



(11) **EP 2 174 869 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
07.09.2011 Bulletin 2011/36

(51) Int Cl.:
B65B 5/06 (2006.01) **B65B 5/10** (2006.01)
B65B 35/44 (2006.01) **B65B 65/00** (2006.01)

(21) Application number: **08425662.7**

(22) Date of filing: **13.10.2008**

(54) **Method and apparatus for rapidly filling trays with individual products**

Verfahren und Vorrichtung zum schnellen Befüllen von Verpackungsschalen mit Gegenständen

Procédé et appareil pour le remplissage rapide de barquettes avec des articles

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(43) Date of publication of application:
14.04.2010 Bulletin 2010/15

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(56) References cited:
EP-A- 0 239 547 EP-A- 0 422 983
EP-A- 1 647 485 CH-A- 409 762
DE-A1- 3 906 635 DE-A1- 4 309 485
GB-A- 2 092 090

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Description

[0001] The present invention refers to a method for the quick filling of containers with single products and the relative apparatus.

[0002] More in particular, the present invention refers to a method and the relative apparatus for the quick filling of identical containers with prearranged products, in particular food products.

[0003] As is well known, containers in the form of trays containing a predefined amount of food products such as, for example, snacks are widely available on the market.

[0004] In order to fill these trays with the products, in bulk or packaged separately, apparatus are employed which, by means of a suitable handling head, pick an ordered and predefined line of product from a pickup zone and place it inside a plurality of identical trays arranged adjacent to each other in a filling zone, forming a first layer of products. This pick-up and filling operation is repeated with a new layer of products to be placed on the preceding one until all the trays are fully and simultaneously filled.

[0005] Obviously, the number of layers may vary depending on the type of trays used, just as it is possible to fill trays with only a single layer.

[0006] At the conclusion of the filling, the trays are conveyed to a packaging line where they are closed and sealed with the products inside. An apparatus of this type is known from GB-A-2092090.

[0007] More in detail, in the prior art the operations outlined above are performed as follows.

[0008] First, the handling head picks up, from the pick-up zone, an ordered row of products that are arranged adjacent to each other with suitable moveable grasping means. The selected row is lifted from the pickup zone and moved towards the filling zone where a number of trays has been arranged, usually from two to six and sufficient to receive the entire row of picked up products.

[0009] In order to prevent that in the course of the filling the products that are intended to occupy the lateral ends inside each tray interfere with the lateral walls of the trays themselves, it is necessary that the trays be arranged next to each other in rows with the walls adjacent.

[0010] Unfortunately, the trays are not always arranged correctly. As a matter of fact, in order to attain correct filling with a picked up row of products, it is necessary that: the trays are arranged in precisely identified positions with respect to the grasping means, when the latter places the product therein on one hand; while on the other hand it is necessary that the trays are accurately placed next to each other in such a manner that no product falls outside of the trays and that they are filled equally.

[0011] In the absence of one of these conditions, the complete filling of the trays with a row of products will not take place correctly.

[0012] When such an undesired event occurs, it is necessary to stop the machine, which results in a reduction

of effective productivity when compared to the potential, and a relative loss in efficiency.

[0013] In order to improve productivity, there have been attempts to increase the amount of products to be processed through a single pick-up operation by the handling head, with the consequent increase of trays to be filled per each filling cycle. Unfortunately, increasing the amount of products to be processed per filling cycle inexorably leads to increasing the occurrence of the above-mentioned problems, forcing the operators to calculate the ideal amount of products to be processed per filling cycle.

[0014] In addition, the handling heads available from the prior art do not allow processing a row of products exceeding a given length/amount on the one hand, while on the other hand the handling heads require availability of more free space in such a manner as to allow transferring the products from the pickup zone to the tray packaging zone without interferences, resulting in more space occupied.

[0015] In other words, though guaranteeing a sufficiently quick performance of the product pickup operations and the subsequent filling of the trays, the operating system of the prior art nevertheless presents some drawbacks and disadvantages.

[0016] In particular, privileging productivity by the use of handling heads capable of operating with a high number of products per filling cycle inevitably entails use of bigger apparatus which occupy more space and simultaneously creates a reduction of reliability due to the contemporaneous management of a greater number of trays to be arranged correctly in the filling zone.

[0017] On the contrary, privileging reliability and compactness - by using smaller handling heads - leads to production drops proportional to the reduction in terms of the number of trays filled per cycle.

[0018] There is, therefore, a strong need for a new method and related apparatus for the quick filling of containers with single prearranged products that is capable of combining reliability with compactness, maintaining at the same time an overall productivity that is more than acceptable in the relevant prior art.

[0019] An object of the present invention is to provide a method and an apparatus possessing such characteristics as to meet the abovementioned needs and that at the same time overcome the aforementioned drawbacks with reference to the prior art.

[0020] This goal is obtained by a method for the quick filling of containers with single products according to claim 1, and an apparatus according to claim 14.

[0021] The dependent claims outline preferred and particularly advantageous embodiments of the method and of the apparatus respectively, according to the invention.

[0022] Further characteristics and advantages of the invention will become clear from the following description provided for exemplifying and nonlimiting purposes, with the help of the figures illustrated in the attached drawings,

wherein:

- figure 1 shows a side view of an apparatus for the quick filling of containers with single products according to the present findings;
- figure 2 shows a cross-sectional view along plane A-A as identified in figure 1 of the apparatus represented in figure 1;
- figure 3 shows a side view of a line for picking up products of the apparatus of figure 1 in a first step of the method according to the present invention;
- figure 4 shows a top view of the apparatus of figure 3 during the same first step of the method according to the present invention;
- figure 5 shows a side view of the line for picking up the products of figure 3 in a second step of the method according to the present invention;
- figure 6 shows a top view of the apparatus of figure 5 during the same second step of the method according to present invention.

[0023] Referring to the abovementioned figures, 1 in its entirety indicates an apparatus for the quick filling of containers, in the example in the form of trays 2 with single products 3, according to the present invention.

[0024] The term single product 3, hereinafter simply referred to as product, is used to indicate any loose or packaged product with dimensions that allow it to be introduced alongside other similar products into special trays 2. In particular, such a product can be a food product, such as for example a snack.

[0025] The apparatus 1 generally comprises a supply line 4 for supplying products, a pickup line 5 for picking up said products, arranging means 6 for arranging the products coming from the supply line 4 to the pick-up line 5 in an orderly manner, a transport line 7 for transporting trays, a first handling head 8a designed to pick up a first group 3a of products 3 from a pick-up zone 5a present on the pickup line 5 and arrange it inside a tray 2 arranged on the transport line 7.

[0026] According to the present invention, the apparatus 1 further comprises a second handling head 8b designed to pick up a second group 3b of products 3 from the same pickup zone 5a where the first group is picked up and arranged inside a tray 2. In particular, as can be seen in figure 6, the first and the second handling head 8a, 8b are arranged adjacent to each other, but operating without interfering with each other.

[0027] Referring to the illustrated example, the supply line 4 is implemented as a conveyor belt on which the products 3 intended to be inserted into the trays 2 are arranged. The products 3 are placed on the conveyor belt at random, in accordance with the prior art, and be-

fore reaching the pickup line 5 they are arranged by suitable arrangement means 6.

[0028] The arrangement means 6, comprising two walls 6a at the sides of the pickup line 5, serve to arrange and channel the products towards the pickup line 5 immediately downstream of the conveyor belt.

[0029] In the example, the pickup line 5 consists of a first and a second conveyor chain 9a, 9b parallel to each other, each wound on two opposite rotating drums, each of which is actuated with a step by step movement by a brushless motor. The pick-up zone 5a is preferably arranged horizontally.

[0030] Fixed on each conveyor chain 9a, 9b is a pair of collection elements 10a, 10b, 11a, 11b which will be referred to as first and second collection pair for the sake of simplicity, collectively forming four collection elements 10a, 10b, 11a, 11b. Furthermore, each collection element of the first pair 10a, 10b alternates with one of the second pair 11a, 11b in such a manner that there is a collection element of the first pair alternating with a collection element of the second pair. The distance between the all four collection elements is established on the basis of the method of forward movement of the conveyors chain 9a, 9b better described hereafter. In the example the distance between the two collection elements of the first pair 10a, 10b is equivalent to the distance between the two collection elements of the second pair 11a, 11b.

