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(54) Method and apparatus for packaging of aubergines and other vulnerable vegetables and/or fruits

(57) The present invention provides a method for packaging aubergines and other vulnerable vegetables and/or fruit, comprising the following steps of:
-placing the aubergines in transport means;
-measuring the weight and/or visual characteristics of each aubergine in the transport means;
-allocating the products to a number of offloading stations and sorting the aubergines into a predetermined number

of classes;
-offloading the aubergines from the transport means at the relevant offloading station onto a packaging unit positioned at the offloading station;
-filling the packaging unit up to a predetermined total weight; and
-re-packing the aubergines from the packaging unit to the final package at a removal location coupled to the offloading station.

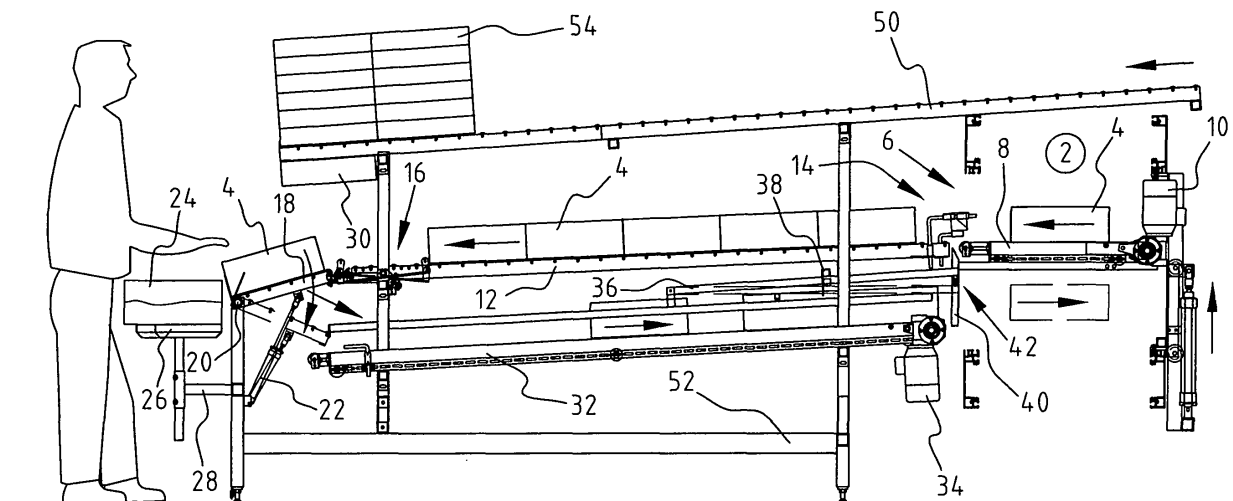


FIG. 1

Description

[0001] The present invention relates to a method and apparatus for packaging aubergines and other vulnerable vegetables and/or fruit.

[0002] Due to the vulnerability of aubergines, particularly with respect to the susceptibility to rubbing thereof, the sorting and transport of such vegetables and/or fruit entails a great deal of manual work. The combination of product quality and efficiency has heretofore been found to be a problem.

[0003] In current practice the operator places about fifteen products, in the case of aubergines, in a final package in order to reach the desired total weight of for instance five kilograms per package. During this operation the operator must thus always keep in mind the total weight of the final package when selecting the products, and check this final weight before releasing the filled final package for further transport.

[0004] A problem in this method is the high labour-intensiveness required for the different operations.

[0005] For aubergines it is the case that all products in a final package belong in the same weight class, of a total of for instance five classes, wherein one product may come from a most closely approximate weight class so as to thus come as close as possible to the desired final weight.

[0006] For aubergines it is moreover the case that most damage occurs due to rubbing of the products relative to each other, this being caused by the transport and the diverse operations with the product.

[0007] The present invention has for its object to provide a method and apparatus for sorting and packaging aubergines in large numbers, wherein the packing can take place less labour-intensively and with a greater accuracy, and/or damage to the product is prevented as much as possible.

