(19) 

SUOMI - FINLAND
(FI)

PATENTTI- JA REKISTERIHALLITUS
PATENT- OCH REGISTERSTYRELSEN
FINNISH PATENT AND REGISTRATION OFFICE

(10) **FI/EP3557541 T3**

(12) **EUROOPPAPATENTIN KÄÄNNÖS**
ÖVERSÄTTNING AV EUROPEISKT PATENT
TRANSLATION OF EUROPEAN PATENT SPECIFICATION

(45) Käännöksen kuulutuspäivä - Kungörelsedag av översättning - Translation available to the public **29.09.2023**

(97) Eurooppapatentin myöntämispäivä - Meddelandedatum för det europeiska patentet - Date of grant of European patent **26.07.2023**

(51) Kansainvälinen patenttiluokitus - Internationell patentklassificering - International patent classification
G07F 7/06 (2006 . 01)

(96) Eurooppapatenttihakemus - Europeisk patentansökan - European patent application EP19163376.7

(22) Tekemispäivä - Ingivningsdag - Filing date **18.03.2019**

(97) Patenttihakemuksen julkiseksitulopäivä - Patentansökans publiceringsdag - Patent application available to the public **23.10.2019**

(30) Etuoikeus - Prioritet - Priority

17.04.2018 DE DE102018205834
30.05.2018 DE DE102018208581
30.05.2018 DE DE102018208575

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(54) Keksinnön nimitys - Uppfinningens benämning - Title of the invention
PULLOJEN ASEMOINTILAITE, PALAUTUSAUTOMAATTI JA KOKOONPANO
BOTTLE POSITIONER, REVERSE VENDING MACHINE AND ASSEMBLY

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a bottle positioner as well as to a reverse vending machine and to a sorting system with such a bottle positioner.

TECHNICAL BACKGROUND

[0002] Reverse vending machines or take-back systems are used to accept empty beverage containers and to pay or credit a corresponding deposit to the user. Various types of beverage containers are intended for return, such as individual bottles, cans, or cups, etc. Such empty beverage containers are also referred to generally as empties.

[0003] In general, empties can be divided into different classes based on their characteristics to which different deposit values are assigned. In the case of bottles, for example, the external shape, weight, any damage, or residual product or a closure on the bottle are recorded as characteristics. Reverse vending machines are designed to determine the characteristics of a bottle that is introduced into the machine in order to decide whether to accept or reject the bottle and whether to issue a corresponding deposit. Accepted bottles can then be forwarded within the system and, for example, placed and collected using a bottle positioner on a bottle table or in a corresponding interim storage area for further processing by staff. Optionally, a presorting of the bottles can already take place in the course of the bottle return in order enable them to be further processed as efficiently as possible according to their characteristics or properties.

[0004] With typical bottle positioners, the bottles are fed in lying down via a feed chute, then stood up and optionally transported further (see, for example, document DE 100 61 462 C2).

[0005] Printed publication DE 10 2006 041 888 B3 describes a positioning apparatus for reverse vending machines for empty containers having the following: a device for standing the empty container up, particularly a bottle chute, a stabilizing device for stabilizing the uprighted empty

container by means of clamping slide jaws that move toward one another, and a conveyor belt downstream from the stabilization device for removing the empty container from the stabilization device, wherein the stabilization device is displaceably supported and can be accelerated by means of an acceleration drive to a speed in the range of the transport speed of the conveyor belt, so that the empty container that is held in the stabilization device is traveling at exactly the speed of the stabilization device when it is placed on the conveyor belt.

SUMMARY OF THE INVENTION

[0006] Against this background, it is the object of the present invention to find solutions that are as efficient as possible for the process of returning and/or sorting empty containers.

[0007] According to the invention, this object is achieved by a bottle positioner with the features of claim 1, by a reverse vending machine with the features of claim 13, and/or by a sorting system with the features of claim 14.

[0008] Accordingly, the following is provided:

- A bottle positioner, comprising a transport element having at least one empties compartment, comprising a feed chute for feeding empty containers, particularly bottles, into an infeed area to the transport element, and comprising a stabilizer which is embodied as a horizontal, linearly movable contact part that is designed to push the fed-in empty container in the infeed area from the feed chute into the at least one empties compartment against the transport element so as to bring the empty container into a vertically stabilized rest position, wherein the transport element is designed to transport the steadied empty container onward in the at least one empties compartment, and wherein the stabilizer is designed to be returned from the empties compartment again before the empty container is moved onward via the transport element.

- A reverse vending machine with a bottle positioner according to the invention.

- A sorting system with a bottle positioner according to the invention.

[0009] The idea on which the present invention is based is to stabilize an empty container that is fed in via a feed chute and, due to the resulting momentum, may be tumbling, by pressing it against a transport element, which then conveys the empty container further. The particular advantage of the present invention lies in the fact that the transport element serves as an object or barrier for pressing the empty container on the one hand while simultaneously acting as a means of transport for the empty container on the other hand. Different functional aspects are thus coordinated with one another, which enables the bottle positioner according to the invention to have an especially compact and simple design. In particular, the number of individual parts to be installed can be kept low, which ultimately saves on manufacturing, maintenance, and assembly costs. What is more, the system according to the invention is less error-prone than known systems from the prior art.

[0010] The bottle positioners according to the invention are especially suitable for use in reverse vending machines and/or sorting systems or similar devices in which a very large number of empty containers are to be received, transported, and/or sorted as in a maximally efficient and error-proof manner. However, the bottle positioners according to the invention can be used for more than the positioning, transporting, and sorting of bottles *per se*. On the contrary: General empty containers such as cans, cups, jars, containers, etc. — optionally disposable or reusable ones — can be processed.

[0011] Advantageous embodiments and refinements follow from the remaining subclaims and from the description with reference to the figures of the drawing.

[0012] According to one refinement, the feed chute can be designed for the substantially vertical infeeding of the empty container. For example, the empty containers can be moved via a conveyor belt in a lying state onto the feed chute, on which they then slide or fall obliquely and/or vertically downward such that they arrive in the infeed area in an approximately upright and/or approximately vertical position.

[0013] In principle, the empty containers can be provided in the infeed area at an angle and/or so as to be tumbling via the feed chute, with the empty containers then being brought into a vertically stabilized rest position via the stabilizer.

[0014] According to the invention, the transport element is has at least one empties compartment. The stabilizer is designed to push the fed-in empty container into the at least one empties compartment. The transport element is designed to further transport the inserted empty container in the at least one empties compartment. According to the invention, the stabilizer thus first pushes the empty container into the empties compartment and, there, against the transport element, for example against a rear wall of the empties compartment. For example, the stabilizer can be designed to press the empty container against the transport element for a predetermined period of time during which it is sufficiently stabilized in its rest position. The empty container is then moved on by the transport element.

