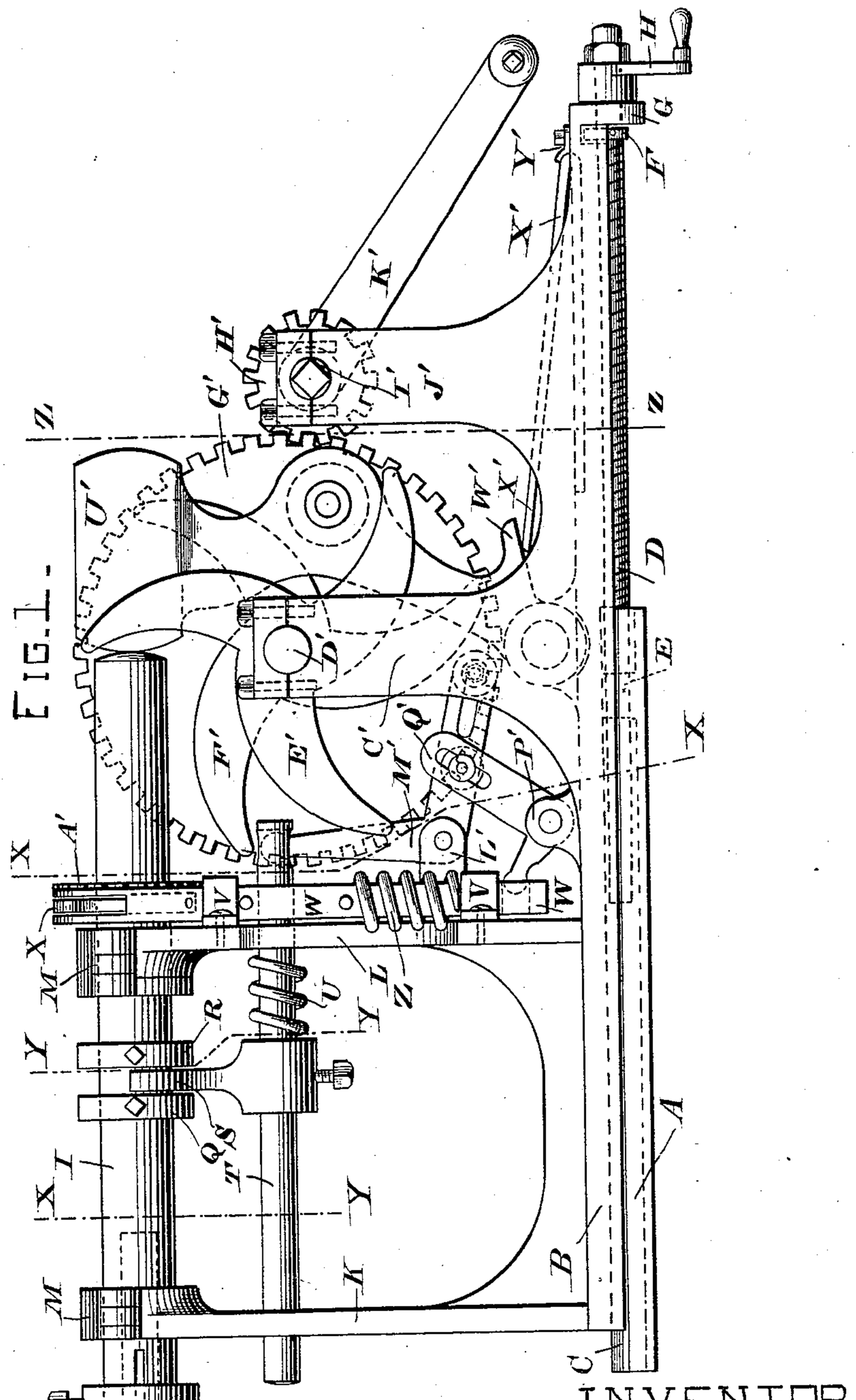
(No Model.) 2 Sheets—Sheet 1.

T. THRELFALL.

ROCK DRILLING MACHINE.

No. 282,687. Patented Aug. 7, 1883.



WITNESSES

Wilmer Bradford

Charles E. Chenery

INVENTOR

Thomas Threlfall

By Wm Smith

his Attorney

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FIG. 3.

