(No Model.)

J. E. BOOTH.

ROCK DRILL.

No. 248,989. Patented Nov. 1, 1881.

Fig. 1

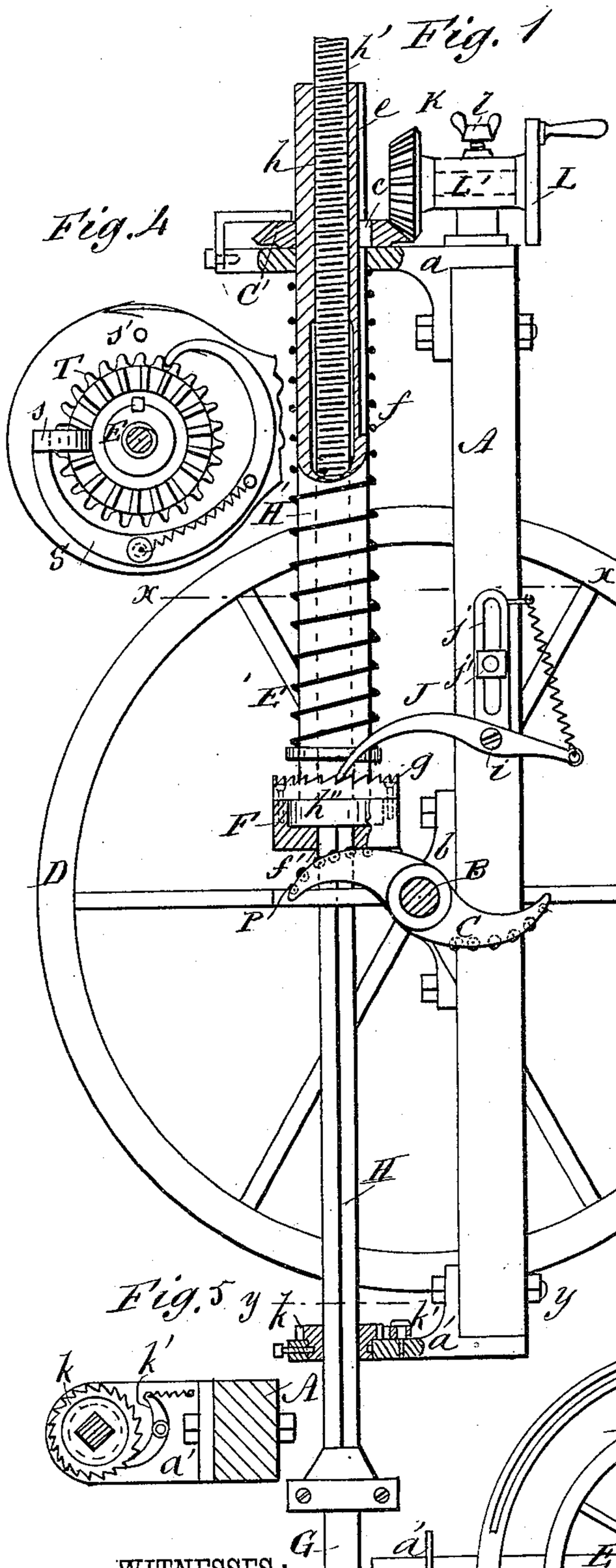


Fig. 2

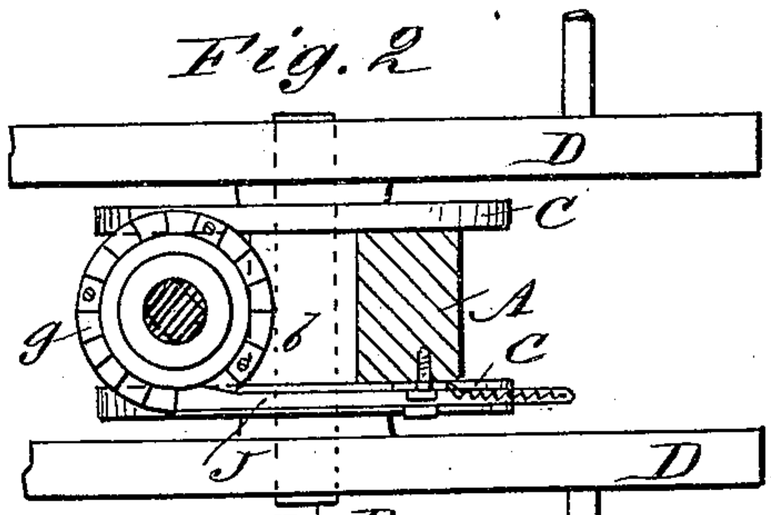


