



(11) **EP 2 862 815 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.04.2015 Bulletin 2015/17

(51) Int Cl.:
B65D 85/32 ^(2006.01) **D21J 7/00** ^(2006.01)
D21H 11/12 ^(2006.01)

(21) Application number: **13188739.0**

(22) Date of filing: **15.10.2013**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

- **Schouten, Dirk**
9079 MA St. Jacobiparochie (NL)
- **Hiemstra, Egbert**
8802 MA Franeker (NL)

(71) Applicant: **Huhtamaki Molded Fiber Technology
B.V.**
8801 JB Franeker (NL)

(74) Representative: **Nederlandsch Octrooibureau
P.O. Box 29720
2502 LS The Hague (NL)**

Remarks:

Amended claims in accordance with Rule 137(2)
EPC.

(72) Inventors:
• **Koopmans, Benno Alexander**
9035 BZ Dronrijp (NL)

(54) **Method for manufacturing a moulded fibre packaging**

(57) The invention relates to a method for manufacturing a moulded fibre packaging in particular a food package, more particular an egg package, comprising,
- providing a fibre pulp for a moulding process, the fibre pulp being contained in a pulp container,

- adding lignocellulosic biomass not originating from wood to the pulp container to obtain a pulp mix comprising between 5-80% lignocellulosic biomass, wherein the lignocellulosic biomass contains between 0 to 2% protein in dry weight

characterized in that the method comprises,

EP 2 862 815 A1

Description

Background

[0001] The present invention relates to a method for manufacturing a moulded fibre packaging in particular a food package, more particular an egg package.

[0002] In many modern food retailing operations, e. g. supermarkets and hardware stores, various products like fruit, meat, eggs and the like, are presented and displayed to the retail customer in trays of many types and sizes, said trays being manufactured from paper pulp. Often the colour or appearance of such trays, for example egg trays, is e. g. greyish and therefore not attractive or aesthetically appealing to the retail customer.

[0003] In addition, usually, fibre packaging materials such as egg boxes and fibre trays are uniform in colour. However, such fibre packaging materials are less appealing to the customer. Although the package as a whole could be provided with different colours by employing labelling and/or printing techniques, such techniques are generally much too expensive. Consequently, there is a need within the art for a cheap and uncomplicated process for the manufacture of more appealing fibre packaging materials.

[0004] Also packaging materials for e. g. electronic equipment comprise less attractive materials such as white coloured expanded polystyrene and similar synthetic materials that can be recycled only with difficulty and which are detrimental to the environment. At present there exists a long felt need to provide coloured or appealing packaging materials based on paper pulp, in particular for food products such as fruit, that are more appealing to the retail customer. However, such coloured packaging materials based on paper pulp have to comply with rather severe food regulations, i. e. that the colouring agent used does not leach into and contaminate the food product.

[0005] Articles based on paper pulp are manufactured in a pulp moulding process wherein pulp moulding machines are employed. The basic principles of manufacture are to provide recovered paper (including newspaper, magazines) or paper furnish that is re-pulped. Relevant regulation for recovered paper in this connection is for example EN 643. Subsequently, various chemicals may be added to the pulp. For example, chemicals are added to give finished products water resistance, wet strength and/or colour. The pulp is cleaned of contaminants such as staples, sand and plastic particles, and transferred to the moulding machine. The moulding dies of the machine are dipped into the pulp and a vacuum is applied to the die and in that way a product is created. The wet product is placed on a conveyor belt and sent through a drying tunnel. Finally, the dried products may be pressed, counted, bundled, printed, labelled, palletised and despatched to the end user. Reference is for example made to US 3.320. 120 and US 3.654.076.

Summary of the invention

[0006] The invention aims to provide a method for manufacturing a moulded fibre food packaging in particular an egg package, which method enables to obtain a package in a more environmental friendly way. It will be clear that the invention is also beneficial for fruit and vegetable packages, cup carriers and industrial buffering means.

[0007] Yet another object of the invention is to provide a food package which appearance is more appealing to the customer during display and/or use.

