

Description

The present invention relates to a parts tray conveying system, and more particularly to a parts tray conveying system suitable for use with an automatic assembly system employing a robot, wherein a plurality of parts trays each containing parts are supplied to a predetermined position.

In carrying out an assembly operation by using an automatic machine such as an assembly robot, parts to be employed for the assembly operation need to be preliminarily supplied to a predetermined position. An apparatus for supplying the parts is disclosed in Japanese Patent Laid-open Publication No. 63-306108, for example. In the conventional parts supply apparatus, the parts are preliminarily accommodated in a tray, and a plurality of trays containing the parts are supplied to a predetermined position. The robot operates to pick up the parts one by one from each tray and carry out the automatic assembly operation.

However, such a parts supply apparatus has a shortcoming such that the trays containing the parts are preliminarily separated from each other at intervals in a tray box, so that a large space is necessary in the parts supply apparatus. Accordingly, the parts supply apparatus becomes large in size to reduce a space factor.

US-A-4720228 discloses a parts handling apparatus in accordance with the pre-characterizing portion of claim 1. Trays of parts may be transferred out of a stack at a store horizontally to positioning apparatus where parts are removed. Empty trays are lowered and transferred horizontally back towards the store where they can be stacked at a lower level.

It is accordingly an object of the present invention to provide a parts tray conveying system which can more effectively utilize a space for setting a plurality of parts trays.

According to the present invention, there is provided a parts tray conveyor system comprising:

a first station for receiving a plurality of trays under a stacked condition each occupied by parts;

means are provided for moving the stack of occupied trays from said first station to a second station;

a second station at which separating means are provided for separating one of the stacked occupied trays from the stack;

a third station at which means are provided for conveying said separated one of said occupied trays to a predetermined position;

a fourth station at which means are provided for removing and discharging one by one a plurality of empty trays each containing no parts from said third station;

a fifth station at which empty trays discharged by said fourth station are stacked; and

means for moving said stacked empty trays from said fifth station; characterized in that:- said separating means at said second station comprise elevator means for vertically moving the uppermost one of said occupied trays, said elevator means having a vertically movable member, an elevating member attached to said vertically movable member, a pair of mounting brackets attached to said elevating member, respective rotatable plates mounted to said mounting brackets and rotatable on contact with the uppermost one of said occupied trays during downward motion of the elevator means to pick-up said tray, a sensing member projecting from one of said plurality of rotatable plates, and a light emitting element and a sensor provided at an upper and lower portion, respectively, of said elevator means so as to form a light path therebetween for detecting rotation of said sensing member.

With this construction, the occupied trays are supplied under the stacked condition from the first station to the second station, and the uppermost one of the occupied trays under the stacked condition is separated one by one to be supplied from the second station to the third station. Accordingly, it is not necessary to preliminarily separate the plural occupied trays from each other at intervals. As a result, a large number of the occupied trays can be set in the conveying system by effectively utilizing the space in the conveying system, thus improving the space factor and making the construction compact.

The invention will be further described by way of non-limitative example with reference to the accompanying drawings, in which:-

Fig. 1 is an elevational view of the parts tray conveying system according to a preferred embodiment of the present invention, showing a general construction;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a side view of Fig. 1;

Fig. 4 is a plan view of a tray supply unit shown in Fig. 1;

Fig. 5 is an elevational view of Fig. 4;

Fig. 6 is a side view of Fig. 4;

Fig. 7 is a plan view of an elevator shown in Fig. 1;

Fig. 8 is an elevational view of Fig. 7;

Fig. 9 is a side view of Fig. 7;

Fig. 10 is a plan view of a chuck unit shown in Fig. 1;

Fig. 11 is an elevational view of Fig. 10;

Fig. 12 is a side view of Fig. 10;

Fig. 13 is a plan view of a tray discharge unit shown in Fig. 1;

Fig. 14 is an elevational view of Fig. 13; and

Fig. 15 is a side view of Fig. 13.

