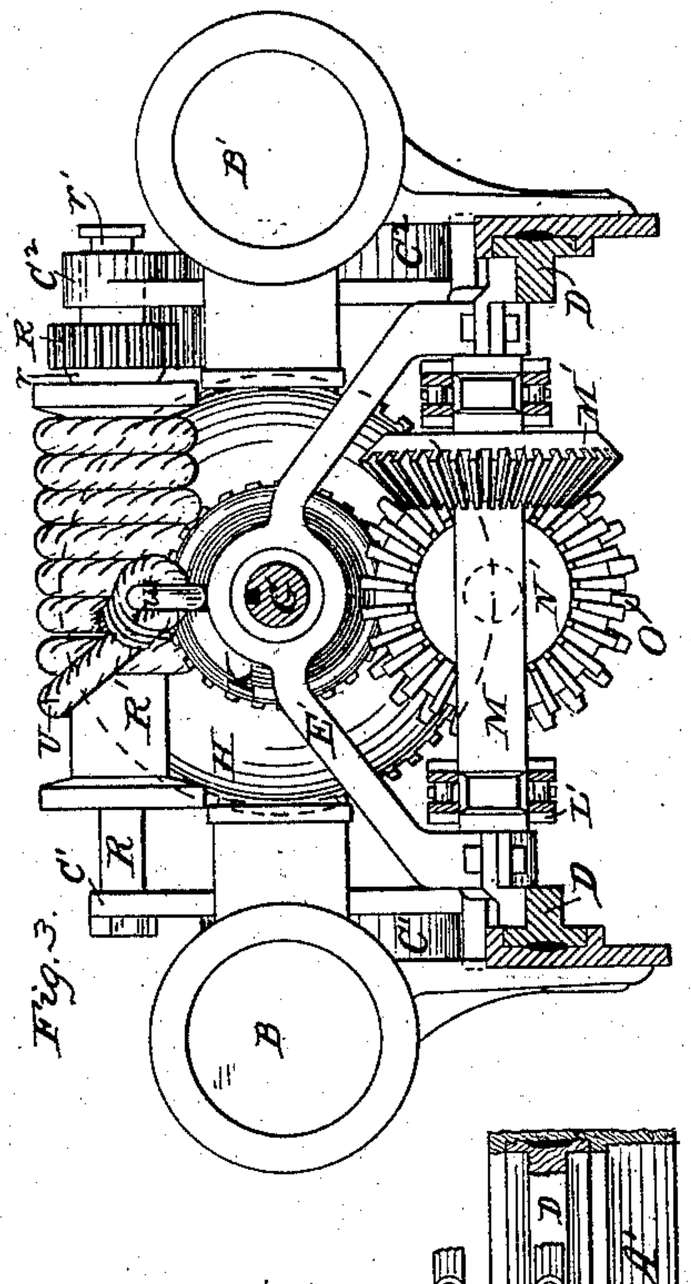


Fig. 3.