[0008] According to a first aspect of the invention this is realized with a method for manufacturing a moulded fibre packaging in particular a food package, more particular an egg package, comprising,

- providing a fibre pulp for a moulding process, the fibre pulp being contained in a pulp container,

characterized in that the method comprises,

- adding lignocellulosic biomass not originating from wood to the pulp container to obtain a pulp mix comprising between 5-80 % lignocellulosic biomass, preferably between 5-60% lignocellulosic biomass, wherein the lignocellulosic biomass contains between 0 to 2% protein in dry weight.

[0009] The lignocellulosic biomass containing between 0 to 2% protein in dry weight enables to perform the method in an economical that is to obtain packages therewith that can compete in the market. In contrast with the current invention; when used in a moulded fibre process, ordinary grass, containing much more protein, does suffer from bad drainage, long drying times and/or high energy consumption which lead to slow production and/or high production cost. The high content of lignocellulosic biomass not originating from wood wherein the lignocellulosic biomass contains between 0 to 2% protein in dry weight enables to optimize operations in that a choice can be made between raw material flow being ordinary pulp originating from paper thus wood and the lignocellulosic biomass not originating from wood. Also the production process is much more efficient. In addition, the high content lignocellulosic biomass not originating from wood enables to provide a package a "green" appearance. Moreover, packages obtained by the method according to the invention perform surprisingly well in known compression tests for egg packages. This was not expected because lignocellulosic biomass not originating from wood is much weaker than wood based fibres. It is found that about 50% lignocellulosic biomass not originating from wood still provides the effect of the invention without compromising too much on strength of the package. Thus, the lignocellulosic biomass not originating from wood being added to the wood based fibre pulp at a rate of 5-80 % lignocellulosic biomass, preferably between 5-60% lignocellulosic biomass on dry fibre

weight enables to manufacturing a moulded fibre food packaging in a an environmental friendly way without compromising too much on strength of the package. In addition, using lignocellulosic biomass not originating from wood as raw material for the fibre pulp mix aims at becoming less independent of wood fibres. This is necessary when paper as journals will become less available what will lead to higher prices of paper in the future.

[0010] In an embodiment of the method, the lignocellulosic biomass originates from grass, leaves of tomato plants, stems of tomato plants, and/or rapeseed straw. The grass originates preferably from controlled cultivation such that regulation in connection with food contact may be respected with more ease. More preferably this controlled cultivation does not involve fertilizing. It is conceivable to use other grass as well like roadside grass for non food packages. It will be understood that the invention is not limited to grass fibres including other graminaceous plants. It is conceivable that other natural fibres, other than wood, like straw fibres, sugar beet residue, are used in the invention.

[0011] In an embodiment, the method comprises, before adding the lignocellulosic biomass to the pulp container, processing the lignocellulosic biomass for removing protein from the lignocellulosic biomass such that the lignocellulosic biomass contains between 0 to 2% protein in dry weight. Such a process for removing protein from lignocellulosic biomass is known per se, like from the patent publication WO 2012/023848 A1 to Danvos B.V. This removing of protein even more enables to optimize operations in that a choice can be made between raw material flows. In the technical field of moulded fibre packaging the pulp container is also referred to with "thin stock tank".

[0012] In an embodiment, the method comprises pre-processing of the lignocellulosic biomass, the pre-processing comprising soaking the lignocellulosic biomass in water for a soaking period of at least 1 day preferably at least 2 days. Pre-processing here means processing the lignocellulosic biomass before adding the lignocellulosic biomass to the pulp container.

[0013] In an embodiment of the method, the pre-processing comprises cutting the lignocellulosic biomass, preferably before the soaking, for obtaining visible lignocellulosic biomass fibres having a length such that the visible lignocellulosic biomass fibres may surface on the fibre pulp mix, the visible lignocellulosic biomass fibres preferably having an average length smaller than 5 cm, preferably smaller than 2 cm, more preferably between 1,5 and 2 cm.

