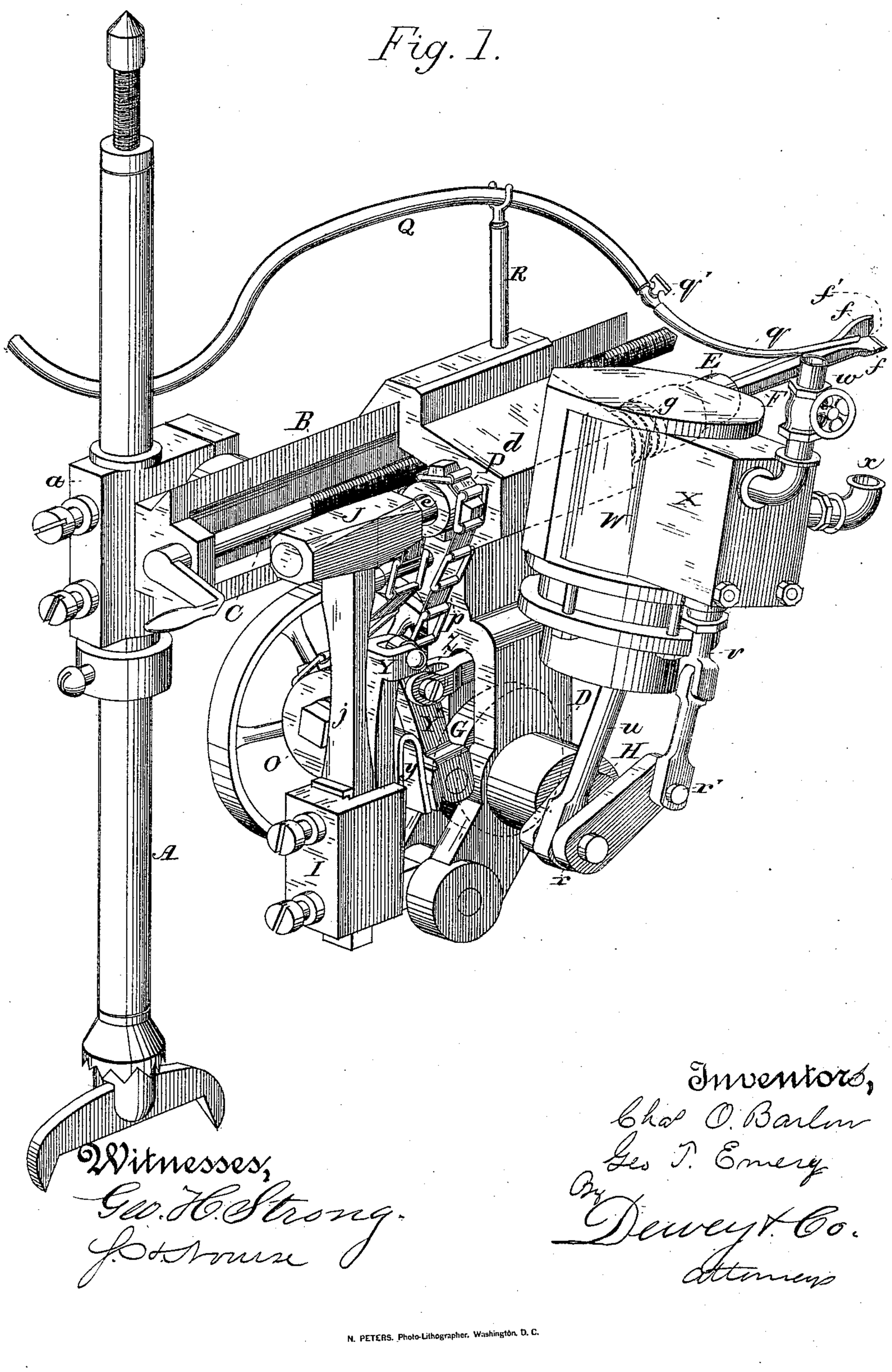
(No Model.) 2 Sheets—Sheet 1.

C. O. BARLOW & G. T. EMERY.

POWER ROCK DRILL.

