(No Model.)

3 Sheets—Sheet 1.

F. M. LECHNER.

COAL AND ROCK DRILLING MACHINE.

No. 250,370. Patented Dec. 6, 1881.

Fig. 1.

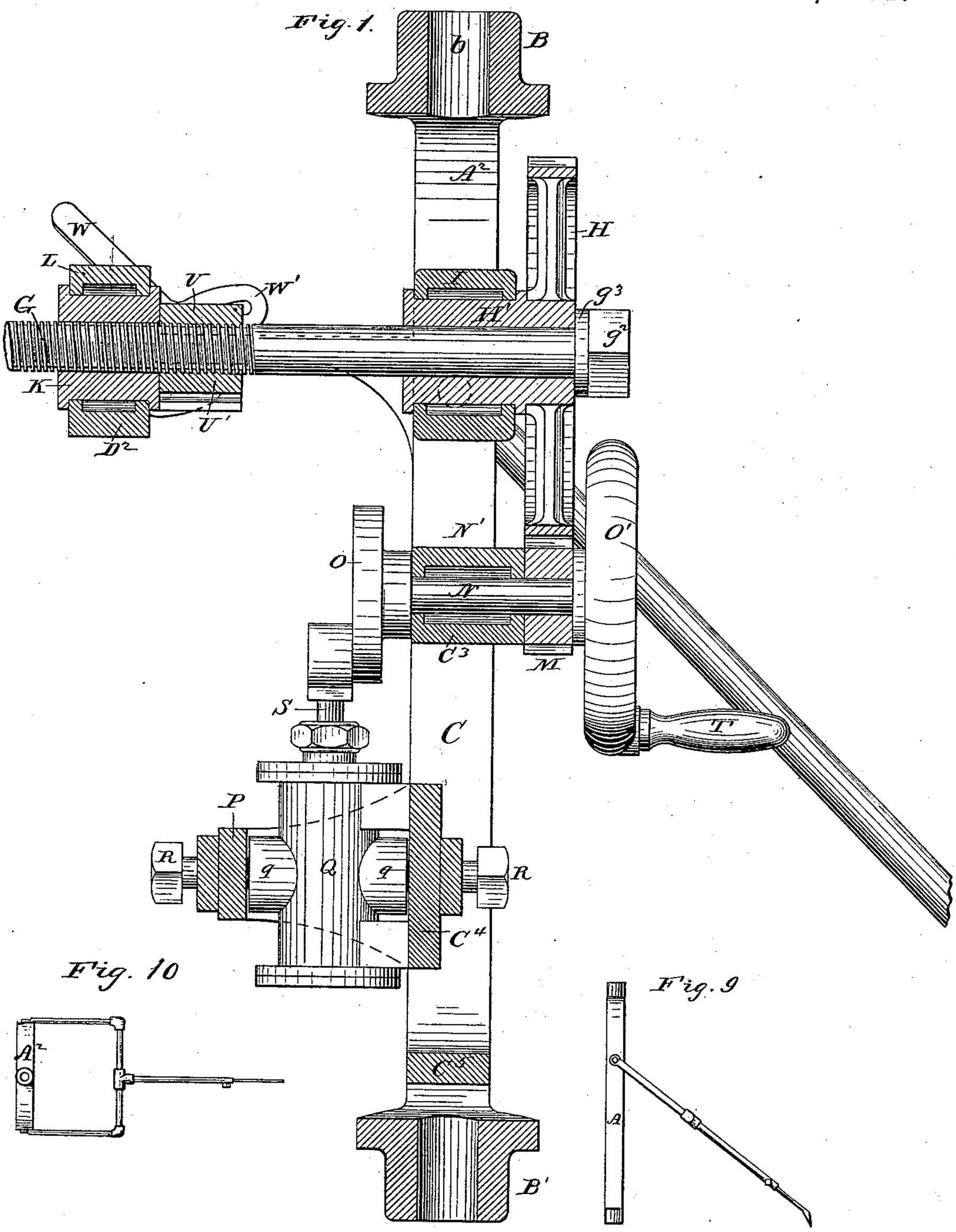

Fig. 10

Fig. 9

Witnesses:

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J. S. Barker.