Fig. 3

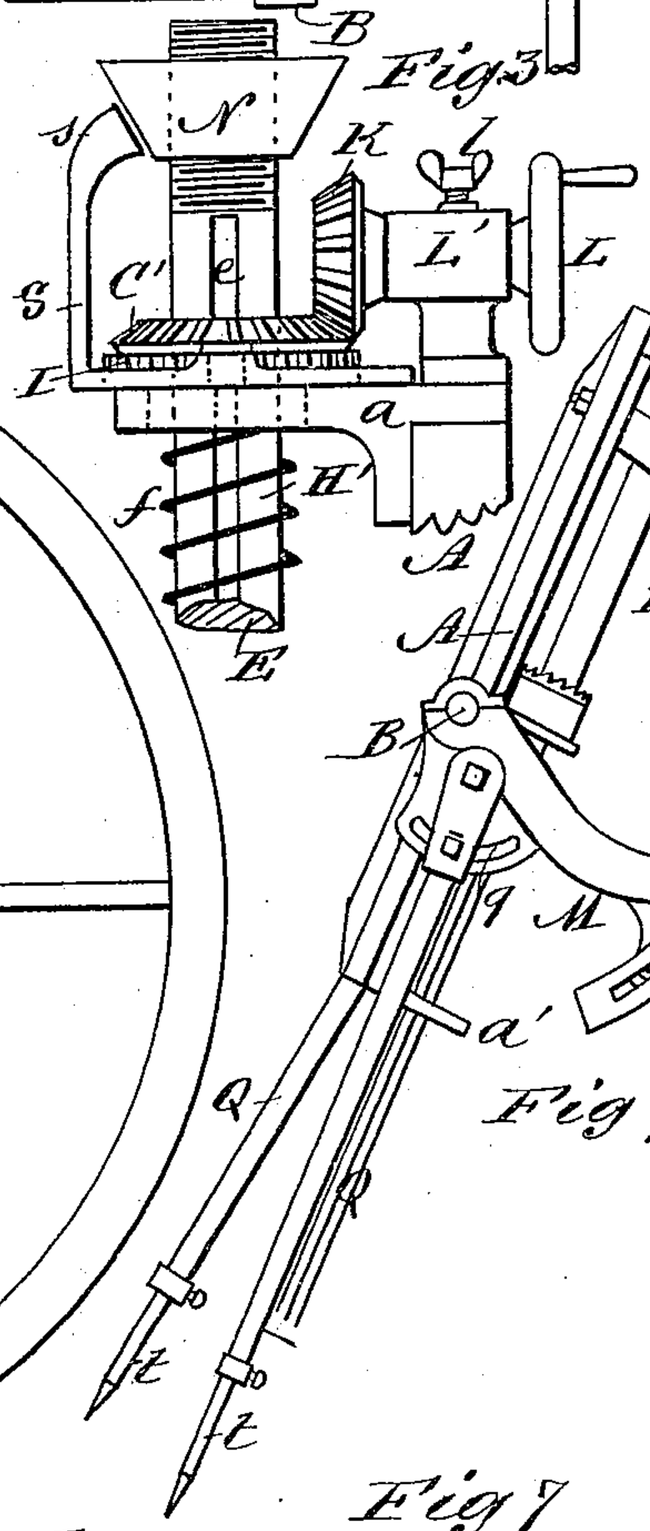
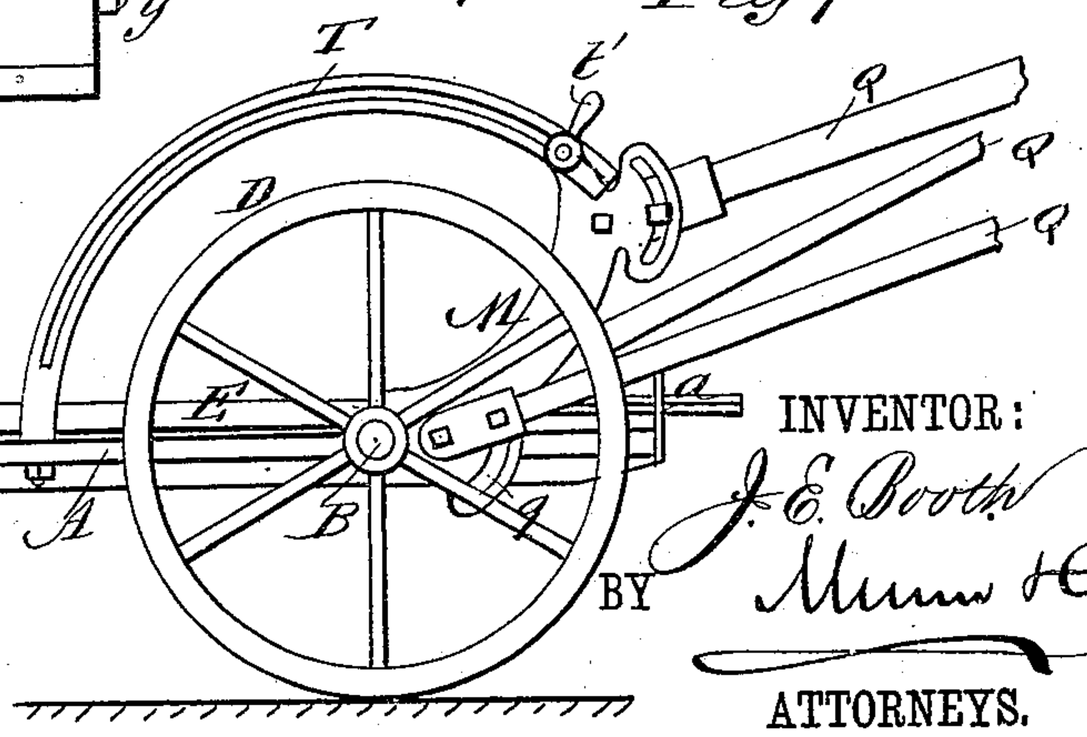


