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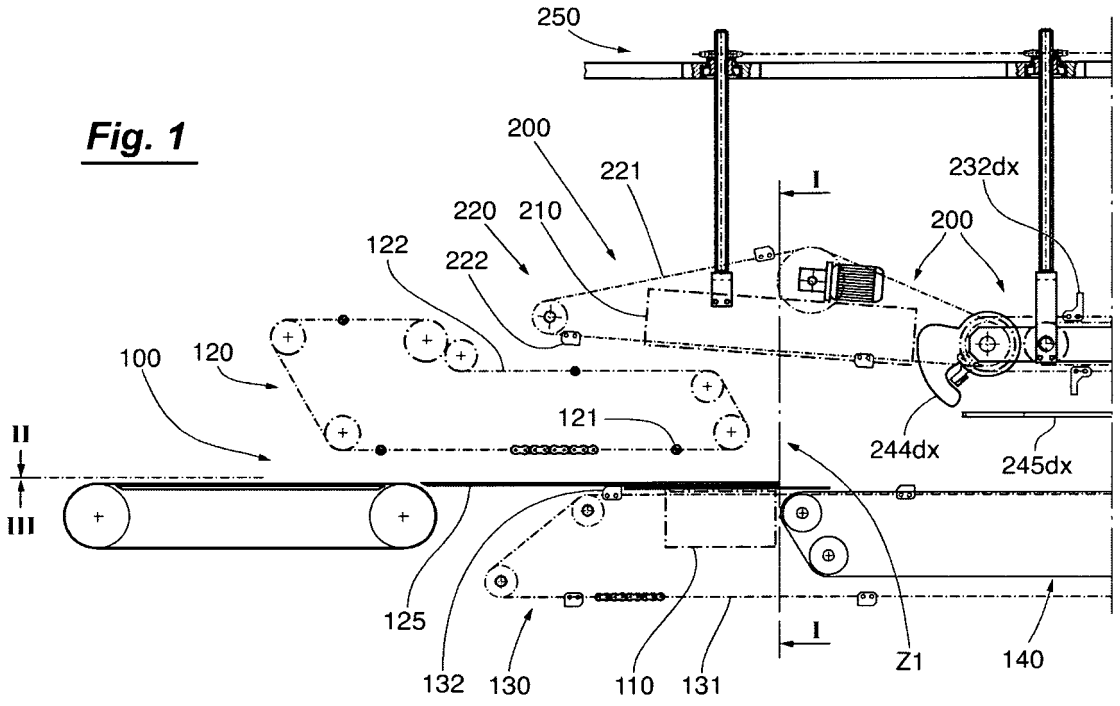
(54) **Multi-functional packaging line**

(57) -A multi-functional packaging line comprises: -dual-functional lower positioning-conveying-forming means (100), alternatively used for inserting, positioning and forming a blank-tray (B) around the base of the products, or else used for inserting, positioning and forming a blank-wraparound (C) around the base of the products; -upper positioning-conveying-forming means (200) used for inserting, positioning and forming a blank-cover (A / A1) on top of the product (P); -upper forming-folding means (300) used for forming and folding the upper portion of the aforementioned blank-wraparound (C) on top of the product (P).

Fig. 1



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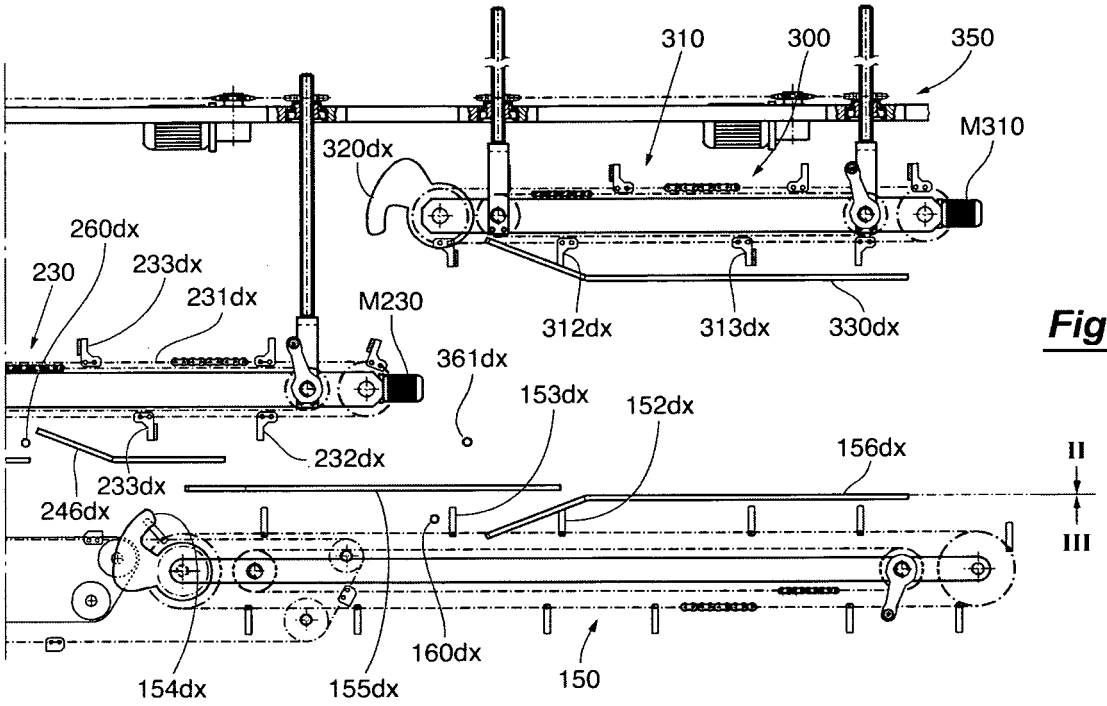

310
300
350
M310
320dx
260dx
230
233dx
231dx
M230
312dx
313dx
330dx
361dx
153dx
152dx
156dx
232dx
233dx
246dx
II
III
160dx
150
154dx
155dx

Fig. 2

Description

[0001] The present invention concerns in a multi-functional packaging line.

[0002] In particular, this invention concerns a multi-functional packaging line able to package products in two-piece type packages comprising a quadrangular tray with lateral edges and a cover shaped like an inverted "U", or else able to package products in packages that comprise a quadrangular tray with lateral edges and a quadrangular cover with lateral edges, or also able to package the same products in so called wraparound packages comprising a single piece.

Background of the invention

[0003] Currently, known packaging lines do not allow to obtain the above described multi-functionality.

[0004] The purpose of the invention is to overcome the aforementioned inconveniences.

[0005] The invention, which is characterized by claims, resolves the problem of creating a multi-functional packaging line that extends longitudinally and able to package products in two-piece boxes obtained by means of a blank-tray and a blank-lid, or to package products in wrap-around type packages obtained by means of a single blank-wraparound, in which multi-functional packaging line is characterized by the fact that it comprises: >-lower dual-functional positioning-conveying-forming means, alternatively able to position a blank-tray under the base of the product and then to fold said blank-tray around the base of the product, translating this blank-tray and the respective product downstream, or else able to position a blank-wraparound under the base of the product and fold the lower portion of said blank-wraparound around the base of the product, translating said blank-wraparound and the respective product downstream; >-upper positioning-conveying-forming means which are able to insert and position a blank-cover on top of the product and then translate downstream said blank-cover and during said translation able to fold said blank-cover on top of the product while said product beneath is translated downstream; >-upper forming-folding means able to form and fold the upper portion of the aforementioned blank-wraparound on top of the product while the product beneath is translated downstream.

Brief Description of the Drawings

[0006]

- Figures 1 and 2, positioned side by side, show a lateral view of the packaging line that is the object of this invention;
- Figures 1A and 2A, positioned side by side, are a plan view with respect to the line II-II in Fig. 1-2;
- Figures 1B and 2B, positioned side by side, are a view with respect to line the III-III in Fig. 1-2;
- Figure 1C is a view with respect to line I-I in Fig. 1;
- Figures 3-4, positioned side by side, are a lateral view of the packaging line subject of the present invention whose purpose is to form two-piece packagings;
- Figures 5-6, positioned side by side, are a lateral view of the packaging line subject of this invention whose purpose is to form wraparound packagings;
- Figure 7 illustrates a blank-tray;
- Figure 8 illustrates a blank-cover used to form a cover like an inverted "U";
- Figure 9 illustrates a blank-cover used to form a quadrangular type cover with lateral edges;
- Figure 10 illustrates a blank-wraparound used to form a packaging;
- Figures 11-12, positioned side by side, are a lateral view of the packaging line subject of the present invention whose purpose is to form two-piece packagings according to a variant of Fig. 3-4.
- Figure 13 illustrates Figures 1-2, 1A-2A, 1B-2B, joined together.

[0007] With reference to Figures 1-2, the multi-functional packaging line subject of the present invention, extends longitudinally and it is able to pack products in two-piece box like packages, obtained by means of two separate blanks, that is, a blank-tray B, see Fig. 7, and a blank-cover A or A1, see Fig. 8 or 9, or else it is able to package the products in packages of the so called wrap-around type, obtained by a single blank-wraparound C, see fig. 10.

[0008] The aforementined packaging line, with respect to a median horizontal plane that is substantially defined by the line II-II in Fig. 1, at the bottom side, compries lower dual-functional positioning-conveying-forming means, indicated in the assembly by 100, comprising individual means and/or functional groups, 110, 120, 130, 140, 150, best described below; said lower dual-functional positioning-conveying-forming means, 100, can alternatively be used to insert and position a blank-tray, B, Fig. 7, under the base of the products, and then to fold said blank-tray B around the product's base translating said blank-tray B downstream together with the product P, or else used to place a blank-wraparound C, Fig. 10, under the base of the products P, and then to fold the bottom portion of said blank-wraparound C around the base of products P, translating said blank-wraparound C downstream together with the product P.

[0009] This multi-functional packaging line also comprises, on the upper side, upper positioning-conveying-forming means, 200, which can be inserted or removed with respect to the multi-functional packaging line, where these upper positioning-conveying-forming means 200 are used to insert and position a blank-cover, A or A1, (Fig. 8 or 9) above the top of the product P, and then to push, translate and fold this blank-cover, A or A1, on top of the product P while the product P beneath is translated downstream.

[0010] Downstream these upper positioning-conveying-forming means, 200, there are upper forming-folding means, 300, preferably inserted and removed with respect to the packaging line, in which said upper forming-folding means 300 are mainly used to form and fold the upper portion of the blank-wraparound C (Fig. 10) on top of the product P, while said blank-wraparound C and the product P beneath are translated downstream, or else they can optionally be used to positively consolidate and/or grasp the top of the cover in order to optimise the operations of closing of a two-piece packaging.

Lower dual-functional positioning-conveying-forming means 100

[0011] With reference to said lower dual-functional positioning-conveying-forming means 100, in their upstream zone they comprise: lower inserting-positioning means 110, first pushing-conveying means 120 and second pushing-conveying means 130.

[0012] The lower inserting-positioning means 110 are able to insert and position, in an insertion zone Z1 of said packaging line, a blank-tray B or a blank-wraparound C.

[0013] More particularly, said lower inserting-positioning means 110, see also Fig. 3-5 and 5-6, are able to insert a blank-tray B, or a blank-wraparound C, under the product P, by inserting and positioning the blank, B or C, under a sliding dead plate, 125, on whose upper surface the product P can slide, in which said product P is illustrated hereby as a lot of bottles without any limitations with respect to the other type of products, either monolithic or of other type.

[0014] In particular, see Fig. 3, the blank-tray B is inserted in a flat configuration under the dead plate 125, while, as seen in Fig. 5, the blank-wraparound C is inserted in a folded configuration, with lower panels C-Pl and back panels C-PP horizontally coplanar to each other placed under the dead plate 125, with the front panel C-PA vertically placed in front of the front side of the product P, and with the panels C-PS and C-LC vertically placed.

[0015] In order to perform the aforementioned insertion-positioning operations, in the illustrated example, said inserting-positioning means 110 comprise a first conveyor belt, 111, which extends transversally with respect to the packaging line, preferably of the suction type or equipped with grasping means, in which the upper branch of said inserting-positioning means 110 is able to grasp the lower face of the blank-tray B or of the blank-wraparound C, and then convey and position them within said packaging line in the first zone Z1, with the eventual help of positioning-abutting means of end of stroke and/or guide means.

[0016] For this purpose, preferably, said conveyor belt 111 has a first end portion, 111 a, externally placed with respect to the packaging line, and a second end portion, 111b, internally placed with respect to the packaging line, in order to feed the blanks in a single succession and in a synchronised manner with respect to the machine cycles.

