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(54) **FORMING SECTION**

BLATTBILDUNGSPARTIE

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Description

TECHNICAL FIELD

[0001] The invention relates to a paper or board machine forming section according to the preamble of claim 1.

BACKGROUND ART

[0002] WO publication 2009/068728 discloses a hybrid forming section comprising a lower wire loop which constitutes a first single wire section following a breast roll. The beginning of the first single wire section comprises a first dewatering zone which consists of at least one stationary, first forming shoe and a pulsating strip cover following it. The first forming shoe comprises a straight cover provided with through holes and under pressure affecting through the holes of the cover. The holes are constituted of openings or slots substantially in the longitudinal direction of the machine, whereby non-pulsating dewatering is applied on the stock travelling on top of the lower wire. The forming section further comprises a first multilayer head box for supplying a slice jet at the beginning of the first forming shoe. A first upper wire loop forms a first twin wire section with the lower wire loop after the first forming shoe. Figures 5 and 6 disclose formers with two separate partial forming units. The first twin wire section of the hybrid former is followed by a second upper wire unit in which the second upper wire forms a second single wire section. A second single layer head box supplies a slice jet at the beginning of the second single wire section. The first partial web formed in the hybrid former and the second partial web formed on the second upper wire loop are combined in a joining point formed by an inner roll of the second upper wire loop and the lower wire loop. The joining point is followed by a short twin wire section on which the joining of the two partial webs is secured. The combined web is then conducted with the lower wire loop to the pick up point. The upper part of the lower wire loop is essentially straight.

[0003] FI patent 121147 (corresponding to DE 10 2009 027 143 A1) discloses a pre-press, a forming section and an apparatus for producing a multi layer web. The forming section in Figure 6 comprises a first wire loop for forming a first partial web and a second wire loop for forming a second partial web. The first wire loop has a first essentially horizontal forming section followed by a second downwardly directed section. The second wire loop has also a first essentially horizontal forming section followed by a second downwardly directed section. The first and the second wire are joined on the downwardly directed section in a pre-press nip. The travel direction of the wires is turned into a horizontal travel direction after the pre-press nip with a turning roll situated within the second wire loop. The combined web is then conducted with the first wire to a pick up point.

[0004] Problem of the prior art multiply forming sections is that the height of the former is very high and that causes very complicated forming section structures and leads to very expensive solutions.

SUMMARY OF THE INVENTION

[0005] The object of the invention is to achieve a compact paper or board machine forming section.

[0006] The forming section according to the invention is characterized by the features in the characterizing portion of claim 1.

[0007] The forming section according to the invention comprises:

- a first wire loop passing over a first breast roll and forming a first single wire forming section in a first direction after the first breast roll,
- a first head box for supplying a slice jet on the first wire loop at the beginning of the first single wire forming section to form a first web,
- a first turning roll within the first wire loop for directing the first wire loop into a downwards inclined slope after the first single wire forming section,
- a second wire loop passing over a second breast roll and forming a second single wire forming section in a second direction after the second breast roll, said second direction being opposite to the first direction,
- a second head box for supplying a slice jet on the second wire loop at the beginning of the second single wire forming section to form a second web,
- a second turning roll within the second wire loop for directing the second wire loop into a downwards inclined slope after the second single wire forming section,
- a joining roll within the second wire loop after the second turning roll forming a joining point to the first web and to the second web between the first wire loop and the second wire loop, said joining point being below the horizontal level of the first single wire forming section,
- the first single wire forming section and the second single wire forming section being essentially on the same horizontal level, and further
- a pick-up unit within a pick-up fabric loop forming a pick-up point between the first wire loop and the pick-up fabric loop.

[0008] In the former according to the invention, the first wire loop and the second wire loop are joined together in the joining point for combining the first web and the second web to be a combined web such that the first wire loop and the second wire loop are wrapped around the joining roll by a wrap angle α, and that after the joining roll the first wire loop is separated from the second wire loop for transferring the combined web to the pick-up point such that the first wire loop travels in a horizontal or upward inclined direction between the joining point and the pick-up point.

[0009] The forming section according to the invention preferably comprises at least one additional wire loop for forming at least one twin wire section with the first wire loop or with the second wire loop.

[0010] The forming section according to the invention is compact and it is easy to be converted to various web grades. The former can be used in a first embodiment for producing a three layer board web with the smooth surface facing upwards or in a second embodiment for producing a three layer board web with the smooth surface facing downwards. The first embodiment is achieved when the additional wire loop is positioned in connection with the first wire loop and the second embodiment is achieved when the additional wire loop is positioned in connection with the second wire loop. The first framework comprises vertical support beams with first support points at the upper end and the second framework comprises vertical support beams with second support points at the upper end, said first and second support points being adapted to receive third support points at the lower ends of vertical support beams of the third framework.

[0011] The first wire loop is preferably supported at least on a first framework comprising horizontal and vertical support beams with first support points and the second wire loop is preferably supported at least on a second framework comprising horizontal and vertical support beams with second support points, said horizontal support beams of the first framework being on the same horizontal level with the horizontal support beams of the second framework. An additional wire loop can be supported on an additional framework comprising horizontal and vertical support beams with additional support points for connecting said additional framework to the first framework and/or to the second framework.

[0012] When the former is followed by a SymPress B press section there is a need to have the smooth surface facing downwards in the web produced by the former. The smooth surface facing downwards of the web produced in the former will settle against the smooth centre roll in the SymPress B press section.

[0013] When the former is followed by an OptiPress press section there might be a need to have the smooth surface facing upwards in the web produced by the former. The smooth surface facing upwards of the web produced in the former will settle against the smooth upper fabric in the OptiPress press section.

[0014] The forming section according to the invention can also comprise at least one additional wire loop for forming at least one twin wire section with the first wire loop and at least one additional wire loop for forming at least one twin wire section with the second wire loop.

[0015] The former can also be used in a third embodiment for producing a four layer board web. This third embodiment is achieved by positioning a first third wire loop in connection with the first wire loop and by positioning a second third wire loop in connection with the second wire loop.

[0016] The total height of the former according to the invention is less than 7 m in all embodiments. The height of a corresponding prior art former is more than 10 m. The fact that the joining point for joining the first partial web and the second partial web is clearly below the level of the first single wire forming section makes it possible to position the second single wire forming section on the same horizontal level as the first single wire section. The total height of the former will be the same in all four embodiments. The drive motors and other equipment on the drive side will in a lower former be on a lower level, which means that the requirements for the frameworks are less rigid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Some specific embodiments of the invention are described in the following in detail with reference to the accompanying figures, in which:

Figure 1 shows a first embodiment of a forming section according to the invention.

