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(54) **METHOD AND APPARATUS FOR INSERTING PARTITION ELEMENTS BETWEEN ARTICLES**

VERFAHREN UND VORRICHTUNG ZUM EINFÜHREN VON FLACHEN TRENNELEMENTEN
ZWISCHEN ARTIKELN

PROCEDE ET APPAREIL D'INSERTION D'ELEMENTS ENTRE DES ARTICLES

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AU-A- 439 944 **US-A- 4 793 117**

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Description

TECHNICAL FIELD

[0001] The present invention relates to a method and an apparatus for automatically fitting up longitudinal and/or transversal flat partition elements between flanked sideways articles that are continuously advanced, particularly suitable to be used in the packaging lines of articles such as cans, bottles or the same.

BACKGROUND ART

[0002] In the specified cited packaging field, and in particular in the case of packaging brittle articles, such as glass bottles, it is often required the insertion of longitudinal and/or transversal flat partition elements between the articles of a package to determine a plurality of cells, each of them is aimed to contain a single article, so as to avoid the contact and the direct collision between the same articles, keeping them save, for instance, during the transport steps of the same package.

[0003] Presently, several methods and apparatuses are known to get the automatic insertion of said partition elements.

[0004] For example, the patent IT-927.943 discloses that the longitudinal and/or transversal flat partition elements are introduced, consecutively one after the other, between the articles of a predefined group, and that the so obtained assembly, articles and partition elements, will be subsequently packaged and bound in cardboard.

[0005] To make the insertion of the longitudinal and transversal partition elements easier, the articles of the group to be packed are placed in longitudinal and transversal ranks, than said longitudinal ranks are temporarily spaced out transversally and the transversal ranks are temporarily spaced out longitudinally, so as to the partition elements can slide from above downwards, preferably for gravity, between the spaced out ranks.

[0006] The apparatus provided to implement the above mentioned method is essentially comprehensive of: a conveyor provided with thrust bars that extends from upstream to downstream of the apparatus, to make the separate groups of articles and to convey the same groups downstream, a plurality of devices fit to insert the boards, placed over the article conveyor and in sequence along the article conveying path, to allow the free fall or to throw downwards the related partition elements; channel devices, to obtain the transversal displacement of the longitudinal ranks of the articles; and a further belt conveyor that is coplanar with the transport plane of the articles, which is fit to act in the operative area of the said first conveyor and to successively speed up the transversal ranks of the articles so as to get a temporary spacing between the same transversal ranks.

[0007] The patent IT-1.154.364, essentially is comprehensive of: a multiple belt conveyor to transport the

articles ordered in transversal and longitudinal ranks from upstream to downstream; an automatic fixed dispenser, placed upon the flow of the containers that advance longitudinally and fit for throwing transversal partition elements from above downwards; and a spacing device to temporarily space longitudinally the transversal ranks of the articles.

[0008] The spacing device essentially includes a plurality of transversal pegs moved along a closed ring path in a vertical orbit by a chain conveyer, in which the upper branch of the said orbit includes the transport of the pegs between the containers according to the same longitudinal speed of these latter.

[0009] The operation of this device is that first the pegs insert between the containers from the bottom upwards and then, during the phase of driving back downwards the chains, they determine the spacing of the container transversal ranks: this is due to the fact that the upper ends of the same pegs, during said phase, make a greater path respect of the one made by their base, that lies about on the same plane with the article bottoms.

[0010] The methods for inserting partitions and the apparatuses above described have several drawbacks.

[0011] A first drawback results from the fact that the longitudinal and transversal elements are inserted from above downwards, by moving them down along vertical planes that are perpendicular to the flow of the articles, so as to determine the need of providing a perfect phase relationship between the lowering partition and the advancing articles, so as the need in keeping a much reduced advancing speed of the articles to have sufficient time to perform said insertion, so having a lower productivity.

[0012] A further drawback, related to the above mentioned, lies in occurring misplacements of the partitions and apparatus jams due to the fact that, to increase the productivity of the apparatus, the partitions are thrown downwardly at an high speed so as they bounce on the transport plane of the articles.

[0013] The last drawback lies in the fact that the different stores of the partitions are positioned at an height hardly reachable by the operator, so as these apparatuses must have a supplementary frame that allows the operator to reach those stores. This fact determines an high risk of possible accidents.

[0014] Patent US 4.793.117 discloses a packaging machine for inserting longitudinal partition elements from beneath of groups of articles, and longitudinal partition elements from above the said articles, which is similar to the one described in the aforesaid italian patent IT 1.154.364.

[0015] From patent document AU-439.944 is known a method and apparatus in accordance with the preambles of appended claims 1,3,5 and 10, for inserting of transversal and longitudinal partition elements, respectively between rows and columns of a batch of closely spaced jars or the like, at two or more operating stations

which are subsequently placed on a conveyor platform.

[0016] The transversal elements are inserted at a first inserting station, from beneath the said platform, through transversal slots suitably made in said platform and after the rows of jars have been accurately placed between the slots.

[0017] Jars are then moved to a second station for inserting of longitudinal elements, which are also inserted from beneath the platform, through corresponding longitudinal slots, after the columns of jars have been accurately placed between said slots.

DISCLOSURE OF THE INVENTION

[0018] The main object of the present invention is therefore to avoid the drawbacks reported above.

[0019] The invention, such as characterised by the claims 1, 3, 5 and 10, resolves the problem of finding out a method and an apparatus for the automatic insertion of longitudinal and transversal partition elements between flanked articles that are continuously advanced.

[0020] The following results are obtained by the use of a method and of an apparatus of this type:

- the partition elements are easier inserted;
- the rebound of these elements on the transport plane of the articles is avoided;
- the stores for said partition elements are easily reached by the operator.

[0021] The advantages obtained with the present invention, essentially, are that it is possible to move much quicker the articles so improving the productivity of the apparatus, that it is possible to avoid the problems due to the rebound of the partition elements and to have no supplementary frame to allow the operator access to the stores of the partition elements, so as a reduction of the risks of possible accidents because of the easy access to the frame.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Further characteristics and advantages of the present invention will be better pointed out in the following detailed description of the preferred embodiment, given here as a mere example, not limitative, with reference to the enclosed drawings, in which:

- Figure 1 is a perspective view of the apparatus being the subject of the present invention;
- Figure 1A is a schematic front view of the apparatus of Figure 1;
- Figures 2 and 2A are two schematic views, respectively front and top view, along the line II-II of Figure 1A;
- Figure 2B is an enlarged view of a portion of Figure 1;

- Figure 3 is a schematic front view along the line III-III of Figure 1A;
- Figures 3A, 3B and 3C are three schematic top views respectively along the lines A, B and C of Figure 3;
- Figure 3D is a schematic sectional view along the line D-D of Figure 3;
- Figures 4A, 4B and 4C are a schematic top view along the line IV-IV of Figure 1A of three successive sequences;
- Figure 5 is a sectional view along the line V-V of Figure 1A.

BEST MODE OF CARRYING OUT THE INVENTION

[0023] The Figures of the enclosed drawings show an apparatus designed to package groups of articles 100, 200, 300, 400, 500 and 600 comprising three transversal ranks and four longitudinal ranks of articles 3. It is clear that the method and the apparatus here disclosed could be used also with different group sizes.

[0024] With reference to the Figures 1 and 1A the apparatus 1, object of the present invention, is constituted by an upstream end 2 linked with a feeding machine, not shown, that feeds a continuous flow of the articles 3 to be packed, that are bottles in the shown Figures.

[0025] The horizontal transport plane of the articles 3, from upstream to downstream, is in succession constituted by: a first sliding surface 2a provided with a plurality of known channel guides 4; a first conveyer 5 provided with multiple belts 5a that are wrapped in a closed ring; a second sliding plane 6; a conveyer 7 with multiple belts 7a that are wrapped to form a closed ring; a third sliding plane 8 comprising, see Figures 3A, 3B and 3C, a plurality of shims 8a longitudinally extending and provided with guides 8c, and that are mutually transversally spaced to determine the openings 8b extending longitudinally; and, at least, a sliding continuous plane 51 having convergent guides 51a, see the said Figure 3C.

[0026] The upper portion of the apparatus 1, as regards said article transport plane, comprises a pairs of side vertical shoulders 9, 9a, extending longitudinally, that support a closed ring conveyor 11, which includes a pair of chains 50, 50a, each of which are wrapped on respective chain wheels and supports one end of respective plurality of transversal thrust bars 11a, so defining a closed ring path, the lower branch of which provides the transport of the articles 3 from upstream to downstream of the apparatus 1.

[0027] A further closed ring conveyor 12 is placed inside the conveyor 11, is similar to this latter and includes a pair of chains 10, 10a, each of which are spooled on respective chain wheels and support one end of respective plurality of transversal thrust bars 12a that, along the lower branch of their closed ring path, operate within the operation of the branch of the lower operative path of the bars 11a, as described and shown in another Italian Patent Application No. BO94A 000215 filed in the

name of this Applicant on the same date.

[0028] The lower portion of the apparatus 1, from upstream to downstream, in sequence includes: a first known closed path conveyor 60 which supports transversal ranks of slugs 60a, fit to insert between the belts 5a of the conveyor 5; a store 13, of known type, to store of an large amount of transversal partition elements 14; extracting-transferring means 15 fit to extract and transport in a single succession partition elements 14 from the said store 13; and a close ring conveyor 16 fit to convey in succession one after the other transversal partition elements 14 handled by said extracting-transferring means 15.

[0029] Particularly, see Figure 2b too, said conveyor 16 includes a pair of belts or chains 17 17a, wrapped on respective wheels 18-19, 18a-19a, and which support a plurality of pairs of slugs 20, 20a, said upper wheels 19, 19a being located between rolls 7b, 7b belonging to the transmission roll upstream the conveyor 7.

[0030] The conveyor 16 is vertically sloping to define an operative path designed to convey in sloping way from the bottom upwards and upstream to downstream, fit to convey the partitions 14 uprights in series, through an opening 21 between the sliding surface 6 and the conveyor 7. Moreover, a switch element 6a (see Figure 1A), fit to switch inside said opening 21 partition elements eventually not well transported, is supplied to avoid wrong insertions of the partition 14 trough the opening 21.

