(No Model.) 2 Sheets—Sheet 1.

F. N. SLADE.

MINING MACHINE.

No. 583,409. Patented May 25, 1897.

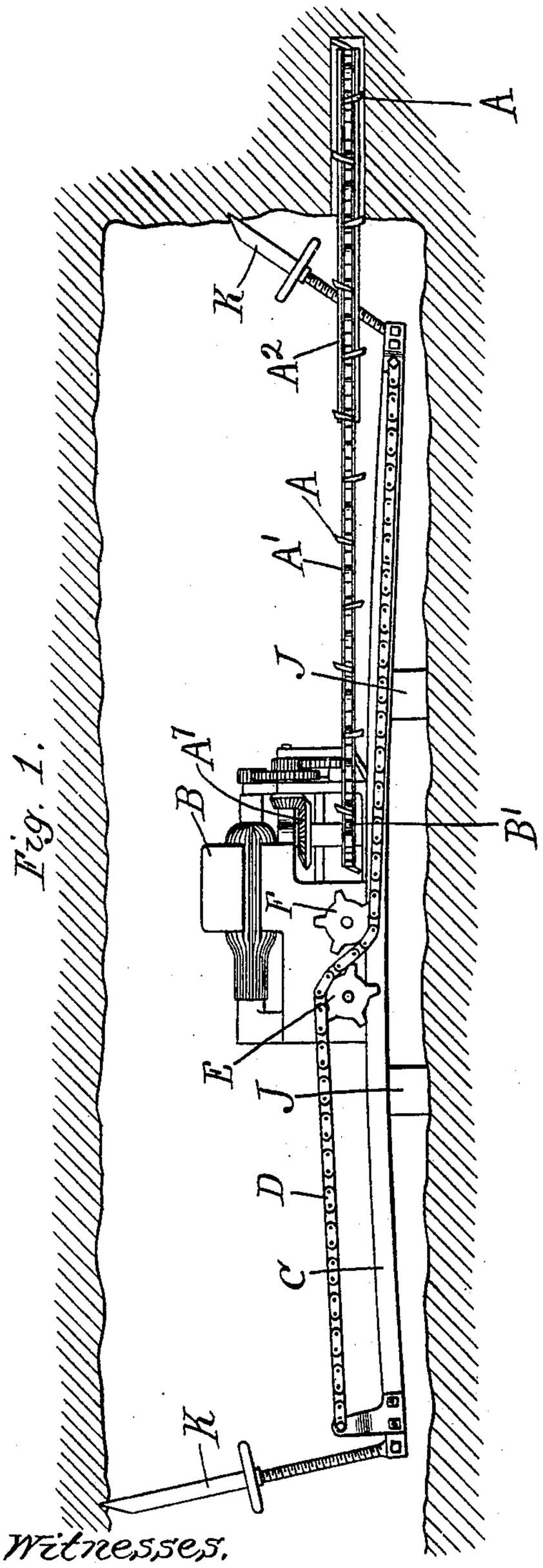


Fig. 1.