[0015] According to the invention, the stabilizer is embodied as a horizontal, linearly movable pressing part. The pressing part is designed to push the fed-in empty container from the feed chute against the transport element and thereby stabilize it. The pressing part is then returned before the empty container is moved on via the transport element.

[0016] The empties compartment can be dimensioned accordingly so that the empty containers that are to be transported remain secure and stable in the empties compartment when they are transported further by the transport element. In a specific example, the bottle positioner can be designed to transport reusable bottles, with the empties compartment being dimensioned such that a bottle that is standing upright in the empties compartment cannot tip over.

[0017] According to one refinement, the transport element can be embodied as a rotating body that is designed to further transport the empty container by means of its own rotation. In this especially efficient and space-saving refinement, an empty container is fed in via the feed chute, pressed against the transport element and thereby stabilized, and then moved further through the rotation of the transport element.

[0018] According to one refinement, the transport element can be embodied as a turnstile with multiple empties compartments. For example, the turnstile can have two, three, four, five, six, or more empties compartments. The empties compartments can be arranged one behind the other in a circumferential direction around the turnstile, it being possible for the empties compartments to be designed to be open radially toward the outside. For example, the circumference of the turnstile can be divided into identically designed and dimensioned empties compartments, e.g., four empties compartments, each of which has an angular range of approximately 90°. In this specific example, the turnstile can have four identical rotating wings which are oriented radially outward from a center of the turnstile in the form of a cross, with two rotating wings respectively delimiting an empties compartment in the circumferential direction. The provision of multiple empties compartments makes it possible, for example, to pass a plurality of empty containers through the bottle positioner and the transport element at the same time.

[0019] The transport element can be designed to rotate continuously and/or in steps. For example, the transport element can be designed to rotate around an angular range corresponding to the number of empties compartments; for example, in the case of four identical empties compartments, a step-by-step rotation through 90° can be provided. In principle, however, the transport element can also be designed with multiple empties compartments that cover different angular ranges — for example, a total of three compartments with two spanning 90° and one spanning 180°, etc. — meaning that rotation can take place in variable or different steps. Alternatively, the transport element can also rotate continuously about its axis, with the rotational speed being selected so as to be so low, for example, that the stabilizer can push an empty container into an empties compartment and stabilize it there without interference by a pressing part of the stabilizer with the movement of the transport element. For instance, the pressing part can retract again before the transport element has rotated substantially further.

[0020] According to one refinement, the transport element can have three empties compartments. The transport element can be designed to rotate stepwise by 120°. In principle, the transport element can be alternatively or additionally designed to rotate continuously. For example, the bottle positioner can be designed with different operating modes in which the transport element is operated differently, for example optionally rotated continuously or stepwise.

[0021] According to one refinement, a first conveyor belt can also be provided for further transport of the empty container. The transport element can be designed to transfer the steadied empty container to the first conveyor belt. For example, the transport element can rotate as a rotating body over at least a portion of the first conveyor belt, which is stopped during the rotation of the transport element. As soon as the empty container is on the first conveyor belt, the rotation of the transport element can be halted and, by contrast, the first conveyor belt can now be started, which then carries the empty container away.

[0022] According to one refinement, a second conveyor belt can also be provided for the further transport of the empty container. The transport element can be designed to selectively transfer the steadied empty container to the first conveyor belt or to the second conveyor belt. For example, the bottle positioner and/or the reverse vending machine or the sorting system can be designed to identify predetermined characteristics of the empty container. The transport element can be designed to then transfer the empty container either to the first conveyor belt or to the second conveyor belt, depending on the characteristic. In this refinement, the bottle positioner also fulfills a sorting function in addition to a stabilization and transport function.

[0023] For instance, the reverse vending machine, the sorting system, and/or the bottle dispenser can have a sensor device by means of which one or more characteristics of the empty container can be detected. For example, a characteristic can be the external shape and weight of a bottle, any damage or residual product, an existing bar or bar code, or a closure on the bottle. The sensor device can be connected to a control device that is designed to evaluate the characteristic detected by the sensor device. The control device can also control the bottle positioner and/or the transport element accordingly, so that after the evaluation of the characteristic, the transport element is prompted to transfer the empty container to the first conveyor belt or to the second conveyor belt.

[0024] In a specific example, a reverse vending machine can have a receiving area into which empty containers can be inserted via an insertion opening arranged on the outside of a housing of the reverse vending machine. In the case of an automatic reverse vending machine for individual bottles, this insertion opening can be circular, for example, and the receiving area can be embodied

as a hollow cylindrical area. The receiving area can further comprise a conveyor belt that forwards an empty container introduced into the receiving area to a sensor device by means of which one or more characteristics of the empty container are detected. The reverse vending machine can now comprise a control device that is connected to the sensor device. The control device can be a central control device of the reverse vending machine. However, the control device can also be provided in the bottle positioner, e.g., in the infeed area of the bottle positioner. Accordingly, the sensor device or the sensor can be provided in or at the infeed area. The control device of the reverse vending machine or of the bottle positioner can be designed to now instruct the transport element to appropriately sort the empty container according to its identified characteristics.

[0025] According to one refinement, the transport element can be designed to transfer the empty container to the first conveyor belt by means of its own rotation in a direction of rotation.

[0026] According to one refinement, the transport element can be designed to transfer the empty container to the second conveyor belt by means of its own rotation counter to the direction of rotation. In this refinement, an especially compact and efficient bottle positioner is thus created which implements the stabilization, transport, and sorting of empty containers with a minimum number of system components. The transport element acts simultaneously as a stabilization object or stabilization barrier, as a means of transport, and as a sorting aid.

[0027] According to one refinement, a control device for controlling the stabilizer can also be provided. Furthermore, a presence sensor can be provided in the infeed area. The control device can be coupled to the presence sensor. The control device can be designed to identify the presence of a fed-in empty container in the infeed area by means of the presence sensor. The control device can also be designed to cause the stabilizer to push the empty container against the transport element when the presence of a fed-in empty container has been detected.

[0028] According to one refinement, the presence sensor can be embodied as an optical sensor and/or weight sensor or the like. For example, the presence sensor can be embodied as a laser barrier which is arranged below the feed chute in the infeed area. Alternatively or in addition, the

presence sensor may comprise a weight sensor in the infeed area, e.g., in and/or on a floor beneath the infeed chute.

[0029] According to one refinement, the stabilizer can be designed with a compensating spring mechanism in order to provide a variable contact force. This enables different container diameters to be compensated for, for example, making it possible for the bottle positioner to process bottles of different sizes or different diameters, for example.

[0030] According to one embodiment, the following is provided:

- a bottle positioner with a transport element, with a feed chute for feeding empty containers, particularly bottles, into an infeed area to the transport element, and with a first conveyor belt and a second conveyor belt for further transport of the empty container, the transport element being designed to selectively transfer the empty container to the first conveyor belt or to the second conveyor belt.

