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(54) **DEVICE FOR PRODUCING MULTI-PLY WEB PRODUCTS AND RELATIVE METHOD**

VORRICHTUNG UND VERFAHREN ZUR HERSTELLUNG VON MEHRLAGIGEN BAHNFÖRMIGEN
PRODUKTEN

DISPOSITIF DE PRODUCTION DE PRODUITS EN BANDE CONTINUE A PLUSIEURS NAPPES ET
PROCEDE S'Y RAPPORTANT

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Description

Technical field

[0001] The present invention relates to a device for producing a multi-ply web material, and a method for producing said material.

State of the art

[0002] In the production of paper web materials, such as and in particular tissue paper, it is frequently necessary to join together two or more plies to obtain a multi-ply material. In some cases the plies are embossed, that is subjected to deformation by means of feeding each ply between an embossing roller provided with protuberances and a pressure roller. Subsequently, after applying a glue to at least one of the two plies, on the most projecting part of its embossing, the two plies are joined by lamination. Examples of embossing-laminating devices employed for this type of production are described in US-A-3,414,459; US-A-4,978,565; US-A-5,173,351; US-A-5,096,527; US-A-3,961,119; WO-A-9720687; WO-A-9720688; WO-A-9720689; GB-A-1,225,440; US-A-3,694,300; WO-A-9618771; US-A-4,320,162.

[0003] WO-A-9944814 describes a device for performing embossing and gluing of two or more plies, provided with: an embossing cylinder equipped with protuberances, cooperating with which are a first pressure roller, to emboss a first ply of web material, a glue dispenser, and a second roller defining with the embossing cylinder a lamination nip, wherein the first embossed and glued ply is joined through lamination to a second ply.

[0004] With a device of this type a web product with at least two plies, at least one of which is embossed, is obtained. Pre-embossing units are also provided to carry out background embossing on the two plies, which is added to the embossing performed by the embossing cylinder in combination with the pressure roller.

[0005] US-A-3,673,052 describes a device for performing embossing and gluing of two plies of paper material. A first ply is embossed between two embossing rollers, fed around an idle guide roller and around a gluing roller equipped with a rubber coating with a series of protuberances. The ply lies on the protuberances and is provided with glue by means of a glue-dispensing roller in the areas corresponding to said protuberances. A joining roller cooperates with the gluing roller forming therewith a lamination nip, through which both the first ply, provided with glue, and a second previously embossed ply are fed.

[0006] WO-A-0242061 describes a device for producing gluing in points or areas between two plies of web material. For this purpose a first ply is fed into a nip between a pressure roller and a cylinder equipped with protuberances. The dimensions of the protuberances, the pressure exerted by the pressure roller and the hardness thereof are selected so as to impress a minimum deformation, essentially invisible, on the ply at the level of the

protuberances of the cylinder. Deformation is nonetheless sufficient to make the areas of the ply that are to receive glue project with respect to the surrounding surface.

[0007] A further device for joining two continuous plies to form a web material is known from DE-A-2031498.

Objects and summary of the invention

[0008] The object of the present invention is to produce a device capable of producing a multi-ply web material glued in areas, wherein the glue can (if required) be invisible. The object of an improved embodiment of the invention is to produce a device of this type that is also capable of producing -with small adjustments if necessary - an embossed multi-ply web material.

[0009] This and other objects and advantages which will be apparent to those skilled in the art by reading the text hereunder, are in substance obtained with a device for joining at least two continuous plies to form a web material, according to the features of claim 1.

[0010] Advantageously, the surface of the guide roller has a high coefficient of friction, for example obtainable with a coating in rubber or another yielding material and with a high coefficient of friction.