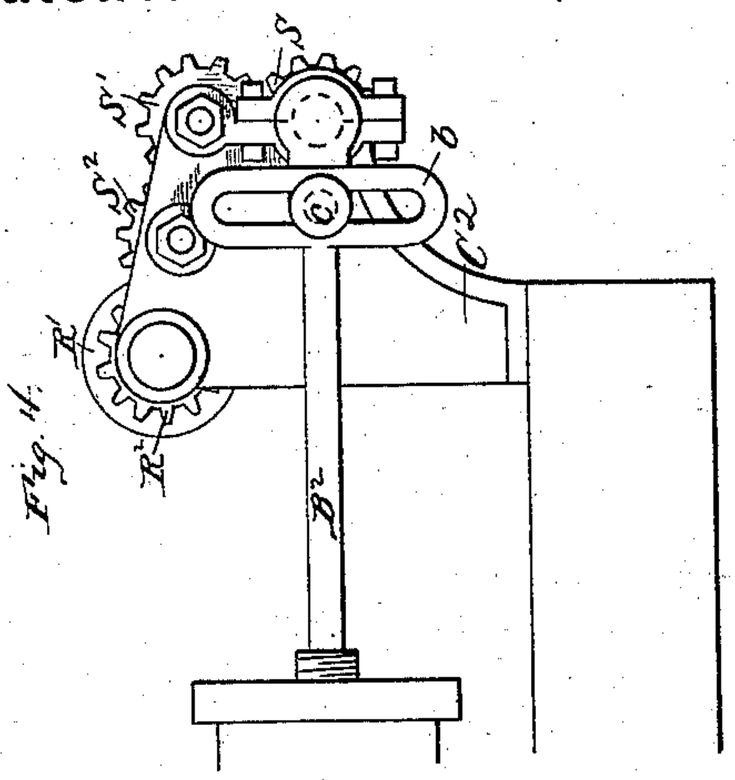
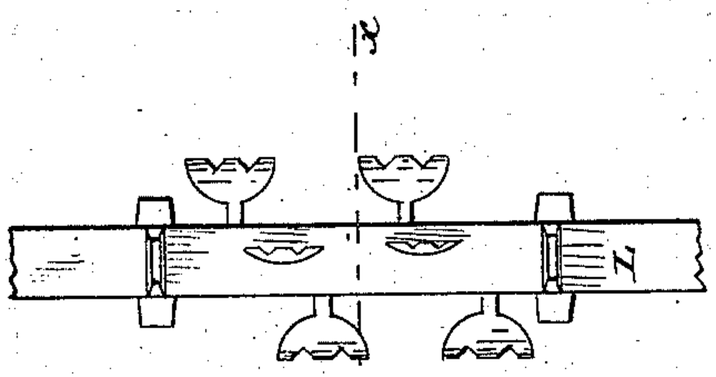


Fig. 4.



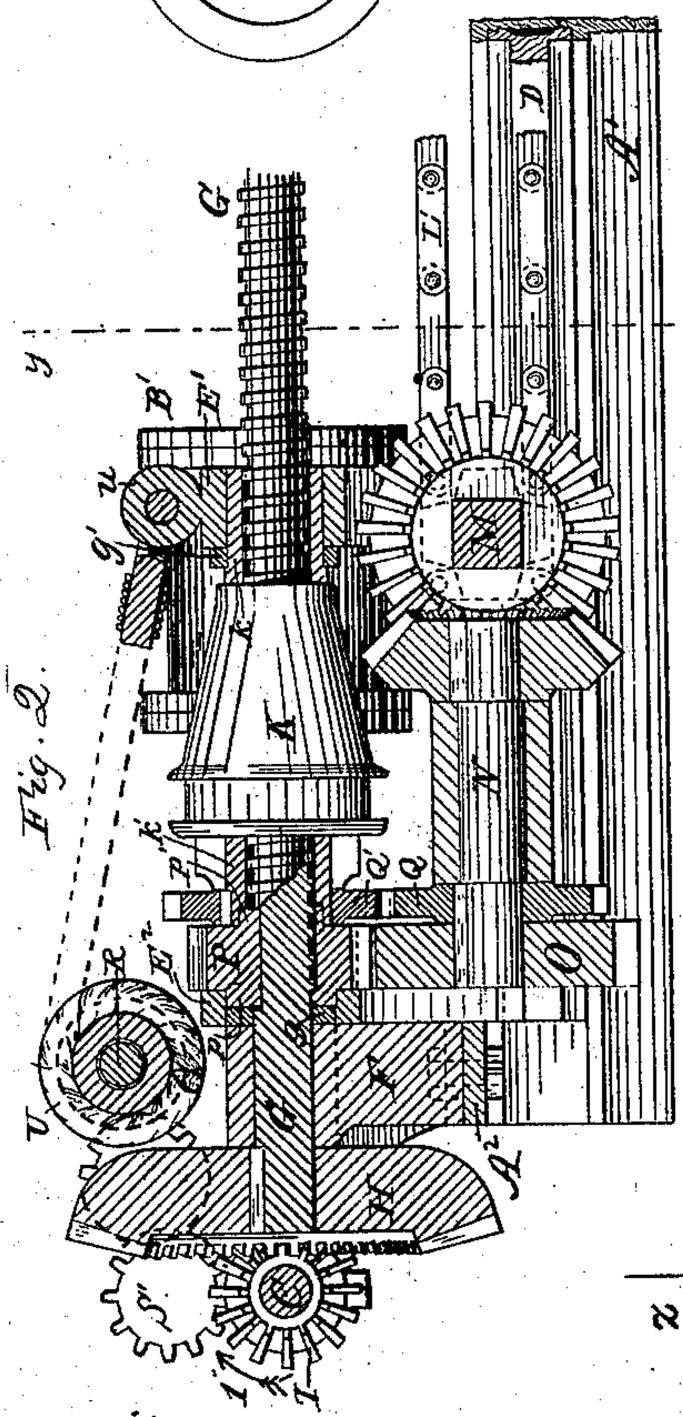


Fig. 2.