[0031] According to the illustrated embodiment, the four collection elements are identical to each other and configured in such a way that they receive from the belt of the supply line 4, the products 3 which are arranged in an orderly manner, in a row and adjacent to each other.

[0032] In particular, each collection element is formed by a comb-shaped structure to separate the products 3 from each other in an orderly manner and individually.

[0033] More in particular, the two collection elements of the first pair 10a, 10b are arranged directly above the conveyor chain 9a supporting them, in the example the one closest to the supply line 4, while the two remaining elements of the second pair 11a, 11b are arranged cantilevered above the same conveyor chain 9a that supports the first pair 10a, 10b.

[0034] Substantially, all four collection elements 10a, 10b, 11a, 11b are positioned above and at the same height with respect to the conveyor chain 9a closest to the supply line 4, so that each can be filled in the same manner.

[0035] The amount of products 3 that fills each of the collection elements is predetermined and corresponds to the quantity of product that should subsequently be picked up and positioned in the tray 2 to form a complete row of products 3.

[0036] The first and the second group of products 3a, 3b described above are thus formed by an identical amount of products 3 placed adjacent to each other in an orderly manner.

[0037] The filling of each collection element with the preset amount of products 3 occurs while the conveyor

chain 9a, 9b that supports it, moves forward at a preset speed.

[0038] In particular, the speed of this forward movement must be coordinated with the speed at which the products 3 are pushed by the compressed air group towards the applicable collection element 10a, 10b, 11a, 11b. In practice the products 3 are pushed one by one at a certain rate corresponding to the forward movement of the collection element 10a, 10b, 11a, 11b, in such a manner that only one product 3 is placed between each pair of teeth, until all the spaces of the comb-shaped structure of the collection element are occupied.

[0039] In the example, each collection element 10a, 10b, 11a, 11b is capable of accommodating five products 3 aligned in a row.

[0040] Once the collecting of the products 3 is finished, the collection element 10a, 10b, 11a, 11b continues moving forward until it reaches the pickup zone 5a, where the collection element 10a, 10b, 11a, 11b is stopped to make available the products 3 to one of the two handling heads 8a, 8b.

[0041] At this point, the handling head 8a, 8b set for picking up through suitable grasping means, picks up the products 3 arranged on the collection element and positions them inside the tray 2 on the transport line 7.

[0042] In the example the transport line 7 comprises a further conveyor belt arranged parallel to the conveyors chain 9a, 9b, and preferably at the same height off the ground.

[0043] In practice there are two parallel rows: one that is formed by the two conveyors chain 9a, 9b on which the products 3 are collected and the other that is formed by the belt with the trays 2 that are to be filled.

[0044] In order to make the filling more efficient, the conveyor belt of the trays 2 is stopped during the filling of tray 2 with the products 3 which have previously been picked up by the handling head 8a, 8b.

[0045] In other words, on the transport line 7 of the trays 2 a preset filling zone 7a is created with the tray 2 set to receive the products 3 during the filling.

[0046] In the preferred embodiment of the present invention, the first and second handling head 8a, 8b are identical to each other. These first and second handling heads, as the attached figures illustrate, are interposed between the pickup line 5 of the products and the transport line 7 for transporting the trays 2.

[0047] In the illustrated example, the handling heads 8a, 8b, each comprise an anthropomorphic robot 12a, 12b which moves the grasping means with a movement system that has at least three degrees of freedom.

[0048] These anthropomorphic robots 12a, 12b are supported by a support base, fixed at the upper part to a frame 30 in which all the pick-up and filling operations occur, as figure 1 clearly illustrates.

[0049] In the illustrated example, the anthropomorphic robots 12a, 12b used in the present invention are articulated in such a manner that the grasping means attached to their free appendage has a total of 6 degrees

of freedom of movement.

[0050] Each robot 12a, 12b is constrained to a turret 21 rotating along a vertical axis Y with respect to the frame 30. Movably attached onto the turret 21 is a rotatable connecting rod 22 hinged to the turret on a horizontal axis.

[0051] The free appendage of the connecting rod 22 supports an arm 23, which also rotates both around a vertical axis and around its own longitudinal axis. The arm 23 terminates in an end-effector, movably attached in a rotating manner along a vertical axis, onto which the grasping means are attached.

[0052] The grasping means can be of various types, including all the prior art devices adapted to the present purpose. In the embodiment illustrated in the enclosed figures 1, 3 and 5, these means take the form of grasping elements with suction caps. In an alternative embodiment, in order to guarantee a better positioning of the products 3 inside the trays 2, the seizing means can consist of grasping members of any known type.

[0053] Regardless of their type, the grasping means advantageously comprise an equivalent number of members with respect to the products 3 transported by a collection element 10a, 10b, 11a, 11b. In the illustrated embodiment, said grasping members are slidably connected to two transverse bars. By moving the grasping members along the bars, it is possible to vary the relative position between the products 3 collected by the anthropomorphic robot 12a, 12b, adapting it to the dimensions of the tray 2.

[0054] Operatively and according to the preferred embodiment of the present invention, the filling of the trays occurs as follows.

[0055] The products 3 arranged on the belt of the supply line 4 are arranged in an orderly manner on a first collection element 10a, 11a. Once the filling has been completed, this first collection element 10a, 11a is moved to the pick-up zone 5a by the same conveyor chain 9a onto which it is fixed and it is simultaneously made available for the filling of a second collection element 10b, 11b, adjacent to the other one and fixed to the remaining conveyor chain 9b.

[0056] Substantially, the filling of the collection elements 10a, 10b, 11a, 11b occurs constantly, given that as soon as a collection element 10a, 10b, 11a, 11b has been filled, a second collection element 10a, 10b, 11a, 11b is immediately made available, and so on and so forth. Furthermore, the filling occurs while the collection element 10a, 10b, 11a, 11b in question moves forward at a speed that corresponds to the velocity of the arrival of the products 3.

[0057] Obviously, the filling elements 3 of the first pair 10a, 11a alternate with those of the second pair 10b, 11b, alternatively actuating the two support conveyors chain 9a, 9b.

[0058] When the first collection element 10a of the first pair reaches the pick-up zone 5a, the conveyor chain 9a supporting it is halted temporarily, while the remaining conveyor chain 9b moves forward to allow the filling of a

second collection element that belongs to the second pair.

[0059] At this point, with the first collection element halted, the first handling head 8a picks up the products 3 from the first collection element 10a. Simultaneously, the second handling head 8b is located at the filling zone 7a. This is the operating step represented in the attached figures 3 and 4. Not until after this step does the first handling head 8a introduce the product into the first tray 2 which, in the meanwhile, has been made available in the filling zone 7a by the conveyor belt, so that a first layer of products 3 is formed.

[0060] As soon as the products 3 are picked up by the first collection element 10a, the conveyor chain 9a supporting it is actuated again to clear the pick-up zone 5a, so that the second collection element 10b, suitably filled, can be moved to the pickup zone 5a by the remaining conveyor chain 9b. In the meantime, the two handling heads 8a, 8b start moving to reverse their positions. The first head 8a, which transports the first group 3a of products, moves towards the filling zone 7a; the second head 8b, unloads the product and moves towards the pickup zone 5a. This intermediate step, in which both conveyors chain 9a, 9b are moving, is represented in the attached figures 5, 6.

[0061] When the second collection element 10b reaches the pickup zone 5b, the conveyor chain 9b that was supporting it is halted momentarily, while the remaining conveyor chain 9a moves forward to allow the filling of a third collection element 11a, once again of the first pair.

[0062] At this point, with the first collection element 10b halted, the handling head 8b picks up the products 3 from the second element 10b to be subsequently inserted into the first tray 2, should its filling not have been completed.

