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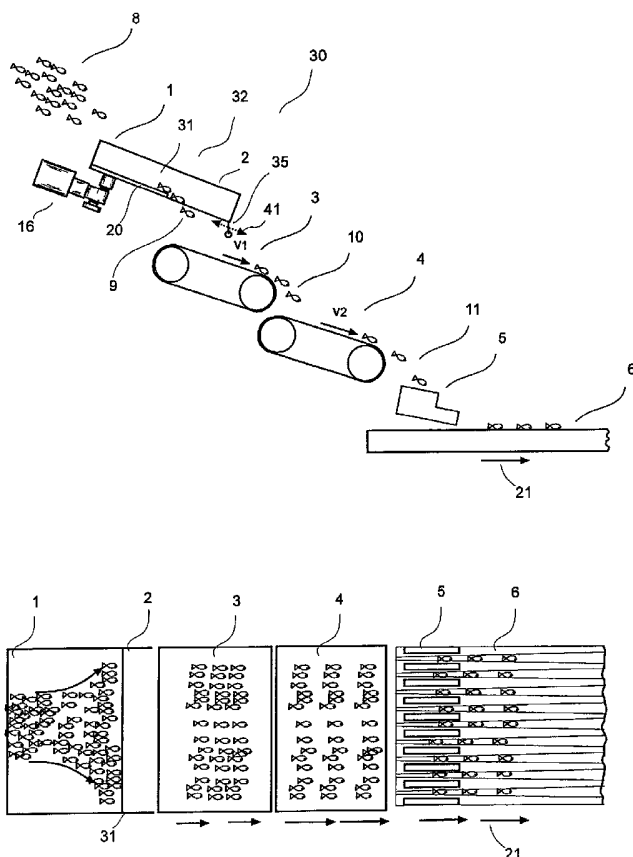
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(54) Title: IN-FEED DISTRIBUTING UNIT



(57) Abstract: This invention relates to an in-feed distributing unit (30) for distributing an uneven stream of individual objects intended to be graded or handled in other way. A sliding member (32) having an in-feed area (1) and an out-feed area (2) with a base unit (20) is provided and arranged incline on a supporting frame. One or more conveyors (3,4) run at one or more conveying speed are arranged below the sliding member and adapted to receive the released objects from out-feed (2) area of said sliding member and optionally from the upper arranged conveyor and advancing the objects in the forward direction, and a grading means is arranged below said one or more conveyors for receiving and grading the objects from said conveying means. The base unit (20) is at least partly moveable in its plane in a continuous eccentric movement, following in that the introduced objects at the in-feed area (1) slide towards said out-feed area (2) due to the incline arrangements of the base unit (20) while being distributed along said base unit due to said eccentric movement and wherein the one or more conveyors are adapted to distribute the objects further in the conveying direction through the one or more conveying speed and thereby preparing the object for grading.



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IN-FEED DISTRIBUTING UNIT

Field of the invention

The present invention relates to an in-feed distributing unit for distributing an uneven
5 stream of individual objects to be graded or handled in other way.

Background

The grading of objects such as fish and marine species such as capilion and herring
can be a difficult task. The reason being their small size and the volume to be
10 processed at each time combined with that the quality of fish deteriorates quickly if
not stored at sub zero temperature. The grading therefore has to be highly efficient.
The purpose of the grading is primarily to separate the species by size and/or sex.

An effective apparatus exist using ridge belts which are drawn by a drive along
15 guides, which are wider at the output end than at the intake end and convey the
material gently without vibration or rubbing.

An essential part for such grading machines is the feeding mechanism for ensuring
that the objects, when they enter the in-feed end of the grading machine, are
20 uniformly distributed. This has been solved in different ways. One preferred way is to
use a plurality of incline stages/steps as described in US 6,321,914, for example
with three stages, where the first stage, which is provided with two side panel, is a
stage where an uneven stream of objects is introduced. The second stage, which is
positioned under the first stage, is provided with a number of side or dividing panels
25 (more than two panels) and forms four chutes and the third stage is provided with for
example seven side panels, which forms six chutes. Accordingly, from the first stage
one stream of objects is formed as the objects slide from the first stage to the
second stage, where four streams of objects are formed that leave the second stage
and enter the third stage where finally six streams of objects are formed that leave
30 the third stage and enter the in-feed end of the grading machine.

The problem with such feeding mechanism is how space demanding it is and that
the distribution of the objects could be better. This mechanism for example does not
allow side- or perpendicular in-feed.

