(No Model.)

E. BITTENBENDER & M. L. SNYDER.

COAL DRILLING MACHINE.

No. 273,443. Patented Mar. 6, 1883.

Fig. 1.

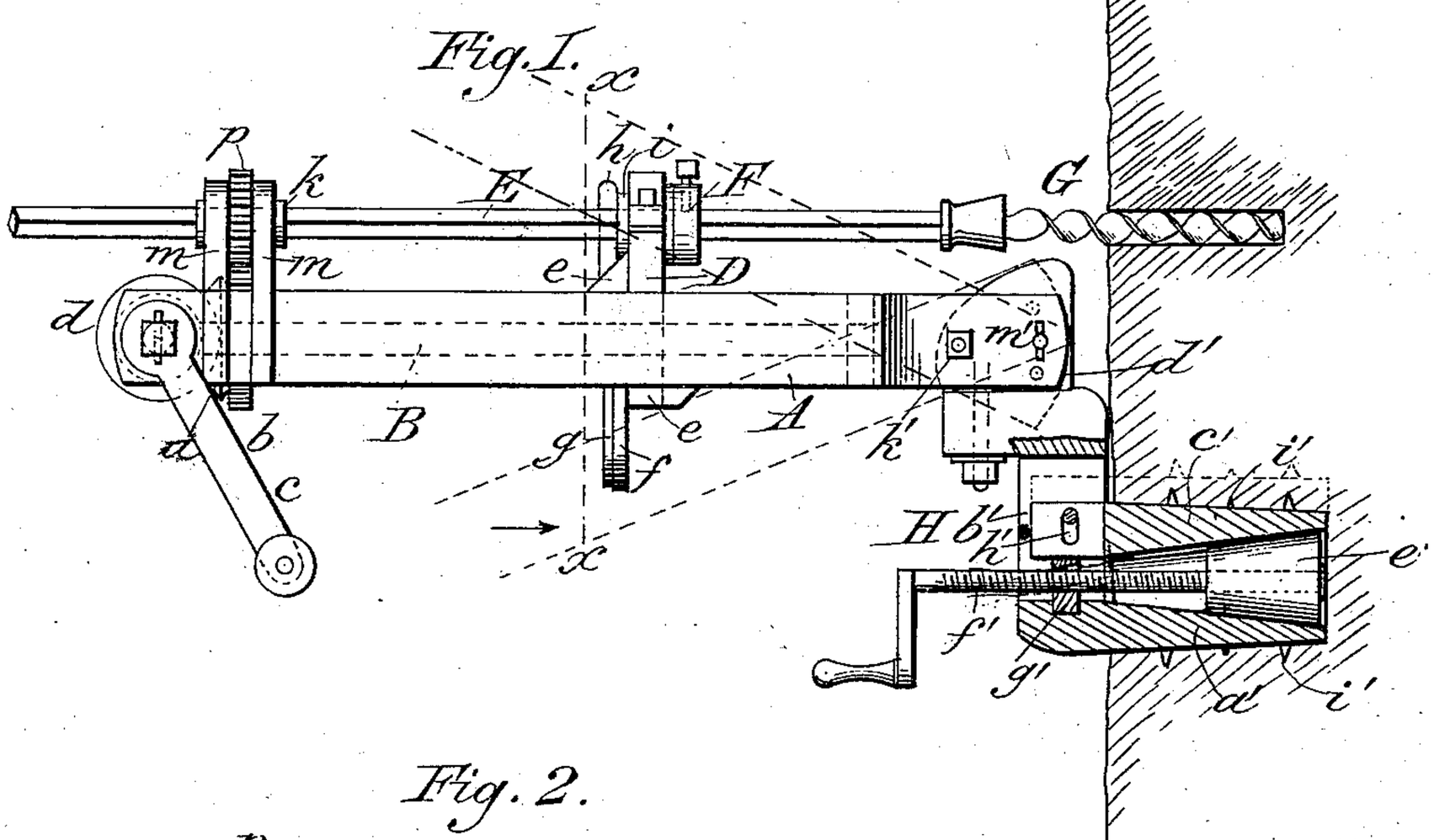


Fig. 2.

Fig. 3.

