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(54) Layering unit for carded webs and method for layering said webs by means of said layering unit.

(57) Layering unit (1; 100) of the type comprising: a first conveyor belt (2; 102) and a second conveyor belt (3; 103), with a section of one arranged over and under the other to form a "U" shape (4; 104) and thereby create a guiding channel (5; 105) for the web (V) with an inlet (6; 106) and an outlet (7; 107); a plurality of revolving cylinders (8; 108); a stacking table (9; 109); a first retriever carriage (10; 110) comprising a first retriever cylinder (11; 111) and a second retriever cylinder (12; 112); a second retriever carriage (13; 113) comprising a retriever cylinder (14; 114); a distributor carriage (15; 115) comprising a first distributor cylinder (16; 116) and a second distributor cylinder (17; 117) forming the outlet (7; 107) of the web-guiding channel (5; 105). The distributor carriage (15; 115) is situated in between said first retriever carriage (10; 110) and said second retriever carriage (13; 113).

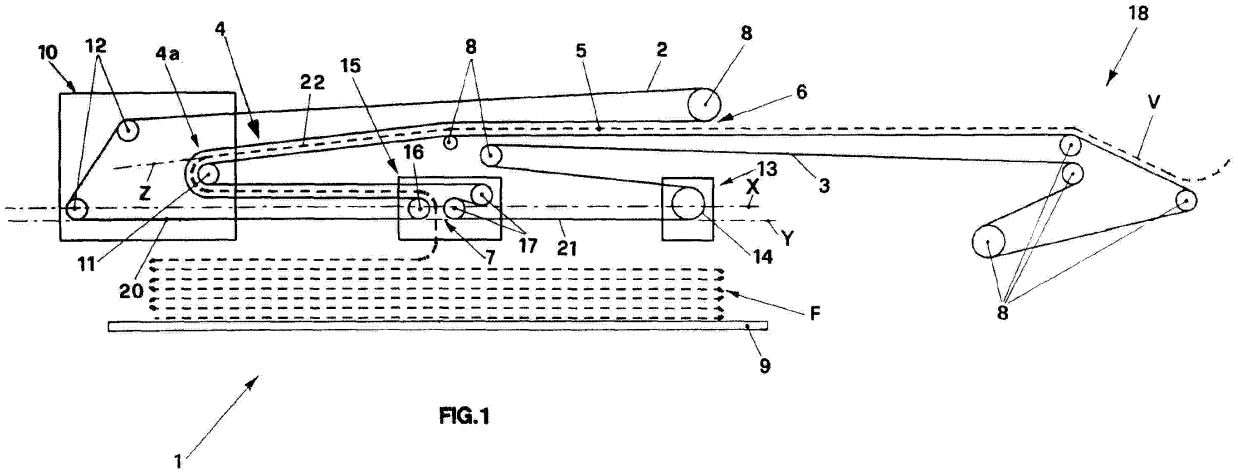


FIG.1

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Description

[0001] The present invention relates to a layering unit for carded webs delivered by a feed unit and to a method for layering said carded webs by means of said layering unit.

[0002] It is common knowledge that the process for obtaining sheets of nonwoven textiles, generally known simply as nonwovens, consists in placing a web of carded fibers in several overlapping layers in order to obtain a multilayer of the required thickness, which is subsequently bonded together by means of a needle punching procedure or other suitable methods.

[0003] It is also common knowledge that implementing such a layering process poses some difficulties, due both to the intrinsic features of the carded fiber web and to difficulties intrinsic in the layering process.

[0004] To be more precise, a first problem consists in the fact that it is difficult to obtain a uniform thickness because the depositing movement needs to be done at a constant speed and this is not easy to achieve because the layering is done using a reciprocating motion.

[0005] Another difficulty stems from the intrinsically fragile nature of the web, which is easily damaged, especially as a result of the air turbulence induced by the rate of displacement of the layering unit's moving parts.

[0006] Since industrial-scale production demands a combination of rapid production times and good quality, layering machines have to be suitably studied to combine a high rate of production with the contrasting goal of a uniform, defect-free product.

[0007] With a view to achieving said objectives, horizontal layering machines have been developed, such as the one described in the Patent IT1213836, which has two conveyor belts wrapped around revolving cylinders, and where at least two carriages can be identified, i.e. a main retriever carriage and a distributor carriage.

[0008] Although these layering machines overcome the previously-mentioned practical difficulties, they also pose certain acknowledged drawbacks.

[0009] One of these drawbacks is that, though they achieve a good production rate, this is still not sufficient to meet market demands.

[0010] Said production rate cannot be further increased because of the presence of the two pressure and distribution cylinders lying in contact with the web leaving the distributor carriage, which are needed to ensure the smooth layering of the web. Any increase in working speed would make these cylinders create a turbulence that would suffice to damage the layered web.

[0011] Another drawback stems from the need to add a pair of separator belts between the layering unit and the layered web in order to protect the latter from the further turbulence generated by the operation of the layering unit.

[0012] To overcome the speed restriction, there are known layering units, such as the one described in the Patent application WO 00/56960, which comprises a distributor carriage and three retriever carriages, two of which are situated underneath the layering unit.

[0013] Though it enables higher working speeds than the previously-described solution, this latter type of layering machine has other drawbacks.

[0014] One of these drawbacks stems from the fact that the high working speed obliges the revolving cylinders to accelerate to such a degree that cylinders made of lightweight materials, such as carbon fibers, have to be used.

[0015] A second drawback, again due to the high working speed, lies in that it is impossible to reduce the ruptures in the carded web to lower levels than those obtainable using layering devices of the previously-described type.

[0016] A third drawback lies in that the layering unit demands a kinematically complex architecture and is consequently costly to manufacture in mechanical terms.

[0017] Yet another drawback, due to the above-mentioned kinematic complexity, lies in that the layering unit carries a high risk of failure of its component parts.

