(19) Europäisches Patentamt
European Patent Office
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(11) EP 1 186 718 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.03.2002 Bulletin 2002/11

(51) Int Cl.[7]: **E02D 5/36**

(21) Application number: **01500221.5**

(22) Date of filing: **27.08.2001**

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

(30) Priority: **06.09.2000 ES 200002183**

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(54) **Concreting device for rotary heads of continuous flight augers**

(57) Concreting device for rotary heads of continuous flight augers (C.F.A.). It consists of a "kelly" bar (1) annexed to the rotary head (2) of a piling rig. Inside the bar a double-effect hydraulic cylinder (3) is placed. The concreting tube (6) is attached to the cylinder's piston (5), therefore the tube being able to switch between two positions: the retracted one (boring phase) and the extended one (concreting phase). During the latter, the lowermost part of the tube (6) is placed below the nose of the boring auger. By means of this device, the concreting tube (6) does not take away any length from the boring rig mast. The invention allows to join in a single rig the advantages of traditional and STARSOL piling systems.

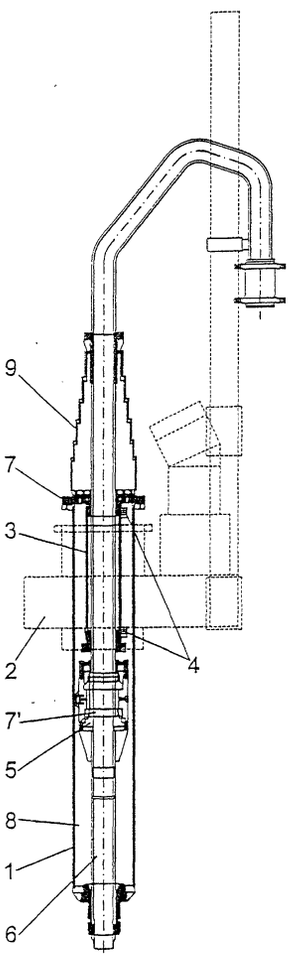

FIG. 1

EP 1 186 718 A1

Description

Objective

[0001] The invention relates to the concreting phase of piles bored by the continuous flight auger (C.F.A.) system.

[0002] Bored piles are widely used as the foundation of any type of construction.

[0003] The invented device can be incorporated to any existing "kelly" system rotary heads used to drive continuous flight augers (C.F.A.), thus allowing the supply of the concrete below the nose of the auger.

[0004] The objective of the invention is to achieve this functionality without any reduction of the effective length of the mast of the boring rig.

Background

[0005] Continuous flight auger (C.F.A.) traditional piles are executed by screwing a tube with an external helix (auger) into the ground. This action is performed by rotating the auger in a continuous action. Once the necessary depth is reached, the concreting of the pile starts, bottom - up. The concrete is pumped through the inside of the auger. The combined forces of the concrete pressure and the traction effected on the auger yield the extraction of the auger, along with the soil (spoil) by it displaced.

[0006] There also exists more advanced system, known in the market as "STARSOL". It consists of a tube inside the axial hole of the auger. The tube can move longitudinally. Once the boring phase of the pile is completed, the inner tube is displaced to its lower position, therefore the concreting takes place below the nose of the auger, thus avoiding the risk of a mixture of concrete and spoil and therefore guaranteeing a correctly contreted pile.

[0007] "STARSOL" results in a pile of better characteristics than traditional piles. But it has a disadvantage over it: in order to displace the inner concreting tube, the system needs two heads, thus adding several metres to the auger length. For instance, for a twenty-mast rig, the STARSOL system needs four additional metres (20% aditional lenght), thus reducing considerably the effective mast length.

[0008] The invention seeks to create a device having the same results as the "STARSOL" pile (i.e., concreting below the nose of the auger), solving the mentioned drawback and therefore not making it necessary to enlarge the mast of the rig.

[0009] For that purpose, the invention is capable of being adapted to the existing rotary head. It consists of a "kelly" bar mounted on the rotary head, and a concreting tube inside the bar. The tube is axially displaced by a double-effect hydraulic cylinder (also placed within the "kelly" bar).

