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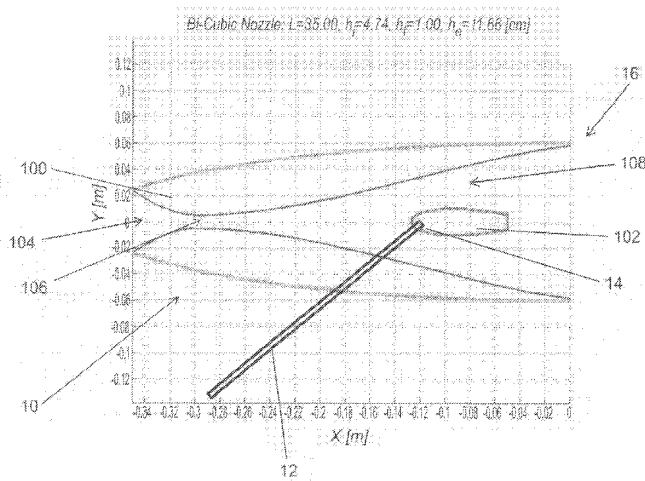
Declarations under Rule 4.17:

— 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))

(54) Title: METHOD AND APPARATUS FOR ARTIFICIAL DISTRIBUTION OF INSECTS OR SPRAY



(57) Abstract: A diffuser (10) for distributing spray or insects from an aircraft is mounted on an aircraft and comprises a distribution tube (12) connected to an insect source at a first end and open to the outside at a second end (14) for distribution of the insects. A nozzle (100) surrounds the second end (14) and a tube cover (102) surrounds the second end (14) within the nozzle (100). The tube cover (102) has an aerofoil, or wing-shaped, cross section. The nozzle (100) shape sets up an air transition volume between the aircraft and ambient air designed for a maximum wind shear over any cubic centimeter volume within the air transition volume to be less than 60km/h, and therefore allowing distribution of insects such as mosquitoes from the aircraft without damage, or allowing aerosols to be spread as large droplets.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 63910	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IL2015/050964	International filing date (<i>day/month/year</i>) 21.09.2015	Priority date (<i>day/month/year</i>) 22.09.2014	
International Patent Classification (IPC) or national classification and IPC INV. B64D1/18			
Applicant Senecio Ltd.			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ (<i>sent to the applicant and to the International Bureau</i>) a total of <u>4</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☒ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3ter of Annex C of the Administrative Instructions).			
4. 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 conclusion 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			
Date of submission of the demand 19.07.2016		Date of completion of this report 21.12.2016	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465		Authorized officer Talvitie, Risto Telephone No. +49 89 2399-4588	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IL2015/050964

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ 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 (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-21 as originally filed

Claims, Numbers

1-11 filed with the letter of 19-10-2016

Drawings, Sheets

1/14-14/14 as originally filed

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.
3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☒ the claims, Nos. 12-23
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☒ the claims, Nos. 7,8
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 29.11.2016 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded".

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-7, 9-11</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-7, 9-11</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-7, 9-11</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

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 I

Amendments not taken into account

- 1 Amended dependent claims 7 and 8, filed with the letter dated 19.10.2016, introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. No basis has been indicated, or can be found, in the application as filed for the combination of features of amended claim 7 without the features of amended claim 8. Likewise, no basis has been indicated or found for the combination of the features of claims 7 and 8 together, without the further features of claim 5.

Amended claims 7 and 8 are, therefore, not taken into consideration in this International Preliminary Examination Report (Rules 70.2(c) and (c-bis)), and the subject-matter of the originally filed claim 7 will be examined instead.