There will first be described a general construction of the parts tray conveying system according to a preferred embodiment of the present invention with

reference to Figs. 1 to 3. Referring to Figs. 1 to 3, the parts tray conveying system is provided with a tray supply unit 11 for supplying a plurality of occupied trays 10 each containing parts under a stacked condition. There is provided above the tray supply unit 11 an elevator 12 for separating an upper-most one of the occupied trays 10 under the stacked condition and upwardly moving the upper-most occupied tray 10 separated above. There is provided above the elevator 12 a chuck unit 13 for taking a plurality of empty trays 10' each containing no parts one by one from a conveyor 14 and also supplying the upper-most occupied tray 10 separated by the elevator 12 to the conveyor 14. There is provided aside the chuck unit 13 a tray discharge unit 15 for discharging the empty tray 10' from the chuck unit 13. In the tray discharge unit 15, the empty trays 10' are stacked in the same manner as the occupied trays 10 in the tray supply unit 11.

A structure of the tray supply unit 11 will now be described with reference to Figs. 4 to 6. The tray supply unit 11 is provided at its bottom with a base 18. A pair of right and left guide rails 19 are provided on the base 18. An air cylinder 20 is provided at the intermediate position between the right and left guide rails 19. A mounting plate 22 is mounted on a movable member 21 of the air cylinder 20. A pair of hooks 24 are rotatably mounted through a pair of pins 23 to a left end portion of the mounting plate 22 as viewed in Figs. 4 and 5. The hooks 24 are rotatably supported in such a manner that when the mounting plate 22 is moved leftwardly as viewed in Fig. 4, the hooks 24 are not engaged with the occupied trays 10, while once the occupied trays 10 come to a predetermined position in the tray supply unit 11, the hooks 24 are brought into engagement with the left end of the occupied trays 10 as viewed in Fig. 4. Further, a pair of stoppers 25 for limiting the rightward movement of the occupied trays 10 after drawn to a predetermined position is provided at a right end portion of the tray supply unit 11 as viewed in Fig. 4.

There will now be described a structure of the elevator 12 for separating an upper-most one of the plural occupied trays 10 under the stacked condition supplied by the tray supply unit 11 with reference to Figs. 7 to 9. The elevator 12 is provided with a vertically extending frame 28. An air cylinder 29 is supported under an erected condition by the frame 28. The air cylinder 29 has no rod, and a movable member 30 is slidably supported to the air cylinder 29. An elevating member 31 is mounted to the movable member 30. A pair of mounting brackets 32 is provided on opposite side portions of the elevating frame 31. A pair of upper pressers 33 are fixed on each mounting bracket 32.

A rotatable plate 35 is mounted through a pair of pins 34 to each mounting bracket 32. A pair of lower pressers 36 are mounted on each rotatable plate 35. A sensing member 37 projects from one of the two

lower pressers 36 on the front side of the elevator 12. A light emitting element 38 and a sensor 39 are provided at upper end lower portions of the elevator 12 so as to form a light path therebetween and detect rotation of the sensing member 37. Each occupied tray 10 is formed at its lower periphery with a flange 40 adapted to be retained by the upper pressers 33 and the lower pressers 36.

There will now be described a structure of the chuck unit 13 for taking the empty tray 10' from the conveyor 14 to the tray discharge unit 11 or supplying the occupied tray 10 from the elevator 12 to the conveyor 14 with reference to Figs. 10 to 12. The chuck unit 13 is provided with a pair of right and left chuck members 43. Each chuck member 43 is provided at its lower portion with a tray receiving plate 44. Each chuck member 43 is connected through a block 45 to an air cylinder 46 for opening and closing the chuck member 43. Further, each chuck member 43 is provided at its front and rear end portions with a pair of air cylinders 47 for pushing the occupied tray 10 to the conveyor 14. Further, an air cylinder 48 for introducing the occupied tray 10 from the elevator 12 to the chuck unit 13 is provided under the tray discharge unit 15 (see Figs. 14 and 15).

As shown in Fig. 11, both the chuck members 43 constituting the chuck unit 13 are connected to a rod 50 of an air cylinder (not shown) vertically extending. By the vertical movement of the rod 50 of the air cylinder, the chuck unit 13 is vertically moved to take three positions, i.e., an upper position 51, a middle position 52 and a lower position 53 as shown in Figs. 11 and 12.

There will now be described a structure of the tray discharge unit 15 for discharging the empty tray 10 from the chuck unit 13 with reference to Figs. 13 to 15. The tray discharge unit 15 is provided with a pair of right and left rails 56. An air cylinder 57 for drawing the empty tray 10' from the chuck unit 13 is provided between the right and left rails 56. A drawing hook 58 is adapted to be moved by the air cylinder 57, and is rotatably supported through a pair of pins 59. Further, an air cylinder 60 for discharging the empty trays 10' under the stacked condition from the tray discharge unit 15 to the outside is provided under the air cylinder 58. A mounting plate 61 is adapted to be moved by the air cylinder 60, and a pair of hooks 63 are rotatably supported through a pair of pins 62 to the mounting plate 61 at opposite side portions thereof.