[0031] Wit reference also to the Figures 4A, 4B, 4C, and 5, in the lower portion of the apparatus 1, and downstream with respect of the above mentioned conveyor 16, three stores 22, 23, 24, of known type, are fit to store related longitudinal partition elements 25, 26, 27 and three extracting-transferring devices 28, 29, 30 are fit to take and to transport respective longitudinal partitions 25, 26, 27, respectively comprising one or more swinging arms 28a, 29a, 30a, supporting respective suction means 28b, 29b, 30b.

[0032] Below said extracting-transferring devices 28, 29, 30, there are three respective guides 31, 32, 33 longitudinally extending, from upstream to downstream, from the bottom upwards, from a zone close to the extracting-transferring devices 28, 29, 30 till next to a zone downstream the plane 8 and directly below this latter, see also Figures 1 and 1A.

[0033] With reference to Figure 5, said guides 31, 32, 33 have a first portion with transversal section like an inverted "L" fit to support relative longitudinal partition elements 25, 26, 27 which are moved by the relative extracting-transferring devices 28, 29, 30. The second middle portion of said guides has a transversal section "U" shaped fit to support the same partition elements 25, 26 and 27 in vertical-longitudinal position.

[0034] Wit reference to Figures 1A and 3D, the third end portion of said guides 31, 32, 33 has a rectangular transversal section and it is fit to support the bottom of the partitions 25, 26, 27 and to cooperate with a guide-

group 61 that has a series of longitudinal guides 61a, protruding from the lower plane of the sliding surface 8 downwards. The lower rim of said guide-group 61 is vertically spaced from the upper surface of the rectangular section in order to allow the passage of thrust bars 34a, better described later, without any interference.

[0035] A closed ring conveyor 34 includes a pairs of chains 35, 35a, wrapped onto relative chain wheels 36, 37, 38, 39 e 36a, 37a, 38a, 39a (not all of them are shown in the Figures), and said chains support a plurality of thrust bars 34a that move along a closed path, the upper branch of which is parallel to the upper level of the guides 31, 32, 33.

[0036] It must be noted that the operative path of the bars 34a is located in correspondence of a level slightly superior with respect of the guides 31, 32, 33, but so as to not interfere with the operation of the suction means 28b, 29b, 30b, as shown in Figure 5. With reference to the third end portion of the guides 31, 32, 33, the above mentioned operative path does not interfere with the lower end of the guide-group 61.

[0037] The apparatus 1 is also equipped with known mechanical and/ or electrical and/or electronic and/or computerised devices fit to synchronise the same apparatus.

[0038] The operation of the apparatus 1 includes the incoming of a continuous flow of articles 3 from a feeding machine linked with the upstream end 2 of the apparatus 1.

[0039] The continuous flow of articles 3 moves on the sliding surface 2a so as the articles 3 are pushed inside the longitudinal channels defined by the guides 4 obtaining their longitudinal alignment (see Figures 2 and 2A).

[0040] Downstream of said sliding surface 2, the articles 3 are transported by the conveyor 5 downstream and towards the longitudinal ranks of pegs 60a protruding from the bottom between the belts 5a in order to transversally align the article 3 to define transversal ranks 3a.

[0041] The transversal ranks of pegs 60a insert between the transversal ranks 3a of articles 3, and because of the longitudinal speed of the transversal ranks of pegs 60a is lower than the speed of the conveyor 5, see Figures 1A, 2, 2A, said pegs 60a touch the frontal portion of the articles 3, giving these latter a translation speed downstream equal to the speed of said pegs 60a, that is lower than the speed of the conveyor 5.

[0042] So, the transversal ranks are moved onto the conveyor 5 and when a transversal rank of pegs 60a is diverted downwards next the downstream end of the conveyor 60, the transversal rank 3a, which was blocked by said rank of pegs 60a, is free to move with a longitudinal speed greater than the conveyor 5. Since the subsequent transversal rank of articles 3 is still blocked by relative subsequent pegs 60a, it is possible to get a first longitudinal spacing between the transversal released rank of article 3 and the subsequent trans-

versal rank 3a of articles 3 that is still blocked by the subsequent rank of peps 60a.

[0043] The transversal ranks 3a of the articles 3 are spaced and are conveyed downstream by means of the conveyor 5. The thrust bars 11a and 12a lower from above downwards, insert between the transversal ranks 3a, and provide to advance the transversal ranks 3a and to set them in a right phase relationship according to the subsequent operations, as shown in Figure 2A with the numeral references 3aa, 3ab, 3ac, 3ad, 3ae and so on. If it is necessary, the thrust bars 11a and 12a increase the longitudinal spacing therebetween.

[0044] It should be noted that, for reasons better clear in the following description, the group of article 100 has the two transversal front ranks 3aa, 3ab, pushed by two bars 12a of the conveyor 12, while the transversal rear rank 3ac is pushed by a bar 11a of the conveyor 11.

[0045] The article transversal ranks 3a are so moved upon the sliding surface 6 and, in phase relationship with the advancement thereof, a partition element 14 is inserted between the two front transversal ranks 3aa and 3ab of the group 100 of article 3. This partition element passes, from the bottom upwards, through the opening 21 placed between the sliding surface 6 and the conveyor 7 and by means of switching element 6a.

[0046] Said partition element 14 is inserted along a sloping plane having a direction from the bottom upwards and upstream to downstream, by means of the conveyor 16, which, with its slugs 20, 20a, takes and transfers the elements 14, extracted from the stare 13 and transferred by the extracting-transferring device 15.

[0047] In this manner a first partition element 14 will be inserted between the first and second transversal rank, respectively 3aa and 3ab and, subsequently, a second partition element 14 will be so inserted between the second and third transversal rank 3ab, 3ac. In this specific embodiment, no partition elements will be inserted between the rank 3ac and the rank 3ad, thus obtaining a group 200 of articles 3 provided with two transversal partition elements 14.

[0048] With reference to Figures 2 and 2A, each transversal rank 3aa, 3ab, 3ac is pushed by respective thrust bars 12a, 12a, 11a, downstream onto the conveyor 7; subsequently bars 12a, 12a are switched upwards so as only the bar 11a longitudinally pushes the group 200.

[0049] The speed of the conveyor 7 is lower than that of the bars 11a, so during the transport of the group of articles on said conveyor 7 a longitudinal accumulation between the transversal ranks 3a of articles, which were previously spaced, is obtained.

[0050] Referring to Figures 3, 3A, 3B and 3C, groups 200, 300 of articles 3 are routed by bars 12a and by conveyor 7 on the sliding surface 8 and against the diverging heads of guides 8c (see Figure 3A), thus separating the group 400 to longitudinal ranks 3b, between which the openings 8b extend.

[0051] Referring now to Figure 5, the extracting-trans-

ferring devices 28, 29, 30 withdraw respective partition elements 25, 26, 27, bringing them to the respective guides 31, 32, 33, which have an inverted "L" shape, for a further transport.

[0052] Referring to Figures 4A, 4B, 4C and 5, the thrust bars 34a of conveyor 34, driven in a phase relationship with the operating cycle of the apparatus 1, during their upper active path, affect the rear rim of the longitudinal partition element 25 first, then, in a succession, the rear rims of the longitudinal partition elements 26 and 27 (Figures 4B and 4C) push three partition elements 25, 26, 27 transversely aligned within respective longitudinal guides 31, 32, 33. Those, as mentioned above, have a transversal shape of a "U" for an intermediate stretch of their longitudinal extension, while their final downstream stretch forms a rectangle-shaped guide (Figure 3) exclusively able to hold the partition elements and a plurality of vertical guides 61a, which extend longitudinally and downwards the sliding surface 8; the vertical guides 61a are aimed to hold in a vertical and longitudinal position the partition elements.

[0053] The partition elements are so routed from the bottom upwards and upstream to downstream under the sliding surface 8, having a longitudinal and vertical position and transversely centred with respect to the openings 8b located between the shims 8a. Afterwards, near the downstream end of the conveyor 7, they are inserted between the longitudinal ranks 3b of articles 3, passing through said openings 8b.

[0054] After said insertion, just after the downstream end of the conveyor 34, the group 500, provided with transverse partition elements 14, 14 and with longitudinal partition elements 25, 26, 27, is transferred from the sliding surface 8 to the sliding surface 51 which transversely accumulates said group 500, as shown as numeral 600. The group 600 then continues its transferring to further packaging operation.

[0055] The description of method and apparatus are given as a pure and not limitative example, and it is therefore evident that all changes or variants coming within the scope of the following Claims and suggested by use or practice are however included.

45 Claims

1. Method for inserting partition elements (14) between ranks of groups of articles (3), in which provision is made to move in single groups of articles (3) along an operating path extending longitudinally and provided with openings (21) fit to allow the access of the partition elements (14) into the operating path from a zone underlying said operating path, and in which provision is made to move the partition elements (14) upwards through said openings (21) and between said ranks, characterised by the following steps for inserting transversal partition elements:

