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(54) **A METHOD OF AND SYSTEM FOR PLACING A SERIES OF TRAYS AT A CONSTANT CENTER TO CENTER DISTANCE**

VERFAHREN UND SYSTEM ZUR PLAZIERUNG EINER SCHALENREIHE IN KONSTANTEN ABSTÄNDE IHRER MITTELPUNKTE

PROCÉDÉ ET SYSTÈME POUR POSER LA CENTRE D'UNE SÉRIE DE BARQUETTES Á UNE DISTANCE CONSTANTE

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Description

TECHNICAL FIELD

[0001] The present invention relates to methods and systems for placing a series of trays in an end to end or side to side contacting relationship and a constant center to center distance, each of said trays having a body and an upper outwards projecting rim.

[0002] In the present context, the term "horizontally" shall be interpreted as substantially horizontal.

[0003] In addition, it relates to a method of picking selected items from a conveyor and delivering them by means of a picker robot to varying selected trays in a plurality of parallel series of horizontally movable trays, where the trays at a dowstream end of the series are individually discharged to a conveyor for discharged trays when filled with a desired amount of measured items, and empty trays provided by a conveyor are substituted for the discharged ones at an upstream end of the series.

BACKGROUND ART

[0004] When grading items (*e.g.* from cut-up chickens) there is an optimizing problem in that the purchaser as a rule requires a specific weight of the package, *e.g.* 750 grams. It is acceptable that an end customer buys a package having a slight overweight, but a deficiency in weight is unacceptable. As a chicken fillet, for example, may weigh between 100 and 200 grams, there is a problem in minimizing the necessary overweight. Also other physical properties of a food item may be desired to take into account when sorting products. One example could be the color of a poultry fillet. To a customer the most attractive is if all the fillets in one packet have a similar color, meaning that a grading procedure is arranged to sort items after their color.

[0005] In packing stations of today, the sorting problem is solved by having a plurality of packing trays accessible, so that a picker robot, which works with a computer algorithm, automatically picks the arriving food item (*e.g.* chicken item) and delivers it to the most suitable package tray, *i.e.* the tray that at the end will give the lowest overweight or the tray already containing a food item with similar color, shape or quality. Presently, statistical basic data (*e.g.* the latest 100 fillets are used as a basis for calculating probabilities) are used to at delivery of the last but two item, and the last but one item, respectively, come as close as possible to the desired weight in the final package.

[0006] Today, the feed line includes a single belt weigher, or multiple parallel belt weighers, for weighing or size scanner for measuring the dimensions of the items to be graded, and these devices are located just upstream of the place where the robot picks the item. As soon as a tray is filled, it is discharged from the packing station.

[0007] Packing stations of this kind are disclosed in US 2008/0241321 A1 and US 2009/0145670 A1, for example. In ’321, the trays are carried by a conveyor that is on level with and parallel to the conveyor feeding the items to the packing station. In ’670, the trays are carried by a circular rotary conveyor located straight below the circular working range of the picker robot, and the item feeding conveyor is located below the circular conveyor and extends diametrically through the working range. As each tray is filled with the desired amount of items, the circular conveyor is rotated so that the filled tray is located at a discharge location and the tray is transferred to a discharge conveyor that extends parallel to the item feeding conveyor. An empty tray is substituted for the filled and discharged tray. This principle has the advantage that during filling a tray may circulate several rounds without the system stopping. However, the disadvantage of the system is that the movement paths for delivering a selected item in a specific tray often may be quite long. This results in a waste of time. In addition, the adjustment of the system to a new tray size is complicated and time consuming, in that locating and shielding components of basically trapezoidal shape have to be removed and replaced by corresponding components for another tray size. Each tray size requires a separate locating and shielding component, and if several tray sizes will be used, a corresponding number of sets of such components will be required.

[0008] Further, US 7,258,237 B2 discloses a method and apparatus for weighing and portioning items utilizing a picker robot to remove an item from a delivery station to a receiving area for placement into a particular tray. An item supplying conveyor conveys items to a weighing plate belonging to a weighing station, which is connected to a registration and control computer. The conveyor belt continues thereafter to a double row of receiving trays, which are_arranged in direct extension of the conveyor, but which could just as well assume any other direction, e.g. at right-angles to the conveyor. The weighing plate may be used as a kind of buffer, which can receive items in quick succession or even at the same time, in that an effective weighing can then be carried out as a "negative weighing" by registration of the reduction in weight which arises with a gripping and lifting of a given item.

[0009] When a plurality of parallel tray carrying conveyors is used, the filling of the leading tray has to be finished before an empty tray can be fed onto this very conveyor in the packing station. If no item of suitable weight, for example, is available, the consequence will be that the trays behind the leading one will be filled-up first and, thus, that too small a number of trays will be available for grading the items efficiently with regard to time. Document US3690438 discloses an apparatus for efficiently collating filled containers by placing trays at a constant center to center distance by placing

the trays so that one of the rims of two adjacent trays is on top of the other rim, and said other rim abuts the body of the tray having the upper rim.

[0010] Another problem often encountered in grading and packing systems is the difficulty in reconfiguring the system for other tray sizes, *i.e.* that a change of tray size often requires large and time consuming efforts for adapting the system. Quite some new locating and possible shielding components may have to be removed and new ones substituted therefore for each new length or width of the tray.

SUMMARY OF THE INVENTION

[0011] An object of the present invention is to improve the adaptability of the system to various sizes of trays.

[0012] This object is achieved in the methods of claims 1 and 2. Similarly, this object is achieved in the systems of claims 7 and 8. As all of the trays have a rim, which the trays can abut or climb, it has been difficult to form a queue of trays having a constant center to center distance between the trays. By incorporating the new features stated in the claims, when the tray conveyor is operating, the trays will move up and down and automatically climb the rim of an adjacent tray. This makes it possible to use a great variety of trays just by adjusting the height and the width spacing between longitudinal side supports keeping the trays in position on the conveyor. These side supports can be mounted on horizontal and vertical guides and can easily be adjusted to a new height and/or a new width spacing to accommodate a new size of tray. A further non-claimed aim is to increase the number of tray conveyors that can be used with a picker robot having a working range of a certain area. This can be achieved by arranging the direction of movement of trays in the plurality of series of trays at a generally perpendicular angle to the conveyor that carries the items to be sorted and picked.

[0013] As an illustrative example, compared to a case where the picker robot picked items from a central item feeding conveyor and delivered them to trays carried by four parallel conveyors, two on each side of the central conveyor, the new arrangement, where the tray carrying conveyors are substantially perpendicular to the item feeding conveyor, makes it possible to extend the working range of the picker robot from four to as many as six tray carrying conveyors, since also the peripheral portions the working range can be used thanks to the invention.

[0014] It is understood that said area of the working range of the picker robot may be of any geometry and may include *e.g.* circular or square shaped areas.

[0015] An additional advantage achieved is that most of the picking movements will get a shorter horizontal path, since more trays will be positioned close to the item feeding conveyor.

[0016] Thus, the direction of movement of trays in the plurality of series of trays is generally perpendicular to the direction of movement of the conveyor that supplies items to be picked by the picker robot, and it can be parallel or perpendicular to the direction of movement of the conveyor supplying empty trays and to the direction of movement of the conveyor for the discharged trays.

[0017] It is to be understood that the items to be picked can be any food stuff with variable characteristics (such as weight) which is to be measured, picked and sorted. Such items may be for instance cut-up poultry or chicken fillets, fish and also pieces of vegetables or sea food. Further it is understood that in the present context, the term "measuring" shall be interpreted to include "measuring the weight", *i.e.* weighing, and also that "measuring" may include assessing other types of characteristics or physical dimensions of the items, such as the shape, color and quality.

[0018] Another non-claimed aim is to accomplish increased accuracy and precision when selecting the proper item to be picked and placed into a tray, *e.g.* that the pre-decided total weight is reached for all packages. This object is achieved by means of providing a belt weigher located at the beginning of the feed line feeding items to be picked, for measuring the weight of each individual item on the in-feed device that carries the items to be picked, said belt weigher being positioned upstream of a in-feed buffer of measured items in the in-feed device. The buffer is so large that the system knows what is to be sorted and will not have to rely on history/statistics about what has just been sorted. Thereby, a better control of the weight distribution of the individual items is obtained, so that the sorting can be carried out with still greater precision and the ready-packed trays can have for example less overweight than previously possible.

[0019] According to a further non-claimed aspect there is provided a tracking system which is arranged to cooperate with the belt weigher in such a way that each item being fed can be identified as it is transported through the in-feed buffer, and the picker robot is programmed to, based on the in-data originating from the belt weigher and the tracking system select an item into the best tray available.

[0020] According to another non-claimed aspect there is provided another belt weigher at the end of the in-feed buffer, at the grading station. Hereby each item is measures with regards to its weight twice so that a better accuracy is accomplished and the right item is chosen and picked by the picker robot.

[0021] Thanks to the in-feed buffer the use of statistical/historical statistic data is no longer needed as a basis for selecting an item. Instead the system according to the invention will chose an item based on real data, which renders a greater accuracy when packing the food products. This means the system can accept various batches with very different characteristics, since the measuring will always register the real properties and will hereby automatically adapt

the sorting if for instance an incoming batch of chicken fillets will have a greater average weight than the previously graded one.

[0022] Further features characterizing the present invention will be stated in the appended dependent claims, and what is achieved thereby will be disclosed in the detailed description below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] In the following, the invention will be described in more detail with reference to preferred embodiments and the appended drawings.

Fig. 1a-b	show a grading station according to prior art.
Fig. 2	is a schematic plan view of a preferred embodiment of a system for picking selected measured items from a conveyor including a belt weigher and delivering them by means of a picker robot to varying selected trays in a plurality of parallel series of horizontally movable trays.
Fig 3	is a perspective view of an exemplary embodiment of the picker robot which may be used in the system of Fig. 2.
Figs. 4a and 4b	are a schematic top view and a schematic side view, respectively, of a conveyor carrying a series of trays in accordance with a preferred embodiment of the present invention.
Figs. 5a, 5b and 5c	are side views of areas Va and Vb, respectively, in Fig. 4b but drawn on a larger scale.
Fig. 6	is an end view of the conveyor with trays shown in Fig. 4b.
Fig. 7	is an end view of area VI in Fig. 6 but drawn on a larger scale.
Fig. 8	is an example of means for adjusting conveyor guides to various dimensions of trays.
Fig. 9	is a schematic plan view of an item feeding conveyor including two belt weighers that are spaced apart to form between them a buffer of measured items.