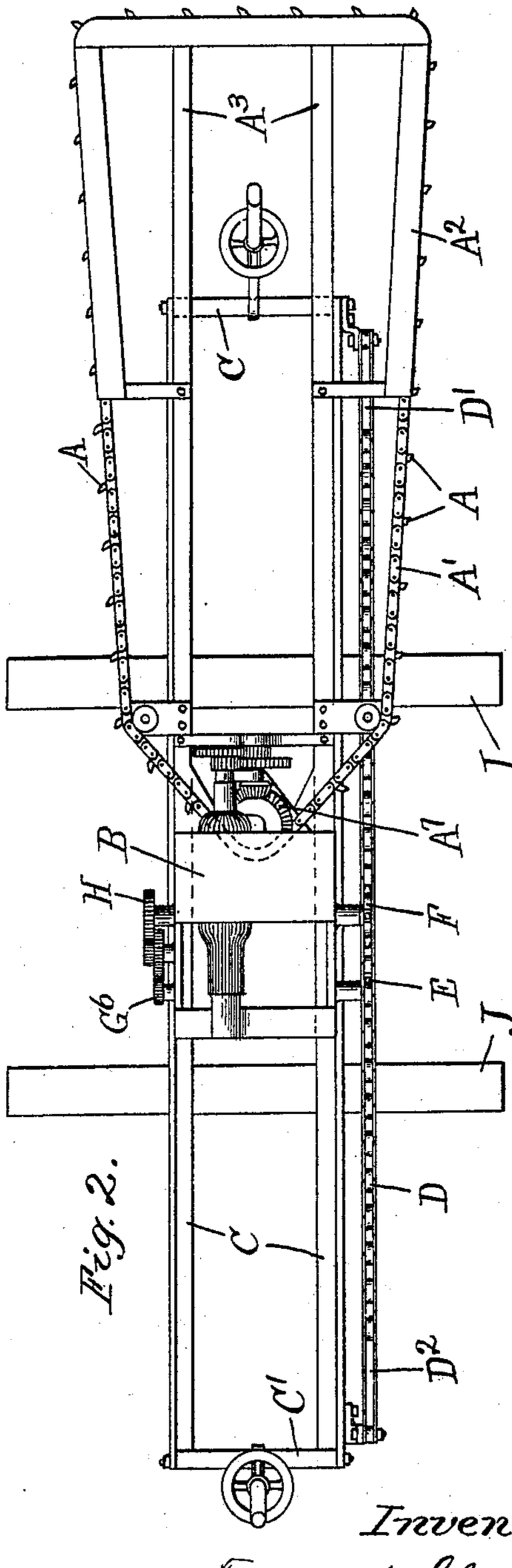


Fig. 2.

Witnesses.
E. T. Wray.
D. M. Carter

Inventor.
Frank N. Slade
by Bruce & W. Parker,
his Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

F. N. SLADE.

MINING MACHINE.

No. 583,409. Patented May 25, 1897.

Fig. 3.