Figure 2 shows a second embodiment of a forming section according to the invention.

Figure 3 shows a third embodiment of a forming section according to the invention.

Figure 4 shows a fourth embodiment of a forming section according to the invention.

DETAILED DESCRIPTION OF SOME SPECIFIC EMBODIMENTS

[0018] Figure 1 shows a first embodiment of a forming section according to the invention. The former comprises a first wire loop 11 passing over a first breast roll 12 and forming a first single wire forming section S1 in a first direction D1 after the first breast roll 12. A first head box 100 supplies a first slice jet at the beginning of the first single wire forming section S1. The former comprises further a second wire loop 21 passing over a second breast roll 22 and forming a second single wire forming section S2 in a second direction D2 after the second breast roll 22. The second direction D2 is opposite to the first direction D1. A second head box 110 supplies a second slice jet at the beginning of the second single wire forming section S2. The first single wire forming section S1 and the second single wire forming section S2 are essentially horizontal.

[0019] The former comprises further an additional wire loop or in other words a third wire loop 31 forming a first twin wire section T1 with the first wire loop 11. The first twin wire section T1 follows immediately after the first single wire section S1. The third wire loop 31 is situated above the first wire loop 11.

[0020] The first wire loop 11 comprises further a first turning roll 13 being situated within the first wire loop 11

for turning the running direction of the first wire 11 to a downwardly directed inclined run.

[0021] The second wire loop 21 comprises a second turning roll 23 being situated within the second wire loop 21 for turning the direction of the second wire loop 21 into a downwards inclined run. The second wire loop 21 comprises further a first joining roll 24 being situated within the second wire loop 21 and forming a joining point J1 with the first wire loop 11.

[0022] The first partial web W1 formed in the first hybrid forming section S1, T1 is joined with the second partial web W2 formed in the second single forming section S2 in said joining point J1. After the joining point J1 the combined web W is wrapped along the first joining roll 24 between the first wire loop 11 and the second wire loop 21 by a wrap angle α, which is between 15° - 90°. This ensures good bond strength of the combined web W and makes possible to create low forming section structure. After the first joining roll 24 wrap angle α follows an upwardly directed inclined run during which the second wire 21 is separated from the first wire 11 and directed to the return rotation. The combined web W is attached to the first wire 11 at the point where the second wire 21 is separated from the first wire 11 with suitable suction means. The final combined web W travels thereafter further on the horizontal run or on the upwards inclined run of the first wire 11 to a pick-up point PP. This ensures that whole forming section height remains low and forming section frames can be easily transformable to various paper grades. The final combined web W is transferred in the pick-up point PP from the first wire 11 with a pick-up unit 210 being situated within a pick-up fabric loop 200. The pick-up unit 210 forms a pick-up point PP with the first wire 11. The pick-up unit is preferably a suction box or a suction roll. The first wire 11 is directed to the return rotation after the pick-up point PP. The lowest point of the joining roll 24 is on the same level or on a lower level than the lowest point of the pick-up unit 210.

[0023] The first head box 100 is advantageously a two layer head box and the second head box 110 is advantageously a one layer head box in this first embodiment of the invention. The lower surface of the second partial web W2 formed in the second single wire section S2 will form the smooth top surface of the final combined web W. Said lower surface of the second partial web W2 will be situated against the second wire 21 in the second single wire section S2. The smooth top surface of the final combined three layer web W will be the surface of the board that is to be printed.

[0024] The first wire loop 11 is supported on a first framework F1, the second wire loop 21 is supported on a second framework F2 and the third wire loop 31 is supported on a third framework F3. The first F1, second F2 and third F3 framework all comprises horizontal and vertical support beams. Two of the vertical support beams V1a, V1b at the tending side of the former in the first framework F1 comprise first support points P1a, P1b that have been adapted to receive corresponding third support points P3a, P3b of the vertical support beams V3a, V3b at the tending side of the third framework F1. There are naturally corresponding vertical support beams on the drive side of the former i.e. four vertical support beams all together. The support points P1a, P1b and P3a, P3b can be formed of flanges positioned at the ends of the support beams. The flanges could be fastened with bolts. There are further two vertical support beams V2a, V2b at the tending side of the former in the second framework F2, which are also adapted to receive the third framework F3. The latter portion of the first wire loop 11 after the joining point J1 is supported on the lower portion of the second framework F2.

[0025] Figure 2 shows a second embodiment of a forming section according to the invention. This second embodiment corresponds to the first embodiment shown in Figure 1 except for the position of the additional wire loop 31. The additional wire loop or in other words the third wire loop 31 forms a first twin wire section T1 with the second wire loop 21 in this embodiment. The additional third wire loop 31 in this second embodiment is a mirror image of the third wire loop 31 in the first embodiment.

[0026] The first turning roll 13 in the first wire loop 11 is advantageously supported on a first swinging arm 13a. The first swinging arm 13a of the first turning roll 13 in the first wire loop 11 is arranged in the first embodiment in Figure 1 in an upper position when acting in the first twin wire section T1 and in this second embodiment in a lower position. A first guide roll 15 in the first wire 11 loop can be moved as shown by the arrow in the Figures in order to adapt the length of the first wire loop 11 depending on the position of the first turning roll 13 in the first wire loop 11.

[0027] The second turning roll 23 in the second wire loop 21 is also supported on a second swinging arm 23a. The second swinging arm 23a of the second turning roll 23 in the second wire loop 21 is arranged in the first embodiment in Figure 1 in a lower position and in this second embodiment in an upper position when acting in the first twin wire section T1. A second guide roll 25 in the second wire 21 loop can be moved as shown by the arrow in the Figures in order to adapt the length of the second wire loop 21 depending on the position of the second turning roll 23 in the second wire loop 21.

[0028] The first partial web W1 formed in the first single forming section S1 is joined with the second partial web W2 formed in the second hybrid forming section S2, T1 in a joining point J1. After the joining point J1 the combined web W is wrapped along the first joining roll 24 between the first wire loop 11 and the second wire loop 21 by a wrap angle α, which is between 15° - 90°. After the first joining roll 24 wrap angle α follows an upwardly directed inclined run during which the second wire 21 is separated from the first wire 11 and directed to the return rotation. The combined web W is attached to the first wire 11 at the point where the second wire 21 is separated from the first wire 11 with suitable suction means. The final combined web W travels thereafter further on the

horizontal run or on the upwards inclined run of the first wire 11 to a pick-up point PP. The lowest point of the joining roll 24 is on the same level or on a lower level than the lowest point of the pick-up unit 210.

