(19) Europäisches Patentamt
European Patent Office
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(11) **EP 3 437 744 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.02.2019 Bulletin 2019/06

(51) Int Cl.:
B07C 5/18 *(2006.01)*

(21) Application number: **18186890.2**

(22) Date of filing: **01.08.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **04.08.2017 IT 201700090345**

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(54) SELECTION APPARATUS FOR THE PACKAGING OF PRODUCTS, IN PARTICULAR FRUIT AND VEGETABLE PRODUCTS

(57) A selection apparatus for the packaging of products, in particular fruit and vegetable products, comprising at least two continuous conveyors (2a, 2b) that are configured as carousels, of which a first conveyor (2a) is arranged outside a second conveyor (2b) so as to define respective closed paths along the respective extensions.

Preferably, the apparatus (1) also comprises a third conveyor (2c) which is configured as a carousel and is arranged inside the second conveyor (2b).

Each one of the conveyors (2a, 2b, 2c) supports a plurality of trays (3) for the transfer of respective products and is a closed loop so as to define a closed path along which there are at least one loading station (4) of the products in respective trays (3), at least one weighing station (5) of the products accommodated in each tray (3), and at least one picking up station (6) of selected products.

The apparatus (1) further comprises an electronic management and control unit which is adapted to store the weight and the position of each product loaded onto the conveyors (2a, 2b, 2c) and to select the products to be picked up at the at least one picking up station (6) according to a preset function of a preset or presettable weight.

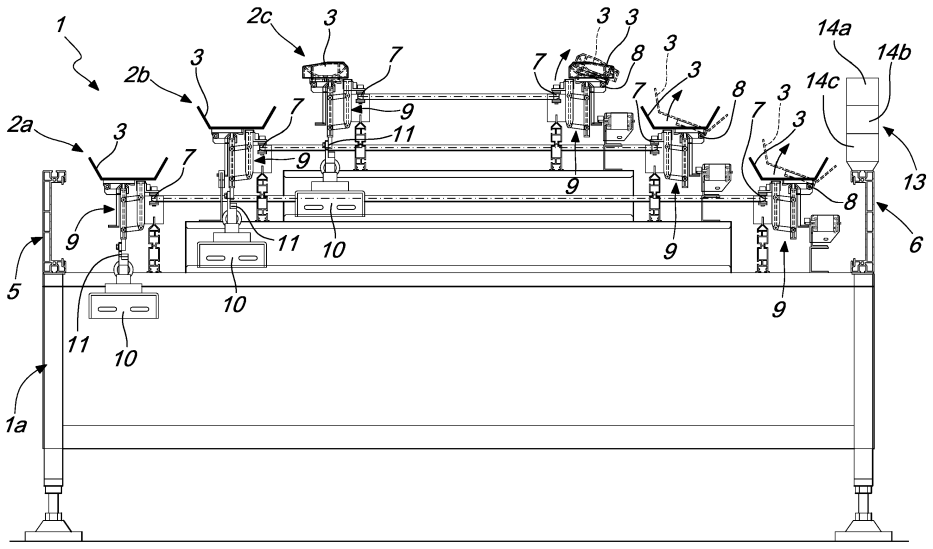

Fig. 2

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Description

[0001] The present invention relates to a selection apparatus for the packaging of products, in particular fruit and vegetable products.

[0002] With particular, but not exclusive, reference to the fruit and vegetable product processing sector, selection apparatuses are known that make it possible to select products to be sent for packaging on the basis of the corresponding size range (weight of the single product), or to select a combination of products the total weight of which is as close as possible to a preset weight which is equal to the net weight of the contents of the package that it is desired to obtain.

[0003] For example a first type of selection apparatus is known which is constituted substantially by a continuous conveyor that supports a plurality of trays, on which the individual products are positioned at a loading side of that conveyor. Along the conveyor there is a weighing station which is associated with an electronic management and control unit which stores the weight and the position of each product and a plurality of picking up stations which are arranged proximate to the unloading side.

[0004] Such apparatuses are generally used to select the products on the basis of the corresponding size range and, as a consequence, sending them to predefined picking up stations for the corresponding packaging.

[0005] Such apparatuses are rarely used to select combinations of products that reach a determined net weight, as the reduced number of products available on the conveyor, limits the precision of the weight that can be obtained, unless the length of the conveyor is considerably increased, with consequent problems of installation.

