

(12) **UK Patent Application** (19) **GB** (11) **2 423 538** (13) **A**

(43) Date of A Publication **30.08.2006**

(21) Application No: **0503804.7**  
(22) Date of Filing: **24.02.2005**

(71) Applicant(s):  
**Marcris International Limited**  
**(Incorporated in the United Kingdom)**  
**Marcris House,**  
**Kirk Sandall Industrial Estate,**  
**DONCASTER, DN3 1QR, United Kingdom**

(72) Inventor(s):  
**Mario Halbeisen**

(74) Agent and/or Address for Service:  
**Loven & Co**  
**Quantum House, 30 Tentercroft Street,**  
**LINCOLN, LN5 7DB, United Kingdom**

(51) INT CL:  
**E21B 10/48 (2006.01)**

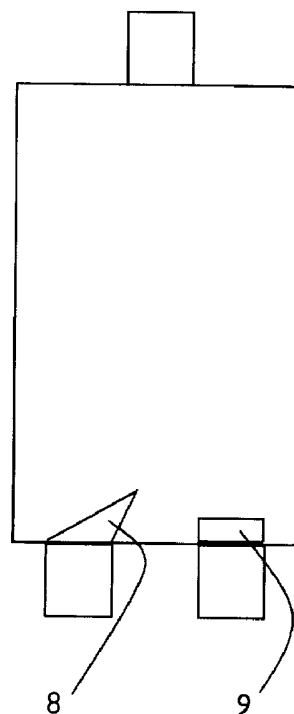
(52) UK CL (Edition X ):  
**E1F FGA**

(56) Documents Cited:  
**EP 0352546 A** **EP 0280835 A**  
**EP 0156762 A** **US 5823276 A**  
**US 4211294 A** **US 4208154 A**

(58) Field of Search:  
UK CL (Edition X ) **E1F**  
INT CL<sup>7</sup> **E21B**  
Other: **Online: WPI, EPODOC**

(54) Abstract Title: **Core drilling segments with side protection**

(57) A core drill comprises a tubular body having a closed end adapted to be fitted to a drill and an open end with an annular face substantially normal to the longitudinal axis of the body, at least one drill segment fixed to the annular face, the at least one segment having a shoulder (8. 9) contacting the cylindrical surface of the tubular body to protect the seating area of the tube where the segment is fixed to the body. The shoulders may be formed on the inner face or the outer face of the segment relative to the tubular body, may be square cut or tapered, and may have a slanting edge to assist in debris removal.