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 US 1 957 075 A (MORGENSEN JR OTTO) 1 May 1934 (1934-05-01)
- D2 US 2 772 061 A (SELLERS JOSEPH M) 27 November 1956 (1956-11-27)
- D5 US 4 260 108 A (MAEDGEN JR MALCOLM A) 7 April 1981 (1981-04-07)
- 2 D5 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses a diffuser (figures 2A,B) for distributing insects from an aircraft (figure 1), the diffuser being mountable on the aircraft, the diffuser comprising:
- at least one distribution tube (23) for connection to a source (14) at a first end and open to the outside at a second end for distribution of the *insects* (column 6, line 32 - 40);
 - a nozzle (12) surrounding the second end, the nozzle (12) being configured to allow part of a flight airstream to enter the diffuser and decrease in velocity (column 6, line 22 - 31);
- the diffuser being intended specifically for distributing insect eggs.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT), as it differs from this known diffuser in further comprising:
a tube cover surrounding the second end within the nozzle, the tube cover having an open aerofoil-shaped cross section, the diffuser thereby shielding the material being distributed; thereby to form an air transition volume.

The problem to be solved by the present invention may, therefore, be regarded as protecting insects being distributed.

Solutions exist in the field of insecticide distribution diffusers for shielding a distribution tube within an aerofoil-shaped cover, as is disclosed in D1 (figures 1, 2) and D2 (figures 1, 2, 3, 4). However, these solutions are not aimed at protecting insects being distributed, and would thus not be considered by the skilled person in solving the problem. Furthermore, the openings of the disclosed aerofoil-shaped covers for insecticide distribution (*jet openings* 6 in D1, *perforations or ports* 22 and 23 in D2) would be unsuitable for distributing insects or their eggs.

The solution proposed in claim 1 of the present application to this problem is thus considered as involving an inventive step (Article 33(3) PCT).

- 3 The method of setting up an air velocity gradient according to independent claim 10, by using a diffuser according to the apparatus claims to set up an air transition volume, is also considered as involving an inventive step (Article 33(3) PCT): Diffusers of the prior art, such as the ones disclosed in D1 (closest prior art) and D2, are not disclosed as providing an air transition volume behind the distribution tube shielded by the wing-shaped cover, nor do they suggest this, as their wing-shaped covers are shaped to avoid air-flow separation.
- 4 Claims 2-7, 9, 11 are each dependent on an independent claim 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.

Re Item VII

Certain defects in the international application

- 5 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art D5 being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 6 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D5 is also not mentioned in the description, nor is this document identified therein.
- 7 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Re Item VIII

Certain observations on the international application

- 8 Claim 1 generally does not meet the requirements of Article 6 PCT, as the features of the claimed device cannot be clearly understood from the claim text, without relying heavily on the description and figures.
- 8.1 This is partly a result of the use of unusual terminology, such as:
- a "nozzle" for what is understood from the figures to be a *duct* or a *main body* of the claimed diffuser;
 - a "tube cover" for what appears, in fact, to be a *nozzle* surrounding the tube end; and
 - an "air transition volume", the relationship of which to the *shielding of the material being distributed* is not clearly defined, and which appears, in fact, not to define any further technical features of the claimed diffuser.
- 8.2 Furthermore, being directed to a *diffuser for distributing insects*, while subsequently referring to "*distribution of the material*" and to "*shielding the material being distributed*", leads to a lack of clarity as to what is being distributed.
- 9 The method step of claim 10 of "*flying an aircraft in excess of stall speed and ambient air*" cannot be clearly understood (Article 6 PCT). In light of the description (page 6, lines 3 - 4), this step must be interpreted as *flying in excess of stall speed and ambient air speed*.



G. E. Ehrlich (1995) Ltd



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- h Also registered in Illinois, Minnesota, Kansas

19 October, 2016

Attention: Authorized Officer: Talvitie Risto
European Patent Office
D-80298 Munich

VIA FAX: 49-89-2399-4465 (8 pages + Forms 1037)

Dear Sirs,

Re : PCT Patent Application No. PCT/IL2015/050964
Filed: 21 September 2015
By : Senecio Ltd. (Inventor: LEPEK Hanan et al)
For : METHOD AND APPARATUS FOR ARTIFICIAL DISTRIBUTION OF INSECTS OR SPRAY

Agent Ref: 63910

Attached please find a Response to the 2nd Written Opinion, of 24 August 2016, being submitted before the 2 months deadline as established by the European Patent Office, namely **24 October 2016**.

