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Inventor(s)	Neubauer; Michael

Device for conveying containers and use thereof

Abstract

The invention relates, inter alia, to a device for conveying containers for a container processing facility. The device has a first, preferably continuous, container conveyor, a second, preferably continuous, container conveyor, which has multiple preferably plate-shaped carriers for transporting the containers, and a transfer station by use of which the containers can be removed from the first container conveyor and positioned on the multiple carriers of the second container conveyor. Advantageously, the device allows unstable containers to be transported securely and these containers to be buffered by use of the carriers.

Inventors:	Neubauer; Michael (Grassau, DE)
Applicant:	KRONES AG (Neutraubling, DE)
Family ID:	1000008748142
Assignee:	KRONES AG (Neutraubling, DE)
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Primary Examiner: Bidwell; James R

Attorney, Agent or Firm: Caesar Rivise, PC

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

(1) This application claims priority under 35 U.S.C. § 119(a) to DE 10 2022 114 419.4, filed Jun. 8, 2022, the content of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

(2) The invention relates to a device for conveying containers and to a container processing facility with a device for conveying containers. The invention further relates to the use of a device for conveying containers or of a container processing facility with a device for conveying containers.

TECHNICAL BACKGROUND

(3) Facilities for filling and packing liquid products (e.g., beverages, personal care products, cleaning agents, etc.) generally feature multiple machines through which the containers pass in succession. The machines can have, for example, a stretch blow molding machine, a bottle washing machine, a filling machine, a labeling machine, a packing machine, or a palletizing machine.

(4) Conventionally, conveyor belts are often used to transport the containers from one machine to the next machine. These conveyor belts can have multiple tasks. This includes transport from one machine to the next machine. In addition, conveyor belts can also function as buffers. These are usually wide conveyor belts (the width of the conveyor belt being significantly greater than the width of the containers) on which many containers can be accumulated together in mass transport.

(5) With the conventional technique, containers that are not self-supporting, for example for cosmetics or healthcare, can only be transported with constraints. Thus, for example, only self-supporting containers can be transported and buffered on conveyor belts. In the case of specially shaped containers that are not self-supporting, such as those used for shower gels and the like, for example, there is a high risk of falling in mass transport. The conveyor speed must be significantly decreased, which likewise leads to a significant decrease in the throughput of the facility.

(6) In most processing machines, the containers are processed in single file, i.e., one after the other. If mass transport is present upstream of such a machine, an individualization path is required to gather the containers from the wide mass transporter onto one track. This individualization is intensive in both space and cost.

(7) In many cases, mass transport is provided between the wet and dry parts of the facility, i.e., usually between the labeling machine and the packing machine. This affords the advantage of being able to buffer a certain number of containers in the event of a malfunction in the packing machine. This can be important, for example, in order to be able to empty the oven of a stretch blow molding machine despite downstream machines being out of action in order to avoid destroying the preforms in the oven. The infeeds of current packing machines often require a lane-guided infeed, i.e., the containers must enter the machine next to one another in multiple rows. To transition from

mass transport to a lane-guided infeed, additional devices are required, for example an accumulation section in which the containers are guided from the mass flow into individual lanes. This is a region in which many disruptions can occur due to containers getting stuck or falling.

(8) WO 2017/001750 A1 discloses a device for packing products, the device comprising a packing module in which the products are packed in batches by shrink-wrapping or case packing, and also a belt extending in a conveying direction in order to supply said module with batches of products. The device further has a supply means which delivers the products on the belt from a station upstream of the packing device, the supply means extending at least partially through at least one lateral zone belonging to the packing device, next to the belt.

(9) US 2021/0331821 A1 discloses a packing system comprising a first transfer station to receive a plurality of products thereon, a staging station comprising a track and a plurality of shuttle members configured to move along a path defined by the track, and a second transfer station with a robotic arm coupled to a plurality of gripping members. The multiple gripping members can be configured to pick up the multiple products from one or more of the multiple shuttle members.

(10) The object of the invention is to provide an improved device for conveying containers with which unstable containers can preferably also be conveyed quickly and reliably, and preferably with a buffering capability.

SUMMARY OF THE INVENTION

(11) The object is achieved by the invention.

(12) One aspect of the present disclosure relates to a device for conveying containers for a container processing facility. The device has a first, preferably continuous, container conveyor and a second, preferably continuous, container conveyor, which has multiple preferably plate-shaped carriers for transporting the containers. The device further has a transfer station by means of which the containers can be removed from the first container conveyor and positioned on the multiple carriers of the second container conveyor.

