No. 803,911. PATENTED NOV. 7, 1905.

J. G. LEYNER.

ROCK CUTTING DRILL BIT.

APPLICATION FILED SEPT. 2, 1903.

Fig. 7.

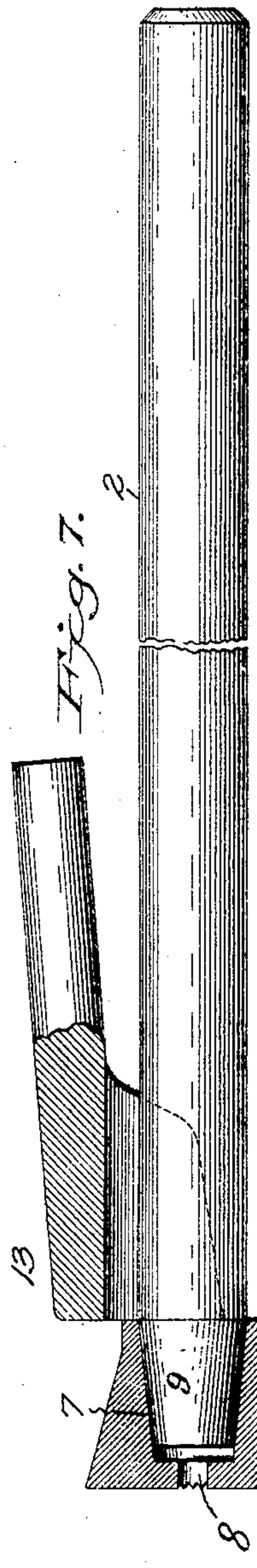


Fig. 3.

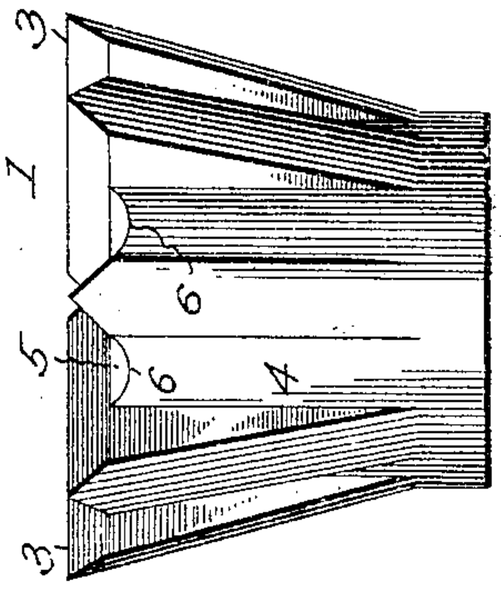


Fig. 6.

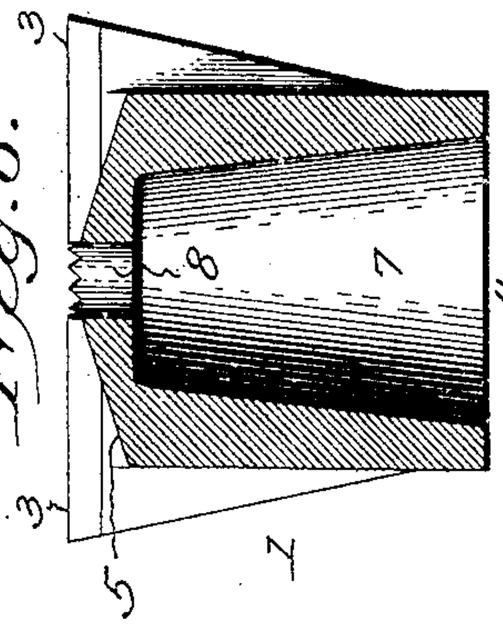


Fig. 2.

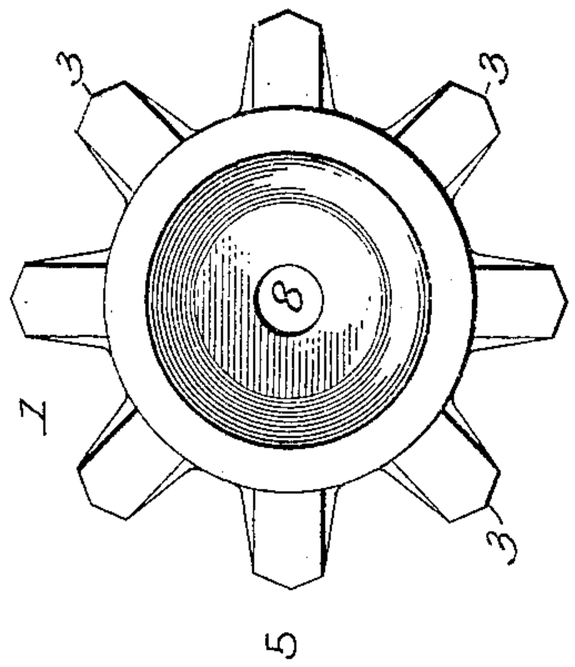


Fig. 5.