DETAILED DESCRIPTION OF THE INVENTION

[0024] For the purpose of understanding in Fig. 1a - b there is shown perspective views of a packaging system 40 according to prior art, wherein a conveyor 2 for items to be picked is parallel to a conveyor 11 supplying trays (not shown) to be filled and perpendicular to the two conveyors for supply 7 of empty trays and discharge 6 of ready-packed trays. In this type of known system the conveyor supplying empty trays is provided with flights 19 for horizontal movement of the trays which are dimensionally adapted after a specific size of trays, leading to that handling of another tray size requires switching of the flights 19, which is very time consuming and also leads to necessity of keeping a storage of extra equipment in order to adapt the system to a variety of products.

[0025] Fig. 2 shows a system for picking selected items 1 (e.g. from cut-up chickens), from an in-feed device 2 (preferably in the form of a conveyor 2) and delivering them by means of a picker robot 3, indicated by its working range 3a but shown in Fig. 3, to varying selected trays 4 in a plurality of parallel series 5 of horizontally movable trays. All of the trays 4 in a series 5 are identical, and the tray at a front end of each of the series is individually discharged when filled with a desired amount of measured items 1, and empty trays 4 are substituted for the discharged ones at a rear end of the series 5. In accordance with the present invention, the direction of movement of trays 4 in the plurality of series 5 of trays is generally perpendicular to the conveyor 2 that carries the items 1 to be picked.

[0026] The picker robot 3, shown in detail in Fig. 3, has a generally circular working range 3a and is located centrally over the series 5 of trays 4. Various types of picker robots may be used, but the one shown in Fig. 3 is an IRB 360, which is designed to work in meat and dairy applications and is available from ABB. The long arm version thereof has a working range of 1600 mm within a height of 350 mm and can handle loads of 1 kg with a cycle time of about 0.5 s. At its top, the picker robot 3 shown in Fig. 3 has a base box 31, from which three identical and vertically pivotal upper arms 32 operated by individual motors housed in the base box 31 extend radially outward. Each of these upper arms 32 has an outer free end, to which an upper end of a separate lower arm 33 is pivotally connected. The lower ends of the three lower arms 33 are pivotally connected to a common hub 34. At the center of its bottom side, the hub 34 carries a gripping device 35 for gripping the load to be picked up at one location and delivered at another location. The gripping

device 35 is maneuvered by means of a control system and is moved to a desired location within the working range by operating one or more, if required, motors.

[0027] An out-feed device 6 (preferably in the form of a conveyor 6) for the discharged trays and also the conveyor 2 that carries the items 1 to be picked are located at the front or downstream end of the series 5 of trays 4, and a supply device 7 (e.g. a conveyor) for supplying empty trays 4 is located at the rear or upstream end of the series 5 of trays 4. The conveyor 2 that carries the items 1 to be picked includes a belt weigher 8 for measuring the weight of each individual item 1. If the conveyor 2 is intended to carry two lines of items next to each other, it is suitable to provide also two parallel belt weighers 8 for measuring the weight of each individual item 1 in each line. Further, if desired, an apparatus for measuring the physical dimensions (e.g. color, shape or quality of the item to be picked) of each item 1 may be provided but is not shown.

[0028] As is best shown in Figs. 4a, 4b, 5a-c, each of the trays 4 has a body 9 and an upper outwardly projecting rim 10. To place the trays 4 in each series 5 in an end to end or side to side contacting relationship and at a constant center to center distance, the system may include a conveyor 11 for each series 5 of trays 4 to carry the series of trays and provide a substantially horizontal tray conveying movement toward a stop (not shown) to make the trays 4 abut one another rim 10 against rim 10. It is to be understood that instead of a plurality of parallel conveyors 11 it is possible to provide one single conveyor 11 which is broad enough to accept the many parallel series 5 (herein six series 5) of trays 4. The cross conveyor 11 includes means 12 for producing a vertical movement to make each of the trays 4 move vertically in relation to its neighbor to make the rims 10 lose their end to end contact and instead be located on top of each other with the lower rim 10 abutting the body 9 of the adjacent tray 4. In the embodiment illustrated in Fig. 2, six cross conveyors 11 are shown, and each cross conveyor 11 carries four trays 4, however it is understood that other types of packaging systems may be provided with another number of cross conveyors 11.

As is evident for the skilled person the above mentioned principle for achieving a constant center-to-center distance may also be provided in connection with other feeding lines, e.g. a conveyor 7 that feeds empty trays 4.

[0029] The means 12 for producing a vertical movement includes a drive (13, not shown) for running the horizontal tray conveying movement continuously thus making the vertical movement of the trays wave-shaped as the means 12 for producing the vertical movement is passing under the trays 4 in the conveying direction. The drive may be in the form of a motor, phneumatic cylinder or any suitable means for driving the conveyor. The cross conveyor 11 may be a traditional kind of belt conveyor or of another kind, e.g. a chain conveyor with rollers for the horizontal movement of the trays 4, and as is best shown in Figs. 5a and 5b, a plurality of transversally extending cams 15 are provided on said chain conveyor to achieve the vertical shaking movement. The cams 15 are spaced from one another a distance that is larger than a maximum measure or length of a tray 4 in the conveying direction. In the embodiment shown in Fig. 4b, the distance between the cams 15 is on the order of three times the maximum length of a tray 4.

[0030] The cams 15 are of a shape such that each of them is sufficiently high to lift a tray rim on top of a neighboring rim, and may also assist in moving a tray 4. Further the cam shall be sufficiently low to then enter below (and lift) a rear end of the tray 4, whereupon the cam 15 passes along the bottom of the tray 4 during further lifting of the rear end until a center of the tray is reached, where the tray 4 will balance, and then letting gravity lower the rear end while keeping a front end of the tray 4 lifted until the cam 15 no longer supports the tray 4. The leading rim 10 of the rear tray will then rest on top of the trailing rim of the fore tray, and the leading end of the tray 4 will be slightly lifted from the cross conveyor 11. Preferably, the height of the cam 15 is on the order of 2 - 7 mm, and the cross conveyor 11 is running continuously, whereby the trays 4 will be exposed to small continuous vertical movements up and down, and the leading rim 10 of a tray will automatically climb the trailing rim 10 of the tray located just ahead of it. In a preferred embodiment the cams 15 are integrated in the belt 11 which will provide a sufficient frictional force to move a tray 4 forward if there is no external resistance, but sufficiently low frictional force to allow the tray 4 to slide on the belt and maintain its horizontal position if abutting a stop, e.g, a tray 4 in a que. As is understood by the skilled person also the friction between the underside of the trays 4 and the conveyor surface will contribute to horizontal movement of trays 4.

[0031] The skilled person understands that various types of means 12 for producing a vertical movement may be used in addition to said cams 15. For example, according to one embodiment of the invention the vertical movement of the trays 4 is achieved by means of a plurality of coaxial rollers 14 (see Fig. 5c) arranged to extend transversally across a conveyor 11. Preferably a chain conveyor 11 is used for the horizontal movement of the parallel series of trays 4, and said plurality of coaxial rollers 14 substitute chain links in the chain conveyor 11 in at least one row transversally extending across the chain conveyor 11. Preferably said rows of rollers 14 are spaced from one another a distance that is larger than a maximum measure of any one of the trays 4 in the conveying direction. Running the conveyor 11 will lead to that said coaxial rollers 14 passing under the trays 4 cause the vertical movement of the trays 4.

[0032] Preferably the rollers 14 comprises a shape such that each of them is sufficiently high to convey a new tray 4 forward until the new tray 4 abuts the stopped series 5 of trays 4, and sufficiently low to then enter below and lift a rear end of the tray 4, whereupon the row of rollers 14 pass along a bottom of the tray 4 during further lifting of the rear end until a point is reached, where the tray 4 will balance on the row of rollers 14, and then lowering the rear end while keeping a front end of the tray 4 lifted until the rim 10 at a leading end of the tray 4 rests upon the rim 10 at a trailing

end of an adjacent tray 4 and the row of rollers 14 no longer supports the tray 4. Preferably said rollers 14 are freely rotatable meaning that upon passing below a tray 4 said roller 14 will rotate and roll along the lower surface of the tray 4, thereby minimizing the frictional wear that otherwise would arise between the protruding roller 14 and said undersurface of the tray 4.

[0033] By permitting the leading rim 10 of a tray to automatically climb the trailing rim 10 of the tray located just ahead of it you also gain the advantage, that the leading rim of tray number two in a line of trays can be used for holding that tray 4 back when tray number one in the line is filled with the desired weight of items 1 and is discharged from the cross conveyor 11.

[0034] As is shown in Figs. 6 and 7, to facilitate the setting of a new size of trays, longitudinal side supports 16, suitably T-bars, are provided for keeping the trays 4 in position laterally and vertically on the cross conveyor 11, and guides are provided, on which said side supports are mounted for vertical and/or horizontal adjustment to a new level and/or a new width spacing, respectively, to accommodate a new size of tray 4. This design makes it very easy to quickly change from one tray size to another, and all of the trays on the cross conveyor will have the very same center to center distance to one another in the conveying direction. It also makes it possible to use a great variation of sizes of trays by just adjusting the level and the width spacing of the longitudinal side supports.

[0035] In Fig. 8 there is illustrated the details of exemplary means for adjusting a conveyor to various height and width of trays 4 to be transported. Herein is shown three parallel trays 4 seen from the front which are transported on a conveyor belt 11. Longitudinal side supports in the form of T-bars 16 are keeping the trays in position laterally and vertically on the belt. The T-bars are adjustable horisontally via slidable guide means 25, and vertically via adjustment means 24 here actuated by rotationally movable handle member 26 with which it is possible to easily regulate the setting of a certain tray size. By means of adjustment devices (*e.g.,* as the ones shown in Fig. 8), each individual series 5 may be vertically and longitudinally adapted after a certain type of tray 4, meaning that for instance a number of six series 5 (as in Fig. 2) can hold six different trays sizes. Thanks to said means 12 for producing the vertical movement (previously described) a constant center-to-center distance between the trays 4 in one series 5 will be kept automatically, regardless of the size of the tray 4. This opens up for a packaging system with a wide variety of packing options, for example one series 5 at the cross conveyor 11 may be arranged to transport big-pack size trays 4 and a neighboring series 5 to transport a smaller tray size with a lower target weight. Preferably the trays 4 within a common series 5 are identical.

