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(54) **METHOD OF APPLYING ADHESIVE IN A SLITTER-WINDER AND A SLITTER-WINDER COMPRISING A SYSTEM OF APPLYING ADHESIVE**

(57) The invention relates to a method of applying adhesive in a slitter-winder, which slitter-winder comprises a winder (20) with at least one winding drum (10) for winding a fiber web (W) into a customer roll (15) by a winding nip (N) formed between the winding drum (10) and the customer roll (15), in which method at least one adhesive application device (31, 32) is adapted to apply adhesive on end of the fiber web (W), while the

fiber web (W) is moving, for attaching the end of the fiber web (W) onto the customer roll (15), in which method the adhesive application device (31; 32) is moved in cross-direction of the running direction of the fiber web (W) over at least partial width of the fiber web webs on a support element (33; 34). In the method the adhesive is applied on the fiber web (W) at most 1000 mm before the adhesive on the fiber web (W) reaches the winding nip (N).

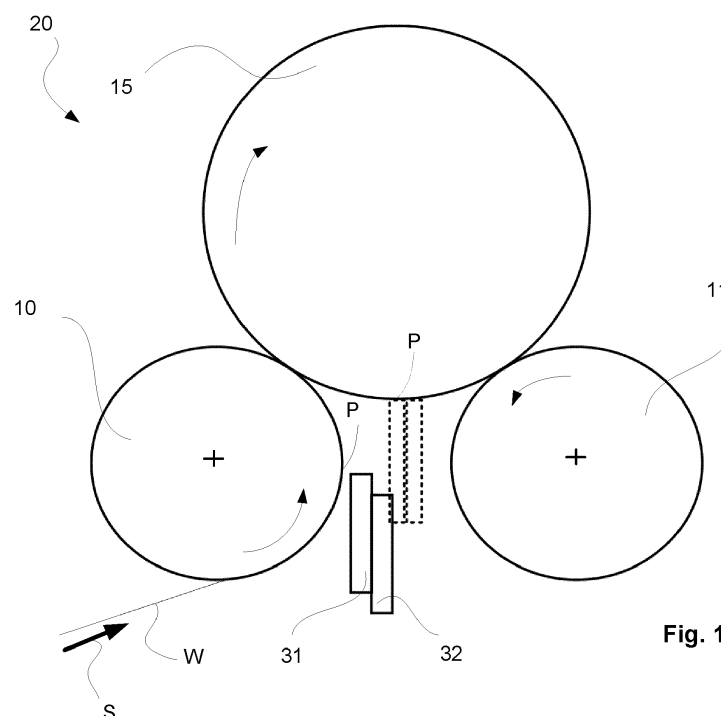


Fig. 1

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Description

Technical field

[0001] The invention relates generally to production of fiber webs and to producing customer rolls of fiber webs, especially in a slitter-winder. The invention relates to a method of applying adhesive in a slitter-winder according to the preamble of the independent method claim. The invention also relates to a slitter-winder comprising a system of applying adhesive according to the preamble of the independent slitter-winder claim.

Background

[0002] It is known that fiber webs, e.g. paper and board webs, are manufactured in machines which together constitute a fiber web production line, which can be hundreds of meters long. As known from the prior art in fiber web production lines typically comprise an assembly formed by a number of apparatuses arranged consecutively in a process line. A typical production line for fiber web comprises a forming section comprising a head box and a wire section, a press section and a drying section and a reel-up. The production line can further comprise other sections and devices for treatment and/or finishing the fiber web, for example a sizer, a coating device, a calender. The production and treatment line also typically comprises at least one slitter-winder for forming customer rolls as well as a roll packaging apparatus. In present days running speeds of fiber web production lines, especially for certain fiber web grades for example for fluting and liner web grades, are so high that two slitter-winders are needed for slitting and winding the fiber web produced in the fiber web production lines.

[0003] In fiber web production lines, the manufacture of the fiber web takes place as a continuous process. A fiber web completing in the fiber web production line is reeled by a reel-up around a reeling shaft i.e. a reel spool into a parent roll the diameter of which can be more than 5 meters and the weight more than 160 tons. The purpose of reeling is to modify the fiber web manufactured as planar and continuous to a more easily processable form. On the reel-up located in the main fiber web production line, the continuous process of the fiber web machine breaks for the first time and shifts into periodic operation. Reel-ups are thus used in fiber web production for reeling the fiber web coming from the fiber web production line into a parent roll, but reel-ups are also used to reel fiber web coming from a coating machine, a calender or a corresponding finishing device.

[0004] The fiber web wound in the reel-up onto the parent roll is full-width so it must be slit in longitudinal direction into partial fiber webs with suitable width and the partial fiber webs are wound to partial fiber web rolls (customer rolls) with suitable length of fiber web or of suitable diameter for the customers. The slitting and winding take place as known from prior art in an appropriate

separate machine i.e. in a slitter-winder. Slitter-winders employ winding devices of different types, for example multistation winders and two-drum winders. On slitter-winders of the multistation winder type, the fiber web is guided from the unwinding via guide rolls to the slitting section where the fiber web is slit into partial webs which are further guided either from above or from below to the winding roll/rolls of the winding stations to be wound up onto cores into customer rolls. Adjacent partial webs are wound up on different sides of the winding roll / on different winding rolls. Multistation winders have one to three winding rolls and in them each partial web is wound to a partial web roll in its own winding station. During winding a winding nip is formed between the winding roll and the partial web rolls to be wound. In the two-drum winders the partial webs are wound around winding cores supported by two winding drums to partial web rolls via a nip between the winding drums and the partial fiber web rolls being formed. In the two-drum winders also a belt arrangement i.e. a so-called set of belt rolls with belt loop or belt loops located around two guide rolls can be used as the winding drum. During winding a winding nip is formed between the winding drums and the partial web rolls to be wound. As known in the prior art, also winding with a shaft without cores or together with cores can be employed in the winding of a fiber web into customer rolls on a slitter-winder.

[0005] As known from the prior art, in the slitter-winder the parent roll is unwound in an unwinding section in at least one unwinder, the full-width fiber web is slit on the slitting section into several narrower partial fiber webs, which are wound up on a winding section around winding cores or around winding shafts or around winding cores located on the shafts, such as spools, into customer rolls. In the slitter-winder when the customer rolls reach desired length and diameter, the partial webs are cut in cross-direction. Tails of the partial webs are attached to the surface of customer rolls by applying adhesive to the surface of the fiber web, which adhesive then attaches the tails to the surface of the customer rolls. When the customer rolls are completed, the slitter-winder is stopped and the rolls i.e. the so-called set is removed from the machine after which the process is continued with the winding of a next set. These stages are repeated periodically until paper runs out of the parent roll in the unwinder, whereby a parent roll change is performed and the operation starts again as the unwinding of a next parent roll.

