Feb. 9, 1943. M. HOKANSON 2,310,288

DRILL BIT

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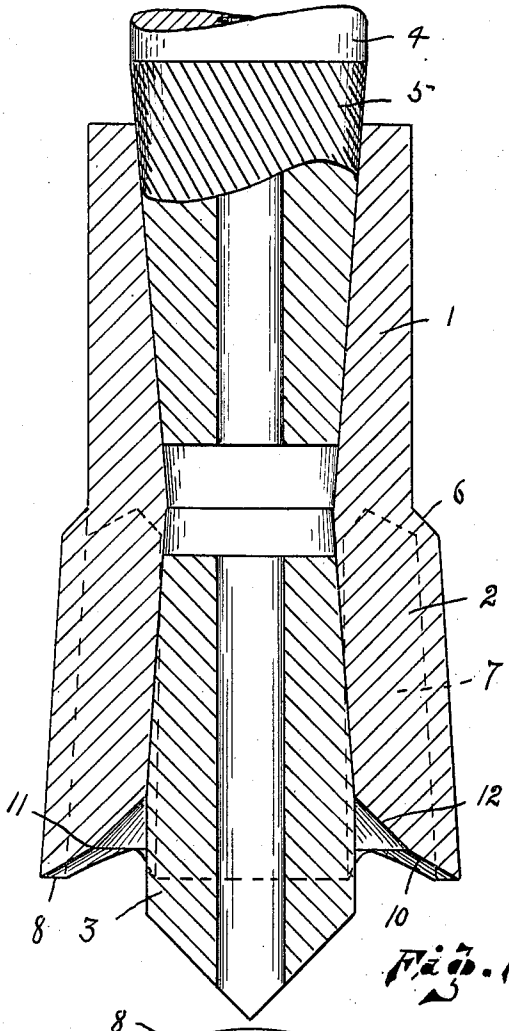


Fig. 1.

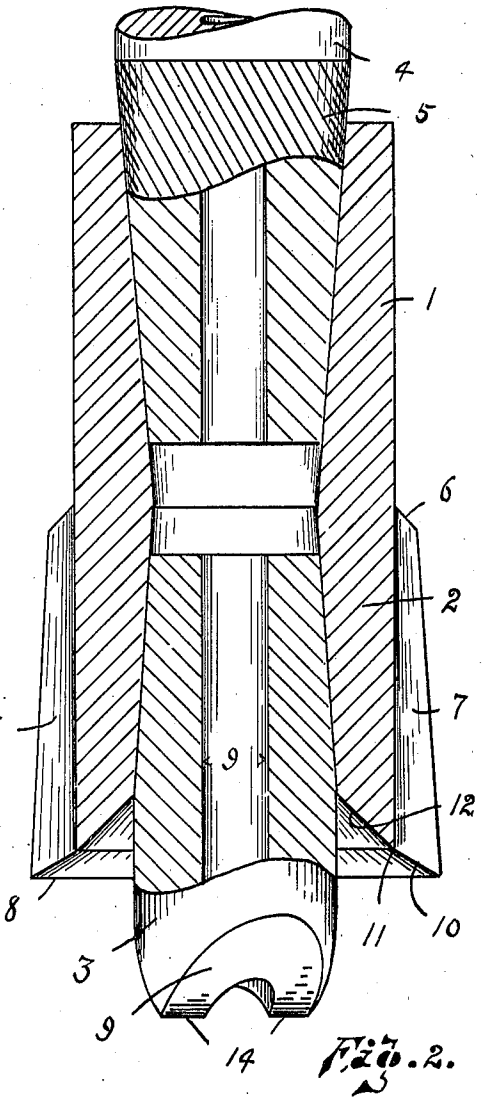


Fig. 2.

