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).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

   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.

3. This report contains indications relating to the following items:
   - Box No. I  Basis of the report
   - 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 Article 35(2) with regard to novelty, inventive step or 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

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).

Date of issuance of this report
09 May 2017 (09.05.2017)

Authorized officer
Agnès Wittmann-Regis

e-mail: pct.teams@wipo.int

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Form PCT/IB/373 (January 2004)
PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA220

PCT

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

Date of mailing
(day/month/year) see form PCT/ISA210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2015/058718

International filing date (day/month/year) 03.11.2015

Priority date (day/month/year) 07.11.2014

International Patent Classification (IPC) or both national classification and IPC
INV. G21C17/013 B63G8/00 ADD. G01M3/38 H01F27/00 E21B23/00

Applicant
ABB TECHNOLOGY AG

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 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 66.1bis(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/ISA220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA220.

Name and mailing address of the ISA:
European Patent Office
D-80296 Munich
Tel. +49 89 2399 - 0
Fax: +49 89 2399 - 4465

Date of completion of this opinion
see form PCT/ISA210

Authorized Officer
Sewtz, Michael
Telephone No. +49 89 2399-0

Form PCT/ISA237 (Cover Sheet) (January 2015)
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

<table>
<thead>
<tr>
<th>Novelty (N)</th>
<th>Yes: Claims 7-10, 18</th>
<th>No: Claims 1-6, 11-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventive step (IS)</td>
<td>Yes: Claims 9, 10, 18</td>
<td>No: Claims 1-8, 11-17</td>
</tr>
<tr>
<td>Industrial applicability (IA)</td>
<td>Yes: Claims 1-18</td>
<td>No: Claims</td>
</tr>
</tbody>
</table>

2. Citations and explanations

> **see separate sheet**

**Box No. VIII**  Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

> **see separate sheet**
Re item V

1. Citations


D2 EP 2 762 279 A1 (2014-08-06)


2. Independent claims

2.1 Claims 1 and 13 in view of D1

Document D1 discloses (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Figs. 1, 5-6) an inspection device [suitable] for use in a fluid container, comprising:

- at least one thrust device (5);
- at least one ballast device (buoyancy tanks 3) and;
- a cage (9) which carries said at least one thrust device (5) and said at least one ballast device (3), said cage comprising at least two bars, each said bar providing an opening wherein said openings form a cage cavity to carry said at least one thrust device and said at least one ballast device (Fig. 1),

according to claim 1.

With respect to claim 13 it is noted, that cage (9) carries a component (thruster 5) and that the fluid passes through openings in cage (9).

Therefore, the subject-matter of present claims 1 and 13, as far as it is clear (see also below section VIII.1.2.), lacks novelty (Art. 33(2) PCT).

2.2 Claims 1 and 13 in view of D2

Document D2 discloses ([0010], [0018]; Figs. 2-6) an inspection device for use in a fluid container according to claims 1 and 13. In particular, D2 discloses thrust device (64), ballast device (battery (54) and a cage (32, 34, 36, see also below section VIII. 1.2).

With respect to claim 13 it is noted, that the fluid passes through openings (46A1, 46A2) in cage (32, 34, 36).

Therefore, the subject-matter of present claims 1 and 13, as far as it is clear (see also below section VIII.1.2.), lacks novelty over D2, as well.
2.3 Claim 13 in view of D3

Document D3 discloses (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4) an inspection device [suitable] for use in a fluid container according to claim 13. In particular, D3 discloses a component (ballast device 28) and a cage (22, 24, see also below section VIII. 1.2), wherein the fluid passes through openings (18) in cage (22, 24).

Therefore, the subject-matter of present claim 13, as far as it is clear (see also below section VIII.1.2.), lacks novelty over D3, as well,

3. Dependent claims

The following dependent claims do not appear to contain any additional features which, in combination with the features of the claims to which they refer, meet the requirements of the PCT with respect to Novelty (Art. 33(2) PCT) and/or Inventive Step (Art. 33(3) PCT), the reasons being as follows:

