(No Model.) 2 Sheets—Sheet 1.

E. & W. PATTERSON.

MINING MACHINE.

No. 570,330. Patented Oct. 27, 1896.

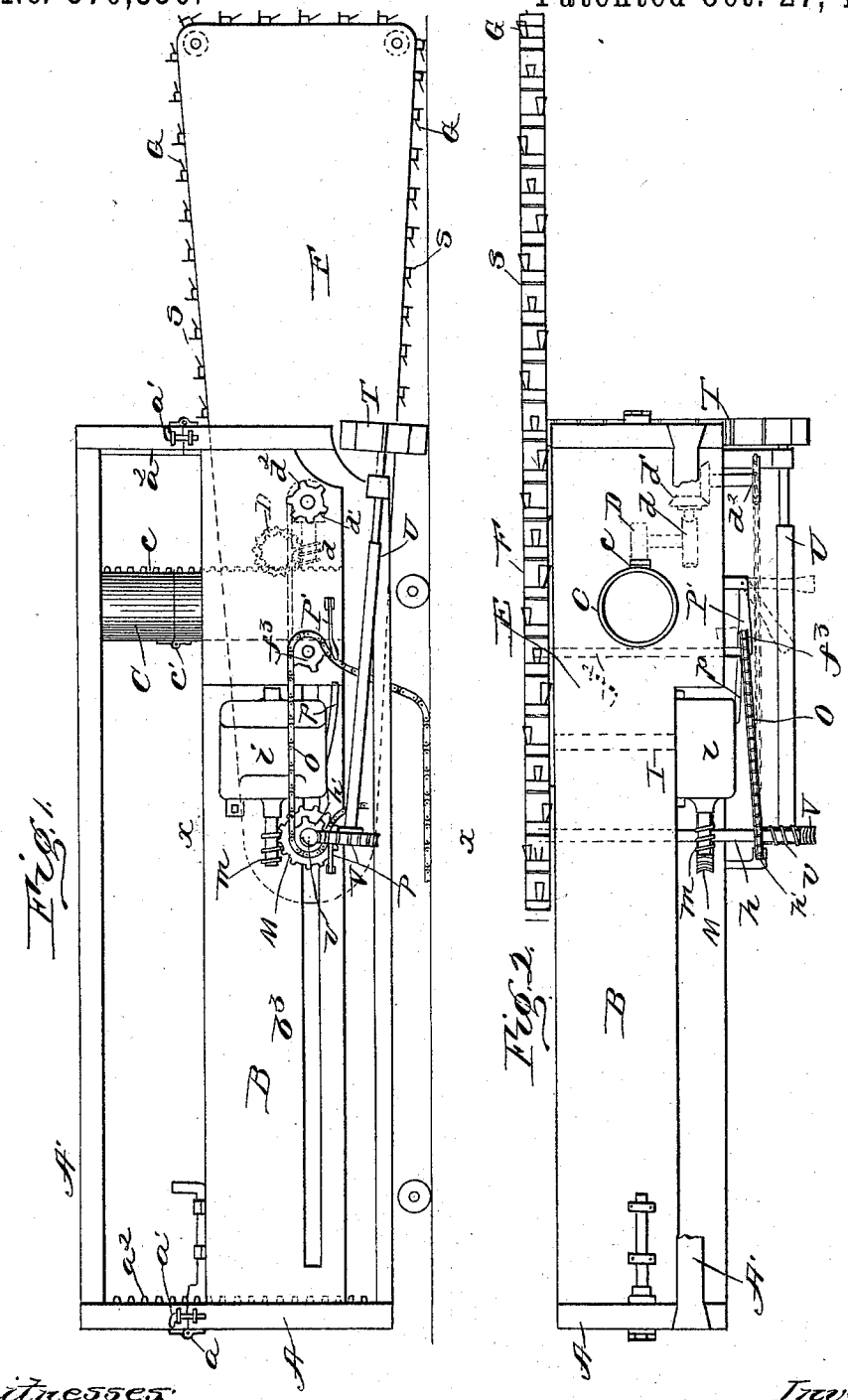

Fig. 1.

Fig. 2.

