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(54) Arrangement in handling web rolls

(57) The invention relates to an arrangement in the handling of web rolls, particularly in the handling of partial web rolls (10) in connection with slitter-winders of fibre-web machines, such as paper and board machines, for attaching a tail of the web roll (10). The arrangement comprises a transfer surface (20) which is inclined descending from the slitter-winder towards a plane of the floor level of the machine hall, a receiving beam (21) into connection with which are arranged tail-attaching means (24).

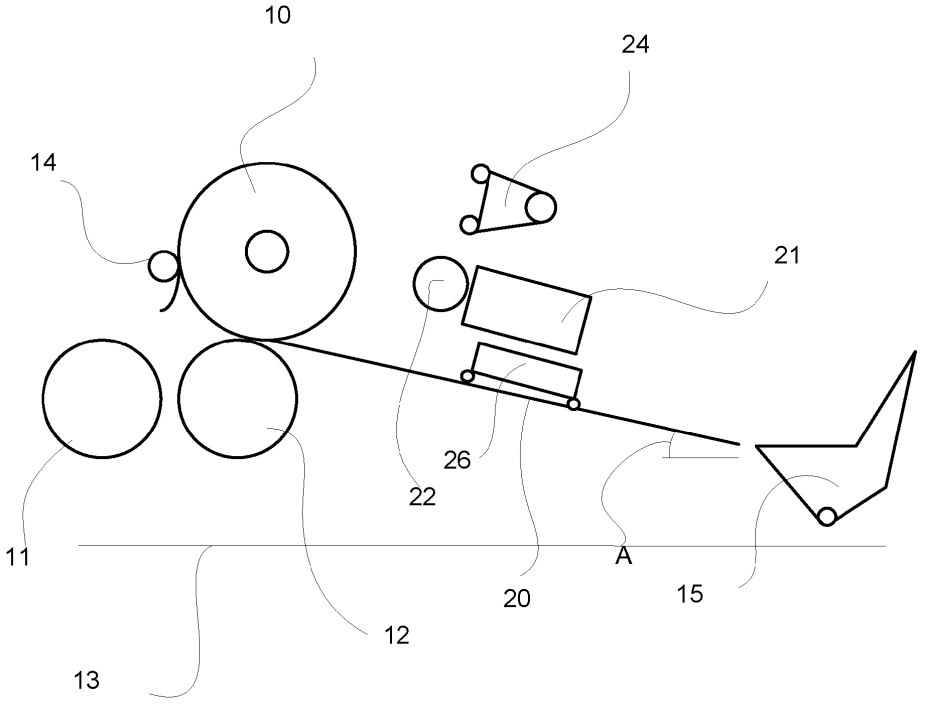

Fig. 1

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Description

[0001] The invention relates to the handling of web rolls, particularly to the handling of web rolls in connection with slitter-winders of fibre-web machines, such as in connection with slitter-winders of paper and board machines, and more particularly to the handling of partial web rolls i.e. customer rolls. The invention relates to an arrangement in the handling of web rolls according to the preamble of claim 1.

[0002] 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 2,000 m/min and the width of the paper web can be more than 11 metres.

[0003] In paper-manufacturing lines, the manufacture of paper takes place as a continuous process. A paper web completing in the paper machine 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 metres and the weight more than 160 tons. The purpose of reeling is to modify the paper web manufactured as planar to 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 tend to be done with efficiency as good as possible in order not to waste already done work.

[0004] The parent roll web produced in paper manufacture is full-width and even more than 100 km long so it must be slit into partial webs with suitable width and length for the customers of the paper mill and wound around cores into so-called customer rolls before delivering them 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. Of prior art are known different types of slitter-winders, in carrier-roll slitter-winders the web roll is wound supported by two carrier rolls and in multistation winders the web roll is wound supported of its centre.

[0005] On the slitter-winder, the parent roll is unwound, the wide 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, whereby a parent roll change is performed and the operation starts again as the winding of a new parent roll.

[0006] It is known of prior art that attaching a tail of the web roll i.e. a tail part of the web remaining on the surface of the wound web roll can be performed by applying adhesive or tape. As known of prior art, the adhesive or tape can be attached in the travel direction or cross direction of the web.