[0029] The first head box 100 is advantageously a one layer head box and the second head box 110 is advantageously a two layer head box in this second embodiment of the invention. The lower surface of the first partial web W1 formed in the first single wire section S1 will form the smooth bottom surface of the final combined web W. Said lower surface of the first partial web W1 will be situated against the first wire 11 in the first single wire section S 1. The smooth bottom surface of the final combined three layer web W will be the surface of the board that is to be printed.

The first wire loop 11 is supported on the first framework F1, the second wire loop 21 is supported on the second framework F2 and the third wire loop 31 is supported on the third framework F3. The first F1, the second F2 and the third F3 framework all comprise horizontal and vertical support beams. Two of the vertical support beams V2a, V2b at the tending side of the former in the second framework F2 comprise second support points P2a, P2b adapted to receive corresponding third support points P3a, P3b of the vertical support beams V3a, V3b at the tending side of the third framework F3. There are naturally corresponding vertical support beams on the drive side of the former i.e. there are four vertical support beams all together. The support points P2a, P2b and P3a, P3b can be formed of flanges positioned at the ends of the support beams. The flanges could be fastened with bolts. The first F1 and the second F2 frameworks are thus as such ready to receive the third framework F3 without any changes in said frameworks. It is thus easy to modify the former according to the invention to be either a former according to figure 1 or a former according to figure 2. The only thing that needs to be done is to change the position of the third wire loop 31, to change the position of the first turning roll 13, to change the position of the second turning roll 23 and to swap the head boxes 100, 110. The latter portion of the first wire loop 11 after the joining point J1 is supported on the lower portion of the second framework F2.

[0030] It is naturally also possible to use a first additional wire loop 31 in connection with the first wire loop 11 and a second additional wire loop 41 in connection with the second wire loop 21. Both head boxes 100, 110 would thus be preferably two layer head boxes. This third embodiment of a former according to the invention is shown in figure 3. In this third embodiment of the invention the former comprises a first wire loop 11 passing over a first breast roll 12 and forming a first single wire forming section S1 in a first direction D1 after the first breast roll 12. A first head box 100 supplies a first slice jet at the beginning of the first single wire forming section S1. The former comprises further a second wire loop 21 passing over a second breast roll 22 and forming a second single wire forming section S2 in a second direction D2 after the second breast roll 22. The second direction D2 is opposite to the first direction D1. A second head box 110 supplies a second slice jet at the beginning of the second single wire forming section S2.

[0031] The former comprises further a first additional wire loop 31 forming a first twin wire section T1 with the first wire loop 11. The first twin wire section T1 follows immediately after the first single wire section S 1. The first additional wire loop 31 is situated above the first wire loop 11. The former further comprises a second additional wire loop 41 forming a second twin wire section T2 with the second wire loop 21. The second twin wire section T2 follows immediately after the second single wire section S2. The second additional wire loop 31 is situated above the second wire loop 21. The second additional wire loop 41 is a mirror image of the first additional wire loop 31.

[0032] The first turning roll 13 in the first wire loop 11 is advantageously supported on a first swinging arm 13a. The first swinging arm 13a of the first turning roll 13 in the first wire loop 11 is arranged in an upper position when acting with the first twin wire section T 1.

[0033] The second turning roll 23 in the second wire loop 21 is also supported on a second swinging arm 23a. The second swinging arm 23a of the second turning roll 23 in the second wire loop 21 is also arranged in an upper position when acting with the second twin wire section T2.

[0034] The first partial web W1 formed in the first hybrid forming section S1, T1 is joined with the second partial web W2 formed in the second hybrid forming section S2, T2 in said joining point J1. After the joining point J1 the combined web W is wrapped along the first joining roll 24 between the first wire loop 11 and the second wire loop 21 by a wrap angle α, which is between 15° - 90°. After the first joining roll 24 wrap angle α follows an upwardly directed inclined run during which the second wire 21 is separated from the first wire 11 and directed to the return rotation. The combined web W is attached to the first wire 11 at the point where the second wire 21 is separated from the first wire 11 with suitable suction means. The final combined web W travels thereafter further on the horizontal run or on the upwards inclined run of the first wire 11 to a pick-up point PP. The final combined web W is transferred in the pick-up point PP from the first wire 11 with a pick-up unit 210 being situated within a pick-up fabric loop 200. The pick-up unit 210 forms a pick-up point PP with the first wire 11. The first wire 11 is directed to the return rotation after the pick-up point PP. The final web produced by such a former would thus be a four layer board web. The lowest point of the joining roll 24 is on the same level or on a lower level than the lowest point of the pick-up unit 210.

[0035] The first single wire section S1 and the second single wire section S2 are essentially on the same horizontal level. This means that also the slice opening of the first head box 100 and the slice opening of the second head box 110 are on the same horizontal level. The service platforms in the first framework F1 and the service

platforms in the second framework F2 are also on the same horizontal level.

[0036] The pick-up point PP is in the embodiments shown in the figures approximately at the same horizontal level as the joining point J1. The pick-up point PP could naturally also be on a higher horizontal level if needed. It might in some cases be more appropriate to lead the web from the former to the press section from a higher horizontal level.

[0037] Figure 4 shows a fourth embodiment of the former according to the invention. This embodiment comprises three additional wire loops 31, 41, 51. The first additional wire loop is in connection with the first wire loop 11 and a second additional wire loop 41 in connection with the second wire loop 21. Both head boxes 100, 110 would thus be two layer head boxes. The third additional wire loop 51 is again in connection with the first wire loop and comprises a one layer head box 120. The same as in figure 3 the first wire loop 11 is also passing over a first breast roll 12 and forming a first single wire forming section S1 in a first direction D1 after the first breast roll 12. A first head box 100 supplies a first slice jet at the beginning of the first single wire forming section S1. The former comprises further a second wire loop 21 passing over a second breast roll 22 and forming a second single wire forming section S2 in a second direction D2 after the second breast roll 22. The second direction D2 is opposite to the first direction D1. A second head box 110 supplies a second slice jet at the beginning of the second single wire forming section S2.