[0018] The object of the present invention is to overcome all the above-listed drawbacks typical of the machines deriving from the known state of the art.

[0019] In particular, the first object of the present invention is to produce a unit for layering carded webs that enables high rates of production while nonetheless retaining a lesser complexity of construction than the layering devices belonging to the known state of the art.

[0020] Another object of the invention is to produce a unit for layering carded webs that, by comparison with equivalent layering units deriving from the known state of the art, features fewer strains in its component parts.

[0021] A further object of the invention is to produce a unit for layering carded webs that enables the use of structural parts (e.g. the revolving cylinders) made of conventional materials.

[0022] Yet another object of the present invention is to produce a unit for layering carded webs that protects the web from the turbulence generated by the layering unit's kinematics without the need to add separator belts or partitions between the web and the machine.

[0023] The aforementioned objects are achieved by a unit for layering carded webs delivered by a feed unit that, in accordance with the details given in the main claim, comprises:

- at least one first conveyor belt and at least one second conveyor belt, both arranged so as to turn in a closed loop, with at least a part of one belt coming over and under the other so as to form a substantially "U" shape and thereby create a channel for guiding said web, with an inlet and an outlet;
- a plurality of revolving cylinders on which said conveyor belts are wound and suitable for ensuring their forward feed and tensioning;
- a stacking table situated underneath said conveyor belts and suitable for collecting said web arranged

in layers;

- at least one first retriever carriage comprising a structure supporting at least one retriever cylinder for said first and said second conveyor belts, in line with the bottom of said U-shaped part and at least one second retriever cylinder for said first conveyor belt;
- at least one second retriever carriage comprising a structure supporting at least one retriever cylinder for said second conveyor belt;
- at least one distributor carriage comprising a structure supporting at least one first winding distributor cylinder for said first conveyor belt, and at least a second winding distributor cylinder for said second conveyor belt, said first and second distributor cylinders forming said outlet from said guiding channel,

characterized in that said distributor carriage is situated in between said at least one first retriever carriage and said at least one second retriever carriage.

[0024] According to the preferred embodiment of the invention, the retriever carriages and distributor carriage move along a path parallel to the stacking table and, as they proceed, the retriever carriages always move in the same direction as the distributor carriage.

[0025] There is a constant distance between the first retriever cylinder forming part of the first retriever carriage and the retriever cylinder forming part of the second retriever carriage.

[0026] The layering unit of the invention has at least a part of the first conveyor belt lying between the distributor carriage and the first retriever carriage and at least a part of the second conveyor belt lying between the distributor carriage and the second retriever carriage, said sections of belt moving in directions substantially coinciding with each other and parallel to the stacking table.

[0027] The previously-mentioned objects are also achieved by a method for layering carded webs delivered by a feed unit in a layering unit of the type comprising:

- at least one first conveyor belt and at least one second conveyor belt, both arranged so as to turn in a closed loop, with at least a part of one belt coming over and under the other so as to form a substantially "U" shape and thereby create a channel for guiding said web, with an inlet and an outlet;
- a plurality of revolving cylinders on which said conveyor belts are wound and suitable for ensuring their forward feed and tensioning;
- a stacking table situated underneath said conveyor belts and suitable for collecting said web arranged in layers;
- at least one first retriever carriage comprising a structure supporting at least one retriever cylinder for said first and said second conveyor belts, in line with the bottom of said U-shaped part and at least one second retriever cylinder for said first conveyor belt;
- at least one second retriever carriage comprising a structure supporting at least one retriever cylinder for said second conveyor belt;
- at least one distributor carriage comprising a structure supporting at least one first winding distributor cylinder for said first conveyor belt, and at least a second winding distributor cylinder for said second conveyor belt, said first and second distributor cylinders forming said outlet from said guiding channel,

characterized in that said retriever carriages and said distributor carriage move parallel to said stacking table and always in the same direction.

[0028] Advantageously, since the distance between the first retriever carriage and the second retriever carriage is constant, the sections of the first and second conveyor belts coming between said carriages and the distributor carriage will always be of limited length, and always shorter than in equivalent layering machines made according to the known state of the art.

[0029] Also advantageously, since these sections of conveyor belt protect the layered web from the air turbulence generated by the layering unit, it is unnecessary to add any partitions between the layering unit and the layered web.

[0030] Another advantage lies in that, because these sections of belt are always of limited length, they run no risk of sagging onto the layered web, which can sometimes damage the end product.

[0031] A further advantage lies in that the movement of the retriever carriages and distributor carriage in the same direction and in the same sense enables the cylinders to turn at lower angular velocities and angular accelerations, and consequently with a lower inertia - for the same production rate - than in layering machines made according to the known state of the art.

[0032] Yet another advantage lies in the straightforward kinematics of the layering unit according to the invention, which means a less complex construction than for layering units made according to the known state of the art and, as a consequence, a lower cost of manufacture and a greater reliability.

[0033] The aforesaid objects and advantages are better illustrated in the description of preferred embodiments of the invention, which are provided as non-restrictive examples with reference to the attached drawings, wherein:

- fig. 1 is a schematic diagram of the layering unit according to the invention;
- fig. 2 is a schematic diagram of one embodiment of the layering unit according to the invention;
- figs. from 3a to 3c show a working sequence of the layering unit according to the invention;
- figs. from 4a to 4c show a working sequence of an embodiment of the layering unit according to the invention.

[0034] The unit for layering carded webs **V** delivered by a feed unit, forming the object of the present invention,

is schematically illustrated in fig. 1, where it is globally indicated by the numeral **1.**

[0035] The unit comprises a first conveyor belt **2** and a second conveyor belt **3,** that are each arranged so as to turn a closed loop and with at least a part of one belt coming over and under the other so as to form a substantially "U" shaped section **4**.

