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(54) **Packaging apparatus for bottles**

(57) The apparatus comprises a mobile conveyor plane (10) for a plurality of parallel rows of upright bottles, means (20) for gripping and rotating some of the bottles by 180° about at least one horizontal axis (x), and for aligning the upturned bottles with upright bottles on

the mobile conveyor plane (10) in at least a parallel direction to the mobile conveyor plane (10); the apparatus also includes means for gripping and moving ordered groups of bottles formed by rows consisting of upright and upturned bottles.

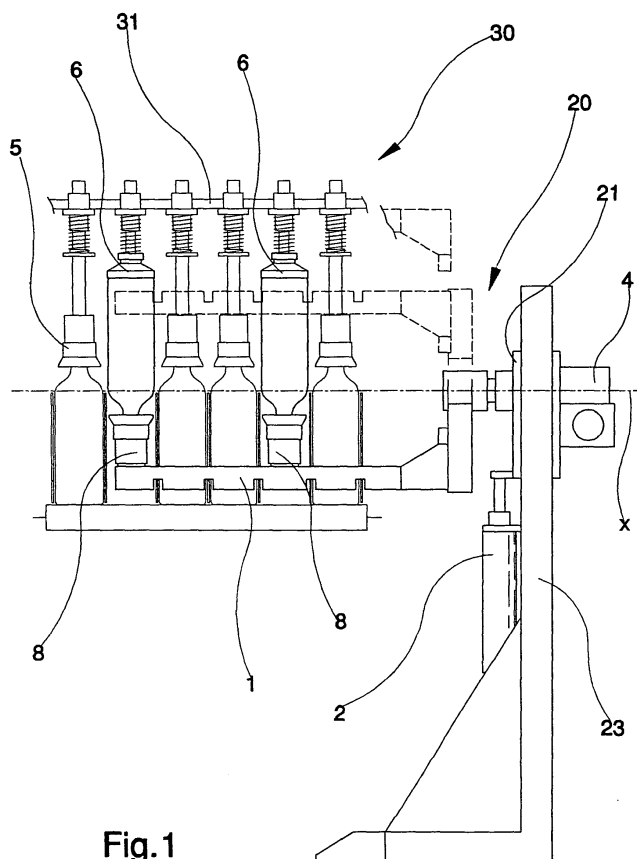


Fig. 1

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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] 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.

[0003] 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.

[0004] 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.

[0005] 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.

[0006] The apparatus further comprises means for gripping and moving 30 ordered groups of bottles formed by lines of upright and upturned bottles.

[0007] 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 1 a 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.

[0008] 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.

[0009] 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 fourth 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.

[0010] 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.

[0011] 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.

[0012] 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.

Claims

1. An apparatus for contemporaneously packing upright and upturned bottles into a cardboard box, **characterised in that** it comprises: 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); means for gripping (30) and moving ordered groups of bottles of the plurality of bottles, formed by rows of upturned bottles alternated with rows of upright bottles.
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 up-

right 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 (8) are associated, the first gripping organs (8) being destined to grip upright bottles; and a plurality of second gripping organs (6) for gripping upturned bottles, 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 mechanical 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 (11).
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). 5