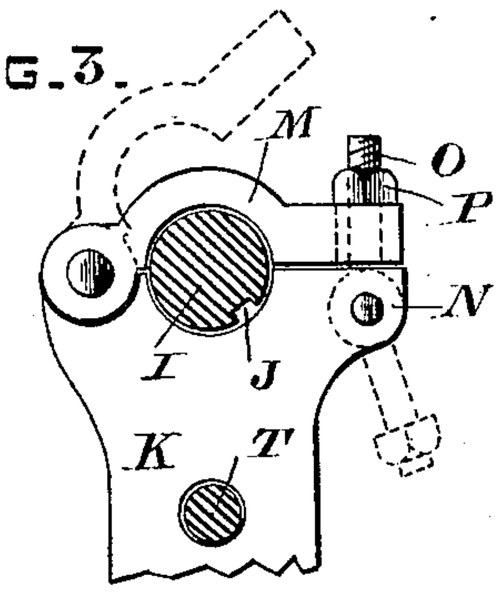


FIG. 4

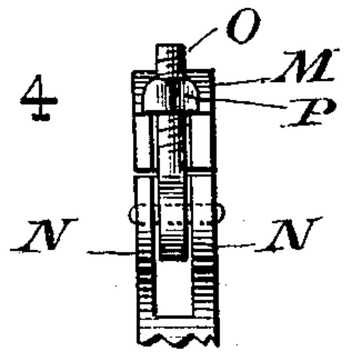


FIG. 2.

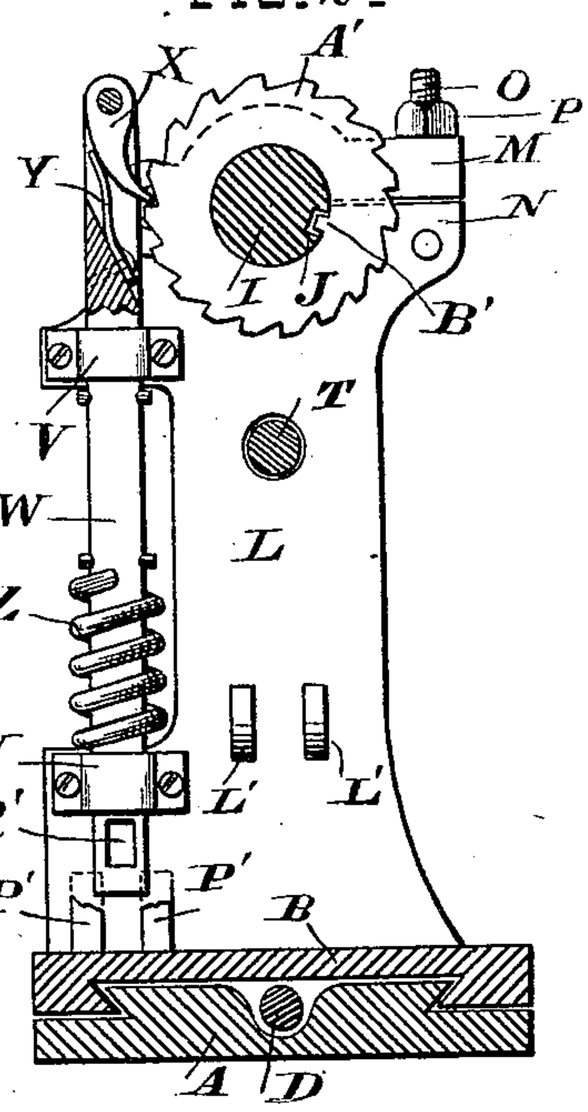


FIG. 5.

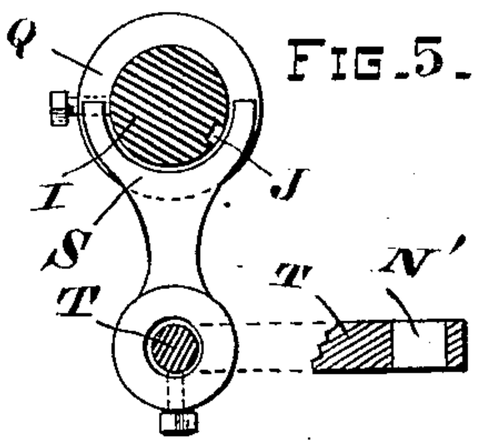


FIG. 6.