Further, the tray discharge unit 15 is provided with a pair of right and left air cylinders 65 for lifting and lowering the empty trays 10' under the stacked condition. A bracket 66 is mounted to a rod of each air cylinder 65. A pair of retainer plate 68 are rotatably supported through a pair of pins 67 to each bracket 66.

The operation of the parts tray conveying system

as mentioned above will now be described.

First, the occupied trays 10 under the stacked condition are set at the left end portion of the tray supply unit 11 as shown in Fig. 1 by hands or an automatic carrier vehicle. Under this condition, the air cylinder 20 in the tray supply unit 11 shown in Figs. 4 to 6 is operated to move the mounting plate 22 leftwardly as viewed in Figs. 4 and 5 until the hooks 24 rotatably supported to the mounting plate 22 comes into engagement with the left end of the occupied trays 10 under the stacked condition. Then, the mounting plate 22 is moved rightwardly as viewed in Figs. 4 and 5 by the air cylinder 20 to thereby draw the occupied trays 10 engaged with the hooks 24 to a predetermined position where the right end of the occupied trays 10 comes into abutment against the stoppers 25. That is, when the occupied trays 10 comes into abutment against the stoppers 25, the operation of the air cylinder 20 is stopped to stop the rightward movement of the mounting plate 22. The above predetermined position is just under the elevator 12. In the tray supply unit 11, there is defined a preparatory space for storing another set of the occupied trays 10 under the stacked condition as shown in Fig. 1. The preparatory space is defined adjacent to the set of the occupied trays 10 under the stacked condition positioned just under the elevator 12, so that the occupied trays 10 stored in the preparatory space await supply to the predetermined position just under the elevator 12. Thus, a large number of the occupied trays 10 can be stored in the tray supply unit 11.

After the occupied trays 10 under the stacked condition are supplied to the predetermined position just under the elevator 12, an upper-most one of the occupied trays 10 is separated and picked up by the elevator 12. That is, when the elevating frame 31 is lowered through the movable member 30 by the air cylinder 29, the lower pressers 36 provided at the opposite side portions of the frame 31 are brought into abutment against the flange 40 of the upper-most occupied tray 10, and are then rotated about the pins 34 as shown by a phantom line in Fig. 9. Then, the lower pressers 36 get over the flange 40 of the upper-most occupied tray 10 to come just under the flange 40.

During the above lowering operation of the lower pressers 36, when the lower pressers 36 are rotated together with the rotatable plates 35, the light path from the light emitting element 38 to the sensor 39 is cut by the sensing member 37, thereby detecting that the lower pressers 36 has got over the flange 40 of the upper-most occupied tray 10. Simultaneously with such a detecting operation, the air cylinder 29 is switched from the lowering operation to a lifting operation of the elevating frame 31. As a result, the upper-most occupied tray 10 is lifted under the condition where the flange 40 of the tray 10 is sandwiched by the upper pressers 33 and the lower pressers 36 provided on the elevating frame 31 as shown in Figs.

8 and 9.

Thus, according to the preferred embodiment, the uppermost one of the occupied trays 10 under the stacked condition positioned just under the elevator 12 is separated and moved upwardly one by one. As the occupied trays 10 under the stacked condition can be positioned under the elevator 12, a large number of the occupied trays 10 can be compactly stored in the parts tray conveying system as shown in Fig. 1. Accordingly, an extra space can be eliminated to improve the space factor of the parts tray conveying system and make the construction compact.

In the next step, the empty tray 10' is discharged from the conveyor 14 to the tray discharge unit 15 by the chuck unit 13 before supplying the occupied tray 10 from the elevator 12 through the chuck unit 13 to the conveyor 14. That is, the chuck members 43 in the chuck unit 13 are lowered to the lower position 53 shown in Figs. 11 and 12 by the air cylinder having the rod 50. At the lower position 53, the chuck members 43 are closed by the air cylinders 46 to grip the empty tray 10' placed on the conveyor 14. Then, the chuck members 43 gripping the empty tray 10' are lifted to the upper position 51 shown in Figs. 11 and 12 by the air cylinder having the rod 50.

