

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

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

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/EP2018/086650

International filing date (day/month/year)
21.12.2018

Priority date (day/month/year)
28.12.2017

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

Applicant
CARLSBERG A/S

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 <i>bis</i> .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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this opinion

see form
PCT/ISA/210

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Box No. I Basis of the 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 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

Novelty (N)	Yes: Claims	<u>2-9, 12, 16, 18, 19</u>
	No: Claims	<u>1, 10, 11, 13-15, 17</u>
Inventive step (IS)	Yes: Claims	<u>16</u>
	No: Claims	<u>1-15, 17-19</u>
Industrial applicability (IA)	Yes: Claims	<u>1-19</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43bis.1 and 70.9)

see form 210

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

Reference is made to the following documents (D1-D7); the numbering will be adhered to in the rest of the procedure.

D1	US 2013/095207 A1
D2	WO 94/29430 A1
D3	WO 2011/127372 A1
D4	CA 751 391 A
D5	US 5 405 624 A
D6	WO 2018/001882 A1
D7	GB 1 384 292 A

The applicant has requested to have the present application processed under PCT Direct (PCT Guidelines B-IV, 1.2.1). Account taken of the applicant's comments submitted with the PCT Direct letter of 21-12-2018, this Authority considers that the claims do not meet the requirements of the PCT for the following reasons:

Re Item V

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

1 - Remark for assessing the novelty and inventive step of claims 1 and 4

Step e) of claim 1 indicates: "finely dividing said germinated grains, while said germinated grains have a water content of at least 20%, with the proviso that said cereal grains do not have a water content below 20% **at any time between steps c) and e)**".

Step e) of claim 4 indicates: "finely dividing said germinated grains, while said germinated grains have a water content of at least 20%, with the proviso that said cereal grains do not have a water content below 20% **at any time between steps c) and d)**".

Passage on page 7, lines 13-17 indicates: "It is to be understood that the term "said cereal grains do not have a water content below 20% at any time between steps c) and e)" includes for example that said cereal grains may have a water content above 20% at any time during steps c), d) and e), at any time from completion of step c) to completion of step e) or at any time from completion of step c) to the initiation of step e)."

However claims 1 and 4 do not comprises the subject-matter of claim 16, wherein the method does not comprise a step of kiln drying germinated grains.

Paragraph 77 of D1 indicates: "Malt may be processed, for example, by milling and thus referred to as "milled malt" or "flour".

And paragraphs 136 and 137 of D1 indicate: "Malt may be further processed, for example by milling. Thus, the plant product according to the invention may be any kind of malt, such as unprocessed malt or milled malt, such as flour. Milled malt and flour thereof comprise chemical components of the malt and dead cells that lack the capacity to re-germinate. Preferably milling is performed in a dry state, i.e. the malt is milled while dry. Thus, it is preferred that malt is not milled under water."

The examining division notices that the milling in D1 is preferably performed in a dry state, which does not exclude that it may also be performed in a wet stage, after germination, when the grains have a water content of 40 to 50%.

D1 was therefore considered for assessing the novelty and inventive step of claims 1 and 4.

2 - The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1,10,11,13-15,17 is not new in the sense of Article 33(2) PCT.

- D1 describes a method for preparing a cereal based beverage with low levels of one or more off-flavours and/or precursors thereof, wherein the method involves reduced energy input, the method comprising the steps of:

- (i) providing a cereal plant or part thereof (e.g. barley grains);
- (ii) malting said cereal, thereby obtaining malted cereal, using a method comprising the steps of
 - a) steeping said barley;
 - b) germinating said barley;
 - c) kiln drying said barley;

(iii) mashing said malted cereal and optionally additional adjuncts, thereby obtaining a wort;

(iv) heating said wort optionally in the presence of additional ingredients (e.g. hops or an extract thereof), wherein at the most 4% of the wort volume is evaporated, thereby obtained heated wort;

(v) processing said heated wort into a beverage (e.g, barley beer), wherein step v) comprises fermentation of the wort.

Said barley and/or said malted barley is milled prior to said mashing.

Steeping may be performed by any conventional method known to the skilled person. One non-limiting example involves steeping at a temperature in the range of 10 to 25°C with alternating dry and wet conditions. During steeping, for example, the barley may be incubated wet for in the range of 30 min. to 3h followed by incubation dry for in the range of 30 min. to 3h and optionally repeating said incubation scheme in the range of 2 to 5 times. The final water content after steeping may, for example, be in the range of 40 to 50%.