**Fig 4**

**GB 2 423 538 A**

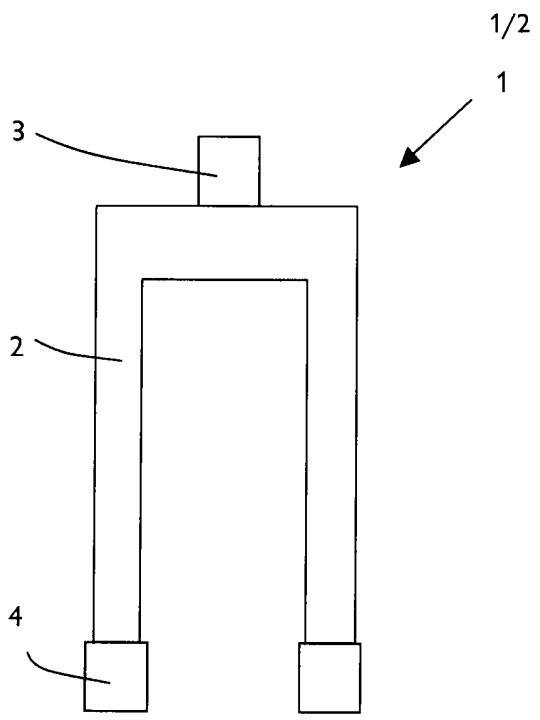


Fig 1

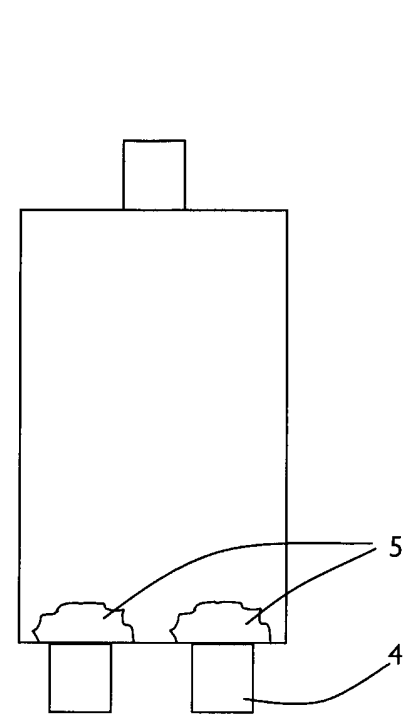


Fig 2

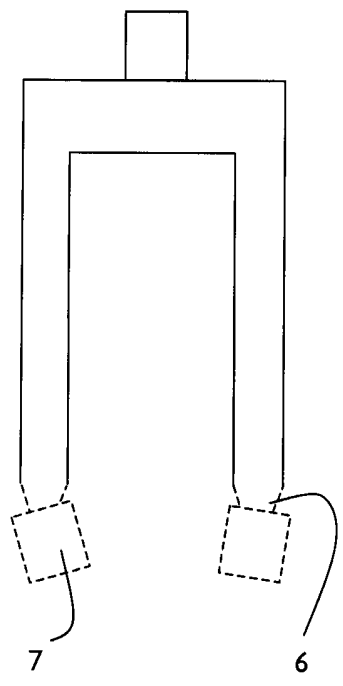


Fig 3

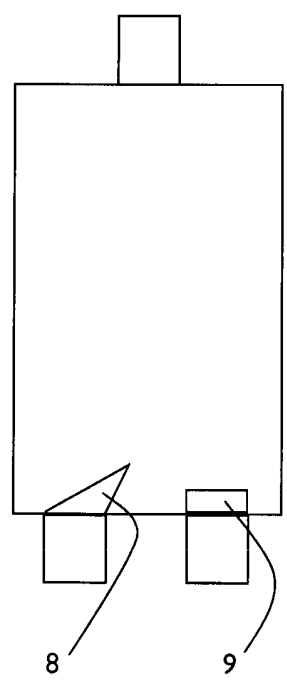


Fig 4

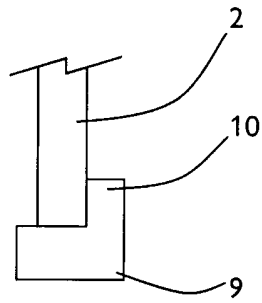


Fig 5

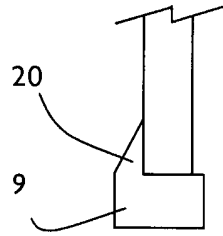


Fig 6

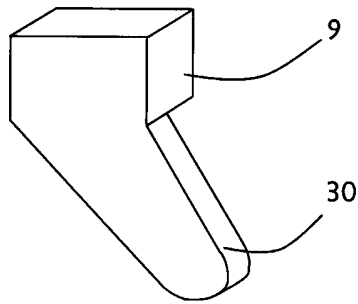


Fig 7

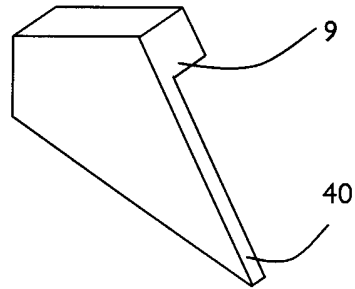


Fig 8

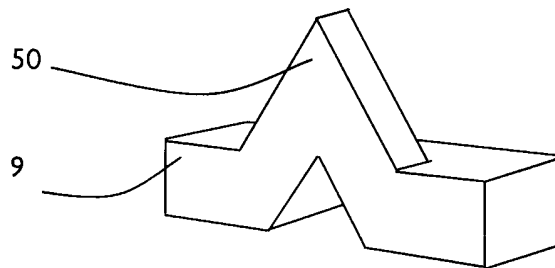


Fig 9

## CORE DRILLING SEGMENTS

### Field of the Invention

The present invention is concerned with core drilling segments and with protecting core drills from wear by the use of such segments.