[0014] The visible lignocellulosic biomass fibres having a length such that the fibres may surface on the fibre pulp mix ensure that during moulding these relatively long fibres are positioned at a package surface. These long fibres are then visible on a package and can be distinguished by touch. This provides an improved appearance to the food package. In this connection, visible has its ordinary meaning that the fibre can be seen with the na-

ked eye without any aid. It will therefore be understood that fibre does not refer to fibres on cellulose level. Instead a fibre here is on biomass level and may have a width typical between 0.1 mm to 2 mm.

[0015] In an embodiment of the method, the pre-processing comprises refining the visible lignocellulosic biomass fibres for facilitating interaction between the fibre pulp and the visible lignocellulosic biomass fibres in the pulp mix. Refining is a process which is known per se in the paper and paper pulp processing industry. The interaction has both a mechanical and chemical component, a mechanical component in that binding surface between fibres is increased, and a chemical component in that e.g. forming of hydrogen bridges is promoted. This refining seems important in connection with strength of the thus manufactured package.

[0016] In an embodiment of the method, the pre-processing comprises adjusting the degree of refining the visible lignocellulosic biomass fibres for facilitating firstly interaction between the fibre pulp and the visible lignocellulosic biomass fibre in the pulp mix, and secondly allowing a portion of the visible lignocellulosic biomass fibres to surface on the pulp mix. Because of the adjusting, an optimum can be chosen for both the strength of the package and the so called "green" appearance.

[0017] In an embodiment of the method, the pre-processing comprises providing a refining device comprising a number of refiner discs arranged at a mutual disc distance wherein adjusting the degree of refining the visible lignocellulosic biomass fibres comprises adjusting the disc distance less than 1,5 mm, preferably between 0,5 and 1,5 mm, and wherein the refining comprises refining the visible lignocellulosic biomass fibres at a concentration of between 10 kg to 75 kg, preferably about 25 kg visible lignocellulosic biomass fibres in dry weight, per 1000 litre of water. An example of such a refiner is a Sprout Waldron disc refiner.

[0018] In an embodiment of the method, the refining comprising fibrillating the visible lignocellulosic biomass fibres for increasing binding surface of the visible lignocellulosic biomass fibres. This even more for facilitates interaction between the fibre pulp and the visible lignocellulosic biomass fibres in the pulp mix. In this connection, fibrillate means the partly splitting of a fibre into fibrils.

[0019] In an embodiment, the method comprises providing a vacuum mould which has a mesh work for sucking up said fibre pulp mix and forming the packaging, wherein the mesh work has mesh openings having a mesh size and the visible lignocellulosic biomass fibres have a length between 50 to 150 times the mesh size, preferably about 100 times the mesh size. This ensures that the visible lignocellulosic biomass fibres extend lengthwise along the mould such that the fibre is visible at a surface of the manufactured package. A typical mesh size for moulding packages is 60 Tyler Mesh which corresponds with a mesh size of 0.251 mm.

[0020] In an embodiment, the method comprises the

step of adding an aromatic substance to the fibre pulp mix for providing a grass smell to the moulded fibre food packaging. The possibly grassy smell can be strengthened or covered as desired by the addition of the aromatic substance.

[0021] In an embodiment, the pulp mix is coloured by adding a colour agency, preferably a green colour agency comprising chlorophyll, to the fibre pulp mix. It is conceivable that the visible lignocellulosic biomass fibres are coloured before adding the visible lignocellulosic biomass fibres to the fibre pulp mix to provide an increased contrast between the grass fibre and the moulded fibre package. This even more improves the appealing effect of the package. In connection with colouring fibres before adding these to the pulp, specific reference is made to WO/2006/091102 of HUHTAMAKI MOLDED FIBER TECHNOLOGY B.V. titled "PROCESS FOR THE MANUFACTURE OF A MOTTLED FIBRE PACKAGING".

[0022] The invention further provides a moulded fibre packaging in particular a food package, more particular an egg package obtained by the method according to the invention, the packaging comprising between 10 to 60 wt. % lignocellulosic biomass not originating from wood.

[0023] In an embodiment of the moulded fibre package, visible lignocellulosic biomass fibres protrude from a package surface to such an extent that separate visible lignocellulosic biomass fibres can be distinguished by sight and/or touch. This even more improves the appealing effect of the package.

