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(54) **Filling box**

(57) A device for filling substantially horizontally placed boxes (10) or crates with vulnerable products (11), such as fruit, supplied in bulk, comprising

- a filling box (1) which is included in a housing and which comprises at least two hinged bottom parts (3¹, 3¹¹) from which the products are discharged into a box (10) or crate to be filled;
- a feeding device (4) for transferring the products into said filling box (1);
- a filling box control (5) which, during transfer of and filling with products (11), moves the filling box gradually in the direction of a crate or box (10) to be filled; and
- a control device for controlling said moving and hinging of the bottom parts (3) after the filling box (11) has been filled to a well-defined level,

wherein, upon transfer and filling, the filling box (1) is moved from a first position of transfer to a second position of discharge;

wherein the position of transfer is a substantially slanting position with which the products (11) roll into the filling box (1) on one of the sides of the filling box (1); and

wherein the position of discharge is a substantially vertical position with which the products (11) are evenly distributed over the box (10) before the bottom parts (3) hinge apart for discharging the products substantially vertically downwards. Advantageously, the bottom parts consist of hinged strips with which hand-like gripping and discharging movements can be carried out. Advantageously, with these, vulnerable products (11) can be discharged into boxes (10), cases or crates.

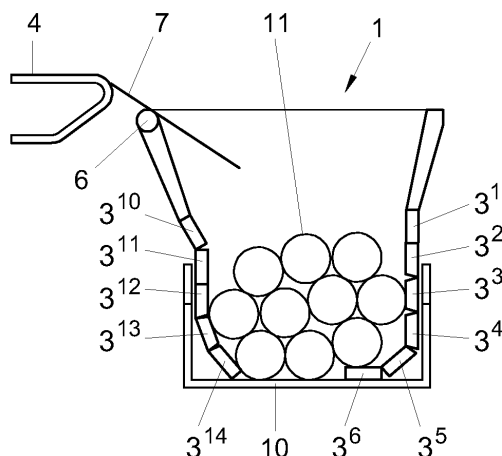


Fig. 6

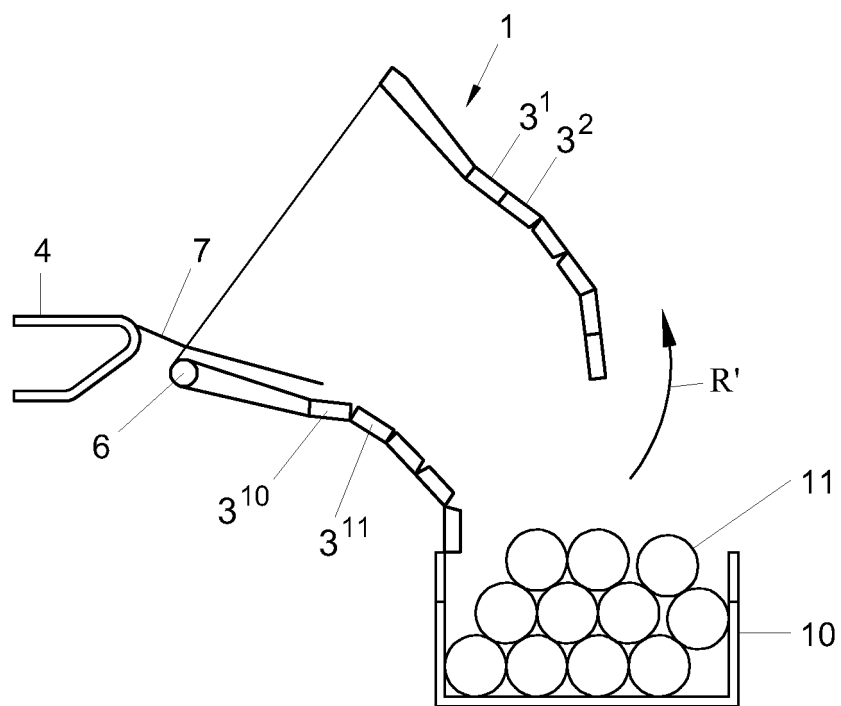


Fig. 7

Description

[0001] The present invention relates to an apparatus for filling substantially horizontally placed boxes or crates with vulnerable products such as fruits, supplied in bulk, comprising

- a filling box which is included in a housing and which comprises at least two hinged bottom parts from which the products are discharged in a box or crate to be filled;
- a feeding device for transferring products into the filling box mentioned;
- a filling box control which, during transfer of and filling with products, moves the filling box gradually in the direction of a crate or box to be filled; and
- a control device for controlling the moving and the hinging of the bottom parts after the filling box has been filled to a well-defined level.

