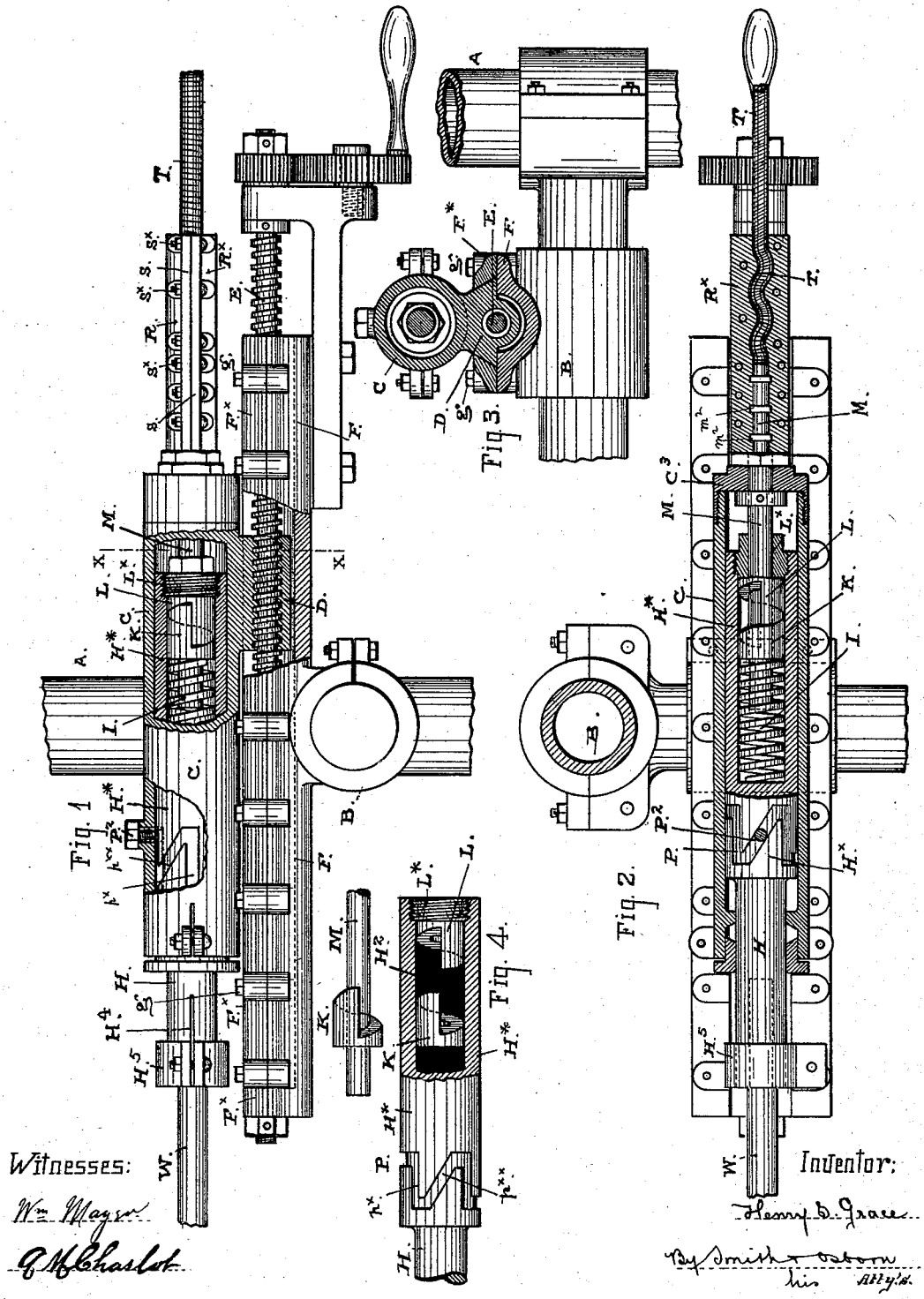
(No Model.)

H. S. GRACE.

ROCK DRILL.

No. 455,396. Patented July 7, 1891.



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UNITED STATES PATENT OFFICE.

HENRY S. GRACE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO JACOB A. FISCHER, OF SAME PLACE.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 455,396, dated July 7, 1891.

Application filed September 29, 1890. Serial No. 366,523. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. GRACE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

My invention relates to improvements in the construction of rock-drills to be worked by power applied through a cable or flexible shaft; and it consists in certain parts and combination of parts, as hereinafter fully described, producing an improved drill for use in mining operations and in working on all kinds of rock.