[0036] In another preferred embodiment of the invention shown in Fig. 9, an additional belt weigher 18 is provided in the item feeding conveyor 2. The additional belt weigher 18 is located in the beginning of the feed line, and a long conveyor belt 21 or the like, which maintains the positions of the items 1 weighed on the additional belt weigher 18 and forms a buffer, extends from the additional belt weigher 18 to the belt weigher 8 at the grading station. The buffer 21 is so large that the system knows what is to be sorted and will not have to rely on history/statistics about what has just been sorted. Thereby, a still better control of the weight distribution of the individual items 1 is obtained, so that the sorting can be carried out with still greater precision and the ready-packed trays 4 can have less overweight than previously possible. It is possible to substitute the belt weigher 8 at the grading station with conveyor tracking means arranged to register each item and provide the picker robot with such information so that it "knows" what item 1 to pick from the buffer 21.

[0037] The grading system may operate as follows. Empty trays 4 are transported by conveyor 7 to the working range 3a of the picker robot, where mechanism (not shown) pushes them onto the six parallel cross conveyors 11 to maintain all cross conveyors filled with trays which form a line of trays abutting one another. The cross conveyors 11 are running continuously and the front tray in each line is prevented from moving past the stop. The items 1 to be graded, e.g. chicken fillets, are fed on conveyor 2 to the working range 3a of the picker robot. To measure the weight, *i.e.* to weigh, each individual item, conveyor 2 includes a belt weigher 8. If the conveyor 2 carries two lines of items beside each other, two parallel belt weighers 8 are provided for measuring the weight of each individual item 1 in each line. If desired, an additional belt weigher 18, or a pair of additional parallel belt weighers, may be provided upstream of belt weigher 8 to form a buffer of measured/weighed items 1 between belt weighers 8 and 18. Further, if desired, an apparatus for measuring the physical dimensions, or other attributes such as color or quality, of each item 1 may be provided in addition to at least one of the belt weighers or as a substitute therefore but is not shown.

[0038] The picker robot 3 picks the measured/weighed items 1 from conveyor 2 and places them in selected trays on the first cross conveyors 11 so as to obtain as little overweight as possible over a target weight in each of the trays 4. Preferably the picker robot is arranged, e.g. by means of a computer algorithm, to favor the trays that are first in line when grading the items 1 in order to increase the chance of reaching the target weight in a tray which is ready to be discharged. When the first tray at a downstream end of a line of trays 4 on a cross conveyor 11 is ready-packed, the stop is temporarily removed and the ready-packed tray is allowed to move further onto an neighboring second cross conveyor 22 aligned with the first cross conveyor 11, wherein the second cross conveyor 22 is arranged with a higher speed compared to the first cross conveyor 11 leading to that said ready-packed tray is caused to accelerate as it proceeds onto the second cross conveyor 22. This acceleration will lead to that the ready-packed tray moves forward quicker than the trays behind it in the line. In this moment the stop (not shown) is returned to its blocking position catching

the leading rim of the second tray in the line and thereby also holds back the trays behind it.
The former second tray now becomes the first tray, the line of trays is moved forward, and an empty tray is added at the end of the line. Obviously other solutions are conceivable for discharge of a ready-packed tray 4, such as providing a mechanically operated rim catching device which may function as to block the second tray in line while the first ready packed tray is released and may proceed towards the out-feed device 6.

[0039] According to one embodiment said second cross conveyor 22 is arranged to pass underneath the in-feed device 2 (e.g. conveyor 2) carrying the items to be picked 1 (shown e.g. in Fig. 2) so that the ready-packed trays 4 may pass said conveyor 2 and move on towards the out-feed device 6 (e.g. conveyor 6) whereto it is discharged.

[0040] The picker robot 3 has a control unit (not shown) ensuring high speed together with path following facilities, which enable the robot to track fast moving conveyor belts with high accuracy. Signals representing the weight/dimensions of the individual items 1 and their location on conveyor 2 are sent to the control unit, for instance via a CPU that communicates with said control unit. The CPU may be a separate unit or incorporated in the control unit. A memory (not shown) keeps track of the weight of the items placed by the robot 3 in the trays 4 during packing. Further signals or data may be fed to one of the units to optimize the performance of the robot 3.

[0041] The invention is not to be seen as limited by the embodiments described above, but can be varied within the scope of the appended claims. For instance the skilled person realises that many alternative solutions exist for moving the trays 4, e.g. using a roller chain conveyor with feed cams 15, whereby the trays 4 will merely be moved forward by the force exerted by the cam.

Claims

1. A method of placing a series (5) of trays (4) in an end to end or side to side contacting relationship, each of said trays (4) having a body (9) and an upper outwards projecting rim (10), by providing a conveyor (11) for substantially horizontal tray conveying movement toward a stop to make the trays (4) abut one another rim (10) against rim (10), and for a vertical movement to make each of the trays (4) move vertically in relation to its neighbor to make the rims (10) lose their end to end contact and instead be located on top of each other with the lower rim (10) abutting the body (9) of the adjacent tray (4), whereby the trays (4) are arranged at a constant center to center distance and placed such that one of the rims (10) of two adjacent trays (4) is on top of the other rim (10), and said other rim (10) abuts the body (9) of the tray (4) having the upper rim (10),
characterized in that said conveyor (11) includes transversally extending means (12) in the form of transversally extending cams provided on said conveyor (11) for making the vertical movement wave-shaped and passing by the trays (4) in the conveying direction by feeding the trays (4) by the conveyor (11) that advances faster than the series of trays (4).

2. A method of placing a series (5) of trays (4) in an end to end or side to side contacting relationship, each of said trays (4) having a body (9) and an upper outwards projecting rim (10), by providing a conveyor (11) for substantially horizontal tray conveying movement toward a stop to make the trays (4) abut one another rim (10) against rim (10), and for a vertical movement to make each of the trays (4) move vertically in relation to its neighbor to make the rims (10) lose their end to end contact and instead be located on top of each other with the lower rim (10) abutting the body (9) of the adjacent tray (4), whereby the trays (4) are arranged at a constant center to center distance and placed such that one of the rims (10) of two adjacent trays (4) is on top of the other rim (10), and said other rim (10) abuts the body (9) of the tray (4) having the upper rim (10), **characterized in that**
said conveyor (11) is a chain conveyor with chain links and includes transversally extending means in the form of coaxial rollers (14) substituted for chain links and arranged transversally extending rows (15) for making the vertical movement wave-shaped and passing by the trays (4) in the conveying direction by feeding the trays (4) by the conveyor (11) that advances faster than the series of trays (4).

3. A method according to claim 1 or 2, **characterized by** running the horizontal tray conveying movement continuously.

4. A method as claimed in claim 2 or 3 when claim 3 is dependent on claim 2, **characterized by** placing the rows (15) of rollers (14) spaced from one another a distance that is larger than a maximum measure of any one of the trays (4) in the conveying direction.

5. A method as claimed in claim 2, 3 when claim 3 is dependent on claim 2 or 4, **characterized by** using rollers (14) of a shape such that each of them is sufficiently high to convey a new tray (4) forward until the new tray abuts the stopped series (5) of trays (4), and sufficiently low to then enter below and lift a rear end of the tray (4), whereupon the row (15) of rollers (14) pass along a bottom of the tray (4) during further lifting of the rear end until a point is

reached, where the tray (4) will balance, and then lowering the rear end while keeping a front end of the tray lifted until its rim (10) rests upon the rim (10) of the adjacent tray (4) and the row (15) of rollers (14) no longer support the tray (4).

6. A method as claimed in any one of claims 1-5, **characterized by** providing longitudinal side supports (16) keeping the trays (4) in position laterally and vertically on the conveyor (11), and further providing guides (17), on which said side supports (16) are mounted for adjustment vertically and/or horizontally to a new level and/or a new width spacing, respectively, to accommodate a new size of trays (4).

7. A system for placing a series (5) of trays (4) in an end to end or side to side contacting relationship and a constant center to center distance, each of said trays (4) having a body (9) and an upper outwards projecting rim (10), said system comprising:

a) a conveyor (11) for carrying the series (5) of trays (4) and providing a substantially horizontal tray conveying movement toward a stop to make the trays (4) abut one another rim (10) against rim (10); and
b) transversally extending means (12) for producing a vertical movement to make each of the trays (4) move vertically in relation to its neighbor to make the rims (10) lose their end to end contact and instead be located on top of each other with the lower rim (10) abutting the body (9) of the adjacent tray (4),

characterized in that said transversally extending means (12) are in the form of cams (14, 15) provided on said conveyor (11).

8. A system for placing a series (5) of trays (4) in an end to end or side to side contacting relationship and a constant center to center distance, each of said trays (4) having a body (9) and an upper outwards projecting rim (10), said system comprising:

a) a conveyor (11) for carrying the series (5) of trays (4) and providing a substantially horizontal tray conveying movement toward a stop to make the trays (4) abut one another rim (10) against rim (10); and
b) transversally extending means (12) for producing a vertical movement to make each of the trays (4) move vertically in relation to its neighbor to make the rims (10) lose their end to end contact and instead be located on top of each other with the lower rim (10) abutting the body (9) of the adjacent tray (4),

characterized in that said conveyor (11) is a chain conveyor with chain links and said transversally extending means (12) are in the form of coaxial rollers (14) substituted for chain links and arranged in transversally extending rows (15).

9. A system as claimed in claim 7 or 8, wherein the conveyor (11) includes a drive for running the horizontal tray conveying movement continuously and making the vertical movement wave-shaped and passing the trays (4) in the conveying direction.

10. A system as claimed in claim 9 when dependent on claim 8, wherein the rows (15) of rollers (14) are spaced from one another a distance that is larger than a maximum measure of any one of the trays (4) in the conveying direction.