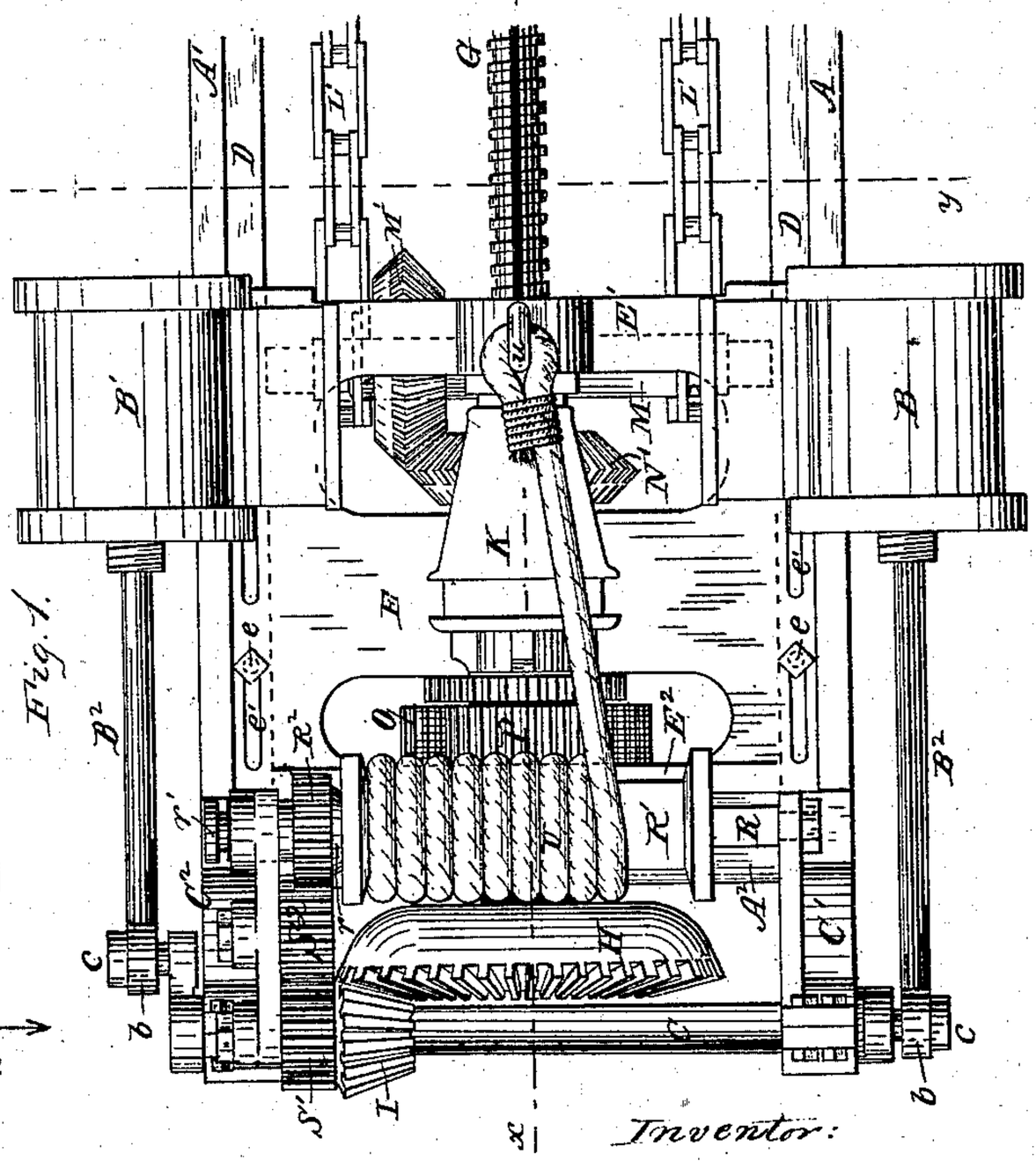


Fig. 1.