[0031] The idea on which this exemplary embodiment is based is to selectively transfer an empty container that is fed in via a feed chute to one of at least two conveyor belts by means of a transport element and then to transport it further on the same. Unlike with typical bottle positioners, it is possible to (pre-)sort the empty containers within the bottle positioner. For example, the bottle positioner and/or the reverse vending machine or the sorting system can be designed to identify predetermined characteristics of the empty container. The transport element can be designed to then transfer the empty container either to the first conveyor belt or to the second conveyor belt, depending on the characteristic. The bottle positioner can thus also fulfill a sorting function in addition to a positioning and transport function. Furthermore, a provision can be made that empty containers are transferred to one of the conveyor belts independently of their specific characteristics. For example, each of the conveyor belts can lead to a separate (intermediate) storage area for the empty containers. For example, if one of the storage areas is currently full, all subsequent empty containers can be directed via an alternative conveyor belt to a storage area that is not yet being fully utilized. It is also possible for the empty containers to be diverted via an alternative conveyor belt if one of the conveyor belts fails and/or if one of the components that is

connected to this conveyor belt fails. The system is thus more convenient, more versatile, and less error-prone than known systems from the prior art.

[0032] According to one exemplary embodiment, the transport element can be embodied as a rotating body that is designed to transfer the empty container by means of its own rotation. In this especially efficient and space-saving exemplary embodiment, an empty container is fed in via the feed chute and then moved on through the rotation of the transport element.

[0033] According to one exemplary embodiment, the transport element can be designed to transfer the empty container to the first conveyor belt by means of its own rotation in a direction of rotation. For example, the transport element can rotate as a rotating body over at least a portion of the first conveyor belt, which is stopped during the rotation of the transport element. As soon as the empty container is on the first conveyor belt, the rotation of the transport element can be halted and, by contrast, the first conveyor belt can now be started, which then carries the empty container away.

[0034] According to one exemplary embodiment, the transport element can be designed to transfer the empty container to the second conveyor belt by means of its own rotation counter to the direction of rotation. In this exemplary embodiment, an especially compact and efficient bottle positioner is thus created which implements the stabilization, transport, and sorting of empty containers with a minimum number of system components. The transport element serves here simultaneously as a means of transport and as a sorting aid and possibly also as a stabilization object or stabilization barrier.

[0035] According to one exemplary embodiment, the transport element can be designed with at least one empties compartment for transporting the empty container. For example, the feed chute can be arranged and designed in such a way that the empty container slides into the empties compartment by itself, so to speak, and is transported further from there. Alternatively or in addition, a stabilizer or the like can be designed to push the fed-in empty container into the at least one empties compartment, for example. In a specific example, the stabilizer can be designed to push the fed-in empty container in the infeed area against the transport element in order to bring

the empty container into a static rest position. The transport element can be designed to further transport the inserted empty container in the at least one empties compartment. In this exemplary embodiment, the stabilizer first pushes the empty container into the empties compartment and there against the transport element, for example against a rear wall of the empties compartment. For example, the stabilizer can be designed to press the empty container against the transport element for a predetermined period of time during which it is sufficiently stabilized in its rest position. The empty container is then moved on by the transport element. In a specific example, the stabilizer can be embodied as a horizontal, linearly movable pressing part. The pressing part can be designed to push the fed-in empty container from the feed chute against the transport element and thereby stabilize it. The pressing part can then be returned before the empty container is moved further via the transport element. The empties compartment can be dimensioned accordingly so that the empty containers that are to be transported remain secure and stable in the empties compartment when they are transported further by the transport element. In a specific example, the bottle positioner can be designed to transport reusable bottles, with the empties compartment being dimensioned such that a bottle that is standing upright in the empties compartment cannot tip over.

[0036] According to one exemplary embodiment, the transport element can be embodied as a turnstile with a plurality of empties compartments. For example, the turnstile can have two, three, four, five, six, or more empties compartments. The empties compartments can be arranged one behind the other in a circumferential direction around the turnstile, it being possible for the empties compartments to be designed to be open radially toward the outside. For example, the circumference of the turnstile can be divided into identically designed and dimensioned empties compartments, for example four empties compartments, each of which occupies an angular range of approximately 90°. In this specific example, the turnstile can have four identical rotating wings which are oriented radially outward from a center of the turnstile in the form of a cross, with two rotating wings respectively delimiting an empties compartment in the circumferential direction. Through the provision of multiple empties compartments, it is possible, for example, to channel a plurality of empty containers through the bottle positioner and the transport element at the same time.

[0037] The transport element can be designed to rotate continuously and/or in steps. For example, the transport element can be designed to rotate around an angular range corresponding to the number of empties compartments; for example, in the case of four identical empties compartments, a step-by-step rotation through 90° can be provided. In principle, however, the transport element can also be designed with multiple empties compartments that cover different angular ranges — for example, a total of three compartments with two spanning 90° and one spanning 180°, etc. — meaning that rotation can take place in variable or different steps. Alternatively, the transport element can also rotate continuously about its axis, with the rotational speed being selected so as to be so low, for example, that an empty container can be placed into an empties compartment without conflicting with the movement of the transport element. For example, the empty containers can be pushed into an empties compartment by a pressing part or a stabilizer and stabilized there, with the pressing part retracting again before the transport element has rotated substantially further.

[0038] According to one embodiment, the transport element can be designed with three empties compartments. The transport element can be designed to rotate stepwise by 120°. In principle, the transport element can be alternatively or additionally designed to rotate continuously. For example, the bottle positioner can be designed with different operating modes in which the transport element is operated differently, for example optionally rotated continuously or stepwise.

[0039] According to one exemplary embodiment, the transport element can be designed to selectively transfer the empty container to the first conveyor belt or to the second conveyor belt on the basis of the empties characteristics of the empty container that have been determined. For example, the reverse vending machine, the sorting system, and/or the bottle positioner can have a sensor device by means of which one or more empties characteristics of the empty container can be detected. For example, an empties characteristic can be the external shape and weight of a bottle, any damage or residual product, an existing barcode, or a closure on the bottle. The sensor device can be connected to a control device which is designed to evaluate the empties characteristic detected by the sensor device. The control device can also control the bottle positioner and/or the transport element accordingly, so that after the evaluation of the empties characteristic, the

transport element is prompted to transfer the empty container to the first conveyor belt or to the second conveyor belt.