[0024] The various aspects discussed in this patent can be combined in order to provide additional advantages.

Description of the drawings

[0025] The invention will be further elucidated referring to a preferred embodiment shown in the drawing wherein shown in:

Fig. 1 in perspective view a package obtained by the method according to the invention;
fig. 2 a cross sectional side view of the package of fig. 1;
fig. 3 a detail of an outer surface of the package of fig. 1; and
fig. 4 a simplified process scheme of an embodiment of the method according to the invention.

Detailed description of embodiments

[0026] In the figure 1 and 2 a moulded fibre egg package 1 is shown. The package 1 is made from moulded fibre containing about 50 % grass fibres. Grass fibres 12 protrude from a package outside surface 2 to such an extent that separate grass fibres can be distinguished by sight and/or touch. These longer grass fibres 12 have a length of about 25 mm. The longer grass fibres 12 have a length such that the fibres are able to float on a fibre

pulp which enables that during moulding these long fibres are positioned at the package surface. These protruding fibres 12 even more improve the appealing effect of the package 1. Grass fibres 12 protrude even more from a package inside surface 3, 4 also because that inside surface is determined by the suction side of a mould. This suction side of a mould is a well known concept in manufacturing a moulded fibre food packaging.

[0027] Fig. 3 shows a detail of an outer surface 2 of the package 1.

[0028] Fig. 4 shows a process scheme of an embodiment of the method according to the invention.

[0029] A fibre pulp, for a moulding process, is contained in a pulp container 9 also referred to as storage tank and also known as thick stock tank. The process of moulding a moulded fibre package is indicated with reference number 11 and is not described here since this is known per se. Such a process of moulding a moulded fibre package is fed with the fibre pulp mix from the pulp container 9.

[0030] According to the invention, adding lignocellulosic biomass not originating from wood 5 is added to the pulp container 9 to obtain a pulp mix comprising between 5-60% lignocellulosic biomass, wherein the lignocellulosic biomass contains between 0 to 2% protein in dry weight.

[0031] The method comprises pre-processing of the lignocellulosic biomass 5. This pre-processing may be done on site or (partly) elsewhere. When the lignocellulosic biomass is pre-processed elsewhere, the lignocellulosic biomass fibres may be added directly to the pulp container 9 which added lignocellulosic biomass fibres are indicated with reference number 10. Here, the pre-processing comprises soaking 6 the lignocellulosic biomass 5 in water for a soaking period of at least 1 day preferably at least 2 days.

[0032] Here, the pre-processing comprises cutting 7 the lignocellulosic biomass 5, preferably before the soaking 6, for obtaining visible lignocellulosic biomass fibres having a length such that the visible lignocellulosic biomass fibres may surface on the fibre pulp mix in the storage tank 9.

[0033] The pre-processing comprises refining 8 the visible lignocellulosic biomass fibres for facilitating interaction between the fibre pulp and the visible lignocellulosic biomass fibres in the pulp mix.

[0034] The refining is performed in a refining device (not shown) comprising a number of refiner discs arranged at a mutual disc distance. The degree of refining the visible lignocellulosic biomass fibres is set by adjusting the disc distance between 0,5 and 1,5 mm. The refining of the visible lignocellulosic biomass fibres is done at a concentration of between 10 kg to 75 kg, preferably about 25 kg visible lignocellulosic biomass fibres in dry weight, per 1000 litre of water. An example of such a refiner is a Sprout Waldron disc refiner.

[0035] Before adding the lignocellulosic biomass 5 to the pulp container 9, the lignocellulosic biomass may be

processed for removing protein from the lignocellulosic biomass such that the lignocellulosic biomass contains between 0 to 2% protein in dry weight. This process is not shown here.

[0036] It will also be obvious after the above description and drawings are included to illustrate some embodiments of the invention, and not to limit the scope of protection. Starting from this disclosure, many more embodiments will be evident to a skilled person which are within the scope of protection and the essence of this invention and which are obvious combinations of prior art techniques and the disclosure of this patent.