[0011] With the device of the invention it is possible to obtain a multi-ply material simply glued in areas, tensioning the first ply between the motorized guide roller and the motorized cylinder provided with protuberances, maintaining the roller and the cylinder at a distance from each other. The tension is imparted by controlling the peripheral speeds of the aforesaid two elements. The ply is thus stretched and deformed on the protuberances or projections of the cylinder, so that the portions thereof which rest on the protuberances of the cylinder have a radially projection to a greater extent with respect to the surrounding surface. The glue dispenser applies the glue in these areas. Deformation is sufficiently low to remain within the elastic range, so that when the ply is released, eliminating the tension applied thereto, the ply returns to its original form and essentially has no embossing, or is embossed from a previous embossing operation, but not by the motorized cylinder provided with protuberances that was used for gluing. The pressure roller or laminating roller has a sufficiently hard surface, with respect to the pressure with which it is pressed against the motorized cylinder, so that it does not deform the two plies to any relevant extent, so that these plies are essentially smooth (or provided solely with any patterns received before entering the gluing device described), except for local deformation caused between the laminating roller and the projections of the cylinder.

[0012] If required, the glue can thus be essentially invisible. Alternatively, colored glue can be used. In this case it provides an effect analogous to a print. The use of colored glue is already known, although it is currently applied at the level of an embossed pattern so that printing is necessarily combined with embossing that has at

least some parts in common with the printed parts.

[0013] On the other hand, by simply modifying the speed of peripheral rotation of the guide roller, taking it to the same value as the peripheral speed of the cylinder provided with protuberances, and pressing the former against the latter, the device can operate as an embossing-laminating device in an analogous way to the one described, for example, in WO-A-9944814. To obtain equal peripheral speeds, the guide roller can be operated in rotation at a controlled speed, or left free to rotate idle on its supports and drawn in rotation by friction by the cylinder cooperating with it.

[0014] If necessary, the cylinder provided with protuberances can be replaced, to adopt forms and distributions of the protuberances that are more suitable in the two operating modes.

[0015] For example, to make the device operate simply in gluing mode, it is possible and advisable to adopt a cylinder provided with annular or helical protuberances, as these determine optimal deformation of the ply. On the other hand, when embossing is also required, protuberances of a different form can be adopted, even more complicated and decorative, as known to those skilled in the art.

[0016] Further advantageous characteristics and embodiments of the invention are indicated in the appended dependent claims.

Brief description of the drawings

[0017] The invention will now be better understood by following the description and accompanying drawing, which shows a non-limiting practical embodiment of the invention. More specifically, in the drawing:

Figure 1 is a diagram of the device according to the invention, in a first operating mode;
 Figure 2 is a local section according to II-II in Figure 1;
 Figure 3 is a schematic portion in a view according to III-III in Figure 1, of a product obtained with the device in the operating mode in Figure 1;
 Figure 4 is an enlarged schematic section according to the line IV-IV in Figure 3;
 Figure 5 is a view analogous to the view in Figure 1, in a different operating mode; and
 Figure 6 is a schematic cross section of the product obtained in the operating mode in Figure 5.

Detailed description of the preferred embodiment of the invention

[0018] Figure 1 shows a schematic side view of the device, indicated as a whole with 1. The device has two paths for a first ply V1 of web material and a second ply V3 of web material, which are joined together in the way described hereunder to form the multi-ply material indicated as a whole with N.

[0019] Disposed along the first path for the ply V1 is a

guide roller 3 provided with a coating in a yielding and elastic material with a high coefficient of friction, indicated with 3A, for example rubber. The guide roller 3 is motorized and can rotate at a suitably controlled peripheral speed.

[0020] Also disposed along the path of the ply V1 is a cylinder 5, for example in steel or another relatively hard material, provided with a series of protuberances. In the example shown the protuberances are indicated with 5P (see in particular also Figure 2) and have an annular conformation, particularly advantageous when the device assumes the operating layout shown in Figure 1, for reasons that will become apparent hereunder.

[0021] The cylinder 5 is motorized and its peripheral speed can be suitably controlled, so that the portion of the ply V1 disposed along the path between the guide roller 3 and the cylinder 5 can be tensioned to the required value. In the layout shown in Figure 1 the roller 3 and the cylinder 5 have a distance between axes according to which these elements are detached from each other and do not press against each other. However, the roller 3 is supported movably by means of arms 4, to be able to assume - alternatively to the position shown in Figure 1 - a position wherein it presses against the cylinder 5, said position being shown in Figure 5 and which will be described hereunder.

