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(54) **Method and arrangement in connection with a slitter-winder of a fibrous web**

(57) The present invention relates to a method in connection with a slitter-winder of a fibrous web for attaching the end of the web of each web roll to the surface of the roll, in which method the web rolls are wound supported by at least two lower support elements (12,13) and in which, during winding, the web is brought onto the roll via the first support element (12) and, upon completing the winding, each completed roll (14) is transferred by a pushing device. In transfer, the support of the roll shifts

away from said first support element (12) onto the second support element (13) and the web (w') travelling from the first support element (12) onto the web roll is slit, after which the web end attachment unit (19) is brought into its operating position such that it can deliver the adhesive material to the surface of the roll (14), and in which method the web roll is rotated by and supported by the second support element (13) while the adhesive material is delivered to the surface of the roll (14).

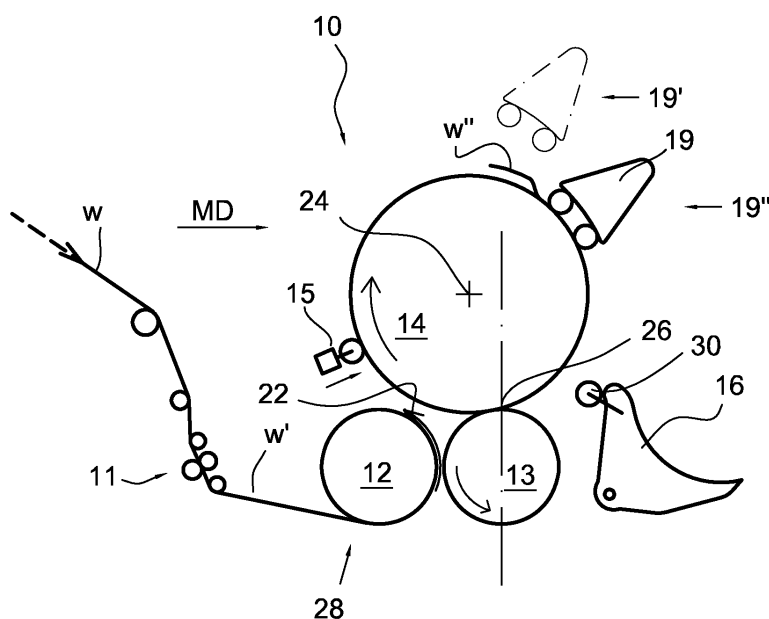


Fig. 3

Description

[0001] The invention relates to a method in connection with a slitter-winder of a fibrous web for attaching the end of the web of each web roll to the surface of the roll, in which method the web rolls are wound supported by at least two lower support elements, and in which, during winding, the web is brought onto the roll via the first support element and, upon completing the winding, each of the completed rolls is transferred by a pushing device.

[0002] The invention also relates to an arrangement in connection with a slitter-winder of a fibrous web for attaching the end of web rolls to the surface of each roll, which arrangement comprises two support elements arranged to support the web rolls from below, and a web roll removal device arranged to receive the web rolls from the second support element, and a pushing device arranged to push each web roll of a web roll group simultaneously in the machine direction, and a web end attachment unit for attaching the end of the web to the web roll.

[0003] It is known that paper is manufactured in machines, which together constitute a paper-manufacturing line, which can be hundreds of metres long. Modern paper machines can produce over 450 000 tons of paper per year. The speed of the paper machine can exceed 2000 m/min and the width of a paper web can be more than 11 metres.

[0004] In paper-manufacturing lines, the manufacture of paper takes place as a continuous process. The paper web completing in the paper machine is wound by a reel-up around a reeling shaft, i.e. reel spool, into a parent roll, the diameter of which can be even more than 5 meters and weight more than 160 tons. The purpose of winding is to modify the paper web manufactured as planar into a more easily processable form. On the reel-up located in the main machine line, the continuous process of the paper machine breaks for the first time and shifts into periodic operation. This periodicity is tried to be made with efficiency as good as possible in order not to waste already done work.

[0005] The web of the parent roll produced in paper manufacture is so-called full-width and even more than 100 km long so it must be slit into partial webs with suitable width and length for customers and wound into so-called customer rolls before shipping from the paper mill. This slitting and winding up of the web takes place, as known, in an appropriate separate machine, i.e. a slitter-winder. From prior known art are known different types of slitter-winders; in king roll slitters, partial web rolls are wound on two king rolls and, in center drum winder, the web rolls are wound supported from their centres.

[0006] On a slitter-winder, a full-width parent roll is unwound, the web is slit on the slitting section into several narrower partial webs, which are wound up on the winding section around winding cores, such as spools, into customer rolls. When the customer rolls are completed, the slitter-winder is stopped and the web rolls, i.e. the so-

called set is removed from the machine. Then, the process is continued with the winding of a new set. These steps are repeated periodically until paper runs out of the parent roll, wherein the parent roll is changed and the operation starts again as the unwinding of a new parent roll.

[0007] It is known from prior art that attaching the tail of a web roll, i.e. the end of the web that remains onto the surface of a wound web roll, to the web roll can be performed by gluing or taping. The glue or tape can, as is known from prior art, be attached in the travelling direction or the cross direction of the web. It is known from prior art to arrange in connection with a slitter-winder a separate attachment station, on which the end of the web of a web roll is attached to the surface of the web roll. Such an attachment station is, however, heavy with its equipment, requiring a web roll rotation station with its rollers, web roll receiving means and web roll removal means.