[0038] The former comprises a first additional wire loop 31 forming a first twin wire section T1 with the first wire loop 11. The first twin wire section T1 follows immediately after the first single wire section S 1. The first additional wire loop 31 is positioned above the first wire loop 11. The former further comprises a second additional wire loop 41 forming a second twin wire section T2 with the second wire loop 21. The second twin wire section T2 follows immediately after the second single wire section S2. The second additional wire loop 31 is situated above the second wire loop 21. The second additional wire loop 41 is a mirror image of the first additional wire loop 31. The former further comprises a third additional wire loop 51 in connection with the first wire loop 11 such that the third additional wire loop 51 is also passing over a first breast roll 32 and forming a third single wire forming section S3 in a first direction D2 after the third breast roll 32. A third head box 120 supplies a first slice jet at the beginning of the third single wire forming section S3.

[0039] The first partial web W1 formed in the first hybrid forming section S1, T1 is joined with the second partial web W2 formed in the second hybrid forming section S2, T2 in said joining point J1. After the joining point J1 the combined web W is wrapped along the first joining roll 24 between the first wire loop 11 and the second wire loop 21 by a wrap angle α, which is between 15° - 90°. After the first joining roll 24 wrap angle α follows an upwardly directed inclined run during which the second wire 21 is separated from the first wire 11 and directed to the a joining point J2 in which the combined W formed in the previous forming sections is joined with a third partial web W3 formed in the third single forming section S3. After the joining roll 34 the fifth wire loop 51 is separated from the first wire 11 and the final combined web W travels thereafter further on the horizontal run or on the upwards inclined run of the first wire 11 to a pick-up point PP. The final combined web W is transferred in the pick-up point PP from the first wire 11 with a pick-up unit 210 being situated within a pick-up fabric loop 200. The pick-up unit 210 forms a pick-up point PP with the first wire 11. The first wire 11 is directed to the return rotation after the pick-up point PP. The final web produced by such a former would thus be a five layer board web. The lowest point of the joining roll 24 is on the same level or on a lower level than the lowest point of the pick-up unit 210.

[0040] In other words, the forming section the further can comprise at least one additional wire loop 31, 41, 51 for forming at least one twin wire section T1, T2 with the first wire loop 11 or with the second wire loop 21. It is also possible that the forming section further comprises at least one additional wire loop 31, 41, 51 for forming at least one twin wire section T1, T2 with the first wire loop (11) and at least one additional wire loop 31, 41, 51 for forming at least one twin wire section T1, T2 with the second wire loop 21.

[0041] The examples of the embodiments of the present invention presented above are not intended to limit the scope of the invention only to these embodiments. Several modifications can be made to the invention within the scope of the claims.

Claims

1. A paper or board machine forming section comprising:

   - a first wire loop (11) passing over a first breast roll (12) and forming a first single wire forming section (S1) in a first direction (D1) after the first breast roll (12),
   - a first head box (100) for supplying a slice jet on the first wire loop (11) at the beginning of the first single wire forming section (S1) to form a first web (W1),
   - a first turning roll (13) within the first wire loop (11) for directing the first wire loop (11) into a downwards inclined slope after the first single wire forming section (S1),
   - a second wire loop (21) passing over a second breast roll (22) and forming a second single wire forming section (S2) in a second direction (D2) after the second breast roll (22), said second direction (D2) being opposite to the first direction (D1),
   - a second head box (110) for supplying a slice

jet on the second wire loop (21) at the beginning of the second single wire forming section (S2) to form a second web (W2),
- a second turning roll (23) within the second wire loop (21) for directing the second wire loop (21) into a downwards inclined slope after the second single wire forming section (S2),
- a joining roll (24) within the second wire loop (21) after the second turning roll (23) forming a joining point (J1) to the first web (W1) and to the second web (W2) between the first wire loop (11) and the second wire loop (21), said joining point (J1) being below the horizontal level of the first single wire forming section (S1),
- the first single wire forming section (S1) and the second single wire forming section (S2) being essentially on the same horizontal level, and further
- a pick-up unit (210) within a pick-up fabric loop (200) forming a pick-up point (PP) between the first wire loop (11) and the pick-up fabric loop (200),

wherein the first wire loop (11) and the second wire loop (21) are joined together in the joining point (J1) for combining the first web (W1) and the second web (W2) to be a combined web (W) such that the first wire loop (11) and the second wire loop (21) are wrapped around the joining roll (24) by a wrap angle α,
characterized in that after the joining roll (24) the first wire loop (11) is separated from the second wire loop (21) for transferring the combined web (W) to the pick-up point (PP) such that the first wire loop (11) travels in a horizontal or upward inclined direction between the joining point (J1) and the pick-up point (PP).

2. The paper or board machine forming section according to claim 1, **characterized in that** the wrap angle α is between 15° - 90°.

3. The paper or board machine forming section according to claim 1 or 2, **characterized in that** the lowest point of the joining roll (24) is on the same level or on a lower level than the lowest point of the pick-up unit (210).

4. The paper or board machine forming section according to any previous claim, **characterized in that** the forming section further comprises an additional wire loop (31, 41) for forming a first twin wire section (T1) with the first wire loop (11) or a second twin wire section (T2) with the second wire loop (21).

5. The paper or board machine forming section according to any of the claims 1 - 3, **characterized in that** the forming section further comprises an additional wire loop (31) for forming a first twin wire section (T1) with the first wire loop (11) and an additional wire loop (41) for forming a second twin wire section (T2) with the second wire loop (21).

6. The paper or board machine forming section according to any previous claim, **characterized in that** the first wire loop (11) is supported at least on a first framework (F1) comprising horizontal and vertical support beams (V1a, V1b) with first support points (P1a, P1b) and the second wire loop (21) is supported at least on a second framework (F2) comprising horizontal and vertical support beams (V2a, V2b) with second support points (P2a, P2b), said horizontal support beams of the first framework (F1) being on the same horizontal level with the horizontal support beams of the second framework (F2).

7. The paper or board machine forming section according to claim 6, **characterized in that** the additional wire loop (31, 41) is supported on an additional framework (F3) comprising horizontal and vertical support beams (V3a, V3b) with additional support points (P3a, P3b) for connecting said additional framework (F3) to the first framework (F1) and/or to the second framework (F2).

8. The paper or board machine forming section according to any of claims 4-6, **characterized in that** the first turning roll (13) is supported on a first swinging arm (13a) and arranged in an upper position when acting in the first twin wire section (T1).

9. The paper or board machine forming section according to any of claims 4-6, **characterized in that** the second turning roll (23) is supported on a second swinging arm (23 a) and arranged in an upper position when acting in the second twin wire section (T2).