Preferably, said kiln drying is performed at a low temperature, more preferably at a temperature below 80°C, yet more preferably at a temperature below 75°C, such as at temperature below 70°C, for example at a temperature below 65°C, such as at temperature below 60°C, for example at a temperature below 55°C, such as at temperature below 50°C, for example at a temperature below 45°C, such as at temperature below 41°C. Kilning at a temperature of below 50°C, for example in the range of 40 to 50°C, may require a kilning time of more than 40h, such as in the range of 40 to 60h, for example in the range of 45 to 52h, such as 48h.

In order to sufficiently dry the germinated barley kernels, the kiln drying time may increase if said drying is performed at a low temperature. Preferably, kiln drying is performed for a time sufficient to reduce the water content of the germinated kernels to less than 10%, preferably to less than 8%, more preferably to less than 6%.

The subject-matter of claims 1,10,11,13-15,17 is therefore not new.

3 - The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 2-8 and 12 does not involve an inventive step in the sense of Article 33(3) PCT.

The subject-matter of claims 2-8 and 12 differs from D1 in that the conditions of the germination step are indicated. These conditions come within the scope of the customary practice followed by persons skilled in the art (see D2), especially as the advantages thus achieved can be readily contemplated in advance.

D2 describes a method for improving the properties of malted cereals (e.g. barley or wheat) comprising the steps of: steeping, germination and kilning. The malted cereal is used for the preparation of beer.

In example 1 of D2, immersion steeping was carried out in two stages at 15°C using a 500 g batch of barley. Total barley to water ratio was 1:8 with a water change after 24 hours. During steeping there was continuous aeration of the water via circulation of a connected stirred reactor, which was aerated at a rate of 0.3 vvm (volume gas per volume liquid per minute). No air rests were applied. The germination was carried out on a 150 gram scale using an covered sieve box (type 22 cm laboratory test sieve, Endecotts Ltd, England). The boxes were placed in a temperature controlled cabinet at 18°C. Air was supplied to the germinating grain by natural diffusion. And kilning was performed in an "Aeromatic" drier. Three sieve boxes were put in the drier and air was blown through at speed 10. Inlet temperature for the first 18 hours was 50°C followed by 4 hours at 80°C.

The subject-matter of claims 4 and 12 further differ from D1 in that there is a step b) of removing hull when the cereal grains are hulled. This features comes within the scope of the customary practice followed by persons skilled in the art (see D7), especially as the advantages thus achieved can be readily contemplated in advance.

D7 discloses a process for preparing compositions for use in mashing for the preparation of brewers' worts including the steps of soaking cereal grain in water, so that the water content of the grain is at least 30% by weight based on the total weight of the soaked grain, draining off any surplus water, crushing the grain and drying the crushed soaked grain. The grain is at least partially dehusked before being soaked in water. It has been found that it is an advantage, before the grain is soaked in water, to submit the grain to various treatments designed to remove all or part of the husks and to make the next innermost layers permeable to various substances, when the thus treated grain is then soaked in water, certain components, deleterious in the production of beer, are removed in the water.

Consequently, the subject-matter of claims 2-8,12 appears to lack an inventive step.

4 - Dependent claims 9, 18 and 19 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step, the reasons being as follows:

- In claim 9 a slight constructional change in the method of claim 1 is suggested which comes within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can be readily contemplated in advance.
- In claims 18 and 19 a slight constructional change in the method of claim 1 is suggested which comes within the scope of the customary practice followed by persons skilled in the art (see D3), especially as the advantages thus achieved can be readily contemplated in advance.

D3 describes a method for improving yield in the malting process comprising: applying conditioned water to germinating cereal grain in the germination stage of the malting process, wherein the conditioned water comprises from 0.025% to 2% chloride salt. The malting process comprises three stages: steeping, germination, and kilning. During the steeping the barley kernels are immersed in water which may or may not be aerated. The goal of steeping is to increase the moisture level of the barley kernels from approximately 10% as harvested to 40-45% moisture. Germination broadly involves subjecting the steeped barley kernels to appropriate conditions of temperature, moisture, and airflow for a time sufficient for the starchy interior portion of the barley kernel to be made more friable and modified by cell wall degradation, and growth of the embryo facilitated. Table 6 of D3 indicates a quantity of rootlets of less than about 3%.

