

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199881882 B2
(10) Patent No. 746736

(54) Title
Apparatus for sorting or selectively collecting flat products individually supplied by a conveyor

(51)⁷ International Patent Classification(s)
B65G 047/69 B65G 047/74

(21) Application No: **199881882**

(22) Application Date: **1998.08.26**

(30) Priority Data

(31) Number	(32) Date	(33) Country
97810617	1997.09.01	EP

(43) Publication Date : **1999.03.11**

(43) Publication Journal Date : **1999.03.11**

(44) Accepted Journal Date : **2002.05.02**

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(56) Related Art
FR 2676941
EP 640409
US 5385243

AUSTRALIA
Patents Act 1990

COMPLETE SPECIFICATION
STANDARD PATENT



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Invention Title:

APPARATUS FOR SORTING OR SELECTIVELY COLLECTING FLAT PRODUCTS
INDIVIDUALLY SUPPLIED BY A CONVEYOR

The following statement is a full description of this
invention, including the best method of performing it known to
me/us:

ABSTRACT OF THE DISCLOSURE

An apparatus for sorting or selectively collecting flat products, such as shipment pouches, printed products or workpieces, which are individually supplied by a conveyor and are placed along the conveying path of the conveyor into collecting stations arranged underneath the conveyor, wherein each collecting station is composed of a device for receiving exchangeable collecting containers and driveable transversely of the conveying direction of the conveyor. The apparatus includes a driveable device constructed as a sliding device moveable in a guide unit for receiving an empty collecting container in exchange for a full collecting container.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an apparatus for sorting or selectively collecting flat products, such as shipment pouches, printed products or workpieces, which are individually supplied by means of a conveyor and are placed along the conveying path of the conveyor into collecting stations arranged underneath the conveyor.

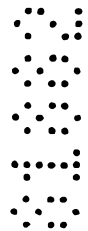
2. Description of the Related Art

An apparatus of the above-described type is disclosed, for example, in EP-A-0 638 501. This apparatus includes an endlessly driven traction member on which are mounted in intervals receiving devices in the form of containers which can be charged and emptied, wherein, as seen in the conveying direction, each container has two walls forming a receiving space with an opening for the products. For feeding and emptying the receiving devices or containers, the openings can be enlarged by pivoting a wall.

The containers can be filled either with the containers being in a horizontal position or also in an inclined position.

The containers are emptied with the containers being tilted obliquely downwardly, wherein the container opening preferably forms the trailing end of the container.

A collecting station each is assigned corresponding to the addresses of the content of each container, wherein the collecting stations are arranged next to each other in the conveying direction.



SUMMARY OF THE INVENTION

According to the present invention, there is provided an apparatus for sorting or selectively
5 collecting flat products which are individually supplied by conveyor, the apparatus including a plurality of collecting stations arranged underneath the conveyor along a conveying path of the conveyor for collecting products supplied by the conveyor, wherein each collecting station
10 includes means for moving an exchangeable collecting container for receiving products transversely of a conveying direction of the conveyor from a ready position into a feeding area underneath the conveyor.

15 In accordance with the present invention, each collecting station is composed of a device for receiving exchangeable collecting containers and driveable transversely of the conveying direction of the conveyor.

20 The configuration according to the present invention makes it possible to carry out emptying of the collecting stations in a simple and quick manner and there are no mutual interference effects between empty containers and sorted material.

25 Moreover, the apparatus according to the present invention makes possible a quick change of sorted material or container sizes, wherein the sorted material change means a new sorting order and the container size change
30 means another type of collecting container.



The apparatus of the present invention prevents longer waiting periods or empty travel during a process change.

In accordance with an advantageous feature, the apparatus includes a driveable device constructed as a sliding device moveable in a guide unit for receiving an empty collecting container in exchange for a full collecting container, so that a quick operational sequence is ensured.

Suitable drive means are double-acting piston/cylinder units, or because of the relatively long travel movements, a combination of piston/cylinder unit and lever system. However, the latter configuration of the sliding device is more expensive than the former.

