(54) Title: A METHOD AND APPARATUS FOR RELATING INFORMATION OF A PROCESSED OBJECT TO AN OPERATOR

(57) Abstract: This invention describes an apparatus and method, where the processing of each individual operator is labelled to each individual processed object through tracing the object. By determining at least one characteristic property of the object before and after the processing, parameters such as the weight of each processed object, the efficiency of the processing, the yield and other parameters relating to the processing and the characteristic property of the object may be monitored and associated to each individual operator.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
A method and apparatus for relating information of a processed object to an operator

Field of the invention

5 The present invention relates to a method and apparatus for labelling an object with at least one characteristic property with at least one information relating to a processing operator.

Background

10 Processing food objects such as fish usually involves receiving the fish to be processed, processing it until it exists as a fish fillet and subsequently conveying the fish fillet, where it is either pre-packed or processed further. The quality of the processing is one of the parameter that affects the value of the object. It is therefore important that the quality of the processing is maximised.

15 Today, many factories are provided with a quality control station that checks randomly weather the quality of the object or the processing fulfils the requirements that are set forth or not. Based thereon the operators need sometimes to be encouraged to improve the processing in order to minimise the waste. However, some operators may lack an experience, or are simply not careful enough in processing the objects. These operators will often continue to process in the same way they did before.

There is therefore a need for a processing line, where each individual may be monitored with respect to the quality of the processing with the aim of maximising the quality of the processing. Furthermore, such monitoring would offer a new way in determining the premium, and even additional premium for a high quality in the processing.

Description of the invention

The object of the present invention is to provide an apparatus and method where the processing of each individual operator is labelled to each individual processed object through tracing the object. Furthermore, by determining at least one characteristic property of the object before and after the processing, parameters such as the weight of each processed object, the efficiency of the processing, the yield and other parameters relating to the processing and the characteristic property of the object may be monitored and associated to each individual operator.
According to the first aspect, the present invention relates to an object receiver apparatus for labelling an object with at least one characteristic property with at least one information relating to a processing operator, said apparatus comprising:

- means for obtaining information relating to at least one characteristic property on the object prior to the processing,

- an object receiver for receiving at least one processed object,

- means for obtaining at least one information related to the processing operator,

- means for detecting the presence of the object in the object receiver,

- a storage means for storing the at least one information related to the processing operator and the at least one characteristic property in a database,

- a releasing mechanism for releasing the object from the object receiver,

- at least one conveyor for receiving and conveying the released object, and

- a computer system adapted to monitor the presence of the object in the object receiver and to monitor the presence of other objects on the at least one conveyor and to control the releasing mechanism, and based thereon activating the releasing mechanism so that the at least one object in the object receiver is directed onto the conveyor such that the released object will not overlap with other conveyed objects, and wherein subsequently the position of the object is traced while it is being conveyed and is labelled with the at least one information relating to the processing operator.

In a preferred embodiment the at least one conveyor comprises a conveyor belt forming an endless loop and wherein the conveyor belt is divided into a plurality of imaginary space intervals, which are traced by the computer system and monitored with respect to whether the intervals are occupied with other objects or not. Accordingly, after directing an object onto the conveyor and occupying one space interval said interval is marked as an occupied space interval. Preferably, the tracing is based on initially dividing the conveyor belt into said space intervals, utilizing the shape of the conveyor belt and
monitor the speed of the conveyor belt to determine at any time the exact position of each space interval.

In one embodiment the at least one conveyor for receiving and conveying the released objects comprises a conveyor for conveying the main part of the processed object and at least one conveyor for conveying the supplementary part of the object. The main part and the supplementary part may be a single piece or a plurality of pieces. These parts are being traced after the processing, and furthermore, their weight is determined with a weighing means. The weighing may either be performed at the processing station in the object receiver or while the processed objects are conveyed. In a preferred embodiment the computer system stores the result from said weighing means and collects the weight for the supplementary part and the main part for a single object such that a detailed analysis on the processing for that particular object is obtained. The analysis may comprise the efficiency of the processing for one operator, the yield and other characteristic related to the processing. As an example, the weight of the main part of the processed object may be compared to the weight of the product before the processing. This comparison gives information relating to the efficiency.

