



US007861774B2

(12) **United States Patent**
Fehr et al.

(10) **Patent No.:** **US 7,861,774 B2**
(45) **Date of Patent:** **Jan. 4, 2011**

(54) **METHOD AND APPARATUS FOR WELLBORE FLUID TREATMENT**

(56) **References Cited**

U.S. PATENT DOCUMENTS

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(73) Assignee: **Packers Plus Energy Services Inc.**, Calgary (CA)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 32 days.

1,956,694 A	5/1934	Parrish	
2,121,002 A	6/1938	Baker	166/134
2,227,539 A	1/1941	Dorton	
2,618,340 A	11/1952	Lynd	166/250.08
2,715,444 A	8/1955	Fewwl	166/147
2,731,827 A	1/1956	Loomis	73/40.5 R
2,737,244 A	3/1956	Baker et al.	
2,780,294 A	2/1957	Loomis	277/239
2,807,955 A	10/1957	Loomis	73/40.5 R
2,836,250 A	5/1958	Brown	166/134

(21) Appl. No.: **12/471,174**

(22) Filed: **May 22, 2009**

(65) **Prior Publication Data**

US 2010/0065276 A1 Mar. 18, 2010

Related U.S. Application Data

(60) Continuation of application No. 11/550,863, filed on Oct. 19, 2006, now Pat. No. 7,543,634, which is a continuation of application No. 11/104,467, filed on Apr. 13, 2005, now Pat. No. 7,134,505, which is a division of application No. 10/299,004, filed on Nov. 19, 2002, now Pat. No. 6,907,936.
(60) Provisional application No. 60/331,491, filed on Nov. 19, 2001, provisional application No. 60/404,783, filed on Aug. 21, 2002.

(51) **Int. Cl.**

E21B 43/14 (2006.01)
E21B 33/124 (2006.01)
E21B 34/14 (2006.01)

(52) **U.S. Cl.** **166/191**; 166/308.1; 166/177.5; 166/318; 166/334.4; 166/147

(58) **Field of Classification Search** 166/387, 166/386, 373, 374, 142, 146, 147, 184, 185, 166/194, 318, 269, 126, 127, 131, 191, 305.1, 166/306, 313, 308.1, 177.5, 50, 332.1, 332.4, 166/334.4

See application file for complete search history.

(Continued)

OTHER PUBLICATIONS

Halliburton Retrievable Service Tools, product brochure, 15 pages.

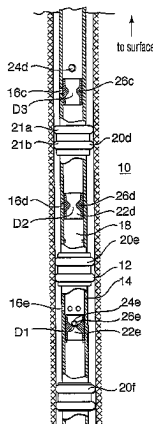
(Continued)

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(57) **ABSTRACT**

A tubing string assembly is disclosed for fluid treatment of a wellbore. The tubing string can be used for staged wellbore fluid treatment where a selected segment of the wellbore is treated, while other segments are sealed off. The tubing string can also be used where a ported tubing string is required to be run in in a pressure tight condition and later is needed to be in an open-port condition.

16 Claims, 9 Drawing Sheets



BAKER HUGHES INCORPORATED AND BAKER HUGHES OILFIELD OPERATIONS, INC.
Exhibit 1001
BAKER HUGHES INCORPORATED AND BAKER HUGHES OILFIELD OPERATIONS, INC. v. PACKERS PLUS ENERGY SERVICES, INC.
IPR2016-00598

