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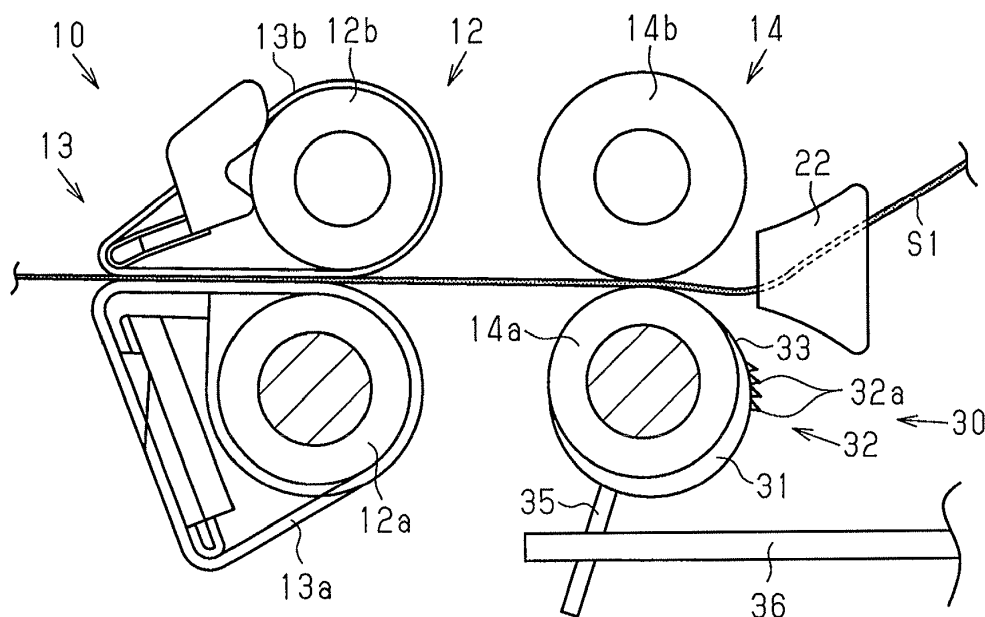
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(54) **FIBER BUNDLE FEED STOPPING DEVICE FOR SPINNING FRAME**

(57) A fiber bundle feed stopping device for a spinning frame. The fiber bundle feed stopping device includes a stopping member provided with a wedge. The wedge is forced between a back top roller and a back bottom roller of a drafting device to block transmission of rotation from the back bottom roller to the back top

roller and clamp a fiber bundle, which is fed to the drafting device, with the back top roller. The stopping member includes a combing portion located upstream of where the back top roller and the wedge clamp the fiber bundle. The combing portion untwists the fiber bundle.

Fig.2



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a fiber bundle feed stopping device for a spinning frame that stops feeding a drafting device with a fiber bundle.

[0002] A spinning frame spins yarn from a roving or a sliver. In the spinning frame, spinning is simultaneously performed by a plurality of spindles. During spinning, when a yarn breaks, spinning is stopped at the spindle where the yarn was broken (hereafter referred to as "the yarn-broken spindle") but continued at the other spindles. One type of a spinning frame continues to feed a drafting device that corresponds to the yarn-broken spindle with a fiber bundle that is drawn in and collected when discharged from the drafting device. There is another type of spinning frame that includes a stopping device to stop feeding the drafting device that corresponds to the yarn-broken spindle with a fiber bundle. As one type of such a stopping device, Japanese Laid-Patent Publication No. 57-133224 describes a roving stopping device.

[0003] The roving stopping device of Japanese Laid-Open Patent Publication No. 57-133224 includes a stopping claw fitted to a back bottom roller of a drafting device. The stopping claw extends over one half of the circumference of the back bottom roller. The stopping claw does not rotate integrally with the back bottom roller when there is no broken yarn. When a yarn breakage is detected, the stopping claw pivots (rotates), and the edge of the stopping claw is forced between a roving and the back bottom roller and held between a back top roller and the back bottom roller of the drafting device. This blocks the transmission of rotation from the back bottom roller to the back top roller. The stopping claw restricts further rotation of the back top roller, and the roving is held between the stopping claw and the back top roller. Under this condition, the drafting device is continuously driven. The drafting device pulls and cuts the roving at the downstream side of the back top roller in the feed direction of the roving. This stops feeding the drafting device of the yarn-broken spindle with the roving.

[0004] In the roving stopping device of Japanese Laid-Open Patent Publication No. 57-133224, if the roving includes, for example, fibers of rayon that has high fracture strength, the roving may not break when held between the stopping claw and the back top roller and pulled at the downstream side of the back top roller in the feed direction of the roving. In the drafting device, for example, a bottom apron runs around a middle bottom roller, and a top apron runs around a middle top roller. Thus, when the roving does not break, the bottom apron and the top apron, which continue to rotate, slip on the roving. This results in wear of the bottom apron and the top apron.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to provide

a fiber bundle feed stopping device for a spinning frame that easily cuts a fiber bundle.

