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(54) **FORMING SECTION WITH METAL BELT**

FORMIERPARTIE MIT METALLBAND

SECTION DE FORMATION AVEC BANDE MÉTALLIQUE

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Description

[0001] The invention relates to a forming section forming a web consisting of fibers.

[0002] A forming section is used in a paper machine or the like, in which a suspension containing fibers and a suspension liquid which is usually water is injected between two forming wires and the liquid is then removed in large part, so that a wet web is formed from the fibers. Then, the web runs via a pre-press nip to a pressing section and further into a dryer section, in which sections the web is further treated to obtain the desired properties such as dryness, web bulk, density, thickness, surface properties etc..

[0003] In the pre-press nip, the web is usually supported on one side of the web by one of the forming wires, since the web is not strong enough in this part of the paper machine to be conveyed alone. However, the forming wires are susceptible to pressure, so that their lifetime is reduced due to pressing. Also, the forming wire may cause surface markings in the adjacent web surface, which reduce surface smoothness and therefore the paper quality as such.

[0004] Further, in order to obtain rapid water removal, there is the tendency to use increased pressure in the pre-press nip. The higher pressure, however, reduces web bulk along with a reduction in bending stiffness of the later paper or board product. To avoid this problem, use of long nips at lower pressure and increased nip length can be a possibility, but long nip rolls with felt loops are expensive.

[0005] Document DE 10 2004 052 975 A1 discloses a vertical double sieve former assembly for fibrous web of paper or carton having a rising section in contact with a dewatering drum and a secondary belt. According to this prior art, in a paper making assembly, a head box discharges a fiber suspension between two rising sieve belts that than make contact with a full-width dewatering belt. The dewatering belt is passed around a series of rollers and also follows a part of a dewatering drum mantle, prior to separation from the fiber web. The dewatering drum is coupled to a suction assembly which operates at the limited peripheral interface between the twin-sieve with fiber suspension and the drum.

[0006] Document US 5,611,893 discloses a device for dewatering of a paper web including prepressing with an extended nip shoe in which a paper web is transferred from a forming wire onto a wire in a drying section while constantly on support of the fabric that receives water, a transfer fabric or of any other corresponding transfer surface as a closed draw, at a particularly high speed, which is higher than about 25 to 30 m/s. Dewatering of the paper web is carried out by means of at least two subsequent press nips, of which nips at least one press nip is a so-called extended-nip zone, whose length in a machine direction is larger than about 100 mm. The extended-nip zone is formed in connection with a mobile flexible press-band loop.

[0007] Document WO 03/064762 A1 discloses a processing device and method of operating the device for processing a coated or uncoated fibrous web. This device comprises a belt adapted to extend around a guiding element, at least one counter-element being disposed outside said belt to provide a contact area with the belt, such that the belt and the counter-element established therebetween a web processing zone for passing a web to be processed therethrough.

[0008] It is the object of the invention to provide a forming section which allows a quick and energy efficient dewatering of the formed web while maintaining the desired web properties and to provide a method for forming the web in which the formed web is dewatered quickly and efficiently.

[0009] The object of the invention is achieved by a forming section according to claim 1 and by a method for forming a fibrous web according to claim 11, respectively. Advantageous embodiments are carried out according to the dependent claims.

[0010] It is noted that in this description the terms "fibrous web" and "web" include paper, board and other web types made from a fiber containing suspension. Also, the invention relates to paper machines, board machines and the like, although only a paper machine is described for the purpose of explanation; this appeared adequate to maintain clarity of this description. Thus, when the claims refer to a fibrous web or web, any of the above mentioned web types is addressed.

[0011] According to the invention, a forming section forming a fibrous web comprises a forming wire loop for forming the fibrous web from a fiber containing suspension as explained above. Additionally, a metal belt loop is arranged to press the web and the forming wire between a metal belt and a support surface.

[0012] Using a metal belt allows the generation of a long nip by merely using appropriate metal belt arrangement and belt tension. In this nip, the metal belt is arranged to contact the fibrous web, and the forming wire is arranged to contact the support surface. In other words, the web is sandwiched between the metal belt and forming wire.

[0013] Advantageously, the metal belt is arranged to press the fibrous web from above pressing the liquid of the suspension towards the forming wire which is arranged below the web. In this way, gravity can be used to support water removal.

[0014] The metal belt is impervious to fluids, so that the suspension liquid cannot pass through the belt. Furthermore, it is preferable that the surface of the metal belt which contacts the web is smooth, so that an improved surface quality of the web can be obtained after the contact of the web to the metal belt.

[0015] Preferably, a heating means can be provided at the metal belt loop for heating the metal belt. Such a heating means may comprise steam heaters which may use condensation of steam exhibiting a very high heat transmission effect to the metal belt and causing a uni-

form temperature distribution in the heating area through which the belt travels. Further, temperature control in steam heating is well-known and inexpensive technology.

[0016] Advantageously, a rapid water removal is promoted, when the support surface is a roll which has surface portions at which the water may exit the forming wire. This can be achieved by e.g. a grooved roll or a suction roll. Further, a suction box may be provided at the forming wire and downstream the support surface and the suction pressure is set to hold the web on the forming wire. Here, the suction box may have a curved cover.

[0017] Preferably, the metal belt is a steel belt coated with a low adhesion coating, which avoids that the web sticks to the metal belt, in particular, when the metal belt is heated. By using such a coating, heating of the metal belt to comparatively high temperatures is possible, so that temperature increase may be used to promote water removal.

[0018] Considerable saving of energy can be achieved, when there is a hood arranged above or around the metal belt, so that e.g. suctioning of hot air by the suction box may increase web temperature preheating the web before guiding it into the press section of the paper machine.

[0019] The invention further suggests a method for forming a fibrous web from a fiber containing suspension, which uses a step of pressing the web and the forming wire between a metal belt and a support surface. In this way, suspension liquid is pressed out of the fibrous web in the forming section already, so that water removal in the subsequent press section is simplified or is made more efficient. Tests have shown that especially in webs having higher basis weights a very high dewatering effect can be achieved, while considerable energy saving is observed as compared to prior art solutions discussed above.

[0020] In the method the metal belt may be heated and then be brought in contact with the fibrous web. Here, the metal belt may be heated to have a temperature below the boiling point of the suspension liquid, when the metal belt contacts the fibrous web. By heating the web via the metal belt, viscosity of the suspension liquid is reduced, so that the suspension liquid flows through pores and meshes at reduced pressure difference which leads to the result that more liquid can be removed at the same available pressure difference. Thus, efficiency of the liquid removal is improved.

[0021] Alternatively, the metal belt may be heated to have a temperature higher than the boiling point of the suspension liquid, when the metal belt contacts the fibrous web. In this case, the liquid at the surface of the web at which the metal belt contacts the web evaporates at or close to the liquid surface. Here, the liquid generates a steam pressure which supports the liquid removal from the web by additionally pressing the liquid towards the forming wire.