U.S. PATENT DOCUMENTS

2,841,007	A	7/1958	Loomis	73/40.5 R
2,860,489	A	11/1958	Townsend	405/269
3,038,542	A	6/1962	Loomis	166/187
3,054,415	A	9/1962	Baker et al.	
3,122,205	A	2/1964	Brown et al.	166/122
3,153,845	A	10/1964	Loomis	29/705
3,154,940	A	11/1964	Loomis	73/40.5 R
3,158,378	A	11/1964	Loomis	277/337
3,165,918	A	1/1965	Loomis	73/40.5 R
3,165,919	A	1/1965	Loomis	73/40.5 R
3,165,920	A	1/1965	Loomis	73/40.5 R
3,193,917	A	7/1965	Loomis	29/407.01
3,194,310	A	7/1965	Loomis	166/250.08
3,195,645	A	7/1965	Loomis	277/337
3,199,598	A	8/1965	Loomis	166/147
3,311,169	A	3/1967	Hefley et al.	166/120
4,099,563	A	7/1978	Hutchison et al.	
4,279,306	A	7/1981	Weitz	166/312
4,498,536	A	2/1985	Ross et al.	166/312
4,516,879	A	5/1985	Berry et al.	
4,519,456	A	5/1985	Cochron	166/312
4,520,870	A	6/1985	Pringle	
4,552,218	A	11/1985	Ross et al.	166/321
4,567,944	A	2/1986	Zunkel et al.	166/120
4,569,396	A	2/1986	Brisco	
4,590,995	A	5/1986	Evans	166/128
4,646,829	A	3/1987	Barrington et al.	166/135
4,657,084	A	4/1987	Evans	166/134
4,714,117	A	12/1987	Dech	166/380
4,716,967	A	1/1988	Mohaupt	166/305.1
4,754,812	A	7/1988	Gentry	166/313
4,791,992	A	12/1988	Greenlee et al.	166/387
4,794,989	A	1/1989	Mills	
4,893,678	A	1/1990	Stokley et al.	
4,949,788	A	8/1990	Szarka et al.	
4,967,841	A	11/1990	Murray	
5,103,901	A	4/1992	Greenlee	166/120
5,152,340	A	10/1992	Clark et al.	166/122
5,186,258	A *	2/1993	Wood et al.	166/387
5,197,547	A	3/1993	Morgan	166/181
5,454,430	A	10/1995	Kennedy et al.	166/50
5,472,048	A	12/1995	Kennedy et al.	
5,499,687	A	3/1996	Lee	
5,526,880	A	6/1996	Jordan, Jr. et al.	
5,533,573	A	7/1996	Jordan, Jr. et al.	
5,542,473	A	8/1996	Pringle	166/120
5,701,954	A	12/1997	Kilgore et al.	166/119
5,775,429	A	7/1998	Arizmendi et al.	166/206
5,791,414	A	8/1998	Skinner et al.	166/187
5,894,888	A	4/1999	Wiemers et al.	
5,960,881	A	10/1999	Allamon et al.	
6,041,858	A	3/2000	Arizmendi	166/187
6,047,773	A	4/2000	Zeltmann et al.	
6,112,811	A	9/2000	Kilgore et al.	166/120
6,131,663	A	10/2000	Henley et al.	166/373
6,253,861	B1	7/2001	Carmichael et al.	
6,446,727	B1	9/2002	Zemlak et al.	
6,460,619	B1	10/2002	Braithwaite et al.	
6,543,545	B1	4/2003	Chatterji et al.	166/276
6,763,885	B2	7/2004	Cavender	
6,907,936	B2	6/2005	Fehr et al.	166/387
7,021,384	B2	4/2006	Themig	
7,096,954	B2	8/2006	Weng et al.	
7,108,060	B2	9/2006	Jones	
7,108,067	B2	9/2006	Themig et al.	
7,134,505	B2	11/2006	Fehr et al.	166/387
7,198,110	B2	4/2007	Kilgore et al.	166/134
7,231,987	B2	6/2007	Kilgore et al.	166/134

2007/0151734 A1 7/2007 Fehr et al. 166/318

OTHER PUBLICATIONS

Halliburton "Halliburton Guiberson® G-77 Hydraulic-Set Retrievable Packer," 6 pages.

Baker Oil Tools, "Retrievable Packer Systems," product brochure, 1 page.

Drawings, Packer Installation Plan, PACK 05543, 5 pages, 1997.

Guiberson•AVA & Dresser, Retrievable Packer Systems, "Tandem Packer," 1 page.

Halliburton, "Hydraulic-Set Guiberson™ Wizard Packer®," 1 page.

D.W. Thomson, "Design and Installation of a Cost-Effective Completion System for Horizontal Chalk Wells Where Multiple Zones Require Acid Stimulation," SPE Drilling & Completion, Sep. 1998, pp. 151-156, 1998.

Packers Plus Energy Services, Inc. "5.1 RockSeal™ II Open Hole Packer Series," 2 pages, 2004.

Halliburton Guiberson G-77 Hydraulic-Set Retrievable Packer presentation, 6 pages.

Owen Oil Tools Mechanical Gun Release; 2-3/8" & 2-7/8" product description, 1 page.

Sapex Oil Tools Ltd. Downhole Completions catalog, 24 pages.

Halliburton, catalog, pp. 51-54, 1957.

Baker Hughes, catalog, pp. 66-73, 1991.

Trahan, Kevin, Affidavit, May 19, 2008.

Trahan, Kevin, Affidavit Exhibit C, May 19, 2008.

Trahan, Kevin, Affidavit Exhibit E, May 19, 2008.

Trahan, Kevin, Affidavit Exhibit G, May 19, 2008.

Baker Oil Tools, catalog, p. 29, Model "C" Packing Element Circulating Washer, Product No. 470-42, Mar. 1997.

Guiberson-AVA Dresser, catalog, front page and pp. 1 & 20, 1994.

Baker Oil Tools, catalog, p. 38, Twin Seal Submersible Pumpjack.

Halliburton, Plaintiff's Fourth Amended Petition in Cause No. CV-44964, 238th Judicial District of Texas, Aug. 13, 2007.

