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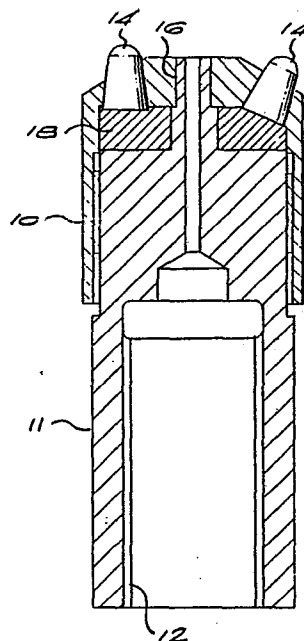
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⑤④ **Drill bit with removable inserts.**

⑤⑦ A drill bit has inserts (14) of hard metal as cutting and abrading elements. The bit body is formed as a hollow cylinder (10) closed at one end and adapted to be screwed to a shank (11), the closed end is pierced by forwardly tapering apertures, and complementally tapered inserts (14) are positioned in the apertures and the shank is provided with a replaceable backing plate (18) of hard metal, to abut the rear ends of the inserts.



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"DRILL BITS"

BACKGROUND TO THE INVENTION

This invention relates to drill bits of the kind in which inserts of hard metal (usually cemented tungsten carbide) are provided as cutting and abrading elements on the body of the drill bit.

5 Conventionally such inserts, including buttons, are secured in recesses in the bit body by means of brazing or by being a force fit in the recesses. However, in US patent No. 4 085 809 it has been proposed to secure tapering buttons in a bit body by inserting them in axial bores terminating in complementary tapered mouths. The buttons are dropped
10 into the bores and the bores are then filled with back-up pins. The body is screwed on to a shank which provides a surface against which the back-up pins abut. Any worn or broken button is replaced by unscrewing the body, removing the pin and any remnant of the button and then relacing the button. Unfortunately it can happen that the back-up
15 pin gets peened at one or both ends so that removal of the back-up pin is not such an easy matter. Also in such an event both the back-up pin and the button have to be replaced.

SUMMARY OF THE INVENTION

In a drill bit of the kind in which removable inserts of hard metal are
20 provided as cutting and abrading elements the invention provides the improvement that the bit body is formed as a hollow cylinder closed at one end and screwed to a shank, the closed end of the body is pierced by tapering apertures, and complementally tapered inserts are positioned in the apertures and the shank presses on the inner ends of
25 the inserts.

A replaceable backing plate of hard metal is preferably interposed between the shank and the inner ends of the inserts.

DESCRIPTION OF THE DRAWINGS

Figure 1 is an exploded sectional view of a drill bit,
Figure 2 is a top view of a backing plate,
Figure 3 is a section through an assembled bit, and
5 Figure 4 is a face view of the bit.

DESCRIPTION OF AN EMBODIMENT

A drill bit body 10 is thimble shaped and internally threaded to screw on to a complementally threaded screw shank 11. The threads are of the opposite hand to the intended direction of rotation of the bit so that
10 during drilling the connection between the body and the shank tends to become tighter. The shank has a threaded socket 12 to screw on to a conventional drill stem.

At the closed end of the body the necessary number of bores 13 are formed. The bores 13 taper to narrow outwardly as shown in Figure 1.
15 Complementally tapered buttons made of cobalt cemented tungsten carbide fit into the bores 13. The buttons 14 taper towards domed ends.

The shank 11 is formed with a projection 16 which fits into a hole 17 in the body 10. The projection 10 is bored to provide passage for flushing fluid. A backing plate 18 made of cobalt cemented tungsten
20 carbide fits over the projection 16 and serves to back up the buttons 14. The plate 18 is formed with steps to cater for the varying degrees that the buttons project forwardly.

In use worn or broken buttons 14 as well as broken backing plates 18 can be replaced in the course of drilling. There is no need to return
25 bits to a workshop.

Gauge buttons which protrude beyond the circumference of the body 10 can easily be indexed or rotated to compensate for wear of the buttons to thereby maintain the gauge of the hole being drilled.

For trial purposes a bit was made to drill a hole with a nominal diameter of 51 mm. It was fitted with six buttons tapering at an inclusive angle of 12° to a dome base diameter of 8,1 mm. The button length was 14,5 mm. The bit was used to drill a series of 2 metre deep 5 holes in a quartzite outcrop. After 51,760 m had been drilled, drilling was discontinued because the gauge of the body had worn too much and a crack had formed in the body. The average penetration rate was 0,33 m/min. Buttons were replaced when broken and sets of buttons were changed when too much wear had taken place. An average of 15,25 m 10 was drilled per set of buttons. In this test no attempt was made to index gauge buttons.

The shank of the bit was still in good condition and the backing plate showed virtually no wear.

On the same outcrop a standard button bit fitted with 7 buttons of 11 15 mm diameter achieved a penetration rate of 0,40 m/min and drilled a total of 50,10 m before it was considered to be too worn to continue drilling. Another bit of the same kind suffered a broken face button after 17,15 m and jammed in the next hole from which it could not be retrieved. All three bits were used with the same rock drilling 20 machine and on the same rig.

CLAIMS:-

1.

A drill bit of the kind in which removable inserts of hard metal are provided as cutting and abrading elements with the improvement that the bit body is formed as a hollow cylinder closed at one end and screwed to a shank, the closed end of the body is pierced by tapering apertures, and complementally tapered inserts are positioned in the apertures and the shank presses on the inner ends of the inserts.

2.

10 The drill bit claimed in claim 1 in which a replaceable backing plate is interposed between the shank and the inner ends of the inserts.

3.

The drill bit claimed in claim 2 in which the backing plate is made of hard metal.

15 4.

The drill bit claimed in any one of the above claims in which the shank and body are formed with screw threads of the opposite hand to the intended direction of rotation of the bit.

5.

20 The drill bit claimed in any one of the above claims in which the inserts are buttons formed with domed outer ends.

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