(13) Advantageously, the device makes it possible for containers that are unstable or unsuitable for accumulation to be transported reliably by means of the carriers of the second container conveyor. The carriers can significantly reduce the risk of falling. In addition, buffering of containers unsuitable for accumulation can easily be achieved by means of the carriers of the second container conveyor. The containers can always be guided by means of the carriers and thus be suitable for accumulation. An accumulation section can be dispensed with since, by virtue of the carriers, the containers preferably already arrive in the required formation downstream of the second container conveyor, for example at a packing machine. Separate grouping of the containers upstream of the packing machine can thus also be dispensed with. Compared with the conventional techniques, the device can also be particularly compact and, for example, have a significantly smaller facility footprint. Advantageously, the carriers can also contribute to decreasing the number of format parts required, since a carrier can replace a plurality of format parts. A further advantage can lie in container tracking, since mass transport is dispensed with. Each container can be tracked in a targeted manner.

(14) In one embodiment, the multiple carriers each have multiple container holders for accommodating multiple of the containers (e.g., one container holder per container to be accommodated), wherein the number of the multiple container holders is preferably ≥ 2 , ≥ 3 , ≥ 4 , ≥ 5 , ≥ 6 or ≥ 10 . Advantageously, multiple containers can thus be transported in a self-supporting manner per carrier, and preferably already in a formation as required by a packing device arranged downstream.

(15) Preferably, the multiple container holders can be configured to be identical or at least partially different, for example in dimensions and/or shape.

(16) In a further exemplary embodiment, the multiple container holders have one or more, preferably grouped, first container holders and one or more, preferably grouped, second container holders. The one or more first container holders on the one hand, and the one or more second

container holders on the other hand, can be configured to be different from one another, preferably in dimensions and/or shape. Advantageously, different container formats can thus also be transported per carrier, whereby a container format can be changed in a simple manner without complicated modification of the second container conveyor.

(17) Preferably, the multiple first container holders and the multiple second container holders can be arranged on the same side (e.g., the upper side) of each respective carrier, for example grouped next to one another. Alternatively, the multiple first container holders and the multiple second container holders can be arranged on different sides of the respective carrier, for example on an upper side and on an underside of the respective carrier.

(18) In a further exemplary embodiment, the multiple container holders are configured as depressions or recesses in an upper side of the respective carrier.

(19) Preferably, the multiple container holders can each be shaped to accommodate a footprint or base of the containers.

(20) In a further exemplary embodiment, the second container conveyor has a continuous conveying element, preferably a conveyor belt, carrier belt, conveyor band or conveyor chain. The multiple carriers can be borne on the conveying element and preferably rest thereon loosely, have buffering capability and/or accumulation capability. Advantageously, the second container conveyor can thus be constructed in a structurally particularly simple and cost-effective manner and still allow buffering, since the carriers with the containers can be moved together in an accumulation by means of the conveying element.

(21) In one embodiment, the multiple carriers are configured as pucks, preferably packaging pucks. Alternatively or additionally, the multiple carriers can be buffered and/or accumulated by the second container conveyor. Alternatively or additionally, the second container conveyor is configured as a buffer conveyor for selectively accumulating the multiple carriers and relieving congestion in the multiple carriers. Alternatively or additionally, the second container conveyor has a buffer section, preferably downstream of the transfer station. Alternatively or additionally, a length of the transport section of the second container conveyor is greater, preferably at least 50%, at least 70% or at least 100% greater than a length of the transport section of the first container conveyor. Advantageously, buffering of the containers on the second container conveyor is thus be made possible.

(22) In a further embodiment, the multiple carriers can be moved independently of one another. Alternatively or additionally, the second container conveyor can be configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor or a planar motor conveyor, and the multiple carriers can be configured as movement devices moved by the long-stator linear motor conveyor, the short-stator linear motor conveyor or the planar motor conveyor which are movable independently of one another. This can advantageously allow the carriers to be individually moved and controlled. A further advantage can consist in that the carriers with the containers can be placed very precisely in a packing device or can even go to different stations. A brief reverse movement can also be possible. In this regard, the planar motor conveyor offers even greater flexibility with respect to movement, positioning and modification.

(23) In a further embodiment, the multiple carriers are exchangeable, preferably without tools. Alternatively or additionally, the multiple carriers can be removed from the second container conveyor by means of the transfer station and can preferably be transported to a parking station or to an automated guided vehicle. Alternatively or additionally, the multiple carriers can be positioned on the second container conveyor by means of the transfer station, preferably taken from a parking station or an automated guided vehicle. It is thus advantageously possible to provide a design that requires as few equipment parts as possible. For equipment parts that are difficult to avoid, such as container-specific carriers, quick-change methods can be used. Thus, in the case of a change in container format or a change in packing format, the carriers can preferably be removed from the second container conveyor fully automatically by means of the transfer station. The

removed carriers can be transported away for storage, for example by means of the automated guided vehicle. Likewise, new carriers that have the desired format can preferably be delivered by means of the automated guided vehicle and be placed onto the second container conveyor by the transfer station.

