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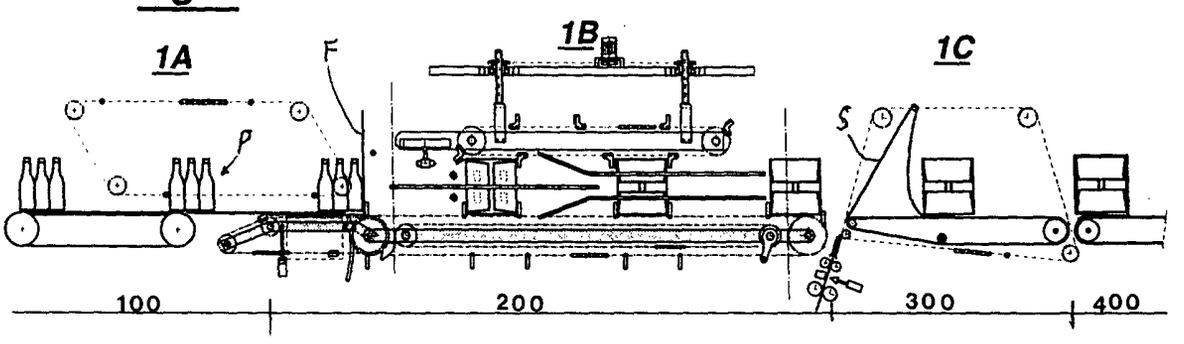
(54) Multiple-function packaging line

(57) - A multiple-function packaging line comprises four machine sections (100, 200, 300, 400) in which the first machine section (100) is a machine section for feeding products (P), in which the second machine section (200) is a dual-function machine section which can be converted into a first configuration for forming boxes from cardboard blanks (F) or into a second configuration for conveying products (P), in which the third machine section (300) is a dual-function machine section which can be converted into a first configuration for wrapping strips (S) or into a second configuration for conveying, and in which the fourth machine section (400) is a receiving machine section.

Fig. 1



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Description

[0001] - The present invention relates to a multiple-function packaging line.

[0002] - More particularly, the present invention relates to a multiple-function packaging line with which it is possible to package, individually in succession, products such as batches of bottles, cans, jars and the like, in various manners such as, for example, in closed, so-called "wrap-around", cardboard boxes, in high-sided cardboard trays or in low-sided cardboard trays, or in the form of packages consisting solely of a film of packaging material, or in boxes overwrapped with film, or in trays overwrapped with film, or in the form of packages consisting solely of film where the products are arranged on a sheet of cardboard, or also in other similar types of packages.

[0003] - At present, see for example, the patents US-5.148.654 and GB-2.233.954, are known machines for boxing products using blanks or, see for example the patent EP-0,949,145, are known machines for wrapping products using a film of packaging material and, consequently, users, in order to obtain boxing with blanks or to obtain wrapping with film, must purchase two separate packaging machines.

Object of the Invention

[0004] - The object of the present invention is to overcome the abovementioned drawbacks.

[0005] - The invention, which is characterized by the claims, solves the problem of creating a multiple-function packaging line, which is characterised in that it comprises four machine sections arranged consecutively; in that the first machine section is a feeding machine section, comprising product feeding means and intended to feed, individually in succession, the products to be packaged, displacing them longitudinally along a first conveying plane, towards and into a loading station of the second machine; in that the second machine section is a dual-function machine section which can be converted into two configurations, wherein the first configuration envisages a condition as a boxing machine section, comprising feeding means for feeding blanks into said loading station, pushing means for moving the blanks from said station downstream, folding/pushing means for folding the blanks onto the products, and intended to carton, individually in succession, the products by means of the blanks, displacing the product/blank assemblies along a second conveying plane, and for feeding the cartoned products into the third machine section, and wherein the second configuration envisages a condition as a conveying machine section, comprising conveying means and intended to convey, individually in succession, without cartoning them, the products supplied by said first machine section, displacing them longitudinally along a different second conveying plane, towards and into the third machine section; in that the third machine section is a wrapping machine section comprising conveying means and wrapping means and intended to wrap, individually in succession, using strips of packaging film, the cartoned products or the uncartoned products supplied by said second machine section, displacing them along a third conveying plane towards and into the fourth machine section, and in that said fourth machine section is a receiving machine section comprising conveying means and intended to receive, individually in succession, the cartoned and wrapped products or the wrapped products supplied by said third machine section, and for conveying them downstream, displacing them along a fourth conveying plane.

[0006] - A further object of the present invention is also that of creating a convertible dual-function machine section intended to operate, for example, as an intermediate machine section, in a multiple-function packaging line of the abovementioned type, wherein the said convertible dual-function machine section is characterized in that it has two different operating configurations, wherein the first configuration envisages a condition as a cartoning machine section, comprising feeding means for feeding blanks into a station arranged upstream, pushing means for moving the blanks from said station downstream, folding/pushing means for folding the blanks onto the products and intended to carton, individually in succession, with the blanks, the products which arrive at said station supplied by a machine section arranged upstream, displacing the product/blank assemblies along a conveying plane, and for feeding the cartoned products into a machine section arranged downstream, and wherein the second configuration envisages a condition as a conveying machine section, comprising conveying means and intended to convey, individually in succession, without cartoning them, the products supplied by said machine section arranged upstream, displacing them longitudinally along a different conveying plane towards and into the machine section arranged downstream.

[0007] - The results which are obtained by means of the use of a multiple-function packaging line of this type consist mainly in the fact that, with a single machine, it is possible to package batches of products in so-called "wrap-around" closed boxes, or in high-sided cardboard trays, or in low-sided cardboard trays, or in the form of packages consisting solely of a film of packaging material, or in boxes overwrapped with film, or in trays overwrapped with film, or in the form of packages consisting solely of film where the products are arranged on a sheet of cardboard, or also in other similar types of cartoning and/or wrapping systems and associated packages. -The results which are obtained using the particular convertible dual-function machine section consist mainly in the fact that it is possible to obtain two different functional configurations rapidly.

[0008] - The advantages obtained by using a multiple-function packaging machine of this type consist mainly

in the fact that the production costs are reduced compared to the manufacture of two separate packaging machines, and in that the dimensions are always smaller compared to two separate packaging machines. -The advantages obtained using the particular convertible dual-function machine section consist mainly in the fact that the production downtimes, due to the conversion from one configuration to another, are reduced and in that the operations for said conversion are simplified.

Practical Example of Embodiment

[0009] - Further characteristic features and advantages of the present invention will emerge more clearly from the following description of a preferred practical example of embodiment provided here purely by way of a non-limiting example, with reference to the figures of the accompanying drawings, in which:

- Figure 1 shows a schematic side view of the multiple-function packaging line according to the present invention, in a first operational configuration, for cartoning products inside closed boxes using blanks and, optionally, wrapping the boxes obtained with a film of packaging material, in which three consecutive portions, indicated as 1A, 1B and 1C, are defined;
- Figures 1A, 1B and 1C show, on an enlarged scale, the three portions indicated by 1A, 1B and 1C in Fig. 1 and therefore it is recommended that they should be arranged alongside each other, joining them along the separation lines;
- Figure 2 shows a schematic top plan view of the conveying plane of the packaging line according to Fig. 1, in which the products and the boxes have been removed, so that the its technical and functional features may be more clearly understood, and in which three consecutive portions, indicated as 2A, 2B and 2C, are defined;
- Figures 2A, 2B and 2C show, on an enlarged scale, the three portions indicated by 2A, 2B and 2C in Fig. 2 and, therefore, it is recommended that they should be arranged alongside each other, as described above;
- Figure 3 shows a schematic side view of the multiple-function packaging line, according to the present invention, in a second operational configuration, for wrapping the products only with a film of packaging material, in which three consecutive portions, indicated as 3A, 3B and 3C, are defined;
- Figures 3A, 3B and 3C show, on an enlarged scale, the portions indicated by 3A, 3B and 3C in Fig. 3 and therefore it is recommended that they should be arranged alongside each other, as mentioned above;
- Figure 4 shows a schematic plan view of the conveying plane of the packaging line according to Fig. 3, in which three consecutive portions, indicated as 4A, 4B and 4C, are defined;
- Figures 4A, 4B and 4C show, on an enlarged scale, the portions indicated by 4A, 4B and 4C in Fig. 4 and therefore it is recommended that they should be arranged alongside each other, as mentioned above;
- Figure 5 shows a flat blank used for cartoning and intended to form a closed box;
- Figure 5A shows a flat blank used for cartoning and intended to form a high-sided tray;
- Figure 5B shows a blank used for cartoning and intended to form a flat support surface for a product packaged with film;
- Figures 6 and 6A show an insertable transporting conveyor device;
- Figures 7, 7A and 7B show a first particular embodiment of a convertible dual-function machine section, applicable as a second machine section in a multiple-function packaging line of the abovementioned type;
- Figures 8 and 8A show a second particular embodiment of a convertible dual-function machine section, applicable as a second machine section in a multiple-function packaging line of the abovementioned type.

[0010] -In the description which follows some parts are indicated by an Arabic numeral followed by the letter "a" or "b", the latter indicating the position of said part on the left-hand side or right-hand side, respectively, of the central longitudinal axis of machine flow, as viewed by a person standing on said axis with their shoulders directed upstream. -Moreover, other parts arranged in succession are indicated by a capital letter which is in turn followed by an Arabic numeral, the latter being intended to indicate the position of said part with respect to the machine flow.

[0011] -With reference to Figures 1A, 1B, 1C; 2A, 2B, 2C; 3A, 3B, 3C and 4A, 4B, 4C, the multiple-function packaging line has four machine sections 100, 200, 300 and 400 which are schematically shown here and which are arranged in succession so as to define a horizontal transfer plane extending longitudinally and consisting of four respective segments Y100, Y200-Y600, Y300 and Y400 which are arranged consecutively so as to be aligned and coplanar with each other, as can be better understood below.

The blanks for obtaining boxes, trays and support sheets

[0012] -In the accompanying drawings and in the descriptions below, relating to some preferred practical embodiments, known blanks are used, being indicated by the letter F, in certain cases followed by an Arabic numeral which indicates their position with respect to the packaging flow, each blank F (see Fig. 5) comprising with respect to its axis of planar extension YF a rear panel PP having flaps PPa and PPb, a bottom panel PI hav-

ing flaps PIa and PIb, a front panel PF having flaps PFa and PFb, and a top panel PS having flaps PSa and PSb and a closing flap LC, said panels and said flaps being defined by means of creasing lines.

[0013] -n this context, the present invention may also use other types of blanks, such as blanks intended to form high-sided trays or low-sided trays, each blank, indicated by the letter V in Fig. 5A, comprising substantially with respect to its axis of planar extension YV, a rear panel PP having flaps PPa and PPb, a bottom panel PI having flaps PIa and PIb, and a front panel PF having flaps PFa and PFb, said panels and said flaps being defined by means of creasing lines, as well as similar blanks.

[0014] -Moreover, the present invention may also use blanks intended to form support sheets for the objects which constitute the product, such as, for example, the blank T shown in Fig. 5B.

First machine section 100

[0015] -With reference to Figures 1A, 1B, 1C and 2A, 2B, 2C, the first machine section 100 is a feeding machine section, for feeding, individually in succession, products P, see the products P1 P2 P3, to be packaged downstream and inside the second machine section 200, displacing them longitudinally along a first transfer plane Y100.

[0016] -Said first machine section 100, in an upstream to downstream direction, essentially comprises a conveyor 110 with a conveyor belt 111 and a dead travel plate 103, the latter extending into the second machine section 200. -Moreover, above said first transfer plane Y100, there is arranged a conveyor 120 which comprises suspended pushing bars B1, B2, etc., intended to move along a closed travel path, and the downstream portion of which extends into the second machine section 200, and said conveyor 120 comprising two chains 121a and 121b which are wound, in a closed path, along respective vertical/longitudinal planes, around respective toothed wheels 122a-123a-124a-125a and 122b-123b-124b-125b, of which at least one pair 125a, 125b of said wheels are keyed onto a common motor-driven shaft 126.

Second machine section 200

[0017] -The second machine section 200 is a dual-function machine section which can be converted into two configurations, the first configuration envisaging a condition as a cartoning machine intended, for example, to carton the products P supplied by said first machine section 100, using the blanks F, so as to obtain boxes P6-F6, as illustrated in Figs. 1A, 1B, 1C and 2A, 2B, 2C, or using the blanks V (Fig. 5A) so as to obtain trays (as described below), or arrange the products P on blanks T (Fig. 5B), i.e. on sheets (as described below), displacing the product/box assemblies P4-F4 or the product/tray assemblies P4-V, or the product/sheet assemblies P-T, along a second conveying plane Y200, and feed the various cartoned products, P4-F4, P4-V, P-T, inside the third machine section (300), as will be understood more clearly below, and the second configuration envisaging a condition as a conveying machine intended to convey, individually in succession, without cartoning them, the products P supplied by said first machine section 100 (see Figs. 3A, 3B, 3C and 4A, 4B, 4C), displacing them longitudinally along a different second conveying plane, Y600, towards and into the third machine section 300, as will be understood more clearly below.

[0018] -With reference to Figs. 1A, 1B, 1C and 2A, 2B, 2C, said second machine section 200 essentially comprises: -a transverse feeding conveyor 210; -a longitudinal pushing conveyor 220; -two longitudinal bottom folding conveyors 230a and 230b; -a transverse folding bar 201; -a longitudinal upper folding conveyor 260; -two lateral rotating folding devices 202a and 202b in a mirror arrangement; -two first, central, lateral, longitudinal, fixed folding devices 203a and 203b in a mirror arrangement (only one of which is visible); -two bottom fixed gluing devices 204a and 204b in a mirror arrangement (only one of which is visible); -two upper fixed gluing devices 205a and 205b in a mirror arrangement (only one of which is visible); -two second bottom fixed folding devices 206a and 206a in a mirror arrangement (only one of which is visible); and -two upper fixed folding devices 207a and 207b in a mirror arrangement (only one of which is visible).

[0019] -The transverse feeding conveyor 210 is a conveyor with a suction conveyor belt 211, the downstream portion of which is arranged underneath the dead plate 103 and has a conveying plane comprising two surfaces 211a and 211b between which a longitudinal opening 212 is located.