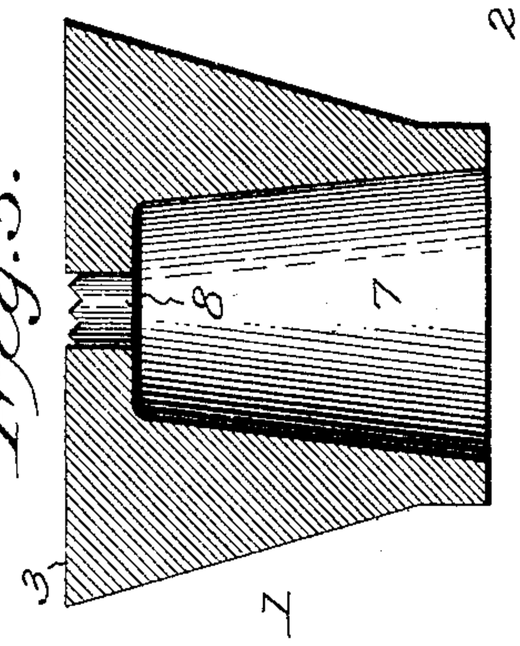


Fig. 1.

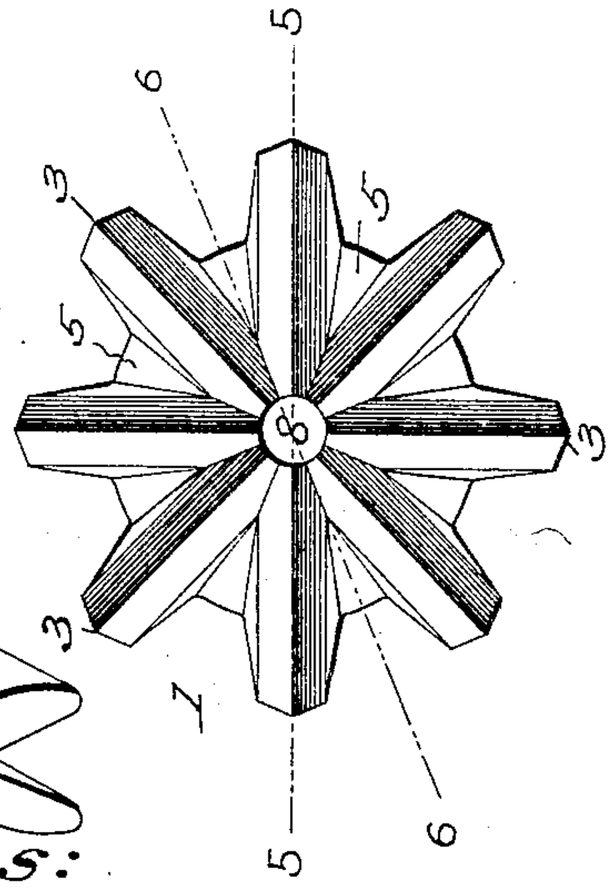


Fig. 4.

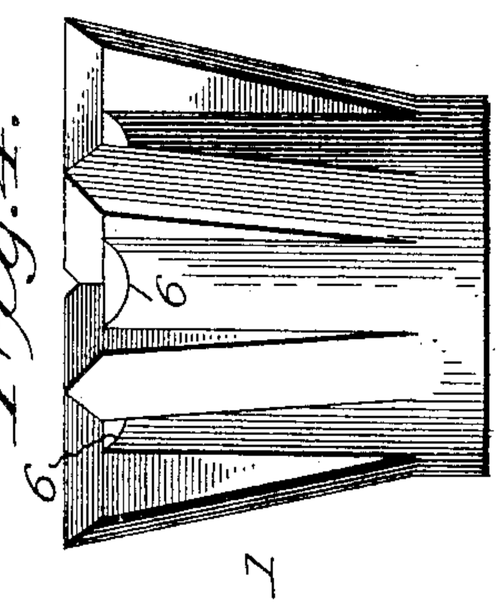


Fig. 8.