(24) In one embodiment, the transfer station is configured to grab the containers from the first container conveyor and position the grabbed containers on the carriers. Alternatively or additionally, the transfer station is configured to reorient the containers removed from the first container conveyor in a predefinable orientation and optionally to position them on the multiple carriers in the predefinable orientation. Alternatively or additionally, the transfer station can be configured to remove a multiple of the containers, preferably simultaneously, from the first container conveyor in one work cycle, and to position the removed containers, preferably simultaneously, on multiple of the carriers, preferably simultaneously. Preferably, the flexibility and throughput of the device can thus be increased.

(25) In a further embodiment, the transfer station has at least one robot device, preferably an articulated robotic arm device, a delta robot device, or a SCARA robot device for removing the containers from the first container conveyor and for positioning the containers on the multiple carriers of the second container conveyor. Optionally, the at least one robot device can have a grabber for grabbing one or more of the containers from the first container conveyor.

(26) In one exemplary embodiment, the at least one robot device has multiple (e.g., two or three) robot devices, which are preferably arranged next to one another, preferably parallel to a longitudinal axis of the first container conveyor and/or to a longitudinal axis of the second container conveyor.

(27) In another exemplary embodiment, the device further has a controller configured to operate the multiple robot devices such that at least two of the multiple robot devices each position at least one container to a common carrier from among the multiple carriers. Alternatively or additionally, the controller can be configured in such a way that, in one work cycle, the multiple robot devices each remove multiple of the containers, preferably simultaneously, from the first container conveyor and position the removed containers, preferably simultaneously, on multiple of the carriers. Advantageously, the load on the robot devices can thus be as uniform as possible and the loading of the carriers can thus be as continuous as possible, for example as the carriers travel substantially constantly along the second container conveyor.

(28) Preferably, the term “controller” can refer to an electronic system (e.g., embodied as a driver circuit or with microprocessors and memory) that can perform control tasks and/or regulating tasks and/or processing tasks depending on the configuration. Although the term “control” is used herein, this can also comprise or be understood as “regulate” or “feedback-control” and/or “process.”

(29) In one embodiment, the first container conveyor is configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor, or a planar motor conveyor. Alternatively or additionally, the first container conveyor can be configured to adjust a relative distance of the container transported by the first container conveyor, preferably to have a predefinable relative distance between adjacent containers. Advantageously, the first container conveyor can space the containers relative to one another in a way that is favorable for a subsequent step. Gaps in the container stream, for example due to containers being removed upstream of the first container conveyor (e.g., in the labeling device), can be closed.

(30) It is possible for a container transfer section of the first container conveyor from which the containers can be removed by means of the transfer station, and a container accepting section of the second container conveyor, in which the containers can be positioned on the multiple carriers by means of the transfer station, to run parallel to one another and/or have opposite conveying directions. Advantageously, particularly quick container transfer by means of the transfer station can thus be made possible.

(31) A further aspect of the present disclosure relates to a container processing system with a device

for conveying containers as disclosed herein. The container processing facility can preferably have a labeling device for labeling the containers, which is preferably arranged directly upstream of the first container conveyor. Alternatively or additionally, the container processing facility can have, for example, a packing device for packing the containers, which is preferably arranged directly downstream of the second container conveyor and preferably configured to pack the containers in groups (e.g., packs) in the format predetermined by the multiple carriers. The container processing system can advantageously afford the same advantages as those which have already been explained with reference to the device for conveying containers.

(32) The container processing facility can preferably be configured to produce, clean, coat, check, fill, seal, label, decorate, print on and/or pack containers for liquid media, preferably beverages, liquid foodstuffs, cleaning agents, cosmetic products or care products.

(33) For example, the containers can be configured as bottles, cans, canisters, cartons, vials, etc.

(34) Another aspect of the present disclosure relates to the use of a device as disclosed herein or to a container processing facility as disclosed herein to convey containers, wherein the containers preferably each have a footprint which is elongate (e.g., oval), wherein, for example, a length of the footprint of the containers is at least 50%, at least 70% or at least 100% greater than a width of the footprint of the containers. The use can advantageously afford the same advantages as those which have already been explained with reference to the device for conveying containers.

(35) The preferred embodiments and features of the invention described above can be combined with one another as desired.

Description

BRIEF DESCRIPTION OF THE FIGURES

(1) Further details and advantages of the invention are described below with reference to the appended drawings. In the drawings:

(2) FIG. 1 shows a perspective view of a section of a container processing system according to one exemplary embodiment of the present disclosure;

(3) FIG. 2 shows a perspective view of a device for conveying containers according to one exemplary embodiment of the present disclosure;

(4) FIG. 3 shows a top view of the exemplary device for conveying containers;

(5) FIG. 4 shows a schematic representation to explain one example of the operation of a transfer station of the exemplary device for conveying containers; and

(6) FIG. 5 shows a schematic representation to explain another example of the operation of a transfer station of the exemplary device for conveying containers.