[0020] -The pushing conveyor 220 comprises a chain 221, which has pushing lugs 222 and which is wound in a closed path around an upstream wheel 223, around an intermediate wheel 224 arranged underneath the dead plate 103 and around a downstream wheel 225 arranged between the upstream portion of the two folding conveyors 230a and 230b, said intermediate wheel 224 and downstream wheel 225 being rotatably supported by means of a frame 226a-226b, the upstream end of the latter being hinged in the vicinity of the upstream wheel 223 and its downstream portion having two eyelets 227a and 227b which slidably engage with two respective vertical guide rods 228a and 228b, so as to be able to pivot said frame 226a-226b inside said longitudinal opening 212 in a longitudinal/vertical plane by means of raising means such as, for example, a fluid-dynamic jack 229, in order to be able to arrange said pushing conveyor 220 in a first raised position, or operating position, so as to push in succession the blanks F from the loading station ST1 in a downstream direction, or in a second lowered position, or inoperative position, so as to realise the second configuration of said second

machine section 200, as will be understood more clearly below.

[0021] -The two bottom folding conveyors, 230a and 230b, intended to fold the blanks F in the bottom zone, displacing them downstream, each comprise, respectively, one or more chains 231a and 231b which are provided with respective hinged folding/pushing lugs, 232a and 232b, and are wound in a closed path around respective one or more upstream wheels, 233a and 233b, and around one or more respective downstream wheels, 234a and 234b, the said upstream wheels, 233a and 233b, being rotatably supported by means of respective forks with prongs, 235a-236a and 235b-236b, of a respective frame, 237a and 237b, and the downstream wheels, 234a and 234b, being the motor-driven wheels and being supported by means of respective forks, 238a-239a and 238b-239b, of the respective frames, 237a and 237b, said latter downstream wheels, 234a and 234b, being slidably engaged on a motor-driven shaft 240 of the splined-profile type, which is supported at its ends by two longitudinal members of the machine frame Ta and Tb.

[0022] -The upstream portions of the frames 237a and 237b of the respective folding conveyors 230a and 230b are engaged with a threaded bar 241 extending transversely and rotationally supported by the machine frame Ta and Tb, said bar 241 having two threaded portions, 241a and 241b, with oppositely directed threading, the thread 241a engaging with a female thread provided in the upstream portion of the frame 237a and the thread 241b engaging with a female thread provided in the upstream portion of the frame 237b. -Moreover, said bar 241, on the right-hand side, has, keyed onto it, a toothed wheel 242 around which a chain 243 is wound for the reasons which will become clear below.

[0023] -The downstream portions of the frames 237a and 237b of the respective folding conveyors 230a and 230b are engaged with a further threaded bar 251 extending transversely and rotationally supported by the machine frame Ta and Tb, said bar 251 having two threaded portions, 251a and 251b, with oppositely directed threading, the thread 251a engaging with a female thread provided in the downstream portion of the frame 237a and the thread 251b engaging with a female thread provided in the downstream portion of the frame 237b. -Said bar, moreover, on the right-hand side, has keyed onto it a toothed wheel 252, around which the chain 243 is wound, and a crank 253.

[0024] -With this system, by rotating the crank 253, the threaded bars 241 and 251 are rotated in the same direction and concurrently, resulting in a movement away or towards each other, in the transverse direction, of the two bottom folding conveyors 230a and 230b, while maintaining the parallel alignment between them, the driving wheels, 234a and 234b, sliding with respect to the shaft 240 so as to be able position said two folding conveyors, 230a and 230b, in a first position arranged transversely close to each other, operating position, so as to fold the bottom part of the blanks F onto the products P, or in a second position arranged fully spaced from each other in the transverse direction, inoperative position, so as to realise the second configuration of said second machine section 200, as will be more clearly understood below.

[0025] -The upper folding conveyor 260, intended to fold the blanks in the upper zone, displacing them downstream, comprises one or more chains 261 which are equipped with respective hinged pushing/folding lugs 262 and are wound in a closed path around one or more upstream wheels 263 and around one or more downstream wheels 264 which are supported by means of a frame 265, the upstream portion of which has an extension 266 intended to support a gluing device 267.

[0026] -Said frame 265 is supported in a hanging manner by means of a first element 268, which is fixed upstream, and by means of a second element 269, which is fixed downstream, said elements having respective threaded shanks, 270 and 271, which are engaged with respective female-thread ring nuts, 272 and 273, which in turn are arranged and supported axially and rotationally by the upper machine frame Ts, each female-thread ring nut, 272 and 273, having respective fixed toothed wheels, 274 and 275, around which a chain 276 is wound, said chain engaging also with a wheel 277, the latter being rotationally driven, upon actuation, by means of a motor 278 also supported by the upper frame Ts.

[0027] -With this system, when the motor 278 is actuated, the female-thread ring nuts 272 and 273 rotate together, resulting in axial displacement of the two elements 268 and 269 with consequent raising or lowering of the upper folding conveyor 260.

Third machine section 300

[0028] -The third machine section 300 may be a mono-functional machine section, of the wrapping type, for wrapping, individually in succession, with strips S of packaging film, the products cartoned in the boxes P6-F6, as illustrated in Figs. 1A, 1B, 1C and 2A, 2B, 2C, or the products cartoned in trays P-V (as described below), or the products arranged on sheets P-T (as described below), as well as the products P without blanks, as illustrated in Figs. 3A, 3B, 3C and 4A, 4B, 4C, supplied by said second machine section 200, and for transporting the products cartoned in boxes and wrapped P8-F8-S (see Fig. 1C), or the products cartoned in trays and wrapped P-V-S, or the products arranged on a sheet and wrapped P-T-S, onto the fourth machine section 400, displacing them along a third conveying plane Y300.

[0029] -Alternatively, said third machine section 300 may also be a third dual-function machine section which can be converted into two configurations, the first configuration envisaging a condition as a wrapping machine section of the aforementioned type and the second con-

figuration envisaging a condition as a conveying machine, for conveying the said products cartoned in boxes P6-F6 (Fig. 1C), or the products cartoned in trays P-V, supplied by said second machine section 200, onto the fourth machine section 400, without performing wrapping, displacing them along a third conveying plane Y300.

[0030] -Said third machine section 300 essentially comprises: a transporting conveyor 310, wrapping means 320, strip feeding means 330, film cutting means 340 and film feeding means 350.

[0031] -The displacement conveyor 310 comprises a conveying belt 311, which is wound around an upstream roller 312 and a downstream roller 313, said transporting conveyor 310 being slightly spaced longitudinally with respect to the second machine section 200, so as to define a first upstream opening 305, as well as slightly spaced longitudinally with respect to the fourth machine section 400, so as to define a second downstream opening 306.

[0032] -Said transporting conveyor 310 interacts with wrapping means, denoted in their entirety by 320, comprising, substantially, at least one transverse wrapping bar 321, which moves around said transporting conveyor 310, passing through said first opening 305 and said second opening 306, the opposite ends of said bar 321 being supported by two respective chains, 322a and 322b, which are wound in a closed path around respective wheels, 323a, 324a, 325a, 326a and 323b, 324b, 325b, 326b, which are arranged on the respective sides of the said transporting conveyor 310, at least one pair of said wheels, for example the pair 323a-323b, being keyed onto the same shaft 327.

[0033] -The means 320 for feeding the strips S of packaging film are arranged in the zone underneath the transporting conveyor 310, in the vicinity of its upstream end, and the strip cutting means 340 and driving means 350 are arranged upstream thereof. -Said means 320, 340, 350 for handling the strip of film may also be of a type other than that illustrated schematically in the diagrams and may be chosen depending on the nature of the strip of packaging film and/or the format of the product to be packaged.

Fourth machine section 400

[0034] -The fourth machine section 400 is a receiving machine section for receiving, individually in succession, the products cartoned inside boxes and wrapped P4-F4-S, (Figs. 1A, 1B, 1C and 2A, 2B, 2C), or the products cartoned in trays and wrapped P-V-S, or the products arranged on a sheet and wrapped P-T-S, or the wrapped products P-S (Figs. 3A, 3B, 3C and 4A, 4B, 4C), as well as the products cartoned in various ways and not wrapped P-F or P-V supplied by said third machine section 300, and for displacing them downstream along a fourth transfer plane Y400.

[0035] -Said fourth machine section 400 essentially comprises a transporting conveyor 410 with a conveying belt 411 which is wound around an upstream roller 412 and around a motor-driven downstream roller, not shown, the upstream end of said conveyor 410 being slightly longitudinally spaced from the third machine section 300, so as to define the said second opening 306.

Additional insertable parts for the second machine section

[0036] -For the reasons which will emerge more clearly below, see Figs. 6 and 6A, the said multiple-function packaging line also comprises an insertable transporting conveyor 600 which, with respect to its longitudinal conveying plane or axis Y600, has a longitudinal dimension which is substantially equal to the longitudinal distance between the downstream end of the first machine section 100 and the upstream end of the third machine section 300, and in any case such that it can be inserted at least between the downstream end of the dead plate 103 and the upstream end of the transporting conveyor 310, maintaining the presence of the opening 305, and a transverse dimension smaller than the transverse distance present between the two bottom folding conveyors 230a, 230b, when the latter are arranged in the second, transversely spaced position, and in any case such that it can be inserted between the two folding conveyors 230a and 230b thus spaced, as described more clearly below, in order to perform the function of a coplanar conveying surface Y600 connecting the conveying plane Y100 of the first machine section 100 and the conveying plane Y300 of the third machine section 300, said transporting conveyor 600 essentially comprising a conveying belt 601 and a support structure formed by a sliding plate 602 and by two hanging supports 603a and 603b, the latter being fixed on the bottom side of said sliding plate 602 and being intended to support the opposite ends 604a and 604b of a motor-driven shaft 604, having, keyed thereon, a first roller 605, the opposite ends 606a and 606b of a shaft 606 which supports a second roller 607 arranged upstream, as well as the opposite ends 608a and 608b (only one of which is visible in the figures) of a shaft 608 which supports a second roller 609 arranged downstream.

[0037] -The sliding plate 602 also has, fixed on its two opposite sides, four resting/support flange-plates, two in the vicinity of the upstream end, 610a and 610b, and similarly two in the vicinity of the downstream end, 611a and 611b, which have seating recesses 610ac, 610bc, 611ac, 611bc (only three of which are visible in the figures).

[0038] -The packaging line indicated above also has mechanical and/or electrical and/or electronic and/or computerized devices able to synchronize the various operating means with each other.

Configuration and method for obtaining products boxed in closed boxes overwrapped with a film of packaging material

[0039] -With reference to Figures 1A, 1B, 1C and 2A, 2B, 2C, these show the multiple-function packaging line in the configuration as a boxing and wrapping device, for boxing the products P using blanks F inside closed boxes and for wrapping the said boxes using strips S of film.

[0040] -Still with reference to said figures, a continuous succession of products to be packaged, P2, P3, are displaced, individually, in the downstream direction, firstly by means of the transporting conveyor 110 and then by means of the dead plate 103 and the pushing bars B2, B3, into a loading station ST1 of the second machine section 200.

[0041] -The second machine section 200, which is actuated in synchronism, by means of the transverse feeding conveyor 210, feeds, individually in succession, into said station ST1, for each product P which arrives at said station ST1, a respective blank F in a folded configuration, said folded configuration envisaging that the top panel PS, the front panel PF and the joining flap LC are lying in a vertical/transverse plane located upstream of the transverse folding bar 201 and the bottom panel PI and the rear panel PP are lying underneath the dead plate 103.

[0042] -With reference to Figs. 1A and 2A, the suspended pushing bar B3 has moved a product P3 onto the dead plate 103 inside the station ST1 and the feeding conveyor 210 has fed a blank F3 into the same station ST1.

[0043] -Then, by means of the pushing bar B3 which pushes the product P3 and by means of a pushing lug 222 of the pushing conveyor 220 which presses against the rear edge of the panel PP of the blank F3, the product/blank assembly P3-F3 is moved downstream, bringing the front portion of said assembly P3-F3 above the upstream end of the two bottom folding conveyors 230a and 230b which, actuated in synchronism, bring up two first pushing/folding lugs, 232a and 232b, arranged vertically and ready to engage, at the bottom, with the front panel PF of the said blank F3.

[0044] -With the assembly P3-F3 thus being moved downstream, when the product P3 passes beyond the downstream end of the dead plate 103, said product P3 falls onto the bottom panel PI of same blank F3 and, at the top, by means of the transverse bar 201, the top panel PS and the closing flap LC are folded downwards and the two flaps PFa and PFb of the said blank are folded inwards by means of two intermediate fixed folding devices 203a and 203b.

[0045] -Then, still moving downstream, before the pushing lug 222 has changed direction downwards along the wheel 225, two successive second pushing/folding lugs, 232a and 232b, of the said folding conveyors, 230a and 230b, fold the rear panel PP upwards, displacing the product/batch assembly downstream and, by means of the rotating folding devices 202a and 202b, the flaps PPa and PPb are folded towards the product and, thus folded, following a further advancing movement, encounter the fixed folding devices 203a and 203b, resulting in the configuration illustrated with reference to the product/blank assembly P4-F4, in which, moreover, a first folding/pushing lug 262 of the upper folding conveyor 260, which is also actuated in synchronism, has engaged at the top the front panel PF, while, on the sides, by means of the gluing devices 204a-205a and 204b-205b, spots of glue have been applied on the external surfaces of the said flaps PFa, PPa and PFb, PPb and, by means of the upper gluing device 267, spots of glue have been applied onto the upper edge of the external surface of the rear panel PP.

[0046] -Then, by means of the pushing action of the second folding/pushing lugs 232a-232b, the assemblies P4-F4 are further moved downstream and, by means of a following second upper folding/pushing lug 262, the closing flap LC is folded downwards, fixing it to the upper portion of the rear panel PP and then, following a further advancing movement downstream, by means of the bottom fixed folding devices 206a and 206b and the upper fixed folding devices 207a and 207b, the flaps PIa, PIb are folded upwards and the flaps PSa, PSb downwards, respectively, resulting in the product/blank assembly P5-F5, i.e. a product boxed inside a closed box, which is thus displaced downstream, see P6-F6.

[0047] -When the product/box assembly P6-F6 is astride the two pushing conveyors 230a-230b and the wrapping conveyor 310, the strip feeding means 330, which are actuated in synchronism, feed the front end of a strip S of packaging film towards and above the upstream end of the wrapping conveyor 310, so as to arrange it between the bottom of the product/box assembly P6-F6 and the conveying plane of the conveyor 310 and then the wrapping bar 321, which is also actuated in synchronism, passing through the first opening 305, pulls the strip S over the product/cardboard box assembly, resulting in the partially wound product/box assembly P7-F7.