[0006] In order to overcome these application limitations, selection apparatuses are likewise known which entail a plurality of conveyors arranged in parallel, so that the selection can occur among the products loaded on the various conveyors.

[0007] This type of apparatus therefore allows to perform both the selection of the individual products on the basis of the size range, and also the selection of a combination of products on the basis of the total weight.

[0008] However, such solution entails an increase in the space occupation of the apparatus transversely with respect to the extension of the conveyors, and also the necessity to provide for further automatic systems for transferring the products selected from each conveyor to one or more detached packaging stations, which considerably complicates the structure and the running of such conventional apparatuses.

[0009] Furthermore, these conventional selection apparatuses are not devoid of drawbacks, among which is the fact that they need to be provided with systems for recovering the products that remain on the conveyors because they were not selected for packaging, and which need to be put back onto the conveyors at the loading side.

[0010] In order to overcome this drawback, selection apparatuses are known that are configured as a carousel, in which there is a continuous conveyor carrying a plurality of trays for the products in a closed loop, to define a closed path along which are arranged one or more loading stations of the products into the aforementioned trays, a weighing station which allows to store the weight of each product and the corresponding position along the conveyor in the electronic management and control unit, and one or more picking up stations, in which the selected products are made available for packaging.

[0011] This type of apparatus allows to perform both the selection on the basis of the size range of the individual product, and also the selection of a combination of products on the basis of the preset total weight.

[0012] Even for this conventional type of apparatus, however, its dimensions determine the number of trays available and therefore limit the possibility of choice for calculating the best combination of products selected in order to obtain the desired total weight, thus penalizing the degree of precision that can be obtained.

[0013] Furthermore, both for apparatuses with line conveyors and for apparatuses with carousel conveyors, if products of different types have to be processed (for example white grapes and black grapes or mixed fruits) it is necessary to provide an electronic vision system, of the type of video cameras, which allows to recognize the type of product present in each tray, so that the electronic unit can also store this information, in addition to the corresponding weight, in order to select the picking up station for which the product is destined.

[0014] Such vision systems have high purchase and maintenance costs, in addition to complicating the overall structure of the apparatus, and therefore limit their possibility for use.

[0015] The aim of the present invention is to eliminate the above mentioned drawbacks in the prior art by providing a selection apparatus for the packaging of products, in particular of the type of fruit and vegetable products, which for the same overall encumbrances allows to increase the quantity of products that can be processed, both for selecting products on the basis of the corresponding size range, and for selecting a combination of products on the basis of the corresponding total weight.

[0016] Within this aim, if the selection is made of a combination of products on the basis of the corresponding total weight, an object of the present invention is to optimize the degree of precision that can be obtained, independently of the preset total weight.

[0017] Another object of the present invention is for it to be flexible and versatile in use, allowing the preparation of packages of products of the same kind or of different kinds without requiring structural modifications and, especially, without requiring the use of vision systems.

[0018] Another object of the present invention is to enable both manual and automated loading and unloading of products.

[0019] Another object of the present invention is to facilitate the task of the users or operators if the selected products are picked up manually.

[0020] Another object of the present invention is to provide a simple structure that is easy and practical to implement, safe in use and effective in operation, and at low cost.

[0021] This aim and these and other objects that will become better apparent hereinafter are achieved by the present selection apparatus for the packaging of products, in particular fruit and vegetable products, according to claim 1, optionally provided with one or more of the characteristics recited in the dependent claims.

[0022] Further characteristics and advantages of the present invention will become better apparent from the detailed description of a preferred, but not exclusive, embodiment of a selection apparatus for the packaging of products, in particular fruit and vegetable products, which is illustrated for the purposes of non-limiting example in the accompanying drawings wherein:

Figure 1 is a schematic plan view from above of a selection apparatus for the packaging of products, in particular fruit and vegetable products, according to the invention;

Figure 2 is a schematic cross-sectional view taken along the line II-II in Figure 1.

[0023] With particular reference to the figures, the reference numeral 1 generally designates a selection apparatus for the packaging of products, in particular fruit and vegetable products.

[0024] The apparatus 1 comprises a frame 1a for supporting at least two continuous conveyors 2a and 2b that are configured as carousels, of which a first conveyor 2a is arranged outside a second conveyor 2b so as to define respective closed paths along the respective extensions.