(7) The embodiments shown in the figures correspond at least in part, so that similar or identical parts are provided with the same reference signs and reference is also made to the description of other embodiments or figures for the explanation thereof to avoid repetition.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

(8) FIG. 1 shows a section of a container processing facility **10**. Containers **12** can be processed in the container processing facility **10**. Preferably, a base or footprint of the containers **12** can be elongate, for example oval or substantially rectangular with rounded corners. For example, a length of the footprint of the containers **12** can be at least 50%, at least 70% or at least 100% greater than a width of the footprint of the containers **12**. The containers **12** can therefore have an increased tendency to tip on a longitudinal axis of the base or footprint.

(9) The container processing facility **10** has a device **18** for conveying and preferably buffering the containers **12**. Optionally, the container processing facility **10** can have a labeling device **14** and/or a packing device **16**.

(10) The labeling device **14** can be arranged upstream (in the direction of movement of the

containers) of the device **18**. A filling device for filling the containers **12** and/or a sealing device for sealing the containers **12** can also be arranged upstream of the labeling device **14**, for example.

(11) The labeling device **14** can label the containers **12**. The labels can, for example, be self-adhesive, shrink-fitted, or applied to the containers **12** by means of an adhesive (e.g., glue). The labeling device **14** can, for example, be configured as a linear labeling device or, as shown in FIG. **1**, as a rotary labeling device.

(12) The packing device **16** can be arranged downstream (in the direction of movement of the containers) of the device **18**.

(13) The packing device **16** can pack the containers **12**, preferably in packs of multiple containers **12**. The packing device **16** can preferably receive the containers **12** in a format or grouping from the device **18**, which corresponds to a packing format or packaging format used by the packing device **16**.

(14) The device **18** is shown in FIGS. **1** to **3**.

(15) The device **18** can connect the labeling device **14** and the packing device **16** to one another. The device **18** can receive the containers **12** from the labeling device **14**. The device **18** can transport the containers **12** to the packing device **16**.

(16) The device **18** has a first container conveyor **20**, a second container conveyor **22** and a transfer station **24**. The device **18** can have a controller (not shown in FIGS. **1** to **3**), which can be configured to operate the first container conveyor **20**, the second container conveyor **22** and/or the transfer station **24** according to the functions thereof explained herein.

(17) Preferably, the first container conveyor **20** can be a continuous container conveyor. For example, the first container conveyor **20** can have a substantially oval course, as shown in FIGS. **1** to **3**. The course can be oriented, for example, in a horizontal plane (as shown) or in a vertical plane.

(18) The first container conveyor **20** can be arranged, preferably directly, downstream of the labeling device **14**. The first container conveyor **20** can receive the containers **12** from the labeling device **14**. The first container conveyor **20** can receive the containers **12**, for example, with a predetermined spacing of X mm (e.g., 126 mm). It is possible for there to be gaps in the container stream which are caused, for example, by defective containers being removed upstream of the first container conveyor **20**.

(19) The first container conveyor **20** can be arranged directly upstream of the transfer station **24**. The first container conveyor **20** can convey the containers **12** to the transfer station **24**. During transport to the transfer station **24**, the containers **12** can have their orientation relative to one another adjusted (e.g., be rotated), their distances relative to one another adjusted and/or be grouped into groups of two or more containers **12** by the first container conveyor **20**.

(20) Preferably, the first container conveyor **20** can transport the containers **12** independently of one another and/or individually. Particularly preferably, the first container conveyor **20** can be configured to adjust a relative distance between the transported containers **12**. Preferably, the distances between adjacent containers **12** can be adjusted by the first container conveyor **20** in such a way that adjacent containers **12** on the first container conveyor **20** have a predefinable relative distance between one another.

(21) The first container conveyor **20** can be configured, for example, as a long-stator linear motor conveyor or a short-stator linear motor conveyor, as shown in FIGS. **1** to **3**. The long-stator linear motor conveyor or short-stator linear motor conveyor can have multiple movement devices, movers or shuttles for transporting containers (not shown in detail in FIGS. **1** to **3**). Each movement device can transport one or more containers **12**. The movement devices can be guided along a preferably continuous guide track **26**, for example by means of rollers or sliding shoes. The movement devices can be driven independently of one another along the guide track **26**. The movement devices can be driven by means of magnetic interaction between permanent magnets and electromagnets (=short stator or long stator). In the case of a long-stator linear motor conveyor, the movement devices can

have the permanent magnets, and the electromagnets can be arranged in multiple long stator segments along the guide track **26**, for example. In the case of a short-stator linear motor conveyor, the movement devices can have the electromagnets, and the permanent magnets can be arranged along the guide track **26**.

(22) Alternatively, the first container conveyor **20** can be configured as a planar motor conveyor, for example (not shown in FIGS. **1** to **3**). The planar motor conveyor can have multiple movement devices, movers or shuttles for transporting containers with at least two degrees of freedom (x-direction and y-direction). The movement devices can preferably be moved independently of one another by means of a planar drive surface through magnetic interaction with the drive surface. It is also possible for there to be a lifting movement (z-direction) and/or a tilting movement of the movement devices relative to the drive surface by means of the magnetic interaction. Preferably, the drive surface can be oriented horizontally or vertically. Each movement device can transport one or more containers.

