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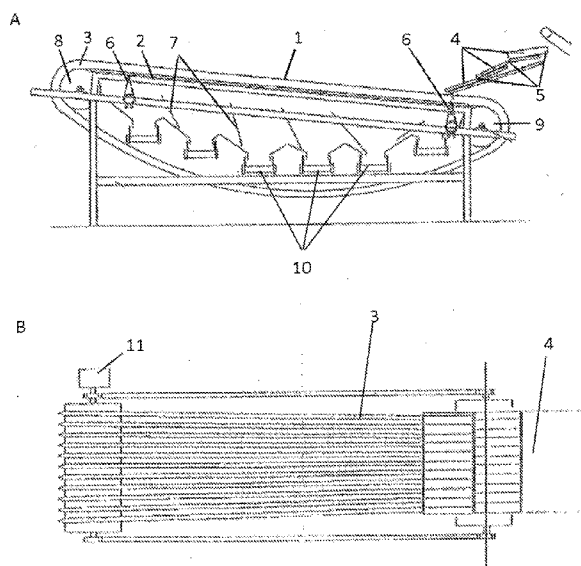


Fig. 1

(57) Abstract: The present invention relates to an apparatus, system and method for volume distribution of objects in a system for grading sensitive products. The grading device of the present invention has grading channels that are wider at the outlet than at the intake. The belt machine draws the objects forward between two inclined belts which form the channel. Adjusting devices are implemented perpendicular underneath the belts of the apparatus and imaging means are used for feedback signals to regulate the take-away process.



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VOLUME DISTRIBUTION FOR GRADING SYSTEMS

Field of invention

5 The present invention relates grading systems for grading objects, based on conveyor equipment with ridge-belts. The device and method makes it possible to change the volume distribution in the grading system based on nature of the incoming stream of objects to be graded.

Introduction

10 The process of grading objects such as small and delicate marine species or fruit can be a problem due to their small size and the volume to be processed at each time and the fact that the quality of the food objects deteriorates quickly upon rough handling procedures. An efficient grading process is therefore required based on selection criteria such as size and/or the sex.

15 Several different types of grading devices are known for grading fish and food objects, which grade the objects according to an assessment of their thickness. The known devices are based on belts and rollers as well as shaker-graders, which use several grading channels. WO9641541 discloses well established grading device based on specially-designed conveyor equipment so-called ridge-belts forming grading channels
20 being narrower at the in-feed end than at the outlet end with take-away belts arranged underneath to collect the graded objects.

The adjustment of the channel width both at the intake and the outlet end is an important aspect of this technology. WO 2016/009452 discloses an adjusting unit for grading devices which is implemented perpendicular underneath the belts of the grading
25 devices comprising alternatively arranged support members and adjusting members arranged on an adjusting screwing shaft allowing the channel width can be set before and during the grading process in a manner such that the channel width is the same between in all the channels on the grading device.

30 A problem with the current technology is that the sometimes a large proportion of the objects to be graded are of similar size, shape or volume and therefore the majority of the objects are expected to fall through the gaps of the grading belts in the same area of

the grading conveyor. This will result in a piling of objects over the area where the objects are supposed to fall through leading to inefficient and inaccurate grading.

Summary of the invention

5 The present invention provides a method for volume distribution of objects on grading devices, which treat the objects to be graded gently and to provide a mechanism which allows for handling a large quantity in the same grading category during operation of such a grading device for later processing. Traditionally the grading devices, such as the one of the present invention, are belt grading device comprising grading channels, where
10 the gap between the grading channels gradually increases from the intake end to the outlet. The way these grading devices work is such that the belt machine draws the objects forward between two inclined belts, which form the channel, and if more channels are included in the same machine, each additional channel consists of an independent unit, i.e. another machine which is placed next to the first one. The machine takes the
15 form of a conveyor belt which neither shakes the objects nor rubs them in the course of moving them but moves them gently forward until the point where the gap becomes large enough for the object to fall through it. When a large proportion of the objects to be graded falls within the same grading category on a belt with a gradually increasing gap width the grading system, including the take-away conveyors will not be able to
20 handle a large proportion of the objects falling through the same gap-width onto one or few take-away belts.

