

Method and station for picking articles according to the goods-to-man principle

The invention relates to a method for picking articles according to the goods-to-man principle at a picking station, in which articles are picked in an order load carrier, and to a
5 corresponding picking station.

It is generally known to operate picking stations for picking according to the goods-to-man principle. In that case, the goods or articles of an order are transported to the respective picking station, for which purpose they are usually brought in inside containers, on trays
10 etc. At that location, they are removed from the so-called storage or product containers and placed into the corresponding containers, trays, etc. of an order, so-called order containers.

This process is usually repeated until the respective order or partial order is completed
15 using the zone picking process.

In order to increase throughput, the worker usually picks a plurality of orders in parallel and so a plurality of order containers are kept in readiness in parallel in the picking station.

20 The picker can thus be shown by means of displays where the articles are to be placed. This is accordingly called "put-to-light". If, in addition, a plurality of product containers are transported analogously to the picking station, a pick-to-light method can also be carried out and so the removal of articles is also simplified.

25 A put place is thus a place for order containers into which the goods/articles from the storage containers are correspondingly placed by the picker.

A put-to-light display is accordingly a display for the picker, in which order containers he is to place the article just removed from the product container, or a plurality of articles or the
30 packing unit etc.

Conversely, the pick place is the place for a product container from which the picker removes the articles etc. A pick-to-light display is accordingly a display which displays to the picker the product container and/or possibly the articles and/or the quantity thereof for
35 the picking step.

From EP 2 050 695 A1, EP 2 098 464 A1 and WO 2013/033743 A1 corresponding picking stations are known, in which a plurality of order containers are held in the picking station at the same time and are filled with articles from a central place with changing product
5 containers.

Although the presentation of a plurality of order containers reduces the demands placed on the sequence of product containers, this means that the picking stations are fitted with a connection to the central conveying system for each put place, which makes the
10 structure complex and expensive as well as troublesome to maintain, and a lot of space is taken up. Since an order does not change its put place, the picking processes are distributed uniformly over all put places and the picker must cover relatively long distances.

15 Therefore, there continues to be a need for a simplified picking solution according to the goods-to-man principle, in which the structure of the picking stations is simplified and picking is made easier for the picker without reducing the throughput.

This object is achieved by the picking method presented in claim 1 and the picking station
20 given in claim 9.

In accordance with the invention it has been recognised that when the order load carriers are conveyed in a row through the picking station and thus the respective put place of the load carrier in the row changes, it is possible to simplify the conveying system connection
25 since not every put place requires a connection since the load carrier do not travel selectively to each free place. In other words, the load carriers are thus conveyed in a "historical row" through the picking station, i.e. the oldest load carriers are at the beginning of the row and the newest at the end.

30 The articles can either be conveyed directly as such when this is permitted by the article properties, or can be present in the product load carrier and be picked therefrom.

Each order load carrier is thus allocated a changing put place. In other words, if an order load carrier in the row is fully picked and then "disposed of", the following order load
35 carrier can close up in order to produce a gap-free row. These thus then change their put

place.

Therefore, the walking distances of the picker are reduced since the oldest load carriers or articles in the picking station are most frequently the target of the next picking process
 5 since the load carrier belonging thereto were likewise in transit to the picking station for the longest time (in terms of transport time) and therefore usually arrive earlier. The picking processes are thus distributed to the oldest load carrier in the row.

In other words, the articles or product load carrier for completion of the picking of an order
 10 load carrier at the beginning of the row have already been requested before others further back in the row and therefore also arrive at the pick place before the other product load carriers or articles provided that the conveying path to the picking station allows this, since they had the most time for this.

15 Therefore, the main pick/put place, i.e. that at the beginning of the row is supplied with articles most frequently in statistical terms. Therefore, the picker has to cover shorter distances.

It has proved to be the case e.g. that therefore about 80% of all picking processes (picks)
 20 are distributed over the three oldest order load carriers when the sequencing rules permit picking in the oldest 6 order load carriers; the picking station thus has 6 put places.