[0040] In a specific example, a reverse vending machine can have a receiving area into which empty containers can be inserted via an insertion opening arranged on the outside of a housing of the reverse vending machine. In the case of an automatic reverse vending machine for individual bottles, this insertion opening can be circular, for example, and the receiving area can be embodied as a hollow cylindrical area. The receiving area can also comprise a conveyor belt, which forwards an empty container that is introduced into the receiving area to a sensor device by means of which one or more empties characteristics of the empty container are detected. The reverse vending machine can now comprise a control device which is connected to the sensor device. The control device can be a central control device of the reverse vending machine. However, the control device can also be provided in the bottle positioner, e.g., in the infeed area of the bottle positioner. Accordingly, the sensor device or the sensor can be provided in or at the infeed area. The control device of the reverse vending machine or the bottle positioner can be designed to now appropriately instruct the transport element to sort the empty container according to its identified empties characteristics.

[0041] According to one exemplary embodiment, a control device for controlling the transport element can also be provided. The control device can be designed to determine the empties characteristics of the empty container and, based on this, to cause the transport element to transfer the empty container to the first conveyor belt or to the second conveyor belt. The control device can, for example, receive or request empties characteristics of the empty container that have already been determined elsewhere, e.g., by communicating with a central control device of a reverse vending machine and/or sorting system, in which case the empties characteristics can have already been recorded, for example, in a receiving area of the reverse vending machine and/or sorting system. On the basis of these empties characteristics, the control device can now initiate appropriate sorting of the empty container onto a specific conveyor belt. Alternatively or in addition, the control device can be coupled to sensors of the bottle positioner which, in turn, are designed to detect the empties characteristics of the empty container and forward them to the control device.

[0042] According to one embodiment, the control device can be coupled to a presence sensor in the infeed area. The control device can be designed to identify the presence of a fed-in empty container in the infeed area by means of the presence sensor and, based on this, to cause the transport element to transfer the empty container to the first conveyor belt or to the second conveyor belt.

[0043] According to one exemplary embodiment, the presence sensor can be embodied as an optical sensor and/or weight sensor or the like. For example, the presence sensor can be embodied as a laser barrier which is arranged below the feed chute in the infeed area. Alternatively or in addition, the presence sensor may comprise a weight sensor in the infeed area, e.g., in and/or on a floor beneath the infeed chute.

[0044] According to one exemplary embodiment, the presence sensor can be designed to detect the empties characteristics of the empty container. For example, the presence sensor can be designed to detect empties characteristics based on labels attached to the empty container and/or based on external characteristics of the empty container such as its weight, its external shape, and/or its size or the like. For this purpose, the presence sensor can be embodied, for example, as an optical sensor and/or as a weight sensor.

[0045] According to one exemplary embodiment, the feed chute can be designed for the substantially vertical infeeding of the empty container. For example, the empty containers can be moved via a conveyor belt in a lying state onto the feed chute, on which they then slide or fall obliquely and/or vertically downward such that they arrive in the infeed area in an approximately upright and/or approximately vertical position. In principle, the empty containers can be provided or similar in the infeed area at an angle and/or so as to be tumbling via the feed chute, with the empty containers then being brought into a vertically stabilized rest position via the stabilizer or the like. Alternatively, the feed chute, the infeed area, and/or the transport element can be configured accordingly such that additional stabilization is not necessary, for example because the empty container is placed directly into an empties compartment of the transport element, thus preventing wobbling due to the walls of the empties compartment.

[0046] The above embodiments and refinements can be combined with one another as desired, insofar as expedient.

[0047] Other possible embodiments, refinements, and implementations of the invention also comprise combinations of features of the invention that were not explicitly mentioned previously or that are described below in relation to the exemplary embodiments. In particular, a person skilled in the art will also add individual aspects to the respective basic form of the present invention as improvements or supplementations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0048] In the following, the present invention is explained in greater detail on the basis of the exemplary embodiments that are indicated in the schematic figures of the drawing, in which:

Figs. 1a-d show schematic plan views of a bottle positioner according to an exemplary embodiment during the transport of an empty container,

Figs. 2a-e show schematic plan views of a bottle positioner according to one embodiment of the invention during the transport of an empty container,

Fig. 3 shows a schematic perspective view of a reverse vending machine from diagonally in front with the bottle positioner from Figs. 1a-d or Figs. 2a-e, and

Fig. 4 shows a schematic perspective view of a sorting system from an angle from the front with the bottle positioner from Figs. 1a-d or Figs. 2a-e.

[0049] The accompanying figures of the drawing are intended to provide a further understanding of the embodiments of the invention. They illustrate embodiments and, in connection with the description, serve to explain principles and concepts of the invention. Other embodiments and

many of the advantages that are mentioned follow from the drawings. The elements of the drawings are not necessarily shown to scale with respect to one another.

[0050] In the figures of the drawing, elements, features, and components that are the same, have the same function, or have the same effect are respectively provided with the same reference symbols unless otherwise stated.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0051] Figs. 1a-d show schematic plan views of a bottle positioner 1 according to one embodiment during the transport of an empty container 4.

[0052] The bottle positioner 1 shown is a machine that enables the positioning, transporting, and sorting of empty containers 4 such as bottles and the like. The empty containers 4 of different shapes, sizes, and materials can be processed. The basic principle of the bottle positioner is to feed the empty containers 4 in via a feed chute 3 and to transfer them to a transport element 2, which sorts them onto different conveyor belts 8a, 8b, where they are then transported further. In another step, for example, downstream machines can be loaded with the transported empty containers 4 and/or they can be temporarily stored on a collection table, for example (see Figs. 3 and 4). The exact process sequence of the transport is explained in the following with reference to Fig. 1a-d.

[0053] Specifically, the bottle positioner 1 comprises a transport element 2 and a feed chute 3 via which empty containers 4, e.g., bottles, are fed into an infeed area 5 (indicated by arrows on the feed chute 3 in Fig. 1a). For example, the empty containers 4 can be moved via a conveyor belt (not shown) or the like in a lying state onto the feed chute 3, on which they then slide or fall obliquely or vertically downward, so that they are in a more or less upright or inclined position upon arrival in the infeed area 5.

[0054] The transport element 2 of the bottle positioner 1 is designed to transfer the fed-in empty container 4 either to the first conveyor belt 8a or to the second conveyor belt 8b. For this purpose, the transport element 2 is embodied as a turnstile which transfers the empty container 4 by means

of its own rotation. The turnstile has three identically designed empties compartments 7, each of which occupies an angular range of 120°. Specifically, the empty container 4 is transferred to the first conveyor belt 8a by means of its own rotation in a direction of rotation 9 and to the second conveyor belt 8b by means of its own rotation counter to the direction of rotation 9. The empty container 4 is thereby carried along within the empties compartment 7 (cf. Fig. 1b). The transport element 2 is positioned on a first conveyor belt 8a in such a way that the empty container 4 is moved onto the conveyor belt 8a due to the rotation of the transport element 2 and can be carried along by the same in a direction of conveyance 16 (see Fig. 1c). By virtue of the symmetrical configuration of the transport element 2, after a rotation of 120°, an empty container compartment 7 is again aligned in the direction of the feed chute 3, enabling another empty container unit 4 to be fed in. In principle, this can already take place during the rotation of the transport element 2.

