No. 609,107. Patented Aug. 16, 1898.

J. G. LEYNER.

DRILL FOR STARTING HOLES IN ROCKS.

(Application filed Oct. 12, 1897.)

(No Model.)

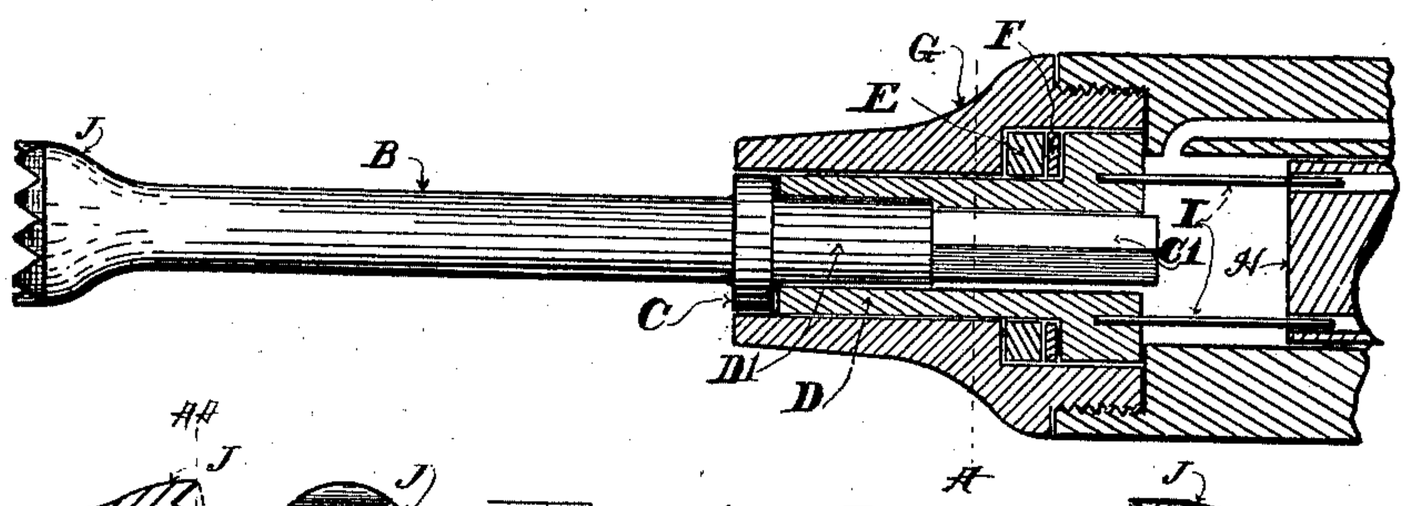

Fig. 1.

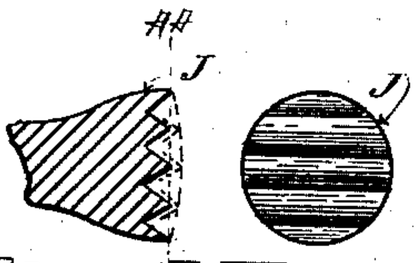

Fig. 9. Fig. 10.

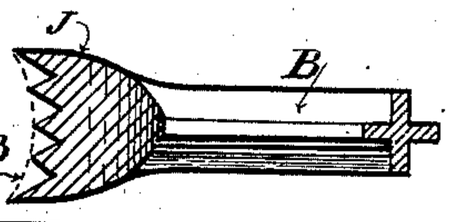

Fig. 11.

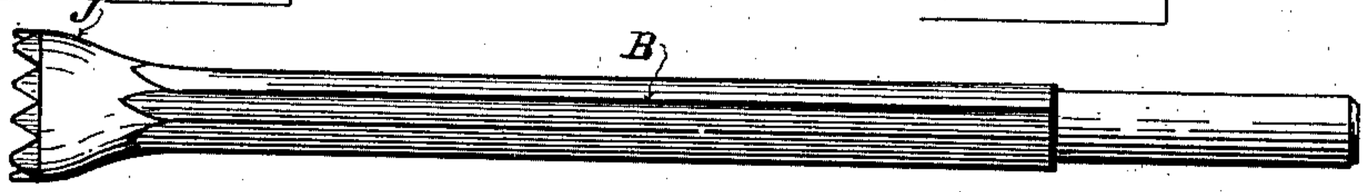

Fig. 2.