[0008] Further, the station needs a separate mobile beam, onto which the taping- or gluing device is attached. Further, the frame structure of the beam is needed.

[0009] Patent application FI 20115205 discloses one solution to above said problems.

[0010] The object of the invention is to provide a new solution in the processing of web rolls, in which the above-described problems and disadvantages have been eliminated or at least minimized.

[0011] Principally, the objects of the invention are achieved in the manner presented in claims 1 and 7.

[0012] In an advantageous embodiment of an arrangement according to the invention in connection with the slitter-winder of a fibrous web for attaching the end of the web of each web roll to the surface of the roll, web rolls are wound supported by at least two lower support elements, in which, during winding, the web is brought onto the roll via the first support element and, upon completing the winding, each completed roll is transferred by the pushing device. In transfer, the support of the roll shifts away from said first support element onto the second support element and the web travelling from the first support element onto the web roll is cut, after which the web end attachment unit is brought into its operating position such that it can deliver the adhesive material to the surface of the roll. In the method, the web roll is rotated by and supported by the second support element while the adhesive material is delivered to the surface of the roll.

[0013] In this manner is avoided a separate web end attachment station and the operation is made more efficient.

[0014] According to one embodiment of the invention, the web roll is rotated by the second support element, supported by the pushing device and the second support element, as the adhesive material is delivered to the surface of the roll.

[0015] According to another embodiment of the invention, in the method, the roll is transferred by the pushing device such that its centre of gravity passes in the ma-

chine direction the apex of the second support element, wherein the roll is supported onto the second support element and the third support element, and the web travelling from the first support element onto the web roll is cut, and the web end attachment unit is brought into its operating position such that it can deliver the adhesive material to the surface of the roll, and in which method the web roll is rotated by the second support element, supported by the second support element and the third support element, while the adhesive material is delivered to the surface of the roll.

[0016] Because the centre point of the roll passes in this embodiment the apex of the second support element in the machine direction, the unsupported draw of the web between the roll and the first support element forms relatively long, wherein better conditions for cutting are created. Alternatively, using this method, rolls having yet greater diameters can be processed.

[0017] According to another embodiment of the invention, in the method, the roll is transferred by the pushing device such that, first, the centre of gravity of the roll passes in the machine direction the apex of the second support element, and the web travelling from the first support element onto the web roll is cut, after which the roll is transferred such that its centre of gravity once again passes in the machine direction the apex of the second support element, and the web end attachment unit is brought into its operating position such that it can deliver the adhesive material to the surface of the roll. In the method, the web roll is further rotated by the second support element, supported by the second support element and the pushing device while the adhesive material is delivered to the surface of the roll.

[0018] Because the centre point of the roll passes, in this embodiment, the apex of the second support element in the machine direction, the unsupported draw of the web between the roll and the first support element forms relatively long, wherein better conditions for cutting are created. Alternatively, using this method, rolls having yet greater diameters can be processed.

[0019] According to one embodiment of the invention, the adhesive material is tape.

[0020] According to one embodiment of the invention, while the roll rotates, the adhesive material is dosed onto its surface extending beyond the site of the end of the web.

[0021] According to one embodiment of the invention, the cutting of the web takes place while the support of the web is shifted away from the first support element.

[0022] In an advantageous application of an arrangement according to the invention, the arrangement in connection with the slitter-winder of a fibrous web for attaching the end of web rolls to the surface of each roll comprises two support elements arranged to support the web rolls from below, and a web roll removal device arranged to receive the web rolls from the second support element, and a pushing device arranged to push each web roll of a web roll group simultaneously in the machine direction,

and a web end attachment unit for attaching the end of the web to the web roll. In the arrangement, the web end attachment unit is arranged in connection with the slitter-winder moveably between the initial position and operating position such that it is in its initial position free from the surface of the web roll and in its operating position in the vicinity of the surface of the web roll, and such that the web end attachment unit is arranged to deliver the adhesive material to the surface of the roll in the circumferential direction in cooperation with the second support element.

[0023] Preferably, the arrangement comprises a control unit to control the operation of at least the second roller and the attachment unit, which control unit comprises control code to execute a method according to any one of claims 1 - 6.

[0024] In this connection, the term "roll" should be understood as either one roll or a group of rolls. The invention is also applicable for use in such slitter-winders, in which one king roll is replaced by a belt roller set, which is formed, for example, of a rotating endless belt adapted around two belt rollers.

[0025] Principally, the advantages of the invention are its efficiency and simplicity. Other additional characterising features specific to the invention are set forth in the accompanying claims and the following description of the embodiments of the figures.

[0026] In the following, the invention and its operation are described with reference to the accompanying schematic drawings, in which

Fig. 1 shows in a schematic view an arrangement according to the invention in connection with a slitter-winder, and

Figs. 2 -5 show various embodiments of the invention.

[0027] Fig. 1 shows in a schematic view one embodiment of an arrangement 10 according to the invention in connection with a slitter-winder of a fibrous web, showing the normal operation situation. In connection with the arrangement is associated a slitting section 11, on which the web *w* is arranged to travel via the guide rolls through the slitting section 11, on which the full-width web *w* is slit into partial webs *w'*, to the winder 28. The winder comprises two support elements 12, 13, supported by which the roll 14 to be wound, or more specifically the parallel rolls, are wound. During winding, the web is brought onto the roll 14 via the first support element 12. In this connection, the word "roll" should be comprised as either one roll or a group of rolls.