Witnesses.
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Fig. 3

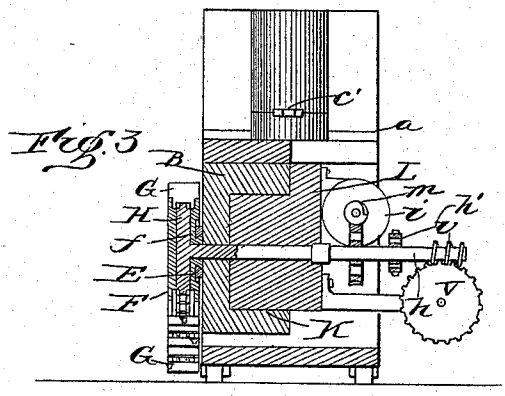


Fig. 4

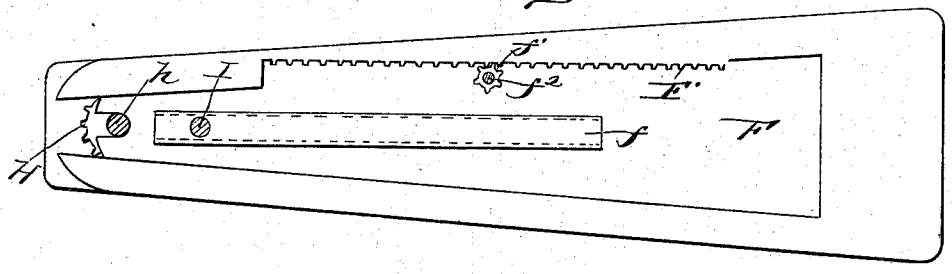
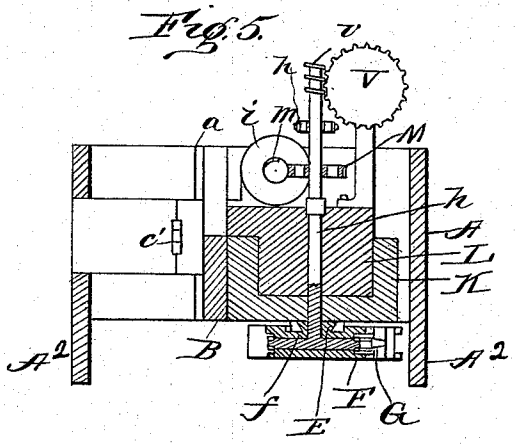


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD PATTERSON, OF OAKLAND, CALIFORNIA, AND WILLIAM PATTERSON, OF SCRANTON, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,330, dated October 27, 1896.

Application filed April 7, 1896. Serial No. 586,626. (No model.)

To all whom it may concern:

Be it known that we, EDWARD PATTERSON, a citizen of the United States, residing at Oakland, county of Alameda, State of California, and WILLIAM PATTERSON, a subject of the Queen of Great Britain, residing at Scranton, in the county of Lackawanna, State of Pennsylvania, have invented certain new and useful Improvements in Mining-Machines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

Our invention relates to machines such as are particularly adapted for mining and cutting coal, with special reference to cutting slits in a vertical and horizontal position to facilitate the separation of the coal by blasting and wedging, the objects of the invention being to produce a machine which will cut the walls of the heading smoothly, whereby not only is the shape of the mine preserved, but a positive advantage is secured, owing to the fact that the air will travel through the mine with greater freedom, or what is known as the "drag" upon the volume of ventilating air will be greatly reduced. Further than this the invention has for its object to provide a machine which will reduce the labor of the miner and improve the quality of the coal by enabling larger lumps to be separated.

The invention consists, first, in a machine having a cutter-frame for guiding an endless series of cutters which is wider at the front or advanced end than at the rear end, whereby a straight relatively wide cut may be made, while allowing of sufficient clearance, and at the same time the cut may be extended in either direction to the plane of the outside wall or floor without moving the cutter-frame radially.

Secondly, the invention consists in a machine in which the cutter-frame and the cutter-driving mechanism are mounted to move forward in straight lines in a secondary frame, which latter is mounted to move at right angles to the advance movement of the cutter-frame, whereby the coal may be cut in right lines as contradistinguished from a radial action of the cutter-frame.