[0063] The first handling head 8a inserts the first layer of products 3 into the tray 2 preferably simultaneously with the picking up of the products of the second group 3b by the second handling head 8b. Vice versa, while the first handling head 8a picks up the first group of products 3a, the second handling head 8b places the second group of products 3b into the tray 2.

[0064] Should the filling of the first tray 2 already have been completed, as in the case represented by the combined figures 1-6, a second tray 2 is made available, preferably in the filling zone 7a, so that the filling of a new tray 2 with one single layer or successive layers may begin.

[0065] As soon as the products 3 are picked up from the second collection element 10b, the second conveyor chain 9b that supports it is actuated again to clear the pick up zone 7a, so that the third collection element 11a can be moved to the pickup zone 5a by the first conveyor chain 9a.

[0066] The filling process is repeated in the same manner, creating a process that can be configured as continuously operative.

[0067] In the example, the first and the third collection element 10a, 11a are supported by the first conveyor

chain 9a, while the second and a fourth collection element 10b, 11b are supported by the remaining conveyor chain 9b.

[0068] During the operation of the apparatus 1, the movement of the handling heads 8a, 8b must obviously occur without interference between the two elements and their possible load.

[0069] Now, to that end the first and the second handling head 8a, 8b are rotated, for example along a circumference arc, to move the respective group of products from the common pickup zone 5a towards the trays 2, and they respectively move in the opposite direction to return to the pickup zone 5a again. The two circumference arcs along which the handling heads 8a, 8b move lie on distinct circumferences which cross at two points, corresponding to the pickup zone 5a and the filling zone 7a. In the filling method described above, the two heads 8a, 8b are never simultaneously in the proximity of the same zone.

[0070] The obvious geometric consequence of the description outlined above is that the two heads 8a, 8b rotate in an inverse direction when moving the respective group of products from the common pickup zone 5a towards the trays 2 present in the filling zone 7a.

[0071] As figure 6 illustrates, alongside the rotation along the designated circumference axis, a rotational motion around its own vertical axis can be applied to the handling heads 8a, 8b, arranging them in a transverse manner during the transit movement. This configuration avoids interference between the two handling heads 8a, 8b without the circumference arcs diverging excessively from the shorter trajectory between the pickup zone 5a and filling zone 7a, thus speeding up the packaging operations.

[0072] As the description makes clear, the method and the apparatus 1 for the quick filling of trays 2 with single products 3 according to the present invention allows meeting the needs and overcoming the drawbacks mentioned in the introduction to the present description with reference to the prior art.

[0073] Obviously, the method and apparatus described above can be subjected, by a person skilled in the art, to various modifications and variants, all of which fall within the scope of protection of the invention, as described in the following claims.

Claims

1. Method for quick filling of containers (2) with single products (3) comprising the steps of:

- providing a line (4) for supplying products (3);
- providing a pickup line (5) for picking up said products (3), said pickup line (5) comprising a first and second conveyor chain (9a, 9b) moving parallel in the same direction, wherein at least a first collection element (10a) is fixed on the

first conveyor chain (9a) and at least a second collection element (10b) is fixed on the second conveyor chain (9b);

- arranging said products (3) coming from said supply line (4) on the collection elements (10a, 10b), alternately feeding the first collection element (10a) and the second collection element (10b);
- providing a line (7) for transporting containers (2);
- moving the first conveyor chain (9a) until the first collection element (10a) carrying a first group of products (3a) reaches a preset pickup zone (5a);
- picking up by means of a first handling head (8a) said first group of products (3a) from the first collection element (10a) while the first conveyor chain (9a) is halted with the first collection element (10a) at the preset pickup zone (5a);
- after picking up, contemporaneously:

- a1. placing - by means of said first head (8a) - said first group of products (3a) into a container (2) arranged on said transport line (7);
- b1. moving the first conveyor chain (9a) to remove the first collection element (10a) from the pickup zone (5a), and
- c1. moving the second conveyor chain (9b) until the second collection element (10b) carrying a second group of products (3b) reaches the same preset pickup zone (5a);

- picking up - by means of a second handling head (8b) - said second group of products (3b) from the second collection element (10b) while the second conveyor chain (9b) is halted with the second collection element (10b) at the preset pickup zone (5a);
- after picking up, contemporaneously:

- a2. placing - by means of said second head (8b) - said second group of products (3b) into a container (2) arranged on said transport line (7);
- b2. moving the second conveyor chain (9b) to remove the second collection element (10b) from the pickup zone (5a), and
- c2. moving the first conveyor chain (9a) until the first collection element (10a) carrying a third group of products (3a) reaches the same preset pickup zone (5a);

- said second head (8b) being arranged adjacent to said first head (8a) and said heads (8a, 8b) operating without interfering with each other, the feeding of the products (3) coming from the supply line (4) occurring while the conveyor chain with its collection element being fed with prod-

ucts moves towards the pickup zone (5a) as the other conveyor chain is halted with its collection element at the pickup zone (5a).

2. Method according to claim 1, wherein said first and second conveyors chain (9a,9b) moves the groups of products (3) to the preset pickup zone (5a) moving forward step by step.
3. Method according to claim 1 or 2, wherein said pickup zone (5a) is arranged horizontally.
4. Method according to any one of the preceding claims wherein when said first handling head (8a) picks up the first group of products (3a), the second handling head (8b) positions the second group of products (3b) in the container (2) and vice versa.
5. Method according to any one of the preceding claims, wherein the picking up of said first and second group of products (3a, 3b) and their subsequent positioning in the containers (2) are performed in an alternating manner without interruption.
6. Method according to any one of the preceding claims, wherein said first and second handling head (8a, 8b) rotate along a circumferential arc to move the respective group of products from the common pickup zone (5a) towards the containers (2), said heads (8a, 8b) respectively moving along the inverse direction to return to the pickup zone (5a) again.
7. Method according to claim 6, wherein the circumference arc along which the first and the second handling head (8a, 8b) move respectively, lie on circumferences that intersect at two points.
8. Method according to any one of the preceding claims, wherein said first and second handling head (8a, 8b) rotate in an inverse direction when moving the respective group of products from the common pickup zone (5a) towards the containers (2).
9. Method according to any one of the preceding claims, wherein said first and second group of products (3a, 3b) are made up of an equivalent number of products (3) adjacent to each other in an orderly manner.
10. Method according to any one of the preceding claims, wherein while said first or second group of products (3a, 3b) is positioned in the container (2), the latter remains immobile.
11. Method according to any one of the preceding claims, wherein the positioning of the group of products (3a, 3b) in the container (2) occurs in a common filling zone (7a).

12. Method according to claim 11, wherein the line (7) for transporting the trays makes a new container (2) available in the common filling zone (7a) upon complete filling of a container (2).

13. Apparatus (1) for the quick filling of trays (2) with single products comprising:

- a line (4) for supplying products;
- a line (5) for picking up said products, said pick-up line (5) comprising a first and second conveyor chain (9a, 9b) moving parallel in the same direction, wherein at least a first collection element (10a) is fixed on the first conveyor chain (9a) and at least a second collection element (10b) is fixed on the second conveyor chain (9b);
- arrangement means (6) adapted to arrange the products coming from said supply line (4) on said pickup line (5) in an orderly manner;
- a line (7) for transporting trays;
- a first handling head (8a) programmed to pick up a first group of said products (3a) from the first collection element (10a) while the first conveyor chain (9a) is halted with the first collection element (10a) at the preset pickup zone (5a) and to place said first group of products (3b) into a container (2) arranged on said transport line (7);

characterised in that it comprises a second handling head (8b) programmed to pick up a second group of said products (3b) from the second collection element (10b) while the second conveyor chain (9b) is halted with the second collection element (10b) at the preset pickup zone (5a) and to place said second group of products (3b) into a container (2) arranged on said transport line (7), said second head (8b) being arranged adjacent to said first head (8a) and both heads (8, 9) operating without interfering with each other.

14. Apparatus according to claim 13, wherein said first and second handling head (8a, 8b) are interposed between said line (5) for picking up products and said line (7) for transporting containers.