[0028] Herein, the support elements are rollers, but they could also be a so-called belt roller set. The web is brought as partial webs *w'* via the so-called rear roller 12 of the first support element to the web roll 14. The arrangement comprises a pushing device 15, by which the roll 14 can be transferred over the so-called front roller of the second roller 13, to a removal device 16, for ex-

ample, to remove the roll. In this connection, the machine direction is shown by the arrow MD, which means generally the direction of the manufacturing line towards an increasing degree of completion. A slitter-winder according to the figure further comprises a so-called press roll 18 to support the roll from its upper side. The roll 14 as well as the rollers 12 and 13 are marked by an arrow indicating the directions of rotation during the normal operation. The arrangement further comprises a web end attachment unit 19. The attachment unit 19 is preferably arranged to deliver and attach the adhesive material, such as tape or glue, to the surface of each roll to bind the end of the web to the roll 14, which is described in more detail in connection with other figures. The attachment unit 19 can be in the direction of the longitudinal axis of the rolls extending over the entire group of rolls or it can be shorter and comprise moving means for moving e.g. a guide and an actuator to reach all the rolls, one or more rolls at a time for processing. The attachment unit is arranged moveably between its initial position 19' and operating position 19". The attachment unit 19 is in its initial position free from the surface of the web roll, locating adequately far from the roll and/or its support devices, and in its operating position in the vicinity of the surface of the web roll such that the web end attachment unit 19 is arranged to deliver the adhesive material to the surface of the roll in the circumferential direction in cooperation with the rotational movement of the roll 14 produced by the second support element 13. The attachment unit 19 is supported onto the moving equipment in order to accomplish a suitable path of movement. According to one embodiment, the attachment unit is adapted onto the safety fence (not shown in the figure) to be moved up/down on the front side, i.e. on the side of the front roller 13. It should be noted that the operating position 19" shown in Fig. 1 is far from the surface of the roll, because, in Fig. 1, the roll 14 is not in such a position, in which attachment of the end of the web takes place.

[0029] The arrangement shown in Fig. 1 further comprises a control unit 20 arranged to control the operation of at least the second roller 13 and the attachment unit 19. The control unit can also control the entire slitter-winder and its operation, or be in connection with a separate control unit controlling the slitter-winder, but, for reasons of clarity, such a type is not shown here. The control unit comprises control code or computer program for executing the operation of the below-described roller, or its part that is essential on the part of the invention.

[0030] Figs. 2 - 5 show the operation of the arrangement according to various embodiments of the invention and the method to be executed with it.

[0031] Fig. 2 shows a situation, in which the web rolls 14 are wound to the desired size and the winding event is at a halt. Upon completing the winding, each completed roll 14 is transferred by and supported by the pushing device 15 such that the support of the roll shifts away from the first support element 12 onto the second support element 13. Further, the roll 14 is supported by the push-

ing device 15. When the roll 14 detaches from the first support element 12, the partial webs w' can be cut on the section extending between the first support element 12 and the roll. According to one embodiment, cutting takes place by a blade 22, which is adapted into the arrangement 10 such that it is to be brought to the position cutting the web w' between the first support element 12 and the second support element 13 in the manner shown Fig. 2. The cutting of the web can thus be implemented such that the blade 22 is brought from the first support element onto the roll in connection with the web travelling unsupported, which is cut under the influence of a movement of the roll 14 and/or blade 22.

[0032] Fig. 3 shows the actual attachment of the end w" of the web according to one embodiment of the invention. According to one embodiment, this step takes place as a continuation of the operation shown in Fig. 2. The web w' is cut and the roll 14 is rotated by the so-called front roller of the second support element 13 in the direction indicated by the arrow. Herein, the end w" of the web is, in a greatly exaggerated manner, free from the surface of the roll, although, in reality, this usually is not the case, rather the end of the web follows the surface of the roll.

[0033] The web end attachment unit 19 is brought into its operating position 19" such that it can apply the adhesive material to the surface of the roll 14, i.e. it is brought into connection with the surface of the roll 14. Herein, the roll 14 is situated such that its centre of gravity 24 has not passed the apex 26 of the support element 13 and the plane passing through it i.e. the centre of gravity 24 is on the side of the apex of the rear roller 12. Preferably, the roll is supported by the roller 13 and pushing device 15 in place such that only the rotational movement takes place. Next, in the method, the web roll 14 is rotated by and supported by the second support element 13 while the adhesive material is delivered to the surface of the roll 14 by the attachment unit. The delivery of the adhesive material can be started at the desired site, before the end w" of the web reaches the site of the attachment unit and the delivery of the adhesive material continued such that the material extends beyond the end of the web. In other words, the delivery of the adhesive material is continued, until the end w" of the web has passed the attachment unit 19 while the roll rotates. Thus, the end w" of the web is, in practice, attached before the final removal of the roll from the winder. The roll is removed by the removal device 16 from the winder for further processing. The adhesive material is preferably tape, wherein the attachment unit is a tape unit.

[0034] According to one embodiment, the adhesive material is delivered between the roll 14 and the end of the web such that the end of the web is first detached from the surface of the roll 14 for a given length, for example, by a blast of air. If this takes place in relation to the rotational direction of the roll along the section sloping downwards, the end of the web can be made to detach from the surface of the roll quite easily. Then, the attachment unit 19 is brought in connection with the roll in the

area of said length and the adhesive material is delivered to the surface of the roll 14. Then, the roll 14 is rotated and the previously detached end of the web is simultaneously pressed back against the roll 14, wherein the adhesive material remains on the roll between the end of the web and the next web layer, binding the end to the roll. In this case, the adhesive material can be glue or two-sided tape.