The invention further consists in certain novel details of construction and combinations and arrangements of parts, all as will be now described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a side elevation of a machine embodying my present improvement and adapted particularly for cutting vertical slits in the plane of the side wall of the drift or heading. Fig. 2 is a top plan view of the same. Fig. 3 is a cross-section taken in a vertical plane in line with the main transverse drive-shaft. Fig. 4 is an elevation looking at the inner side of the cutter-frame and showing the pinion and rack for advancing the same. Fig. 5 is a sectional view similar to Fig. 3, showing the main frame extended to form a base for adapting the machine for cutting horizontal slots or undercutting.

Similar letters of reference in the several figures indicate the same parts.

The machine illustrated in the accompanying drawings consists, primarily, of a main or outer framing A, which may or may not be mounted on wheels, as desired, and preferably with its upper sections or parts hinged at *a* to allow them to be turned down for running the machine through low places in the mine or permitting the same to be operated in such places. When turned up to the position shown in Fig. 1, the upper ends of the same are held by longitudinal framing A′, which may be dovetailed into the ends of the frame A and by bolts *a*′, if so desired. Working within this frame and transversely of its length there is a supplemental frame B. As shown, this frame B is vertically adjustable in the main frame A, being held therein by suitable guides a^2 at the ends and adapted to be raised and lowered through the operation of a rack *c*, carried by a somewhat centrally-arranged column C, with which rack engages a pinion D, journaled in the supplemental frame B and adapted to be driven through a worm-wheel and worm *d*, beveled pinions *d*′, and sprocket-wheel d^2.

By the rotation of the sprocket-wheel d^2

the supplemental frame may be moved laterally or raised and lowered, and in order that the column C may be lowered to correspond to the height of the main frame A when folded, said column C is provided with a hinge at *c*, whereby its upper end is adapted to fold down to a level with the lower portion of the frame.

As illustrated in Fig. 2, the supplemental frame B, it will be observed, preferably extends out flush with the side of the main frame A, and it has formed on its side dovetailed guideways E, in which there is mounted a slide *f*, mounted on or forming a part of the cutter-frame F. By this means the cutter-frame is guided in straight lines parallel with the length of the supplemental frame B, and in order to advance the cutter-frame we preferably employ a rack F′ and a pinion *f′*, the pinion being carried by a shaft f^2, extending way through the supplemental frame B and having on its opposite end a sprocket-wheel f^3, by means of which the pinion may be rotated, as will be presently explained.

The cutter-frame, it will be observed in Fig. 4, is widest at its advance or front end, and from Fig. 3 it will be seen that it is provided with a longitudinal channel, in which runs an endless chain carrying cutters G, set at various angles to cut away the coal and afford sufficient clearance for the frame. The chain is adapted to be driven by the sprocket-wheel H, Fig. 4, carried by a shaft *h*, journaled in the cutter-frame and extending through the slot b^3 in the supplemental frame B.

The shaft *h* is adapted to be driven by any suitable form of motor, preferably an electric motor *i*, which is longitudinally movable with the cutter-frame, for which purpose the supplemental frame B is provided on the side opposite to that on which the cutter-frame is mounted with guideways K, in which slides a motor-carrying base L. This motor-base L besides being supported by the shaft *h* is also supported and held in proper position with relation to the cutter-frame by a second support I, also passing through the slot b^3, and the cutter is preferably arranged to be driven by a worm *m* on the motor-shaft meshing with a wheel M on the shaft *h*. Thus the shaft may be rotated with great power, and inasmuch as the motor travels longitudinally with the cutter-frame, no complicated or delicate mechanism is necessary for connecting the cutter-chain and motor.

As a convenient means for advancing the cutter-frame, the shaft *h* is provided with a sprocket-wheel *h′*, over which a sprocket-chain O is adapted to pass and to have its opposite end thrown into engagement with the sprocket-wheel f^3 for driving the pinion *f′*. The sprocket-chain O is preferably a long chain and is held in engagement with the sprocket-wheels by spring-retainers P P′, Fig. 1, and the retainer P′ is adapted to be thrown out of engagement with the chain when the cutter-frame has advanced to the limit of its movement by a throw-out projection *p*, moving with the cutter-frame and adapted to engage the retainer P′, as illustrated in Fig. 2. This same chain O may be employed to raise and lower the supplemental frame B by being disengaged from the sprocket-wheel f^3 and put in engagement with the sprocket-wheel d^2, and thus while the cutters are in operation the cutter-frame may be either advanced or moved at right angles in a vertical direction, so as to cut directly into the seam or to cut a channel therein of greater width than the end of the cutter-frame itself.

