



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.06.2011 Bulletin 2011/24

(51) Int Cl.:
D01H 5/72 (2006.01) **D01H 5/26** (2006.01)
D01H 5/86 (2006.01)

(21) Application number: **10191469.5**

(22) Date of filing: **17.11.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventors:
• **Sato, Kohei**
Kariya-shi Aichi 448-8671 (JP)
• **Ashizaki, Tetsuya**
Kariya-shi Aichi 448-8671 (JP)

(30) Priority: **11.12.2009 JP 2009281703**

(74) Representative: **TBK**
Bavariaring 4-6
80336 München (DE)

(71) Applicant: **Kabushiki Kaisha Toyota Jidoshokki**
Kariya-shi,
Aichi 448-8671 (JP)

(54) **Fiber bundle concentrating device for spinning machine**

(57) A fiber bundle concentrating apparatus (11) for a spinning machine is disclosed. The fiber bundle concentrating apparatus includes a suction pipe (15) and an air-permeable conveyor belt. The suction pipe has a suction slit (27). The guide surface (28) has a guide edge and a non-guide edge that extend along both sides in the

widthwise direction of the suction slit. The guide edge and the non-guide slit define the width of the suction slit (15). The fiber bundle concentrating apparatus includes a cover. The cover covers the suction slit (15) from above, while covering an area outside of the non-guide edge. An air flow introducing clearance is provided between the guide edge (29) and the cover (33,33A,33B).

Fig.1A

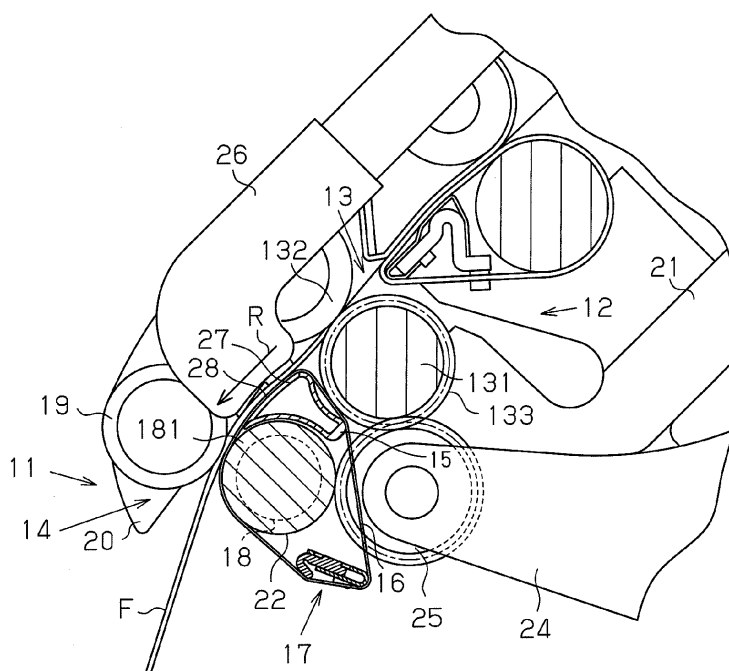
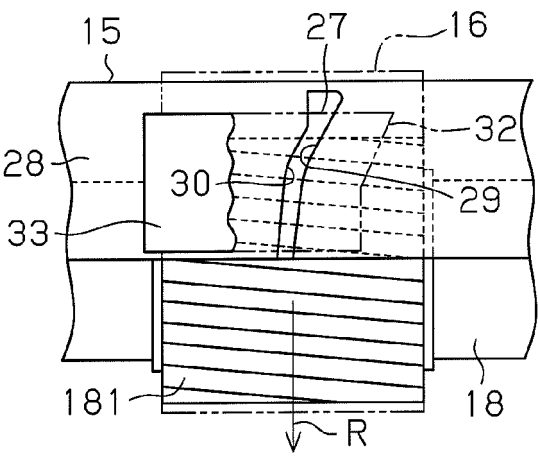


Fig.1B



Description

[0001] The present invention relates to a fiber bundle concentrating device for a spinning machine.

[0002] Japanese Laid-Open Patent Publication No. 2002-69762 discloses a fiber bundle concentrating device that concentrates a drafted fiber bundle (sliver) before the bundle is twisted. The fiber bundle concentrating device disclosed in the above publication includes a hollow forming member (suction pipe) and a perforated conveyor belt. The hollow forming member is located downstream in the moving direction of fiber bundle of a pair of outlet rollers (a pair of final rollers) of a draft machine, and the conveyor belt is wound about a slide surface formed on the outer circumferential surface of the hollow forming member. An inlet slit (suction slit) is formed in the slide surface of the hollow forming member. The inlet slit is covered with the conveyor belt. The hollow forming member has a tightening roller, which is provided in the vicinity of the downstream end in the moving direction of the fiber bundle. The tightening roller moves the conveyor belt while pressing the fiber bundle and the conveyor belt against the outer circumferential surface of the hollow forming member.

[0003] The inlet slit is inclined relative to the moving direction of the fiber bundle, and one of the two side edges on both sides in the widthwise direction of the slit forms a fiber guide edge. Between the pair of outlet rollers and the tightening roller, the fiber bundle is covered with a cover. The cover includes a support portion and a covering wall extending from the upper end of the support portion. The support portion and the covering wall are formed integrally. The support portion is coupled to a part of the slide surface that is located outside of the fiber guide edge. An air inlet clearance is formed on the opposite side of the slit to the support portion of the inlet slit. The air inlet clearance is located between the covering wall and the conveyor belt.

[0004] The above publication discloses that the cover functions to further improve the compression (concentration) of the sliver. However, since the cover support portion is located in an area outside of the fiber guide edge, there is only a small amount of air flow from the outside area to the fiber guide edge. This results in insufficient air flow for moving the fiber bundle from the outside area toward the fiber guide edge. Accordingly, the concentration of the fiber bundle is insufficient. This lowers the quality of the yarn.