[0007] It is known of prior art to arrange into connection with the slitter-winder a separate tail-attaching station by means of which the tail of the web roll is attached on the surface of the web roll. However, such a tail-attaching station is heavy of its apparatus requiring a rotating station of the web roll with its rolls, receiving means of the web roll and removing means of the web roll. Furthermore, the station requires a separate movable beam where the taping or adhesion device is attached. Additionally, a frame structure of the beam is required.

[0008] The object of the invention is to provide a novel arrangement in the handling of web rolls in which the above-described problems and disadvantages have been eliminated or at least minimised.

[0009] A particular object of the invention is to create an arrangement in the handling of web rolls, particularly partial web rolls, in connection with slitter-winders of fibre-web machines where, in connection with the slitter-winder, no separate tail-attaching station is required.

[0010] To achieve the above objects and those which come out later, the arrangement according to the invention is mainly characterised by what is presented in the characterising part of claim 1.

[0011] In an advantageous embodiment of the arrangement according to the invention, a web roll completed on a slitter-winder is pushed from carrier rolls of the slitter-winder onto a transfer surface of the arrangement which is located such that the transfer surface is in an inclined position descending from a plane of the substantial upper surface of the carrier rolls of the slitter-winder towards a plane formed by the floor surface of the machine hall. Above the transfer surface is arranged a receiving beam for receiving the web roll. The receiving beam comprises rotating rolls or a sliding surface on which the web roll supports itself when contacting the receiving beam. The receiving beam comprises transfer means and an actuator, by which the position of the web roll is descended on the transfer surface controllably downwards such that the web tail of the web roll is at a desired point for attaching the end. Into connection with the receiving beam are also arranged tail-attaching means by which the tail is attached on the surface of the web roll. When the web roll is in a desired position for tail attachment, the attachment of the tail is performed by the tail-attaching means which attach the tail with an adhesive material, such as glue or tape, in the machine or cross direction. When performing the tail attachment in the cross direction, the web roll is stopped by the receiving beam. When performing the tail attachment in the machine direction, there is no need to stop the web roll. When the tail has been attached to the web roll, the receiving beam is transferred away from the web roll in the machine direction or the vertical direction and the web roll transfers along the transfer surface e.g. to a roll receiver or on the floor, from where the web roll is typically transferred onto a conveyor. The receiving beam can al-

so transfer downwards parallel with the transfer surface supporting the web roll to accompany it to a receiver i.e. a tipper or on the floor or so far as the conveyor.

[0012] According to an advantageous embodiment of the arrangement according to the invention, the web roll is then pushed from the carrier rolls of the slitter-winder onto a table having a downward slope. The web roll is received by the receiving beam which has rotating rolls or a sliding surface. On the receiver, the web roll is descended controllably downwards until the web end i.e. the tail end is at a desired point. Then, the web roll is stopped and the tail attachment is performed with an adhesive material, such as tape or glue, in the machine and/or cross direction. The tail-attaching means are attached to the receiving beam above or below it. When the tail has been attached to the web roll, the receiving beam is transferred away from the web roll in the machine direction or the vertical direction.

[0013] According to an advantageous additional characteristic of the invention, to control the operation of the tail-attaching means is arranged the identification of the web tail end. The identification can be based on calculation or it can be detected e.g. by an observation device based on computer vision or e.g. by photoelectric sensors.

[0014] According to an advantageous additional characteristic of the arrangement according to the invention, the receiving beam of the arrangement has been supported from its both ends being cross-directional in relation to the machine direction on end structures which e.g. move along rails or equivalents arranged on the machine hall floor. The motion of the end structures can be mechanically or programmatically synchronised.

[0015] Advantageously in the arrangement according to the invention, the receiving beam is provided with a damping device to damp the contact impact of the web roll. The damping device is e.g. a damper arranged into connection with the end structures.

[0016] The arrangement according to the invention is simple and reliable in operation enabling the tail attachment of the web roll quickly and smoothly.