(23) It is possible for there to be an additional (third) container conveyor (not shown in the figures). The additional container conveyor can be arranged above, next to or below the first container conveyor. The additional container conveyor can in principle be configured as already explained for the first container conveyor **20**. The additional container conveyor can be used to increase throughput, for example. Alternatively, the additional container conveyor can be configured to transport containers with another container format than those of the first container conveyor **20**, for example. In this way, a change in container format can preferably be made possible without modification in this region of the device **18**.

(24) Preferably, the second container conveyor **22** can be a continuous container conveyor. For example, the second container conveyor **22** can have a substantially oval course, as shown in FIGS. **1** to **3**. The course can be oriented, for example, in a horizontal plane (as shown).

(25) The second container conveyor **22** can be arranged directly downstream of the transfer station **24**. The second container conveyor **22** can receive the containers **12** from the transfer station **24**.

(26) The second container conveyor **22** can be arranged directly upstream of the packing device **16**. The second container conveyor **22** can convey the containers **12** to the packing device **16**. During transport to the packing device **16**, the containers **12** can preferably be buffered if needed, for example by accumulating the containers **12**.

(27) The second container conveyor **22** has multiple preferably plate-shaped carriers **28** for transporting the containers **12**. The carriers **28** are preferably configured as so-called pucks, preferably packaging pucks (pucks for multiple containers in each case). The pucks can each carry one or more containers **12**.

(28) The carriers **28** can each have one or more container holders **30**, **32** for accommodating one or more containers **12**. Preferably, the number of the multiple container holders **30**, **32** can be ≥ 2 , ≥ 3 , ≥ 4 , ≥ 5 , ≥ 6 or ≥ 10 . Preferably, the at least one container holder **30**, **32** can be shaped to accommodate a base or footprint of the containers **12**. Particularly preferably, a shape (e.g., profile and/or contour) of the at least one container holder **30**, **32** can be matched to a shape of a base or footprint of the containers **12**.

(29) It is possible for the multiple container holders **30**, **32** to be configured identically. The container holders **30**, **32** can thus accommodate the same container formats.

(30) Alternatively, at least one first container holder **30** and at least one second container holder **32** can be comprised in each carrier **28**, for example. The at least one first container holder **30** and the at least one second container holder **32** can be configured to be different from one another, preferably in dimensions and/or shape. Preferably, the at least one first container holder **30** can accommodate a container format other than that accommodated by the at least one second container holder **32**. For example, different container formats can be transported in this way, e.g., 250 ml containers and 350 ml containers.

(31) For example, each carrier **28** can comprise multiple first container holders **30** and multiple

second container holders **32**. The first container holders **30** and the second container holders **32** can be arranged on the same side (e.g., upper side) of the respective carrier **28**, for example grouped next to one another as shown in FIGS. **1** to **3**. Alternatively, the multiple first container holders **30** and the multiple second container holders **34** can be arranged on different sides of the respective carrier **28**, for example on an upper side and on an underside of the respective carrier. In this case, a change in container format requires only that the carriers **28** be turned over.

(32) The at least one container holder **30**, **32** can preferably be configured as depressions or recesses in an upper side of the respective carrier. It is understood that modified embodiments of the carriers **28** are also possible.

(33) The carriers **28** can be moved together with the containers **12** positioned thereon by means of the second container conveyor **22** from the transfer station **24** to a downstream end region of the second container conveyor **22**. The packing device **16** can preferably be arranged in the downstream end region or downstream thereof. Preferably, the packing device **16** can pack the containers **12** in groups in the format predetermined by the respective carriers **28**, e.g., to form packs. It is possible for the packing device **16** to remove the containers **12** directly from the carriers **28** for packing or to pack the containers **12** directly on the carriers **28**, e.g., to wrap them.

(34) After the containers **12** have been removed (e.g., to the packing device **16**), the carriers **28** can be transported back to the transfer station **24**. For example, a separate return conveyor can transport the carriers **28** back to the transfer station **24**. For the sake of clarity, the return conveyor is not shown in FIGS. **1** to **3**. Alternatively, it is possible, for example, for the second container conveyor **22** itself to transport the carriers **28** at least partially back to the transfer station **24**.

(35) Preferably, the carriers **28** are provided in or on the second container conveyor **22** in an exchangeable manner. Preferably, the carriers **28** can be exchanged without tools, e.g., by removing one carrier **28** and replacing the removed carrier **28** with another carrier **28**. For example, the carriers **28** can be removed by means of the transfer station **24** and/or can be positioned on the second container conveyor **22** by means of the transfer station **24**. The transfer station **24** can transport the removed carrier **28** directly or indirectly to a parking station or to an automated guided vehicle (AGV), for example. Alternatively or additionally, the transfer station **24** can take a (or another) carrier **28** from a parking station or an automated guided vehicle and position it on the second container conveyor **22**.