[0006] One aspect of the present invention is a fiber bundle feed stopping device for a spinning frame. The fiber bundle feed stopping device includes a stopping member provided with a wedge. The wedge is forced between a back top roller and a back bottom roller of a drafting device to block transmission of rotation from the back bottom roller to the back top roller and clamp a fiber bundle, which is fed to the drafting device, with the back top roller. The stopping member includes a combing portion located upstream of where the back top roller and the wedge clamp the fiber bundle. The combing portion untwists the fiber bundle.

[0007] Other aspects and advantages of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1 is a schematic side view of a drafting device in one embodiment;

Fig. 2 is a partial, enlarged schematic side view of the drafting device shown in Fig. 1;

Fig. 3A is a schematic side view of a stopping member;

Fig. 3B is a plan view of the stopping member;

Fig. 4 is a schematic side view of a wedge forced between a back top roller and a back bottom roller;

Fig. 5 is a schematic plan view showing a roving that is untwisted;

Fig. 6A is a schematic perspective view of a stopping member in a further embodiment; and

Fig. 6B is a schematic side view showing the wedge forced between the back top roller and the back bottom roller.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] One embodiment of a fiber bundle feed stopping device 30 for a spinning frame will now be described with reference to Figs. 1 to 5. The fiber bundle feed stopping device 30 stops feeding a drafting device 10 with a roving S1, which serves as a fiber bundle.

[0010] Referring to Fig. 1, the drafting device 10 is of a three-roller configuration and includes front rollers 11, aprons 13 that run around middle rollers 12, and back rollers 14. The front rollers 11 include a front bottom roller 11 a and a front top roller 11 b. The middle rollers 12

include a middle bottom roller 12a and a middle top roller 12b. A bottom apron 13a runs around the middle bottom roller 12a, and a top apron 13b runs around the middle top roller 12b. The back rollers 14 include a back bottom roller 14a and a back top roller 14b.

[0011] The front bottom roller 11a is supported by a roller stand 15. The middle bottom roller 12a is supported on the roller stand 15 by a middle bottom roller support 16 and a bearing (not shown). The back bottom roller 14a is supported on the roller stand 15 by a back bottom roller support 17 and a bearing (not shown). The middle bottom roller support 16 and the back bottom roller support 17 are each fixed to the roller stand 15 in a manner allowing for adjustment of the positions of the middle bottom roller support 16 and the back bottom roller support 17 relative to the roller stand 15 in the front-rear direction of the frame (lateral direction in Fig. 1).

[0012] A support shaft 19, which is pivotally supported by the roller stand 15, supports a weighting arm 18 with a bracket 20. The front top roller 11b, the middle top roller 12b, and the back top roller 14b are respectively supported by top roller supports (not shown) on the weighting arm 18.

[0013] A support bar 21 extends behind and parallel to the back bottom roller 14a. A trumpet 22 is fixed to the support bar 21 to guide the roving S1. The roving S1 is fed from a roving winding, which is suspended from a creel (not shown), through the trumpet 22 and to the back rollers 14.

[0014] Referring to Fig. 2, the drafting device 10 includes a fiber bundle feed stopping device 30. The fiber bundle feed stopping device 30 includes a stopping member 31 engaged with approximately one half of the outer circumferential surface of the back bottom roller 14a. The stopping member 31 is curved in an arcuate manner like a crescent. The stopping member 31 does not rotate integrally with the back bottom roller 14a.

[0015] As shown in Figs. 3A and 3B, the stopping member 31 includes a combing portion 32 defined by a region located near one end (distal end) of the curved outer circumferential surface. The combing portion 32 includes teeth 32a. The teeth 32a are arranged in rows, each extending in a direction orthogonal to the feed direction of the roving S1. The teeth rows are arranged next to one another in the feed direction of the roving S1. In the present embodiment, four teeth rows are arranged next to one another in the feed direction. The teeth 32a in each teeth row is shifted by one half of a teeth pitch relative to the teeth 32a in the teeth row that is adjacent in the feed direction of the roving S1. The portion of the stopping member 31 at the distal side of the combing portion 32 defines a wedge 33 that is forced between the back top roller 14b and the back bottom roller 14a.