Description of the invention

It is an object of the present invention to provide a feeding mechanism for objects such as capilion, herring, shrimps, that both requires less space than known mechanism and increases the distribution of the objects before entering the in-feed part of grading machines.

According to the first aspect the present invention relates to an in-feed distributing unit for distributing an uneven stream of individual objects intended to be graded or handled in other way, wherein the distributing unit comprises:

- a frame,
- a sliding member having an in-feed area and an out-feed area and a base unit having an approximately planar surface arranged incline on the frame,
- one or more conveyors running at one or more conveying speed arranged below said sliding member adapted to receive the released objects from out-feed area of said sliding member and optionally from the upper arranged conveyor and advancing the objects in the forward direction, and
- grading means arranged below said one or more conveyors for receiving and grading the objects from said conveyors,

wherein said base unit is at least partly moveable in its plane in a continuous eccentric movement, following in that the introduced objects at the in-feed area slide towards said out-feed area due to the incline arrangements of the base unit while being distributed along said base unit through said eccentric movement and wherein said one or more conveyors are adapted to distribute the objects further in the conveying direction through said one or more conveying speed and thereby preparing the objects for grading.

The object may be marine species such as capilion and/or herring and/or shrimps.

In one preferred embodiment the in-feed distributing unit further comprises a plurality of dividing boards extended side-by-side substantially perpendicular to the

conveying direction arranged in-between said grading means and its nearest adjacent conveyor adapted to ensure that the objects falling from said nearest adjacent conveyor onto said grading means lie parallel to the conveying direction of the grading. In one embodiment the cross-section shape of the boards is triangular shaped with the broader end arranged adjacent to said grading means and the narrower end to said nearest adjacent conveyor. Furthermore, the shape of each respective board is in one embodiment step-wise in its longitudinal direction along the conveying direction so that the higher or highest step is facing the in-feed unit and the lower or lowest step is facing the grader. In another embodiment the dividing boards are inclined arranged so that the higher side is facing the in-feed unit and the lower side the grader.

The number of conveyors may be one or more, such as two or more, and wherein the conveyor speed is such that the speed of the uppermost conveyor is lowest and increases with the subsequent below arranged conveyor or conveyors.

According to the second aspect the present invention relates to a method for distributing an uneven stream of individual objects intended to be graded or handled in other way, said method comprising:

- feeding the objects to be graded to a sliding member having an in-feed area and an out-feed area and a base unit having an approximately planar surface arranged incline on the frame,
- arranging one or more conveyors running at one or more conveying speed below said sliding member for receive the released objects from out-feed area of said sliding member and optionally from the upper arranged conveyor and advancing the objects in the forward direction, and
- grading the objects from said one or more conveyors,

wherein said base unit is at least partly moveable in its plane in a continuous eccentric movement, following in that the introduced objects at the in-feed area slide towards said out-feed area due to the incline arrangements of the base unit while being distributed along said base unit through said eccentric movement and wherein

said one or more conveyors are adapted to distribute the objects further in the conveying direction through said one or more conveying speed and thereby preparing the objects for grading.

5 Detailed description

In the following the present invention and in particular preferred embodiments thereof are described in more details in connection with the accompanying drawings in which

10 Figure 1a and 1b shows a side and top view of an in-feed distributing unit,

Figure 2a and 2b shows one embodiment of an dividing board adapted to ensure that the objects falling from a conveyor to a grading means lie parallel to the conveying direction,

15

Figure 3 shows one embodiment of means for generating an eccentric movement of the base unit, and

Figure 4a-c shows the sliding member from Fig. 1 and its movements.

20

Figure 1a shows a side view of the in-feed distributing unit, showing sliding member (32) having base unit (20) with an in-feed area (1) and an out-feed area (2), side walls (31), a first conveyor 3 running at a conveyor speed v_1 , and a second conveyor (4) running at a second conveyor speed v_2 , dividing boards (5), a grading means (6) and means (16) for generating a eccentric movement and/or rotational movement of the base unit (20). In this embodiment two hinges (8) are provided to the sliding member (32) and act as a supporting means for the out-feed part (2) and are preferably independent of each other. The movement provided under the in-feed area (3), which is preferably eccentric orbit movement, but may also be rotational movement, is partly transformed to the out-feed area part (2), preferably in such a way that it is mainly visible as a linear motion. The hinges (35) at the out-feed end (2) are primarily moveable in a back and forth movement as indicated by the arrow (41), but side movements are limited.