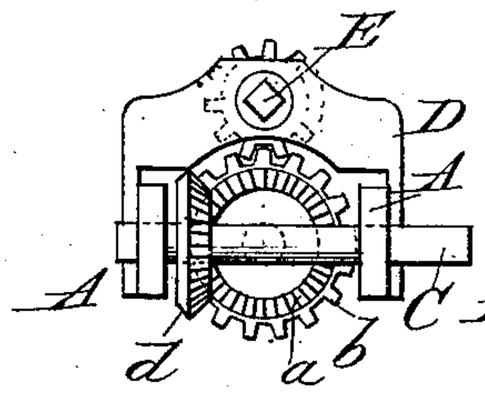


Fig. 4.

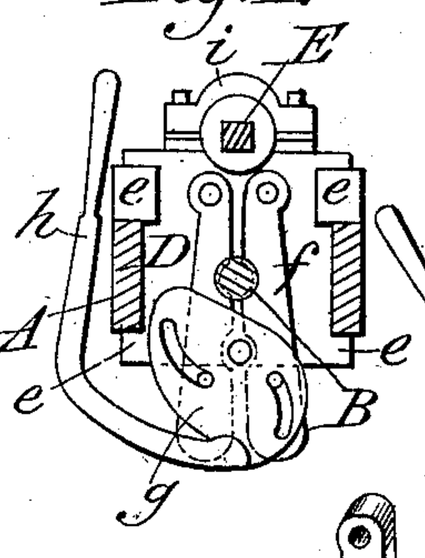


Fig. 5.

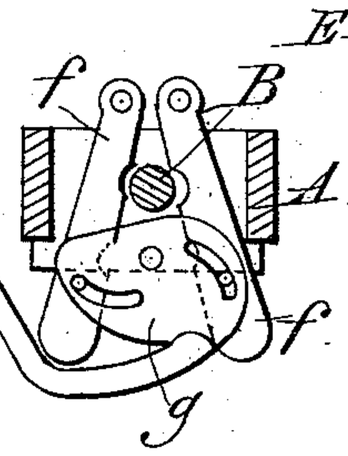
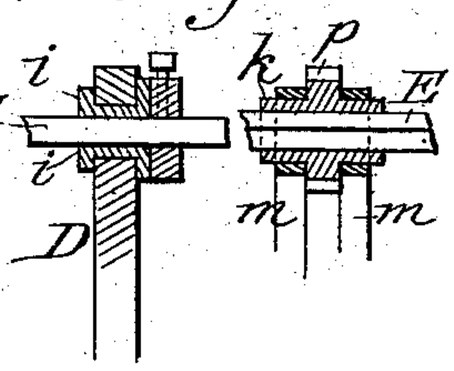
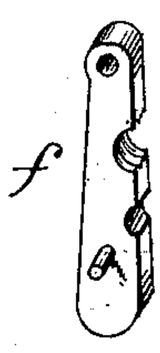


Fig. 6.





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UNITED STATES PATENT OFFICE.

ELI BITTENBENDER AND MICHAEL L. SNYDER, OF PLYMOUTH, PENNSYLVANIA, ASSIGNORS OF ONE-FOURTH TO FREDERICK T. BITTENBENDER AND GEORGE H. BITTENBENDER, OF SAME PLACE.

COAL-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 273,443, dated March 6, 1883.

Application filed November 17, 1882. (No model.)

To all whom it may concern:

Be it known that we, ELI BITTENBENDER and MICHAEL L. SNYDER, citizens of United States, residing at Plymouth, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Coal-Drilling Machines; and we do 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 the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in machines for drilling coal, rock, and similar substances; and it consists in certain peculiarities in the construction, arrangement, and combination of parts, as hereinafter more fully described and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a side elevation of our improved drilling-machine, showing the same in position for work, the device for attaching the drill-machine to the rock or coal bed being shown in section. Fig. 2 is a plan. Fig. 3 is a rear elevation. Figs. 4 and 5 are cross-sections on the line *x x* of Fig. 1. Fig. 6 represents sectional details.

Like letters of reference are used to designate the same parts in the several views.

The frame of the machine consists of the side pieces, A A, and suitable cross-pieces or connections. A screw-shaft, B, is supported within this frame in suitable bearings and carries a bevel-gear, *a*, and a spur-gear, *b*, as shown in Figs. 1 and 3.

