

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
3 February 2005 (03.02.2005)

PCT

(10) International Publication Number
WO 2005/010362 A3

(51) International Patent Classification⁷: **E21B 49/08**

(21) International Application Number:
PCT/US2004/023362

(22) International Filing Date: 21 July 2004 (21.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/489,262 21 July 2003 (21.07.2003) US
60/489,049 21 July 2003 (21.07.2003) US
10/896,262 20 July 2004 (20.07.2004) US

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant and
(72) Inventor: **BLAISDELL, Mark, Kevin** [US/US]; 1915
Laura Court, Concord, CA 94521 (US).

Published:
— with international search report

(74) Agents: **GLENN, Michael, A.** et al.; Glenn Patent Group,
3475 Edison Way, Suite L, Menlo Park, CA 94025 (US).

(88) Date of publication of the international search report:
15 September 2005

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: IMPROVED METHOD AND APPARATUS FOR GAS DISPLACEMENT WELL SYSTEMS

(57) Abstract: A method and apparatus is provided for reducing the purge volume of a well during purging and sampling operations. In some system embodiments, the apparatus can be retrofitted to existing small diameter wells. A further embodiment provides a method and apparatus for using direct pneumatic pressure to purge and sample small diameter wells using a removable valve. This aspect of the invention allows a direct pneumatic pressure pump with a primary valve to be withdrawn through the top of the inside to the pump's pressure holding structure without removing a riser pipe or the system's fluid inlet structure. The invention allows fitting or retrofitting small diameter wells with valves for direct pneumatic pressure purging and sampling. Other embodiments include sealing a removable valve at or above the bottom of a riser pipe, remotely attaching a tool at the top of a removable valve, withdrawing a, direct pneumatic pressure pump system's primary valve through the inside of the inside pump's pressure holding structure without removing the riser pipe, and attaching a direct pneumatic pressure pump system's sample return line to its primary valve. Further embodiments include a multiple return line pneumatic pump/well, which allows the use of multiple return lines on a pneumatic pump when used to pump water from very deep wells where piezometric surface of the water is also deep, as well as other uses for direct pressure pneumatic pumping and sampling.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/23362

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : E21B 49/08

US CL : 166/264, 72, 187; 73/152.28, 863.81, 833.84

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)

U.S. : 166/264, 72, 187; 73/152.28, 863.81, 833.84

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,408,691 B1 (SORBEN) 25 June 2002 (25.06.2002), see entire document.	65, 71, 74, 75, 82, 85, 86, 88
---		-----
Y		51, 54, 55, 61-64

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	"T"
"A" document defining the general state of the art which is not considered to be of particular relevance	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
"E" earlier application or patent published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

15 June 2005 (15.06.2005)

Date of mailing of the international search report

22 JUN 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

William Dixon

Telephone No. (571) 272-1600