[0022] Liquid removal may further be supported by applying suction pressure to the forming wire at the support surface and/or downstream of the support surface.

[0023] The invention is now explained here below using presently preferred embodiments as examples, which embodiments are shown in the drawings:

Fig. 1 shows a first embodiment of a forming section of a paper machine, to which the invention is applied;
Fig. 2 shows another embodiment of a forming section of a paper machine, to which the invention is applied;
Fig. 3 shows details of a metal belt loop arrangement used in Fig. 1 and 2;
Fig. 4 shows a modified arrangement of the metal belt loop of Fig. 3;
Fig. 5 shows another modified arrangement of the metal belt loop of Fig. 3; and
Fig. 6 shows an enlarged schematic sectional view for explanation of a liquid removal mechanism.

[0024] Fig. 1 shows a forming section of a paper machine which has two forming wire loops 1, 3 and a metal belt loop 2.

[0025] Further, a transfer loop 4 is shown on the right hand side in Fig. 1, which transfer fabric loop is used for further transferring the web from the forming section to subsequent sections of the paper machine, e.g. the press section. The transfer fabric loop 4 may comprise a felt or a belt as the transfer fabric.

[0026] On the left hand side in Fig. 1 there is shown the forming wire loop 3 in which the forming wire 31 runs in counterclockwise direction past a series of guide rolls 35. The forming wire 31 further passes a forming roll 32 which is a suction roll, a suction box 33 and a blow box 34. On the right hand side in Fig. 1, the forming wire loop 1 has a forming wire 11 which runs in clockwise direction via several guide rolls 14, a transfer roll 13 which is normally a suction roll, a suction roll 12 and a suction box 15. A fiber containing suspension containing the fibers from which the later paper is to be formed of, is injected form a head box into the gap between the two forming wires 11 and 31 as is indicated with arrow 10 at the bottom of Fig. 1. Water from this suspension is rapidly removed in the beginning in forming roll 32 and in the suction box 33. In order to ensure that the web which is already formed on the forming wires stays on forming wire 11, a blow box 34 cooperating with transfer roll 13 is provided using pressure differences to ensure that the web travels along the desired parts, i.e. along with forming wire 11.

[0027] In the further course of its travel, the web reaches a nip formed between a metal belt 21 of a metal belt loop 2, which nip is particularly formed between a metal belt 21 and a suction roll 12. The metal belt 21 itself is guided by guide rolls 22, 23, 24, so as to run in a counterclockwise direction in Fig. 1. A heating device 25 may be provided to heat the metal belt. A guide roller 22 is arranged to be movable within the metal belt loop 2, so

as to adjust tension of the metal belt controlling the nip formed between the metal belt 21 and the suction roll 12. Right after the suction roll 12, a suction box 15 is arranged.

[0028] The web (not shown) travelling on forming wire 11 enters, coming from the left in Fig. 1, a nip formed between the metal belt 21 and the forming wire 11, and the metal belt presses the web against the forming wire. Pressure in the nip will increase when approaching suction roll 12, in which water pressed out of the web can be rapidly removed due to a suction pressure exerted through the forming wire 11 to the web. A suction box 15 is arranged immediately behind the suction roll 12, which suction box 15 applies negative pressure to the forming wire 11 to improve removal of water. The web which is now pre-pressed, travels further along with forming wire 11 to reach a nip formed between the forming wire and a transfer fabric of the transfer loop 4, which nip is formed at the suction transfer roll 41 of the transfer loop 4. Then, the web follows the transfer fabric of this transfer loop 4 to be transferred to subsequent sections of the paper machine.

[0029] The rectangle 25 drawn with dotted lines in Fig. 1 indicates a heating device provided with the metal belt 21 to heat the metal belt. Heating of the metal belt 21 has basically two different possibilities; heating the metal belt to a temperature below a boiling point of the water forming the suspension liquid or heating the metal belt to a temperature above a boiling point of the suspension liquid (water) of the suspension used for the paper making. In the former case, the metal belt temperature is set such that the web and the water in it will be sufficiently heated but the water will not evaporate to a significant extent. When heating the web and the suspension liquid contained therein, the viscosity of the suspension liquid will decrease. Accordingly, the suspension liquid will flow easier through the pores of the web and of course through the meshes of the forming wire, so that liquid removal can be accelerated. If the liquid removal is made easier by means of reducing viscosity of the suspension liquid, of course, with the same pressure difference a larger amount of suspension liquid can be removed within a certain time.

[0030] If the metal belt 21 is heated to a temperature which causes boiling on the surface of the suspension liquid, there is a particular additional effect, which will be explained with reference to Fig. 6. It is noted that boiling only occurs at or close to the contact surface between the metal belt and the suspension liquid; that is, boiling of suspension liquid only happens in the surface of the liquid.

[0031] In Fig. 6 there is shown a cross section through the nip formed between the metal belt 21 and the forming wire 11, wherein the metal belt 21 is arranged above the web W, which is nipped between metal belt 21 and forming wire 11. The forming wire has pores or meshes 111 through which a suspension liquid 5 escapes when the web W is pressed between metal belt 21 and forming wire 11. The metal belt 21 has no pores and is gas-tight. With the metal belt being sufficiently heated when contacting the wet web W, suspension liquid 5 will rapidly evaporate at its surface to form a steam cushion 6 between the web W and the metal belt 21. The pressure (arrow p) of this steam cushion 6 is added to the nip pressure between the metal belt 21 and the forming wire 11, so that this pressure additionally contributes to the transport of the suspension liquid out of the web W.

[0032] As can be seen in Fig. 6, the steam cushion 6 formed between the web and the belt contributes to separating metal belt and web, so that the web follows the further course of the forming wire 11 more easily. In addition, this effect can be further supported by a coating of the metal belt 21 which avoids adhesion of the web W to the belt 21.

[0033] Returning to Fig. 1, the suction box 15 arranged in the forming wire loop 1 is used to draw warm air past the web, so that a preheating of the web can be obtained, which preheating promotes web behaviour and treatability in the subsequent press section.

[0034] As was discussed above, the metal belt loop 2 forming a nip with a forming wire loop 1 through which the web passes contributes to water or suspension liquid removal in the forming section of the paper machine. Particular advantages obtained are a reduced nip pressure, especially in the nip with the metal belt as compared to commonly known solutions in which a press roller or an extended nip press is used for pressing the web and the forming wire therebetween. Accordingly, the lifetime of the forming wire can be improved.

[0035] Furthermore, due to the long nip which can be formed between the metal belt and the forming wire at the suction roll 12, a considerable time is available for removing water from the web, so that lower pressures at the nip can be used. This avoids an overpressing of the web reducing bulk of the later paper.