[0048] -Then, before the product/box assembly P7-F7 interacts with the opening 306 located between the transporting conveyors 310 and 410, the wrapping bar 321 covers its remaining wrapping path and moves downwards, passing through the said opening 306, in order to arrange the rear end of the strip S so that it hangs between the said conveyors 310 and 410, so as to fold said rear portion of the strip S below the front portion of the said strip S, as illustrated for the package/box assembly P8-F8, during the displacement of said assembly P8-F8 on the transporting conveyor 410, resulting in a product P8 which is boxed in a box formed by a blank F8 over which a strip S of packaging material is wrapped, i.e. packages P-F-S.

[0049] -Finally, in the case where the strip S of packaging material consists of heat-shrinkable material, said

two superimposed portions of the same strip S are bonded together so that heat-shrinking of the strip S onto the box F8 can then be performed, by displacing the batch/blank/strip assembly P8-F8-S, for example, through a tunnel furnace.

Configuration and method for obtaining products boxed in trays overcropped with a film of packaging material

[0050] -With reference to the description given above, if it is required to obtain products cartoned in trays overwrapped with film, it is sufficient to use, instead of the preceding blanks for boxes, blanks for trays, such as, for example, the blanks V illustrated in Fig. 5A which, compared to the preceding blanks, are devoid of the upper panel PS, the associated flaps PSa and PSb and the closing flap LC.

[0051] -Said blanks V will be similarly fed into the station ST1 by the feeding conveyor 210, arranging the bottom panel PI underneath the dead plate 103 and the front panel PF in a vertical/transverse plane, and then loaded with the products P in the manner indicated above, the panels and the side flaps being then folded and glued together onto the products in the manner indicated above, and when the product/tray assemblies P-V arrive in the vicinity of the third machine section 300, said product/tray assemblies P-V are wrapped in the manner indicated above with reference to the product/box assemblies P6-F6, obtaining products P cartoned in trays V and wrapped with strips S, i.e. packages P-V-S.

[0052] -In this connection, it should be pointed out that with this embodiment it is not required to use the upper folding conveyor 260 and the associated gluing device 267, which may be absent or raised by means of the motor 278 and positioned at a level such as to avoid interference with the underlying products which pass through in the downstream direction.

Configuration and method for obtaining products arranged on a sheet and packaged with a film of packaging material

[0053] -With reference to the description given above, if it is required to obtain products arranged on a sheet and packaged with film, it is sufficient to use, instead of the preceding blanks, blanks for a sheet, such as, for example, the blanks T illustrated in Fig. 5B which, compared to the preceding ones, comprise only the bottom panel PI.

[0054] -Said blanks T will be fed into the station ST1 by the feeding conveyor 210, arranging them underneath the dead plate 103, and then loaded with the products P on the single sheet PI in the manner indicated above, and are then transported by means of the lugs 232a and 232b of the longitudinal folding conveyors 230a and 230b in the downstream direction, and when the product/sheet assemblies, P-T, arrive in the vicinity of the third machine section 300, said product/sheet assemblies P-T are wrapped in the manner indicated above with reference to the product/box assemblies P6-F6, resulting in products P arranged on the sheets T and wrapped with strips S, i.e. packages P-T-S.

[0055] -For this mode of use also, it is not required to use the upper folding conveyor 260 and the associated gluing device 267, which may be absent, or raised by means of the motor 278 and positioned at a level such as to avoid interference with the underlying products which are passing downstream.

Configuration and method for obtaining products boxed in boxes or products boxed in trays without film wrapping

[0056] -In the case where it is required to use the said multiple-function packaging line in order to obtain only cartoning of the products in boxes or only cartoning of the products in trays, the third machine section 300 is configured as a third conveying machine section, making the transporting conveyor 310 operative, the wrapping means 320 inoperative, with the wrapping bars 321 removed, or stopped underneath or above the transporting conveyor 310 so as not to interfere with the displacement of the products, the strip feeding means 320 inoperative, the cutting means 330 inoperative and the strip driving means 340 inoperative so that the product/box assemblies P6-F6 obtained in the manner described above or the product/tray assemblies P6-V obtained in the manner similar to that described above are displaced, in sequence, by the folding conveyors 230a-230b of the second machine section 200 on the said transporting conveyor 310 of the third machine section 300 and then on the conveyor 410 without undergoing wrapping with packaging film.

Configuration for obtaining only wrapping of the products with a film of packaging material

[0057] -In the case where it is required to use the abovementioned multiple-function packaging line in order to obtain only wrapping of the products P with strips S of packaging film, the second machine section 200 is configured as a conveying machine section.

[0058] -In order to obtain this configuration (see Figs. 3A, 3B, 3C and 4A, 4B, 4C), the pushing conveyor 220 is arranged in its second lowered position, so as to lower the intermediate wheel 224 and the downstream wheel 225, and the two bottom folding conveyors 230a and 230b are arranged in their second position of maximum transverse spacing, in order to create a wide longitudinal opening between them, and the upper folding conveyor 260 is also raised, if required.

[0059] -After this, according to this example of embodiment, operating manually, from the bottom upwards, passing through the two threaded bars 241 and 251, the insertable transporting conveyor 600 (illustrated in Figs. 6, 6A) is positioned in the second machine

section 200, see again Figs. 3A-3B-3C and 4A-4B-4C, arranging it inside the longitudinal opening created following transverse spacing of the two longitudinal folding conveyors 230a and 230b, supporting of said transporting conveyor 600 occurring by arranging the recesses 610ac and 610bc of the flange-plates 610a and 610b so as to rest on top of the upstream threaded bar 241 and the recesses 611ac and 611bc of the flange-plates 611a and 611b so as to rest on top of the downstream threaded bar 251.

[0060] -Said transporting conveyor 600, thus positioned, is then connected to the (mechanical and/or electrical and/or electronic) control system of the machine system so as to actuate it in a synchronized manner.

[0061] -In this way, following the said operations, the second machine section 200 has been converted into a second conveying machine section, the said transporting conveyor 600, and more particularly its conveying surface Y600, acts as a coplanar conveyor connecting together the dead plate 103 of the first machine section 100, i.e. the conveying plane Y100, and the upstream end of the conveyor 310 of the third machine section 300, i.e. the conveying plane Y300, while still ensuring the presence of a narrow minimum opening 305 between said two transporting conveyors 600 and 310, in such a way as to allow the wrapping bar 321 to pass through.

[0062] -With this configuration, the products to be packaged, such as for example batches of bottles, see P3, are pushed by the suspended pushing bars, see B3, along the dead plate 103 until they are located above the upstream end of the inserted transporting conveyor 600, which displaces them downstream, see P4, and, when the batches, see P7, arrive in the vicinity of the third machine section 300, said batches are wrapped in the manner indicated above and then transferred onto the transporting conveyor 410 of the fourth machine section 400, in order to arrange the tail end of the strip S underneath the front portion of the same strip S, resulting in packaging of the batches P wrapped with strips S of packaging film, without performing cartoning, i.e. the packages P-S.

Rapidly convertible dual-function machine section - First variation of embodiment

[0063] -With reference to Figs. 7, 7A and 7c, these show a first variation of embodiment of a rapidly convertible, dual-function, intermediate, machine section intended, for example, to perform the function of a second machine section 200 in a multiple-function packaging line of the abovementioned type.

[0064] -With reference to the said figures, said first variant has a product transfer surface identical to that of the preceding embodiment, comprising essentially a transverse feeding conveyor 210, a vertically oscillating, longitudinal, pushing conveyor 220, two longitudinal pushing conveyors 230a and 230b which can be transversely spaced by means of the threaded bars 241 and 251, while, as a variant, at the top, a device 700 for rapidly performing conversion from a cartoning machine section into a conveying machine section and vice versa is provided.

[0065] -Said device 700 comprises a vertically movable assembly 710 supported in a hanging manner by the upper machine frame Ts, said assembly 700 being intended to carry a transporting conveyor 600, of the type illustrated in Figs. 6 and 6A, oriented longitudinally and arranged on a first higher level, and a folding conveyor 260, of the type indicated above by the same number, oriented longitudinally and arranged on a second lower level.

[0066] -In the embodiment illustrated, in order to move the assembly 710 vertically, an upstream hanging support 701 and a downstream hanging support 702 are provided, which supports are movable vertically and the top portions of which have respective threaded shanks 703 and 704 which are engaged with respective female-thread ring nuts 705 and 706, which are arranged and supported axially and rotationally in the upper machine frame Ts, each female-thread ring nut, 705 and 706, having fixed respective toothed wheels 708 and 709 around which a chain 711 is wound, said chain also engaging with a wheel 712, the latter being rotationally driven, upon actuation, by means of a motor 713 which is also supported by the upper frame Ts.

[0067] -The said hanging supports 701 and 702, see also Fig. 7C, have bottom portions 715 and 716 in the form of an overturned "U" between the arms of which there is arranged and fixed, at a higher level, the said transporting conveyor 600 with a conveyor belt 601, by means of fixing of the sliding surface 602 between the arms of said "U" and, at a lower level, by means of two lateral brackets 715a and 715b, the frame 265 of the folding conveyor 260 with one or more chains 261 intended to carry pushing/folding lugs 262.

[0068] -With this device, in order to obtain the configuration of said second convertible machine section 200 in the form of a boxing machine, the two bottom folding conveyors 230a and 230b are positioned close to each other so as to fold the bottom portions of the blanks F and, by means of the motor 713 and associated chain 711, the folding conveyor 260 is positioned at a height such as to position the bottom working section in the vicinity of the plane of transfer of the tops of the products P being boxed, so as to fold the top part of the blanks F onto the said products, resulting in a working configuration similar to that of Figs. 1A, 1B, 1C and 2A, 2B, 2C described above.

[0069] -When the configuration as a second conveying machine section is required, see Fig. 7A, by means of the pneumatic cylinder 229 the pushing conveyor 220 is arranged in the lowered position, by means of the crank 253 the two bottom folding conveyors 230a and 230b are arranged in a spaced condition and, then, by

means of the motor 713 and associated wheel 712 and chain 711, the assembly 710 is lowered by means of lowering of the two hanging supports 701 and 702, until the folding conveyor 260 is positioned underneath the product conveying plane, and the transporting conveyor 600 with its belt 601 is arranged with its upper conveying plane Y600 aligned and coplanar with the conveying plane Y100 of the upstream section 100 and the conveying plane Y300 of the downstream section 300, arranging preferably the supporting flange-plates 610a-610b and 611a-611b so as to rest on top of the associated threaded bars 241 and 251 in order to stabilise said position.

Rapidly convertible dual-function machine section - Second variation of embodiment

[0070] -With reference to Figs. 8 and 8A, these illustrate a second variation of embodiment of a rapidly convertible, intermediate, machine section intended, for example, to perform the function of a second machine section 200 in a multiple-function packaging line of the abovementioned type.

[0071] -With reference to the said figures, a carriage 810 is arranged between the loading station ST1 comprising the feeding conveyor 210 and the downstream machine section 300, and more particularly between the downstream end of the dead plate 103 and the upstream end of the conveyor 310, said carriage extending longitudinally, being movable transversely and comprising three longitudinal members L1, L2, L3 intended to slide in a guided manner on two bottom cross-pieces Ts1 and Ts2 provided on the two longitudinal members of the machine frame Ta and Tb.

[0072] -Said carriage 810, on a first side, supported by means of the longitudinal members L1 and L2, has a longitudinally oriented transporting conveyor 600, with belt 601, of the type illustrated in Figs. 6 and 6A, which has an upper conveying plane Y600 and, adjoining it, on the other side, supported by means of two longitudinal members L2 and L3, two folding conveyors 230a and 230b, oriented longitudinally, of the type described above with the same reference number.

[0073] -With this embodiment, in order to obtain the configuration as a cartoning machine section, see Fig. 8, by means of transverse displacement of the carriage 810, the two folding conveyors 230a and 230b are positioned with their upper conveying and folding plane Y200 aligned and coplanar with the conveying plane Y100 of the front machine section 100 and the conveying plane Y300 of the rear machine section 300, i.e. said two folding conveyors 230a and 230b between the downstream end of the dead plate 103 and the upstream end of the transporting conveyor 310 maintaining the presence of the opening 305, and the pushing conveyor 220 is then arranged in its first raised position, obtaining a functional and working configuration similar to that illustrated in Figs. 1A, 1B, 1C and 2A, 2B, 2C.

[0074] -Still with this embodiment, in order to obtain the configuration as a conveying machine section, see Fig. 8A, firstly the pushing conveyor 220 is positioned in its second lowered position and, after this, by means of transverse displacement of the carriage 810, the transporting conveyor 600 is positioned with its upper conveying plane Y600 aligned and coplanar with the conveying plane Y100 of the front machine section 100 and the conveying plane Y300 of the rear machine section 300, i.e. said transporting conveyor 600 is positioned between the downstream end of the dead plate 103 and the upstream end of the transporting conveyor 310 maintaining the presence of the opening 305, essentially resulting in a functional and working configuration similar to that illustrated in Figs. 3A, 3B, 3C and 4A, 4B, 4C.

[0075] -The description of the multiple-function packaging line and the various embodiments of the associated convertible dual-function machine section is provided purely by way of a non-limiting example and therefore may be subject to all those modifications and variations arising from their practical use or application, while remaining within the scope of the claims below.