[0016] Referring to Fig. 4, the stopping member 31 is rotated between a fiber bundle release position, as shown by the broken lines, and a fiber bundle clamp position, as shown by the solid lines. When the stopping member 31 is located at the fiber bundle release position,

the stopping member 31 is separated from the back top roller 14b. When the stopping member 31 is located at the fiber bundle clamp position, the back top roller 14b and the wedge 33 clamp the fiber bundle. A rod-shaped drive force transmission member 36 is coupled by a bracket 35 to the stopping member 31.

[0017] As shown in Fig. 1, a switching device 37 is coupled to the end of the drive force transmission member 36 at the opposite side of the bracket 35. A controller (not shown) controls the switching device 37 based on a detection signal from a yarn breakage sensor (not shown). The configuration of the switching device 37 is not particularly limited. The switching device 37 need only be configured to switch the stopping member 31 between the fiber bundle release position and the fiber bundle clamp position with the drive force transmission member 36 and the bracket 35 under the control of the controller based on the detection signal of the yarn breakage sensor.

[0018] Referring to Fig. 4, in the present embodiment, the switching device 37 is driven to linearly reciprocate the drive force transmission member 36. Linear reciprocation of the drive force transmission member 36 rotates the stopping member 31 with bracket 35. The combing portion 32 is allowed to contact the back top roller 14b. Contact of the combing portion 32 with the back top roller 14b restricts further rotation of the stopping member 31 and positions the stopping member 31 at the fiber bundle clamping position.

[0019] When the stopping member 31 is positioned at the fiber bundle clamping position, the wedge 33 is forced between the back top roller 14b and the back bottom roller 14a, and the wedge 33 clamps the roving S1 with the back top roller 14b. Further, under this condition, the combing portion 32 pierces the roving S1 at a location upstream of where the roving S1 is clamped between the back top roller 14b and the wedge 33. "Upstream" is defined with reference to the feeding of the roving S1.

[0020] The operation of the present embodiment will now be described.

[0021] When there are no broken yarns, the stopping member 31 is held at the fiber bundle release position. A state in which there are no broken yarns includes a state in which spinning is performed when the roving S1 is fed via the trumpet 22 to the drafting device 10 and a state before spinning starts in which the roving S1 is not yet fed to the drafting device 10. In a state before spinning starts, the controller does not determine whether or not a yarn has broken since the yarn breakage sensor does not yet detect for a yarn breakage, and the switching device 37 does not rotate the stopping member 31 to the fiber bundle clamp position.

[0022] When the spinning frame starts to operate, the roving S1 is guided from the roving winding, which is suspended from the creel (not shown), to the trumpet 22 and fed to the back rollers 14. The roving S1 fed to the back rollers 14 is drafted into fleece between the back rollers 14 and the aprons 13 and between the aprons 13

and the front rollers 11. Yarn is formed from the fleece. The yarn is guided to a snail wire (not shown) and a traveler (not shown) and wound around a bobbin (not shown).

[0023] When a yarn breakage occurs, the yarn-broken spindle is located from the detection signal of each wire breakage sensor, and the controller drives the switching device 37 that corresponds to the yarn-broken spindle. The switching device 37 rotates the stopping member 31 from the fiber bundle release position toward the fiber bundle clamp position. This forces the wedge 33 between the back top roller 14b and the back bottom roller 14a. The wedge 33 blocks the transmission of rotation from the back bottom roller 14a to the back top roller 14b. Further, the wedge 33 clamps the roving S1 with the back top roller 14b, the combing portion 32 contacts the back top roller 14b, and further rotation of the stopping member 31 is restricted. This positions the stopping member 31 at the fiber bundle clamp position. In addition, the combing portion 32 pierces the roving S1 upstream of where the roving S1 is clamped between the back top roller 14b and the wedge 33 in the feed direction of the roving S1. As the roving S1 passes through the combing portion 32 when the drafting device 10 is driven, the combing portion 32 combs and untwists the roving S1.

[0024] As shown in Fig. 5, the teeth 32a in each teeth row are shifted by one half of a teeth pitch relative to the teeth 32a in the teeth row that is adjacent in the feed direction of the roving S1. This facilitates the separation of fibers S2 in the roving S1 with the teeth 32a and efficiently untwists the roving S1. Further, the teeth 32a weaken the bonding of the fibers S2 and decrease the strength of the roving S1. Thus, even when the roving S1 has high strength, the roving S1 pulled by the drafting device 10 is cut between the back rollers 14 and the aprons 13. Moreover, the wedge 33 blocks the transmission of rotation from the back bottom roller 14a to the back top roller 14b even when the drafting device 10 is continuously driven. This stops feeding of the roving S1 to the drafting device 10 of the spindle where a yarn was broken.

[0025] The above embodiment has the advantages described below.