[0025] In the embodiment shown, there is also a third conveyor 2c which is configured as a carousel and is arranged inside the second conveyor 2b.

[0026] Preferably the closed paths defined by the conveyors 2a, 2b and 2c are substantially mutually equidistant along their corresponding extension.

[0027] In the embodiment shown, in particular the conveyors 2a, 2b and 2c define respective closed paths in elongated loops with a horizontal arrangement. Each conveyor 2a, 2b or 2c has, therefore, two parallel straight portions connected by respective curved end portions. Obviously different shape structures of the conveyors 2a, 2b and 2c are not ruled out.

[0028] Furthermore, the first conveyor 2a is preferably arranged at a lower height than the second conveyor 2b, which in turn is positioned at a lower height than the third conveyor 2c, so as to make all the trays 3 more easily accessible and visible to the workers.

[0029] The apparatus 1 can in any case have a different number of conveyors, as well as a different configuration or arrangement thereof.

[0030] Each one of the conveyors 2a, 2b or 2c supports a plurality of trays 3 for the transfer of respective products and is a closed loop so as to define a closed path along which there are at least one loading station 4 of the products in respective trays 3, at least one weighing station 5 the products accommodated in the respective trays 3, and at least one picking up station 6 of selected products.

[0031] The apparatus 1 further comprises an electronic management and control unit which is adapted to store the weight and the position of each product loaded onto the conveyors 2a, 2b and 2c and to select the products to be picked up at the at least one picking up station 6 as a function of a preset or presettable weight, the electronic unit not being shown and described in detail since it is conventional.

[0032] According to a possible operating mode of the apparatus 1, the set or settable weight corresponds to the size range (unit weight or range of values for the unit weight) of the products to be selected. In this manner the electronic unit allows to route products of the same size range to the at least one picking up station 6, so as to obtain packages of products of uniform weight.

[0033] According to an alternative operating mode of the apparatus 1, on the other hand, the set or settable weight corresponds to the net weight of the package that it is desired to obtain. In this case the electronic unit, on the basis of the weight of the products available on the conveyors 2a, 2b and 2c, is adapted to calculate the combination of products whose total weight comes closest to the set weight, which can be varied in each instance according to requirements.

[0034] The presence of the second conveyor 2b and the third conveyor 2c positioned inside the first conveyor 2a allows, for the same space occupation of the entire apparatus 1, to process different products, loaded on respective conveyors, without requiring the use of electronic vision systems, and also to considerably increase the number of products that can be loaded and processed simultaneously.

[0035] If the selection occurs on the basis of the net weight of the package to be obtained, in particular, this contrivance increases the variety of available weights in order to calculate the best combination of products to be picked up, thus optimizing the degree of precision that can be obtained in the packaging.

[0036] Each conveyor 2a, 2b or 2c has a flexible pulling element 7, of the chain-like type or the like, which is a closed loop and is associated with means for movement along the respective closed path, which are not detailed as they are conventional.

[0037] In particular the means for movement of each conveyor 2a, 2b or 2c can be associated with a single drive motor by way of respective mechanical transmission means, or they can have independent drive units.

[0038] Furthermore, each tray 3 is associated with the corresponding pulling element 7 so that it can oscillate, about a substantially horizontal pin 8 which is aligned with the advancement direction A of the conveyors 2a,

2b and 2c, between a conveyor configuration and an unloading configuration which is substantially inclined with respect to the previous configuration.

[0039] Preferably, in the conveyor configuration each tray 3 presents a substantially horizontal arrangement, while in the unloading configuration it is inclined outward from the conveyors 2a and 2b so as to facilitate the picking up of the product contained in it.

[0040] If the picking up is done manually, the positioning of the trays 3 in the unloading configuration allows to indicate to the operator of the picking up station 6 which product is to be picked up.

[0041] In more detail, according to a solution known to the person skilled in the art and for this reason only partially described in the present description, each tray 3 is connected to the corresponding pulling element 7 by means of an articulated parallelogram 9 which is provided with a first vertical lever, which is affixed and anchored to the flexible element, on which the tray 3 rests in the conveyor configuration, a second vertical lever which can perform an alternating translational motion along its plane of arrangement and to which the tray 3 is articulated and which allows to lift it off the first lever at the weighing station 5, and a pair of interposed parallel linkages.