Patentansprüche

1. Papier- oder Kartonmaschinenbahnbildungspartie mit:

- einer ersten Siebschleife (11), die über eine erste Brustwalze (12) tritt und eine erste Einzelsiebbahnbildungspartie (S1) in einer ersten Richtung (D1) nach der ersten Brustwalze (12) ausbildet,
- einem ersten Stoffauflaufkasten (100) zum Liefern eines Auslaufdüsenstrahls an der ersten Siebschleife (11) zu Beginn der ersten Einzelsiebbahnbildungspartie (S1) zum Ausbilden einer ersten Bahn (W1),
- einer ersten Drehwalze (13) innerhalb der ersten Siebschleife (11) zum Richten der ersten Siebschleife (11) zu einer nach unten gerichte-

ten schrägen Neigung nach der ersten Einzelsiebbahnbildungspartie (S1),
- einer zweiten Siebschleife (21), die über eine zweite Brustwalze (22) tritt und eine zweite Einzelsiebbahnbildungspartie (S2) in einer zweiten Richtung (D2) nach der zweiten Brustwalze (22) ausbildet, wobei die zweite Richtung (D2) zu der ersten Richtung (D1) entgegengesetzt ist,
- einem zweiten Stoffauflaufkasten (110) zum Liefern eines Auslaufdüsenstrahls an der zweiten Siebschleife (21) zu Beginn der zweiten Einzelsiebbahnbildungspartie (S2) zum Ausbilden einer zweiten Bahn (W2),
- einer zweiten Drehwalze (23) innerhalb der zweiten Siebschleife (21) zum Richten der zweiten Siebschleife (21) zu einer nach unten schrägen Neigung nach der zweiten Einzelsiebbahnbildungspartie (S2),
- einer Verbindungswalze (24) innerhalb der zweiten Siebschleife (21) nach der zweiten Drehwalze (23), die einen Verbindungspunkt (J1) mit der ersten Bahn (W1) und der zweiten Bahn (W2) zwischen der ersten Siebschleife (11) und der zweiten Siebschleife (21) ausbildet, wobei der Verbindungspunkt (J1) unterhalb der horizontalen Höhe der ersten Einzelsiebbahnbildungspartie (S1) ist,
- wobei die erste Einzelsiebbahnbildungspartie (S1) und die zweite Einzelsiebbahnbildungspartie (S2) im Wesentlichen auf der gleichen horizontalen Höhe sind, und des Weiteren
- eine Aufnahmeeinheit (210) innerhalb einer Aufnahmegewebeschleife (200) einen Aufnahmepunkt (PP) zwischen der ersten Siebschleife (11) und der Aufnahmegewebeschleife (200) ausbildet,

wobei die erste Siebschleife (11) und die zweite Siebschleife (21) miteinander an dem Verbindungspunkt (J1) verbunden werden zum Kombinieren der ersten Bahn (W1) und der zweiten Bahn (W2) zu einer kombinierten Bahn (W) in derartiger Weise, dass die erste Siebschleife (11) und die zweite Siebschleife (21) um die Verbindungswalze (24) um einen Umhüllungswinkel α umhüllt werden,
dadurch gekennzeichnet, dass
nach der Verbindungswalze (24) die erste Siebschleife (11) von der zweiten Siebschleife (21) für ein Befördern der kombinierten Bahn (W) zu dem Aufnahmepunkt (PP) so separiert wird, dass die erste Siebschleife (11) in einer horizontalen oder einer nach oben schräg verlaufenden Richtung zwischen dem Verbindungspunkt (J1) und dem Aufnahmepunkt (PP) läuft.

2. Papier- oder Kartonmaschinenbahnbildungspartie gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Umhüllungswinkel α zwischen 15° - 90° ist.

3. Papier- oder Kartonmaschinenbahnbildungspartie gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der niedrigste Punkt der Verbindungswalze (24) auf der gleichen Höhe oder bei einer niedrigeren Höhe als der niedrigste Punkt der Aufnahmeeinheit (210) ist.

4. Papier- oder Kartonmaschinenbahnbildungspartie gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die Bahnbildungspartie des Weiteren eine zusätzliche Siebschleife (31, 41) aufweist zum Ausbilden einer ersten Zwillingssiebpartie (T1) mit der ersten Siebschleife (11) oder einer zweiten Zwillingssiebpartie (T2) mit der zweiten Siebschleife (21).

5. Papier- oder Kartonmaschinenbahnbildungspartie gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Bahnbildungspartie des Weiteren eine zusätzliche Siebschleife (31) aufweist zum Ausbilden einer ersten Zwillingssiebpartie (T1) mit der ersten Siebschleife (11) und eine zusätzliche Siebschleife (41) aufweist zum Ausbilden einer zweiten Zwillingssiebpartie (T2) mit der zweiten Siebschleife (21).

6. Papier- oder Kartonmaschinenbahnbildungspartie gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die erste Siebschleife (11) zumindest an einem ersten Rahmen (F1) gestützt ist, der horizontale und vertikale Stützbalken (V1a, V1b) mit ersten Stützpunkten (P1a, P1b) aufweist, und die zweite Siebschleife (21) zumindest an einem zweiten Rahmen (F2) gestützt ist, der horizontale und vertikale Stützbalken (V2a, V2b) mit zweiten Stützpunkten (P2a, P2b) aufweist, wobei die horizontalen Stützbalken des ersten Rahmens (F1) auf der gleichen horizontalen Höhe wie die horizontalen Stützbalken des zweiten Rahmens (F2) sind.

7. Papier- oder Kartonmaschinenbahnbildungspartie gemäß Anspruch 6, **dadurch gekennzeichnet, dass** die zusätzliche Siebschleife (31, 41) an einem zusätzlichen Rahmen (F3) gestützt ist, der horizontale und vertikale Stützbalken (V3a, V3b) mit zusätzlichen Stützpunkten (P3a, P3b) aufweist zum Verbinden des zusätzlichen Rahmens (F3) mit dem ersten Rahmen (F1) und/oder dem zweiten Rahmen (F2).

8. Papier- oder Kartonmaschinenbahnbildungspartie gemäß einem der Ansprüche 4 bis 6, **dadurch gekennzeichnet, dass** die erste Drehwalze (13) an einem ersten Schwenkarm (13a) gestützt ist und an einer oberen Position angeordnet ist beim Wirksamwerden in der ersten Zwillingssiebpartie (T1).