25

30

When the objects, which may be capilion, herring or shrimps, enter the base unit (20) they slide down the incline base unit (20). The eccentric movement of the base unit has the function that the while the received object slide down the base unit the are being distributed along said base unit (5) due to said eccentric movement as shown in Fig. 1b which is a top view of Fig. 1a. At the in-feed area (1) the received object is relative localized while at the out-feed area (2) the objects have been distributed across the base unit (20) where they drop to the first conveyor (3), which is running at speed v_1 which is preferably higher than the speed of the objects at the out-feed area (2). It follows that the objects are distributed additionally along the conveying direction indicated by the arrows in Fig. 1a and 1b. In the embodiment shown in Fig. 1a and 1b, there is another conveyor (4) running at speed v_2 , where v_2 is larger than v_1 . Therefore, the objects are again distributed additionally in the conveying direction. The objects are here ready to be directed to the grading means, wherein the grading means may be similar as described in US patent No. 6,065,607.

A plurality of dividing boards are arranged in between said grading means and the second conveyor (4) to ensure that the orientation of the objects is parallel to the moving direction of the grading means as indicated by the arrows (21). The number of conveyors may easily be varied, i.e. from a single conveyor to a plurality of conveyors. This may depend on the products to be graded, the material of the conveyor belt, and the friction between the objects to be graded an the conveyor belt. What is essential here is that the distribution of the objects is sufficient so that the quality of the grading may be maximized.

Figure 2a and 2b show the side and a front view of one embodiment of the dividing boards. In this embodiment the dividing boards have stepwise construction. They may also be incline or have different shape (not shown). It is important that the construction of the dividing boards is such that when the object from the second conveyor fall onto the dividing boards the orientation of those objects, which is not parallel to the conveying direction, will be parallel to the conveying direction after falling onto the boards. The dividing boards are therefore adapted to correct the orientation of those objects which orientation is not suitable for the grading.

Figure 3 shows one embodiment of said means (16) for generating a eccentric movement of the base unit (20), comprising a rotor (15), a first and a second rotation

axis (14, 12), wherein the second rotation axis is mounted to the base unit (20). The rotation speed may easily be controlled depending on the products to be graded.

Figure 4a-c show a perspective view, side view and top view of the base unit (20),
5 the side walls (31), the hinges (35) sliding member (32) and said means (16) for
generating the eccentric movement and/or rotational movement of the base unit (20)
from Fig. 1a-b. In Fig. 4c the movement of the base unit (and the sliding member
(32)) is illustrated (40) as well as the back and forth movement of the hinges (35,
41).

10

Claims

1. In-feed distributing unit (30) for distributing an uneven stream of individual objects intended to be graded or handled in other way, wherein the distributing unit
5 comprises:

- a frame (10),
- a sliding member (32) having an in-feed area (1) and an out-feed area (2)
10 and a base unit (20) having an approximately planar surface arranged incline on the frame,
- one or more conveyors running at one or more conveying speed arranged below said sliding member adapted to receive the released objects from out-feed area of said sliding member (32) and optionally from the upper arranged
15 conveyor and advancing the objects in the forward direction, and
- grading means arranged below said one or more conveyors (3, 4) for receiving and grading the objects from said conveyors,

20

wherein said base unit (20) is at least partly moveable in its plane in a continuous eccentric movement, following in that the introduced objects at the in-feed area (3) slide towards said out-feed area (2) due to the incline arrangements of the base unit (20) while being distributed along said base unit (20) through said eccentric
25 movement and wherein said one or more conveyors are adapted to distribute the objects further in the conveying direction through said one or more conveying speed and thereby preparing the objects for grading.

2. In-feed distributing unit according to claim 1, wherein the object is marine species
30 such as capilion and/or herring and/or shrimps.

3. In-feed distributing unit according to claim 1 or 2, further comprising a plurality of dividing boards (5) extended side-by-side substantially perpendicular to the conveying direction arranged in-between said grading means and its nearest

adjacent conveyor adapted to ensure that the objects falling from said nearest adjacent conveyor to said grading means lie parallel to the conveying direction.

4. In-feed distributing unit according to any of the preceding claims, wherein each
5 respective dividing board (5) is substantially parallel to the conveying direction.

5. In-feed distributing unit according to any of the preceding claims, wherein the cross section of each respective board triangular shaped with the broader end arranged adjacent to said grading means and the narrower end to said nearest
10 adjacent conveyor.

