

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 May 2003 (01.05.2003)

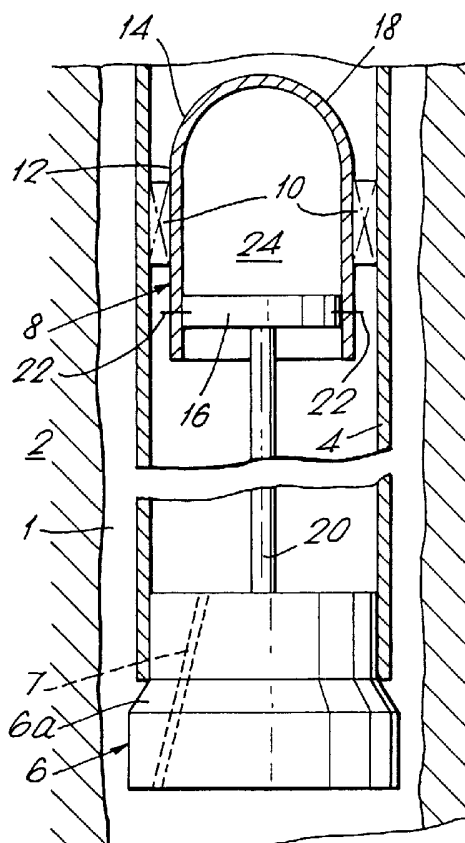
PCT

(10) International Publication Number
WO 03/036018 A3

- (51) International Patent Classification⁷: **E21B 23/04**, 43/10, 23/00, 33/134, 27/02
- (21) International Application Number: PCT/EP02/11898
- (22) International Filing Date: 23 October 2002 (23.10.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
01204031.7 23 October 2001 (23.10.2001) EP
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),

[Continued on next page]

(54) Title: DOWNHOLE ACTUATOR AND TOOL



(57) Abstract: A downhole actuator (8) movable from a first configuration to a second configuration by the action of a selected increase of fluid pressure acting on the exterior of the actuator (8), and a tool arranged to be moved by the actuator so as to perform a downhole operation upon movement of the actuator from the first configuration to the second configuration thereof. The actuator (8) may comprise an atmospheric gas reservoir (24, 88) and the tool may comprise an expander (37) for tubulars or a fluid injector (90, 81a).



Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK,
TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

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

18 September 2003

Published:

— with international search report

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/EP 02/11898

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E21B23/04 E21B43/10 E21B23/00 E21B33/134 E21B27/02

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)

IPC 7 E21B

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 669 190 A (SCHWEGMAN HARRY E ET AL) 13 June 1972 (1972-06-13)	1-8,11
Y	column 6, line 29 -column 8, line 7; figures 1-17	9

X	WO 01 46551 A (HARDING RICHARD PATRICK ;WEATHERFORD LAMB (US)) 28 June 2001 (2001-06-28) page 2, line 6-16; figures 1-11 page 6, line 19 -page 7, line 15; claims 3,4 page 7, line 29 -page 8, line 4	1-4,11

Y	WO 98 22690 A (SHELL CANADA LTD ;SHELL INT RESEARCH (NL)) 28 May 1998 (1998-05-28) figures 1-3	9

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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"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

"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

Date of the actual completion of the international search

15 January 2003

Date of mailing of the international search report

25.04.2003

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/11898

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 097 760 A (DAIDO STEEL CO LTD) 9 May 2001 (2001-05-09) figures 1-4 ---	1
A	US 5 560 426 A (TRAHAN KEVIN O ET AL) 1 October 1996 (1996-10-01) column 2, line 30-65 ---	1
A	EP 0 534 732 A (HALLIBURTON CO) 31 March 1993 (1993-03-31) abstract ---	3,4
A	US 6 189 616 B1 (GANO JOHN C ET AL) 20 February 2001 (2001-02-20) figure 10 -----	8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 02/11898

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional 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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

1-9, 11

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-9,11

Tubular element expander

2. Claim : 10

Fluid injector

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 02/11898

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3669190	A	13-06-1972	NONE	
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