[0055] As already described, the empty container 4 can optionally also be transferred to the second conveyor belt 8b instead of to the first conveyor belt 8a. For that purpose, the transport element 2 can rotate counterclockwise in a counter-**rotational direction 9′ b**y means of its own rotation (cf. Fig. 1d). The second conveyor belt 8b can now move the empty container 4 further in a direction of conveyance 16 similar to the first conveyor belt 8a, it being possible for the direction of conveyance 16 to be identical to the direction of conveyance 16 of the first conveyor belt 8a, as shown in Fig. 1e. As will readily be understood by those skilled in the art, different arrangements are conceivable, for example in which the two conveyor belts 8a, 8b extend or are aligned in different directions. In principle, more than two conveyor belts — e.g., three, four, or more conveyor belts — are also possible, and those skilled in the art will design the transport element accordingly in these cases so that empty containers can be optionally transferred to the conveyor belts.

[0056] In the example shown, the transport element 2 is designed to selectively transfer the empty container 4 to the first conveyor belt 8a or to the second conveyor belt 8b based on identified empties characteristics of the empty container 4. For this purpose, the bottle positioner 1 has a control device 12 for controlling the transport element 2 which determines the empties characteristics of the empty container 4 and, based on this, causes the transport element 2 to transfer the empty container 4 to the first conveyor belt 8a or to the second conveyor belt 8b. The

control device 12 is communicatively connected to a presence sensor 13 in the infeed area 5. The presence sensor 13 is designed to identify the presence of a fed-in empty container 4 in the infeed area 5. For this purpose, the presence sensor 13 can be configured as an optical sensor, for example, such as a laser barrier or the like, and/or as a weight sensor. As soon as an empty container 4 is fed in, the presence sensor 13 detects this and transmits this information to the control device 12, which in turn causes the transport element 2 to rotate on that basis.

[0057] Different designs are conceivable for the sorting or selection of the empty containers 4. For example, the presence sensor 13 and/or another sensor (not shown) in the infeed area 5 can be designed to detect one or more empties characteristics of the empty container 4. For example, an empties characteristic can be the external shape and weight of the empty container 4, any damage or residual product, an existing barcode, or a closure on the empty container, etc. The control device 12 can be designed to evaluate the empties characteristic detected by the sensor and, based on this, to rotate the transport element 2 either in the direction of rotation 9 or, alternatively, in the counter-rotation direction 9′ in order to further transport the empties container 4 either onto the first conveyor belt 8a or onto the second conveyor belt 8b.

[0058] Alternatively or in addition, the empties characteristics of the fed-in empty container 4 can also have been identified before feeding to the bottle positioner 1, for example by a sensor system of a higher-level or upstream machine, and subsequently transmitted to the control device 12 of the bottle positioner 1. To achieve this, the control device 12 can be in communication with a higher-level controller, for example a reverse vending machine or the like (see Figs. 3 and 4).

[0059] The result is a comfortable and versatile bottle positioner with a sorting function that is less prone to errors than known systems from the prior art.

[0060] A bottle positioner 1 according to one embodiment of the invention will be explained with reference to Figs. 2a-e. This bottle positioner 1 is has a fundamentally similar design to that in Figs. 1a-d. However, the bottle positioner 1 also has a stabilizer 6 which is designed to push the fed-in empty container 4 in the infeed area 5 against the transport element 2 in order to bring the empty container 4 into an upright, static rest position, i.e., a vertically stabilized rest position (see.

Fig. 2b). For this purpose, the bottle positioner 1 has a control device 12 which, among other things, controls the stabilizer 6. The control device 12 is communicatively connected to a presence sensor 13 in the infeed area 5. The presence sensor 13 is designed to identify the presence of a fed-in empty container 4 in the infeed area 5. For this purpose, the presence sensor 13 can be configured as an optical sensor, for example, such as a laser barrier or the like, and/or as a weight sensor. As soon as an empty container 4 is fed in, the presence sensor 13 detects this and transmits this information to the control device 12, which, on that basis, causes the stabilizer 6 to push the empty container 4 against the transport element 2. The stabilizer 6 can be embodied, for example, as a horizontally displaceable pressing part that can be moved back and forth in a straight line between the feed chute 3 and the transport element 2. In the embodiment shown, the stabilizer 6 is driven by a drive, for example an electric motor such as a servo motor or the like, and is pushed against the empty container 4 with a contact force 15.

[0061] In order to take into account that different empty containers 4 can have different characteristics, e.g., weight and/or diameter, the stabilizer 6 is designed with a compensating spring mechanism 14 in order to provide a variable contact force 15. The stabilizer 6 thus pushes the empty container 4 against the transport element 2 in such a way that the empty container 4 assumes a static rest position. For instance, an embodiment is possible in which the empty container 4 is pressed against the transport element 2 for a specific period of time. A dynamometer, for example a piezoelectric element, can be provided in embodiments in order to determine whether the empty container 4 is being pressed against the transport element 2 with a predetermined force. In principle, however, variants with an especially simple design are also possible in which the stabilizer 6 is extended by a predetermined distance, for example by means of a servomotor, in which case the compensating spring mechanism 14 compensates for different external dimensions of the empty containers 4. The control device 12 can then cause the stabilizer bar 6 to be moved back to its initial position.

[0062] The transport element 2 is also designed in this embodiment as a turnstile with three identical empties compartments 7, each of which occupies an angular range of 120°. The transport element 2 is thus embodied as a rotating body in order to further transport the empty container 4 by means of its own rotation. The stabilizer 6 pushes the empty container 4 into one of the empties

compartments 7 until it strikes against the transport element 2 and is stabilized in its rest position. The stabilizer 6 then returns to its starting position. In a next step, the transport element 2 rotates stepwise by 120° in a clockwise direction of rotation 9. The empty container 4 is thereby carried along within the empties compartment 7 (cf. Fig. 2c).

[0063] The transport element 2 is positioned on a first conveyor belt 8a in such a way that the empty container 4 is moved onto the conveyor belt 8a due to the rotation of the transport element 2 and can be carried along by the same in a direction of conveyance 16 (see Fig. 2d). By virtue of the symmetrical configuration of the transport element 2, after a rotation of 120°, an empty container compartment 7 is again aligned in the direction of the feed chute 3, enabling another empty container unit 4 to be fed in. In principle, this can already take place during the rotation of the transport element 2.

[0064] The bottle positioner 1 is not only designed for positioning and transporting empty containers 4 but can also sort them based on their characteristics, as will be explained below with reference to Fig. 1e.