[0017] The first pushing-conveying means 120, preferably, comprise a suspended bars pushing system 121, in which said bars 121 are supported by chains 122sx and 122dx and are used to push-convey the product P downstream by sliding it over the dead plate 125.

[0018] The second pushing-conveying means, 130, are used to push and convey the blank-tray B, or the blank-wraparound C, from the said first zone Z1 downstream along the packaging line and, in the given example, they comprise a chain 131 equipped with pushing teeth 132, in which said chain 131 travels in a closed loop with an operative upper branch extending from upstream to downstream and running into a slot 112 obtained in the end portion 110b of the conveyor belt 111 (see also fig. 1 C).

[0019] Downstream from the dead plate 125 there are lower longitudinal flat-transportation means 140 which include two transport belts, 141 sx and 141 dx, preferably of suction type, transversally spaced, traveling in a closed loop, used for moving downstream the blank-tray B or the blank-wraparound C on which the product P is placed.

[0020] In addition, it is preferably that between said belts, 141sx and 141dx, the upper branch of the chain 131 with the pushing teeth 132 of the pushing-conveying means 130 is to be moved longitudinally.

[0021] Finally, downstream from the flat-transportation means 140 there are lower conveying-folding means 150, of the two groups with multiple chains type, 151 sx and 151dx, in which said chains are used to carry abutting-folding elements 152sx-152dx and pushing-folding elements 153sx-153dx.

[0022] Furthermore, close to the lower conveying-folding means 150, there can also be rotating folding means, 154sx and 154dx, one or more stationary folding means, 155sx-155dx and 156sx-156dx, and lower gluers 160sx and 160dx.

[0023] It is preferable for the second pushing-conveying means 130 to extend longitudinally from the upstream zone of the inserting-positioning means 110 to the upstream zone of said lower conveying-folding means 150.

Upper positioning-conveying-forming means 200

[0024] In the upper side of said packaging line there are upper positioning-conveying-forming means 200, which are supported from the top hanging towards the bottom by means of vertical translator means 250 used to move and position them vertically, in order to get a change in size with regards to the product's height, and, in addition, used to obtain two configurations: **a)**-a first operative lowered configuration, in which said positioning-conveying-forming means 200 are inserted within the packaging line and can position, convey and form covers on top of the products, and **b)**-a non-operative lifted configuration.

[0025] Said upper positioning-conveying-forming means 200, for example, can comprise: >-upper insert-

ing-positioning means 210; >-upper pushing-conveying means 220, >-upper pushing-conveying-folding means 230.

[0026] The upper inserting-positioning means 210, preferably driven by a servo-motor M210, are used to insert and position, in a suspended manner, in an insertion zone Z1 of the said packaging line, in a single succession and in synchronization with the packaging cycles, a blank-cover A or A1, in a folded configuration, in front of and above the product P, with the back panel A-PP and the upper panel A-PS horizontally coplanar placed above the upper side of the product P and with the front panel, A-PA, vertically placed in front of the front side of the product P.

[0027] In the illustrated example, the inserting-positioning means 210 include a conveyor belt 211, preferably of suction type, transversally extended with respect to this packaging line, whose lower branch grasps the upper face of the upper panel A-PS and/or the back panel A-PP of the blank-cover A, and then convey it in a folded configuration into the said products packaging line and place it in the first zone Z1.

[0028] This suction conveyor belt 211, preferably, has a transversal section placed into the assembly line inclined from top to bottom and downstream with respect to the product's movement, and, also, said suction conveyor belt 211 has a predetermined suction force able to maintain the blank-cover A suspended in said zone Z1, and able to allow the downstream translation of said blank-cover A held suspended by suction when an external force is applied.

[0029] In order to insert blank-covers A in a continuous succession rate, said conveyor belt 211 has a first end portion, 211 a, externally placed with respect to the packaging line, and a second end portion 211 b, internally placed with respect to the packaging line.

[0030] The upper pushing-conveying means 220, preferably driven by the servo-motor M220, are used to push and convey the blank-cover A, in this folded configuration, from the first zone Z1 downstream along the products packaging line, as soon as the front side of the product P come against and/or near the front panel A-PA of the blank A.

[0031] In the illustrated embodiment, said pushing-conveying means 220 include a closed-loop travelling chain 221 equipped with pushing teeth 222, in which said chain 221 travels into a groove 212 that extends longitudinally obtained through transmission shaped like an inverted "U" of the suction conveyor belt 211.

[0032] The upper pushing-conveying-folding means 230, preferably driven by a servo-motor a servomotor M230, are mainly used to abut the upper front edge of the front panel A-PA of the blank-cover A / A1, to convey this blank-cover A / A1 downstream along the products packaging line, and to fold the back panel A-PP of the blank-cover A against the back side of the product P.

[0033] In the illustrated realisation, said upper pushing-conveying-folding means 230 include a conveyor group with multiple chains, 231 sx and 231 dx, equipped with abutting-folding elements 232sx and 232dx, and folding-pushing elements 233sx and 233dx.

[0034] In addition, if required, close to the pushing-conveying-folding means 230 there can also be rotating folding means 244sx and 244dx and/or stationary folding elements 245sx, 245dx, 246sx, 246dx, and/or gluers 260sx and 260dx.

Upper forming-folding means 300

[0035] In the upper side of said packaging line there are upper forming-folding means 300, which are supported from the top hanging towards the bottom by means of vertical translation means 350 used to vertically translate and position the aforementioned upper forming-folding means 300, in order to obtain a change in size with respect to the product's height, and, in addition, if desired, able to obtain two configurations: **a)**-a first operative lowered configuration, in which said third forming-folding means 300 are inserted within the packaging line for a positive forming of the upper portion of the two-piece packaging, or for a positive forming of the upper portion of the blank-wraparound on top of products P, and **b)**-a second non-operative lifted configuration.

[0036] In the illustrated example, said upper forming-folding means 300 include a conveyor group 310, preferably driven by a servomotor M310, comprising multiple chains, 311 sx and 311 dx equipped with abutting-folding elements 312sx and 312dx and with folding-pushing elements 313sx and 313dx.

[0037] Furthermore, close to said upper forming-folding means, 300, there can also be rotating folding means, 320sx and 320dx, stationary folding means, 330sx and 330dx, and upper lateral gluers 361 sx and 361 dx, as well as other gluers 370 (Fig. 6).

Operation - Two-piece box

[0038] With respect to Figures 3-4, if the aforementioned packaging line is to be used to package products P into a two-piece box, including a cover and a tray, two operational setups can be provided: >-a first setup, illustrated in Fig. 3-4, in which the upper forming-folding means 300 are raised up and non-operational; >-or else a second setup, illustrated in Fig. 11-12, in which the upper forming-folding means 300 are lowered down and operational.

Realisation of a two piece packaging comprising a tray with lateral edges and a cover in the shape of an inverted "U"

[0039] With reference to the first setup, see Fig. 3-4 (excluding the closing flaps A-PAsx, A-Padx, A-PSsx, A-PSdx, A-PPsx, A-PPdx of the blank-cover A1), if is desired to form a two-piece box comprising a quadrangular tray type glued with lateral edges obtained by means of

a blank-tray B (Fig. 7) and a cover shaped like an inverted "U" obtained by means of a blank-cover A (Fig. 8), the following operations are executed: **1a)**-the product P is pushed and conveyed downstream, sliding it over the dead plate 125 by means of a pushing bar 121; **1b)**-in the zone Z1 a blank-tray B is inserted and placed in a flat configuration with the panels in a longitudinal orientation under the dead plate 125, by means of a conveyor belt 111 of the lower inserting-positioning means 110; **1c)**-a blank-cover A is inserted and placed in a folded configuration, suspended from the top downwards, with the front panel A-PA placed in front of the front side of the product P, in said zone Z1, by means of the conveyor belt 211 of the upper inserting-positioning means 210; **1d)**-the blank-tray B is conveyed downstream at the same linear speed of the product P, by means of a pushing tooth 132 of second pushing-conveying means 130, when said product P is in a correct vertical setup with respect to the lower panel B-PI of the blank-tray B; **1e)**-the blank-cover A is conveyed downstream at the same linear speed of the product P, by means of a pushing tooth 222 of the upper pushing-conveying means 220, when the front side of the product P comes against and/or close to the front panel A-PA of the blank-cover A, in which during this operation the blank-cover A moves downstream while being adhered to the suction conveyor belt 211, and then falls in order to softly place the said blank-cover A on top of the product P; **1f)**-the blank-tray B, the product P and the blank-cover A are conveyed downstream in this manner beyond the downstream end of the dead plate 125, and then the product P falls onto the lower panel B-PI of the blank-tray B; **1g)-**the blank-tray B with the product P placed upon it are conveyed downstream by means of pushing tooth 132 of the second pushing-conveying means 130 and by means of the optional suction conveyor belt 141sx and 141dx of the flat transportation means 140, and the blank-cover A is translated downstream in a vertical alignment with respet to said product by means of pushing tooth 222 of the upper pushing-conveying means 220; **1h)**-the front panel A-PA of the blank-cover A on the upper side is abutted by means of a couple of abutting-folding elements 232sx and 232dx of the upper pushing-conveing-folding means 230; **1i)**-the back panel A-PP of the blank-cover A is folded downwards by means of a couple of pushing-folding elements 233sx and 233dx of the upper pushing-conveying-folding means 230, thus obtaining a cover shaped like an inverted "U" placed on top of the product P; **1l)**-the front panel B-PA of the blank-tray B is folded upwards by means of a couple of abutting-folding elements 152sx and 152dx of the lower conveying-folding means 150 by said abutting-folding elements 152sx and 152dx placing said abutting-folding elements 152sx and 152dx against the lower side of the front panel B-PA; **1m)**-the closing flaps B-PAsx and B-PAdx of the front panel B-PA are folded inwards by means of a couple of stationary folding means 155sx and 155dx; **1n)**-the closing flaps B-PPsx and B-PPdx of the back panel B-PP are folded upwards by means of a couple of rotating folding means 154sx and 154dx, **1o)**-the back panel B-PP is folded upwards by means of a couple of pushing-folding elements 153sx and 153dx of the lower conveying-folding means 150, with the closing flaps B-PPsx and B-PPdx placed within the stationary folding means 155sx and 155dx; **1p)-**adhesive is applied on the lower zones of the closing flaps B-PAsx-P-PPsx and B-PAsx-B-PAdx using a couple of lateral gluers 160sx and 160dx; **1q)**-the closing flaps B-PIsx and B-PIdx are folded upwards by means of stationary folding means 156sx and 156dx.

Realisation of a two piece packaging comprising a tray with lateral edges and a cover with lateral edges without the use of the upper forming-folding means 300

[0040] Again with reference to the first setup, Fig. 3-4, if desired to form a two-piece box comprising a glued quadrangular tray with lateral edges obtained by means of a blank-tray B (Fig. 7) and a glued quadrangular cover with lateral edges obtained by means of a blank-cover A1 (Fig. 9), the following operations are performed: **2a)**-the product P is pushed and conveyed downstream sliding it over the dead plate 125 by means of a pushing bar 121; **2b)**-in the zone Z1 a blank-tray B is inserted and placed in a flat configuration with the panels in a longitudinal orientation, under the dead plate 125, by means of a conveyor belt 111 of the lower inserting-positioning means 110; **2c)**-a blank-cover A1 is inserted and placed in a folded configuration, suspended from the top downwards, with the front panel A-PA placed in front of the front side of the product P, in said zone Z1, by means of the conveyor belt 211 of the upper inserting-positioning means 210; **2d)**-the blank-tray B is translated downstream, at the same linear speed of the product P, by means of pushing tooth 132 of the second pushing-conveying means 130, when said product P is in a correct vertical alignment with respect to the lower panel B-PI of the blank-tray B; **2e)-**the blank-cover A1 is translated downstream, at the same linear speed of the product P, by means of pushing tooth 222 of the upper pushing-conveying means 220, when the front side of the product P comes against and/or close to the front panel A-PA of the blank-cover A1, in which during said operation the blank-cover A1 moves downstream while being adhered to the suction conveyor belt 211, and then falls in order to softly place the same blank-cover A1 on top of the product P; **2f)**-the blank-tray B, the product P and the blank-cover A are conveyed downstream in this manner beyond the downstream end of the dead plate 125, and then the product P falls onto the lower panel B-PI of the blank-tray B; **2g)**-the blank-tray B with the product P are conveyed downstream by means of the pushing tooth 132 of the second pushing-conveying means 130, and by means of the optional suction conveyor belts 141sx and 141dx of the flat transportation means 140, moving the blank-cover A1 downstream in a correct vertical alignment by means of a pushing tooth 222 of the upper push-