SUMMARY OF THE INVENTION

[0005] It is an objective of the present invention to improve the concentration property of a fiber bundle.

[0006] To achieve the above objective, and in accordance with one aspect of the present invention, a fiber bundle concentrating device for a spinning machine is provided. The fiber bundle concentrating apparatus is located downstream of a pair of final delivery rollers of a

spinning machine. The fiber bundle concentrating apparatus includes a suction pipe and an air-permeable conveyor belt. The suction pipe has a suction slit. The air-permeable conveyor belt is moved while being wrapped about a guide surface of the suction pipe so as to cover the suction slit. The guide surface has first and second side edges that extend along both sides in the widthwise direction of the suction slit. The first and second side edges define the width of the suction slit. The first side edge functions as a guide edge for concentrating a fiber bundle. The fiber bundle concentrating apparatus includes a cover. The cover covers the suction slit from above, while covering an area outside of the second side edge. An air flow introducing clearance is provided between the guide edge and the cover.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

Fig. 1A is a side view, with a part cut away, illustrating a fiber bundle concentrating device according to a first embodiment of the present invention;

Fig. 1B is a partial plan view of Fig. 1A;

Fig. 2A is a partial plan view showing the relationship between the suction pipe and the conveyor belt of the fiber bundle concentrating device shown in Fig. 1A;

Fig. 2B is a cross-sectional view taken along line 2B-2B in Fig. 2A;

Fig. 3A is a graph showing the relationship between the movement position and hairiness of a fiber bundle;

Fig. 3B is a graph showing the relationship between the movement position and yarn strength of a fiber bundle;

Fig. 4 is a cross-sectional view illustrating a fiber bundle concentrating device according to a second embodiment of the present invention;

Fig. 5A is a partially enlarged plan view illustrating a fiber bundle concentrating device according to a third embodiment of the present invention;

Fig. 5B is a cross-sectional view taken along line 5B-5B in Fig. 5A;

Fig. 6A is a graph showing the relationship between the movement position and hairiness of a fiber bundle;

Fig. 6B is a graph showing the relationship between the movement position and yarn strength of a fiber bundle;

Fig. 7A is a partially enlarged plan view illustrating a fiber bundle concentrating device according to a modified embodiment of the present invention;

Fig. 7B is a cross-sectional view taken along line 7B-7B in Fig. 7A;

Fig. 8 is a cross-sectional view illustrating a fiber bundle concentrating device according to a modified embodiment of the present invention; and

Fig. 9 is a cross-sectional view illustrating a fiber bundle concentrating device according to a modified embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] A fiber bundle concentrating device 11 according to a first embodiment of the present invention will now be described with reference to Figs. 1A to 3B.

[0009] As shown in Fig. 1A, the fiber bundle concentrating device 11 is located in a draft machine 12 at a position downstream of a pair of final delivery rollers 13. The fiber bundle concentrating device 11 includes a delivery portion 14, a suction pipe 15, an air-permeable conveyor belt 16, and a guide portion 17. The pair of final delivery rollers 13 includes a front bottom roller 131 and a front top roller 132.

[0010] The delivery portion 14 includes a rotary shaft 18 parallel with the front bottom roller 131, a bottom nip roller 181 formed on the rotary shaft 18, and a top nip roller 19 pressed against the bottom nip roller 181 via the air-permeable conveyor belt 16. Like the front top roller 132, the top nip roller 19 is supported by a weighting arm (not shown) with a support member 20 at every other spindle. The support member 20 is formed integrally with a support member (not shown) of the front top roller 132. The suction pipe 15 is located on the upstream side in the moving direction of a fiber bundle F relative to the nip point (the contact point of the top nip roller 19 and the air-permeable conveyor belt 16) of the delivery portion 14.

[0011] A plurality of roller stands 21 are arranged at predetermined intervals along the longitudinal direction of the spinning frame [the direction perpendicular to the plane of Fig. 1A]. A support arm (not shown) is arranged at an intermediate position between each adjacent pair of the roller stands 21. The support arms are supported by a support beam (not shown), which extends along the longitudinal direction of the spinning frame. The rotary shaft 18 is supported between the roller stands 21 and the support arm. The rotary shaft 18 has a gear 22 at an intermediate position in the longitudinal direction. The gear 22 rotates integrally with the rotary shaft 18.

[0012] A gear portion 133 is formed on the outer circumferential surface of the front bottom roller 131 that faces the gear 22. The support arm 24, which is fixed to the support beam, rotatably supports an intermediate gear 25. The intermediate gear 25 is meshed with the gear portion 133 and the gear 22. Rotational force of the front bottom roller 131 is transmitted to the rotary shaft 18 via the gear portion 133, the intermediate gear 25, and the gear 22.

[0013] A suction duct (not shown) is arranged in the spinning frame to extend along the longitudinal direction of the spinning frame. The suction pipe 15 extends parallel with the suction duct and is connected to the suction duct by a connecting pipe 26. The suction pipe 15 has a guide surface 28, in which a suction slit 27 is formed. The

guide surface 28 is a curved surface bulging outward from the suction pipe 15.

[0014] The air-permeable conveyor belt 16 wraps and contacts the suction pipe 15, the guide portion 17, and the bottom nip roller 181. The suction slit 27 is covered with the air-permeable conveyor belt 16. The air-permeable conveyor belt 16 is formed of woven cloth so as to have an adequate air permeability.

[0015] As the rotary shaft 18 rotates, the bottom nip roller 181 and the top nip roller 19 rotate in opposite directions, so that the air-permeable conveyor belt 16 between the bottom nip roller 181 and the top nip roller 19 is moved in a direction of arrow R. Accordingly, the fiber bundle F between the top nip roller 19 and the air-permeable conveyor belt 16 is moved from an upstream end 271 to a downstream end 272 of the suction slit 27.

