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- (71) **Applicant:** MINCON INTERNATIONAL [IE/IE];
Smithstown Industrial Estate, Shannon, Co. Clare (IE).
- (72) **Inventor:** PURCELL, Joseph; 38 The Hazels, Oakleigh
Wood, Co. Clare (IE).
- (74) **Agents:** O'NEILL, Aoife et al.; TOMKINS & CO., 5
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ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
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Declarations under Rule 4.17:

- *as to the applicant's entitlement to claim the priority of the
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(54) **Title:** SYMMETRICAL BIT FOR DIRECTIONAL DRILLING TOOL

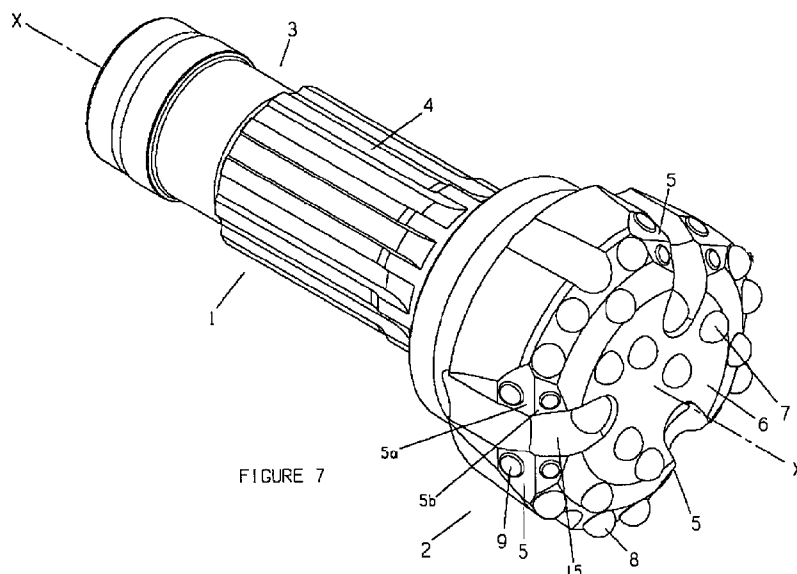


FIGURE 7

(57) **Abstract:** The present invention relates to a percussion drill bit (1) for directional drilling tools (10). The drill bit comprises a head portion (2) formed with an axially extending shank (3). The drill bit also comprises engagement means (4) on the shank engageable with complementary engagement means formed on a drive chuck whereby rotational drive from the chuck may be transmitted to the shank. The head portion (2) of the drill bit is formed with a plurality of slant faces (5) arranged symmetrically about the head portion.



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER INV. E21B4/06 E21B7/06 E21B10/36 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) E21B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/034462 A1 (MINROC TECHN PROMOTIONS LTD [IE]; PURCELL JOSEPH [IE]) 29 March 2007 (2007-03-29) page 3, line 30; figures 1-4 page 8, lines 24-30	1,2,4,8,10
Y	----- WO 2005/056972 A1 (SANDVIK AB [SE]; BJOERK FREDRIK [SE]) 23 June 2005 (2005-06-23) page 2, lines 27-28; figures 1A, 1B, 2 page 3, lines 12-13	3,5-7,9
Y	----- US 2006/060389 A1 (HADIN PER-OLA [SE] ET AL) 23 March 2006 (2006-03-23) figure 1C	3,6,7,9
Y	----- US 2007/267226 A1 (UNDERWOOD LANCE D [US] ET AL) 22 November 2007 (2007-11-22) page 3, line 30; figures 1-4 page 8, lines 24-30	5
A	----- -----	1-11
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 17 January 2014	Date of mailing of the international search report 11/04/2014	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Georgescu, Mihnea	

INTERNATIONAL SEARCH REPORT

International application No.
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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

"see additional sheet(s)"

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-11, 13

Percussion drill bit of claim 1, wherein (potential special technical feature of claim 3) each of the slant faces comprises a plurality of contiguous planar surfaces and each of the planar surfaces is angled with respect to the elongate axis of the bit.

Technical problem: how to improve the removal of cuttings from the working surface of the drill bit.

2. claims: 12, 14

Percussion drill bit of claim 1, wherein (potential special technical feature of claim 12) a directional drilling tool comprising a locator housing threadably connected to percussion hammer by means of a sub.

Technical problem: how to determine a specific position of the drill bit with regards to the drilling tool.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2013/057046

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