



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
02.01.2002 Bulletin 2002/01

(51) Int Cl.7: **E21B 10/44, E21B 17/22**

(43) Date of publication A2:
04.10.2000 Bulletin 2000/40

(21) Application number: **00106647.1**

(22) Date of filing: **28.03.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventors:
• **Matsuzawa, Kazuyuki**
Okaya-shi, Nagano (JP)
• **Miyajima, Masakatsu**
Kanazawa-shi, Ishikawa (JP)
• **Sanai, Masanobu**
Kanazawa-shi, Ishikawa (JP)

(30) Priority: **30.03.1999 JP 8895599**

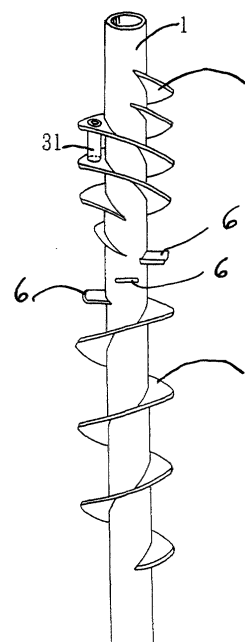
(71) Applicant: **Showa Kensho Co., Ltd.**
Mattou-shi, Ishikawa 924-0867 (JP)

(74) Representative: **Sajda, Wolf E., Dipl.-Phys. et al**
MEISSNER, BOLTE & PARTNER Postfach 86 06
24
81633 München (DE)

(54) **Auger drill**

(57) A method of constructing high-friction piles in the ground is provided, wherein the amount of excavated soil from prebored holes can be reduced, and the total number of piles which must be set for a pile foundation can be reduced. An auger is utilized which comprises an elongated shaft (1) and a helical blade (2, 3) extending around the shaft (1) and projecting radially from the periphery of the shaft (1). The shaft comprises a first helical blade (2) along the length of the main portion thereof with an inclination angle in the positive direction of rotation and at least one second helical blade (3) only along the top portion of the shaft (1) with an inclination angle in the opposite or reverse direction as that of the first helical blade (2). When drilling such an auger into the ground, the agitated soil is thrust sideways into the ground so that a plastic zone (A) is formed around the hole up to a prescribed range. Next, a hardening agent (4) is poured into the hole, and then a support or reinforcement material (5) is inserted into the hardening agent (4) before the hardening agent (4) hardens completely. The support material (5) and the plastic zone (A) surrounding the hole form together a monolithic pile.

Fig. 2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 10 6647

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	US 5 722 498 A (CORTVRINDT GUY ADOLF AUGUST ET AL) 3 March 1998 (1998-03-03) * column 3, line 16-31; figures 2,3 *	1,3,8	E21B10/44 E21B17/22
Y	---	4,6	
Y	GB 2 137 678 A (MATSUZAWA KIKO KABUSHIKI KAISH; SANWA KIZAI CO LTD) 10 October 1984 (1984-10-10) * page 1, line 41-56 * * figures 1A,1B *	4,6	
X	US 3 391 544 A (DACZKO DONALD S) 9 July 1968 (1968-07-09) * column 3, line 23-25,61-70 *	1,5	
X	EP 0 228 138 A (COELUS GASPAR JOZEF) 8 July 1987 (1987-07-08) * the whole document *	1	
X	US 4 942 932 A (BRACEWELL ROSS W) 24 July 1990 (1990-07-24) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E21B E02D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 November 2001	Examiner Schouten, A
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 10 6647

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.

15-11-2001

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5722498	A	03-03-1998	BE	1007558 A5	01-08-1995
			AT	154097 T	15-06-1997
			AU	680057 B2	17-07-1997
			AU	7987094 A	22-05-1995
			WO	9512050 A1	04-05-1995
			BR	9407911 A	26-11-1996
			CA	2174119 A1	04-05-1995
			DE	69403643 D1	10-07-1997
			DE	69403643 T2	02-01-1998
			EP	0693158 A1	24-01-1996
			ES	2105775 T3	16-10-1997
			IL	111457 A	20-11-1997
			JP	9504062 T	22-04-1997
			KR	208121 B1	15-07-1999
			SG	46390 A1	20-02-1998

GB 2137678	A	10-10-1984	NONE		

US 3391544	A	09-07-1968	NONE		

EP 0228138	A	08-07-1987	BE	903965 A2	16-04-1986
			AT	57550 T	15-11-1990
			DE	3674993 D1	22-11-1990
			EP	0228138 A2	08-07-1987
			GR	3001034 T3	20-01-1992

US 4942932	A	24-07-1990	CA	1266043 A1	20-02-1990

EPO FORM P0458

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