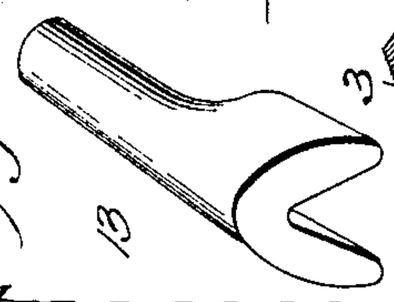
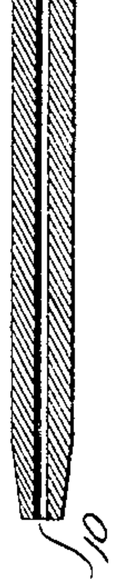


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN GEORGE LEYNER, OF DENVER, COLORADO.

ROCK-CUTTING DRILL-BIT.

No. 803,911. Specification of Letters Patent. Patented Nov. 7, 1905.

Application filed September 2, 1903. Serial No. 171,623.

To all whom it may concern:

Be it known that I, JOHN GEORGE LEYNER, a citizen of the United States of America, residing in the city and 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 drill-bits; and the objects of my invention are, first, to provide a drill-bit provided with a larger number of rock-cutting edges than the rock-cutting drill-bits in common use; second, to provide a drill-bit point that is made independent of its hammer-striking drill-bit shank or bar and that is adapted to be detachably secured to and removed from a hammer-striking drill-bar especially made to receive it; third, to provide an independent hammer-striking drill-bar and an independent rock-cutting drill-bit that can be instantly secured to the independent hammer-striking drill-bar, and, fourth, to provide means for attaching and detaching said independent rock-cutting drill-bit to said hammer-striking drill-bar. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the drill-bit. Fig. 2 is a rear end elevation of the drill-bit. Fig. 3 is a side elevation of the drill-bit. Fig. 4 is also a side elevation of the drill-bit looking at it from a different position than the view in Fig. 3. Fig. 5 is a sectional elevation of the drill-bit on line 5 5 of Fig. 1. Fig. 6 is a sectional elevation of the drill-bit on line 6 6 of Fig. 1. Fig. 7 is a side elevation of my improved rock-cutting drill-bit and hammer-striking drill-bar, showing the swage used to detach the drill-bit from the drill-bar. Fig. 8 is a perspective view of the drill-bit's driving-off swage, and Fig. 9 is a longitudinal section of a hollow drill-bit bar.

Referring to the drawings, the numeral 1 designates a short circular hub of metal formed into a rock-cutting bit and embodying in itself an independent renewable attachable and detachable rock-cutting point or drill-bit. One end of this hub is formed into a plurality of cutting-lips 3. Five to ten or more may be used, but I preferably use eight, as illustrated. This drill-bit is adapted to be attached to a suitable bar or rod 2 of steel, which I term the "drill-bar." This drill-bar corresponds to the shank portion of the common form of a rock-drill bit that has its cutting-point forged on one end of it, while its opposite end is adapted to be struck by a hammer. This drill-bar part of my rock-cutting drill-bit is adapted to be used in any of the rock-cutting engines in use or may be used as a hand-drill. The cutting-points are adapted to be practically instantaneously attached and detached to and from the drill-bit and are designed to be used until their cutting-lips are worn dull and then be instantly removed and replaced by sharp ones.

The cutting end of the hub is provided with a plurality of rock-cutting lips 3, which radiate from the center of the end of the hub and extend beyond its peripheral edge. These lips are arranged at preferably equal distances apart, and they are arranged longitudinally of the axis of the hub to form radial ribs that extend rearward on the hub from its cutting end to close to the opposite or drill-bar-receiving end of the hub, where they blend or die out into the circumference of the hub. Their cutting ends are beveled equally on each side to form a central chisel edge which extends from the center of the hub through the radial length of each rib, and between the cutting edge of the ribs fillets 4 are formed. The ends 5 of these fillets slope outward and downward to the center of the bit, as shown in Fig. 6, and their ends are provided with concaved recesses 6, as shown in Figs. 3 and 4, which form channels through which the rock-cuttings work away from the center of the bit. These center fillets form the body portion of the bit, from which the ribs radiate, and these fillets are of sufficient diameter to allow a tapering axial hole 7 to be formed in the hub from its rear end the greater portion of the length of the hub, thus leaving a sufficient thickness of metal between the bottom of the hole and the cutting end of the bit. The bottom of this taper hole is preferably flat, and extending from it axially through the end of the bit I preferably form a small hole 8, through which water or air or steam or a watery fluid may be fed to the rock-cutting edges of the cutter to wash or blow out the rock-cuttings as fast as they are made by the cutter while drilling holes in rock.

