No. 749,369. PATENTED JAN. 12, 1904.

L. DURKEE.

ROCK CUTTING DRILL BIT.

APPLICATION FILED JAN. 23, 1903.

NO MODEL.

Fig. 3.

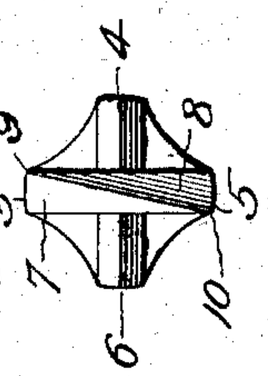


Fig. 7.

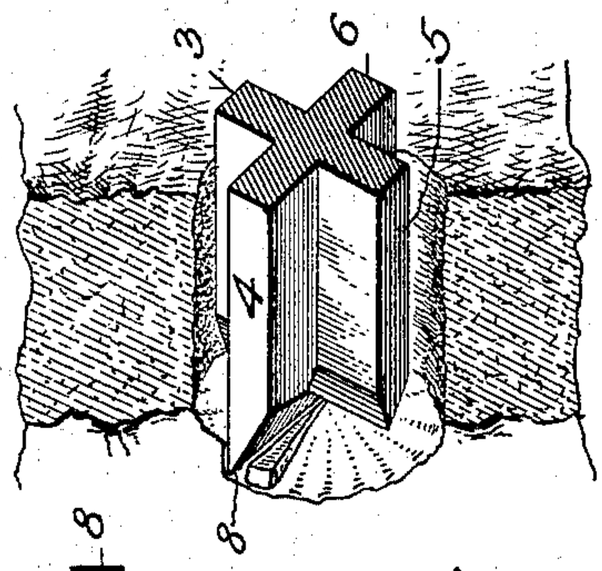


Fig. 6.

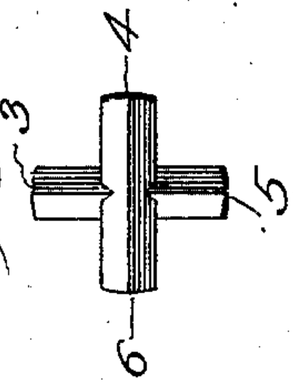


Fig. 1.

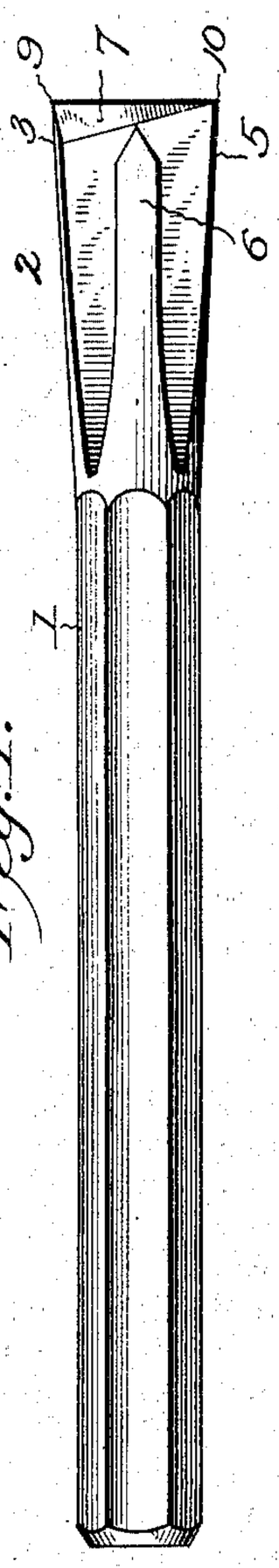


Fig. 2.