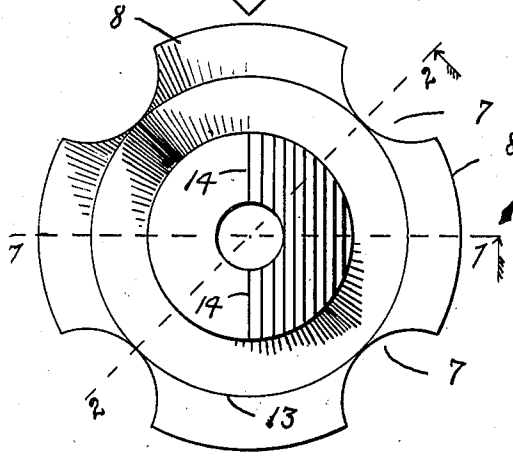


Fig. 3.

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DRILL BIT

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Application July 17, 1939, Serial No. 284,939

3 Claims. (Cl. 255—64)

This invention relates to rock drills and has special reference to that type of drill disclosed in my copending applications Serial Numbers 251,630, filed January 18, 1939, and 264,791, filed March 29, 1939.

The principal object of the instant invention is to provide a more sturdy durable and efficient bit of this type.

Another object is to provide such a bit by the use of which greater speed in drilling may be accomplished due to provision for unusual freedom in the discharge of cuttings from the face of the bit, together with a relatively large number of comparatively short, integral cutting edges evenly distributed about the face of the bit.

Another object is to provide a bit, the cuttings of which are of more uniform and relatively smaller size, so that they can be freely discharged from the face of the bit without further crushing or pulverizing thereby.

Still another object is to provide a type of bit readily susceptible to variation in sizes of cooperative parts for best results in different charactered material being drilled in, as well as different forms of power apparatus used in operating the drill.

Further objects and advantages of the invention will appear in the following description thereof.

Referring now to the accompanying drawing, forming part of this application, and wherein like reference characters indicate like parts:

Figure 1 is a central vertical section, on the line 1—1, Figure 3, of a bit embodying the invention.

Figure 2 is a similar view on the line 2—2, Figure 3.

Figure 3 is a plan view of the cutting face of the bit.

In the embodiment here illustrated, the invention is applied to a two-piece separable bit, and which bit comprises the portions 1, 2 and 3, which represent, respectively, the cylindrical shank, the head, and chisel portions thereof, the same being shown as applied to the drill rod 4 as by a tapered friction joint illustrated at 5, and which form of joint or connection is shown for the application of the chisel 3 to the head of the bit, although other forms of practical connections for these parts may be resorted to without departing from the spirit of the invention.

The head portion 2 of the bit is formed by an outwardly flaring enlargement of approximately the lower half of the body portion thereof and which enlargement is illustrated as being stepped at a suitable angle as at 6 to avoid an abrupt enlargement or stepped portion circumferentially of the bit.

In this embodiment I have shown the head portion as divided into four equal parts, circumferentially, and which parts are separated by concaved channels illustrated at 7, resulting in the establishment of the four radially extended reaming portions 8, and it is to be understood that these reaming portions may be of any desired number in keeping with the character of material being drilled, size of bit used, and class of work in which it is employed.

The grooves or discharge channels 7 may obviously be of any desired depth, though preferably approximately as illustrated, and in which the bottom of said channels occur on a line coincident with the circumferential wall of the shank 1 of the bit, thus in no way tending to weaken the structure thereof, but provide ample clearance for the cuttings or spalls from the bit, as the latter is shown as provided with the usual axial water hole, indicated at 9, though side water holes as shown in my copending application supra may be employed.

The cutting face of the bit is clearly illustrated in Figure 3 of the drawing, and wherein the cutting edges of the reaming portions 8 are formed as by a conical depression of a predetermined angle, and by which the inclined surface indicated at 10 results, the innermost terminus of which surface is indicated at 11, and from which point the remaining face of the bit towards the chisel socket is formed as by a predetermined conical depression of greater angularity, resulting in the inclined surface indicated at 12, which compound angle provides for convenient resharpening without materially changing the form of bit as disclosed in my copending application above referred to. The intersection of the conical surfaces is indicated by the circle 13, and to which the arcs of the spall channels 7 are tangent. It is to be understood that these tangential points occur at the lower terminus of a continuous straight line coincident with the outer wall of the shank of the bit and the bottom of the channel 7.