The taper hole in the rear end of the drill-

bit is adapted to receive one end 9 of a drill-bar, which is tapered to fit tight round its circumference in the hole in the drill-bit. This drill-bar is a straight bar of steel. Its opposite end is adapted to be inserted in any of the rock-drilling engines in use, or it may be used as a hand drill-bar and be struck by a hand-hammer. I preferably provide this drill-bar with an axial hole 10, which extends through it from end to end, as shown in Fig. 9, although, if preferred, it may be made solid, as shown in Fig. 7. When made solid, it is especially adapted for use in the plunger type of air-and-motor-operated drilling-engines, as well as in the piston type of rock-drilling engines in common use, and the hammer-striking end of the drill-bar, though illustrated straight and plain in Fig. 7, may be formed to fit the drill-holding mechanism of any type of drilling-engine; but when made hollow it is especially adapted for use in the air-and-water type of rock-drilling engines, in which combined jets of air and water are forced through the drill-bit to its cutting-point to eject the rock-cuttings from the holes in rock while drilling them, patented to me September 16, 1902, No. 709,022. These drill-bars when used in my drilling-engines are provided with oppositely-projecting lugs 11 and 12 in order to adapt them to its drill-holding mechanism, this form of drill-bit being particularly adapted for use in water-drills, as the channels in the face end of the fillets and between the ribs of the bit permit the water to flow freely between the cutting-lips of the bit and wash away the rock-cuttings as fast as they are made.

Where it is preferred to use drill-rods and drill-bits in drilling-engines or for hand-drilling without the use of water or air or a watery fluid to wash or blow out the rock-cuttings, both the drill-bars and the drill-bits may be made without the axial holes 8 and 10. The drill-bits are quickly placed on the taper end of the drill-bar by a slight chuck of the hand and will stick tight until the drill-bar receives a blow, which very rigidly secures the two together. A block of any suitable material or a hammer or mallet is all that is necessary to knock the drill-bit off from the end of the drill-bar. I preferably employ for this purpose, however, a yoke-ended swage 13, as shown in Figs. 7 and 8, which consists of a hammer-striking handle-bar provided with a bifurcated yoke-shaped end that is adapted to straddle the drill-bar and rest evenly against opposite sides of the rear end of the drill-bit, as shown in Fig. 7. With this tool only a slight tap of anything handy is sufficient to knock the drill-bit from the drill-bar.

The drill-bar shown in Fig. 7 is a hand drill-bar and is adapted to be held in one hand and be struck by a hammer held in the other hand. Consequently the lugs 11 are not shown, as they are not required, while the drill-bar shown in Fig. 9 is a machine drill-bar—that is, it is adapted for use with a rock-drilling engine, and the lugs are used to secure it to the rock-drilling engine.

My improved drill-bit is made of superior tool-steel and may be formed very quickly, cheaply, and in very large numbers in hot-metal drop-forging die-presses or by any other suitable duplicate forging method. They are then properly tempered for rock-drilling work and are adapted to be shipped in kegs or barrels to mines, quarries, or railroad graders, with a set of drill-bars of different lengths adapted to fit any type of rock-drilling engine the purchasers of the drill-bits may use.

The large number of evenly-arranged rock-cutting lips I employ insures very rapid rock-cutting, and they will wear very much longer without becoming dull than the forms of drill-bits in common use, while when dull they can be quickly replaced by sharp bits and can be resharpened again many times by suitable dies and tools.

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

1. A drill-bit, comprising a cylindrical hub, a series of radial cutters projecting from the end of said hub, leaving intermediate, triangular fillets, said cutters having their edges substantially in one plane, and a series of spaced, longitudinal ribs on the periphery of said hub, said ribs having parallel sides and being in alinement with and constituting integral, rearward extensions of said cutters, and the rectangular hub-spaces between said ribs being in alinement with said fillets.

2. A drill, comprising an apertured bit and a tubular striking-bar, said bit having a taper socket and said bar having a taper end fitting said socket but not extending to its bottom, whereby said bit is frictionally held on said bar but a continuous passage for fluid is provided, said bit comprising a cylindrical hub, a series of radial cutters projecting from the end of said hub, leaving intermediate, triangular fillets, said cutters having their edges substantially in one plane, and a series of spaced, longitudinal ribs on the periphery of said hub, said ribs having parallel sides and being in alinement with and constituting integral, rearward extensions of said cutters, and the rectangular hub-spaces between said ribs being in alinement with said fillets.

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

JOHN GEORGE LEYNER.

Witnesses:

CLARENCE A. LAWSON,

LUTHER H. WYGANT, Jr.