### 5 Background to the Invention

Conventional core drills comprise a tubular support body having a closed end formed with a mechanism for attaching it to a drill and an open end spaced from the closed end by a cylindrical wall extending longitudinally along the axis of the drill. The open end defines an annular region on which are mounted one or more cutting teeth,  
10 better known as drilling segments or crowns.

The tubes are generally made of steel or other material designed to withstand the rigours of drilling into a variety of working media. Core drills are adapted to make an annular cut into such materials as concrete, rock and other hard materials so as to leave a pillar or cone within the cylindrical wall. The pillar can subsequently be removed. It is  
15 therefore essential that the material of the tube and the manner in which the cutting segments are fixed to the rim of the tube are substantial enough to perform the tasks required of them.

Traditionally, segments have been fixed to the tubes by welding or brazing. The segments themselves may be individual or form part of a ring or crown adapted to be fitted to the tube as a single item. One of the disadvantages of using joining techniques that  
20 require high temperatures is that the hardness of the tube immediately surrounding the point where the segment is fixed can be altered and made less resistant to wear.

Several consequences of the point of attachment, known as the "segment seating", being softened can manifest themselves. First, the tube in the region of the seat can  
25 wear at an excessive rate. This leads to undercutting of the tube and can reach a point where the segment physically collapses inwards or outwards of the tube when subjected to the stress of drilling. Second, cracks can readily develop in the area of the tube around the segment seat. If the drill is used in that condition, it is likely that the segments will collapse completely, possibly causing personal injury to the operator and/or damage to the  
30 drill and/or the area surrounding the drilling site. Both are undesirable consequences of poor fixing of the segment(s) to the tube body.

Additionally, the segments need to be positioned accurately during manufacture to ensure correct inside and outside clearance, typically 0.25 to 0.5mm on either side. The placing is either done by automatic placing machinery or manually, with magnets to hold the segments in position until welded. However, if the machinery or the magnets become worn or dirty, the placing of the segments may be incorrect, in that the outside and inside clearances are incorrect or the segment does not stand perfectly perpendicular to the tube end. Each segment which is not fitted correctly adversely affects the performance of the core drills to a considerable extent, because the drill has to remove more material, thereby reducing drilling speed, and wear is increased.

10 The present invention therefore aims to alleviate or eradicate these problems.

US Patent Application US 2003/0029643, discloses a core drill segment having an elongate support member designed to clip into the interior of a tubular body forming part of a drill. The cutting portion of the segment has a groove-like recess to accept the outward end of the elongate support. The edges of the groove do not operate to protect the tubular body from wear or erosion etc as in the present invention.

### 15 **Summary of the Invention**

The invention provides a core drill comprising a tubular body having a closed end adapted to be fitted to a drill and an open end with an annular face substantially normal to the longitudinal axis of the body, at least one drill segment fixed to the annular face, the at least one segment having a shoulder contacting the cylindrical surface of the tubular body to protect the seating area of the tube where the segment is fixed to the body.

The shoulder may be formed on the inner face or the outer face of the segment relative to the tubular body.

25 The shoulder may be square cut or tapered. Alternatively, the shoulder may have a slanting edge or face or may be formed as an inverted V-shape. In this way, the slanting face or edge may assist debris removal from the cutting site.

The segment may be of sintered construction or may be a unitary body incorporating a cutting surface.

30 Where a plurality of segments are provided, they may be formed in a crown or a ring and each or some of the individual cutting parts of the ring or crown may be formed with the aforesaid protective shoulders.

The protective shoulders not only ensure correct positioning of the segments on the tube end and so accurate cutting, but also afford a substantially greater bonding area with the tube, thereby increasing tear-off strength and so reducing segment loss.

### **Brief Description of the Drawings**

5           The invention will now be described with reference to the following drawings, of which:

Figure 1 shows a sectional view of a conventional core drill;

Figure 2 is a side elevation of the drill in Figure 1;

Figure 3 illustrates diagrammatically the result of wear at the seating area;

10           Figure 4 is a side elevation showing two different constructions of the segment in accordance with the invention;

Figure 5 is a detail of a segment with a square shoulder;

Figure 6 is a detail of a segment with a tapered shoulder;

Figure 7 is a segment with a slanting side or wing;

15           Figure 8 is a variation on Figure 7 but showing a pointed wing; and

Figure 9 is a further variation of segment shape.