[0006] In WO publication 2008/148937 is described an apparatus for applying adhesive onto a moving web, containing an application head provided in connection with a support structure extending in the transverse direction across the fiber web, the support structure comprising a guide extending across the fiber web into which the application head has been disposed movably, and the application head has been arranged to form onto the surface of the fiber web an adhesive stripe essentially in the transverse direction in relation to the fiber web

running direction while the fiber web is moving and the adhesive is brought to the surface of the fiber web during the decelerating movement of the fiber web. This prior art apparatus comprises means for changing the movement direction of the application head during the application of adhesive and/or that the application apparatus includes means for changing the movement speed of the application head during the application of adhesive.

[0007] In WO publication 2011/076997 is disclosed an apparatus in a slitter-winder which comprises an applicator head which is arranged to apply the adhesive onto the fiber web surface and support member by means of which the apparatus can be mounted into the slitter-winder and by means of which the apparatus can be arranged to be movably substantially in cross-direction with respect to the slitter-winder.

[0008] In EP patent publication 2666739B1 is disclosed a method of applying adhesive in a slitter-winder of a fiber web machine, which slitter-winder comprises an unwinder for unwinding a parent roll, slitting section for slitting a fiber web unwound from the parent roll into partial webs and winder with winding stations on at least one winding roll for winding the partial webs partial web rolls, in which method an adhesive application device is adapted to apply adhesive on ends of partial webs for attaching the ends of the partial webs onto the partial web rolls, in which method the device is moved in cross-direction of the main running direction of the partial webs over the width of the partial webs on a support element, in which method at least two transverse movements of at least one adhesive application device are used for applying the adhesive onto the partial webs and during the first movement of the adhesive application device at least a part set of the partial webs are provided with adhesive for attaching the tail of the partial web onto the wound partial web roll and during the second movement of the adhesive application device at least a part set of the partial webs not provided with adhesive during the first movement are provided with adhesive.

[0009] The above type of systems with transverse type of movement of the adhesive application device have in most cases proven to be well functioning but in order to create onto the fiber web surface a substantially in cross-direction extending an adhesive strip, running speed of the slitter-winder must be decreased and the adhesive application performed in crawling speed and thus, capacity of the slitter-winder decreases. Even though, this is question of some seconds, only, when targeting to performing customer roll production after a fiber web production line by utilizing only one slitter-winder, all savings in capacity are significant.

[0010] In the systems according to prior art the adhesive application device has been located before the fiber web has been brought to contact with the first winding drum in the two-drum slitter-winders or with the winding drum (both in the following denoted by term "winding drum"). Typically, the adhesive application device has been located near or at a guiding or spreading roll pre-

ceding the first winding drum of the winding section of the slitter-winder. During the recent times adhesive substances have improved and fast-hardening adhesive substances have become increasingly popular due to their good adhesion properties. In the systems according to prior art such improved and fast-hardening substances have not been applicable due to long time it takes from adhesive application to the nip between the customer roll and the winding drum, in which the adhesive substance is pressed between the incoming fiber web and the almost finished customer roll to attach the tail of the fiber web to the surface of the customer roll. Thus, there exist a significant need to shorten the time between from adhesive application to the nip between the customer roll and the winding drum.

[0011] An object of the invention is to create a method of applying adhesive in a slitter-winder, especially suitable for two-drum type of winders, in which the disadvantages of prior art are eliminated or at least minimized.

[0012] A further object of the present invention is to create a slitter-winder, in particular a two-drum type slitter-winder, comprising a system of applying adhesive, in which the disadvantages of prior art are eliminated or at least minimized.

Summary

[0013] To achieve the above-mentioned objects and those which come out later, the method according to the invention is mainly characterized by what is presented in the characterizing part of claim 1. The slitter-winder according to the invention, in turn, is mainly characterized by what is presented in the characterizing part of the independent slitter-winder claim. Advantageous features and embodiments of the invention are defined in dependent claims.

[0014] It should be noted that in this description and the claims by transverse movement of an adhesive application device and by movement of an adhesive application device in cross-direction is meant a movement of the adhesive application device in direction that is transverse / cross-directional in relation to the running direction of the fiber web but if the fiber web is running during the movement of the adhesive application device the movement direction will be inclined in respect of the running direction of the fiber web such that at least last applied adhesive stripe will be substantially transverse / cross-directional in relation to the main running direction of the fiber web. Inclination is defined based on relation of running speed of the fiber web and application speed of the application device. Adhesive application can also be conducted such that the adhesive stripe/-s is/are inclined but then also cutting of the fiber web end would be conducted respectively inclined to avoid too long loose fiber web end on the customer roll.

[0015] It should also be noted that in this description and the claims by adhesive is meant glue or other in fluid form applicable adhesive properties having substance

i.e. adhesive that is applied by a nozzle or corresponding means such, that an adhesive stripe is provided on a surface of a moving fiber web.

[0016] Further it should be noted that in this description and the claims by term "winding drum" is meant winding drums of a two-drum type slitter-winder and winding rolls of a multistation type slitter-winder contrary to the common use of these terms in the art for clarity reasons.

[0017] According to the invention in the method of applying adhesive in a slitter-winder, which slitter-winder comprises a winder with at least one winding drum for winding a fiber web into a customer roll by a winding nip formed between the winding drum and the customer roll, at least one adhesive application device is adapted to apply adhesive on end of the fiber web, while the fiber web is moving, for attaching the end of the fiber web onto the customer roll, in which method the adhesive application device is moved in cross-direction of the running direction of the fiber web over at least partial width of the fiber web webs on a support element, wherein in the method the adhesive is applied on the fiber web at most 1000 mm before the adhesive on the fiber web reaches the winding nip.

[0018] According to an advantageous feature of the invention in the method the adhesive is applied on the fiber web at an adhesive application point, the adhesive application point is located at a position, wherein the fiber web is running on the surface of the winding drum and angular distance between the winding nip and the adhesive application point on the winding drum is about 90 degrees.

[0019] According to an advantageous feature of the invention in the method the adhesive is applied by two adhesive application devices, each located movably on the corresponding support elements such that one adhesive application device is used for applying adhesive over partial width of the fiber web, advantageously from one edge to about middle area of the fiber web, and the other adhesive application device is used for applying the adhesive over the rest of the width of the fiber web from the about middle area to the other edge.

[0020] According to an advantageous feature of the invention in the middle area the adhesive application on the fiber web is overlapping.

