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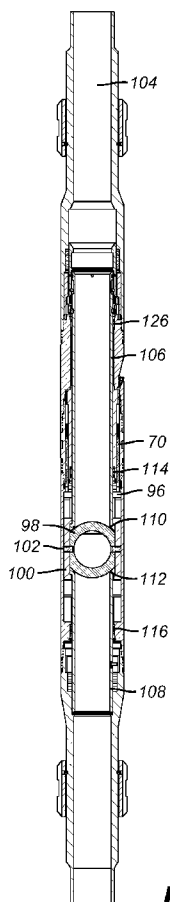
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- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,

[Continued on next page]

(54) **Title:** DUAL ACTING ROD PISTON CONTROL SYSTEM

(57) **Abstract:** A downhole tool is hydraulically actuated through a control system that features rod piston(s) that are double acting. The piston bore is in a single housing component with an annular cavity that provides access to all piston bores to move the pistons in a first direction. The housing component that has the piston bore also includes an internal sleeve in a passage in the housing. A second control system connection communicates with a sealed annular space defined between the sleeve and the passage wall that holds the sleeve. A series of radial ports communicate from the annular space into each piston bore on the opposite side of each piston from the annular cavity so that each piston is double acting with a bore in a single housing component.



**FIG. 6**



**WO 2010/144593 A3**



DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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**A. CLASSIFICATION OF SUBJECT MATTER***E21B 34/10(2006.01)i, E21B 21/10(2006.01)i, F16K 31/122(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: hydraulic actuated, double acting piston, piston bore, seal and similar terms.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6691785 B2 (PATEL; DINESH R.) 17 February 2004 See the abstract; column 1, line 62 - column 5, line 5 and figures 1A-1C.	1-16
A	US 4467870 A (LANGHAM; RONALD F.) 28 August 1984 See the abstract and figures 1A-2.	1-16
A	US 2008-0223581 A1 (BEALL CLIFFORD H. et al.) 18 September 2008 See the abstract and figure 1.	1-16
A	US 3886967 A (NELSON NORMAN A.) 03 June 1975 See the abstract and figure 1.	1-16

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2010/037996**

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