- feeding with continuous motion successive transversal ranks (3aa, 3ab) by means of conveying means (12) with thrust bars (12a) equipped with continuous motion, whereby each of the thrust bars (12a) continuously and longitudinally feeds and spaces out a single transversal rank (3aa, 3ab) of articles (3) from upstream to downstream of said at least one transversal opening (21);
 - moving said transversal partition element (14) through the transversally orientated opening (21) in relation to the position of continuous feed which the transversal ranks (3aa, 3ab) assume with respect to said transversal opening (21);
 - bringing the upper end of said partition element (14) beyond the upper end of said opening (21) when the downstream transversal rank (3aa) of the two transversal ranks (3aa, 3ab) has passed beyond the transversal opening (21);
 - bringing the lower end of said partition element (14) beyond the upper end of said opening (21) before the upstream transversal rank (3ab) of the two ranks (3aa, 3ab) affects said opening (21);
 - accumulating the transversal ranks (3aa, 3ab) of a group of articles (3).
2. Method according to claim 1, characterized in that it provides a vertical/transversal movement plane sloping from the bottom upwards and from upstream to downstream passing into said opening (21) along which plane the transversal partition elements (14) are fed in single succession during their insertion between the transversal ranks (3aa, 3ab).
3. Method for inserting partition elements (25, 26, 27) between ranks of groups of articles (3), in which provision is made to move in single groups of articles (3) along an operating path extending longitudinally provided with openings (8) fit to allow the access of the partition elements (25, 26, 27) into the operating path from a zone underlying said operating path, and in which provision is made to move the partition elements (25, 26, 27) upwards through said openings (8) and between said ranks, characterised in the following steps for inserting longitudinal partition elements:
- feeding with continuous motion the ranks (3b, 3b, 3b) of each group (500) reciprocally spaced out transversally from upstream to downstream of longitudinal openings (8b, 8b, 8b) causing said longitudinal ranks (3b, 3b, 3b) to pass beside respective longitudinal openings (8b, 8b, 8b);
 - moving the longitudinal partition elements from the bottom upwards and simultaneously from upstream to downstream, in vertical/longitudinal attitude, through said longitudinal openings (8b, 8b, 8b) and between said longitudinal ranks (3b, 3b, 3b, 3b), whilst these latter pass from upstream to downstream and beside said longitudinal openings (8b), in phase relationship with the position of continuous feeding which the longitudinal ranks (3b, 3b, 3b, 3b) assume with respect to said longitudinal openings (8b, 8b, 8b).
4. Method according to claim 3, characterized by the steps of
- providing for each longitudinal opening (8b, 8b, 8b) an underlying plane of vertical/longitudinal movement sloping from the bottom upwards and from upstream to downstream opening into said openings (8b, 8b, 8b);
 - providing along said plane of movement a succession of longitudinal partition elements (25; 26; 27) disposed in vertical/longitudinal attitude;
 - feeding each longitudinal partition element (25; 26; 27) along said plane of movement in relation with the respective group (400, 500) of articles into which it should be inserted which advances continuously at the top along the operating path.
5. Apparatus for inserting transversal partition elements (14) between transversal ranks of groups of articles (3) moved along an operating path extending longitudinally, in which are provided thrusting means fit to move the groups of articles aligned transversally downstream along said operating path, transversal openings (21) fit to allow the access of the transversal partition elements (14) into the operating path from a zone underlying said operating path, inserting means fit to move the transversal partition elements (14) through said transversal openings (21) and between said transversal ranks of articles, characterised in
- conveying means (11, 50, 50a; 12, 10, 10a) with thrust bars (11a, 12a) equipped with continuous motion in which each of the thrust bars (11a, 12a) continuously and longitudinally feeds and spaces out a single transversal rank (3a) of articles (3) from upstream to downstream of at least one transversal opening (21);
 - inserting means (16, 17, 17a) constantly positioned under said at least one transversal opening (21), actuated in correlation with said conveying means (11, 50, 50a; 12, 10, 10a), fit to move the transversal partition elements (14)

through the transversal opening (21) in vertical disposition and in phase relationship with the position of continuous feed which said transversal ranks (3aa, 3ab) assume with respect to the transversal opening (21); and

- a phase relationship between said conveying means (11, 50, 50a, 11a; 12, 10, 10a, 12a) and said inserting means (16, 17, 17a) that provides to move at least one partition element (14) between at least two successive transversal ranks (3aa, 3ab) after the more downstream rank (3aa) has released said opening (21) and before the successive rank (3ab) affects said opening (21), the transversal ranks (3aa, 3ab) of a group of articles (3) being subsequently accumulated.

6. Apparatus according to claim 5, characterized in that said inserting means (16, 17, 17a) provide a pair of belts or chains equipped with thrust pegs (20, 20a) wrapping around in closed path in respective parallel planes on respective drive-back wheels, in that the upper wheels (19, 19a) of said drive-back wheels (18, 19; 18a, 19a) are positioned between drive-back rollers (7b, 7b) upstream of a tape conveyor (7), and in that the upstream end of said tape conveyor (7) defines the downstream end of said transversal opening (21).

7. Apparatus according to claim 5 or 6, characterized in that said inserting means (16) with closed path have the active or transport branch sloping from the bottom upwards and from upstream to downstream, the downstream end of which is constantly positioned and aligned toward and into said opening (21).

8. Apparatus according to anyone of claims 5 to 7, characterized in that said conveying means (11, 11a, 50, 50a; 12, 12a, 10, 10a) provide first thrust bars (11a) fit to push the more upstream transversal ranks (3ac) of each group (100, 200, 300) and second thrust bars (12, 12a) fit to push the further, more downstream transversal ranks (3aa, 3ab) of each group (100, 200, 300); in that said first thrust bars (11a) and said second thrust bars (12a, 12a) each provide to feed in continuous succession respective transversal ranks (3aa, 3ab, 3ac) longitudinally spaced out upwards and beyond said transversal opening (21) during the insertion phases of the partition elements (14); and in that said second thrust bars (12a, 12a) when they arrive downstream of the said opening (21) are removed out of the operating path whereas the first thrust bars (11a) continue to act along said operating path, with the purpose of obtaining the longitudinal compacting between the transversal ranks (3aa, 3ab, 3ac) by means of the first bars (11a) which push the more upstream ranks

(3ac) of each group (100, 200, 300).

9. Apparatus according to anyone of claims 5 to 8, characterized in that at least one switching element (6a) fit to direct the partition elements (14) into said opening (21) is provided underneath said opening (21).

10. Apparatus for inserting longitudinal partition elements (25, 26, 27) **[deletion(s)]** between longitudinal ranks of groups of articles (3), in which is provided an operating path along which provision is made to move said groups of articles (3) and in which are provided first conveying means fit to move the longitudinal ranks of each group of articles downstream, longitudinal openings (8) fit to allow the access of the longitudinal partition elements (25, 26, 27) into the operating path from a zone underlying the operating path and inserting means fit to insert the longitudinal partition elements (25, 26, 27) from the bottom upwards through said longitudinal openings (8) and between said longitudinal ranks, characterized in

- first conveying means (11) with thrust bars (11a) equipped with continuous motion, each of which feeds with continuous motion the longitudinal ranks (3b, 3b, 3b, 3b) of a respective group (400, 500, 600) of articles (3) from upstream to downstream of longitudinal openings (8b, 8b, 8b);
- guide means (8) with single longitudinal sliding channels (8c) reciprocally spaced out transversely between which longitudinal openings (8b) are formed, in which said channels are fit to maintain transversely spaced out the longitudinal ranks (3b, 3b, 3b, 3b) of each group of articles (3) whilst said ranks (3b, 3b, 3b, 3b) pass from upstream to downstream and beside said longitudinal openings (8b, 8b, 8b);
- inserting means, constantly positioned underneath each of said longitudinal openings (8b, 8b, 8b), actuated in correlation with said conveying means (11, 11a), fit to move longitudinal partition elements (25, 26, 27) in vertical/longitudinal disposition from the bottom upwards and simultaneously from upstream to downstream, through said longitudinal openings (8b, 8b, 8b) and between said longitudinal ranks (3b, 3b, 3b) whilst these latter pass beside said openings (8b, 8b, 8b, 8b).

11. Apparatus according to claim 10, characterized in that said guide means (8) with single longitudinal sliding channels (8c) provide a sliding plane (8) formed by a plurality of shims (8a) extending longitudinally, equipped with guides (8c) and in that said shims (8a) are transversely spaced out to deter-

mine openings (8b) extending longitudinally.

12. Apparatus according to claim 10 or 11, characterized in that downstream of said guide means (8) is provided a continuous sliding plane (51) the transversal ends of which have convergent guides (51a) fit to compact transversely the groups (600) which arrive continuously from the preceding guide means (8).
13. Apparatus according to anyone of claims 10 to 12, characterized in that said inserting means provide:
- support/guide means (31, 32, 33, 61) disposed underneath the operating path, extending from upstream to downstream and from the bottom upwards, opening into said longitudinal openings (8b, 8b, 8b), fit to support and guide in a sliding manner the longitudinal partition elements (25, 26, 27) in vertical/longitudinal attitude towards and into said openings (8b, 8b, 8b); and
 - conveying means (34) with thrust bars (34a), actuated in correlation with the above mentioned conveying means (11), whose thrust bars (34a) are intended to act in the operating sphere of said support/guide means (31, 32, 33, 61), to feed the longitudinal partition elements (25, 26, 27) along the support/guide means (31, 32, 33, 61) in relation to the continuous feed position which the longitudinal ranks (3b, 3b, 3b, 3b) assume with respect to the longitudinal openings (8b, 8b, 8b).
14. Apparatus according to anyone of claims 10 to 13, characterized in that said support/guide means (31, 32, 33, 61) provide for each opening (8b):
- a first support/guide element (31, 32; 33), extending from the bottom upwards and from upstream to downstream with respect to the direction of feed, having its downstream end aligned and vertically spaced out with respect to said longitudinal opening (8b),
 - a second guide element (61) projecting from the top downwards with respect to the longitudinal opening (8b), intended to cooperate with the downstream portion of said first support/guide element (31; 32; 33) for the purpose of permitting the passage of the thrust bars (34a) between the two elements (31, 61), fit to guide the upper part of the longitudinal partition elements before they enter said opening (8b).

Patentansprüche

1. Verfahren zum Einführen von flachen Trennele-

menten (14) zwischen Reihen von aus Gegenständen (3) bestehenden Gruppen, bei dem Vorkehrungen getroffen sind, die einzelnen Gruppen der Gegenstände (3) auf einer Arbeitsbahn zu bewegen, die sich in Längsrichtung erstreckt und Öffnungen (21) hat, durch die hindurch die Trennelemente (14) von einer unter der Arbeitsbahn liegenden Zone in die Arbeitsbahn zugeführt werden können, und bei dem ferner Vorkehrungen getroffen sind, die Trennelemente (14) durch diese Öffnungen (21) und zwischen den Reihen nach oben zu bewegen, gekennzeichnet durch die folgenden Schritte zum Einführen von Trennelementen, die sich in Querrichtung erstrecken:

- kontinuierliche Zuführung von aufeinander folgenden Querreihen (3aa, 3ab) mit Hilfe von Schubstangen (12a) aufweisenden, kontinuierlich bewegten Fördermitteln (12), von denen jede Schubstange (12a) kontinuierlich und in Längsrichtung jeweils eine einzelne Querreihe (3aa, 3ab) der Gegenstände (3) von einem Bereich vor bis zu einem Bereich hinter der sich in Querrichtung erstreckenden Öffnung (21) vorschubt und vereinzelt,
- Vorschub des sich in Querrichtung erstreckenden Trennelements (14) durch die Queröffnung (21) in Abhängigkeit von der Position kontinuierlichen Vorschubs, welche die Querreihen (3aa, 3ab) bezüglich der Öffnung (21) einnehmen,
- Vorschieben des oberen Endes des Trennelementes (14) über das obere Ende der Öffnung (21) hinaus, wenn die vorlaufende Querreihe (3aa) von zwei Reihen (3aa, 3ab) über die Queröffnung (21) hinweggelaufen ist,
- Vorschub des unteren Endes des Trennelementes (14) über das obere Ende der Öffnung (21) hinaus, bevor die nachlaufende Querreihe (3ab) der beiden Reihen (3aa, 3ab) zu der Öffnung (21) gelangt,
- Zusammenschieben der Querreihen (3aa, 3ab) einer Gruppe von Gegenständen (3).