Claims

1. Multiple-function packaging line for packaging, individually in succession, products (P), **characterized in that** it comprises four machine sections (100, 200, 300, 400) arranged consecutively; **in that** the first machine section (100) is a feeding machine section, comprising product (P) feeding means (110, 103, B2, B3) and intended to feed, individually in succession, the products (P) to be packaged, displacing them longitudinally along a first conveying plane (Y100), towards and into a loading station (ST1) of the second machine (200); **in that** the second machine section (200) is a dual-function machine section which can be converted into two configurations, wherein the first configuration envisages a condition as a cartoning machine section, comprising feeding means (210) for feeding blanks (F3) into said loading station (ST1), pushing means (220) for moving the blanks (F3) from said station (ST1) downstream, folding/pushing means (230a-230b, 201, 260, 203a-203b, 206a-206b, 207a-207b) for folding the blanks (F4) onto the products (P4), and intended to cartoning, individually in succession, the products (P) by means of the blanks (F), displacing the product/blank assemblies (P4/F4) along a second conveying plane (Y200), and for feeding the boxed products (P6-F6) into the third machine section (300), and wherein the second configuration envisages a condition as a conveying machine section, comprising conveying means (600) and intended to convey, individually in succession, without boxing them, the prod-

ucts (P) supplied by said first machine section (100), displacing them longitudinally along a different second conveying plane (Y600), towards and into the third machine section (300); **in that** the third machine section (300) is a wrapping machine section comprising conveying means (310) and wrapping means (320) and intended to wrap, individually in succession, using strips (S) of packaging film, the cartoned products (P5-F5) or the uncartoned products (P5) supplied by said second machine section (200), displacing them along a third conveying plane (Y300) towards and into the fourth machine section (400), and **in that** said fourth machine section (400) is a receiving machine section comprising conveying means (410) and intended to receive, individually in succession, the cartoned and wrapped products (P6-F6-S) or the wrapped products (P6-S) supplied by said third machine section (300), and for conveying them downstream, displacing them along a fourth conveying plane (Y400).

2. Multiple-function packaging line according to Claim 1, **characterized in that** the third machine section (300) is a dual-function machine section which can be converted into two configurations, wherein the first configuration envisages a condition as a wrapping machine section, comprising conveying means (310) and wrapping means (320) and intended to wrap, individually in succession, by means of strips (S) of packaging film, the cartoned products (P5-F5) or the individual products (P5) supplied by said second machine section (200), displacing them along a third conveying plane (Y300), and for feeding the cartoned and wrapped products (P5-F5-S) or the wrapped products (P5-S) towards and into the fourth machine section (400), and wherein the second configuration envisages a condition as a conveying machine section, comprising conveying means (310) intended to convey, individually in succession, without wrapping them, the boxed products (P4-F4) supplied by said second machine section (200), displacing them longitudinally along a conveying plane (Y300), towards and into the fourth machine section (400).

3. Multiple-function packaging line according to Claim 1 or 2, **characterized in that** said second, convertible, dual-function machine section (200) comprises a pushing conveyor (220) extending longitudinally, movable vertically in a vertical/longitudinal plane and intended to assume a first raised position, or operating position, so as to push in succession the blanks (F) from the loading station (ST1) downstream, and a second lowered position, or inoperative position, for realising the second configuration of said second machine section (200); **in that** said second, convertible, dual-function machine section (200) comprises two longitudinal bottom folding conveyors (230a, 230b) movable transversely and intended to assume a first position arranged close to each other in the transverse direction, operating position, in order to fold the bottom part of the blanks (F) onto the products (P), and a second position arranged spaced from each other in the transverse direction, inoperative position, in order to realise the second configuration of said second machine section (200); and **in that,** in order to obtain the second configuration of said second convertible dual-function machine section (200), a transporting conveyor (600) is arranged longitudinally, being insertable between the two said bottom folding conveyors (230a, 230b) arranged in their second position spaced from each other in the transverse direction, said transporting conveyor (600) having its longitudinal conveying plane (Y600) in the form of a coplanar conveying surface connecting together the first conveying plane (Y100) of the first machine section (100) and the third conveying plane (Y300) of the third machine section (300).

4. Multiple-function packaging line according to Claim 3, **characterized in that** said second convertible machine section (200) further comprises an upper folding conveyor (260) extending longitudinally, movable vertically and intended to assume a first lowered position, or operating position, for folding the top part of the blanks (F) onto the products (P), and a second raised position, or inoperative position, for realising the second configuration of the second machine section (200).

5. Multiple-function packaging line according to one of Claims 3 to 4, **characterized in that** said two longitudinal bottom folding conveyors (230a and 230b) have a first frame (237a) for the first folding conveyor (230a) and a second frame (237b) for the second folding conveyor (230b), **in that** the upstream portion of both said two frames (237a, 237b) is supported by means of a first threaded bar (241) which extends transversely and is rotationally supported by the machine frame (Ta and Tb) and which has two threaded portions (241a and 241b) with oppositely directed threading, the first thread (241a) engaging with a female thread provided in the upstream portion of the first frame (237a) and the second thread (241b) engaging with a female thread provided in the upstream portion of the second frame (237b); **in that** the downstream portion of said frames (237a, 237b) is supported by means of a second threaded bar (251) which extends transversely and is supported rotationally by the machine frame (Ta and Tb) and which has two threaded portions (251a and 251b) with oppositely directed threading, the first thread (251a) engaging with a female thread provided in the downstream portion of the first frame (237a) and the second thread (251b) engaging with

a female thread provided in the downstream portion of the second frame (237b); and **in that** the first threaded bar (241) has, keyed on it, a first wheel (242) around which a chain (243) is wound, said chain also being wound around a second wheel (252) which is mounted, keyed, on the second threaded bar (251), one of said threaded bars (251) also having a crank (253) for rotation.

6. Multiple-function packaging line according to one of Claims 3 to 5, **characterized in that** the pushing conveyor (220) comprises a chain (221) which is provided with pushing lugs (223) and is wound in a closed path around an upstream motor-driven wheel (223), around an intermediate wheel (224) and around a downstream wheel (225), **in that** said intermediate wheel (224) and said downstream wheel (225) are rotatably supported by means of a frame (226a, 226b) and **in that** said frame (226a, 226b) has its upstream portion hinged in the vicinity of the upstream wheel (223) and its downstream portion pivotable by means of actuating means (229).

7. Multiple-function packaging line according to one of Claims 3 to 6, **characterized in that** the insertable transporting conveyor (600) has a first pair of supporting/resting flange plates (610a, 610b) in the vicinity of its upstream portion and a second pair of resting/support flange-plates (611a, 611b) in the vicinity of its downstream portion, **in that** said first pair of flange-plates (610a, 610b) is arranged resting on top of the first threaded bar (241) and **in that said** second pair of flange-plates (611a, 61 1b) is arranged resting on top of the second threaded bar (251).

8. Multiple-function packaging line according to one of Claims 3 to 7, **characterized in that** each bottom folding conveyor (230a; 230b) comprises respective driving wheels (234a; 234b) and **in that** said two driving wheels (234a; 234b) are engaged with a shaft (240) of the splined-profile type supported rotationally by the machine frame (Ta and Tb).

9. Convertible intermediate machine section (200), which can be applied in particular in a multiple-function packaging line with several machine sections (100, 200, 300, 400) arranged in succession, **characterized in that** it has two different operating configurations, **wherein** the first configuration envisages a condition as a cartoning machine section, comprising feeding means (210) for feeding blanks (F3) into a station (ST1) arranged upstream, pushing means (220) for moving the blanks (F3) from said station (ST1) downstream, folding/pushing means (230a-230b, 203a-203b, 206a-206b, 207a-207b) for folding the blanks (F4) onto the products (P4) and intended to carton, individually in succession, with the blanks (F), the products (P) which arrive at said station (ST1) supplied by a machine section (100) arranged upstream, displacing the product/blank assemblies (P4-F4) along a conveying plane (Y200), and for feeding the cartoned products (P6-F6) into a machine section (300) arranged downstream, and **wherein** the second configuration envisages a condition as a conveying machine section, comprising conveying means (600) and intended to convey, individually in succession, without cartoning them, the products (P) supplied by said machine section (100) arranged upstream, displacing them longitudinally along a different conveying plane (Y600), towards and into the machine section (300) arranged downstream.

10. Intermediate machine section according to Claim 9, **characterized in that** it comprises a pushing conveyor (220) which extends longitudinally, is movable vertically in a vertical/longitudinal plane and is intended to assume a first raised position, or operating position, for pushing in succession the blanks (F) from the loading station (ST1) downstream, and a second lowered position, or inoperative position, for realising the second configuration of said intermediate machine section (200); **in that** it comprises two longitudinal bottom folding conveyors (230a, 230b) which are movable transversely and intended to assume a first position arranged close to each other in the transverse direction, operating position, for folding the bottom part of the blanks (F) onto the products (P) and a second position spaced from each other in the transverse direction, inoperative position, for realising the second configuration of said second machine section (200); and **in that** in order to obtain the second configuration, a transporting conveyor (600) is arranged longitudinally, being insertable between the two said bottom folding conveyors (230a, 230b) arranged in their second position spaced from each other in the transverse direction, said transporting conveyor (600) having its longitudinal conveying plane (Y600) in the form of a coplanar conveying surface for connecting together the conveying plane (Y100) of the upstream machine section (100) and the conveying plane (Y300) of the downstream machine section (300).

11. Intermediate machine section according to Claim 10 (Figs. 7, 7A, 7B), **characterized in that** a device (700) comprising a vertically movable assembly (710) is arranged above the conveying plane (Y200) of the intermediate machine section (200), **in that** said assembly (710) supports a transporting conveyor (600) which is oriented longitudinally and arranged on a first upper level and a folding conveyor (260) which is oriented longitudinally and ar-

ranged on a second bottom level, **in that,** in order to obtain the configuration of said intermediate machine section (200) as a cartoning machine, the said assembly (710) is positioned at a height such as to position the bottom operating section of the folding conveyor (260) in the vicinity of the transfer plane of the top portion of the products (P) being boxed, so as to fold the top part of the blanks (F) onto said products (P) and **in that,** in order to obtain the configuration as a second conveying machine section, said assembly (710) is lowered so as to position the folding conveyor (260) underneath the conveying plane of the products (P) until the transporting conveyor (600) is positioned with its upper conveying plane (Y600) coplanar with the conveying plane (Y100) of the upstream front machine section (100) and the conveying plane (Y300) of the downstream machine section (300).

12. Intermediate machine section according to Claim 11, **characterized in that** said assembly (700) is supported by means of two hanging supports (701, 702), the bottom portions (715, 716) of which are in the form of an overturned "U", between the arms of which the said transporting conveyor (600) is arranged and fixed at a higher level and said folding conveyor (260) is arranged and fixed at a lower level.

13. Intermediate machine section according to one of Claims 10 to 12, **characterized in that** the pushing conveyor (220) comprises a chain (221) which is provided with pushing lugs (222) and which is wound in a closed path around an upstream motor-driven wheel (223), around an intermediate wheel (224) and around a downstream wheel (225), **in that** said intermediate wheel (224) and said downstream wheel (225) are rotatably supported by means of a frame (226a-226b), and **in that** said frame (226a-226b) has its upstream portion hinged in the vicinity of the upstream wheel (223) and its downstream portion pivotable by means of actuating means (229).

14. Intermediate machine section according to one of Claims 10 or 13, **characterized in that** said two, longitudinal, bottom, folding conveyors (230a and 230b) have a first frame (237a) for the first folding conveyor (230a) and a second frame (237b) for the second folding conveyor (230b), **in that** the upstream portion of both said two frames (237a, 237b) is supported by means of a first threaded bar (241) which extends transversely and is rotationally supported by the machine frame (Ta and Tb) and which has two threaded portions (241a and 241b) with oppositely directed threading, the first thread (241a) engaging with a female thread provided in the upstream portion of the first frame (237a) and the second thread (241b) engaging with a female thread provided in the upstream portion of the second frame (237b); **in that** the downstream portion of said frames (237a, 237b) is supported by means of a second threaded bar (251) which extends transversely and is rotationally supported by the machine frame (Ta and Tb) and which has two threaded portions (251a and 251b) with oppositely directed threading, the first thread (251a) engaging with a female thread provided in the downstream portion of the first frame (237a) and the second thread (251b) engaging with a female thread provided in the downstream portion of the second frame (237b); and **in that** the first threaded bar (241) has, keyed on it, a first wheel (242) around which a chain (243) is wound, said chain also being wound around a second wheel (252) mounted, keyed, on the second threaded bar (251), one of said threaded bars (251) also having a crank (253) for rotation.

15. Intermediate machine section according to one of Claims 10 to 14, **characterized in that** each bottom folding conveyor (230a; 230b) comprises respective driving wheels (234a; 234b) and **in that** said two driving wheels (234a; 234b) are engaged with a shaft (240) of the splined-profile type rotationally supported by the machine frame (Ta and Tb).

16. Intermediate machine section according to one of Claims 10 to 15, **characterized in that** the transporting conveyor (600) has a first pair of resting/support flange-plates (610a, 610b) in the vicinity of its upstream portion and a second pair of resting/support flange-plates (611a, 611b) in the vicinity of its downstream portion, **in that** said first pair of flange-plates (610a, 610b) is arranged resting on top of the first threaded bar (241) and **in that** said second pair of flange-plates (611a, 611b) is arranged resting on top of the second threaded bar (251).

17. Intermediate machine section according to Claim 9, **characterized in that** it comprises a carriage (810) extending longitudinally and movable transversely, **in that** said carriage (810) supports, on one side, two folding conveyors (230a, 230b) oriented longitudinally and, on the other side, a transporting conveyor (600) oriented longitudinally, **in that**, in order to obtain the configuration as a cartoning machine section, said carriage (810) is displaced transversely until the two folding conveyors (230a, 230b) are positioned with their upper conveying and folding plane (Y200) arranged aligned and coplanar with the conveying plane (Y100) of the front machine section (100) and the conveying plane (Y300) of the rear machine section (300), and **in that**, in order to obtain the configuration as a conveying machine section, said carriage (810) is displaced transverse-

ly until the transporting conveyor (600) is positioned with its upper conveying plane (Y600) arranged aligned and coplanar with the conveying plane (Y100) of the front machine section (100) and the conveying plane (Y300) of the rear machine section (300).

18. Intermediate machine section according to Claim 10 or 17, **characterized in that** it further comprises an upper folding conveyor (260) which extends longitudinally, is movable vertically and is intended to assume a first lowered position, or operating position, for folding the top part of the blanks (F) onto the products (P), and a second raised position, or inoperative position, for realising the second configuration.