[0022] The cylinder 5 cooperates with a glue dispenser indicated as a whole with 7, per se known and not described. The glue dispenser 7 applies glue to defined and delimited areas of the ply V1 fed around the cylinder 5, and more precisely to the areas found at the level of the protuberances 5P of said cylinder 5.

[0023] Along the circumferential extension of the cylinder 5, disposed downstream of the dispenser 7 with respect to the direction of rotation of said cylinder, and therefore in respect of the direction of advance of the ply V1, is a pressure roller 9, supported idle and drawn in rotation by the friction produced between said roller and the cylinder 5, the roller 9 and the cylinder 5 being pressed against each other. The pressure roller 9 is coated with a coating 9A in a relatively hard material, for example a rubber with a hardness greater than the hardness of the rubber forming the coating 3A of the roller 3. The hardness of the coating 9A of the roller 9 is chosen so that with the pressure produced between the roller 9 and the cylinder 5 the web material that passes through the nip between these two elements essentially is not subjected to any permanent embossing deformation.

[0024] Alternatively, the roller 9 can also be produced with an external surface in steel, rather than hard rubber. In this case it can advantageously be motorized, rather than drawn in rotation through friction by the cylinder 5.

[0025] In addition to the ply V1, the ply V3, which along its path is fed around a roller 11 disposed upstream of the nip and having the function of tensioner of the ply V3, is also fed through the nip defined between the cylinder 5 and the roller 9. The tensioner roller 11 can advantageously be coated in rubber or another material with a

high coefficient of friction. It can be drawn in rotation at a controlled speed, or it can be braked with a controllable braking moment, or can simply even have a movable axis. In general, it has the function of controlling the tension of the ply V3, so that said ply has a more suitable tension value in relation to the tension of the ply V1.

[0026] Operation of the device described hereinbefore is as follows. The web material V1 is fed along its path and fed around the motorized guide roller 3. Between this roller and the cylinder 5 the ply V1 is tensioned through the effect of a controlled difference in peripheral speed between the guide roller 3 and the cylinder 5. In this way, thanks to the tension in a longitudinal direction on the ply V1, the latter rests on the annular protuberances 5P of the cylinder 5 and is deformed as shown schematically in Figure 2. In this way, the areas of the ply V1 corresponding to the projections or annular protuberances 5P are in a radially projecting position with respect to the surrounding areas of said ply. This allows a glue to be applied by means of the dispenser 7 in delimited areas of the ply V1, essentially corresponding to the protuberances 5P. However, it would also be possible for the dispenser 7 to have glue transfer cylinders produced in such a way as to apply the glue discontinuously.

[0027] Figures 3 and 4 schematically show how glue is distributed on the ply V1, forming longitudinal strips C. These strips of glue guarantee reciprocal adhesion of the plies V1 and V3 thanks to the effect of lamination between the cylinder 5 and the pressure roller 9.

[0028] The deformation imparted on the ply V1 by the tension applied by means of the difference in peripheral speed of the roller 3 and of the cylinder 5 is temporary, that is, once the ply slackens, downstream of the nip between the roller 9 and the cylinder 5, it returns to the original form, which is normally smooth unless the material has been processed upstream to obtain a different conformation.

[0029] The tensioner roller 11 ensures that along the portion between said roller 11 and the pressure roller 9 the ply V3 has a suitable tension with respect to the tension of the ply V1, for example a tension essentially equal to the tension of the ply V1 to guarantee optimum lamination and gluing.

[0030] From the aforesaid it is clear that the device in the layout in Figure 1 produces an essentially smooth web material N, where the two plies V1 and V3 are glued together along the strips C.

[0031] However, with small adjustments in the layout and, if necessary, by replacing the cylinder 5, it is possible to use the device described as a normal embossing-gluing device. The layout assumed by the device in this case is shown in Figure 5. The guide roller 3 in this case is pressed against the cylinder 5 and drawn in rotation through friction by said cylinder 5. The motorization on the guide roller 3 is disengaged, for example by providing between the motor and the roller a friction clutch device, a coupling or in another suitable way (not shown).