[0002] Such a device is known from NL9201646. In this publication, a filling station is described for filling boxes, crates, or cases with vulnerable products, such as fruit. The filling station is a tray moving vertically downward during filling, which directly links up with the downstream side of a conveyor belt. From there, at the beginning of filling, the products roll on two substantially horizontally placed bottom halves. Then, the products roll onto the product layers having meanwhile formed. When the holder has obtained the desired degree of filling and, at the vertical movement, has taken up the correct position above the box, crate or case, the halves hinge downward and outwards so that the products are discharged or poured in a downward, falling movement. For the wall part of the feed side of the feeding station, use is made of an unwinding belt.

[0003] In the device according to NL9201646, supplying and feeding vulnerable products has indeed been taken into account. However, as soon as the first product layer is formed, the distribution of the products over the entire cross-section of the filling station may stagnate frequently due to products accumulating in front of it in an irregular manner. Furthermore, the dimensions of the bottom halves are such that when they open, most products have to bridge a considerable trajectory before taking up a place in the box, crate or case.

[0004] In order to further improve the transfer of such products into a box or crate, the device according to the present invention is characterized in that upon transfer and filling, the filling box is moved from a first position of transfer to a second position of discharge, while the position of transfer is a substantially slanting position in which the products roll into the filling box on one of the sides of the filling box, while the position of discharge is a substantially vertical position in which the products are evenly distributed over the box before the bottom parts hinge apart for discharging the products substantially vertically downwards.

[0005] It has appeared that with the features according to the present invention, the products are transferred very gradually, and also that in this manner, the boxes and crates are filled in a very even manner. A very frequent shortcoming occurring during filling of boxes, viz. the products ending up beside it or the filling having local, undesired accumulations and, hence, sustaining loss or damage during conveyance, is also remedied in a suitable manner.

[0006] The device can further comprise the feature:

that the bottom parts are built up from hinged strips extending substantially horizontally, while, with the filling box in the position of discharge, with a strip control unit, the strips hinge gradually outwards whereby an ever enlarging opening is obtained; that the strips have a trapezoid cross-section, wherein the strips each have at least a single through-bore in the cross direction, forming a wire guide, while the strip control unit pulls the wire in each bottom part for closing the bottom parts and eases the wire in each bottom part for opening the bottom parts; that the strips are inflatable and have a profile whereby, under pressure, a closed position is taken up, while, under pressure relief, the strips relax and an opening is obtained; that at the transition from the feeding device to the filling box, a product guide is provided, transferring the products box to the filling box substantially as a layer; that the product guide is connected to the filling box control while the position of the product guide and the position of the filling box are geared to each other; and that the product guide comprises a hinged plate part.

[0007] The feature of the above-mentioned strips highly advantageously allows a manner of transfer with which the movement of the strips forms a mechanic imitation of the movement of stretching and folding hands, while the strips can be compared to bones in the hand. This is clearly most advantageous when treating and processing vulnerable products such as fruits.

[0008] Hereinafter, the device according to the invention will be described in detail with reference to a few Figures, wherein

Fig. 1 gives a schematic view of the device according to the invention;

Figs. 2 - 7 schematically show successive positions of an exemplary embodiment of the filling box during a cycle of transfer of products, with Fig. 2 as starting position of such a cycle, Figs. 3 - 6 as intermediate positions and Fig. 7 as final position. In the different Figures, the same pieces or parts have the same reference numerals.

[0009] In Fig. 1 are shown a filling box 1 that is movably

suspended in a housing 2, and a feeding device 4. The feeding device 4 may be an endless conveyor belt that can feed products in the direction T and can feed and transfer the products 11 into the filling box with a continuous movement. The filling box 1 comprises at least two hinged bottom parts 3 that are movable in a manner such and, hence, can be opened such, that products resting in the filling box 1 can be discharged therefrom into a box or case or crate 10. The filling box 1 is connected to a filling box control 5 with which the displacements and movements of the filling box 1 and of the bottom parts 3 are controlled and driven. Such a control can for instance be mechanical, such as with a cam disc, electromagnetic, pneumatic, or also hydraulic, or even combinations thereof.

[0010] Not represented is a control device which gears the mutual movements and displacements of the feeding device 4 and the filling box 1 and the bottom parts 3. In general, this will be a computer that processes signals and gears them to each other. Here however, other solutions, for instance in hardware, generally known to the skilled person are possible too.