[0021] According to an advantageous feature of the invention in the method the adhesive is applied by two adhesive application devices, each located movably on a same support element such that one adhesive application device is used for applying adhesive over partial width of the fiber web, advantageously from one edge to about middle area of the fiber web, and the other adhesive application device is used for applying the adhesive over the rest of the width of the fiber web from the about middle area to the other edge.

[0022] According to an advantageous feature of the invention the adhesive application device and the corresponding support element is moved from a home position, in which the adhesive application device and the

corresponding support element is positioned while no adhesive is applied, in substantially vertical movement to an application position, in the application position adhesive is applied and after application of the adhesive the adhesive application device and the corresponding support element is returned to the home position by a substantially vertical movement.

[0023] According to the invention the method is used in a two-drum winder, in a two-drum winder at least one of the winding drums is moved to provide space for the adhesive application device and the support element in between the winding drums for application of the adhesive on to the on the surface of the first winding drum moving fiber web.

[0024] According to an advantageous feature of the invention in a two-drum winder the adhesive application device and the support element are positioned at a three o'clock position of the first winding drum.

[0025] According to an advantageous feature of the invention in the method when the slitter-winder is decelerated for a set change the application device and the support element are moved to the adhesive application position, that the adhesive substance is applied during transversal movement of the application device from a beginning position of the adhesive application to an end position of the adhesive application on the corresponding support element.

[0026] According to an advantageous feature of the invention in a home position the application device is located in mid area of the corresponding support element and in the application position moved to a beginning position and after the application of the adhesive substance the application device is moved to the home position.

[0027] According to the invention the slitter-winder comprises a system of applying adhesive, in which slitter-winder the winder comprises at least one winding drum and which system of applying adhesive comprises at least one adhesive application device and at least one support element, on which support element the adhesive application device is movably arranged, wherein the adhesive application device and the support element are located in the adhesive application position next to the winding drum at a three o'clock or a nine o'clock position.

[0028] According to an advantageous feature of the invention the adhesive application device and the support element are arranged substantially vertically movable between the adhesive application position and a home position, in which home position the adhesive application device and the support element are located, while no adhesive is applied.

[0029] According to the invention the winder is a two-drum winder comprising two winding drums and the adhesive application device and the support element are located between the winding drums in the adhesive application position.

[0030] According to the invention at least one of the

winding drums is arranged movable such, that the space between the winding drums is adjustable.

[0031] According to an advantageous feature of the invention in the winder a customer roll of fiber web is configured to be wound and the adhesive application device and the support element are located below the customer roll.

[0032] According to an advantageous aspect of the invention the adhesive is applied onto the moving fiber web close to the winding nip, the distance the fiber web travels after applying the adhesive before entering the winding nip is less than 1000 mm.

[0033] According to an advantageous aspect of the invention in a two-drum winder at least one of the winding drums is arranged movable to provide space for the adhesive application device in between the winding drums for application of the adhesive on to the on the surface of the first winding drum moving fiber web.

[0034] According to an advantageous aspect of the invention in a two-drum winder the adhesive application device/-s are positioned at a three (3) o'clock position of the first winding drum to minimize the space requirement of the adhesive application device, as at this position the fiber web running direction is substantially vertical and thus only cross-directional inclination in respect of the running direction of the fiber web is needed for the support element/-s, on which the adhesive application device/-s are arranged movable in transversal movement.

[0035] According to an advantageous aspect of the invention in a two-drum winder the adhesive application device/-s are located directly under the customer roll and the adhesive is applied onto the surface of the customer roll from below. This alternative is suitable in two-drum winders having well space in machine direction between the winding drums as this requires that the support elements inclination is provided in machine direction. Alternatively, cutting of the fiber web end should be conducted inclined.

[0036] According to an advantageous aspect of the invention in a multistation winder the adhesive application device/-s are positioned at a nine (9) o'clock position of the first winding drum to minimize the space requirement of the adhesive application device, as at this position the fiber web running direction is substantially vertical and thus only cross-directional inclination in respect of the running direction of the fiber web is needed for the support element/-s, on which the adhesive application device/-s are arranged movable in transversal movement.

[0037] According to an advantageous aspect of the invention in the method, when the slitter-winder is decelerated for the set change, the adhesive application device/-s and the support element/-s are lifted from a home position, which is advantageously underneath the level of the winding drum/-s and in which the adhesive application device/-s is/are advantageously in a home position in mid area of the support element/-s, to the adhesive application position in vertical direction. Advantageously,

during the lifting stage the adhesive application device/-s are still in home position on the support element/-s. When the application device/-s and the support element/-s is/are in beginning position of the adhesive application in vertical direction, the adhesive application device/-s are moved to beginning position of the adhesive application on the support element/-s. The adhesive substance is applied during the movement of the application device/-s from the beginning position of the adhesive application to the end position of the adhesive application on the corresponding support element/-s. After application of the adhesive the application device/-s are returned to the home position on the mid area of the support element/-s and then the application device/-s and the support element/-s are lowered to the home position.

[0038] Advantageously, for the application device/-s, the support element/-s are located such, that an accelerating/decelerating distance is provided for the adhesive application device/-s at the edges of the fiber web such, that the adhesive application device is in application speed at the beginning and end positions of the adhesive application.

[0039] In the method according to an advantageous aspect of the invention the adhesive application device and the corresponding support element is moved from the home position, in which the adhesive application device and the corresponding support element is positioned while no adhesive is applied, in substantially vertical direction to the application position and adhesive is applied in the application position and the adhesive application device and s the support element is returned to the home position after application of the adhesive.

[0040] According to another aspect of the method according to the invention adhesive can also be applied during the return movement of the adhesive applying device.

[0041] In the method according to the invention advantageously an adhesive application device is used which has one adhesive nozzle but also a device with two adhesive nozzles that are attached to the adhesive application device, which is movable along the support element that extends the width of the partial webs in cross-direction in relation to the running direction of the fiber web, can be used.

[0042] According to an advantageous aspect of the invention, especially in connection with wide webs to be slitted into partial webs, two adhesive application devices are used for applying the adhesive. The devices are located substantially one after the other in the transverse / cross-direction such that one device is used for applying adhesive to partial width of the fiber web, advantageously from one edge to about middle area of the fiber web and the other is used for applying the adhesive to the rest of the width of the fiber web from the about middle area to the other edge. The movements in the middle area are advantageously partially overlapping in the middle area. The construction in case of two adhesive application devices is advantageously provided such,

that the two adhesive application do not collide, which provides advantages in maintenance and in cases malfunctioning occurs.

[0043] According to one aspect of the invention also a device may also comprise two separate adhesive applying devices that are apart in the running direction of the fiber web.

