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(54) Roller cone drill bit, method of designing the same and rotary drilling system

(57) A method of designing a roller cone bit is disclosed. The method comprises the steps of:

calculating the trajectory of at least one tooth on each cone through formation material at the cutting face; and  
jointly optimising both the orientations of said teeth and the width of uncut rings on said cutting face, in dependence on said trajectory.

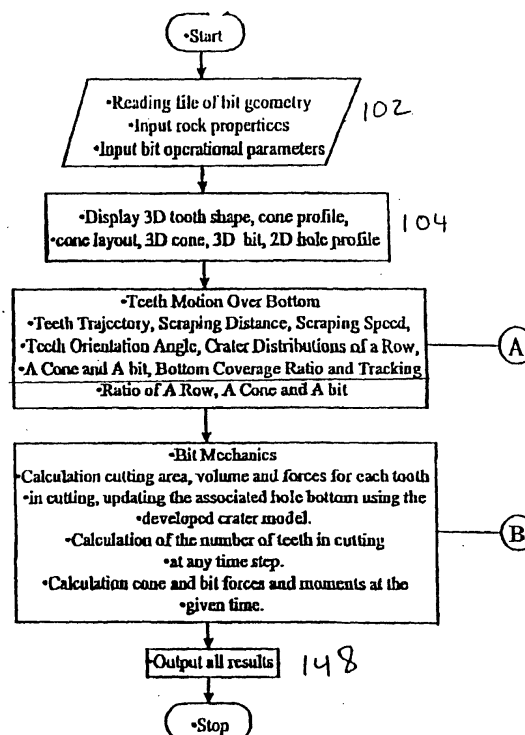


FIGURE 1A



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 03 02 1139

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 5 372 210 A (HARRELL PATRICIA N) 13 December 1994 (1994-12-13) * the whole document *	1-21	E21B10/16
A	US 5 415 030 A (JOGI PUSHKAR N ET AL) 16 May 1995 (1995-05-16) * the whole document *	1-21	
A	US 5 794 720 A (GOLDMAN WILLIAM A ET AL) 18 August 1998 (1998-08-18) * the whole document *	1-21	
A	US 5 730 234 A (PUTOT CLAUDE) 24 March 1998 (1998-03-24) * the whole document *	1-21	
A	US 4 815 342 A (BRETT JAMES F ET AL) 28 March 1989 (1989-03-28) * the whole document *	1-21	
A,D	D. MA; J.J. AZAR: "A New Way to Characterize the Gouge-Scraping Action of Roller Cone Bits" SPE #19448, 1989, pages 1-21, XP002258936 * the whole document *	1-21	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E21B
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>23 October 2003</b>	Examiner <b>Schouten, A</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 02 1139

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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23-10-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5372210 A	13-12-1994	DE 69308718 D1	17-04-1997
		EP 0593268 A2	20-04-1994
US 5415030 A	16-05-1995	AU 3109593 A	15-07-1993
		EP 0551134 A1	14-07-1993
		MX 9300087 A1	31-03-1994
		NO 930044 A	12-07-1993
US 5794720 A	18-08-1998	AU 709128 B2	19-08-1999
		AU 2338997 A	17-10-1997
		BR 9708257 A	03-08-1999
		CA 2250030 A1	02-10-1997
		CN 1214754 A ,B	21-04-1999
		GB 2328467 A ,B	24-02-1999
		JP 2000507658 T	20-06-2000
		NO 984454 A	12-11-1998
		US 6131673 A	17-10-2000
		WO 9736084 A1	02-10-1997
		US 2003187582 A1	02-10-2003
		US 2003015351 A1	23-01-2003
		US 6109368 A	29-08-2000
		US 6374926 B1	23-04-2002
		US 6408953 B1	25-06-2002
		US 2001042642 A1	22-11-2001
US 5730234 A	24-03-1998	FR 2734315 A1	22-11-1996
		DE 69600511 D1	17-09-1998
		DE 69600511 T2	10-12-1998
		EP 0743423 A1	20-11-1996
US 4815342 A	28-03-1989	NO 961962 A	18-11-1996
		NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82