[0036] Furthermore, due to the high water removal capacity of this metal belt loop arrangement, the initial forming roll 32 and the pressure in the initial suction box 33 can be reduced. In particular, as compared to the prior art which uses high-vacuum suction boxes in the end of the forming section, which cause a considerable sliding resistance between forming wire and suction boxes, the energy for driving the wire loop can be considerably reduced when replacing the high-vacuum suction boxes by the metal belt loop. Also, generation of high vacuums for high performance suction boxes is generally energy consuming, so that a reduction of the required pressure difference may directly pay-off in reduced energy costs for this paper machine.

[0037] Fig. 2 shows another arrangement of a paper machine forming section in which the metal belt arrangement for water removal is used. Since the basic structure of the forming section including the metal belt arrangement is the same as that of Fig. 1, a repetition of the explanation of these parts will be omitted here. However, since the same reference signs designate the same el-

ements, direct reference to the description of Fig. 1 can be made here with respect to these elements. Accordingly, only the differences will be explained in more detail.

[0038] In the forming section of Fig. 2, there is a wire loop 3 on the left hand side and a wire loop 1 on the right hand side. The suspension from which the fibrous web is to be made is injected from a head box (not shown) following the direction indicated by arrow 10. In this embodiment of the forming section, wire loop 3 has a further guide roll 36 instead of a suction roll. On the other hand, wire loop 1 has a suction box 16 installed immediately behind the guide roller 14 at which the two forming wires 11 and 31 approach each other to form the area in which the initial web is formed. Passing a suction box 33 which has been described with respect to Fig. 1 in detail, the web now passes a suction and transfer roll 17 which is arranged inside wire loop 1 to guide forming wire 11 towards the metal belt arrangement 2. In this suction roll 17 water can be removed and the suction pressure further assures that the web follows forming wire 11 during its travel. The wet web now lying on top of forming wire 11 in Fig. 2 enters the nip formed between metal belt 21 and forming wire 11. The further course of the web corresponds to that described in Fig. 1.

[0039] Also, since the same heating device 25 is provided in metal belt loop 2, the same operations and advantages as described before with respect to Fig. 1 and Fig. 6 apply here.

[0040] Fig. 3 shows details of a metal belt arrangement. It is noted that the same elements have the same reference signs as used in the description of the forming sections above with reference to Fig. 1 and Fig. 2. Thus, these elements have the same functions and have been explained before. In Fig. 3 the web W lying on the forming wire 11 enters a nip formed between the forming wire 11 and the metal belt 21 when these elements pass the guide roll 23.

[0041] The surface of the metal belt 21 is smooth and the smoothness Ra is preferably less than 6,3 μm. Furthermore, as mentioned above, the belt is impervious to fluids especially water and steam. These requirements can be fulfilled with a belt made from stainless steel plate material, which may, of course, be coated with suitable coatings. Also, surface treatments which chemically react with the steel material or which cooperate with the steel on atomic basis can be used here as well as coatings which are applied on the belt surface.

[0042] A suction roll 12 is arranged such that its outer diameter crosses a straight line connecting the outer diameters of guide rolls 23 and 24, that is suction roll 12 pushes the metal belt 21 into the gap between the guide rolls 23 and 24. Guide roll 22 can be adjusted as is shown by the double pointed arrow drawn in guide roll 22. Adjustment of guide roll 22 controls the tension of the metal belt, so that the pressure exerted to the web and the forming wire when the metal belt presses the web can be adjusted. If needed, the metal belt is cleaned by a water shower or a doctor blade or the like (not shown).

[0043] Between guide rolls 23 and 24, the web is sandwiched between the metal belt 21 and the forming wire 11. Securing its run in the sandwiched state, the web is permanently pressed and the suspension liquid, usually water, is pressed out through the forming wire only, because the metal belt is gas-tight. The smooth metal belt surface smoothes the web surface. When the metal belt is on another side than most of the suction boxes or suction rolls, symmetry of the paper web is improved. Additionally, due to the fact that that in the (subsequent) press section typically the bottom side surface of the web is more smoothened than the top side surface, it is advantageous to smoothen the top side surface already in the forming section. As a result, a more symmetric web can finally be obtained.

[0044] In order to simplify liquid removal, suction roll 12 can be a suction roll having openings for water removal or it can be formed as a grooved roll which allows water removal from the forming wire 11.

[0045] A suction box 15 is shown arranged facing the part of the forming wire loop 1, in which the web and the forming wire are to leave the metal belt, i.e. at the point where the metal belt follows guide roll 24 while the web and the forming wire travel towards the lower guide roll 14 (see Fig. 1 and Fig. 2). Suction box 15 provides a negative pressure onto the surface of the web facing the forming wire 11, so that suction box 15 promotes a separation of the web from the metal belt 21 and of course, travel of the web towards the transfer belt of the transfer loop 4.

[0046] Furthermore, reference sign 26 in Fig. 3 indicates a hood our housing being placed over the metal belt arrangement 2. This hood is a hood isolating the metal belt against heat losses, so that a more energy saving arrangement of the heated metal belt is possible. Together with a reduced suction pressure at the initial forming part of this forming section with reduced negative pressures and reduced friction losses, this hood 26 also contributes to an improved energy balance of a paper machine. Hot air from this hood can, if needed, be transferred to a heat exchanger or other heat consuming devices in the paper- or board machine. Besides, the hood also exhibits noise reduction and safety functions and therefore further improves the forming section. The hood is preferably designed such that mist and/or fiber dust generated by the forming section is prevented from entering inside the metal belt loop.

[0047] Fig. 4 shows some modifications at the nip formed between the metal belt and the forming wire. Below the forming wire 11, there is arranged a suction box 18, which overlaps the part where sandwiching of the wet web starts between the forming web 11 and the metal belt 21.

[0048] In particular, this suction box 18 is arranged to overlap the point where the metal belt 21 guided by guide roll 23 touches the web. Here at the beginning of that nip, an immediate water removal peak can be observed which is then taken away by the suction box 18. Since the suc-

tion box 18 only removes free liquid, the suction pressure can be low, so that there is no considerable increase of wear and friction losses at the suction box contacting forming wire 11. Furthermore, opposite the suction zone 125 of suction roll 12, there is arranged a pressure or pressing arrangement 27, which can be a hydrodynamic (water and/or steam) pressing element pressing the metal belt towards the suction roll 12. Then, the pressing medium like hot water or steam advantageously transfer heat via the metal belt to the web, thereby further improving the dewatering capacity or dewatering efficiency. Alternatively, the pressing arrangement may be a mechanical pressing element, e.g. a roll. With such a pressing arrangement, the pressure distribution in the nip can be controlled at need to obtain water removal at predetermined portions of the web travel. Preferably, the pressing arrangement is arranged close to or at the end of the metal belt nip.

[0049] Finally, a further suction box 15 is arranged to overlap the opening part of the nip, i.e. it overlaps the point where the web separates from the metal belt to stay on the forming wire 11. With this suction box in overlap arrangement, already a negative pressure can be generated at the side of the forming wire, so that web control is more reliable, i.e. already with low pressure differences, a precise web control can be obtained.