Inventor:

Francis M Lechner

by Doubleday and Bliss attys

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F. M. LECHNER.

COAL AND ROCK DRILLING MACHINE.

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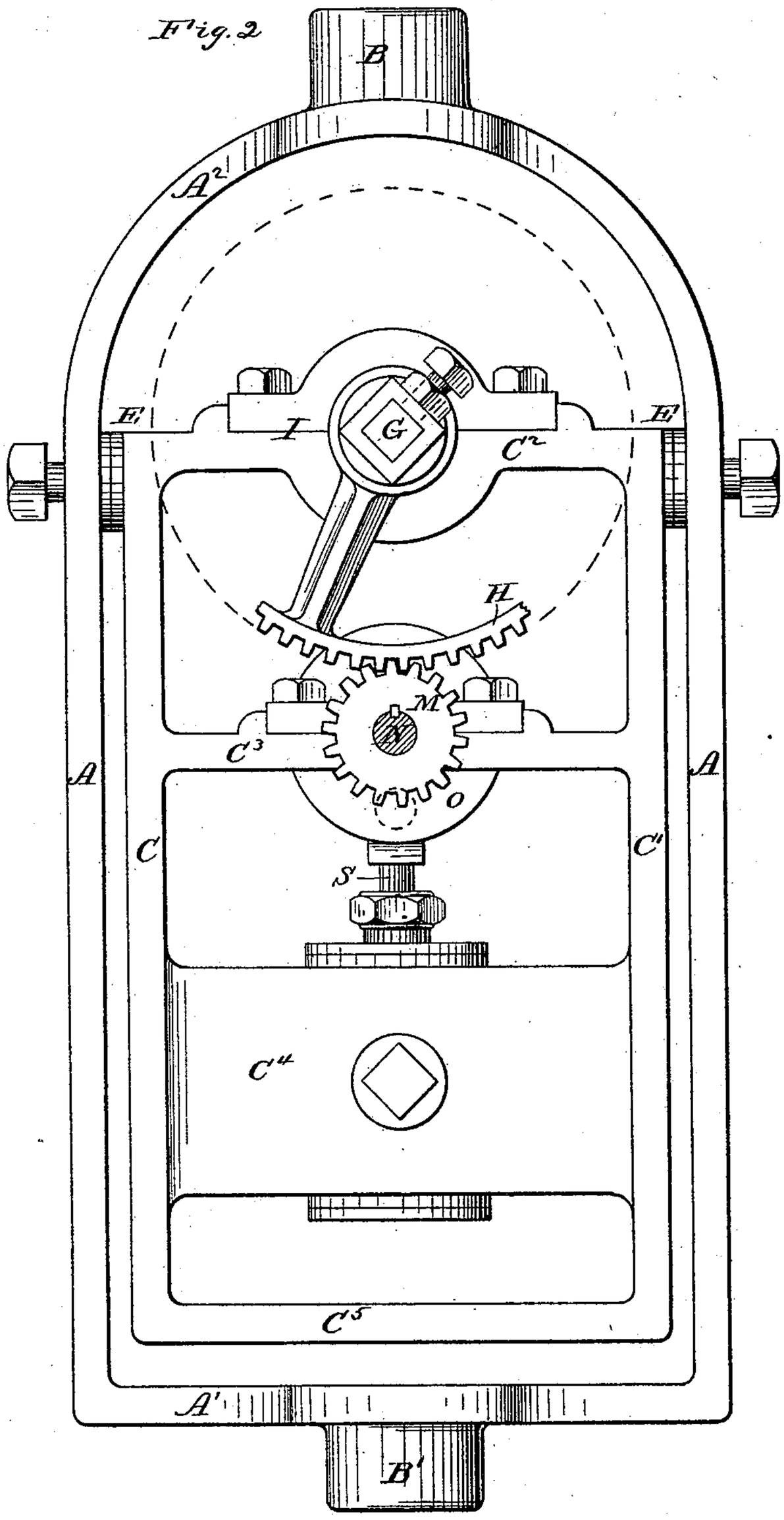
Fig. 2



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(No Model.)

3 Sheets—Sheet 3.

F. M. LECHNER.

COAL AND ROCK DRILLING MACHINE.