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß eine vertikal und quer verlaufende Bewegungsebene vorgesehen ist, die sich in Schrägrichtung von unten nach oben und von hinten nach vorn erstreckt und in die Öffnung (21) übergeht, auf welcher Bewegungsebene die sich in Querrichtung erstreckenden Trennelemente (14) einzeln nacheinander für den Einschub zwischen die Querreihen (3aa, 3ab) zugeführt werden.

3. Verfahren zum Einführen von flachen Trennelementen (25, 26, 27) zwischen Reihen von aus Gegenständen (3) bestehenden Gruppen, bei dem Vorkehrungen getroffen sind, die einzelnen Grup-

pen der Gegenstände (3) auf einer Arbeitsbahn zu bewegen, die sich in Längsrichtung erstreckt und Öffnungen (8) hat, durch die hindurch die Trennelemente (25, 26, 27) von einer unter der Arbeitsbahn liegenden Zone in die Arbeitsbahn zugeführt werden können, und bei dem ferner Vorkehrungen getroffen sind, die Trennelemente (25, 26, 27) durch diese Öffnungen (8) und zwischen den Reihen nach oben zu bewegen, gekennzeichnet durch die folgenden Schritte zum Einführen von Trennelementen, die sich in Längsrichtung erstrecken:

- kontinuierliche Zuführung der Reihen (3b, 3b, 3b) jeder Gruppe (500), die vom in Förderrichtung hinteren zum vorderen Ende von in Längsrichtung verlaufenden Öffnungen (8b, 8b, 8b) gegenseitig quer zueinander auf Abstand gebracht werden, so daß die sich in Längsrichtung erstreckenden Reihen (3b, 3b, 3b, 3b) neben den entsprechenden, in Längsrichtung verlaufenden Öffnungen (8b, 8b, 8b) vorbeilaufen,
- Vorschub der sich in Längsrichtung erstreckenden Trennelemente von unten nach oben und gleichzeitig in Förderrichtung von hinten nach vorn in einer vertikalen und längs verlaufenden Stellung durch die Längsöffnungen (8b, 8b, 8b) und zwischen den in Längsrichtung verlaufenden Reihen (3b, 3b, 3b, 3b) hindurch, während diese Reihen neben den Längsöffnungen (8b) von hinten nach vorn in Phase mit der Position kontinuierlichen Vorschubs, welche die Längsreihen (3b, 3b, 3b, 3b) bezüglich der Längsöffnungen (8b, 8b, 8b) einnehmen, vorbeilaufen.

4. Verfahren nach Anspruch 3, gekennzeichnet durch die folgenden Schritte:

- für jede Längsöffnung (8b, 8b, 8b) wird eine unter dieser liegende, vertikal und längs verlaufende Ebene für eine vertikale Bewegung vorgesehen, die sich in Schrägrichtung von unten nach oben und in Förderrichtung von hinten nach vorn erstreckt und in die Öffnungen (8b, 8b, 8b) übergeht,
- auf dieser Ebene wird eine Bewegungsfolge von sich in Längsrichtung erstreckenden Trennelementen (25, 26, 27) vorgesehen, die eine vertikale und längs ausgerichtete Stellung einnehmen,
- jedes sich in Längsrichtung erstreckende Trennelement (25, 26, 27) wird auf dieser Bewegungsebene in Abhängigkeit von den zugehörigen Gruppen (400, 500) der Gegenstände zugeführt, in welche das Trennelement eingeführt werden soll, das sich kontinuierlich auf der Bewegungsbahn vorwärts bewegt.

5. Vorrichtung zum Einführen von flachen Trennele-

menten (14) zwischen Querreihen von aus Gegenständen (3) bestehenden Gruppen, die auf einer Arbeitsbahn bewegt werden, die sich in Längsrichtung erstreckt und die mit Schubmitteln versehen ist, welche die Gruppen der in Querrichtung gegeneinander ausgerichteten Gegenstände auf der Arbeitsbahn vorwärts befördern, ferner mit in Querrichtung verlaufenden Öffnungen (21), durch die hindurch die sich in Querrichtung erstreckenden Trennelemente (14) von einer unter der Arbeitsbahn liegenden Zone in die Arbeitsbahn zugeführt werden, sowie mit Einführmitteln für den Vorschub der sich in Querrichtung erstreckenden Trennelemente (14) durch die Queröffnung (21) und zwischen die Querreihen der Gegenstände, gekennzeichnet durch

- kontinuierlich bewegte Fördermittel (11, 50, 50a; 12, 10, 10a) mit Schubstangen (11a, 12a), von denen jede kontinuierlich jeweils eine einzelne Querreihe (3a) der Gegenstände (3) von einem Bereich vor bis zu einem Bereich hinter der wenigstens einen sich in Querrichtung erstreckenden Öffnung (21) in Längsrichtung vorschiebt und vereinzelt,
- Einführmittel (16, 17, 17a), die ständig unter der Queröffnung (21) angeordnet und in Korrelation mit den Fördermitteln (11, 50, 50a; 12, 10, 10a) angetrieben sind, um die sich in Querrichtung erstreckenden Trennelemente (14) in vertikaler Stellung in Abhängigkeit von der Position kontinuierlichen Vorschubs, welche die Querreihen (3aa, 3ab) bezüglich der Öffnung (21) einnehmen, durch diese Öffnung (21) zu schieben,
- eine Phasenrelation zwischen den Fördermitteln (11, 50, 50a, 11a; 12, 10, 10a, 12a) und den Einführmitteln (16, 17, 17a) derart, daß jeweils wenigstens ein Trennelement (14) zwischen wenigstens zwei aufeinander folgende Querreihen (3aa, 3ab) zugeführt wird, nachdem die in Förderrichtung vordere Reihe (3aa) die Öffnung (21) überfahren hat und bevor die nachfolgende Reihe (3ab) diese Öffnung (21) erreicht, wonach die Querreihen (3aa, 3ab) einer Gruppe von Gegenständen (3) zusammengesoben werden.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Einführmittel (16, 17, 17a) aus einem Paar endloser Riemen oder Ketten mit Mitnehmern (20, 20a) bestehen, die in parallelen Ebenen über Umlenkräder (18, 19; 18a, 19a) laufen, wobei die oberen Umlenkräder (19, 19a) zwischen Umlenkrollen (7b, 7b) am hinteren Ende eines Bandförderers (7) angeordnet sind, welches das in Förderrichtung vorderen Ende der Queröffnung (21) bildet.

7. Vorrichtung nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß bei den endlos umlaufenden Einführmitteln (16) das Transporttrum von unten schräg nach oben und in Förderrichtung von hinten nach vorn geneigt angeordnet ist, wobei das vordere Ende immer zu der Öffnung (21) ausgerichtet ist. 5
8. Vorrichtung nach einem der Ansprüche 5 bis 7, dadurch gekennzeichnet, daß die Fördermittel (11, 11a, 50, 50a; 12, 12a, 10, 10a) erste Schubstangen (11a) haben, die die jeweils vordere Querreihe (3ac) jeder Gruppe (100, 200, 300) vorwärts schieben, sowie zweite Schubstangen (12, 12a), die die weiteren, nachfolgenden Querreihen (3aa, 3ab) jeder Gruppe (100, 200, 300) vorwärts schieben, daß die ersten Schubstangen (11a) und die zweiten Schubstangen (12a, 12a) jeweils die in Längsrichtung auf Abstand voneinander gebrachten Querreihen (3aa, 3ab, 3ac) kontinuierlich und nacheinander während der Einführphasen der Trennelemente (14) über die Queröffnung (21) vorschieben, und daß sich die zweiten Schubstangen (12a, 12a) nach dem Überstreichen der Öffnung (21) aus der Arbeitsbahn heraus bewegen, während die ersten Schubstangen (11a) ihre Bewegung in der Arbeitsbahn fortsetzen, wodurch die Querreihen (3aa, 3ab, 3ac) über die ersten Schubstangen (11a), welche die in Förderrichtung hinteren Reihen (3ac) jeder Gruppe (100, 200, 300) vorschieben, in Längsrichtung wieder zusammenschieben. 10
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9. Vorrichtung nach einem der Ansprüche 5 bis 8, dadurch gekennzeichnet, daß unterhalb der Öffnung (21) wenigstens ein Abweiselement (6a) vorgesehen ist, das die Trennelemente (14) in die Öffnung (21) leitet. 35
10. Vorrichtung zum Einführen von flachen Trennelementen (25, 26, 27) **[deletion(s)]** zwischen Längsreihen von Gruppen von Gegenständen (3), bei der eine Arbeitsbahn für den Vorschub der Gruppen der Gegenstände (3) vorgesehen ist, wobei erste Fördermittel die Längsreihen jeder Gruppe von Gegenständen vorschieben und in Längsrichtung verlaufende Öffnungen (8) vorgesehen sind, durch die hindurch die sich in Längsrichtung erstreckenden Trennelemente (25, 26, 27) aus einer unter der Arbeitsbahn liegenden Zone in die Arbeitsbahn zugeführt werden, sowie Einführmittel für die Zufuhr der sich in Längsrichtung erstreckenden Trennelemente (25, 26, 27) von unten durch die Längsöffnungen (8) hindurch und zwischen die sich in Längsrichtung erstreckenden Reihen, gekennzeichnet durch 40
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- kontinuierlich bewegte, erste Fördermittel (11) mit Schubstangen (11a), von denen jede kontinuierlich die Längsreihen (3b, 3b, 3b) einer entsprechenden Gruppe (400, 500, 600) von Gegenständen (3) vom hinteren zum vorderen Ende der Längsöffnungen (8b, 8b, 8b) schiebt, 55
 - Führungsmittel (8) mit in Längsrichtung verlaufenden Kanälen (8c), die in Querrichtung voneinander beabstandet sind und zwischen denen in Längsrichtung verlaufende Öffnungen (8b) vorgesehen sind, wodurch die Längsreihen (3b, 3b, 3b) jeder Gruppe der Gegenstände (3) in Querrichtung auf Abstand gehalten werden, während diese Reihen (3b, 3b, 3b) entlang der Längsöffnungen (8b, 8b, 8b) von hinten nach vorn vorbeilaufen,
 - Einführmittel, die ständig unter den Längsöffnungen (8b, 8b, 8b) angeordnet und in Korrelation mit den Fördermitteln (11, 11a) angetrieben sind, um die sich in Längsrichtung erstreckenden Trennelemente (25, 26, 27) in vertikaler, längs verlaufender Stellung von unten nach oben und gleichzeitig von hinten nach vorn durch die Längsöffnungen (8b, 8b, 8b) und zwischen den Längsreihen (3b, 3b, 3b) vorzuschieben, während die Längsreihen an den Längsöffnungen (8b, 8b, 8b) vorbeilaufen.
11. Vorrichtung nach Anspruch 10, dadurch gekennzeichnet, daß die Führungsmittel (8) mit den einzelnen Führungskanälen (8c) eine Gleitebene (8) aufweisen, die aus mehreren, sich in Längsrichtung erstreckenden Leisten (8a) mit Führungen (8c) besteht, wobei die Leisten (8a) zur Bildung der Längsöffnungen (8b) in Querrichtung voneinander beabstandet sind.
12. Vorrichtung nach Anspruch 10 oder 11, dadurch gekennzeichnet, daß in Förderrichtung vor den Führungsmitteln (8) eine durchgehende Gleitebene (51) vorgesehen ist, deren seitliche Begrenzungen konvergierende Führungen (51a) aufweisen, wodurch die Gruppen (600), die kontinuierlich von den dahinter angeordneten Führungsmitteln (8) zugeführt werden, in Querrichtung zusammengeschoben werden.
13. Vorrichtung nach einem der Ansprüche 10 bis 12, dadurch gekennzeichnet, daß die Einführmittel bestehen aus:
- Stütz- und Führungsmitteln (31, 32, 33, 61), die sich unter der Arbeitsbahn von hinten nach vorn und von unten nach oben erstrecken und in die Längsöffnungen (8b, 8b, 8b) übergehen, um die sich in Längsrichtung erstreckenden Trennelemente (25, 26, 27) in vertikaler und in Längsrichtung verlaufender Stellung aufzunehmen und in Richtung auf die Öffnungen (8b, 8b, 8b) und in diese hineingleitend zu führen,
 - Fördermitteln (34) mit Schubstangen (34a), die in Korrelation mit den Fördermitteln (11) ange-