The method and system of the present invention uses ridge belt grading conveyors with a plurality of adjusting devices to adjust the gap between the belts of the grading conveyor, where the gap distance can be adjusted to be approximately the same for a
25 longer distance of the grading portion of the belt. This is accomplished by accurate adjusting devices, which are placed with regular intervals under the grading portion of the ridge belts of the grading conveyor. A plurality of take-away conveyors is arranged perpendicularly under the grading belts for collecting objects in the same size category for packing or further processing. When a large proportion of the objects to be graded is
30 determined to fall within the same grading category, the gradually widening gap between each two belts is altered to maintain an almost similar opening for an extended distance to accurately grade the large portion of objects onto takeaway means for further processing. The problem is solved by use of a detection devices associated with the take-away conveyors, where the amount of food objects in each size category is determined
35 and feedback signals sent to the adjusting devices to alter the gap distance for collection of a larger amount of objects in the same size category. The detection devices can be

imaging devices placed over the take-away conveyors to obtain images which are processed by the computer to determine size of individual objects, volume of individual objects or a volume/number of objects in the same category or other criteria. The detection devices can also be a weighing device or any other means for detecting and/or determining the amount and/or proportion of objects in the same size category falling onto one or too few take-away conveyors. If the majority of the objects are of similar size, weight or volume, the adjusting means will get a feedback signal from the computer to adjust the gap between the ridge belts such that this majority of objects is collected on several takeaway belts and optionally in several under categories. The solution provided by the present invention is important for process planning of the objects to be graded.

The present invention is useful in industry, not only for the purpose of enabling the currently existing equipment to operate at the ideal level of throughput, but also as a new standard of concentration control for which future devices can be designed to exploit.

It is an object of the present invention to overcome or ameliorate the aforementioned drawbacks of the prior art and to provide an improved and/or alternative and/or additional device for automatic and continuous for grading of sensitive products, comprising a grading unit, where the grading unit comprises a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction, forming a gap there in-between, the gap being increased in the direction of movement, two adjacent belts receiving, conveying and releasing the products as the gap there between becomes greater than the product thickness into the receiving units, the ridge-belts being longitudinally supported by plurality of guide rails, and an adjusting unit or device, which is arranged underneath the ridge-belts and supporting guide rails, the adjusting unit is arranged for adjusting the distance between the ridge-belts. Moreover, it is a preferred object of the present invention to provide a setting or adjusting device comprising alternatively arranged support members and adjusting members where both components comprise screwing sections which regulate an increase or a decrease in the gap between the support members when an adjusting screwing shaft penetrating the adjusting members is rotated. It is also a preferred object of the present invention to provide detecting means for detecting the size, and/or weight/ and/or amount of food objects falling onto each take-away belt and to send feedback signals with the aid of a computer to adjust the gap between the ridge belts such that a large number of objects in very similar size/volume category is collect on an increased number of takeaway belts.

In some embodiments of the present invention, the following features may be employed:

a) use of adjusting devices with modified square screw threads for the screwing section of the support members and the adjusting screwing members, where the corners of the crest rims have been rounded off, which provides the improved device resulting in a more accurate and jam-free adjustment of the grading device as the adjusting device during operation of the device, b) using detection devices such as imaging means or weighing devices or any other means for detecting and/or determining the amount and/or proportion of objects falling onto each take-away conveyor, and/or c) providing computer for sending feedback signals to the adjusting devices to change the gap-with between the grading belts. These features may provide a new and improved solution of distributing the volume of objects in a grading system to better handle either a large volume of objects in the same category and/or rapidly changing volume of objects during a grading process.

The object(s) underlying the present invention is (are) particularly solved by the features defined in the independent claims. The dependent claims relate to preferred embodiments of the present invention. Further additional and/or alternative aspects are discussed below.

The grading device as such is disclosed in WO9641541 and will not be discussed in detail herein. Furthermore, WO 2016/009452 discloses the adjusting devices as such and will not be discussed in detail herein.

Thus, at least one of the preferred objects of the present invention is solved by a system for grading objects. The apparatus comprises i) a grading unit further comprising: a) a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction, forming a gap there in-between, the gap being increased in the direction of movement, and b) two or more adjusting devices arranged underneath said ridge-belts, said adjusting devices arranged for adjusting the distance between said ridge-belts, ii) two or more take away conveyors, and iii) two or more detecting device for detecting the size, and/or weight/ and/or amount of food objects falling onto each take-away belt, and computing means connected to each of the detecting device for processing the output from each detecting means to determine at least one characteristic property of each object. Each take-away conveyor is monitored by a detecting devices for detecting the size, and/or weight/ and/or amount of food objects falling onto each take-away belt, and the computing means processes output data from the detecting device for each take-away conveyor to determine the volume distribution of the objects in the grading process and where the computing means sends feedback signals to the adjusting

devices to set the distance between said ridge-belts such that the objects are distributed evenly over the take-away conveyors.

