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(54) **Packaging apparatus for bottles**

Vorrichtung zum Verpacken von Flaschen

Dispositif d'emballage de bouteilles

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Description

[0001] The prior art teaches apparatus for packing bottles which introduce into boxes from above both upright bottles and upturned bottles, in an intercalated fashion. These apparatus basically include two distinct work stations, arranged in series along the packing line the cardboard boxes are transiting on. By means of actuators, in the first of the work stations upright bottles, suitably separated, are inserted into the boxes, while in the second station upturned bottles, which have been upturned by special means for doing so, are inserted into the box, thus completing the packing operation

[0002] An example of this prior art device is disclosed in DE 4034640 which has been filed in the name of the same Applicant as the present application.

[0003] This device is able to fill a box with the prescribed number of bottles in two subsequent stages. In a first stage a box is filled with upright bottles arranged in two spaced rows. In a second stage, a row of upturned bottles is inserted in the same box between the first two rows of upright bottles.

[0004] The device comprises means for gripping and moving which are suitable for depositing simultaneously a row of upturned bottles in a first box and two rows of upright bottles in a subsequent box. The means for gripping and moving comprise a panel having grippers for holding the neck of upright bottles and, on one side of this first means, gripping means for holding upturned bottles on the recessed base. This panel is suitable for depositing the upright bottles into an empty carton, while the rotated bottles are deposited in a carton in which the upright bottles have been already deposited.

[0005] Apparatus of this type exhibit some drawbacks. Firstly, the series arrangement of the work stations increases the overall mass of the apparatus. Secondly, performing the two operations (inserting the upright bottles followed by the upturned bottles) in succession increases overall work times for the packing cycle. In other words, the device according to the prior art takes two stages to complete one box, or, equivalently, a box has to stop twice in order to be completed and the gripping means has to run up and down twice.

[0006] The main aim of the present invention is to obviate the drawbacks described above by contemporaneously packing both upright and upturned bottles in the cardboard boxes.

[0007] The aim is achieved by an apparatus according to claim 1.

[0008] Further characteristics and advantages will better emerge from the detailed description which follows, of an apparatus for contemporaneously packing upright and upturned bottles in cardboard boxes, made with reference to the figures of the drawings, which are included by way of non-limiting example, and in which:

figure 1 is a frontal view of the apparatus according to the present invention;

figure 2 is a view from above of the apparatus of the present invention;

figure 3 is a view from the left of the apparatus of the present invention.

[0009] With reference to the figures of the drawings, the apparatus of the present invention comprises a mobile conveyor plane 10 for a plurality of parallel rows of upright bottles. The apparatus further comprises means 20 for gripping the bottles and rotating them by 180° about at least one horizontal axis x, for example a horizontal and transversal axis with respect to the mobile conveyor plane 10 as in the illustrated embodiment, and then aligning the upturned bottles with the upright bottles in at least one horizontal direction which is perpendicular to the direction of motion of the mobile conveyor plane 10. In a further embodiment, the mobile conveyor plane 10 can be positioned perpendicular with respect to the above; in this case the axis x is horizontal and parallel to the mobile conveyor plane 10. In this further embodiment the bottles are aligned by the means for gripping and rotating 20 in a parallel direction to the direction of motion of the mobile conveyor plane 10.

[0010] The apparatus further comprises means for gripping and moving 30 ordered groups of bottles formed by lines of upright and upturned bottles.

[0011] The means for gripping and rotating 20 comprise an arm 1 arranged horizontally above the mobile conveyor plane 10 and gripping organs 8, associated to the arm 1 and destined to grip a number of upright bottles. In the illustrated embodiment the arm 1 is arranged transversally above the mobile conveyor plane 10. The gripping organs 8 each comprise a suction cup. The arm 1 is connected by an end 1a thereof to a rotary actuator 4 which is associated to a slide 21 which is vertically and horizontally mobile in a parallel direction to an advancement direction of the mobile conveyor plane 10, and which slide 21 has a rotation axis that coincides with the axis x. The slide 21 is moved by action of a first linear actuator 3 along two horizontal and parallel guides 22 which are in turn slidable on two vertical uprights 23 by action of a second linear actuator 2. In the described further embodiment, the arm 1 is arranged parallel and above the mobile conveyor plane 10 and the slide 21 is mobile vertically and horizontally in a perpendicular direction to the advancement direction of the mobile conveyor plane 10.