trieben sind, wobei die Schubstangen (34a) im Wirkungsbereich der Stütz- und Führungsmittel (31, 32, 33, 61) die sich in Längsrichtung erstreckenden Trennelemente (25, 26, 27) entlang der Stütz- und Führungsmittel (31, 32, 33, 61) verschieben, und zwar in Abhängigkeit von der Position kontinuierlichen Vorschubs, welche die Längsreihen (3b, 3b, 3b) bezüglich der Längsöffnungen (8b, 8b, 8b) einnehmen.

14. Vorrichtung nach einem der Ansprüche 10 bis 13, dadurch gekennzeichnet, daß die Stütz- und Führungsmittel (31, 32, 33, 61) im Bereich jeder Öffnung (8b) aufweisen:

- ein erstes Stütz- und Führungselement (31, 32, 33), das sich von unten nach oben und in Förderrichtung nach vorn erstreckt und dessen vorderes Ende auf die Längsöffnung (8b) hin ausgerichtet ist und zu dieser einen vertikalen Abstand einnimmt, - ein zweites Führungselement (61), das von der Längsöffnung (8b) nach unten absteht und mit den ersten Stütz- und Führungselementen (31, 32, 33) derart zusammenwirkt, daß die Schubstangen (34a) zwischen den beiden Elementen (31, 61) durchlaufen und dabei den oberen Bereich der sich in Längsrichtung erstreckenden Führungselemente vor deren Eintritt in die Öffnung (8b) führen.

Revendications

1. Procédé pour insérer des éléments de séparation (14) entre des rangées de groupes d'articles (3), dans lequel on prévoit de déplacer les articles (3) par groupes distincts le long d'un chemin fonctionnel s'étendant longitudinalement et muni d'ouvertures (21) adaptées pour permettre l'insertion d'éléments de séparation (14) dans le chemin fonctionnel à partir d'une zone située au-dessous dudit chemin fonctionnel, et dans lequel on prévoit de déplacer les éléments de séparation (14) vers le haut à travers lesdites ouvertures (21) et entre lesdites rangées, caractérisé par les étapes suivantes pour l'insertion d'éléments de séparation transversaux :

- amener en un déplacement continu des rangées transversales successives (3aa, 3ab) au moyen de moyens de déplacement (12) avec des barres de poussée (12a) déplacées en mouvement continu, de sorte que chacune des barres de poussée (12a) entraîne de façon continue et longitudinale et écarte une rangée transversale unique (3aa, 3ab) d'articles (3) depuis l'amont vers l'aval de ladite au moins une

ouverture transversale (21) ;

- déplacer ledit élément de séparation transversal (14) à travers l'ouverture (21) orientée transversalement en synchronisme avec la position de déplacement continu que prennent les rangées transversales (3aa, 3ab) par rapport à ladite ouverture transversale (21) ;
- amener l'extrémité supérieure dudit élément de séparation (14) au-delà de l'extrémité supérieure de ladite ouverture (21) lorsque la rangée transversale aval (3aa) des deux rangées transversales (3aa, 3ab) a dépassé l'ouverture transversale (21) ;
- amener l'extrémité inférieure dudit élément de séparation (14) au-delà de l'extrémité supérieure de ladite ouverture (21) avant que la rangée transversale amont (3ab) des deux rangées (3aa, 3ab) affecte ladite ouverture (21) ;
- rassembler les rangées transversales (3aa, 3ab) d'un groupe d'articles (3).

2. Procédé selon la revendication 1, caractérisé en ce qu'il prévoit un plan de déplacement vertical/transversal en pente depuis le fond vers le haut et depuis l'amont vers l'aval et pénétrant dans ladite ouverture (21), le long duquel les éléments de séparation transversaux (14) sont alimentés l'un après l'autre en succession pendant leur insertion entre les rangées transversales (3aa, 3ab).

3. Procédé pour insérer des éléments de séparation (25, 26, 27) entre des rangées de groupes d'articles (3), dans lequel on prévoit de déplacer les articles (3) en groupes distincts le long d'un chemin fonctionnel s'étendant longitudinalement et muni d'ouvertures (8) adaptées pour permettre l'introduction des éléments de séparation (25, 26, 27) dans le chemin fonctionnel à partir d'une zone située au-dessous dudit chemin fonctionnel et dans lequel on prévoit de déplacer les éléments de séparation (25, 26, 27) vers le haut à travers lesdites ouvertures (8) et entre lesdites rangées, caractérisé par les étapes suivantes pour l'insertion d'éléments de séparation longitudinaux :

- amener en un déplacement continu les rangées (3b, 3b, 3b, 3b) de chaque groupe (500) espacées les unes par rapport aux autres transversalement depuis l'amont vers l'aval d'ouvertures longitudinales (8b, 8b, 8b) en faisant passer lesdites rangées longitudinales (3b, 3b, 3b, 3b) au-delà desdites ouvertures longitudinales respectives (8b, 8b, 8b) ;
- déplacer les éléments de séparation longitudinaux depuis le fond vers le haut et simultanément depuis l'amont vers l'aval, en orientation verticale/longitudinale, à travers lesdites ouvertures longitudinales (8b, 8b, 8b) et entre

lesdites rangées longitudinales (3b, 3b, 3b, 3b), pendant que ces dernières passent depuis l'amont vers l'aval et à côté desdites ouvertures longitudinales (8b), en synchronisme avec la position d'alimentation continue que prennent les rangées longitudinales (3b, 3b, 3b, 3b) par rapport auxdites ouvertures longitudinales (8b, 8b, 8b) .

4. Procédé selon la revendication 3, caractérisé par les étapes de :

- prévoir pour chaque ouverture longitudinale (8b, 8b, 8b) un plan de déplacement inférieur vertical/longitudinal en pente depuis le fond vers le haut et depuis l'amont vers l'aval et débouchant dans lesdites ouvertures (8b, 8b, 8b) ;
- prévoir le long dudit plan de mouvement une succession d'éléments de séparation longitudinaux (25 ; 26 ; 27) disposés en orientation verticale/longitudinale ;
- alimenter chaque élément de séparation longitudinal (25 ; 26 ; 27) le long dudit plan de mouvement en relation avec le groupe correspondant (400, 500) d'articles dans lequel il doit être inséré et qui avance de façon continue au-dessus le long du chemin fonctionnel .

5. Appareil pour insérer des éléments de séparation transversaux (14) entre des rangées transversales de groupe d'articles (3) déplacés le long d'un chemin fonctionnel s'étendant longitudinalement, dans lequel on prévoit des moyens de poussée adaptés pour déplacer les groupes d'articles alignés transversalement vers l'aval le long dudit chemin fonctionnel, des ouvertures transversales (21) adaptées pour permettre l'introduction des éléments de séparation transversaux (14) dans le chemin fonctionnel à partir d'une zone située au-dessous dudit chemin fonctionnel, des moyens d'insertion adaptés pour déplacer les éléments de séparation transversaux (14) à travers lesdites ouvertures transversales (21) et entre lesdites rangées transversales d'articles, caractérisé en ce que

- des moyens de déplacement (11, 50, 50a ; 12, 10, 10a) avec des barres de poussée (11a, 12a) animées d'un déplacement continu dans lesquels chacune des barres de poussée (11a, 12a) déplace longitudinalement de façon continue et écarte une rangée transversale unique (3a) d'articles (3) depuis l'amont vers l'aval d'au moins une ouverture transversale (21) ;
- des moyens d'insertion (16, 17, 17a) positionnés de façon constante sous ladite au moins une ouverture transversale (21), actionnés en corrélation avec lesdits moyens de déplacement

(11, 50, 50a ; 12, 10, 10a), adaptés pour déplacer les éléments de séparation transversaux (14) à travers l'ouverture transversale (21) en position verticale et en synchronisme avec la position d'alimentation continue que prennent lesdites rangées transversales (3aa, 3ab) par rapport à l'ouverture transversale (21) ; et

- un synchronisme entre lesdits moyens de déplacement (11, 50, 50a, 11a ; 12, 10, 10a, 12a) et lesdits moyens d'insertion (16, 17, 17a) qui assure le déplacement d'au moins un élément de séparation (14) entre au moins deux rangées transversales successives (3aa, 3ab) après que la rangée la plus en aval (3aa) ait libéré ladite ouverture (21) et avant que la rangée suivante (3ab) affecte ladite ouverture (21), les rangées transversales (3aa, 3ab) d'un groupe d'articles (3) étant ensuite rassemblées.