[0016] As shown in Fig. 1B, the suction slit 27 is inclined relative to the conveying direction of the air-permeable conveyor belt 16 along the guide surface 28. The guide surface 28 has a pair of side edges 29, 30 extending along both sides in the direction of the width of the suction slit 27 (the direction of arrow H in Fig. 2A, or the longitudinal direction of the suction pipe 15). The side edges 29, 30 define the width of the slit 27. Of the two side edges 29, 30, the side edge (first side edge) 29 functions as a guide edge (hereinafter, referred to as a guide edge 29) that concentrates the fiber bundle F. The width of the suction slit 27 decreases partway from the upstream end toward the downstream end along the conveying direction R of the air-permeable conveyor belt 16.

[0017] As shown in Figs. 2A and 2B, a cover 33 is provided on the guide surface 28. The cover 33 covers the suction slit 27 from above, and an area outside of the side edge 30 (a second side edge or non-guide edge), which is opposite to the guide edge 29. The cover 33 includes a side wall 31 in an area of the guide surface 28 outside of the side edge 30 [an area left of the side edge 30] and a covering wall 32 located above the suction slit 27. The side wall 31 and the covering wall 32 are formed integrally. The area outside of the side edge 30 refers to an area on the opposite side of the suction slit 27 to the side edge 30, and will hereinafter be referred to as a first area. The side wall 31 extends toward the guide surface 28, and the covering wall 32 extends from the upper end of the side wall 31 in a direction perpendicular to the side wall 31. The lower end (distal end) of the side wall 31 contacts the guide surface 28 such that there is no clearance between the side wall 31 and the guide surface 28, and the covering wall 32 is coupled to the side wall 31 such that there is no clearance between the covering wall 32 and the side wall 31.

[0018] A projecting portion 331 is formed integrally with the inner surface of the side wall 31 (the surface facing the suction slit 27) and the inner surface of the covering wall 32. In the first area, the projecting portion 331 projects toward the air-permeable conveyor belt 16 and reaches a point before the side edge 30, and a small clearance exists between the projecting portion 331 and

the air-permeable conveyor belt 16. The space between an inner surface 320 of the covering wall 32 (parts except for the projecting portion 331) and the guide surface 28 is constant. The space between the projecting portion 331 and the guide surface 28 is also constant.

[0019] As shown in Fig. 2A, a distal edge 321 of the covering wall 32 is slightly inclined relative to the conveying direction R of the air-permeable conveyor belt 16 on the guide surface 28. The length of the covering wall 32 along the widthwise direction H of the suction slit 27 increases along the direction opposite to the conveying direction R of the air-permeable conveyor belt 16. That is, the length of the covering wall 32 along the widthwise direction H of the suction slit 27 is greater in a part close to the upstream end 271 of the suction slit 27 than in a part close to the downstream end 272 of the suction slit 27. Along the widthwise direction H of the suction slit 27, the distal edge 321 of the covering wall 32 is located in an area (second area) outside of the guide edge 29 [an area right of the guide edge 29 in Fig. 2A], and the covering wall 32 covers the guide surface 28 to a position beyond the guide edge 29 along the widthwise direction H of the suction slit 27.

[0020] The covering wall 32 is separated upward from the suction slit 27 and covers most of the suction slit 27. In the present embodiment, the upstream end 271 and the downstream end 272 of the suction slit 27 are out of the area covered with the covering wall 32.

[0021] The side wall 31 and the covering wall 32 form the cover 33, which spreads from a part of the guide surface 28 in the first area [the area left of the side edge 30 in Fig. 2A] to a space above a part of the guide surface 28 in the second area [the area right of the guide edge 29 in Fig. 2A]. The second area is an area on the opposite side of the guide edge 29 to the suction slit 27. The first area and the second area are on the opposite sides of the suction slit 27. The cover 33 is supported to the support member 20 with a bracket (not shown). By arranging the weighting arm (not shown) at a released position, the cover 33, together with the top nip roller 19, can be separated from the suction pipe 15.

[0022] An air flow introducing clearance S is formed between the guide edge 29 (in the present embodiment, the surface of the air-permeable conveyor belt 16 arranged on the guide edge 29) and the distal edge 321 of the covering wall 32. The space between the cover 33 and the guide surface 28 is open to the second area via the air flow introducing clearance S.

[0023] The fiber bundle F is moved while being traversed by the operation of a traverse device (not shown). The speed of the traverse motion is set to a smaller value than the speed of the moving speed of the fiber bundle F. The upstream end 271 of the suction slit 27 is perpendicular to the conveying direction R of the air-permeable conveyor belt 16. Even if the position of the fiber bundle F is changed due to the traverse motion, the distance between the nip point of the pair of final delivery rollers 13 and the suction slit 27 is maintained to a constant

value.

[0024] Operation of the fiber bundle concentrating device 11 will now be described.

[0025] When the spinning frame is started, the fiber bundle F is drafted by the draft machine 12, and is then guided to the fiber bundle concentrating device 11 from the pair of final delivery rollers 13. The bottom nip roller 181 and the top nip roller 19 are rotated such that the speed of their outer circumferential surfaces is substantially equal to the speed of the outer circumferential surfaces of the pair of final delivery rollers 13. After passing the nip point of the rollers 181 and 19 under adequate tension, the fiber bundle F is moved downstream while being twisted.

