

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference N00562WO-PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2017/052448	International filing date (<i>day/month/year</i>) 20 September 2017 (20.09.2017)	Priority date (<i>day/month/year</i>)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant CARGILL, INCORPORATED		

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 6 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: <table style="width: 100%;"> <tr> <td style="width: 5%; text-align: center;">☒</td> <td style="width: 25%;">Box No. I</td> <td style="width: 70%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	☒	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
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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).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 24 March 2020 (24.03.2020) Authorized officer Agnès Wittmann-Regis e-mail: pct.team6@wipo.int
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: Jihan A.R. Jenkins
MS 24
15407 McGinty Road West
Wayzata, MN 55391
United States of America

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

20 NOV 2017

Applicant's or agent's file reference
N00562WO-PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/US17/52448

International filing date (day/month/year)
20 September 2017 (20.09.2017)

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC

IPC - C09K 8/90, 8/58, 8/588 (2017.01)

CPC - C08B 37/0024; C09K 8/90, 8/58, 8/588

Applicant
CARGILL, INCORPORATED

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 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/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/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300

Date of completion of this opinion
31 October 2017 (31.10.2017)

Authorized officer
Shane Thomas
PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US17/52448

Box No. I Basis of this 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 43*bis*.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 13*ter*.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 13*ter*.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13*ter*.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:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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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

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-19	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-2, 9-10, 14-15, and 18-19 lack an inventive step under PCT Article 33(3) as being obvious over CA 1329159 C (WINTERSHALL AG) (hereinafter 'Wintershall') in view of JP 2016/113705 A to Hashimoto, et al (hereinafter 'Hashimoto').

As per claim 1, Wintershall discloses a beta glucan material, comprising solid 1,3-1,6 beta glucan (chain of 1,3-bonded beta-D glucopyranose units (1,3 beta glucan) substituted to different degrees by 1,6-bonded beta-D-glucopyranosyl groups (1,6 beta glucan); page 3, lines 1-3), that when solubilized achieves a filterability ratio ranging from 1 to 2 (solutions have MPFR, millipore filter ratio, of 1.0-1.4; page 16 lines 18-30) a viscosity ratio ranging from 1.5 to 4 (AW 114, the product of the invention, at 25 degrees C has a viscosity ratio of 74/30, i.e. 2.46; page 15, lines 1-21). However, the viscosity ratio of Wintershall is not measured as the ratio of the viscosity at 6 rpm to the viscosity at 60 rpm, as defined by the instant application paragraph [00014]. Hashimoto discloses a viscosity ratio ranging from 1.5 to 4 (TI (viscosity ratio) of 2.0-5.0 is desirable for use in softeners; seventeenth page, fifth paragraph), where the ratio is ratio of the viscosity at 6 rpm to the viscosity at 60 rpm (TI (viscosity ratio) is 6 rpm viscosity values/60 rpm viscosity values; seventeenth page, fourth paragraph). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the viscosity testing parameters of Hashimoto, as Wintershall already employs parameters in the same proportion (0.3 s⁻¹, i.e. 18 rpm and 3 s⁻¹, i.e. 180 rpm, with viscosity ratio of 2.46; page 15, lines 1-15) and it is taught by Hashimoto to achieve the highly similar viscosity ratio.

As per claim 2, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses that when solubilized achieves at least 90 percent ultimate viscosity (Ultimate viscosity is defined as the viscosity after a given solubilization procedure is repeated six times (see instant application paragraph [00012]). Since the material increases in viscosity as it is solubilized (see instant application paragraph [00032]) once the material is solubilized, that is, once solubilization is complete, the viscosity is by definition 100 percent of ultimate viscosity)).

As per claim 9, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses wherein the filterability ratio ranges from 1 to 1.5 (solutions have MPFR, millipore filter ratio, of 1.0-1.4; page 16, lines 18-30).

As per claim 10, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses wherein the filterability ratio ranges from 1 to 1.2 (solutions have MPFR, millipore filter ratio, of 1.0-1.4; page 16, lines 18-30).

As per claim 14, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses that when solubilized achieves a viscosity ranging from 2 cP to about 1000 cP (AW 114 has viscosity of 188 mPas, i.e., 188 cP; page 7, lines 1-10).

As per claim 15, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses that when solubilized achieves a viscosity ranging from 50 cP to about 200 cP (AW 114 has viscosity of 188 mPas, i.e., 188 cP; page 7, lines 1-10).

As per claim 18, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses wherein the material comprises at least 75 wt percent beta glucan (PS, i.e. polysaccharides, are beta glucans; page 3, lines 1-3) (resulting polysaccharides are 99 percent pure; page 2, lines 8-12).

As per claim 19, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. Wintershall further discloses wherein the material has a molecular weight ranging from 300,000 to 8 million daltons (AW 114 has molecular weight of 8X10⁶ g/mol (8 million daltons); page 7, lines 1-10).

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**WRITTEN OPINION OF THE
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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-Continued from Box V: Citations and Explanations-

Claims 3-8 lack an inventive step under PCT Article 33(3) as being obvious over Wintershall in view of Hashimoto, and further in view of US 6,106,867 A to Mishima, et al. (hereinafter 'Mishima').

As per claim 3, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. However, Wintershall does not disclose that the material achieves greater than 42 percent of ultimate viscosity after one pass after running solubilization procedure and greater than 70 percent of ultimate viscosity after two passes. Mishima discloses a beta glucan material (beta glucan material is preferred gelatinizing agents; column 3, lines 5-9) that achieves greater than 42 percent of ultimate viscosity after one pass after running solubilization procedure (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity) and greater than 70 percent of ultimate viscosity after two passes (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the solubilization procedure of Mishima, as it is taught by Mishima to completely solubilize the glucan (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1).

