



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
17.12.2014 Bulletin 2014/51

(51) Int Cl.:
E21B 19/20 (2006.01) **E21B 19/14** (2006.01)
E21B 19/15 (2006.01)

(43) Date of publication A2:
05.11.2014 Bulletin 2014/45

(21) Application number: **14166503.4**

(22) Date of filing: **30.04.2014**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(30) Priority: **30.04.2013 FI 20135450**
11.10.2013 FI 20136017

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(54) **Automatic drill rod handling**

(57) There is provided a manipulator (210) comprising a mounting base (212), a gripping unit (214) for gripping a drill rod (216), and a swivel arm (218) attached to the mounting base (212) and to the gripping unit (214), wherein the swivel arm (218) comprises a plurality of swivels (220 to 230) between the mounting base (212) and the gripping unit (214); wherein the swivel arm (218) is configured to automatically move the gripping unit (214) according to a programmed three-dimensional trajectory between a first position (232) and a second position (234), wherein: in the first position (232), the gripping unit (214) is able to grip or release the drill rod (216) directly from/to a storage unit (202) for a plurality of drill rods, and in the second position (234), the gripping unit (214) is able to grip or release the drill rod (216) when the drill rod (216) is along a drilling axis (116) connected to a drill string (108) entering a borehole (110); and to automatically grip or release the drill rod (216) in the first position (232) or in the second position (234).

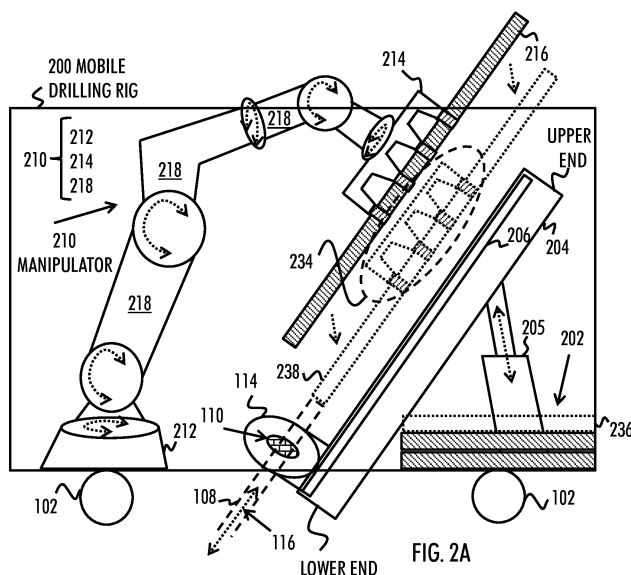


FIG. 2A



EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6503

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E21B E21D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 October 2014	Examiner Morrish, Susan
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

 2
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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