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- (81) Designated States (unless otherwise indicated, for every
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AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
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GW, KM, ML, MR, NE, SN, TD, TG).
- Declarations under Rule 4.17:**
— of inventorship (Rule 4.17(iv))

[Continued on next page]

- (54) Title: DIHYDROXYALKYL SUBSTITUTED POLYGALACTOMANNAN, AND METHODS FOR PRODUCING AND USING THE SAME

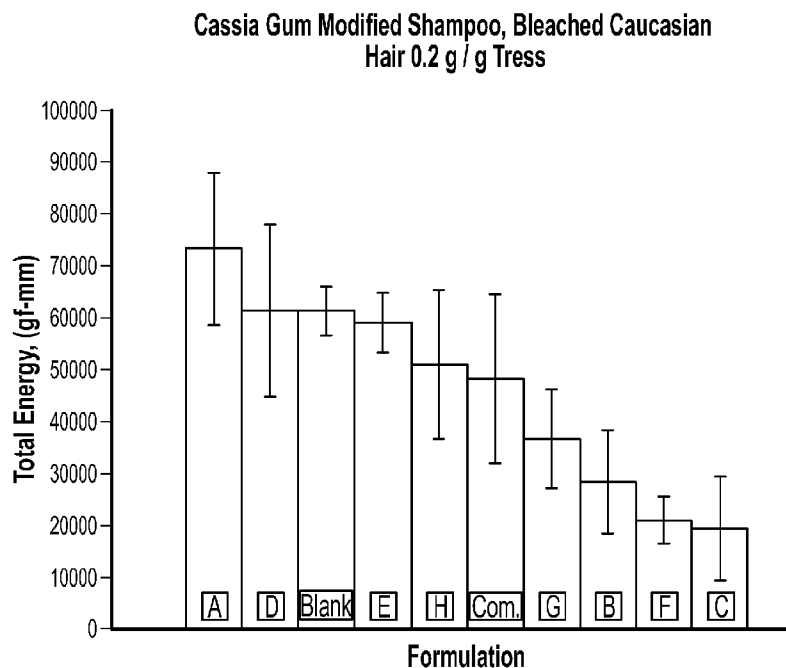


FIG. 1

(57) Abstract: Disclosed are compositions including dihydroxyalkyl substituted polygalactomannan, and the optional further substitution of such with cationic and/or hydrophobic moieties. Method of making such compositions is also disclosed as well as the use of such compositions in industrial applications, fabric laundering, and personal and household care.

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INTERNATIONAL SEARCH REPORT

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International application No.

PCT/US 14/58856

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C07H 3/00 (2014.01)

CPC - C12P 19/04; C08B 37/006; C08B 37/00

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)
IPC(8)-C07H 3/00 (2014.01)Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC-C12P 19/04; C08B 37/006; C08B 37/00
USPC-536/123,124,123.1,123.13

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

PatBase, Google Patents, Google Scholar (Without Patents)

Keywords: polygalactomannan dihydroxyalkyl mannose galactose moiety substituted unsubstituted ratio molecular weight range surfactant conditioning cation silicone

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/0129639 A1 (Anderson et al.) 23 May 2013 (23.05.2013) Abstract, para [0001], para [0005], para [0006], para [0011], para [0018], para [0012], para [0029], para [00335], para [0024], para [0057], para [0066], para [0083], para [0086], para [0089], para [0096], para [0070], para [0105], para [0125], para [0228], and entire document	1-6, 18-26
Y	US 2011/0213139 A1 (Chan et al.) 1 September 2011 (01.09.2011) Abstract, para [0006], para [0109], para [0039], and entire document	1-6, 18-26
Y	US 2010/0178261 A1 (Lepilleur) 15 July 2010 (15.07.2010) Abstract, para [0002], para [0012], para [0014], and entire document	1-6, 18-24
Y	US 2007/0292380 A1 (Staudigel et al.) 20 December 2007 (20.12.2007) Abstract, para [0001], para [0035], and entire document	1-6, 18-26
Y	US 5,128,462 A (Zody) 7 July 1992 (07.07.1992) Abstract, col 1 ln 5-20,	1-6, 18-26
Y	US 2011/0189248 A1 (Baldoro et al.) 4 August 2011 (04.08.2011) Abstract, para [0017], para [0031], para [0057] and entire document	1-6, 18-26
Y	US 2010/0075880 A1 (Dupont et al.) 25 March 2010 (25.03.2010) Abstract, para [0048], para [0041], and entire document	1-6, 18-26
A	US 2005/0026794 A1 (Utz et al.) 3 February 2005 (03.02.2005) Abstract, para [015], para [020]	1-6, 18-26
A	US 2009/0047227 A1 (Lepilleur) 19 February 2009 (19.02.2009) Abstract, para [005], para [013]	1-6, 18-26

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search

20 January 2015 (20.01.2015)

Date of mailing of the international search report

13 FEB 2015

Name and mailing address of the ISA/US

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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.: 7-17,27-52,62-66
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 PAGE ...

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.:
1-6,18-26

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.

continued from box III

FORM 206

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 examined, the appropriate additional examination fees must be paid.

Group I: claims 1-6, 18-26, directed to a composition comprising a polygalactomannan

Group II: claims 53-61, 67-84, directed to a method for making a dihydroxypropyl-substituted-polygalactomannan

The inventions listed as Groups I-II 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 special technical feature of Group II is a method for making a dihydroxypropyl-substituted-polygalactomannan, not required by group I

Shared Technical Features:

Groups I-II share the technical feature of composition comprising a polygalactomannan substituted with at least one dihydroxyalkyl moiety, wherein the composition comprises unsubstituted mannose, substituted mannose, unsubstituted galactose and substituted galactose, and wherein the molar ratio of the combined unsubstituted mannose and substituted mannose to the combined unsubstituted galactose and substituted galactose is at least about 2.0: 1.

However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is being anticipated by US 2013/0129639 A1 to Anderson et al. (hereinafter 'Anderson'). Anderson discloses a polygalactomannan (para [0001], galactomannan polymers) with at least one dihydroxyalkyl moiety (para [0066] and [0070], dihydroxy acetone and para [0101] and para [0106], dihydroxy ethyl stearylamine and para [0105], dihydroxyethyl soya glycinat) wherein the composition comprises unsubstituted mannose (para [0006], unsubstituted polymannose backbone), substituted mannose (para [0020], hydrophobically modified galactomannan) unsubstituted galactose (para [0006], attachment of galactose side units) substituted galactose (para [0011], hydroxyl groups present on the galactomannan are substituted with at least one cationic moiety) wherein the molar ratio of combined unsubstituted and substituted mannose to the combined unsubstituted and substituted galactose is at least about 2:1 (para [0018], the average ratio of d-mannosyl to d-galactosyl units in the polygalactomannan is at least 5:1).

As the shared technical features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups. Therefore, Groups I-II lack unity under PCT Rule 13.

Note: claims 7-17, 27-52, 62-66 determined unsearchable because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)