The adjusting device of the present invention may comprise a control device attached to the adjusting screwing shaft adapted for turning the adjusting screwing shaft and thereby increasing or decreasing the gap between the ridged belts. The control device can be a manual member such as a steering wheel, winch or the like, or it can be a motor connected to a computer, said motor being able to respond and turn the adjusting screwing shaft in response to a feedback signal from the computer.

According to the present invention two or more adjusting devices can be implemented on the grading apparatus, such as at the intake end and the outlet end of the grading apparatus. In order to adjust the gap between the ridge belts to handle a large portion of the objects in a similar category, two or more adjusting device can be placed between the intake end and the outlet end to set the gap width the same or very similar over a larger portion of the length of the grading conveyor resulting in collection of similar or same size objects on a plurality of take-away conveyors.

At least another preferred objects of the present invention is solved by a method for volume distribution of objects on a grading devices. The method comprises the steps of: a) grading objects in a grading unit comprising a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction forming a gap there in-between, the gap between each two belts being increased in the direction of movement, two adjacent belts receiving, conveying and releasing the products as the gap there between becomes greater than the product thickness onto the take-away conveyors, b) adjusting the distance between said ridge-belts along the length of the ridge-belts using an adjusting device arranged underneath said ridge-belts, c) receiving objects from the grading unit on take-away conveyors arranged perpendicular under the plurality of endless ridge-belts. The method further comprises the steps of: d) monitoring the size, and/or weight/ and/or amount of food objects falling onto each take-away belt using detecting devices, e) determining the volume distribution of object sizes of the objects in the grading process using the computing means based on output data from the detecting device for each take-away conveyor, and f) computing means sending feedback signals to the adjusting devices to set the distance between said ridge-belts such that the objects are distributed evenly over the take-away conveyors.

Another preferred objects of the present invention is solved by an apparatus for volume distribution of graded objects. The apparatus comprises: i) a grading unit, further comprising; a) a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction, forming a gap there in-between, the gap being

increased in the direction of movement, and b) two or more adjusting devices arranged underneath said ridge-belts, said adjusting devices arranged for adjusting the distance between said ridge-belts; and ii) two or more take-away conveyors. The apparatus further comprises iii) two or more detecting device for monitoring the size, and/or weight/ and/or amount of food objects falling onto each take-away belt, and iv) computing means for processing output data from the detecting device for each take-away conveyor to determine the volume distribution of the objects in the grading process and sending feedback signals to the adjusting devices to set the distance between said ridge-belts such that the objects are distributed evenly over the take-away conveyors.

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10 In an embodiment of the present invention a separate detecting device is associated with each take-away conveyor.

In an embodiment of the present invention the detecting device is an imaging means.

In an embodiment of the present invention the detecting device is a weighing means, such as a flow scale.

15 In an embodiment of the present invention one detecting device can monitor more than one take-away conveyor.

In an embodiment of the present invention an additional imaging means is positioned prior to, above or after the ridge belts to further estimate the volume distribution in objects to be graded.

20 In an embodiment of the present invention the detecting devices and the two or more adjusting devices are used to collecting a large volume in the same size category on an increased number of take-away conveyors.

In an embodiment of the present invention cross plates are used for distributing the objects evenly over the take-away conveyors.

25 In an embodiment of the present invention each adjusting device is controlled by an industrial computer.

In an embodiment of the present invention the device for determining the size of the objects in the object stream is imaging means.

30 In an embodiment of the present invention the distance between said ridge-belts, set by adjusting devices, is determined such that the amount of objects falling onto each take-away conveyor per time unit is within a certain predetermined range.

In an embodiment of the present invention the device for determining the size and/or number of objects falling onto each take-away belt is determined by imaging and/or weighing means.

5 In an embodiment of the present invention a further imaging means is positioned prior to, above or after the ridge belts or any combination thereof. In some embodiments the imaging means is positioned above in-feeding belts feeding objects to the grading unit. In other embodiments the imaging means is positioned above the grading unit. In further embodiments the imaging means is positioned above the one or more of the take-away conveyors.

10 In an embodiment of the present invention each adjusting device is controlled by an industrial computer.

In an embodiment of the present invention the grading device further comprises an in-feed device.

15 In an embodiment of the present invention the grading device further comprises cross plates for further controlling and determining the diverting of food objects onto different take-away conveyors.

Another object of the present invention is solved by an apparatus for grading objects. The apparatus comprises i) a grading unit, ii) two or more take away conveyors, and iii) computing means, said computing means is connected to each of the imaging means for
20 processing said one or more images to determine at least one characteristic property of each object. The grading unit comprises a) a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction, forming a gap there in-between, the gap being increased in the direction of movement, and b) two or more adjusting devices arranged underneath said ridge-belts, said adjusting devices arranged
25 for adjusting the distance between said ridge-belts. The apparatus further comprises a device for determining the size of the items in the object stream and sends data to the computing means, where the computing means processes the data to determine the volume distribution of the objects in the grading process, and where the computing means sends feedback signals to the adjusting devices to set the distance between said
30 ridge-belts such that a large volume in the same size category is collected on an increased number of take away conveyors.