Fig. 1

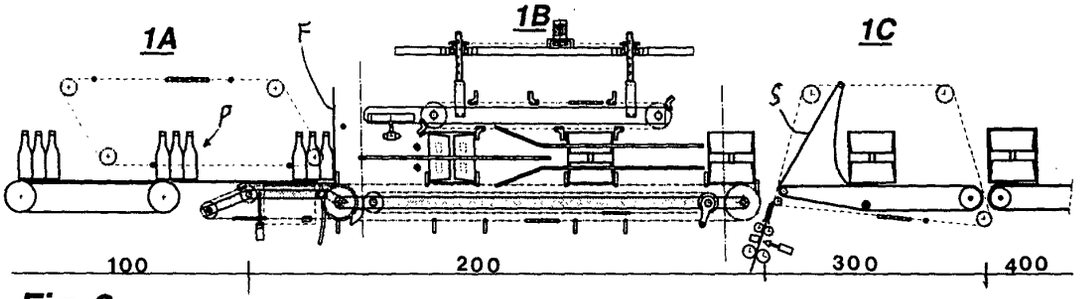


Fig. 2

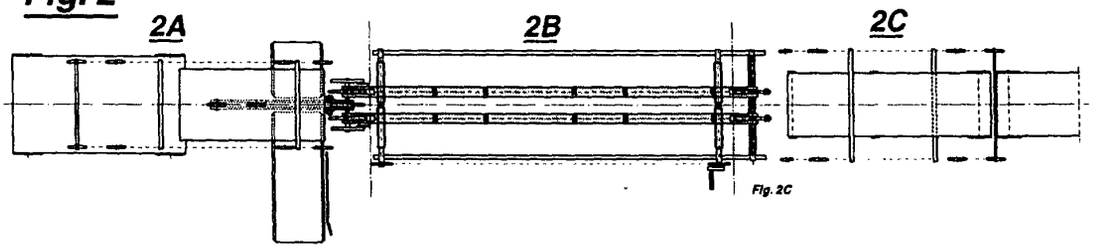


Fig. 3

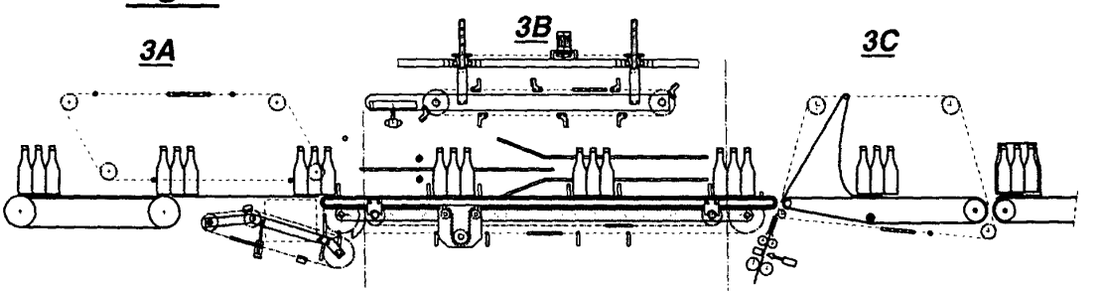
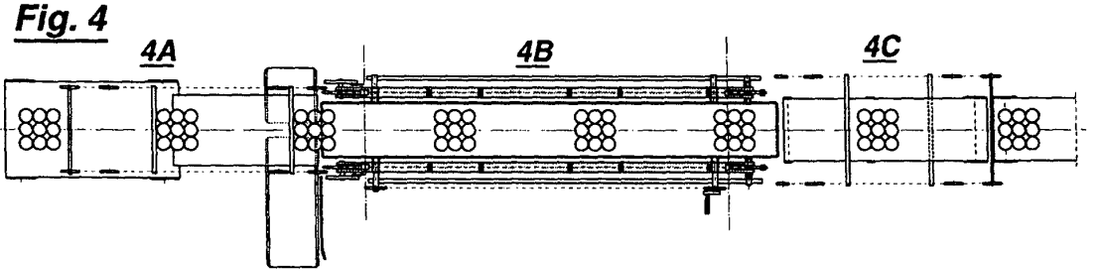
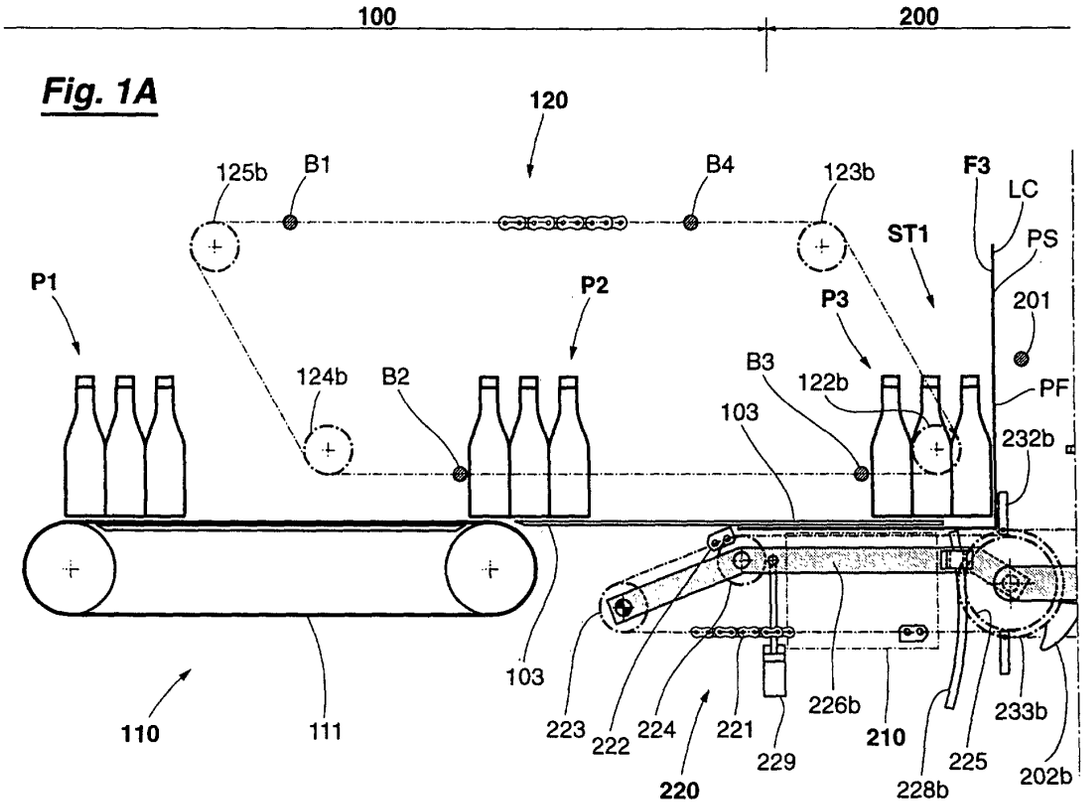


Fig. 4

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B1
B4
123b
F3
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ST1
P1
P2
P3
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124b
B2
B3
122b
PF
103
232b
110
111
103
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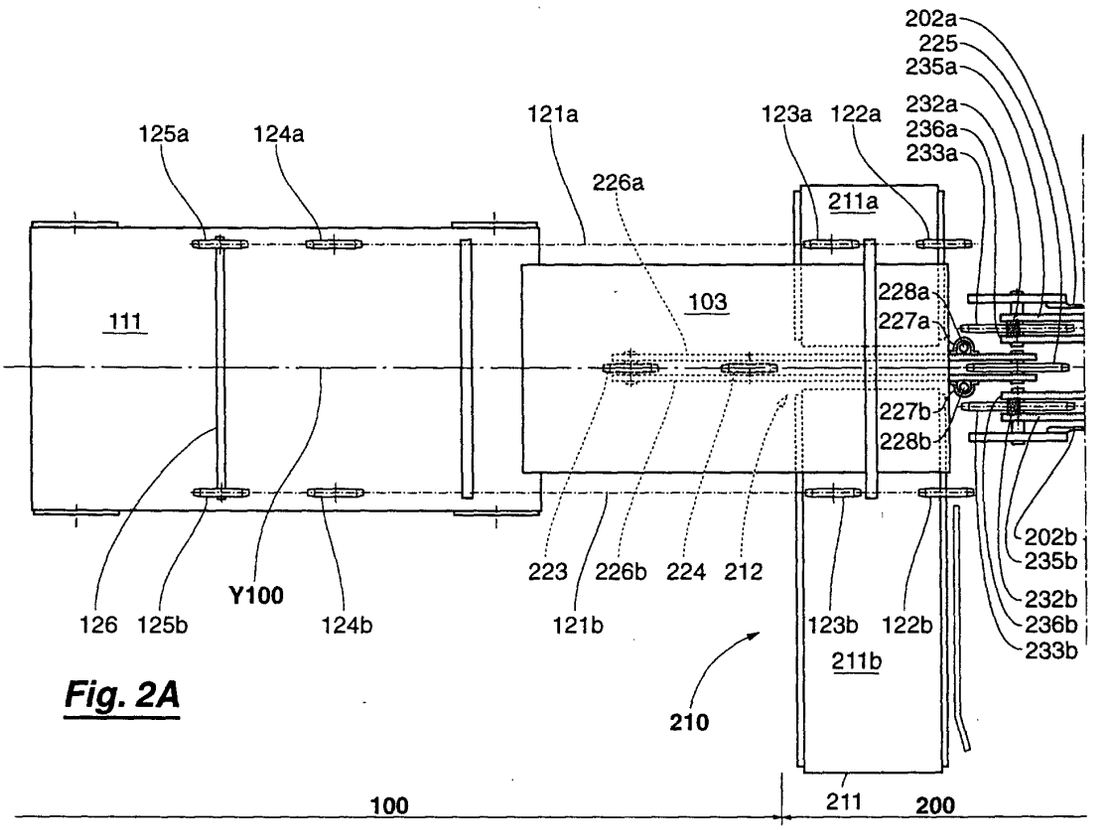
222
224
221
229
220
226b
210
233b
225
228b
202b

Fig. 1A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225
235a
232a
236a
233a
125a
124a
121a
123a
122a
226a
211a
111
103
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227a
227b
228b
202b
235b
232b
236b
233b
223
226b
224
212
Y100
126
125b
124b
121b
123b
122b
211b
210
100
211
200