Claims

1. Method for manufacturing a moulded fibre packaging in particular a food package, more particularly an egg package, comprising,

- providing a fibre pulp for a moulding process, the fibre pulp being contained in a pulp container,

characterized in that the method comprises,

- adding lignocellulosic biomass not originating from wood to the pulp container to obtain a pulp mix comprising between 5-80 % lignocellulosic biomass, preferably between 5-60% lignocellulosic biomass, wherein the lignocellulosic biomass contains between 0 to 2% protein in dry weight.

2. Method according to claim 1, wherein the lignocellulosic biomass originates from grass, leaves of tomato plants, stems of tomato plants, and/or rapeseed straw.
3. Method according to claim 1 or 2, wherein before adding the lignocellulosic biomass to the pulp container, the lignocellulosic biomass has been processed for removing protein from the lignocellulosic biomass such that the lignocellulosic biomass contains between 0 to 2% protein in dry weight.
4. Method according to a preceding claim, the method comprising pre-processing of the lignocellulosic biomass, the pre-processing comprising soaking the lignocellulosic biomass in water for a soaking period of at least 1 day preferably at least 2 days.
5. Method according to claim 4, the pre-processing comprising cutting the lignocellulosic biomass, preferably before the soaking, for obtaining visible lignocellulosic biomass fibres having a length such that the visible lignocellulosic biomass fibres may surface on the fibre pulp mix, the visible lignocellulosic bio-

mass fibres preferably having an average length smaller than 5 cm, preferably smaller than 2 cm, more preferably between 1,5 and 2 cm.

6. Method according to claim 4 or 5, the pre-processing comprising refining the visible lignocellulosic biomass fibres for facilitating interaction between the fibre pulp and the visible lignocellulosic biomass fibres in the pulp mix.
7. Method according to claim 6, comprising adjusting the degree of refining the visible lignocellulosic biomass fibres for facilitating firstly interaction between the fibre pulp and the visible lignocellulosic biomass fibre in the pulp mix, and secondly allowing a portion of the visible lignocellulosic biomass fibres to surface on the pulp mix.
8. Method according to claim 7, comprising providing a refining device comprising a number of refiner discs arranged at a mutual disc distance wherein adjusting the degree of refining the visible lignocellulosic biomass fibres comprises adjusting the disc distance less than 1,5 mm, preferably between 0,5 and 1,5 mm, and wherein the refining comprises refining the visible lignocellulosic biomass fibres at a concentration of between 10 kg to 75 kg, preferably about 25 kg visible lignocellulosic biomass fibres in dry weight, per 1000 litre of water.
9. Method according to claim 6, 7, or 8, the refining comprising fibrillating the visible lignocellulosic biomass fibres for increasing binding surface of the visible lignocellulosic biomass fibres.
10. Method according to a preceding claim, comprising providing a vacuum mould which has a mesh work for sucking up said fibre pulp mix and forming the packaging, wherein the mesh work has mesh openings having a mesh size and the visible lignocellulosic biomass fibres have a length between 50 to 150 times the mesh size, preferably about 100 times the mesh size.
11. Method according to a preceding claim, wherein the method comprises the step of adding an aromatic substance to the fibre pulp mix for providing a grass smell to the moulded fibre food packaging.
12. Method according to a preceding claim, wherein the pulp mix is coloured by adding a colouring agent, preferably a green colouring agent comprising chlorophyll, to the fibre pulp mix.
13. Moulded fibre food packaging obtained by the method according to a preceding claim, the packaging comprising between 10 to 60 wt. % lignocellulosic biomass not originating from wood.

14. Moulded fibre food package according to claim 13, wherein visible lignocellulosic biomass fibres protrude from a package surface to such an extent that separate visible lignocellulosic biomass fibres can be distinguished by sight and/or touch.

Amended claims in accordance with Rule 137(2) EPC.