9. Papier- oder Kartonmaschinenbahnbildungspartie

gemäß einem der Ansprüche 4 bis 6, **dadurch gekennzeichnet, dass** die zweite Drehwalze (23) an einem zweiten Schwenkarm (23a) gestützt ist und an einer oberen Position angeordnet ist beim Einwirken in der zweiten Zwillingssiebpartie (T2).

Revendications

1. Section de formage de machine à papier ou à carton comprenant :

une première boucle de fil métallique (11) passant sur un premier rouleau de tête (12) et formant une première section de formage de fil métallique unique (S1) dans une première direction (D1) après le premier rouleau de tête (12),
une première caisse d'arrivée (100) pour fournir un jet par règle sur la première boucle de fil métallique (11) au début de la première section de formage de fil métallique unique (S1) afin de former une première toile (W1),
un premier rouleau rotatif (13) dans la première boucle de fil métallique (11) pour diriger la première boucle de fil métallique (11) dans une inclinaison inclinée vers le bas après la première section de formage de fil métallique unique (S1),
une seconde boucle de fil métallique (21) passant sur un second rouleau de tête (22) et formant une seconde section de formage de fil métallique unique (S2) dans une seconde direction (D2) après le second rouleau de tête (22), ladite seconde direction (D2) étant opposée à la première direction (D1),
une seconde caisse d'arrivée (110) pour fournir un jet par règle sur la seconde boucle de fil métallique (21) au début de la seconde section de formage de fil métallique unique (S2) pour former une seconde toile (W2),
un second rouleau rotatif (23) à l'intérieur de la seconde boucle de fil métallique (21) pour diriger la seconde boucle de fil métallique (21) dans une inclinaison inclinée vers le bas après la seconde section de formage de fil métallique unique (S2),
un rouleau de liaison (24) à l'intérieur de la seconde boucle de fil métallique (21) après le second rouleau rotatif (23) qui forme une point de liaison (J1) avec la première toile (W1) et la seconde toile (W2) entre la première boucle de fil métallique (11) et la seconde boucle de fil métallique (21), ledit point de liaison (J1) étant au-dessous du niveau horizontal de la première section de formage de fil métallique unique (S1), la première section de formage de fil métallique unique (S1) et la seconde section de formage de fil métallique unique (S2) étant essentiellement sur le même niveau horizontal, et en outre une unité de collecte (210) dans une boucle de tissu de collecte (200) formant un point de collecte (PP) entre la première boucle de fil métallique (11) et la boucle de tissu de collecte (200), dans laquelle :

la première boucle de fil métallique (11) et la seconde boucle de fil métallique (21) sont assemblées dans le point de liaison (J1) pour combiner la première toile (W1) et la seconde toile (W2) pour être une toile combinée (W) de sorte que la première boucle de fil métallique (11) et la seconde boucle de fil métallique (21) sont enroulées autour du rouleau de liaison (24) par un angle d'enroulement α,
caractérisée en ce que, après le rouleau de liaison (24), la première boucle de fil métallique (11) est séparée de la seconde boucle de fil métallique (21) pour transférer la toile combinée (W) au point de collecte (PP) de sorte que la première boucle de fil métallique (11) se déplace dans une direction horizontale ou inclinée vers le haut entre le point de liaison (J1) et le point de collecte (PP).

2. Section de formage de machine à papier ou à carton selon la revendication 1, **caractérisée en ce que** l'angle d'enroulement α est compris entre 15° et 90°.

3. Section de formage de machine à papier ou à carton selon la revendication 1 ou 2, **caractérisée en ce que** le point le plus bas du rouleau de liaison (24) est sur le même niveau ou sur un niveau inférieur au point le plus bas de l'unité de collecte (210).

4. Section de formage de machine à papier ou à carton selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la section de formage comprend en outre une boucle de fil métallique supplémentaire (31, 41) pour former une première section de fil métallique jumelée (T1) avec la première boucle de fil métallique (11) ou une seconde section de fil métallique jumelé (T2) avec la seconde boucle de fil métallique (21).

5. Section de formage de machine à papier ou à carton selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** la section de formage comprend en outre une boucle de fil métallique supplémentaire (31) pour former une première section de fil métallique jumelée (T1) avec la première boucle de fil métallique (11) et une boucle de fil métallique supplémentaire (41) pour former une seconde section de fil métallique jumelé (T2) avec la seconde boucle de fil métallique (21).

6. Section de formage de machine à papier ou à carton selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la première boucle de fil métallique (11) est supportée au moins sur un premier châssis (F1) comprenant des poutres de support horizontales et verticales (V1a, V1b) pour les premiers points de support (P1a, P1b) et la seconde boucle de fil métallique (21) est supportée au moins sur un second châssis (F2) comprenant des poutres de support horizontales et verticales (V2a, V2b) avec des seconds points de support (P2a, P2b), lesdites poutres de support horizontales du premier châssis (F1) étant sur le même niveau horizontal avec les poutres de support horizontales du second châssis (F2).

7. Section de formage de machine à papier ou à carton selon la revendication 6, **caractérisée en ce que** la boucle de fil métallique supplémentaire (31, 41) est supportée sur un châssis supplémentaire (F3) comprenant des poutres de support horizontales et verticales (V3a, V3b) avec des points de support supplémentaires (P3a, P3b) pour raccorder ledit châssis supplémentaire (F3) au premier châssis (F1) et/ou au second châssis (F2).

8. Section de formage de machine à papier ou à carton selon l'une quelconque des revendications 4 à 6, **caractérisée en ce que** le premier rouleau rotatif (13) est supporté sur un premier bras oscillant (13a) et agencé dans une position supérieure lorsqu'il agit dans la première section de fil métallique jumelé (T1).

9. Section de formage de machine à papier ou à carton selon l'une quelconque des revendications 4 à 6, **caractérisée en ce que** le second rouleau rotatif (23) est supporté sur un second bras oscillant (23a) et agencé dans une position supérieure lorsqu'il agit dans la seconde section de fil métallique jumelé (T2).