Packers Plus, Second Amended Original Answer in Cause No. CV-44964, 238th Judicial District of Texas, Feb. 13, 2007.

Packers Plus, Original Answer in Cause No. CV-44964, 238th Judicial District of Texas, Feb. 13, 2007.

Guiberson AVA, Packer Installation Plan, Aug. 26, 1997.

Guiberson AVA, Packer Installation Plan, Sep. 9, 1997.

Guiberson AVA, Packer Installation Plan, Nov. 11, 1997.

Guiberson AVA, Wizard II Hydraulic Set Retrievable Packer Tech Manual, Apr. 1998.

Dresser Oil Tools, catalog, Multilateral Completion Tools Section.

Dresser Oil Tools, catalog, Technical Section, title page and page 18, Nov. 1997.

Berryman, William, First Supplemental Expert Report in Cause No. CV-44964, 238th Judicial District of Texas.

Brown Oil Tools, catalog page, entitled "Brown Hydraulic Set Packers."

Brown Oil Tools, catalog page, entitled "Brown HS-16-1 Hydraulic Set Retrievable Packers."

Brown Oil Tools General Catalog 1962-63, Hydraulic Set Packers and Hydraulic Set Retrievable Packers, pp. 870-871.

First Supplemental Expert Report of Kevin Trahan, Case No. CV-44,964, 238th Judicial District, Midland County, Texas, Aug. 21, 2008, 28 pages, 2008.

Order of Dismissal, Case No. CV-44,964, 238th Judicial District, Midland County, Texas, Oct. 14, 2008, 1 page.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 6, Deposition of Daniel Jon Themig, Calgary, Alberta, Canada, dated Jan. 17, 2006, parts 1 and 2 total for a total of 82 pages with redactions from p. 336, Line 10 through all of p. 337.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 7, Deposition of Daniel Jon Themig, Calgary, Alberta, Canada, dated Jan. 8, 2007, 75 pages with redactions from p. 716, Line 23 through p. 726, Line 22.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 8,

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 9, Cross-examination of Daniel Jon Themig, In the Court of Queen's Bench of Alberta, Canada, dated Mar. 14, 2005, 67 pages.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 10, Deposition of William Sloane Muscroft, Edmonton, Alberta, Canada, dated Mar. 31, 2007, parts 1 and 2 for a total of 111 pages.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 11, Email from William Sloane Muscroft to Peter Krabben dated Jan. 27, 2000, 1 page.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 12, Email from William Sloane Muscroft to Daniel Jon Themig dated Feb. 1, 2000, 1 page.

238th District Court, Midland, Texas, Case No. CV44964, Exhibit 13, Email from Daniel Jon Themig to William Sloane Muscroft dated Jun. 19, 2000, 2 pages.

Design and Installation of a Cost-Effective Completion System for Horizontal Chalk Wells Where Multiple Zones Require Acid Stimulation, D. W. Thompson, SPE Drilling & Completion, Sep. 1998, pp. 151-156.

<http://www.packersplus.com/rockseal%202.htm> description of open hole packer, available prior to Nov. 19, 2001.