[0042] In fact, according to a solution known to the person skilled in the art, the weighing station 5 has a load cell 10 which is arranged below each pulling element 7 and extends along a section of the element. Each load cell 10 is provided in an upper region with a guide 11 which is adapted to interfere with the lower end of the second lever of the articulated parallelogram 9 associated with each tray 3 for lifting it off from the first lever during the transit through the weighing station 5, so as to detect the weight of the product arranged therein.

[0043] At each picking up station 6 there are actuation means 12 associated with each conveyor 2a, 2b or 2c for moving the trays 3 in transit between the configuration for conveyance and the configuration for unloading. Such actuation means 12 can entail, for example, a solution known to the person skilled in the art which consists of a solenoid actuator that, if activated, lifts the tray 3 in order to engage it with a contoured ramp that causes the oscillation of the tray from the configuration for conveyance to the configuration for tilting and the return to the configuration for conveyance downstream of the picking up station 6. Such actuator is activated by the electronic unit upon the transit through the picking up station 6 of the tray 3 containing a selected product.

[0044] In the embodiment shown, there is a manual loading and picking up of the products at the stations 4 and 6, but the possibility is not ruled out of having automated assemblies dedicated to carrying out such functions and/or assemblies for transferring the products to and from detached stations.

[0045] Furthermore, there is a plurality (six) of manual loading stations 4 along a straight section of the conveyors 2a, 2b and 2c and a plurality (eight) of manual picking up stations 6 along the straight section on the other side, between which is interposed, along the advancement direction A of these conveyors, the weighing station 5.

[0046] It should be noted that the apparatus 1 with manual loading and picking up stations 4 and 6 are particularly suitable for processing delicate fruit and vegetable products, such as those in bunches or clusters (grapes and cherry tomatoes).

[0047] The electronic unit is adapted to alternately select the products (on the basis of the corresponding size range) or a combination of products (on the basis of the corresponding total weight) to be unloaded for each picking up station 6.

[0048] Conveniently, each picking up station 6 can be provided with means 13 for signaling the end of the unloading of the selected combination of products. In fact, if the selection occurs on the basis of the set net weight, then the user at the picking up station 6 will not know the number of products to be picked up for each combination calculated by the electronic unit, and so it is useful to have a system that informs the user when he or she has finished the picking up of the products intended for a package with a preset net weight.

[0049] Such signaling means 13 can be luminous or acoustic and are activated by the electronic unit. In the embodiment shown, the signaling means 13 have, for example, a plurality of luminous elements 14a, 14b, 14c, of which the first 14a is adapted to be switched on at the first picking up, the second 14b is adapted to be switched on for any intermediate picking up, and the third 14c is adapted to be switched on at the last picking up, so that the user knows he or she has finished the unloading of the products intended for a package.

[0050] If homogeneous products are loaded on the conveyors 2a, 2b and 2c, the electronic unit can be programmed to pick up products indifferently from the trays 3 of each of them. Conveniently, if the selection is made on the basis of a set net weight, products of a smaller size range can be loaded on the third conveyor 2c, which favor obtaining exact combinations with respect to the set net weight. For example, for the packaging of bunches of grapes, small bunches of grapes can be loaded on the third conveyor 2c.

[0051] If, on the other hand, it is desired to obtain packages with a certain net weight and containing different products (for example white grapes and black grapes, or mixed fruits), then respective varieties of products must be loaded on the first and on the second conveyor 2a and 2b and the electronic unit must be programmed to select at least one product for each conveyor 2a or 2b for each selected combination. This contrivance allows to process different products, thus avoiding the need to use electronic vision means.

[0052] If the apparatus 1 is used to select products on the basis of the corresponding size range, then different types of products can be loaded on the conveyors 2a, 2b and 2c, which the electronic unit will route to respective picking up stations 6. This contrivance allows to process different products, thus avoiding the need to use elec-

tronic vision means.

[0053] Operation of the present invention is the following.

[0054] At the loading stations 4, the products are positioned on the respective trays 3. When the apparatus 1 is started, all the trays 3 in transit must be filled, and subsequently only the trays that are empty following the picking up of the products selected by the electronic unit.

[0055] For the packaging of dissimilar products, the users or operators at the stations for loading have to position the products on the conveyors 2a, 2b and 2c as a function of their type, or the loading stations 4 can be geared to process only one type of products intended to be arranged along a preset conveyor 2a, 2b or 2c.