Prior to the processing, an in-feed conveyor is preferably provided for distributing the objects between the processing stations, where the objects are being processed, wherein an arm is provided for guiding the object from the in-feed conveyor to the processing station. When the number of objects at the processing station exceeds a number based on predefined criteria, the guiding into that particular processing station is stopped. The criteria may be based on the number of items in the processing station, or a gate arranged on each processing station is displaced from its equilibrium position.

At least one characteristic property of the object is known prior to entering the processing stations. Accordingly, in a preferred embodiment, the objects that are directed to the processing stations have been weighed by a weighing means, such as dynamic scale, and have also been separated from each other and the results stored in the storage means. Other characteristic properties are inherent also possible, such as the shape of the object. Furthermore, a tracing as described earlier is necessary in the in-feed conveyor in order to known to which processing station a weighed object has been directed. The processing operator receives therefore an object that has as an example been weighed, wherein the object may be a whole fish such as cod or haddock as an example.
In one embodiment the processing station is provided with at least one exit for waste, and an object receiver that will be described in more details later. Before beginning the processing the processing operator logs into a computer system. This may be done through the operators-identification tag that is registered by a sensing device, which identifies the operator. There are however different versions of how to log into the computer system, which are not essential for the present invention. The computer is therefore aware of the presence of the processing operator at the time of the processing. Furthermore, the computer system may be provided with additional information relating to the age of the processing operator, the work experience etc.

The means for detecting when at least one object is present in the receiver bin may be based on mounting at least one arm to the bottom unit of the object receiver through a mutual horizontal axis arranged perpendicular to the arm, so that when an object is displaced on the object receiver the bottom unit is displaced downward due to the gravitational force exerted from the object with a following upward displacement of the arm that passes a sensing mechanism and signalises that an object is present in the object receiver.

In a preferred embodiment the releasing mechanism comprises a board with a front end arranged perpendicular to the bottom of the object receiver so that its periphery is substantially in the same height as the bottom of the object receiver, and wherein the board is mounted to a pneumatic cylinder, so that through an extended movement of the pneumatic cylinder the front end of the board is pushed at least partly across the object receiver and thereby directing the at least one object onto the conveyor, and through a contracted movement the front end is moved in a reversed direction towards its initial position.

The at least one object receiver may be defined by at least one bottom unit, at least two side walls, a front wall and the board as a rear wall, wherein the front wall may be arranged on a horizontal hinge on the distal end from the bottom of the object receiver. In order to open the front wall, a beam that is arranged perpendicular from the front end towards the front wall is provided so that through an extended movement of the pneumatic cylinder the beam is pushed on the front wall resulting in an opening of the front wall and thereby providing opening for releasing the objects from the object receiver onto the conveyor.
According to the second aspect, the present invention relates to a method for labelling an object with at least one characteristic property with at least one information relating to a processing operator, said method comprising:

- obtaining information relating to at least one characteristic property on the object prior to processing the object,

- obtaining information relating to the processing operator,

- receiving the object to be processed by the processing operator,

- storing the information relating to the processing operator and the at least one characteristic property of the object to be processed,

- labelling the object with at least one information relating to the processing operator,

- processing and subsequently directing the object in a object receiver,

- detecting the presence the object in the object receiver, and

- releasing the object from the object receiver onto a conveyor that conveys the released object, wherein the releasing is based on the presence of the object in the object-receiver, and that the released object will not overlap with other conveyed objects,

wherein the position of the released object is traced while being conveyed and is labelled with the at least one information relating to the processing operator.

The object may be a fish product as mentioned earlier, and the at least one characteristic property can be the weight of the fish.

An essential part of the present invention is utilizing the tracing in monitoring the information relating to the processing, which may be associated to a given time interval. In a preferred embodiment, the weight of the processed products is determined and
related to the processing operator through the tracing. Therefore, the weight of the object prior to the processing and the weight of the same object after the processing may be compared. The efficiency of the processing for that individual processing operator can therefore be calculated, i.e. the total weight of processed products, which may be compared to the total incoming weight of the product prior to the processing, the yield or the quality of the processing performed by the processing operator(s) in a given time interval. Through the tracing a quality control station, assuming it is a part of the apparatus, is in the position to relate the processing of an object directly to the processing operator.

**Detailed description**

In the following the present invention, and in particular preferred embodiments thereof, will be described in greater details in connection with the accompanying drawings in which

Figure 1 shows an overview of the apparatus for processing object,

Figure 2 shows a side view, a front view, a top view and an overview of the object receiver in a closed position,

Figure 3 shown an overview of the object receiver in Fig. 2 in a open position.