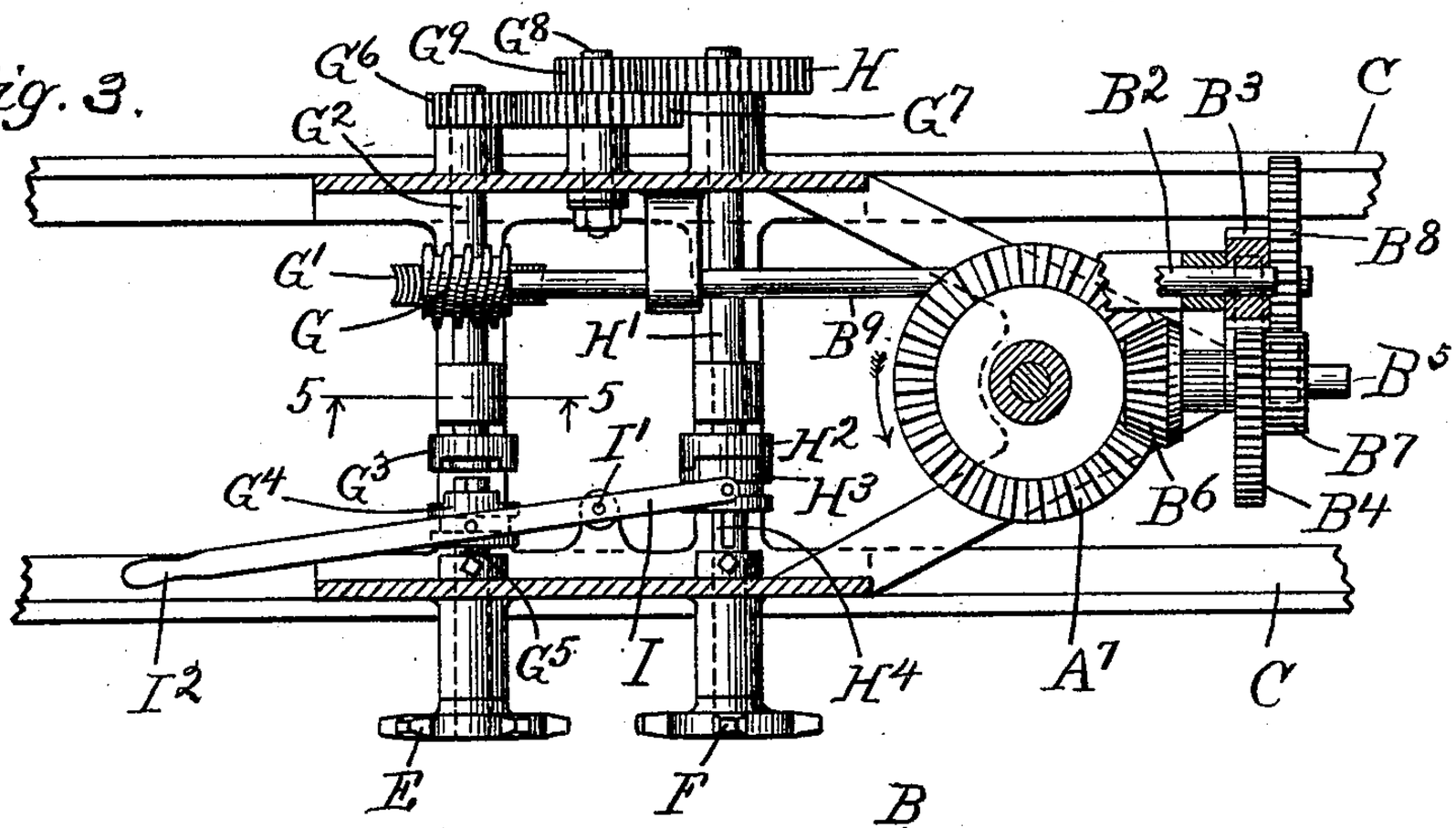
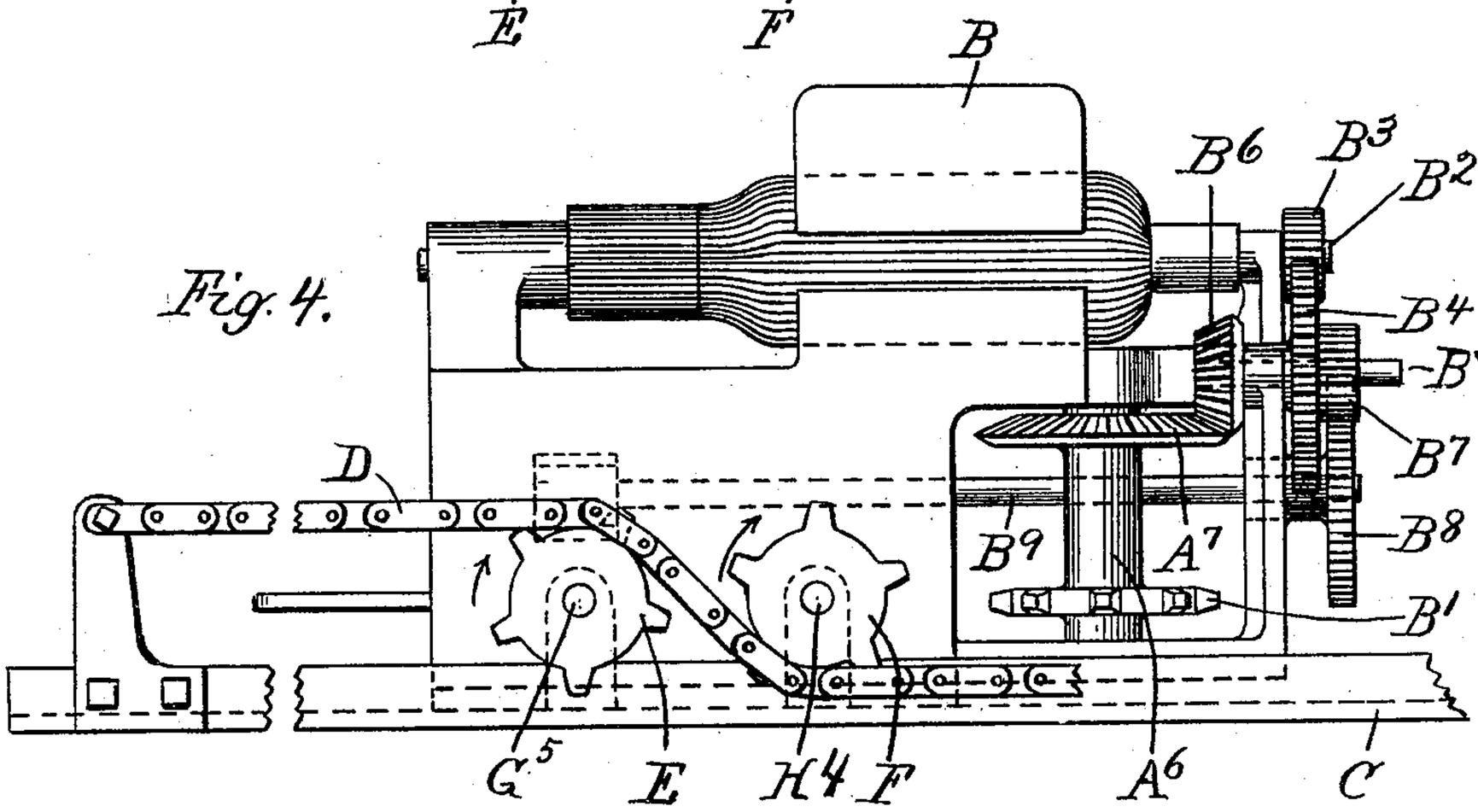


