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(54) Title: GAS-LOCK RE-PRIME SHAFT PASSAGE IN SUBMERSIBLE WELL PUMP AND METHOD OF RE-PRIMING THE PUMP

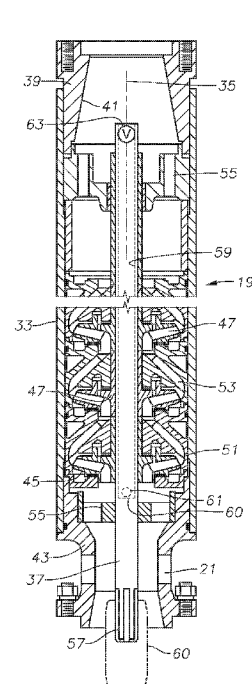


FIG. 2

(57) Abstract: A well fluid centrifugal pump (19) has a shaft passage (59) in the shaft (37). The shaft passage has an open upper end above the impellers (45) and a closed lower end below the impellers. An outlet port (61) extends laterally from the shaft passage. A gas-lock re-priming device (63) in the shaft passage diverts a portion of well fluid in the discharge adapter bore (41) through the shaft passage and out the outlet port. The re-priming device may be a pressure actuated valve (63) that is biased to a closed position and opens when the pressure in the discharge adapter bore drops below a minimum. Alternately, the re-priming device may be an orifice member (123) with an orifice passage (125) that continuously diverts a portion of the well fluid in the discharge adapter bore (119) out the outlet port.

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2019/060738**A. CLASSIFICATION OF SUBJECT MATTER****E21B 34/08(2006.01)i, E21B 43/12(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 34/08; E21B 027/00; E21B 034/06; E21B 17/10; E21B 43/00; E21B 43/12; E21B 43/38; F04B 19/22; F04B 47/08

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: centrifugal pump, impeller, gas lock, shaft passage, valve

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
DA	US 2003-0192702 A1 (GAY et al.) 16 October 2003 paragraphs [0014]-[0021] and figures 1-2	1-15
A	US 2016-0201444 A1 (HALLIBURTON ENERGY SERVICES, INC.) 14 July 2016 paragraphs [0016]-[0023] and figures 2, 3A-3B	1-15
A	US 4867242 A (HART, GORDON E.) 19 September 1989 claims 1-4 and figures 1-2	1-15
A	US 2010-0230091 A1 (PUGH et al.) 16 September 2010 paragraphs [0020]-[0031] and figures 3A-3E	1-15
A	WO 2014-176225 A1 (SCHLUMBERGER CANADA LIMITED et al.) 30 October 2014 paragraphs [0012]-[0029] and figure 1	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"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

"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

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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