[0017] The arrangement according to the invention is applicable in connection with various fibre-web slitter-winders. In this description, the arrangement according to the invention is described in connection with the so-called carrier-roll slitter-winder, in which carrier-roll slitter-winder, the web roll is wound supported by two carrier rolls. The invention is also applicable for use in such slitter-winders where one carrier roll is replaced by a set of belt rolls which consists of e.g. a rotating, endless belt arranged around two belt rolls. Furthermore, the invention is also applicable in connection with the so-called multistation winders where the web roll is wound by rotating means located in the centre of the web roll.

[0018] Even though this description mainly refers to paper, the invention is also applicable in connection with the manufacture of other fibre webs.

[0019] On the slitter-winder, several web rolls are typically completed from one set which are endwise successively in the longitudinal direction and, naturally, the arrangement according to the invention can attach the tails of the web rolls of the whole set. The receiving beam extends advantageously in the cross-machine direction substantially for the longitudinal travel of the whole set in the same way as the rolls supporting the web roll. There can be several tail-attaching devices in the longitudinal direction of the set such that one tail-attaching device attaches the tail of at least one web roll or they can be transversing, whereby the tail-attaching device comprises a control arrangement to direct the application of the adhesive material always at the point of each web roll. The tail-attaching device can also extend in the longitudinal area of the whole set adding the adhesive material for attaching all tails of the web rolls of the set substantially simultaneously.

[0020] Next, the invention will be described in more detail with reference to the figure of the enclosed drawing, to the details of which the invention is, however, intended by no means to be narrowly limited.

Fig. 1 schematically shows an advantageous embodiment of the invention.

Fig. 2 schematically shows another advantageous embodiment of the invention.

Figs. 3A-3C schematically show some possibilities in attaching the web end.

[0021] In the schematical exemplifying embodiment shown in Fig. 1, a web roll 10 has just been completed on a slitter-winder. The slitter-winder comprises two carrier rolls 11, 12 supported on which the web roll 10 has been wound. The web roll 10 is pushed away from the support of the carrier rolls 11, 12 by a pusher 14. The pusher 14 pushes the web roll onto a transfer surface 20 which is in an inclined position descending from a plane of the upper surface of the carrier rolls 11, 12 of the slitter-winder downwards towards a plane of the machine hall floor. An inclination angle A is 0.1-45 degrees, advantageously 0.5-30 degrees. On the transfer surface 20, the web roll 10 is arranged to contact a receiving beam 21 which comprises rolls 22 for enabling the rotation of the web roll 10 and supporting the web roll 10. The web roll 10 is transferred supported by the receiving beam 21 and the conveyor rolls 22 on the transfer surface 20 downwards until a tail of the web roll 10 is at an attaching point in a correct position in relation to tail-attaching means 24. The tail-attaching means 24 comprise elements for transferring an adhesive material, such as tape or glue, to the tail of the web roll 10 for attaching it on the surface of the web roll 10. The tail-attaching means 24 are arranged into connection with the receiving beam 21. When the tail of the web roll 10 has been attached on the surface of the web roll 10, the receiving beam 21 and the rolls 22 and the tail-attaching means 24 connected to it are trans-

ferred away from the web roll 10 in the machine direction or the vertical direction and the web roll 10 transfers to a roll receiver 15 which transfers the web roll 10 typically onto a conveyor (not shown in the figures).

[0022] As seen from Fig. 1, an advantageous embodiment of the invention for the arrangement in the handling of web rolls comprises the transfer surface 20 which is inclined descending from the slitter-winder towards the main plane of the machine hall floor 13. The arrangement further comprises the receiving beam 21, which includes the rolls 22 and into connection with which are arranged the tail-attaching means 24. In the embodiment of Fig. 1, the tail-attaching means 24 are located above the receiving beam 21. Additionally in the embodiment of Fig. 1, the arrangement is provided with a safety beam 26 by which it is further ensured that the web roll 10 remains in place on the transfer surface 20. The safety beam 26 is advantageously arranged to operate together with the receiving beam 21.