[0008] The present invention provides a method for packaging aubergines and other vulnerable vegetables and/or fruit, comprising the following steps of:

- placing the aubergines in transport means;
- measuring the weight and/or visual characteristics of each aubergine in the transport means;
- allocating the products to a number of offloading stations and sorting the aubergines into a predetermined number of classes;
- of flooding the aubergines from the transport means at the relevant offloading station onto a packaging unit positioned at the offloading station;
- filling the packaging unit up to a predetermined total weight; and
- re-packing the aubergines from the packaging unit to the final package at a removal location coupled to the offloading station.

[0009] In the preferred embodiment the packaging units are transported in a closed system between the

offloading position and the removal position in order to reduce the number of labour-intensive operations. This closed transport system comprises a lift system for positioning the packaging unit relative to the sorting system, a number of conveyor belts and/or roller conveyors and/or chain conveyors for transporting the packaging units between offloading position and removal position, and a platform at the removal position for re-packing products from the packaging unit to the final packages on a table.

[0010] The filled packing container is preferably placed at an angle on a platform where the re-packing of the products can take place.

[0011] In the preferred embodiment the filled packaging unit is passed from the belt or conveyor onto the platform by means of a tipping device.

[0012] The platform is preferably given a tiltable form for the purpose of transporting the empty packing container via the closed system back to the offloading location after its release.

[0013] The feed belt or roller conveyor or chain conveyor with filled packing containers is preferably provided with a sensor which generates a warning when a belt or conveyor is filled. This sensor also generates a signal for the release of the lift. In addition to a transport function, this belt or conveyor also has a buffer function. The operator can hereby monitor a plurality of offloading stations and also carry out the re-packing function.

[0014] In the preferred embodiment the belt or conveyor with empty packing containers is provided with a throughfeed system consisting of an arm, hinge, blocking ratchet and releasing ratchet. This prevents the possibility of empty packaging units moving outside the closed system or the process being blocked by an incorrectly placed packaging unit.

[0015] An empty packing container is preferably transported to the offloading position by means of a positioning system embodied as a lift.

[0016] In an alternative preferred embodiment such a lift system is placed outside the sorting or offloading space.

[0017] In the preferred embodiment each packaging unit is brought to the desired weight by means of a sorting system, by placing the product at the required offloading position in the packaging unit after weighing of this product. During allocation the fact of whether a positioned packaging unit is present at the offloading position must be taken into account. In order to avoid undesirable waiting times as much as possible a plurality of offloading stations can be provided for the same weight class.

[0018] In an alternative preferred embodiment the sorting and allocation of products to the offloading stations can be extended with a visual system such as a camera.

[0019] In the preferred embodiment the final packages are assembled at the removal location. The required materials, sides and covers are supplied by means of a roller conveyor.

[0020] In an alternative preferred embodiment the final

packages are supplied in completed form via a roller conveyor or a conveyor belt, or in other manner.

[0021] Further advantages, features and details of the present invention will be elucidated on the basis of the following description with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of a preferred embodiment of the apparatus according to the present invention;

Figure 2 shows a schematic side view of the lift part in an alternative embodiment; and

Figure 3 shows a view of the transport holders for the product.