The displacement movement of a collecting container can also be ensured by a traction member with rungs as a ladder chain endlessly travelling around two spaced-apart horizontal axes, wherein this type of sliding device requires a greater length than a slide which is moved back and forth.

Alternatively, the traction member could also be constructed as a conveyor belt or by two upper portions of endless toothed

belts forming a support plane on which the collecting containers can be placed.

A quick exchange of the collecting containers and a short cycle time is achieved by providing a guide unit which extends underneath the conveyor and to a pick-up area arranged laterally of the conveyor.

A quick cycle sequence is achieved by a sliding device which receives an empty collecting container if the sliding device is used for displacing a collecting container located in the feeding area.

A simple drive for the sliding device is a friction roller drive connected to the sliding device, wherein such a drive is advantageous economically as well as operationally.

A simple construction of the friction roller drive advantageously includes two friction rollers connected to a drive roller, wherein one of the friction rollers is essentially provided for moving the sliding device out of the ready position and the other friction roller is provided essentially for moving the sliding device from the feeding area.

For dividing the movements, the friction roller drive is located approximately at half the length of the guide unit, so that an efficient and uniform sequence of movements can be carried out.

In order to avoid significant wear as a result of the frictional engagement between the sliding device and the friction rollers, the friction rollers are in drive connection with the end of the sliding device facing the respective friction roller in the ready position and the feeding area.

The precise position of the collecting container in the ready position or in the feeding area is finally determined, *inter alia*, by a spring force acting against the collecting container.

In the feeding area, the position for feeding a collecting container is achieved by positioning the collecting container by means of a holding-back device which can be switched into the travel path of the collecting container and is arranged in front of the feeding area as seen in the travel direction of the collecting container.

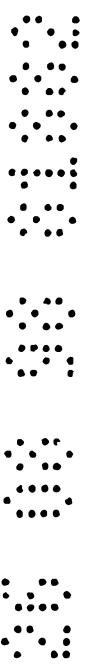
For positioning the collecting container in the feeding area, the holding-back device is switched on and the collecting container is displaced relative to the sliding device and is placed in the feeding area by the return movement of the sliding device into the ready position, in which another empty collecting container is placed on the sliding device. In other words, the receiving plane at the sliding device is located higher than the floor in the feeding area underneath the conveyor.

In accordance with a useful feature, the holding-back device includes at least one locking lever which is connected to the guiding unit and can be swung into the travel path of the sliding device, such that the collecting container rests against the locking lever during the return movement of the sliding device.

For placing the collecting containers in the feeding area, the feeding area has a floor for placing the collecting containers thereon wherein the floor is located at a lower level than the receiving plane of the sliding device.

In order to be able to use collecting containers of different sizes, a significant feature of the present invention provides that the length of the travel movements of the sliding device is adjustable.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of the disclosure. For a better understanding of the invention, its operating advantages, specific objects attained by its use, reference should be had to the drawing and descriptive matter in which there are illustrated and described preferred embodiments of the invention.



BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

Fig. 1 is a schematic elevational view of the apparatus according to the present invention, shown in the initial position;

Fig. 2 is a schematic illustration, corresponding to Fig. 1, showing the apparatus with the sliding device moved into the feeding position;

Fig. 3 is an illustration, corresponding to Fig. 1, showing the sliding device during the return travel thereof;

Fig. 4 is a top view of the apparatus according to the present invention; and

Fig. 5 is a sectional view, on a larger scale, taken along sectional line V-V in Fig. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 of the drawing shows an apparatus 1 according to the present invention for sorting or selectively collecting flat products, for example, shipment pouches used for mailing, which are supplied by means of a conveyor 2, only schematically illustrated, wherein the conveyor 2 has a conveying direction extending perpendicularly to the plane of the drawing.