Fig. 4.



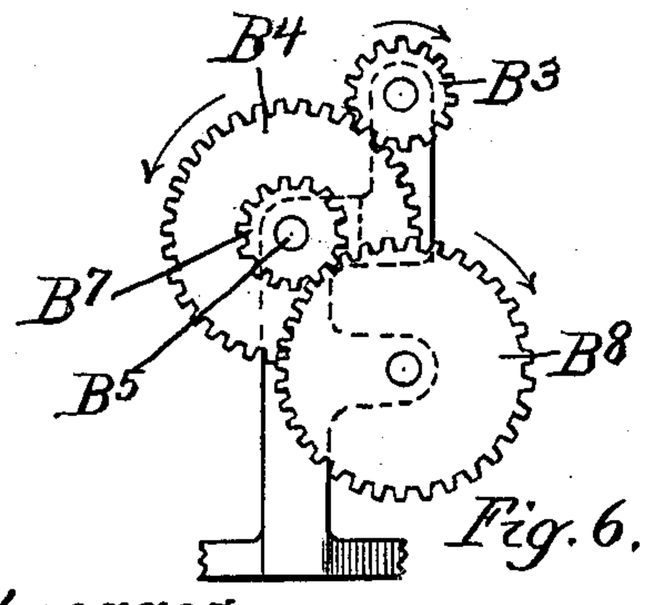


Fig. 6.

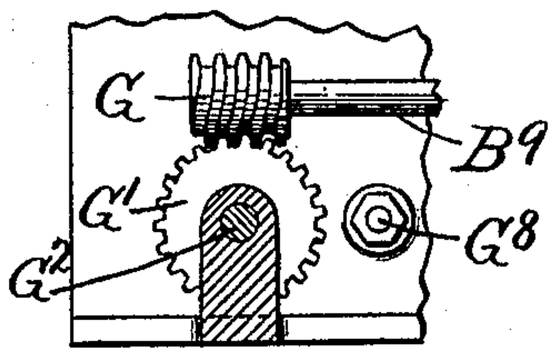


Fig. 5.

Witnesses.
E. F. Wray.
D. M. Carter

Inventor.
Frank N. Slade.
by Francis W. Parker,
his Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANK N. SLADE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE INDEPENDENT ELECTRIC COMPANY, OF SAME PLACE.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 583,409, dated May 25, 1897.

Application filed January 2, 1895. Serial No. 533,662. (No model.)

To all whom it may concern:

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

My invention relates to mining-machines, and has for its object to produce a mining-machine provided with a flexible feeding device, of which the following is a description, reference being had to the accompanying drawings, wherein—

Figure 1 is an elevation showing machine in operation. Fig. 2 is a plan view of the same. Fig. 3 is a view with the motor removed, showing the feeding mechanism. Fig. 4 is an enlarged side elevation. Fig. 5 is a section on line 5 5, Fig. 3. Fig. 6 is a detail.

Like letters refer to like parts throughout the several figures.

I have shown in the drawings a mining-machine that undermines the body of material by means of cutting-tools A A on the endless belt A′. Said endless belt works in a groove in the guides A^2 A^2, which are supported by the pieces A^3 A^3, attached to the frame of the motor B. Said belt receives its motion from the sprocket-wheel B′. The frame of the motor B is adapted to move along the stationary guides C C as the cutting-tools are fed forward. Said guides are connected together by the cross-pieces C′ C′.