[0044] By the invention and its advantageous features several advantages are achieved: The adhesive application position being close to the winding nip than in prior art arrangements provides, that time is saved in the set change as the time for decelerating and crawling speed needed for the application of the adhesive properly, is remarkable shorter. Thus, a significant step for making it possible to use only one slitter-winder to take care of the customer rolls production after the fiber web production line is provided. Additionally, the invention provides for possibility of using improved and fast-hardening adhesive substances.

Brief description of the drawings

[0045] Aspects of the invention, however, together with additional objects and advantages thereof, will be best understood from the following description of some example embodiments when read in connection with the accompanying drawings and in the following the invention is described in more detail referring to the accompanying drawing, in which

In figure 1 is schematically shown an advantageous example of the invention as an end view and the adhesive application device in application position.

In figure 2 is schematically shown the advantageous example of the figure 1 as an end view and the adhesive application device in home position.

In figure 3 is schematically shown the advantageous example of the figures 1-2 as a side view and the adhesive application device in application position and at the beginning of the transversal application movement.

In figure 4 is schematically shown the advantageous example of the figures 1-3 as a side view and the adhesive application device in application position and at the end of the transversal application movement.

In figure 5 is schematically shown an example for narrow webs.

In figure 6 is schematically shown an example for wide webs.

In figure 7 is schematically shown an advantageous example in a multistation type slitter-winder.

Detailed description

[0046] In the following description same reference signs designate for similar components unless otherwise mentioned and it should be understood that the examples are susceptible of modification in order to adapt to different usages and conditions within the frames of the invention. Repetition of some reference signs may have been omitted in the figures for clarity reasons. In some of the figures an arrow has been used to indicate rotation direction of the respective main element of the construction.

[0047] Figs. 1-4 schematically show an exemplifying embodiment of the invention in a winder 20 of a two-drum type slitter-winder. A fiber web W is guided for example from an unwinder to a slitter, in which the fiber web W is slitted in the longitudinal direction into narrower fiber webs for customer rolls 15. The fiber web W is after the slitter guided onto surface of first winding drum 10 and along the surface of the winding drum 10 through a winding nip N formed between the winding drum 10 and a customer roll 15 to be wound around the customer roll 15. The customer roll is created around a core or equivalent winding spool. The winder 20 also comprises a second winding drum 11 and during winding of the customer rolls 15 the customer rolls 15 are supported on both of the winding drums 10, 11. The second winding drum 11 may also be formed as a set of belt rolls depending on the type of two-drum winder in which an endless loop of belt/belts is arranged around two rolls.

[0048] In the example of figures 1-4 two adhesive application devices 31, 32 are arranged for applying adhesive. The adhesive application devices 31, 32 are arranged in cross-direction in respect of the longitudinal direction of the fiber web W movably on a support elements 33, 34. The adhesive application devices 31, 32 are thus movable along the support element 33, 34, correspondingly, which support elements 33, 34 extend in cross-direction in relation to the running direction of the fiber web W. The support elements 33, 34 are advantageously located such, that they extend a distance L over the corresponding edge of the fiber web W, which provides an acceleration/deceleration distance for the adhesive application device 31, 32 to be accelerated/decelerated to/from application speed before beginning of application of the adhesive substance / at end of application of the adhesive substance. As shown in figure 1 the application position of the adhesive application devices 31, 32 and the support elements 33, 34 is located at about 3 o'clock position in view of the circumference of the winding drum 10 and thus, at 90 degrees from the winding nip N. As shown in the figures the application devices 31, 32 and the support elements 33, 34 are located below the customer roll 15. The adhesive application devices 31, 32 and the support elements 33, 34 can also be located such, that the adhesive is applied on the surface of the customer roll 15 from below, as indicated by the dashed line position in figure 1. Advantageously, the distance

between the adhesive application point P and the winding nip N is less than 1000 mm measured as the travel distance of the fiber web W between the adhesive application point P and the winding nip N. This provides that the applied adhesive substance on the surface of the fiber web W enters the winding nip N for attaching the tail of the fiber web W to the surface of the customer roll 15 while the adhesive substance is still functioning (i.e. not hardened). When the adhesive substance is applied on the surface of the fiber web W at the winding drum 10, the distance depends on the diameter of the winding drum and is thus, less than $\frac{1}{4}$ of length of the diameter of the winding drum 10. In cases the space between the two winding drums 10, 11 is narrow, one or both of the winding drums 10; 11 can be arranged to be movable away from the other / each other such, that required space for the application device 31, 32 and the support elements 33, 34 is provided between the winding drums 10, 11. As shown in figure 2 the home position of the adhesive application device 31, 33 and the support elements 33, 34 is advantageously below the adhesive application position such, that the adhesive application devices 31, 32 and the support elements 33, 34 are substantially in vertical direction movable between the application and the home position. As shown in figures 3-4 when applying the adhesive substance the application devices 31, 32 have a cross-directional movement i.e. a transverse movement in width direction of the fiber web W along the support elements 33, 34 to provide adhesive strip A31, A32 (figs. 5-6) onto the surface of the fiber web W from a beginning position shown in figure 3 to end position shown in figure 4. After the adhesive has been applied the application devices 32, 32 have a return movement correspondingly along the support elements 33, 34 and return to the beginning position (fig. 3).

[0049] In figure 5 is schematically shown the transverse / cross-directional location of the support element 33 of the adhesive application device in respect of the fiber web W for narrow webs, 2 - 7 m. The support element 33 of the adhesive application device is located in the transverse / cross-direction in relation to the running direction S of the fiber web W. As the fiber web W is running during for the movement of the adhesive application device the support element 33 is inclined in respect of the running direction S of the fiber web W such that the adhesive stripe A31 applied will be substantially transverse / cross-directional in relation to the running direction S of the fiber web W.

[0050] In figure 6 is schematically shown the transverse / cross-directional location of the support elements 33, 34 of the adhesive applying devices in respect of the fiber web W for wide webs, 7 - 12 m. The support elements 33, 34 of the adhesive applying devices are located in the transverse / cross-direction in relation to the running direction S of the fiber web W. As the fiber web W is running during for the movement of the adhesive applying devices the support elements 33, 34 are inclined in respect of the running direction S of the fiber web W

such that the adhesive stripes A31, A32 applied will be substantially transverse / cross-directional in relation to the running direction S of the fiber web W. The support elements 33, 34 are located substantially one after the other in the transverse / cross-direction such that one adhesive application device 31; 32 on the support element 33; 34 is used for part of the width of the fiber web W and the other one of the adhesive application devices 31, 32 is used for rest of the width of the fiber web W. As shown in the figure the support elements 33, 34 are advantageously partially overlapping in the middle area.