[0022] The products are displaced from the loading position to the desired offloading position using a transport system 2. The transport system is provided with a loading position where the products from the feed system are placed into the transport means, a weighing system with a load cell for measuring the product in the transport means, optionally in combination with a camera system for the purpose of a sorting on the basis of characteristics such as weight, colour, shape, dimensions and characteristics derived therefrom, and an offloading position where the products are offloaded into a packaging unit 4 by a tilting movement. Packaging unit 4 is a carton, crate, box or the like, preferably made of a lightweight plastic material with dimensions of 50x40 cm, although other materials and dimensions are also possible. By means of a lift system 6 as shown in figure 1 the packaging unit is positioned at the correct height for offloading a product into unit 4. The offloading location is embodied here with 1, but preferably 2 offloading positions in order to obtain a good filling of packaging unit 4. After filling of the packaging unit the filled packaging unit is transported, using a conveyor belt 8 with a drive 10, to a roller conveyor 12 with which the product is carried from the offloading position to the removal position. If desired, this roller conveyor 12 can also be embodied as a conveyor belt or chain conveyor. Roller conveyor 12 is provided with a detection sensor 14 which generates a signal if the packing container comes to a standstill in front of the sensor. This will occur if roller conveyor 12 is wholly filled with packaging units 4. This signal is also a safety measure against the lift being actuated. In addition to transport, a second function of roller conveyor 12 is buffering of packaging units 4. Packaging units 4 are fed through one by one to a platform 18 by means of a tipping device 16. Tipping device 16 allows through one packaging unit at a time to platform 18 and simultaneously blocks the other packaging units on roller conveyor 12. Packaging unit 4 on platform 18 is preferably placed at an angle for easier placing of products from the packaging unit into final package 24. The final package 24 is a box of strong cardboard with dimensions of 40x30 cm, although other materials and dimensions are also possible. Platform 18 is mounted tiltably on a hinge 20 on frame 52, and the plat-

form can be tilted using cylinder 22 or other mechanism, for instance a motor. Final package 24 is placed on a table 26 which is fixed to frame 52 using support 28. Support 28 can also be disposed with its own support means independently of frame 52. An insert sheet or protective layer from supply box 30 is usually placed on the re-packed product after each product layer in final package 24 before the following product layer is placed in final package 24. Table 26 is freely accessible from both the front and the two sides in order to transfer or re-pack products. After being released, the empty packing container 4 is placed on conveyor belt 32 by tilting the platform 18. Conveyor belt 32 displaces the empty packing container 4 from the removal position to the offloading position using a drive 34. In another embodiment the conveyor belt 32 can be embodied as roller conveyor and/or chain conveyor. The empty packing containers 4 are placed from conveyor belt 32 onto lift 6 using a release system 36. This release system, consisting of a long arm which is hingedly mounted, also comprises a blocking ratchet 38 for arresting a packing container. Packing container 4 on conveyor belt 32 runs against blocking plate 40 which is fixed to lift 6. By placing lift 6 in the low position the blocking plate 40 also descends away from conveyor belt 32, whereby one packing container is placed on the lift. By displacing the lift to the upper position the blocking ratchet 38 is lifted up briefly by the releasing ratchet 42, whereby one packing container is transported further to a position against blocking plate 40 which has meanwhile been moved upward. Release system 36 herein drops back down and the subsequent packing container is arrested by blocking ratchet 38. This release system can of course have a different embodiment. A closed system for the packing containers is formed by means of lift 6, roller conveyor 12, platform 18 and conveyor belt 32 with associated components.

[0023] The feed of the final packages preferably takes place by a roller conveyor 50 placed above the whole apparatus, with which the collapsed or stacked final packages 54 are transported to the removal position. If desired, this roller conveyor 50 can also be embodied as conveyor belt or chain conveyor, and in addition the definitive final package can also be transported in assembled form. In the preferred embodiment the assembly of final package 24, consisting of the sides and a cover, takes place on table 26.

[0024] In another embodiment a lift system 6 as shown in figure 2, consisting of a packaging unit 4 on a conveyor belt 8 with a drive 10 placed under offloading position 2, can also be placed outside this offloading position in order to obtain a more flexible and more rapid apparatus. For this purpose use is then made of an additional conveyor belt 80 with which packing container 4 is placed directly below offloading position 2 from lift 6.

[0025] The products are transported from the infeed position to the offloading position by means of transport holders 62 as shown in figure 3, wherein transport holders 62 are connected by means of a bearing shaft 60.