Of course, it is necessary to provide a plurality of units 1 arranged next to one another underneath the conveyor 2 along the conveying path of the conveyor 2. The units 1 form collecting stations for specified products, wherein the conveyor 2 includes receiving containers, not shown, attached to a driveable traction member, wherein the receiving containers are previously supplied with a product and, after travelling a certain conveying distance, are emptied above one of the collecting containers.

The unit 1 which is in communication with a collecting station is constructed as a sliding device 3 which can be driven in a direction transversely of the conveying direction of the conveyor 2. As can also be seen in Fig. 4, the sliding device 3 can be moved back and forth transversely of the travel direction of the conveyor 2 between a ready position 5 and a feeding area 6

in a guide unit 4. The sliding device 3 constructed for receiving a collecting container 7 is composed of a flat support element 8 which is displaceable in the guide unit 4 supported on both sides by two support rollers 9 and by guide rollers 10, as illustrated in detail in Fig. 5.

The support element 8 has an approximately rectangular groove 11 extending in travel direction of the sliding device 3 for providing a greater stiffness. The bottom side of the groove 11 serves as a drive surface of a stationary friction roller drive 12.

The friction roller drive 12 is arranged approximately in the middle of the length of the travel path of a collecting container 7 and includes a drive roller 13 which is coupled to a motor 14, and two laterally arranged friction rollers 15, 16 which form a frictional connection together with the drive roller 13, on the one hand, and which are alternately in drive connection with the sliding device 3, on the other hand.

As illustrated in Fig. 1, the friction roller 15 is provided for effecting the movement of the sliding device 3 out of the ready position 5, while the friction roller 16 arranged on the opposite side of the drive roller 13 is used for effecting the

return travel of the sliding device 3 out of the feeding area 6. As illustrated in Figs. 1 to 3, the sliding device 3 is moved by the respective friction rollers 15, 16 into the final positions in the ready position 5 and the feeding area 6.

Figs. 1 and 2 of the drawing show that, prior to a movement of the sliding device 3, the sliding device 3 rests with one end on a friction roller 15, 16. This feature is provided to prevent significant wear of the friction rollers 15, 16 by holding the sliding device 3 by the force of a spring acting at one end from an end position on one of the friction rollers 15, 16.

The empty collecting container 7 reaches its precise position within the feeding area 6 by resting with a rear wall 17 against a holding-back device 14 switched into its travel path when the sliding device 3 travels back from the feeding area 6. This holding-back device 14 is composed of two locking levers 18 which are arranged on both sides above the guide unit 14 so as to be pivotable about vertical axes, wherein the locking levers 18 are held in an inwardly directed position by the force of a spring and are displaced outwardly when the collecting container 7 passes by and pivot back inwardly after the collecting container 7 has passed by. Of course, a mechanical/electrical operation of the holding-back 14 is also possible.

The return movement of the sliding device 3 causes the empty collecting container 7 to be moved from the sliding device 3 onto a stationary floor 19 arranged in the feeding area 6 and connected to the guide unit 4.

The manner of operation of the apparatus according to the present invention will now be described with the aid of Figs. 1 to 3.

As shown in Fig. 1, an empty collecting container 7 is placed on the sliding device 3 in the ready position 5. The front end of the sliding device 3 as seen in travel direction rests on the friction roller 15 and the locking levers 18 of the holding-back device 14 are displaced outwardly by the collecting container 7.

Another collecting container 7 is placed on the floor 19 in the feeding area 6 and flat products 20 are fed from above from the conveyor 2 into the collecting container 7.

At the front end of the guide unit 4 as seen in travel direction of the sliding device 3, a conveyor belt 21 is provided which extends parallel to the conveyor 2 and which further

conveys the filled collecting containers 7 which have been pushed out of the feeding area 6.

The collecting containers 7 can be fed into the ready position 5 of the sliding device either manually or by means of an automatic feeding device. A stop 22 at the rearward end of the sliding device 3 determines the loading position of a collecting container 7 and serves to reinforce the support element 8 in the area of the groove 11.

