C. H. Davis.

Rock Drill.

No. 88,696. Patented Apr. 6, 1869.

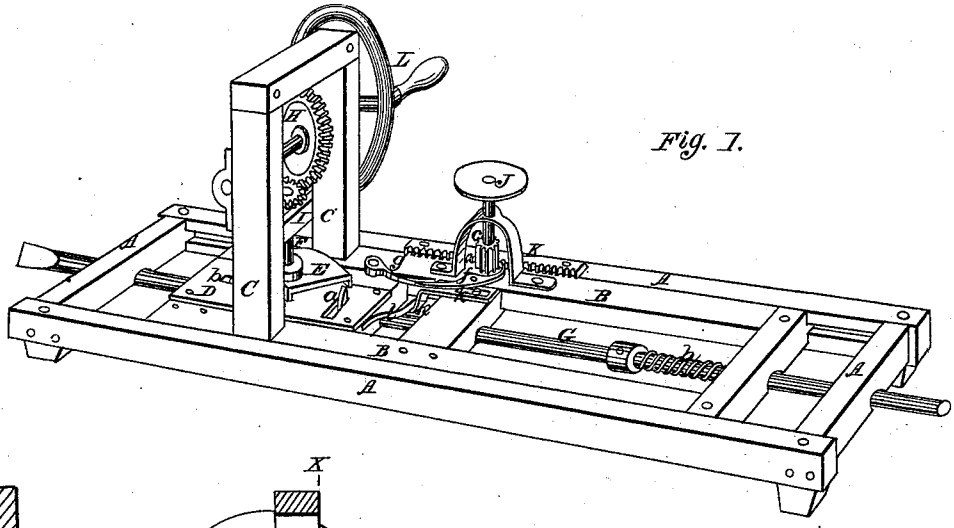

Fig. 1.

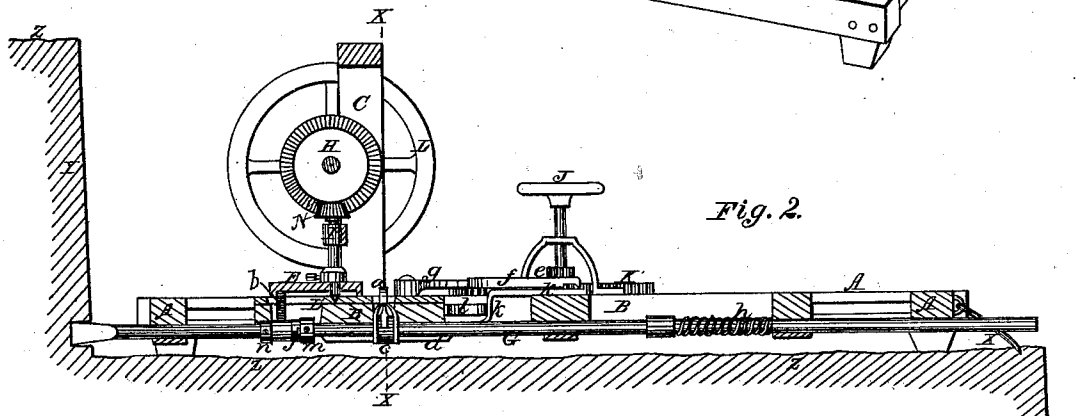

Fig. 2.

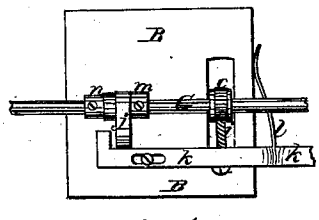

Fig. 4.

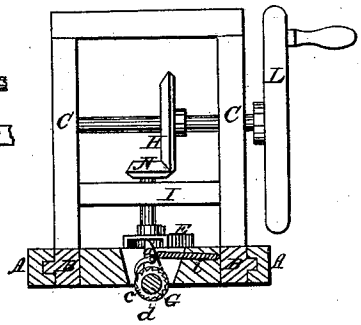

Fig. 3.

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CHARLES H. DAVIS, OF TROY, NEW YORK.

Letters Patent No. 88,696, *dated April* 6, 1869.

IMPROVED ROCK-DRILL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, CHARLES H. DAVIS, of the city of Troy, in the county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Rock-Drilling Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, and the letters of reference marked thereon, forming a part of this specification, in which—

Figure 1 is a perspective view of the improved machine;

Figure 2 is a longitudinal vertical section of the same, and also showing it as arranged in position for operation in a quarry;

Figure 3 is a vertical transverse section, taken at the line *x x* of fig. 2; and

Figure 4 is a view of the under side of the carriage below the standards.

The same letters refer to like parts in each of the said figures.

In the operation of quarrying marble and other rock or stone, after the back and end sides of the intended block of marble or stone have been separated from the ledge or quarry, by the usual process of "channelling," the intended block of stone is then to be wedged or "gadded" out from the ledge, which is done by drilling, by hand, a series of horizontal, or nearly so, "gadding"-holes at the base of the intended block of stone, and then driving thereinto a series of wedges, which thus splits, or "gads" the block out of the ledge.

The object of my invention is to make an improved rock-drilling machine, or a machine for "gad"-drilling; that is to say, a machine that shall drill horizontally into rock at the base of the intended block of stone, in a more expeditious and economical manner than is done by hand, such a series of wedging, or "gadding"-holes as is required for separating the base of the block of stone from the ledge; and

The said invention consists in the combination and arrangement of certain mechanical devices for actuating the drill-shaft, so as to alternately and successively draw it back, rotate, and drive it; and

It also consists in the arrangement of the drill-shaft at the under side of its movable carriage and actuating-devices, in a horizontal position, and so as to be operated therein close to the bed or face of the rock, in the manner as hereinafter fully described and shown, for the purpose of drilling a series of wedging, or "gadding"-out holes at the base of the block of stone to be separated from the ledge or quarry.