15. Apparatus according to claim 13 or 14, wherein said first and second head (8a, 8b) are identical to each other and each comprises an anthropomorphic robot (12a, 12b) which moves grasping means having a movement system with at least three degrees of freedom.

16. Apparatus according to any one of claims 13-15, wherein said supply line (4) comprises a first conveyor belt arranged level with said pickup line (5).

17. Apparatus according to claim 16, wherein said first conveyor belt has opposite guiding walls (6a) on the

two opposite sides arranged in proximity to said pick-up line (5).

18. Apparatus according to claim 17, wherein each of said walls (6a) is formed by a closed belt arranged vertically and moveable at a preset speed.

19. Apparatus according to any one of claims 13-18, wherein said conveyors chain (9a, 9b), are actuated by a respective motor of the brushless type.

20. Apparatus according to any one of claims 13-19, wherein said arrangement means (6) comprises pushing means for moving the products from the supply line (4) to alternatively the first collection element (10a) and the second collection element (10b).

21. Apparatus according to any one of claims 13-20, wherein said line (7) for transporting trays comprises a second conveyor belt.

22. Apparatus according to any one of claims 13-21, wherein said first and second handling head (8a, 8b) are positioned above said lines for picking up (5) and transporting (7) trays in such a manner that they are all contained within a single structure.

Patentansprüche

1. Verfahren zum schnellen Befüllen von Behältern (2) mit einzelnen Produkten (3), umfassend die Schritte:

- Bereitstellen einer Strecke (4) zum Zuführen von Produkten (3);
- Bereitstellen einer Aufnahmestrecke (5) zum Aufnehmen der Produkte (3), wobei die Aufnahmestrecke (5) eine erste und zweite Förderkette (9a, 9b) aufweist, die sich parallel in dieselbe Richtung bewegen, wobei wenigstens ein erstes Sammelement (10a) auf der ersten Förderkette (9a) befestigt ist und wenigstens ein zweites Sammelement (10b) auf der zweiten Förderkette (9b) befestigt ist;
- Anordnen der von der Zuführungsstrecke (4) kommenden Produkte (3) auf den Sammelementen (10a, 10b), wobei abwechselnd das erste Sammelement (10a) und das zweite Sammelement (10b) beschickt wird;
- Bereitstellen einer Strecke (7) zum Transportieren der Behälter (2);
- Bewegen der ersten Förderkette (9a) bis das erste Sammelement (10a), das eine erste Produktgruppe (3a) befördert, eine vorbestimmte Aufnahmezone (5a) erreicht;
- Aufnehmen mittels eines ersten Handhabungskopfs (8a) der ersten Produktgruppe (3a)

aus dem ersten Sammelement (10a), während die erste Förderkette (9a) mit dem ersten Sammelement (10a) in der vorbestimmten Aufnahmezone (5a) angehalten ist;

- Nach dem Aufnehmen gleichzeitig:

a1. Stellen - mittels des ersten Kopfs (8a) - der ersten Produktgruppe (3a) in einen Behälter (2), der auf der Transportstrecke (7) angeordnet ist;

b1. Bewegen der ersten Förderkette (9a), um das erste Sammelement (10a) aus der Aufnahmezone (5a) zu entfernen und

c1. Bewegen der zweiten Förderkette (9b) bis das zweite Sammelement (10b), das die zweite Produktgruppe (3b) befördert, dieselbe vorbestimmte Aufnahmezone (5a) erreicht;

- Aufnehmen - mittels eines zweiten Handhabungskopfs (8b) - der zweiten Produktgruppe (3b) aus dem zweiten Sammelement (10b), während die zweite Förderkette (9b) mit dem zweiten Sammelement (10b) in der vorbestimmten Aufnahmezone (5a) angehalten ist;

- Nach dem Aufnehmen gleichzeitig:

a2. Stellen - mittels des zweiten Kopfs (8b) - der zweiten Produktgruppe (3b) in einen Behälter (2), der auf der Transportstrecke (7) angeordnet ist;

b2. Bewegen der zweiten Förderkette (9b), um das zweite Sammelement (10b) aus der Aufnahmezone (5a) zu entfernen und

c2. Bewegen der ersten Förderkette (9a) bis das erste Sammelement (10a), das eine dritte Produktgruppe (3a) befördert, dieselbe vorbestimmte Aufnahmezone (5a) erreicht;

- wobei der zweite Kopf (8b) benachbart zu dem ersten Kopf (8a) angeordnet ist und die Köpfe (8a, 8b) betreibbar sind, ohne sich gegenseitig zu stören, wobei das Beschicken der Produkte (3), die von der Zuführungsstrecke (4) kommen, geschieht, während sich die Förderkette, deren Sammelement mit Produkten beschickt wird, in Richtung der Aufnahmezone (5a) bewegt, während die andere Förderkette mit ihrem Sammelement in der Aufnahmezone (5a) angehalten ist.

2. Verfahren nach Anspruch 1, wobei die erste und zweite Förderkette (9a, 9b) die Produktgruppe (3) in die vorbestimmte Aufnahmezone (5a) bewegen, wobei sie sich schrittweise nach vorne bewegen.

3. Verfahren nach Anspruch 1 oder 2, wobei die Auf-

nahmezone (5a) horizontal angeordnet ist.

4. Verfahren nach einem der vorhergehenden Ansprüche, wobei, wenn der erste Handhabungskopf (8a) die erste Produktgruppe (3a) aufnimmt, der zweite Handhabungskopf (8b) die zweite Produktgruppe (3b) in den Behälter (2) stellt und umgekehrt.

5. Verfahren nach einem der vorhergehenden Ansprüche, wobei das Aufnehmen der ersten und zweiten Produktgruppe (3a, 3b) und ihr nachfolgendes Stellen in die Behälter (2) in einer abwechselnden Weise ohne Unterbrechung ausgeführt werden.

6. Verfahren nach einem der vorhergehenden Ansprüche, wobei sich der erste und zweite Handhabungskopf (8a, 8b) entlang eines Kreislinienbogens drehen, um die entsprechenden Produktgruppen von der gemeinsamen Aufnahmezone (5a) in Richtung der Behälter (2) zu bewegen, wobei sich die Köpfe (8a, 8b) jeweils entlang der umgekehrten Richtung bewegen, um erneut zur Aufnahmezone (5a) zurückzukehren.

7. Verfahren nach Anspruch 6, wobei der Kreislinienbogen, entlang dessen sich der erste und zweite Handhabungskopf (8a, 8b) jeweils bewegen, auf Kreislinien liegt, die sich in zwei Punkten schneiden.

8. Verfahren nach einem der vorhergehenden Ansprüche, wobei sich der erste und zweite Handhabungskopf (8a, 8b) in einer reziproken Richtung drehen, wenn sie die jeweiligen Produktgruppen von der gemeinsamen Aufnahmezone (5a) in Richtung der Behälter (2) bewegen.

9. Verfahren nach einem der vorhergehenden Ansprüche, wobei die erste und zweite Produktgruppe (3a, 3b) aus einer gleichwertigen Zahl an Produkten (3) bestehen, die zueinander in einer geordneten Weise benachbart sind.

10. Verfahren nach einem der vorhergehenden Ansprüche, wobei, während die erste und zweite Produktgruppe (3a, 3b) in den Behälter (2) gestellt wird, die letztere unbeweglich verbleibt.

11. Verfahren nach einem der vorhergehenden Ansprüche, wobei das Stellen der Produktgruppe (3a, 3b) in den Behälter (2) in einer gemeinsamen Auffüllzone (7a) geschieht.

12. Verfahren nach Anspruch 11, wobei die Strecke (7) zum Transportieren der Schalen einen neuen Behälter (2) in der gemeinsamen Auffüllzone (7a) nach dem vollständigen Auffüllen eines Behälters (2) verfügbar macht.