11. A system as claimed in any one of claims 7-10, wherein longitudinal side supports (16) are provided for keeping the trays (4) in position laterally and vertically on the conveyor (11), and guides (17) are provided, on which said side supports (16) are mounted for vertical and/or horizontal adjustment to a new height and/or a new width spacing, respectively, to accommodate a new size of trays (4).

12. A method of picking selected items (1) from an in-feed device, preferably in the form of a conveyor (2), and delivering them by means of a picker robot (3) to varying selected trays (4) in a plurality of parallel series (5) of horizontally movable trays, where the trays (4) at a downstream end of the series (5) are individually discharged to an out feed device, preferably in the form of a conveyor (6), for discharged trays (4) when filled with a desired amount of measured items (1), and empty trays (4) provided by a supply device (7) are substituted for the discharged ones at an upstream end of the series (5), **characterized by** arranging the trays (4) in all of said series (5) in an end to end or side to side contacting relationship by means of a method according to anyone of claims 1 - 6.

Patentansprüche

1. Verfahren zum Platzieren einer Folge (5) von Schalen (4) in einer Berührungsbeziehung hintereinander oder nebeneinander, wobei jede der Schalen (4) einen Körper (9) und einen oberen nach außen vorspringenden Rand (10) hat, durch Bereitstellen eines Fördervorrichtung (11) für eine im Wesentlichen horizontale Schalenbeförderungsbewegung zu einem Anschlag hin, um zu veranlassen, dass die Schalen (4) Rand (10) an Rand (10) aneinander anstoßen, und für eine vertikale Bewegung, um zu veranlassen, dass sich jede der Schalen (4) in Vertikalrichtung im Verhältnis zu ihrer Nachbarin bewegt, um zu veranlassen, dass die Ränder (10) ihre Berührung hintereinander verlieren und stattdessen übereinander positioniert werden, wobei der untere Rand (10) an den Körper (9) der benachbarten Schale (4) anstößt, wodurch die Schalen (4) mit einem konstanten Abstand von Mitte zu Mitte angeordnet und derart platziert werden, dass sich der eine der Ränder (10) zweier benachbarter Schalen (4) oben auf dem anderen Rand (10) befindet und der andere Rand (10) an den Körper (9) der Schale (4) anstößt, die den oberen Rand (10) hat, **dadurch gekennzeichnet, dass** die Fördervorrichtung (11) sich in Querrichtung erstreckende Mittel (12) in der Form von sich in Querrichtung erstreckenden Nocken einschließt, die an der Fördervorrichtung (11) bereitgestellt werden, um die vertikale Bewegung wellenförmig zu machen und die Schalen (4) in der Förderrichtung zu überholen durch Zuführen der Schalen (4) durch die Fördervorrichtung (11), die schneller vorankommt als die Folge von Schalen (4).

2. Verfahren zum Platzieren einer Folge (5) von Schalen (4) in einer Berührungsbeziehung hintereinander oder nebeneinander, wobei jede der Schalen (4) einen Körper (9) und einen oberen nach außen vorspringenden Rand (10) hat, durch Bereitstellen eines Fördervorrichtung (11) für eine im Wesentlichen horizontale Schalenbeförderungsbewegung zu einem Anschlag hin, um zu veranlassen, dass die Schalen (4) Rand (10) an Rand (10) aneinander anstoßen, und für eine vertikale Bewegung, um zu veranlassen, dass sich jede der Schalen (4) in Vertikalrichtung im Verhältnis zu ihrer Nachbarin bewegt, um zu veranlassen, dass die Ränder (10) ihre Berührung hintereinander verlieren und stattdessen übereinander positioniert werden, wobei der untere Rand (10) an den Körper (9) der benachbarten Schale (4) anstößt, wodurch die Schalen (4) mit einem konstanten Abstand von Mitte zu Mitte angeordnet und derart platziert werden, dass sich der eine der Ränder (10) zweier benachbarter Schalen (4) oben auf dem anderen Rand (10) befindet und der andere Rand (10) an den Körper (9) der Schale (4) anstößt, die den oberen Rand (10) hat, **dadurch gekennzeichnet, dass** die Fördervorrichtung (11) ein Kettenförderer mit Kettengliedern ist und sich in Querrichtung erstreckende Mittel in der Form von koaxialen Walzen (14) einschließt, die Kettenglieder ersetzen und in sich in Querrichtung erstreckenden Reihen (15) angeordnet sind, um die vertikale Bewegung wellenförmig zu machen und die Schalen (4) in der Förderrichtung zu überholen durch Zuführen der Schalen (4) durch die Fördervorrichtung (11), die schneller vorankommt als die Folge von Schalen (4).

3. Verfahren nach Anspruch 1 oder 2, **gekennzeichnet durch** kontinuierliches Laufenlassen der horizontalen Schalenbeförderungsbewegung.

4. Verfahren nach Anspruch 2 oder 3, wenn Anspruch 3 abhängig ist von Anspruch 2, **gekennzeichnet durch** Platzieren der Reihen (15) von Walzen (14) voneinander beabstandet bei einem Abstand, der größer ist als ein maximales Maß einer beliebigen der Schalen (4) in der Förderrichtung.

5. Verfahren nach Anspruch 2, 3, wenn Anspruch 3 abhängig ist von Anspruch 2, oder 4, **gekennzeichnet durch** die Verwendung von Walzen (14) mit einer derartigen Gestalt, dass jede von ihnen ausreichend hoch ist, um eine neue Schale (4) nach vorn zu befördern, bis die neue Schale an die angehaltene Folge (5) von Schalen (4) anstößt, und ausreichend niedrig, um dann unterhalb einzutreten und ein hinteres Ende der Schale (4) anzuheben, woraufhin die Reihe (15) von Walzen (14) entlang eines Bodens der Schale (4) passiert, während eines weiteren Anhebens des hinteren Endes, bis ein Punkt erreicht ist, da die Schale (4) balancieren wird, und dann Absenken des hinteren Endes, während ein vorderes Ende der Schale angehoben gehalten wird, bis ihr Rand (10) auf dem Rand (10) der benachbarten Schale (4) aufliegt und die Reihe (15) von Walzen (14) die Schale (4) nicht mehr trägt.

6. Verfahren nach einem der Ansprüche 1 bis 5, **gekennzeichnet durch** Bereitstellen längsgerichteter Seitenstützen (16), welche die Schalen (4) seitlich und vertikal in Position auf der Fördervorrichtung (11) halten, und ferner Bereitstellen von Führungen (17), an denen die Seitenstützen (16) angebracht sind, zur vertikalen und/oder horizontalen Einstellung jeweils auf eine neue Ebene und/oder einen neuen Breitenabstand, um eine neue Größe von Schalen (4) aufzunehmen.

7. System zum Platzieren einer Folge (5) von Schalen (4) in einer Berührungsbeziehung hintereinander oder nebeneinander und einem konstanten Abstand von Mitte zu Mitte, wobei jede der Schalen (4) einen Körper (9) und einen

oberen nach außen vorspringenden Rand (10) hat, wobei das System Folgendes umfasst:

a) eine Fördervorrichtung (11) zum Tragen der Folge (5) von Schalen (4) und Bereitstellen einer im Wesentlichen horizontalen Schalenbeförderungsbewegung zu einem Anschlag hin, um zu veranlassen, dass die Schalen (4) Rand (10) an Rand (10) aneinander anstoßen; und
b) sich in Querrichtung erstreckende Mittel (12) zum Erzeugen einer vertikalen Bewegung, um zu veranlassen, dass sich jede der Schalen (4) in Vertikalrichtung im Verhältnis zu ihrer Nachbarin bewegt, um zu veranlassen, dass die Ränder (10) ihre Berührung hintereinander verlieren und stattdessen übereinander positioniert werden, wobei der untere Rand (10) an den Körper (9) der benachbarten Schale (4) anstößt,

dadurch gekennzeichnet, dass die sich in Querrichtung erstreckenden Mittel (12) Form von Nocken (14, 15) haben, die an der Fördervorrichtung (11) bereitgestellt werden.

8. System zum Platzieren einer Folge (5) von Schalen (4) in einer Berührungsbeziehung hintereinander oder nebeneinander und einem konstanten Abstand von Mitte zu Mitte, wobei jede der Schalen (4) einen Körper (9) und einen oberen nach außen vorspringenden Rand (10) hat, wobei das System Folgendes umfasst:

a) eine Fördervorrichtung (11) zum Tragen der Folge (5) von Schalen (4) und Bereitstellen einer im Wesentlichen horizontalen Schalenbeförderungsbewegung zu einem Anschlag hin, um zu veranlassen, dass die Schalen (4) Rand (10) an Rand (10) aneinander anstoßen; und
b) sich in Querrichtung erstreckende Mittel (12) zum Erzeugen einer vertikalen Bewegung, um zu veranlassen, dass sich jede der Schalen (4) in Vertikalrichtung im Verhältnis zu ihrer Nachbarin bewegt, um zu veranlassen, dass die Ränder (10) ihre Berührung hintereinander verlieren und stattdessen übereinander positioniert werden, wobei der untere Rand (10) an den Körper (9) der benachbarten Schale (4) anstößt,

dadurch gekennzeichnet, dass die Fördervorrichtung (11) ein Kettenförderer mit Kettengliedern ist und die sich in Querrichtung erstreckenden Mittel (12) die Form von koaxialen Walzen (14) haben, die Kettenglieder ersetzen und in sich in Querrichtung erstreckenden Reihen (15) angeordnet sind.

9. System nach Anspruch 7 oder 8, wobei die Fördervorrichtung (11) einen Antrieb einschließt, um die horizontale Schalenbeförderungsbewegung kontinuierlich laufen zu lassen und die vertikale Bewegung wellenförmig zu machen und die Schalen (4) in der Förderrichtung zu überholen.

10. System nach Anspruch 9, wenn abhängig von Anspruch 8, wobei die Reihen (15) von Walzen (14) voneinander bei einem Abstand beabstandet sind, der größer ist als ein maximales Maß einer beliebigen der Schalen (4) in der Förderrichtung.