[0036] The shaped section **4** creates a channel **5** for guiding the web **V**, complete with an inlet **6** and an outlet **7.**

[0037] The conveyor belts **2, 3** are wound around a plurality of revolving cylinders **8** that ensure their forward feed and tensioning.

[0038] A stacking table **9** is provided underneath the conveyor belts **2, 3,** for collecting the web **V,** arranged in layers **F**.

[0039] These layers are created by a first retriever carriage **10,** a second retriever carriage **13** and a distributor carriage **15.**

[0040] The first retriever carriage **10** includes a structure supporting a first retriever cylinder **11** for the first conveyor belt **2** and the second conveyor belt **3,** coinciding with the bottom **4a** of the U-shaped section **4,** and a pair of second retriever cylinders **12** for the first conveyor belt **2.**

[0041] The second retriever carriage **13** comprises a structure supporting a retriever cylinder **14** for the second conveyor belt **3.**

[0042] The distributor carriage **15** includes a structure supporting a first winding distributor cylinder **16** for the first conveyor belt **2** and a pair of second winding distributor cylinders **17** for the second conveyor belt **3,** said first and second distributor cylinders **16, 17** forming the outlet **7** from the web-guiding channel **5**.

[0043] According to the invention, the distributor carriage **15** is situated in between the retriever carriages **10, 13.**

[0044] According to the preferred embodiment of the invention, the retriever carriages **10, 13** and the distributor carriage **15** move along a path **X** parallel to the stacking table **9** and, when in motion, said retriever carriages **10, 13** always move in the same direction as the distributor carriage **15.**

[0045] There is a constant distance separating the first retriever cylinder **11** forming part of the first retriever carriage **10,** and the retriever cylinder **14** forming part of the second retriever carriage **13.**

[0046] The first conveyor belt **2** has a section **20** coming between the distributor carriage **15** and the first retriever carriage **10;** to be more precise, as shown in fig. 1, said section **20** comes between the first distributor cylinder **16** in the distributor carriage **15** and the pair of second retriever cylinders **12** in the first retriever carriage **10.**

[0047] Similarly, the second conveyor belt **3** has a section **21** coming between the distributor carriage **15** and the second retriever carriage **13;** to be more precise, said section **21** comes between the pair of second distributor cylinders **17** forming part of the distributor carriage **15** and the retriever cylinder **14** forming part of the second retriever carriage **13.**

[0048] Said sections **20, 21** of the first conveyor belt **2** and second conveyor belt **3** follow a path **Y** parallel to the stacking table **9** and form a surface that separates the inside of the layering unit **1** from the web **V** arranged in layers **F.**

[0049] This has the advantage of separating the layering unit **1** from the web **V** arranged in layers **F,** thereby protecting the latter from the turbulence generated by the movements of the layering unit **1,** with no need to add any further protective partitions.

[0050] Fig. 1 also shows that the web-guiding channel **5** has a section **22** following a path **Z** leading to the stacking table **9** containing the layered web **V.**

[0051] Said section **22** slopes downwards and is needed to bring the web **V** from the feed area **18** to the distributor carriage **15.**

[0052] The movement of the retriever carriages **10, 13** and distributor carriage **15** is assured by means of two distinct motors, which are electronically synchronized by means of an electronic control unit.

[0053] This offers the advantage of avoiding the need to use mechanical drive shafts, thus further reducing the inertia in the layering unit.

[0054] It also carries the advantages of a further improvement in the performance and reduction in the complexity of the servicing needs for the layering unit according to the invention.

[0055] According to one embodiment, illustrated in fig. 2 and globally indicated by the numeral **100,** the first retriever carriage **110** comprises a first retriever half-carriage **130,** that includes the first retriever cylinder **111,** and a second retriever half-carriage **131** that includes the pair of second retriever cylinders **112.**

[0056] In this embodiment, the section **120** of the first conveyor belt **102** comes between the distributor carriage **115** and the second retriever carriage **131,** the latter being positioned alongside the first half-carriage **130** on the side opposite the distributor carriage **115.**

[0057] In operating terms, the carded web **V,** delivered by the feed unit is laid on the second conveyor belt **3,** which, in moving forward, carries the web inside the guiding channel **5** through the inlet **6.**

[0058] As it moves along inside the guiding channel **5**, the web **V** is protected by the first conveyor belt **2** extending above it.

[0059] As the conveyor belts **2, 3** move forward, the web **V** covers the descending section **22** of the guiding channel **5**, reversing the direction in which it travels when it reaches the bottom **4a** of the U-shaped section **4** and finally coming up to the distributor carriage **15,** from where it exits in a vertical direction, through the outlet **7,** to become arranged in layers **F** on the stacking table **9.**

[0060] The sequence of figures from **3a** to **3c** shows a succession of moments in the working cycle of the layering unit **1** according to the invention, specifically showing that the first retriever carriage **10** and the second re-

triever carriage **13** move along the same path **X** and in the same direction due to the movement of the distributor carriage **15.**

[0061] Said movement in the same direction of the retriever carriages **10, 13** and of the distributor carriage **15** offers the advantage that the acceleration of the cylinders, when they change direction in the normal layering procedure, is lower than in equivalent layering machines made according to the known state of the art, wherein the retriever carriages are either fixed or they have a reciprocating motion with respect to the distributor carriage.

[0062] This enables a reduction in the inertia, and consequently allows for the use of conventional materials for the construction of the component parts of the layering unit **1.**

[0063] In addition, the retriever carriages **10, 13** are distinctive in that they have the same rate of displacement, so that the distance between them remains constant.

[0064] This means that the distances between said retriever carriages **10, 13** and the distributor carriage **15** remain limited, since the latter has a higher rate of displacement.