(1) The stopping member 31 includes the combing portion 32, which untwists the roving S1, at a location upstream of where the roving S1 is clamped between the back top roller 14b and the wedge 33. As the roving S1 moves through the combing portion 32 when the drafting device 10 is driven, the combing portion 32 combs and untwists the roving S1. This weakens the bonding of the fibers S2 in the roving S1 and decrease the strength of the roving S1. Thus, the roving S1 is easily cut when pulled by the drafting device 10.

(2) The combing portion 32 is allowed to contact the back top roller 14b. Contact of the combing portion 32 with the back top roller 14b increases the positioning accuracy of the stopping member 31 relative

to the back top roller 14b. Thus, the wedge 33 may be accurately forced between the back top roller 14b and the back bottom roller 14a.

(3) Even when the roving S1 includes, for example, fibers of rayon that has high fracture strength, the combing portion 32 combs and untwists the roving S1. This weakens the bonding of the fibers S2 in the roving S1 and decrease the strength of the roving S1. Thus, the roving S1 is cut even when the roving S1 has high fracture strength. This avoids wear of the bottom apron 13a and the top apron 13b that would occur if the bottom apron 13a and the top apron 13b were to rotate and slip on the roving S1 when the roving S1 is not cut.

(4) The teeth 32a in each teeth row is shifted by one half of a teeth pitch relative to the teeth 32a in the teeth row that is adjacent in the feed direction of the roving S1. Thus, when the drafting device 10 is driven and the roving S1 passes through the teeth 32a, the teeth rows facilitate the separation of the fibers S2. This further efficiently untwists the roving S1.

[0026] The above embodiment may be modified as described below.

[0027] In the above embodiment, the combing portion 32 does not have to contact the back top roller 14b as long as the switching device 37 may be accurately driven and controlled so that the wedge 33 is forced between the back top roller 14b and the back bottom roller 14a to clamp the roving S1 with the back top roller 14b and restrict further rotation of the stopping member 31. Further, as shown in Figs. 6A and 6B, the two edges of the stopping member 31 located at opposite sides in a direction orthogonal to the feed direction of the roving S1 may each include a projection 34 that contacts the back top roller 14b and is separate from the combing portion 32. When the stopping member 31 is rotated from the fiber bundle release position toward the fiber bundle clamp position, the projections 34 contact the back top roller 14b before the combing portion 32 and restrict contact of the combing portion 32 with the back top roller 14b. Thus, the sharp teeth 32a of the combing portion 32 do not contact and damage the circumferential surface of the back top roller 14b when combing the roving S1. Further, the projections 34 may be used to position the stopping member 31.

[0028] In the above embodiment, the teeth 32a in each teeth row do not have to be shifted by one half of a teeth pitch relative to the teeth 32a in the teeth row that is adjacent in the feed direction of the roving S1. The teeth 32a of each teeth row may be arranged without being shifted from the teeth 32a in other teeth rows.

[0029] In the above embodiment, there may be two or three teeth rows arranged next to one another in the feed direction of the roving S1. Alternatively, there may be five or more teeth rows arranged next to one another in the feed direction of the roving S1.

[0030] In the above embodiment, there may be only

one row of teeth that extends in a direction orthogonal to the feed direction of the roving S1.

[0031] In the above embodiment, the teeth 32a only need to be arranged next to one another in a direction intersecting the feed direction of the roving S1 and do not have to be arranged in a direction orthogonal to the feed direction of the roving S1.

[0032] In the above embodiment, the fiber bundle is not limited to the roving S1 and may be a sliver. For example, the fiber bundle feed stopping device 30 may be used in a ring spinning frame that spins yarns from a sliver with a drafting device, which drafts a fiber bundle at a draft ratio that is much larger than the typical three-roller drafting device.

[0033] In the above embodiment, the spinning frame is not limited to a ring spinning frame and may be, for example, a fascinated yarn spinning machine or a friction spinning machine.

[0034] In the above embodiment, the spinning frame may be a roving frame.

[0035] Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope and equivalence of the appended claims.

[0036] A fiber bundle feed stopping device for a spinning frame. The fiber bundle feed stopping device includes a stopping member provided with a wedge. The wedge is forced between a back top roller and a back bottom roller of a drafting device to block transmission of rotation from the back bottom roller to the back top roller and clamp a fiber bundle, which is fed to the drafting device, with the back top roller. The stopping member includes a combing portion located upstream of where the back top roller and the wedge clamp the fiber bundle. The combing portion untwists the fiber bundle.