11. System nach einem der Ansprüche 7 bis 10, wobei längsgerichtete Seitenstützen (16) bereitgestellt werden, um die Schalen (4) seitlich und vertikal in Position auf der Fördervorrichtung (11) zu halten, und Führungen (17) bereitgestellt werden, an denen die Seitenstützen (16) angebracht sind, zur vertikalen und/oder horizontalen Einstellung jeweils auf eine neue Ebene und/oder einen neuen Breitenabstand, um eine neue Größe von Schalen (4) aufzunehmen.

12. Verfahren zum Aufnehmen ausgewählter Artikel (1) von einer Einspeisungseinrichtung, vorzugsweise in der Form einer Fördervorrichtung (2), und Liefern derselben mit Hilfe eines Aufnahmeroboters (3) an wechselnde ausgewählte Schalen (4) in mehreren parallelen Folgen (5) von horizontal beweglichen Schalen, wobei die Schalen (4) an einem stromabwärts gelegenen Ende der Folgen (5) einzeln an eine Ausspeisungseinrichtung, vorzugsweise in der Form einer Fördervorrichtung (6), für abgeführte Schalen (4), wenn sie mit einer gewünschten Menge von abgemessenen Artikeln (1) gefüllt sind, abgeführt werden und leere Schalen (4), die durch eine Zuführungseinrichtung (7) bereitgestellt werden, für die abgeführten an einem stromaufwärts gelegenen Ende der Folgen (5) ausgetauscht werden, **gekennzeichnet durch** Anordnen der Schalen (4) in allen der Folgen (5) in einer Berührungsbeziehung hintereinander oder nebeneinander mit Hilfe eines Verfahrens nach einem der Ansprüche 1 bis 6.

Revendications

1. Un procédé de placement d'une série (5) de barquettes (4) dans une relation de contact bout à bout ou de côté à côté, chacune desdites barquettes (4) ayant un corps (9) et un rebord supérieur (10) faisant saillie vers l'extérieur,

en prévoyant un convoyeur (11) pour un mouvement sensiblement horizontal d'acheminement des barquettes vers une butée afin de faire venir les barquettes (4) en butée les unes contre les autres rebords (10) contre rebords (10), et pour un mouvement vertical afin d'amener chacune des barquettes (4) à se déplacer verticalement par rapport à sa voisine de façon que les rebords (10) perdent leur contact bout à bout et se trouvent au contraire les uns sur les autres avec le rebord inférieur (10) venant en butée contre le corps (9) de la barquette (4) adjacente, de sorte que les barquettes (4) soient disposés à une distance centre à centre constante et placées de façon que l'un des rebords (10) de deux barquettes (4) adjacentes se trouve au-dessus de l'autre rebord (10) et que ledit autre rebord (10) vienne buter contre le corps (9) de la barquette (4) comportant le rebord supérieur (10),
caractérisé en ce que ledit convoyeur (11) comprend des moyens (12) s'étendant transversalement, sous la forme de cames s'étendant transversalement prévues sur ledit convoyeur (11), pour faire en sorte que le mouvement vertical soit en forme d'ondulation et passe par les barquettes (4) dans la direction d'acheminement en alimentant les barquettes (4) par le convoyeur (11), lequel avance plus vite que la série de barquettes (4).

2. Un procédé de placement d'une série (5) de barquettes (4) dans une relation de contact bout en bout ou de côté à côté, chacune desdites barquettes (4) ayant un corps (9) et un rebord supérieur (10) faisant saillie vers l'extérieur, en prévoyant un convoyeur (11) pour un mouvement sensiblement horizontal d'acheminement des barquettes vers une butée afin de faire venir les barquettes (4) en butée les unes contre les autres rebords (10) contre rebords (10), et pour un mouvement vertical afin d'amener chacune des barquettes (4)) à se déplacer verticalement par rapport à sa voisine de façon que les rebords (10) perdent leur contact bout en bout et se trouvent au contraire l'un sur l'autre avec le rebord inférieur (10) venant en butée contre le corps (9) de la barquette (4) adjacente, de sorte que les barquettes (4) soient disposés à une distance de centre à centre constante et placées de façon que l'un des rebords (10) de deux barquettes (4) adjacentes se trouve au-dessus de l'autre bord (10) et que ledit autre rebord (10) vienne buter contre le corps (9) de la barquette (4) comportant le rebord supérieur (10), **caractérisé en ce que** ledit convoyeur (11) est un convoyeur à chaîne ayant des maillons de chaîne et comprend des moyens s'étendant transversalement sous la forme de rouleaux coaxiaux (14) se substituant à des maillons de chaîne et agencés en des rangées (15) s'étendant transversalement, pour faire en sorte que le mouvement vertical soit en forme d'ondulation et passe par les barquettes (4) dans la direction d'acheminement en alimentant les barquettes (4) par le transporteur (11), lequel avance plus vite que la série de barquettes (4).

3. Un procédé selon la revendication 1 ou la revendication 2, **caractérisé par** le fait de mettre en oeuvre de façon continue le mouvement d'acheminement horizontal des barquettes.

4. Un procédé selon la revendication 2 ou la revendication 3, lorsque la revendication 3 est dépendante de la revendication 2, **caractérisé par** le fait de placer les rangées (15) de rouleaux (14) de façon espacée les unes des autres sur une distance qui est plus grande qu'une mesure maximale de l'une quelconque des barquettes (4) dans la direction d'acheminement.

5. Un procédé selon la revendication 2, 3 lorsque la revendication 3 est dépendante de la revendication 2 ou de la revendication 4, **caractérisé par** le fait d'utiliser des rouleaux (14) d'une forme telle que chacun d'entre eux soit suffisamment haut pour acheminer une nouvelle barquette (4) vers l'avant jusqu'à ce que la nouvelle barquette vienne en butée contre la série (5) arrêtée de barquettes (4), et soit suffisamment bas pour ensuite entrer en dessous d'une extrémité arrière de la barquette (4), et soulever cette dernière, après quoi la rangée (15) de rouleaux (14) passe le long d'un fond de le barquette (4) pendant le soulèvement supplémentaire de l'extrémité arrière jusqu'à ce qu'un point soit atteint, dans lequel le barquette (4) s'équilibre, puis en abaissant l'extrémité arrière tout en gardant une extrémité avant de la barquette soulevée jusqu'à ce que son rebord (10) repose sur le rebord (10) de la barquette (4) adjacente et la rangée (15) de rouleaux (14) ne supportent plus la barquette (4).

6. Un procédé selon l'une quelconque des revendications 1 à 5, **caractérisé par** le fait de prévoir des supports de côté longitudinaux (16) maintenant les barquettes (4) en position latéralement et verticalement sur le convoyeur (11), et en prévoyant en outre des guides (17) sur lesquels lesdits supports de côté (16) sont montés pour un réglage vertical et / ou horizontal à une nouvelle hauteur et / ou à un nouvel espacement en largeur, respectivement, afin de recevoir une nouvelle taille de barquettes (4).

7. Un système pour placer une série (5) de barquettes (4) dans une relation de contact bout en bout ou de côté à côté et à une distance de centre à centre constante, chacune desdites barquettes (4) ayant un corps (9) et un rebord supérieure (10) faisant saillie vers l'extérieur, ledit système comprenant :

a) un convoyeur (11) pour porter la série (5) de barquettes (4) et réaliser un mouvement d'acheminement des

barquettes sensiblement horizontal vers une butée afin d'amener les barquettes (4) en butée l'une contre l'autre rebord (10) contre rebord (10) ; et
b) des moyens (12) s'étendant transversalement pour produire un mouvement vertical permettant à chacune des barquettes (4) de se déplacer verticalement par rapport à sa voisine de façon que les rebords (10) perdent leur contact bout à bout et se trouvent au contraire au-dessus les uns des autres avec le rebord inférieur (10) venant buter contre le corps (9) de la barquette (4) adjacente,

caractérisé en ce que lesdits moyens (12) s'étendant transversalement sont sous la forme de cames (14, 15) prévues sur ledit transporteur (11).

8. Un système pour placer une série (5) de barquettes (4) selon une relation de contact bout en bout ou de côté à côté et à une distance constante de centre à centre, chacune desdites barquettes (4) ayant un corps (9) et un rebord supérieur (10) faisant saillie vers l'extérieur, ledit système comprenant :

a) un convoyeur (11) pour porter la série (5) de barquettes (4) et réaliser un mouvement d'acheminement de barquettes sensiblement horizontal vers une butée afin d'amener les barquettes (4) en butée l'une contre l'autre rebord (10) contre rebord (10) ; et
b) des moyens (12) s'étendant transversalement pour produire un mouvement vertical permettant à chacune des barquettes (4) de se déplacer verticalement par rapport à sa voisine de façon que les rebords (10) perdent leur contact bout à bout et se trouvent au contraire au-dessus les uns des autres avec le rebord inférieur (10) venant buter contre le corps (9) de la barquette (4) adjacente,

caractérisé en ce que ledit convoyeur (11) est un convoyeur à chaîne ayant des maillons de chaîne et lesdits moyens (12) s'étendant transversalement se présentent sous la forme de rouleaux coaxiaux (14) se substituant aux maillons de chaîne et agencés en des rangées (15) s'étendant transversalement.

9. Un système selon la revendication 7 ou la revendication 8, dans lequel le convoyeur (11) comprend un entraînement pour mettre en oeuvre de façon continue le mouvement horizontal d'acheminement de barquettes et faire en sorte que le mouvement vertical soit en forme d'ondulation et faire défiler les barquettes (4) dans la direction d'acheminement.

10. Un système selon la revendication 9 lorsqu'elle est dépendante de la revendication 8, dans lequel les rangées (15) de rouleaux (14) sont espacées les unes des autres d'une distance qui est plus grande qu'une mesure maximale de l'une quelconque des barquettes (4) dans la direction d'acheminement.

11. Un système selon l'une quelconque des revendications 7 à 10, dans lequel des supports de côté longitudinaux (16) sont prévus pour maintenir les barquettes (4) en position latéralement et verticalement sur le convoyeur (11), et des guides (17) sont prévus, sur lesquels lesdits supports de côté (16) sont montés pour un réglage vertical et / ou horizontal à une nouvelle hauteur et / ou à un nouvel espacement en largeur, respectivement, afin de recevoir une nouvelle taille de barquettes (4).