[0026] The transport device is provided with an offloading location for the products which do not meet the desired standards, in particular weight. Transporting of the transport holders with the products takes place by means of a driven conveyor chain which rotates round a number of transport wheels or transport rollers. The products are offloaded from transport holders 62 by a sorting system which activates the tilting mechanism associated with the relevant transport holders 62 at the correct offloading position 2. This activation causes holder 62 to tilt downward as a result of the force of gravity, whereby the product is placed into packaging unit 4 from transport holder 62.

[0027] The present invention is not limited to the above described preferred embodiments thereof; the rights sought are defined by the following claims, within the scope of which many modifications can be envisaged.

Claims

1. Method for packaging aubergines and other vulnerable vegetables and/or fruit, comprising the following steps of:
 - placing the aubergines in transport means;
 - measuring the weight and/or visual characteristics of each aubergine in the transport means;
 - allocating the products to a number of offloading stations and sorting the aubergines into a predetermined number of classes;
 - offloading the aubergines from the transport means at the relevant offloading station onto a packaging unit positioned at the offloading station;
 - filling the packaging unit up to a predetermined total weight; and
 - re-packing the aubergines from the packaging unit to the final package at a removal location coupled to the offloading station.
2. Method as claimed in claim 1, wherein the packaging units are transported in a closed system between the offloading position and removal position using one or more conveyor belts, one or more roller conveyors, a platform and/or a positioning system.
3. Method as claimed in claim 1 or 2, wherein the packaging unit is filled by offloading a product from a most closely approximate class.
4. Method as claimed in claim 1, 2 or 3, wherein products are allocated to an offloading station with a positioned packaging unit.
5. Method as claimed in one or more of the foregoing claims, wherein the products are placed at the removal location into a final package assembled at that location.
6. Method as claimed in one or more of the foregoing claims, wherein the product is visually assessed using a camera system.
7. Apparatus for packaging vulnerable products such as aubergines, comprising:
 - transport means which comprise transport holders for singulated transport of the products;
 - a weighing platform for determining the weight of the product for the purpose of sorting the products;
 - sorting means for allocating the products over a number of offloading stations;
 - offloading means for offloading the products from the transport means into a packaging unit;
 - a number of offloading stations with positioning system for the packaging unit; and
 - a platform as removal position for the purpose of re-packing the products from the packaging unit to the final package.
8. Apparatus as claimed in claim 7, wherein the packing containers are transported in a closed system between the offloading position and the removal position.
9. Apparatus as claimed in claim 8, wherein the closed system for the packaging units comprises:
 - a lift system for positioning the packaging unit relative to the sorting system;
 - a number of conveyor belts and/or roller conveyors and/or chain conveyors for transporting the packaging units between offloading position and removal position; and
 - a platform and table at the removal position for re-packing products from the packaging units to the final packages.
10. Apparatus as claimed in claim 9, wherein the filled packing container is placed on a platform where the products from the packing container are placed into a final package placed on a table.
11. Apparatus as claimed in one or more of the foregoing claims, wherein the conveyor belt or roller conveyor or chain conveyor with filled packing containers is provided with a sensor which generates a warning when a belt or conveyor is filled and also provides the control of the tilting movement or the lift movement.
12. Apparatus as claimed in one or more of the foregoing claims, wherein the filled packaging units are passed from the belt or conveyor onto the platform by means of a tipping device.

13. Apparatus as claimed in one or more of the foregoing claims, wherein the platform is tiltable for the purpose of transporting the empty packing container via the closed system back to the offloading location. 5
14. Apparatus as claimed in one or more of the foregoing claims, wherein the belt or conveyor with empty packing containers is provided with a throughfeed system consisting of an arm, hinge, blocking ratchet and releasing ratchet. 10
15. Apparatus as claimed in one or more of the foregoing claims, wherein the positioning system is formed by a lift on which the empty packing container is transported to the offloading position. 15
16. Apparatus as claimed in one or more of the foregoing claims, wherein the lift system is placed outside the sorting space. 20