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UNITED STATES PATENT OFFICE.

FRANCIS M. LECHNER, OF WAYNESBURG, ASSIGNOR TO THE LECHNER MINING MACHINE COMPANY, OF COLUMBUS, OHIO.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 239,516, dated March 29, 1881.

Application filed October 5, 1880. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS M. LECHNER, a citizen of the United States, residing at Waynesburg, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Mining-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a top-plan view of my improved mining-machine. Fig. 2 is a longitudinal vertical section on the line *x x* of Fig. 1. Fig. 3 is a vertical transverse section on the line *y y*. Fig. 4 is a side elevation of the rear part of one side of the frame, looking in the direction of the arrow *z*, Fig. 1.

The cutting apparatus, the nut-holder, and the mechanism for withdrawing the cutters are, or may be, similar to those shown in my various patents issued prior hereto—to wit, Nos. 172,637, January 25, 1876; 186,854, January 30, 1877; 197,734, December 4, 1877; 211,100, January 7, 1879; 223,626, January 13, 1880; and 232,280, and therefore these parts need not be described in detail herein.

In the drawings, A A′ represent the side sills of a stationary bed-frame, and A^2 one or more cross pieces or braces. Upon the inner side of the side pieces, A A′, ways are formed to support and guide the sliding frame. These ways may be of any of the species shown in my aforesaid patents, or of any other preferred character.

In the construction shown in the patents above enumerated, use was made of engines having cylinders situated on vertical lines. This style of construction necessitated the use of a high frame and of a complication of parts which, under some circumstances, are undesirable; and one of the main purposes of this invention is to so construct and arrange the operative parts of a mining-machine that it shall occupy but small compass, and shall especially be of a short diameter or dimension vertically.

B B′ represent engine-cylinders, constructed to be moved by compressed air or steam, or other motive power. They are situated upon substantially horizontal lines, and are secured to the stationary frame-work. They may be attached in any preferred manner.

C is the main shaft of the engine, supported above the rear end of the frame. It is mounted in bracket-arms C′ C^2, bolted to the rear end of the frame, as shown in Fig. 4.

The pistons B^2 B^2 may be connected with the engine-shaft C in any suitable manner.

In the construction shown in the drawings, *b b* are slotted arms or yokes engaging with the crank-pins *c* in a well-known manner. Instead of this construction use may be made, if desired, of pitmen, or of oscillating engines.

A frame is arranged to slide upon the stationary frame above described, the sliding frame being supported on the stationary frame by means of tongue-bars or T-bars D. The sliding frame is represented as being formed of a substantially horizontal plate, E, an arched standard, E′, at the front end of the sliding frame, and an arched standard, E^2, at the rear end of said frame. These parts may be formed in one piece of metal, or in separate pieces bolted together. The plate E is secured to the T-bar D adjustably, by means of bolts and nuts, at *e e*, inserted through slots *e′*.

F is a standard or upright, secured to the stationary frame A A′ A^2 at its rear end.

The sliding frame above described is moved forward by means of a screw-threaded shaft, G, which is supported in the standard F at the rear end of the stationary frame, and in a corresponding standard (not shown) at the front end of the stationary frame, as fully set forth in my previous patents.

H is a bevel-wheel keyed to the screw-shaft G, which latter extends to the rear of the standard F sufficiently far to support it.

I is a small bevel-wheel, mounted on and rotated by the shaft C. It engages with the wheel H, and through these devices the power is transmitted to the screw-shaft G.

K represents the nut-holder, and indicates the position of the nut, which is caused to engage with the screw-shaft when the sliding frame is to be thrust forward toward the coal.