[0012] The means for gripping and moving 30 comprise a head 31 to which a plurality of first gripping organs 5 are associated, for gripping the upright bottles. Also, a plurality of second gripping organs 6 are associated to the head 31; these are for gripping the upturned bottles. The head 31 is mobile vertically and horizontally in a parallel direction to the advancement direction of the mobile conveyor plane 10, or, in the further embodiment described, the head 31 is mobile vertically and horizontally in a perpendicular direction to the advancement direction of the mobile conveyor plane 10. The first gripping organs

5 each comprise a suction cup, while the second gripping organs 6 each comprise a suction plunger with a small central piston for enabling a gripping of a bottle by depression at a bottom thereof. In place of the gripping systems employing the principle of depression, other gripping systems could be used, such as mechanical pliers, for example.

[0013] The apparatus operates as follows. With reference to the illustrated embodiment, the bottles are fed upright on the conveyor plane 10 and are halted within the field of action of the means for gripping and rotating 20 by the mobile conveyor plane 10. The bottles are arranged in six parallel rows to enable contemporary filling of two cardboard boxes with six bottles each. The second and fifth rows of the six rows are halted in a position which is behind the other four rows. The number of rows can be less or more, depending on the number of rows of bottles needed in the box, which can, for example, be twelve bottles. While the bottles are being supplied the arm 1 is in an upper position with the gripping organs 8 facing downwards. After the bottles have been halted, the arm 1 is activated to descend by the second linear actuator 2.

[0014] The gripping organs 8, which are arranged in such a way as to act on bottles of the second and fourth rows, descend and grip the necks of the first two bottles of each of the second and fourth rows. The arm 1 is then raised by means of the second actuator 2 and translated in a forwards direction by means of the first linear actuator 3. At this point, the rotary actuator 4 causes the arm 1 to rotate by 180° about the axis x, upturning the bottles and positioning them in alignment with the upright bottles. The upturned bottles are supported by the gripping organs 8, the suction cups of which now have open ends thereof facing upwards. At this stage the head 31 is activated to descend so that the first gripping organs 5 insert on and grip the necks of the upright bottles, while the suction plungers of the second gripping organs 6 grip the bottoms of the upturned bottles. The gripping organs 8 connected to the arm 1 release the necks of the upturned bottles and the head 31 is raised together with the bottles, translated horizontally and lowered to introduce the bottles into one or more cardboard boxes located in a suitable position. At the end of the described operations all parts are returned to the initial positions thereof and a new cycle can begin.

[0015] In the second embodiment described, in which the mobile conveyor plane is perpendicular to the plane of the first embodiment, and therefore parallel to the axis x, all the bottles at the start of the cycle are aligned. With a single vertical movement of the actuator 2 followed by a rotation by 180° of the arm 1 by the actuator 4, the upturned bottles would become aligned with the upright bottles and could therefore be gripped by the head 31.

[0016] The described apparatus achieves the set aims and enables, without suffering in terms of productivity, a reduction in the overall size of the apparatus for this operation; or, in another interpretation, if the apparatus used

were brought to be a same size as prior art apparatus, productivity would be doubled.