No. 316,106. Patented Apr. 21, 1885.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

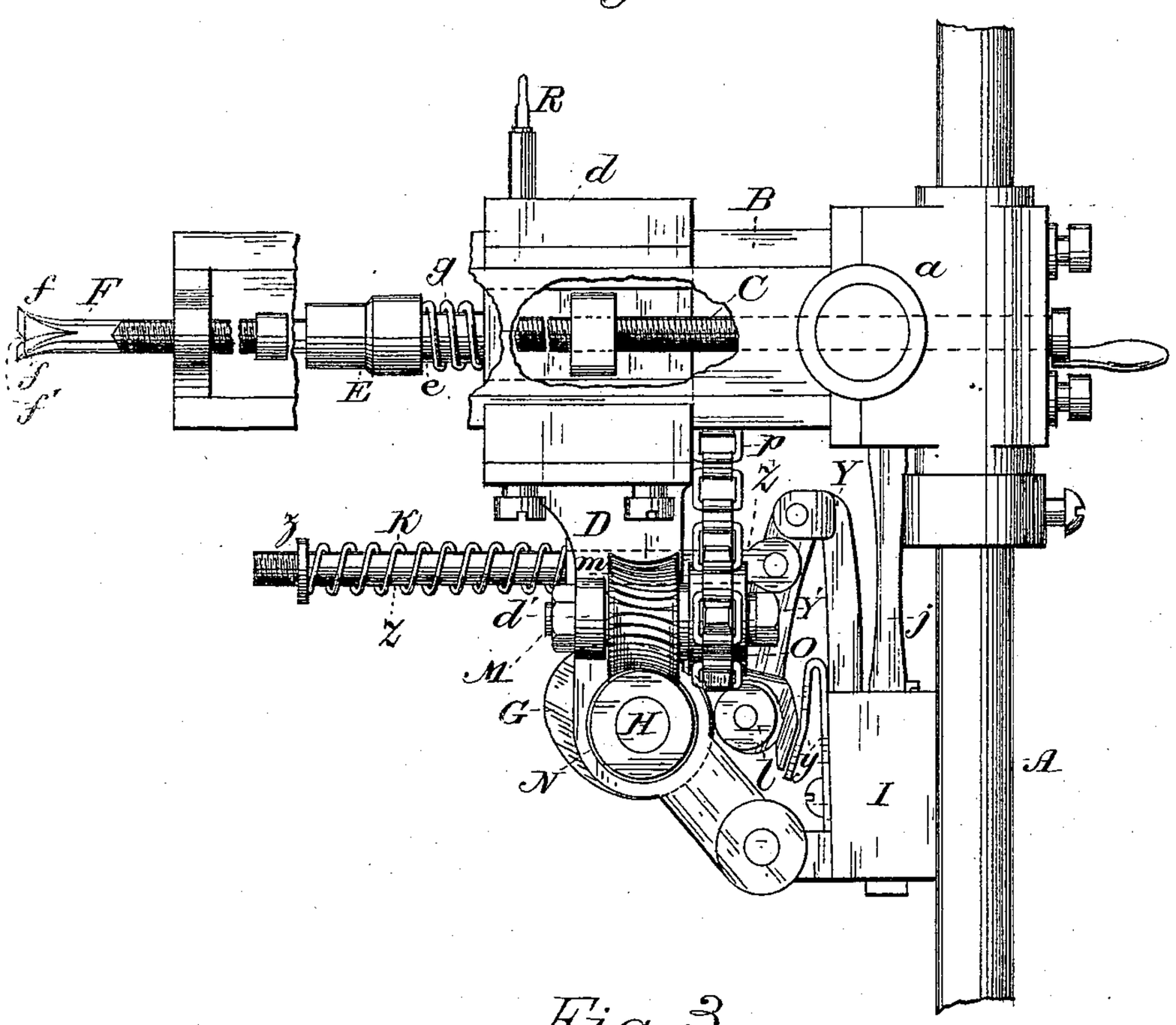
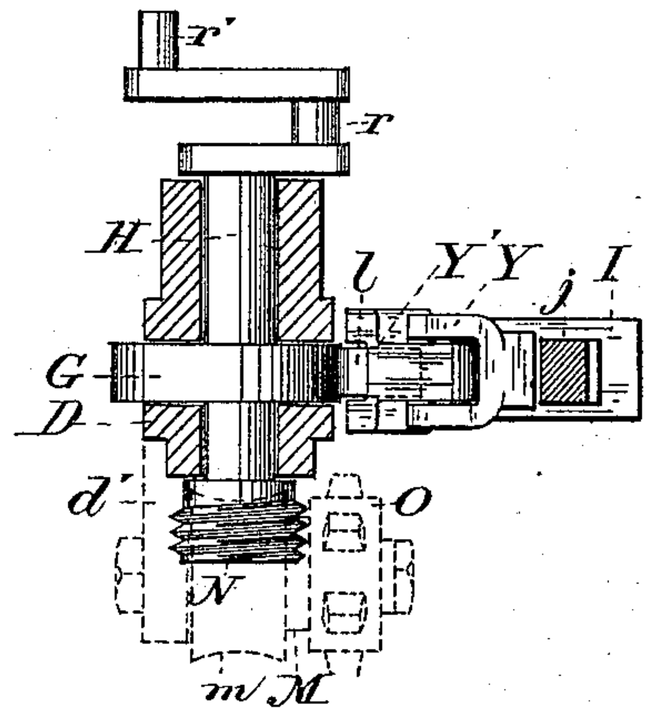