[0032] The cylinder 5 can in this case have protuber-

ances 5P of a different shape, for example no longer annular and continuous, but protuberances forming elements isolated from one another. These elements can produce on the ply V1 any embossing pattern, imparted by the pressure exerted by the roller 3 and thanks to the yieldingness of the coating 3A of said roller. It would also be possible to use the same cylinder 5 employed in the configuration in Figure 1.

[0033] However, when the device is used in the layout in Figure 1 it is preferable for the extension of the protuberances to be essentially parallel to the direction of advance of the material of the ply V1, that is, to be a preferably continuous annular extension, as this form allows the best temporary deformation to be obtained through tensioning of the ply V1.

[0034] It is apparent from the above that the device according to the invention can operate as a normal embossing-gluing unit or, with small adjustments, as a simple reciprocal gluing device between two plies forming the web material N.

[0035] The possibility of replacing the cylinder 5 when changing from the layout in Figure 1 to the layout in Figure 5 does not affect the versatility of the device, as in any case embossing-gluing devices are frequently equipped with a series of interchangeable cylinders 5 provided with different patterns to obtain various embossed products. It is therefore sufficient for the device to be equipped with an auxiliary cylinder provided with annular protuberances 5P for it become bifunctional. Helical projections can be advantageously utilized in place of annular projections, preferably equipping the cylinder 5 with two series of helical protuberances with opposed inclinations to prevent producing on the ply V1 a thrust in the direction parallel to the direction of the axis of rotation of the cylinder 5.

[0036] It is understood that the drawing merely shows an embodiment provided purely as a practical example of the invention, which may vary in forms and layouts without however departing from the scope of the concept on which the invention is based. Any reference numerals in the appended claims are provided purely to facilitate reading of the claims with reference to the description and of the drawing, and do not limit the scope of protection whatsoever.

Claims

1. A device for joining at least two continuous plies (V1, V3) to form a web material (N), comprising:

- a path for at least a first ply (V1), and a path for at least a second ply (V3);
- along the path of said first ply, a guide roller (3) for said first ply (V1);
- a motorized cylinder (5) provided with protuberances (5P), associated with said guide roller (3) and around which the path of said first ply extends;

- a glue applicator (7) cooperating with said cylinder (5), arranged along the path of said first ply, between said guide roller (3) and a pressure roller (9) cooperating with said cylinder (5);

characterized in that said the guide roller (3) is motorized and has at least a first operating position wherein it does not press against said cylinder (5), and a second operating position, wherein it is pressed against said cylinder to emboss the first ply, the peripheral speeds of said guide roller (3) and of said cylinder (5) being controllable in order to tension the first ply fed around the cylinder.

2. Device as claimed in claim 1, **characterized in that** a system to disengage the motorization is associated with said guide roller (3), so that when it is pressed against said cylinder (5) it is drawn in rotation by said cylinder (5)

3. Device as claimed in one or more of the previous claims.

characterized in that said guide roller (3) has a yielding surface.

4. Device as claimed in one or more of the previous claims,

characterized in that said pressure roller (9) has a surface with a greater hardness with respect to said guide roller (3).

5. Device as claimed in one or more of the previous claims,

characterized in that said protuberances (5P) on said cylinder (5) have an annular or helical development.

6. Device as claimed in one or more of the previous claims,

characterized in that a tensioning member is (11) disposed along the path of the second ply (V3).

7. Device as claimed in claim 6, **characterized in that** said tensioning member (11) is a roller with a high coefficient of friction and rotating at a controlled speed.

8. Device as claimed in at least claim 3, **characterized in that** said tensioner roller (11) has a surface with a high coefficient of friction.