The nature of my said improvements and the manner in which I proceed to construct and combine the same will be understood from the following description and the drawings that accompany and form part of this specification.

Referring to the drawings, in which these parts are shown in combination with other parts necessary for the production of the complete drill, Figure 1 represents in side view the complete drill with portions of the casing and side broken away to show the interior construction. Fig. 2 is a top view principally in horizontal section. Fig. 3 is a transverse section taken at about the line x x, Fig. 1. Fig. 4 is a detail view of the reciprocating barrel that forms the head of the tool-carrier and the cams that produce the longitudinal movement of the barrel in the casing.

A indicates the post or standard on which the drill is fixed in the usual manner by the clamp B.

C is the casing, and D the screw-threaded block or nut on the bottom for the feed-screw E. The block is dovetailed to fit the way or groove of corresponding form in the bed F. The sides of the bed are removable pieces $F^{\times}$, fixed by screws g, so that they can be taken off for repairs or set up when worn. The nut has a bottom semicircular in cross-section, and the bottom of the way in which it slides is also half-round to take the nut.

The tool-carrier H is formed of a barrel or tubular head-portion $H^{\times}$, provided with a chamber in which is a coil-spring I, and on the end outside the stationary casing is the socket H^4, with a clamp H^5 for holding the shank of the drill-tool W.

K is a cam or piece fixed on the inner end of a rotating rod M and having a spiral acting face for the lift and a perpendicular face for the drop, which set and work against corresponding faces of a block or piece L in the end of the barrel. This part is formed on a screw-threaded plug $L^{\times}$, to be readily taken out and removed when worn or broken, and it is bored for the rod M to work through it. The spring is interposed between the bottom of the chamber and the flat back of the rotating cam K, and consequently it is compressed as the barrel is driven back in the casing by the rotating movements of the rod. The points of these cams are cut off square, as shown in Figs. 1 and 4.

A groove p around the surface of the barrel is formed of straight or longitudinal portions $p^{\times}$ and inclined or angular portions $p^{\times\times}$ to take a pin or stud P^2, that sets through the casing from the outside, as shown in Figs. 1 and 2, and acts to produce partial rotation of the barrel at every longitudinal movement backward in the casing, so that the drill-tool is turned around in the hole at every stroke a distance equal to the distance between one straight groove and another. The pin P^2 is threaded so that it can be set clear of the groove whenever the rotation is not required.

The head of the casing is formed of a screw-cap C^3, through which the rotating rod is carried, and the end of the rod beyond the cap is coupled to the shafting by the coupling-clamp. This part is composed of two blocks or half-clamps R $R^{\times}$, united together along the center by flanges and bolts S $S^{\times}$ and having grooves in their meeting faces to take in the ends of the rotating rod and the flexible shaft T. These grooves are so formed that the blocks hold the rod and the shafting firmly and prevent them from slipping and drawing out. That portion of the groove which receives the rod is straight and is also formed with enlarged recesses $t^{\times}$ $t^{\times}$ to take the collars or rings m^2 of corresponding form on the rod, but the remaining portion of the groove in each block is of serpentine form, so that the flexible shaft must be bent to correspond when it is laid in. The rod and the flexible

shaft are thus firmly gripped and held when the two half-clamps are drawn together on the parts. This clamp furnishes an effective means to join a flexible shaft to the rod to be turned, and it is easily loosened when the parts are to be separated.

The drawings show a hand-feed of simple character to move the drill as the work progresses, but other character of feed can be arranged for operation, if desired, no special novelty being claimed for such part of the mechanism.

It will be understood that the mechanism can be adjusted to work a diamond-drill by simply throwing the pin P^2 out of the groove in the barrel, so that the tool-carrier will not rotate.

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

1. In a rock-drill, the combination of a stationary case, a longitudinally-moving tool-carrier and a rod for operating the same, provided with collars or projections m^2, a flexible shaft T, and a clamp R, having recesses to receive the collars or projections m^2 and a curved or serpentine opening for clamping the flexible shaft, as set forth.

2. In a rock-drill, the combination, with a stationary casing, of the longitudinally-movable tool-carrier H, having a cylindrical spring-containing chamber $H^\times$ formed on the inner end, a tool-socket H^4, provided with a clamp on the end outside the casing, the spiral spring I, the threaded plug having the cam or part K of corresponding shape, and the rotating rod having on the end the part K and working through the plug and having the collars m^2, and the flexible shaft and clamp or connection R, having grooves to correspond with the collars m^2 and a serpentine opening for clamping the flexible shaft, for operation as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

HENRY S. GRACE. [L. S.]

Witnesses:
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