When, from a product load carrier, picking of a plurality of order load carriers or, from a plurality of product load carriers, an order load carrier is possible, a series effect can also
 25 be achieved in order to improve the throughput.

A further reduction in the sequencing requirements can be achieved when more than one, preferably two, product load carriers or articles can be accessed at the picking station at the same time.

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Furthermore, in accordance with the invention provision is made that when an article or product load carrier has been used, i.e. the picker has removed desired articles for the picking order, these are immediately transported further and the next article or product load carrier moves up. The confirmation of error-free performance of the respective
 35 picking step is not even waited for. However, in order that a correction remains possible,

the discharged article or the product load carrier is held in a buffer zone which lies within reach of the picker. Therefore, in the event of an error, the picker can still access the articles in order to grasp further articles or put back articles.

- 5 If both the order load carrier and also the product load carrier or articles are each conveyed in a row through the picking station, possibly in reversed conveying directions, a still greater weakening of the sequence requirement on both types of load carriers or articles can be achieved, which e.g. is advantageous when picking partial orders.
- 10 In such an n:m arrangement, a plurality of picks and puts can then be processed at the same time in parallel.

The load carriers can be containers, trays, boxes etc.

- 15 The put place constantly changes in the row when an order load carrier further forward in the row is fully picked and conveyed away. The put place of the order load carrier preferably changes when a historically preceding order load carrier has been fully picked and discharged (i.e. removed from the row). This is usually the first order load carrier in the row. However, it can also be the case that an order load carrier disposed within the
- 20 row has been fully picked and output onto the discharging conveying system. The subsequent order load carrier then move up. This is entirely analogous to a classic build-up row.

- The picking can be effected manually by a picker or automatically by a picking device
- 25 such as e.g. an appropriately equipped robot.

- In the case of manual picking it is useful for the respective order load carrier to be displayed to the picker during each picking process, e.g. by a put-to-light display.
- However, it is of interest that, according to the invention, the put place of an order load
- 30 carrier changes. It is thus likewise useful if the display of the respective order load carrier changes along with the order load carrier. This preferably happens virtually, i.e. the displays are stationary and only the "content" moves, adapting to the respective changing order load carrier.

- 35 The order load carriers are thus preferably conveyed in a first-in-first-out (FIFO) row

through the picking station.

The invention likewise relates to a corresponding picking station for picking articles according to the goods-to-man principle, wherein articles are picked from product load carriers into order load carriers, and the product load carriers are conveyed through the picking station on a first conveying system, and the order load carriers are conveyed through the picking station on a second conveying system.

In accordance with the invention, the order load carriers are conveyed through the picking station together in a row on the second conveying system and together in a row on the first conveying system, and at least each load carrier is allocated a changing put place.

Therefore, as described above, the conveying system can be simplified. In addition, ergonomic improvements for the picker are made (see above) since by virtue of the FIFO row used, the picking processes are concentrated on the order load carrier at the start of the row.

It is preferable if each put place is formed as an individually controllable and operable conveying section of the second conveying system. Each order load carrier is then allocated a changing put place.

If an order load carrier is fully picked, the order load carrier can be pushed off the second conveying system onto a discharging gathering conveying system. This can be effected manually or by an automatic push-off device such as e.g. a pusher or a belt transfer means. This will usually be the first order load carrier at the beginning of the row. It is thus usually sufficient for the gathering conveying system to connect to the second conveying system at that location. However, provision can also be made for the discharging gathering conveying system to be disposed in order to permit a part of the row or even the whole row to be transferred or pushed off. For example, it can be disposed in parallel with the second conveying system.

In order to facilitate and improve picking, a picking display is preferably allocated to each picking place and moves jointly along with the respective order load carrier in the row. It is preferred if these travel together virtually as described above, for which purpose a virtual picking display is allocated (paired) to an order load carrier upon entry to the row and

travels therewith in the row. Only the real display location is then changed again owing to the position change of the order load carrier. For this purpose, stationary classic put-to-light displays can be used, each being connected to the virtual display. It would also be feasible to use a type of in-progress display on which the display moves owing to a change in the display region connected to the virtual picking display.