[0011] In Figs. 2 - 7, schematically, a cycle of filling such a filling box 1 is represented. In general, the intermediate positions upon feed and transfer can be called slanting, while upon first feed, a substantially horizontal position, and upon discharge, a substantially vertical position is taken up by the filling box 12.

[0012] In Fig. 2, the filling box 1 is positioned in a substantially horizontal filling position so that products 11 are fed and transferred in the direction T by the conveyor belt 4 into the filling box 1. The position for the filling box 1 is realised by, for instance, rotating it around an axis 6. The filling box control 5 from Fig. 1 is not represented here. It is shown how the products 11 gradually roll over a product guide 7, for instance a plate part from the belt 4 into the filling box 1. With the aid of such a transition, the products 11 will be fed substantially as a layer. It is clearly shown that the filling box 1 is closed and the bottom parts 3 take up a closed position.

[0013] In Fig. 3, a following intermediate position for filling is shown, wherein the filling box is rotated around the axis 6 in the direction R. As a result of such a relatively small rotation, the products 11 are allowed to spread gradually and evenly in the filling box 1, in particular over the bottom parts 3.

[0014] In Fig. 4, a further intermediate position is shown, while it can be seen how the filling box 1 as a whole is gradually filled. In the exemplary embodiment shown, the plate part 7 has not changed position.

[0015] In Fig. 5, the filling box 1 is shown in a final position or position of discharge. In this Figure it is represented how the plate part 7 has rotated further downwards to still transfer any products 11 that may have remained behind on the plate piece 7.

[0016] In Fig. 6, the bottom parts 3 are opened for discharging the products 11. It can be seen, for instance in connection with Fig. 1, how the bottom parts are built up

from hinged strips $3_1, 3_2, \dots, 3_{10}, 3_{11}, 3_{12}, \dots$, while when the strips hinge outward, the strips hang limp and the products can flow from the filling box 1 into the crate or box 10.

[0017] The hinging is carried out with a strip control unit (not represented). In the embodiment shown, to that end, the strips have a trapezoid cross-section. When bored through cross-wise, through which bore a pulling wire can be guided, the strips can hinge towards each other when pulled and the bottom can be closed, and vice versa. In another exemplary embodiment, not represented in the Figures, strips may be designed in plastic and be inflatable, whereby a similar result is obtained, i.e., under pressure for a closed condition, and under pressure relief for opening the bottom parts 3. The controls and drives for such strips may be mechanical, electromagnetic, hydraulic or pneumatic.

[0018] In Fig. 7 it is represented how the filling box 1, after discharge of products, is rotated back into the direction R' to the position according to Fig. 2, to commence a following cycle.

[0019] With a control device, for instance a computer, all movements and displacements are geared to each other. This control device will process signals produced by recorders and controls and with these drive the filling box control and the strip control unit and any further moving parts such that a cycle is carried out. It will be clear to all skilled in the art that herein, many variations and modifications are possible. Further, control devices other than a computer, or also combinations, can be utilized.

[0020] It will be clear to all skilled in the art that further modifications of the described concept are possible. Such modifications are understood to be comprised within the protective scope of the appended claims. For instance, the entire filling box 1 can be built up as hinged unit, for instance as a grapple as used with earth moving and digging operations. In another embodiment, the strips can be divided and driven in a different manner. Several pulling wires or other pulling mechanisms too can be utilized.

Claims

1. A device for filling substantially horizontally placed boxes or crates with vulnerable products, such as fruit, supplied in bulk,
characterized in that
upon transfer and filling, the filling box is moved from a first position of transfer to a second position of discharge,
wherein the position of transfer is a substantially slanting position in which the products roll into the filling box at one of the sides of the filling box, and
wherein the position of discharge is a substantially vertical position in which the products are evenly distributed over the box before the bottom parts hinge apart for discharging the products substantially ver-

tically downwards.

