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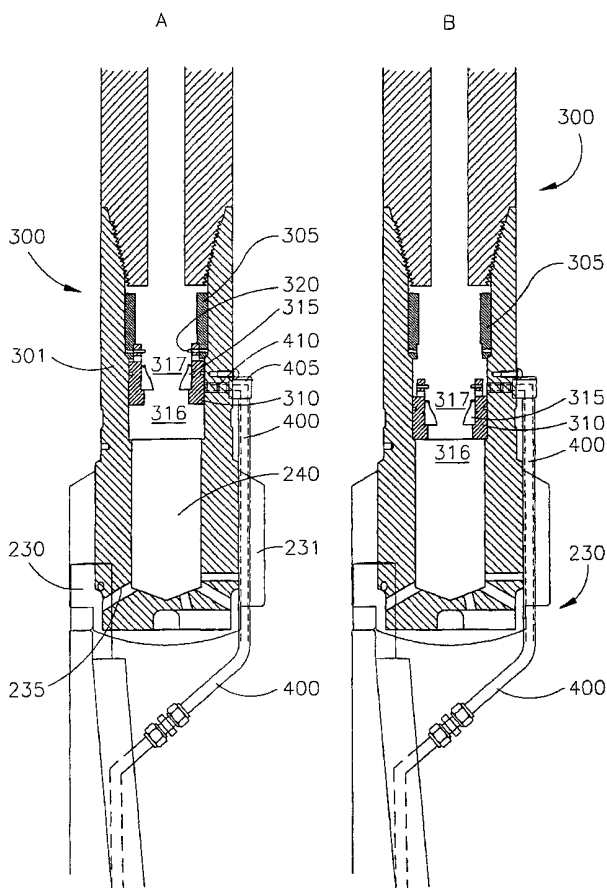
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- (25) Filing Language: English (72) Inventors: BRUNNERT, David, J. [US/US]; 7915 Clarion Way, Houston, TX 77040 (US). CARTER, Thurman, B. [US/US]; 2901 Roseheath Lane, Houston, TX 77073 (US). INGRAM, Gary, D. [US/US]; 6327 Bridlewood Drive, Richmond, TX 77469 (US). TEALE, David [US/US]; 6311 Rippling Hollow, Spring, TX 77379 (US).
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- (30) Priority Data: 09/547,068 11 April 2000 (11.04.2000) US (72) Inventor; and
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[Continued on next page]

(54) Title: APPARATUS TO ACTUATE DOWNHOLE TOOL



(57) Abstract: The invention provides an apparatus (300, 400) for actuating a downhole tool (700) by utilizing a pressure differential created by fluid flowing through a restriction in a conduit (315). The conduit is in communication with a pressure sensing line (400) that is selectively exposable to areas of near the restriction in the conduit (316, 317) having different pressures. By exposing the pressure sensing line to a portion of the conduit having a predetermined pressure therein, the pressure sensing line causes actuation of a hydraulic tool therebelow. The apparatus is of particular use for a single trip sidetrack system in combination with an MWD-tool, a whipstock, and an anchor packer without a bypass valve.



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AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,  
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HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,  
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*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/GB 01/01567

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 E21B7/06 E21B29/06 E21B47/024 E21B23/04 E21B23/06  
E21B33/1295

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, TULSA

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 359 067 A (RALPH WARREN) 26 September 1944 (1944-09-26) page 1, column 2, line 30 -page 2, column 2, line 14; figures 1-3 ---	1-7, 15
X	US 3 595 326 A (CLAYCOMB JACKSON R) 27 July 1971 (1971-07-27) column 5, line 1 -column 7, line 20; figures 2,3 ---	1-6, 15
X	EP 0 539 020 A (HALLIBURTON CO) 28 April 1993 (1993-04-28) column 12, line 28 -column 14, line 1; figure 2 ---	1, 2, 5
X	US 4 781 536 A (HICKS RUSSELL R) 1 November 1988 (1988-11-01) column 2, line 7-25; figures 2-5 ---	1, 2, 5
	-/--	

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
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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

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- \*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

17 October 2001

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Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 775 428 A (DAVIS JERRY ET AL) 7 July 1998 (1998-07-07) figure 5 ---	1,7,15
A	WO 99 47789 A (CHURCHILL ANDREW PHILIP) 23 September 1999 (1999-09-23) the whole document ---	1,7,15
A	US 4 566 540 A (PRINGLE RONALD E ET AL) 28 January 1986 (1986-01-28) abstract; figure 1 ---	15
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A	GB 2 303 158 A (RED BARON) 12 February 1997 (1997-02-12) page 5, paragraph 1; figures 1-5 page 9, paragraph 1 -page 10, paragraph 1 ---	20
A	US 5 771 972 A (DAWSON ALEXANDER WILLIAM ET AL) 30 June 1998 (1998-06-30) figures 3-5 ---	20
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P,A	EP 0 994 238 A (SCHLUMBERGER SERVICES PETROL ;SCHLUMBERGER HOLDINGS (VG)) 19 April 2000 (2000-04-19) figures 1-3 -----	20

# INTERNATIONAL SEARCH REPORT

international application No.  
PCT/GB 01/01567

## 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.:  
  
1-15, 20
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.
- 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: 1-15

downhole tool actuator comprising a restriction

2. Claims: 16-19

downhole tool comprising an atmospheric chamber

3. Claim : 20

method of setting a mechanism and drilling with MWD in a single trip

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 01/01567

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