Fig. 3



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UNITED STATES PATENT OFFICE.

CHARLES O. BARLOW AND GEORGE T. EMERY, OF NEVADA CITY, CALIFORNIA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO JOSEPH W. SPRAGUE, OF SAME PLACE, AND RICHARD H. LANE, OF NEW YORK, N. Y.

POWER ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 316,106, dated April 21, 1885.

Application filed January 14, 1884. (No model.)

To all whom it may concern:

Be it known that we, CHARLES O. BARLOW and GEORGE T. EMERY, of Nevada City, in the county of Nevada and State of California, have invented an Improvement in Power Rock-Drills; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to the class of power rock-drills in which a column supports a cross-bar on which is suspended the body of the machine carrying the drill, the hammer, and means for vibrating the hammer and rotating the drill; and our invention more particularly relates to certain new and useful improvements in that machine of this class for which we applied for Letters Patent of the United States February 27, 1883, and the application for which was allowed October 19, 1883.

Our improvements consist in a steam-engine as a source of power formed with and carried by the body-bar of the machine and connected with the driving-shaft which operates the hammer; in novel mechanism for vibrating the hammer, a peculiar drill and mechanism for rotating it, and means for introducing a continuous supply of water near the bottom of the hole to wash out the pulp, all of which we shall hereinafter fully explain, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view of our power rock-drill. Fig. 2 is a side elevation, portions of the cross-bar being broken away in order to show feed-screw C and chuck E. Fig. 3 is a horizontal section taken on the plane of the axis of shaft H.

The object of our invention will be made known in the course of the description.

A is the supporting-column provided at top and bottom with obvious devices for taking hold of the timbers or walls of the shaft or tunnel. B is the cross-bar secured to said column by a boxing, *a*, which we have fully described in our previous specification, and which need herein be simply indicated. By means of this connection the cross-bar is adapted to be adjusted vertically and to any desired inclination.

D is the body-bar provided with a cross-head, *d*, by which it is suspended from and is adapted to slide upon the cross-bar B. This movement we herein accomplish by means of a feed-screw, C. Cast with said body-bar and its cross-head is a steam-cylinder, W, having a steam-chest, X, a steam-pipe, *w*, and an exhaust, *x*. It is provided with a piston, of which *u* is the pitman, and with a valve, of which *v* is the rod.

This engine is of a common form, taking steam at one end only, the novelty in this connection being merely its union with the body-bar and its connection with the driving mechanism, whereby it becomes part of the machine itself and is carried with it.

Mounted in the lower end of the body-bar D is the main driving-shaft H, with which the pitman *u* of the engine is connected by a crank, *r*, and with which the valve-rod *v* is connected by a small return-crank, *r'*, whereby said shaft is rotated and the operation of the engine continued.

Steam is furnished to the engine from any suitable source through a flexible tube, (not here shown,) whereby the drill may be moved about.

In the top of body-bar D is fitted the drill-holding spindle or arbor *e*, having the chuck E on its forward end and a cushion-spring, *g*.

F is the drill inserted in the chuck.