[0050] Fig. 5 shows another modified form of the metal belt loop 2 especially at the nip formed between the metal belt and the forming wire. Below the forming wire 11, there is arranged a suction roll 12 which has a particular arrangement of its suction chamber 125 or effective suction area.

[0051] The suction roll chamber 125 or its respective suction area are arranged to extend substantially over the metal belt loop ensuring the web remains on the wire surface and the suction chamber also guides removed water away from the wire and the web. Together with this arrangement, the suction box 15 of Fig. 3 and 4 can be used.

[0052] The forming section of the invention may be applied to new paper- or board machines, and it is also possible to integrate it into existing machines in the frame of so-called rebuilds. Test have shown that in a paper machine excellent dewatering results have been obtained with the following parameters:

metal belt temperature 20 to 180°C
metal belt tension 50 to 200 kN/m (belt width in CD-direction)
suction roll (12) diameter 1000 to 2000 mm guide rolls (22,23,24) diameter 600 to 2000 mm pressure in the belt nip 0,05 to 0,3 MPa pressing arrangement (27) adds up to 1 MPa.

[0053] It is noted that the invention has been described by making reference to a paper machine. Of course, this invention can be applied to board machines or other machines making a web out of a fibrous suspension, and where it is required to remove water or suspension liquid from fiber containing suspensions.

Claims

1. A forming section forming a fibrous web (W), said forming section comprising
a forming wire loop (1) for forming the fibrous web (W) from a fiber containing suspension (10) thereon, and
a fluid impervious looped metal belt (21) that is arranged to press the fibrous web (W) and said forming wire (11) between said metal belt (21) and a support surface (12),
wherein the forming wire (11) is arranged to contact the support surface (12), **characterized in that** the metal belt (21) is arranged to contact the fibrous web (W).

2. A forming section according to claim 1, wherein said metal belt (21) is smooth, wherein a smoothness Ra value of the metal belt (21) is less than 6.3 μm.

3. A forming section according to claim 1 or 2, wherein the metal belt (21) is arranged to press the fibrous web (W) from above pressing the liquid (5) of the suspension (10) towards the forming wire (11) arranged below the web (W).

4. A forming section according to claim 1, 2 or 3, wherein a heating means (25) is arranged at the metal belt loop (2) for heating the metal belt (21).

5. A forming section according to any of claims 1 to 4, wherein the support surface is a roll (12) having surface portions at which liquid (5) from said suspension (10) exits the forming wire (11).

6. A forming section according to claim 5, wherein, the support surface is a grooved roll or a suction roll (12).

7. A forming section according to any of the foregoing claims, wherein a suction box (15) is provided at the forming wire (11) and downstream the support surface (12), wherein the suction pressure is set to hold the web (W) on the forming wire (11).

8. A forming section according to claim 7, wherein the suction box (15) has a curved cover.

9. A forming section according to any of the foregoing claims, wherein a hood (26) is arranged above or around the metal belt (21).

10. A paper- or cardboard machine comprising a forming section according to any one of the foregoing claims 1 to 9.

11. Method for forming a fibrous web (W) from a fiber containing suspension (10), said method **characterized by** the step of pressing a fibrous web (W) and a forming wire (11) between a fluid impervious looped metal belt (21) and a support surface (12), to press suspension liquid (5) out of the fibrous web (W),
wherein the metal belt (21) is arranged to contact the fibrous web (W) and the forming wire (11) is arranged to contact the support surface (12).

12. Method according to claim 11, further comprising the step of heating the metal belt (21) and bringing the heated metal belt (21) in contact with the fibrous web (W).

13. Method according to claim 11 or 12 further comprising the step of applying suction pressure to the forming wire (11) at the support surface (12) and/or downstream of the support surface (12).

14. Method according to claim 12, wherein the metal belt (21) is heated to have a temperature below the boiling point of the suspension liquid (5), when the metal belt (21) contacts the fibrous web (W), or wherein the metal belt (21) is heated to have a temperature higher than the boiling point of the suspension liquid (5), when the metal belt (21) contacts the fibrous web (W).

Patentansprüche

1. Formabschnitt, der eine Faserbahn (W) formt, wobei der Formabschnitt umfasst
eine Formsiebschleife (1) zum Formen der Faserbahn (W) aus einer Fasern enthaltenden Suspension (10) darauf, und
einem fluidundurchlässigen eine Schleife bildenden Metallband (21), das angeordnet ist, die Faserbahn (W) und das Formsieb (11) zwischen dem Metallband (21) und einer Stützfläche (12) zu pressen,
wobei das Formsieb (11) angeordnet ist, die Stützfläche (12) zu berühren,
dadurch gekennzeichnet, dass
das Metallband (21) angeordnet ist, die Faserbahn (W) zu berühren.

2. Formabschnitt nach Anspruch 1, wobei das Metallband (21) glatt ist, wobei ein Glattheits-Ra-Wert des Metallbands (21) weniger als 6,3 μm beträgt.

3. Formabschnitt nach Anspruch 1 oder 2, wobei das Metallband (21) angeordnet ist, die Faserbahn (W) von oben zu pressen, und dabei die Flüssigkeit (5) der Suspension (10) zu dem unterhalb der Bahn (W) angeordneten Formsieb (11) zu drücken.

4. Formabschnitt nach Anspruch 1, 2 oder 3, wobei ein Heizmittel (25) an der Metallbandschleife (2) zum Erwärmen des Metallbands (21) angeordnet ist.

5. Formabschnitt nach einem der Ansprüche 1 bis 4, wobei die Stützfläche eine Walze (12) ist, die Oberflächenabschnitte aufweist, an der eine Flüssigkeit (5) von der Suspension (10) das Formsieb (11) verlässt.

6. Formabschnitt nach Anspruch 5, wobei die Stützfläche eine Walze mit Nuten oder eine Saugwalze (12) ist.

7. Formabschnitt nach einem der voranstehenden Ansprüche, wobei ein Saugkasten (15) an dem Formsieb (11) und stromabwärts der Stützfläche (12) bereitgestellt ist, wobei der Saugdruck eingestellt ist, die Bahn (W) an dem Formsieb (11) zu halten.

8. Formabschnitt nach Anspruch 7, wobei der Saugkasten (15) eine gekrümmte Abdeckung aufweist.

9. Formabschnitt nach einem der voranstehenden Ansprüche, wobei eine Haube (26) oberhalb oder um das Metallband (21) herum angeordnet ist.

10. Papier- oder Kartonmaschine mit einem Formabschnitt nach einem der voranstehenden Ansprüche 1 bis 9.

11. Verfahren zum Formen einer Faserbahn (W) aus einer Fasern enthaltenden Suspension (10), wobei das Verfahren **gekennzeichnet ist, durch** den Schritt, eine Faserbahn (W) und ein Formsieb (11) zwischen einem fluidundurchlässigen eine Schleife bildenden Metallband (21) und einer Stützfläche (12) zu pressen, um eine Suspensionsflüssigkeit (5) aus der Faserbahn (W) herauszudrücken,
wobei das Metallband (21) angeordnet ist, die Faserbahn (W) zu berühren, und das Formsieb (11) angeordnet ist, die Stützfläche (12) zu berühren.

