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(54) Title: PUMP ROD CONNECTION

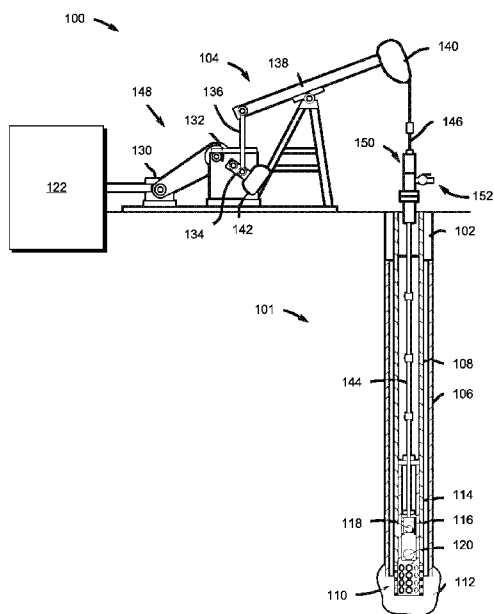


Fig. 1

(57) Abstract: A pump rod can include a body that includes a longitudinal axis; and a pin at an end of the body where the pin includes threads where the threads include tangential elliptical roots.



SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
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A. CLASSIFICATION OF SUBJECT MATTER**E21B 17/02(2006.01)i, F16B 7/18(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 17/02; F16L 25/00; F16D 1/00; F16L 35/00; E21B 19/06; H02G 3/06; E21B 17/042; F16B 7/18

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) & Keywords: pump rod, body, pin, thread, tangential elliptical root

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2015-191940 A1 (SCHLUMBERGER CANADA LIMITED et al.) 17 December 2015 See paragraphs [0003]-[0005], [0014]-[0024], [0031]; and figures 1-3.	1-20
A	US 2010-0123311 A1 (CHURCH, KRIS L.) 20 May 2010 See paragraphs [0043]-[0058]; and figures 1-5.	1-20
A	US 7078623 B1 (SHEEHAN, ROBERT K.) 18 July 2006 See column 6, line 60 - column 9, line 44; and figures 1-5.	1-20
A	US 2006-0273601 A1 (CARSTENSEN, KENNETH J.) 07 December 2006 See paragraphs [0039]-[0045]; and figures 1-4.	1-20
A	US 5794985 A (MALLIS, DAVID L.) 18 August 1998 See column 2, line 3 - column 3, line 5; and figures 1-4.	1-20

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

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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015-191940 A1	17/12/2015	CN 106536850 A US 2015-0362100 A1	22/03/2017 17/12/2015
US 2010-0123311 A1	20/05/2010	CA 2743512 A1 CA 2743512 C EP 2347162 A1 EP 2347162 A4 US 8136846 B2 WO 2010-056277 A1	20/05/2010 01/12/2015 27/07/2011 31/05/2017 20/03/2012 20/05/2010
US 7078623 B1	18/07/2006	AT 494650 T CA 2631588 A1 DE 06838550 T1 EP 1969689 A2 EP 1969689 B1 TW 200729649 A TW I305970 B WO 2007-064683 A2 WO 2007-064683 A3	15/01/2011 07/06/2007 28/01/2010 17/09/2008 05/01/2011 01/08/2007 01/02/2009 07/06/2007 18/10/2007
US 2006-0273601 A1	07/12/2006	US 2002-0076273 A1 US 2004-0231127 A1 US 6942254 B2 US 7108063 B2 US 7596847 B2	20/06/2002 25/11/2004 13/09/2005 19/09/2006 06/10/2009
US 5794985 A	18/08/1998	EP 0815377 A1 EP 0815377 B1 JP 11-502592 A WO 96-29533 A1	05/01/2000 18/12/2002 02/03/1999 26/09/1996