[0010] The tube moves in reference to the "kelly" bar, not to the rig mast, therefore it does not require any supplemental length of mast to carry out its displacement.

[0011] Two rotary joints link the hydraulic cylinder and the concreting tube with the "kelly" bar, thus allowing the required relative rotation between these elements.

Description

[0012] The invention will now be described with reference to the accompanying drawings in which:

- Figure 1 is a longitudinal cross-section illustrating the invented device (rotary head, "kelly" bar, hydraulic cylinder and concreting tube) during the boring phase of the pile (i.e. the concreting tube is located in its uppermost situation).

- Figure 2 shows the cross-section of the same elements during the concreting phase of the pile. The hydraulic cylinder pushes down the concreting tube to its lowest position, thus allowing the system to concrete below the nose of the auger.

[0013] It can be observed that the invention is based on a "kelly" bar (1). It is a conventional, tubular-shaped bar mounted on the rotary head (2). The auger - not drawn in the figures - is attached to the "kelly" bar (1). Inside the "kelly" bar a double-effect hydraulic cylinder (3) is placed, along its hydraulic intakes (4) to axially displace it. The piston (5) of the cylinder (3) is attached to the concreting tube (6), being the stroke of the cylinder the proper distance to lower the concreting tube (6) from the bottom of the auger.

[0014] The axial displacement of the tube (6) within the "kelly" bar (1) must not be subject to the rotary movement of the "kelly" bar (1) and auger, moved by the rotary head (2). In order to allow this, two rotary joints (7 - 7') are placed between the external "kelly" bar (1) and the hydraulic cylinder (3) and piston (5). These joints also maintain watertight the chamber (8) within the "kelly" bar (1).

[0015] A bellows (9) isolates the upper, rotary joint (7) from external agents allowing vertical relative displacement between the "kelly" bar (1) and the concreting tube (6).

[0016] According to this system structure, the effective pile depth achieved combines the rig capacity to the stroke of the "kelly" bar. This is feasible provided the necessary, relative displacement between the auger and the concreting tube (6) is achieved not by extension of the mast (prior art), but by the relative displacement between the concreting tube (6) and the "kelly" bar (1), linked by the hydraulic cylinder (3).

Claims

1. Concreting device for rotary heads of continuous

flight augers (C.F.A.), having the auger an inner tube, physically independent of the auger and axially displaceable inside it, tube by means of which the concreting is performed below the nose of the auger, **characterised in that** the aforementioned concreting tube (6) can be displaced axially within a tubular, "kelly" type bar (1), mounted on the rotary head (2) which drives the auger, said concreting tube (6) being attached to the piston (5) of a double-effect hydraulic cylinder (3), said piston (5) performing the axial displacement of the concreting tube (6) in reference to the auger and being said piston (5) hollow allowing the flow of the concrete through it.

2. Concreting device for rotary heads of continuous flight augers (C.F.A.) as claimed in Claim 1, **characterised in that** between the double-effect hydraulic cylinder (3-5) and the "kelly" bar (1) two rotary joints (7-7') are placed, maintaining watertight the inner chamber (8) of said kelly bar (1), allowing the required rotation movement of the "kelly" bar (1) in reference to the concreting tube (6) while boring.