2. A device according to claim 1, **characterized in that** the bottom parts are built up from hinged strips extending substantially horizontally, while in said position of discharge of the filling box, with a strip control unit, the strips gradually hinge outwards, whereby an ever enlarging opening is obtained. 5
3. A device according to claim 2, **characterized in that** the strips have a trapezoid cross-section, the strips each having at least a single through bore in cross direction, forming a wire guide, while the strip control unit pulls the wire in each bottom part for closing the bottom parts and eases the wire in each bottom part for opening the bottom parts. 10 15
4. A device according to claim 2, **characterized in that** the strips are inflatable and have a profile whereby, under pressure, a closed position is taken up and, under pressure relief, the strips relax and an opening is obtained. 20
5. A device according to any one of the preceding claims, **characterized in that** at the transition from the feeding device to the filling box a product guide is comprised with which the products are transferred to the filling box substantially as layer. 25
6. A device according to claim 5, **characterized in that** the product guide is connected to the filling box control, while the position of the product guide and the position of the filling box are geared to each other. 30
7. A device according to any one of claims 5 or 6, **characterized in that** the product guide comprises a hinged plate part. 35

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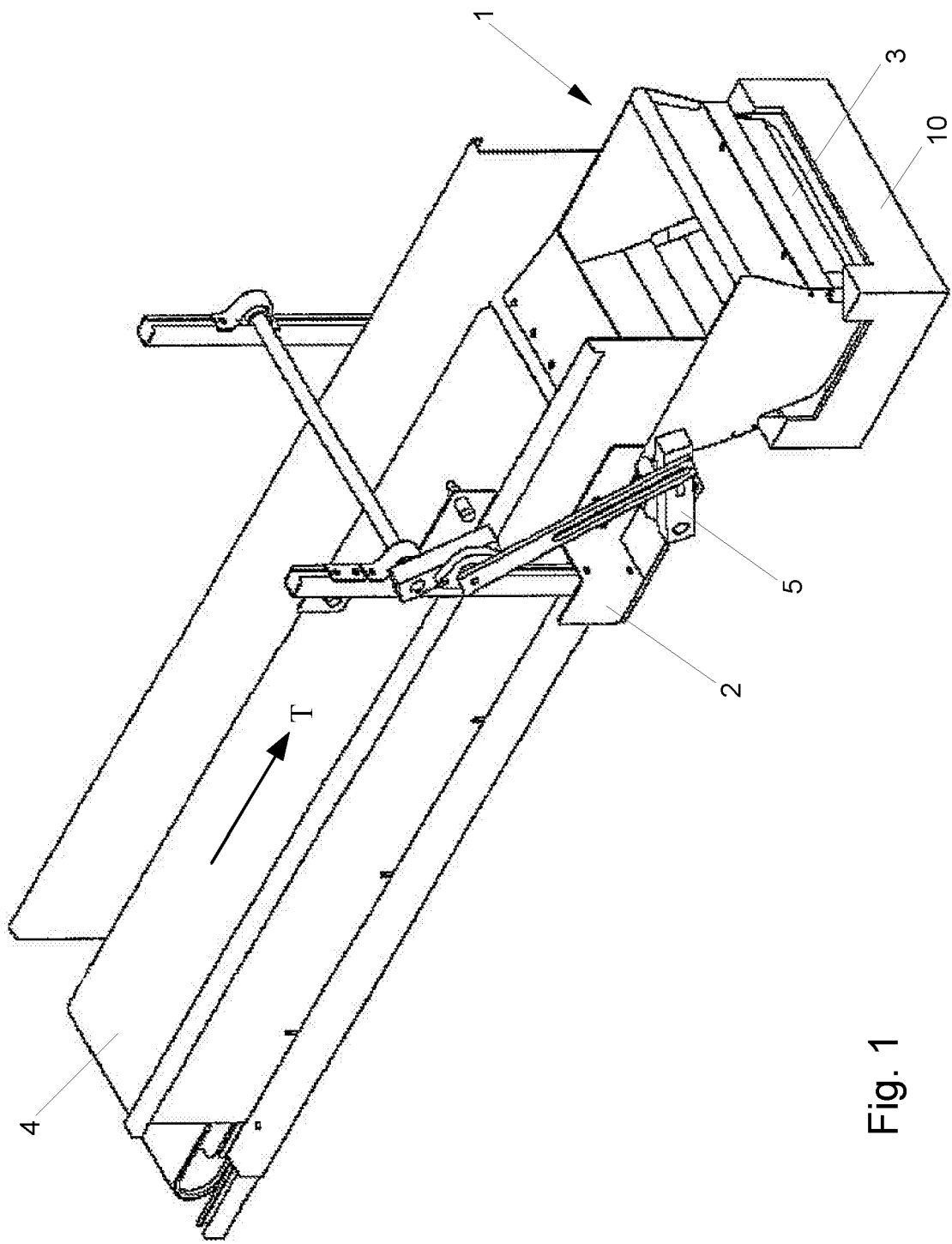