[0023] In the schematical exemplifying embodiment shown in Fig. 2, a web roll 10 has just been completed on a slitter-winder. The slitter-winder comprises two carrier rolls 11, 12 supported on which the web roll 10 has been wound. The web roll 10 is pushed away from the support of the carrier rolls 11, 12 by a pusher 14. The pusher 14 pushes the web roll onto a transfer surface 10 which is in an inclined position descending from a plane of the upper surface of the carrier rolls 11, 12 of the slitter-winder downwards towards a plane of the machine hall floor. An inclination angle A is 0.1-45 degrees, advantageously 0.5-30 degrees. On the transfer surface 20, the web roll 10 is arranged to contact a receiving beam 21 which comprises a sliding surface 25 for enabling the rotation of the web roll 10 and supporting the web roll 10. The web roll 10 is transferred supported by the receiving beam 21 and conveyor rolls 22 on the transfer surface 20 downwards until a tail of the web roll 10 is at an attaching point in a correct position in relation to tail-attaching means 24. The tail-attaching means 24 comprise elements for transferring an adhesive material, such as tape or glue, to the tail of the web roll 10 for attaching it on the surface of the web roll 10. The tail-attaching means 24 are arranged into connection with the receiving beam 21. When the tail of the web roll 10 has been attached on the surface of the web roll 10, the receiving beam 21 and the rolls 22 and the tail-attaching means 24 connected to it are transferred away from the web roll 10 in the machine direction or the vertical direction and the web roll 10 transfers to a floor 13 typically onto a conveyor (not shown in the figures) on the floor 13.

[0024] As seen from Fig. 2, an advantageous embodiment of the invention for the arrangement in the handling of web rolls comprises the transfer surface 20 which is inclined descending from the slitter-winder towards the main plane of the machine hall floor 13. The arrangement further comprises the receiving beam 21, which includes the sliding surface 25 and into connection with which are arranged the tail-attaching means 24. In the embodiment of Fig. 2, the tail-attaching means 24 are located below the receiving beam 24.

[0025] Characteristics shown in Figs. 1 and 2 are not limited to apply only to the embodiment in question but the characteristics of one embodiment can naturally be used in another embodiment, e.g. the rolls 22 and the sliding surface 25 are possible in both embodiments as alternatives as well as it is possible to arrange the safety beam 26 to the embodiment according to Fig. 1.

[0026] Figs. 3A-3B schematically show some possibilities in attaching the tail end of the web. In the example shown in Fig. 3A, a tail 30 of the web roll 10 is attached with an adhesive material 27, e.g. tape, positioned in the machine direction, whereby the tape 27 extends from the upper surface of the tail 30 to the surface of the web roll 10. In this case, the tail-attaching means 24 are located advantageously above the receiving beam 21. There can be one or several of the tapes 27 in parallel. Fig. 3B shows a possibility of positioning the adhesive material 27 in the cross direction for attaching the tail 30 of the web roll 10 by the tail-attaching means 24 below the receiving beam 21. Then, the tail 30 is allowed to open and descend onto the transfer surface 20. The adhesive material 27 is added on the surface of the web roll 10 in the area of the tail 30 and, as the web roll 10 rotates, the tail is attached with the adhesive material 27, e.g. glue or tape, on the surface of the web roll 10 in a nip between the web roll 10 and the transfer surface 20. Fig. 3C shows an example where the adhesive material 27 is added, when the web tail 30 has been opened e.g. by blowings, on the surface of the web roll 10 in the area of the tail in the cross direction by the tail-attaching means 24 above the receiving beam 21. The tail 30 is attached as the web roll 10 rotates e.g. in a nip between the rolls 22 or the sliding surface 25 of the receiving beam 21 and the web roll 10.

[0027] The invention was described above referring to only one of its advantageous exemplifying embodiments, to the details of which the invention is not intended to be narrowly limited but many modifications and variations are possible within the scope of the idea according to the invention.

List of reference numbers

[0028]

10	web roll
11	carrier roll
12	carrier roll
13	floor
14	pusher
15	receiver

20 transfer surface

21 receiving beam

22 rolls

24 tail-attaching means

25 sliding surface

26 safety beam

27 adhesive material

30 web tail i.e. web end

[0029] An inclination angle of transfer surface

Claims

1. An arrangement in the handling of web rolls, particularly in the handling of partial web rolls (10) in connection with slitter-winders of fibre-web machines, such as paper and board machines, for attaching a tail of the web roll (10), **characterised in that** the arrangement comprises a transfer surface (20) which is inclined descending from the slitter-winder towards a plane of the floor level of the machine hall, a receiving beam (21) arranged above the transfer surface (20) into connection with which are arranged tail-attaching means (24) and into connection with the receiving beam (21) arranged rolls (22) or a sliding surface on which the web roll supports itself when contacting the receiving beam.