One preferred objects of the present invention is solved by a method for volume distribution of objects on a grading devices, where a large proportion of the objects is in the same size category. The method comprises the steps of: a) grading objects in a

grading unit comprising a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction forming a gap there in-between, the gap between each two belts being increased in the direction of movement, two adjacent belts receiving, conveying and releasing the products as the gap there between becomes greater than the product thickness onto the take away conveyors, b) adjusting the distance between said ridge-belts along the length of the ridge-belts using an adjusting device arranged underneath said ridge-belts, c) receiving objects from the grading unit on take away conveyors arranged perpendicular under the plurality of endless ridge-belts, d) determining the size of the items in the object stream and sending data relating to the size to the computing means, e) processing the data relating to the size by the computing means to determine the volume distribution of the objects in the grading process, and f) wherein the computing means sends feedback signals to the adjusting devices to set the distance between said ridge-belts such that a large volume in the same size category is collected on an increased number of take away conveyors.

The gap size between the ridge belts is then set by using the control board, which can be a simple electrical control board attached to the grading device, having control buttons which rotate the adjusting screwing shaft in each direction as well as controlling the speed of the grading device and the in-feed device. The control board can further be a wireless remote control or an industrial computer, which co-ordinates the turning of the adjusting screwing shaft by the motor and the pressure applied by the pressure means.

An adjustment device as disclosed here is implemented on the in-feed end as well as on the outlet end of the grading device and as they are individually controlled, the gap width of each end can be altered without affecting the other.

Brief description of drawings

The present invention will be further described with reference to the drawings using reference numbers in the drawings to identify the individual components of the invention.

Fig. 1 shows a side view (A) of the equipment designed for the grading of smaller fish species and relatively light objects. A top view (B) of the same equipment.

Fig. 2 is a schematic drawing showing the difference of the gap distance for (A) grading objects with even size distribution and (B) objects being mostly of similar size.

Fig. 3 outlines how feedback signals are used for the adjusting means in three different embodiments.

Detailed description of the present invention

In the following, exemplary embodiments of the invention will be described, referring to the figures. These examples are provided to provide further understanding of the invention, without limiting its scope.

- 5 In the following description, a series of steps are described. The skilled person will appreciate that unless required by the context, the order of steps is not critical for the resulting configuration and its effect. Further, it will be apparent to the skilled person that irrespective of the order of steps, the presence or absence of time delay between steps, can be present between some or all of the described steps.
- 10 Figure 1 shows a side-view of a traditional grading device (1) with an in-feeding step channel device. In Fig. 1A the objects to be graded are placed onto an in-feed device (step-channel) (4). As the objects slide downwards, they assume the optimal position before sliding onto the ridge-belts (3). If the objects are not adversely affected by contact with water, a water-pipe (5) is used to direct a film of water onto the step-
- 15 channel, which makes the objects quicker to assume the optimal position. The gradient of the step-channel (4) is set so that the speed of the objects as they enter the grading gaps is as close as possible to the speed of the ridge-belts. The ridge-belts (3) run along guide-rails (2) and the guide-rails (2) rest on the adjusting device (6) attached to an adjusting screwing shaft. The number of ridge-belts may be from 2 to over 30 according
- 20 to the processing rate required of the grader. The guides are shown with an upward incline in the figure, but they may be horizontal or inclined downwards, depending on what is found suitable at any given time. Between the ridge-belts (3) are formed the grading gaps, the number of which is one fewer than the number of ridge-belts. Below the ridge-belts (3) are cross-plates (7) for guiding and dividing graded objects between
- 25 size categories. The ridge-belts (3) as driven by the drive drum (8), frictional resistance between the drum and the belts being sufficient to drive the belts; if it is not sufficient, e.g. in the case of long machines or heavy objects, then the drum is covered with object with a high friction resistance or with pins which engage in the ridges and so drive them. Drum (9) is a free drum which guides the belts into the guide slots in the belt guides. A
- 30 plurality of take-away conveyors (10) are arranged perpendicular under the plurality of endless ridge-belts.