A flexible belt or chain D is fastened at both ends to one of the guides C and is adapted to engage the sprocket-wheels E F, associated with the motor-frame. Said sprocket-wheels are adapted to be connected with the armature-shaft B^2 of the motor, so that they may be alternately rotated.

Referring to Figs. 3 and 4, which show in detail the connection between the motor-armature and the sprocket-wheels E F, a pinion B^3 on the end of said motor-shaft engages a gear B^4 on the short shaft B^5. Said short shaft is provided at one end with the bevel-gear B^6 and at the other end with the pinion B^7, both of which are rigidly connected to said shaft. The pinion B^7 meshes with the gear B^8, keyed to the shaft B^9. Said shaft is provided with the worm G, which engages the worm-gear G′ on the shaft G^2. Said shaft is provided at one end with the stationary clutch member G^3, adapted to be engaged by the sliding clutch member G^4 on the shaft G^5, to which the sprocket-wheel E is fastened. A pinion G^6 at the other end of said shaft G^2 engages the gear-wheel G^7 on the short shaft G^8. A pinion G^9 on the end of said shaft G^8 meshes with the gear-wheel H on the shaft H′. By this construction the shaft H′ is driven at a much slower speed than the shaft G^2. The shaft H′ is provided with the stationary clutch member H^2, adapted to be engaged by the sliding clutch member H^3, feathered to the shaft H^4, to which the sprocket-wheel F is attached. A shifting bar I, pivoted at I′, engages the sliding clutch members G^4 and H^3 in the usual manner and is provided with the controlling-handle I^2.

Since the sprocket-wheels E and F run at different speeds, the sprocket-wheel F cannot be placed directly on the shaft H′, it being necessary to divide such shaft, as shown, so that said sprocket-wheel may be disconnected therefrom when the sprocket-wheel E is operatively connected with the motor.

It will be seen that by this construction the sprocket-wheels E and F may be alternately connected with the armature-shaft, so as to be revolved in the same direction, but at different speeds, and since the flexible chain or rack D passes below the sprocket-wheel F and above the sprocket-wheel E, so as to be engaged by both, it is evident that the motor-frame can be moved back and forward along the stationary guides C C.

The sprocket B′, that drives the belt A′, carrying the cutting-tools A, is rigidly connected to the vertical shaft A^6. The shaft A^6 is driven by the beveled pinion B^6, which engages the beveled gear-wheel A^7 on said shaft. The stationary guides C C rest upon the loose cross-pieces J J and are held in place by the jack-screws K K. The rivets or cross-pieces of the flexible rack or chain are removed at the ends, as indicated at D′ D^2, and the driving-sprockets E and F are so arranged that they engage the chain at different positions along the length thereof, so that when one sprocket-wheel reaches the place where the rivets are broken out and becomes disen-

gaged from the rack, so as to stop the motion of the machine, the other sprocket-wheel will still be in engagement with the rack, and hence when it is connected with the motor the motor and accompanying parts may be moved in an opposite direction.

I have described these several parts in detail, but it is evident that they may be varied in form, construction, and arrangement and that the connection between the motor and the flexible rack may be made in a manner different to that herein described without departing from the spirit of my invention, and I therefore do not wish to be limited to the construction shown.

The use and operation of my invention are as follows:

In operating the mining-machine I have shown and described it is the common practice to place the cross-pieces J J beneath the guides C C and then jack said guides down by means of the jack-screws K K at each end. It often happens, on account of the unevenness of the floor or the carelessness of the operator, that the guides C C are bent or sprung after they are jacked down, as shown in Fig. 1. As mining-machines are ordinarily constructed the motor-frame and accompanying parts are moved along the guides C C by the engagement of a pinion on said motor-frame with a rigid rack or the like fastened to the guides C C. It is evident that when the guides C C are sprung out of line, as in the case of Fig. 1, for example, the machine would not feed in a satisfactory manner. Mining-machines, as a rule, are handled very roughly, and hence a rigid rack is very likely to be sprung so as to cause an uneven mesh of the pinion along the entire length, the inevitable result of which is excessive breakage of the pinion or rack or of both. These evils are all overcome by the use of my flexible rack, as the machine will be fed regardless of the position of the guides C C, and the chain is not likely to be broken or injured when the frame is sprung out of line.

