

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
23 February 2006 (23.02.2006)

PCT

(10) International Publication Number
WO 2006/020734 A3

(51) International Patent Classification:
E21B 17/00 (2006.01) *E21B 23/00* (2006.01)

(21) International Application Number:
PCT/US2005/028473

(22) International Filing Date: 11 August 2005 (11.08.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/600,679 11 August 2004 (11.08.2004) US

(71) Applicant (for all designated States except US): EN-
VENTURE GLOBAL TECHNOLOGY, LLC [US/US];
15995 North Barkers Landing, Suite 350, Houston, TX
77084 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): BRISCO, David,

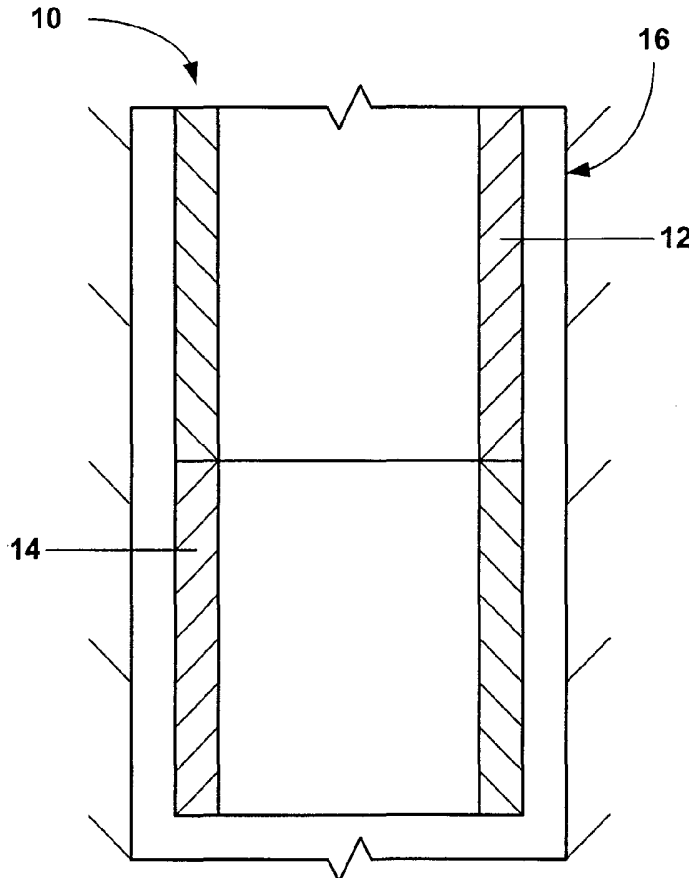
Paul [US/US]; 405 Westridge Drive, Duncan, Oklahoma
73533 (US). WATSON, Brock, Wayne [US/US]; 2535
Marsh Lane, # 1004, Carrollton, Texas 75006 (US).
SHUSTER, Mark [US/US]; 19115 Prospect Lane, Hous-
ton, Texas 77094 (US). GRAY, Malcolm [US/US]; 1502
Wagon Gap Trail, Houston, Texas 77010 (US). GRIN-
BERG, Grigoriy [US/US]; 4758 Mount Airy, Sylvania,
Ohio 43560 (US). COSTA, Scott [US/US]; 25614 Broad-
crest Court, Katy, Texas 77494 (US). WASSON, Russell
[US/US]; 2647 Highway J, Bourbon, Missouri 65441
(US).

(74) Agents: MATTINGLY, Todd et al.; Haynes and Boone
LLP, 901 Main Street, Suite 3100, Dallas, Texas 75202
(US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,

[Continued on next page]

(54) Title: LOW CARBON STEEL EXPANDABLE TUBULAR



(57) Abstract: A low carbon steel
expandable tubular (10, 100, 200).



WO 2006/020734 A3

18



MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, 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, IS, IT, LT, LU, LV, 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).

Declaration under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

9 November 2006

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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/28473

A. CLASSIFICATION OF SUBJECT MATTER
 IPC: **E21B 17/00(2006.01),23/00(2006.01)**

USPC: 166/380,242.1,207
 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. : 166/380, 242.1, 207, 382, 206

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, E	US 2005/0217768 A1 (ASAHI et al) 06 October 2005 (06.10.2005), see the entire patent, in particular, Paragraphs [0052]-[0109] and [0170].	1-20
A	US 6,070,671 A (CUMMING et al) 06 June 2000 (06.06.2000), column 3, lines 10-28.	1-20

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
 10 May 2006 (10.05.2006)

Date of mailing of the international search report

01 SEP 2006

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. (571) 273-3201

Authorized officer

Hoang Dang

Telephone No. 571-272-3600

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/28473

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
 2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of any additional fees.
 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
- Remark on Protest
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US05/28473

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-4, drawn to an expandable tubular member.

Group II, claim(s) 5-7, drawn to a method for manufacturing an expandable member or a structure completion.

Group III, claim(s) 8-10, drawn to a method for manufacturing an expandable member or an expandable member or a structural completion.

Group IV, claim(s) 11-13 and 18-20, drawn to a method for manufacturing an expandable member.

Group V, claim(s) 14-117, drawn to a method for manufacturing a tubular member or an expandable tubular member.

The inventions listed as Groups I-V do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical feature of the claims of Group I is an expandable tubular member having a carbon content being less than or equal to 0.12 percent and the carbon equivalent value being less than 0.21 or having a carbon content greater than 0.12 percent and the carbon equivalent value less than 0.36.

The special technical feature of the claims of Group II is an expandable tubular member formed from a steel alloy comprising a weight percentage of carbon of less than about 0.08%.

The special technical feature of the claims of Group III is an expandable tubular member formed from a steel alloy comprising a weight percentage of carbon of less than about 20% and a charpy V-notch impact toughness of at least about 6 joules.

The special technical feature of the claims of Group IV is an expandable member formed from a steel alloy comprising C from about 0.002 to about 0.08; Si from about 0.009 to about 0.30; Mn from about 0.10 to about 1.92; P from about 0.004 to about 0.07; S from about 0.0008 to about 0.006; Al up to about 0.04; N up to about 0.01; Cu up to about 0.3; Cr up to about 0.5; Ni up to about 18; Nb up to about 0.12; Ti up to about 0.6; Co up to about 9; and Mo up to about 5.

The special technical feature of the claims of Group V is an expandable tubular member fabricated from a steel alloy having a concentration of carbon between approximately 0.002% and 0.08% by weight of the steel alloy.

The claims of Groups I-V lack unity since they each depends on a different special technical feature as pointed out above.