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DIAMOND DRILL BIT

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Sheet 2 of 2

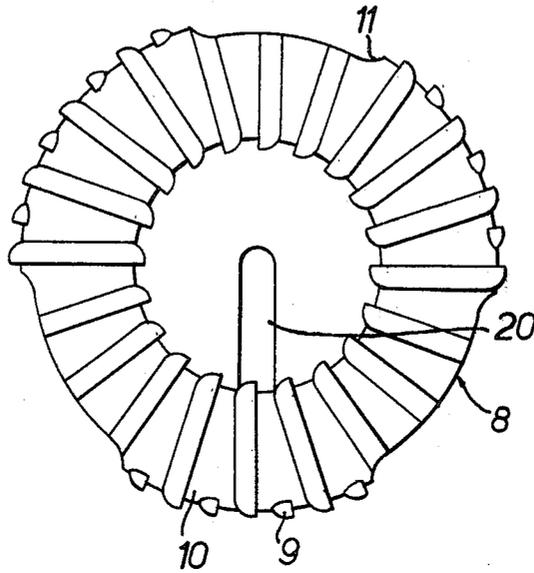


FIG. 2.

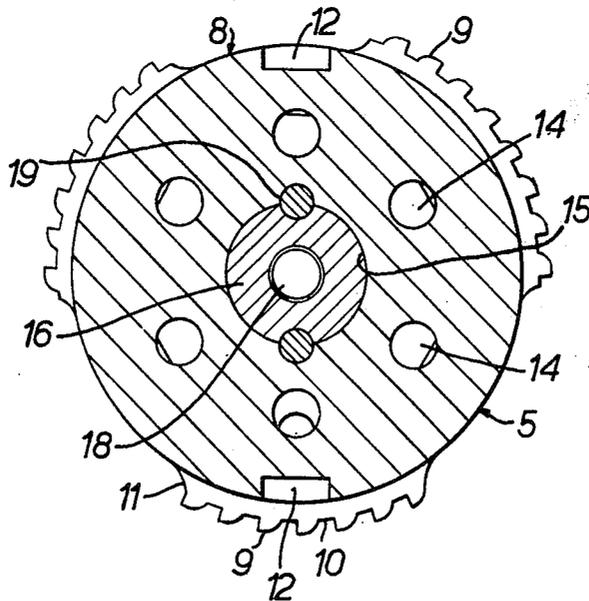


FIG. 3.

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DIAMOND DRILL BIT

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3 Claims

ABSTRACT OF THE DISCLOSURE

A diamond drill bit comprising a body portion, a crown portion in the form of an annulus presenting at least one cutting surface, and a centre portion arranged within said body portion to co-operate with said crown portion to present a further cutting surface. The centre portion also serving to control the flow of drilling fluid through the bit.

This invention relates to diamond or like drill bits.

It is standard practice in diamond drill bits to provide a bit body which is adapted to be attached to a drill string and to fix to the body, for example by a sintering process, the required size and density of diamonds or diamond chips and/or to provide other cutting or abrasive means.

Such bits have numerous practical limitations, amongst which are, that a different bit has to be used for each different size bore hole; that in deep drilling, where the size of the bore hole is decreased as the depth increases, again different bits have to be used; that different grades of bit have to be used according to the strata being drilled; and that, where uneven wear takes place, the whole bit has to be discarded. These limitations present obvious disadvantages in known bits more especially since it is necessary, on a site, to stock a large number of different sizes and grades of very expensive bits.

It is among the objects of the present invention to avoid or substantially reduce the aforementioned disadvantages and to provide a drill bit which is adapted to carry out a plurality of different operations in a plurality of different size bore holes with a reduced financial outlay compared with known bits.

According to the present invention, a diamond or like drill bit comprises a barrel or body which is formed at one end with means by which it can be attached to a drill string and, at its other end, is adapted to receive a replaceable annularly formed crown portion which, in combination with a replaceable centre portion, provides the cutting or abrasive surface or surfaces of the bit.

Preferably, the crown portion is attached to the barrel or body by means of screw-threading and the centre portion is fixed within the barrel or body to the rear of the crown portion.

According to a further feature of the invention, the barrel or body is formed with the usual waterways and means are provided for varying, according to the grade and/or size of the bit being used, and the strata being drilled, the volume of liquid which can be passed through the waterways. Conveniently, such means may comprise the replaceable centre portion.

The invention is illustrated by way of example in the accompanying drawings in which,

FIGURE 1 is a longitudinal section through a drill bit according to the invention,

FIGURE 2 is an end elevation in the direction of the arrow 2 of FIGURE 1, and

FIGURE 3 is a cross-section on the line 3-3 of FIGURE 1.

