

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 063718.5423	FOR FURTHER ACTION		See item 4 below
International application No. PCT/US2016/020105	International filing date (<i>day/month/year</i>) 29 February 2016 (29.02.2016)	Priority date (<i>day/month/year</i>)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant HALLIBURTON ENERGY SERVICES, INC.			

<p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
<p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).</p>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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<p align="center">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p>	<p>Date of issuance of this report 04 September 2018 (04.09.2018)</p>
	<p>Authorized officer</p> <p align="center">Xiaofan Tang</p> <p>e-mail: pct.team2@wipo.int</p>

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: CATE, AVERY BAKER BOTTS LLP 910 LOUISIANA STREET HOUSTON TX 77002 USA

Date of mailing (day/month/year) 22 November 2016 (22.11.2016)

Applicant's or agent's file reference 063718.5423	FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US2016/020105	International filing date (day/month/year) 29 February 2016 (29.02.2016)	Priority date(day/month/year)
International Patent Classification (IPC) or both national classification and IPC E21B 23/00(2006.01)i, E21B 23/02(2006.01)i, E21B 17/00(2006.01)i		
Applicant HALLIBURTON ENERGY SERVICES, INC.		

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	Date of completion of this opinion 18 November 2016 (18.11.2016)	Authorized officer LEE, Dal Kyong Telephone No. +82-42-481-8440
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2016/020105

Box No. 1 Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :
 - the international application in the language in which it was filed
 - a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*. I(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13*ter*. I(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13*ter*. I(a)).
 - on paper or in the form of an image file (Rule 13*ter*. I(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2016/020105

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-20</u>	YES
	Claims	<u>NONE</u>	NO
Inventive step (IS)	Claims	<u>1-20</u>	YES
	Claims	<u>NONE</u>	NO
Industrial applicability (IA)	Claims	<u>1-20</u>	YES
	Claims	<u>NONE</u>	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2013-0161027 A1 (HALLIBURTON ENERGY SERVICES, INC.) 27 June 2013

D2: US 2014-0209323 A1 (SCHLUMBERGER TECHNOLOGY CORPORATION) 31 July 2014

D3: US 2015-0041218 A1 (TOLER, JR., JIMMY EDWARD) 12 February 2015

D4: US 2011-0232898 A1 (PENDLETON et al.) 29 September 2011

D5: US 2011-0232897 A1 (ZWEIFEL, THOMAS J.) 29 September 2011

1. Novelty and Inventive Step

1.1 Independent Claim 1

The subject matter of claim 1 differs from prior art documents D1-D5 in that a system comprises a low-load ramped surface of a first protrusion having a shallow angle and a low-load ramped surface of a second protrusion having a steep angle that is larger than the shallow angle. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2 Dependent Claims 2-6

Claims 2-6 are directly or indirectly dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.3 Independent Claim 7

Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of : Box No. V

The subject matter of claim 7 differs from prior art documents D1-D5 in that a collet comprises a low-load ramped surface of a first protrusion having a shallow angle and a low-load ramped surface of a second protrusion having a steep angle that is larger than the shallow angle. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 7 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.4 Dependent Claims 8-14

Claims 8-14 are dependent on claim 7 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Independent Claim 15

The subject matter of claim 15 differs from prior art documents D1-D5 in that a method of actuating a downhole tool comprises providing a low-load ramped surface of a first protrusion having a shallow angle and a low-load ramped surface of a second protrusion having a steep angle that is larger than the shallow angle. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 15 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.6 Dependent Claims 16-20

Claims 16-20 are directly or indirectly dependent on claim 15 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).