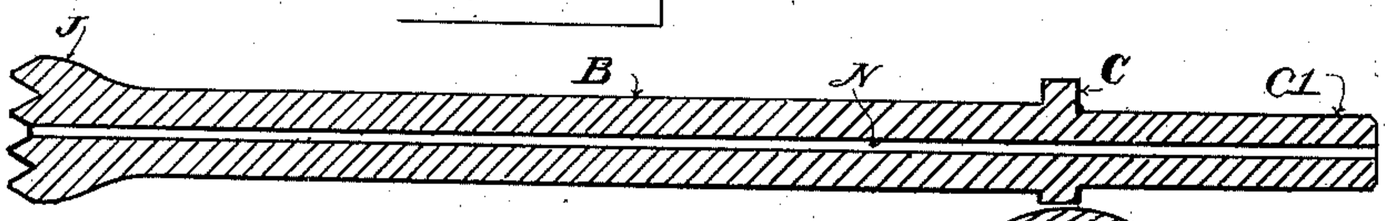

Fig. 3.

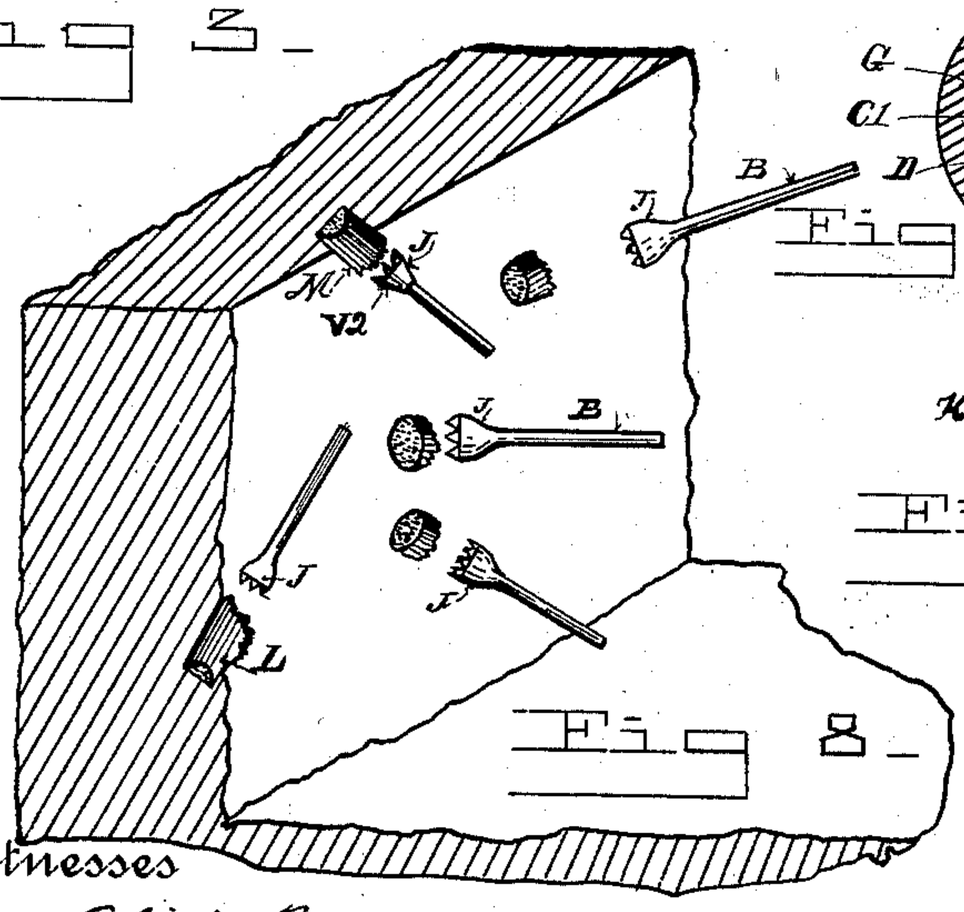

Fig. 8.

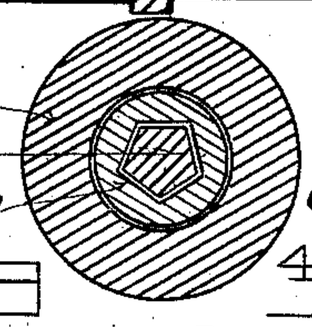

Fig. 4.

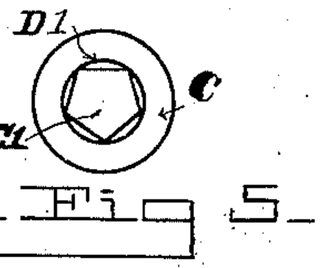

Fig. 5.