Figure 1 shows one embodiment of an object receiver apparatus 19, comprising a supporting frame 50, an in-feed conveyor arranged on the frame with a conveyor belt 1 forming an endless loop and four processing stations arranged side by side and towards each. At least one characteristic property of the objects being conveyed with the in-feed conveyor is determined (not shown) and stored in a computer system. In one preferred embodiment the characteristic property is the weight of the object, which may be fish products, meat products and any other type of raw material. Furthermore, the position of the in-coming object is traced. Thereby, when a processing station is selected for processing one particular object, the computer system links that particular object to the selected processing station and therefore the operator that is logged to that processing station. The logging may be done through reading from the identification card that the operator is provided with.
An arm 5 is used in directing the object to a processing station through opening and closing the arm and the piece of raw material is directed to the processing station and slides down the cute 8. When the number of objects in the cute 8 is to large a tablet 6 is displace outward from its equilibrium position and the computer system is signalised that the processing station is fully loaded. In another embodiment the number of items at each processing station is predetermined so that when this number is obtained the feeding of objects to that processing station is stopped. When the processing station can receive more objects to process it signalises the computer system that the processing station can receive more raw material.

In a typical procedure a processing operator receives an object to be processed and processes it into main part and supplementary part.

The supplementary part may be waste, skin, bones or defected parts that are placed in cute 9 and directed to side bins 10, 14, and 15. In the embodiment shown in Fig. 1 bins 10 and 15 are emptied on the conveyor 17 for those particular supplementary parts, while bin 15 is for waste, and that is directed onto the bottom conveyor 16. The emptying is controlled by the computer system, wherein the releasing of these supplementary parts is based on that the objects do not overlap with objects that are being conveyed. At least a part of these may be recycled back to the system and be reprocessed. If the object is a fish, the supplementary parts may be as an example the fish skin, bones, the fish head etc. The conveyed supplementary parts are preferably weighed, either in the bins 10, 14 or while they are being conveyed and are being traced while they are conveyed. Therefore, the exact weight for each part of the same product (the main part will be discussed later) can be monitored.

The main part of the object is, in this case the object is fish, a fish fillet. These are, after being processed, arranged in the object receiver 3, which comprises one or more bins. After releasing the main part from the object receiver 3 onto the conveyor 18 that is adapted to convey the main parts, the main part will be traced and weighed. Accordingly, by monitoring the weight of the supplementary parts and the main part of one and the same object as well as relating information of the processing operator to the object a detailed information relating to the processing is obtained. A detailed description of the object receiver will be described later.
Figure 2 shows further the working condition for the operator comprising a platform 13 and a chair 11 mounted to a supporting frame 12, wherein the height of the platform and the chair is adjustable, so that the working condition for the processing operator may be optimised. The processing board 2 is illuminated from below so it is easy to identify and remove bones and other undesirable articles from the raw material.

In one preferred embodiment the conveyor belt is divided into a plurality of imaginary space intervals that the computer system recognises. Each of these space intervals is adapted to receive objects for the object receiver or the bins 10, 14 and 15. This is to prevent that the supplementary parts on conveyors 16, 17, as well as the main parts on conveyors 18 do not overlap. Accordingly, by defining such intervals and based on the conveyor speed the computer knows the exact position of each interval. As an example, if a main part is to be directed onto the conveyor 18, the computer monitors weather there is an empty space interval on the conveyor 18 and based thereon selects a proper timing from directing the object from the object receiver onto the conveyor so that it does not overlap with other conveyed objects. After directing the main part onto this space interval, the computer defines it as an occupied space interval with this particular object that is labelled with at least one information relating to the operator that processed this object.

When a new operator is assigned to a processing station it must log into the computer system. This may be done through an identification tag that is registered by sensing device 4. There are however different versions of how to log into the computer system, which are not essential for the present invention. The computer is therefore aware of the presence of the processing operator at the time of the processing. Furthermore, the computer system may be provided with additional information relating to the age of the processing operator, the work experience etc.