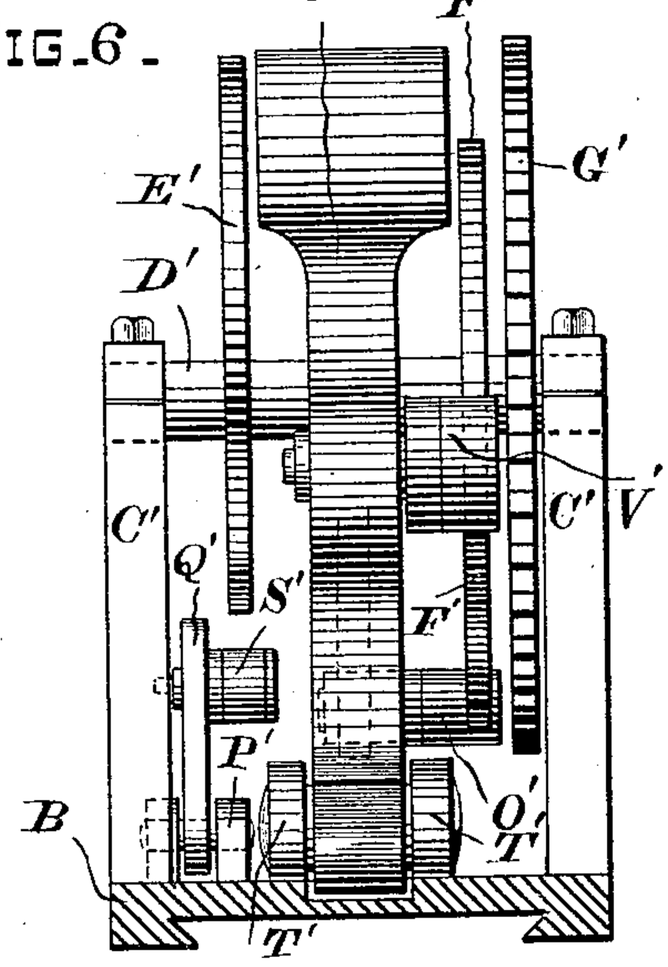
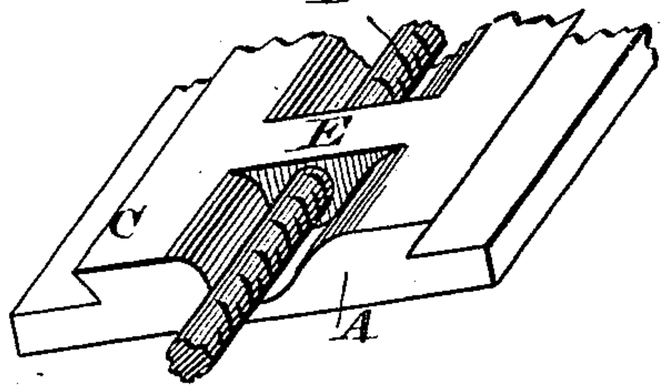


FIG. 7.



WITNESSES.

Wilmer Bradford

Charles E. Chenery

INVENTOR.

Thomas Threlfall.

By Lemuel Smith

his Attorney.

UNITED STATES PATENT OFFICE.

THOMAS THRELFALL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO JAMES WATSON, OF SAME PLACE.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 282,687, dated August 7, 1883.

Application filed February 2, 1882. Renewed June 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS THRELFALL, a subject of the Queen of Great Britain, and residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Rock-Drilling Machines, of which the following is a specification.