When the clutch members H^2 and H^3 are in engagement and the motor running, the sprocket-wheel F will be rotated in the direction of the arrow, (see Fig. 4,) and since it is in engagement with the flexible belt D the motor-frame and the belt carrying the cutting-tools will be moved forward, and as the chain carrying the cutting-tools is in motion the material against which they bear will be cut away, as shown in Fig. 1. The motor-frame will continue to move forward until the sprocket-wheel F reaches the point D', where the rivets or cross-pieces of the flexible rack are removed. When this point is reached, the forward motion of the motor-frame ceases, although the motor-armature is still running and the sprocket-wheel E is still in engagement with the rack. If now the shifting lever I be moved so as to disengage the clutch members H^2 H^3 and bring the clutch members G^3 G^4 into engagement, the sprocket-wheel E will be rotated in the direction of the arrow (see Fig. 4) and the motor-frame and associated parts will be moved in a direction opposite to that of its former motion. The motor-frame will be stopped, as described above, when the sprocket-wheel E reaches the point D^2, where the rivets or cross-pieces of the rack are removed and may be moved forward again by moving the shifting bar I.

I consider one of the essential features of my invention to embrace the stationary frame adapted to be fixed in position for a definite period and a moving cutter-carrying frame adapted to move along the stationary frame, the two frames operatively connected by means of a flexible rack on one and the traveling device on the other, said traveling device adapted to engage the flexible rack, and when actuated to creep or travel therealong, and thus move the cutter-carrying frame along the stationary frame regardless of the position of the stationary frame.

I claim—

1. The combination in a mining-machine of a stationary frame having substantially rigid guides, a cutter-carrying frame supported by such guides and adapted to move therealong, a motor on said cutter-carrying frame, a flexible rack attached at both ends to one frame and a traveling device on the other frame adapted to engage said flexible rack when actuated so as to travel or creep backward and forward along the rack, thus moving one frame upon the other, the several parts so constructed and connected together that a complete, self-contained machine is produced substantially as described.

2. The combination in a mining-machine of a cutter-carrying frame, a motor mounted upon such frame, a stationary frame upon which said cutter-carrying frame is supported and along which it is adapted to move, a flexible rack fastened at each end to the said stationary frame and a connection between said motor and the flexible rack by which said cutter-carrying frame may be moved backward and forward along the stationary frame, said connection so constructed that said cutter-carrying frame may be moved backward and forward while the motor is running continuously in one direction, whereby a self-contained machine is produced.

3. The combination in a mining-machine of a cutter-carrying frame, a motor mounted upon said frame, a two-part shaft operatively connected with said motor and provided at one end with a sprocket-wheel, a second two-part shaft operatively connected with the first shaft and provided at one end with a sprocket-wheel, a clutch associated with each shaft and adapted to connect the two parts of each shaft together, a stationary frame upon which said cutter-carrying frame is adapted to move, and a flexible rack connected at each end to said stationary frame and adapted to engage the sprocket-wheels

associated with the cutter-carrying frame, whereby said cutter-carrying frame may be moved backward and forward along the stationary frame, substantially as described.

4. In a coal-mining machine the combination of a cutter-carrying frame with a stationary frame along which the cutter-carrying frame is adapted to move, a flexible rack on one frame with cross-rivets removed at its ends, and an actuating device having two members adapted to engage said rack in such a manner that one of said members will always be in engagement with the rack.

5. The combination of a stationary frame having substantially rigid guides with a cutter-carrying frame supported by such guides, and adapted to move therealong, a motor on said cutter-carrying frame, a flexible rack attached at both ends to one frame, and a traveling device on the other frame, said traveling device adapted to engage the flexible rack when actuated so as to travel or creep backward or forward along the rack, thus moving one frame upon the other, said flexible rack having the cross-pieces removed at its ends, the traveling device on the cutter-carrying frame having two members adapted to engage said rack in such a manner that one of said members will always be in engagement with the rack while the other will be moved out of engagement therewith when the cutter-carrying frame has reached either end of the stationary frame.

FRANK N. SLADE.

Witnesses:
DONALD M. CARTER,
FRANCIS W. PARKER.