[0026] Suction of the suction duct (not shown) acts on the suction pipe 15 through the connecting pipe 26, and air passes through the air-permeable conveyor belt 16 and is drawn into the suction pipe 15 from the suction slit 27. Suction created at the suction slit 27 acts on the fiber bundle F through the air-permeable conveyor belt 16. At this time, the fiber bundle F is moved along the air-permeable conveyor belt 16 while being concentrated along the suction slit 27 in the space between the cover 33 and the guide surface 28. In this case, air in the vicinity of the suction slit 27 and in the vicinity of the surface of the air-permeable conveyor belt 16 continuously flows into the suction slit 27. However, the side wall 31 of the cover 33 blocks air flow from the first area to the suction slit 27, and the covering wall 32 blocks air flow from the area above the suction slit 27 to the suction slit 27. Accordingly, air flow toward the suction slit 27 along the widthwise direction H of the suction slit 27 becomes an air flow that mainly flows to the suction slit 27 from the air flow introducing clearance S between the distal edge 321 of the covering wall 32 and the surface of the air-permeable conveyor belt 16. As a result, the fiber bundle F is attracted to a position on the air-permeable conveyor belt 16 that corresponds to the suction slit 27. The fiber bundle F is then concentrated by the conveying effect of the air-permeable conveyor belt 16 and the air flow mainly into the suction slit 27 from the air flow introducing clearance S between the distal edge 321 of the covering wall 32 and the surface of the air-permeable conveyor belt 16.

[0027] Fig. 3A shows the relationship between the hairiness and movement positions of the fiber bundle F, which was obtained through experiments. Fig. 3B is a graph showing the relationship between the yarn strength and movement positions of the fiber bundle F, which was obtained through experiments. Hairiness refers to an evaluation item related to fuzzing, and is defined as a total length of protruding fiber per 1 cm of yarn. Position X in the horizontal axis, which represents the movement position of the fiber bundle F in Figs. 3A and 3B, corresponds to position X in Fig. 2A, and position Z in the horizontal axis corresponds to position Z in Fig. 2A. Position Y in the horizontal axis corresponds to position Y in Fig. 2A.

[0028] The symbol □ in Figs. 3A and 3B represents

the results of experiments in which the cover 33 was used, and the symbol 0 represents the results of experiments in which the cover 33 was not used. The smaller the hairiness, that is, the closer to the bottom of the graph of Fig. 3A, the better the property of the fiber bundle F becomes. The greater the yarn strength, that is, the farther away from the bottom of the graph of Fig. 3B, the better the property of the fiber bundle F becomes.

[0029] The experiment results of Fig. 3A show that the hairiness was better when the cover 33 was used than when the cover 33 was not used. When the fiber bundle F was at the movement position Z, the hairiness was particularly improved. Further, when the cover 33 was used, the differences in hairiness among positions X, Y and Z were small compared to the case where the cover 33 was not used. That is, the hairiness was stable regardless of the traverse position.

[0030] The experiment results of Fig. 3B show that the yarn strength was better when the cover 33 was used than when the cover 33 was not used. The yarn strength was significantly improved in both cases where the fiber bundle F was at the movement positions X and Z. Further, when the cover 33 was used, the differences in yarn strength among positions X, Y and Z were small compared to the case where the cover 33 was not used. That is, the yarn strength was stable regardless of the traverse position.

[0031] The present embodiment has the following advantages.

(1) The side wall 31 blocks air flow to the suction slit 27 from an area on the opposite side of the side edge 30 to the suction slit 27 (the first area). This increases the amount of air flow to the suction slit 27 from the area on the opposite side of the guide edge 29 to the suction slit 27 (the second area) through the air flow introducing clearance S, compared to the case where there is no side wall 31. Accordingly, the amount of air flow from the second area to the suction slit 27 is increased, improving the concentration property of the fiber bundle F.

(2) The covering wall 32 blocks the air flow into the suction slit 27 from above.

Accordingly, the amount of air flow into the suction slit 27 from the second area through the air flow introducing clearance S is increased compared to the case where the covering wall 32 is not provided. That is, the covering wall 32 contributes to improvement of the concentration property of the fiber bundle F.

(3) In order to improve the concentration property of the fiber bundle F, it is preferable that air flow from the second area to the suction slit 27 be directed toward the suction slit 27 while flowing parallel to the guide surface 28. According to the present embodiment, the covering wall 32 has the inner surface 320, which is away from the guide surface 28 by a predetermined distance. The distal edge 321 of the covering wall 32 reaches a position beyond the guide

edge 29 in the widthwise direction H of the suction slit 27, that is, a position in the second area. Thus, the direction of the air flow from the second area to the suction slit 27 via the air flow introducing clearance S approximates to a direction parallel to the guide surface 28. This improves the concentration property of the fiber bundle F.

(4) The projecting portion 331, which projects toward the air-permeable conveyer belt 16 in the first area, suppresses the air flow into the suction slit 27 from the upstream end 271 and the downstream end 272 of the suction slit 27 in the first area. Such suppression of air flow into the suction slit 27 further increases the air flow into the suction slit 27 from the second area, thereby contributing to improvement of the concentration property of the fiber bundle F.

(5) The lower end (distal end) of the side wall 31 contacts the guide surface 28 such that there is no clearance between the side wall 31 and the guide surface 28 of the suction pipe 15, and the covering wall 32 is coupled to the side wall 31 such that there is no clearance between the covering wall 32 and the side wall 31. In this configuration, there is no air flow through between the lower end (distal end) of the side wall 31 and the guide surface 28, and there is no air flow through between the upper end of the side wall 31 and the proximal end of the covering wall 32. Thus, the amount of air flow from the second area to the suction slit 27 is effectively increased.

(6) Since the cover 33 is formed by integrating the side wall 31 and the covering wall 32, the cover 33 can be easily formed into a desired shape.

[0032] A second embodiment of the present invention will now be described with reference to Fig. 4. In the present embodiment, the same reference numerals are given to those components that are the same as the corresponding components of the first embodiment, and detailed explanations are omitted.

[0033] As shown in Fig. 4, a cover 33A of the present embodiment is different from the first embodiment in that the cover 33A has no projecting portion 331 of the first embodiment.

[0034] The present embodiment has the same advantages as the advantages (1) to (3), (5), and (6) of the first embodiment.