12. Un procédé de prélèvement d'articles sélectionnés (1) à partir d'un dispositif d'acheminement en entrée, de préférence sous la forme d'un transporteur (2), et de distribution de ceux-ci au moyen d'un robot de prélèvement (3) à différentes barquettes (4) sélectionnés dans un plusieurs séries (5) parallèles de barquettes mobiles horizontalement, les barquettes (4) situées à une extrémité aval de la série (5) étant déchargés individuellement vers un dispositif d'acheminement en sortie, de préférence sous la forme d'un convoyeur (6), pour décharger des barquettes (4) remplies d'une quantité désirée de produits mesurés (1), et des barquettes (4) vides fournies par un dispositif d'alimentation (7) sont substituées à celles qui sont déchargées à une extrémité amont de la série (5), **caractérisé par** le fait d'agencer les barquettes (4) dans toutes lesdites séries (5) selon une relation de contact bout en bout ou de côté à côté au moyen d'un procédé selon l'une quelconque des revendications 1 à 6.

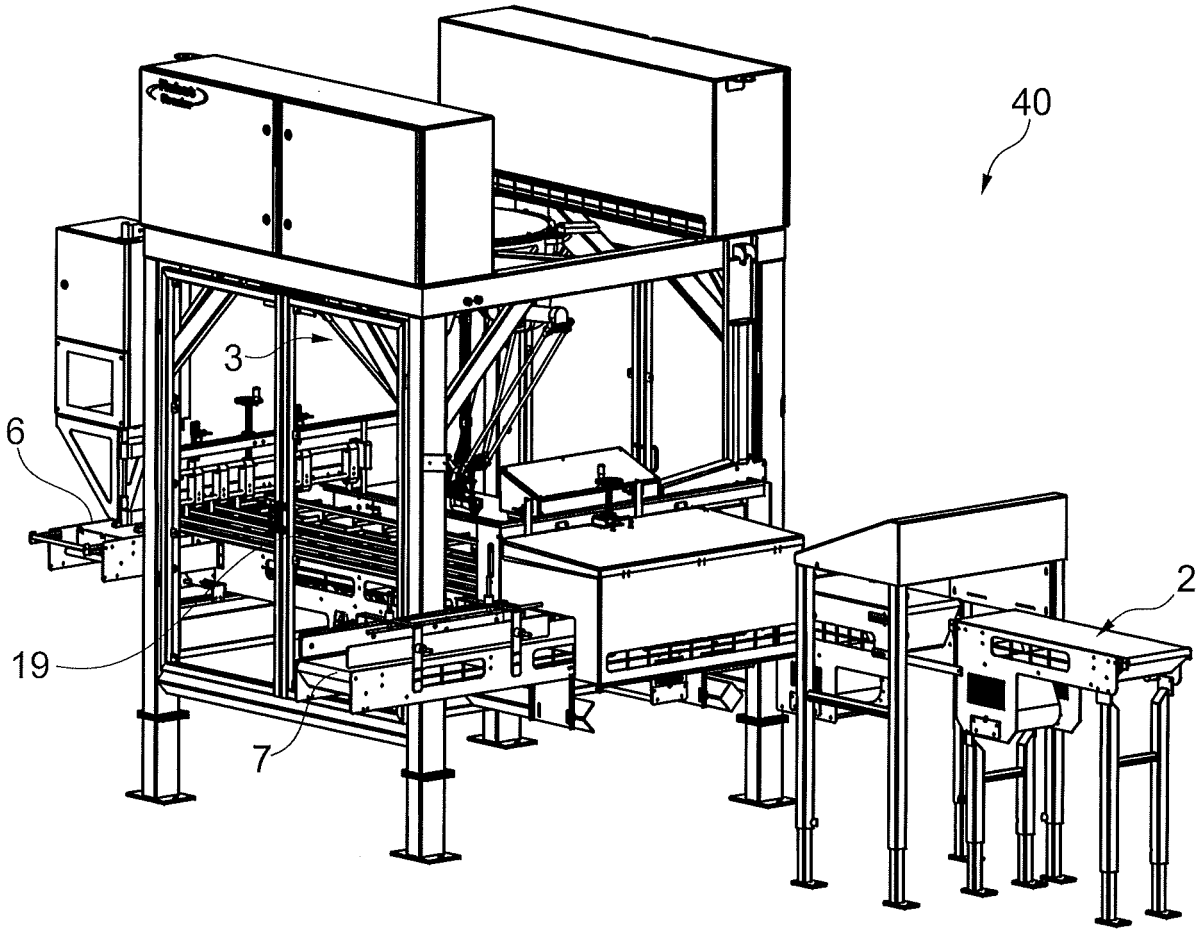


Fig. 1a
Prior Art

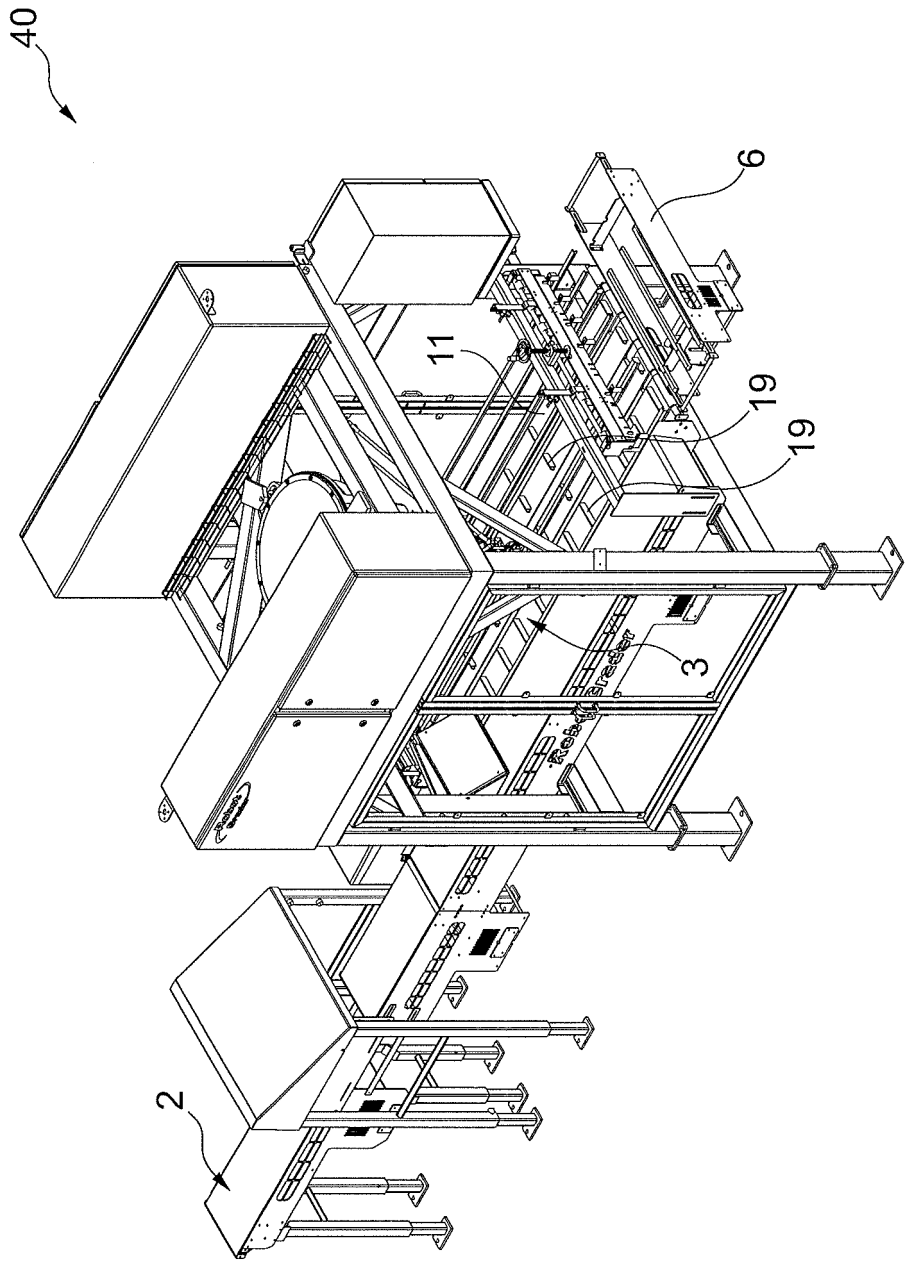


Fig. 1b
Prior Art

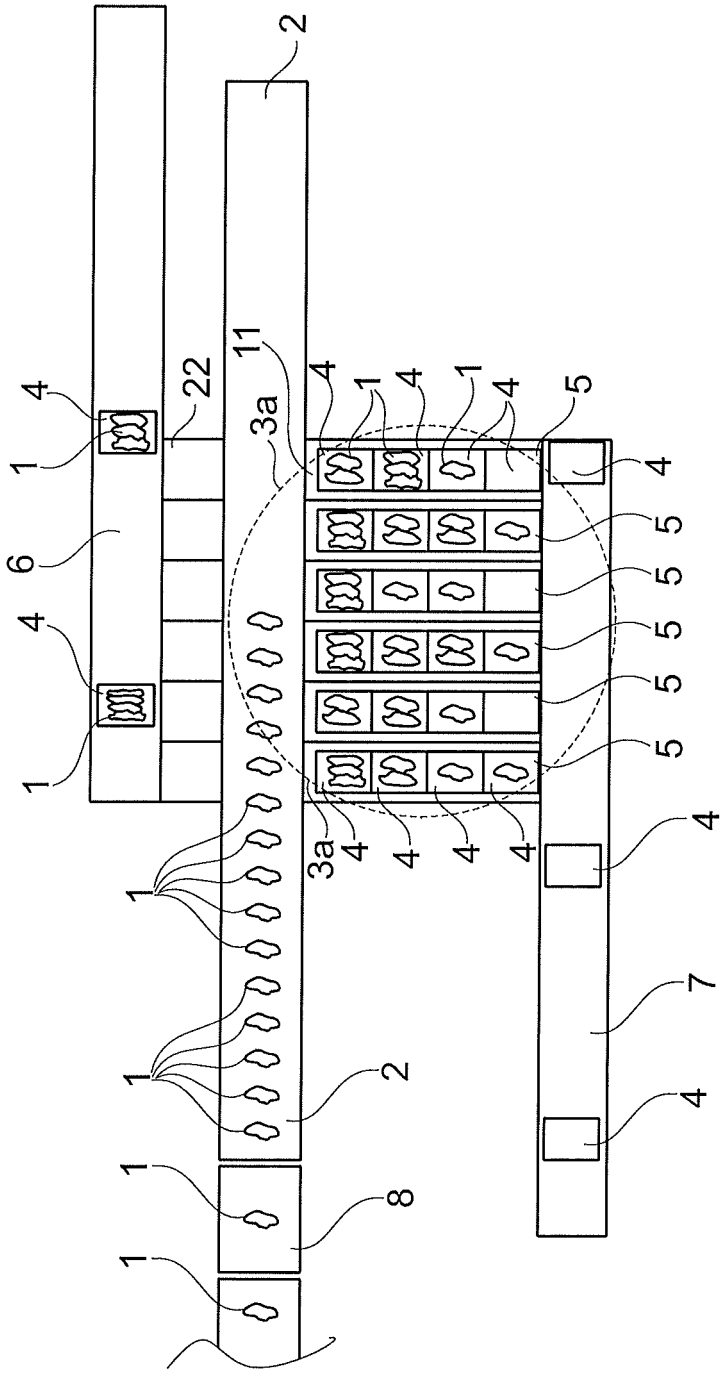


Fig. 2

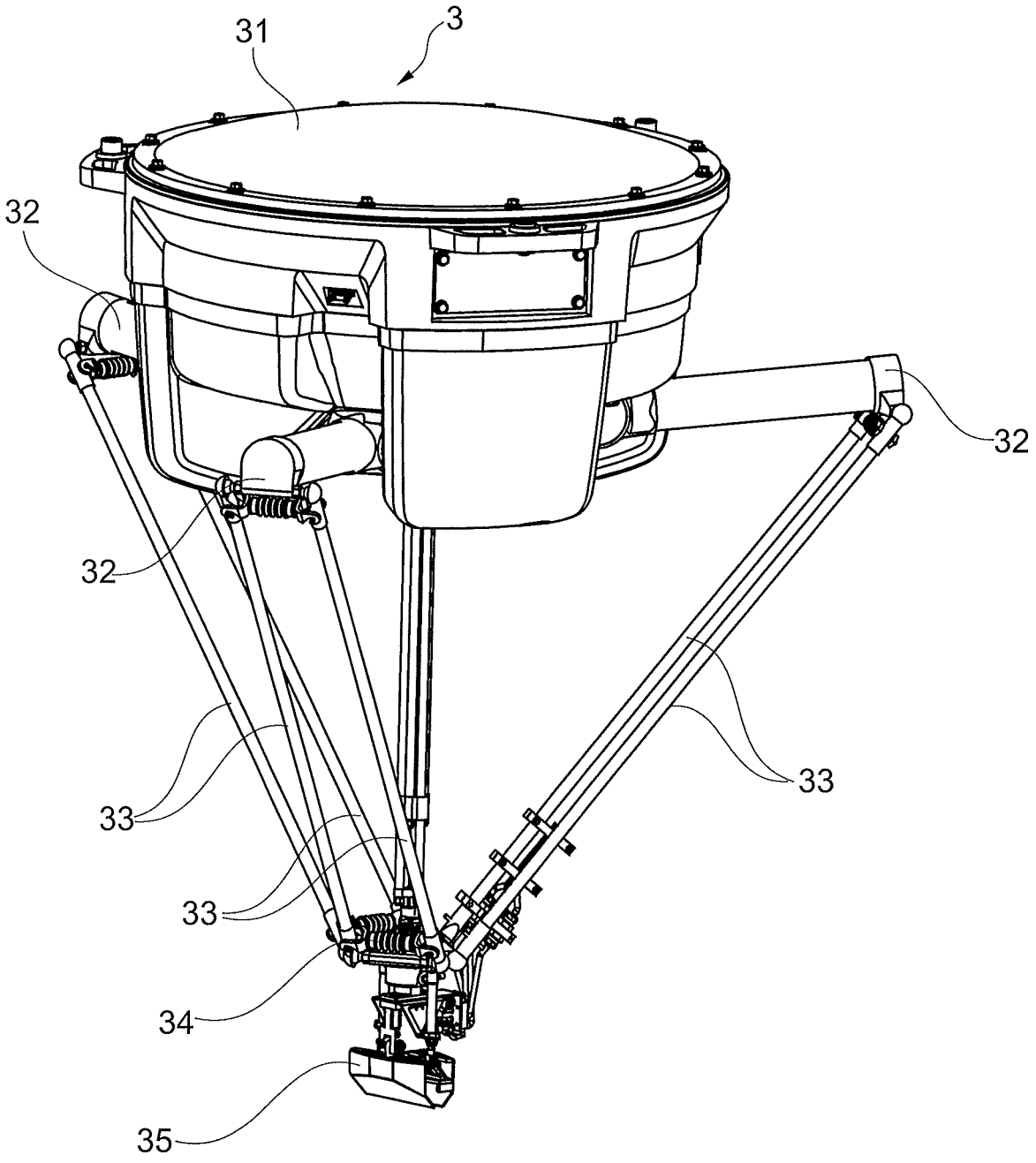


Fig.3