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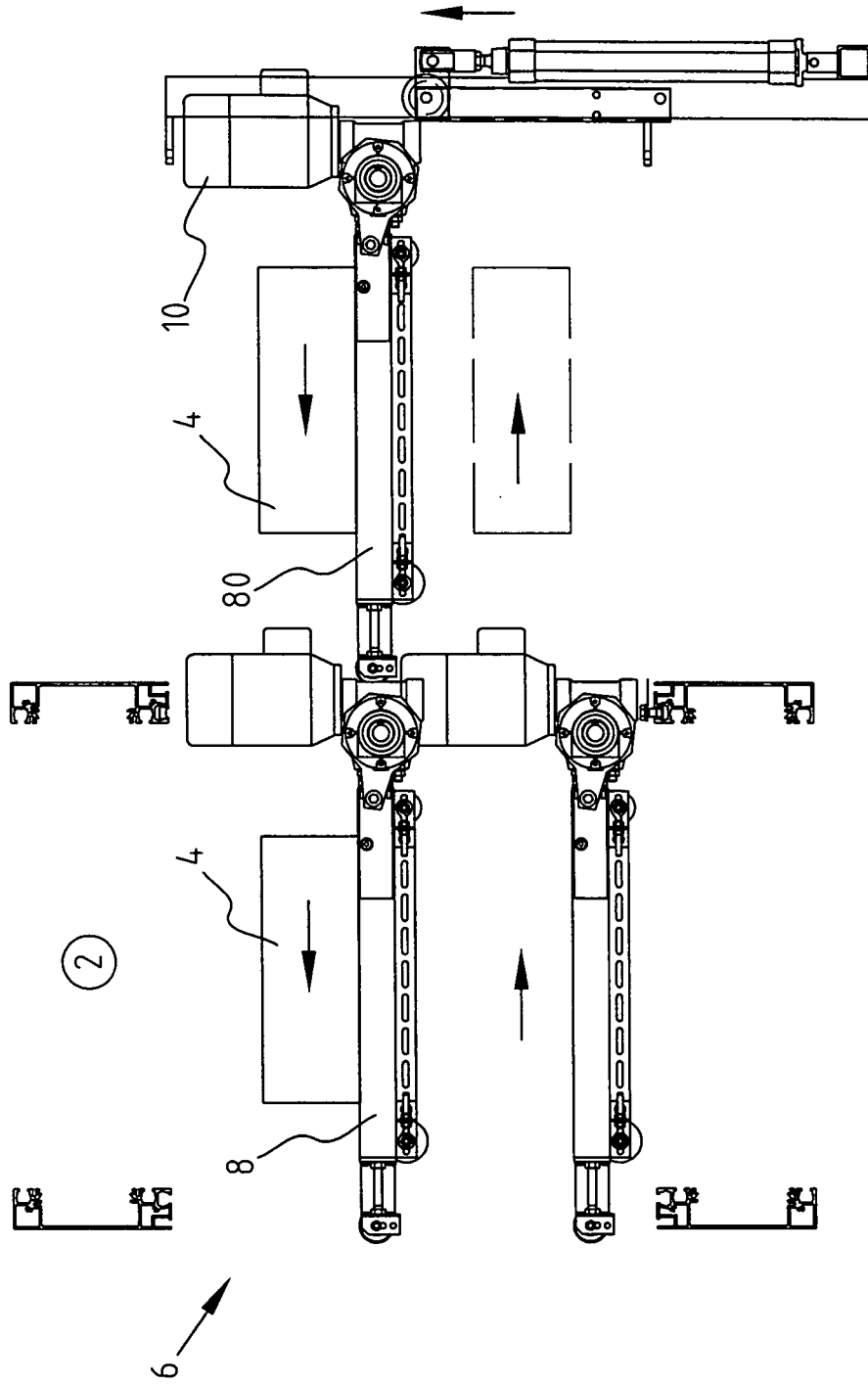