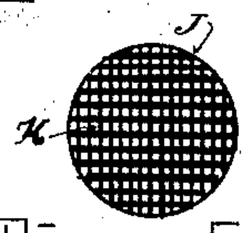

Fig. 6.

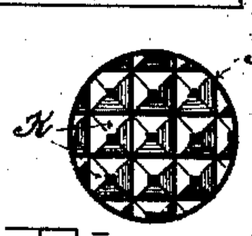

Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN GEORGE LEYNER, OF DENVER, COLORADO.

DRILL FOR STARTING HOLES IN ROCKS.

SPECIFICATION forming part of Letters Patent No. 609,107, dated August 16, 1898.

Application filed October 12, 1897. Serial No. 654,953. (No model.)

To all whom it may concern:

Be it known that I, JOHN GEORGE LEYNER, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Drills for Starting Holes in Rocks; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to a rock-cutting tool for surfacing the face of rock at any point where a hole is to be drilled and for dressing a flat round surface or a shallow hole with a flat bottom at right angles to the axis of the hole to be drilled.

In drilling holes in rock for blasting in shafts and tunnels it is necessary to put them in at various oblique angles to the surface of the rock and in all directions; and the object of my invention is to provide a rock-cutting drill that is especially adapted for starting a true round hole into the rock at any desired angle to the general surface of the rock regardless of how uneven and jagged its surface may be. I attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal view of my improved drill-hole starter operatively attached to one type of drilling-engine. Fig. 2 is a longitudinal view of my drill-hole starter with its shank adapted to fit the chuck of the piston in that class of drilling-engines in which the piston-head has a plunger extension which carries the cutting-drill in a chuck formed at its outer end. Fig. 3 is a longitudinal section of the starting-drill with a hole axially through it from end to end. Fig. 4 is a section of Fig. 1 on line A; Fig. 5, an end view of the striking end of the drill; Fig. 6, an end view of the cutting end of the drill; Fig. 7, an end view of the cutting end of the drill, showing a different and better arrangement of the cutting-teeth than that shown in Fig. 6; and Fig. 8, a fragmentary perspective view of a breast of rock, showing the application of my hole-starting drill at various angles of application; Fig. 9, a fragmentary section of the cutting-point of a drill-bit with the cutting-face formed by long parallel teeth, each of which extends clear across the face. All are arranged straight across the face at right angles to the drill-bit's axis and with their combined edges parallel to the line A A and with a concave cutting-face and arrangement of teeth shown in dotted lines; Fig. 10, an end elevation of Fig. 9; and Fig. 11, a fragment of a drill-bit with the cutting-point in section and with its face convexed and its cutting-teeth arranged in a convexed curve, as indicated by the dotted line B B.

Similar letters of reference refer to similar parts throughout the several views.

My hole-starting drill is adapted for hand-drilling, but is more particularly adapted for use in all kinds of hand drilling-machines and in all types of air or steam drilling-engines, the only change necessary in the drills to adapt them to the different types of engines in use being in the arrangement of the striking end of the shank B, which must be formed to adapt the drill to the chuck or holder in which it is operatively held. For hand use the shank portion B of the drill should be left in its natural form.

In Fig. 1 I illustrate the drill with its shank adapted to a drilling-engine in which the drill is practically stationary and the piston strikes against its end, which projects into the cylinder in its reciprocal path. In order to adapt my drill to this type of drilling-engine, I form a collar C near the striking end of the shank, and the end C′ of the shank for several inches is given a polygonal shape that will key it against independent rotary movement in the sleeve D, which is provided with a polygonal bore either wholly or partially through it of the same shape as the end of the shank, as shown in Fig. 4, which is a cross-section of Fig. 1 at A. The polygonal portion of the shank need not extend to the collar, and the intervening portion D′ is preferably made round, or it may be left the natural form of the cross-section of the drill steel used. In Fig. 1 only a fragment of this type of drilling-engine is shown. This fragment includes the drill-holding end of the engine and a portion of the cylinder and piston, this being all that is necessary to show the appli-

cation of my starting-drill to it. The sleeve D is rotatably mounted and cushioned by the buffer-rings E and F in the cylinder-head G and is rotated step by step by the reciprocal and turning movements of the piston H through the medium of the rods I, which are secured to the sleeve and upon which the piston slides. The piston strikes the end of the drill, which is loose in the sleeve, and the collar is used as a stop to define the drill's inward movement and operative position in the sleeve relative to the piston.