[0035] A third embodiment of the present invention will now be described with reference to Figs. 5 and 6. In the present embodiment, the same reference numerals are given to those components that are the same as the corresponding components of the second embodiment, and detailed explanations are omitted.

[0036] As shown in Figs. 5A and 5B, a hole 322 is formed in a covering wall 32 of a cover 33B. The hole 322 connects the outside and the inside of the covering wall 32 to each other. The hole 322 is formed in a position in the cover 33B that is close to the upstream end 271 of the suction slit 27 and corresponds to the first area.

The air flow that has flowed into the inside of the covering wall 32 from the outside through the hole 322 is directed toward a part of the side edge 30 that is close to the upstream end 271 of the suction slit 27 in the first area. The air flow that has passed through the hole 322 moves the fiber bundle F in the vicinity of the movement position X toward the guide edge 29.

[0037] Fig. 6A shows the relationship between the hairiness and movement positions of the fiber bundle F, which was obtained through experiments. Fig. 6B is a graph showing the relationship between the yarn strength and movement positions of the fiber bundle F, which was obtained through experiments. The symbol ○ in Figs. 6A and 6B shows the results of experiments in which the cover 33B was used, and the symbol □ shows the results of experiments in which the cover 33 of the first embodiment was used.

[0038] The experiment results shown in Fig. 6A show that, at the movement positions Y and Z, the hairiness was not significantly different between the cover 33B and the cover 33. However, at the movement position X, the hairiness was better with the cover 33B than with the cover 33. This shows that, when the cover 33B is used, the difference in hairiness among the positions X, Y, Z is further reduced, and the hairiness is stable regardless of the traverse position, compared to the first embodiment. The experiment results shown in Fig. 6B show that, at the movement positions Y and Z, the yarn strength was not significantly different between the cover 33B and the cover 33. However, at the movement position X, the yarn strength was better with the cover 33B than with the cover 33. This shows that, when the cover 33B is used, the difference in yarn strength among the positions X, Y, Z is further reduced, and the yarn strength is stable regardless of the traverse position, compared to the first embodiment.

[0039] The present invention provides the same or more advantages as the second embodiment.

[0040] The present invention is not limited to the embodiments described above, but may be embodied as follows, for example.

[0041] As shown in Figs. 7A and 7B, a hole 332 may be formed in a projecting portion 331 of a cover 33. The hole 332 is located in a part of the projecting portion 331 that is close to the upstream end 271 of the suction slit 27, and extends to the side edge 30. The air flow that has passed through the hole 332 moves the fiber bundle F in the vicinity of the movement position X toward the guide edge 29. This configuration provides the same advantages as the third embodiment.

[0042] A cover 33C shown in Fig. 8 may be employed that includes a side wall 31C inclined relative to the guide surface 28, and a covering wall 32C inclined relative to the guide surface 28 by an angle different from the angle of the side wall 31C. The covering wall 32C covers the guide surface 28 to a position beyond the guide edge 29 along the widthwise direction H of the suction slit 27.

[0043] As shown in Fig. 9, a wall-shaped cover 33D

may be employed that is inclined relative to the guide surface 28. The cover 33D covers the guide surface 28 to a position beyond the guide edge 29 along the widthwise direction H of the suction slit 27. The cover 33C serves as a wall surface inclined relative to the guide surface 28 and a covering wall inclined relative to the guide surface 28.

[0044] In the first embodiment, the guide surface 28 may be a flat surface, and the inner surface 320 of the covering wall 32 may be a flat surface.

[0045] In the first embodiment, the covering wall 32 of the cover 33 may cover the entire suction slit 27.

[0046] In the first embodiment, the projecting portion 331 may be separated from the side wall 31.

[0047] The guide surface 28 and the inner surface 320 of the covering wall 32 may have different shapes. For example, the guide surface 28 may be a curved surface, and the inner surface 320 may be a flat surface.

[0048] The suction slit 27 may be inclined in the opposite direction to that in the first embodiment, relative to the conveying direction of the air-permeable conveyer belt 16. That is, the suction slit 27 may have a mirror-reversed image of Fig. 2A.

[0049] An air-permeable conveyer belt made of rubber or elastic resin with a great number of holes may be used.

[0050] A fiber bundle concentrating apparatus for a spinning machine is disclosed. The fiber bundle concentrating apparatus includes a suction pipe and an air-permeable conveyer belt. The suction pipe has a suction slit. The guide surface has a guide edge and a non-guide edge that extend along both sides in the widthwise direction of the suction slit. The guide edge and the non-guide slit define the width of the suction slit. The fiber bundle concentrating apparatus includes a cover. The cover covers the suction slit from above, while covering an area outside of the non-guide edge. An air flow introducing clearance is provided between the guide edge and the cover.

Claims

1. A fiber bundle concentrating apparatus (11) for a spinning machine, comprising: a suction pipe (15) that has a suction slit (27) and is located downstream of a pair of final delivery rollers (13) of a draft machine (12); and an air-permeable conveyer belt (16) that is moved while being wrapped about a guide surface (28) of the suction pipe (15) so as to cover the suction slit (15), the guide surface (28) having first and second side edges that extend along both sides in the widthwise direction of the suction slit (15), the first and second side edges defining the width of the suction slit (27), and the first side edge functioning as a guide edge (29) for concentrating a fiber bundle, the apparatus being **characterized in** by a cover (33, 33A, 33B) that covers the suction slit (27) from above while covering area outside of the second side

edge, an air flow introducing clearance (S) being provided between the guide edge (29) and the cover (33, 33A, 33B).