No. 250,370. Patented Dec. 6, 1881.

Fig. 3

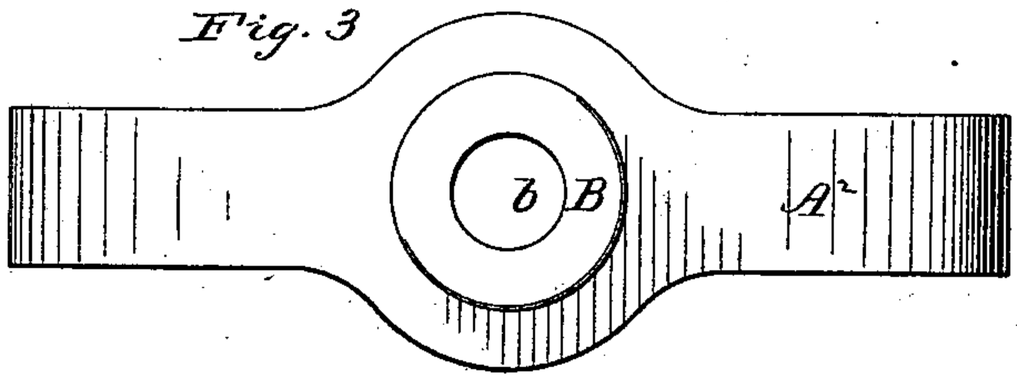


Fig. 8

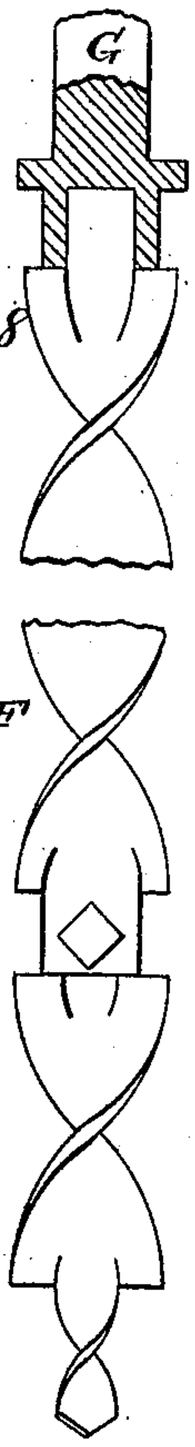


Fig. 4

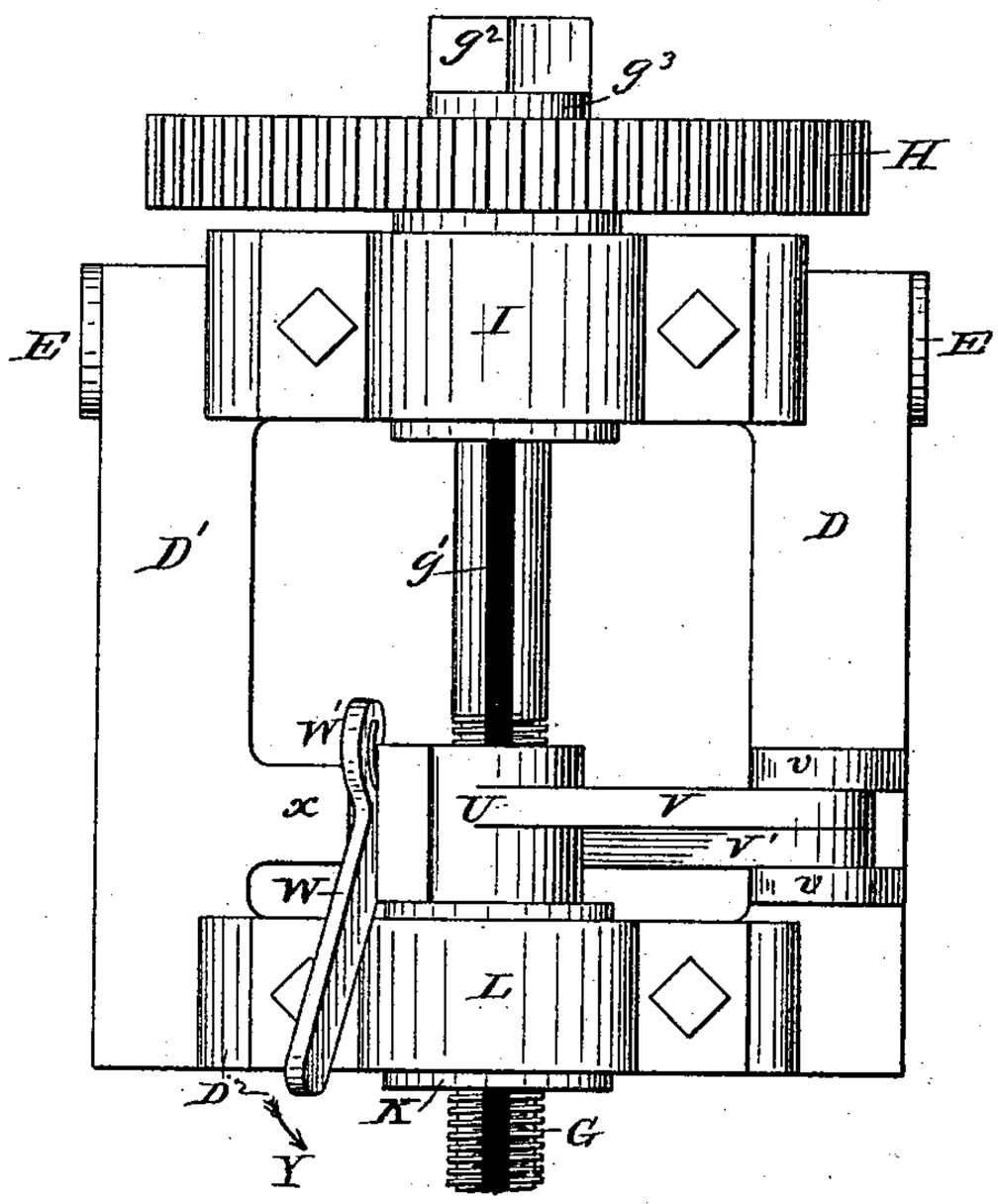


Fig. 5

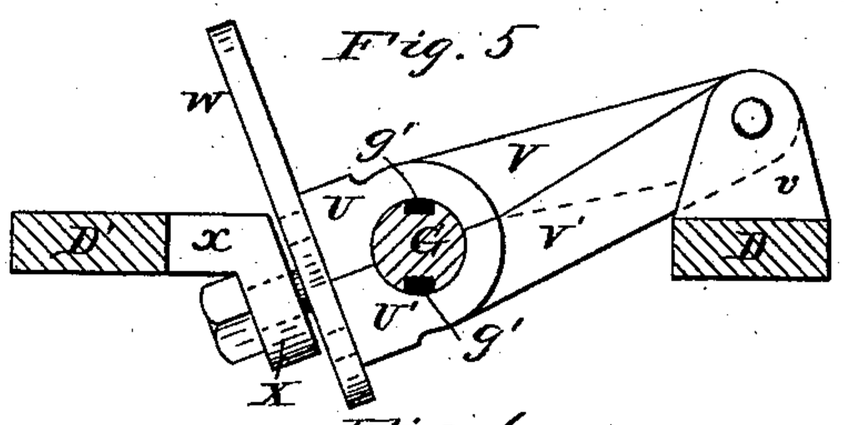


Fig. 7

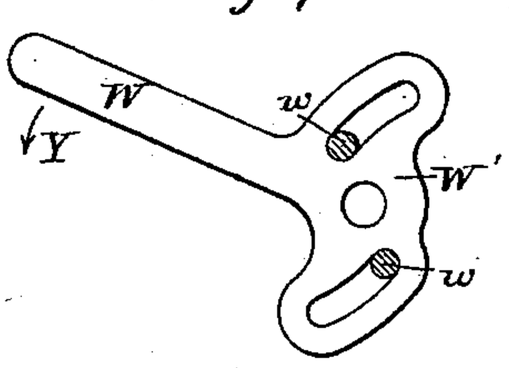
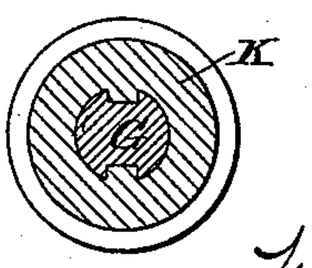


Fig. 6



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

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

COAL AND ROCK DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 250,370, dated December 6, 1881.