Fig. 2A

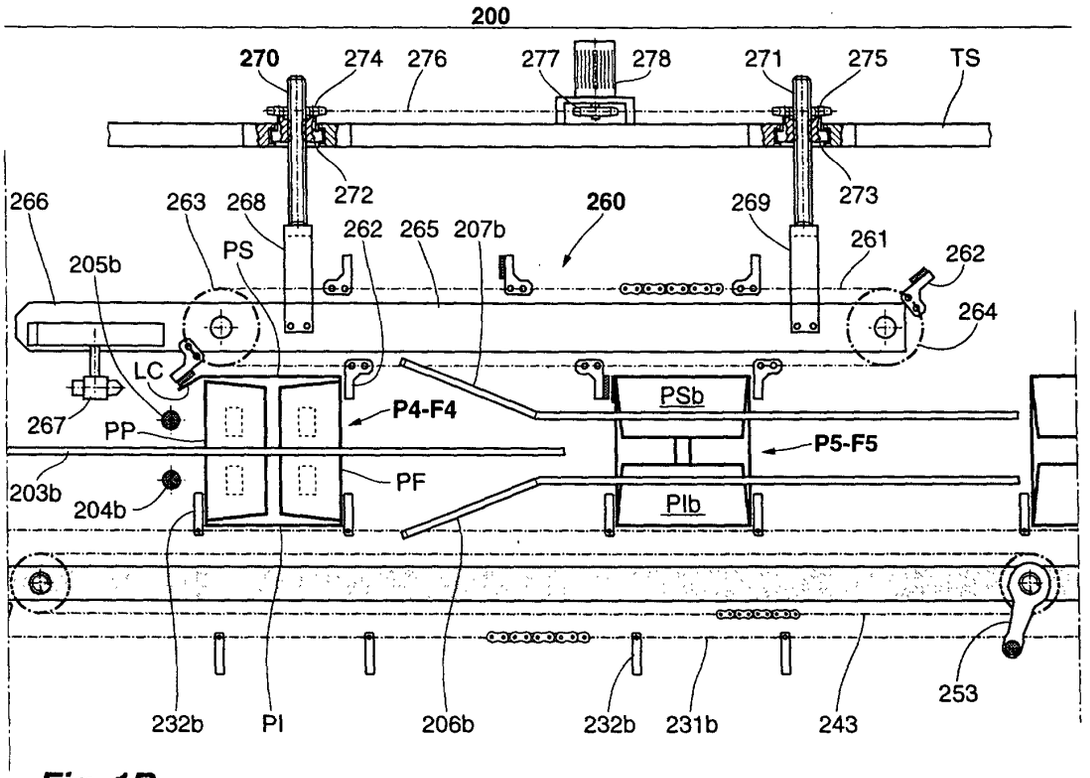


Fig. 1B

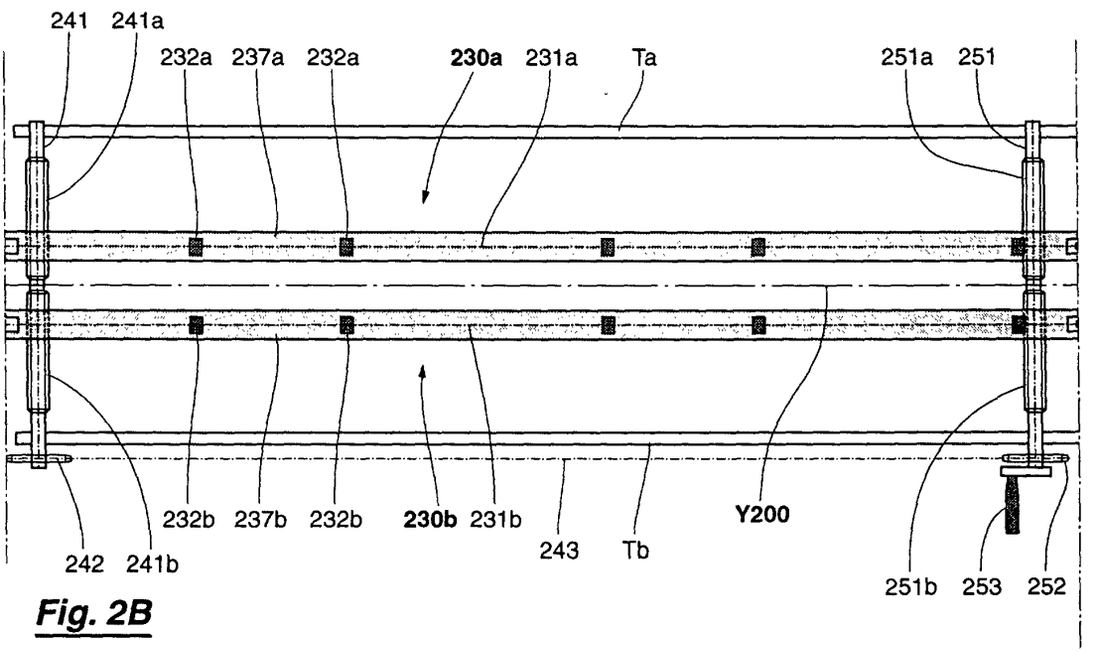
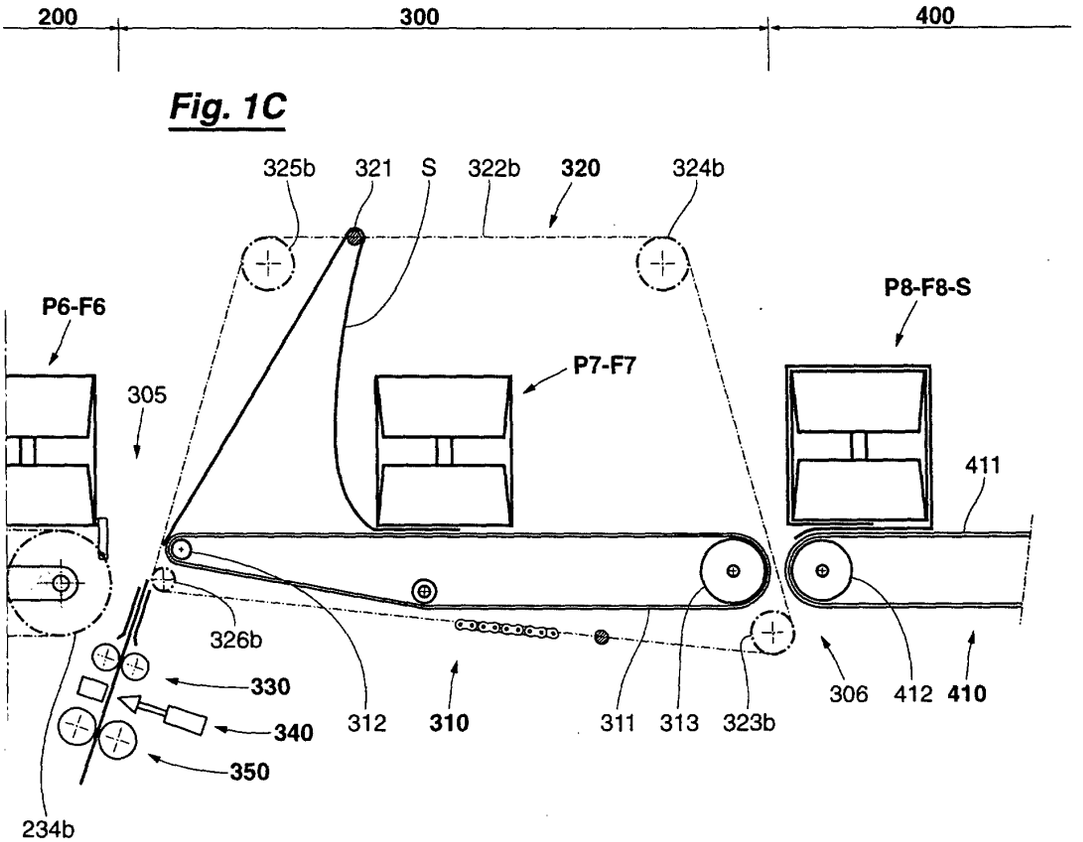


Fig. 2B

200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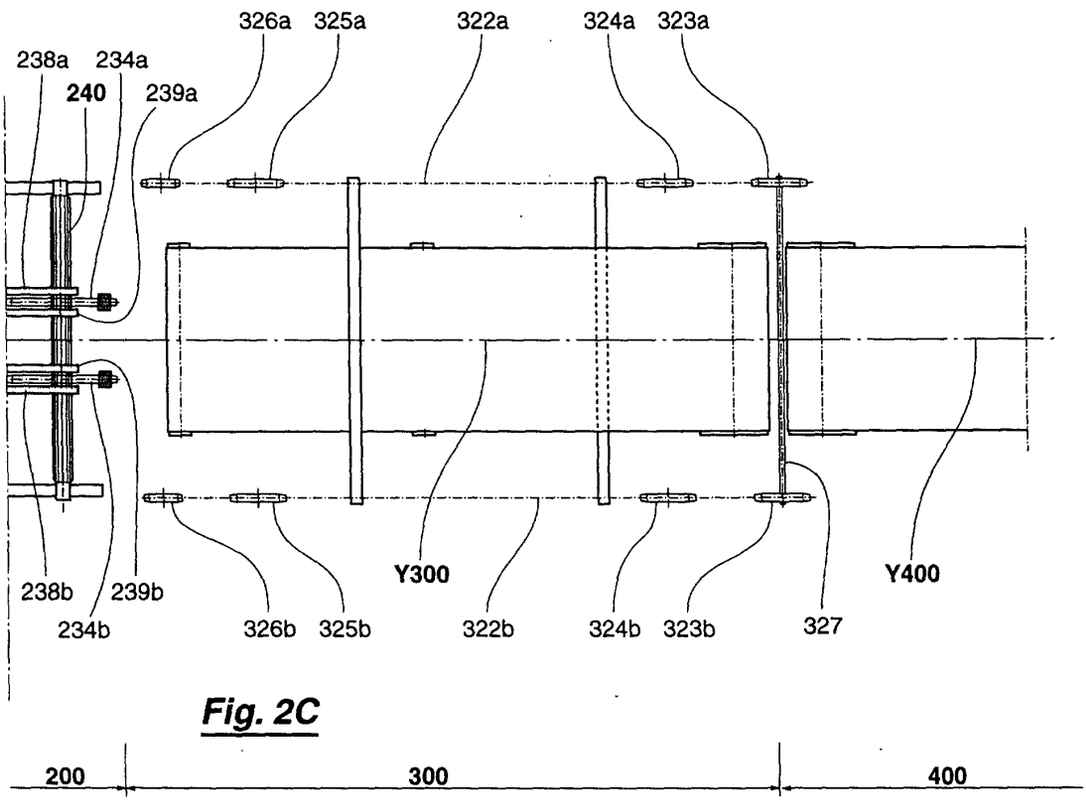
S
322b
320
324b
P6-F6
P8-F8-S
P7-F7
305
411
326b
330
340
350
312
310
311
313
323b
306
412
410
234b

Fig. 1C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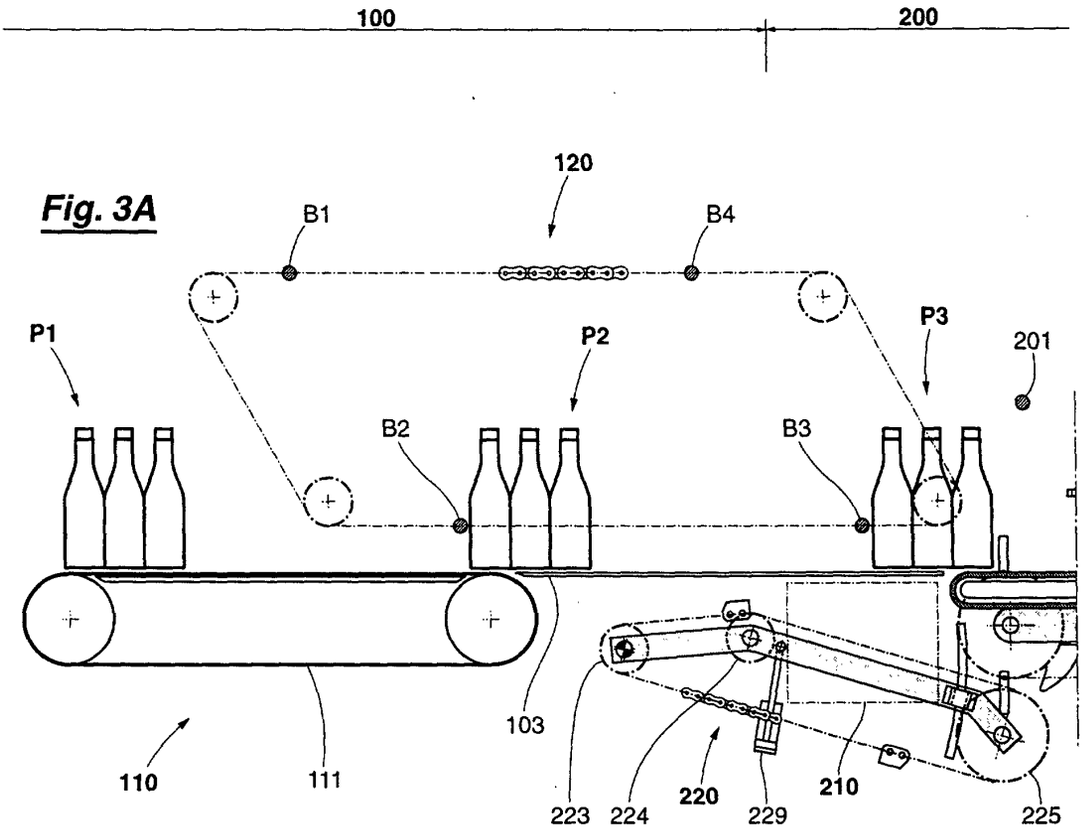
322a
324a
323a
238a
234a
240
239a
Y300
Y400
238b
239b
234b
326b
325b
322b
324b
323b
327

Fig. 2C

200
300
400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B1
B4
P1
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P3
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B2
B3
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111
223
224
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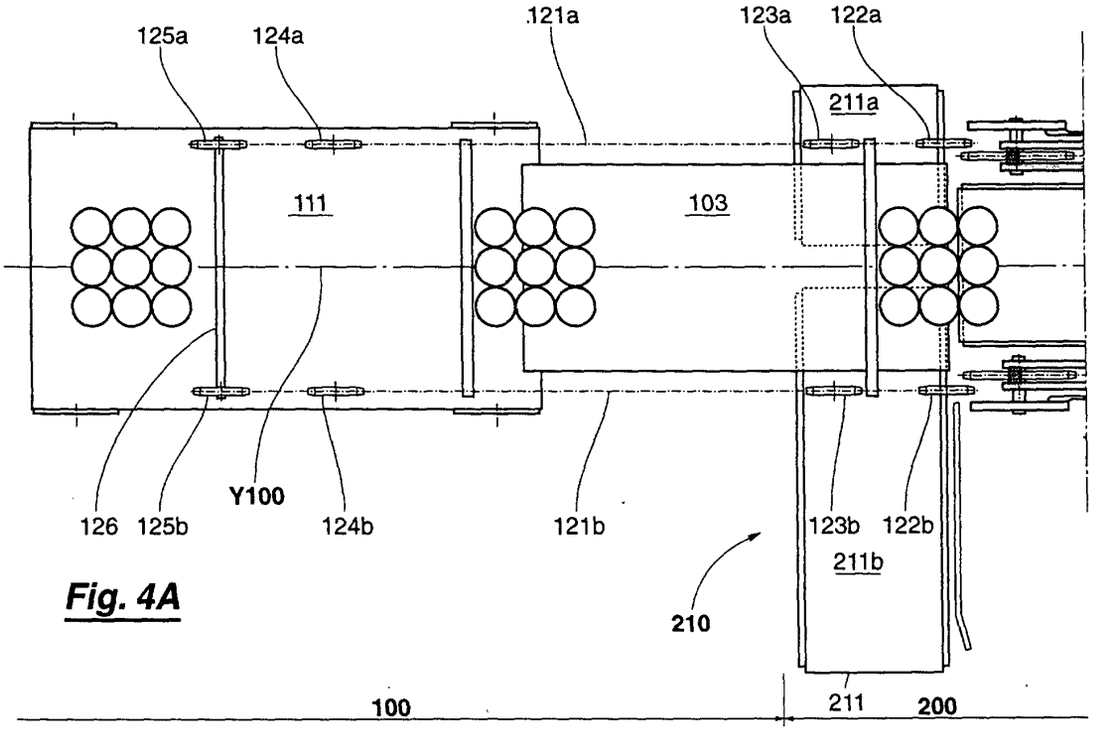
229
210
225

Fig. 3A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123a
122a
211a
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Y100
126
125b
124b
121b
123b
122b
211b
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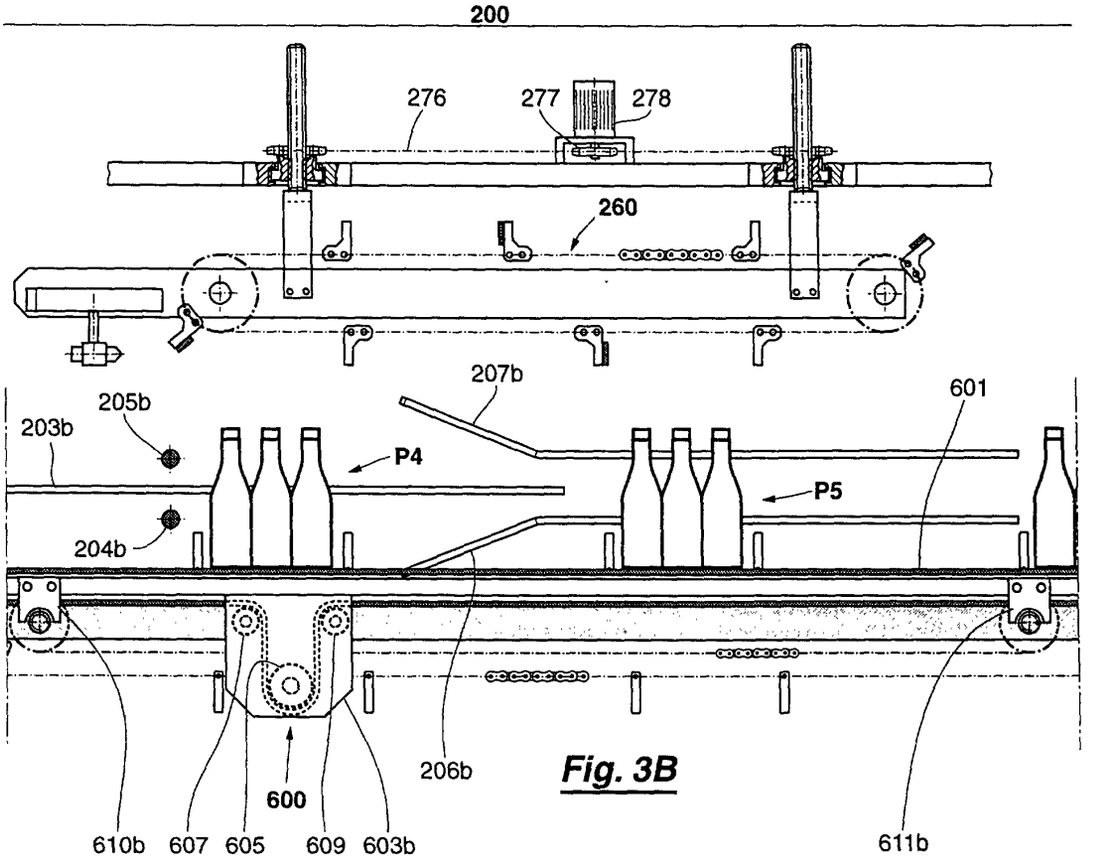
100
211
200