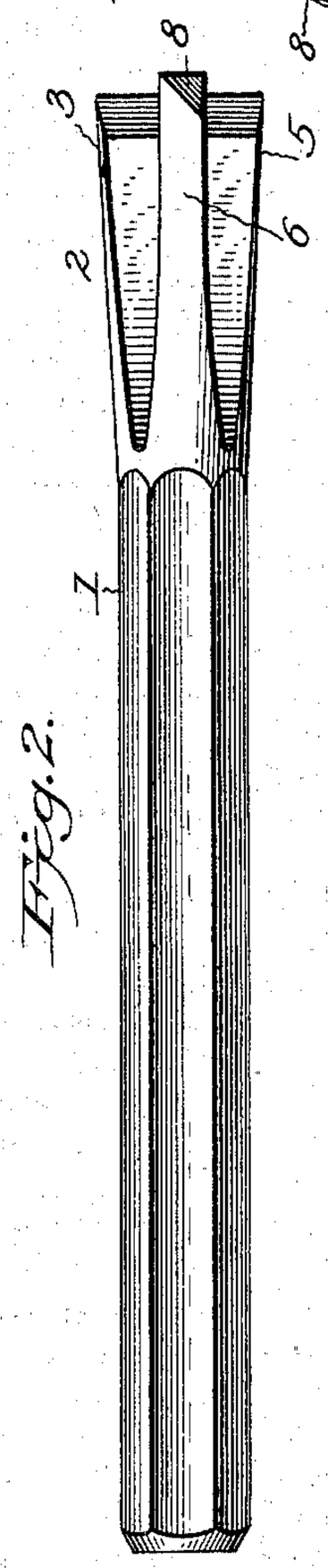


Fig. 4.

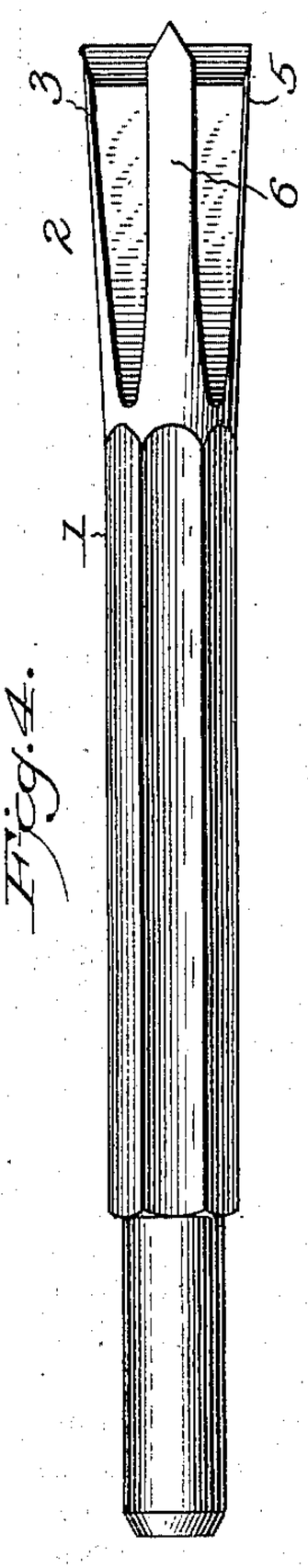
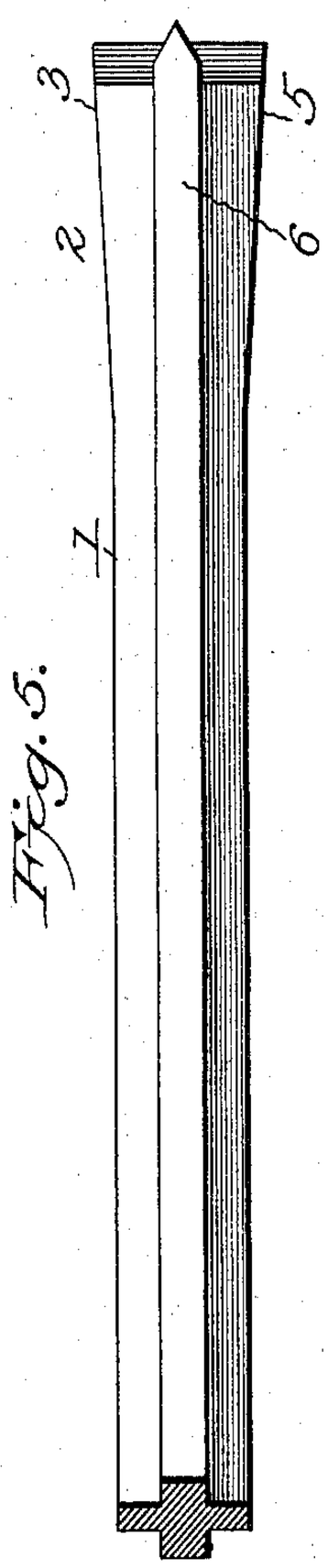