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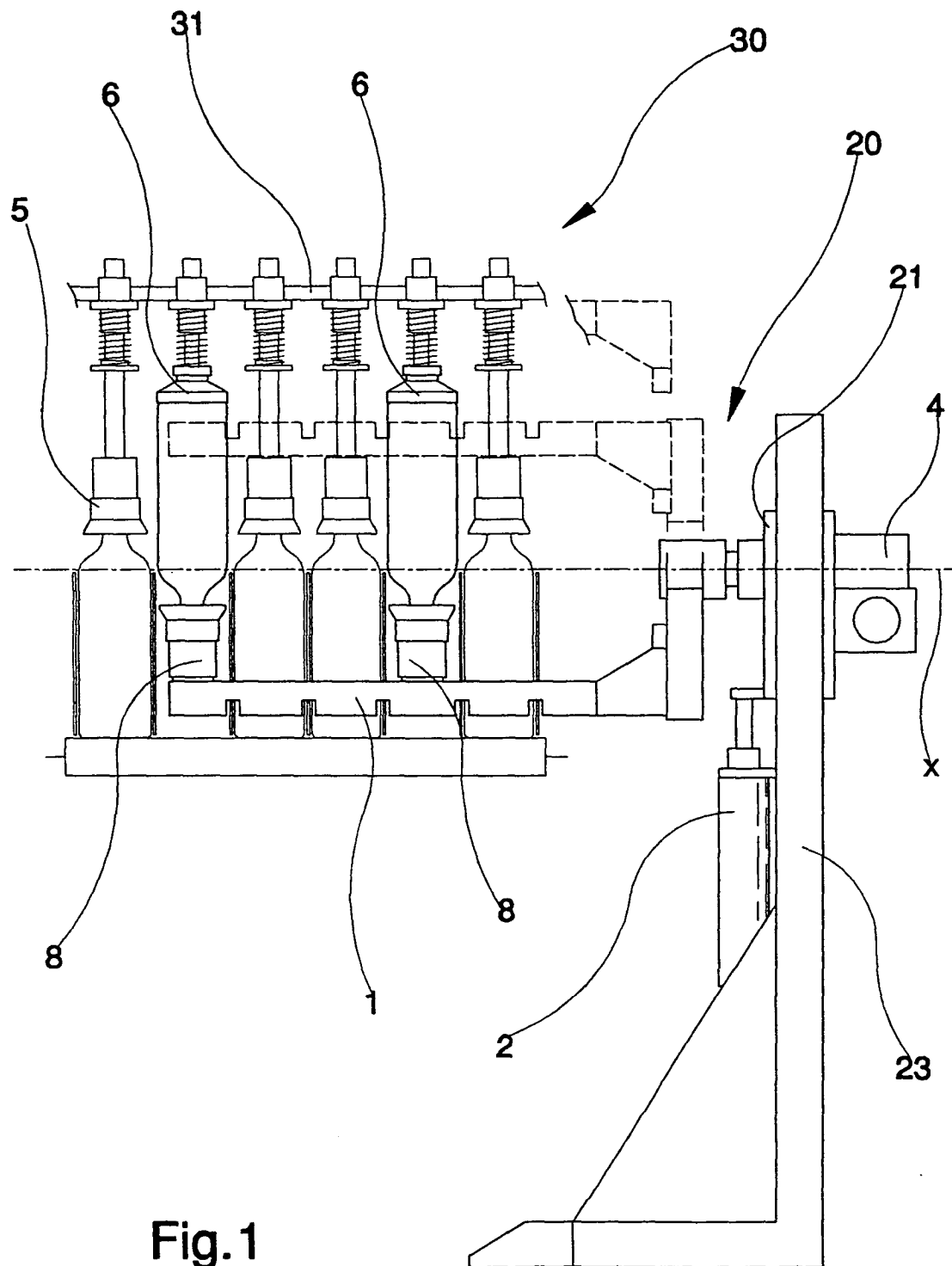