Fig. 4A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278
260
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601
205b
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P4
P5
204b
206b
600
610b
607
605
609
603b
611b

Fig. 3B

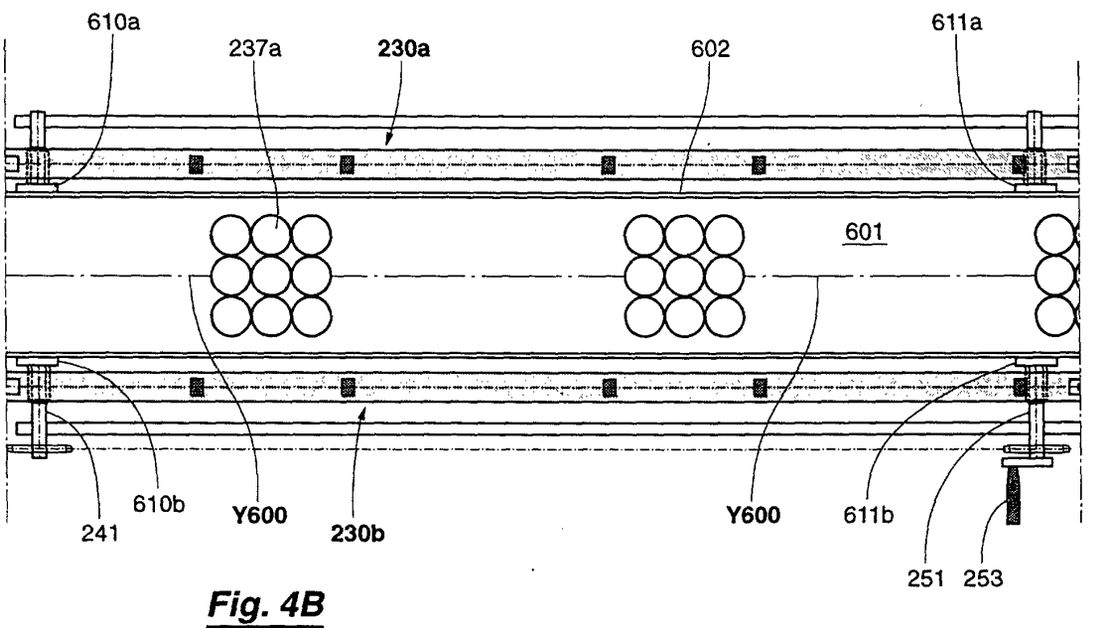
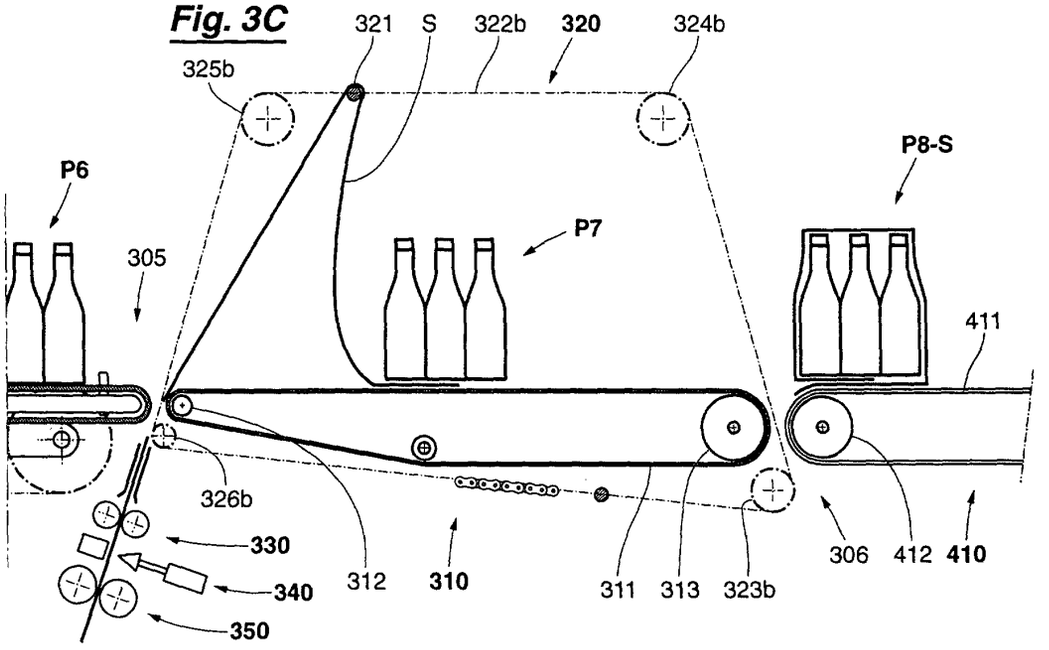

610a
237a
230a
602
611a
601
241
610b
Y600
230b
Y600
611b
251
253

Fig. 4B


200
300
400

Fig. 3C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S
322b
320
324b
325b
P8-S
P6
P7
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326b
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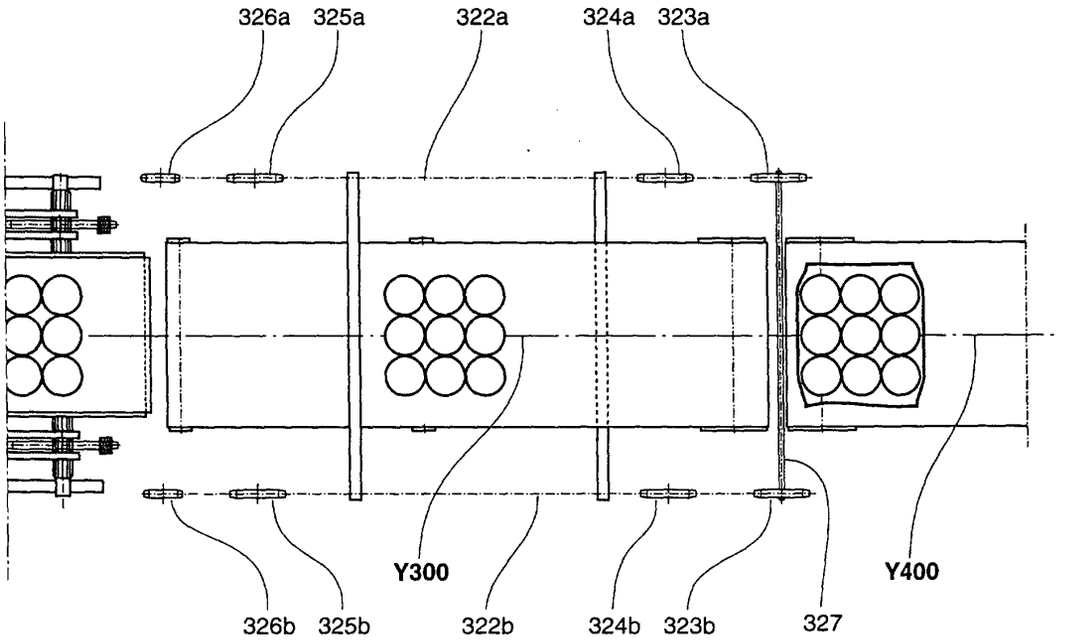
323b
306
412
410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Y300
Y400
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322b
324b
323b
327

Fig. 4C

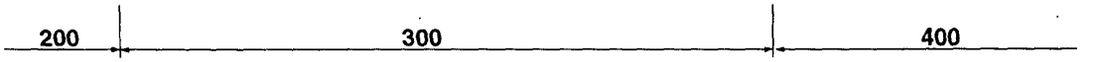
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Fig. 5

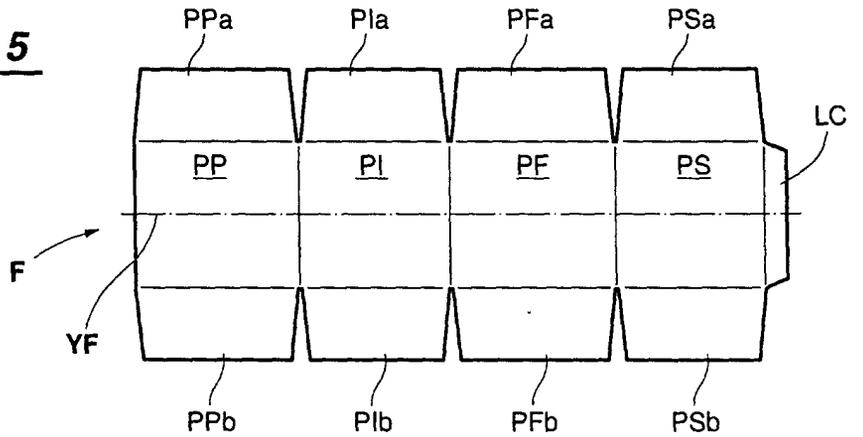


Fig. 5A

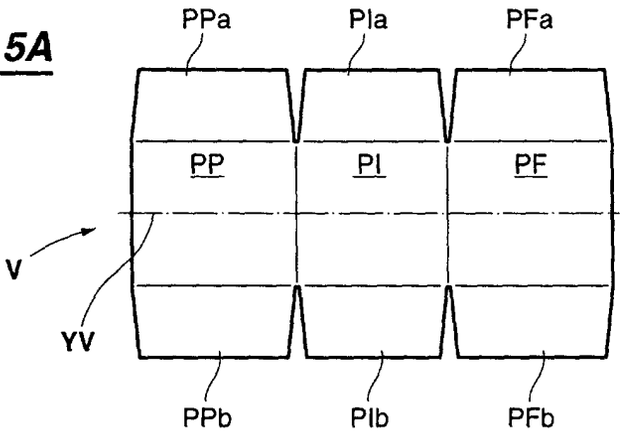
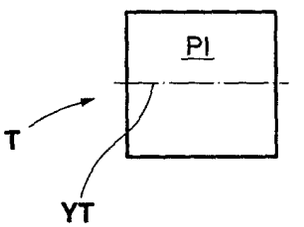
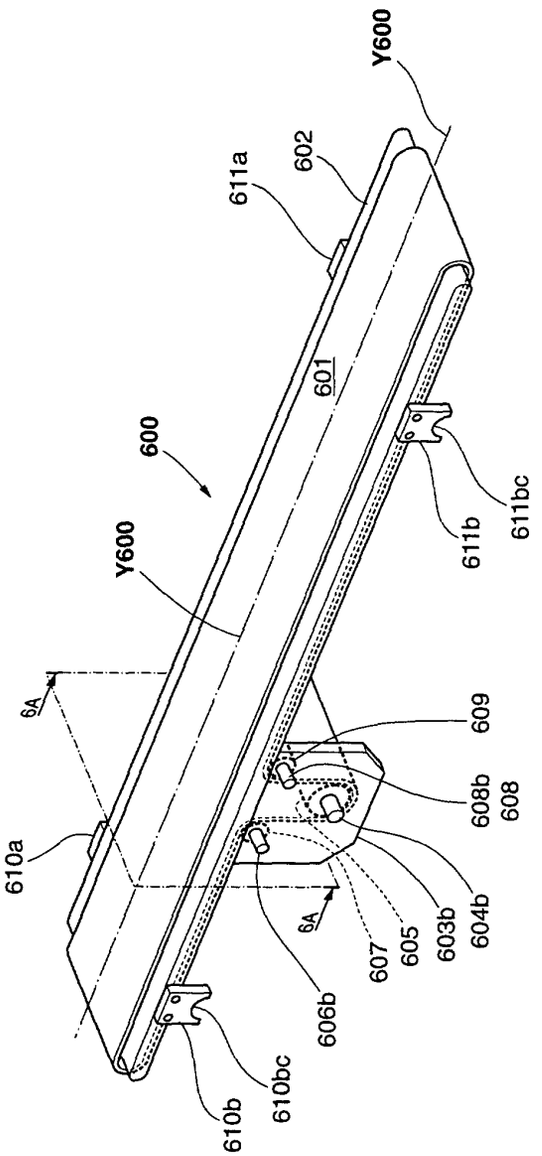


Fig. 5B

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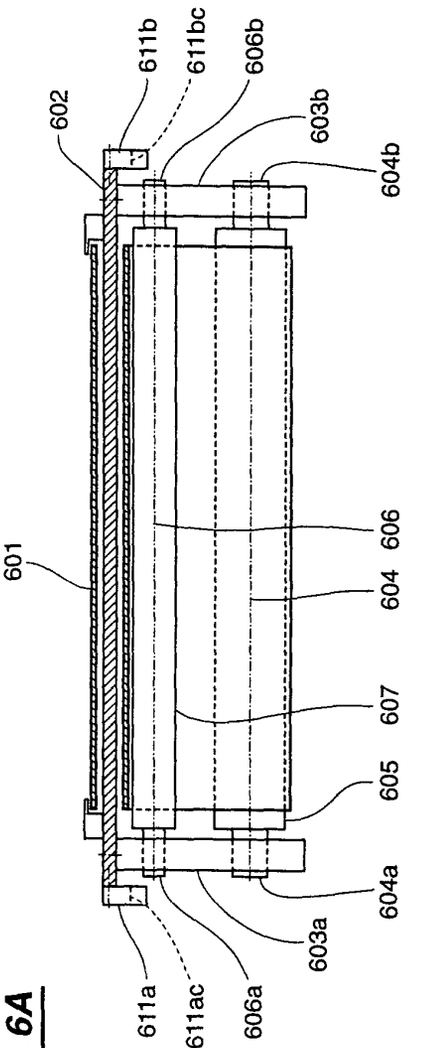
606b
610bc
610b