[0065] Accordingly, a second conveyor belt 8b is provided for the onward transport of the empty container 4 onto which the transport element 2 can optionally transfer the steadied empty container 4 instead of the first conveyor belt 8a. For this purpose, the transport element 2 can rotate counterclockwise in a counter-**rotation direction 9′ by means** of its own rotation (see Fig. 2e). The second conveyor belt 8b can now move the empty container 4 further in a direction of conveyance 16 similar to the first conveyor belt 8a, it being possible for the direction of conveyance 16 to be identical to the direction of conveyance 16 of the first conveyor belt 8a, as shown in Fig. 1e.

[0066] Again, different designs are conceivable for the sorting or selection of the empty containers 4. For example, the presence sensor 13 and/or another sensor (not shown) in the infeed area 5 can be designed to detect one or more empties characteristics of the empty container 4. For example, an empties characteristic can be the external shape and weight of the empty container 4, any damage or residual product, an existing barcode, or a closure on the empty container, etc. The control device 12 can also be designed to control the transport element 2. The control device 12

can be designed to evaluate the empties characteristic detected by the sensor and, based on this, to rotate the transport element 2 either in the direction of rotation 9 or, alternatively, in the counter-rotation direction 9′ in order to further transport the empties container 4 either onto the first conveyor belt 8a or onto the second conveyor belt 8b.

[0067] Alternatively or in addition, the characteristics of the fed-in empty container 4 can also have been identified before feeding to the bottle positioner 1, for example by a sensor system of a higher-level or upstream machine, and subsequently transmitted to the control device 12 of the bottle positioner 1. In principle, the control of the transport element 2 can also be assumed by a higher-level control, for example by a reverse vending machine or the like (see Figs. 3 and 4).

[0068] The result is a bottle positioner 1 that positions, sorts, and transports empty containers 4 such as bottles or the like in the most efficient manner possible. The transport element 2 simultaneously acts as a stabilizing barrier for positioning the empty container 4 and as a rotation lock for the selection of the empty containers 4 based on predetermined characteristics. The bottle positioner 1 is characterized by an especially simple and robust structure with a minimum number of individual parts. The bottle positioner 1 is therefore especially efficient in terms of costs, maintenance, and assembly. This is achieved, among other things, by embodying the transport element 2 as a three-part turnstile that can be rotated on both sides and via which empty containers 4 can be outputted onto two different conveyor belts 8a, 8b.

[0069] Figs. 3 and 4 show two exemplary uses of the bottle positioner from Figs. 1a-d and/or Figs. 2a-e, on the one hand as a component of a reverse vending machine 10 in Fig. 3 and on the other hand as a component of a sorting system 11 in Fig. 4.

[0070] The exemplary reverse vending machine 10 in Fig. 3 is intended for the returning of bottles. The reverse vending machine 1 comprises a housing with an insertion opening 17 embedded in its front which is hollow and cylindrical in order to accommodate empty bottles. What is more, the usual components, such as a display panel and/or an output opening, can be attached to the outside of the front side of the housing. The reverse vending machine 10 comprises a conveyor belt (not shown) which forwards a bottle inserted into the insertion opening 17 to a

sensor device (also not shown), by means of which sensor device one or more empties characteristics of the bottle are detected. For example, an empties characteristic can be the external shape and the weight of the bottle, any damage or residual product, an existing barcode, or a closure on the bottle. The reverse vending machine further comprises a control device (not shown) which is connected to the conveyor belt and the sensor device. This is designed to evaluate the empties characteristic detected by the sensor device. After the bottle that was inserted has been evaluated, the control device — in the event that the bottle is accepted — causes the bottle to be further transported by the conveyor belt or — in the event that the bottle is rejected — causes the bottle to be returned. If the bottle is accepted, it is forwarded to a bottle positioner 1 via a transport device 18. The bottle positioner 1 corresponds, for example, to that in Fig. 1a-d and/or that in Figs. 2a-e. Accordingly, the bottle is placed here and, depending on the characteristics, forwarded either on the first conveyor belt 8a or on the second conveyor belt 8b. The bottle is then placed on a collection table, particularly on different sides of the collection table 19 depending on the characteristics and the conveyor belt 8a, 8b used (indicated by arrows in Fig. 3). The characteristics on which the sorting is based can be identified, for example, by the sensor device of the reverse vending machine 10, thereby enabling the transport element 2 of the bottle positioner 1 to make a corresponding selection on that basis.

[0071] The sorting system 11 in Fig. 4 also has a bottle positioner 1 which is loaded by a transport device 18 and then guides the bottles to a collection table 19. The bottles are delivered to the sorting system 11 via a roller conveyor 20. In principle, such a sorting system 11 can be part of a reverse vending machine, for example like the one in Fig. 3. However, other applications are possible in principle, such as within an assembly line production or the like in which containers are to be positioned and selected or sorted before they are possibly filled, for example. List of Reference Symbols

[0072]

1	bottle positioner
2	transport element
3	feed chute

4	empty container
5	infeed area
6	stabilizer
7	empties compartment
8a	first conveyor belt
8b	second conveyor belt
9	direction of rotation
9′	counter-rotational direction
10	reverse vending machine
11	sorting system
12	control device
13	presence sensor
14	compensating spring mechanism
15	contact force
16	direction of conveyance
17	insertion opening
18	conveyor
19	collection table
20	roller conveyors
21	drive

Patenttivaatimukset

1. Pullojen asemointilaite (1),

joka käsittää kuljetuselementin (2), joka on muodostettu sisältämään ainakin yhden tyhjien säiliöiden osaston (7),

joka käsittää syöttöluistin (3) tyhjien säiliöiden (4), erityisesti pullojen, syöttämiseksi kuljetusalueelle (5) kuljetuselementtiin (2), ja

joka käsittää stabilisaattorin (6), joka on muodostettu vaakasuuntaisena, lineaarisesti liikutettavissa olevana kosketusosana, sisään syötetyn tyhjän säiliön (4) liu'uttamiseksi syöttöalueella (5) syöttöluistilta (3) ainakin yhteen tyhjien säiliöiden osastoon (7) vasten kuljetuselementtiä (2), tyhjän säiliön (4) tuomiseksi pystysuunnassa vakautettuun lepoasentoon, jolloin kuljetuselementti (2) on muodostettu kuljettamaan vakautetun tyhjän säiliön (4) eteenpäin ainakin yhdessä tyhjien säiliöiden osastossa (7), jolloin stabilisaattori (6) on muodostettu tuotavaksi takaisin ulos tyhjien säiliöiden osastosta (7) jälleen ennen kuin tyhjä säiliö (4) siirretään eteenpäin kuljetuselementin (2) kautta.

2. Patenttivaatimuksen 1 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että syöttöluisti (3) on muodostettu tyhjän säiliön (4) syöttämiseksi olennaisesti pystysuorasti.