(36) The carriers **28** can be buffered and/or accumulated by the second container conveyor **22**. Specifically, the second container conveyor **22** can be configured as a buffer conveyor for selectively accumulating the carriers **28** and relieving congestion in multiple carriers **28**.

(37) The second container conveyor **22** is preferably long enough to have sufficient space for buffering a number of containers **12** or carriers **28** if needed. Accordingly, the second container conveyor **22** can have a buffer section. For example, a length of the transport section of the second container conveyor **22** can be greater, preferably at least 50%, at least 70% or at least 100% greater, than a length of the transport section of the first container conveyor **20**.

(38) To accumulate the carriers **28**, these can preferably be movable independently of one another. For this, different configurations of the second container conveyor **22** can be provided.

(39) For example, the second container conveyor **22** can have a continuous conveying element **34**. The conveying element **34** can preferably have a conveyor belt, a carrier belt, a conveyor band or a conveyor chain, e.g., a flat top chain conveyor. The multiple carriers **28** can be borne by the conveying element **34**. Preferably, the carriers **28** can rest loosely on the conveying element **34**, so that they can preferably be buffered by accumulating the carriers **28**.

(40) Alternatively, the second container conveyor **22** can be configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor or a planar motor conveyor (not shown in FIGS. **1** to **3**), for example.

(41) The long-stator linear motor conveyor or short-stator linear motor conveyor can have multiple movement devices, movers or shuttles for transporting containers. The movement devices can form

or have the carriers **28**. The movement devices can be guided along a preferably continuous guide track, for example by means of rollers or sliding shoes. The movement devices can be driven independently of one another along the guide track. The movement devices can be driven by means of magnetic interaction between permanent magnets and electromagnets (=short stator or long stator). In the case of a long-stator linear motor conveyor, the movement devices can have the permanent magnets, and the electromagnets can be arranged in multiple long stator segments along the guide track, for example. In the case of a short-stator linear motor conveyor, the movement devices can have the electromagnets, and the permanent magnets can be arranged along the guide track.

(42) The planar motor conveyor can have multiple movement devices, movers or shuttles for transporting containers with at least two degrees of freedom (x-direction and y-direction). The movement devices can form or have the carriers **28**. The movement devices can preferably be moved independently of one another by means of a planar drive surface through magnetic interaction with the drive surface. It is also possible for there to be a lifting movement (z-direction) and/or a tilting movement of the movement devices relative to the drive surface by means of the magnetic interaction. Preferably, the drive surface can be oriented horizontally or vertically.

(43) The transfer station **24** can remove the containers **12** from the first container conveyor **20**. The containers **12** can, for example, each be grabbed from the transfer station **24** individually or in a group. The transfer station **24** positions the removed containers **12** on the carriers **28** of the second container conveyor **22**. For example, the grabbed containers **12** can be positioned on the carriers **28** by the transfer station **24** and released there. Preferably, the carriers **28** can move in a conveying direction of the second container conveyor **22** as the transfer station **24** positions the containers **12** on the carriers **28**.

(44) The transfer station **24** can thus be considered as a transfer station for transferring the containers **12** from the first container conveyor **20** to the second container conveyor **22**.

(45) The transfer station **24** can be arranged directly downstream of the first container conveyor **20** and directly upstream of the second container conveyor **22** relative to the container stream.

(46) The transfer station **24** can, if needed, be configured to reorient the containers **12** removed from the first container conveyor **20** in a predefinable orientation.

(47) A position of the container **12** to be removed from the first container conveyor **20** can, for example, be extracted or inferred from control data, for example when the first container conveyor **20** is configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor or a planar motor conveyor. Alternatively or additionally, the device **18** can have a sensor system for detecting the position of the containers **12** on the first container conveyor **20**. For example, the sensor system can be optical, preferably camera-based.

(48) A position of the carrier **28** on the second container conveyor **22** for positioning the removed container **12** can, for example, be extracted or inferred from control data, for example when the second container conveyor **22** is configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor or a planar motor conveyor. Alternatively or additionally, the device **18** can have a sensor system for detecting the position of the carriers **28** on the second container conveyor **22**. For example, the sensor system can be optical, preferably camera-based.

(49) The transfer station **24** preferably has at least one robot device **36, 38, 40**. The at least one robot device **36, 38, 40** can remove the containers **12** from the first container conveyor **20** and position them on the carriers **28** of the second container conveyor **22**. The at least one robot device **36, 38, 40** preferably has at least one grabber for removing the containers **12** from the first container conveyor **20** and for releasing the grabbed containers **12** on the carriers **28**.

(50) The at least one robot device **36, 38, 40** can be configured, for example, as an articulated robotic arm device, as shown in FIGS. **1** to **3**. Alternatively, the at least one robot device **36, 38, 40** can be configured, for example, as a delta robot device or a SCARA robot device.