Fig. 4

Fig. 5

Fig. 6

Fig. 7



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ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 248,989, dated November 1, 1881.

Application filed August 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. BOOTH, of Bangor, Penobscot county, and State of Maine, have invented a new and Improved Rock-Drill, of which the following is a full, clear, and exact description.

The object of my invention is to provide a rock-drill, to be operated by hand, which shall at all times have a positive feed, and a feed the rapidity of which may be varied according to the quality of rock being drilled, thus adapting the drill to a great variety of work with but slight change; also, to provide a drill which can be easily moved from place to place and set at any desired angle for working.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, (one of the drive-wheels removed,) of my improved rock-drill. Fig. 2 is a cross-section of the same, taken on the line *x x*, Fig. 1. Fig. 3 is a detail, showing in elevation the auxiliary-feed attachment. Fig. 4 is also a detail, showing a plan view of the auxiliary feed. Fig. 5 is a cross-section taken on the line *y y* of Fig. 1. Fig. 6 is an elevation, showing the drill mounted upon its adjustable tripod-frame, and Fig. 7 is a side elevation of my drill as it appears when the parts are in position ready for moving.

Similar letters of reference indicate corresponding parts.

The vertical bar A has bolted to its upper end the bracket *a*, and to its lower end the bracket *a'*, and it has bolted to it at about the center of its length the shaft-hanger *b*, in which the main shaft B takes its bearing. The shaft B extends some distance past the sides of the bar A, and upon the ends of the said shaft are placed the fly-wheels D D, and between the hubs of these fly-wheels and the sides of the bar A are fixed, upon the shaft B, the double cams C C, which are adapted to lift the drill-head E by coming in contact as the shaft is revolved with the tappet F, secured in proper position upon the said drill-head. When the drill-head is lifted by the cam the coiled spring *f*, placed upon the drill-head between the tappet and the bracket *a*, will be compressed, so that when the cams, in their revolution, pass the tappet, the drill-head will be forced suddenly down by the spring and cause the drill G, which is secured in the lower end of the drill-bar H of the drill-head to deliver its blow. The said drill-head E is formed of the said drill-bar H and the sleeve H'. The upper part of this sleeve is internally screw-threaded, as shown at *h*, and the upper end of the bar H is externally threaded, as shown at *h'*, to fit the threaded portion of the sleeve. The lower end of the sleeve H' is formed with the collar *h''*, which fits in a corresponding chamber in the tappet F, and upon the upper annular edge of the tappet is secured, by screws or bolts or by other means, the annular ratchet-plate *g*, which holds the tappet and sleeve together in such manner that the tappet may be turned as the drill-head is raised and let drop by the cams independent of the sleeve by means of the spring-actuated pawl J, which is pivoted upon the pin or screw *i*, which enters the slotted plate *j*, which plate is secured in proper position upon the vertical bar A by the bolt *j'*, as shown in Fig. 1.

In order that the tappet will positively cause the drill-bar H to revolve, the greater part of the said bar is made square, or it may have any number of sides to fit the corresponding central opening, *f'*, made in the tappet through which the drill-bar passes; and in order that the drill-bar will have no backward movement, I provide the bracket *a'* at the lower end of the main bar A with the ratchet-wheel *k*, which fits upon the square portion of the said bar, and which is engaged by the pawl *k'*, which holds the bar against all possible backward revolution. The upper portion of the sleeve H' is formed with the kerf *e*, into which the feather *e* of the beveled-cog wheel C' fits. This cog-wheel C' rests upon the bracket *a*, and meshing with this wheel is the beveled pinion K, secured upon the horizontal crank-shaft L. This shaft L is adapted to be held from rotation by means of the set-screw *l* passing through the sleeve L', in which the shaft takes its bearing. When this screw *l* is not screwed down upon the shaft L the friction between the parts is sufficient to cause the sleeve H', the cog-wheels C' and K, and the shaft L all to revolve with

the drill-bar, so that when thus arranged there will be no downward movement given to the drill-bar, and hence there will be no feed; but when the screw *l* is turned down upon the shaft the sleeve H′ will be held from turning by means of the cog-wheels C′ and K, and the drill-bar will then be caused to turn in the sleeve, and thus caused to move downward with a positive motion. The rapidity of this feed can be varied somewhat by adjusting the pawl J up or down upon the bar A, but in order that this feed may be increased or diminished and the increased or diminished feed automatically controlled according to the depth of the cut of the drill, which always varies with the quality of the rock being drilled, whether hard or soft, I provide the drill with the cogged disk I, which is placed upon the bracket *a* below the cog-wheel C′, and key the same to the sleeve H′, and provide the sleeve with the adjustable beveled collar N, which comes in contact when the drill-head descends with the beveled head *s* of the bent and circular-shaped spring-actuated pawl S, which is pivoted upon the upper side of the bracket *a*, as shown in Figs. 3 and 4. There should be two of these pawls, but they should be oppositely curved.