[0065] This is due particularly to the fact that the distributor carriage **15** is always situated in between the two retriever carriages **10, 13.**

[0066] As a result, there is the particular advantage that the sections **20, 21** of the conveyor belts **2, 3** are always short and the risk of their sagging, which could damage the web **V** being arranged in layers **F** is thus avoided.

[0067] Moreover, there is the advantage that, for the same risk of sagging, longer layers of web can be obtained.

[0068] The mobility of the first retriever carriage **10** also means that the descending section **22** of the web-guiding channel 5 has a gradient that varies with the movement of the first retriever carriage **10** and is always less than the gradient of the corresponding descending section of similar layering machines made according to the known state of the art.

[0069] Since the gradient of the descending sections is one of the causes of web damage, this means there is the advantage that the descending section of the layering unit according to the present invention carries a lower risk of damaging the web than the corresponding descending sections of known layering units.

[0070] As for the embodiment involving the division of the first retriever carriage **110** into two half-carriages **130, 131,** the advantages become apparent at the two points where the direction in which they move is reversed.

[0071] The point on the right-hand side where the direction of movement is reversed is shown in the operating sequence shown in figs. from 4a to 4c.

[0072] According to the preferred embodiment described herein, at this reversing point, when the first retriever half-carriage **130** and the second retriever carriage **113** stop, the distributor carriage **115** and the second retriever half-carriage **131** are still decelerating, the latter with a more accentuated deceleration than the distributor carriage **115.**

[0073] When the distributor carriage **115,** the second retriever carriage **113** and the first retriever half-carriage **130** move on, while the second retriever half-carriage **131** remains at a standstill, the distributor carriage **115** accelerates less than the second retriever carriage **113** or the first retriever half-carriage **130.**

[0074] As a result, at the point where the direction is reversed, the second retriever half-carriage **131,** together with the distributor carriage **115,** performs a relative movement, with respect to the first retriever half-carriage **130** and to the second retriever carriage **113,** that creates a sort of magazine for the conveyor belts **102, 103** and for the web **V**.

[0075] In fact, we know that the conveyor belts **102, 103** and the web **V** proceed at a constant rate, while the carriages **110, 113** and **115** must stop and change direction every time they reach an edge of the layers **F.**

[0076] Said situation poses a risk of the web piling up and this is generally prevented by adding kinematic devices of known type.

[0077] To further reduce the structural complexity and increase the productivity of the layering unit according to the present invention by comparison with known layering units, said kinematic devices are eliminated in the embodiment described herein by dividing the first retriever carriage **110** into two retriever half-carriages **130, 131** so as to create the aforesaid magazine.

[0078] In fact, as shown in the operating sequence illustrated in figs. 4a to 4c, when the direction of movement is reversed, the distance **L1** between the first retriever half-carriage **130** and the second retriever half-carriage **131** is shortened until it reaches the distance **L2.**

[0079] At the same time, the section 140 of the web-guiding channel 105 is extended by a length **L1-L2,** thus taking up the extra web.

[0080] Once the direction has changed, said extra web is released.

[0081] At the second point where the direction changes, i.e. on the left-hand side, the sequence is repeated in the same way.

[0082] To be more precise, when the second retriever half-carriage **131** stops, the distributor carriage **115,** the first retriever half-carriage **130** and the second retriever carriage **113** are still decelerating, since the latter have a more accentuated deceleration than the distributor carriage **115.**

[0083] When the distributor carriage **115** and the second retriever half-carriage **131** move on again, while the second retriever carriage **113** and the first retriever half-carriage **130** are still not moving, the distributor carriage **115** accelerates less than the second retriever half-carriage **131.**

[0084] Here again, therefore, at the point where the direction changes, the second retriever half-carriage

131, together with the distributor carriage **115,** performs a relative movement, with respect to the first retriever half-carriage **130** and to the second retriever carriage **113,** that again creates a sort of magazine for the conveyor belts **102, 103** and for the web **V.**

[0085] The above movements are described simply as a non-restrictive example.

[0086] In fact, various operating sequences can be used, all of which share the feature of achieving a relative movement between the two half-carriages, together with the distributor carriage and the second retriever carriage, so as to create a virtual magazine between the half-carriages and the distributor carriage.

[0087] In the light of the above, the unit for layering carded web according the present invention achieves all the established objects.

[0088] In particular, thanks to the movement of the first and second retriever carriages, the unit for layering carded webs according to the present invention achieves the object of enabling a high rate of production while retaining a low rate of rotation of the cylinders forming part of said carriages.

[0089] This means that the invention achieves the object of ensuring that cylinders made of steel or other standard materials can be installed in the layering unit, which is not the case of layering units of known type, because of the high speeds involved.

[0090] The unit for layering carded webs according to the present invention also achieves the object of being particularly reliable, thanks to its global structural simplicity.

[0091] To be more precise, the unit for layering carded webs according to the present invention achieves the object of enabling high processing speeds while nonetheless retaining a lesser complexity of construction than layering machines made according to the known state of the art.

[0092] Thanks to its low inertia and simplified kinematics, the unit for layering carded webs according to the present invention also achieves the object of not submitting any of its components to severe stresses and thereby causing their failure.

[0093] Finally, thanks to the sections of the two conveyor belts coming between the layering unit and the layered web, the unit for layering carded webs according to the present invention achieves the object of protecting the web from the turbulence generated by the kinematics of the layering unit without the need to add separator belts or partitions between the web and the machine.

[0094] In the industrial engineering stage, the unit for layering carded webs according to the present invention may be modified and further embodiments may be developed that will still be protected by the present patent, provided that they come within the concept of the present invention, even if they are not illustrated in the drawings or described herein.