3. Patenttivaatimuksen 1 tai patenttivaatimuksen 2 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että kuljetuselementti (2) on muodostettu pyörivänä kappaleena siirtämään tyhjän säiliön (4) eteenpäin omalla pyörivällä liikkeellään.

4. Patenttivaatimuksen 3 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että kuljetuselementti (2) on muodostettu kääntöportiksi, joka käsittää useita tyhjien säiliöiden osastoja (7).

5. Patenttivaatimuksen 4 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että kuljetuslaite (2) on muodostettu sisältämään kolme tyhjien säiliöiden osastoa (7) ja sitä voidaan kääntää 120°:n välein.

6. Minkä tahansa edeltävän patenttivaatimuksen mukainen pullojen asemointilaite (1),

tunnettu

siitä, että lisäksi on järjestetty ensimmäinen kuljetinhihna (8a) kuljettamaan tyhjän säiliön (4) eteenpäin, jolloin kuljetuselementti (2) on muodostettu luovuttamaan vakautetun tyhjän säiliön (4) ensimmäiselle kuljetinhihnalle (8a).

7. Patenttivaatimuksen 6 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että on järjestetty toinen kuljetinhihna (8b) kuljettamaan tyhjän säiliön (4) eteenpäin, jolloin kuljetuselementti (2) on muodostettu luovuttamaan vakautetun tyhjän säiliön (4) valinnaisesti ensimmäiselle kuljetinhihnalle (8a) tai toiselle kuljetinhihnalle (8b).

8. Patenttivaatimuksen 6 tai patenttivaatimuksen 7 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että kuljetuselementti (2) on muodostettu luovuttamaan tyhjän säiliön (4) ensimmäiselle kuljetinhihnalle (8a) omalla pyörimisellään pyörimissuunnassa (9).

9. Patenttivaatimuksen 8 mukainen pullojen asemointilaite (1),

tunnettu

siitä, että kuljetuselementti (2) on muodostettu luovuttamaan tyhjän säiliön (4) toiselle kuljetinhihnalle (8b) omalla pyörimisellään pyörimissuunnassa (9).

10. Minkä tahansa edeltävän patenttivaatimuksen mukainen pullojen asemointilaite (1),

tunnettu

siitä, että lisäksi on järjestetty ohjauslaite (12) stabilisaattorin (6) ohjaamiseksi, ja se on kytketty läsnäoloanturiin (13) syöttöalueella (5), jolloin ohjauslaite (12) on muodostettu varmistamaan sisään syötetyn tyhjän säiliön (4) läsnäolo syöttöalueella (5) läsnäoloanturin (13) avulla ja tämän perusteella saamaan stabilisaattori (6) liu'uttamaan tyhjä säiliö (4)

kuljetuselementtiä (2) vasten.

11. Patenttivaatimuksen 10 mukainen pullojen asemointilaite (1), **tunnettu**
siitä, että läsnäoloanturi (13) on muodostettu optiseksi anturiksi ja/tai painoanturiksi.

12. Minkä tahansa edeltävän patenttivaatimuksen mukainen pullojen asemointilaite (1), **tunnettu**
siitä, että stabilisaattori (6) on muodostettu sisältämään kompensoivan jousimekanismin (14) säädettävän kosketusvoiman (15) aikaansaamiseksi.

13. Palautusautomaatti (10), joka käsittää minkä tahansa edeltävän patenttivaatimuksen mukaisen pullojen asemointilaitteen (1).