As per claim 4, Wintershall, Hashimoto, and Mishima, in combination, disclose the beta glucan material of claim 3. However, Wintershall does not disclose wherein greater than 60 percent of ultimate viscosity is achieved after running solubilization procedure for one pass. Mishima discloses wherein greater than 60 percent of ultimate viscosity is achieved after running solubilization procedure for one pass (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3 line 63-column 4 line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the solubilization procedure of Mishima, as it is taught by Mishima to completely solubilize the glucan (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1).

As per claim 5, Wintershall, Hashimoto, and Mishima, in combination, disclose the beta glucan material of claim 3. However, Wintershall does not disclose wherein greater than 70 percent of ultimate viscosity is achieved after running solubilization procedure for one pass. Mishima discloses wherein greater than 70 percent of ultimate viscosity is achieved after running solubilization procedure for one pass (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the solubilization procedure of Mishima, as it is taught by Mishima to completely solubilize the glucan (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1).

As per claim 6, Wintershall, Hashimoto, and Mishima, in combination, disclose the beta glucan material of claim 3. However, Wintershall does not disclose wherein greater than 80 percent of ultimate viscosity is achieved after running solubilization procedure for one pass. Mishima wherein greater than 80 percent of ultimate viscosity is achieved after running solubilization procedure for one pass (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the solubilization procedure of Mishima, as it is taught by Mishima to completely solubilize the glucan (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1).

As per claim 7, Wintershall, Hashimoto, and Mishima, in combination, disclose the beta glucan material of claim 3. However, Wintershall does not disclose wherein greater than 80 percent of ultimate viscosity is achieved after running solubilization procedure for two passes. Mishima wherein greater than 80 percent of ultimate viscosity is achieved after running solubilization procedure for two passes (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the solubilization procedure of Mishima, as it is taught by Mishima to completely solubilize the glucan (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1).

As per claim 8, Wintershall, Hashimoto, and Mishima, in combination, disclose the beta glucan material of claim 3. However, Wintershall does not disclose wherein greater than 90 percent of ultimate viscosity is achieved after running solubilization procedure for two passes. Mishima wherein greater than 90 percent of ultimate viscosity is achieved after running solubilization procedure for two passes (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1) (since one pass of the solubilization procedure completely dissolves the material, the viscosity after one solubilization procedure is equal to the ultimate viscosity). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the solubilization procedure of Mishima, as it is taught by Mishima to completely solubilize the glucan (gelatinizing agents heated (solubilization procedure) until completely dissolved; column 3, line 63-column 4, line 1).

-Continued Within the Next Supplemental Box-

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US17/52448

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-***-Continued from Previous Supplemental Box-***-

Claims 11-13 and 16-17 lack an inventive step under PCT Article 33(3) as being obvious over Wintershall in view of Hashimoto, and further in view of US 2011/0003982 A1 to Mazoyer, et al, (hereinafter 'Mazoyer').

As per claim 11, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. However, Wintershall does not disclose that when solubilized the material achieves less than 13 percent viscosity loss. Mazoyer discloses a material that when solubilized the material achieves less than 13 percent viscosity loss (before filtration viscosity is 210 cP, filtrate viscosities of 193-3100 cP, equating to a viscosity loss of 8.1 percent to-1,376 percent; table 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the viscosity loss of Mazoyer, as it is taught by Mazoyer that filtering removes impurities (glucans purified by process including filtration; paragraph [0001]) and that viscosity is desirable in many industrial applications (glucans' thickening properties have found industrial applications; paragraph [0002]).

As per claim 12, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. However, Wintershall does not disclose that when solubilized the material achieves less than 10 percent viscosity loss. Mazoyer discloses a material that when solubilized the material achieves less than 10 percent viscosity loss (before filtration viscosity is 210 cP, filtrate viscosities of 193-3100 cP, equating to a viscosity loss of 8.1 percent to-1,376 percent; table 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the viscosity loss of Mazoyer, as it is taught by Mazoyer that filtering removes impurities (glucans purified by process including filtration; paragraph [0001]) and that viscosity is desirable in many industrial applications (glucans' thickening properties have found industrial applications; paragraph [0002]).

As per claim 13, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. However, Wintershall does not disclose that when solubilized the material achieves less than 5 percent viscosity loss. Mazoyer discloses a material that when solubilized the material achieves less than 5 percent viscosity loss (before filtration viscosity is 210 cP, filtrate viscosities of 193-3100 cP, equating to a viscosity loss of 8.1 percent to-1,376 percent; table 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the viscosity loss of Mazoyer, as it is taught by Mazoyer that filtering removes impurities (glucans purified by process including filtration; paragraph [0001]) and that viscosity is desirable in many industrial applications (glucans' thickening properties have found industrial applications; paragraph [0002]).

As per claim 16, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. However, Wintershall does not disclose wherein the beta glucan is scleroglucan. Mazoyer discloses wherein the beta glucan is scleroglucan (scleroglucan used in invention; paragraph [0019]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the scleroglucan of Mazoyer, as it is taught by Mazoyer to be an acceptable glucan (scleroglucan is preferable glucan; paragraph [0019]).

As per claim 17, Wintershall and Hashimoto, in combination, disclose the beta glucan material of claim 1. However, Wintershall does not disclose wherein the beta glucan is schizophyllan. Mazoyer discloses wherein the beta glucan is schizophyllan (schizophyllan used in invention; paragraph [0019]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Wintershall to include the schizophyllan of Mazoyer, as it is taught by Mazoyer to be an acceptable glucan (schizophyllan is preferable glucan; paragraph [0019]).

Claims 1-19 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.