ing-conveying means 220; **2h)**-the closing flaps A-PAsx and A-PAdx of the front panel A-PA are folded inwards by means of stationary folding means 245sx and 245dx; **2i)**-the closing flaps A-PPsx and A-PPdx of the back panel A-PP are folded downwards by means of the rotating folding means 244sx and 244dx; **2l)**-the front panel A-PA of the blank-cover A1 is abutted on the upper side by means of a couple of abutting-folding elements 232sx and 232dx of the upper pushing-conveying-folding means 230; **2m)**-the back panel A-PP of the blank-cover A1 is folded downwards by means of a couple of abutting-folding elements 233sx and 233dx of the upper pushing-conveying-folding means 230, with the closing flaps A-PPsx and A-PPdx of the back panel A-PP placed within the stationary folding means 245sx and 245dx; **2n)**-adhesive is applied on the upper areas of the closing flaps A-PAsx/A-PPsx and A-PAdx/A-PPdx by means of a couple of upper lateral gluers 260sx and 260dx; **2o)**-the closing flaps A-PSsx and A-PSdx are folded downwards by means of the stationary folding means 246sx and 246dx; **2p)**-the front panel B-PA of the blank-tray B is folded upwards using a couple of abutting-folding elements 152sx and 152dx of the lower conveying-folding means 150, with said abutting-folding elements 152sx and 152dx placed on the lower side against the front panel B-PA; **2q)**-the closing flaps B-PAsx and B-PAdx of the front panel B-PA are folded inwards by means of a couple of stationary folding means 155sx and 155dx; **2r)**-the closing flaps B-PPsx and B-PPdx of the back panel B-PP are folded upwards by means of a couple of rotating folding means 154sx and 154dx; **2s)**-the back panel B-PP is folded upwards by means of a couple of pushing-folding elements 153sx and 153dx of the lower conveying-folding means 150; **2t)**-adhesive is applied on the lower areas of the closing flaps B-PAsx/B-PPsx and B-PAsx/B-PPdx by means of a couple of lower lateral gluers 160sx and 160dx; **2u)**-the closing flaps B-Plsx and B-Pldx are folded upwards using stationary folding means 156sx and 156dx.

Realisation of a two piece packaging comprising a tray with lateral edges and a cover with lateral edges utilizing also the upper forming-folding means 300

[0041] With reference to the second operational setup, Fig. 11-12, if desired to form a two-piece box comprising a glued quadrangular tray with lateral edges obtained by means of a blank-tray B (Fig. 7) and a glued quadrangular cover with lateral edges obtained by means of a blank-cover A1 (Fig. 9), utilizing the upper forming-folding means, the following operations are performed: **3a)**-the product P is pushed and conveyed downstream sliding it over the dead plate 125 by means of a pushing bar 121; **3b)**-in the zone Z1 a blank-tray B is inserted and placed in a flat configuration with the panels in a longitudinal orientation, under the dead plate 125, by means of a conveyor belt 111 of the lower inserting-positioning means 110; **3c)**-a blank-cover A1 is inserted and placed in a folded configuration, suspended from the top downwards, with the front panel A-PA placed in front of the front side of the product P, in said zone Z1, by means of the conveyor belt 211 of the upper inserting-positioning means 210; **3d)**-the blank-tray B is translated downstream, at the same linear speed of the product P, by means of a pushing tooth 132 of the second pushing-conveyor means 130, when the product P is in a correct vertical alignment with respect to the lower panel B-PI of the blank-tray B; **3e)**-the blank-cover A1 is translated downstream, at the same linear speed of the product P, by means of pushing tooth 222 of the upper pushing-conveying means 220, when the front side of the product P comes against and/or close to the front panel A-PA of the blank-cover A1, in which during said operation the blank-cover A1 moves downstream while being adhered to the suction conveyor belt 211, and then falls in order to softly place the same blank-cover A1 on top of the product P; **3f)**-the blank-tray B, the product P and the blank-cover A1 are conveyed downstream in this manner beyond the downstream end of the dead plate 125, and then the product P falls onto the lower panel B-PI of the blank-tray B; **3g)**-the blank-tray B with the product P upon it are conveyed downstream by means of the pushing tooth 132 of the second pushing-conveying means 130 and by means of the optional suction conveyor belts 141 sx and 141dx of the flat transportation means 140, moving the blank-cover A1 downstream in a correct vertical alignment by means of a pushing tooth 222 of the upper pushing-conveying means 220; **3h)**-the closing flaps A-PAsx and A-PAdx of the front panel A-PA are folded inwards by means of the stationary folding means 245sx and 245dx; **3i)**-the closing flaps A-PPsx and A-PPdx of the back panel A-PP are folded downwards by means of rotating folding means 244sx and 244dx; **3l)**-the front panel A-PA of the blank-cover A1 on the upper side is abutted by means of a couple of abutting-folding elements 232sx and 232dx of the upper pushing-conveying-folding means 230; **3m)**-the back panel A-PP of the blank-cover A1 is folded downwards by means of a couple of abutting-folding elements 233sx and 233dx of the upper pushing-conveying-folding means 230, with the closing flaps A-PPsx and A-PPdx of the back panel A-PP placed within the stationary folding means 245sx and 245dx; **3o)**-the front panel B-PA of the blank-tray B is folded upwards using a couple of abutting-folding elements 152sx and 152dx of the lower conveying-folding means 150, with said abutting-folding elements 152sx and 152dx placed on the lower side against the front panel B-PA; **3p)**-the closing flaps B-PAsx and B-PAdx of the front panel B-PA are folded inwards by means of a couple of stationary folding means 155sx and 155dx; **3q)**-the closing flaps B-PPsx and B-PPdx of the back panel B-PP are folded upwards by means of a couple of rotating folding means 154sx and 154dx; **3r)**-the back panel B-PP is folded upwards by means of a couple of pushing-folding elements 153sx and 153dx of the lower conveying-folding means 150; **3s)**-adhesive is applied on the

lower areas of the closing flaps B-PAsx/B-PPsx and B-PAdx/B-PPdx by means of a couple of lower lateral gluers 160sx and 160dx; **3t)**-adhesive is applied on the upper areas of the closing flaps A-PAsx/A-PPsx and A-PAdx/A-PPdx of the front panel A-PA of the cover-blank A1 by means of a couple of upper lateral gluers 361 sx and 361 dx; **3u)**-the front panel A-PA of the blank-cover A1 on the upper side is abutted by means of a couple of abutting-folding elements 312sx and 312dx of the upper forming-folding means 330; **3v)**-the back panel A-PP of the blank-cover A1 is abutted on its upper side by means of a couple of pushing-folding elements 313sx and 313dx of the upper forming-folding means 330; **3x)**-the closing flaps B-Plsx and B-Pldx are folded upwards by means of the stationary folding means 156sx and 156dx; **3y)**-the closing flaps A-PSsx and A-PSdx are folded downwards using the stationary folding means 330sx and 330dx.

[0042] In this context, please note that the operations from 3a to 3m are the same as the previous operations from 2a to 2m.

Realisation of a wraparoung packaging

[0043] With reference to Figures 5-6, if it is desired to use the said packaging line to package products P by means of a box formed by means of a single blank-wraparound C (Fig. 10), the upper positioning-conveying-forming means 200 are lifted up in a non-operative position by means of translator means 250, and the following operations are executed: **4a)**-the product P is pushed and conveyed downstream, sliding it over the dead plate 125 by means of a driving bar 121; **4b)**-a blank-wraparound C is inserted and placed in a folded configuration in the zone Z1 by means of the conveyor belt 111 of the lower inserting-positioning means 110, with the lower and back panels C-Pl and C-PP arranged under the dead plate 125, and with the front and upper panels and the closing flaps C-PA, C-PS, C-LC, placed on a vertical plane; **4c)**-the blank-wraparound C is conveyed downstream, at the same linear speed as the product P, by means of the pushing tooth 132 of the second pushing-conveying means 130, when said product P is positioned in a correct vertical alignment with respect to the lower panel C-Pl of the blank-wraparound C; **4d)**-the blank-wraparound C and the product P are conveyed downstream in this manner, beyond the downstream end of the dead plate 125, and then the product P falls onto the lower panel C-Pl of the blank-wraparound C; **4e)**-the blank-wraparound C with the product P upon it are conveyed downstream by means of a pushing tooth 132 of the second pushing-conveying means 130 and by means of the optional suction conveyor belts 141sx and 141dx of the flat-transportation means 140; **4f)**-the front panel C-PA is abutted on its lower side by means of a couple of abutting-folding elements 152sx and 152dx of the lower conveying-folding means 150; **4g)**-the closing flaps C-PAsx and C-PAdx of the front panel C-PA are folded inwards by means of a couple of stationary folding means 155sx and 155dx; **4h)**-the closing flaps C-PPsx and C-PPdx of the back panel C-PP are folded upwards by means of a couple of rotating folding means 154sx and 154dx; **4i)**-the back panel C-PP is folded upwards by means of a couple of pushing-folding elements 153sx and 153dx of the lower conveying-folding means 150 with the closing flaps C-PPsx and C-PPdx placed within the stationary folding means 155sx and 155dx; **4l)**-the upper panel C-PS is folded downwards by means of a transversal bar 157; **4m)**-the front panel C-PA is abutted on its upper side by means of a couple of abutting-folding elements 312sx and 312dx of the upper forming-folding means 300; **4n)**-adhesive is applied along the external side of the upper edge of the back panel C-PP by means of the glue nozzles 370; **4o)**-the closing flap C-LC is folded downwards using the pushing-folding elements 313sx and 313dx of the upper forming-folding means 300; **4p)**-adhesive is applied on the lower areas of the closing flaps C-PAsx/C-PPsx and C-PAdx/C-PPdx of the front panel C-PA and of the back panel C-PP by means of a couple of lower lateral gluers 160sx and 160dx; **4q)**-adhesive is applied on the upper areas of the closing flaps C-PAsx/C-PPsx and C-PAdx/C-PPdx of the front panel C-PA and of the back panel C-PP by means of a couple of upper lateral gluers 361 sx and 361 dx; **4r)**-the closing flaps C-Plsx and C-Pldx of the lower panel C-Pl are folded upwards by means of the stationary folding means 156sx and 156dx; **4s)**-the closing flaps C-PSsx and C-PSdx are folded downwards by means of the stationary folding means 330sx and 330dx.

[0044] The description of the aforementioned multi-functional line is provided purely by way of non-limiting example, and therefore all modifications and variations suggested by practice and by its utilisation or use can be made to it, within the scope of the following claims.

[0045] In such context, the following claims also form an integrative part of the above stated description.

Claims

1. Multi-functional packaging line that extends longitudinally, able for packaging products (P) in packages of two-piece box type obtained through a blank-tray (A / A1) and a blank-cover (B), or able for packaging products (P) in wrap-around packages obtained through a single blank-wraparound (C), **characterized by the fact** that it comprises:

   >-lower dual-functional positioning-conveying-forming means (100), alternatively able to position a blank-tray (B) under the base of the product (P) and then able to fold said blank-tray (B) around the base of the product (P) conveying this blank-tray (B) and the product (P) downstream, **or** able to position a blank-wraparound (C) under the base of the product (P) and able to fold the lower portion of said blank-wrapa-

round (C) around the base of the product (P) conveying said blank-wraparound (C) and the respective product (P) downstream;
>-upper positioning-conveying-forming (200) means, able to insert and position a blank-cover (A / A1) on top of the product (P), and then translate said blank-cover (A / A1) downstream, and during said translation able to fold said blank-cover (A / A1) on the top of product P while said beneath product P is translating downstream;
>-upper forming-folding means (300), able to fold and to form the upper portion of said blank-wraparound (C) on top of the product (P) while the product (P) beneath is translating downstream.

2. Packaging line according to claims from 1 to 3, **characterized by the fact that** the lower dual-functional positioning-conveying-forming means (100) in their upstream zone comprise:

>-lower dual-functional insertion-positioning means (110), able to insert and position, in a first insertion zone (Z1) of said packaging line, a blank-tray (B) or a blank-wraparound (C) under a sliding dead plate (125);
>-first lower pushing-conveying means (120), able to push and translate the product (P) downstream by sliding it over and along said sliding dead plate (125);
>-second lower pushing-conveying means (130), able to push and translate downstream the blank-tray (B) or the blank-wraparound (C) under said sliding dead plate (125) from said first zone (Z1).

3. Packaging line according to Claim 2, **characterized by the fact that** said lower inserting-positioning means (110) are able to insert the blank-tray (B) in a flat configuration under the dead plate (125).

4. Packaging line according to Claim 2, **characterized by the fact that** said lower inserting-positioning means (110) are able to insert and position the blank-wraparound (C) in a folded configuration, with the lower panel (B-PI) and the back panel (B-PS) placed horizontally coplanar under the dead plate (125), and with the front panel (B-PA) vertically placed in front of the front side of the product (P).