6. In-feed distributing unit according to any of the preceding claims, wherein said dividing boards (5) are step-wise shape in its longitudinal direction along the conveying direction.
15

7. In-feed distributing unit according to any of the preceding claims, wherein the number of conveyors is at least two (3, 4), and wherein the conveyor speed is such that the speed of the uppermost conveyor (3) is lowest and increases with the subsequent conveyor (4) or conveyors.
20

8. A method for distributing an uneven stream of individual objects intended to be graded or handled in other way, said method comprising:

- 25 • feeding the objects to be graded to a sliding member (32) having an in-feed area (1) and an out-feed area (2) and a base unit (20) having an approximately planar surface arranged incline on the frame,
- arranging one or more conveyors running at one or more conveying speed below said sliding member adapted to receive the released objects from out-feed area of said sliding member (32) and optionally from the upper arranged
30 conveyor and advancing the objects in the forward direction, and
- grading the objects from said one or more conveyors,

wherein said base unit (20) is at least partly moveable in its plane in a continuous eccentric movement, following in that the introduced objects at the in-feed area (1) slide towards said out-feed area (2) due to the incline arrangements of the base unit (20) while being distributed along said base unit (20) through said eccentric
5 movement and wherein said one or more conveyors are adapted to distribute the objects further in the conveying direction through said one or more conveying speed and thereby preparing the objects for grading.

9. A method according to claim 8, wherein the number of conveyors is two or more.
10
10. A method according to claim 8 or 9, further comprising means for providing a plurality of dividing boards arranged in-between said grading means and its nearest adjacent conveyor adapted to ensure that the objects falling from said nearest adjacent conveyor to said grading means lie parallel to the moving direction of said
15 grading means.