<table>
<thead>
<tr>
<th>claims</th>
<th>N/IS</th>
<th>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): Thrust device (5) and ballast device (3) are carried within the cage (9). D2 ([0010], [0018]; Figs. 2-6).</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): First and second set of parallel bars.</td>
</tr>
<tr>
<td>3</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): First and second directions are perpendicular.</td>
</tr>
<tr>
<td>4</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): Intersection points (elbows 16) for a cage opening.</td>
</tr>
<tr>
<td>5</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): The cage opening is contiguous with said cage cavity to allow fluid to flow through cage (9) when thrust device (5) is activated.</td>
</tr>
<tr>
<td>6</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): It is well-known to form cages from slats, according to the subject-matter of claims 7 and 8, see e.g. D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4), see also below section VIII.1.2.</td>
</tr>
<tr>
<td>7, 8</td>
<td>IS</td>
<td>---</td>
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<td></td>
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</tr>
<tr>
<td>11</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): Bars of cage (9) intersect at elbows (16).</td>
</tr>
<tr>
<td>12</td>
<td>IS</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): It is well-known to form spherical inspection vehicles, see D2 (Fig. 2) or D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4). D2 ([0010], [0018]; Figs. 2-6).</td>
</tr>
<tr>
<td>14</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): First and second bars are connected at intersection points (elbows 16). D2 ([0010], [0018]; Figs. 2-6): First and second bars (44) are connected at intersection points (46A1) with the housing (30). D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4): First bars (24a-c) and second bars (24d-h).</td>
</tr>
<tr>
<td>15</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): Interconnecting bar (7). D2 (Figs. 5-6): interconnecting bar, connecting bars (44). D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4): Interconnecting bars (24d-h).</td>
</tr>
<tr>
<td>16</td>
<td>N</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Figs. 1, 5-6): Circular bars (15, 21) with openings and different outer diameters, see also below section VIII.1.2. D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4): Bars (24d-h) have a different outer diameter and an opening for housing the floating device (28).</td>
</tr>
<tr>
<td>17</td>
<td>IS</td>
<td>D1 (p. 5, l. 1-21; p. 6, l. 8-11; p. 9, l. 6-10; Fig. 1): It is well-known to form cages from slats, see e.g. D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4), see also below section VIII.1.2. D3 (p. 3, l. 17 to p. 4, l. 30; Figs. 1-4): Bars (24a-h) are slats (see also below section VIII.1.2) with leading and trailing edge.</td>
</tr>
</tbody>
</table>
4. **No objections with regard to novelty and inventive step**

No objections with regard to novelty (Art. 33(2), PCT) and inventive step (Art. 33(3), PCT) are made with respect to present claim 9, which refers back to claims 8 and 1; with respect to claim 10, which refers back to claim 1; and with respect to claim 18, which refers back to claims 17 and 13.

Document D1 is identified as closest prior art with respect to claims 9, 10, and 18 and discloses the subject-matter of claims 1 and 13 and renders obvious the subject-matter of claim 8, see above sections 2 and 3.

Document D1 does not disclose, that the slats, forming the cage, have (a leading edge opposite a trailing edge, wherein said leading edge and said trailing edge are connected by) opposed surfaces which are oriented in a same direction as a thrust vector generated by said at least one thrust device.

This distinguishing technical feature solves the problem of reducing the resistance of the inspection device when travelling through viscous media like oil, and of simultaneously stabilising the motion of the device.

The above solution is neither disclosed, nor rendered obvious by the currently available prior art D1-D3.

5. **Remarks**

In view of a further prosecution of the application in front of the European Patent Office, new claims should be filed which take into account the above observations. The applicant is asked to show where a basis for the amendments can be found in the original application document. The independent claims should be put in the two-part form and the most relevant documents D1-D3 should be acknowledged in the description. The description should be brought in line with the new claims.

Further, the features of the claims should be provided with reference signs placed in parentheses to increase the intelligibility of the claims. This applies to both the preamble and characterising portion.
Re item VIII

1. Conciseness, clarity, and support by the description (Art. 6 PCT)

1.1 Conciseness

The present set of claims does not meet the requirements of Art. 6 PCT (conciseness) because of the multiple number of independent apparatus claims 1 and 13, which do not relate to a plurality of interrelated products, different use of an apparatus, or alternative solutions to a particular problem.

1.2 Clarity of claims 1, 13, 16, and 17

According to the Oxford English Dictionary, a bar is "a straight piece of wood, metal, or other rigid material, long in proportion to its thickness". Claim 16 and the present description (p. 5,l. 19-25), however specify, that the bar has a circular body. The skilled person would therefore relate this claim to bars with different circular cross-sectional diameters. Claim 17, however, specifies, that the bar does not have a circular cross-section, but is a slat.

With respect to D2 it is noted, that housing parts (Fig. 3: parts 32, 34, 36) may as well be called slats or bars, if the above terms are not clarified, which may be done on the basis of the present description (p. 5, l. 19-23).

The present wording of claims 1, 13, 16, and 17 therefore is vague and unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

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