12. Verfahren nach Anspruch 11, außerdem mit dem Schritt, das Metallband (21) zu erwärmen und das erwärmte Metallband (21) mit der Faserbahn (W) in Berührung zu bringen.

13. Verfahren nach Anspruch 11 oder 12, außerdem mit dem Schritt, einen Saugdruck auf das Formsieb (11) an der Stützfläche (12) und/oder stromabwärts der Stützfläche (12) aufzubringen.

14. Verfahren nach Anspruch 12, wobei das Metallband (21) erwärmt ist, eine Temperatur unter dem Siedepunkt der Suspensionsflüssigkeit (5) aufzuweisen, wenn das Metallband (21) die Faserbahn (W) berührt, oder wobei das Metallband (21) erwärmt wird,

um eine Temperatur höher als der Siedepunkt der Suspensionsflüssigkeit (5) aufzuweisen, wenn das Metallband (21) die Faserbahn (W) berührt.

Revendications

1. Section de formage destinée à former une bande fibreuse (W), ladite section de formage comprenant une boucle de toile de formage (1) pour former la bande fibreuse (W) à partir d'une fibre contenant une suspension (10) dessus, et
une courroie métallique (21) en boucle imperméable aux fluides qui est agencée pour presser la bande fibreuse (W) et ladite toile de formage (11) entre ladite courroie métallique (21) et une surface de support (12),
où la toile de formage (11) est agencée pour se mettre en contact avec la surface de support (12),
caractérisée en ce que la bande métallique (21) est agencée pour se mettre en contact avec la bande fibreuse (W).

2. Section de formage selon la revendication 1, dans laquelle ladite bande métallique (21) est lisse, dans laquelle une valeur Ra de lissé de la courroie métallique (21) est inférieure à 6,3 μm.

3. Section de formage selon la revendication 1 ou 2, dans laquelle la bande métallique (21) est agencée pour presser la bande fibreuse (W) par le dessus en pressant le liquide (5) de la suspension (10) vers la toile de formage (11) disposée au-dessous de la bande (W).

4. Section de formage selon la revendication 1, 2 ou 3, dans laquelle un moyen de chauffage (25) est disposé au niveau de la boucle (2) de la courroie métallique pour chauffer la bande métallique (21).

5. Section de formage selon l'une des revendications 1 à 4, dans laquelle la surface de support est un rouleau (12) ayant des parties de surface au niveau de laquelle un liquide (5) à partir de ladite suspension (10) quitte la toile de formage (11).

6. Section de formage selon la revendication 5, dans laquelle, la surface de support est un rouleau à rainures ou un rouleau d'aspiration (12).

7. Section de formage selon l'une des revendications précédentes, dans laquelle une boîte d'aspiration (15) est prévue au niveau de la toile de formage (11) et en aval de la surface de support (12), où la pression d'aspiration est réglée pour maintenir la bande (W) sur la toile de formage (11).

8. Section de formage selon la revendication 7, dans laquelle la boîte d'aspiration (15) présente une surface courbe.

9. Section de formage selon l'une des revendications précédentes, dans laquelle une hotte (26) est disposée au-dessus ou autour de la courroie métallique (21).

10. Machine à papier ou à carton comprenant une section de formage selon l'une quelconque des revendications précédentes 1 à 9.

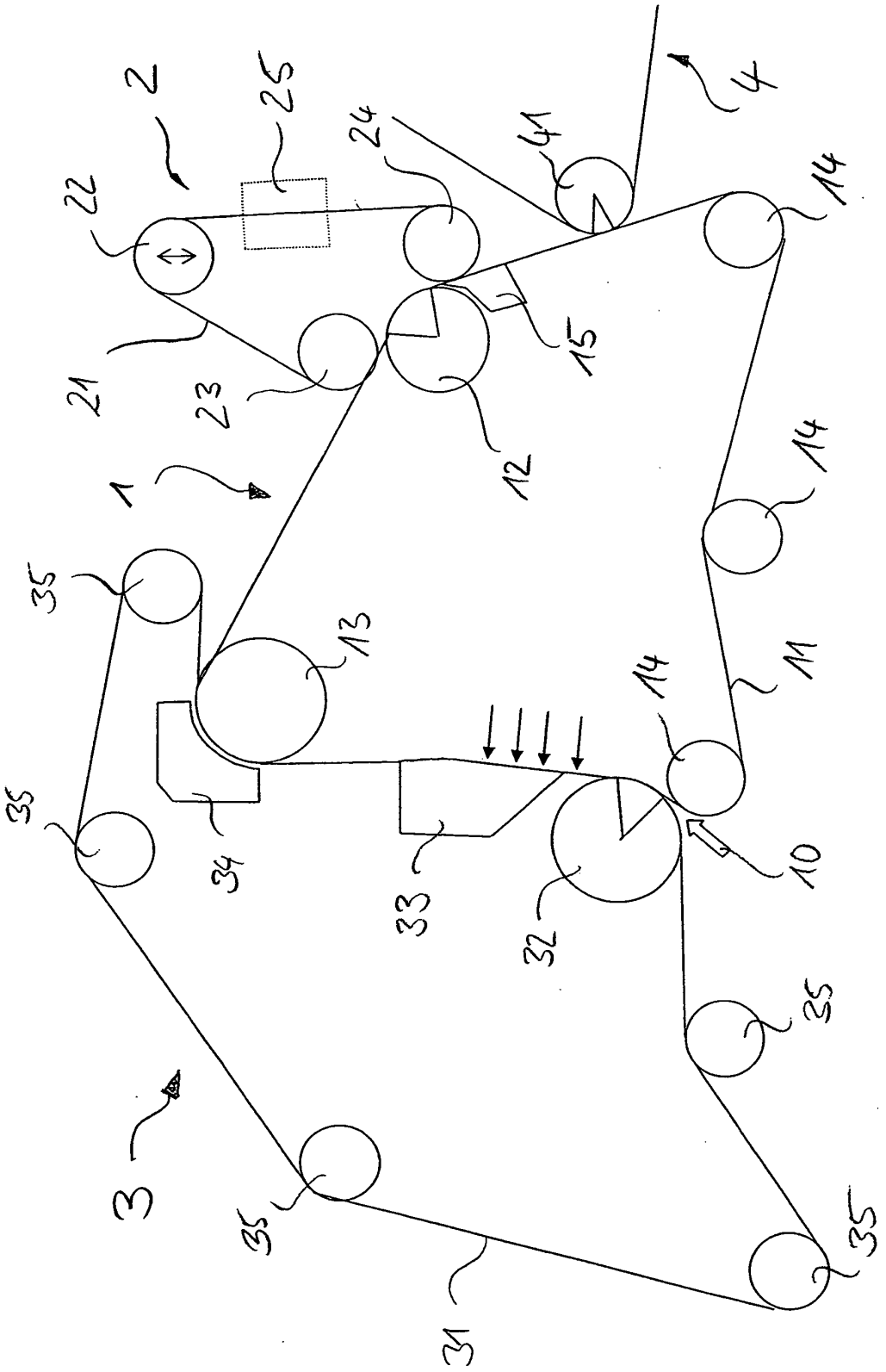
11. Procédé destiné à former une bande fibreuse (W) à partir d'une fibre contenant une suspension (10), ledit procédé étant **caractérisé par** l'étape consistant à presser une bande fibreuse (W) et une toile de formage (11) entre une courroie métallique (21) en boucle imperméable aux fluides et une surface de support (12), pour presser le liquide de suspension (5) hors de la bande fibreuse (W),
où la bande métallique (21) est agencée pour se mettre en contact avec la bande fibreuse (W) et la toile de formage (11) est agencée pour se mettre en contact avec la surface de support (12).

