

# 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/GB2019/053344

International filing date (day/month/year)  
27.11.2019

Priority date (day/month/year)  
27.11.2018

International Patent Classification (IPC) or both national classification and IPC  
INV. H02N1/04

Applicant  
UNIVERSITY OF SURREY

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.

Name and mailing address of the ISA:



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Date of completion of this opinion

see form  
PCT/ISA/210

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**Box No. I Basis of the opinion**

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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:

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**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**

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1. Statement

|                               |             |                        |
|-------------------------------|-------------|------------------------|
| Novelty (N)                   | Yes: Claims | <u>3, 10-23, 25-30</u> |
|                               | No: Claims  | <u>1, 2, 4-9, 24</u>   |
| Inventive step (IS)           | Yes: Claims | <u>10-12, 14-23</u>    |
|                               | No: Claims  | <u>1-9, 13, 24-30</u>  |
| Industrial applicability (IA) | Yes: Claims | <u>1-30</u>            |
|                               | No: Claims  |                        |

2. Citations and explanations

**see separate sheet**

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

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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 VIII**

**Certain observations on the international application**

- 1 The application does not meet the requirements of Article 6 PCT, because claim 1 is not clear.
- 1.1 In claim 1, the expressions "another surface" and "other surface" are not clear since claim 1 does not define which surface is meant. The examiner has interpreted these expressions as meaning a surface of the actuating elements.

**Re Item V**

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

Reference is made to the following documents:

- D1 KR 2017 0002363 A (NAT UNIV CHONNAM IND FOUND [KR]; UNIV SUNGKYUNKWAN RES & BUS [KR]) 6 January 2017 (2017-01-06)
- D2 CN 105 897 036 A (UNIV JIANGSU) 24 August 2016 (2016-08-24)

**Novelty**

- 2 The present application does not meet the requirements of Article 33(1) PCT, because the subject-matter of claims 1,2,4-8,9,24 is not new in the sense of Article 33(2) PCT.
- 2.1 The document D1 discloses (the references in parentheses applying to this document):

A triboelectric generator for generating electrical power using the triboelectric effect, the triboelectric generator comprising:  
a first body (fig.1, ref.40);  
a second body (fig.1, ref.10) moveable relative to the first body;  
a plurality of power generation modules(fig.1, ref.50) disposed on the first body, the plurality of power generation modules each being electrically connected to a common output and comprising material capable of generating electrical power through the triboelectric effect when brought into contact with another surface (§[0034]); and  
one or more actuating elements (fig.1, ref.20) disposed on the second body, wherein the plurality of power generation modules and the one or more

actuating elements are arranged on the first and second bodies such that relative movement of the first and second bodies can cause the one or more actuating elements to come into contact with the plurality of power generation modules,

wherein the contact between one of the one or more actuating elements and one of the power generation modules causes the material of said one of the power generation modules to be brought into contact with said other surface so that electrical power is generated, and

wherein the triboelectric generator is configured such that the plurality of power generation modules supply electrical power to the common output at different times during the relative movement of the first and second bodies.

Therefore, claim 1 is not new.

The features of claims 2,4-8,24 are also disclosed in D1 (see fig.1).

- 2.2 D2 is also describing all the features of claim 1 (see claim 1 and fig.1). Furthermore, D2 discloses also the features of claim 9 since both elements 4 and 5 are power generation modules.

### **Inventive Step**

- 3 The present application does not meet the requirements of Article 33(1) PCT, because the subject-matter of claims 3,13,25-30 does not involve an inventive step in the sense of Article 33(3) PCT.
- 3.1 The features of claim 3 are alternatives to the ones of claim 1. The skilled person knows that the configuration of a rotating generator may be adapted to linear movement. Insofar, the features of claim 3 are not inventive.
- 3.2 The use of rectifiers as claimed in claims 13 and 25 is well known in the state of the art. Therefore, the features of claims 13 and 25 are not inventive.
- 3.3 Claims 26-30 define an apparatus using the generator of claim 1. These features are straightforward and not inventive.

### **Claims 10-12,14-23**

The combination of the features of dependent claims 10-12 and 14-23 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

Starting from D1 or D2, the skilled person has no technical incentives in modifying D1 or D2 in order to achieve a triboelectric generator as claimed in the combination of claim 1 with one or several of claims 10-12 and 14-23. Therefore, these claims are inventive.