[0051] Fig. 7 schematically shows an example in a multistation type slitter-winder, in which one winding drum 10 is used. A fiber web W is guided for example from an unwinder 50 to a slitter 51, 52, in which the fiber web W is slitted in the longitudinal direction into narrower fiber webs for customer rolls 15. By guide roll or a spreading roll 53 the fiber web W is guided onto surface of the winding drum 10 and along the surface of the winding drum 10 through a winding nip N formed between the winding drum 10 and the customer roll 15 to be wound around the customer roll 15. The customer roll is created around a core or equivalent winding spool. The multistation winder 20 may also comprise two winding nips along the circumference of the winding drum 10, typically at about ten-eleven o'clock and one-two o'clock positions. The multistation winder may also comprise two winding drums, one for one set of customer rolls and the other one for another set of the customer rolls. In the example of figure 7 two adhesive application devices 31, 32 are arranged for applying adhesive. In case of a multistation winder of two winding nips on one winding drum, one of the adhesive application device may apply adhesive on the fiber web guided to one customer roll and the other to the other customer roll. In case of a multistation winder case of two winding drums, two sets of adhesive application devices can be provided, one in connection with one winding drum and the other one with the other winding drum. The adhesive application devices 31, 32 are arranged in cross-direction in respect of the longitudinal direction of the fiber web W movably on a support element 33, 34. The adhesive application devices 31, 32 are thus movable along the support element 33, 34, correspondingly, which support elements 33, 34 extend in cross-direction in relation to the running direction of the fiber web W. The application position of the adhesive application devices 31, 32 and the support elements 33, 34 is located at about 9 o'clock position in view of the circumference of the winding drum 10 and thus, at 90 degrees from the winding nip N. Advantageously, the distance between the adhesive application point P and the winding nip N is less than 1000 mm measured as the travel distance of the fiber web W between the adhesive application point P and the winding nip N. Naturally, the distance depends on the diameter of the winding drum and is thus, less than $\frac{1}{4}$ of length of the diameter of the winding drum 10. This provides that the applied adhesive substance on the surface of the fiber

web W enters the winding nip N for attaching the tail of the fiber web W to the surface of the customer roll 15 while the adhesive substance is still functioning (i.e. not hardened). The home position of the adhesive application device 31, 32 and the support elements 33, 34 is advantageously below the adhesive application position such, that the adhesive application devices 31, 32 and the support elements is substantially in vertical direction movable between the application and the home position.

[0052] In the method transverse movements of the adhesive applying devices 31, 32 are used for applying the adhesive onto the fiber web W. During the movement of one of the adhesive applying devices 31, 32 on at least part of the width of the fiber web W, advantageously about half of the width of the fiber web W is provided with adhesive for attaching the tail of the fiber web W onto the wound customer roll 15 and during the movement of the other of the adhesive applying devices 31, 32 rest of the width of the fiber web W, advantageously about second half of the width of the fiber web is provided with adhesive.

[0053] In the description in the foregoing, although some functions have been described with reference to certain features, those functions may be performable by other features whether described or not. Although features have been described with reference to certain embodiments or examples, those features may also be present in other embodiments or examples whether described or not. Above the invention has been described by referring to some advantageous examples only to which the invention is not to be narrowly limited. Many modifications and alterations are possible within the invention as defined in the following claims.

Reference signs used in the drawing:

[0054]

10 winding drum
 11 winding drum
 15 customer roll
 20 winder
 31 application device
 32 application device
 33 support element
 34 support element
 A31 adhesive substance
 A32 adhesive substance
 L distance
 N winding nip
 P adhesive application point
 S running direction of the fiber web
 W fiber web
 50 unwinder
 51, 52 slitte
 53 spreading roll

Claims

1. Method of applying adhesive in a slitte-winder, which slitte-winder comprises a winder (20) with at least one winding drum (10) for winding a fiber web (W) into a customer roll (15) by a winding nip (N) formed between the winding drum (10) and the customer roll (15), in which method at least one adhesive application device (31, 32) is adapted to apply adhesive on end of the fiber web (W), while the fiber web (W) is moving, for attaching the end of the fiber web (W) onto the customer roll (15), in which method the adhesive application device (31; 32) is moved in cross-direction of the running direction of the fiber web (W) over at least partial width of the fiber web / webs on a support element (33; 34), **characterized in, that** in the method the adhesive is applied on the fiber web (W) at most 1000 mm before the adhesive on the fiber web (W) reaches the winding nip (N), that the method is used in a two-drum winder (20), that in the two-drum winder at least one of the winding drums (10, 11) is moved to provide space for the adhesive application device (31, 32) and the support element (33, 34) in between the winding drums (10, 11) for application of the adhesive on to the on the surface of the first winding drum (10) moving fiber web (W).
2. Method according to claim 1, **characterized in, that** in the method the adhesive is applied on the fiber web (W) at an adhesive application point (P), that the adhesive application point (P) is located at a position, wherein the fiber web (W) is running on the surface of the winding drum (10) and that angular distance between the winding nip (N) and the adhesive application point (P) on the winding drum (10) is about 90 degrees.
3. Method according to claim 1 or 2, **characterized in, that** in the method the adhesive is applied by two adhesive application devices (31, 32), each located movably on the corresponding support elements (33, 34) such that one adhesive application device (31) is used for applying adhesive over partial width of the fiber web (W), advantageously from one edge to about middle area of the fiber web (W), and the other adhesive application device (32) is used for applying the adhesive over the rest of the width of the fiber web (W) from the about middle area to the other edge.
4. Method according to claim 3, **characterized in, that** in the middle area the adhesive application on the fiber web (W) is overlapping.
5. Method according to any of claims 1-4, **characterized in, that** in the method the adhesive is applied by two adhesive application devices (31, 32), each

located movably on a same support element (33; 34) such that one adhesive application device (31) is used for applying adhesive over partial width of the fiber web (W), advantageously from one edge to about middle area of the fiber web (W), and the other adhesive application device (32) is used for applying the adhesive over the rest of the width of the fiber web (W) from the about middle area to the other edge.