* cited by examiner

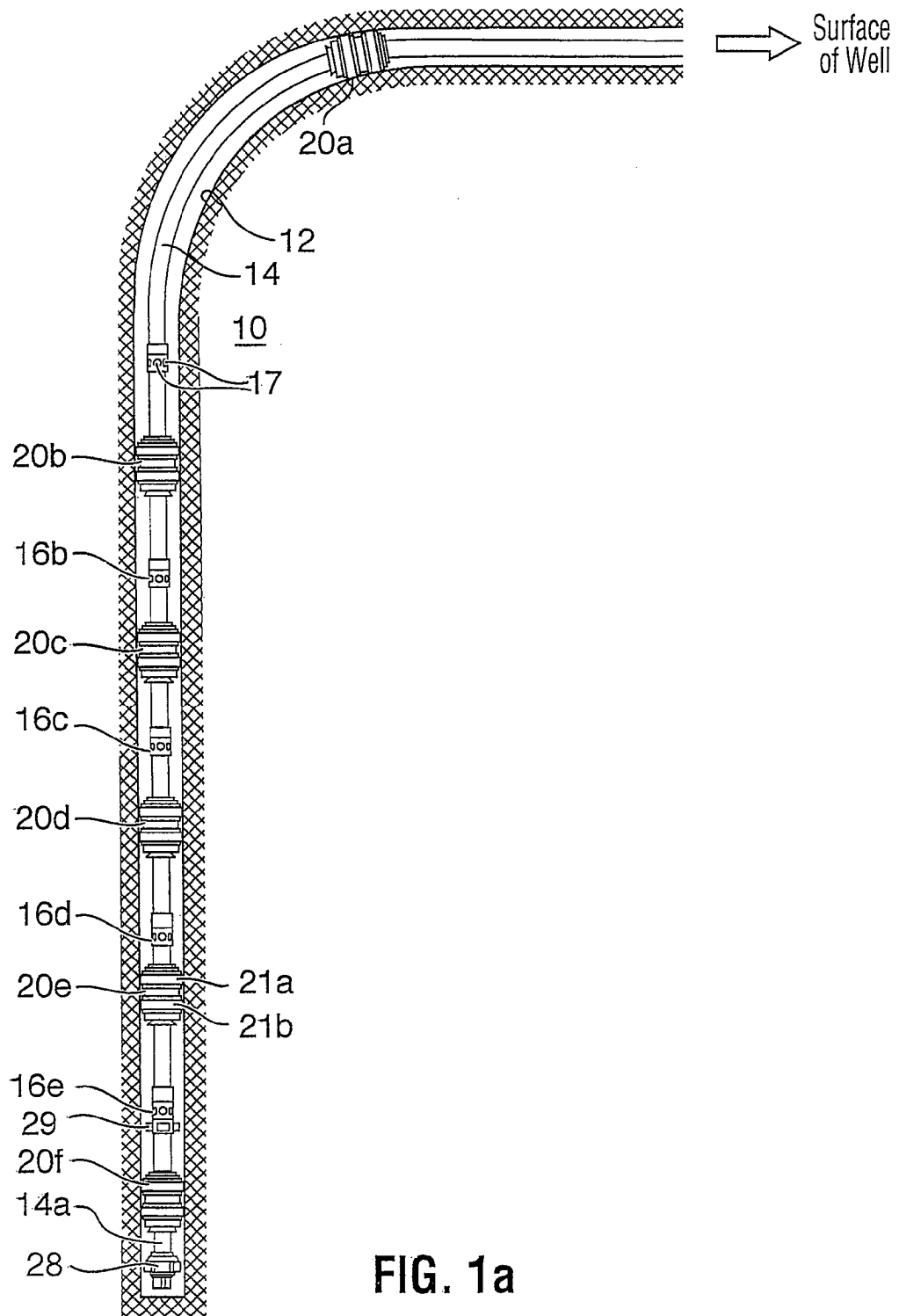


FIG. 1a

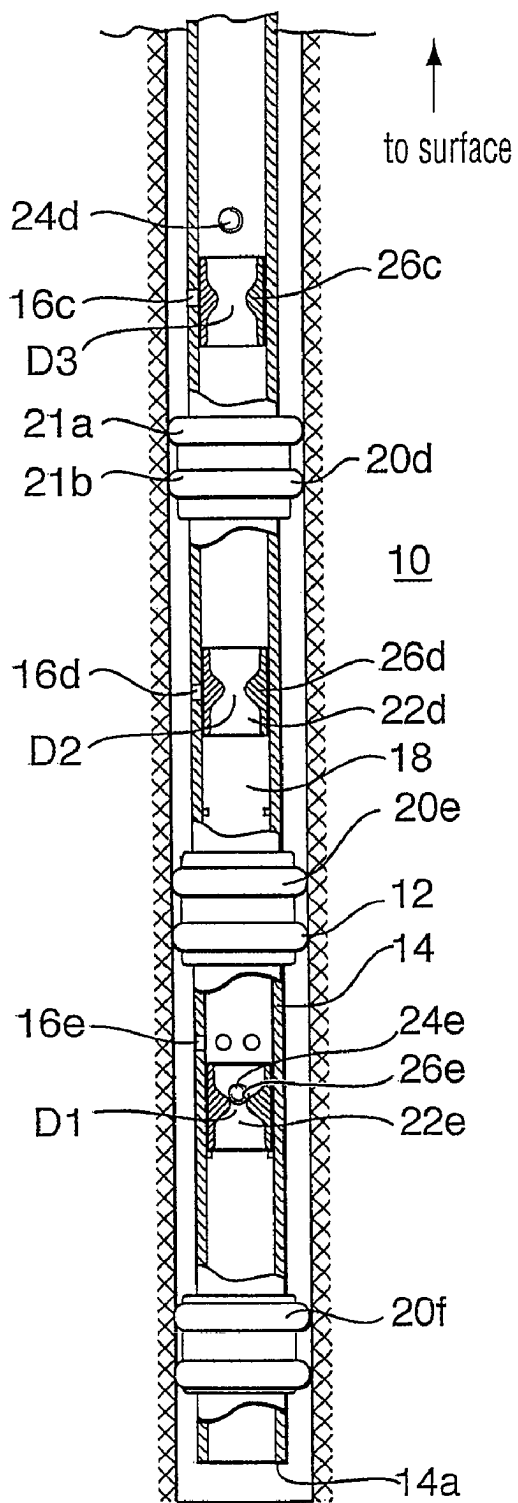


FIG. 1b

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