2. An arrangement according to claim 1, **characterised in that** the receiving beam (21) is arranged transferable for stopping the web roll (10) at a desired point to attach the tail of the web roll (10).

3. An arrangement according to claim 1, **characterised in that** the arrangement comprises means for transferring the receiving beam in the machine and/or vertical direction.

4. An arrangement according to claim 1, **characterised in that** the arrangement comprises means for positioning the tail-attachment means (24) at a desired point for attaching the tail of the web roll.

5. An arrangement according to claim 1, **characterised in that** the arrangement comprises several tail-attaching means (24) which are located in parallel into connection with the receiving beam (21) in the cross-machine direction.

6. An arrangement according to claim 1, **characterised in that** the tail-attaching means (24) are arranged transferable in the cross direction in the receiving beam (21).

7. An arrangement according to claim 1, **characterised in that** an inclination angle (A) of the transfer surface (20) is 0.1-45 degrees.

8. An arrangement according to claim 1, **characterised in that** the tail-attaching means (24) are arranged to apply the adhesive material in the machine or cross direction for attaching the tail on the surface of the web roll (10).

9. An arrangement according to claim 1, **characterised in that**, in the arrangement for attaching a tail (30) of the web roll (10) in the cross direction by the tail-attaching means (24) below the receiving beam (21), the tail (30) of the web roll (10) is arranged openable gravitationally such that the tail (30) is arranged to descend onto the transfer surface (20) and that the tail-attaching means (24) are arranged to add an adhesive material (27) on the surface of the web roll (10) in the area of the tail (30) and that, as the web roll (10) rotates, the tail (30) is arranged to attach on the surface of the web roll (10) in a nip between the web roll (10) and the transfer surface (20).

10. An arrangement according to claim 1, **characterised in that** the arrangement comprises the transfer surface (20) which is arranged to receive the web roll (10) completed on the slitter-winder and which is located such that the transfer surface (20) is in an inclined position descending from a plane of the substantial upper surface of the carrier rolls of the slitter-winder towards a plane formed by the floor level of the machine hall, that in the arrangement above or below the transfer surface (20) is arranged the receiving beam (21) for receiving the web roll (10), that the receiving beam (21) comprises rotating rolls (22) or a sliding surface (25) on which the web roll (10) is arranged to support on when contacting the receiving beam (21), that the receiving beam (21) comprises transfer means and an actuator by which the position of the web roll (10) is descended on the transfer surface (20) controllably downwards such that the web tail of the web roll (10) is at a desired point for attaching the end by the tail-attaching means (24), that as the tail is attached to the web roll (10) the receiving beam (21) is arranged transferable away from the web roll (10) in the machine direction or the vertical direction as the web roll (10) transfers along the transfer surface (20).