5 Claims

1. An apparatus for contemporaneously packing upright and upturned bottles in an intercalated fashion into one cardboard box, comprising: a mobile conveyor plane (10) of a plurality of parallel upright bottles; means for gripping and rotating (20) some of the plurality of bottles by 180° about at least one horizontal axis (x) and for aligning the some of the plurality of bottles when so upturned with a remaining number of the plurality of bottles in at least one direction which is parallel to the mobile conveyor plane (10); and means for gripping (30) and moving ordered groups of bottles of the plurality of bottles, said means (30) being suitable to grip and move ordered groups of bottles formed by rows of upturned bottles alternated with rows of upright bottles in an intercalated fashion.
2. The apparatus of claim 1, **characterised in that** the means for gripping and rotating (20) comprise an arm (1) which is horizontally arranged above the mobile conveyor plane (10), and gripping organs (8) associated to the arm (1) and destined to grip upright bottles; the arm (1) being connected by an end (1a) thereof to a rotary actuator (4), a rotation axis of which coincides with the axis (x), the rotary actuator (4) being associated to a slide (21) which is vertically and horizontally mobile in a parallel direction to an advancement direction of the mobile conveyor plane (10).
3. The apparatus of claim 2, **characterised in that** the means (30) for gripping and moving (30) comprise: a head (31) to which a plurality of first gripping organs (5) are associated, the first gripping organs (5) being destined to grip upright bottles; and a plurality of second gripping organs (6) for gripping upturned bottles which second gripping organs (6) are alternated with said first gripping organs (5), the head (31) being vertically and horizontally mobile.
4. The apparatus of claim 3, **characterised in that** the gripping organs (8) and the first gripping organs (5) comprise a plurality of suction cups (5).
5. The apparatus of claim 4, **characterised in that** the second gripping organs (6) each comprise a suction plunger with a central piston for creating a depression at a bottom of a bottle and thus gripping the bottle.
6. The apparatus of claim 5, **characterised in that** the second gripping organs (6) each comprise mechan-

ical pliers.

7. The apparatus of claim 6, **characterised in that** the axis (x) is horizontal and transversal to the advancement direction of the mobile conveyor plane (10) and the upturned bottles are aligned with the upright bottles in at least a horizontal and perpendicular direction to the advancement direction of the mobile conveyor plane (10).
8. The apparatus of claim 6, **characterised in that** the axis (x) is horizontal and parallel to the advancement direction of the mobile conveyor plane (10) and the upturned bottles are aligned with the upright bottles in at least a horizontal and parallel direction to the advancement direction of the mobile conveyor plane (10).
9. The apparatus of claim 7, **characterised in that** the arm (1) is arranged transversally above the mobile conveyor plane (10).
10. The apparatus of claim 8, **characterised in that** the arm (1) is arranged parallel and above the mobile conveyor plane (10).
11. The apparatus of claim 9, **characterised in that** the head (31) is vertically and horizontally mobile in a parallel direction to the advancement direction of the mobile conveyor plane (10).
12. The apparatus of claim 10, **characterised in that** the head (31) is vertically and horizontally mobile in a perpendicular direction to the advancement direction of the mobile conveyor plane (10).

Patentansprüche

1. Vorrichtung zum gleichzeitigen Verpacken von aufrecht stehenden und umgedrehten Flaschen auf eine wechselgelagerte Weise in einen Pappkarton, umfassend: eine bewegliche Transportfläche (10) mehrerer parallel ausgerichteter aufrecht stehender Flaschen, Mittel zum Greifen und Drehen (20) einiger der mehreren Flaschen um 180° um wenigstens eine horizontale Achse (x) und zum Ausrichten von einigen der mehreren Flaschen, wenn diese so umgedreht sind, mit einer restlichen Anzahl der mehreren Flaschen in wenigstens eine parallel zur beweglichen Transportebene (10) verlaufende Richtung, und Mittel zum Greifen (30) und Bewegen geordneter Flaschengruppen der mehreren Flaschen, wobei diese Mittel (30) dazu geeignet sind, geordnete Flaschengruppen, bestehend aus Reihen von umgedrehten Flaschen, abgewechselt mit Reihen von aufrecht stehenden Flaschen in einer wechselgelagerten Weise, zu greifen und zu bewegen.

2. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Mittel zum Greifen und Drehen (20) einen Arm (1) umfassen, welcher horizontal oberhalb der beweglichen Transportfläche (10) angeordnet ist, sowie dem Arm (1) zugeordnete Greifelemente (8), dazu bestimmt, aufrecht stehende Flaschen zu greifen; wobei der Arm (1) mit einem Ende (1a) an einen Drehantrieb (4) angeschlossen ist, von welchem eine Drehachse mit der Achse (x) übereinstimmt, und wobei der Drehantrieb (4) einem Schlitten (21) zugeordnet ist, welcher vertikal und horizontal in einer parallelen Richtung zu einer Vorschubrichtung der beweglichen Transportfläche (10) beweglich ist.
3. Vorrichtung nach Patentanspruch 2, **dadurch gekennzeichnet, dass** die Mittel (30) zum Greifen und Bewegen umfassen: einen Kopf (31), welchem eine Mehrzahl von ersten Greifelementen (5) zugeordnet ist, wobei die ersten Greifelemente (5) dazu bestimmt sind, aufrecht stehende Flaschen zu greifen; und eine Mehrzahl von zweiten Greifelementen (6) zum Greifen umgedrehter Flaschen, wobei sich diese zweiten Greifelemente (6) mit den ersten Greifelementen (5) abwechseln und der Kopf (31) vertikal und horizontal beweglich ist.
4. Vorrichtung nach Patentanspruch 3, **dadurch gekennzeichnet, dass** die Greifelemente (8) und die ersten Greifelemente (5) eine Mehrzahl von Saugnapfen (5) enthalten.
5. Vorrichtung nach Patentanspruch 4, **dadurch gekennzeichnet, dass** die zweiten Greifelemente (6) jeweils einen Saugstempel mit einem mittleren Kolben umfassen, um einen Unterdruck an einem Boden einer Flasche zu erzeugen und somit die Flasche zu greifen.
6. Vorrichtung nach Patentanspruch 5, **dadurch gekennzeichnet, dass** die zweiten Greifelemente (6) jeweils mechanische Zangen umfassen.
7. Vorrichtung nach Patentanspruch 6, **dadurch gekennzeichnet, dass** die Achse (x) horizontal und quer zur Vorschubrichtung der beweglichen Transportfläche (10) verläuft und die umgedrehten Flaschen zu den aufrecht stehenden Flaschen ausgerichtet sind, und zwar in wenigstens einer horizontalen und lotrechten Richtung zur Vorschubrichtung der beweglichen Transportfläche (10).
8. Vorrichtung nach Patentanspruch 6, **dadurch gekennzeichnet, dass** die Achse (x) horizontal und parallel zur Vorschubrichtung der beweglichen Transportfläche (10) verläuft und die umgedrehten Flaschen zu den aufrecht stehenden Flaschen ausgerichtet sind, und zwar in wenigstens einer horizon-

talen und parallelen Richtung zur Vorschubrichtung der beweglichen Transportfläche (10).

9. Vorrichtung nach Patentanspruch 7, **dadurch gekennzeichnet, dass** der Arm (1) in Querrichtung oberhalb der beweglichen Transportfläche (10) angeordnet ist. 5
10. Vorrichtung nach Patentanspruch 8, **dadurch gekennzeichnet, dass** der Arm (1) parallel zur und oberhalb der beweglichen Transportfläche (10) angeordnet ist. 10
11. Vorrichtung nach Patentanspruch 9, **dadurch gekennzeichnet, dass** der Kopf (31) vertikal und horizontal in einer parallelen Richtung zur Vorschubrichtung der beweglichen Transportfläche (10) beweglich ist. 15
12. Vorrichtung nach Patentanspruch 10, **dadurch gekennzeichnet, dass** der Kopf (31) vertikal und horizontal in einer lotrechten Richtung zur Vorschubrichtung der beweglichen Transportfläche (10) beweglich ist. 20