### **Detailed Description of the Illustrated Embodiments**

Referring first to Figure 1, this illustrates schematically a conventional core drill 1 having a tubular body 2 formed with a closed end on which is provided a fixing means 3  
20 to enable the drill to be mounted on a driver. At the opposite end, the body is open and has an annular surface on which one or more cutting segments are directly mounted. Conventional fixing methods, such as brazing, welding or sintering are used.

The difficulty with this construction is that the seating areas, such as 5 in Figure 2, can be compromised as a consequence of the fixing method. This can lead to cracking of  
25 the body around the seating area. Also, erosion and wear of the seating area can lead to narrowing or "undercutting" of the seating area in the immediate vicinity of the seating area, as illustrated at 6 in Figure 3. In severe cases, the segments can fold inwards or outwards, as indicated at 7 in Figure 3, and can even be sheared off completely.

The present invention offers a protective shoulder to minimise deleterious effects  
30 on the tubular body. In Figure 4, two different constructions are represented. One segment has a triangular shoulder 8 extending from the segment *per se* and along a cylindri-

cal side face of the body 2. In the other example shown in Figure 4, the shoulder is square cut and extends a smaller distance along the body.

5 Figure 5 illustrates a detail of a segment 9 in cross-section. The segment 9 has an upstanding portion or shoulder 10 extending a short way along the outer cylindrical surface of the body. The variation shown schematically in Figure 6 has a chamfered or tapered surface 20 extending along the body. It is conceivable that the shoulders in any embodiment may extend along one or other or both side faces of the tubular body to protect the seating area from wear in any direction.

10 Figure 7 shows another variation, in which the shoulder is formed as a wing 30 with a rounded end. Figure 8 is similar except that the end of the wing is pointed 40. In a further variation, as shown in Figure 9, the segment consists of a cutting body 9 formed with an inverted V-shaped shoulder portion 50.

15 Advantages of the shoulders being formed with edges or surfaces inclined to the longitudinal axis of the body are that they aid in the cutting operation, either providing a further cutting edge or assisting in debris removal in a similar way to the spiral (flute) of a masonry drill.

## CLAIMS

1. A core drill comprising a tubular body having a closed end adapted to be fitted to a drill and an open end with an annular face substantially normal to the longitudinal axis of the body, at least one drill segment fixed to the annular face, the at least one  
5 segment having a shoulder contacting the cylindrical surface of the tubular body to protect the seating area of the tube where the segment is fixed to the body.
2. A core drill as claimed in Claim 1, wherein the shoulder is formed on the inner face or the outer face of the segment relative to the tubular body.
3. A core drill as claimed in Claim 1 or Claim 2, wherein the shoulder is  
10 square cut.
4. A core drill as claimed in Claim 1 or Claim 2, wherein the shoulder is tapered.
5. A core drill as claimed in any of Claims 1 to 4, wherein the shoulder has a slanting edge.
- 15 6. A core drill as claimed in any of claims 1 to 5, wherein the shoulder has a slanting face.
7. A core drill as claimed in any of Claims 1 to 6, wherein the shoulder is formed as an inverted V-shape.
8. A core drills as claimed in any of Claims 1 to 7, wherein the segment is of  
20 sintered construction, comprising a cutting surface.
9. A core drill as claimed in any of Claims 1 to 8 comprising a plurality of segments formed in a crown or a ring, at least some of the individual cutting parts of the ring or crown being formed with said shoulders.
- 25 10. A core drill substantially as herein described with reference to the drawings.





INVESTOR IN PEOPLE

Application No: GB0503804.7

b

Examiner: David Pepper

Claims searched: 1-10

Date of search: 6 April 2005

### Patents Act 1977: Search Report under Section 17

#### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-3,9	EP 0352546 A (Hilti) - see figures
X	1-3,8,9	EP 0280835 A (Hilti) - see figures
X	1-3,8,9	EP 0156762 A (Hilti) - see figures
X	1-3,8,9	US 5823276 A (Beck111) - see figs 3A,B and 4B
X	1-4,6-9	US 4211294 A (Multakh)
X	1-4,6-8	US 4208154 A (Gundy)

#### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

#### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup>:

E1F

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

E21B

The following online and other databases have been used in the preparation of this search report

Online: WPI, EPODOC