5. Packaging line according to one of the claims from 2 to 4, **characterized by the fact that** said lower inserting-positioning means (110) comprise a first conveyor belt (111) that extends transversally with respect to said packaging line, and **the by fact that** this first conveyor belt (111) with its upper branch is able to grasp the lower face of the blank-tray (B) or of the blank-wraparound (C) and then able to translate it into the said packaging line and position it in the first zone (Z1).

6. Packaging line according to Claim 5, **characterized by the fact that** said conveyor belt (111) is of the suction belt type.

7. Packaging line according to claims 5 or 6, **characterized by the fact that** said first conveyor belt (111) comprises a first end portion (111a) externally placed with respect to the packaging line and a second end portion (111b) internally placed with respect to the packaging line.

8. Packaging line according to one of the claims from 2 to 7, **characterized by the fact that** said lower pushing-conveying means (120) comprise a system with suspended pushing bars (121).

9. Packaging line according to one of the claims from 2 to 8, **characterized by the fact that** said lower pushing-conveying means (130) comprise a chain (131) equipped with pushing teeth (132), in which said chain (131) travels in a closed loop with an operative upper branch that extends from upstream to downstream, in which said upper branch run into a slot (112) obtained in the end portion (111 b) of the belt (111).

10. Packaging line according to one of the claims from 1 to 9, **characterized by the fact that** said lower dual-functional positioning-conveying-forming means (100) further comprise flat conveyor means (140) placed downstream from a sliding dead plate (125).

11. Packaging line according to Claim 10, **characterized by the fact that** said flat-conveyor means (140) comprise two suction belts (141sx, 141dx) that run in a closed loop.

12. Packaging line according to Claim 11, **characterized by the fact that** between said two belts (141 sx, 141 dx) there is an upper branch of a chain (131) that runs longitudinally, in which said chain (131) is equipped with pushing teeth (132) of the pushing-conveying means (130).

13. Packaging line according to one of the claims from 1 to 12, **characterized by the fact that** said lower dual-functional positioning-conveying-forming means (100) comprise lower conveying-folding means (150) with abutting-folding elements (152sx, 152dx) and pushing-folding elements (153sx, 153dx).

14. Packaging line according to Claim 13, **characterized by the fact that** said lower conveying-folding

means (150) comprise a conveyor group with multiple chains (151sx and 151dx) able to transport said abutting-folding and pushing-folding elements (152sx-152dx and 153sx-153dx).

15. Packaging line according to one of the claims from 13 to 14, **characterized by the fact that** said lower conveying-folding means (150) are placed downstream from the flat conveyor means (140).

16. Packaging line according to one of the claims from 13 to 15, **characterized by the fact that** close to the said lower conveying-folding means (150) there furtherly are rotating folding means (154sx, 154dx).

17. Packaging line according to one of the claims from 13 to 16, **characterized by the fact that** close to the said lower conveying-folding means (150) there furtherly are stationary folding means (155sx, 155dx, 156sx, 156dx).

18. Packaging line according to one of the claims from 13 to 17, **characterized by the fact that** said second pushing-conveying means (130) extend longitudinally from a zone situated upstream from the inserting-positioning means (110) until reaching the said lower conveying-folding means (150).

19. Packaging line according to one of the previous claims, **characterized by the fact that** said upper dual-functional positioning-conveying-forming means (200) can be either inserted or removed with respect to the packaging line.

20. Packaging line according to one of the previous claims, **characterized by the fact that** said upper positioning-conveying-forming means (200) are supported in a hanging manner from the top downwards by means of vertical translator means (250) that are able to vertically translate and position them.

21. Packaging line according to Claim 1, **characterized by the fact that** said upper positioning-conveying-forming means (200) execute the following operations: **a)**-positioning of a blank-cover (A) in a suspended manner on top of a product (P), **b)**-conveying downstream the said blank-cover (A) and along said translation folding said blank-cover (A) on top of the product (P) in order to form a cover in the shape of an inverted "U".

22. Packaging line according to Claim 1, **characterized by the fact that** said upper positioning-conveying-forming means (200) execute the following operations: **a)**-positioning of a blank-cover (A1) in a suspended manner on top of a product (P), **b)**-conveying downstream the said blank-cover (A1) and along said translation folding it on top of the product (P) in order to form a quadrangular cover with lateral edges.

23. Packaging line according to Claim 1, **characterized by the fact that** said upper positioning-conveying-forming means (200) execute the following operations: **a)**-positioning of a blank-cover (A1) on top of a product (P), **b)-**conveying downstream the said blank-cover (A1) while partially folding it on top of the product (P), and **by the fact that** said upper forming-folding means (300) complete the operations to obtain the forming of a quadrangular cover on top of the product (P).

24. Packaging line according to one of the previous claims, **characterized by the fact that** said upper positioning-conveying-forming means (200) include: >-upper inserting-positioning means (210), able to insert and position, in a suspended manner, in an first insertion zone (Z1) of the said packaging line, a blank-cover (A / A1) in a folded configuration in front of and above the product (P), with the back panel (A-PP) and the upper panel (A-PS) placed horizontally coplanar above the upper side of the product (P), and with the front panel (A-PA) vertically placed in front of the front side of the product (P); >-upper pushing-conveying means (220) able to push and convey the blank-cover (A/A1), in this folded configuration, from said first zone (Z1) downstream along the product packaging line, as soon as the front side of the product (P) comes against and/or near the front panel (A-PA) of the blank (A/A1); >-upper pushing-conveying-folding means (230) able to push and translate the blank-cover (A / A1) downstream along the product packaging line and able to fold the back panel (A-PP) of the blank-cover (A) against the back side of the product (P).

25. Packaging line according to Claim 24, **characterized by the fact that** said upper inserting-positioning means (210) comprise a second conveyor belt (211) that extends transversally with respect to the said packaging line, and **by the fact** that said conveyor belt (211), with its lower branch, is able to grasp the upper face of the upper panel (A-PS) and/or of the back panel (A-PP) of the blank-cover (A / A1) and then able to convey it in a folded configuration within the said product packaging line and position it in the first zone (Z1).

26. Packaging line according to Claim 24, **characterized by the fact that** said second conveyor belt (211) is of the suction type.

27. Packaging line according to Claims from 24 to 26, **characterized by the fact** that the transversal section of the second conveyor belt (211) placed within the packaging line is tilted from upstream to down-

stream from top to bottom with respect to the direction in which the products advance.

28. Packaging line according to one of the Claims from 24 to 27, **characterized by the fact that** said second conveyor belt (211) has a predetermined suction force able to keep the blank-cover (A/A1) in a suspended position in said zone (Z1) and able to allow the translation of the said blank-cover (A/A1) downstream keeping it suspended if an external force is applied.

29. Packaging line according to one of the claims from 24 to 28, **characterized by the fact that** said second conveyor belt (211) has a first portion end (211a) externally placed with respect to the packaging line and a second portion end (211 b) internally placed with respect to the packaging line.

30. Packaging line according to one of the claims from 24 to 29, **characterized by the fact that** said upper pushing-conveying means (220) comprise a closed-loop chain (221) equipped with pushing teeth (222), and **by the fact that** said chain (221) runs into a longitudinally extended groove (212) obtained from the upper inserting-positioning means (210).

31. Packaging line according to one of the claims from 24 to 30, **characterized by the fact that** said upper pushing-conveying-folding means (230) comprise a conveyor group with chains (231 sx and 231dx) equipped with abutting-folding elements (232sx-232dx) and pushing-folding elements (233sx, 233dx).

32. Packaging line according to one of the claims from 24 to 31, **characterized by the fact that** next to said upper pushing-conveying-folding means (230) there furtherly are rotating folding elements (244sx, 244dx).

33. Packaging line according to one of the claims from 24 to 32, **characterized by the fact that** close to said pushing-conveying-folding means (230) there furtherly are stationary folding elements (245sx, 245dx, 246sx, 246dx).

34. Packaging line according to one of the previous claims, **characterized by the fact that** said upper forming-folding means (300) can be inserted and removed with respect to the packaging line.

35. Packaging line according to one of the previous claims, **characterized by the fact that** said upper forming-folding means (300) are supported from the top hanging towards the bottom by means of vertical-translating means (350) that are able to vertically translate and position them.

36. Packaging line according to one of the previous claims, **characterized by the fact that** said upper forming-folding means (300) comprise a conveyor group (310) with multiple chains (311sx, 311dx) equipped with abutting-folding elements (312sx, 312dx) and with pushing-folding elements (313sx, 313dx).

37. Packaging line according to one of the previous claims, **characterized by the fact that** close to said upper forming-folding means (300) there are rotating folding elements (320sx, 320dx).

38. Packaging line according to one of the previous claims, **characterized by the fact that** close to said upper forming-folding means (300) there are stationary folding means (330sx, 330dx).

39. Packaging line according to one of the previous claims, **characterized by the fact that** close to said upper forming-folding means (300) there are lower lateral gluers (361sx, 361dx).

40. Multi-functional packaging line according to one of the previous claims, **characterized by the fact that** in order to form a two-piece box comprising a glued quadrangular tray with lateral edges obtained by means of a blank-tray (B) comprising a front panel (B-PA) with closing flaps (B-PAsx, B-PA x) a lower panel (B-PI) with closing flaps (B-PIsx, B-PIdx) and a back panel (B-PP) with closing flaps (B-PPsx, B-PPdx) and a cover shaped like an inverted "U" obtained by means of a blank-cover (A) comprising a front panel (A-PA) an upper panel (A-PS) and a back panel (A-PP), the following operations are executed:

1a) the product (P) is pushed and conveyed downstream, sliding it over a dead plate (125) by means of a pushing bar (121);
1b) a blank-tray (B) in a flat configuration with the panels in a longitudinal orientation is inserted and positioned by means of the first conveyor belt (111) in an insertion zone (Z1) under the dead plate (125), in which said insertion zone (Z1) is placed along said packaging line;
1c) a blank-cover (A) is inserted and placed in a folded configuration, suspended from the top downwards, with the front panel (A-PA) placed in front of the front side of the product (P), in an insertion zone (Z1) of the packaging line by means of a second conveyor belt (211);
1d) the blank-tray (B) is conveyed downstream at the same linear speed of the product (P) by means of a pushing tooth (132) when said product (P) is in correct vertical setup with respect to the lower panel (B-PI) of the blank-tray (B);
1e) the blank-cover (A) is conveyed downstream at the same linear speed of the product (P), by

means of a pushing tooth (222), when the front side of the product (P) comes against and/or close to the front panel (A-PA) of the blank-cover (A), in which during this operation the blank-cover (A) moves downstream while being adhered to the suction conveyor belt (211) and then falls in order to softly place the said blank-cover (A) on top of the product P;

1f) the blank-tray (B), the product (P) and the blank-cover (A) are conveyed downstream in this manner beyond the downstream end of the dead plate (125) and then the product (P) falls onto the lower panel (B-PI) of the blank-tray (B);

1g) the blank-tray (B) with the product (P) are conveyed downstream by means of the pushing tooth (132) and by use of the optional suction conveyor belts (141sx and 141dx), thus conveying downstream the blank-cover (A) too in a correct vertical alignment by means of a pushing tooth (222);

1h) the front panel (A-PA) of the blank-cover (A) is abutted on the upper side by means of a couple of abutting-folding elements (232sx and 232dx);

1i) the back panel (A-PP) of the blank-cover (A) is folded downwards by means of a couple of pushing-folding elements (233sx and 233dx), thus obtaining a cover shaped like an inverted "U" placed on top of the product (P);

1l) the front panel (B-PA) of the blank-tray (B) is folded upwards by means of a couple of abutting-folding elements (152sx and 152dx) with said abutting-folding elements (152sx and 152dx) placed on the lower side against the front panel (B-PA);

1m) the closing flaps (B-PAsx and B-Padx) of the front panel (B-PA) are folded inwards by means of a couple of stationary folding means (155sx and 155dx);

1n) the closing flaps (B-PPsx and B-PPdx) of the back panel (B-PP) are folded upwards by means of a couple of rotating folding means (154sx and 154dx);

1o) the back panel (B-PP) is folded upwards by means of a couple of pushing-folding elements (153sx and 153dx) with the closing flaps (B-PPsx and B-PPdx) placed within the stationary folding means (155sx and 155dx);

1p) adhesive is applied on the lower zones of the closing flaps (B-PAsx-B-PPsx and B-PAdx-B-PAdx) by using a couple of lateral gluers (160sx and 160dx);

1q) the closing flaps (B-Plsx and B-Pidx) are folded upwards by means of stationary folding means (156sx and 156dx).