FIG. 2

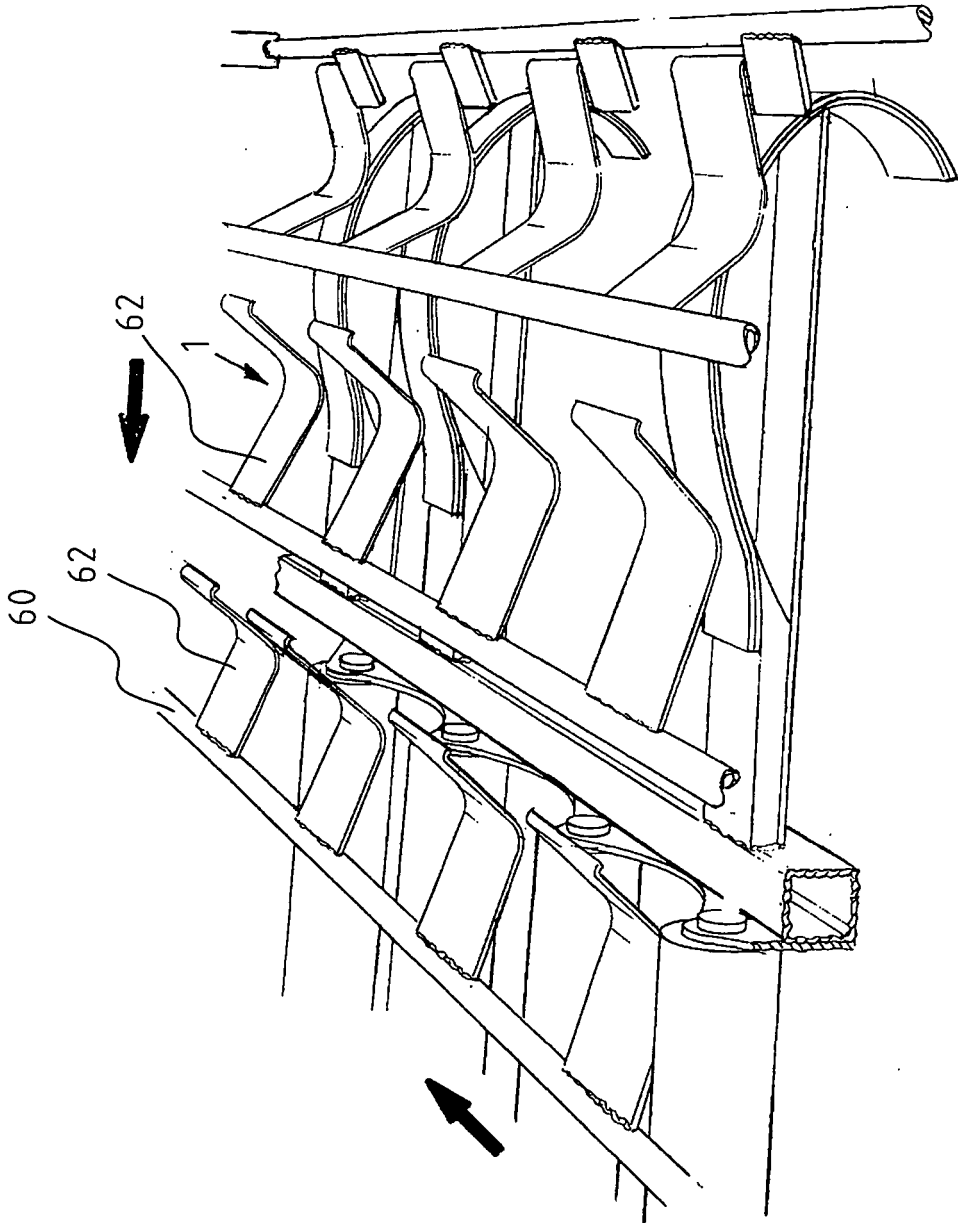


FIG. 3