6. Method according to any of claims 1-5, **characterized in, that** the adhesive application device (31, 32) and the corresponding support element (33, 34) is moved from a home position, in which the adhesive application device (31, 32) and the corresponding support element (33, 34) is positioned while no adhesive is applied, in substantially vertical movement to an application position, that in the application position adhesive is applied and that after application of the adhesive the adhesive application device (31, 32) and the corresponding support element (33, 34) is returned to the home position by a substantially vertical movement.
7. Method according to any of claims 1-6, **characterized in, that** in the two-drum winder the adhesive application device (31, 32) and the support element (33, 34) are positioned at a three (3) o'clock position of the first winding drum (11).
8. Method according to any of claims 1-7, **characterized in, that** in the method when the slitter-winder is decelerated for a set change the application device (31, 32) and the support element (33, 34) are moved to the adhesive application position, that the adhesive substance is applied during transversal movement of the application device (31, 32) from a beginning position of the adhesive application to an end position of the adhesive application on the corresponding support element (33, 34).
9. Method according to any of claims 1-8, **characterized in, that** in a home position the application device (31, 32) is located in mid area of the corresponding support element (33, 34) and in the application position moved to a beginning position and after the application of the adhesive substance the application device is moved to the home position.
10. Slitter-winder comprising a system of applying adhesive, in which slitter-winder the winder (20) comprises at least one winding drum (10) and which system of applying adhesive comprises at least one adhesive application device (31, 32) and at least one support element (33, 34), on which support element (33, 34) the adhesive application device (31, 32) is movably arranged, **characterized in, that** the winder (20) is a two-drum winder comprising two winding drums (10, 11) and that the adhesive appli-

cation device (31, 32) and the support element (33, 34) are located between the winding drums (10, 11) in the adhesive application position, that at least one of the winding drums (10, 11) is arranged movable such, that the space between the winding drums (10, 11) is adjustable, that the adhesive application device (31, 32) and the support element (33, 34) are located in the adhesive application position next to the winding drum (10) at a three o'clock or a nine o'clock position.

11. Slitter-winder according to claim 10, **characterized in, that** the adhesive application device (31, 32) and the support element (33, 34) are arranged substantially vertically movable between the adhesive application position and a home position, in which home position the adhesive application device (31, 32) and the support element (33, 34) are located, while no adhesive is applied.
12. Slitter-winder according to claim 10 or 11, **characterized in, that** in the winder a customer roll (15) of fiber web (W) is configured to be wound and that the adhesive application device (31, 32) and the support element (33, 34) are located below the customer roll.

