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31.08.2001 US 316572 P
17.10.2001 US 981487
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04.12.2001 US 4945
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02.05.2002 US 136969
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(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:
02736875.2 / 1 392 953

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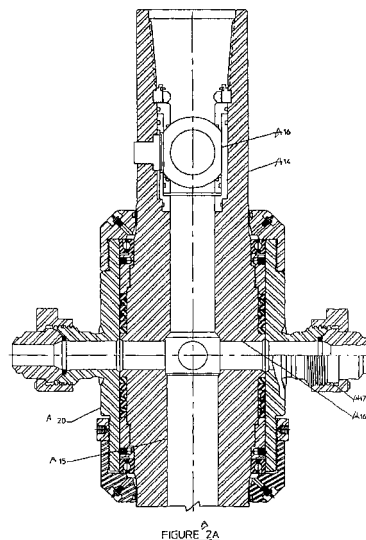
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(54) **Liner hanger, running tool and method**

(57) A liner hanger running tool (120) includes improvements to the running tool release mechanism, the packoff bushing, and the packer setting assembly. A method is provided for reliably releasing a running tool from a liner hanger (110), for allowing stabbing of the running tool packoff bushing (10) into the top of the liner hanger, and for reliably setting the radial set packer element. The port closure member (212) is movable with a tubular body from a port isolation position to an open port position. The tool includes an annular seal assembly and a substantially conical wedge ring having an outer surface configured to radially expand the annular seal assembly. A ball (240) is lowered into a diverter and thus guided into a pocket (286) in one side thereof to permit passage of a pump down plug (180) into a lower wiper plug (181). A slip assembly carried about a liner for lowering into a wellbore includes a C-ring (64), which expands to cause its teeth to engage with the wellbore. A plug holder (10) sub temporarily supports a liner wiper plug, so that a pump down plug may land in the liner

wiper plug and be supported from a generally tubular body of the plug holder sub.



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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 2128

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 206 095 B1 (BAUGH JOHN L) 27 March 2001 (2001-03-27) * abstract; figures *	1	INV. E21B23/06 E21B33/04 E21B33/12 E21B33/05
A	US 2 713 909 A (BAKER REUBEN C) 26 July 1955 (1955-07-26) * claim 1; figures *	1	
A	DE 23 62 175 A1 (DELANO, CHARLES GEORGE, CORPUS CHRISTI, TEX.) 26 June 1975 (1975-06-26) * claim 1; figures *	1	
A	US 5 960 881 A (ALLAMON ET AL) 5 October 1999 (1999-10-05) * abstract; figures *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E21B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		11 August 2006	Weiland, Thomas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1,2



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1,2

A ball and plug dropping head

2. claims: 3,4

A liner hanger system

3. claims: 5-8

A tool and method for suspending and sealing a liner hanger
in a casing

4. claims: 9,10

A plug holder sub for temporarily supporting a wiper plug

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 01 2128

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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11-08-2006

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