Consequently, the subject-matter of claims 9, 18 and 19 also appears to lack an inventive step.

5 - Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D6 is not mentioned in the description, nor are these documents identified therein.

- D4 describes a process of producing malt from a cereal grain. Samples of barley were steeped in water in the temperature range of 55 to 62°F for 20 hours, and then allowed to drain (couch) for about 2 hours (moisture content at this stage is in the range of 38 to 42%). The acid and gibberellic acid were sprayed on the steeped barley in separate dilute solutions, using sufficient dilution to bring the moisture content of the steeped barley up to 44% after the solutions are sprayed separately,

but simultaneously, into the barley. The treated barley was allowed to germinate in a suitable container with adequate aeration with humidified air in the temperature range of 59 to 62°F. The germinating samples were generally treated with water to keep the moisture at the 44% level, or treated with other solutions such as a solution of sodium metabisulfite or calcium hydroxide at 24, 48 and/or 72 hours germination time. After 72 hours or 84 hours, as the case may be, germination time the green malt was carefully kiln dried, with or without a small amount of sulphur dioxide mixed into the drying air during the first hour of drying. Generally the kilning times and temperatures were: 20 hours at 110 to 115°F, 20 hours at 120°F, and 2 to 4 hours at 175°F, all drying using an abundance of air. The malts can be used in foodstuffs as well as the brewing and distilling industries.

- D5 describes a process for preparing a dried malt with a high content of beer flavor precursors, beer flavor components, coloring agents, and soluble protein and low amylase levels and for converting the malt to a product with an intensified beer flavor.

Barley malt is steeped with water to produce steeped out barley which is germinated at a fairly low temperature. Germination is carried out with daily mixing and water addition as needed to maintain the moisture content at about 43%. The resulting green malt contains a high content of beer flavor precursors, beer flavor components, and coloring agents. After germination is complete, the green malt is heated at a high moisture content to generate beer flavor precursors, beer flavor components and also to reduce amylolytic enzyme activity. After heating, the malt is transferred to a kiln basket through which hot air is passed for a few hours to partially dry the malt. Then the heat is somewhat reduced to allow the malt to further dry for nearly a day. Then the inlet hot air temperature is increased to 85-95°C for a few hours for a final drying and further enhancing the flavor and color of the malt. The resulting dried malt has a moisture content of 3.5-5.5% and a soluble protein content of 6.5-8%.

The dried malt is then mashed, either by itself or with conventional malt, to produce a wort which is boiled with hops, cooled, pitched with brewers yeast, and fermented. During fermentation, a toasted barley protein extract may be added to further intensify the flavor of the finished product. The fermented wort is chilled to settle the yeast then filtered to produce a product with an intensified beer flavor.

Re Item VI

Certain documents cited

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (<i>valid claim</i>) (day/month/year)
WO 2018/001882	04-01-2018	23-06-2017	01-07-2016

D6 (WO 2018/001882) discloses a method for producing an aqueous extract of a cereal, said method comprising the steps of:

- a. providing grains of a cereal;
- b. subjecting the cereal grains to a step of germination thereby obtaining germinated grains, wherein said step of germination comprises incubating said grains in an aqueous solution until the grains have a water content of at least 30%, wherein at least 2 L 02per kg dry weight cereal grains is passed through said aqueous solution per h;
- c. finely dividing said germinated grains, while said germinated grains have a water content of at least 20%, with the proviso that said cereal grains do not have a water content below 20 at any time between steps b) and c);
- d. preparing an aqueous extract of said milled germinated grains,

thereby producing an aqueous extract of the cereal.

This is prejudicial for the subject-matter of claims 4,6-8,10-19.

Re Item VIII

Certain observations on the international application

1 - Although claims 1 and 4 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

2 - Claim 5 is a method according to claim 4 and not to any one of the preceding claims. Indeed the heat treatment step at a temperature in the range of 35 to 55 °C is already present in claim 1.

3 - Claim 11 is a method according to claim 1 and not to any one of the preceding claims. Indeed the germination temperature in the range of 15 to 30°C is already present in claim 4.

4 - Claim 12 is a method according to claim 4 and not to any one of the preceding claims. Indeed the "removal of said hull" refers to step b) of claim 4.