[0035] Then, the attachment unit 19 is returned to its initial position 19' and the roll is transferred by the transfer device 15 to the removal device 16, by which the roll is removed from the winder and transferred, for example, to a conveyor.

[0036] Fig. 4 shows the attachment of the end w" of the web according to another embodiment of the invention. According to one embodiment, this step takes place as a continuation of the operation shown in Fig. 2. Herein, upon completing the winding, each completed roll 14 is transferred by and supported by the pushing device 15 such that the support of the roll shifts away from the first support element 12 onto the second support element 13. The roll 14 is pushed so far that the roll 14 is situated such that its centre of gravity 24 has in the machine direction passed the apex 26 of the support element 13 and the plane passing through it, i.e. the centre of gravity 24 is in relation to the apex of the rear roller 12 on the opposite side. The roll 14 is now supported on both the second support element 13 and the third support element 30. In the figure, the pushing device 15 is detached from the surface of the roll after the pushing, but it can also remain to support the roll. The third support element 30 is preferably adapted in connection with the removal device 16. The third support element can comprise, for example, a roller or corresponding arranged in connection with the removal device 16, supported by which the roll 14 can safely be rotated. The web w' is cut and the roll 14 is rotated while the end of the web is being attached by the so-called front roller of the second support element 13 in the direction indicated by the arrow. Herein, the end w" of the web is, in a greatly exaggerated manner, free from the surface of the web, although, in reality, this usually is not the case, rather the end of the web follows the surface of the roll.

[0037] The web end attachment unit 19 is brought into its operating position 19" such that it can apply the adhesive material to the surface of the roll 14, i.e. brought in connection with the surface of the roll. Next, in the method, the web roll 14 is rotated by the second support element 13 while the adhesive material is delivered to the surface of the roll 14 by the attachment unit. The delivery of the adhesive material can be started at the desired site, before the end w" of the web reaches the site of the attachment unit and the delivery of the adhesive material continued such that the material extends beyond the end of the web. In other words, the delivery of the adhesive material is continued, until the end w" of the web has passed the attachment unit 19 while the roll rotates. Thus, the end w" of the web is, in practice, at-

tached before the final removal of the roll from the winder. The roll is removed by the removal device 16 from the winder for further processing. The adhesive material is preferably tape, wherein the attachment unit is a tape unit.

[0038] Then, the attachment unit 19 is returned to its initial position 19' and the roll is transferred by the transfer device 15 to the removal device 16, by which the roll is removed from the winder and transferred, for example, to a conveyor.

[0039] Fig. 5 shows the attachment of the end w" of the web according to another embodiment of the invention. Herein, upon completing the winding, each completed roll 14 is transferred by and supported by the pushing device 15 such that the support of the roll shifts away from the first support element 12 onto the second support element 13. The roll 14 is pushed so far that the roll 14 is situated such that its centre of gravity 24 has in the machine direction passed the apex 26 of the support element 13 and the plane passing through it, i.e. the centre of gravity 24 is in relation to the apex of the rear roller 12 on the opposite side. The position of this roll is shown by a dotted line and reference number 14'. The roll 14 is now supported on both the second support element 13 and the third support element 30. In the embodiment, in which the roll 14 is brought against the support element 30 while the web w' is being cut and returned back over the apex 26 into the position, in which rotation of the roll 14 takes place, the third support element 30 can, instead of a roller, also be a part of a removal element 16, which is suitably shaped such that the completed roll or its surface layers are not damaged by this procedure. In this position, the partial webs w' are cut on the section extending between the first support element 12 and the roll. According to one embodiment, cutting takes place by a blade 22, which is adapted into the arrangement 10 such that it is to be brought to the position cutting the web w' between the first support element 12 and the second support element 13 in the manner shown Fig. 2. The cutting of the web can thus be implemented such that the blade 22 is brought from the first support element onto the roll in connection with the web travelling unsupported, which is cut under the influence of a movement of the roll 14 and/or blade 22. When the slitting of the web w' is performed in this position, in which the unsupported draw of the web travelling between the first support element 12 and the roll is longer than in the position of the roll 14 shown in Fig. 2, the position, size and/or cutting position of the blade 22 can be selected more freely. The embodiment of Fig. 5 enables that, also for large-sized rolls, such as rolls with diameters greater than 1800 mm, the end of the web can be reliably cut.

[0040] When the web w' is cut, the roll is returned into the position, which is shown in Fig. 5 by a solid line and reference number 14. This takes place such that the roll 14 is transferred by the third support element 30 such that the centre of gravity once again passes in the machine direction the apex 26 of the second support element

13 and a plane passing through it, i.e. the centre of gravity 24 is in relation to the apex 26 on the side of the rear roller 12.

[0041] In this case, the roll 14 is supported by the pushing device and the second support roll 13. The roll is nonetheless kept free from the first support element 12. After the cutting of the web w', the roll 14 is rotated while the end of the web is being attached by the so-called front roller of the second support element 13 in the direction indicated by the arrow. Herein, the end w" of the web is, in a greatly exaggerated manner, free from the surface of the web, although, in reality, this usually is not the case, rather the end of the web follows the surface of the roll.

