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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,

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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))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

(54) Title: FERTILIZER COATING METHOD

(57) Abstract: Disclosed is a method of coating fertilizer particles with a coating, the method comprising providing fertilizer particles in a coating unit, one or more steps of applying a coating layer by applying one or more coating components to the fertilizer particles in the coating unit, and at least, partially curing or hardening the coating layer, wherein said curing or hardening involves a chemical reaction of said one or more coating components, discharging the coated fertilizer particles from the coating unit, optionally after a final cure or hardening step, wherein the coating unit comprises a stationary frame and at least two movable elements.

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 P119252PC00	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IB2019/054628	International filing date (<i>day/month/year</i>) 04.06.2019	Priority date (<i>day/month/year</i>) 04.06.2018	
International Patent Classification (IPC) or national classification and IPC INV. C05C9/00			
Applicant Pursell Agri-Tech, LLC			
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 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			
Date of submission of the demand 02.09.2019	Date of completion of this report 21.08.2020		
Name and mailing address of the international preliminary examining authority:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016		Authorized officer Agra-Gutierrez, C Telephone No. +31 70 340-1960	



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

1-29 as originally filed

Claims, Numbers

1-15 as originally filed

Drawings, Sheets

1, 2 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.
 - ☐ 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.
 - ☐ 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.
PCT/IB2019/054628

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 14.04.2020 (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>1-15</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-15</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-15</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

Re Item V

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

D1 US 2015/376077 A1

D2 US 2014/298873 A1

D3 US 4 854 715 A

D4 JP H11 228271 A

D5 JP H08 277191 A

1 Novelty - Article 33(2) PCT

None of the documents cited above describing the state of the art disclose all technical features of independent claims 1 or 15 in combination. Therefore the subject-matter of claims 1-15 is novel within the meaning of Article 33(2) PCT.

2 Inventive step - Article 33(3) PCT

The present application meets the criteria of Article 33(1) PCT, because the subject-matter of claims 1-15 can be considered as to involve an inventive step in the sense of Article 33(3) PCT.

2.1 Document D4 is regarded as being the prior art closest to the subject-matter of independent claims 1 and 15 and discloses a method of coating fertilizer particles as described in previous communications. In particular, D4 further discloses that the coating apparatus 1 may be a Henschel or a Nauta mixer mixer (see paragraph [0040]).

In the letter dated 21.07.2020 the applicant indicated that D4 did not directly and unambiguously disclosed that the Henschel or Nauta mixers comprised a stationary container frame with one rotor on the central axis including several blades as movable elements or a stationary container frame with two rotors on two axes displaced from the axis of the container at a distance and forming an angle. The examining division respectfully disagrees with this statement

because the construction of a Henschel or Nauta mixer constitutes common knowledge in the field of coating apparatus and it is therefore readily available to the skilled person.

As confirmed by the applicant in page 2 lines 22-25 of the letter dated 21.07.2020, the subject-matter of claims 1 and 15 therefore differs from this known method and urea finishing plant in at least partially curing or hardening the coating layer, wherein said curing or hardening involves a chemical reaction of said coating component.

The applicant has provided, in page 2 line 27 to page 3 line 30, technical arguments in support of a technical effect of the above differences with respect to the disclosure of D4. In this respect, conventional processes for coating fertilizer particles, such as the process of D4, are based on coating the fertilizer particles with a coating agent comprising a polymer and a solvent. After coating the particles with this coating agent, the solvent has to be evaporated in order to obtain the particles coated with the polymer. This evaporation is an essentially physical process in which no chemical reaction takes place, and the efficiency of this evaporation process determines the design of the coating units to provide sufficient transport of heat and gases and to achieve efficient and fast evaporation of the solvent.

In the process of the invention, curing or hardening of the coating layer involves a chemical reaction, which is fundamentally different from the essentially physical process of evaporation. Therefore, for an efficient chemical curing or hardening process, other factors play a role in determining optimal design than those for efficient evaporation processes. For instance, the change in viscosity of the coating layer over time is typically much faster in case of curing or hardening involving chemical reaction compared to the change in viscosity over time during evaporation. In particular, during the chemical reaction there is the so called gel phase in which the viscosity may increase very rapidly in a very short time. During this gel phase, the particles can temporarily become sticky.

The coating unit used in the process of the present invention should therefore preferably be suitable for keeping the particles in suspension and preventing sticking together of the particles (present application, page 12, lines 3-8).

The problem to be solved by the present invention may therefore be regarded as to how to provide an efficient method of curing or hardening polymer coatings on fertilizer particles.

Due to the specific requirements of a coating unit designed for providing a cured or hardened polymer coating on fertilizer particles, it would not be obvious how to modify the method and urea finishing plant known from D4 when faced with the above objective technical problem in such a way that the method and apparatus according to claims 1 and 15 are obtained. Therefore, the skilled person would not apply coating units that are suitable for evaporation to a coating process that involves curing or hardening by chemical reaction with a reasonable expectation of success.

Consequently, the subject-matter of claims 1-15 can be considered as to involve an inventive step (Article 33(3) PCT).

- 2.2 It is also noted that similar arguments would apply *mutatis mutandis* if document D5 were to be considered the prior art closest to the subject-matter of claims 1-15. The subject-matter of claims 1-15 can also be considered as to involve an inventive step in the sense of Article 33(3) PCT.

3 Industrial applicability - Article 33(4) PCT

The subject-matter of claims 1-15 is useful in the technical field of coating fertilizer particles and fulfils therefore the requirements of Article 33(4) PCT.

Re Item VII

4 Certain defects in the international application

- 4.1 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 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).
- 4.2 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D4 and D5 is not mentioned in the description, nor are these documents identified therein.
- 4.3 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).