At the upper position 51, the air cylinder 57 in the tray discharge unit 15 shown in Figs. 13 to 15 is operated to draw the empty tray 10' from the chuck unit 13 to the tray discharge unit 15 by engaging the drawing hook 58 with the empty tray 10'. This drawing operation is followed by a subsequent discharging operation such that the air cylinder 60 is operated to discharge the empty trays 10' under the stacked condition by engaging the hooks 63 mounted on the mounting plate 61 with the empty tray 10'.

In the case that the empty trays 10' under the stacked condition have been already positioned in the tray discharge unit 15 before carrying out the discharging operation of the empty tray 10' from the chuck unit 13, the new empty tray 10' discharged from the chuck unit 13 is inserted just under a lowermost one of the empty trays 10' already stored under the stacked condition. This operation is carried out by operating the air cylinders 65.

That is, the empty trays 10' under the stacked condition are first lifted by operating the air cylinders 65. More specifically, the air cylinders 65 are operated to lower the brackets 66. During the lowering operation of the brackets 66, the retainer plates 68 rotatably supported through the pins 67 to the brackets 66 are brought into abutment against the flanges 40 of the empty trays 10', and are then rotated so as to get over the flanges 40. When the retainer plates 68 finally get over the flange 40 of the lowermost empty tray 10', the air cylinders 65 are switched to lift the retainer plates 68 through the brackets 66 as shown by a phantom line in Fig. 14. Thus, there is defined a space for inserting the new empty tray 10' under the

lower-most empty tray 10'. Under this condition, the air cylinder 57 is operated to draw the new empty tray 10' from the chuck unit 13 into the above space by engaging the hook 58 with the new empty tray 10'. Then, the air cylinders 65 are operated again to lower the retainer plates 68, thereby stacking the already stacked empty trays 10' onto the new empty tray 10' drawn as mentioned above.

After discharging the empty tray 10' from the conveyor 14 through the chuck unit 13 to the tray discharge unit 15, the chuck unit 13 is lowered to the middle position 52 shown in Figs. 11 and 12 by the air cylinder having the rod 50. At the middle position 52, the air cylinder 48 is operated to horizontally transfer the upper-most occupied tray 10 from the elevator 12 to between the chuck members 43 in the chuck unit 13. Then, the chuck members 43 having thus received the occupied tray 10 are lowered to the lower position 53 by the air cylinder having the rod 50. Then, the air cylinders 47 in the chuck unit 13 are operated to transfer the occupied tray 10 from the chuck members 43 to the conveyor 14. Then, the occupied tray 10 is conveyed to an assembly system by the conveyor 14.

As described above, the empty trays 10' are returned from the assembly system through the conveyor 14 to the tray discharge unit 15, and simultaneously the occupied trays 10 are supplied from the tray supply unit 11 through the conveyor 14 to the assembly system. Such a series of operation is automatically carried out. In supplying the occupied trays 10, the upper-most one of the occupied trays 10 under the stacked condition is separated by the elevator 12. Further, in discharging the empty trays 10', the already stacked empty trays 10' in the tray discharge unit 15 are once lifted by the air cylinders 65 and the retainer plates 68 to define a space corresponding to a height of the new empty tray 10' to be discharged from the conveyor 14 to the tray discharge unit 15, and then the new empty tray 10' is inserted into the space. Accordingly, by employing the parts tray conveying system according to the preferred embodiment of the present invention, the occupied trays 10 can be applied under the stacked condition to the assembly system, and the empty trays 10' can also be discharged under the stacked condition.

In the parts tray conveying system according to the preferred embodiment, after the occupied trays 10 under the stacked condition are set into this conveying system by hands or an automatic carrier vehicle, the upper-most one of the occupied trays 10 under the stacked condition is separated one by one by the elevator 12 to be supplied to the automatic assembly system. Furthermore, the empty trays 10' returned from the automatic assembly system are discharged under the stacked condition in the same manner as the occupied trays 10. Accordingly, the occupied trays 10 contained in a carton or the like can

be simply and easily applied under the stacked condition to the assembly system. Further, the empty trays 10' can be put into the carton under the stacked condition, thereby eliminating a stacking work or the like by hands to widely rationalize the conveyance of the parts trays.