41. Multi-functional packaging line, **characterized by the fact that** in order to form a two-piece box comprising: -a glued quadrangular tray with lateral edges obtained by means of a blank-tray (B) comprising a front panel (B-PA) with closing flaps (B-PAsx, B-PAdx) a lower panel (B-PI) with closing flaps (B-Plsx, B-Pldx) a back panel (B-PP) with closing flaps (B-PPsx, B-PPdx), and -a quadrangular cover with lateral edges obtained by use of a blank-cover (A1) comprising a front panel (A-PA) with closing flaps (A-PAsx, A-PAdx) an upper panel (A-PS) with closing flaps (A-PSsx, A-PSdx) and a back panel (A-PP) with closing flaps (A-PPsx, A-PPdx); the following operations are executed:

2a) the product (P) is pushed and conveyed downstream sliding it over a dead plate (125) by means of a pushing bar (121);

2b) in an insertion zone (Z1) situated along the packaging line a blank-tray (B) in a flat configuration with the panels in a longitudinal orientation is inserted and placed under the dead plate (125) by means of a first conveyor belt (111);

2c) a blank-cover (A1) is inserted and placed in a folded configuration, suspended from the top downwards, with the front panel (A-PA) placed in front of the front side of the product (P), in an insertion zone (Z1) placed along the packaging line by means of a second conveyor belt (211);

2d) the blank-tray (B) is translated downstream, at the same linear speed of the product (P), by means of first pushing tooth (132), when the product (P) is in a correct vertical alignment with respect to the lower panel (B-PI) of the blank-tray (B);

2e) the blank-cover (A1) is translated downstream, at the same linear speed of the product (P), by means of a second pushing tooth (222), when the front side of the product (P) comes against and/or close to the front panel (A-PA) of the blank-cover (A1), in which during said operation the blank-cover (A1) moves downstream while being adhered to the suction conveyor belt (211), and then falls in order to softly place the same blank-cover (A1) on top of the product (P);

2f) the blank-tray (B), the product (P) and the blank-cover (A1) are conveyed downstream in this manner beyond the downstream end of the dead plate (125) and then the product (P) falls onto the lower panel (B-PI) of the blank-tray (B);

2g) the blank-tray (B) with the product (P) are conveyed downstream by means of the first pushing tooth (132) and by use of the optional suction conveyor belts (141 sx and 141 dx), moving the blank-cover (A1) downstream in a correct vertical alignment by means of a second pushing tooth (222);

2h) the closing flaps (A-PAsx and A-PAdx) of the front panel (A-PA) are folded inwards by means of stationary folding means (245sx and

245dx);

2i) the closing flaps (A-PPsx and A-PPdx) of the back panel (A-PP) are folded downwards by means of folding means (244sx and 244dx);

2l) the front panel (A-PA) of the blank-cover (A1) is abutted on the upper side by means of a couple of abutting-folding elements (232sx and 232dx);

2m) the back panel (A-PP) of the blank-cover (A1) is folded downwards by means of a couple of folding-pushing elements (233sx and 233dx) with the closing flaps (A-PPsx and A-PPdx) of the back panel (A-PP) placed within stationary folding means (245sx and 245dx);

2n) adhesive is applied on the upper areas of the closing flaps (A-PAsx/A-PPsx and A-PAdx/A-PPdx) by means of a couple of upper lateral gluers (260sx and 260dx);

2o) the closing flaps (A-PSsx and A-PSdx) are folded downwards by means of stationary folding means (246sx and 246dx);

2p) the front panel (B-PA) of the blank-tray (B) is folded upwards by using a couple of abutting-folding elements (152sx and 152dx) with said abutting-folding elements (152sx and 152dx) placed on the lower side against the front panel (B-PA);

2q) the closing flaps (B-PAsx and B-PAdx) of the front panel (B-PA) are folded inwards by means of a couple of stationary folding means (155sx and 155dx);

2r) the closing flaps (B-PPsx and B-PPdx) of the back panel (B-PP) are folded upwards by means of a couple of rotating folding means (154sx and 154dx);

2s) the back panel (B-PP) is folded upwards by means of a couple of pushing-folding elements (153sx and 153dx) of the lower conveying-folding means (150);

2t) adhesive is applied on the lower areas of the closing flaps (B-PAsx/B-PPsx and B-PAsx/B-PPdx) by means of a couple of lower lateral gluers (160sx and 160dx);

2u) the closing flaps (B-Plsx and B-Pldx) are folded upwards by use of stationary folding means (156sx and 156dx).

42. Multi-functional packaging line, **characterized by the fact that** in order to form a two-piece box comprising: -a glued quadrangular tray with lateral edges obtained by means of a blank-tray (B) comprising a front panel (B-PA) with closing flaps (B-PAsx, B-PAdx) a lower panel (B-Pl) with closing flaps (B-Plsx, B-Pldx) a back panel (B-PP) with closing flaps (B-PPsx, B-PPdx), and -a quadrangular cover with lateral edges obtained by means of a blank-cover (A1) comprising a front panel (A-PA) with closing flaps (A-PAsx, A-PAdx) an upper panel (A-PS) with closing flaps (A-PSsx, A-PSdx) and a back panel (A-PP) with closing flaps (A-PPsx, A-PPdx), the following operations are executed:

3a) the product (P) is pushed and conveyed downstream sliding it over a dead plate (125) by means of a pushing bar (121);

3b) a blank-tray (B) in a flat configuration with the panels in a longitudinal orientation is inserted and placed by means of the first conveyor belt (111) in an insertion zone (Z1) under the dead plate (125);

3c) in an insertion zone (Z1) placed along the packaging line a blank-cover (A1) is inserted and placed in a folded configuration, suspended from the top downwards with the front panel (A-PA) placed in fronf of the front side of the product (P), by means of a second conveyor belt (211).

3d) the blank-tray (B) is translated downstream, at the same linear speed of the product (P), by means of a pushing tooth (132), when said product (P) is in a correct vertical alignment with respect to the lower panel (B-Pl) of the blank-tray (B);

3e) the blank-cover (A1) is translated downstream, at the same linear speed of the product (P), by means of pushing tooth (222), when the front side of the product (P) comes against and/or close to the front panel (A-PA) of the blank-cover (A1), in which during said operation the blank-cover (A1) moves downstream while being adhered to the suction conveyor belt (211), and then falls in order to softly place the same blank-cover (A1) on top of the product (P);

3f) the blank-tray (B), the product (P) and the blank-cover (A) are conveyed downstream in this manner beyond the downstream end of the dead plate (125), and then the product (P) falls onto the lower panel (B-Pl) of the blank-tray (B);

3g) the blank-tray (B) with the product (P) upon it are conveyed downstream by means of a pushing tooth (132) and by the the optional suction conveyor belts (141 sx and 141 dx), and conveying the blank-cover (A1) downstream in a correct vertical alignment by a pushing tooth (222);

3h) the closing flaps (A-PAsx and A-PAdx) of the front panel (A-PA) are folded inwards by means of folding means (245sx and 245dx);

3i) the closing flaps (A-PPsx and A-PPdx) of the back panel (A-PP) of the blank-cover (A1) are folded downwards by means of folding means (244sx and 244dx);

3l) the front panel (A-PA) of the blank-cover (A1) is abutted on the upper side by means of a couple of abutting-folding elements (232sx and 232dx);

3m) the back panel (A-PP) of the blank-cover

(A1) is folded downwards by means of a couple of folding-pushing elements (233sx and 233dx) placing the closing flaps (A-PPsx and A-PPdx) of the back panel (A-PP) within the stationary folding means (245sx and 245dx);

3o) the front panel (B-PA) of the blank-tray (B) is folded upwards using a couple of abutting-folding elements (152sx and 152dx), placing said abutting-folding elements (152sx and 152dx) on the lower side against said front panel (B-PA);

3p) the closing flaps (B-PAsx and B-PAdx) of the front panel (B-PA) are folded inwards by means of a couple of folding means (155sx and 155dx);

3q) the closing flaps (B-PPsx and B-PPdx) of the back panel (B-PP) are folded upwards by means of a couple of folding means (154sx and 154dx);

3r) the back panel (B-PP) of the blank-tray (B) is folded upwards by means of a couple of pushing-folding elements (153sx and 153dx);

3s) adhesive is applied on the lower areas of the closing flaps (B-PAsx/B-PPsx and B-PAdx/B-PPdx) of the front panel (B-PA) of the blank-tray (B) by means of a couple of lower lateral gluers (160sx and 160dx);

3t) adhesive is applied on the upper areas of the closing flaps (A-PAsx/A-PPsx and A-PAdx/A-PPdx) of the front and rear panels (A-PA, A-PP) of the blank-cover (A1) by means of a couple of upper lateral gluers (361 sx and 361 dx);

3u) the front panel (A-PA) of the blank-cover (A1) is abutted on the upper side by means of a couple of abutting-folding elements (312sx and 312dx);

3v) the back panel (A-PP) of the blank-cover (A1) is abutted on the upper side by means of a couple of folding-pushing elements (313sx and 313dx);

3x) the closing flaps (B-Plsx and B-Pldx) of the lower panel (B-PI) of the blank-tray (B) are folded upwards by means of folding means (156sx and 156dx);

3y) the closing flaps (A-PSsx and A-PSdx) of the upper panel (A-PS) of the blank-cover (A1) are folded downwards by means of stationary folding means (330sx and 330dx).

43. Multi-functional packaging line, **characterized by the fact that** in order to form a glued wraparound box type obtained by means of a blank-wraparound (C) comprising a closing flap (C-LC) an upper panel (C-PS) with closing flaps (C-PSsx, C-PSdx) a front panel (C-PA) with closing flaps (C-PAsx, C-PAdx) a lower panel (C-PI) with closing flaps (C-Plsx, C-Pldx) a back panel (C-PP) with closing flaps (C-PPsx, C-PPdx), the following operations are executed:

4a) the product (P) is pushed and conveyed downstream, sliding it over the dead plate (125) by means of a driving bar (121);

4b) a blank-wraparound (C) is inserted and placed in a folded configuration in a zone (Z1) by means of the conveyor belt (111) of the lower inserting-positioning means (110), with the lower and back panels (C-PI) and (C-PP) arranged under the dead plate (125) and with the front and upper panels and the closing flaps (C-PA, C-PS, C-LC) placed in a vertical planel plane in front of the product (P);

4c) the blank-wraparound (C) is translated downstream, at the same linear speed of the product (P), by means of a first pushing tooth (132) when the product (P) is in a correct vertical set up with respect to the lower panel (C-PI) of the blank-wraparound (C);

4d) the blank-wraparound (C) and the product (P) are conveyed downstream in this manner beyond the downstream end of the dead plate (125) and then the product (P) falls onto the lower panel (C-PI) of the blank-wraparound (C);

4e) the blank-wraparound (C) with the product (P) placed onto it are conveyed downstream by means of a first pushing tooth (132) and by use of the optional suction conveyor belts (141 sx and 141 dx) of the flat-transportation means 140;

4f) the front panel (C-PA) of the blank-wraparound (C) is abutted on the lower side by means of a couple of abutting-folding elements (152sx and 152dx);

4g) the closing flaps (C-PAsx and C-PAdx) of the front panel (C-PA) are folded upwards by means of a couple of folding means (154sx and 154dx);

4h) the closing flaps (C-PPsx) and (C-PPdx) of the back panel (C-PP) are folded upwards by means of a couple of folding means (154sx and 154dx);

4i) the back panel (C-PP) is folded upwards by means of a couple of pushing-folding elements (153sx and 153dx) of the lower conveying-folding means (150) with the closing flaps (C-PPsx and C-PPdx) placed within folding means (155sx and 155dx);

4l) the upper panel (C-PS) is folded downwards by means of a transversal bar (157);

4m) the front panel (C-PA) is abutted on the upper side by means of a couple of abutting-folding elements (312sx and 312dx);

4n) adhesive is applied along the external side of the upper border of the back panel (C-PP) by means of gluers (370);

4o) the closing flap (C-LC) is folded downwards by means of folding-pushing elements (312sx and 312dx);

4p) adhesive is applied on the lower areas of

the closing flaps (C-PAsx/C-PPsx and C-PAdx/C-PAdx) of the front panel (C-PA) and of the back-panel (C-PP) by means of lower lateral gluers (160sx and 160dx);

4q) adhesive is applied on the upper areas of the closing flaps (C-PAsx/C-PPsx and C-PAdx/C-PPdx) of the front panel (C-PA) by means of upper lateral gluers (361 sx and 361 dx);

4r) the closing flaps (C-Plsx and C-Pldx) are folded upwards by means of folding means (156sx and 156dx);

4s) the closing flaps (C-PSsx and C-PSdx) are folded downwards by means of folding means (330sx and 330dx).