Claims

1. A fiber bundle feed stopping device (30) for a spinning frame, wherein the fiber bundle feed stopping device (30) includes a stopping member (31) provided with a wedge (33), the wedge (33) is forced between a back top roller (14b) and a back bottom roller (14a) of a drafting device (10) to block transmission of rotation from the back bottom roller (14a) to the back top roller (14b) and clamp a fiber bundle (S1), which is fed to the drafting device (10), with the back top roller (14b), the fiber bundle feed stopping device (30) being **characterized in that:**

the stopping member (31) includes a combing portion (32) located upstream of where the back top roller (14b) and the wedge (33) clamp the fiber bundle (S1), wherein the combing portion (32) untwists the fiber bundle (S1).

2. The fiber bundle stopping device (30) according to claim 1, **characterized in that** the combing portion (32) is allowed to contact the back top roller (14b).
3. The fiber bundle stopping device (30) according to claim 1, **characterized in that** the stopping member (31) includes a projection (34) that is allowed to contact the back top roller (14b) and separate from the combing portion (32).
4. The fiber bundle stopping device (30) according to claim 3, **characterized in that** the projection (34) contacts the back top roller (14b) to restrict contact of the combing portion (32) with the back top roller (14b).
5. The fiber bundle stopping device (30) according to any one of claims 1 to 4, **characterized in that** the stopping member (31) is configured to move between a fiber bundle release position that is where the stopping member (31) is separated from the back top roller (14b) and a fiber bundle clamp position that is where the back top roller (14b) and the wedge (33) clamp the fiber bundle (S1).
6. The fiber bundle stopping device (30) according to any one of claims 1 to 5, **characterized in that:**

the combing portion (32) includes teeth rows arranged next to each other in the feed direction of the fiber bundle (S1),
each of the teeth rows includes teeth (32a) arranged next to each other in a direction intersecting the feed direction of the fiber bundle (S1); and
the teeth (32a) in each of the teeth rows are shifted by one half of a teeth pitch relative to the teeth (32a) in the teeth row that is adjacent in the feed direction of the fiber bundle (S1).