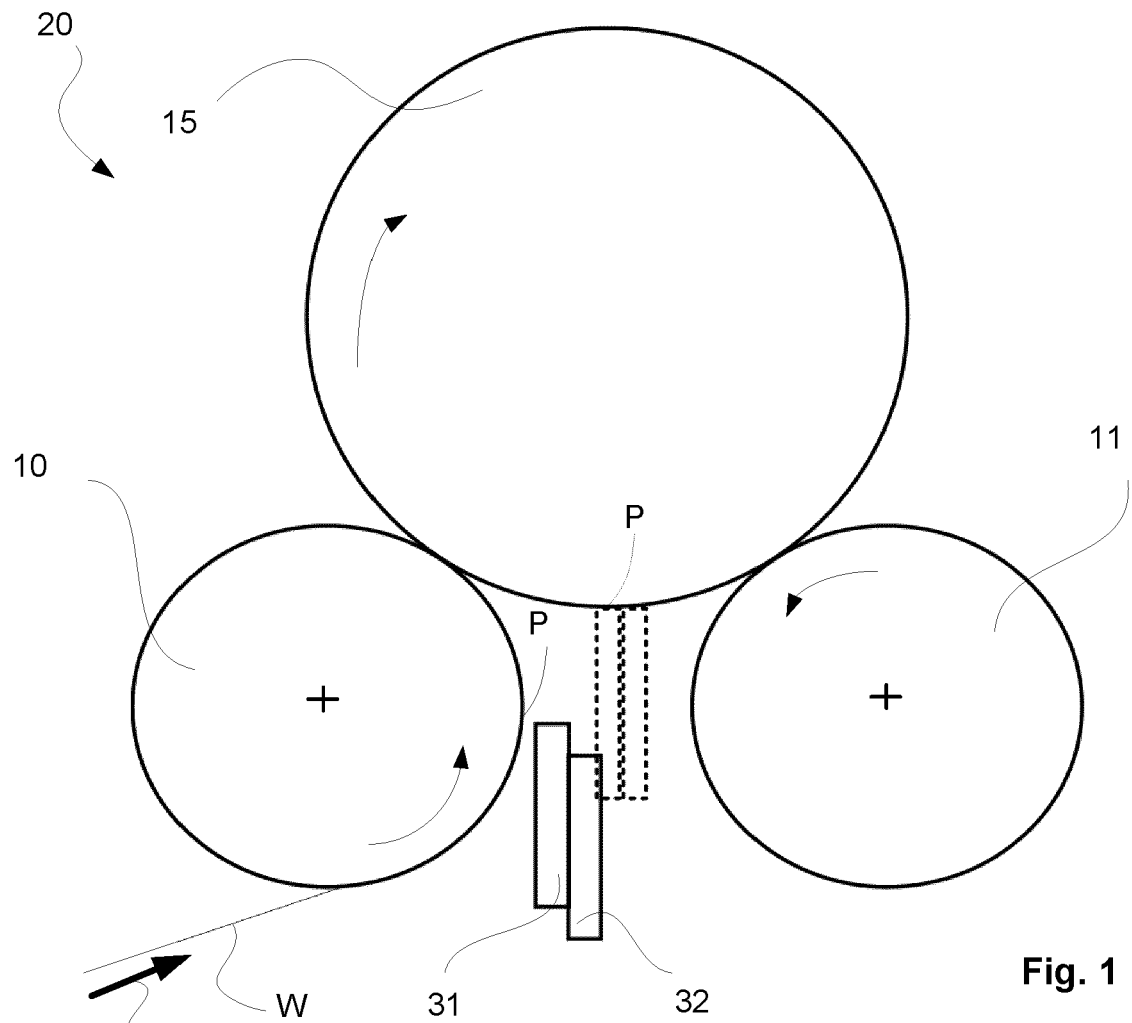


Fig. 1

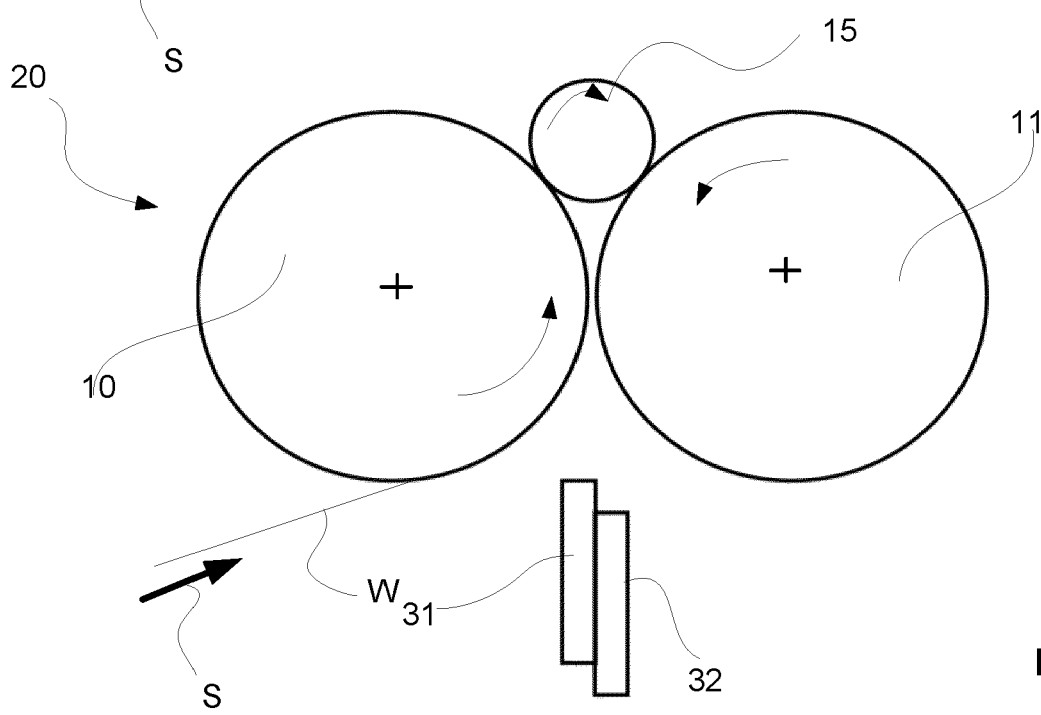


Fig. 2

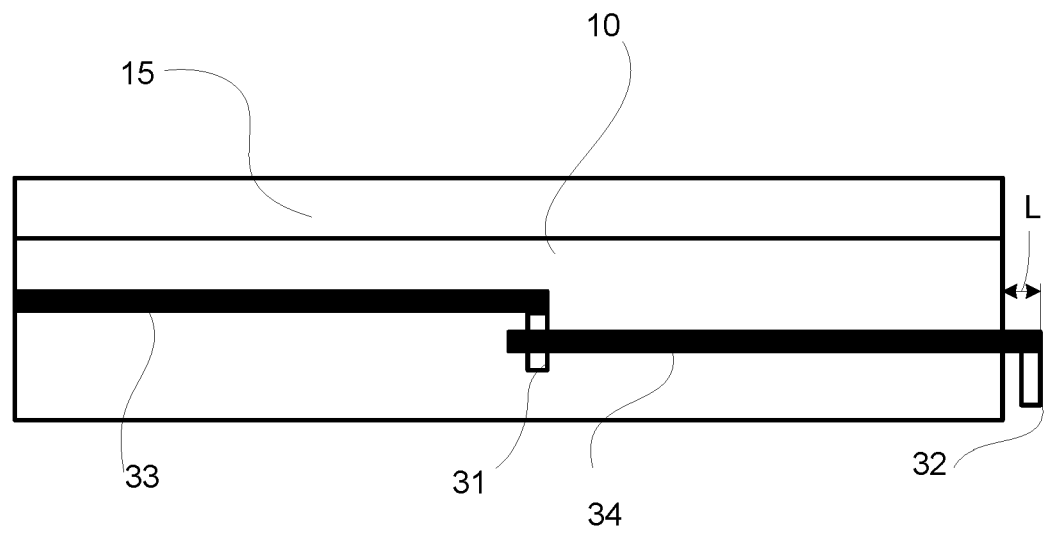


Fig. 3

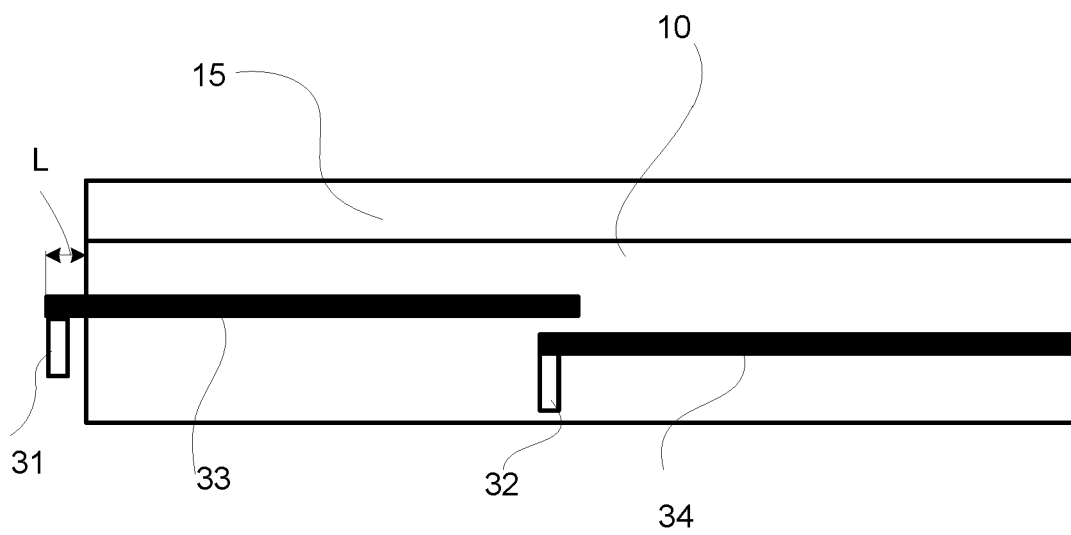


Fig. 4

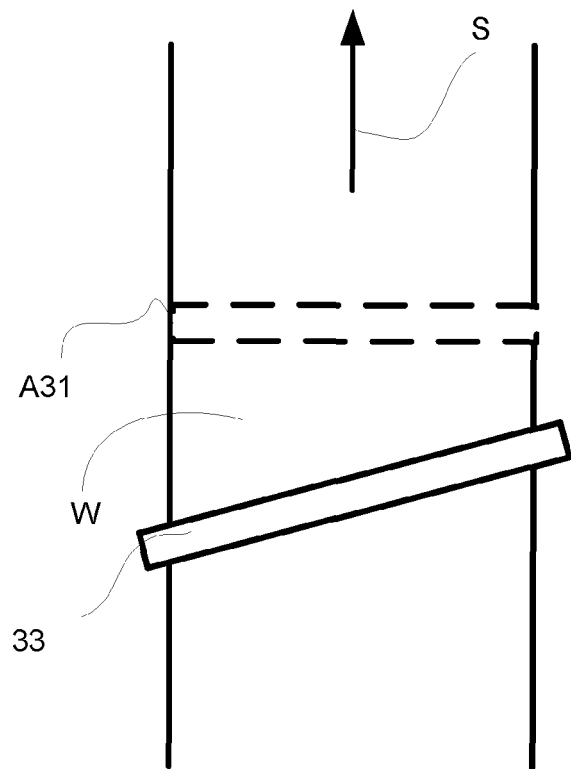


Fig. 5

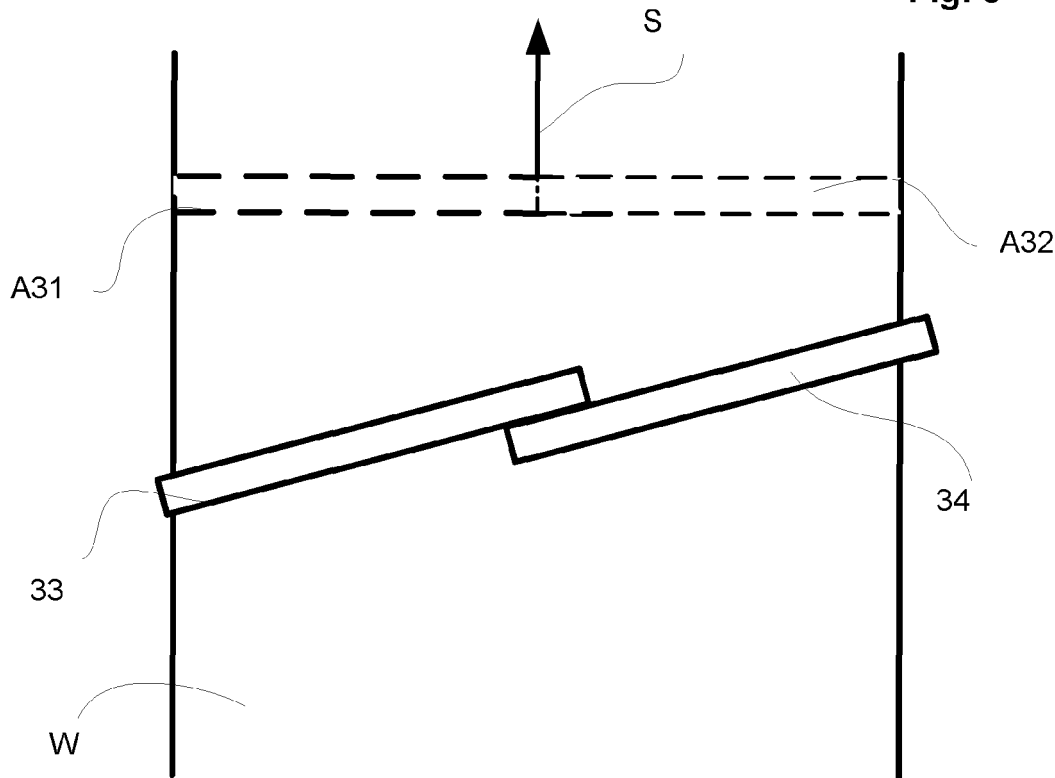


Fig. 6