1. Method for manufacturing a moulded fibre packaging in particular a food package, more particular an egg package, comprising,

- providing a fibre pulp for a moulding process, the fibre pulp being contained in a pulp container,

characterized in that the method comprises,

- adding lignocellulosic biomass originating from grass, leaves of tomato plants, stems of tomato plants, and/or rapeseed straw to the pulp container to obtain a pulp mix comprising between 5-80 % lignocellulosic biomass, preferably between 5-60% lignocellulosic biomass, wherein the lignocellulosic biomass contains between 0 to 2% protein in dry weight, and

- before adding the lignocellulosic biomass to the pulp container, processing the lignocellulosic biomass for removing protein from the lignocellulosic biomass such that the lignocellulosic biomass contains between 0 to 2% protein in dry weight..

2. Method according to claim 1, the method comprising pre-processing of the lignocellulosic biomass, the pre-processing comprising soaking the lignocellulosic biomass in water for a soaking period of at least 1 day preferably at least 2 days.

3. Method according to claim 2, the pre-processing comprising cutting the lignocellulosic biomass, preferably before the soaking, for obtaining visible lignocellulosic biomass fibres having a length such that the visible lignocellulosic biomass fibres may surface on the fibre pulp mix, the visible lignocellulosic biomass fibres preferably having an average length smaller than 5 cm, preferably smaller than 2 cm, more preferably between 1,5 and 2 cm.

4. Method according to claim 2 or 3, the pre-processing comprising refining the visible lignocellulosic biomass fibres for facilitating interaction between the fibre pulp and the visible lignocellulosic biomass fibres in the pulp mix.

5. Method according to claim 4, comprising adjusting the degree of refining the visible lignocellulosic biomass fibres for facilitating firstly interaction between

the fibre pulp and the visible lignocellulosic biomass fibre in the pulp mix, and secondly allowing a portion of the visible lignocellulosic biomass fibres to surface on the pulp mix.

6. Method according to claim 5, comprising providing a refining device comprising a number of refiner discs arranged at a mutual disc distance wherein adjusting the degree of refining the visible lignocellulosic biomass fibres comprises adjusting the disc distance less than 1,5 mm, preferably between 0,5 and 1,5 mm, and wherein the refining comprises refining the visible lignocellulosic biomass fibres at a concentration of between 10 kg to 75 kg, preferably about 25 kg visible lignocellulosic biomass fibres in dry weight, per 1000 litre of water.

7. Method according to claim 4, 5, or 6, the refining comprising fibrillating the visible lignocellulosic biomass fibres for increasing binding surface of the visible lignocellulosic biomass fibres.

8. Method according to a preceding claim, comprising providing a vacuum mould which has a mesh work for sucking up said fibre pulp mix and forming the packaging, wherein the mesh work has mesh openings having a mesh size and the visible lignocellulosic biomass fibres have a length between 50 to 150 times the mesh size, preferably about 100 times the mesh size.

9. Method according to a preceding claim, wherein the method comprises the step of adding an aromatic substance to the fibre pulp mix for providing a grass smell to the moulded fibre food packaging.

10. Method according to a preceding claim, wherein the pulp mix is coloured by adding a colour agency, preferably a green colour agency comprising chlorophyll, to the fibre pulp mix.

11. Moulded fibre food packaging obtained by the method according to a preceding claim, the packaging comprising between 10 to 60 wt. % lignocellulosic biomass not originating from wood.

12. Moulded fibre food package according to claim 11, wherein visible lignocellulosic biomass fibres protrude from a package surface to such an extent that separate visible lignocellulosic biomass fibres can be distinguished by sight and/or touch.