Application filed April 15, 1881. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS M. LECHNER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Coal and Rock Drilling 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 longitudinal vertical section of my improved drilling-machine. Fig. 2 is a rear elevation. Fig. 3 is a top-plan view of the outer frame detached. Fig. 4 is a top plan of the inner frame detached. Fig. 5 is a side view of the nut and its operating devices, the screw-shaft and carrying-frame being shown in cross-section. Fig. 6 is a cross-section of the screw and thimble. Fig. 7 is a view of the lever, detached, used to engage the nut with the screw-shaft and to disengage it therefrom. Fig. 8 is a view of the sectional drill. Fig. 9 is a side elevation, on a reduced scale, of the outer frame and the bracing mechanism. Fig. 10 is a top plan view of the last said parts.

The movable parts of the mechanism are suspended or supported in a frame which can be made stationary in the mine, and which, in the drawings, is shown to be composed of vertical standards A A, bottom cross-piece, A′, and an arch, A^2, at the top. These can be, and preferably are, formed in one piece of metal.

B represents a boss projecting from the arch A^2, and provided with a central aperture, *b*. Through this aperture passes a bolt, whereby the upper end of the frame can be firmly pressed against the roof of the mine. B represents a similar boss, projecting from the bottom piece, A′, of the frame, and through it passes a bolt for pressing against the floor of the mine. Upon this outer frame the inner frame, which carries the operating devices, is suspended.

The inner frame is composed of a vertical portion and a horizontal portion, substantially at right angles to each other. The vertical portion is composed of the side bars, C C′, a top cross-piece, C^2, an intermediate cross-piece, C^3, and the plate C^4. C^5 is a bottom cross-bar, which, if desired, may be employed, though under ordinary circumstances sufficient strength is insured without it. The horizontal portion of the inner frame lies substantially in the same horizontal plane as the upper cross-bar, C^2, and is composed of the side bars, D D′, and the end bar, D^2. This frame last described is supported on the stationary frame A, A′, and A^2 by means of trunnions E E, projecting from the upper end, preferably, of the inner frame, and mounted in bearings formed in the uprights of the outer frame. When thus supported the inner frame can be vibrated on the trunnions E E, so that the drill can be operated at any desired angle, as will more fully hereinafter appear.

F represents the drill, the construction of which in detail will be more fully set forth, attention at present being directed to the means of operating it. It is attached to the end of the screw-shaft G by means of a squared socket on the latter, or by a set-screw or other suitable device. The screw-shaft G rotates the drill and at the same time gradually feeds it forward into the coal or other material upon which the drill is operating. The screw-shaft G is mounted upon the inner frame, above described, in two bearings. One of these bearings is the hub H′ of wheel H, mounted upon shaft G in rear of the vertical portion of the inner frame. The shaft is provided with two longitudinal slots, *g′ g′*, and the wheel H and its hub H′ engage with the shaft by means of two keys or feathers, whereby the shaft is permitted to move longitudinally through the wheel and hub, and at the same time be rotated thereby. At the rear end of the shaft G a nut is placed for limiting the movement of the shaft, there being preferably a collar, g^3, between the nut and the wheel H; or, instead of a nut, a square collar and set-screw may be used, as shown at g^2. The hub H′ of the wheel H is mounted in a boxing at I on the cross-bar C^2, a cap of substantially the ordinary character being placed above the same. The other bearing of the screw-shaft G is provided by a thimble, K, mounted in a boxing at L on the outer or end bar, D^2, of the horizontal part of the inner

frame. The thimble rotates with the screw, but does not interfere with its longitudinal movements, and thus the threads of the screw are guarded from the wear which they would experience if they should rotate in direct contact with the boxing. It will be seen that when the screw-shaft is thus mounted in a swinging frame it can be readily turned to any desired angle. The wheel H, which rotates the screw-shaft, receives motion from a pinion, M, beneath it. This pinion is carried by the crank-shaft N, which latter is mounted on the cross-bar C^3 in a suitable boxing at N′. At one end the crank-shaft carries a crank-wheel, O, and at the other a fly-wheel, O′. Power is imparted to the shaft by means of an engine supported on the vibrating frame. It is preferably attached thereto by means of the above-described plate C^4, which carries a yoke, P, lying in horizontal planes.