(51) Multiple robot devices **36, 38, 40** is particularly preferred. The robot devices **36, 38, 40** can

preferably be arranged next to one another, for example parallel to a longitudinal axis of the first container conveyor **20** and/or to a longitudinal axis of the second container conveyor **22**.

(52) A variety of possibilities are conceivable for positioning the containers **12** on the carriers **28** removed from the first container conveyor **20**.

(53) It is preferred here for at least one container **12** to be positioned on the carriers **28** by each of the multiple robot devices **36**, **38**, **40**. The robot devices **36**, **38**, **40** can each position at least one container **12** on one of the multiple carriers **28**. For example, the first robot device **36** can position at least one container **12** on a carrier **28**. The second robot device **38** can position at least one container **12** on the same carrier **28**. Optionally, the third robot device **40** can position at least one container **12** on the same carrier **28**.

(54) It is also preferred here if the transfer station **24** or each of the robot devices **36**, **38**, **40** removes multiple containers **12**, preferably simultaneously, from the first container conveyor **20** and positions the removed containers **12**, preferably simultaneously, on multiple of the carriers **28**. For example, the first robot device **36** can position multiple removed containers **12** on two, three or more carriers **28**.

(55) FIGS. **4** and **5** show, purely schematically, two exemplary modes of operation of the transfer station **24**. In both figures, the carriers **28** each have an accommodation capacity of six containers **12** in 3×2 format. The containers **12** positioned by the first robot device **36** are marked with diagonal hatching. The containers **12** positioned by the second robot device **38** are marked with vertical hatching. The containers **12** positioned by the third robot device **40** are marked with horizontal hatching. Containers positioned in successive work cycles are marked with different distances between the respective hatched lines (first work cycle: large distance between hatched lines=>second work cycle: small distance between hatched lines=>third work cycle: large distance between hatched lines=>etc.). The conveying direction of the second container conveyor **22** is indicated by an arrow **F**.

(56) In the exemplary mode of operation in FIG. **4**, the first robot device **36** can position ten containers **12** on five carriers **28** per work cycle, namely two containers **12** per carrier **28**. The second robot device **38** can position ten further containers **12** on the same carriers **28** per work cycle, namely two containers **12** per carrier **28**. The third robot device **40** can position ten additional further containers **12** on the same carriers **28** per work cycle, namely two containers **12** per carrier **28**.

(57) In the exemplary mode of operation of FIG. **5**, the mode of operation of FIG. **4** is modified such that the carriers **28** on which the robot devices **36**, **38**, **40** position ten containers **12** per work cycle are at least partially different.

(58) The invention is not limited to the preferred exemplary embodiments described above. Rather, a plurality of variants and modifications are possible which likewise make use of the inventive concept and therefore fall within the scope of protection. In particular, the invention also claims protection for the subject matter and the features of the dependent claims independently of the claims to which they refer. In particular, the individual features of independent claim **1** are each disclosed independently of one another. In addition, the features of the dependent claims are also disclosed independently of all of the features of independent claim **1** and, for example, independently of the features relating to the presence and/or the configuration of the first container conveyor, of the second container conveyor and/or of the transfer station of independent claim **1**. All ranges specified herein are to be understood as disclosed in such a way that all values falling within the respective range are individually disclosed, e.g., also as the respective preferred narrower outer limits of the respective range.

LIST OF REFERENCE SIGNS

(59) **10** Container processing facility **12** Container **14** Labeling device **16** Packing device **18**
Device for conveying containers **20** First container conveyor **22** Second container conveyor **24**
Transfer station **26** Guide track **28** Carrier **30** First container holder **32** Second container holder **34**