Referring to the drawings, a drill bit comprises a barrel or body 5 which is formed at one end with a screw-

threaded spigot 6 by which it is attached to a drill string and, at its other end, with an externally screw-threaded neck part 7 which is adapted to receive a correspondingly screw-threaded crown portion 8.

The crown portion 8 shown in the drawings is in the form of an annulus and is provided with radially disposed cuttings ribs 9, which may or may not be provided with inset diamonds, and intervening waterways 10 through which drilling liquid may be passed over the end face and the sides of the crown portion 8. The crown portion may also be provided with the usual junk grooves indicated at 11. However, it will be appreciated that, in accordance with the invention, the crown portion 8 is replaceable and therefore the invention is not limited to the form thereof shown in the drawings. Thus, the shape and size of the crown portion 8 is varied according to the size of the bore hole and/or to the nature of the strata being drilled.

The barrel or body 5 and the crown portion 8 are provided with tool-engaging recesses 12 to facilitate attachment and removal of the barrel 5 to and from the drill string and attachment and removal of the crown portion 8 to and from the barrel 5.

The barrel or body 5, which is generally of tubular formation, is formed with an internal web 13 having a plurality of circumferentially spaced axially disposed bores 14 for the passage of drilling fluid.

The internal web 13 is also formed with an axially disposed counterbore recess 15 to receive the shank 16 of a replaceable centre portion or head part 17, the latter being held securely in the recess 15 by means of a bolt 18. Pegs or studs 19 are provided to secure the centre portion 17 against rotation in the recess 15.

As can be seen from the drawings, the replaceable centre portion 17 is of bulbous formation and is disposed to the rear of the crown portion 8. It will also be seen that the centre portion 17 partially overlaps the bores 14 and provides a means for controlling the volume of drilling fluid which is passed through the bit to the crown portion and, at the same time provides an abrasive surface to cut away the centre core of material remaining after the cutting operation carried out by the annular crown portion 8.

As indicated, the centre portion 17 is replaceable, the purpose of this being to change the size of the member being used, firstly to suit the size of the crown portion being used, and secondly, to vary the volume of drilling fluid which is permitted to pass through the bores 14. It will of course be appreciated that the abrasive surface of the centre portion can also be varied to suit the strata being drilled.

In order to lubricate the cutting surface of the centre portion 17, one or more waterways 20 are provided therein.

It will be obvious that, by controlling the volume of drilling fluid in the manner described, greater economy results since the jets of fluid keep the base of the bore hole clean with the result that the cutting surfaces of the bit do not wear out so quickly as their use is restricted solely to cutting and not also to breaking up or crushing the loose material in the bore hole.

Since the crown portion and the centre portion are replaceable separately from one another, it will be evident that, apart from providing the advantage that they can be changed to suit the size and/or drilling conditions of the bore hole, they can, due to wear, be replaced individually. This latter feature is particularly advantageous since it is well known that the centre part of a drill bit is subject to greater wear than that of the remainder and, by using the bit of the present invention, this problem can be overcome by merely replacing the centre portion 17 without having to discard the whole bit.

Thus it will be understood that the present invention provides an economical drill bit which can be used for a variety of sizes of bore holes and in a variety of conditions by providing a common bit barrel or body to which can be attached different sizes and grades of cutting surfaces.

I claim:

1. A diamond drill bit for full hole drilling having a body part including an internal web, a crown part providing at least one cutting surface arranged at one end of said body part, and means provided at the other end of said body part by which it can be attached to a drill string, wherein said crown part comprises an annulus which is detachably secured to said body part, and wherein a centre portion is secured within said body part to extend into the core of said annulus in order to provide a further cutting surface, said internal web having a counterbore and being formed with axially disposed circumferentially spaced bores for passage of drilling fluid, said centre portion comprising a bulbous part and a shank part, said shank part being fixed against rotation within the counterbore in the internal web in said body part, said bulbous part also operating to control the volume of drilling fluid passing to said cutting surfaces.

2. A diamond drill bit as claimed in claim 1, wherein said shank part of said centre portion is arranged in said counterbore in said internal web, bolt means being provided to secure said shank part against axial movement, and axially disposed pegs arranged between said shank part and said recess to secure said shank part against angular rotational movement.

3. A diamond drill bit for full hole drilling comprising a body part including an internal web, said internal web having a counterbore and being formed with axially disposed circumferentially spaced bores for passage of drilling fluid, a crown part detachably secured to said body part, said crown part being of annular formation and having at least one cutting surface, a centre part having a shank secured within the counterbore in the web of said body part and having a head part to co-operate with said crown part to present a further cutting surface, means permitting the flow of drilling fluid through said body part and said bores to said cutting surfaces, and means for controlling the volume of drilling fluid supplied to said cutting surfaces.

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