Patentansprüche

1. Vorrichtung zum Verbinden wenigstens zweier endloser Bogen (V1, V3) zur Bildung einer Bahn (N), die aufweist:

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- einen Pfad für wenigstens einen ersten Bogen (V1), und einen Pfad für wenigstens einen zweiten Bogen (V3);

- eine Führungswalze (3) für den ersten Bogen (V1) längs des Pfades des ersten Bogens;

- einen angetriebenen Zylinder (5), der mit Erhebungen (5P) versehen und der Führungswalze (3) zugeordnet ist, und um welchen sich der Weg des ersten Bogens erstreckt;

- einen Klebstoffspender (7), der mit dem Zylinder (5) zusammenwirkt und längs des Weges des ersten Bogens zwischen der Führungswalze (3) und einer Druckwalze (9), die mit dem Zylinder (5) zusammenwirkt, angeordnet ist,

dadurch gekennzeichnet, dass die Führungswalze (3) angetrieben ist und wenigstens eine erste Betriebsposition aufweist, in welcher sie nicht gegen den Zylinder (5) drückt, und eine zweite Betriebsposition aufweist, in welcher sie gegen den Zylinder zum Prägen des ersten Bogens angedrückt wird, wobei die Umfangsgeschwindigkeiten der Führungswalze (3) und des Zylinders (5) steuerbar sind, um den ersten, um den Zylinder geführten Bogen zu spannen.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** ein System zum Außereingriffbringen des Antriebs der ersten Führungswalze (3) zugeordnet ist, so dass dann, wenn sie gegen den Zylinder (5) gepresst wird, sie von dem Zylinder (5) in Drehung mitgenommen wird.

3. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Führungswalze (3) eine nachgiebige Oberfläche besitzt.

4. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Druckwalze (9) eine im Verhältnis zur Führungswalze (3) härtere Oberfläche aufweist.

5. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Erhebungen (5P) des Zylinders (5) eine ringförmige oder spiralförmige Abwicklung besitzen.

6. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** ein Spannungsteil (11) längs des Weges des zweiten Bogens (V3) angeordnet ist.

7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** das Spannungsteil (11) eine Rolle mit hohem Reibungskoeffizienten ist und mit gesteuerter Geschwindigkeit rotiert.

8. Vorrichtung nach wenigstens Anspruch 3, **dadurch gekennzeichnet, dass** die Spannungsrolle (11) eine Oberfläche mit hohem Reibungskoeffizienten besitzt.

Revendications

1. Dispositif pour joindre au moins deux nappes continues (V1,V3) pour former un matériau en bandes (N), comprenant :

- un chemin pour au moins une première nappe (V1) et un chemin pour au moins une deuxième nappe (V3) ;
- le long du chemin de la première nappe, un galet de guidage (3) pour la première nappe (V1) ;
- un cylindre motorisé (5) muni de protubérances (5P) associé avec le galet de guidage (3) et autour duquel s'étend le chemin de la première nappe ;
- un applicateur de colle (7) coopérant avec le cylindre (5), placé le long du chemin de la première nappe, entre le galet de guidage (3) et un galet de pression (9) coopérant avec le cylindre (5) ;

caractérisé en ce que le galet de guidage (3) est motorisé et présente au moins une première position de fonctionnement dans laquelle il ne presse pas contre le cylindre (5) et une deuxième position de fonctionnement dans laquelle il est pressé contre le cylindre pour gaufrer la première nappe, les vitesses périphériques du galet de guidage (3) et du cylindre (5) étant contrôlables de façon à mettre en tension la première nappe arrivant autour du cylindre.

2. Dispositif selon la revendication 1, **caractérisé en ce qu'un** système pour désengager la motorisation est associé avec le galet de guidage (3), de telle façon que quand il est pressé contre le cylindre (5), il est mis en rotation par ce cylindre (5).
3. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** le galet de guidage (3) a une surface plastique.
4. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** le galet de pression (9) a une surface d'une plus grande dureté que celle du galet de guidage (3).
5. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** les protubérances (5P) sur le cylindre (5) présentent un développement annulaire ou hélicoïdal.

6. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce qu'un** organe de tension (11) est placé le long du chemin de la deuxième nappe (V3).

7. Dispositif selon la revendication 6, **caractérisé en ce que** l'organe de tension (11) est un galet ayant un haut coefficient de friction et qui tourne à une vitesse contrôlée.

8. Dispositif selon au moins la revendication 3, **caractérisé en ce que** le rouleau de tension (11) présente une surface ayant un haut coefficient de friction.