Revendications

1. Dispositif destiné à emballer en même temps des bouteilles verticales et retournées de façon intercalée dans une boîte en carton comprenant : un plan convoyeur mobile (10) composé d'une pluralité de bouteilles verticales parallèles ; des moyens de préhension et de rotation (20) d'une partie de la pluralité de bouteilles de 180° autour d'au moins un axe horizontal (x) et pour aligner une partie de la pluralité de ces bouteilles retournées de cette façon avec le nombre restant de la pluralité de bouteilles dans au moins une direction étant parallèle au plan convoyeur mobile (10) ; et des moyens de préhension (30) et de déplacement des groupes ordonnés de bouteilles de la pluralité de bouteilles, lesdits moyens (30) étant adaptés pour saisir et déplacer des groupes ordonnés de bouteilles formés par des rangées de bouteilles retournées alternées, de façon intercalée, avec des rangées de bouteilles verticales. 30
2. Dispositif selon la revendication 1, **caractérisé en ce que** les moyens de préhension et de rotation (20) comprennent un bras (1) horizontalement disposé au-dessus du plan convoyeur mobile (10), et des organes de préhension (8) associés au bras (1) et destinés à saisir les bouteilles verticales ; le bras (1) étant connecté en correspondance de l'une des ses extrémités (1a) à un actionneur rotatif (4), un axe de rotation duquel coïncide avec l'axe (x), l'actionneur rotatif (4) étant associé à un chariot (21) verticalement et horizontalement mobile dans une direction 35

parallèle à une direction d'avancement du plan convoyeur mobile (10).

3. Dispositif selon la revendication 2, **caractérisé en ce que** les moyens (30) de préhension et de déplacement comprennent : une tête (31) à laquelle une pluralité de premiers organes de préhension (5) sont associés, les premiers organes de préhension (5) étant destinés à saisir les bouteilles verticales ; et une pluralité de seconds organes de préhension (6) pour saisir les bouteilles retournées, lesdits seconds organes de préhension (6) étant alternés aux dits premiers organes de préhension (5), la tête (31) étant verticalement et horizontalement mobile. 40
4. Dispositif selon la revendication 3, **caractérisé en ce que** les organes de préhension (8) et les premiers organes de préhension (5) comprennent une pluralité de ventouses (5). 45
5. Dispositif selon la revendication 4, **caractérisé en ce que** les seconds organes de préhension (6) comprennent chacun un plongeur d'aspiration avec piston central pour créer une dépression sur un fond d'une bouteille et ainsi saisir la bouteille. 50
6. Dispositif selon la revendication 5, **caractérisé en ce que** les seconds organes de préhension (6) comprennent chacun des pinces mécaniques. 55
7. Dispositif selon la revendication 6, **caractérisé en ce que** l'axe (x) est horizontal et transversal par rapport à la direction d'avancement du plan convoyeur mobile (10) et les bouteilles retournées sont alignées avec les bouteilles verticales dans au moins une direction horizontale et perpendiculaire par rapport à la direction d'avancement du plan convoyeur mobile (10).
8. Dispositif selon la revendication 6, **caractérisé en ce que** l'axe (x) est horizontal et parallèle par rapport à la direction d'avancement du plan convoyeur mobile (10) et les bouteilles retournées sont alignées avec les bouteilles verticales dans au moins une direction horizontale et parallèle par rapport à la direction d'avancement du plan convoyeur mobile (10).
9. Dispositif selon la revendication 7, **caractérisé en ce que** le bras (1) est disposé transversalement au-dessus du plan convoyeur mobile (10).
10. Dispositif selon la revendication 8, **caractérisé en ce que** le bras (1) est disposé parallèlement et au-dessus du plan convoyeur mobile (10).
11. Dispositif selon la revendication 9, **caractérisé en ce que** la tête (31) est verticalement et horizontalement mobile dans une direction parallèle à la direc-

tion d'avancement du plan convoyeur mobile (10).

12. Dispositif selon la revendication 10, **caractérisé en ce que** la tête (31) est verticalement et horizontalement mobile dans une direction perpendiculaire à la direction d'avancement du plan convoyeur mobile (10).