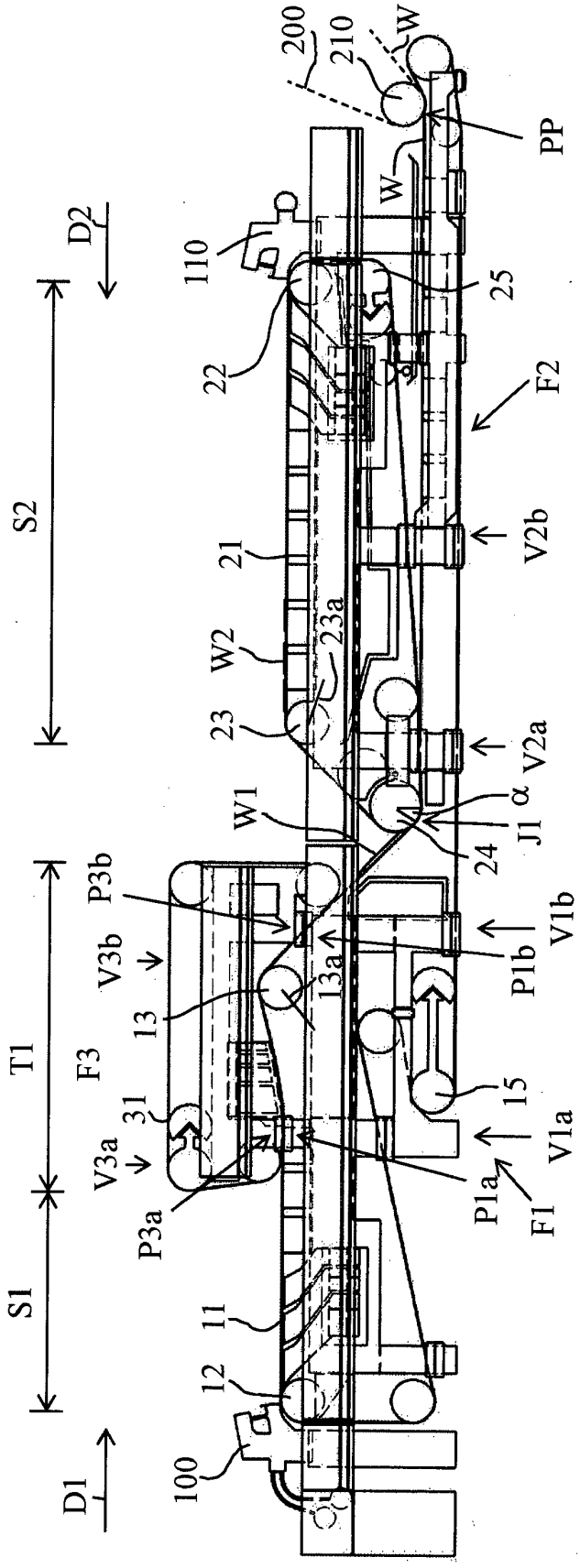

200
210
W
PP
W
D2
110
25
22
F2
S2
21
V2b
23a
W2
23
V2a
W1
α
J1
24
P3b
V1b
V3b
P1b
13a
13
T1
F3
15
31
V1a
V3a
P1a
P3a
F1
S1
11
12
100
D1

Fig.1

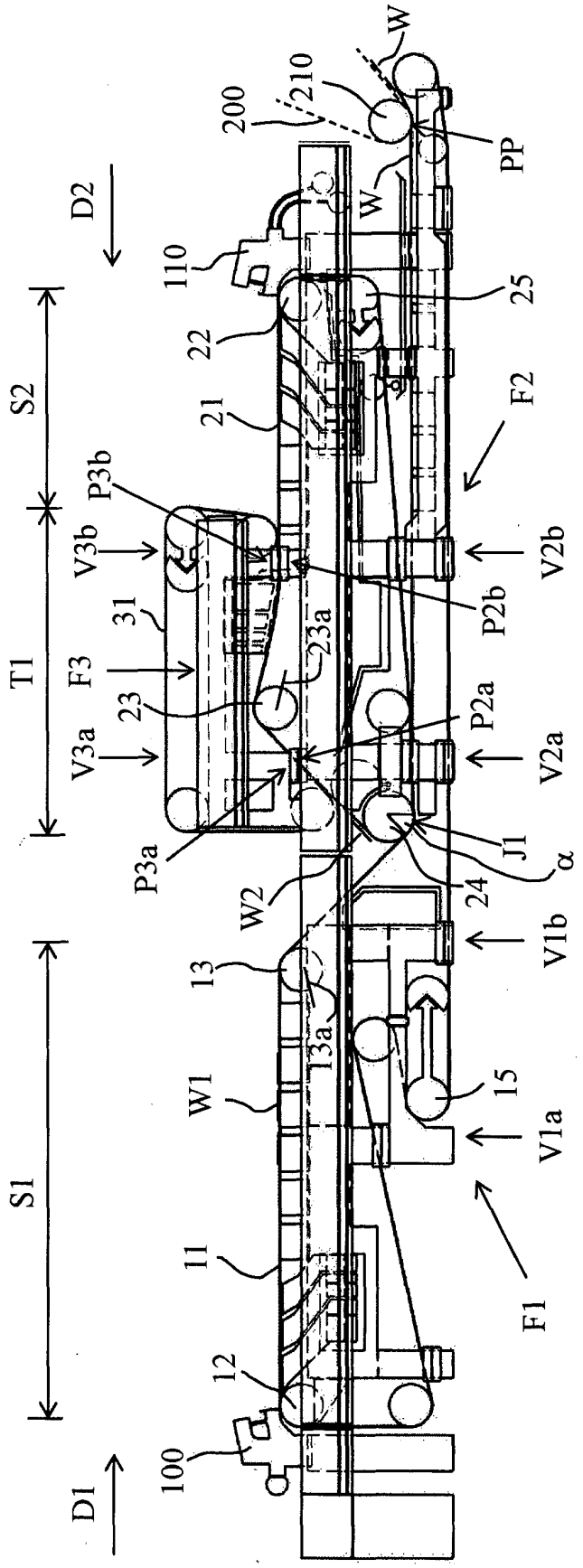

W
210
200
PP
D2
W
110
25
22
F2
21
P3b
V3b
V2b
P2b
31
23a
T1
F3
23
P2a
V3a
V2a
P3a
J1
α
W2
24
V1b
13
T3a
W1
15
V1a
S2
S1
11
F1
12
100
D1