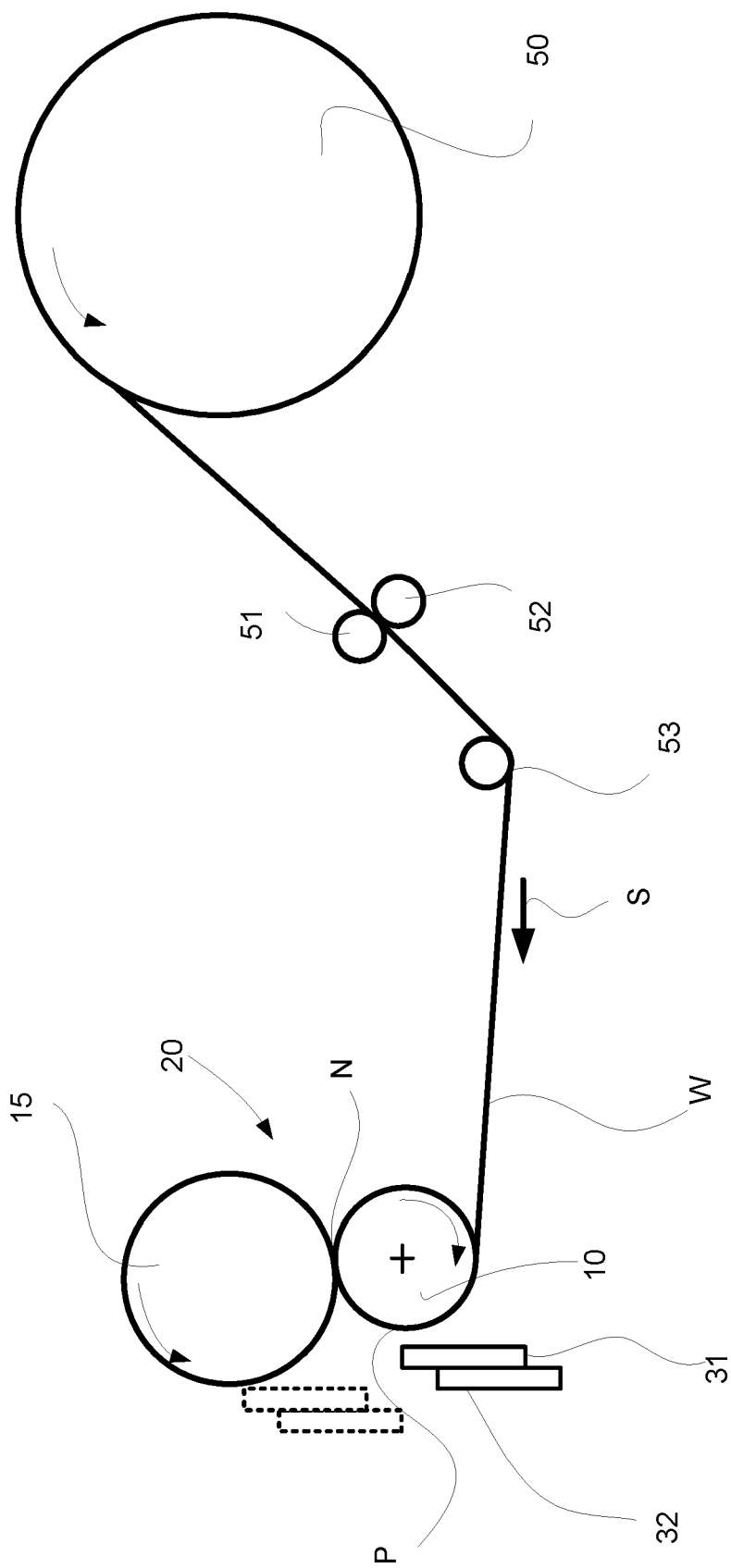


Fig. 7



EUROPEAN SEARCH REPORT

Application Number

EP 24 16 9907

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Place of search		Date of completion of the search	Examiner
The Hague		24 October 2024	Piekarski, Adam
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