Although the occupied tray 10 is transferred to the conveyor 14 by the chuck unit 13 in the above preferred embodiment, the occupied tray 10 may be directly supplied to the assembly system by the chuck unit 13.

While the invention has been described with reference to specific embodiments, these are illustrative and various modifications and changes may occur to those skilled in the art without departing from the scope of the invention as defined by the appended claims.

Claims

1. A parts tray conveyor system comprising:
 - a first station (11) for receiving a plurality of trays (10) under a stacked condition each occupied by parts;
 - means (20-24) are provided for moving the stack of occupied trays from said first station (11) to a second station (12);
 - a second station at which separating means are provided for separating one of the stacked occupied trays (10) from the stack;
 - a third station (14) at which means are provided for conveying said separated uppermost one of said occupied trays (10) to a predetermined position;
 - a fourth station at which means (13) are provided for removing and discharging one by one a plurality of empty trays each containing no parts from said third station (14);
 - a fifth station (15) at which empty trays (10') discharged by said fourth station are stacked; and
 - means (60-63) for moving said stacked empty trays (10') from said fifth station; characterized in that:-
 - said separating means at said second station comprise elevator means (12) for vertically moving the uppermost one of said occupied trays (10), said elevator means (12) having a vertically movable member (30), an elevating member (31) attached to said vertically movable member (30), a pair of mounting brackets (32) attached to said elevating member (31), respective rotatable plates (35) mounted to said mounting brackets (32) and rotatable on contact with the uppermost one of said occupied trays (10) during downward motion of the elevator means (12) to pick-up said tray (10), a sensing member (37) projecting from



lower-most empty tray 10'. Under this condition, the air cylinder 57 is operated to draw the new empty tray 10' from the chuck unit 13 into the above space by engaging the hook 58 with the new empty tray 10'. Then, the air cylinders 65 are operated again to lower the retainer plates 68, thereby stacking the already stacked empty trays 10' onto the new empty tray 10' drawn as mentioned above.

After discharging the empty tray 10' from the conveyor 14 through the chuck unit 13 to the tray discharge unit 15, the chuck unit 13 is lowered to the middle position 52 shown in Figs. 11 and 12 by the air cylinder having the rod 50. At the middle position 52, the air cylinder 48 is operated to horizontally transfer the upper-most occupied tray 10 from the elevator 12 to between the chuck members 43 in the chuck unit 13. Then, the chuck members 43 having thus received the occupied tray 10 are lowered to the lower position 53 by the air cylinder having the rod 50. Then, the air cylinders 47 in the chuck unit 13 are operated to transfer the occupied tray 10 from the chuck members 43 to the conveyor 14. Then, the occupied tray 10 is conveyed to an assembly system by the conveyor 14.

As described above, the empty trays 10' are returned from the assembly system through the conveyor 14 to the tray discharge unit 15, and simultaneously the occupied trays 10 are supplied from the tray supply unit 11 through the conveyor 14 to the assembly system. Such a series of operation is automatically carried out. In supplying the occupied trays 10, the upper-most one of the occupied trays 10 under the stacked condition is separated by the elevator 12. Further, in discharging the empty trays 10', the already stacked empty trays 10' in the tray discharge unit 15 are once lifted by the air cylinders 65 and the retainer plates 68 to define a space corresponding to a height of the new empty tray 10' to be discharged from the conveyor 14 to the tray discharge unit 15, and then the new empty tray 10' is inserted into the space. Accordingly, by employing the parts tray conveying system according to the preferred embodiment of the present invention, the occupied trays 10 can be applied under the stacked condition to the assembly system, and the empty trays 10' can also be discharged under the stacked condition.

In the parts tray conveying system according to the preferred embodiment, after the occupied trays 10 under the stacked condition are set into this conveying system by hands or an automatic carrier vehicle, the upper-most one of the occupied trays 10 under the stacked condition is separated one by one by the elevator 12 to be supplied to the automatic assembly system. Furthermore, the empty trays 10' returned from the automatic assembly system are discharged under the stacked condition in the same manner as the occupied trays 10. Accordingly, the occupied trays 10 contained in a carton or the like can

be simply and easily applied under the stacked condition to the assembly system. Further, the empty trays 10' can be put into the carton under the stacked condition, thereby eliminating a stacking work or the like by hands to widely rationalize the conveyance of the parts trays.