2. The fiber bundle concentrating apparatus according to claim 1, wherein the cover (33, 33A, 33B) has a covering wall (32) that covers the suction slit (27) from above, the covering wall (32) extending from the area outside of the second side edge to an area outside of the guide edge (29), so as to have a distal edge (321) located in the area outside of the guide edge (29). 5
10

3. The fiber bundle concentrating apparatus according to claim 2, wherein the covering wall (32, 32C) has a projecting portion (331) that is located in the area outside of the second side edge and projects toward the air-permeable belt (16). 15

4. The fiber bundle concentrating apparatus according to claim 2 or 3, wherein the cover (33, 33A, 33B) has the covering wall (32, 32C) and a side wall (31, 31 C) that covers the area outside of the second side edge, the covering wall (32, 32C) and the side wall (31, 31 C) being formed integrally. 20
25

5. The fiber bundle concentrating apparatus according to claim 4, wherein the side wall (31, 31 C) being arranged on the suction pipe (15) such that there is no clearance between the side wall (31, 31C) and the suction pipe (15), and wherein the covering wall (32, 32C) is coupled to the side wall (31, 31C) such that there is no clearance between the covering wall (32, 32C) and the side wall (31, 31C). 30
35

6. The fiber bundle concentrating apparatus according to any one of claims 2 to 5, wherein the length of the covering wall (32, 32C) along the widthwise direction of the suction slit (27) is greater in a part close to the upstream end of the suction slit (27) than in a part close to the downstream end of the suction slit (27). 40

7. The fiber bundle concentrating apparatus according to any one of claims 1 to 6, wherein the cover (33, 33A, 33B) has a hole (322) that extends through the cover (33, 33A, 33B) so as to connect the outside and the inside of the cover (33, 33A, 33B) to each other, the hole (322) being located in an area that is close to the upstream end of the suction slit (27) and outside of the second side edge. 45
50

