



(51) International Patent Classification:

A23C 11/00 (2006.01) A23L 9/20 (2016.01)
A23C 20/00 (2006.01) A23L 25/00 (2016.01)
A23L 1/36 (2006.01)

(21) International Application Number:

PCT/US2019/028899

(22) International Filing Date:

24 April 2019 (24.04.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/662,037 24 April 2018 (24.04.2018) US
62/687,141 19 June 2018 (19.06.2018) US
62/815,286 07 March 2019 (07.03.2019) US

(71) Applicant: **SPERO FOODS, INC.** [US/US]; 4121 Via Marina, 409, Marina Del Rey, California 90292 (US).

(72) Inventor: **RANDOLPH, Phaedra**; 4121 Via Marina, 409, Marina Del Rey, California 90292 (US).

(74) Agent: **MACCONAGHY, Kelsey**; Wilson Sonsini Goodrich & Rosati, 650 Page Mill Road, Palo Alto, California 94304 (US).

(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, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available):

ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: METHODS AND COMPOSITIONS FOR OILSEED MATERIALS

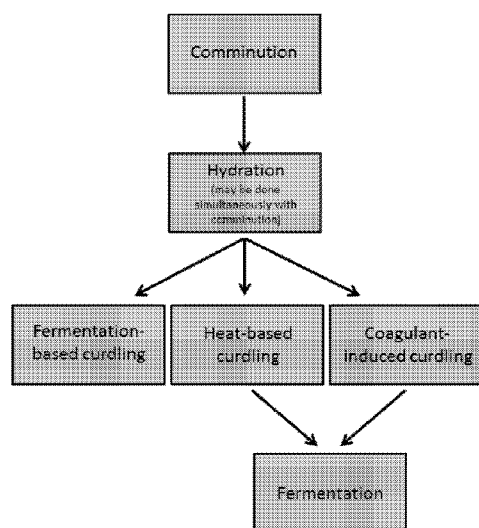


FIG. 4

(57) Abstract: Contained, herein, are processes that may be used to produce and compositions of plant-based egg, milk, cheese, and fermented products. Plant-based products may be produced from oilseed materials, squash seed materials, and compositions thereof. Oilseed and squash seed materials may be comminuted, hydrated, curdled, fermented, pressed, aged, or any combination thereof to form plant-based food products.



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))*

Published:

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

(88) Date of publication of the international search report:

23 July 2020 (23.07.2020)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 19/28899

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A23C 11/00; A23C 20/00; A23L 1/36; A23L 9/20; A23L 25/00 (2019.01)
CPC - A23C 11/106; A23C 20/005; A23L 9/20; A23L 25/30; A23L 25/40

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- A	JP 2015-167500 A (Frontier Foods Co. Ltd.) 28 September 2015 (28.09.2015); entire document, but especially: para [0001], para [0006], para [0008], para [0015], para [0016]	1-2, 4, 6-7 ----- 3, 5, 8
X --- A	US 4,659,583 A (Hashimoto et al.) 21 April 1987 (21.04.1987); entire document, but especially: col 2 lines 8-10, col 2 lines 24-25, col 2 line 58, example 4	1-2, 4, 9 ----- 3, 5, 8
A	US 2017/0042204 A1 (Hampton Creek, Inc.) 16 February 2017 (16.02.2017); para [0006], para [0010], para [0086], example 15	3
A	US 7,309,773 B2 (Green et al.) 18 December 2007 (18.12.2007); col 1 lines 11-12, col 2 lines 47-51, col 7 lines 35-38	5, 8
A	US 6,316,043 B1 (Tsumura et al.) 13 November 2001 (13.11.2001); col 1 lines 4-5, col 4 lines 37-40, col 5 lines 7-19, col 5 lines 60-65	5, 8
A	US 2015/0072046 A1 (Aftoora) 12 March 2015 (12.03.2015); entire document, but especially: para [0005], example 1	1-9

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 29 July 2019	Date of mailing of the international search report 10 OCT 2019
---	--

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	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
---	--

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 19/28899

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

- 2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

- 3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

--See Supplemental Sheet--

- 1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
- 2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
- 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
- 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-9

- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

Lack of Unity Invention

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I: Claims 1-9 directed to a method for forming a plant-based food product comprising comminuting squash seed material.