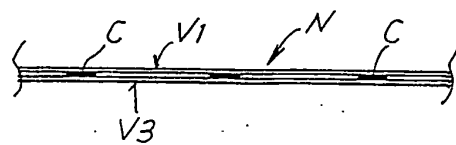
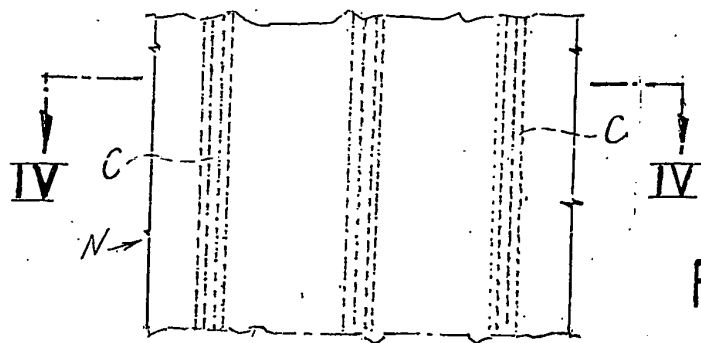
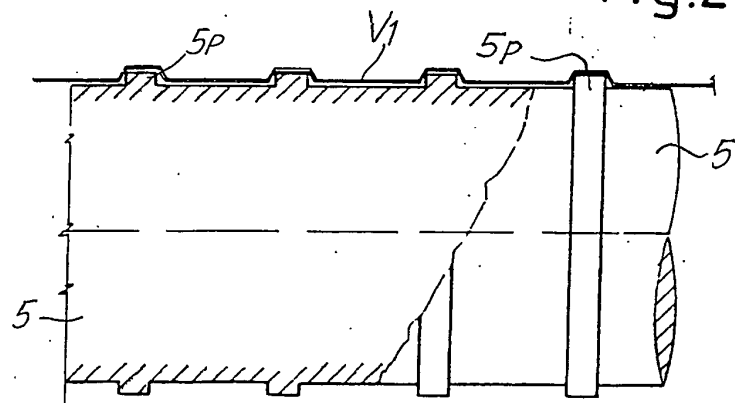
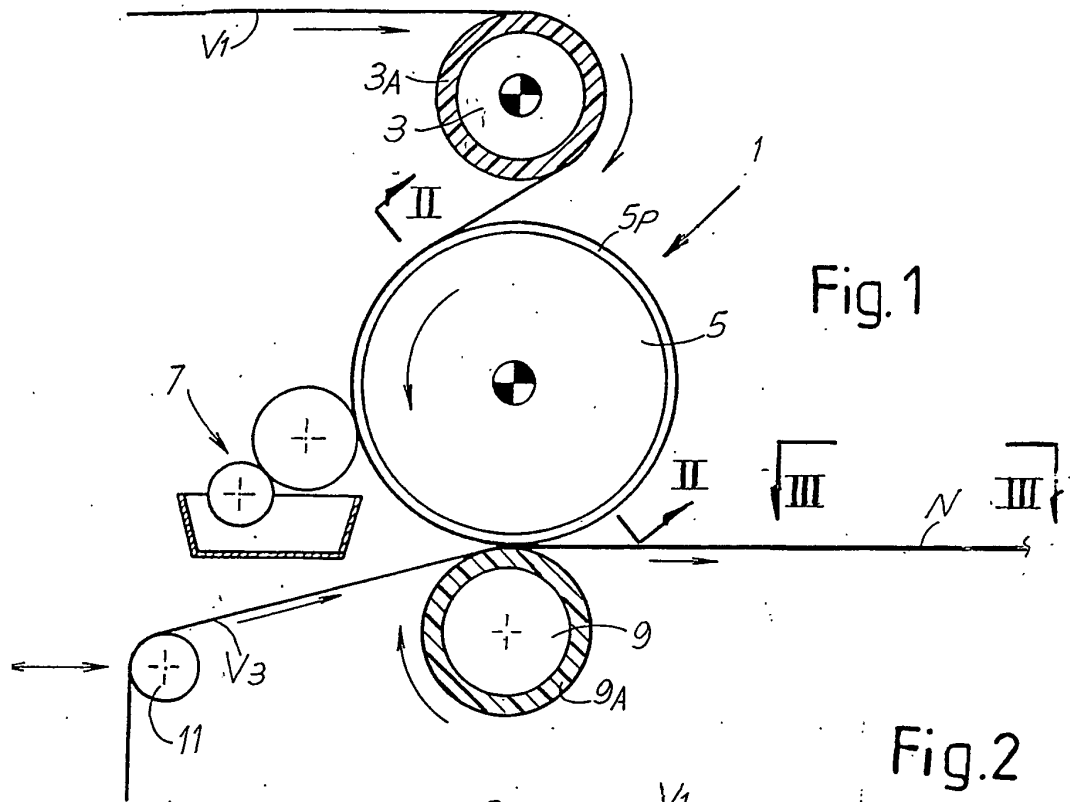