6. Appareil selon la revendication 5, caractérisé en ce que lesdits moyens d'insertion (16, 17, 17a) comprennent deux bandes ou chaînes équipées avec des doigts de poussée (20, 20a) qui s'enroulent autour d'un chemin en boucle fermée dans des plans parallèles respectifs sur des roues de renvoi respectives, en ce que les roues supérieures (19, 19a) desdites roues de renvoi (18, 19 ; 18a, 19a) sont positionnées entre des rouleaux de renvoi (7b, 7b) en amont d'un convoyeur à bande (7), et en ce que l'extrémité amont dudit convoyeur à bande (7) définit l'extrémité aval de ladite ouverture transversale (21) .

7. Appareil selon les revendications 5 ou 6, caractérisé en ce que ledit moyen d'insertion (16) avec un chemin en boucle fermée comprend la branche active ou de transport en pente depuis le fond vers le haut et depuis l'amont vers l'aval, dont l'extrémité aval est constamment positionnée et alignée vers et à travers ladite ouverture (21).

8. Appareil selon l'une quelconque des revendications 5 à 7, caractérisé en ce que lesdits moyens de transport (11, 11a, 50, 50a ; 12, 12a, 10, 10a) présentent des premières barres de poussée (11a) adaptées pour pousser les rangées transversales les plus en amont (3ac) de chaque groupe (100, 200, 300) et des secondes barres de poussée (12, 12a) adaptées pour pousser les autres rangées transversales (3aa, 3ab) plus en aval de chaque groupe (100, 200, 300) ; en ce que lesdites premières barres de poussée (11a) et lesdites secondes barres de poussée (12a, 12a) assurent chacune l'alimentation en continu et en succession des rangées transversales respectives (3aa, 3ab, 3ac) longitudinalement espacées les unes des autres vers le haut et au-delà de ladite ouverture transversale (21) pendant les étapes d'insertion des éléments de

séparation (14) ; et en ce que lesdites secondes barres de poussée (12a, 12a) lorsqu'elles arrivent en aval de ladite ouverture (21) sont escamotées du chemin fonctionnel tandis que les premières barres de poussée (11a) continuent à agir le long dudit chemin fonctionnel, dans le but d'obtenir le compactage longitudinal entre les rangées transversales (3aa, 3ab, 3ac) au moyen des premières barres (11a) qui poussent les rangées les plus en amont (3ac) de chaque groupe (100, 200, 300) .

9. Appareil selon l'une quelconque des revendications 5 à 8, caractérisé en ce qu' on prévoit en dessous de ladite ouverture (21) au moins un élément d'aiguillage (6a) adapté pour diriger les éléments de séparation (14) dans ladite ouverture (21).

10. Appareil pour insérer des éléments de séparation longitudinaux (25, 26, 27) entre des rangées longitudinales de groupe d'articles (3), dans lequel on prévoit un chemin fonctionnel le long duquel on prévoit de déplacer lesdits groupes d'articles (3) et dans lequel sont prévus des premiers moyens de déplacement adaptés pour déplacer les rangées longitudinales de chaque groupe d'articles vers l'aval, des ouvertures longitudinales (8) adaptées pour permettre l'introduction des éléments de séparation longitudinaux (25, 26, 27) dans le chemin fonctionnel à partir d'une zone située au-dessous du chemin fonctionnel, et des moyens d'insertion adaptés pour insérer les éléments de séparation longitudinaux (25, 26, 27) depuis le fond vers le haut à travers lesdites ouvertures longitudinales (8) et entre lesdites rangées longitudinales, caractérisé par :

- des premiers moyens de déplacement (11) avec des barres de poussée (11a) animées d'un déplacement continu, dans lesquels chacune imprime un mouvement continu aux rangées longitudinales (3b, 3b, 3b, 3b) d'un groupe respectif (400, 500, 600) d'articles (3) depuis l'amont vers l'aval d'ouvertures longitudinales (8b, 8b, 8b) ;
- des moyens de guidage (8) avec des canaux de glissement longitudinaux distincts (8c) espacés réciproquement et transversalement entre lesquels sont formées des ouvertures longitudinales (8b), dans lesquels lesdits canaux sont adaptés pour maintenir transversalement espacées les rangées longitudinales (3b, 3b, 3b, 3b) de chaque groupe d'articles (3) pendant que lesdites rangées (3b, 3b, 3b, 3b) passent depuis l'amont vers l'aval et à côté desdites ouvertures longitudinales (8b, 8b, 8b) ;
- des moyens d'insertion, positionnés constamment au-dessous de chacune des ouvertures longitudinales (8b, 8b, 8b), actionnés en corré-

lation avec lesdits moyens de déplacement (11, 11a), adaptés pour déplacer des éléments de séparation longitudinaux (25, 26, 27) en orientation verticale/longitudinale depuis le fond vers le haut et simultanément depuis l'amont vers l'aval, à travers lesdites ouvertures longitudinales (8b, 8b, 8b) et entre lesdites rangées longitudinales (3b, 3b, 3b) pendant que ces dernières passent à côté desdites ouvertures (8b, 8b, 8b, 8b).

11. Appareil selon la revendication 10, caractérisé en ce que lesdits moyens de guidage (8) avec des canaux de glissement longitudinaux distincts (8c) réalisent un plan de glissement (8) formé par une pluralité d'éléments de compensation (8a) s'étendant longitudinalement, équipé avec des guides (8c) et en ce que lesdits éléments de compensation (8a) sont espacés transversalement pour définir des ouvertures (8b) s'étendant longitudinalement.

12. Appareil selon les revendications 10 ou 11, caractérisé en ce que en aval desdits moyens de guidage (8) on prévoit un plan de glissement continu (51) dont les extrémités transversales comprennent des guides convergents (51a) adaptés pour compacter transversalement les groupes (600) qui arrivent de façon continue depuis les moyens de guidage précédents (8).

13. Appareil selon l'une quelconque des revendications 10 à 12, caractérisé en ce que les moyens d'insertion comprennent :

- des moyens de support/de guidage (31, 32, 33, 61) disposés au-dessous du chemin fonctionnel, s'étendant depuis l'amont vers l'aval et depuis le fond vers le haut, débouchant dans lesdites ouvertures longitudinales (8b, 8b, 8b), adaptés pour supporter et guider à coulissement les éléments de séparation longitudinaux (25, 26, 27) en orientation verticale/longitudinale vers et à travers lesdites ouvertures (8b, 8b, 8b) ; et
- des moyens de déplacement (34) avec des barres de poussée (34a), sollicités en corrélation avec les moyens de déplacement mentionnés ci-dessus (11), dont les barres de poussée (34a) sont destinées à agir dans la sphère fonctionnelle desdits moyens de support/de guidage (31, 32, 33, 61), pour déplacer les éléments de séparation longitudinaux (25, 26, 27) le long des moyens de support/de guidage (31, 32, 33, 61) en relation avec la position de déplacement continu que prennent les rangées longitudinales (3b, 3b, 3b, 3b) par rapport aux ouvertures longitudinales (8b, 8b, 8b).

14. Appareil selon l'une quelconque des revendications 10 à 13, caractérisé en ce que lesdits moyens de support/de guidage (31, 32, 33, 61) comprennent pour chaque ouverture (8b) :

- un premier élément de support/de guidage (31, 32 ; 33), s'étendant depuis le fond vers le haut et depuis l'amont vers l'aval par rapport à la direction de déplacement, ayant son extrémité aval alignée et verticalement espacée par rapport à ladite ouverture longitudinale (8b), 5 10
- un second élément de guidage (61) dépassant du sommet vers le bas par rapport à l'ouverture longitudinale (8b), destiné à coopérer avec la portion aval dudit élément de support/de guidage (31 ; 32 ; 33) dans le but de permettre le passage des barres de poussée (34a) entre les deux éléments (31, 61), adapté pour guider la partie supérieure des éléments de séparation longitudinaux avant leur entrée dans ladite ouverture (8b). 15 20

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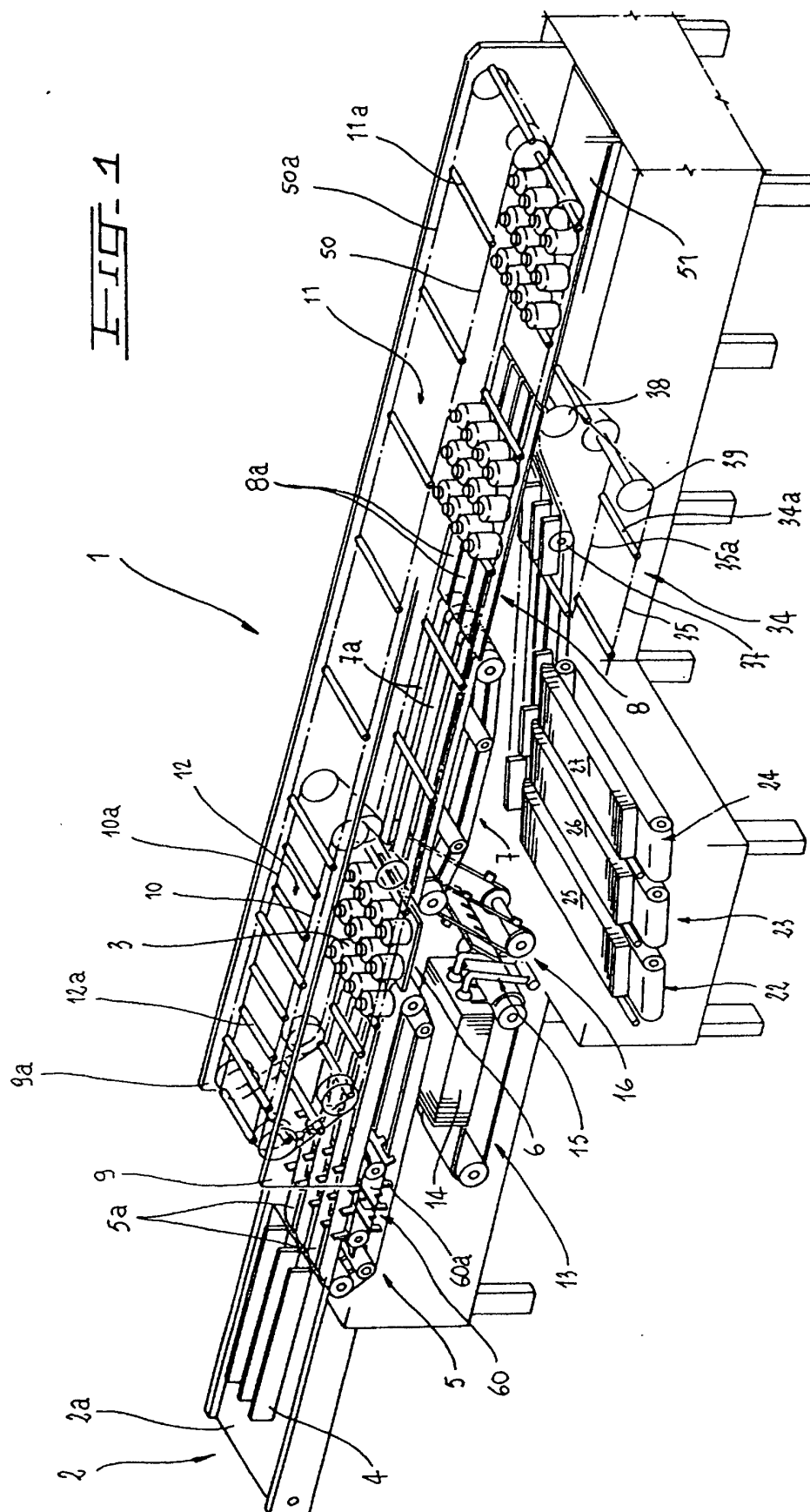