- In Fig. 1B, a light-construction grading machine seen from above, showing the motor (11) which drives the drive drum. It is desirable that the motor should be speed-adjustable, but whether it is a hydraulic motor or an electric motor is immaterial. A gear
- 35 motor may be used after the machine has been set and the object to be graded is always of the same type. Fig. 1B shows a grading machine with eleven ridge belts (3), where the

gap between the belts at the in-feed end below the in-feed device (4) is smaller than at the outfeed end.

Figure 2 outlines the difference of the gap distance for (A) grading objects with even size distribution and (B) grading objects where the majority of the objects are of similar size.

5 The schematic drawing shows a pair of ridge belts (3) over four adjusting devices (6a-d). If Fig. 2A the distance between the ridge belts increases gradually from the in-feeding end to the out-feed end. In Fig. 2B adjusting device (6a) sets a short distance between the ridge belts to collect the smallest objects. Adjusting device (6b) is set to start collecting a group of objects which are all in the same size category and adjusting device
10 (6c) defines the gap distance where the collection of objects in large group being in the same size category is stopped. Adjusting device (6d) is then set much wider to collect the remaining objects

Fig. 3 shows how feedback signals may be given from detecting devices, which in this example are imaging devices, to the adjusting means in three different embodiments of
15 the inventions based on different positions of the detection devices. In the first embodiment (A) an additional imaging device 14a is positioned prior to feeding the objects onto the grading device. The imaging device 14a sends image data to the computer 13, where the computer analyses the data and in response to detecting if a large majority if the objects to be graded are in the same size category the computer
20 sends feedback signals (----) to the adjusting means (6b and 6c) to collect the large group between these two adjusting devices on all take-away conveyors 10 apart from the first and the last two belts. The second embodiment (B) outlines a system where the additional imaging means (14b) is positioned over the ridge belt grading device. The imaging device detects if all the objects are being graded over a short distance of the
25 grading device and are piling thereon. In the same manner the computer sends feedback signals to adjusting means (6b and 6c) to collect the large group between these two adjusting devices. In the third embodiment (C) the detecting means (12) is positioned over each take-away conveyor (10) and the imaging means (12c) detects if a large majority if the objects being graded are in the same size category. In the same manner
30 as in the other two embodiments the imaging device 12c sends image data to the computer 13, where the computer analyses the data and in response to detecting if a large majority if the objects to be graded are in the same size category the computer sends feedback signals (----) to the adjusting means (6b and 6c) to collect the large group between these two adjusting devices on all take-away conveyors 10 apart from the
35 first and the last two belts.

As used herein, including in the claims, singular forms of terms are to be construed as also including the plural form and vice versa, unless the context indicates otherwise. Thus, it should be noted that as used herein, the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise.

- 5 Throughout the description and claims, the terms "comprise", "including", "having", and "contain" and their variations should be understood as meaning "including but not limited to", and are not intended to exclude other components.

The present invention also covers the exact terms, features, values and ranges etc. in case these terms, features, values and ranges etc. are used in conjunction with terms
10 such as about, around, generally, substantially, essentially, at least etc. (i.e., "about 3" shall also cover exactly 3 or "substantially constant" shall also cover exactly constant).

The term "at least one" should be understood as meaning "one or more", and therefore includes both embodiments that include one or multiple components. Furthermore, dependent claims that refer to independent claims that describe features with "at least
15 one" have the same meaning, both when the feature is referred to as "the" and "the at least one".

It will be appreciated that variations to the foregoing embodiments of the invention can be made while still falling within the scope of the invention can be made while still falling within scope of the invention. Features disclosed in the specification, unless stated
20 otherwise, can be replaced by alternative features serving the same, equivalent or similar purpose. Thus, unless stated otherwise, each feature disclosed represents one example of a generic series of equivalent or similar features.

Use of exemplary language, such as "for instance", "such as", "for example" and the like, is merely intended to better illustrate the invention and does not indicate a limitation on
25 the scope of the invention unless so claimed. Any steps described in the specification may be performed in any order or simultaneously, unless the context clearly indicates otherwise.

All of the features and/or steps disclosed in the specification can be combined in any combination, except for combinations where at least some of the features and/or steps
30 are mutually exclusive. In particular, preferred features of the invention are applicable to all aspects of the invention and may be used in any combination.