In Fig. 2 the striking end of the shank is simply turned round for several inches, and this is the form of shank used in the chucks of the piston-plunger type of drilling-engines in general use. Upon the opposite end of the drill-shank a cutting end is formed which consists of a round head J, which is a little larger in diameter than the shank. The face of this cutting end is preferably made flat and at substantially right angles to the axis of the shank, as this form gives the best satisfaction. The face may, however, be made concaved, as shown in Fig. 11. It will work, however, quite nicely even if slightly convexed, as shown in Fig. 9. Its entire surface is formed into projecting independent teeth K, preferably of pyramid shape and arranged in cross-rows on the face, as shown in Fig. 7. Any form or shape of teeth may, however, be used, and they may be irregular in shape or arrangement. They should, however, extend fully to the side edge of the cutting end, and I preferably form the teeth at the periphery of the face with their outside surfaces substantially parallel with the shank's axis, as shown in Figs. 1 and 3 and at V^2 in Fig. 8. The teeth should not be too sharp-pointed; but they should all be of substantially the same height in order that they may cut evenly as the drill is rotated step by step between its impingements against the rock.

In Fig. 6 I show a cutting-drill end that is simply cross-channeled or slotted to form a serrated surface; but if it is channeled in but one direction, as shown in Figs. 9 and 10, it will form teeth that will work quite well if they are properly pointed.

In Fig. 3 I show a starting-drill with an axial hole N through it from end to end. This form of drill allows, especially when used in the type of engine shown in Fig. 1, a portion of the expansive fluid of the cylinder to be conveyed to the cutting-point between each backward stroke of the piston, which operates to blow the rock cuttings away from the drill-point and out of the starting-hole as the drilling proceeds.

My starting-drill can be made of any suitable form of cross-section of tool-steel, but the round hexagon, cross or ribbed tool-steels are mostly used. When used only to start a hole, they are made from a foot to four feet long.

In Fig. 8 I illustrate several drills pointing in different directions and holes started in line with the drills. It is only necessary that the drill be used long enough to cut a round flat spot or a shallow hole into the irregular surface at the angle the hole is to be put in. Thus at L and M very oblique starting-holes are shown.

The drill operates as follows: The drill is placed in the drilling-engine, which is alined and firmly set in the shaft or tunnel, in a position that will drill a hole in the direction of, say, the hole L. The drilling-engine is then started up and the hole-starting drill is turned step by step the same as the regular drill; but the starting-drill cuts at its peripheral edge first, as that is where it contacts with the rock in oblique holes, and it cuts where it strikes, while a regular drill having always a tapering cutting end would slide off to one side when striking at an angle against a rock surface. Consequently the starting-drill commences to cut the rock wherever the edge of the end strikes it, and it cuts clear and smooth straight into it, although it may cut several inches deep on only one side of the drill before it cuts to a full round bearing, as shown at the hole L, and in feeding the drill the operator should feed only as fast as it will cut clear. After a hole is started far enough to make a round flat surface the starting-drill is taken out and the regular form of drill substituted for it. My starting-drill is also of great assistance in drilling holes when seams and loose rock are encountered, as in such cases the regular drill will slide out of alinement and follow the seam and bind and stick; but if the regular drill is taken out of the engine and a starting-drill of the same size is put in and fed carefully it will cut a perfectly round and true hole along or across a seam or in loose rock.

While my starting-drill can be used in any type of rock-drilling engine or in hand-drilling, it is especially adapted for use with the type of engine shown in Fig. 1, which is more fully illustrated in application Serial No. 633,955. In this type of engine the drill is held always just before the piston strikes it by the expansive power of the actuating fluid of the cylinder against the rock, and the piston strikes it very rapidly. The force of this blow can be regulated and reduced to lightly tap the drill by the operator's choking off the air when drilling very oblique holes until the drill is well started into the rock, and as the drill rests loosely in the cylinder-head of this type of engine it can be instantly inserted or withdrawn and changed for the regular form of drill when seams or loose rock are encountered.

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

The combination with the cylinder, the piston and the sleeve having a partial round and partial polygonal bore, of a hole-starting drill adapted to be operatively positioned in said

sleeve loosely and to project into said cylinder into the reciprocal path of said piston and comprising a shank of any suitable form of cross-section, a collar or stop adjacent to its striking end, a polygonal end fitting loosely said polygonal bore of said sleeve and a round portion between said polygonal section and said collar or stop, and an enlarged round cutting end having a flat face channeled, grooved, serrated and formed into cutting-teeth, and a hole through the axis of said drill-shank from end to end, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN GEORGE LEYNER.

Witnesses:
SAMUEL ELISHA FOWLER,
CLARENCE A. LAMPSON.