My invention relates to improvements in rock-drilling machines which may be operated by hand or other motive power; and the objects of my improvements are, first, to provide a rock-drilling machine in which the hammer which drives the drill is actuated by an expansive spring contained within the general outlines of the frame-work of the said machine; second, to provide a new and improved means whereby the drill may be automatically and partially rotated at the end of each stroke; third, to provide a new and improved means whereby the drill may be withdrawn from the face of the rock, partially rotated, and then pressed against the face of the rock preparatory to receiving the next blow from the hammer; fourth, to provide a means whereby the drill and its actuating mechanism may be fed forward as the work progresses; fifth, to provide a means whereby the withdrawal of the drill from the face of the rock, rotation, and advancement of the drill to the rock-face, and blow of the hammer are given in a regular and successive manner; sixth, to provide an improved arrangement of the gearing and cams for driving the drilling mechanism. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine, showing the position of the parts immediately after the blow has been struck. Fig. 2 is a cross-sectional view on line X X of Fig. 1. Fig. 3 is a cross-sectional view on line X Y of Fig. 1. Fig. 4 is a side view of Fig. 3. Fig. 5 is a cross-sectional view on line Y Y of Fig. 1. Fig. 6 is a cross-sectional view on line Z Z of Fig. 1, (omitting the flat spring.) Fig. 7 is a perspective view, partly broken away, of the lower or stationary bed-plate.

Similar letters of reference are used to designate like parts throughout the several views.

The bed-plate A of my drill is mounted upon a tripod or other similar device, having means for horizontal, vertical, and angular adjustment, and the legs of which are adjustable, to provide for the inequalities of the surface of the ground upon which the drill is placed. The upper bed-plate, B, is supported by and moves upon the bed-plate A, and is held in position by means of the dovetail C. The drill is fed forward or retracted by revolving the screw or feed rod D, one end of which passes through the threaded nut or cross-bar E, formed across the top of the bed-plate A, which is hollowed out to admit of the passage of said screw-rod, while the other end is provided with a collar, F, for taking up the thrust of said rod, and passes through the lug G, formed upon the rear outer end of the upper or movable bed-plate, and is provided with the crank-handle H, by which the rod is revolved and the upper plate and the operating mechanism moved forward or backward upon the lower bed-plate, A.

The drill-stock I is formed of a solid piece of metal, having its front end perforated to receive the drill, and is provided with any suitable clamping device for holding the drill firmly within its socket. It is likewise provided with a longitudinal groove, J, extending from the front end to a short distance from the rear end. The drill-stock is supported and held in position by the two standards K and L, erected upon the bed-plate B, and they are each provided with a hinged cap, M. (Seen in side elevation in Fig. 3.) The upper outer end of the standard is slotted or provided with two lugs, N N, between which is pivoted a bolt, O, which rests between two corresponding lugs upon the cap M, hinged to the opposite side of the standard. When the drill-stock has been placed in position, the caps are thrown down and bolt O turned up between the lugs. The nut P is turned down and clamps the cap firmly to place. About midway between the two standards are placed the two collars Q R, adjustably secured thereto by set-screws. Between the collars is placed the yoke S, which is adjustably secured upon the rod T. The rod T passes through perforations made in the standards K L, and a coiled spring, U, is placed around it between

the standard L and the base of the yoke S. Upon the face of the standard L, I fasten the strap-irons V V, which hold in place the rod W, the upper end of which is slotted to receive the pawl X and spring Y. A coiled spring, Z, is placed around the last-named rod, and rests upon the lower strap-iron V, while the upper end presses against a pin set in the said rod.

The ratchet-wheel A′, having a feather, B′, formed upon its bore, is placed upon the drill-stock in such a position as to engage the point of the pawl X; or, if found more convenient, the ratchet-wheel may be formed with such a bore as will fit upon an octagonal drill, and the drill-stock may be dispensed with.

At either side of the movable bed-plate standards C′ C′ are placed, in which is journaled the shaft D′, having keyed upon it the two triple cam-wheels or wiper-wheels E′ F′, and also the cog-wheel G′, which meshes with the pinion H′, keyed upon the shaft I′, mounted in bearings in the standards J′ J′, and driven by the crank-handle K′, which may be placed upon either end, or one upon each end of the shaft I′. The cam-wheels or wipers are so set upon their driving-shaft that the points of one cam-wheel will operate a little in advance of the points of the other cam-wheel.

Upon the face of the standard L is cast the lugs L′, between which is pivoted the bell-crank M′. The upper end of said bell-crank enters the slot N′, cut through the inner end of the rod T, and the opposite end is provided with the adjustable friction-roller O′, which engages with the cam-wheel F′.

The two lugs P′ P′ are cast upon the upper face of the movable bed-plate, and between them is pivoted the bell-crank Q′, one end of which enters the slot R′, cut through the lower end of the vertical rod W, and an adjustable friction-roller, S′, is secured upon the opposite end of said bell-crank and engages with the cam-wheel E′.