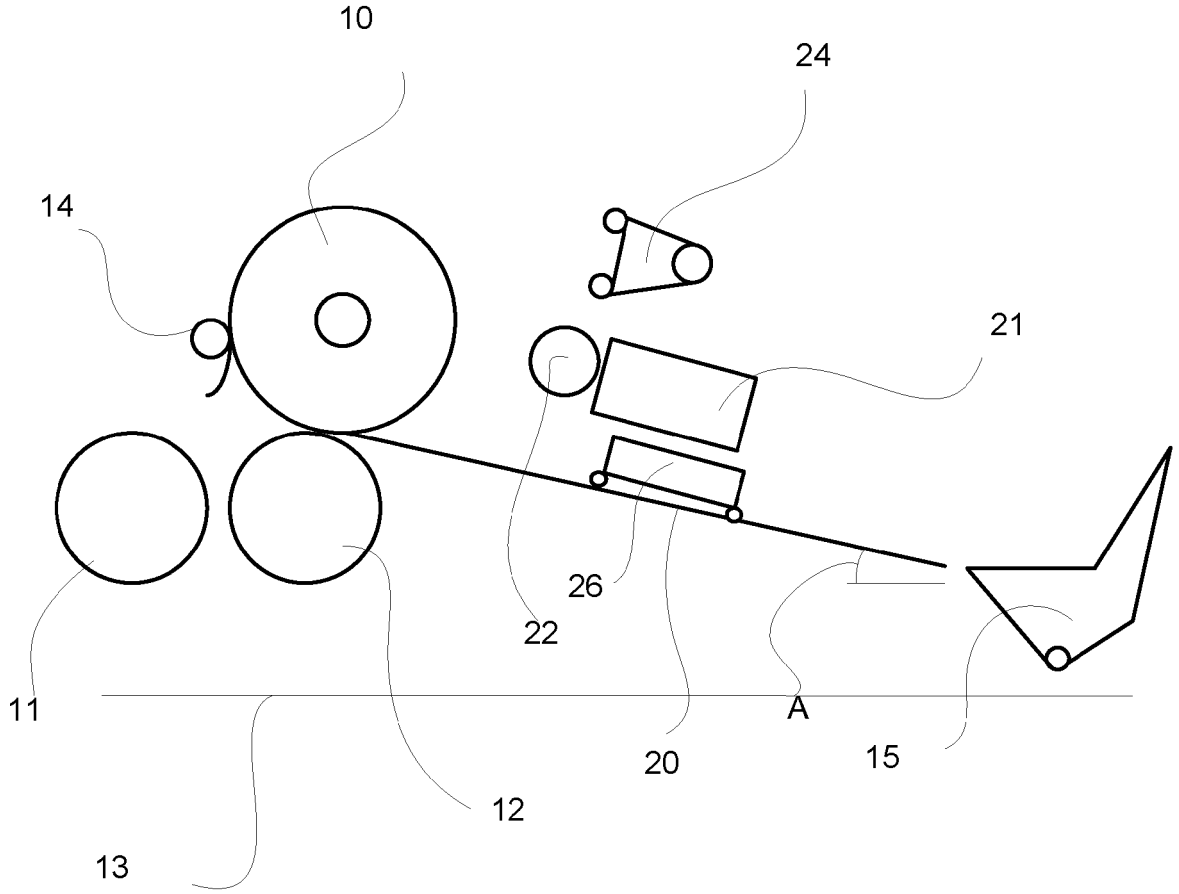

Fig. 1

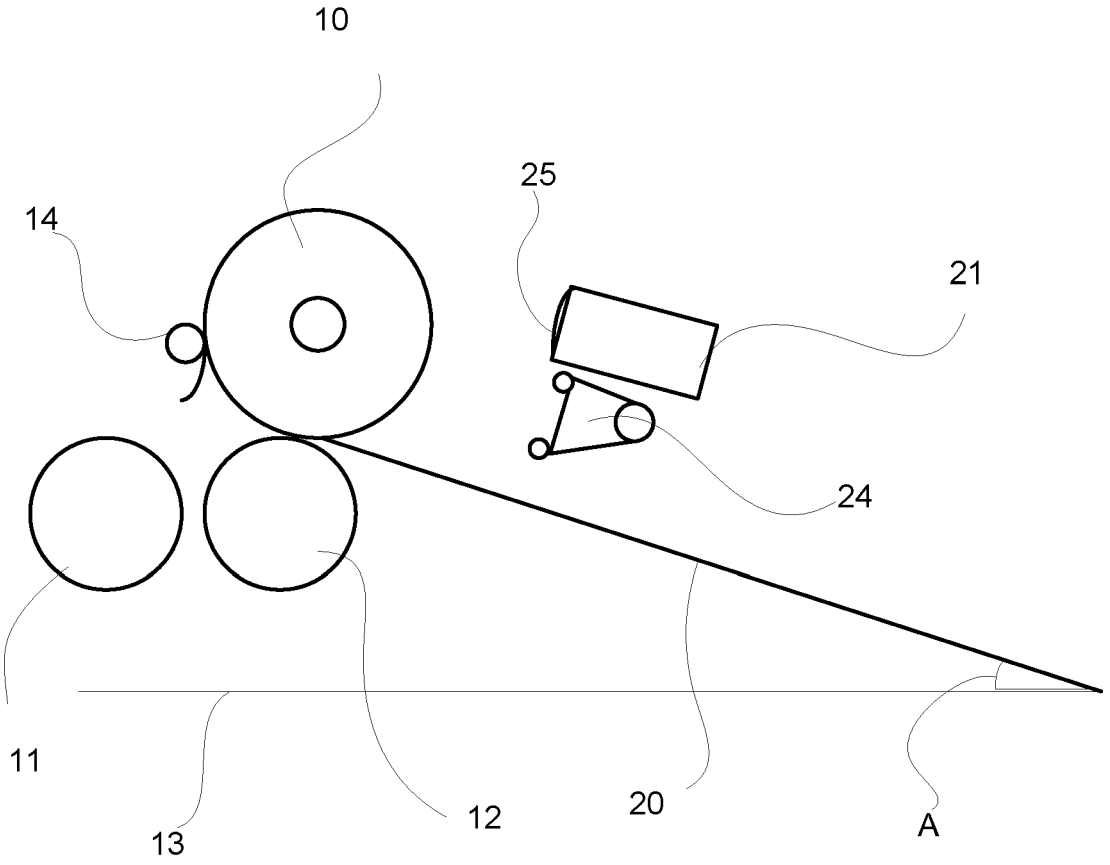

Fig. 2

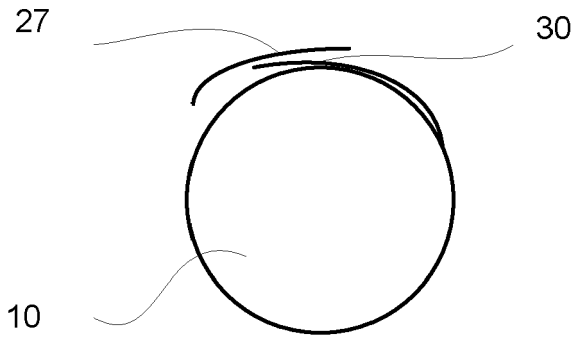