[0042] The web end attachment unit 19 is brought into its operating position 19" such that it can apply the adhesive material to the surface of the roll 14, i.e. is brought in connection with the surface of the roll 14. Next, in the method, the web roll 14 is rotated by the second support element 13 while the adhesive material is delivered to the surface of the roll 14 by the attachment unit. Delivery of the adhesive material can be started at the desired site, before the end w" of the web reaches the site of the attachment unit and the delivery of the adhesive material continued such that the material extends beyond the end of the web. In other words, the delivery of the adhesive material is continued until the end w" of the web has passed the attachment unit 19 while the roll rotates. Thus, the end w" of the web is, in practice, attached before the final removal of the roll from the winder. The roll is removed by the removal device 16 from the winder for further processing. The adhesive material is preferably tape, wherein the attachment unit is a tape unit.

[0043] Then, the attachment unit 19 is returned to its initial position 19' and the roll is transferred by the transfer device 15 to the removal device 16, by which the roll is removed from the winder and transferred, for example, to a conveyor.

[0044] It must be noted that above are presented only a few of the most preferred embodiments of the invention. It is thus obvious that the invention is not limited to the embodiments presented above, rather it can be applied in many various manners within the scope of the accompanying claims. Characteristics presented in connection with various embodiments can, within the scope of the primary idea of the invention, likewise be used in connection with other embodiments and/or from the presented characteristics can be combined whole new entities, if the desire and the technical possibility for this exist.

Claims

1. A method in connection with a slitter-winder of a fibrous web for attaching the end of the web of each web roll to the surface of the roll, in which method the web rolls are wound supported by at least two lower support elements (12,13), and in which, during

winding, the web is brought onto the roll via the first support element (12) and, upon completing the winding, each completed roll (14) is transferred by a pushing device, **characterized in that**, in transfer, the support of the roll shifts away from said first support element (12) onto the second support element (13) and the web (w') travelling from the first support element (12) onto the web roll is cut, after which the web end attachment unit (19) is brought into its operating position such that it can deliver the adhesive material to the surface of the roll (14), and in which method the web roll is rotated by and supported by the second support element (13) while the adhesive material is delivered to the surface of the roll (14).

2. A method according to claim 1, **characterized in that** the web roll is rotated by the second support element (13), supported by the pushing device (15) and the second support element (13) while the adhesive material is delivered to the surface of the roll (14).
3. A method according to claim 1, **characterized in that**, in the method, the roll is transferred by a pushing device (15) such that its centre of gravity (24) passes in the machine direction the apex (26) of the second support element (26), wherein the roll is supported onto the second support element (13) and the third support element (30), and the web travelling from the first support element (12) to the web roll (14) is cut, and the web end attachment unit (19) is brought into its operating position such that it can deliver the adhesive material to the surface of the roll (14), and in which method the web roll (14) is rotated by the second support element (13), supported by the second support element and the third support element (30), while the adhesive material is delivered to the surface of the roll (14).
4. A method according to claim 1, **characterized in that**, in the method, the roll (14) is transferred by the pushing device (15) such that, first, the centre of gravity (24) of the roll passes in the machine direction (MD) the apex (26) of the second support element (26), and the web travelling from the first support element (12) to the web roll is cut, after which the roll (14') is transferred such that its centre of gravity (24) once again passes in the machine direction (MD) the apex (26) of the second support element (13), and the web end attachment unit (19) (w') is brought into its operating position such that it can deliver the adhesive material to the surface of the roll, and in which method the web roll is rotated by the second support element (13), supported by the second support element and the pushing device while the adhesive material is delivered to the surface of the roll.

5. A method according to any one of the preceding claims, **characterized in that** the adhesive material is tape, which is dosed onto its surface extending beyond the site of the end of the web while the roll (14) rotates. 5
6. A method according to any one of preceding claims 1 - 5, **characterized in that** the cutting (22) of the web takes place while the support of the roll is shifted away from the first support element. 10
7. An arrangement (10) in connection with a slitter-winder of a fibrous web for attaching the ends of web rolls to the surface of each roll, which arrangement comprises two support elements (12,13) arranged to support the web rolls from below, and a web roll removal device (16) arranged to receive the web rolls (14) from the second support element (13), and a pushing device arranged to push each web roll of the web roll group simultaneously in the machine direction (MD), and an web end attachment unit (19) for attaching the end of the web to the web roll (14), **characterized in that** the web end attachment unit (19) is arranged in connection with the slitter-winder moveably between the initial position (19') and the operating position (19') such that it is in its initial position free from the surface of the web roll and in its operating position in the vicinity of the surface of the web roll, and such that the web end attachment unit (19) is arranged to deliver the adhesive material to the surface of the roll in the circumferential direction in cooperation with the second support element (13). 15 20 25 30
8. An arrangement according to claim 7, **characterized in that** the arrangement comprises a control unit to control the operation of at least the second roller (13) and the attachment unit (19), and that the control unit comprises a control code to execute a method according to any one of claims 1- 6. 35 40