The engine consists of an oscillating cylinder, Q, mounted upon trunnions *q q*. The spindles or shafts of the trunnions are mounted, one in the yoke P and the other in the plate C^4, as shown at R R′. The piston S is connected to the crank-wheel in the ordinary manner. The cylinder is preferably operated by air, which is admitted to and exhausted from it through plate C^4.

T represents a handle attached to the fly-wheel O′, which may be used to assist the engine in starting the machine.

It will now be seen that if the frame A A′ A^2 be braced against the roof and the floor of the mine, and if the engine at Q R S O be started, the screw-shaft G will be rotated through the parts N, M, and H, and that the drill F will be rotated therewith; but there is required not only a rotary motion of the drill and its shaft, but also a longitudinal motion thereof, in order to feed the drill forward. This longitudinal motion is caused by a nut, U U′, carried by the upper part of the inner frame, and arranged to be engaged with and disengaged from the screw-shaft G. It is formed in two parts, U U′, respectively, carried by arms V V′. These arms are pivoted between two upwardly-extending lugs, *v v*, as shown in Figs. 4 and 5.

W represents the lever whereby the sections of the nut can be engaged with the shaft or separated therefrom. It is pivoted to a lug, *x*, projecting inwardly from the side bar, D′, as shown at *x*, Fig. 5.

W′ is a plate attached to or formed with the lever W. It has two curvilinear slots, as shown in Fig. 7, by which it engages with two studs, *w w*, carried respectively by the nut-sections U U′. If the lever W be thrust in the direction of the arrow Y, the nut-sections will be separated from the screw-shaft, and the latter will revolve without engagement therewith, or it can be drawn longitudinally backward without rotating.

The drill F is made in sections, each section being preferably about thirty inches in length. The sections are successively joined together, as they are, one after another, driven into the coal or rock. By making the drill thus in sections I am enabled to use a much shorter screw-shaft than would be necessary if the drill were all in one continuous piece.

Z Z′ Z^2 represent a brace for avoiding the disadvantages that result from cross-strains upon the vertical stays, said strains being caused by the reaction of the drill. Preferably this brace is pivoted to the outer frame on line of the trunnions E E, and is constructed of metal pipes arranged to form a yoke, the legs of which are pivoted, as described, and to which an arm, Z′, is secured.

Z^2 is a rod adjustably connected to the pipe Z′, and provided with a dog, *z*, at the lower end, by which it engages with the floor of the mine.

z′ is a set-screw passing through the pipe Z′ and engaging with the rod Z^2, and by this set-screw the length of the brace can be adjusted at will.

These last-described parts are shown, on a reduced scale, in Figs. 9 and 10.

What I claim is—

1. In combination with the outer frame, A A′ A^2, and the rotating and longitudinally-reciprocating drill-shaft, the inner frame having the vertical part for the support of the engine and the horizontal part for the support of the drill-shaft, substantially as and for the purposes set forth.

2. The combination, with the screw-threaded shaft arranged to rotate and also to be moved longitudinally in its bearings, and the hinged frame D D′ D^2, of the thimble K, surrounding the thread of the shaft, and provided with tongues for engaging therewith, as set forth.

3. The combination, with the stationary frame, and the inner frame hinged thereto and formed with a vertical part and a horizontal part, of the engine mounted on the vertical part of said frame, and the screw-shaft mounted on the horizontal part thereof, and power-transmitting devices between said engine and said shaft, substantially as set forth.

4. The combination, with the rotating and longitudinally-reciprocating drill-shaft and the swinging frame which supports said shaft, of the lever W, the plate W′, the nut-sections U U′, and the arms V V′, pivoted to the swinging frame, substantially as and for the purposes set forth.

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

FRANCIS M. LECHNER.

Witnesses:
WILLIAM H. ALBERY,
THOMAS C. ORNDORFF.