Claims

1. A system for volume distribution of graded objects, the system comprising:

- a grading unit (1), said grading unit (1) comprising;
 - a plurality of endless ridge-belts (3) arranged side by side and moved continuously in a forward direction, forming a gap there in-between, the gap being increased in the direction of movement, and
 - two or more adjusting devices (6) arranged underneath said ridge-belts, said adjusting devices (6) arranged for adjusting the distance between said ridge-belts;
- two or more take-away conveyors (10),
- two or more detecting device (12) for detecting the size, and/or weight/ and/or amount of food objects falling onto each take-away belt
- computing means (13), said computing means (13) is connected to each of the detecting device (12) for processing the output from each detecting means to determine at least one characteristic property of each object,

characterised in that each take-away conveyor (means) is monitored by a detecting devices for detecting the size, and/or weight/ and/or amount of food objects falling onto each take-away belt, and

in that the computing means (13) processes output data from the detecting device for each take-away conveyor to determine the volume distribution of the objects in the grading process and where the computing means (13) sends feedback signals to the adjusting devices (6) to set the distance between said ridge-belts (3) such that the objects are distributed evenly over the take-away conveyors (10).

2. The system of claim 1, wherein a separate detecting device is associated with each take-away conveyor.

3. The system of claim 1, wherein the detecting device is an imaging means (12).

4. The system of claim 1, wherein the detecting device is a weighing means (12).

5. The system of claim 1, wherein an additional imaging means (12) is positioned prior to, above or after the ridge belts to further estimate the volume distribution in objects to be graded.

6. The system according to any of the preceding claims, wherein the detecting devices and the two or more adjusting devices are used to collecting a large volume in the same size category on an increased number of take-away conveyors (10).

5 7. The system according to any of the preceding claims, wherein cross plates (7) are used for distributing the objects evenly over the take-away conveyors (10).

8. The system according to any of the preceding claims, wherein each adjusting device is controlled by an industrial computer.

10

9. A method for volume distribution of objects on a grading devices, the method comprising,

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a) grading objects in a grading unit comprising a plurality of endless ridge-belts arranged side by side and moved continuously in a forward direction forming a gap there in-between, the gap between each two belts being increased in the direction of movement, two adjacent belts receiving, conveying and releasing the products as the gap there between becomes greater than the product thickness onto the take-away conveyors,

20

b) adjusting the distance between said ridge-belts along the length of the ridge-belts using an adjusting device arranged underneath said ridge-belts,

c) receiving objects from the grading unit on take-away conveyors arranged perpendicular under the plurality of endless ridge-belts,

characterised in

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d) monitoring the size, and/or weight/ and/or amount of food objects falling onto each take-away belt using detecting devices, and

e) determining the volume distribution of object sizes of the objects in the grading process using the computing means based on output data from the detecting device for each take-away conveyor, and

30

f) computing means sending feedback signals to the adjusting devices to set the distance between said ridge-belts such that the objects are distributed evenly over the take-away conveyors.

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10. The method of claim 9, wherein the monitoring of the size, and/or weight/ and/or amount of food objects falling onto each take-away belt is performed by weighing or imaging.

5 11. An apparatus for volume distribution of graded objects, the apparatus comprising:

- a grading unit (1), said grading unit (1) comprising;
 - a plurality of endless ridge-belts (3) arranged side by side and moved continuously in a forward direction, forming a gap there in-between, the gap being increased in the direction of movement, and
- 10 - two or more adjusting devices (6) arranged underneath said ridge-belts, said adjusting devices (6) arranged for adjusting the distance between said ridge-belts;
- two or more take-away conveyors (10),

characterised in that

- 15 the apparatus further comprises two or more detecting device (12) for monitoring the size, and/or weight/ and/or amount of food objects falling onto each take-away belt, and
- computing means (13) for processing output data from the detecting device for each take-away conveyor to determine the volume distribution of the objects in
- 20 the grading process and sending feedback signals to the adjusting devices (6) to set the distance between said ridge-belts (3) such that the objects are distributed evenly over the take-away conveyors (10).