C is a driving-shaft, having a crank, *c*, and a bevel-gear, *d*, that meshes with the gear *a*, whereby the rotation of the driving-shaft is caused to actuate the screw-shaft.

A sliding cross-head, D, is supported in and upon the frame of the machine by means of guides *e e*, that move along the upper and under edges of the side pieces. This cross-head D is perforated for passage over the screw-shaft B, and is provided with pivoted jaws *f f* and a slotted cam-plate, *g*, that engages with pins on said jaws, the cam-plate having a lever or handle, *h*, by which it may be turned so as to open or close said jaws, as shown in Figs. 4 and 5. The jaws *f f* are notched to fit the screw-shaft when closed, so as to grasp the same, and these notches are screw-threaded to correspond with the pitch of the threads on said screw-shaft.

It will be seen that when the handle *h* is turned upward and inward, so as to cause the cam-plate *g* to close the jaws *f f* upon the screw-shaft B, thereby clutching or grasping the same, the cross-head D will be then connected with the screw-shaft B in such a manner as to move forward upon the same when said shaft is rotated in the proper direction. If the shaft is rotated in the opposite direction, the cross-head will be moved backward.

The cross-head D carries in its upper part a flanged sleeve or cylinder, *i*, which is provided with a squared opening for the passage of the drill-stock E, that has a loose bearing therein and is also squared throughout its entire length, so as to turn or rotate with the sleeve *i*, which has its bearings in the cross-head. The drill stock or shaft E also has a bearing at the rear end of the machine in a similar flanged sleeve, *k*, that rotates in bearings *m m* and carries a spur-gear, *p*, which meshes with the gear *b* on the screw-shaft B, the rotation of which is thus caused to impart a similar movement to the drill-shaft.

An adjustable collar, F, is carried upon the drill-shaft E, in advance of the cross-head D, so that the latter, by pressing against said collar in its forward movement, will cause the drill-shaft to be fed or moved forward as the drill G is forced into the material operated upon.

In machines of this class the drill has been usually attached directly to the screw-shaft—an arrangement that involves many obvious disadvantages.

It will be seen that by attaching the drill to an independent shaft and arranging the same to be rotated and fed in the manner described, the drill may be worked in and out, so as to loosen and remove the débris or packed material surrounding the same by simply sliding the drill-shaft back and forth without disarranging the operating mechanism.

The manner in which the drill-shaft E is supported in the tubular bearings or sleeves *i k* enables this sliding back-and-forth movement of the drill-shaft to be readily accomplished, it being only necessary to adjust the cross-head D and collar F in such position that they will not interfere with the backward movement of the drill-shaft. This construction also permits additional lengths to be added to the rear end of the drill-shaft without disconnecting the machine or detaching it from the material operated upon. After the machine has been operated so as to carry the cross-head D to the forward end of the frame A, if it is desired to drive the drill further, the pivoted jaws on the cross-head will be unclutched from the screw-shaft B and the cross-head moved back to the rear end of the frame and again clutched to the screw-shaft. The adjustable collar F is also moved back on the drill-shaft and again secured thereon in front of the cross-head. If required, an additional length may be added to the rear end of the drill-shaft, and the parts being now properly adjusted the drill may be operated by simply turning the crank *c*, which actuates the screw-shaft B through the shaft C and gears *d a*, so as to rotate said screw-shaft, thereby rotating the drill-shaft E through the gears *b p* and sleeve *k*. The rotation of the screw-shaft B also carries the cross-head D forward, causing it to bear against the collar F, thus feeding the rotating drill-shaft. The drill-shaft E is thus fed and rotated from the screw-shaft B, while at the same time it is capable of an endwise movement independent of said screw-shaft.

The forward end of the frame A is preferably contracted or formed with converging sides, as shown in Fig. 2, and is connected by suitable means to a clamp or fastening device, H, by which the drill-frame is attached to the rock or coal to be drilled. This fastening device consists of a semi-cylindrical jaw, *a'*, having a slotted arm, *b'*, in which is fitted a movable jaw, *c'*, also semi-cylindrical in form; a head, *d'*, being swiveled to the upper end of the arm *b'*, and a cone, *e'*, having a threaded crank-shaft, *f'*, being arranged to operate in the conical cavity formed by the jaws *a' c'*, which are opened and closed as the cone *e'* is moved back and forth. A bearing, *g'*, for the shaft *f'* is formed in the rear end of the fixed jaw *a'*, and a vertical slot, *h'*, is formed in the rear end of the movable jaw *c'* for engagement with a guide-pin in the slotted arm *b'*. The exterior of each jaw *a'* and *c'* is provided with steel points *i'*.