Fig. 1

Fig. 2

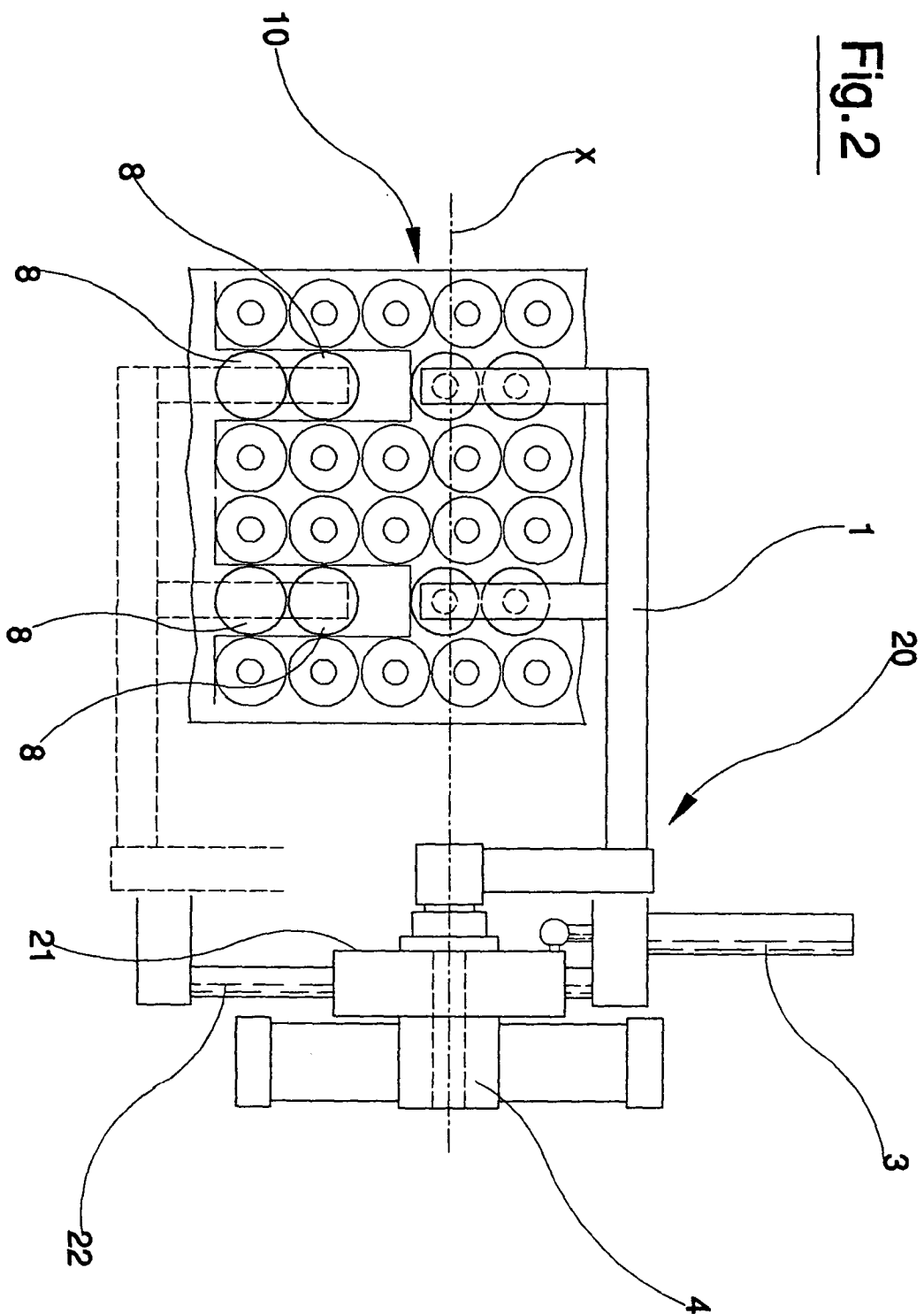
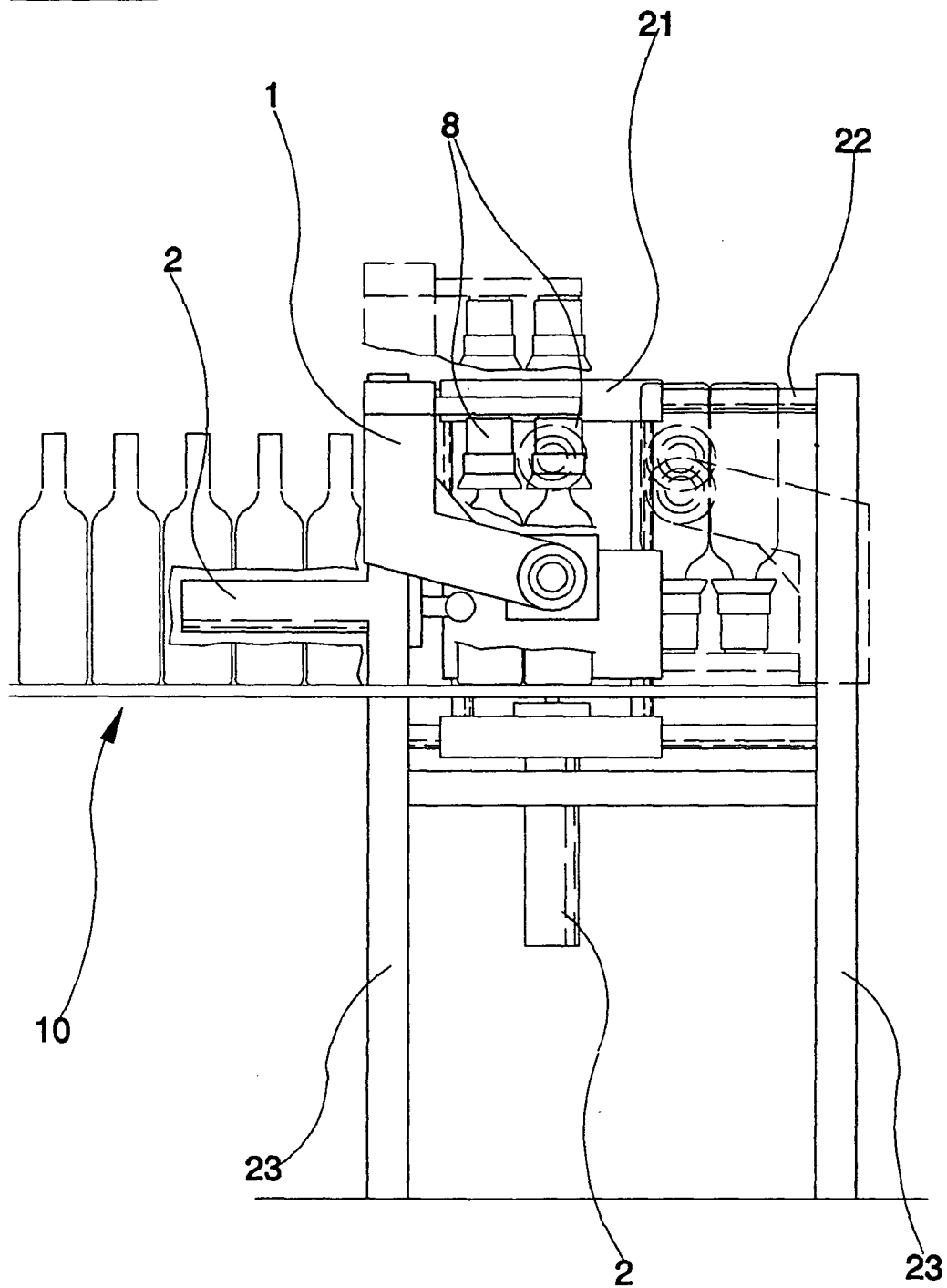


Fig. 3





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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5596

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 40 34 640 A (BORTOLIN KEMO SPA) 16 May 1991 (1991-05-16) * column 3, line 6 - line 15 * * column 3, line 28 - line 37 * ---	1-12	B65B21/02
A	FR 2 600 039 A (BENOIT JEAN LOUIS ;BROYE BERNARD (FR); LUCOTTE ALAIN (FR)) 18 December 1987 (1987-12-18) * abstract; figures 1-3 * ---	1-12	
A	FR 2 534 877 A (SAVOYE SA) 27 April 1984 (1984-04-27) * abstract; figures 1,2 * ---	1-12	
A	FR 2 528 008 A (SAVOYE SA) 9 December 1983 (1983-12-09) * the whole document * -----	1-12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search		Date of completion of the search	Examiner
MUNICH		25 February 2004	Damiani, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 42 5596

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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