Fig. 1

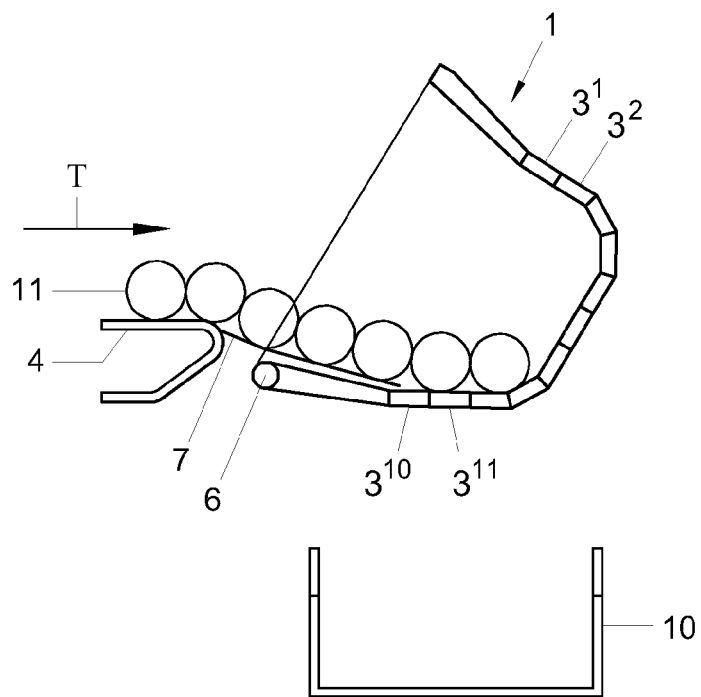


Fig. 2

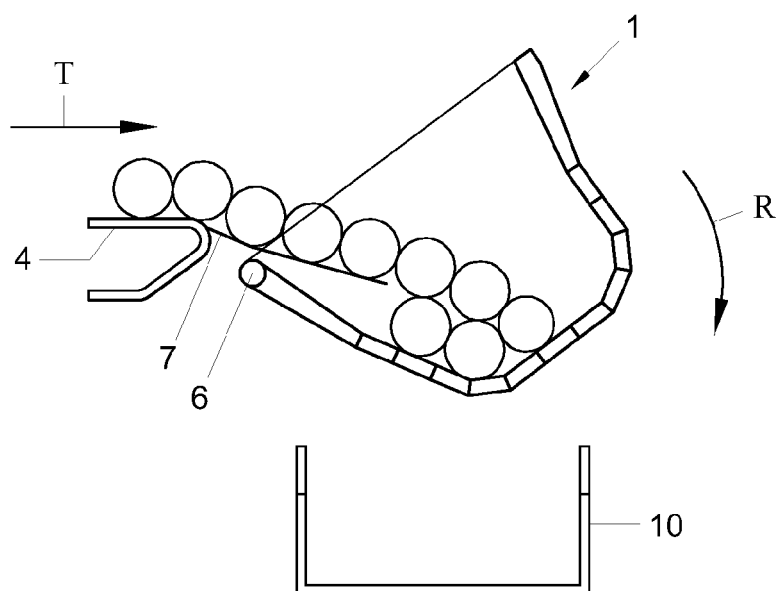


Fig. 3

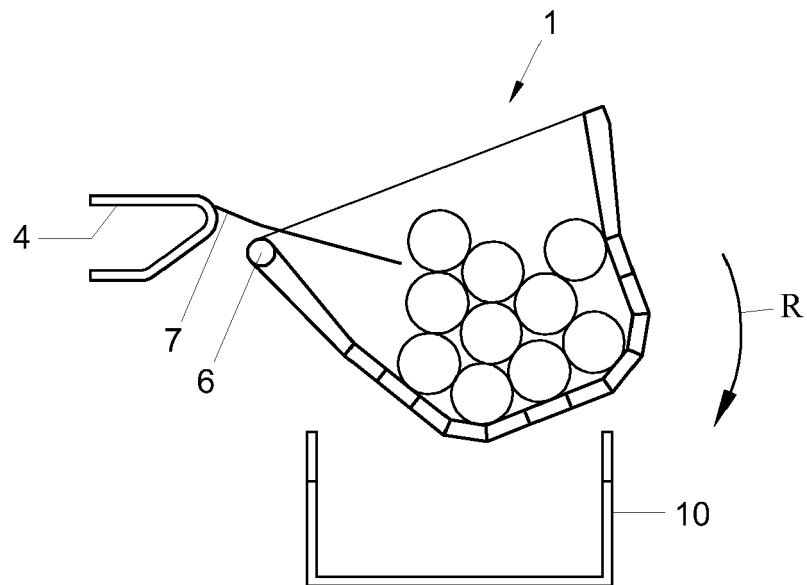


Fig. 4

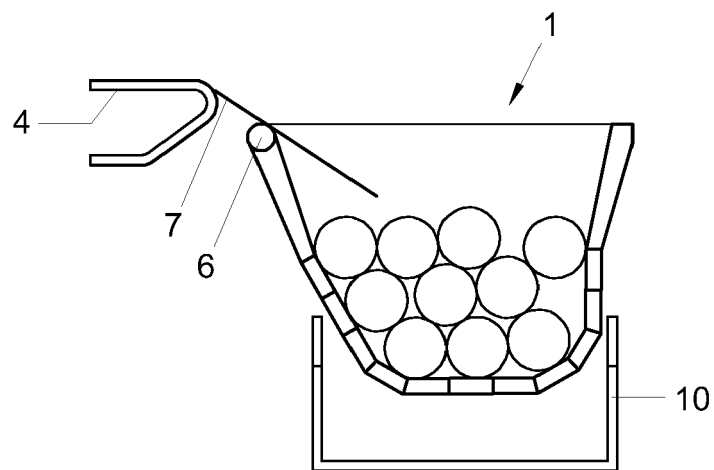


Fig. 5

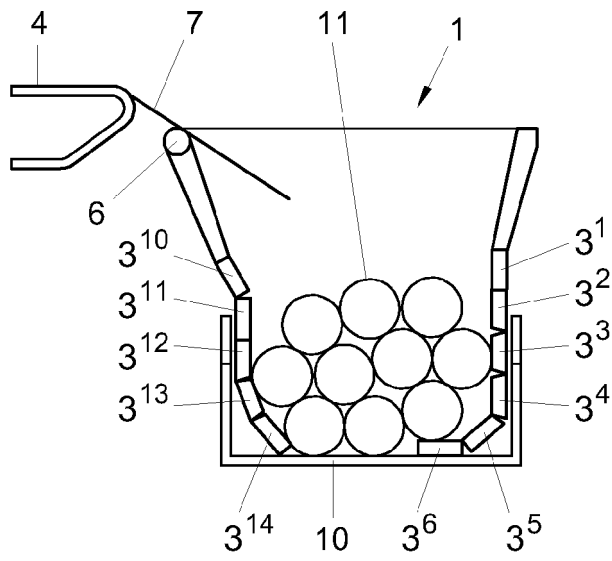


Fig. 6