Fig. 1

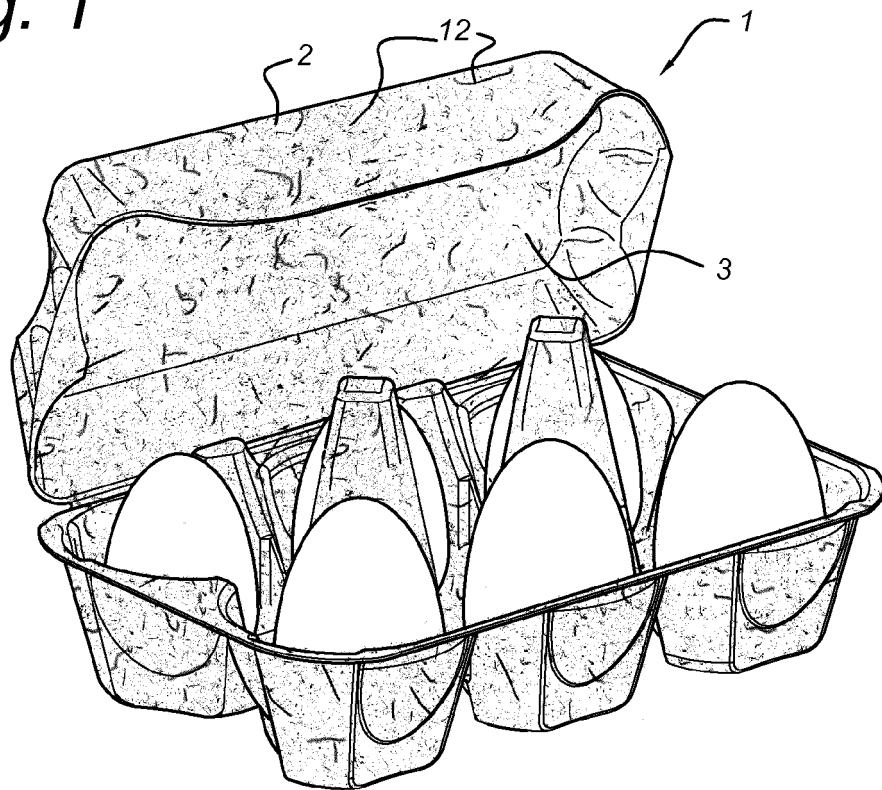


Fig. 2

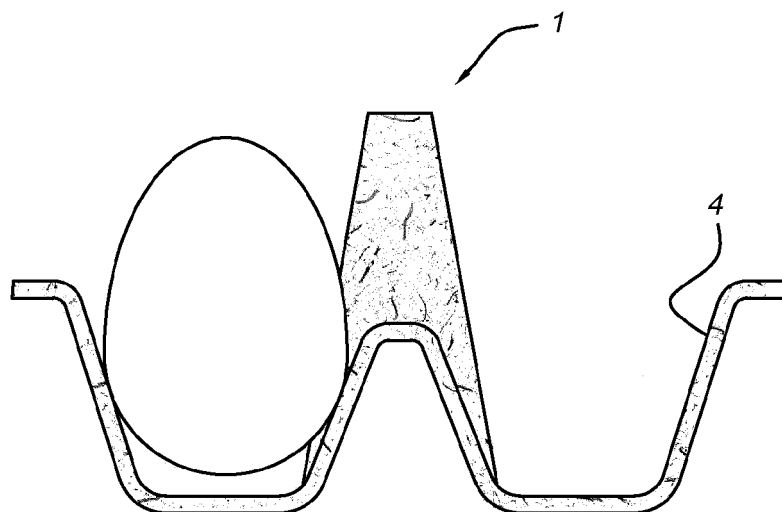


Fig. 3

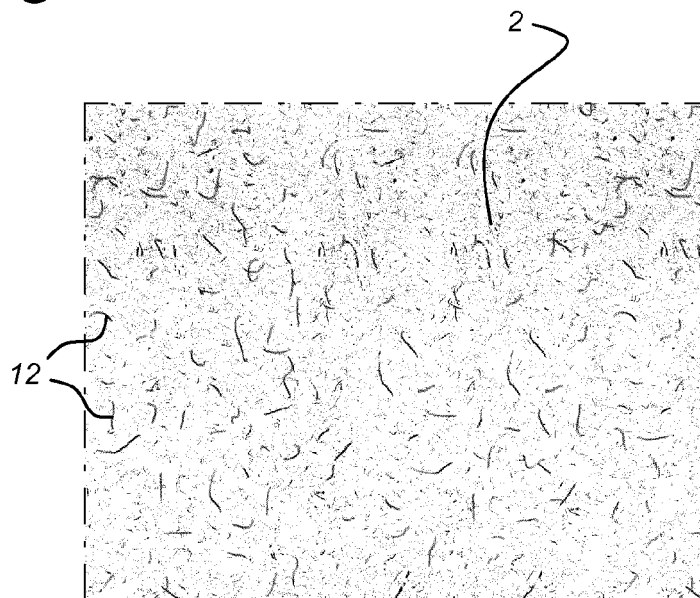
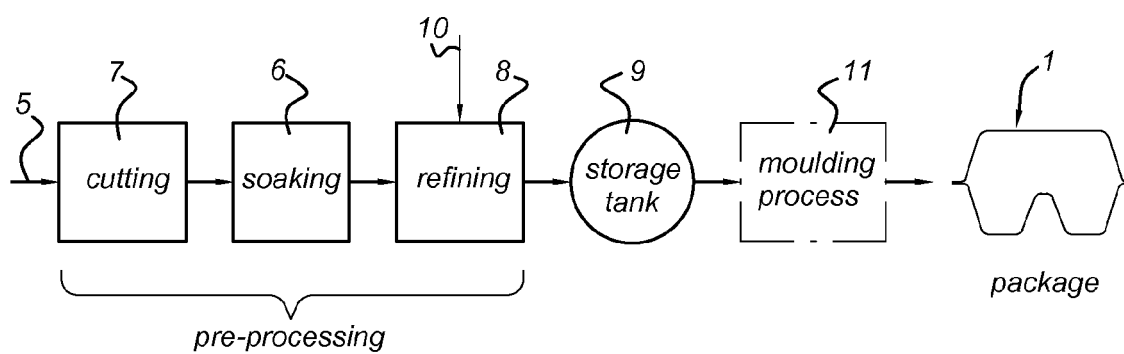


Fig. 4





EUROPEAN SEARCH REPORT

 Application Number
EP 13 18 8739

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 196 18 554 A1 (RUEHLAND LOTHAR [DE]) 27 November 1997 (1997-11-27) * column 1, line 3 - column 3, line 25; claims 3,4 *	1,2, 4-10,13	INV. D21J7/00 D21H11/12
A,D	WO 2012/023848 A1 (DANVOS B V [NL]; VOS DIRK JAN [NL]; RUSTENBURG SIMON [NL]) 23 February 2012 (2012-02-23) * page 9, line 10 - line 13 * * page 13, line 10 - line 13; claim 1 *	1-3,13	
A	WO 95/15252 A1 (BIO SUNN CORP [US]) 8 June 1995 (1995-06-08) * page 6, line 2 - page 8, line 10; figure 1 *	1,2,4,5, 13	
A,D	US 3 320 120 A (RANDALL WALTER H) 16 May 1967 (1967-05-16) * the whole document *	1,13	
			TECHNICAL FIELDS SEARCHED (IPC)
			D21J D21H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 November 2013	Examiner Beckman, Anja
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 8739

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-11-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19618554 A1	27-11-1997	AU 3023697 A	05-12-1997
		DE 19618554 A1	27-11-1997
		WO 9743485 A1	20-11-1997

WO 2012023848 A1	23-02-2012	AU 2011292493 A1	21-03-2013
		CA 2806288 A1	23-02-2012
		CN 103124792 A	29-05-2013
		EP 2606140 A1	26-06-2013
		NL 1038175 C	21-02-2012
		US 2013143287 A1	06-06-2013
		WO 2012023848 A1	23-02-2012

WO 9515252 A1	08-06-1995	CA 2177984 A1	08-06-1995
		WO 9515252 A1	08-06-1995

US 3320120 A	16-05-1967	BE 662587 A	05-11-2013
		DE 1436944 A1	28-11-1968
		DK 111656 B	23-09-1968
		GB 1041495 A	07-09-1966
		NL 6504964 A	21-10-1965
		NO 118643 B	19-01-1970
		SE 301262 B	27-05-1968
		US 3320120 A	16-05-1967

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 3320 A [0005]
- US 120 A [0005]
- US 3654076 A [0005]
- WO 2012023848 A1, Danvos B.V. [0011]
- WO 2006091102 A [0021]