Fig. 6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611b
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603b
604b
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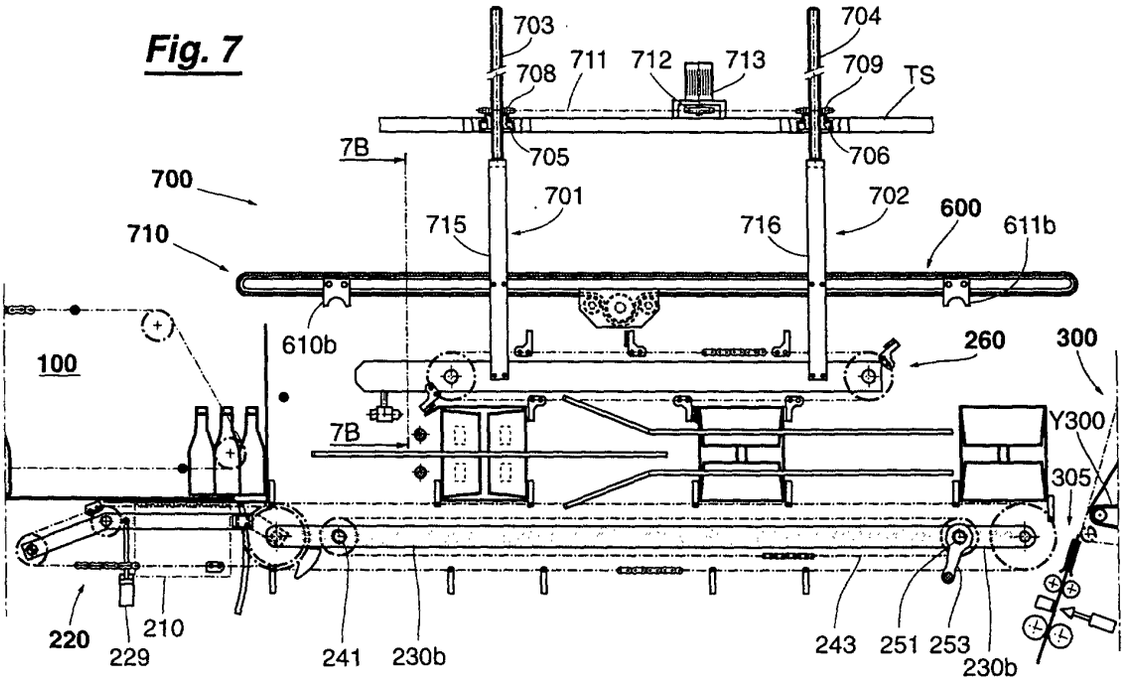
603a
611a
611ac
606a

Fig. 6A

Fig. 7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TS
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7B
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701
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715
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7B
Y300
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230b
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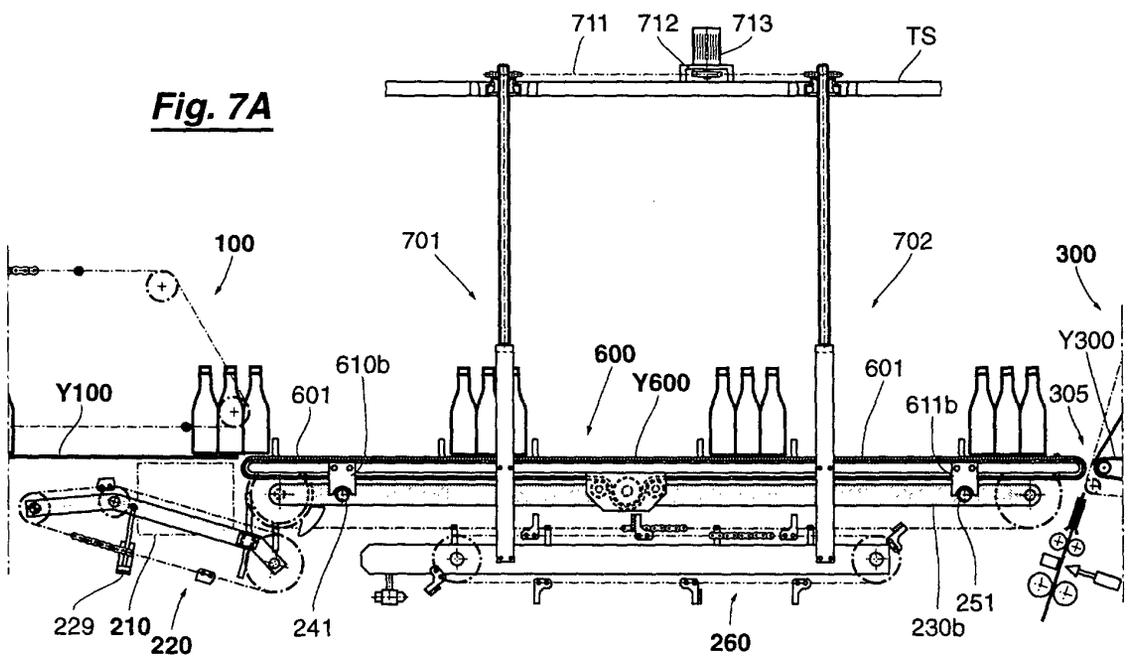
253
230b

Fig. 7A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230b

Fig. 7B

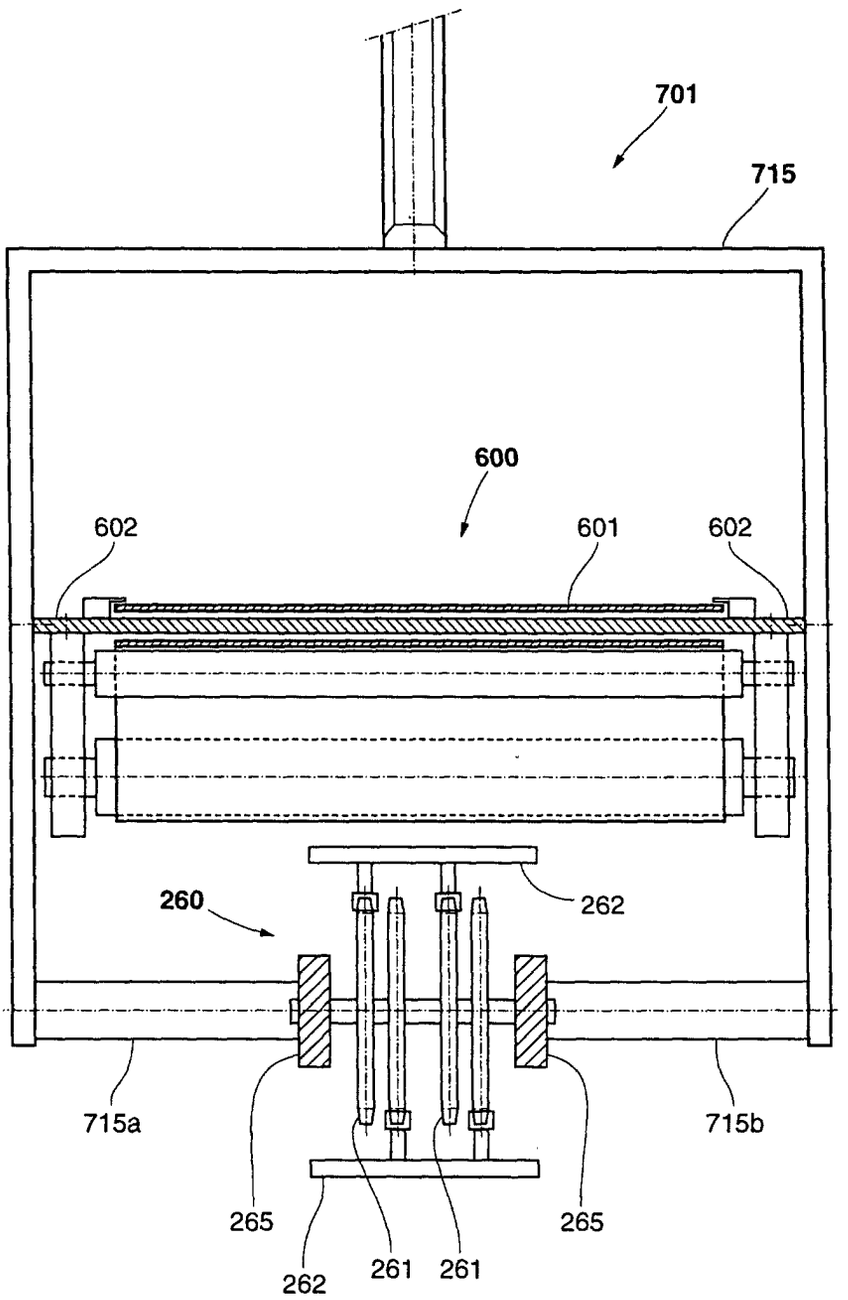
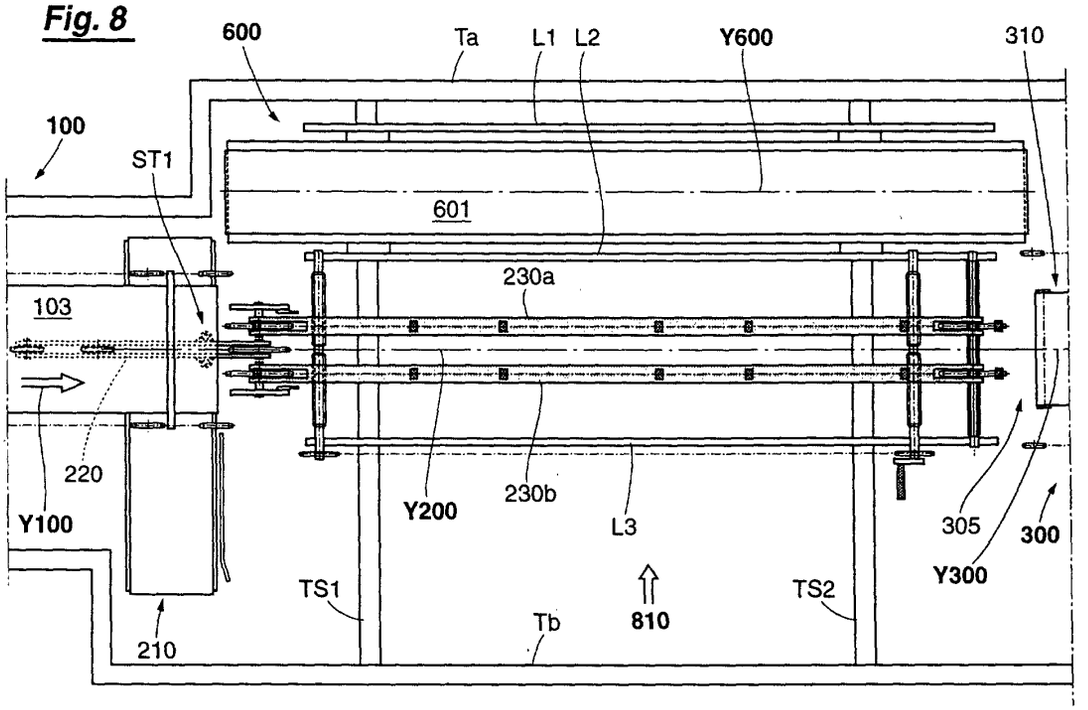


Fig. 8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L3
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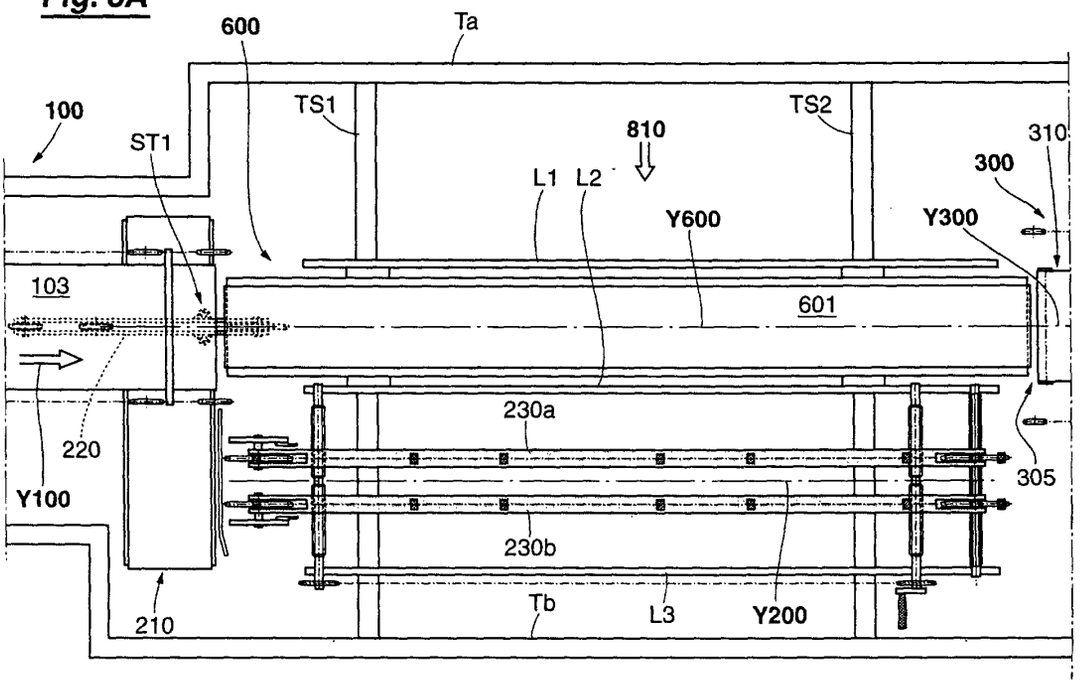
TS1
TS2
Tb
810
210

Fig. 8A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TS2
ST1
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305
Y100
230b
Tb
L3
Y200
210

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 13 0616

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 509 310 A (FOCKE) 9 April 1985 (1985-04-09) * abstract * * column 2, line 21 - column 4, line 66 * * column 5, line 52 - column 6, line 4; figures 1-7 * -----	1,9	B65B11/58

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 April 2002	Claeys, H

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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O : non-written disclosure
P : intermediate document

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18-04-2002

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