Fig. 5.



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No. 749,369. Patented January 12, 1904.

UNITED STATES PATENT OFFICE.

LAFAYETTE DURKEE, OF DENVER, COLORADO, ASSIGNOR TO THE MINE & SMELTER SUPPLY COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

ROCK-CUTTING DRILL-BIT.

SPECIFICATION forming part of Letters Patent No. 749,369, dated January 12, 1904.

Application filed January 23, 1903. Serial No. 140,280. (No model.)

To all whom it may concern:

Be it known that I, LAFAYETTE DURKEE, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Rock-Cutting Drill-Bits; 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 figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in rock-cutting drills or drill-bits; and the objects of my invention are, first, to provide a rock-cutting drill adapted to cut a round hole in rock and having chisel-shaped cutting edges; second, to provide a rock-drill provided with four cutting edges, two of which are chisel-shaped edges and the remaining two are wedge or inverted-**V** shaped cutting edges; third, to provide a rock-cutting drill having several cutting edges, a part of which are chisel-shaped and project beyond the remaining cutting edges. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a drill embodying my invention. Fig. 2 is a plan view of Fig. 1. Fig. 3 is an end elevation of Figs. 1 and 2. Fig. 4 is a side elevation of a drill, showing a different form of rock-cutting edge. Fig. 5 is a plan view of a cross-ribbed steel-shanked drill, showing a plan view of the cutting edge shown in Fig. 4; and Fig. 6 is an end elevation of Fig. 5. Fig. 7 is a fragmentary perspective view of the drill-bit in a fragment of rock, showing the manner in which it chisels off a chip of rock.

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

Referring to the drawings, the numeral 1 designates the shank of a drill. This shank may be made of either hexagon, square, round, or of triangular or cross-ribbed steel, and its striking end may be shaped and formed to fit rock-drilling machines or engines, and it may also be made either solid or hollow, these features being common to all drill-shanks. The rock-cutting end 2 of the drill is tapered outward in forging it, so that it is larger in diameter at its cutting edges than the shank in order that it will drill a hole larger in diameter than the shank. I preferably provide the drill with four ribs or lips 3, 4, 5, and 6, although three or more than four might be employed, if desired. The ribs 3 and 5 project a short distance beyond the ribs 4 and 6, so that the two ribs unite with the center to form an integral chisel-shaped blade. The end of each rib is preferably sharpened by bevels 7 and 8, that are formed on one side only of each rib. These bevels are placed on the opposite sides of the ribs from each other and extend from the opposite corners 9 and 10 of the ribs diagonally across the chisel end from one rib to the other. Thus the bevel 7 of the rib 3 extends to the opposite corner of the opposite rib 5, while the bevel 8 of the rib 5 extends to the opposite corner of the rib 3 from the corner of rib 5 that it started from. Thus the cutting edge of each of these two oppositely-disposed ribs extends diagonally across the top of the chisel-blade formed by the union of these two ribs and the center of the drill to the opposite corner of the opposite rib and forms one cutting edge diagonally across from corner to corner, as shown in Fig. 3. The two ribs 3 and 5 form one integral chisel end to the drill-bit, having two cutting edges beveled on one side only, like a chisel, but beveled in both directions at the center of the diametrical length of the chisel end. The ribs 4 and 6 are formed to terminate in cutting edges at a short distance back from the cutting edges of the ribs 3 and 5, the distance of these cutting edges of the ribs 4 and 6 being preferably from about an eighth to a quarter of an inch.