13. Vorrichtung (1) zum schnellen Befüllen von Schalen (2) mit einzelnen Produkten, aufweisend:

- eine Strecke (4) zum Zuführen von Produkten;
 - eine Strecke (5) zum Aufnehmen der Produkte, wobei die Aufnahmestrecke (5) eine erste und zweite Förderkette (9a, 9b) aufweist, die sich parallel in dieselbe Richtung bewegen, wobei wenigstens ein erstes Sammelelement (10a) auf der ersten Förderkette (9a) befestigt ist und wenigstens ein zweites Sammelelement (10b) auf der zweiten Förderkette (9b) befestigt ist;
 - ein Anordnungsmittel (6), das ausgelegt ist, die von der Zuführungsstrecke (4) kommenden Produkte auf der Aufnahmestrecke (5) in einer geordneten Weise anzuordnen;
 - eine Strecke (7) zum Transportieren von Schalen;
 - einen ersten Handhabungskopf (8a), der programmiert ist, eine erste Produktgruppe (3a) aus dem ersten Sammelelement (10a) aufzunehmen, während die erste Förderkette (9a) mit dem ersten Sammelelement (10a) in der vorbestimmten Aufnahmezone (5a) angehalten ist, und die erste Produktgruppe (3b) in einen Behälter (2) zu stellen, der auf der Transportstrecke (7) angeordnet ist;

dadurch gekennzeichnet, dass

sie einen zweiten Handhabungskopf (8b) aufweist, der programmiert ist, eine zweite Produktgruppe (3b) aus dem zweiten Sammelelement (10b) aufzunehmen, während die zweite Förderkette (9b) mit dem zweiten Sammelelement (10b) in der vorbestimmten Aufnahmezone (5a) angehalten ist, und die zweite Produktgruppe (3b) in einen Behälter (2) zu stellen, der auf der Transportstrecke (7) angeordnet ist, wobei der zweite Kopf (8b) benachbart zu dem ersten Kopf (8a) angeordnet ist und beide Köpfe (8, 9) betreibbar sind, ohne sich gegenseitig zu stören.

14. Vorrichtung nach Anspruch 13, wobei der erste und zweite Handhabungskopf (8a, 8b) zwischen der Strecke (5) zum Aufnehmen der Produkte und der Strecke (7) zum Transportieren der Behälter angeordnet sind.
15. Vorrichtung nach Anspruch 13 oder 14, wobei der erste und zweite Kopf (8a, 8b) einander gleich sind und jeder einen anthropomorphen Roboter (12a, 12b) aufweist, der Greifmittel mit einem Bewegungssystem mit wenigstens drei Freiheitsgraden bewegt.
16. Vorrichtung nach einem der Ansprüche 13-15, wobei die Zuführungsstrecke (4) ein erstes Förderband aufweist, das in Höhe der Aufnahmestrecke (5) angeordnet ist.

17. Vorrichtung nach Anspruch 16, wobei das erste Förderband gegenüberliegende Führungswände (6a) an den zwei gegenüberliegenden Seiten aufweist, die in der Nähe der Aufnahmestrecke (5) angeordnet sind.

18. Vorrichtung nach Anspruch 17, wobei jeder der Wände (6a) durch ein geschlossenes Band ausgebildet ist, das vertikal angeordnet und mit einer vorbestimmten Geschwindigkeit bewegbar ist.

19. Vorrichtung nach einem der Ansprüche 13-18, wobei die Förderketten (9a, 9b) durch einen entsprechenden bürstenlosen Motor angetrieben sind.

20. Vorrichtung nach einem der Ansprüche 13-19, wobei das Anordnungsmittel (6) Schiebemittel zum Bewegen der Produkte von der Zuführungsstrecke (4) wahlweise zu dem ersten Sammelelement (10a) und zu dem zweiten Sammelelement (10b) aufweist.

21. Vorrichtung nach einem der Ansprüche 13-20, wobei die Strecke (7) zum Transportieren von Schalen ein zweites Förderband aufweist.

22. Vorrichtung nach einem der Ansprüche 13-21, wobei der erste und zweite Handhabungskopf (8a, 8b) oberhalb der Strecken zum Aufnehmen (5) und Transportieren (7) von Schalen derart angeordnet sind, dass sie alle innerhalb eines einzigen Aufbaus enthalten sind.

Revendications

1. Procédé destiné à remplir rapidement des contenants (2) avec des produits individuels (3) comprenant les étapes consistant à :
- fournir une ligne (4) destinée à approvisionner des produits (3);
 - fournir une ligne de saisie (5) destinée à saisir lesdits produits (3), ladite ligne de saisie (5) comprenant des première et seconde chaînes de transport (9a, 9b) qui se déplacent de manière parallèle dans la même direction, dans lequel au moins un premier élément de collecte (10a) est fixé sur la première chaîne de transport (9a) et au moins un second élément de collecte (10b) est fixé sur la seconde chaîne de transport (9b);
 - agencer lesdits produits (3) qui proviennent de ladite ligne d'approvisionnement (4) sur les éléments de collecte (10a, 10b), en approvisionnant de manière alternée le premier élément de collecte (10a) et le second élément de collecte (10b) ;
 - fournir une ligne (7) destinée à transporter des contenants (2);

- déplacer la première chaîne de transport (9a) jusqu'à ce que le premier élément de collecte (10a) qui porte un premier groupe de produits (3a) atteigne une zone de saisie prééglée (5a) ;
 - saisir, au moyen d'une première tête de manipulation (8a), ledit premier groupe de produits (3a) à partir du premier élément de collecte (10a) tandis que la première chaîne de transport (9a) est arrêtée, le premier élément de collecte (10a) se situant au niveau de la zone de saisie prééglée (5a) ;
 - après la saisie, et en même temps :

a1. placer, au moyen de ladite première tête (8a), ledit premier groupe de produits (3a) dans un contenant (2) disposé sur ladite ligne de transport (7) ;

b1. déplacer la première chaîne de transport (9a) de façon à retirer le premier élément de collecte (10a) de la zone de saisie (5a) ; et

c1. déplacer la seconde chaîne de transport (9b) jusqu'à ce que le second élément de collecte (10b) qui porte un deuxième groupe de produits (3b) atteigne la même zone de saisie prééglée (5a) ;

- saisir, au moyen d'une seconde tête de manipulation (8b), ledit deuxième groupe de produits (3b) à partir du second élément de collecte (10b) tandis que la seconde chaîne de transport (9b) est arrêtée, le second élément de collecte (10b) se situant au niveau de la zone de saisie prééglée (5a) ;

- après la saisie, et en même temps :

a2. placer, au moyen de ladite seconde tête (8b), ledit deuxième groupe de produits (3b) dans un contenant (2) disposé sur ladite ligne de transport (7) ;

b2. déplacer la seconde chaîne de transport (9b) de façon à retirer le second élément de collecte (10b) de la zone de saisie (5a) ; et

c2. déplacer la première chaîne de transport (9a) jusqu'à ce que le premier élément de collecte (10a) qui porte un troisième groupe de produits (3a) atteigne la même zone de saisie prééglée (5a) ;

- ladite seconde tête (8b) étant disposée adjacente à ladite première tête (8a) et lesdites têtes (8a, 8b) fonctionnant sans se gêner l'une l'autre, l'approvisionnement des produits (3) en provenance de la ligne d'approvisionnement (4) se faisant tandis que la chaîne de transport, dont l'élément de collecte est approvisionné en produits, se déplace vers la zone de saisie (5a) alors que l'autre chaîne de transport, dont l'élément

de collecte se situe au niveau de la zone de saisie (5a), est arrêtée.

2. Procédé selon la revendication 1, dans lequel lesdites première et seconde chaînes de transport (9a, 9b) déplacent les groupes de produits (3) vers la zone de saisie prééglée (5a) en se déplaçant vers l'avant pas à pas.

3. Procédé selon la revendication 1 ou la revendication 2, dans lequel ladite zone de saisie (5a) est disposée de manière horizontale.

4. Procédé selon l'une quelconque des revendications précédentes, dans lequel, lorsque ladite première tête de manipulation (8a) saisit le premier groupe de produits (3a), la seconde tête de manipulation (8b) place le deuxième groupe de produits (3b) dans le contenant (2) et vice versa.