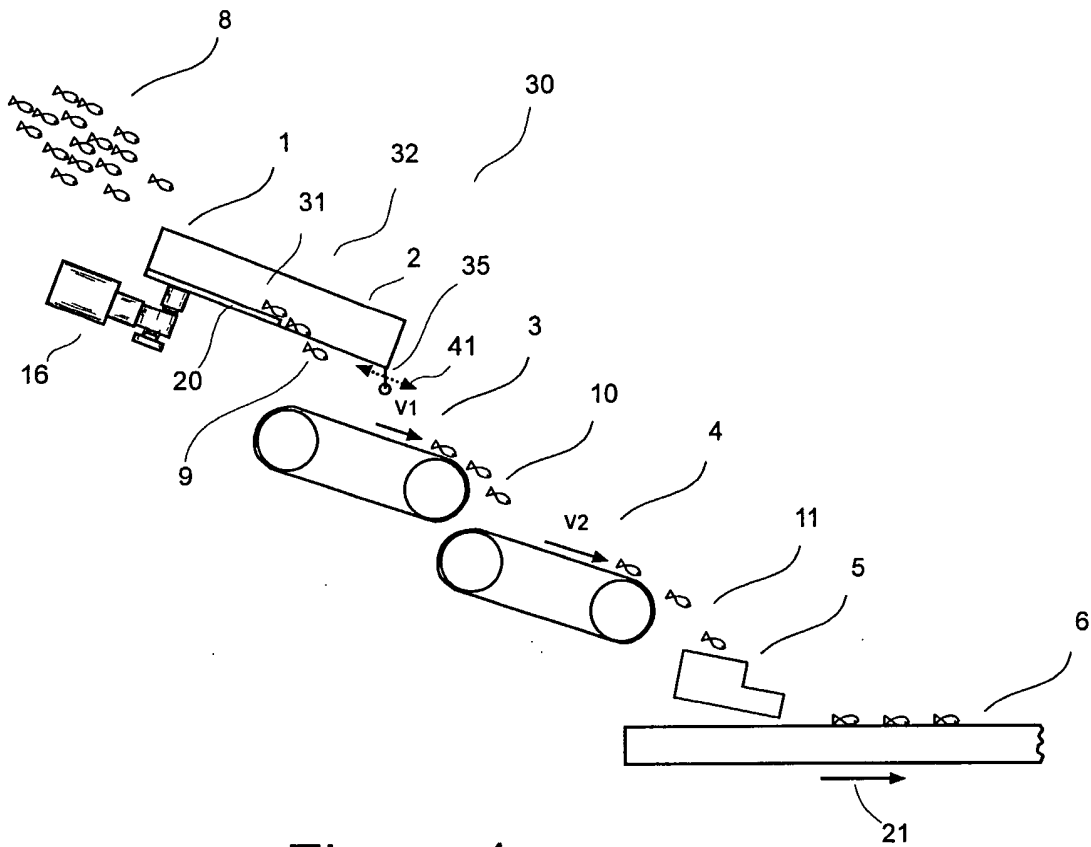


Figure 1a

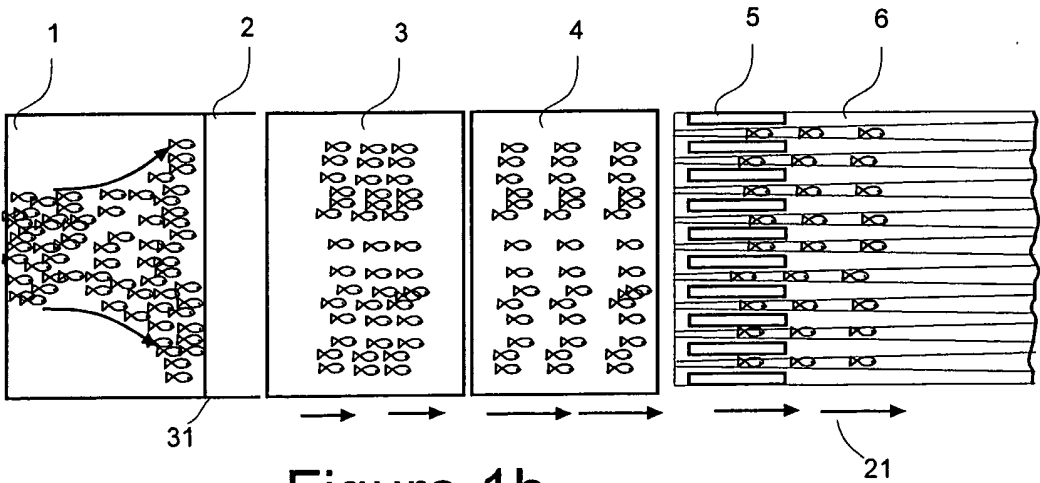


Figure 1b

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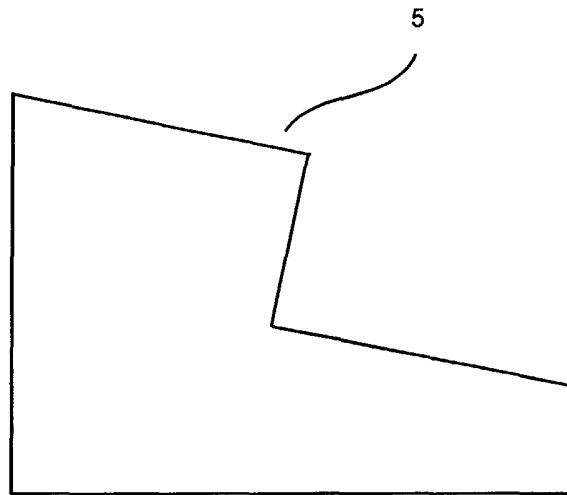


Figure 2a

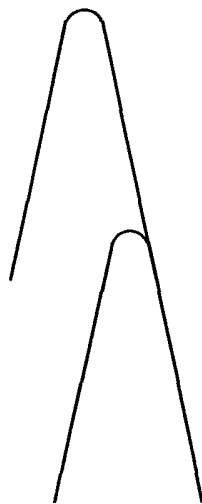


Figure 2b

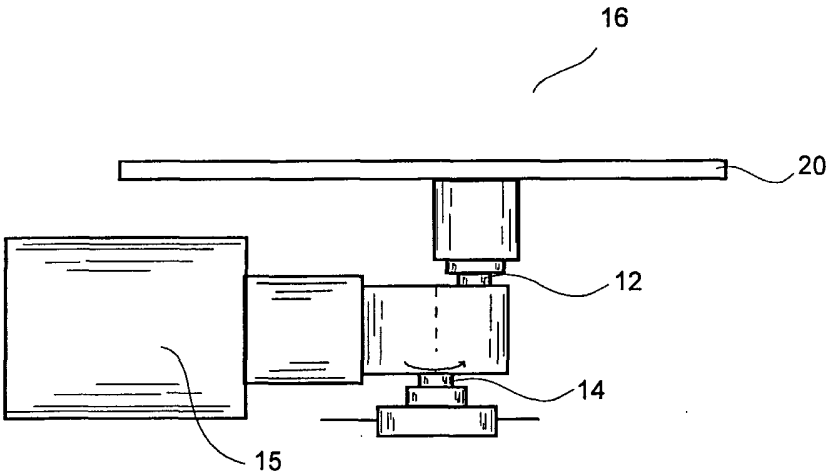


Figure 3