In the lower end of the body-bar D is pivoted the hammer-head I, in which is secured the hammer-handle *j* of the hammer J, which in its vibration is adapted to deliver a blow on the head of the drill-arbor *e*. Extending upward from said hammer-head is an arm, Y, in the top of which is pivoted a downwardly-extending arm, Y', between the lower end of which and the hammer-head is a cushion-spring, *y*. Pivoted to the upper end of arm Y' is a rod, Z, which extends forward through the body-bar loosely, and has a nut, *z*, threaded on its end. Around this rod, between its nut and the body-bar is a spring, K.

Upon the shaft H is a modified eccentric, G, of the shape shown in Fig. 2, and consisting of a disk, one portion of the circumference of which is formed on a radius so much

greater than the rest of it that in its rapid revolution it has somewhat the effect of a cam with an abrupt fall in its circumference without producing the jar of such a cam.

In the lower end of the arm Y′ is a roller, *l*, which is held at all times against the eccentric G by the spring K. If the eccentric is revolved slowly, its only effect is to press the hammer back and allow it to come forward without a blow; but when run at a high speed the hammer is pressed back and allowed to come forward with a blow upon the drill-arbor. In this movement there is not that jar which we experienced in the operation of our former machine from the cam, and which had a tendency to break the hammer-handle. In that case the cam running at a high rate of speed and acting direct on the friction-roller attached directly to the hammer-head produced rapid jars or blows, generating vibration in the handle, which increased until it broke; but in the present case the roller, being always against the eccentric, and cushioned on the head I is not subjected to jar, and therefore cannot transmit it to the hammer-handle, the life of which is thereby materially increased. The spring K, being compressed on the rod Z, keeps the roller against the eccentric, and of course draws forward the hammer to deliver its blow. By setting up the nut *z* the tension of the spring is regulated.

The means for communicating a positive rotation to the drill are as follows: In a side arm, *d′*, of body-bar D is journaled a shaft, M, upon which is a gear-wheel, *m*, which meshes with a worm, N, on the main shaft H, Figs. 2, 3. Upon the end of shaft M is a chain-pulley, O, and upon the rear end of the drill-arbor *e* is another chain-pulley, P. Between these pulleys extends an endless chain, *p*. By these means a positive and continuous rotation is given the drill.

Q is a flexible tube communicating with a suitable source of water, (not here shown,) whereby it receives water under head or pressure. Its forward end is supported by a pivoted bearing, R, above the body-bar, and it is provided with a long straight nozzle, *q*, having a check-cock, *q′*; but we accomplish the result by means of a continuous supply of water under pressure introduced during the operation of drilling near the bottom of the hole. We insert the long nozzle *q* into the hole with the drill until it reaches a point just behind its lips. It is not interfered with by the drill, as the hole is large enough for both. The water passes by the lips and forces the pulp back between them, thus keeping the bottom of the hole clear. As the drill advances, the water-nozzle is pushed in farther. The length of the nozzle and its material (preferably brass) enable us to bend it sufficiently to get it into the hole without having its rear portion in the way of the machine. The three-lip drill is particularly advantageous in this connection, as it affords greater space for the discharge of the pulp.

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

1. In a rock-drill, the body-bar D, the drill-arbor *e*, swinging hammer-head I, and hammer J, in combination with the modified eccentric G, a yielding surface between said eccentric and hammer-holder, and a means for holding said surface against the eccentric, substantially as herein described.

2. In a rock-drill, the body-bar D, drill-arbor *e*, swinging hammer-head I, and hammer J, in combination with the modified eccentric G, arm Y on the hammer head, swinging arm Y′, pivoted in said arm, and having the roller *l* impinging on the eccentric, the cushion *y* between said arms, the rod Z, connected with the swinging arm Y′, and spring K on the rod, all arranged and operating substantially as herein described.

3. In a rock-drill, the sliding body-bar D, the drill F, and arbor *e*, with which it is connected, in combination with the vibrating hammer J, shaft H, and intermediate devices for operating the hammer, the worm N on shaft H, shaft M, gear *m*, chain-pulley O on said shaft M, chain-pulley P on the drill-arbor *e*, and the endless chain *p*, all arranged and operating substantially as and for the purpose described.

In witness whereof we have hereunto set our hands.

CHARLES O. BARLOW.
GEORGE T. EMERY.

Witnesses:
W. D. LONG,
T. D. CLEARMAN.