To enable others skilled in the art to construct and use my improved rock-drilling machine, I now proceed to fully describe its construction and operation, as follows:

A A is a timber frame for supporting the machinery.

Within this frame is arranged a sliding, or movable carriage, B B, provided with an upright frame, or standards, C C, which supports the driving-shaft and driving-wheel H, below which wheel there is a cross-bar, I, affixed to the standards C C, and supporting the upright shaft and pinion N, which gears with the wheel H, as shown.

To the upright shaft of pinion N, and at its lower end, is affixed the grooved, or hollow cam E, in manner as shown, and so as to rotate with its hollow side close down to the face-plate D on the movable carriage B B.

At the under side of the supporting-frame A A, and its movable carriage B B, there is arranged thereunder, and so as to operate in a horizontal position, the rock-drill shaft G, which is supported thereat in suitable boxes, bolted to the aforesaid frame and carriage, and which permits the drill-shaft G to move reciprocally endwise therein.

Affixed to the drill-shaft is the draw-back arm *b*, which is secured in adjusted position thereon, by the set-screw collars *m* and *n*, as shown.

A ratchet-wheel, *c*, is adjusted on the drill-shaft in a manner so as to allow the shaft to slide through it; the ratchet-wheel *c* being so attached to the shaft G, by a feather *d*, that when rotated, it turns the drill-shaft with it.

a is the ratchet-wheel arm, attached to the ratchet, so as to move backward thereon without moving the ratchet-wheel, and carrying a pawl, which, in the forward movement of the arm *a*, turns the ratchet.

The back motion of arm *a* is given by a spring, *i*, arranged as shown.

These arms *a* and *b*, respectively, of the drill-shaft G, project upward through slots in the face-plate D, and they are, respectively, so arranged, relatively to the cam E, as to be within and under its circle of operation, described while in rotation, so that the said grooved, or hollow cam E shall, in its rotation, so act on the arms *a* and *b* aforesaid, as to alternately and successively draw back and rotate the drill-shaft G, before the cam uncovers and releases the arm *b*, which, when released, allows the coil-spring *h*, which is attached to the drill-shaft G, in manner substantially as shown, to expand, and thus drive or operate the drill.

By the use of a hollow, or grooved cam, E, for drawing the drill-shaft back, when it is driven by a spring, *h*, as shown, a great advantage is thereby gained, because the leverage brought to bear in turning the cam is increased proportionally to the increasing resistance to compression of the spring *h*, as the drill-shaft is drawn back for another stroke, for, as the cam rotates over the arm *b*, it brings its acting-face nearer its centre, and so increasing the leverage of the power applied to drive it. Hence the machine can be run fast, steadily, and easily, without jerking or straining it.

The drill-shaft G is fed to its work in manner substantially as follows:

Upon the frame A A is affixed a rack, K, and upon the movable carriage B B is affixed an upright shaft, with a hand-wheel, J, and a pinion, *e*, gearing with rack K, and so as to feed the drill-shaft G by hand, when desired.

The drill-shaft G is also made self-feeding, by the arrangement and combination with it of the following devices, substantially:

Upon the drill-shaft is affixed a feeding-bar, *j*, (see fig. 4,) which, in the endwise motion of the shaft, at each successive stroke thereof, acts on the feeding-bar *k*, so as to move it endwise, to thereby cause the pawl *f*, pivoted thereto, to act on the pinion *e*, so as to turn it sufficiently in the rack K to feed the drill properly at each of its successive strokes.

A spring, *g*, acts on the pawl *f*, to keep it on the pinion *e;* and a spring, *l*, attached to the feeding-bar, with its free end acting on the carriage B B, in manner as shown, serves to keep the feed-bar in operative contact or position with the feeding-arm *j*.

This improved rock-drilling machine is used by arranging it in working-position on a quarry-ledge, Z Z, in manner as shown in fig. 2 of the annexed drawings, with its drill-shaft G along close to the ledge or face of the rock, and with its drill-point at the base of the block of stone, Y, whereat a series of wedging, or "gadding"-out holes is to be drilled. The machine-frame is kept in fixed position on the ledge by dogs, or braces *x*. Power being now applied at the crank, or wheel L, the drill G is operated in manner as hereinbefore described. After one hole of the series is drilled, the machine is then shifted into position for drilling the next hole, and so on, until the series of holes is completed.

Having thus fully described my improved machine for drilling rock,

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with the drill-shaft G and spring *h*, when arranged to operate in horizontal position at the under side of the carriage B B, as set forth, the arrangement, respectively, of said drill-shaft's draw-back arm *b* and pawl-arm *a*, in such relative position to each other, and to the hollow, or grooved cam E, in manner as described, that the said cam, in its rotations, actuates, respectively and alternately, the said arms *b* and *a*, and thereby successively draws back and then rotates said drill-shaft G, in manner as set forth.

2. In combination with the supporting-frame A A, and its horizontally-movable carriage B B, with the drill's actuating-machinery, the arrangement of the endwise-reciprocating and rotating drill-shaft G, at the under, or bottom side thereof, so as to be operated thereat in a horizontal position or close to the rock, in the manner substantially as herein shown and set forth.

3. The combination and arrangement of the driving-wheel H, pinion N, hollow, or grooved cam E, draw-back arm *b*, pawl-arm *a*, ratchet-wheel *c*, driving-spring *h*, with the movable carriage B B, frame A A, and the rock-drill shaft G, as arranged in horizontal position thereunder, in manner substantially as described and shown, so as to operate or rotate and move reciprocally the said rock-drill, in manner as and for the purposes set forth.

CHARLES H. DAVIS.

Witnesses:

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