5. Procédé selon l'une quelconque des revendications précédentes, dans lequel la saisie desdits premier et deuxième groupes de produits (3a, 3b) et leur placement ultérieur dans les contenants (2), sont effectués d'une façon alternée sans interruption.

6. Procédé selon l'une quelconque des revendications précédentes, dans lequel lesdites première et seconde têtes de manipulation (8a, 8b) tournent le long d'un arc circonférentiel de façon à déplacer le groupe de produits respectif à partir de la zone de saisie commune (5a) vers les contenants (2), lesdites têtes (8a, 8b) se déplaçant respectivement le long de la direction inverse de façon à retourner de nouveau vers la zone de saisie (5a).

7. Procédé selon la revendication 6, dans lequel l'arc de circonférence le long duquel se déplacent respectivement les première et seconde têtes de manipulation (8a, 8b), se situe sur des circonférences qui se coupent au niveau de deux points.

8. Procédé selon l'une quelconque des revendications précédentes, dans lequel lesdites première et seconde têtes de manipulation (8a, 8b) tournent dans une direction inverse quand elles déplacent le groupe de produits respectif à partir de la zone de saisie commune (5a) vers les contenants (2).

9. Procédé selon l'une quelconque des revendications précédentes, dans lequel lesdits premier et deuxième groupes de produits (3a, 3b) se composent d'un nombre équivalent de produits (3) adjacents les uns aux autres d'une façon ordonnée.

10. Procédé selon l'une quelconque des revendications précédentes, dans lequel lesdits premier et deuxième groupes de produits (3a, 3b) sont placés dans le

contenant (2), ce dernier demeurant immobile.

11. Procédé selon l'une quelconque des revendications précédentes, dans lequel le placement du groupe de produits (3a, 3b) dans le contenant (2) se fait dans une zone de remplissage commune (7a).

12. Procédé selon la revendication 11, dans lequel la ligne (7) destinée à transporter les barquettes rend disponible un nouveau contenant (2) dans la zone de remplissage commune (7a) une fois que le remplissage d'un contenant (2) est achevé.

13. Appareil (1) destiné à remplir rapidement des barquettes (2) avec des produits individuels comprenant :

- une ligne (4) destinée à approvisionner des produits;
- une ligne (5) destinée à saisir lesdits produits, ladite ligne de saisie (5) comprenant des première et seconde chaînes de transport (9a, 9b) qui se déplacent de manière parallèle dans la même direction, dans lequel au moins un premier élément de collecte (10a) est fixé sur la première chaîne de transport (9a) et au moins un second élément de collecte (10b) est fixé sur la seconde chaîne de transport (9b) ;
- des moyens d'agencement (6) adaptés de façon à agencer les produits en provenance de ladite ligne d'approvisionnement (4) sur ladite ligne de saisie (5) d'une façon ordonnée ;
- une ligne (7) destinée à transporter les barquettes;
- une première tête de manipulation (8a) programmée de façon à saisir un premier groupe desdits produits (3a) en provenance du premier élément de collecte (10a) tandis que la première chaîne de transport (9a), dont le premier élément de collecte (10a) se situe au niveau de la zone de collecte pré-réglée (5a), est arrêtée, et à placer ledit premier groupe de produits (3b) dans un contenant (2) disposé sur ladite ligne de transport (7) ;

caractérisé en ce qu'il comprend une seconde tête de manipulation (8b) programmée de façon à saisir un deuxième groupe desdits produits (3b) à partir du second élément de collecte (10b) tandis que la seconde chaîne de transport (9b), dont le second élément de collecte (10b) se situe au niveau de la zone de saisie pré-réglée (5a), est arrêtée, et à placer le deuxième groupe desdits produits (3b) dans un contenant (2) disposé sur ladite ligne de transport (7), ladite seconde tête (8b) étant disposée adjacente à ladite première tête (8a) et les deux têtes (8, 9) fonctionnant sans se gêner l'une l'autre.

14. Appareil selon la revendication 13, dans lequel lesdites première et seconde têtes de manipulation (8a, 8b) sont interposées entre ladite ligne (5) destinée à saisir des produits et ladite ligne (7) destinée à transporter des contenants.

15. Appareil selon la revendication 13 ou la revendication 14, dans lequel lesdites première et seconde têtes (8a, 8b) sont identiques entre elles et chacune d'elles comprend un robot anthropomorphe (12a, 12b) qui déplace des moyens de préhension présentant un système de déplacement avec au moins trois degrés de liberté.

16. Appareil selon l'une quelconque des revendications 13 à 15, dans lequel ladite ligne d'approvisionnement (4) comprend une première courroie de transport disposée de niveau avec ladite ligne de saisie (5).

17. Appareil selon la revendication 16, dans lequel ladite première courroie de transport présente des parois de guidage opposées (6a) situées sur les deux côtés opposés disposés à proximité de ladite ligne de saisie (5).

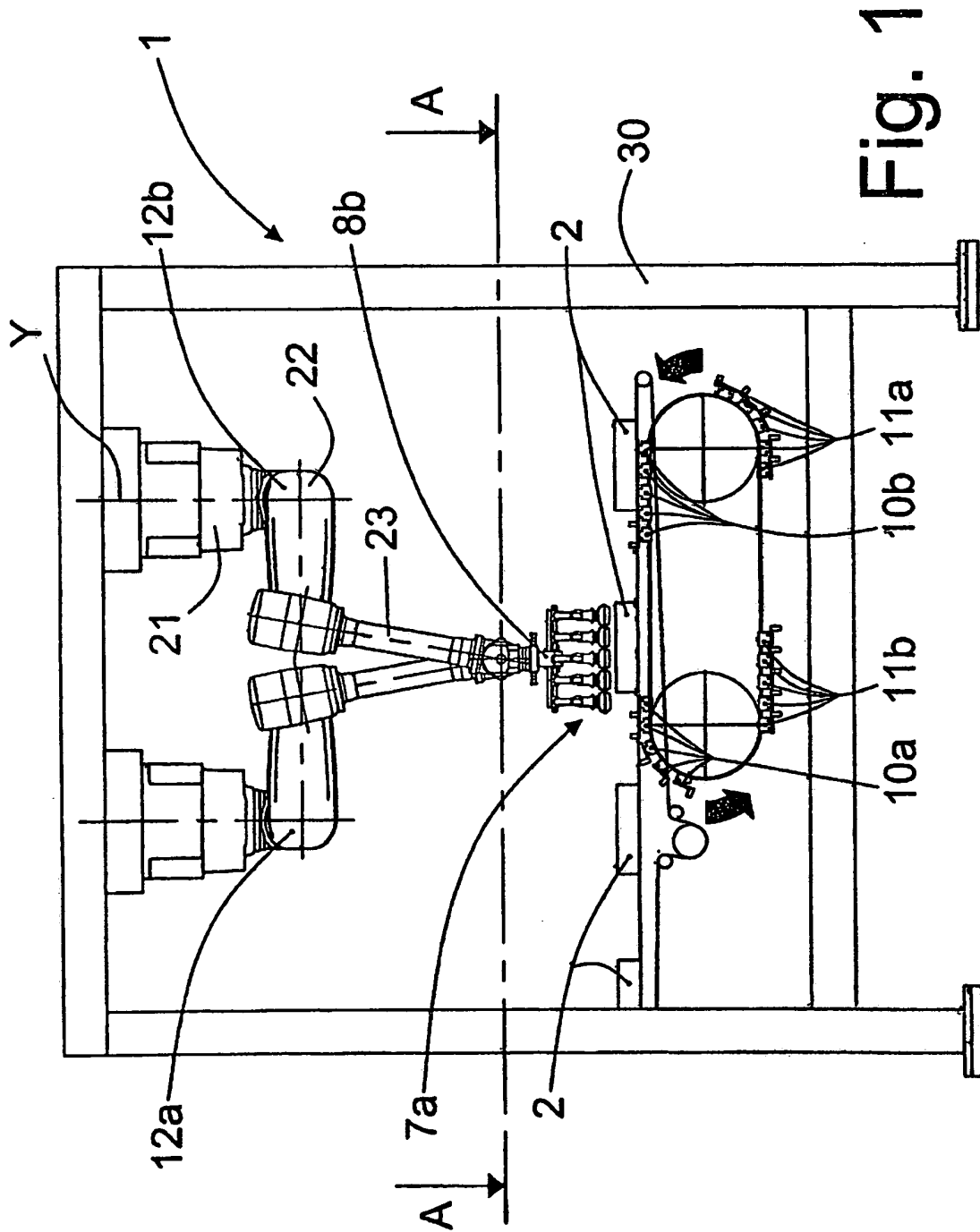
18. Appareil selon la revendication 17, dans lequel chacune desdites parois (6a) est formée par une courroie fermée agencée de manière verticale et pouvant se déplacer à une vitesse pré-réglée.