The construction, in detail, of this nut-holder and nut need not here be described, as they are fully shown and described in my previous patents, I preferring to use that shown in patent No. 232,280, September 14, 1880. When the nut is engaged with the shaft the forward cylindrical part, *k*, of the nut-holder bears against the front standard, E′, of the stationary frame. The nut can be disengaged from the shaft by sliding it on the same, in the manner set forth in the last aforesaid patent. With my present construction I not only carry the cutting apparatus forward by means of the screw-threaded shaft, but I also impart the required rotary motion to said apparatus from this same shaft.

L represents the cutter-bar, which also may be of any of the characters I have heretofore shown and patented, and L′ L′ the chains for rotating said bar. The chains receive motion from a shaft, M, mounted on the plate E of the sliding frame. M′ is a miter-pinion attached to the shaft M.

N is a short supplemental shaft, mounted in said plate E on a line situated in the same vertical plane as the screw-shaft G, and in the same horizontal plane as the rear chain-shaft, M.

N′ is a miter-wheel mounted at the front end of the short shaft N, and engaging with the miter-wheel M′.

Power is applied to the shaft N by means of a spur-wheel, O, keyed to the front end of said shaft, and a spur-wheel, P, mounted on the screw-shaft G. The shaft G engages with the wheel P by means of a feather or spline on the wheel fitted within a slot, running parallel to the axis of the screw. Thus the wheel, while rotating with the screw, is at the same time permitted to traverse the screw longitudinally, and as the cutter-carriage is moved forward said wheel is moved along the shaft by means of the rear standard, E², which, as will be seen by an examination of the drawings, is so situated as to bear against the rear face of the wheel. *p* is a boss projecting from the face of the wheel, and arranged to provide a mounting for it within the standard E². *p′* is also a boss projecting from the opposite side or face of the wheel.

It will now be seen that if power be applied to shaft C in the direction of the arrow 1 in Fig. 2 the screw-shaft will be rotated, and as a result the wheels P, O, N′, and M′ will be rotated in such direction as to rotate the cutters properly for cutting the coal, and if the nut at K be held in engagement with the screw the cutter-carriage will be at the same time moved forward; but as it is desirable to move the machine forward with a speed different from that which it would obtain in the manner last described, I interpose between the nut and the power devices the following mechanism.

Q is a spur-wheel keyed to shaft N, and Q′ is a spur-wheel of diameter equal thereto, and keyed to the cylindrical portion *k′* of the nut-holder. By an examination of the drawings it will be seen that the wheels Q Q′ differ in diameter from the wheels O and P to such an extent that while the wheel O is rotating the cutters, the wheel Q is rotating the nut-holder K in the same direction as the screw-shaft G is rotating, and that the result of the rotations of the shaft and of the nut is to move the nut forward with a speed lower than it would have if operated directly by the screw-shaft G. The nut-holder can readily rotate around the screw-shaft, owing to the smooth cylindrical inner surface of the holder *k k′*.

In order to prevent wear of the parts to as great a degree as possible, washers *g g′* may be employed at the points where the screw-shaft bears backward against the stationary standard F, and where the nut bears against the sliding standard E′. The rear end of the nut-carrier *k k′* surrounds the boss *p′* on wheel P, which provides a bearing for it.

By means of the slotted plate E and the adjusting-bolts at *e e* the chains L′ L′ may be adjusted so as to keep them always properly tight.

By mounting the engine in the manner which I have described and applying power directly therefrom to the screw-threaded shaft, and by arranging the parts so that said shaft shall not only move the carriage forward, but shall also rotate the cutters, I am enabled to provide a much simpler construction than heretofore, and to place the parts of the machine more compactly than can be done when several chains are necessary for imparting the power to produce the various required motions.

To withdraw the cutting mechanism from the coal, after the operation of cutting has been completed, use may be made of any of the devices shown in my aforesaid previous patents. I have shown in the drawings one arrangement of devices to accomplish this purpose, though others may be used, if preferred.

R is a shaft mounted above the rear standard, F, upon the stationary frame. R′ is a spool or reel keyed to the shaft R, and R² is a sliding pinion supported loosely upon the same shaft. It carries a conical hub, *r*, which can be caused to engage with a flaring or conical recess formed in the end of the spool R in a manner substantially similar to that shown in Patent No. 232,280, September 14, 1880. The pinion may be shifted on the shaft R by a lever engaging at *r′* with the sleeve which carries the pinion R². The pinion receives power from a spur-wheel, S, on the engine-shaft C, through idler-wheels S′ S². The shaft R is mounted in brackets or standards C′ C² projecting upwardly from the main frame, and the idlers S′ S² are supported upon the standard C² by means of stud-shafts.