The removable axial bit 3 is of common chisel like form having the diametrically straight cutting edge 14 and which obviously may be placed as desired in relation to the reaming portions 8, and is shown as leading in the drilling operation. The chisel here illustrated is similar in its action to an ordinary chisel like cutter, but it is to be understood that some other shape of chisel may be used with equal results for specific purposes.

Generally speaking, regarding the speed of

cutting, the shorter the length of the cutting edge of the chisel, the faster the bit will cut, consequently when using a straight edge chisel as a cutter it is desirable to make its diameter as small as possible, with the only limitation being as to the strength and standing-up qualities of the chisel itself, plus, possibly, the ability of the reaming portion to break out the ring around the chisel.

While I have specified that the depression in the working face of the bit, forming the reaming edges thereof, is conical in form, it is to be understood that the side walls of said depression may be either straight conical, compound conical, or substantially spherical in form with practically equal results, and that the same may be sharpened by the use of a similarly shaped end grinding wheel.

It will be also observed that many of the advantages of the novel structure herein disclosed may prove equally effective in larger types of drills, such as used in the art of oil well drilling and wherein either direct reciprocal power is applied to the drill, or the drill proper operated by a cable.

It will also be obvious that while I have illustrated four equally spaced arcuate edges as constituting the reaming portion of the bit, that any number of such may be spaced about the bit axis and possibly function with equal results under certain conditions.

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

1. In a detachable two-piece drill bit, the combination of a hollow body portion having a cylindrical shank at one end and an outwardly flaring enlarged portion at the other end, said enlarged portion having a plurality of longitudinal passages symmetrically disposed about the circumference of said enlarged portion; an axial socket within said enlarged portion; a depression within the lower end of said enlarged portion extending from the base of said socket to the lower outer end of said enlarged portion forming a plurality of arcuate reaming edges; and a central pilot cutter consisting of a shank at one end for removable installation within said socket and a substantially cylindrical portion at its other end extending through said depression and beyond the plane of said reaming edges, and terminating in a straight cutting edge at right angles to the axis of said drill bit.

2. In a detachable two-piece drill bit, the combination of a hollow body portion having a cylindrical shank at one end and an outwardly flaring enlarged portion at the other end, said enlarged portion having a plurality of longitudinal passages symmetrically disposed about the circumference of said enlarged portion; an axial socket within said enlarged portion; a depression within the lower end of said enlarged portion, formed with two concentric surfaces of differing angularity, and extending from the base of said socket to the lower outer edge of said enlarged portion, forming a plurality of arcuate reaming edges; and a central pilot cutter consisting of a shank at one end for removable installation within said socket and a substantially cylindrical portion at its other end extending through said depression and beyond the plane of said reaming edges, and terminating a straight cutting edge at right angles to the axis of said drill bit.

3. In a detachable two-piece drill bit, the combination of a hollow body portion having a cylindrical shank at one end and an outwardly flaring enlarged portion at the other end, said enlarged portion having a plurality of longitudinal passages symmetrically disposed about the circumference of said enlarged portion; an axial socket within said enlarged portion; a depression within the lower end of said enlarged portion extending from the base of said socket to the lower outer end of said enlarged portion forming a plurality of arcuate reaming edges; and a central pilot cutter provided with a longitudinal axial bore and consisting of a shank at one end for removable installation within said socket and a substantially cylindrical portion at its other end extending through said depression and beyond the plane of said reaming edges, and terminating in a straight cutting edge at right angles to the axis of said drill bit.

MARTIN HOKANSON.