Figure 2 a)-e) shows a side view a), a front view b), a top view c) and an overview d), e) of the object receiver in a closed position. The object receiver is arranged in a box 25 and comprises two bottom units 20, 21, two side walls 40a, 40b, a front wall 22 mounted on a horizontal axis 51 and a rear wall 41. The rear wall is one part of a mechanism for releasing the objects from the object receiver onto the conveyor 18, which is released by pushing the object from the object receiver onto the conveyor. In this embodiment the rear wall forms a board which is arranged perpendicular to the bottom of the object receiver so that its periphery is substantially in the same height as the bottom of the
object receiver, and is adapted to push the object in the object receiver onto the conveyor 18. This board is bent 90° and forms also a horizontal plate 23, and is mounted to a pneumatic cylinder 26, that is shown in a contracted position and is mounted to the box 25 through a mounting means 27. Furthermore, a plate defining the bottom plate of the object receiver 28 is mounted to the box 25 with a seal, which makes the boundary tight and water resistant. A side guidance 30 is arranged in the box 25 in which the horizontal plate 23 is slid into and enables therefore a smooth back and forth displacement of the horizontal plate 23 and the rear wall 41. A vertical supporting means 31 supports the upper part of the object receiver, while a horizontal supporting means 32 supports the side plates 30.

The presence of the object in the object receiver is monitored through an arm 24 that is mounted to the bottom unit of the object receiver 20, 21 through a mutual horizontal axis 34 arranged perpendicular to the arm. Accordingly, when the object is displaced on the object receiver the bottom unit is displaced downward due to the gravitational force exerted from the object with a following upward displacement of the arm that passes a sensing mechanism 29 and signalises that an object is present in the object receiver. In the embodiment shown in Fig. 2, the number of object receiving bins is two, bin 20 and 21, and each of these is provided with the arms 24 and the sensing means. Accordingly, the operator can therefore use the object receiver for sorting.

Figure 3 shows an overview of the object receiver in open position. Through an extended movement of the pneumatic cylinder the front end of the board 22 is pushed at least partly across the object receiver and thereby directing the at least one object onto the conveyor. This is realised by mounting a beam 35 perpendicular from the front end towards the front wall 22 so that through an extended movement of the pneumatic cylinder 26 the beam is pushed on the front wall 22 resulting in an opening of the front wall around an axis 51 and provided therefore an opening for releasing the objects from the object receiver towards the conveyor.
Claims

1. An object receiver apparatus for labelling an object with at least one characteristic property with at least one information relating to a processing operator, said apparatus comprising:

- means for obtaining information relating to at least one characteristic property on the object prior to the processing,

- an object receiver for receiving at least one processed object,

- means for obtaining at least one information related to the processing operator,

- means for detecting the presence of the object in the object receiver,

- a storage means for storing the at least one information related to the processing operator and the at least one characteristic property in a database,

- a releasing mechanism for releasing the object from the object receiver,

- at least one conveyor for receiving and conveying the released object, and

- a computer system adapted to monitor the presence of the object in the object receiver and to monitor the presence of other objects on the at least one conveyor and to control the releasing mechanism, and based thereon activating the releasing mechanism so that the at least one object in the object receiver is directed onto the conveyor such that the released object will not overlap with other conveyed objects, and wherein subsequently the position of the object is traced while it is being conveyed and is labelled with the at least one information relating to the processing operator.

2. An object receiver apparatus according to claim 1, wherein the at least one conveyor comprises a conveyor belt forming an endless loop and wherein the conveyor belt is divided into a plurality of imaginary space intervals.
3. An object receiver according to claim 1 or 2, wherein said space intervals are traced by the computer system.

4. An object receiver according to any of the preceding claims, wherein the tracing is based on initially dividing the conveyor belt into said space intervals, utilize the shape of the conveyor belt and monitor the speed of the conveyor belt to determine at any time the exact position of each space interval.

5. An object receiver according to any of the preceding claims, wherein monitoring the presence of the object on the at least one conveyor comprises monitoring whether said space intervals are occupied with other objects.

6. An object receiver according to any of the preceding claims, wherein after directing an object onto the conveyor and occupying one space interval said interval is marked as an occupied space interval.

7. An object receiver according to any of the preceding claims, wherein the at least one conveyor for receiving and conveying the released objects comprises a conveyor for conveying the main part of the processed object and at least one conveyor for conveying the supplementary part of the object.

8. An object receiver according to any of the preceding claims, wherein the main part and the supplementary part of the object are being traced and wherein the weight of the main part and the supplementary part are determined with a weighing means.

9. An object receiver according to any of the preceding claims, wherein the computer system stores the result from said weighing means and collects the weight for the supplementary part and the main part for a single object such that a detailed analysis on the processing for that particular object is obtained.