[0056] If the third conveyor 2c is adapted to transfer small-sized products, then the users or operators at the loading stations 4 must position appropriate products on the respective trays 3, or a loading station 4 can be dedicated to filling the trays 3 of that conveyor.

[0057] At the weighing station 5, each product is weighed by the load cells 10 and the corresponding weight and position information is stored by the electronic unit which determines the products or the combination of products to be unloaded in each picking up station 6.

[0058] In each picking up station 6, upon the passage of the tray 3 containing one of the selected products, the electronic unit activates the actuation means 12 so that the tray is brought to the unloading configuration and the operator picks up the products.

[0059] At the end of picking up, the user or operator transfers the products to a package or onto a packaging line.

[0060] In practice it has been found that the invention as described achieves the intended aim and objects and, in particular, attention is drawn to the fact that the selection apparatus according to the invention allows to increase the number of products that can be processed simultaneously without increasing the overall space occupation.

[0061] Furthermore the apparatus according to the invention allows to carry out a selection on the basis of the size range or on the basis of the net weight to be obtained, even of products of different types, without necessitating the use of electronic vision systems.

[0062] If the selection is made on the basis of the net weight to be obtained, the system according to the invention allows to optimize the precision of the weight of the packages that can be obtained, without requiring increases in space occupation or structural complications of the apparatus.

[0063] The apparatus according to the invention is also flexible and versatile to use, as the size range or the set net weight and the type of products to be processed varies.

[0064] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0065] Moreover, all the details may be substituted by other, technically equivalent elements.

[0066] In practice the materials employed, as well as the contingent dimensions and shapes, may be any according to requirements without for this reason departing from the scope of protection claimed herein.

[0067] The disclosures in Italian Patent Application No. 102017000090345 from which this application claims priority are incorporated herein by reference.

[0068] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A selection apparatus (1) for the packaging of products, particularly fruit and vegetable products, which comprises at least one continuous conveyor (2a, 2b, 2c) which is configured as a carousel and supports a plurality of trays (3) for the transfer of respective products and is a closed loop so as to define a closed path along which there are at least one loading station (4) of the products in respective trays (3), at least one weighing station (5) of the products accommodated in each tray (3), and at least one picking up station (6) of selected products, there being also an electronic management and control unit which is adapted to store the weight and the position of each product loaded onto said at least one conveyor (2a, 2b, 2c) and to select the products to be picked up at the at least one picking up station (6) as a function of a preset or presettable weight,
characterized in that it comprises at least two of said conveyors (2a, 2b), of which a first conveyor (2a) is arranged outside a second conveyor (2b) so as to define respective closed paths along the respective extensions.

2. The apparatus (1) according to claim 1, **characterized in that** said first conveyor (2a) is arranged at a substantially lower height than said second conveyor (2b).

3. The apparatus (1) according to claim 1 or 2, **characterized in that** it comprises three of said conveyors (2a, 2b, 2c), of which a third conveyor (2c) is arranged inside said second conveyor (2b) and at a greater height.

4. The apparatus (1) according to one or more of the preceding claims, **characterized in that** the closed paths defined by said at least two conveyors (2a, 2b, 2c) are substantially mutually equidistant along their corresponding extensions.

5. The apparatus (1) according to at least one of the preceding claims, **characterized in that** said set or settable weight corresponds to the size range of the products to be packaged, the electronic unit being adapted to select products of the same size range for unloading at said at least one picking up station.

6. The apparatus (1) according to at least one of claims 1-4, **characterized in that** said set or settable weight corresponds to the net weight of the package to be obtained, the electronic unit being adapted to process a combination of products the total weight of which substantially corresponds to said net weight for unloading at said at least one picking up station.

7. The apparatus (1) according to claim 6, **characterized in that** said electronic unit is adapted to select for said combination of products at least one product for each one of said first conveyor and second conveyor (2a, 2b), a different type of product being loaded onto each of them.

8. The apparatus (1) according to claim 6 or 7, **characterized in that** said at least one picking up station (6) comprises means (13) for signaling the end of the unloading of the selected combination of products.

9. The apparatus (1) according to at least one of the preceding claims, **characterized in that** each one of said conveyors (2a, 2b, 2c) comprises a flexible pulling element (7), which is a closed loop and is associated with means for movement along the respective closed path, the corresponding trays (3) being associated with said pulling element (7) so as to oscillate between a configuration for conveyance and a configuration for unloading which is substantially inclined with respect to the preceding configuration.