Fig. 1B

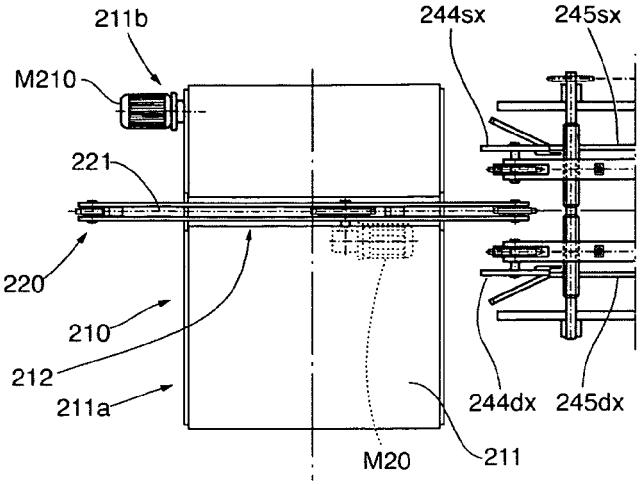


Fig. 1

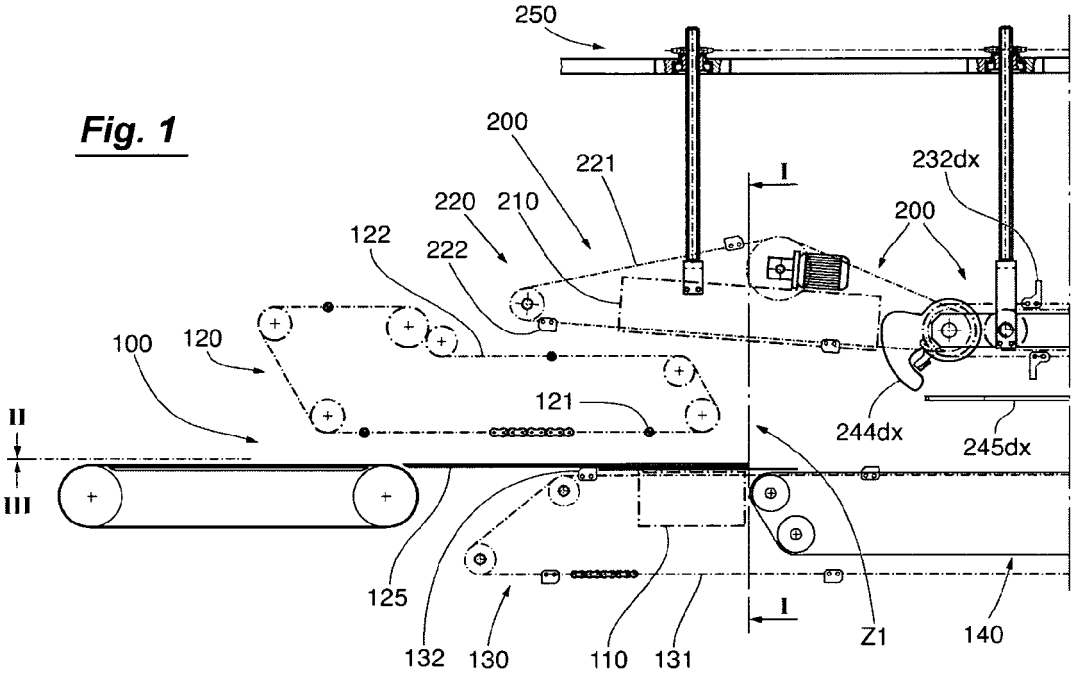


Fig. 1A

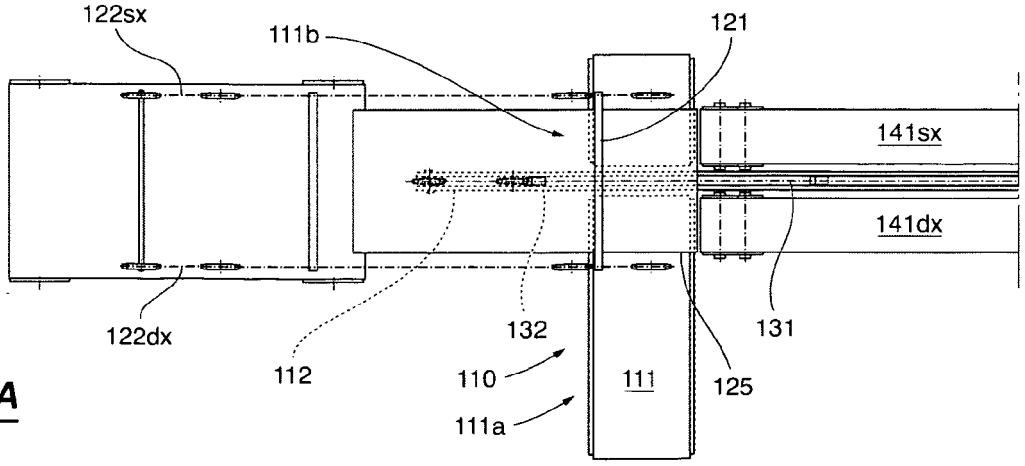
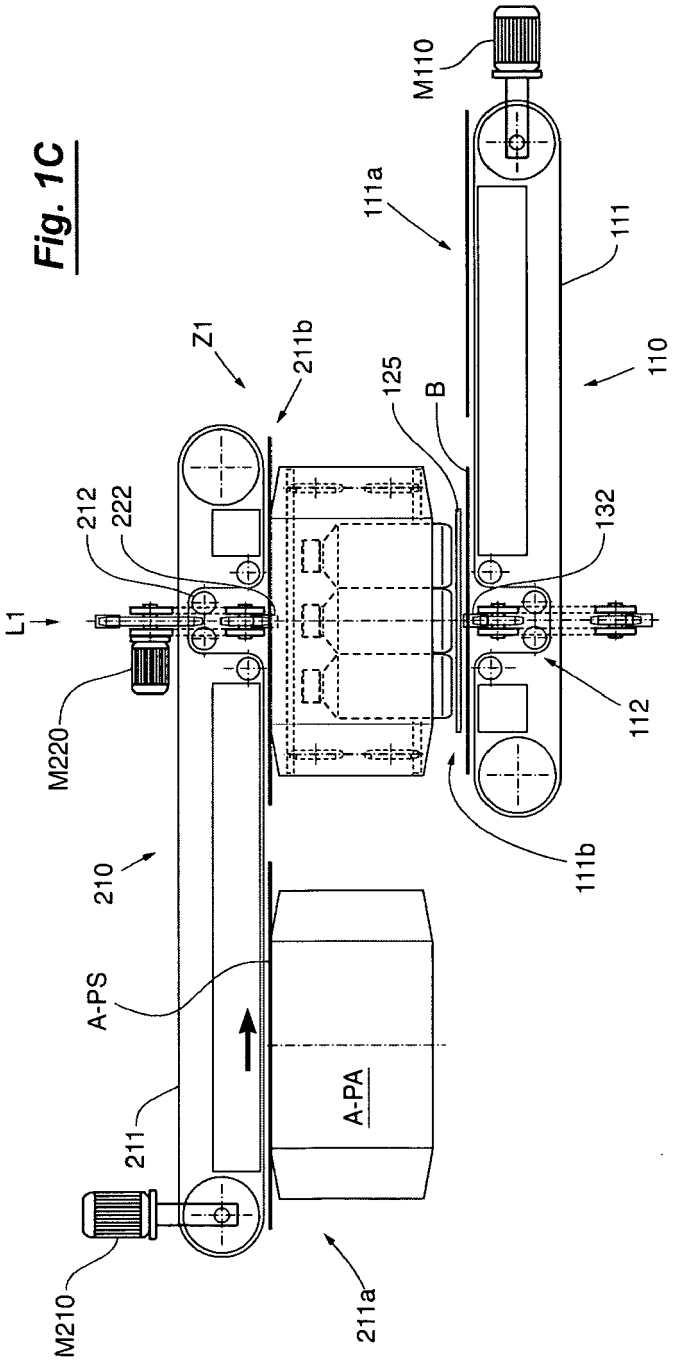


Fig. 1C


M110
111a
111
110
Z1
211b
125
B
212
222
132
L1
M220
112
111b
210
A-PS
A-PA
211
M210
211a