10. An apparatus according to any of the preceding claims, wherein said means for obtaining information relating to at least one characteristic property on the object prior to the processing is a weighing means for weighing the object prior to the processing.

11. An apparatus according to any of the preceding claims, wherein the weighing means is a dynamic scale.
12. An apparatus according to any of the preceding claims, wherein said means for obtaining information related to the processing operator is based on reading information from an identification tag identifying the processing operator with a sensing device.

13. An apparatus according to any of the preceding claims, wherein said means for obtaining information related to the processing operator is based on that the processing operator logs into the computer system.

14. An apparatus according to any of the preceding claims, wherein said releasing mechanism comprises a board with a front end arranged perpendicular to the bottom of the object receiver so that its periphery is substantially in the same height as the bottom of the object receiver, and wherein the board and is mounted to a pneumatic cylinder, so that through an extended movement of the pneumatic cylinder the front end of the board is pushed at least partly across the object receiver and thereby directing the at least one object onto the conveyor, and through a contracted movement the front end is moved in a reversed direction towards its initial position.

15. An apparatus according to any of the preceding claims, wherein said at least one object receiver is defined by at least one bottom unit, at least two side walls, a front wall and the board as a rear wall.

16. An apparatus according to any of the preceding claims, wherein said means for detecting when at least one object is present in the receiver bin is based on mounting at least one arm to the bottom unit of the object receiver through a mutual horizontal axis arranged perpendicular to the arm, so that when an object is displaced on the object receiver the bottom unit is displaced downward with a following upward displacement of the arm that passes a sensing mechanism and signalises that an object is present in the object receiver.

17. An apparatus according to any of the preceding claims, wherein the front wall is arranged on a horizontal hinge on the distal end from the bottom of the object receiver.

18. An apparatus according to any of the preceding claims, wherein the front end of the board further comprises a beam arranged perpendicular from the front end towards the front wall so that through an extended movement of the pneumatic cylinder the beam is
pushed on the front wall resulting in an opening of the front wall and thereby providing opening for releasing the objects from the object receiver towards the conveyor.

19. An apparatus according to any of the preceding claims, further comprising an in-feed conveyor for feeding the processing operators with objects to be processed.

20. A method for labelling an object with at least one characteristic property with at least one information relating to a processing operator, said method comprising:

- obtaining information relating to at least one characteristic property on the object prior to processing the object,

- obtaining information relating to the processing operator,

- receiving the object to be processed by the processing operator,

- storing the information relating to the processing operator and the at least one characteristic property of the object to be processed,

- labelling the object with at least one information relating to the processing operator,

- processing and subsequently directing the object in a object receiver, and

- detecting the presence of the object in the object receiver, and

- releasing the object from the object receiver onto a conveyor that conveys the released object, wherein the releasing is based on the presence of the object in the object-receiver, and that the released object will not overlap with other conveyed objects,

wherein the position of the released object is traced while being conveyed and is labelled with the at least one information relating to the processing operator.
21. A method according to claim 20, wherein the information related to the processing operator comprises the identification of the processing operator.

22. A method according to claim 20 or 21, wherein the information related to the processing operator comprises the time of processing.

23. A method according to any of the claims 20-22, wherein the object is fish.

24. A method according to any of the claims 20-23, wherein the at least one characteristic property is the weight of the object.

25. A method according to any of the claims 20-24, further comprising means for tracing the object prior to the processing in order to link a selected processing station and therefore an operator to the object.

26. A method according to any of the claims 20-25, further comprising means for weighing the processed object.

27. A method according to any of the claims 20-26, wherein the initial weight of the object and the weight of the same object after being processed are compared.

28. A method according to any of the claims 20-27, wherein the comparison between the initial weight of the object and the weight of the processed object are utilized in calculating the efficiency of the processing.

29. A method according to any of the claims 20-28, wherein the processed object comprises at least one main part and at least one supplementary part.

30. A method according to any of the claims 20-29, further comprising means for utilizing the tracing in monitoring the total weight processed by the processing operator in a given time interval.

31. A method according to any of the claims 20-30, further comprising means for utilizing the tracing in monitoring the yield of the processing performed by the processing operator in a given time interval.
32. A method according to any of the claims 20-31, further comprising means for utilizing the tracing in monitoring the quality of the processing performed by an processing operator in a given time interval.
C. DOCUMENTS CONSIDERED TO BE RELEVANT

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