12. Procédé selon la revendication 11, comprenant en outre l'étape consistant à chauffer la bande métallique (21) et à amener la bande métallique chauffée (21) en contact avec la bande fibreuse (W).

13. Procédé selon la revendication 11 ou 12, comprenant en outre l'étape consistant à appliquer une pression d'aspiration à la toile de formage (11) au niveau de la surface de support (12) et/ou en aval de la surface de support (12).

14. Procédé selon la revendication 12, dans lequel la bande métallique (21) est chauffée à une température inférieure au point d'ébullition du liquide de suspension (5), lorsque la bande métallique (21) se met en contact avec la bande fibreuse (W), ou dans lequel la courroie métallique (21) est chauffée à une température supérieure au point d'ébullition du liquide de suspension (5), lorsque la courroie métallique (21) se met en contact avec la bande fibreuse (W).

Fig. 1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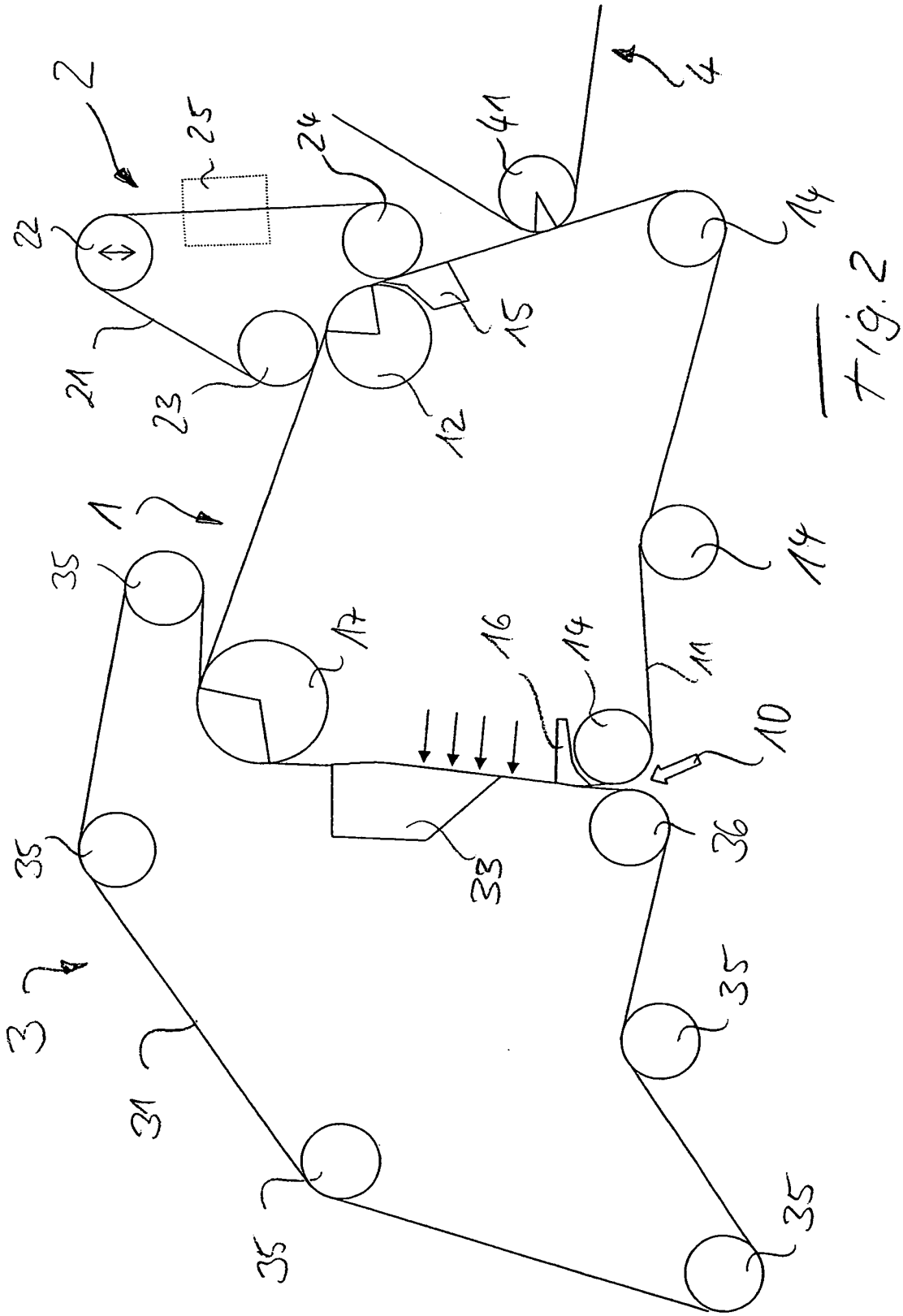
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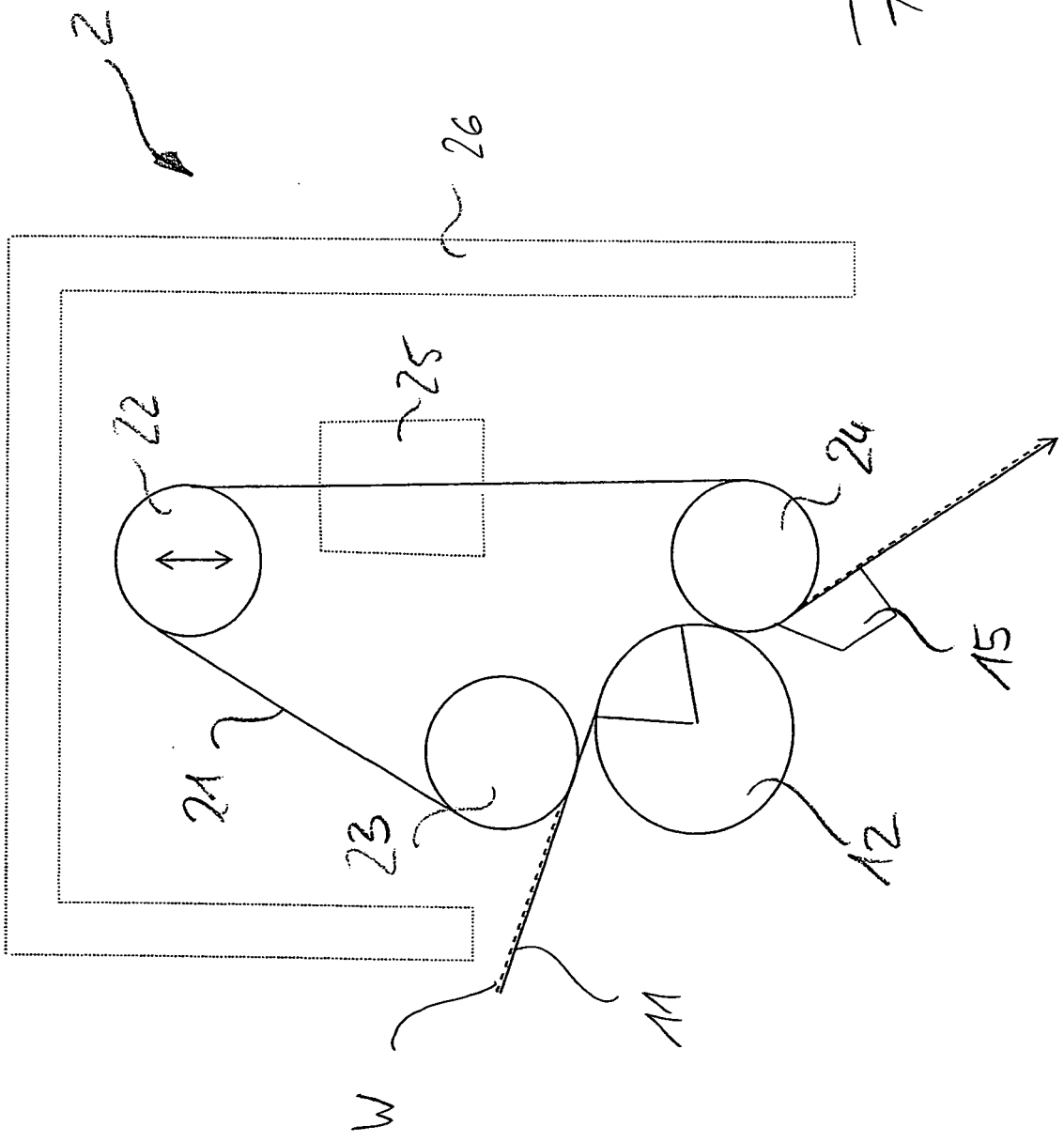
Fig. 2