Claims

1. A device for conveying containers for a container processing facility, comprising: a first container conveyor; a second container conveyor which has multiple carriers for transporting the containers; and a transfer station configured to remove the containers from the first container conveyor and to position the containers on the multiple carriers of the second container conveyor, wherein the device comprises at least one of the following features: the multiple carriers are configured as pucks; the second container conveyor is configured to buffer the multiple carriers; the second container conveyor is configured to accumulate the multiple carriers; the second container conveyor is configured as a buffer conveyor for selectively accumulating the multiple carriers and relieving congestion in the multiple carriers; the second container conveyor has a buffer section; and a length of a transport section of the second container conveyor is greater than a length of a transport section of the first container conveyor.
2. The device according to claim 1, wherein: the multiple carriers each have multiple container holders for accommodating multiple of the containers.
3. The device according to claim 2, wherein: the multiple container holders have one or more first container holders and one or more second container holders; and the one or more first container holders are configured to be different from the one or more second container holders.
4. The device according to claim 2, wherein: the multiple container holders are configured as depressions or recesses in an upper side of the respective carrier.
5. The device according to claim 1, wherein: the second container conveyor has a continuous conveying element; and the multiple carriers are borne on the conveying element.
6. The device according to claim 3, further comprising at least one of the following features: the device comprises from 2 to 10 of the multiple container holders; the one or more first container holders are grouped; the one or more second container holders are grouped; and the one or more first container holders have different dimensions than the one or more second container holders; and the one or more first container holders have different shapes than the one or more second container holders.
7. The device according to claim 1, wherein at least one of: the multiple carriers are movable independently of one another; and the second container conveyor is configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor or a planar motor conveyor, and the multiple carriers are configured as movement devices moved by the long-stator linear motor conveyor, the short-stator linear motor conveyor or the planar motor conveyor which are movable independently of one another.
8. The device according to claim 1, wherein at least one of: the multiple carriers are exchangeable without tools; the multiple carriers can be removed from the second container conveyor by use of the transfer station; and the multiple carriers can be positioned on the second container conveyor by use of the transfer station.
9. The device according to claim 1, wherein at least one of: the first container conveyor is configured as a long-stator linear motor conveyor, a short-stator linear motor conveyor or a planar motor conveyor; and the first container conveyor is configured to adjust a relative distance of the container transported by the first container conveyor.
10. The device according to claim 1, wherein: the transfer station has at least one robot device, preferably an articulated robotic arm device, a delta robot device, or a SCARA robot device for removing the containers from the first container conveyor and for positioning the containers on the multiple carriers of the second container conveyor; and optionally the at least one robot device has a grabber for grabbing one or more of the containers from the first container conveyor.

11. The device according to claim 10, wherein: the at least one robot device has multiple robot devices arranged next to one another.
12. The device according to claim 11, further comprising: a controller configured to operate the multiple robot devices such that at least one of: at least two of the multiple robot devices each position at least one container on a common carrier from among the multiple carriers; and in one work cycle, the multiple robot devices each remove multiple of the containers from the first container conveyor and position the removed containers on multiple of the carriers.
13. The device according to claim 10, further comprising at least one of the following features: the at least one robot device is a member selected from the group consisting of an articulated robotic arm device, a delta robot device, and a SCARA robot device; the at least one robot device has multiple robot devices arranged next to one another parallel to a longitudinal axis of the first container conveyor and/or to a longitudinal axis of the second container conveyor; and the multiple robot devices each remove multiple of the containers simultaneously from the first container conveyor and position the removed containers simultaneously on multiple of the carriers.
14. A container processing facility comprising a device for conveying containers according to claim 1, further comprising at least one of: a labeling device for labeling the containers, which is arranged upstream of the first container conveyor; and a packing device for packing the containers, which is arranged downstream of the second container conveyor.
15. The container processing facility according to claim 14, wherein at least one of: the labeling device is arranged directly upstream of the first container conveyor; and the packing device is arranged directly downstream of the second container conveyor and configured to pack the containers in groups in a format predetermined by the multiple carriers.
16. A method of conveying containers, said method comprising: providing the device according to claim 1; providing containers each having a footprint which is elongate; and conveying the containers between at least two different locations by use of the device.
17. The method according to claim 16, wherein the footprint of each of the containers has a length at least 50% greater than a width of the footprint of each of the containers.
18. A device for conveying containers for a container processing facility comprising: a first container conveyor; a second container conveyor which has multiple carriers for transporting the containers; and a transfer station configured to remove the containers from the first container conveyor and to position the containers on the multiple carriers of the second container conveyor, wherein at least one of: the transfer station is configured to grab the containers from the first container conveyor and position grabbed containers on the carriers; the transfer station is configured to reorient the containers removed from the first container conveyor in a predefinable orientation; and the transfer station is configured to remove multiple of the containers from the first container conveyor in one work cycle, and to position the removed containers on multiple of the carriers.
19. A device for conveying containers for a container processing facility, comprising: a first container conveyor; a second container conveyor which has multiple carriers for transporting the containers; and a transfer station configured to remove the containers from the first container conveyor and to position the containers on the multiple carriers of the second container conveyor, further comprising at least one of the following features: the first container conveyor is continuous; the second container conveyor is continuous; the multiple carriers are plate-shaped; the multiple carriers are configured as packaging pucks; a length of a transport section of the second container conveyor is at least 50% greater than a length of a transport section of the first container conveyor; the multiple carriers are exchangeable without tools; the multiple carriers are configured to be transported to a parking station or to an automated guided vehicle; the multiple carriers can be taken from a parking station or an automated guided vehicle and positioned on the second container conveyor by use of the transfer station; the transfer station is configured to simultaneously remove multiple of the containers from the first container conveyor in one work cycle, and to

simultaneously position the removed containers on multiple of the carriers; the second container conveyor has a continuous conveying element, which is a conveyor belt, carrier belt, conveyor band or conveyor chain, wherein the multiple carriers are borne on the continuous conveying element and have buffering capability and/or accumulation capability; and the first container conveyor is configured to adjust a relative distance of the container transported by the first container conveyor to have a predefinable relative distance between adjacent containers.
