



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 072 754 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
13.10.2004 Bulletin 2004/42

(43) Date of publication A2:
31.01.2001 Bulletin 2001/05

(21) Application number: **00203891.7**

(22) Date of filing: **01.07.1998**

(84) Designated Contracting States:
BE DE DK FR GB NL SE

(30) Priority: **11.07.1997 EP 97202177**

(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:
98202205.5 / 0 890 708

(71) Applicant: **Heerema Holding Construction Inc.**
1206 Geneva (CH)

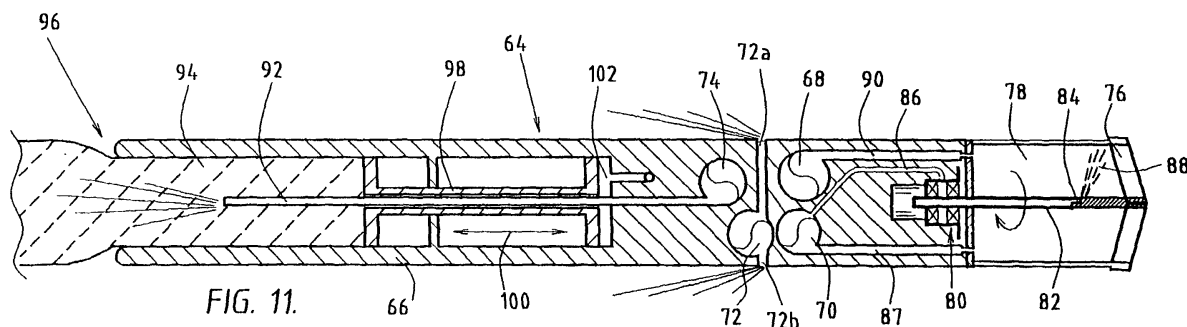
(72) Inventors:
• **Lammertink, Marinus Christiaan**
2518 GH Den Haag, (NL)
• **van Voorden, Rutger Christiaan**
3334 CV Zwijndrecht (NL)
• **Broeder, René**
4102 JT Culemborg (NL)

(74) Representative: **Mertens, Hans Victor**
van Exter Polak & Charlouis B.V.,
P.O. Box 3241
2280 GE Rijswijk (NL)

(54) **Ground removing device**

(57) A device for removing ground (2) comprises a plurality of interconnected jetting units accommodated next to each other at the leading side of the ground removing device. Each jetting unit has a jetting chamber (78) which is open at the leading side thereof. Each jetting chamber (78) comprises a wall at the trailing side thereof. Further, each jetting unit comprises a first duct

(86) for feeding jetting fluid to a jetting device in the jetting chamber (78), a second duct (87) for feeding jetting fluid to the jetting chamber (78), and a third duct (68, 90) for removing a ground/fluid mixture from the jetting chamber (78). The ground removing device is pulled through the ground by pulling means (12), which comprise one or more drill strings (14; 62; 112) or casing strings (16).



EP 1 072 754 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 20 3891

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)
X	DE 33 19 662 A (PITOT HANNS ANDRE) 6 December 1984 (1984-12-06) * page 8, line 31 - page 9, line 11 * * page 9, line 18 - page 10, line 1; figures 3-5 *	1-9	E21B7/18 E21B7/20 E21D9/04 E21D9/10 E21B7/28 F16L15/08 E21C25/60 E21C37/12
Y	DE 41 17 575 A (GEODRILL BOHR GMBH) 12 December 1991 (1991-12-12) * column 2, line 17 - line 36 * * column 5, line 49 - column 6, line 12; figures 1-10 *	1-7	
Y	DE 42 17 293 A (KIPP JENS WERNER) 26 November 1992 (1992-11-26) * column 5, line 52 - column 6, line 15; figure 5 *	1-7	
A	US 5 297 639 A (DURR ISABELLE ET AL) 29 March 1994 (1994-03-29) * abstract; figure 2 *	1	
A	US 4 776 769 A (HILARIS JOHN A) 11 October 1988 (1988-10-11) * column 5, line 14 - column 6, line 36; figures 1,2 *	1-10	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E21B E21C E21D
A	US 3 572 451 A (COPELAND CONLEY B) 30 March 1971 (1971-03-30) * figure 1 *		
A	WO 95/21989 A (ATLAS COPCO GEOTECHNICAL DRILL ; BOERJESON NICLAS (SE); PETTERSSON STE) 17 August 1995 (1995-08-17) * the whole document *	11-16	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 August 2004	Examiner Bellingacci, F
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			

EPO FORM 1503 03.82 (P04C01)

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

EP 00 20 3891

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-08-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3319662 A	06-12-1984	DE 3319662 A1	06-12-1984
DE 4117575 A	12-12-1991	AT 396505 B	25-10-1993
		AT 126590 A	15-01-1993
		DE 4117575 A1	12-12-1991
		DE 9106585 U1	22-08-1991
DE 4217293 A	26-11-1992	DE 4217293 A1	26-11-1992
		DE 9218516 U1	04-08-1994
US 5297639 A	29-03-1994	DE 4128422 A1	04-03-1993
		CA 2076217 A1	28-02-1993
		EP 0535329 A2	07-04-1993
US 4776769 A	11-10-1988	US 4761039 A	02-08-1988
US 3572451 A	30-03-1971	NONE	
WO 9521989 A	17-08-1995	AU 1827895 A	29-08-1995
		SE 9400465 A	12-08-1995
		WO 9521989 A1	17-08-1995
		US 5845720 A	08-12-1998