U represents a rope or chain attached to the spool or reel R′ at one end, and secured to the sliding carriage by means of an eye, *u*.

When it is desired to withdraw the cutters the nut at K is released from the screw and

the pinion R^2 is moved so as to cause the hub *r* to engage with the spool R′, whereupon the said spool is rotated with shaft R. The rope U is wound around the spool, and the sliding frame is drawn back till it reaches the standard E, or arrives at any desired point, the nut-holder K moving freely backward over the shaft G.

In this application I do not base claims upon any of the features shown, except those incident to the rope or chain for withdrawing the cutters, and the mechanism for supporting and operating said ropes, as I prefer to claim all of the other features in another application which I have filed.

In some respects the withdrawing mechanism shown herein is similar to those shown in my aforesaid previous patents; but owing to the peculiar arrangement of the frame and other parts of the machine herein shown I have met great difficulty in employing a rope or other flexible device for withdrawing the cutters. I have relieved the sliding frame from the weight of the reel and the other rope-operating devices by mounting these parts upon the stationary frame and securing the rope to the movable frame by means of an eye or loop.

What I claim is—

1. In a mining-machine, the combination, with a stationary frame and a sliding cutter-frame, of the reel R′, mounted upon the stationary frame, the rope U, the engine-shaft C, mounted upon the stationary frame, and intermediate mechanism for conveying power from the engine to the stationary reel, substantially as set forth.

2. In a mining-machine, the combination of the following elements: a rotating cutter, a sliding carriage for said cutter, a screw-threaded shaft, arranged, substantially as set forth, to advance the cutter-carriage, and also to rotate the cutter, and mechanism intermediate between said screw-threaded shaft and the cutter, and arranged to transmit rotary motion from the screw-threaded shaft to the cutter.

3. In a mining-machine, the combination of the following elements, viz: a stationary bed-frame, a cutter-frame arranged to slide upon said bed-frame, a rotated cutter mounted upon the sliding frame, an engine secured to the stationary frame, and mechanism operated by said stationary engine, and arranged, substantially as set forth, to advance the cutter-frame and rotate the cutter.

4. In a mining-machine, the combination of the following elements, viz: a stationary bed-frame, a cutter-frame arranged to slide upon said frame, a rotating cutter carried by said sliding frame, an engine-cylinder situated on a substantially horizontal axis, and an engine-shaft mounted in rear of the sliding frame, substantially as set forth.

5. In a mining-machine, the combination of the following elements, viz: a stationary bed-frame, a cutter-frame which slides upon said bed-frame, a rotating screw-shaft, and a nut which engages with said shaft to advance the cutters, and which rotates in the same direction with the shaft, substantially as set forth.

6. In a mining-machine, the combination of the following elements, viz: a stationary frame, a sliding cutter-frame, a cutter mounted upon said sliding frame, mechanism arranged, substantially as set forth, to rotate said cutters, a rotating screw-shaft which advances the cutter-frame, and which is provided with a longitudinal slot, whereby it can engage with the cutter-rotating mechanism, as described.

7. In a mining-machine, the combination of the following elements, viz: a stationary bed-frame, a sliding cutter-frame, mechanism which withdraws the cutter-frame, and a continuously-rotating screw-threaded shaft, arranged, substantially as described, to alternately advance the cutter-frame and to operate the withdrawing mechanism without being reversed.

8. The combination of the following elements, viz: the screw-threaded shaft G, the sliding cutter-frame, the nut at K, which engages with the thread of shaft G to advance said sliding frame, a rotating cutter, the mechanism which rotates said cutter, and the spur-wheel P, which operates the cutter-rotating mechanism, and which is rotated by the shaft G, and traverses said shaft longitudinally, substantially as set forth.

9. The combination, with the cutter, a sliding cutter-frame, the shaft G, and the nut at K, of the wheels P and O, which operate the cutter, and the wheels Q and Q′, which rotate the nut K, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS M. LECHNER.

Witnesses:

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