When the regular feed of the drill caused by the pawl J is to be increased the pawl S should be attached, as shown in the drawings. Then to set the drill for working, crank L should be turned so that the drill-point will rest upon the rock and the tappet elevated from the platform P any suitable distance. The collar N should then be screwed down upon the sleeve, so as to come in contact with the head *s* of the bent pawl. Thus arranged the pawl J will cause the drill-bar to turn in one direction, and the pawl S will cause the sleeve to turn in the opposite direction, thus increasing the rapidity of downward movement of the drill-bar and drill. When the regular feed of the drill-bar is to be diminished the pawl S is to be removed, and the additional pawl of similar construction above mentioned is to be placed upon the bracket *a*, in the pivot-hole *s′*, made in the bracket, as shown in Fig. 4. The parts of the drill are then to be arranged as above described, so that the said additional pawl will be operated by the collar N. The action of this pawl will cause the sleeve H′ to turn in the same direction as the drill-bar, but at a less speed, and hence the regular feed of the drill-shaft will be accordingly diminished.

It will be understood that when either of the pawls are used the crank-shaft L will not be set by the screw *l*, but will be left free to turn so as not to interfere with the revolution of the sleeve.

When it is desired to remove the drill from the rock after the hole has been made the proper depth the crank-shaft has only to be turned in the proper direction, which will cause the sleeve to turn and cause the drill-bar to be elevated by the threads of the sleeve and the threads of the upper end of said bar.

The frame shown in Fig. 6, upon which the drill may be mounted for use, is formed of the body or trunk M, in the upper portion of which the shaft B takes its bearings. The legs Q of the frame are adjustable laterally in the slots *q* of the body M, and vertically by means of the short rods *t*, which enter the lower ends of the legs and are held at any desired point by the set-screws, as shown in Fig. 6.

The drill may be adjusted at any desired angle and held in such position by means of the curved and slotted arm or arms T, which are adapted to be clamped to the body of the supporting-frame by the set-screw *t′*.

When the drill is being operated the drive-wheels D D are made fast upon the shaft B by means of suitable set-screws in the hubs of said wheels; but when the drill is to be moved from one place to another the said drive-wheels are made loose upon the shaft B, and the legs of the supporting-frame and the drill are to be brought to the position shown in Fig. 7, in which condition the wheels and shaft serve as a vehicle by means of which the drill may be easily moved over the ground, as in a cart.

In order to reduce the friction between the cams C and the tappets, I provide the bearing-surfaces of the cams with the anti-friction rollers *c′*, as shown in Fig. 1.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a rock-drill, the combination, with the threaded drill-bar H, the threaded sleeve H′, provided with the collar *h″*, the spring *f*, and the cam C, of the chambered tappet F, provided with the ratchet *g* and the adjustable spring-actuated pawl J, substantially as and for the purpose set forth.

2. In a rock-drill, the combination, with the drill-head E, provided with the ratchet *g*, of the adjustable spring-actuated pawl J, substantially as and for the purpose set forth.

3. In a rock-drill, the combination, with the cam C, drill-bar H, the sleeve H′, provided with the collar *h″* and the tappet F, of the ratchet *g* and the adjustable spring-actuated pawl J, substantially as and for the purpose set forth.

4. In a rock-drill, the combination, with the drill-bar H and the bracket *a′*, of the ratchet *k* and the spring-pawl *k′*, substantially as and for the purpose set forth.

5. The threaded sleeve H′ and the threaded drill-bar H, in combination with the cams C, pawl J, ratchet *g*, and the cogged wheel I, bent pawl S, and movable collar N, substantially as and for the purposes set forth.

6. The cog-wheel I and the bent pawl S, in combination with the movable beveled collar N, upon the sleeve H′, substantially as and for the purposes set forth.

7. In a rock-drill, the combination, with the threaded sleeve H′, provided with the kerf *e*, and the beveled wheel C′, provided with the feather *c*, of the bevel-wheel K, the crank-shaft L, the sleeve L′, and the set-screw *l*, whereby

the sleeve is adapted to be prevented from turning, substantially as and for the purpose set forth.

8. In a rock-drill, the combination, with the shaft B, the wheels D, adapted to turn upon the said shaft, and the body M, provided with slots *q*, of the adjustable legs Q, substantially as and for the purpose set forth.

9. In a rock-drill, the combination, with the bar A and the body M, of the slotted curved arm T and set-screw *t*, substantially as and for the purpose set forth.

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Witnesses:

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