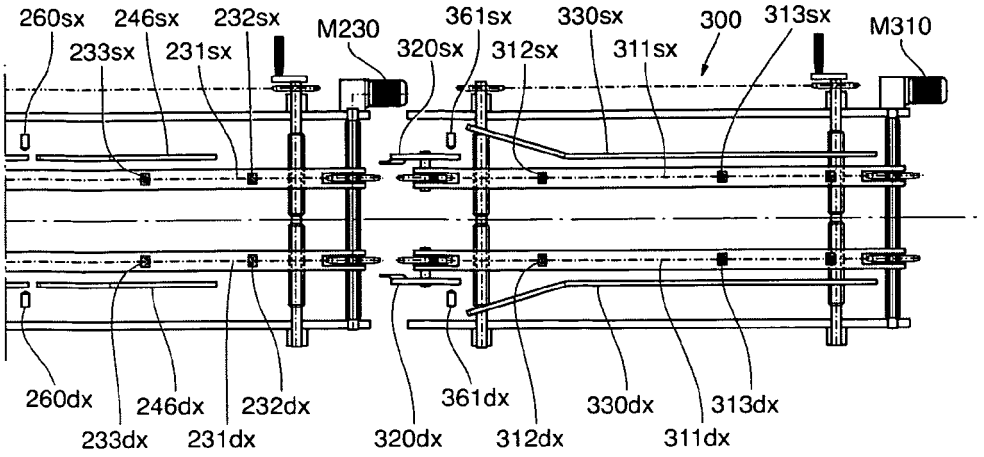


Fig. 2B

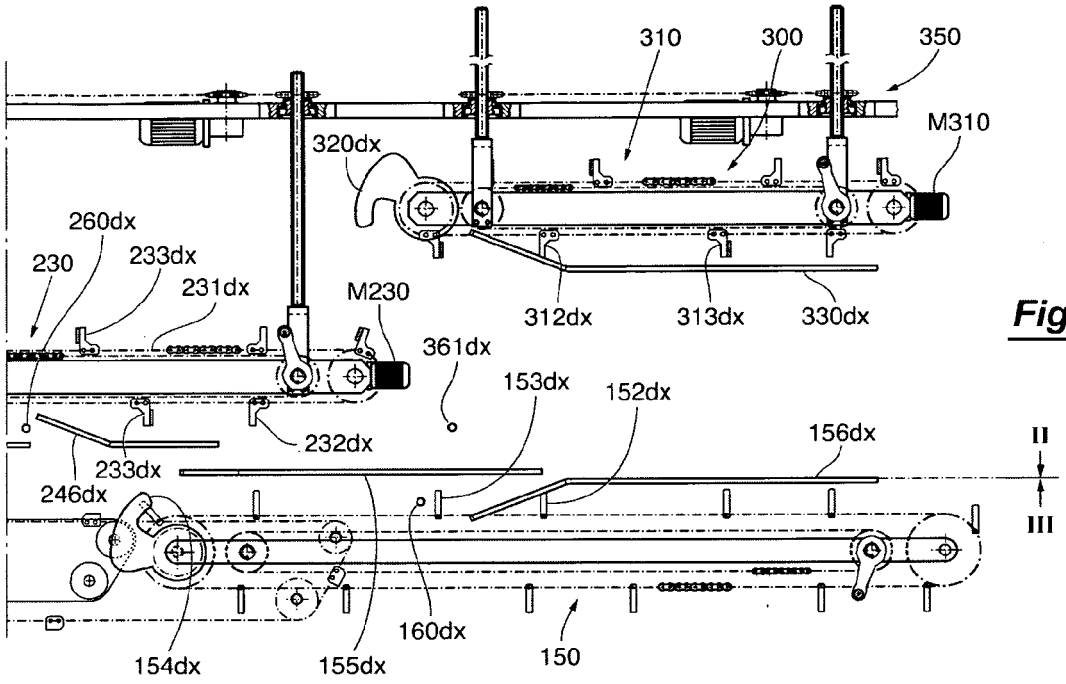


Fig. 2

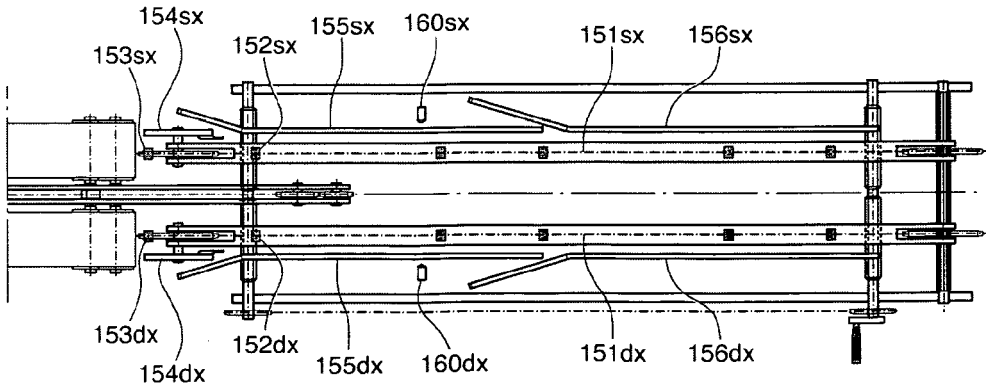


Fig. 2A

Fig. 3

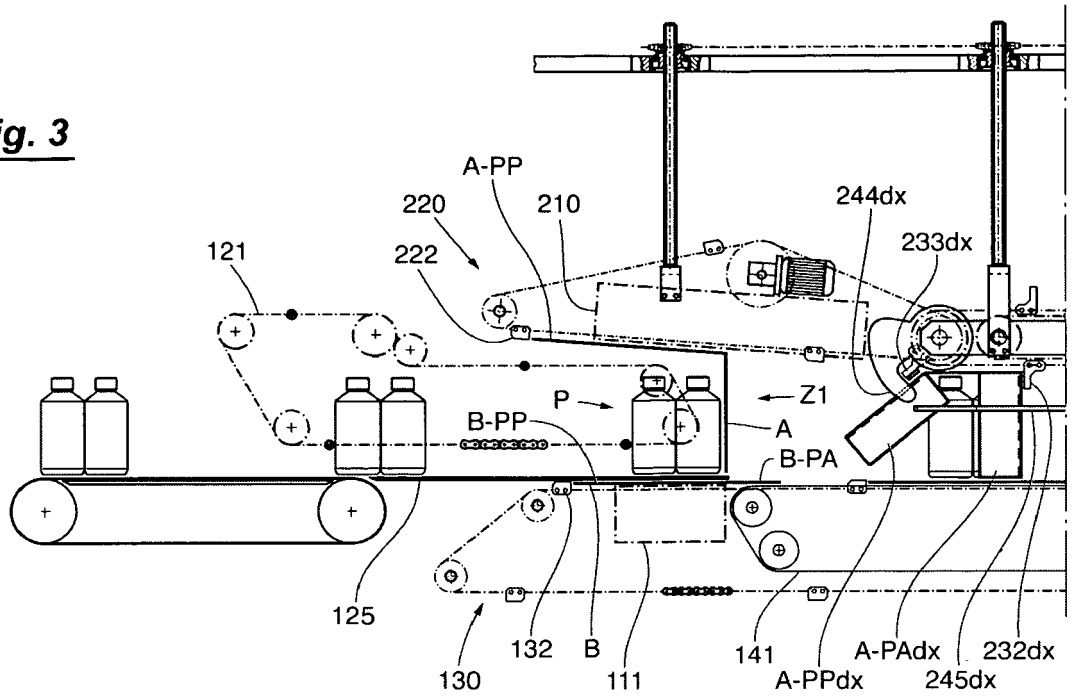
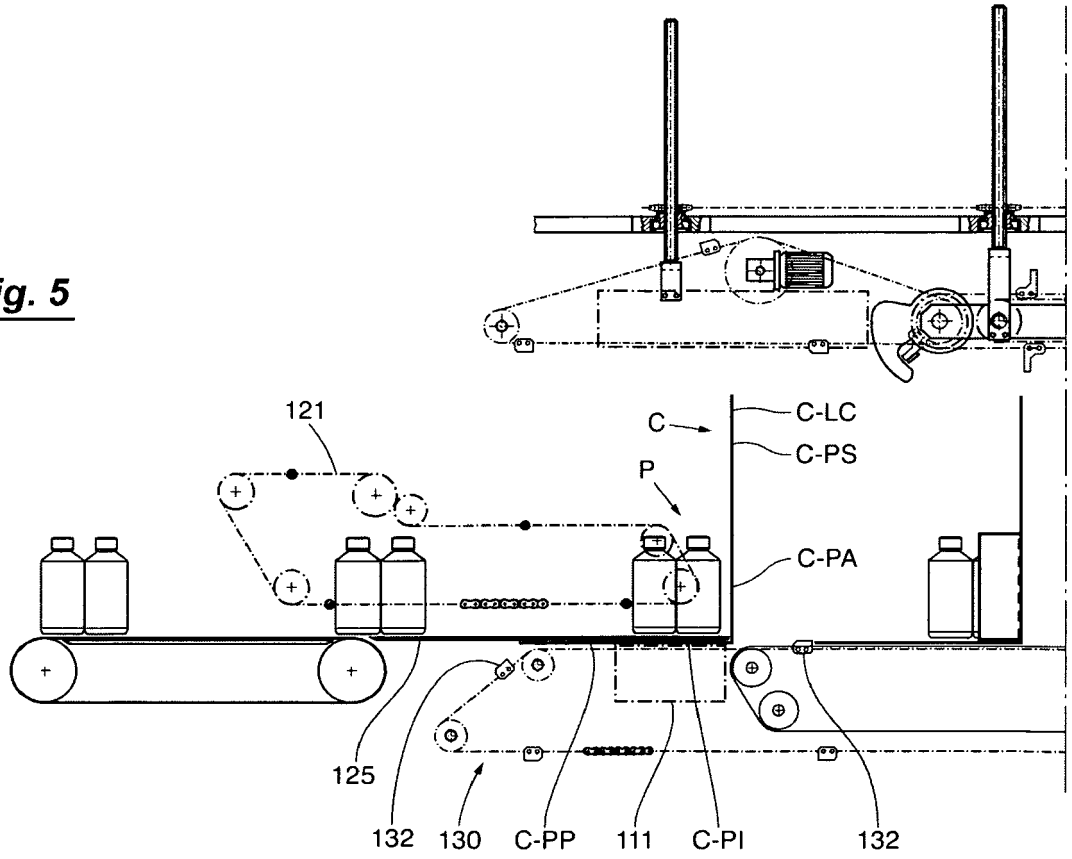

A-PP
220
210
244dx
233dx
121
222
P
Z1
B-PP
A
B-PA
125
132
B
141
A-PAdx
232dx
130
111
A-PPdx
245dx

Fig. 5


121
C
C-LC
C-PS
P
C-PA
125
132
130
C-PP
111
C-PI
132

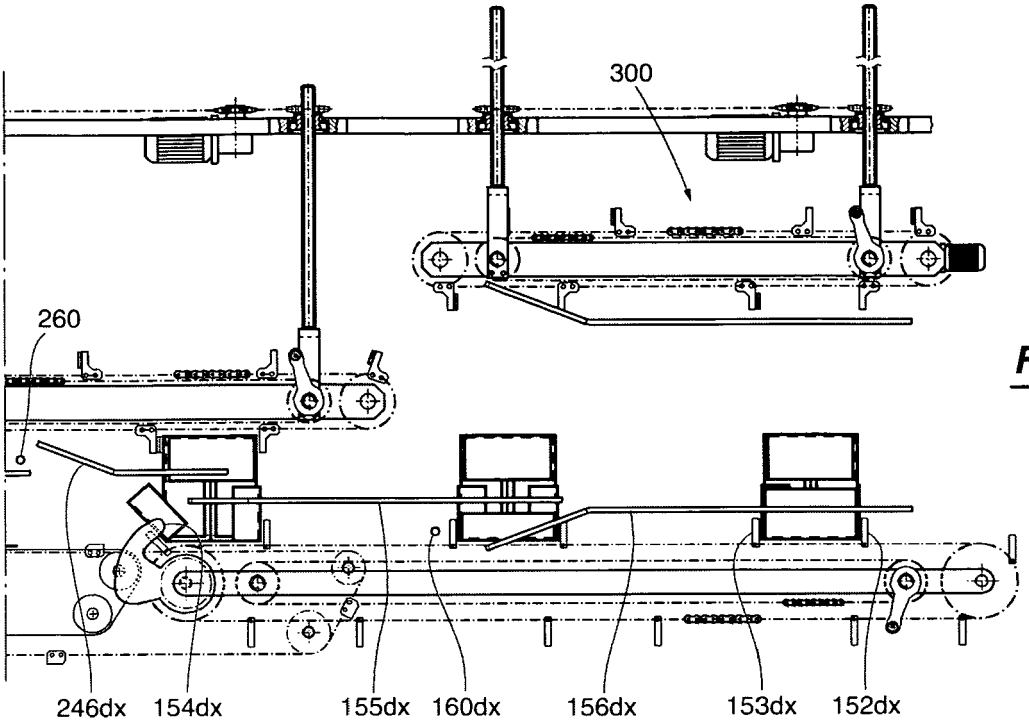

300
260
246dx
154dx
155dx
160dx
156dx
153dx
152dx

Fig. 4

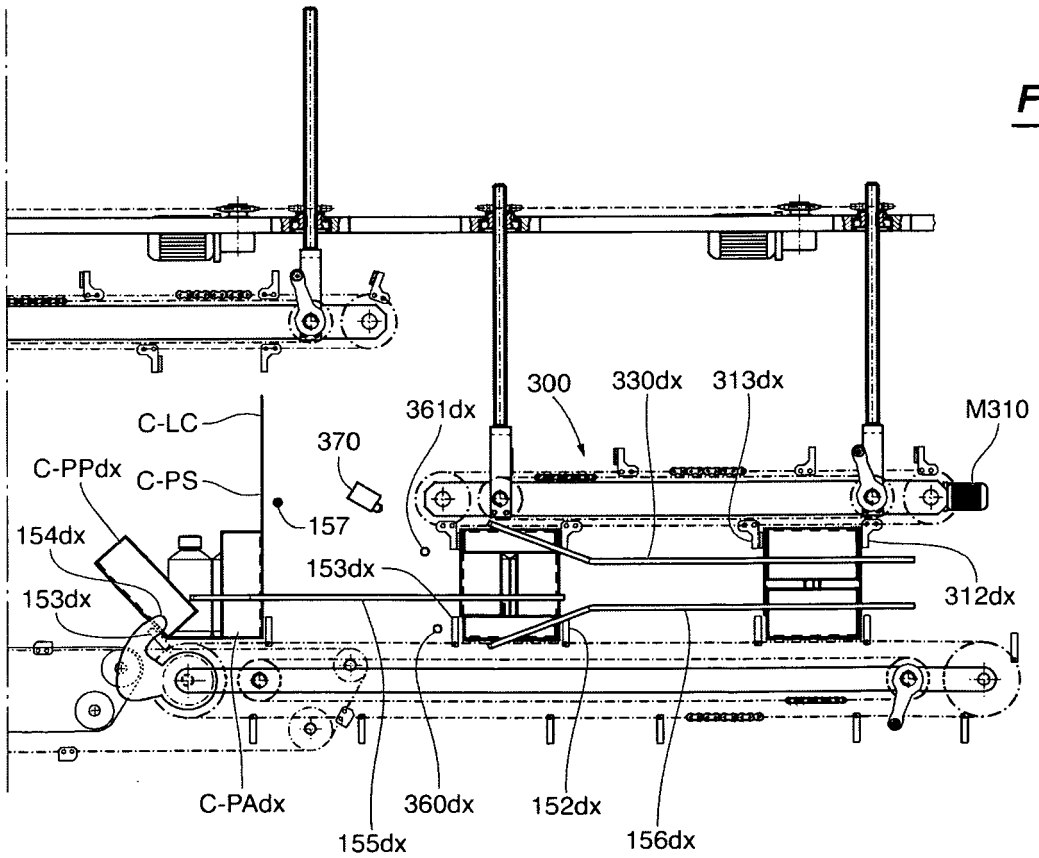

C-LC
C-PPdx
C-PS
154dx
153dx
370
157
361dx
300
330dx
313dx
M310
153dx
312dx
C-PAdx
155dx
360dx
152dx
156dx