Although the occupied tray 10 is transferred to the conveyor 14 by the chuck unit 13 in the above preferred embodiment, the occupied tray 10 may be directly supplied to the assembly system by the chuck unit 13.

While the invention has been described with reference to specific embodiments, these are illustrative and various modifications and changes may occur to those skilled in the art without departing from the scope of the invention as defined by the appended claims.

Claims

1. A parts tray conveyor system comprising:
 - a first station (11) for receiving a plurality of trays (10) under a stacked condition each occupied by parts;
 - means (20-24) are provided for moving the stack of occupied trays from said first station (11) to a second station (12);
 - a second station at which separating means are provided for separating one of the stacked occupied trays (10) from the stack;
 - a third station (14) at which means are provided for conveying said separated uppermost one of said occupied trays (10) to a predetermined position;
 - a fourth station at which means (13) are provided for removing and discharging one by one a plurality of empty trays each containing no parts from said third station (14);
 - a fifth station (15) at which empty trays (10') discharged by said fourth station are stacked; and
 - means (60-63) for moving said stacked empty trays (10') from said fifth station; characterized in that:-
 - said separating means at said second station comprise elevator means (12) for vertically moving the uppermost one of said occupied trays (10), said elevator means (12) having a vertically movable member (30), an elevating member (31) attached to said vertically movable member (30), a pair of mounting brackets (32) attached to said elevating member (31), respective rotatable plates (35) mounted to said mounting brackets (32) and rotatable on contact with the uppermost one of said occupied trays (10) during downward motion of the elevator means (12) to pick-up said tray (10), a sensing member (37) projecting from



one of said plurality of rotatable plates (35), and a light emitting element (38) and a sensor (39) provided at an upper and lower portion, respectively, of said elevator means (12) so as to form a light path therebetween for detecting rotation of said sensing member (37).

2. The parts tray conveyer system as defined in claim 1 further comprising a sixth station for accepting a further stack of occupied trays (10) for supply to said first station (11), said sixth station being located adjacent to said first station (11).
3. The parts tray conveyer system as defined in claim 1 or 2, wherein said stacking means (65-68) are provided at said fifth station (15) for inserting said empty trays (10') one by one below a lowermost one of said empty trays (10') already stacked.
4. The parts tray conveyer system as defined in claim 1, 2 or 3 wherein said fifth station (15) is located just above said first station (11) and said second station (12).

Patentansprüche

1. Transportsystem für Einzelteilbehälter, das umfaßt:
eine erste Station (11) zum Aufnehmen einer Vielzahl von Behältern (10) in gestapeltem Zustand, wovon jeder derselben durch Einzelteile gefüllt ist, wobei Mittel (20 - 24) zum Bewegen des Stapels von gefüllten Behältern von der ersten Station (11) zu einer zweiten Station (12) vorgesehen sind,
die zweite Station, bei welcher Trennmittel zum Trennen eines der gestapelten gefüllten Behälter (10) von dem Stapel vorgesehen sind,
eine dritte Station (14), bei welcher Mittel zum Transportieren des getrennten obersten der gefüllten Behälter (10) zu einer vorbestimmten Position vorgesehen sind,
eine vierte Station, bei welcher Mittel (13) vorgesehen sind zum Fortbewegen von der dritten Station (14) und Abführen eines nach dem anderen einer Vielzahl von leeren Behältern, von welchen jeder keine Einzelteile enthält,
eine fünfte Station (15), bei welcher leere Behälter (10'), die durch die vierte Station abgeführt sind, gestapelt werden, und
Mittel (60 - 63) zum Bewegen der gestapelten leeren Behälter (10') fort von der fünften Station,
dadurch gekennzeichnet, daß
die Trennmittel bei der zweiten Station ein Hebemittel (12) zum Bewegen des obersten der gefüll-

ten Behälter (10) in vertikaler Richtung umfassen, wobei das Hebemittel (12) hat: ein in vertikaler Richtung bewegbares Teil (30), ein Hebeteil (31), das an dem in vertikaler Richtung bewegbaren Teil (30) angebracht ist, ein Paar von Befestigungsbügeln (32), das an dem Hebeteil (31) angebracht ist, jeweilige drehbare Platten (35), die an den Befestigungsbügeln (32) montiert sind und auf eine Berührung mit dem obersten der gefüllten Behälter während einer Abwärtsbewegung des Hebemittels (12) hin drehbar sind, um den Behälter (10) aufzugreifen, ein Erfassungsmittel (37), das von einer der Vielzahl von drehbaren Platten (35) vorsteht, und ein lichtemittierendes Element (38) und einen Sensor (39), die an einem oberen beziehungsweise einem unteren Teil des Hebemittels (12) vorgesehen sind, um auf diese Weise einen Lichtpfad zwischen sich zum Erfassen einer Drehung des Erfassungsmittels (37) zu bilden.