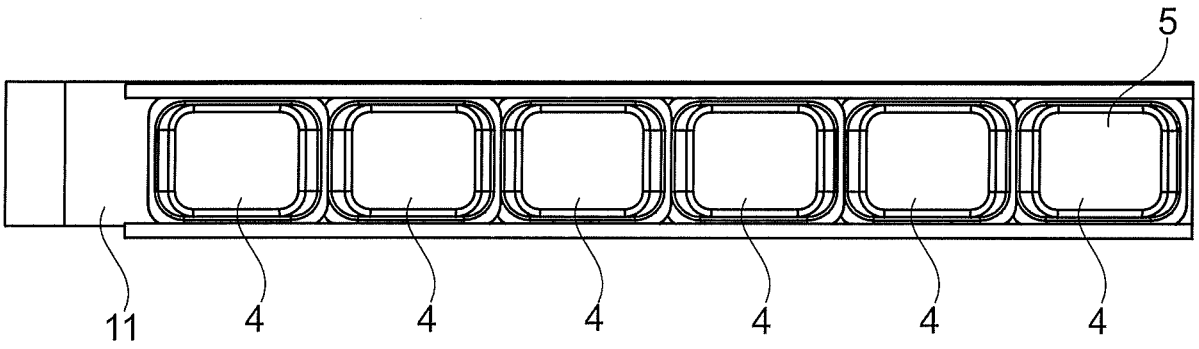


Fig. 4a

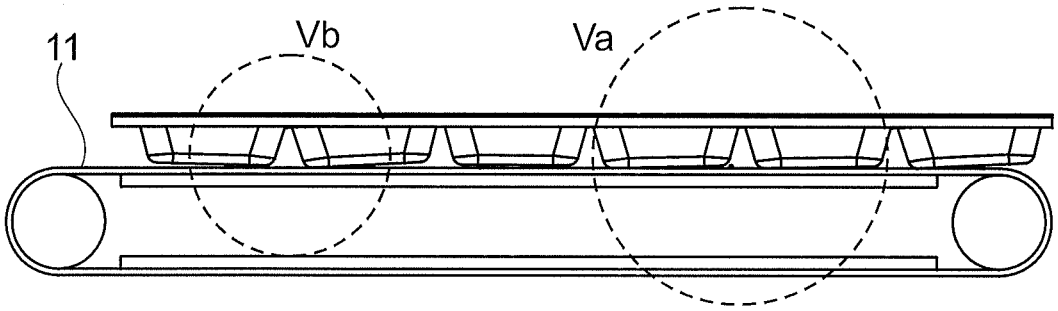


Fig. 4b

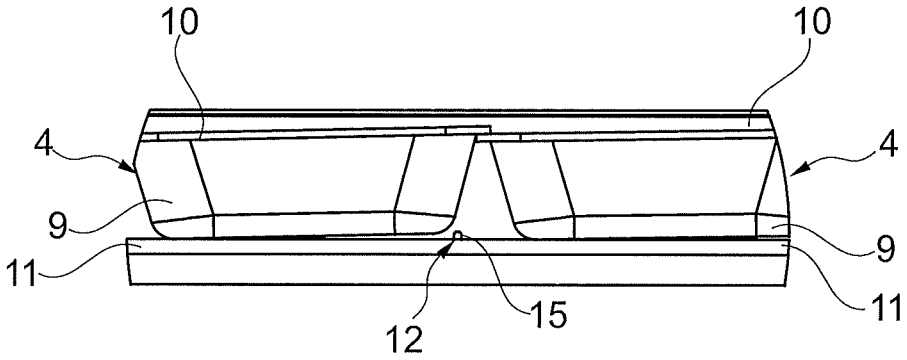


Fig. 5a

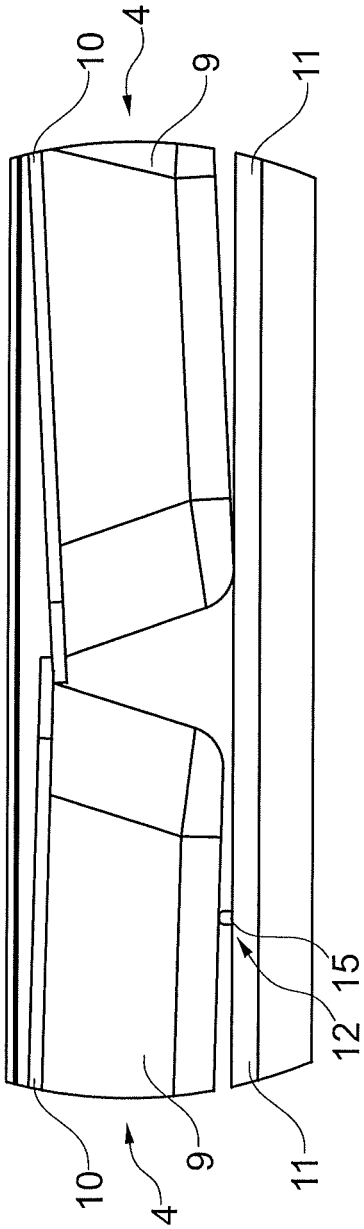


Fig. 5b

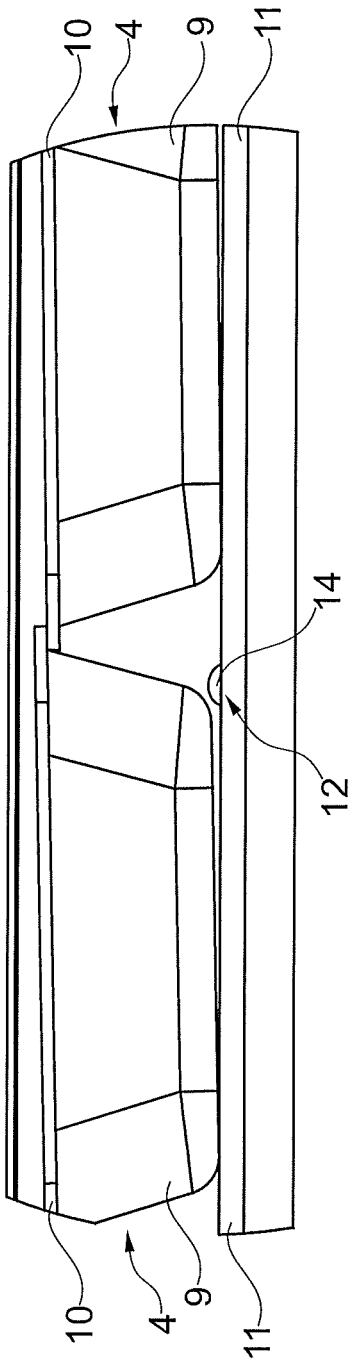


Fig. 5c

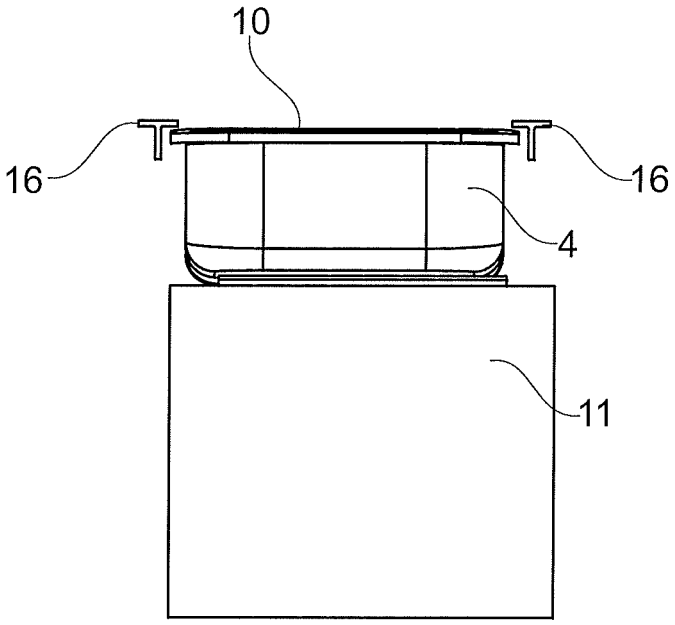


Fig. 6

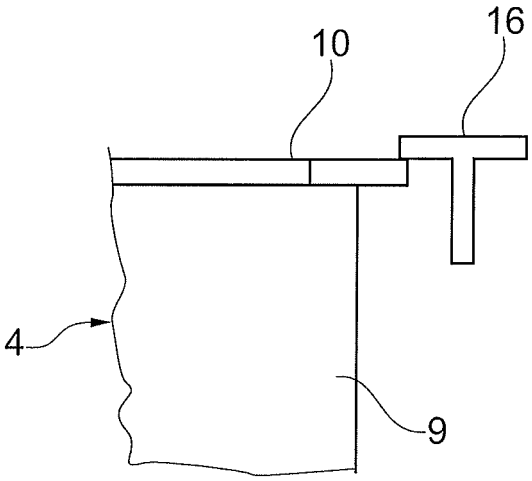


Fig. 7

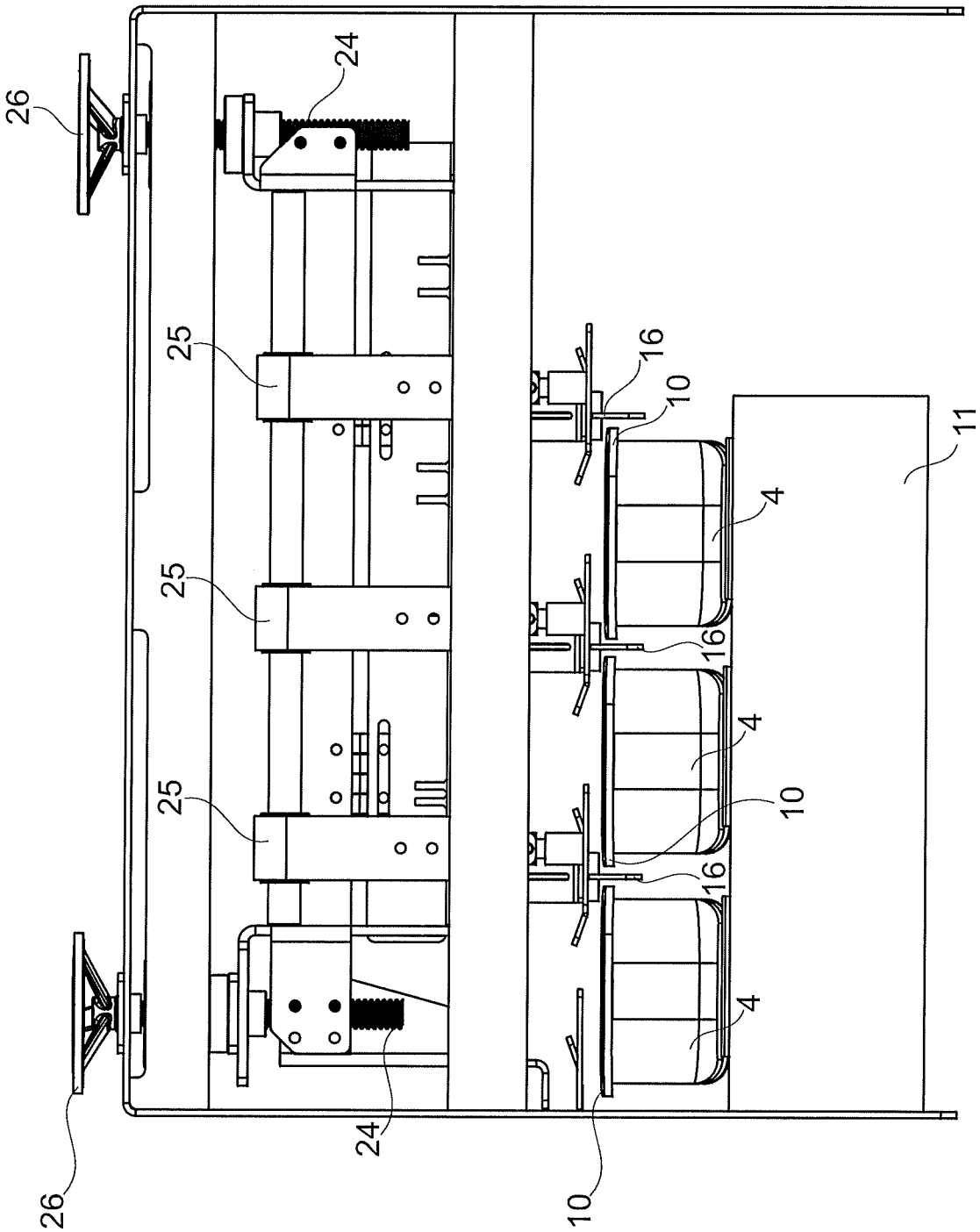


Fig. 8

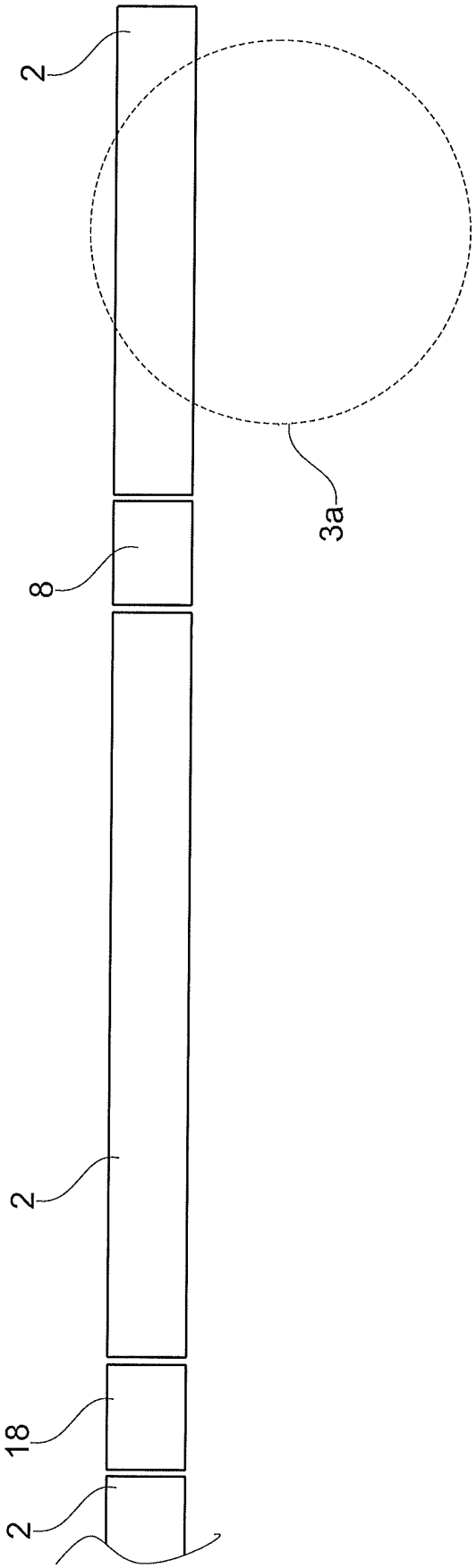


Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 20090145670 A1 **[0007]**
- US 7258237 B2 **[0008]**
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