As illustrated in Fig. 2, the front end of the sliding device 3 has pushed the collecting container 7 filled with products from the feeding area 6 onto the conveyor belt 21, while another empty collecting container 7 has been moved by the sliding device 3 into the feeding area 6. For this purpose, the feeding area 6 may be equipped, for example, with a monitoring unit directed toward the collecting container 7 to monitor the degree of filling of the container, wherein the monitoring unit triggers an automatic exchange of the collecting container 7 and may also be connected in a controllable manner to the conveyor 2.

When the sliding device 3 carries out its movement and return movement, it travels prior to reaching the initial position or position of rest in the ready position 5 or the

feeding area 6 initially past these positions and is then decelerated and briefly pushed back by an oppositely directed spring, not shown, until the collecting container 7 is in drive connection at one end thereof with one of the friction rollers 15, 16.

The initial position can be determined indirectly, for example, by a proximity switch.

For removing the filled collecting containers 7 from the feeding area 6, the front end of the sliding device 3 pushes out the collecting container 7, wherein this end position for the pushing-out movement once again may be determined by a proximity switch and, after the sliding device 3 has reached a drive connection with the drive roller 16 as in the ready position 5, the return movement of the sliding device 3 can be triggered by a control device.

As illustrated in Fig. 3, during the return travel of the sliding device 3, the collecting container 7 is pushed by the holding-back device 14 from the sliding device 3 travelling back into the ready position. Once the sliding device 3 has been completely pulled out from under the empty collecting container 7, the latter then rests on the floor 19 in the feeding area 6.

The top view of Fig. 4 shows the sliding device 3 in the initial position thereof in which an empty collecting container 7 is placed on the sliding device 3.

A light sensor 23 is provided for indicating to a control unit the presence of a collecting container 7 in the feeding area 6.

The invention is not limited by the embodiments described above which are presented as examples only but can be modified in various ways within the scope of protection defined by the appended patent claims.

It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents forms part of the common general knowledge in the art, in Australia or in any other country.

For the purposes of this specification it will be clearly understood that the word "comprising" means "including but not limited to", and that the words "comprise" and "comprises" have a corresponding meaning.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An apparatus for sorting or selectively
collecting flat products which are individually supplied
5 by conveyor, the apparatus including a plurality of
collecting stations arranged underneath the conveyor along
a conveying path of the conveyor for collecting products
supplied by the conveyor, wherein each collecting station
includes means for moving an exchangeable collecting
10 container for receiving products transversely of a
conveying direction of the conveyor from a ready position
into a feeding area underneath the conveyor.
2. The apparatus according to claim 1, wherein the
means for moving the collecting container includes a guide
15 unit and a sliding device movably mounted in the guide
unit for moving the collecting container.
3. The apparatus according to claim 2, wherein the
guide unit extends underneath the conveyor toward the
ready position located laterally of the conveyor.
- 20 4. The apparatus according to claim 2 or 3, wherein
the sliding device is configured to push out a collecting
container located underneath the conveyor.
5. The apparatus according to any preceding claim,
further including a friction roller drive connected to the
25 sliding device.
6. The apparatus according to claim 5, wherein the
friction roller drive includes a drive roller and at least
two friction rollers connected to the drive roller,
wherein one friction roller is configured to move the
30 sliding device from the ready position into the feeding
area and another of the friction rollers is configured to
move the sliding device from the feeding area to the ready
position.
7. The apparatus according to claim 6, wherein the
35 friction roller drive is located approximately at half a
length of the guide unit.
8. The apparatus according to claim 6, wherein, in



at least one of the ready positions and the feeding area, an end of the sliding device facing one of the friction rollers is configured to be in drive connection with the friction rollers.