2. Transportsystem für Einzelteilbehälter nach Anspruch 1, das ferner eine sechste Station zum Entgegennehmen eines weiteren Stapels von gefüllten Behältern (10) zum Zuliefern zu der ersten Station (11) enthält, wobei die sechste Station der ersten Station (11) benachbart angeordnet ist.
3. Transportsystem für Einzelteilbehälter nach Anspruch 1 oder 2, bei dem die Mittel zum Stapeln (65 - 68) bei der fünften Station (15) vorgesehen sind zum Einschieben der leeren Behälter (10') einen nach dem anderen unterhalb des untersten der leeren Behälter (10'), die bereits gestapelt sind.
4. Transportsystem für Einzelteilbehälter nach Anspruch 1, 2 oder 3, bei dem die fünfte Station (15) unmittelbar oberhalb der ersten Station (11) und der zweiten Station (12) angeordnet ist.

Revendications

1. Système de convoyage pour plateaux porte-pièces, comprenant :
- une première station (11) pour recevoir une pluralité de plateaux (10) sous une condition empilée, chacun étant occupé par des pièces ;
- des moyens (20-24) prévus pour déplacer l'empilement de plateaux occupés depuis ladite première station (11) jusqu'à une seconde station (12) ;
- une seconde station à laquelle sont prévus des moyens de séparation afin de séparer l'un des plateaux occupés empilés (10) de



puis l'empilement ;

- une troisième station (14) à laquelle des moyens sont prévus pour convoier ledit plateau occupé séparé et situé le plus en haut parmi les plateaux occupés (10) jusqu'à une position prédéterminée ;
 - une quatrième station à laquelle des moyens (13) sont prévus pour enlever et pour évacuer un par un une pluralité de plateaux vides ne contenant chacun aucune pièce, depuis ladite troisième station (14) ;
 - une cinquième station (15) à laquelle les plateaux vides (10') évacués par ladite quatrième station sont empilés ; et
 - des moyens pour déplacer lesdits plateaux vides empilés (10') depuis ladite cinquième station ;
- caractérisé en ce que
- lesdits moyens de séparation à ladite seconde station comprennent des moyens de levage (12) pour déplacer verticalement le plateau occupé situé le plus en haut parmi les plateaux occupés (10), lesdits moyens de levage (12) comportant un organe verticalement mobile (30), un organe de levage (31) attaché audit organe verticalement mobile (30), une paire de platines de montage (32) attachées audit organe de levage (31), des plaques rotatives respectives (35) montées sur lesdites platines de montage (32) et capables de tourner en contact avec ledit plateau occupé situé le plus en haut (10) lors d'un mouvement descendant desdits moyens de levage (12) afin de saisir ledit plateau (10), un élément détecteur (37) qui se projette de l'une de ladite pluralité de plaques rotatives (35), et un élément émetteur de lumière (38) et un détecteur (39) prévus respectivement au niveau d'une partie supérieure et d'une partie inférieure desdits moyens de levage (12) de manière à former un trajet lumineux entre eux afin de détecter la rotation dudit organe détecteur (37).

un au-dessous d'un plateau vide situé le plus en bas (10') parmi lesdits plateaux empilés.

4. Système de convoyage pour plateaux porte-pièces selon l'une quelconque des revendications 1, 2 ou 3, dans lequel ladite cinquième station (15) est située immédiatement au-dessus de ladite première station (11) et de ladite seconde station (12).

2. Système de convoyage pour plateaux porte-pièces selon la revendication 1, comprenant en outre une sixième station afin d'accepter un autre empilement de plateaux occupés (10) pour l'alimentation vers ladite première station (11), ladite sixième station étant située en position adjacente à ladite première station (11).
3. Système de convoyage pour plateaux porte-pièces selon l'une ou l'autre des revendications 1 et 2, dans lequel lesdits moyens d'empilement (65-68) sont prévus à ladite cinquième station (15) afin d'insérer lesdits plateaux vides (10') un par