Group II: Claims 10-15, 52-55, and 63-83 directed to a method for forming a plant-based fermentation product, a composition comprising a plant-based fermentation product, and composition comprising a plant-based product.

Group III: Claims 16-51 and 56-62 directed to a method for forming a plant-based curd product and a composition comprising a plant-based curd product.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

SPECIAL TECHNICAL FEATURES

The invention of Group I includes the special technical feature of a method for forming a plant-based food product, comprising: providing a material comprising squash seed material and comminuting said material to form said plant-based food product, wherein said plant-based food product has a water content of less than or equal to 80% by weight, not required by the claims of Groups II-III.

The invention of Group II includes the special technical feature of a step of fermentation, a fermentation product, and a composition comprising a plant-based product comprising from about 5% to 30% by dry weight starch, protein isolate, protein powder, or combination thereof, wherein said plant-based product is thermoreversible and undergoes a phase transition from a solid phase to a semi-solid or liquid phase at a temperature, not required by the claims of Groups I or III.

The invention of Group III includes the special technical feature of method for forming a plant-based curd product and a plant-based curd product comprising at least 10% whole oilseed material by dry weight, not required by the claims of Groups I-II.

COMMON TECHNICAL FEATURES

Groups I-III share the common technical feature of method for forming a plant-based food product, comprising providing a material comprising about 5% squash seed material (squash seed is a type of oilseed, see instant specification [0029]: "In some embodiments, the oilseed material is selected from the group consisting of squash seeds..."). However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 4,659,583 A to Hashimoto et al., which discloses of a method of forming a plant-based food product (col 2 lines 8-10: "An object of the present invention is therefore to provide a method for the preparation of powdered or granulated... seeds...") comprising providing a material comprising about 5% squash seed material (example 4: "One part by weight of pumpkin seeds was roasted at 170 degrees centigrade. for 15 minutes in a roaster"; see instant specification [0078]: "...squash seed... e.g. pumpkin...").

Groups II-III share the common technical feature of a plant-based food product comprising at least about 5% whole oilseed material by dry weight and one or more protein isolates or protein powders. However, this shared technical feature does not represent a contribution over prior art as being obvious over US 2007/0014914 A1 to Borders et al. (hereinafter Borders), which discloses of a plant-based food product (example 11: "Crunchy Cajun Bar") comprising whole oilseed material by dry weight and protein isolates (para [0093]: "The ingredients for the Cajun bar are presented in Table 8"; table 8: "Cajun Party Mix... 75.00%... Modified Wheat Protein Isolate... 8.75%..."; para [0095]: "The Cajun party mix contained peanuts... sesame seeds..."; see instant specification [0078]: "The term 'oilseed,' as used herein... [includes]... peanut, sesame seed..."). However, Borders does not specifically disclose that the plant-based food product specifically comprises at least 5% whole oilseed material. However, it would have been obvious to one of ordinary skill in the art that the plant-based food product disclosed by Borders, the crunchy Cajun bar, comprises at least 5% whole oilseed material, since peanuts are listed as the first ingredient in the ingredient list of the Cajun party mix, which comprises 75% of the crunchy Cajun bar.

As the common technical features were known in the art at the time of the invention, these cannot be considered special technical feature that would otherwise unify the groups.

Therefore, Groups I-III lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.

Notes to Application:

Claim 10 lacks antecedent basis, it states that the step of fermenting can comprise "[reducing] a pigment... such that said pigment of said plant-based curd product is a white or off-white color", however, there is no plant-based curd product disclosed in claim 10. Therefore, in the interest of completing the international search, the word "curd" has been interpreted to be a typo, and that the step of reducing the pigment produces a plant-based product that is a white or off-white color.