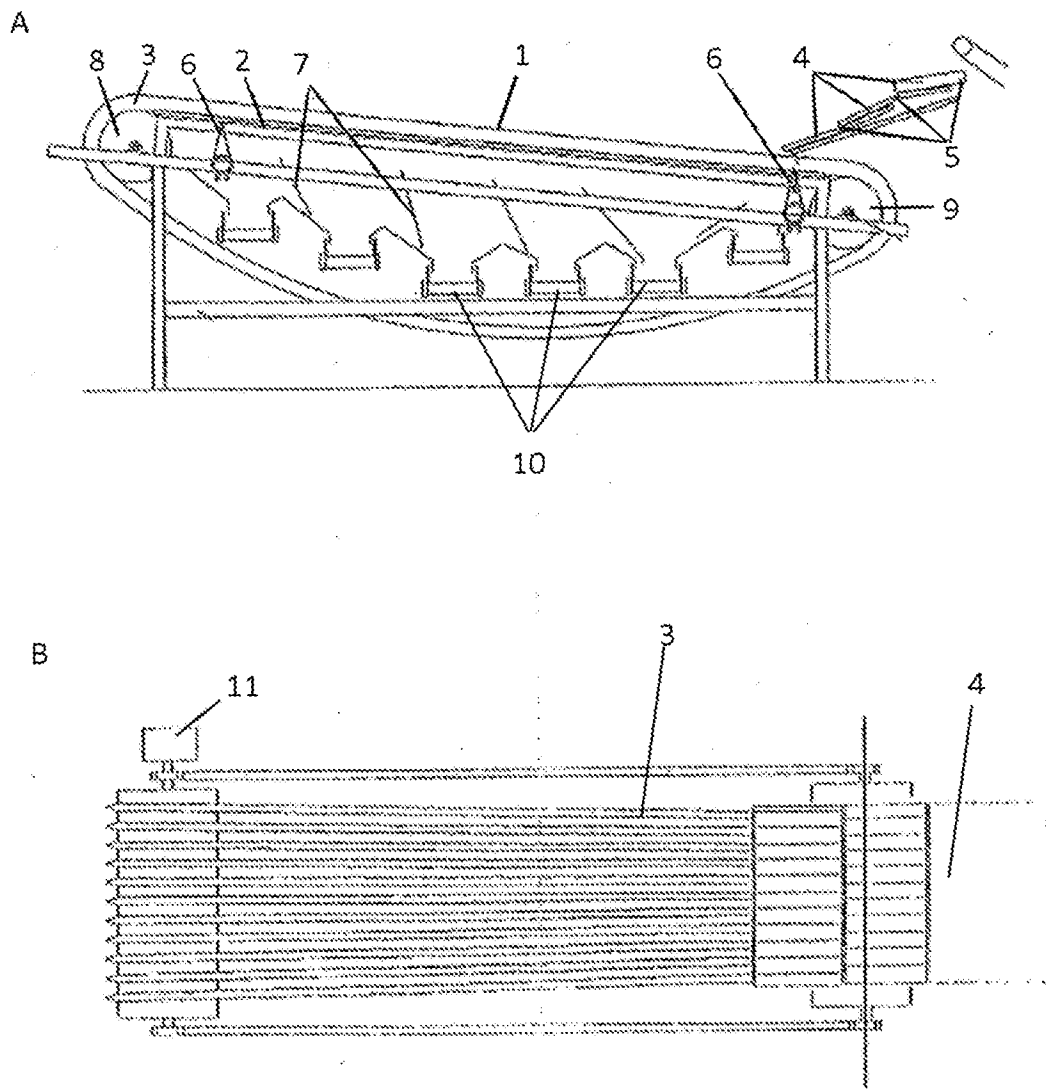


Fig. 1

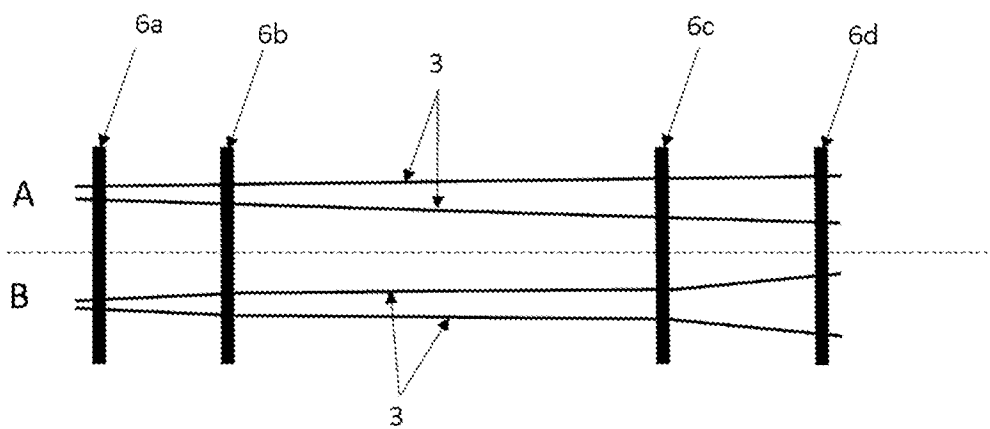


Fig. 2

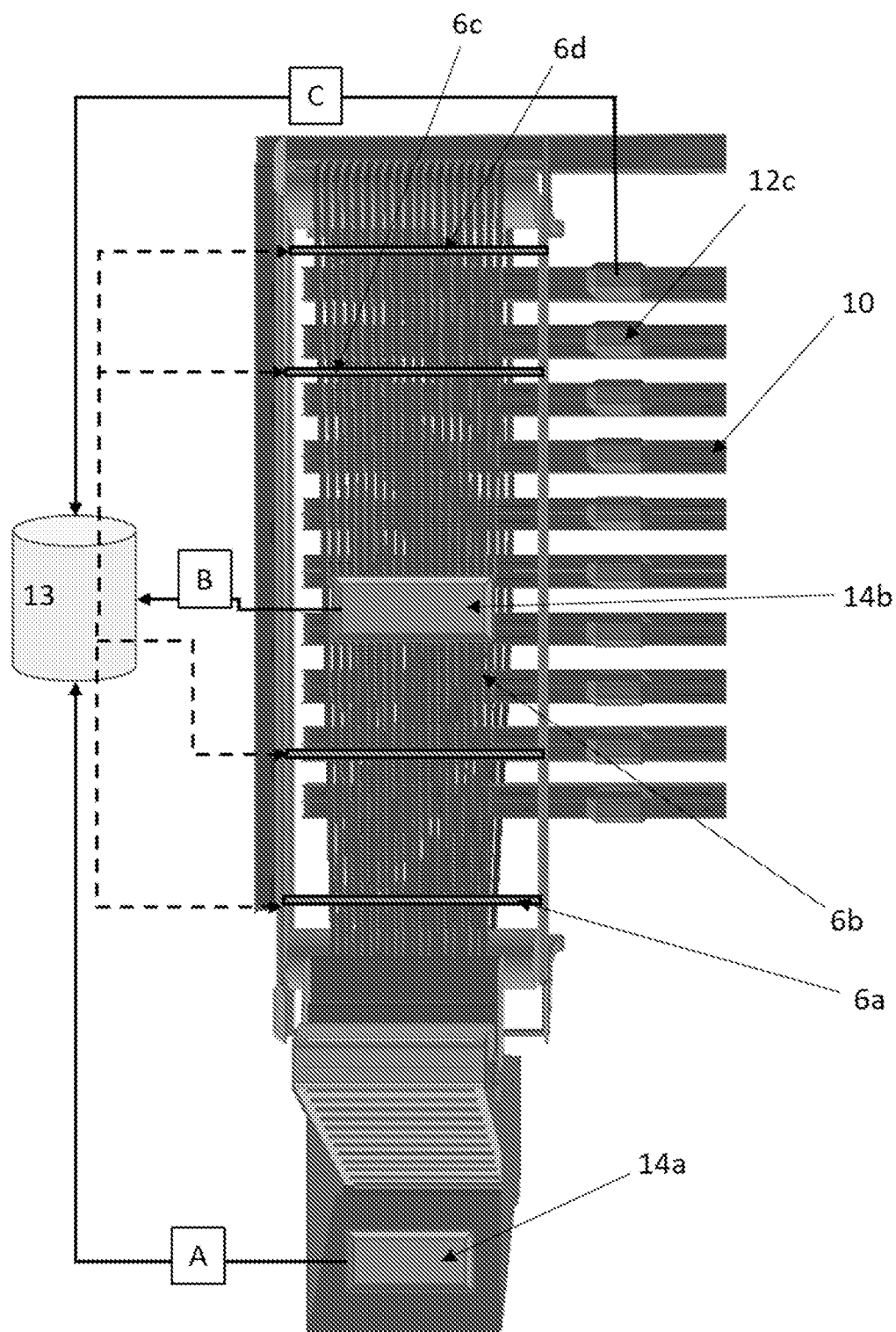


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IS2019/050016

A. CLASSIFICATION OF SUBJECT MATTER INV. B07C5/36 B07B13/065 A01K61/95 A22C25/04 A22C25/08 B65G47/71 ADD. 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) B07C B08B B07B A01K A22C B65G Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data								
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category*</th> <th style="width: 70%; padding: 5px;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width: 20%; padding: 5px;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;"> WO 2018/193484 A1 (SKAGINN HF [IS]; STYLE EHF [IS]) 25 October 2018 (2018-10-25) page 11, line 2 - line 8; figures ----- </td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-11</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	WO 2018/193484 A1 (SKAGINN HF [IS]; STYLE EHF [IS]) 25 October 2018 (2018-10-25) page 11, line 2 - line 8; figures -----	1-11
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.						
A	WO 2018/193484 A1 (SKAGINN HF [IS]; STYLE EHF [IS]) 25 October 2018 (2018-10-25) page 11, line 2 - line 8; figures -----	1-11						
☐ 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 "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 24 March 2020	Date of mailing of the international search report 02/04/2020							
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Wich, Roland							

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IS2019/050016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2018193484 A1	25-10-2018	EP 3612323 A1 WO 2018193484 A1	26-02-2020 25-10-2018