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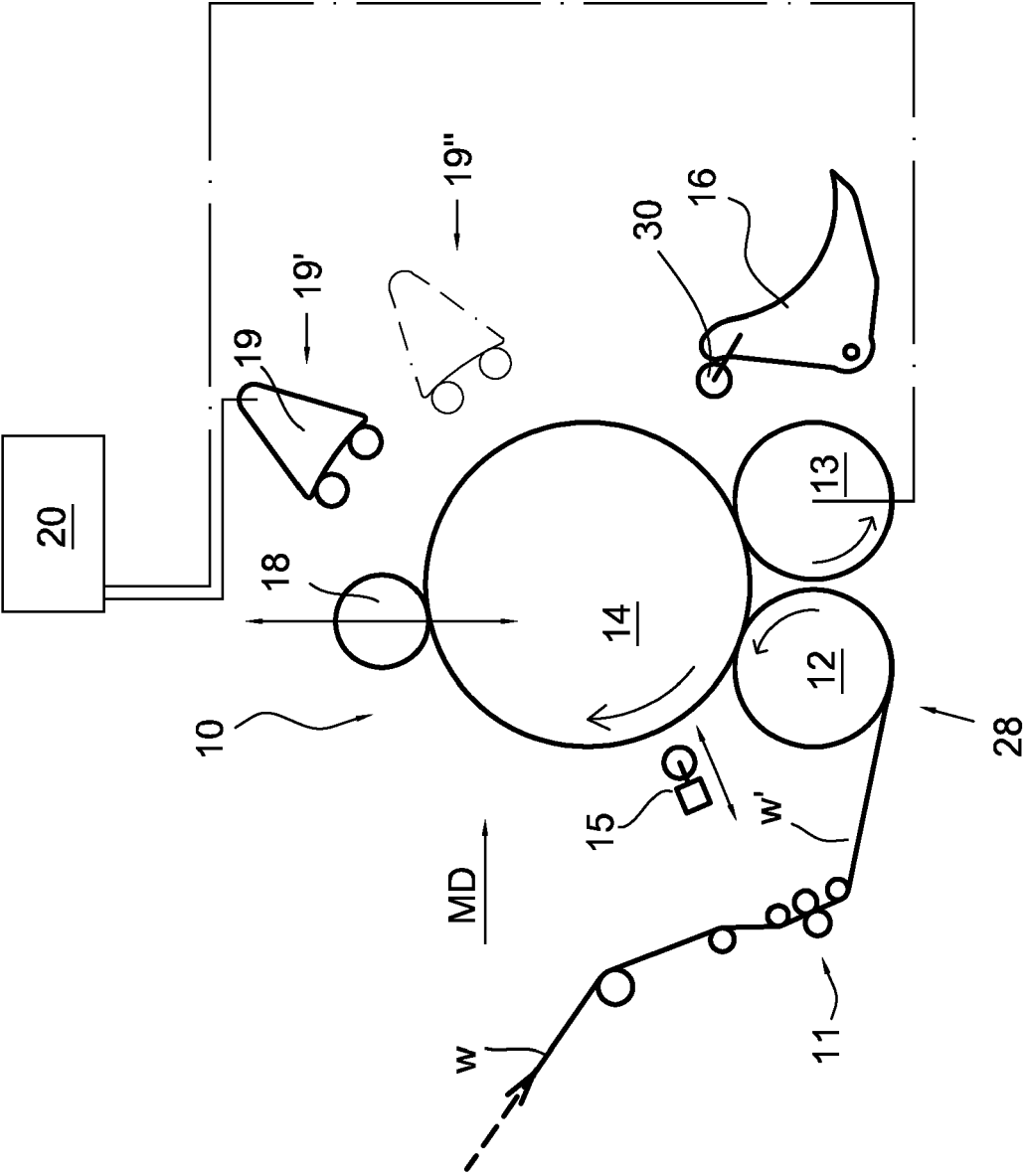