By forming the front end of the cutter-frame of greater width than the rear end, it will be observed that the forward corners, as the cutter-frame is advanced or withdrawn, will cut on a level with the bottom edge of the frame or floor level, and when the supplemental frame is raised to the top of the main frame the cut will be correspondingly extended in a direct line with the ceiling. This result follows if the cutter is arranged horizontally for undercutting, that is to say, without giving the cutter a radial movement the coal may be slitted or undercut to the extreme edge or side walls of the drift or heading, and in order to illustrate such horizontal arrangement we have shown a section in Fig. 5 in which the parts are arranged identically as in the other figures, save that the main frame is extended to support the cutter-frame just off the floor, such extensions being indicated at the points lettered A^3.

To facilitate the clearing away of the debris or cuttings from the tools, we prefer to mount on the endless chain a series of scrapers S, preferably of rubber, leather, or other flexible material, which will sweep the cuttings out of the slot, and at the front end of the machine we provide a transverse conveyer T, which takes the cuttings from the main cutter-chain and moves them across the face of the machine to the opposite side, where they may be shoveled away in the ordinary manner. This transverse conveyer is driven by means of a telescoping shaft U, which at its rear ends is provided with a worm-wheel V in mesh with a worm *v* on the main transverse drive-shaft *h*. The bearings for supporting the rear end of the shaft U are omitted in order to prevent confusion; but, as will be readily understood by any ordinary mechanic, such bearings are to be carried by the motor-base in order that the rear end of the shaft may travel back and forth with the motor and cutter-frame without throwing the worm out of gear, and at the same time said shaft will telescope with its front section and maintain its operative connection with the transverse conveyer.

Having thus described our invention, what we claim as new is—

1. In a mining-machine, the combination

with the main frame, having vertical guideways and a supplemental frame mounted on said guideways to move vertically, of a cutter-frame mounted on the supplemental frame and guides interposed between the cutter-frame and supplemental frame for guiding the cutter-frame longitudinally of the supplemental frame in a direct line and an endless cutter carried by the cutter-frame; substantially as described.

2. In a mining-machine, the combination with the main frame and supplemental frame guided therein to move transversely, of the cutter-frame carried by the supplemental frame on one side and adapted to project beyond the main frame, the longitudinally-movable motor-base mounted on the opposite side of said supplemental frame, connections between the motor-base and cutter-frame, whereby said parts advance in unison and a motor for driving the cutter mounted on the motor-base; substantially as described.

3. The combination in a mining-machine, of the main frame and supplemental frame guided therein to move transversely and having longitudinal guides on opposite sides thereof, of the cutter-frame supported by the guides on one side of said supplemental frame, the longitudinally-movable motor-base supported in the guides on the opposite side of said supplemental frame, connections between said supplemental base and cutter-frame, whereby they move in unison, a drive-shaft for the cutter extending from side to side of the supplemental frame, a motor for rotating said shaft and an endless cutter carried by the cutter-frame and driven from said shaft; substantially as described.

4. In a mining-machine, the combination with the main frame, a longitudinally-movable cutter-frame arranged on one side thereof and a motor for driving the cutter movable longitudinally with said cutter-frame, of a transversely-arranged conveyer located at the front of the main frame for transferring the debris from the cutter-frame to the opposite side of the main frame and an extensible connection interposed between the conveyer and motor, whereby the same motor may be employed for driving the cutters and conveyers; substantially as described.

5. In a mining-machine, the combination with the main frame, the vertically-arranged and longitudinally-movable cutter-frame mounted on one side thereof, and the motor movable longitudinally with said cutter-frame, of the transversely-arranged conveyer for transferring the debris from the cutter-frame to the opposite side of the main frame and a telescoping shaft interposed between the motor and conveyer; substantially as described.

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