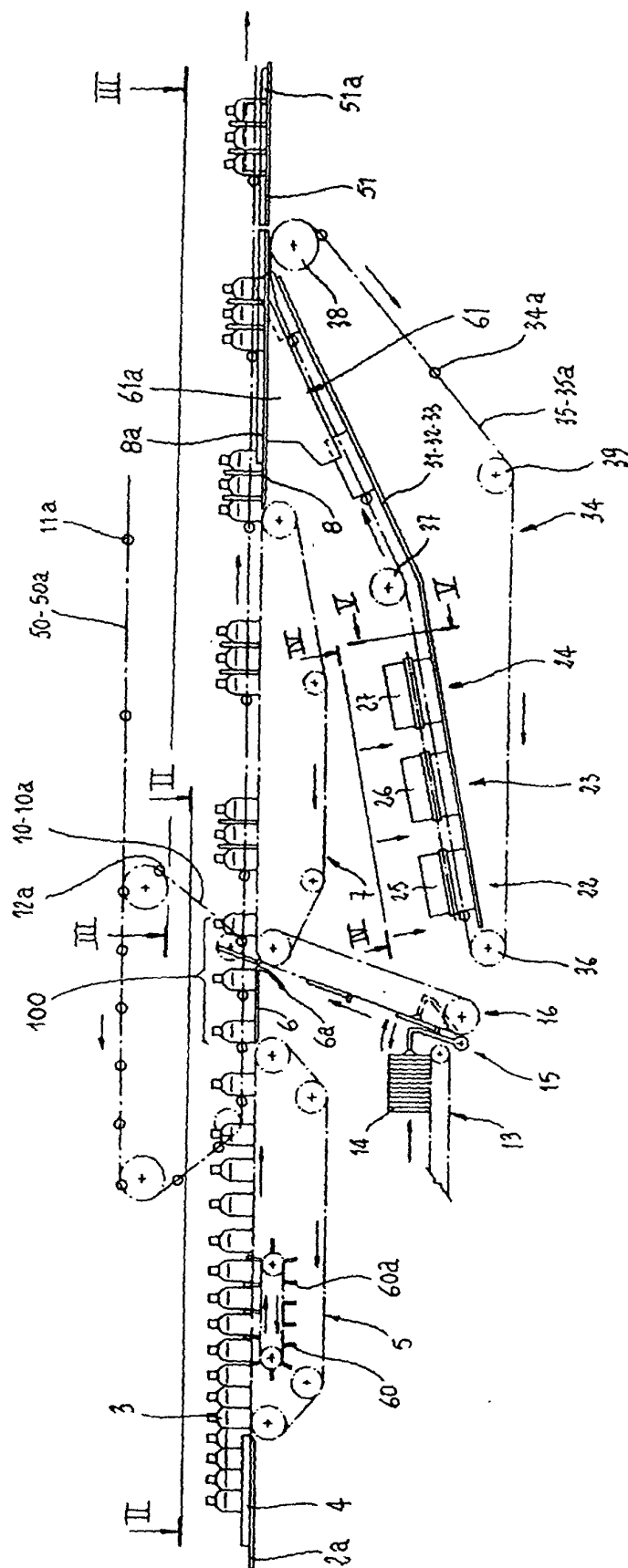
FIG. 1A

Fig. 2

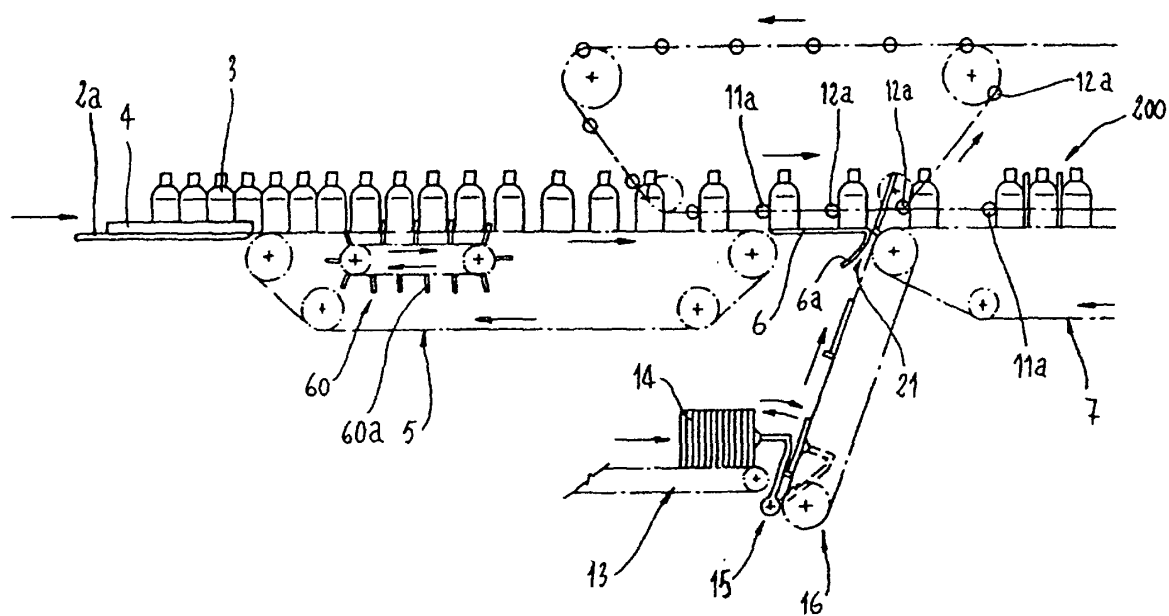
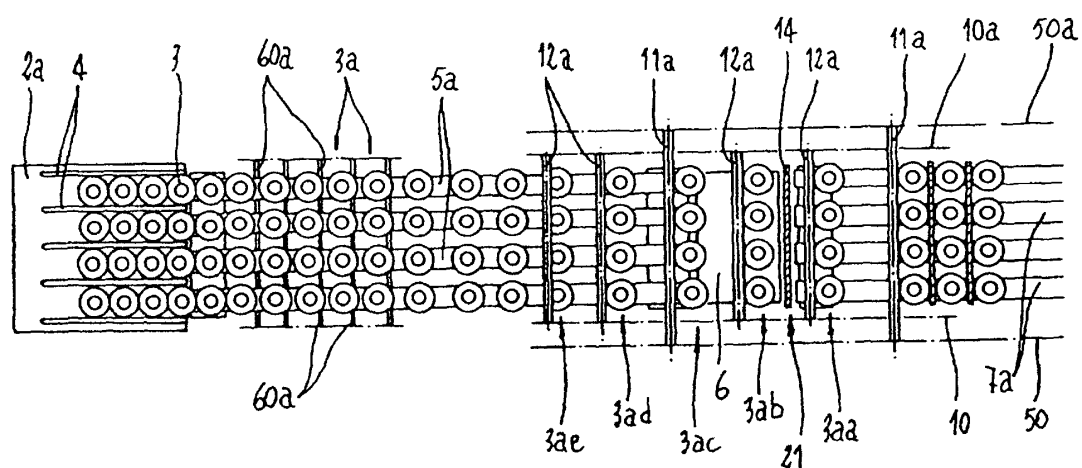