Claims

1. Layering unit (1; 100) for carded webs (V) delivered by a feed unit, of the type comprising:

- at least one first conveyor belt (2; 102) and at least one second conveyor belt (3; 103), both arranged so as to turn in a closed loop, with at least a part of one belt coming over and under the other so as to form a substantially "U" shape (4; 104) and thereby creating a channel (5; 105) for guiding said web (V) with an inlet (6; 106) and an outlet (7; 107);
- a plurality of revolving cylinders (8; 108), whereon said conveyor belts (2, 3; 102, 103) are wound and suitable for ensuring their forward feed and tensioning;
- a stacking table (9; 109) placed underneath said conveyor belts (2, 3; 102, 103) and suitable for collecting said web (V) arranged in layers (F);
- at least one first retriever carriage (10; 110) comprising a structure supporting at least one first retriever cylinder (11; 111) for said first and said second conveyor belts (2, 3; 102, 103), in line with the bottom (4a; 104a) of said U-shaped section (4; 104), and at least one second retriever cylinder (12; 112) for said first conveyor belt (2; 102);
- at least one second retriever carriage (13; 113) comprising a structure supporting at least one retriever cylinder (14; 114) for said second conveyor belt (3; 103);
- at least one distributor carriage (15; 115) comprising a structure supporting at least one first winding distributor cylinder (16; 116) for said first conveyor belt (2; 102) and at least one second winding distributor cylinder (17; 117) for said second conveyor belt (3; 103), said first and second distributor cylinders (16, 17; 116, 117) forming said outlet (7; 107) from said web-guiding channel (5; 105),

characterized in that said distributor carriage (15; 115) is situated in between said at least one first retriever carriage (10; 110) and said at least one second retriever carriage (13; 113).

2. Layering unit (1; 100) as in claim 1) **characterized in that** said retriever carriages (10, 13; 110, 113) and said distributor carriage (15; 115) move along a path (X) parallel to said stacking table (9; 109), said retriever carriages (10, 13; 110, 113) always moving in the same direction as said distributor carriage (15; 115).

3. Layering unit (1; 100) as in claim 2) **characterized in that** it has a plurality of motors suitable for driving said retriever carriages (10, 13; 110, 113) and said

distributor carriage (15; 115) along said path (X).

4. Layering unit (1) as in claim 1) **characterized in that** there is a constant distance between said first retriever cylinder (11) forming part of said first retriever carriage (10) and said retriever cylinder (14) forming part of said second retriever carriage (13).

5. Layering unit (1) as in claim 1) **characterized in that** said first conveyor belt (2) has at least a section (20) coming between said distributor carriage (15) and said first retriever carriage (10), and **in that** said second conveyor belt (3) has at least a section (21) coming between said distributor carriage (15) and said second retriever carriage (13).

6. Layering unit (100) as in claim 1) **characterized in that** said first retriever carriage (110) is composed of a first retriever half-carriage (130) including at least said first retriever cylinder (111), and a second retriever half-carriage (131), including at least said second retriever cylinder (112).

7. Layering unit (100) as in claim 6) **characterized in that** said first and second retriever half-carriages (130, 131) are placed side by side, said first retriever half-carriage (130) being situated in between said second retriever half-carriage (131) and said distributor carriage (115).

8. Layering unit (100) as in claim 6) **characterized in that** said first conveyor belt (102) has at least a section (120) coming between said distributor carriage (115) and said second retriever half-carriage (131), and **in that** said second conveyor belt (103) has at least a section (121) coming between said distributor carriage (115) and said second retriever carriage (113).

9. Layering unit (1; 100) as in claim 5) or 8) **characterized in that** said sections (20, 21; 120, 121) of said first conveyor belt (2; 102) and said second conveyor belt (3; 103) follow paths (Y) substantially parallel to said stacking table (9; 109).

10. Layering unit (1; 100) as in claim 1) **characterized in that** said web-guiding channel (5; 105) has at least a section (22; 122) on a gradient (Z) leading to said stacking table (9).

11. Method for layering carded webs (V) delivered by a feed unit to a layering unit (1; 100) of the type comprising:

- at least one first conveyor belt (2; 102) and at least one second conveyor belt (3; 103), both arranged so as to turn in a closed loop, with at least a part of one belt coming over and under the other so as to form a substantially "U" shape (4; 104) and thereby creating a channel (5; 105) for guiding said web (V) with an inlet (6; 106) and an outlet (7; 107);
- a plurality of revolving cylinders (8; 108), whereon said conveyor belts (2, 3; 102, 103) are wound and suitable for ensuring their forward feed and tensioning;
- a stacking table (9; 109) placed underneath said conveyor belts (2, 3; 102, 103) and suitable for collecting said web (V) arranged in layers (F);
- at least one first retriever carriage (10; 110) comprising a structure supporting at least one first retriever cylinder (11; 111) for said first and said second conveyor belts (2, 3; 102, 103), in line with the bottom (4a; 104a) of said U-shaped section (4; 104), and at least one second retriever cylinder (12; 112) for said first conveyor belt (2; 102);
- at least one second retriever carriage (13; 113) comprising a structure supporting at least one retriever cylinder (14; 114) for said second conveyor belt (3; 103);
- at least one distributor carriage (15; 115) comprising a structure supporting at least one first winding distributor cylinder (16; 116) for said first conveyor belt (2; 102) and at least one second winding distributor cylinder (17; 117) for said second conveyor belt (3; 103), said first and second distributor cylinders (16, 17; 116, 117) forming said outlet (7; 107) from said web-guiding channel (5; 105),

characterized in that said retriever carriages (10, 13; 110, 113) and said distributor carriage (15; 115) move along a path (X) parallel to said stacking table (9; 109) and always in the same direction.

12. Method as in claim 11) **characterized in that** said distributor carriage (15; 115) is situated in between said at least one first retriever carriage (10; 110) and said at least one second retriever carriage (13; 113).

13. Method as in claim 11) **characterized in that** the speed variations along said path (X) of said first retriever cylinder (11; 111) in said first retriever carriage (10; 110) are always the same as the speed variations along said path (X) of said retriever cylinder (14; 114) in said second retriever carriage (13; 113).

