

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43*bis*.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2017/055949

International filing date (day/month/year)
28.09.2017

Priority date (day/month/year)
29.09.2016

International Patent Classification (IPC) or both national classification and IPC
INV. F16C17/08 F16C21/00 F16C23/04 F16C32/06 F16C39/02

Applicant
GENIUS ENERGY S R L

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 43*bis*.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 usually 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 66.1*bis*(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.

<p>Name and mailing address of the ISA:</p> <div style="text-align: center;">  <p>European Patent Office</p> <p>D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465</p> </div>	<p>Date of completion of this opinion</p> <p>see form PCT/ISA/210</p>	<p>Authorized Officer</p> <p>Fischbach, Gerhard</p> <p>Telephone No. +49 89 2399-0</p>
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Box No. I Basis of the 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 43bis.1(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 13ter.1(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 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(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:

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)	Yes: Claims	<u>1-11</u>
	No: Claims	

Inventive step (IS)	Yes: Claims	<u>1-11</u>
	No: Claims	

Industrial applicability (IA)	Yes: Claims	<u>1-11</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Reference is made to the following documents:
- D1 US 2010/155512 A1 (PERSSON SEBASTIAN [SE] ET AL)
24 June 2010 (2010-06-24)
 - D2 JP S55 115432 U (NN.) 14 August 1980 (1980-08-14)
 - D3 US 3 672 733 A (ARSENIUS TORSTEN HENRY ET AL)
27 June 1972 (1972-06-27)
 - D4 US 4 218 023 A (BRUNDIEK HORST [DE]) 19 August 1980
- 1.1 D1 may be regarded as being the prior art closest to the subject-matter of claim 1, and discloses (cf. paragraphs 31 to 67 and figures 2a, 2b, 2c and 3):
A vertical support device with reduced energy dissipation for rotating shafts 102, 202 comprising a spherical end portion 126, 226 having radius (r) that is adapted to be rigidly constrained to a rotating vertical shaft, coupled with a rotating and floating plate 128, 228 having a hemispherical upper surface 129, 229, which identifies a complementary concave seat 129, 229 having radius (r) for the spherical end portion 126, 226, also comprising a bearing track 127, 227 for bearing a load (K) that rests on the plate 128, 228, wherein the plate 128, 228 (including the hemispherical cap 128, 228) and the bearing track 127, 227 are arranged coaxial to a housing hollow body 132, 232 and have an axial hole 144, 244 for the passage of pressurised feed oil for the hydrostatic bearing of the spherical end portion 126, 226, an oil separating film being arranged between the conjugated tracks of the plate 128, 228 and of the bearing track 127, 227, as well as between the hemispherical cap 128, 228 and the spherical end portion 126, 226.
- 1.2 The subject-matter of claim 1 therefore differs from this known support device in that
- a) the rotating and floating plate (3) bears a hemispherical cap (4), i.e. cup and plate are made as two pieces and not in one piece as in D1
 - b) the rotating and floating plate (3) has a maximum outer radius ($d_e/2$)

greater than the radius of curvature (r) of the spherical end portion (2) and c) the support device comprises at least one hydraulic cooling circuit for cooling the bearing track (5)

and is therefore new (Article 33(2) PCT).

1.3 Two separate problems are solved by the above features, which may therefore be regarded as solving a constructional task (a) and b)) and providing a cooling function (c)).

1.4 The solutions to these problems proposed in claim 1 of the present application are considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Features a) and b) concern the design of a hemispherical cup supported by a bearing plate as a two piece solution instead of making cup and plate of one piece as disclosed in D1 as well as the geometrical relation of diameter d_e of the rotating and floating plate (3) and radius (r) of the spherical end portion (2). Even though these features per se are known from D2 (cf. figure), it is not regarded obvious to the skilled person to take this document into consideration, since D2 refers to a gas bearing with a porous bearing member 2, while the spherical parts 61, 71 define a gas supply device with an air supply channel therethrough. Furthermore, its shaft 12 is also not rigidly constrained to spherical end portion 7.

Feature c) concerns a separate hydraulic cooling circuit for cooling the bearing track. Such an hydraulic cooling circuit is not disclosed in any of the cited documents.

Accordingly, the subject-matter of claim 1 is neither known from nor rendered obvious by the cited prior art.

2 Claims 2 to 11 are dependent on one or more independent claims whose subject-matter is considered as being new and inventive, as discussed above, and as such said dependent claims also meet the requirements of the PCT with respect to novelty and inventive step.