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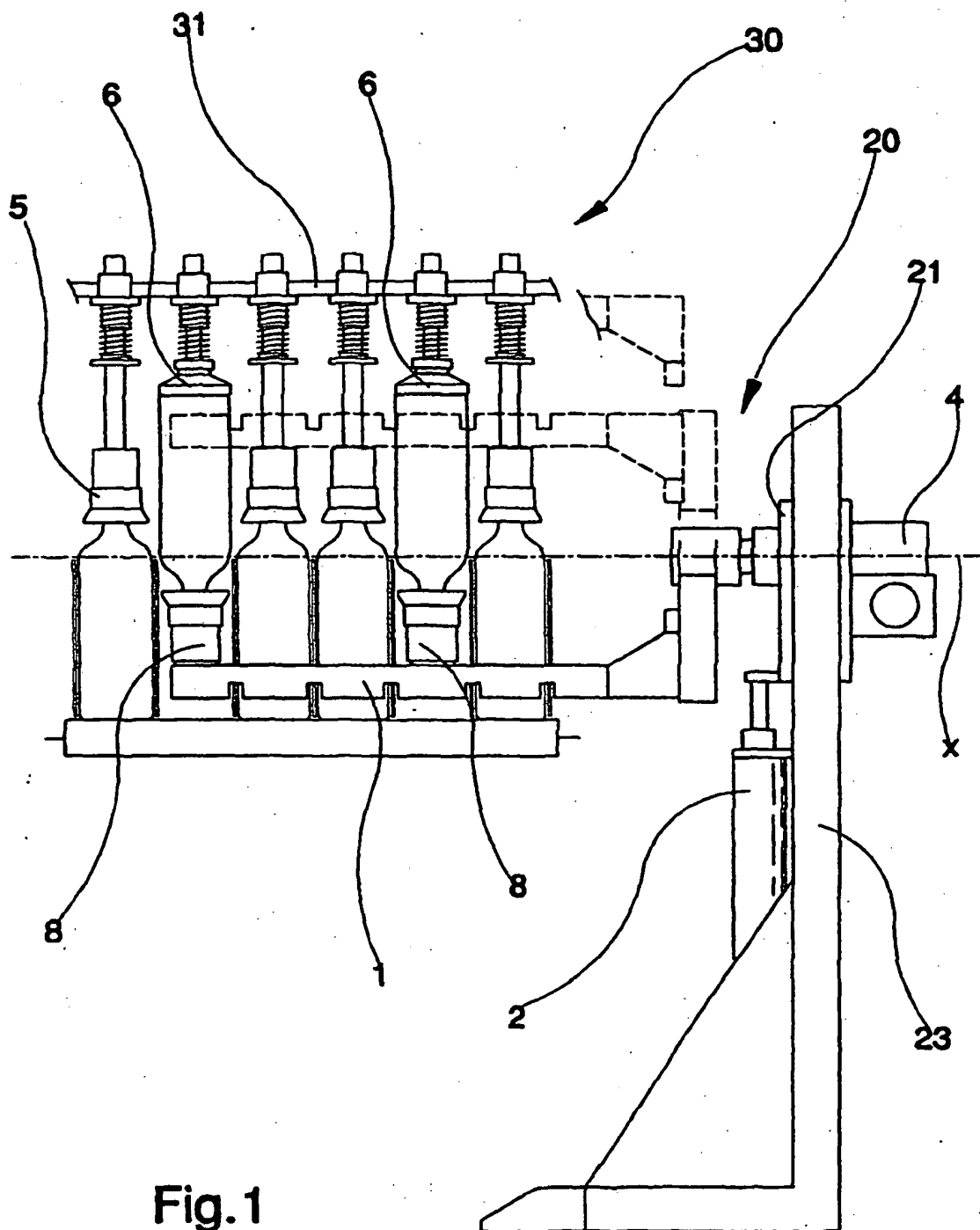