Fig. 3A

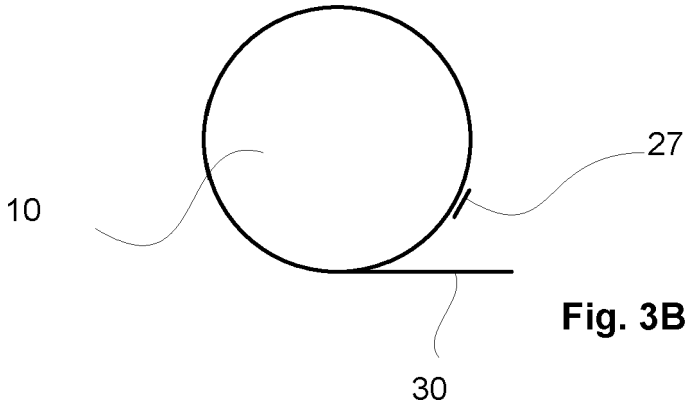

Fig. 3B

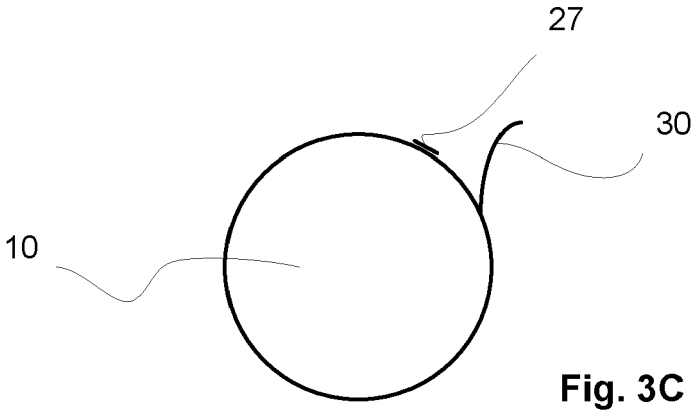

Fig. 3C