Fig.2

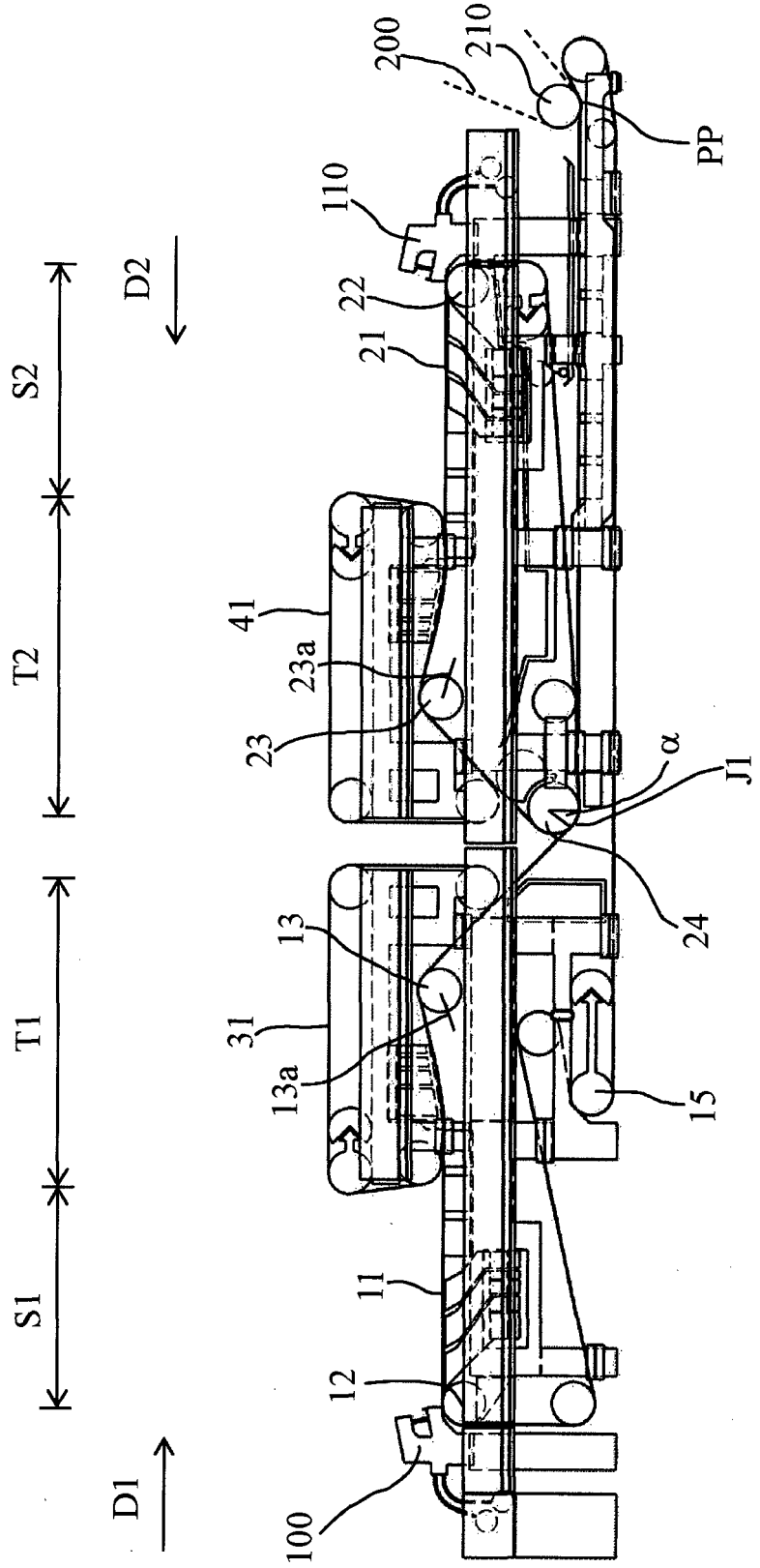

200
210
PP
110
22
21
D2
S2
T2
41
23a
23
α
J1
24
13
T1
31
13a
15
11
S1
12
D1
100

Fig.3

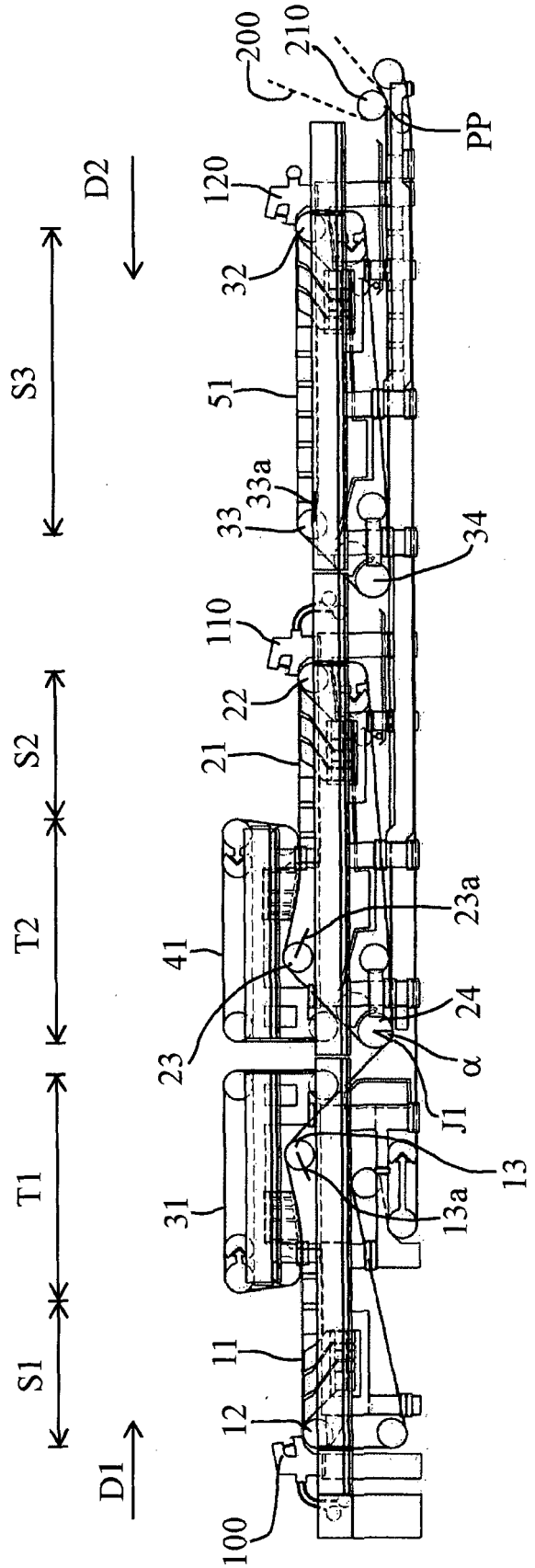

200
210
PP
D2
120
32
51
33a
33
34
110
22
21
S3
S2
T2
T1
S1
41
23a
23
24
α
J1
13
13a
31
11
12
D1
100

Fig.4

REFERENCES CITED IN THE DESCRIPTION

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