Upon the bed-plate B, and midway between the standards C C, I cast the lugs T′ T′, between which is pivoted the shank of the hammer U′. The face of this hammer when it delivers a blow is in a vertical line with its pivotal point, and strikes the butt of the drill or drill-stock with a straight and direct blow. Upon one side of the shank is placed the friction-roller V′, which is acted upon by the cam-wheel F′, and upon the lower end of the hammer-shank is formed the tang W′, upon the under side of which the upper free end of the doubled flat spring X′ presses, as is seen in Fig. 1. The spring X′ is let into a dovetailed groove cut in the upper surface of the bed-plate B, and is held in position or prevented from working backward by the bar and bolt Y′.

The operation of my improved rock-drilling machine will be as follows, to wit: The machine having been placed in position, with the point of the drill in contact with the face of the rock, the shaft D′ is rotated, carrying with it the cams E′ F′. The rounded faces of the cam-wheel F′ are successively brought against the friction-roller V′ of the hammer U′ and force it backward, at the same time throwing the tang W′ downward and compressing the spring X′. When the point of the cam passes beyond the point at which contact with the friction-roller can be had, the expansive power of the spring will cause the hammer-head to fly back to its original position and deliver a sudden and powerful blow upon the end of the drill-stock. It should here be observed that as the fulcrum or pivotal point of the hammer is placed in a vertical line beneath the face of the drill-stock the blow from the hammer will be given in an axial line with the center of the drill-stock, and thereby impart its full force to the drill without any of the power being taken up by a shearing strain upon the journals in which the said drill or drill-stock is supported, as would be the case were the hammer to deliver a blow tangential to the axial line of the stock. The first blow having been delivered, and the rotation of the shaft D′ being continued, the succeeding cam upon the right-hand cam or wiper wheel, F′, will be brought into contact with the friction-roller V′ upon the hammer-shank and force the hammer backward, compressing the spring X′. At the same time the cam which last acted upon the hammer will, by pressing against the friction-roller O′, cause the upper end of the bell-crank M′ to be drawn back, and at the same time draw back the rod T, and by means of the yoke S retract the drill from the face of the rock and compress the spring U. By the time this has been accomplished the cam of the wiper-wheel E′ upon the left-hand side of the machine has come in contact with the friction-roller S′ upon the bell-crank Q′, causing the outer end thereof to move downward, carrying with it the rod W, compressing the spring Z, and, by means of the ratchet-wheel A′ and pawl X, will cause a partial rotation of the drill-stock I. As soon as the drill has been rotated the cams of the wheel F′ will be released from contact with the bell-crank M′ and friction-roller O′, and the expansion of the coiled spring U will move the drill into contact with the face of the rock, and the cam of the wheel E′, by passing out of contact with the bell-crank Q′ and its friction-roller S′, will permit the coiled spring Z to throw the rod W up to its original position, as is shown in Fig. 2. These results having been accomplished, the hammer U′, which was being gradually forced backward during the retraction, rotation, and advancement of the drill, is released from contact with the cam-wheel F′, and flies forward and delivers another blow.

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

1. In a rock-drilling machine, the combination of the drill-stock I, collars Q R, arranged thereon, horizontal rod T, provided with coiled

spring U and slot N′, the yoke S, adjustably secured upon the rod T, for the purpose of engaging with the collars on the drill-stock, and the bell-crank lever M′, adapted to operate said rod, thereby retracting the drill, substantially as shown and described.

2. In a rock-drilling machine, the combination of the shaft D′, having cam-wheel F′, the hammer U′, provided with roller V′, the bell-crank lever M′, having roller O′, and the shaft T, connected with the said bell-crank and with the drill-stock, substantially as shown and described.

3. In a rock-drilling machine, the combination of the shaft D′, having cam-wheel E′, bell-crank lever Q′, having roller S′, slotted rod W, having springs Z Y and pawl X, the drill-stock I, having groove J, and the ratchet-wheel A′, having feather B′, adapted to fit said groove, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 23d day of January, 1882.

THOMAS THRELFALL. [L. S.]

Witnesses:
C. W. M. SMITH,
CHAS. E. KELLY.