

UNITED STATES PATENT OFFICE

1,950,513

BIT FOR DRILLS

Alexander Pope, Evanston, Ill.

Application May 6, 1932, Serial No. 609,560

3 Claims. (Cl. 255—64)

The present invention relates to drills, such as those for drilling holes in stone or rock.

Among the objects of the invention, is to provide a novel drill having a shank to which the force of an air or steam driven hammer may be transmitted to effect the drilling, and a bit comprising a cutter or cutting portion for cutting or breaking away the pieces of the stone or rock in which a hole is being drilled, and a hammer or pounding part adapted to reduce, as by crushing or powdering, the cut or broken away pieces, whereby the reduced material is of such a character as to be readily cleared away by means or through the medium of a clearing fluid, such as air or water. The drill, therefore, has a passage for the passing of the clearing fluid to the cutting and hammering parts, of the bit, and the bit has a clearance passage, such as a groove or the like at each side of the cutter, for the passing of the clearing fluid with the reduced material or powder so as to clear the same from the part of rock or stone being drilled.

The bit hammer may have a substantially flat face disposed transversely to the axis of the drill, and that face may be smooth or unbroken, or it may be irregular, toothed or serrated. Preferably the hammering face is located axially behind the cutting edge of the bit and laterally thereof so that as the drill is turned or rotated, the pieces cut or broken off by the cutting edge, may then be hammered or reduced by the hammering part. The cutting edge may be continuous or interrupted by notches as desired.

By making the drill in accordance with the present invention, the function of cutting is effected by the cutter, and the function of reducing the cut-off pieces, is performed by a separate part, that is, a hammer part. The outer edge or periphery of the bit, which is also the outer edge of the hammer, acts to ream the hole around, uniform and straight as the drill is angularly moved during the drilling operation. This novel drill greatly decreases or shortens the time for drilling a given hole in the rock or stone.

Other objects, advantages, capabilities, and features are possessed by the invention as will later appear and as are inherently possessed thereby.

Referring to the drawing:

Fig. 1 is a view in elevation of a drill constructed in accordance with the invention;

Fig. 2 is a similar view at right angles to the view of Fig. 1;

Fig. 3 is an end plan view of the drill shown in Fig. 1;

Fig. 4 is a view similar to Fig. 1 but of an alternate form;

Fig. 5 is a fragmentary view in elevation of the bit part of the drill shown in Fig. 4;

Fig. 6 is an end plan view of the bit shown in Fig. 4; and

Fig. 7 is a fragmentary view in elevation of a part of the cutting and hammering portions of the drills shown, with an interrupted or serrated surface on the hammer face and an interrupted or notched cutting edge of the chisel.

Referring more in detail to the drawing, the embodiments selected to illustrate the invention are shown as comprising a shank 1 which may be either round or polygonal in cross-section. The specific form shown is hexagonal, but other regular cross-sectional shapes may be used.

At one end of the shank, is provided a flared bit 2. The end of the bit has a flat face 3 which may be disposed transversely or normal to the axis of the drill. This face constitutes the hammering or crushing face of the hammer portion or part 4. From this face, extends or projects a cutting part 5 having a cutting edge 6. The angle between the faces of the cutter may be sharp or obtuse as required for the kind of stone or rock to be drilled. The illustrative angle is about 90°, but it is to be understood that this invention is not limited thereto. As is apparent from the drawing, the cutter protrudes beyond the face 3 so as to be free in its function for cutting the rock, and the face 3 is axially behind the cutting edge 6 so as to efficiently perform its function of reducing the pieces cut or broken off by the cutter from the stone or rock being drilled, without interfering with the function of the cutter. The cutter also may extend diametrically across such face 3.

The bit is generally round or circular, and has a periphery or reaming edge 7 so as to maintain the walls of the hole straight, round and uniform as the drill is operated and rotated. The outer edge of the hammer 4 is part of such periphery and functions for the same purpose. See Fig. 3. The bit body tapers or has a draft behind the reaming edge 7 so that the reaming action may occur without jamming. See Fig. 1.