Fig.1

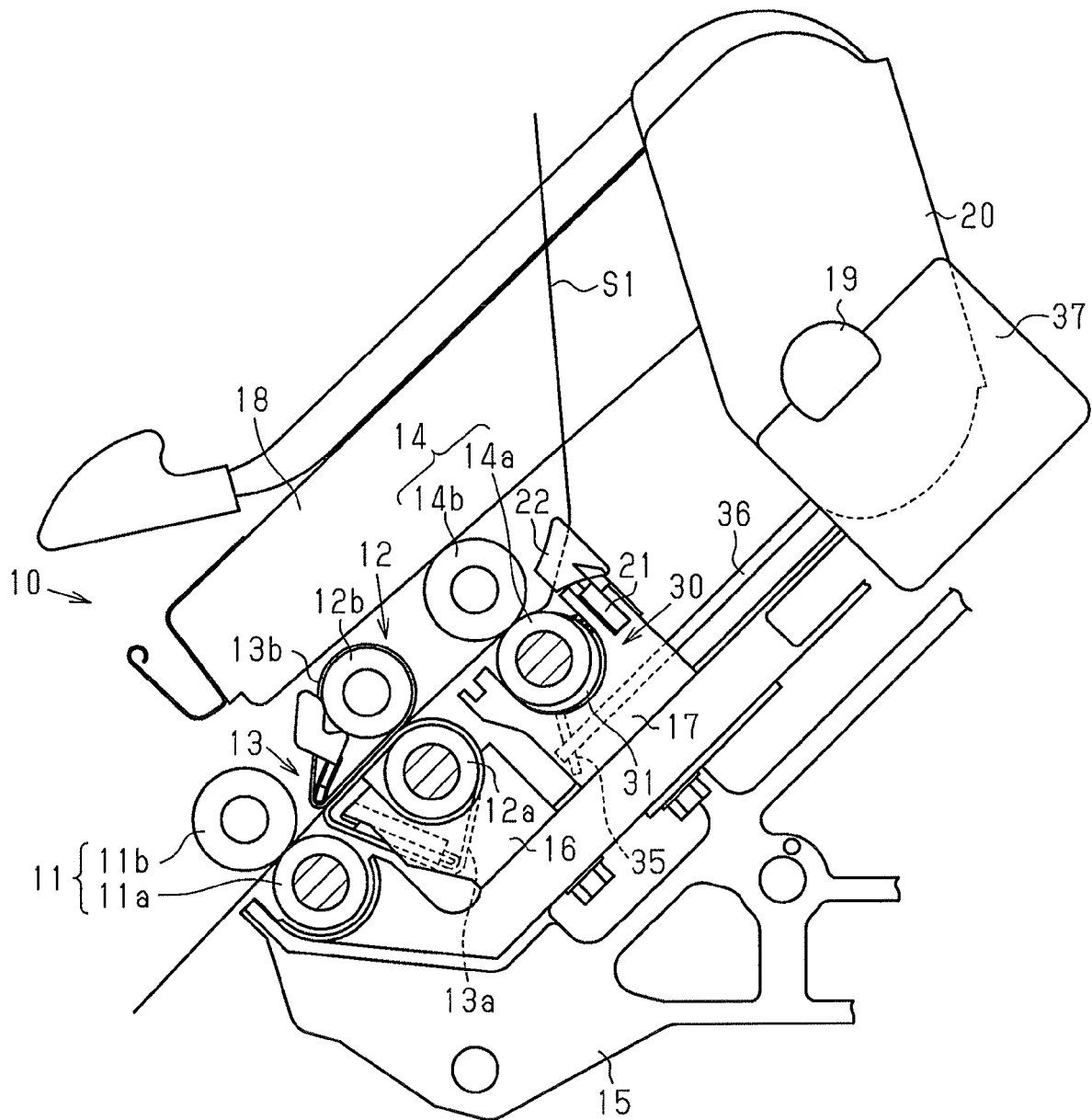


Fig.2

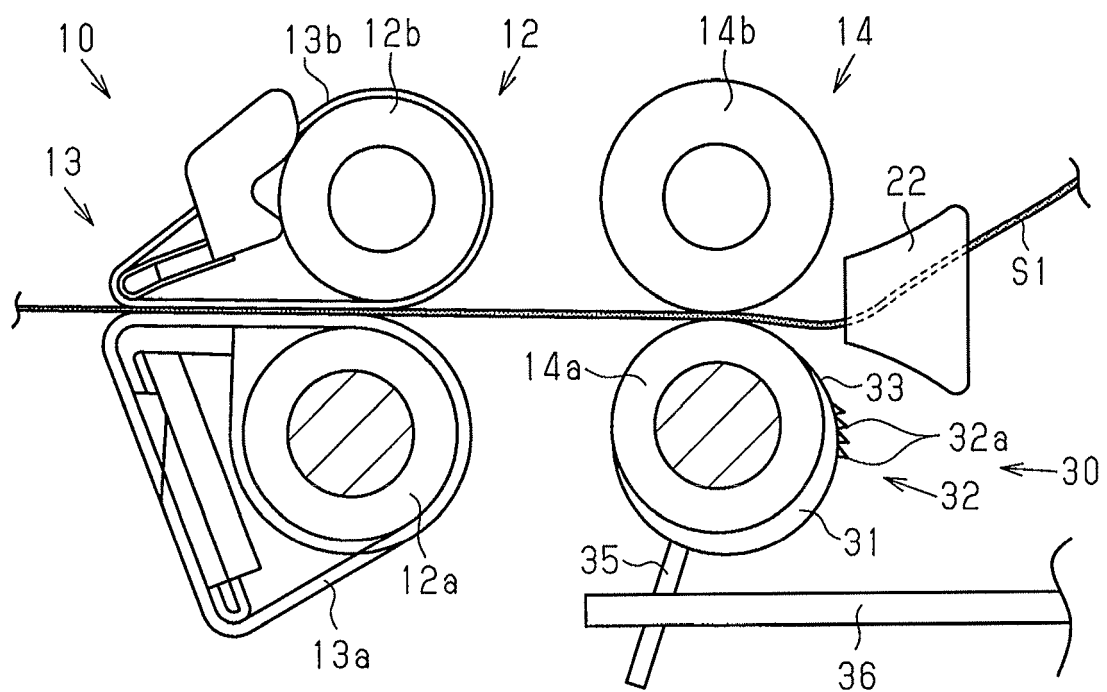


Fig.3A

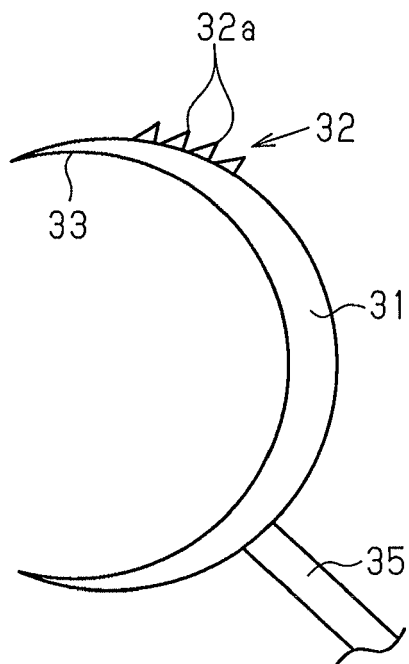
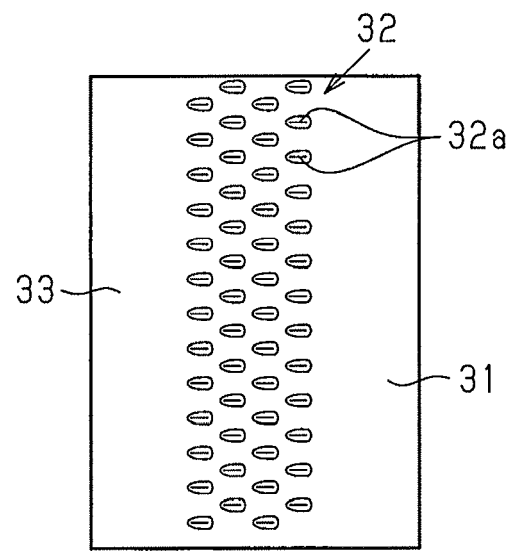