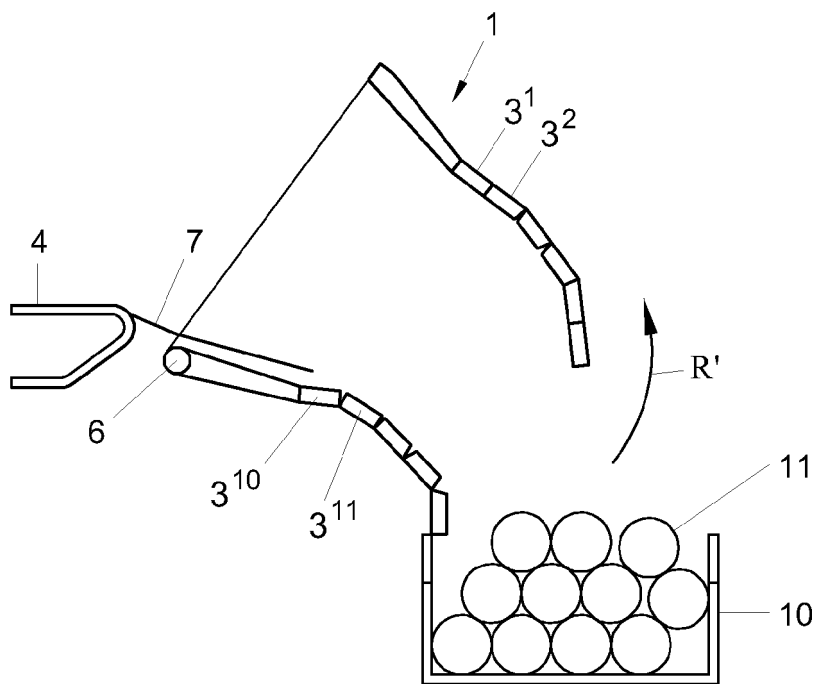


Fig. 7



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 6454

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 July 2007	Examiner Ungureanu, Mirela
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