14. Lajittelujärjestelmä (11), joka käsittää jonkin patenttivaatimuksen 1-13 mukaisen pullojen asemointilaitteen (1).

Fig. 1a

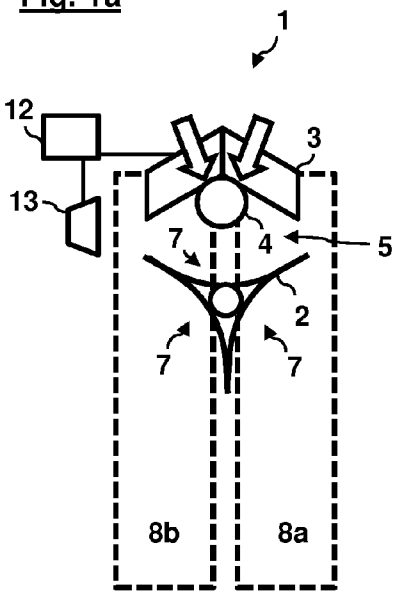


Fig. 1b

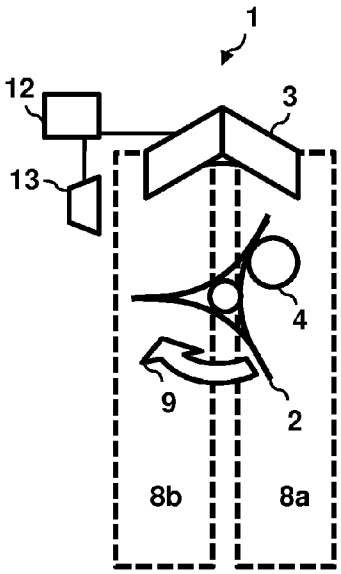


Fig. 1c

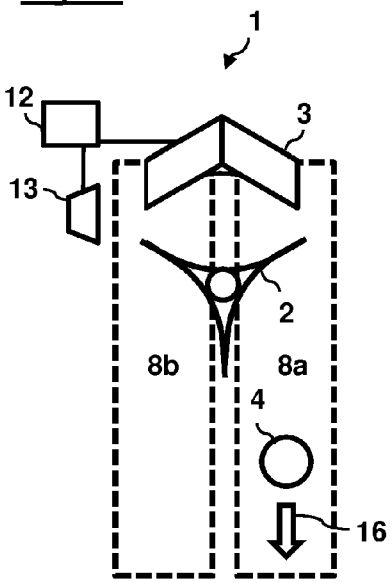


Fig. 1d

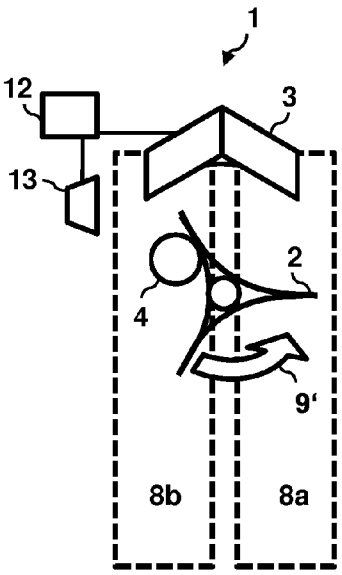


Fig. 2a

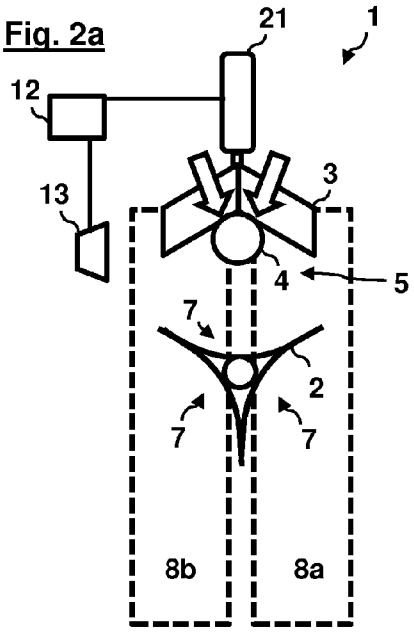


Fig. 2b

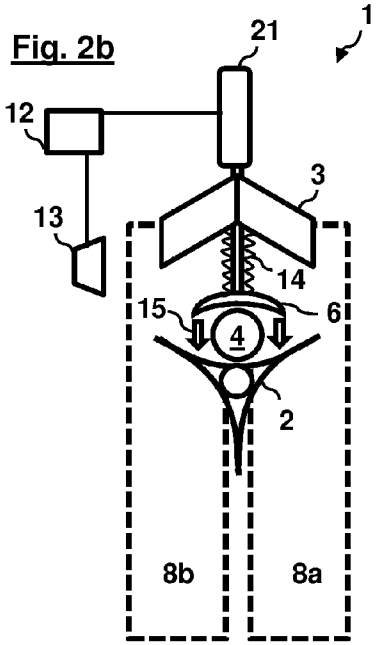


Fig. 2c

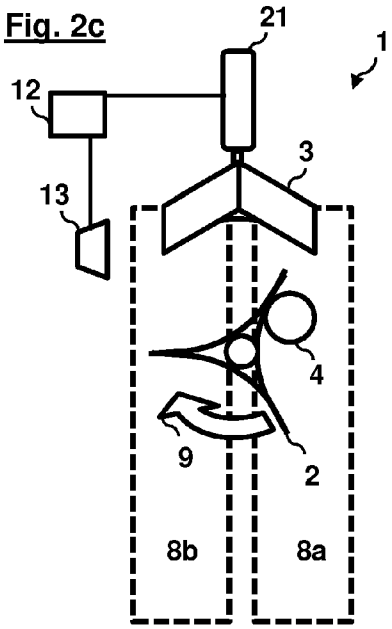


Fig. 2d

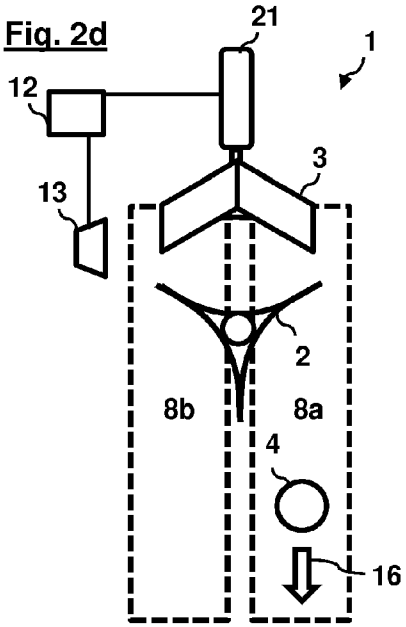
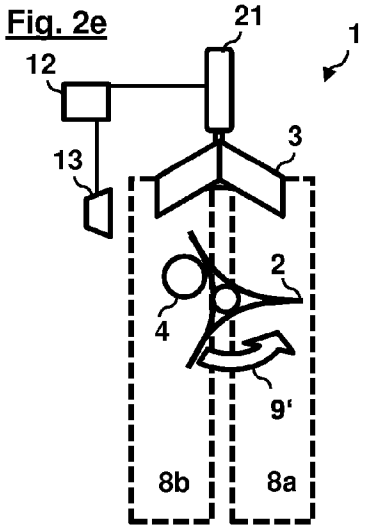


Fig. 2e



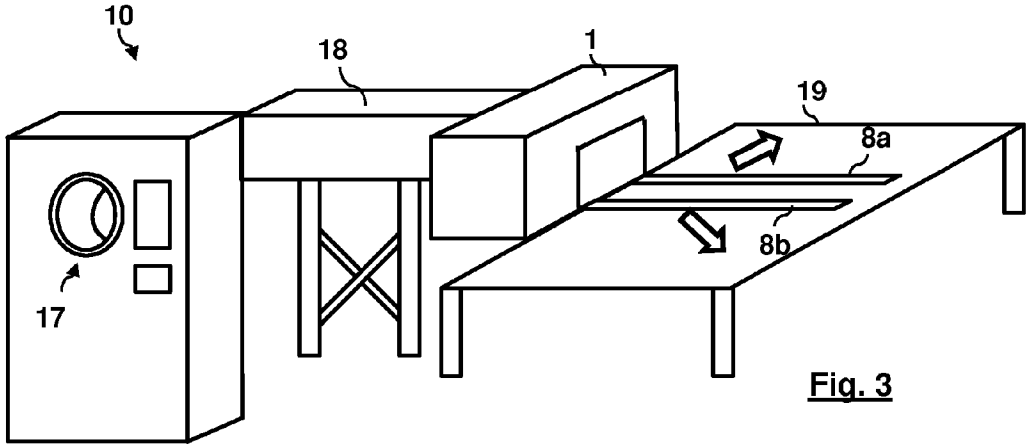


Fig. 3

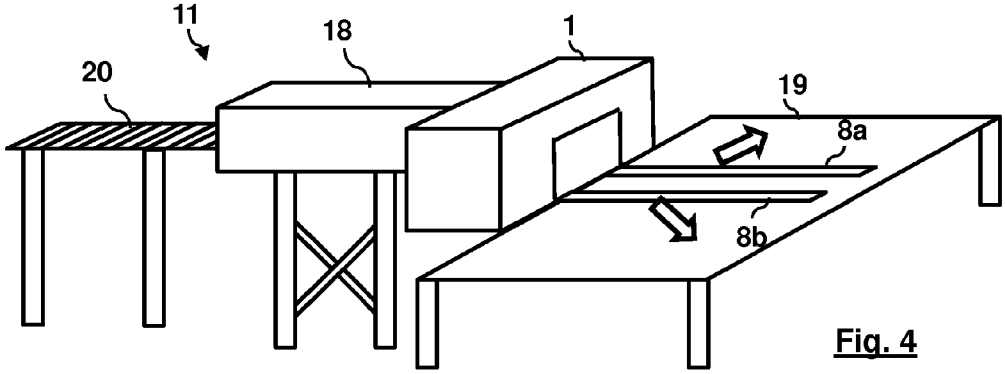


Fig. 4