The operation of the clamp H is very simple, it being only necessary to introduce the jaws *a' c'*, when closed, into a suitable cavity formed in the rock or coal bed, and then expand said jaws by turning the crank-shaft *f'* and cone *e'* so as to force the steel points into the coal.

It will be observed that the movable jaw *c'* rises and falls uniformly, or nearly so, throughout its length, its movement differing from those of similar devices in which the jaws are hinged.

The slot formed in the arm *b'* may be of any desired length, so as to give sufficient range of movement to the movable jaw; and the bearing *g'* of the crank-shaft *f'* is so formed or arranged as to allow said shaft sufficient play to prevent the cone *e'* from binding against the fixed jaw *a'* while being moved backward.

The forward end of the frame A, as shown in the drawings, is connected to the swiveled head *d'* of the clamp H by means of a pivot-bolt, *k'*, and a pin, *m'*, said pin being passed through the sides of the drill-frame and through either of a series of perforations formed in the swiveled head, the object being to render the drill-frame capable of adjustment to any desired angle, as indicated by the dotted lines in Fig. 1. By means of the swiveled head *d'* the drill-frame may also be turned horizontally in any direction, as indicated by the dotted lines in Fig. 2.

Instead of connecting the drill-frame and fastening device by means of the pivot *k'* and pin *m'*, it is obvious that other suitable connections may be employed.

The fastening device or clamp H having been first secured in position by means of the expansible jaws *a' c'* and the drill-frame then connected thereto, the machine may be operated, as before explained, so as to drill holes or openings of any desired depth.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a drilling-machine, the combination of a feed screw-shaft, a sliding cross-head having means for clutching said feed-shaft, a drill-shaft supported in said cross-head and capable of endwise movement therein, said drill-shaft being provided with a collar arranged in advance of the cross-head, and means for rotating the drill-shaft from the feed-shaft, substantially as described.

2. In a drilling-machine, the combination of a screw-shaft mounted in a suitable frame, an adjustable cross-head adapted to slide on said frame and having means for clutching the screw-shaft, a drill-shaft mounted in flanged sleeves, said drill-shaft being capable of rotation with said sleeves and of endwise movement therein, an adjustable collar arranged on the drill-shaft in advance of the cross-head, and means for rotating the screw-shaft and drill-shaft, substantially as described.

3. In a drilling-machine, the combination of the frame A, screw-shaft B, having spur-gear *b*, the sliding cross-head D, having means for clutching the screw-shaft, flanged sleeve *i*, mounted in the cross-head, flanged sleeve *k*, mounted in bearings on the frame and having spur-gear *p*, and the drill-shaft E, mounted in the sleeves *i k* and provided with an adjustable collar, F, substantially as described.

4. In a drilling-machine, the combination of the frame A, screw-shaft B, drill-shaft E, having collar F, and the sliding cross-head D, hav-

ing jaws *f f*, cam-plate *g*, and lever *h*, substantially as described.

5. In a drilling-machine, the combination of the frame A, having bearings *m m*, screw-shaft B, having gears *a b*, driving-shaft C, having gear *d*, sliding cross-head D, provided with means for clutching the screw-shaft, the sleeve *i*, mounted in said cross-head, sleeve *k*, mounted in the bearings *m m* and having gear *p*, and the drill-shaft E, supported in said sleeves and provided with adjustable collar F, substantially as described.

6. In a drilling-machine, the combination, with the drill-frame A, of a fastening device consisting of the swiveled head *d'*, having a slotted arm, *b'*, provided with a fixed jaw, *a'*, the movable jaw *c'*, cone *e'*, and crank-shaft *f'*, said jaws *a' c'* being provided with spurs *i'*, and having conjointly a conical internal surface, whereby the movements of the cone *e'* will cause the jaws to open or close, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ELI BITTENBENDER.
MICHAEL L. SNYDER.

Witnesses:
N. G. DOWNEY,
JOSEPH SWEITZER.