Fig. 1

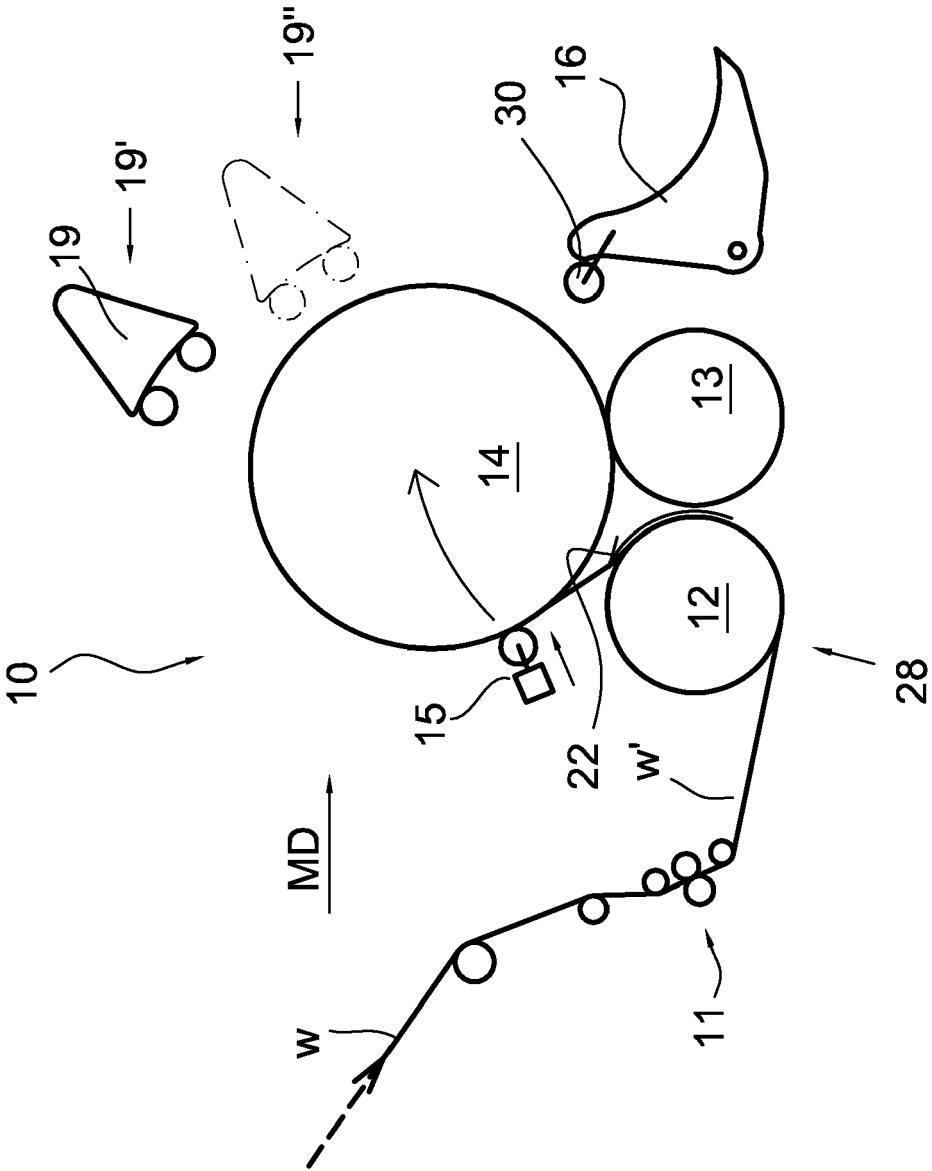


Fig. 2

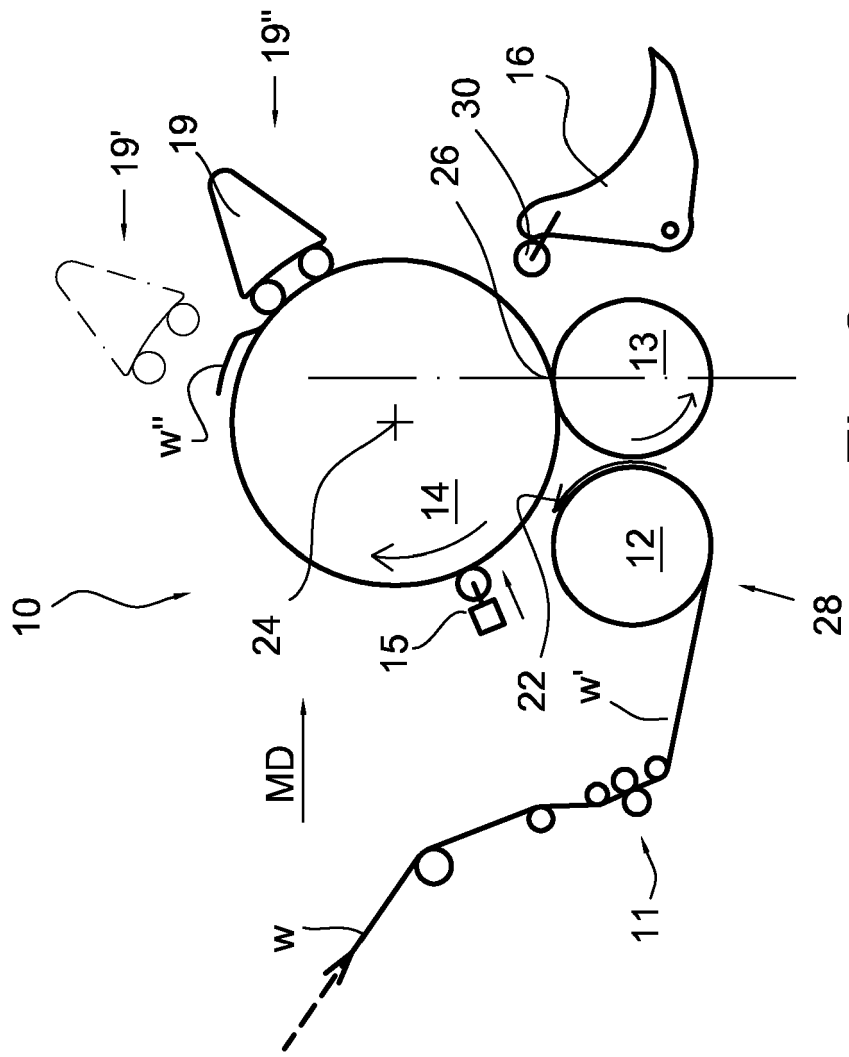


Fig. 3

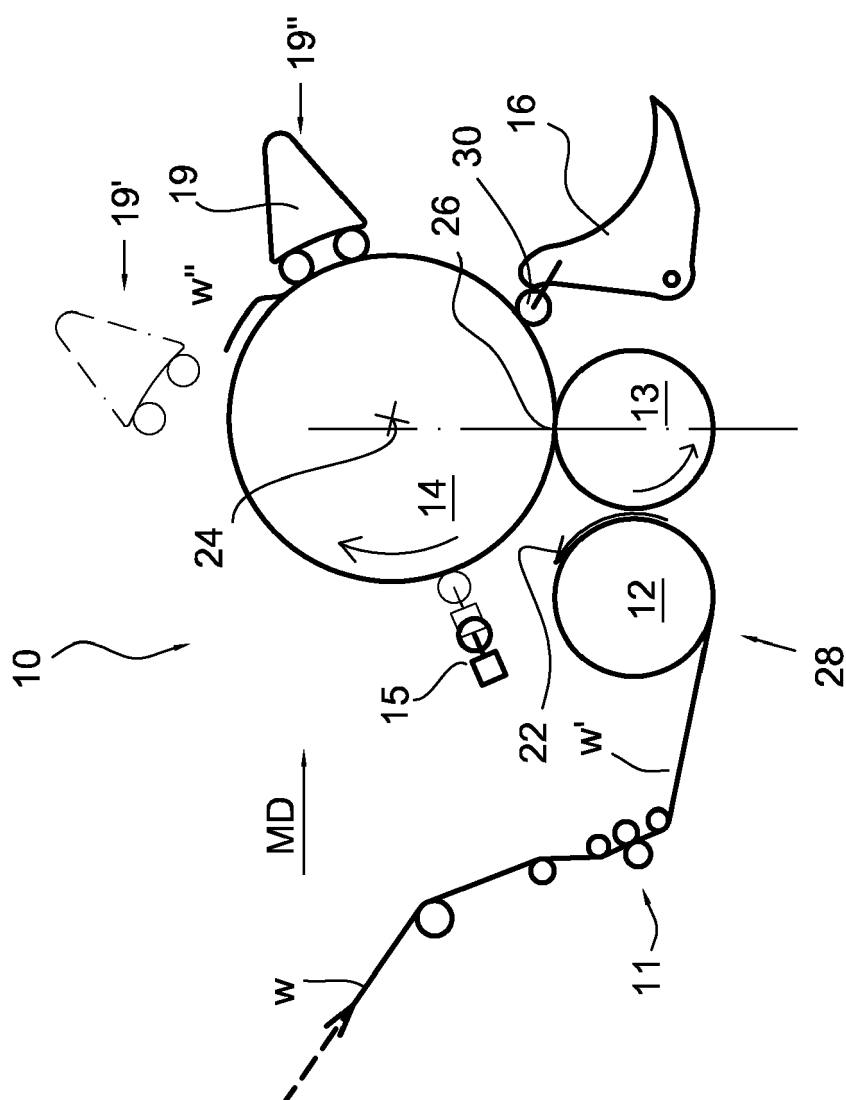


Fig. 4

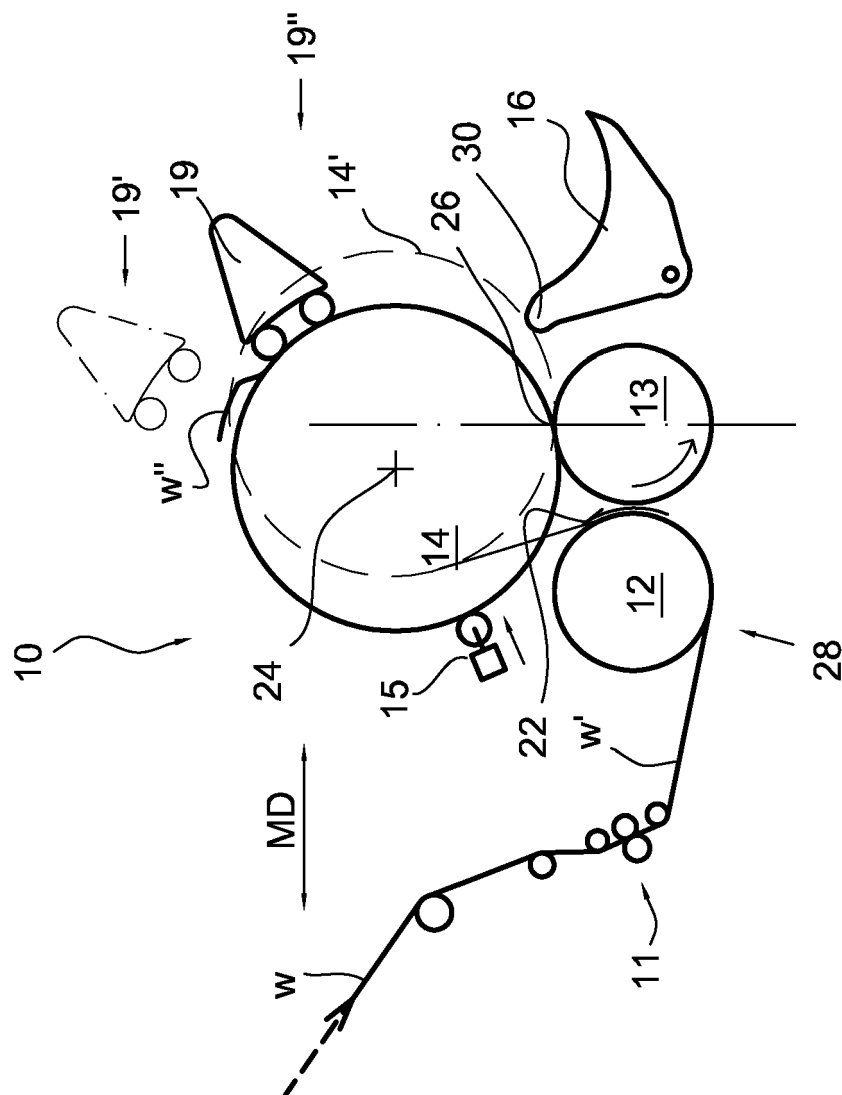


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 9487

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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