Fig.1

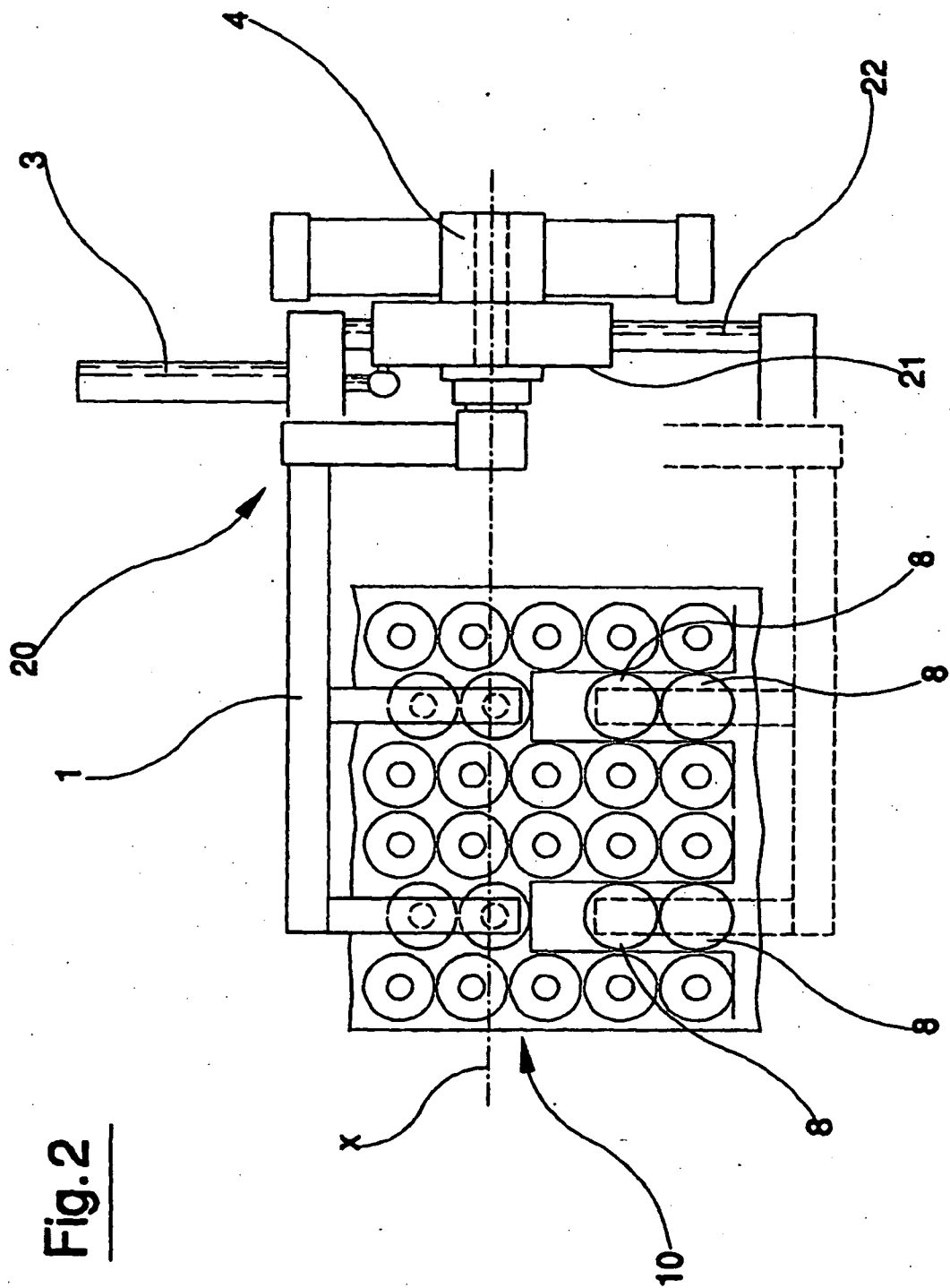
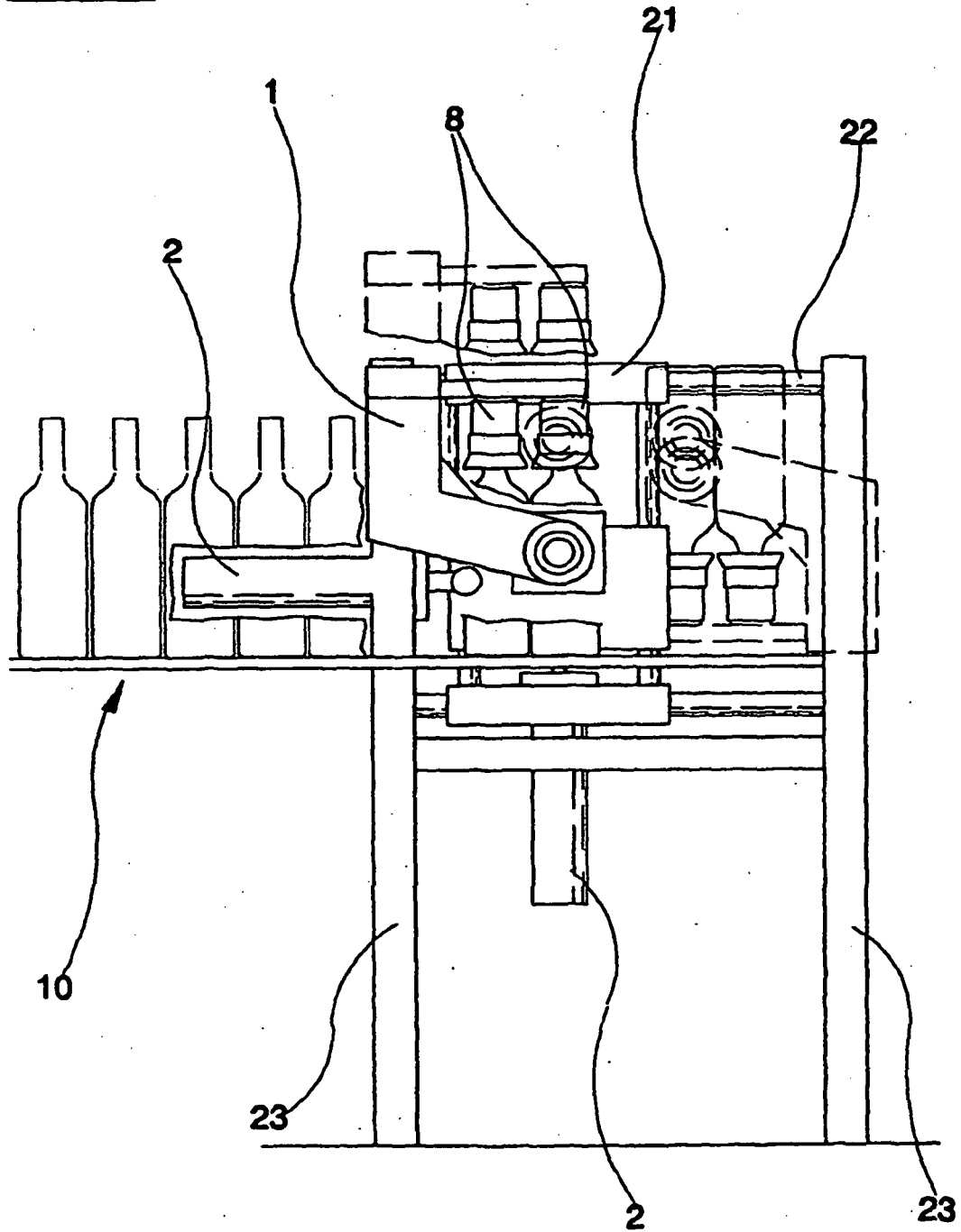


Fig. 2

Fig. 3



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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