10. The apparatus (1) according to claim 9, **characterized in that** said at least one picking up station (6) comprises actuation means (12) associated with each one of said conveyors (2a, 2b, 2c) for moving the trays (3) in transit between said configuration for conveyance and said configuration for unloading, the actuation means (12) being actuated by said electronic unit in order to move the tray (3) that contains the product selected by said electronic unit.

11. The apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises a plurality of said loading stations (4) and a plurality of said picking up stations (6), said electronic unit being adapted to alternately select products for each picking up station (6).

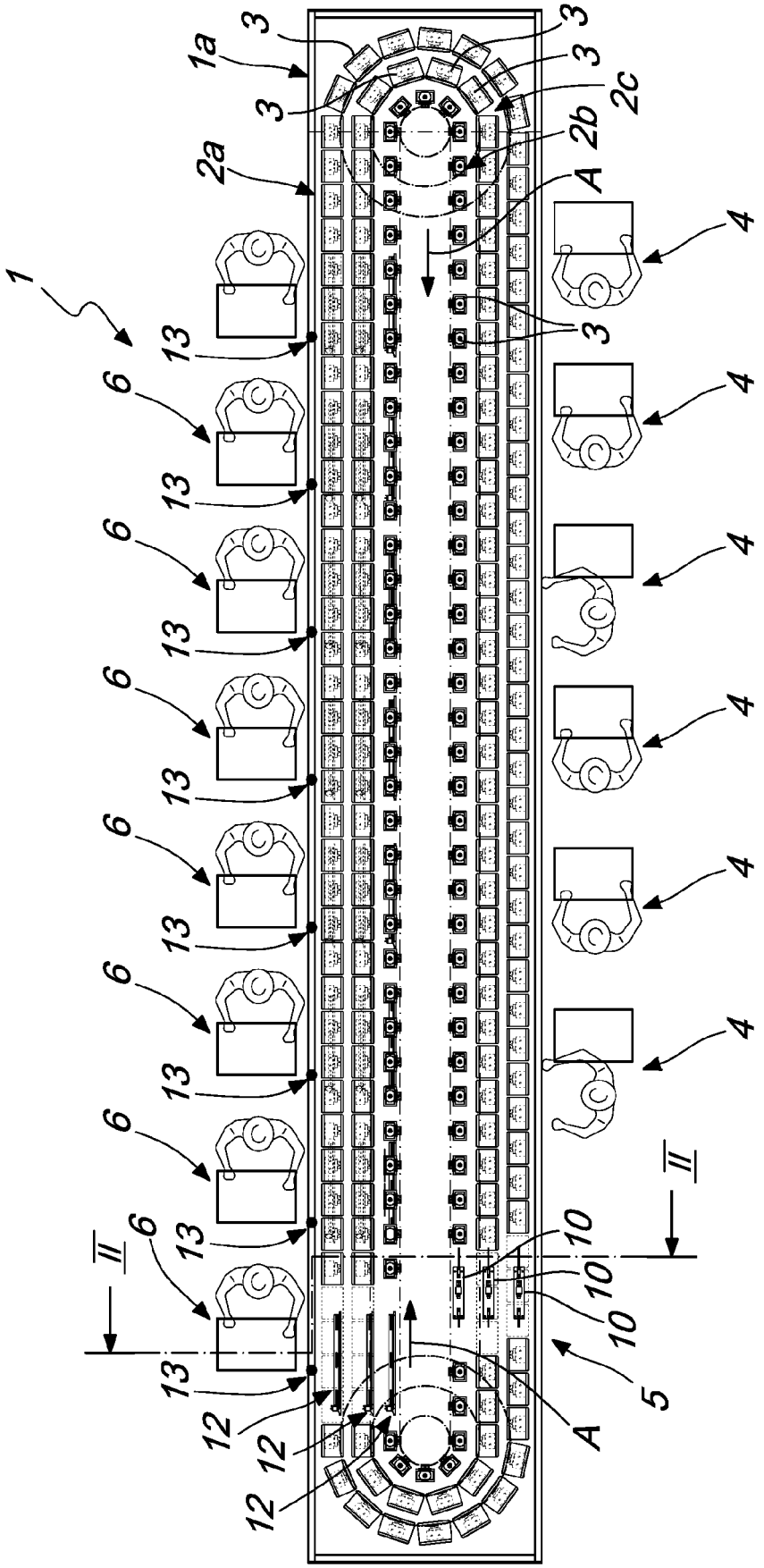

Fig. 1

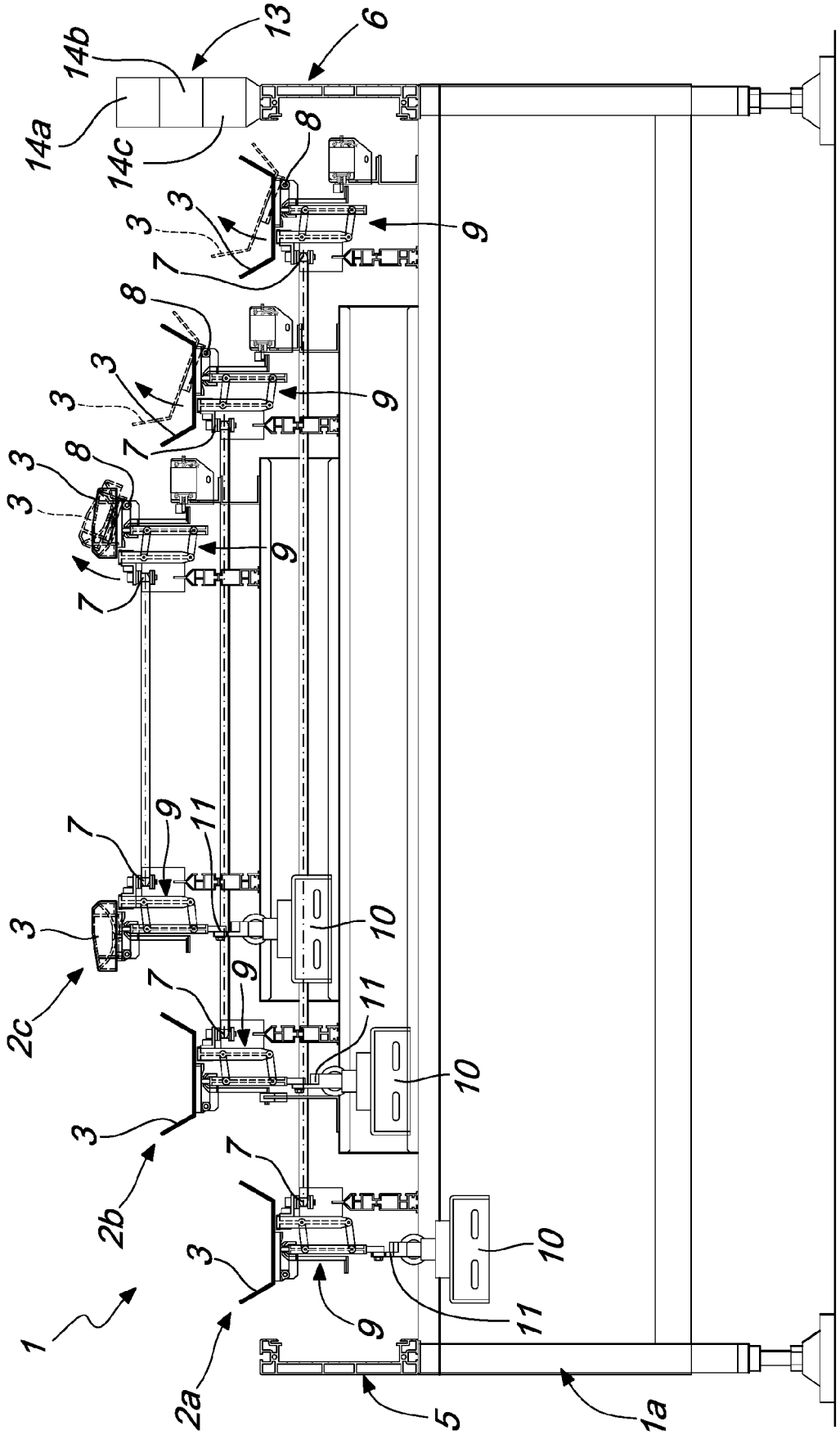

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 18 18 6890

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 December 2018	Wich, Roland

CATEGORY OF CITED DOCUMENTS

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