- 5 9. The apparatus according to claim 8, further including a spring force storage means acting against the sliding device for providing an end position of the sliding device in one of the ready positions and the feeding area.
- 10 10. The apparatus according to any preceding claim, further including a holding-back device for positioning the collecting container in the feeding area, wherein the holding-back device is switchable into a travel path of the collecting container in front of the feeding area in
15 the direction of movement, and wherein the holding-back device acts on the sliding device during a return movement thereof.
11. The apparatus according to claim 10, wherein the holding-back device in the switched-on position thereof is
20 configured to push the empty collecting container in the feeding area from the sliding device during the return travel thereof.
12. The apparatus according to claim 10, wherein the holding-back device includes at least one locking lever
25 connected to the guide unit and pivotable into the travel path of the sliding device.
13. The apparatus according to any one of claims 2 to 12, further including a floor in the feeding area, wherein the floor is located at a lower level than a receiving
30 plane of the sliding device for placing the collecting container on the floor.
14. The apparatus according to any one of claims 2 to 13, wherein a length of travel of the sliding device is adjustable.
- 35 15. The apparatus according to any preceding claim, in which the flat products include shipment pouches, printed products or work pieces.



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16. An apparatus for sorting or selectively collecting flat products which are individually supplied by conveyor, substantially as herein described with reference to the accompanying drawings.

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Dated this 11th day of February 2002

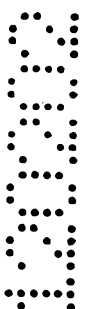
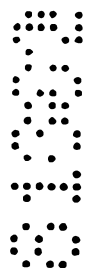
GRAPHIA-HOLDING AG

By their Patent Attorneys

GRIFFITH HACK

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Fellows Institute of Patent and
Trade Mark Attorneys of Australia



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Fig. 2

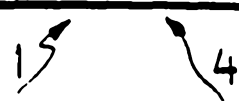
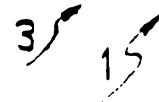


Fig. 3



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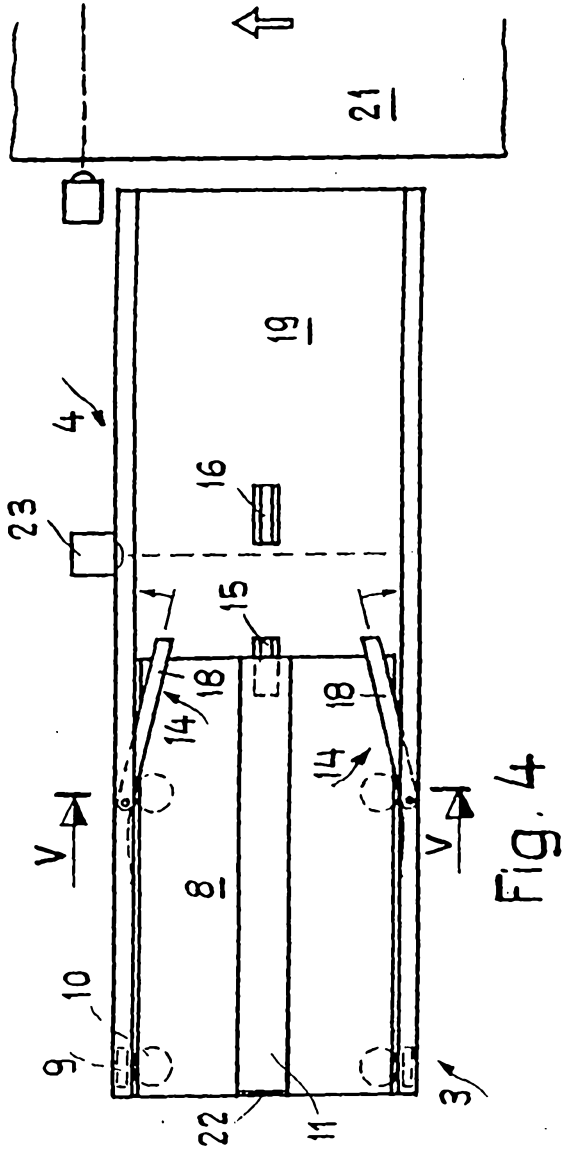


Fig. 5