Fig. 6

Fig. 7

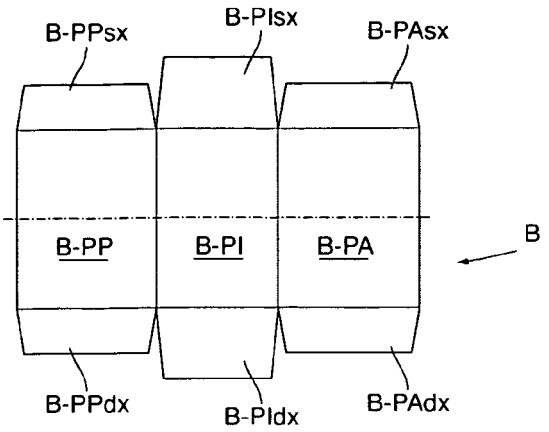


Fig. 8

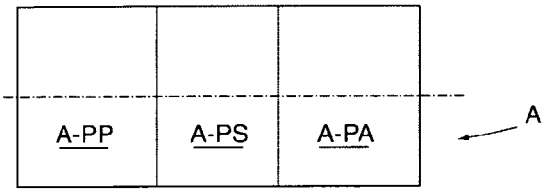


Fig. 9

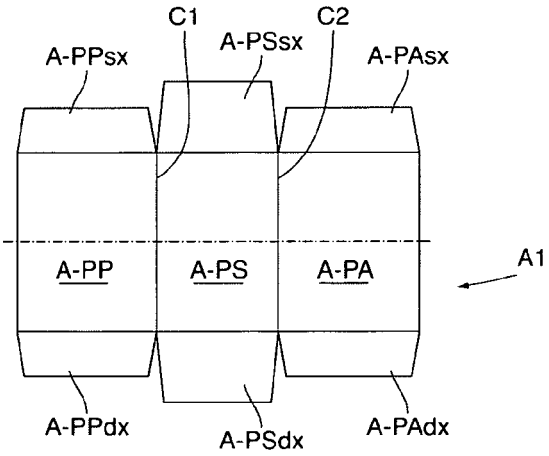


Fig. 10

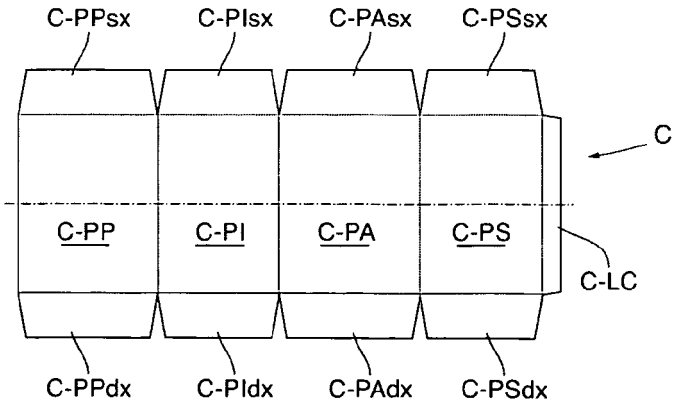
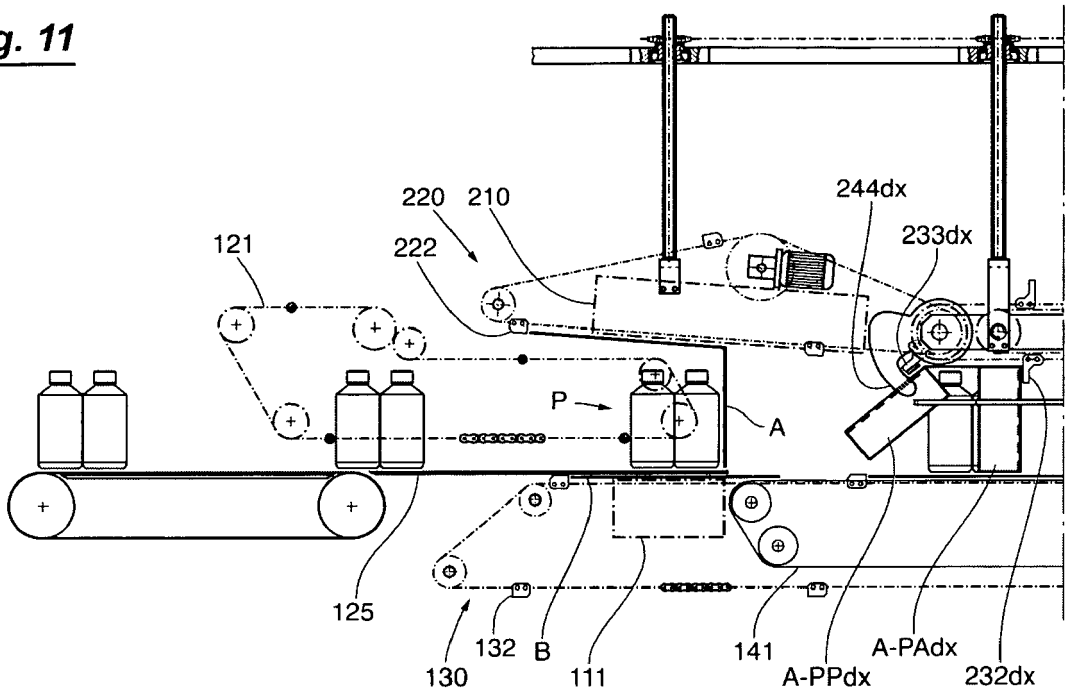


Fig. 11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210
244dx
233dx
121
222
P
A
125
132
B
130
111
141
A-PPdx
A-PAdx
232dx

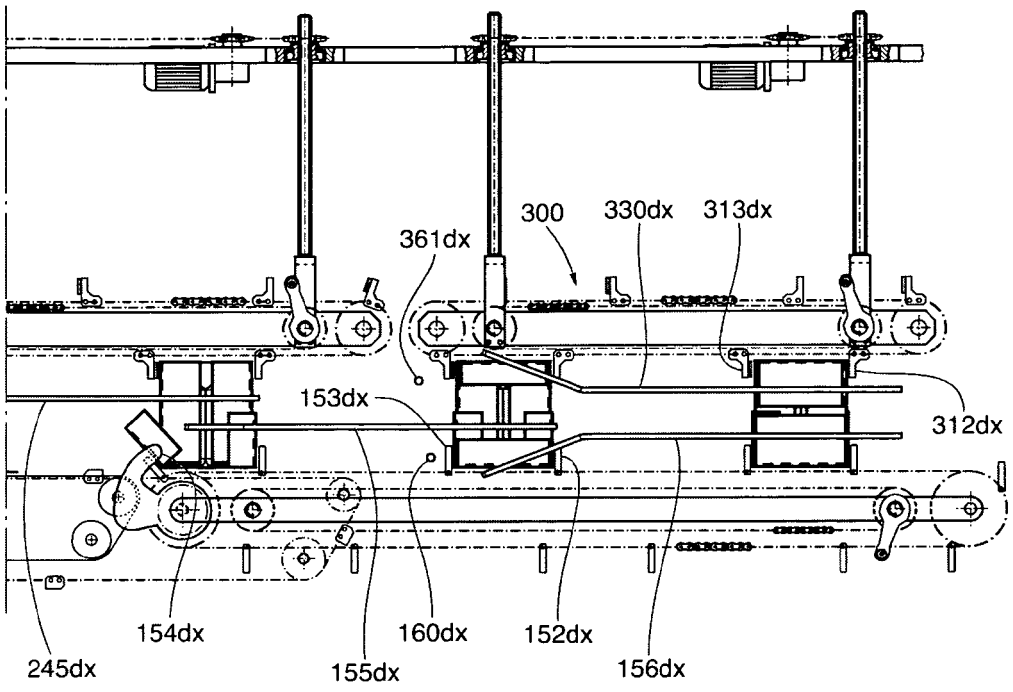
361dx
300
330dx
313dx
153dx
312dx
154dx
160dx
152dx
245dx
155dx
156dx

Fig. 12

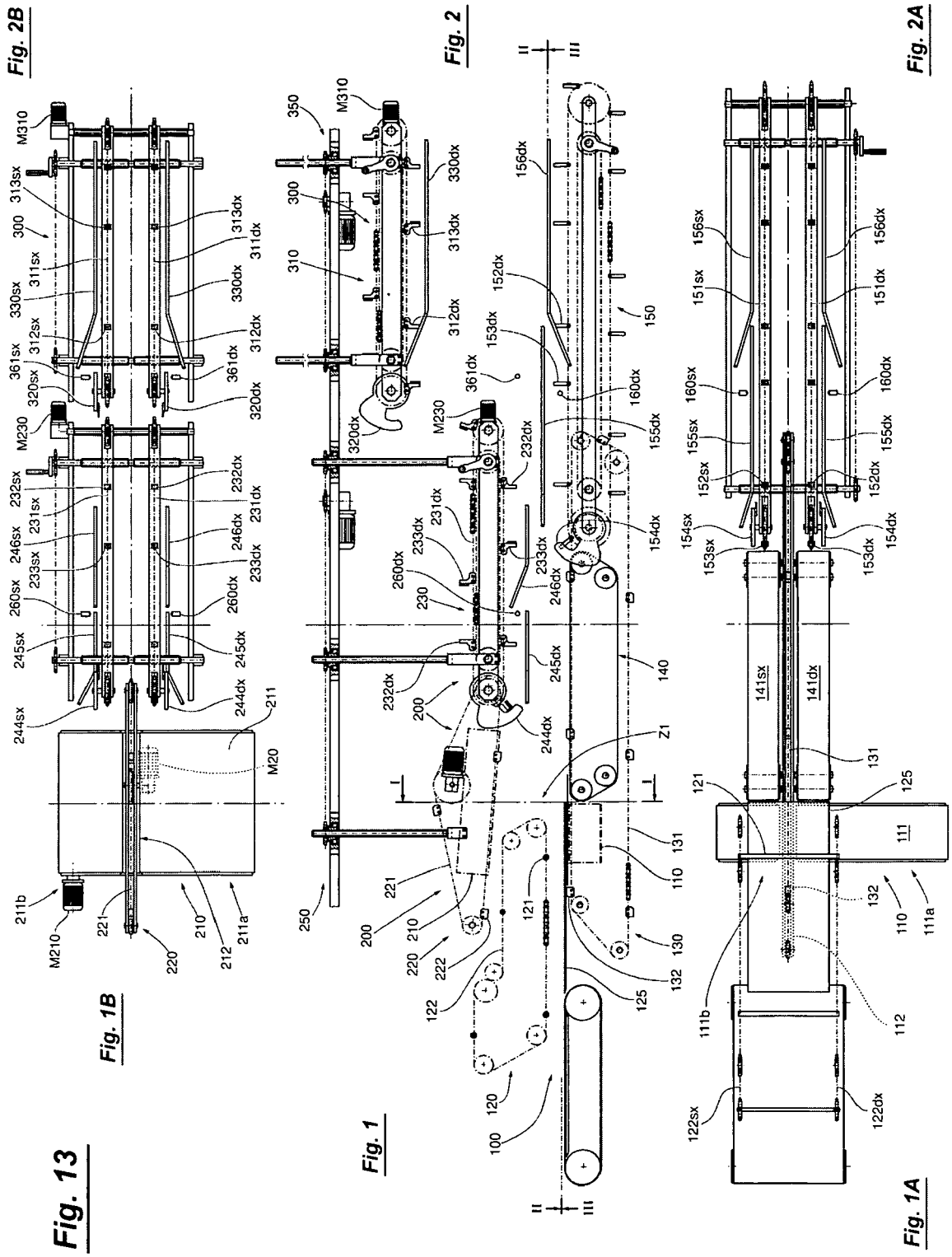
Fig. 2B
Fig. 1B
Fig. 13
Fig. 2
Fig. 1
Fig. 2A
Fig. 1A

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 10 1877

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 01/04017 A (ZAMBELLI ALBERTO [IT]; ZAMBELLI MARIO [IT]; ZAMBELLI MONICA [IT]; ZAMB) 18 January 2001 (2001-01-18)	1	INV. B65B5/02 B65B21/24
A	* page 4, line 3 - page 7, line 13; figures *	2,3,21, 23,24, 40-43	

A	GB 2 299 565 A (FOCKE & CO [DE]) 9 October 1996 (1996-10-09) * page 11, line 15 - page 12, line 32; claims; figures *	1,40-42	

A	EP 1 177 980 A (PRASMATIC S R L [IT]) 6 February 2002 (2002-02-06)		

A	US 4 150 523 A (GENTILI VITTORIO [IT]) 24 April 1979 (1979-04-24)		

TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 September 2008	Jagusiak, Antony

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

& : member of the same patent family, corresponding document

1

EPO FORM 1503 03.82 (P04C01)

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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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15-09-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0104017 A	18-01-2001	AT 280719 T	15-11-2004
		DE 60015333 D1	02-12-2004
		DE 60015333 T2	16-02-2006
		EP 1194347 A1	10-04-2002
		ES 2230123 T3	01-05-2005
		HK 1046886 A1	30-06-2005
		IT BO990385 A1	09-01-2001
		MX PA02000325 A	21-06-2002
GB 2299565 A	09-10-1996	DE 19512547 A1	10-10-1996
		IT MI960641 A1	02-10-1997
		JP 8282611 A	29-10-1996
		US 6283363 B1	04-09-2001
EP 1177980 A	06-02-2002	AT 300472 T	15-08-2005
		BR 0103157 A	02-04-2002
		DE 60112194 D1	01-09-2005
		DE 60112194 T2	01-06-2006
		ES 2244526 T3	16-12-2005
		IT BO20000467 A1	31-01-2002
US 4150523 A	24-04-1979	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82