55

Fig.1A

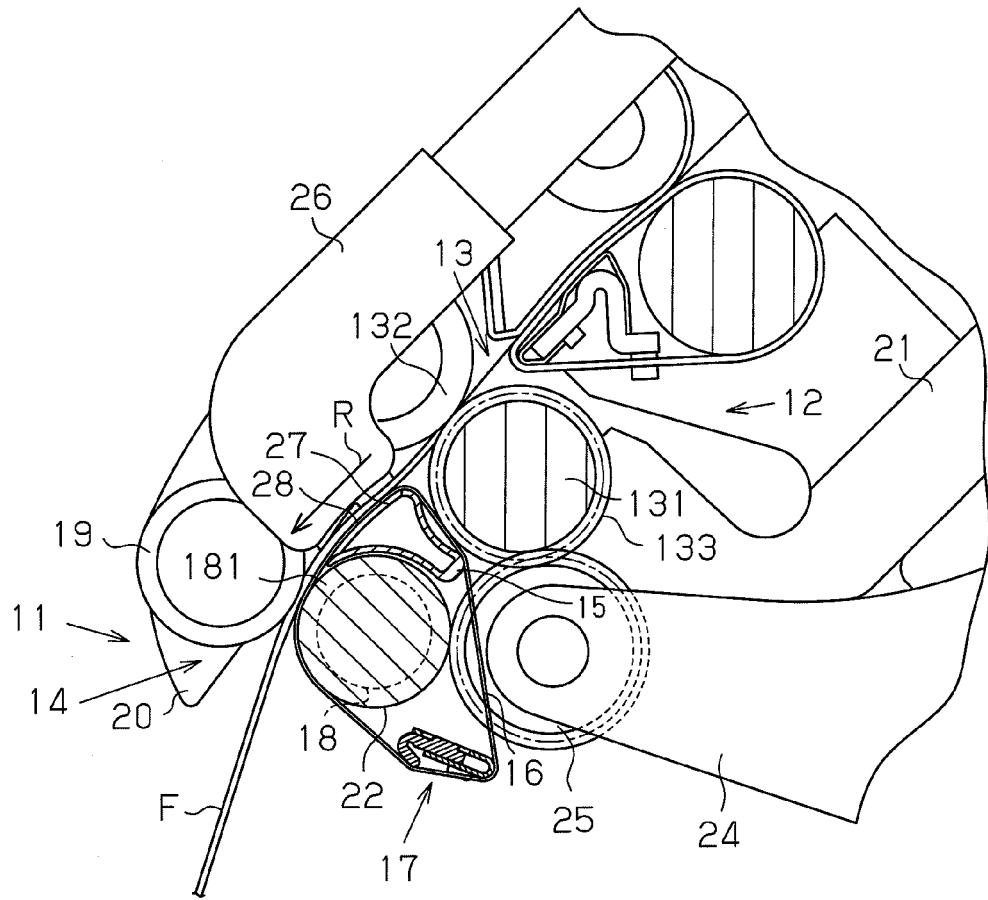


Fig.1B

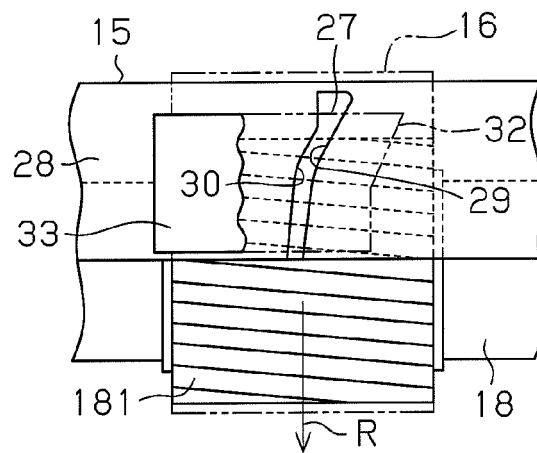


Fig. 2A

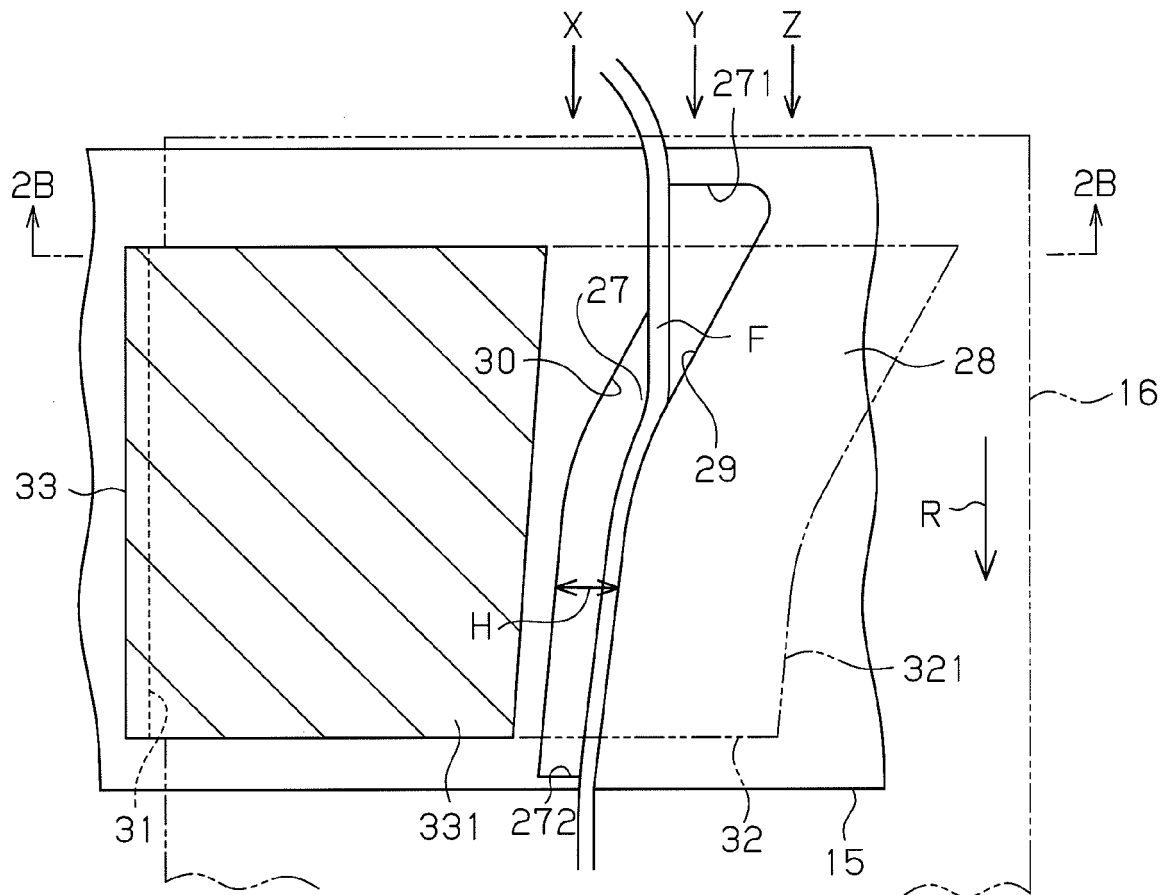


Fig. 2B

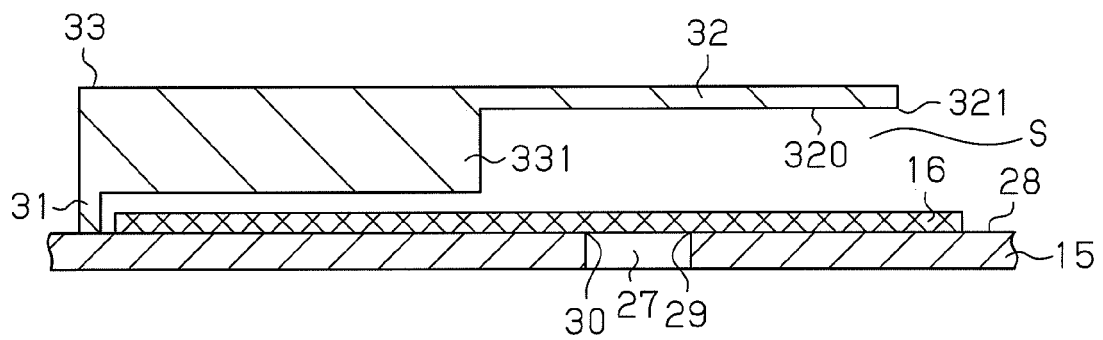


Fig.3A

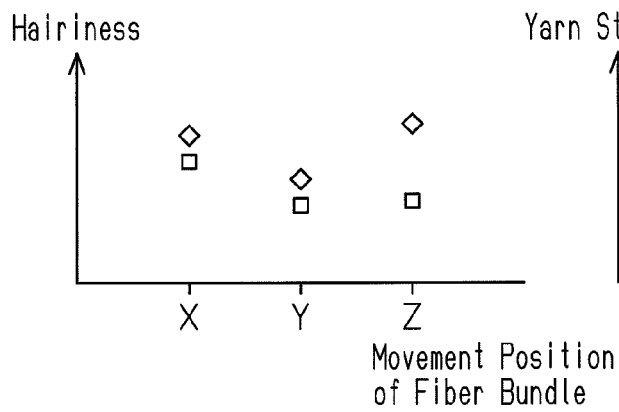


Fig.3B