Fig. 5

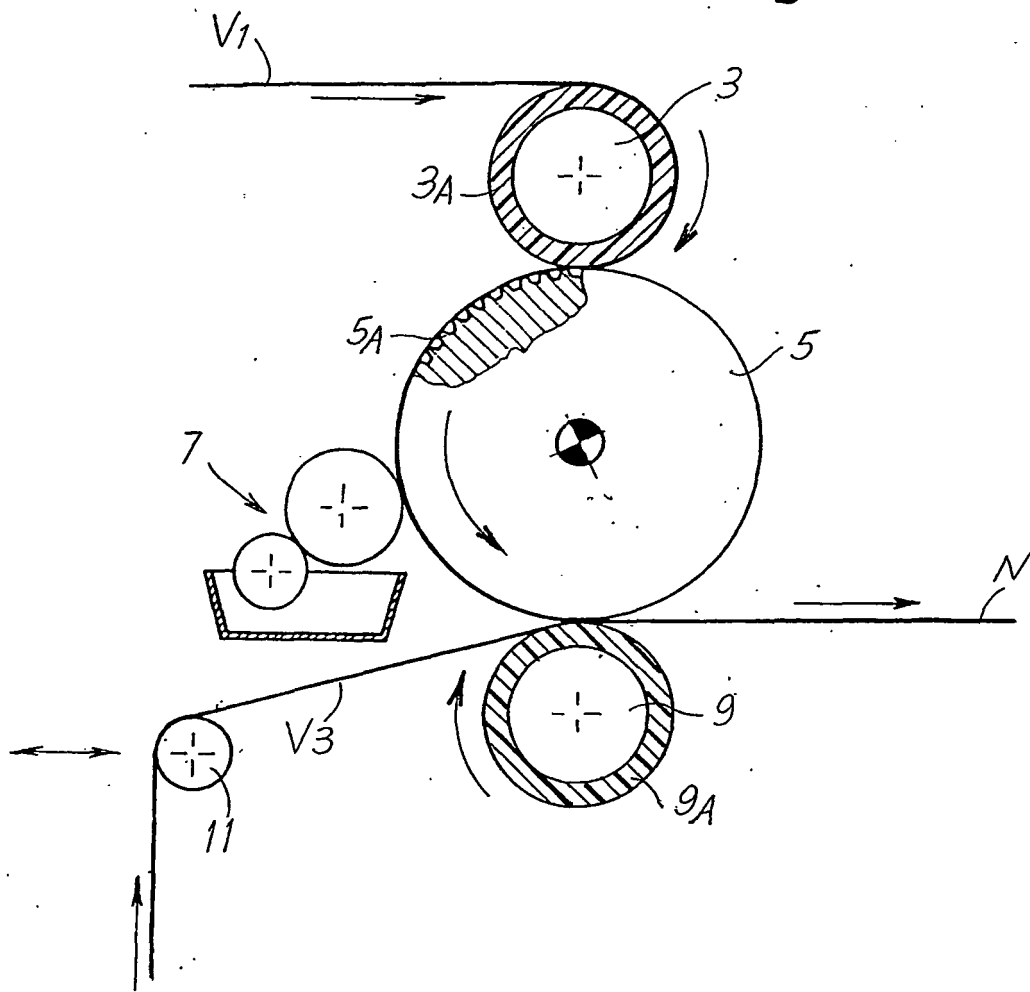


Fig. 6