14. Method as in claim 11) **characterized in that** the speed variations along said path (X) of said first retriever cylinder (11; 111) in said first retriever carriage (10; 110) and of said retriever cylinder (14; 114) in said second retriever carriage (13; 113) are greater than the speed variations along said path (X) of said distributor carriage (15; 115) when said second

retriever cylinder (12; 112) in said first retriever carriage (10; 110) stops on its way along said path (X).

15. Method as in claim 11) **characterized in that** the speed variations along said path (X) of said second retriever cylinder (12; 112) in said first retriever carriage (10; 110) are greater than the speed variations along said path (X) of said distributor carriage (15; 115) when said first retriever cylinder (11; 111) in said first retriever carriage (10; 110) and said retriever cylinder (14; 114) in said second retriever carriage (13; 113) stop on their way along said path (X).

16. Method as in claim 11) **characterized in that** the gradient of at least a section (22; 122) of said web-guiding channel (5; 105) is variable in time, said section (22; 122) moving in a direction (Z) substantially leading to said stacking table (9; 109).

17. Layering unit as illustrated and described herein.

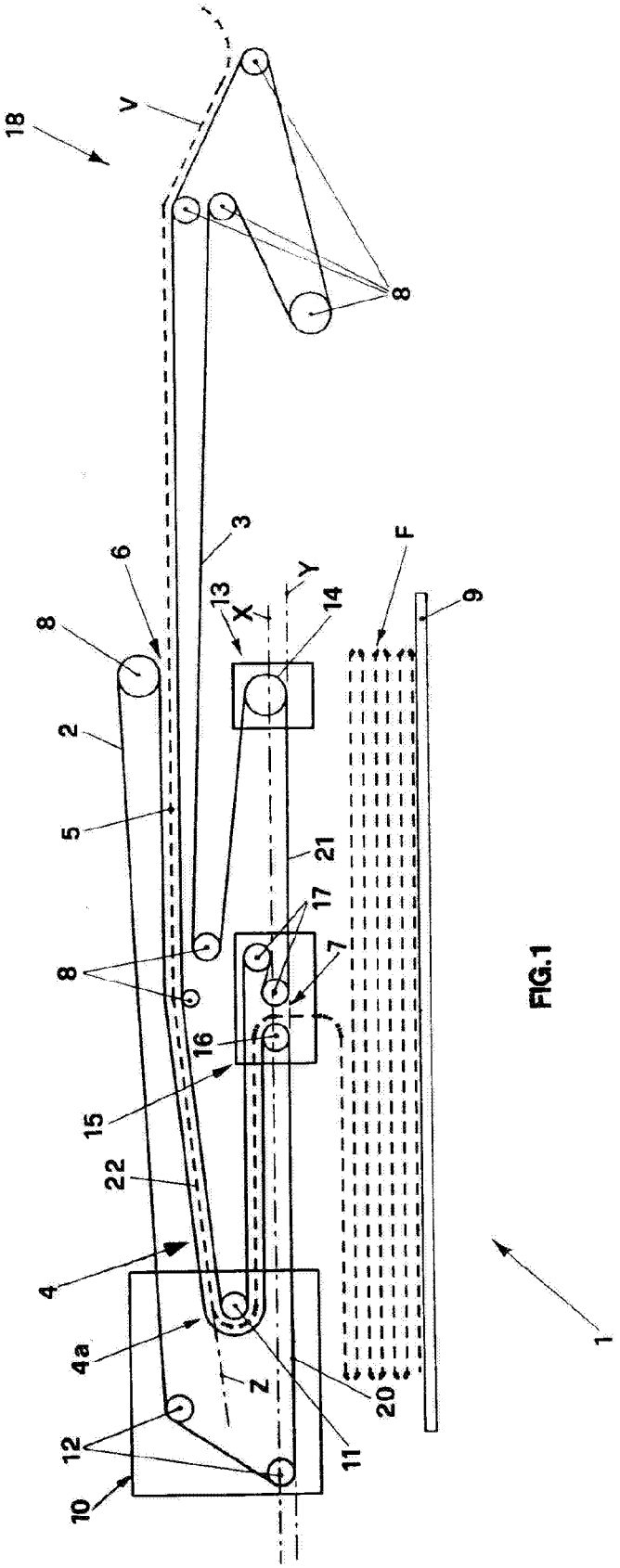


FIG.1

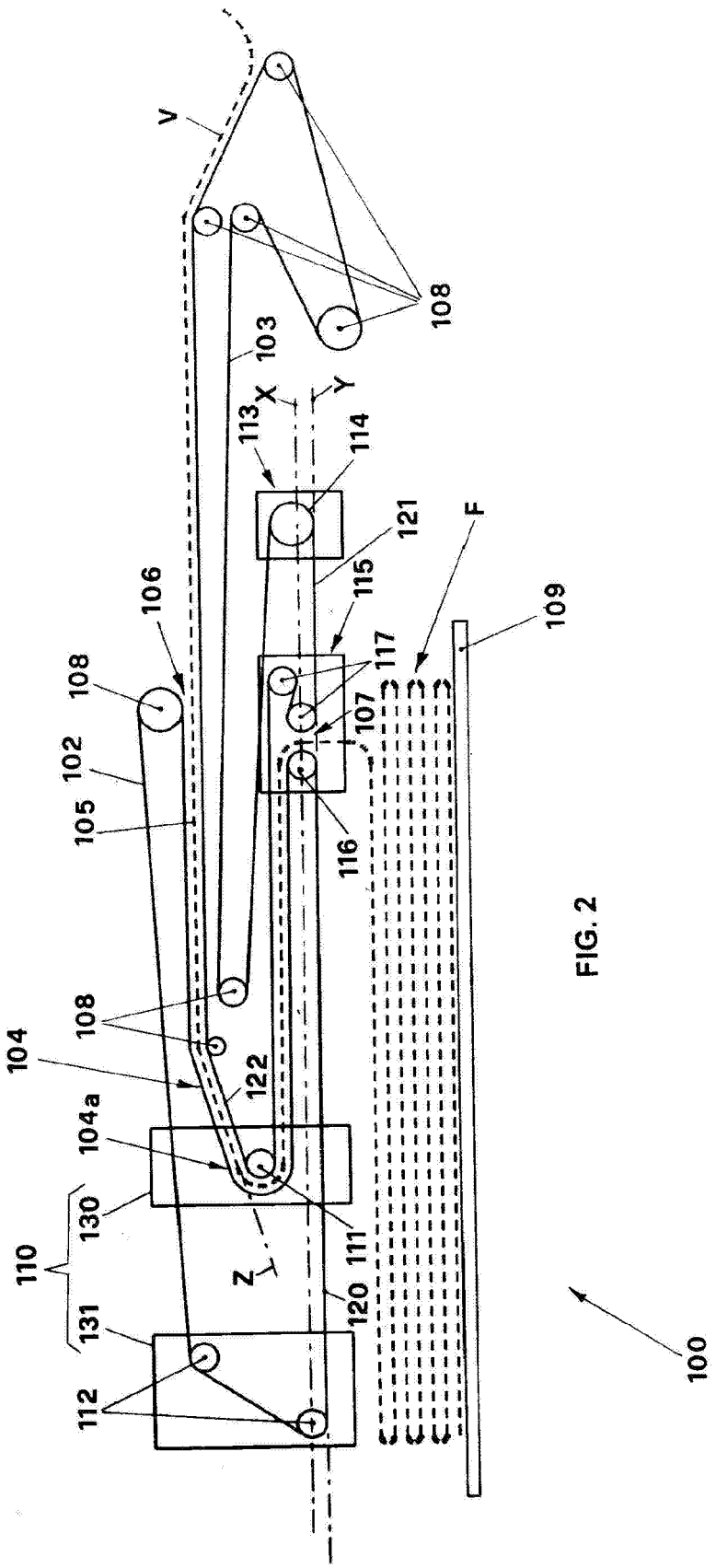

V
108
103
X
Y
113
114
121
F
106
115
109
108
117
107
102
105
116
108
104
122
104a
130
110
111
Z
120
131
112
100

FIG. 2

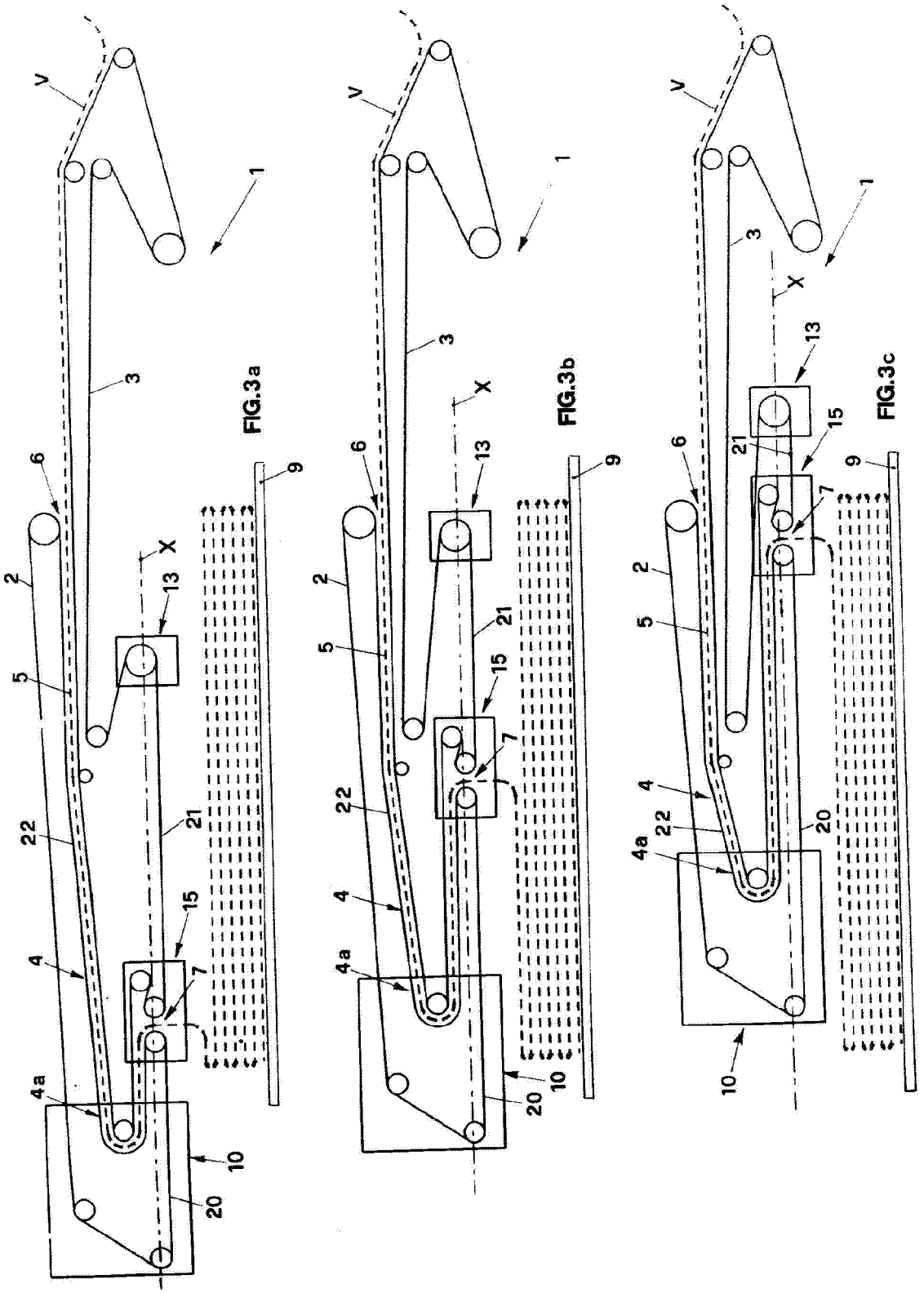


FIG.3a

FIG.3b

FIG.3c

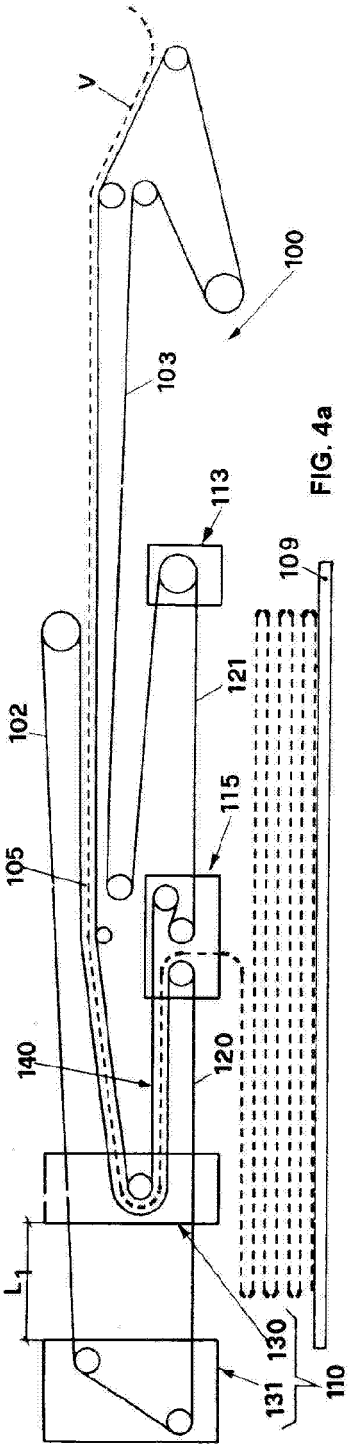


FIG. 4a

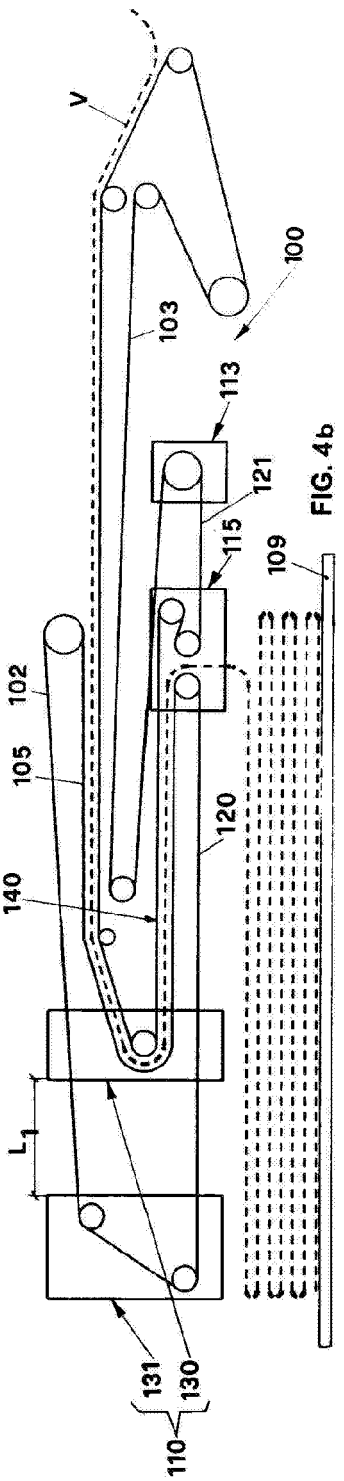


FIG. 4b

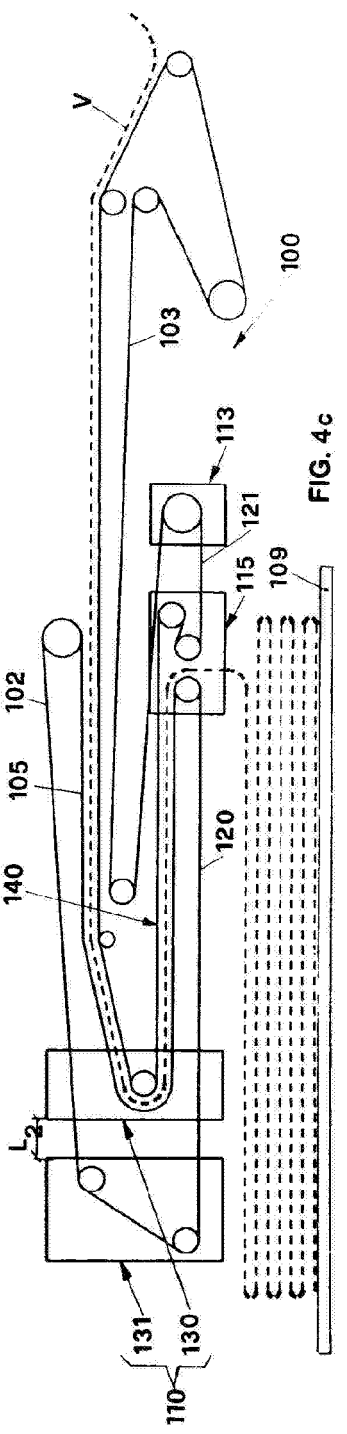


FIG. 4c

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EUROPEAN SEARCH REPORT

Application Number
EP 05 10 6993

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 March 2006	D'Souza, J

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