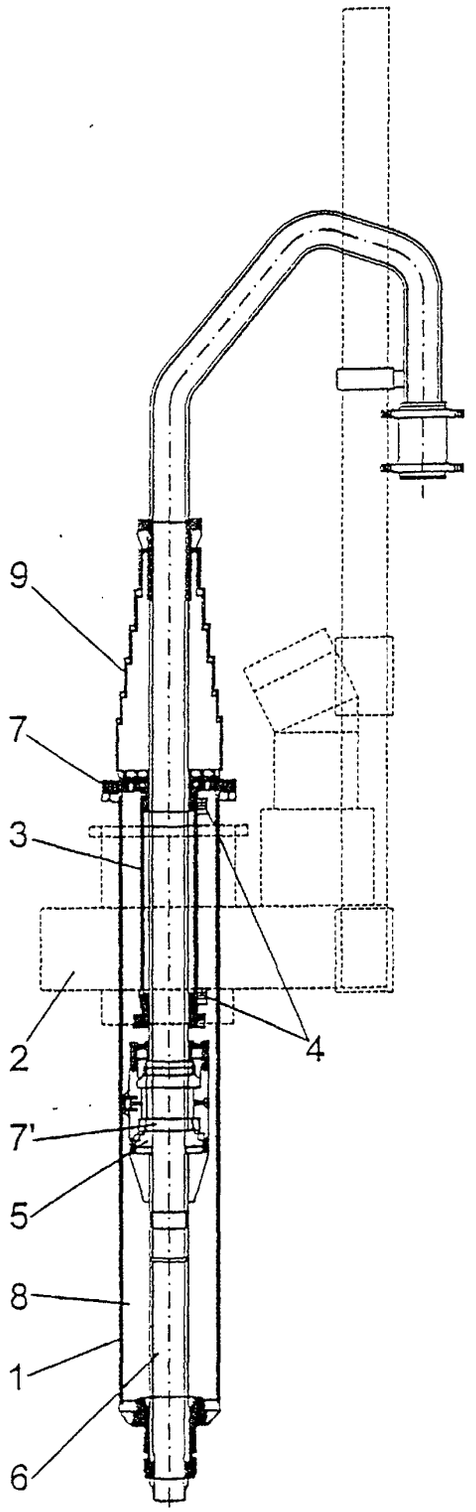

FIG. 1

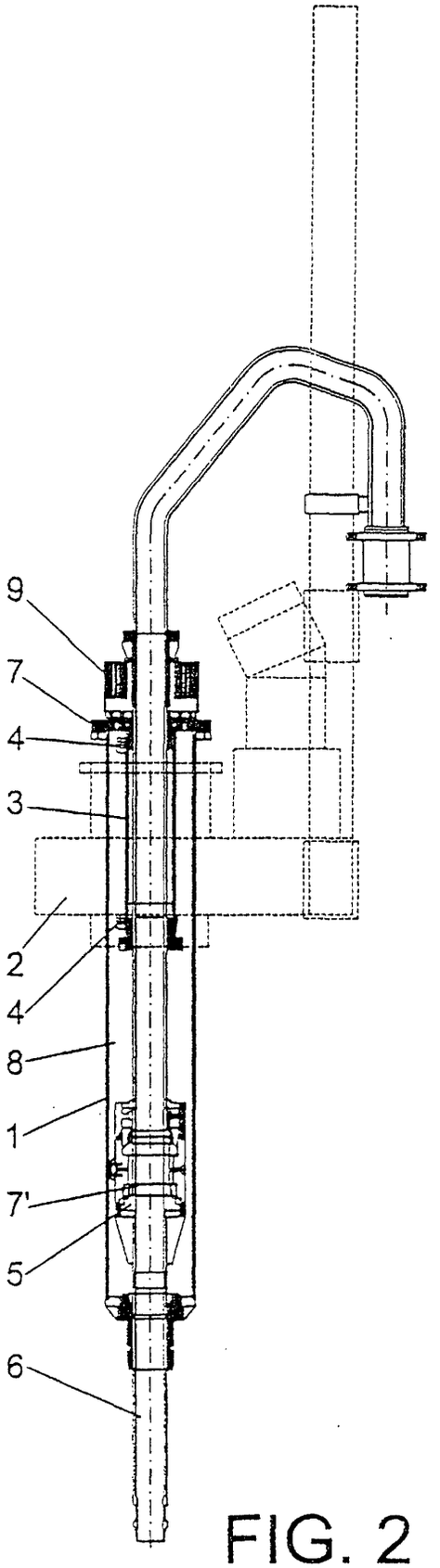

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 01 50 0221

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)
E	FR 2 807 455 A (CIE DU SOL) 12 October 2001 (2001-10-12) * page 4, line 17 - page 6, line 23; figure 2 *	1	E02D5/36
A	FR 2 566 813 A (SOLETANCHE) 3 January 1986 (1986-01-03) * abstract; figure 2 *	1	
A	US 3 604 214 A (TURZILLO LEE A) 14 September 1971 (1971-09-14) * column 2, line 53 - column 3, line 10; figure 2 * * column 3, line 50 - line 64 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E02D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 December 2001	De Neef, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 50 0221

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