For the purpose of clearing away the crushed or powdered material, the drill is provided with a passage 8 which leads to the cutter, the latter having a notch 9 into which the passage 8 terminates, so that the clearing fluid, such as air or water, conducted by the passage 8, may reach both sides of the cutting edge. In order that the clearing fluid and the material to be cleared

thereby, be readily carried away, the bit on each side of the cutting edge, is provided with a clearance passage or groove 10. The clearing fluid is forced under pressure through the passage 8 to the spaces on both sides of the cutter and under the hammer faces, so as to sweep and flush away the reduced or powdered material and carry the same out of the drilled hole by way of the clearance passages 10 and the space around the body of the drill.

The shank may have a lug or collar 11 for holding, and for limiting the rebound of the drill.

The form of drill shown in Figs. 4, 5 and 6, is the same in all respects as that shown in Figs. 1, 2 and 3 with the exception that the hammers 4^a and their hammering surfaces 3^a are arranged symmetrically with respect to the cutter 5 instead of asymmetrically as in the case of the form shown in Figs. 1, 2 and 3. Compare Figs. 6 and 3. Likewise, the clearance passages 10^a of the drill shown in Figs. 4, 5 and 6 are arranged symmetrically.

In Fig. 7 is shown a fragmentary view of a bit, the hammering faces 3^b of the hammers 4^b of which may be provided with projections or serrations or prominences 12, thus aiding the crushing or powdering effect of the hammers. Similarly, the cutting edge may also be provided with notches 13, to assist in the cutting action of the bit.

The hammer portions are so arranged as to either lead or follow the cutting edge of the bit when the drill is rotated either in one direction or the other. In the bit of Figs. 1, 2 and 3, when it is rotated clockwise, the hammer follows the cutting edge.

While I have herein described and upon the drawing shown a few embodiments of the invention, it is to be understood that the invention is not limited thereto but may comprehend other constructions, arrangements of parts, details, and features without departing from the spirit thereof.

Having thus disclosed the invention, I claim:

1. A bit for a drill of larger diameter than the shank and being dressed at its periphery to act

as a reaming part for maintaining round the hole being drilled, the end of the bit having a flat face disposed normally to the line of movement of the drill, a cutting part extending across said face and having a cutting angle such as to rapidly cut away pieces of rock being drilled, said flat face being disposed at a distance behind the cutting edge of said cutting part approximately equal to the height of the larger pieces of rock cut off by the cutting part to crush said pieces as they are cut off by said cutting part, said drill having a fluid passage extending therethrough and leading to said cutting edge for supplying fluid under pressure to the space on each side of said cutting part, said bit having a clearance passage in a side thereof for the clearing of the crushed material and the fluid mixed therewith.

2. A bit for a drill having a cutter extended diametrically across the face thereof, and flat hammer areas on opposite sides of said cutter, said bit also having longitudinally disposed clearance passages leading from said hammer areas, said cutter and said hammer areas being so constructed and arranged that said areas will strike and crush the larger pieces of material as fast as they are cut and freed by said cutter, said drill having a fluid passage extending therethrough to the cutter, said cutter having a longitudinally disposed notch at the terminal of said bore and contiguous to said clearance passages.

3. A bit for a drill having a cutter extended diametrically across the face thereof, and flat hammer areas on opposite sides of said cutter, said drill having a fluid passage extending therethrough to the cutter, said bit also having longitudinally disposed clearance passages leading from said hammer areas, said cutter and said hammer areas being so constructed and arranged that said areas will strike and crush the larger pieces of material as fast as they are cut and freed by said cutter, said clearance passages being arranged in staggered relation and so constructed and arranged as to provide reaming edges at the periphery of said bit.

ALEXANDER POPE.