19. Appareil selon l'une quelconque des revendications 13 à 18, dans lequel lesdites chaînes de transport (9a, 9b), sont actionnées par un moteur respectif du type sans balais.

20. Appareil selon l'une quelconque des revendications 13 à 19, dans lequel lesdits moyens d'agencement (6) comprennent des moyens de poussée destinés à déplacer les produits à partir de la ligne d'approvisionnement (4) à tour de rôle vers le premier élément de collecte (10a) et vers le second élément de collecte (10b).

21. Appareil selon l'une quelconque des revendications 13 à 20, dans lequel ladite ligne (7) destinée à transporter des barquettes comprend une seconde courroie de transport.

22. Appareil selon l'une quelconque des revendications 13 à 21, dans lequel lesdites première et seconde têtes de manipulation (8a, 8b) sont placées au-dessus desdites lignes destinées à saisir (5) et à transporter (7) des barquettes de telle façon qu'elles soient toutes deux contenues à l'intérieur d'une seule structure.



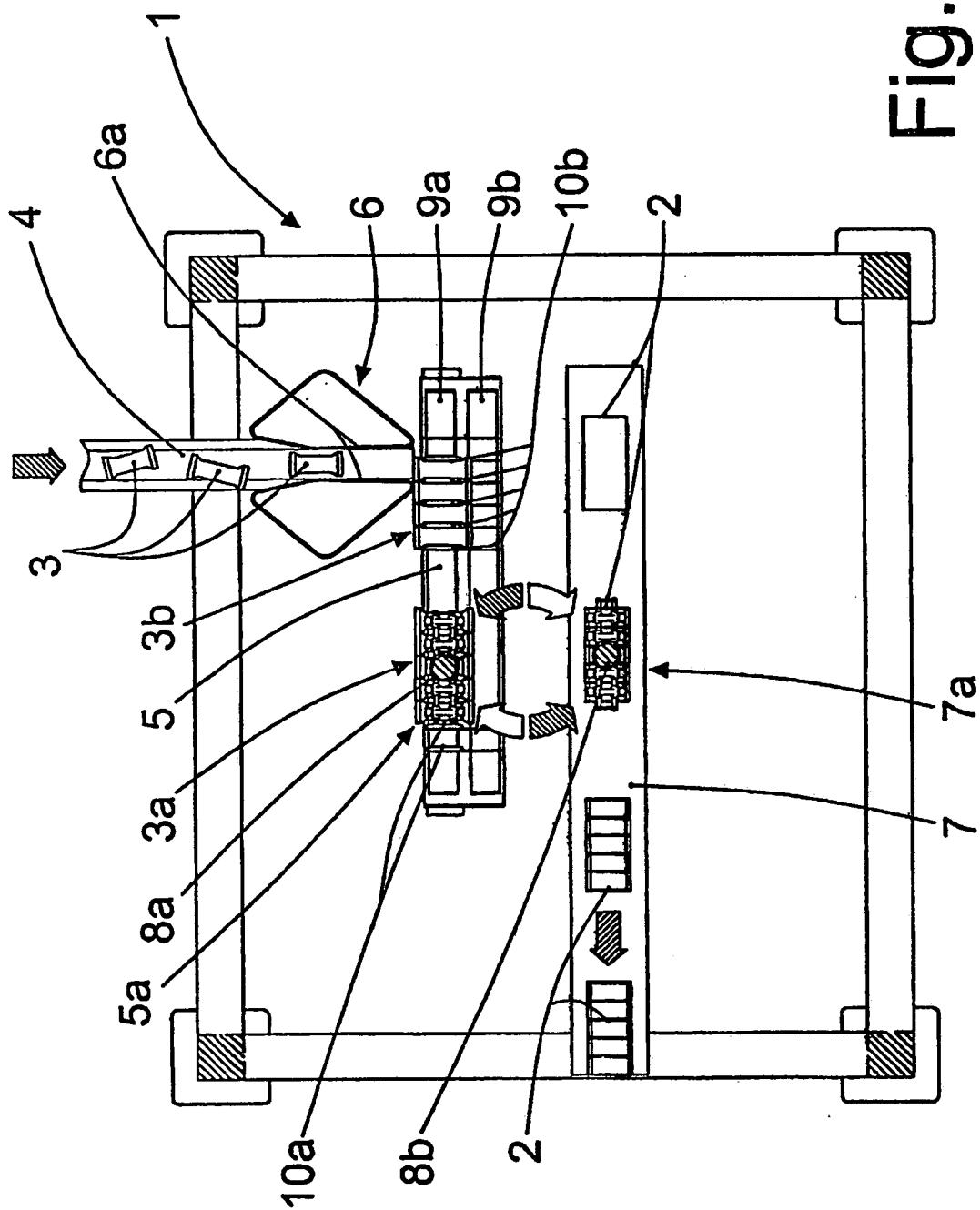


Fig. 2

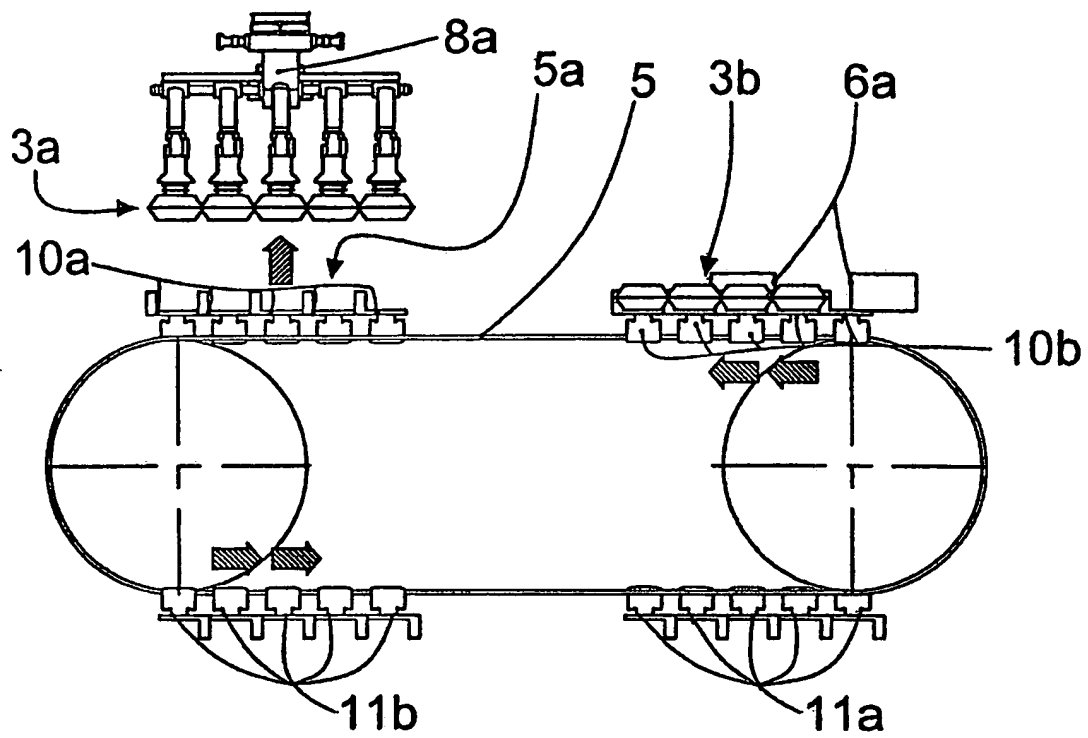


Fig. 3

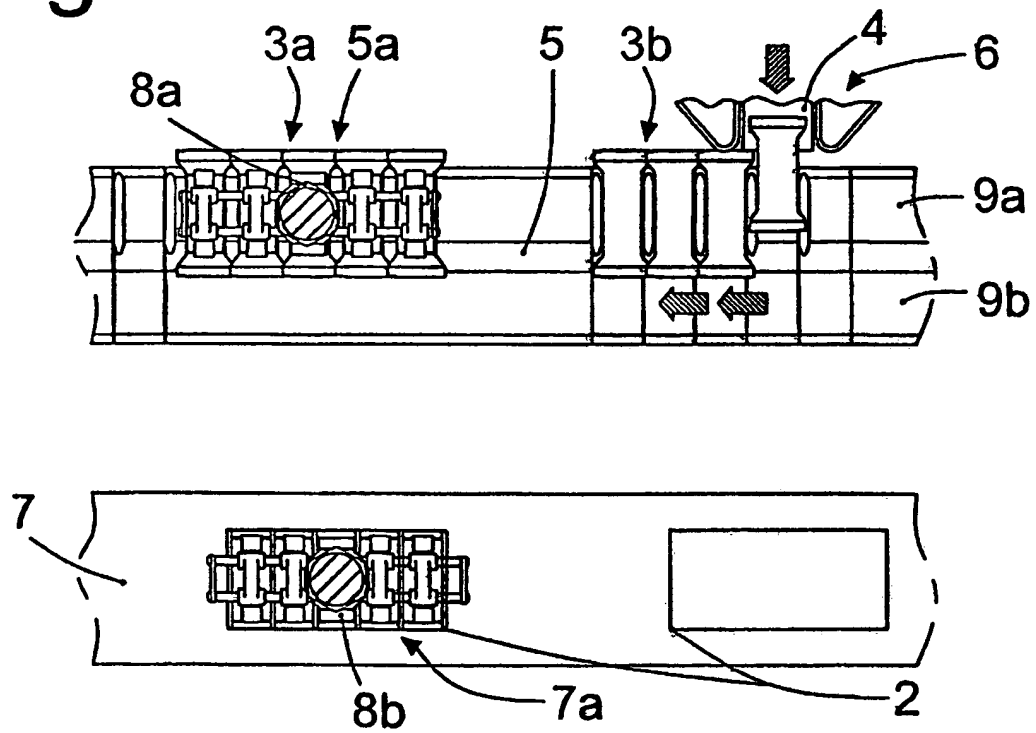


Fig. 4

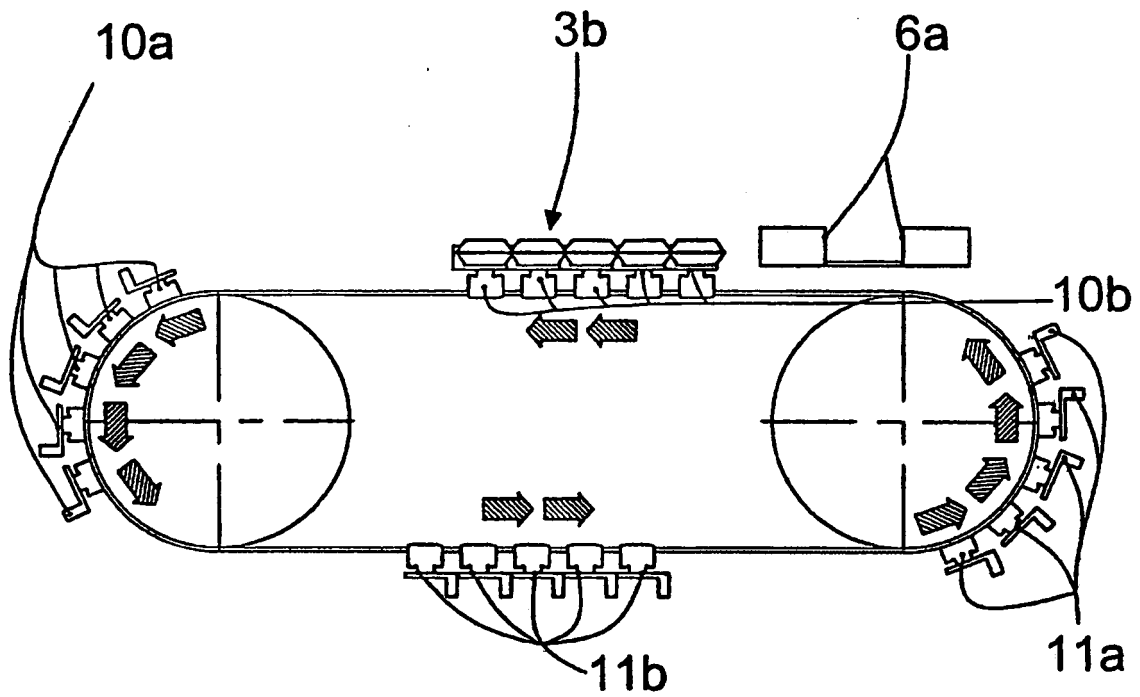


Fig. 5

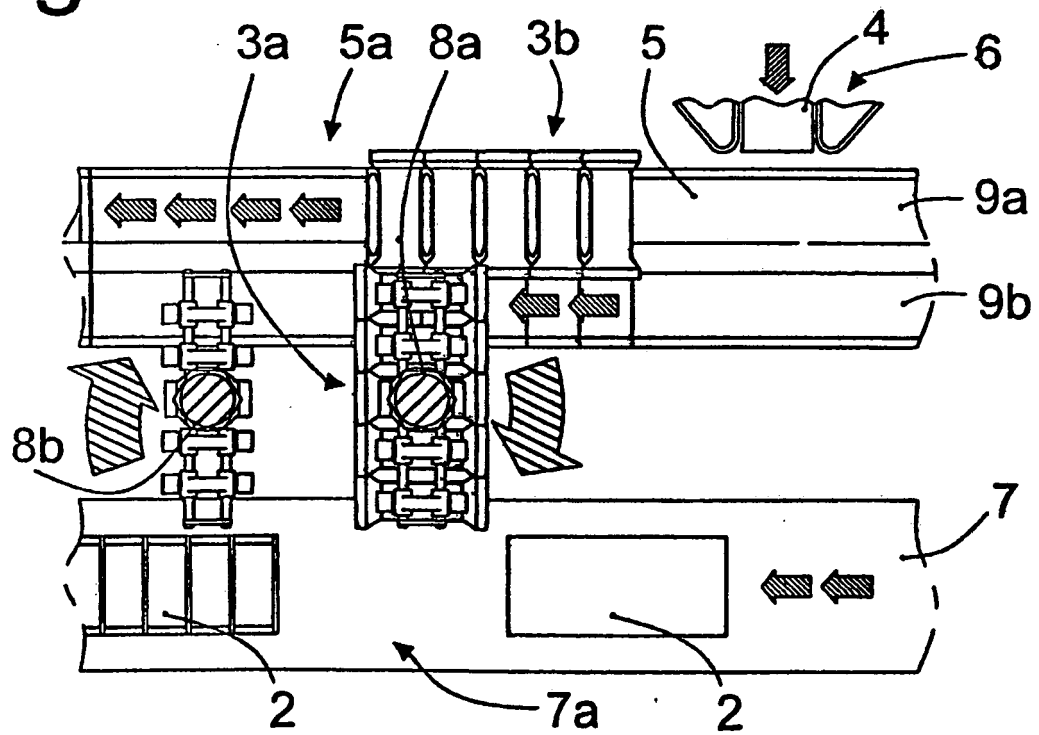


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2092090 A [0006]