It is useful for the order load carrier to be conveyed in a space-saving manner on a third conveying system below the second conveying system. They can then be raised by means of an elevator onto the second conveying system. Therefore, in a constructionally simple manner a space-saving arrangement is created. A further advantage is found in the good accessibility of the picking station, since the order circuit is guided vertically, the stations are freely accessible (without reaching over or the like). When arranging a row of picking places, the conveying system lies on only one side of the row. Nevertheless, source and target containers are located at one level in an ergonomically favourable manner. Furthermore, in this way many buffer places for orders can be housed in a small space.

When the picking stations are designed as double stations, the stations can be divided over the discharging gathering conveying system so that less space is required and only 50% of the cost of a station needs to be allocated to them.

Further features, and details of the invention will be apparent from the following description of the drawing, in which:

Fig. 1 shows a schematic plan view of a picking station in accordance with the invention;

Fig. 2 shows a cross-sectional view of the picking station of figure 1 along the line A-A;

Fig. 3 shows a schematic plan view of a double picking station in accordance with the invention and

Fig. 4 shows a cross-sectional view of the picking station of figure 3 along the line B-B.

The figures each show manual picking stations, designated as a whole by 1, with a picker 2.

The picking station 1 is supplied with product containers P on a conveyor track 3 from a central conveying system 4 and, after a change of direction by about 90 degrees, these containers are conveyed through the picking station 1 on a conveyor track 5.

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The picking station 1 is supplied with order containers A on a conveyor track 6 from a central conveying system 7 and these order containers are raised via an elevator 8 from the lower level and transported to a higher conveyor track 9 and conveyed thereon through the picking station 1.

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The conveyor tracks 3 and 6 thus serve as buffers. The conveyor tracks 5 and 9 therefore convey the containers in mutually transverse directions so that the picker 2 remains suitably within a corner working region formed thereby. The container change on the conveyor track 5 is particularly rapid because old and new containers move at the same time.

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The conveyor track 5 issues onto a discharging gathering belt 10 extending transversely thereto and leading back to the central conveying system 4, 7 and therefore ensuring disposal of the product containers P.

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In accordance with the invention provision is also made for the used product container P - i.e. the picker has removed desired articles for the picking order - to be transported onwards immediately and for the next product container P to move up. The confirmation of error-free performance of the respective picking step is not even waited for. In order, however, for a correction to remain possible, the product container P is held in a buffer zone 14 which lies within reach of the picker, before the product container P arrives on the gathering belt 10. Therefore, in the event of an error, the picker can still access to the articles in order to grasp further articles or put back articles.

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The order containers A are conveyed on the conveyor track 9 in a row through the picking station 1. When an order container A has been fully picked, it is automatically pushed onto the gathering belt 10 and therefore introduced into the central conveying system 4, 7 for further handling. The gathering belt 10 can extend to the end of the conveyor belt 9 or, as indicated by a broken line marked 10', extend over the whole length of the conveyor belt 9 so that a push-off action is possible over the whole length.

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The conveyor belt 9 thus forms 6 picking places as put places 11 which are each provided with a put-to-light display 12 in order to display to the picker the order container A and the number of articles for the upcoming picking step (put).

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In order to allow the order containers A to move up in the row on the conveyor belt 9 without leaving gaps, each put place 11 is designed as an individually controllable and operable conveying section 13. Therefore, in spite of the pushing-off of an order container A which is not disposed at the front in the row, a gap-free row is retained. It is possible to
10 dispense with this conveying section 13 when the gathering belt 10 extends only as far as the first put place 11 (indicated by the region shown with a non-broken line).

The picking station in figures 1 and 2 differs from that in figures 3 and 4 essentially only by the duplication with the gathering belt 10 as a mirror axis and therefore divided use of the
15 discharging gathering conveying system. Therefore, corresponding parts of both picking stations are designated by corresponding reference signs.

Picking is carried out in both stations in the same manner as explained below.

20 The order containers A are conveyed to the station 1 and disposed in a row on the conveyor track 9 corresponding to the put places 11. At the same time, the first product container P is provided on the conveyor track 5.