Yours very truly,

Dr. Gal Ehrlich (AB)
Agent on behalf of Applicant

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1

Application Number: PCT/IL2015/050964

Applicant: SENECIO LTD.

Filed: 21 September 2015

Title: METHOD AND APPARATUS FOR ARTIFICIAL DISTRIBUTION OF INSECTS OR
SPRAY

Examiner: TALVITIE Risto

Remarks

The claims are amended to deal with the clarity issues raised by the Examiner.

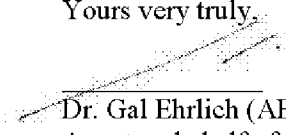
Claim 1 is amended to define the open aerofoil shape of the tube cover, as indicated by the Examiner.

The method claims are defined as making use of the diffuser of the apparatus claims.

The issues of two-part form and reference numerals, are left to the national phase as they are not required in many countries.

As the kind suggestions of the Examiner have been adopted it is now believed that the claims represent allowable subject matter and the issuance of a positive IPER is respectfully awaited.

Yours very truly,



Dr. Gal Ehrlich (AB)

Agent on behalf of Applicant

Enclosed: Marked Up Amended claims
Clean Amended Claims

WHAT IS CLAIMED IS:

1. A diffuser for distributing insects from an aircraft, the diffuser being mountable on the aircraft, the diffuser comprising:

at least one distribution tube for connection to a source at a first end and open to the outside at a second end for distribution of the material;

a nozzle surrounding the second end, the nozzle being configured to allow part of a flight airstream to enter the diffuser and decrease in velocity;

and a tube cover surrounding the second end within the nozzle, the tube cover having an open aerofoil-shaped cross section, the diffuser thereby shielding the material being distributed; thereby to form an air transition volume.

2. The diffuser of claim 1, wherein the nozzle comprises a subsonic two-dimensional converging-diverging nozzle.

3. The diffuser of claim 2, wherein the nozzle comprises a bi-cubic polynomial internal contour.

4. The diffuser of any of claims 1 to 3, wherein the nozzle comprises an elliptical external shape.

5. The diffuser of any one of the preceding claims, wherein the aerofoil shape is an NACA standard shape.

6. The diffuser of claim 5, wherein the NACA standard shape is an NACA 0018 standard shape.

7. The diffuser of any one of the preceding claims, wherein the tube cover is positioned within the nozzle such as to limit flow separation to the near wake of the blunt trailing edge section of the nozzle.

8. The diffuser of claim 7, wherein said tube cover comprises a smooth external contour of the standard shape.

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9. The diffuser of any one of the preceding claims, wherein the nozzle comprises a cross-sectional internal contour following a cubic polynomial shape.

10. A method of setting up an air velocity gradient comprising:
flying an aircraft in excess of stall speed and ambient air, the aircraft having a diffuser mounted thereon, the diffuser being according to any one of the preceding claims;

setting up an air transition volume using the diffuser, the air transition volume being between the aircraft flying in excess of an aircraft stall speed and in excess of 110kmh, and the ambient air, the air transition volume being set up by the diffuser to comprise:

a first transition volume part immediately behind an opening of a tube part of the diffuser, at a location shielded by a wing-shaped tube cover and surrounded by a nozzle, the first transition volume part defined by an airspeed of air exiting the opening at a velocity of at least 1m/s less than a speed of the aircraft;

successive further transition volume parts receding from the first transition volume part rearwardly of the diffuser, said further transition parts eventually merging into the ambient air, the transition volume being characterized by a maximum wind shear over any cubic centimeter volume within the air transition volume being less than 60km/h.

11. The method of claim 10, further comprising
using overpressure to push insects out of an insect source into the first end of said tube and allowing the insects to exit the tube at a second end into the air transition volume.