Fig. 3



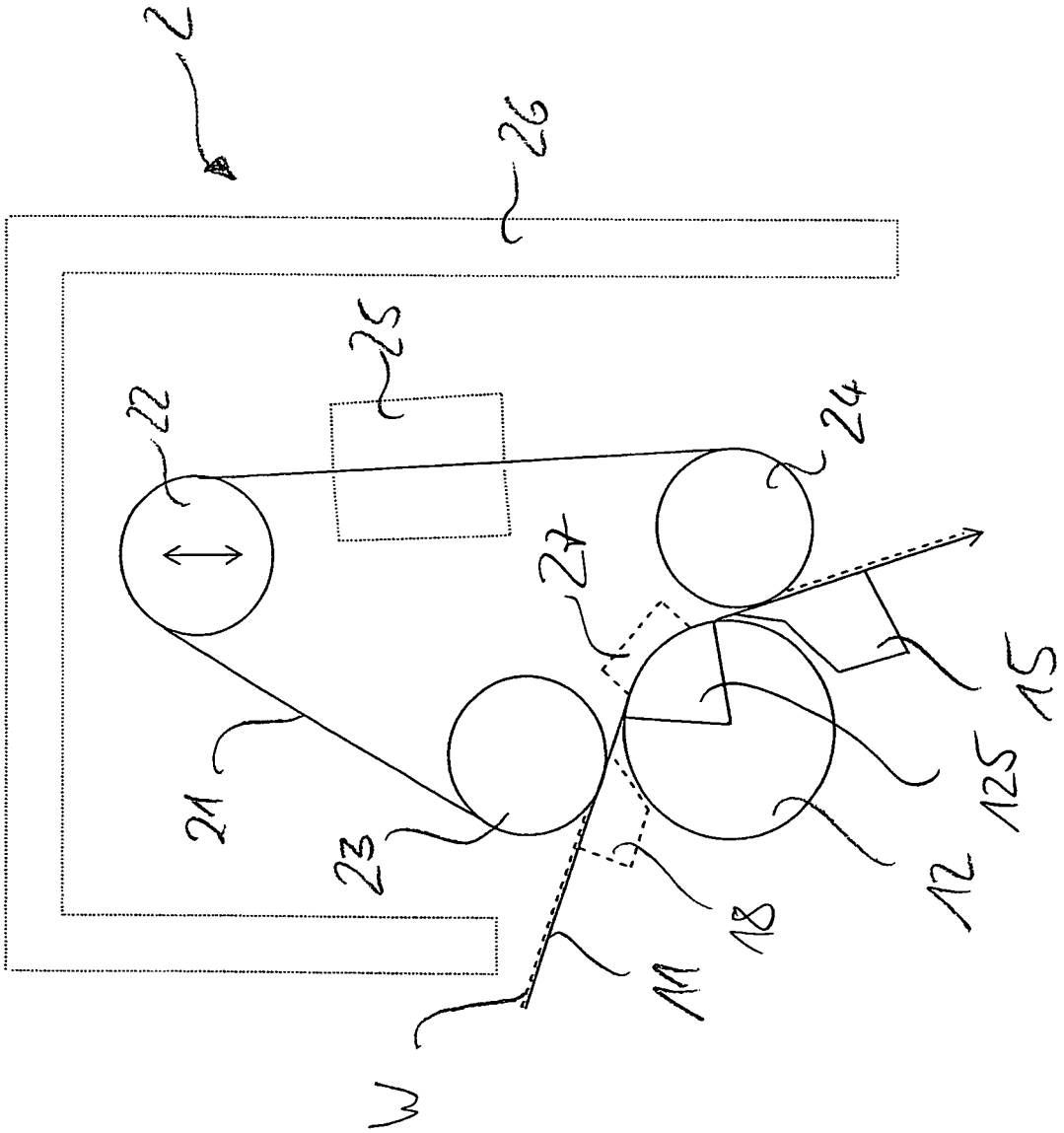


Fig. 4

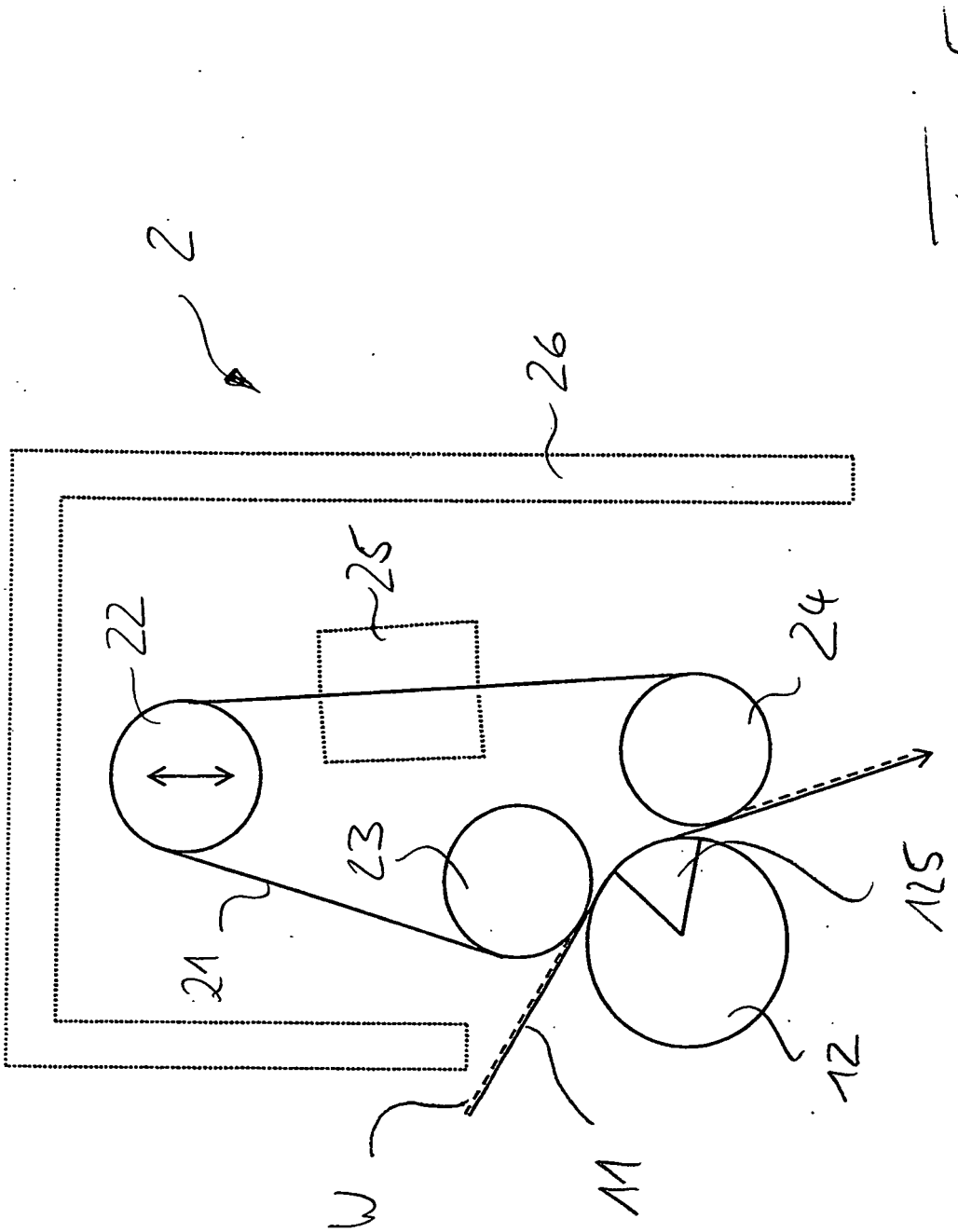


Fig. 5