The projecting extension of the ribs 3 and 5 beyond the ribs 4 and 6 enables me to provide the end of the drill with a true chisel edge, which strikes the rock and cuts it by a wedging impact or blow, as at each blow the straight side of each corner makes a well-defined straight shouldered cut into the rock,

while the beveled side wedges or breaks off the rock to the shoulder made by the previous cut, as shown in Fig. 7, and as the opposite corners are beveled in opposite directions both corners cut into and break or wedge off small particles of rock.

I have called particular attention to the character of the cut my chisel-bit makes, as the common form of four-ribbed drill, where all of the ribs had even cutting edges drills, into rocks more by crushing it into a powder than by cutting and breaking or wedging it off of the bottom of a hole being drilled. Especially is this the case after they have become dull.

The two shorter ribs of my improved drill, one of the same radial diameter as the chisel-cutting ribs, form supporting and centering wings for the cutting edges of the single rib, as well as cutting edges in soft rock and in seams. Consequently I also provide them with cutting edges, but preferably with inverted-**V** or double-wedge shaped cutting edges.

In very soft rock when the drill is subjected to heavy blows they would be brought into cutting contact with the rock, as the chisel cutting edge would be driven far enough into the rock to allow them to contact with it. They are also very useful in stony rock, as the chisel edge is apt to strike frequently direct into seams and would stick there if the shorter ribs did not act to cut the rock and also act as abutment-stops to the penetration of the chisel edge. Their chief function in solid hard rock is to pick the hole round, which they do by fitting it on the opposite side from the chisel-ribs, and thus hold the chisel edge in a true circle as it is turned by hand or by machine in short rotative even step-by-step movement when operatively drilling rock, such a movement being necessary to all percussion ore-hammer-operating rock-drills.

In Figs. 4, 5, and 6 I illustrate my improved drill constructed similar to Figs. 1, 2, and 3, except that the cutting edges of the extending ribs are made of inverted-**V** or double-wedge form. Consequently the single cutting edge which is formed by the extension extends centrally across the two ribs and makes a single or continuous cutting edge on the end of the extending ribs that is beveled equally both ways. This form of single cutting edge, while not as good as the diagonal edge and opposite bevel, may be used to good advantage in some kinds of rock.

My improved drill is simple and will cut rock very fast, and as it breaks off the rock in small grains and atoms instead of crushing the rock it makes very little dust.

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

1. In a rock-cutting drill, the combination of a suitable drill-shank having a chuck-holding end, with a rock-cutting end, comprising four radial ribs extending substantially axially with said shanks, and forming an integral part thereof, two oppositely-disposed sets of ribs, one set of which sets extends beyond the opposite set a short distance and forms a chisel-shaped cutting edge at the end of the drill-bit, and having the opposite corners of the two longest ribs beveled in opposite directions, and an inverted-**V**-shaped cutting edge at the center of said chiseled end, and a suitable cutting edge on the terminal edges of the two opposite shorter ribs, substantially as described.

2. In a rock-cutting drill-bit, the combination of a shank provided with four oppositely-arranged fluted lips or ribs, all of which form an integral part of the shank of said drill-bit and all of which taper divergingly outward to their terminal ends and having one oppositely-arranged pair of ribs longer than the other pair of ribs, and having the opposite outer ends of said longer ribs provided with a bevel on one side only and having the bevel on one edge arranged on the opposite side of the rib-frame the bevel on the opposite rib so that a diagonal cutting edge is formed on this pair of ribs and a straight rock-cutting edge of equal angular pitch on each side of the cutting edge at the cutting-point of each of the short ribs, substantially as described.

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

LAFAYETTE DURKEE.

Witnesses:

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BESSIE THOMPSON.