By means of the picking displays 12 the picker is now shown how many articles he is to
25 place into the respective order containers from the current product container P.

After confirmation of the picking step, the used product container P is moved to the gathering area 10 and transported away. At the same time, the next product container P is provided and the next picking step is carried out.

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If a picking order of an order container is being processed, the picker is shown that the respective order container A can be pushed off onto the gathering area 10 or the order container A is pushed off automatically.

35 If this is the first container at the put place 1, the row of order containers is conveyed

further, wherein the put places of the order containers A change and a new order container is provided via the elevator 8.

5 This is the standard case since the first order container in the row is also that of which the requested product containers had most time to be conveyed to the picking station.

However, if this is another order container in the row, the other containers A move up, for which purpose the conveying sections 13 are operated and controlled in a corresponding manner, and a new order container is provided by the elevator 8.

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The process then begins anew.

Claims

1. A method for picking articles according to the goods-to-man principle at a picking station for loading the articles into a series of order load carriers, comprising:
 - 5 conveying the series of order load carriers through the picking station, the series of order load carriers including at least one set of multiple order load carriers arranged in a predetermined configuration of order load carriers with each order load carrier of the set of order load carriers being located at a put place or area for loading of one or more articles therein and positioned in substantially parallel series in relation to one another in a
 - 10 substantially gap-free row arrangement along the picking station;
 changing a respective put place or area of one or more of the order load carriers of the set of order load carriers received at the picking station, when at least one chronologically preceding order load carrier of the set of order load carriers has been loaded and discharged from the picking station; and
 - 15 further conveying at least one order load carrier of the series of order load carriers into an open put place or area after the chronologically preceding order load carrier is discharged in order to maintain the substantially gap-free row arrangement of the set of order load carriers at the picking station.
- 20 2. The method of claim 1, wherein the articles are present in product load carriers and picking is carried out therefrom.
3. The method of claim 1, further comprising displaying one or more order load carriers of the series of order load carriers to a picker during each picking process on a display allocated to
- 25 at least one of the put places or areas.
4. The method of claim 3, further comprising changing the display to correspond to one or more of the set of order load carriers at the put places or areas.
- 30 5. The method of claim 1, further comprising conveying multiple order load carriers of the series of order load carriers in a first-in-first-out (FIFO) row through the picking station.
6. The method of claim 1, wherein upon removal of desired articles for the picking order, used article load carriers are transported out of a pick place of the picking station into a buffer

zone lying within reach of the picker, and the next article load carrier moves up into the pick place and only after confirmation of the error-free performance of the respective picking step is the used article load carrier transported away out of the buffer zone and therefore out of the picking station.

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7. A picking station for picking goods or articles according to the goods-to-man principle, comprising:

a series of order load carriers;

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a first conveying system, wherein the articles are conveyed through the picking station on the first conveying system; and

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a second conveying system, wherein the order load carriers are conveyed through the picking station on the second conveying system, and wherein the order load carriers are conveyed jointly in a prescribed configuration of order load carriers along the second conveying system defining at least one set of order load carriers including multiple order load carriers arranged in a gap-free row and moving in substantially parallel series through the picking station on the second conveying system, and wherein each order load carrier of the set of order loader carriers is allocated a changing put place or area at which goods or articles are correspondingly placed within the set of order load carriers, each put place or area comprising an individually controllable and operable conveying section of the second conveying system, and wherein

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when at least one order load carrier of the set of order load carriers is discharged from the picking station, its put place or area is allocated to another order load carrier of the series of order load carriers so as to substantially maintain the prescribed configuration of order load carriers at the picking station.

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8. The picking station of claim 7, further comprising a discharging gathering conveying system, wherein one or more loaded order load carriers of the set of order load carriers are pushed off the second conveying system onto the discharging gathering conveying system.

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9. The picking of claim 7, wherein each put place or area is allocated a picking display which changes as one or more order load carriers of the series of order load carriers are positioned about the put places or areas.

10. The picking station of claim 9, further comprising a third conveying system, wherein one or more of the series of order load carriers are conveyed on the third conveying system below the second conveying system.