Fig. 2A



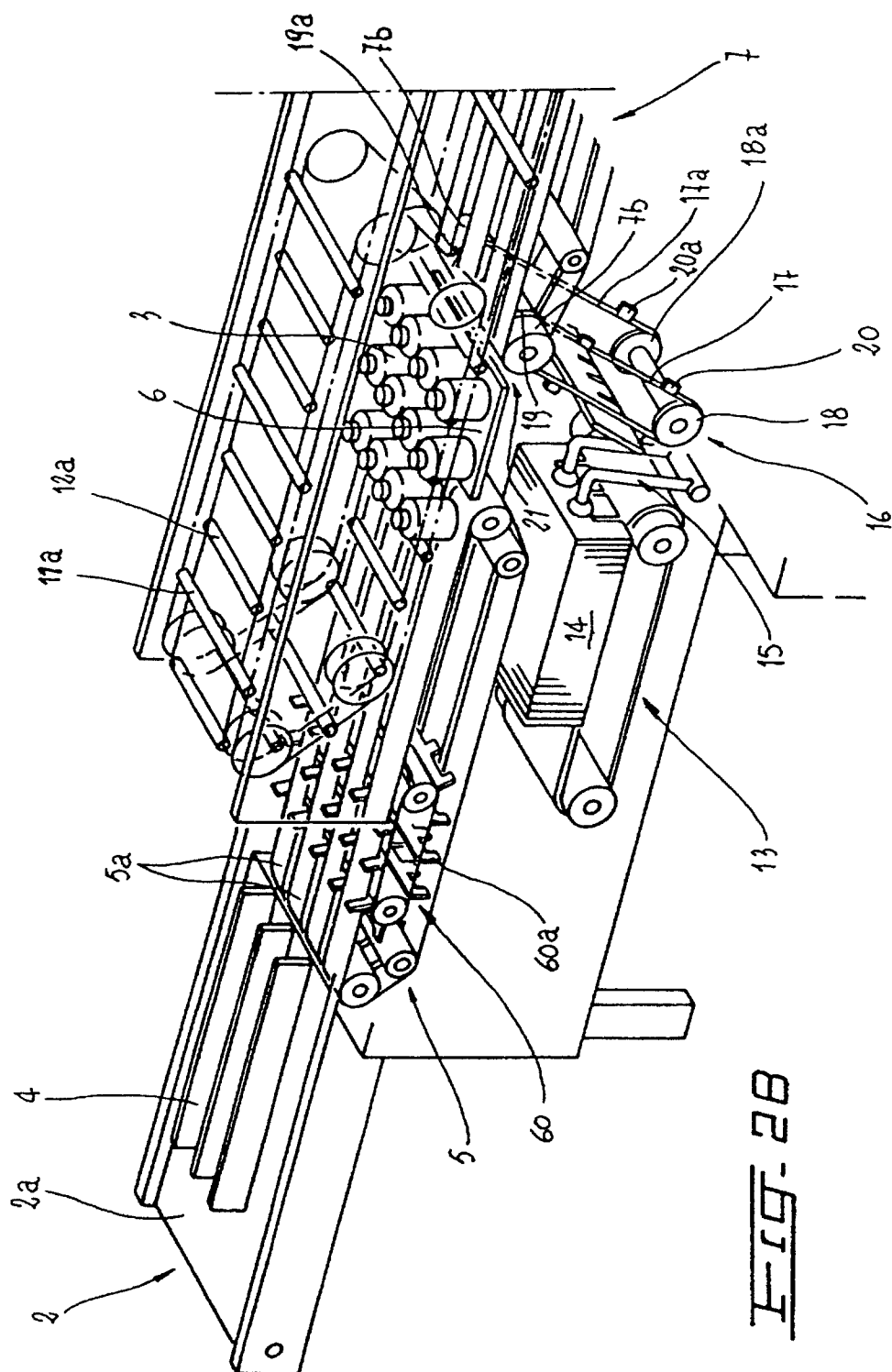


Fig. 28

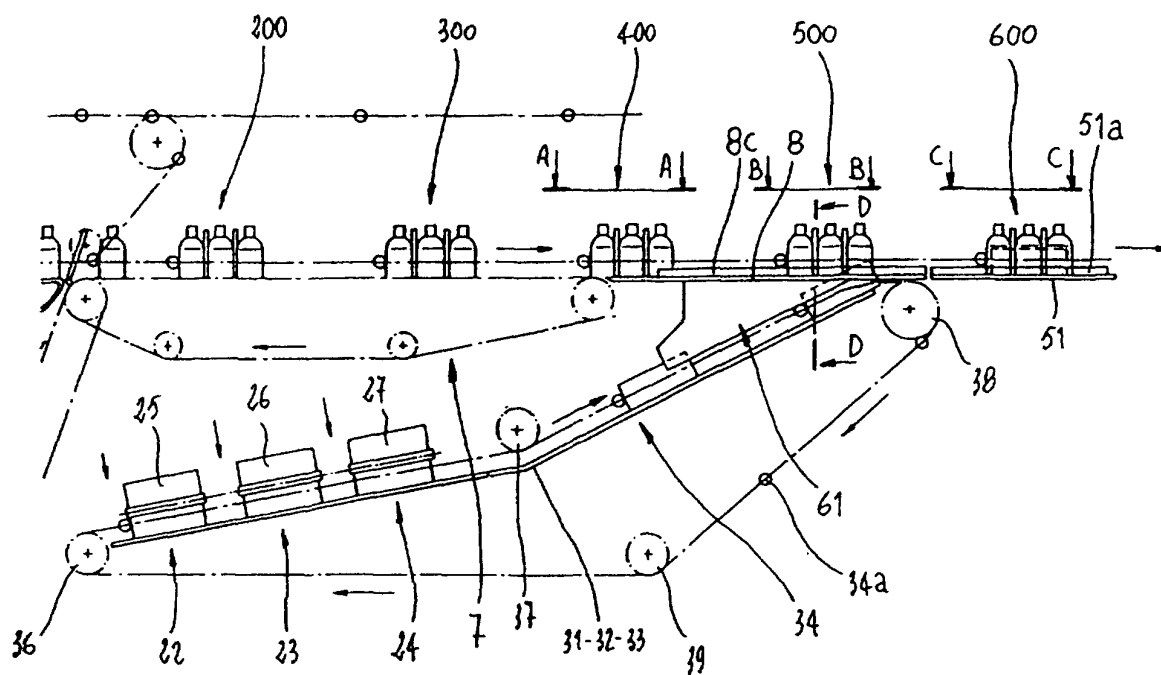


Fig. 3

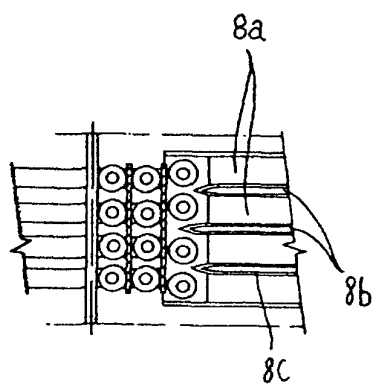


Fig. 3A

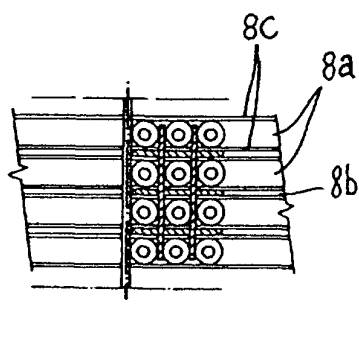


Fig. 3B

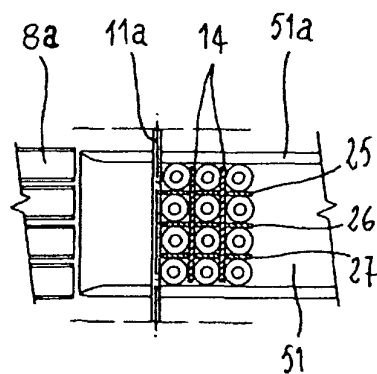


Fig. 3C

FIG. 3D

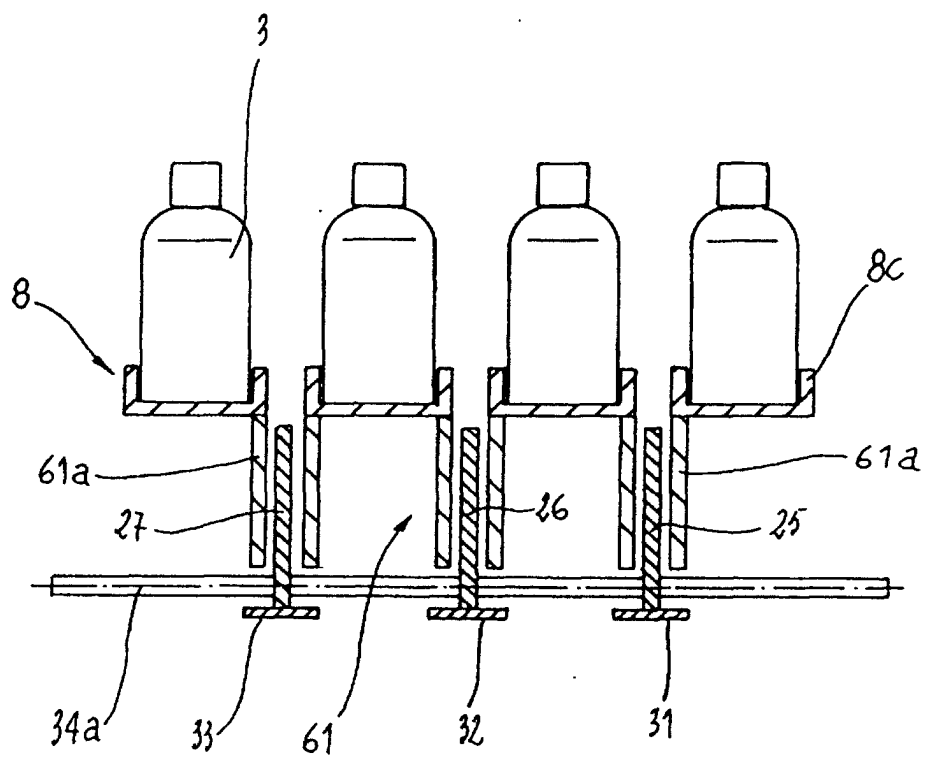


FIG. 4A

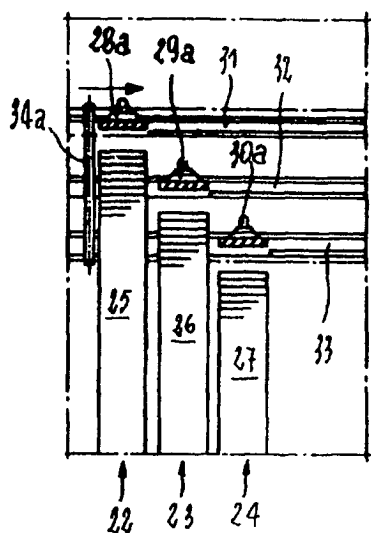


FIG. 4B

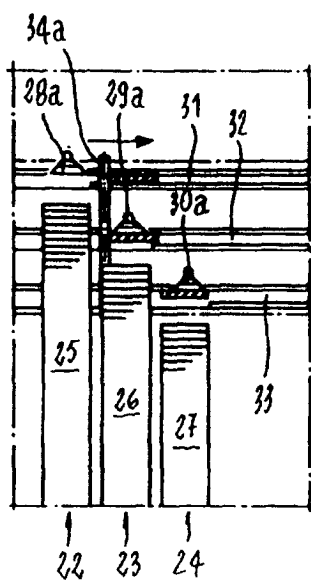


FIG. 4C

