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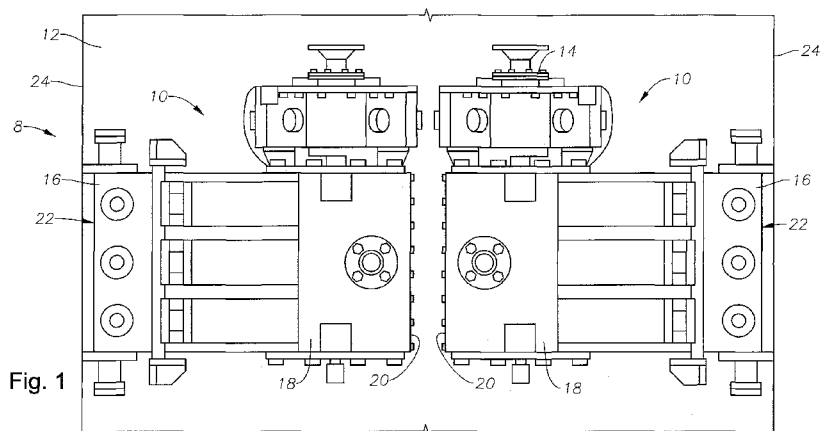
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(54) **Title:** SHORT LENGTH PUMP HAVING BRINE RESISTANT SEAL AND ROTATING WRIST PIN AND RELATED METHODS



(57) **Abstract:** Pumps and plunger assemblies are provided. An exemplary pump can have or contain a cylinder mounted in a pump housing, a plunger assembly including a crosshead, a plunger, a stationary bushing having substantial portions fixedly mounted within a laterally extending bore of the crosshead, and a non-stationary pivotally rotating wrist pin mounted within the bushing. The pump can also include a power end seal assembly including a seal housing extending at least partially through an aperture in the sealed fluid end-facing side of the power end of the pump, a power end seal disposed therein in sealing contact with the power end section of the plunger and a splashguard assembly.



**A. CLASSIFICATION OF SUBJECT MATTER***F04B 39/00(2006.01)i, E21B 43/12(2006.01)i, F04B 47/00(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)

F04B 39/00; F16J 1/12; F04B 15/00; F04B 53/14; F04B 9/02; F02F 3/00; F04B 19/00

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: pump, plunger, crosshead, bushing, wrist, and pin

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010-0158726 A1 (DONALD STEVEN T. et al.) 24 June 2010 See paragraphs [0023]-[0029] and figure 3 .	1-29
A	US 2010-0172778 A1 (KUGELEV VLADIMIR et al.) 08 July 2010 See paragraphs [0019]-[0023] and figures 2-4.	1-29
A	US 04013057 A (GUENTHER; WILLIAM D.) 22 March 1977 See column 4, lines 11-32 and figures 1-2.	1-29
A	US 2010-0160710 A1 (STRICKLAND MICHAEL L.) 24 June 2010 See paragraph [0085] and figure 2.	1-29

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

\* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2011/067770**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0158726 A1	24.06.2010	None	
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