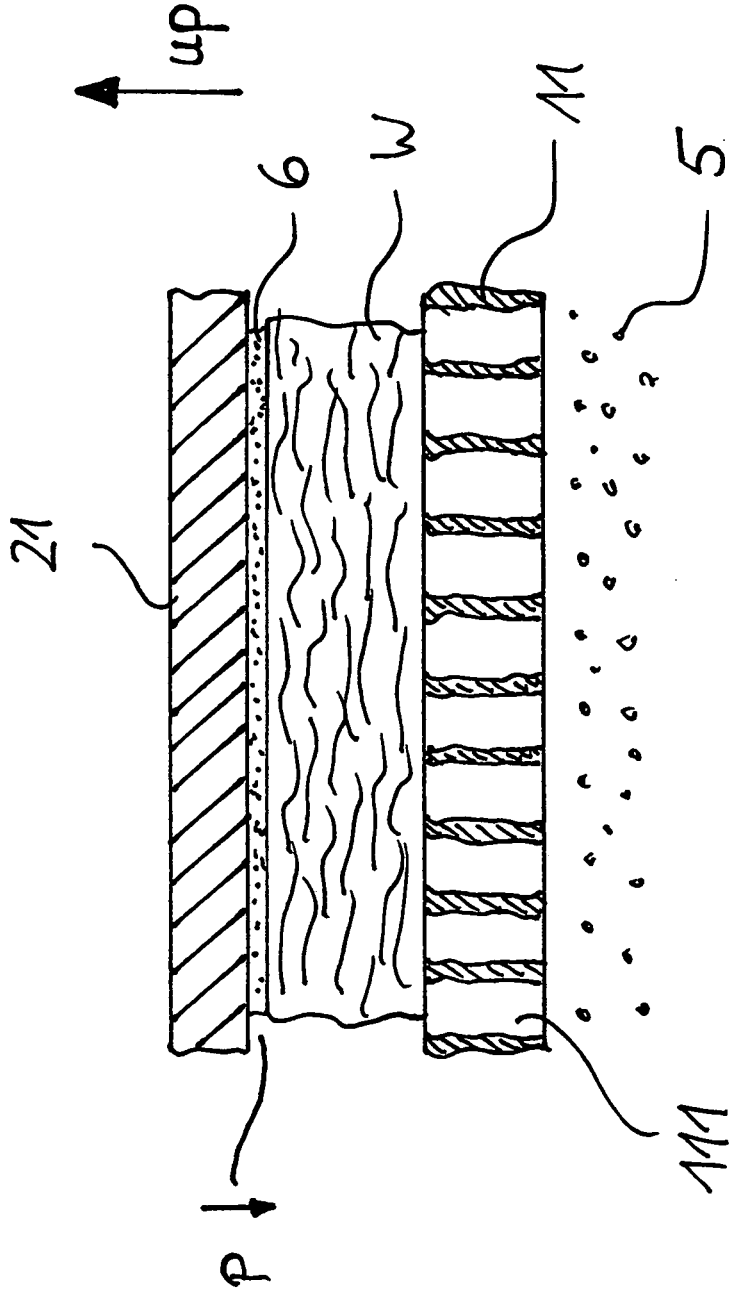


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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