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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
18 August 2016

(54) Title: METHOD OF REMOVING MATERIALS BY THEIR DISINTEGRATION BY ACTION OF ELECTRIC PLASMA

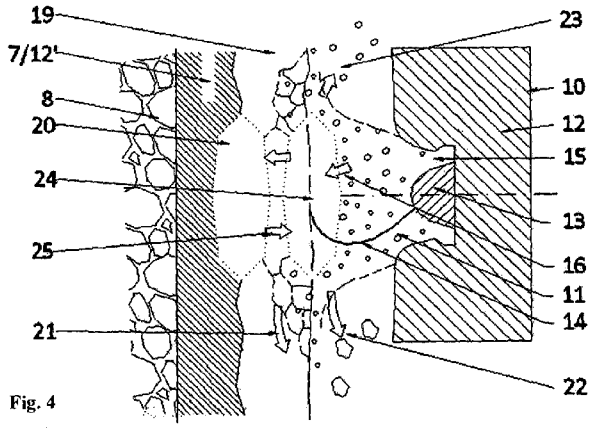


Fig. 4

(57) Abstract: A method of removing materials by their disintegration, especially metal tubes and non-metal materials, particularly in an area of a borehole, by thermal disintegration of materials by action of plasma created in a plasma generator, by hydrodynamic and/or gravitational removing of disintegrated materials from the area of the borehole, characterized in that a directed flow of water vapour-based plasma acts on material being disintegrated and disintegrates it by synergetic simultaneous effect of thermal action and exothermic chemical reactions.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/SK2015/050014

A. CLASSIFICATION OF SUBJECT MATTER
INV. E21B29/02 E21B7/14 E21B7/15
ADD.

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)
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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 567 898 A (FEIN SAMUEL) 2 March 1971 (1971-03-02) cited in the application	1-7, 10-12, 14-19, 21,23,24
Y	column 2, lines 60-75 column 3, line 28 - column 4, line 31; figure 1 column 4, line 60 - column 5, line 6	8,9,13, 22
Y	WO 2014/137299 A1 (GA DRILLING A S [SK]) 12 September 2014 (2014-09-12) cited in the application paragraphs [0062] - [0078]	13,22
A	US 5 006 687 A (FUJITA TSUTOMU [JP] ET AL) 9 April 1991 (1991-04-09) column 6, lines 42-47 column 11, lines 11-24; figure 20	23

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family 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 application or patent but published on or after the international filing date

"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)

"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	Date of mailing of the international search report
7 June 2016	22/06/2016

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Beran, Jiri

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/SK2015/050014

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94/13424 A1 (HYPERTHERM INC [US]) 23 June 1994 (1994-06-23) page 6, line 17 - page 11, line 3	1,2,5,6, 12-15, 22,23
A	WO 2011/037546 A2 (KOCIS IVAN [SK]; KOCIS IGOR [SK]; KOCIS DUSAN [SK]; KRISTOFIC TOMAS [S) 31 March 2011 (2011-03-31) cited in the application pages 3-9	1,2,5,6, 12-15, 22,23
Y	US 3 621 916 A (SMITH NOYES D JR) 23 November 1971 (1971-11-23) column 3, lines 54-62	8,9
A	WO 2013/126358 A1 (SHELL OIL CO [US]; SHELL INT RESEARCH [NL]) 29 August 2013 (2013-08-29) page 4, lines 11-41	1,3,4, 7-11, 16-21

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SK2015/050014

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:

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 fees, this Authority did not invite payment of 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.

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, 2, 5, 6, 12-15, 22, 23

   A method of generating, modifying and directing a water-vapour based plasma in a material removal with the simultaneous effect of a thermal action and exothermic chemical reactions dissintegrating said material.

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2. claims: 1, 3, 4, 7-11, 16-21, 24

   A physical, chemical and material property of a material removed by a water-vapour based plasma with the simultaneous effect of a thermal action and exothermic chemical reactions disintegrating said material.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/SK2015/050014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 2015041144 A1	12-02-2015
		WO 2013126358 A1	29-08-2013