Fig.3B



←
Feed Direction of Roving

Fig.4

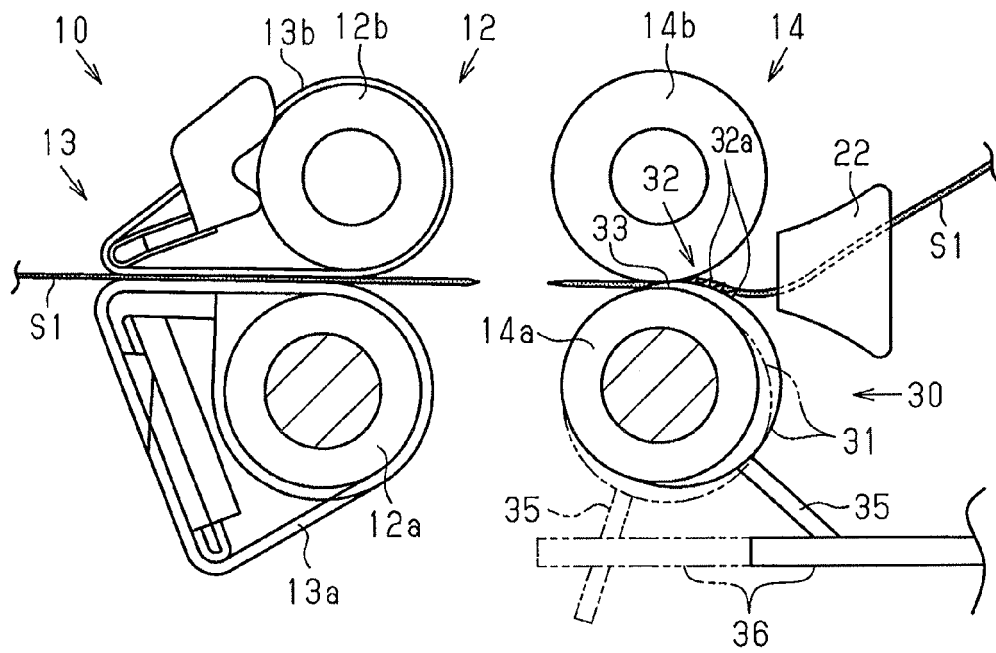


Fig.5

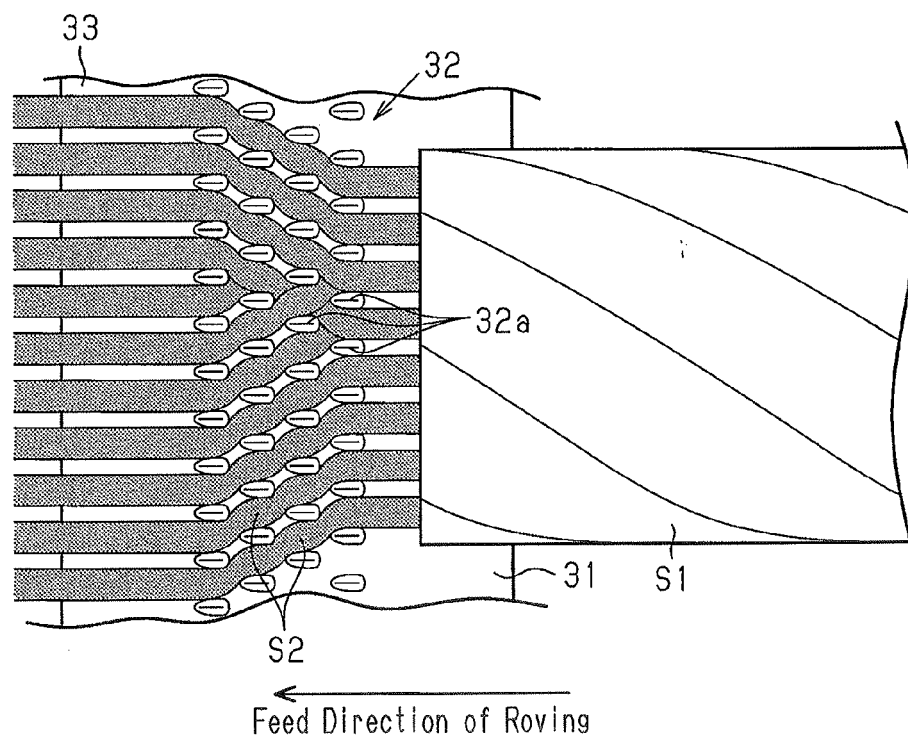


Fig.6A

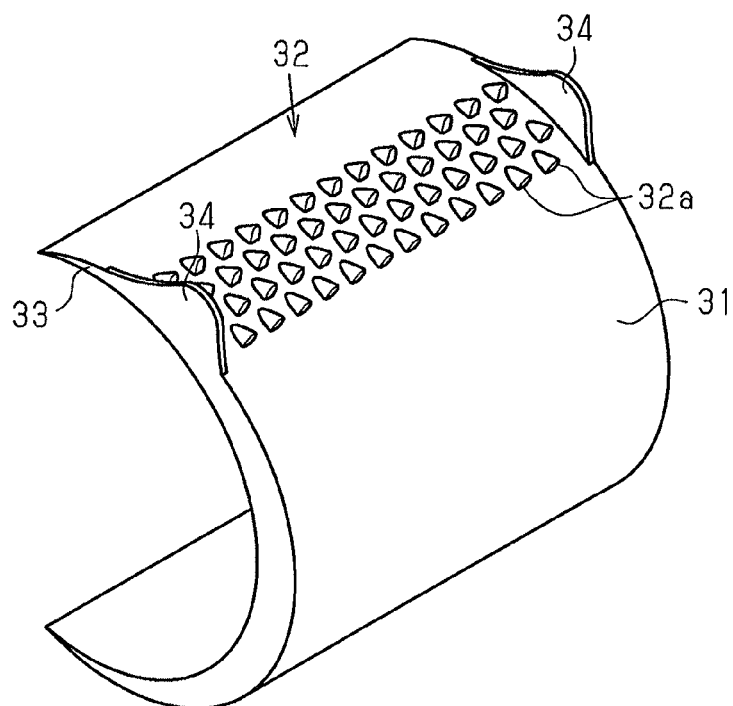
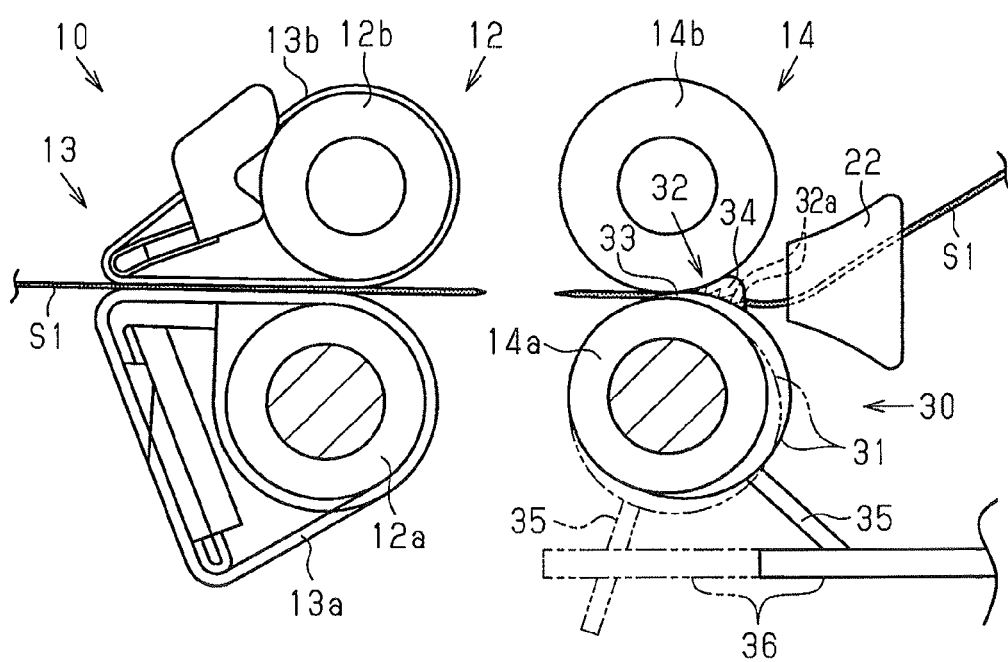


Fig.6B





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Application Number
EP 16 17 5182

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Place of search Munich		Date of completion of the search 16 November 2016	Examiner Humbert, Thomas
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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