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(54) Title: SUBMERSIBLE PUMP HAVING A TWO-STEP CONTROL HYDRAULIC VALVE

(57) Abstract: A submersible pump includes a pump valve configured to switch the pump between first and second states in which a piston is respectively extended and retracted. The pump valve includes first and second components that reciprocate between corresponding first and second positions. The pump is in the first state when both components are in their corresponding first position. The pump is in the second state when both components are in their corresponding second position. Neither the valve nor the pump is hydraulically locked at any time during normal operation.



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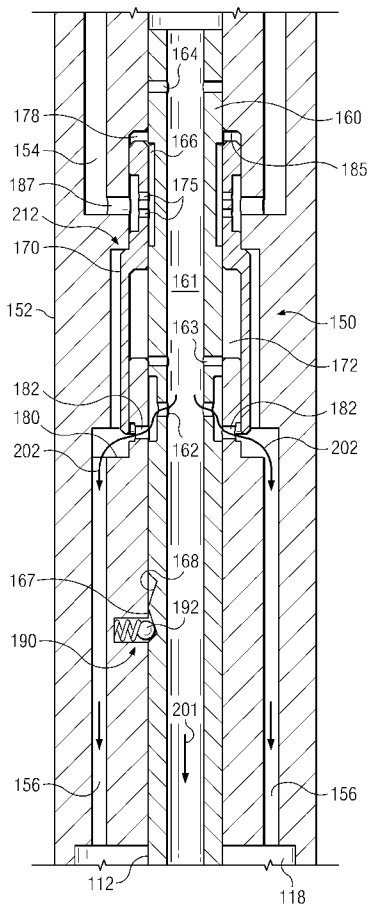


FIG. 2A



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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**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

**Published:**

- with international search report (Art. 21(3))
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**A. CLASSIFICATION OF SUBJECT MATTER***E21B 43/12(2006.01)i, F04B 43/10(2006.01)i, E21B 43/16(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)

E21B 43/12; G06F 15/16; H04J 3/22; H04B 7/02

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 valve; pump; piston; and pilot spool

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0003118 A1 (TRAYLOR; LELAND B. et al.) 03 January 2008 See abstract; paragraphs [0019]-[0025]; claims 1, 12; and figures 1, 2	1-19
A	US 6889765 B1 (TRAYLOR; LELAND B.) 10 May 2005 See abstract; column 8 line 29-column 9 line 2; claim 1; and figure 1	1-19
A	US 2006-0008364 A1 (TRAYLOR; LELAND B.) 12 January 2006 See abstract; paragraphs [0018]-[0022]; claims 1, 9; and figure 1	1-19
A	US 4649956 A (ZEUNER; KENNETH W. et al.) 17 March 1987 See abstract; column 2 line 44-column 4 line 38; claim 1; and figure 1	1-19

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

\* Special categories of cited documents:

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2010/032389**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0003118 A1	03.01.2008	AU 2007-266495 A1 CA 2651181-A1 CN 101454570 A WO 2007-140436 A2 WO 2007-140436 A3 WO 2007-140436 A3	06.12.2007 06.12.2007 10.06.2009 06.12.2007 06.12.2007 16.10.2008
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