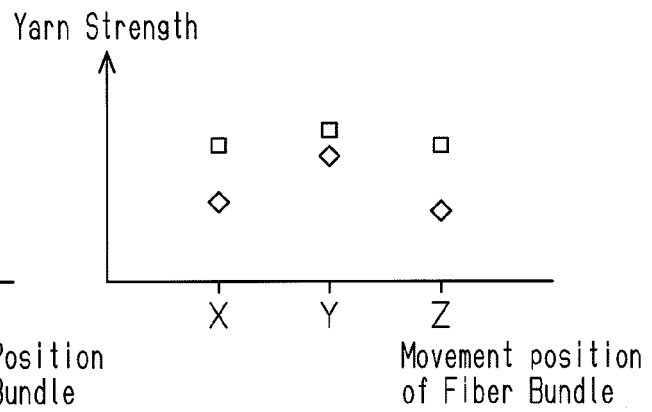


Fig.4

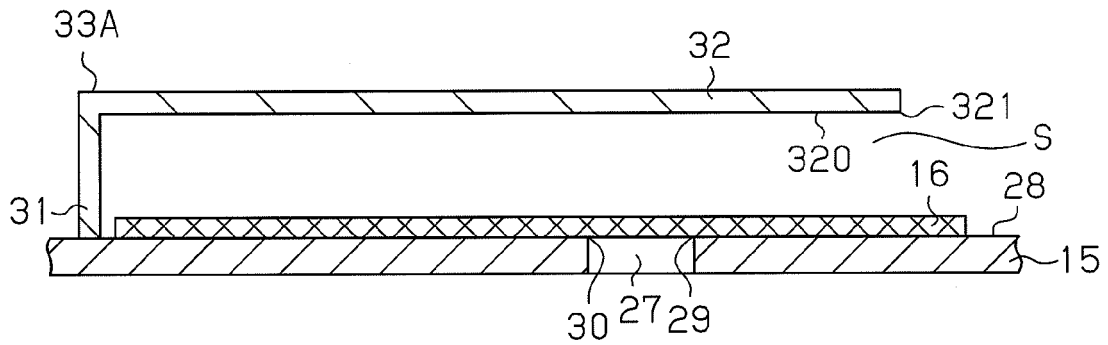


Fig.5A

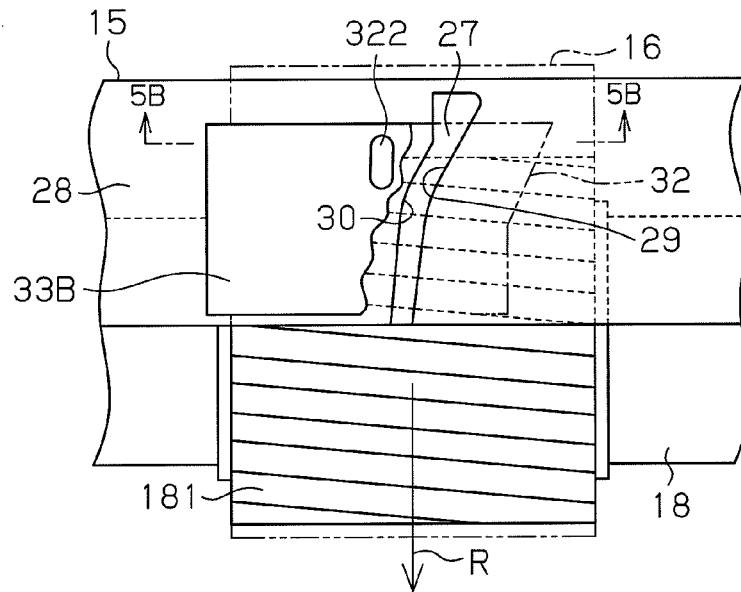


Fig.5B

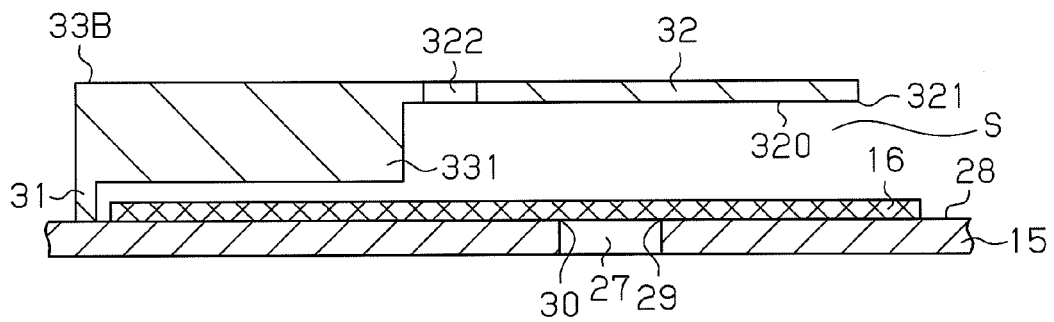


Fig.6A

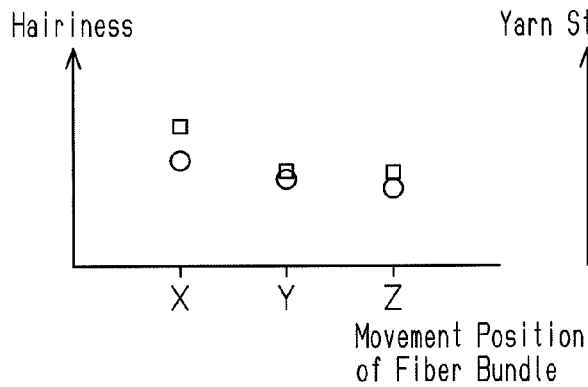


Fig.6B

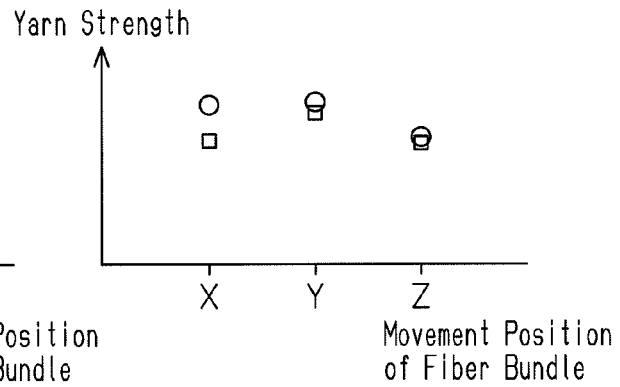


Fig.7A

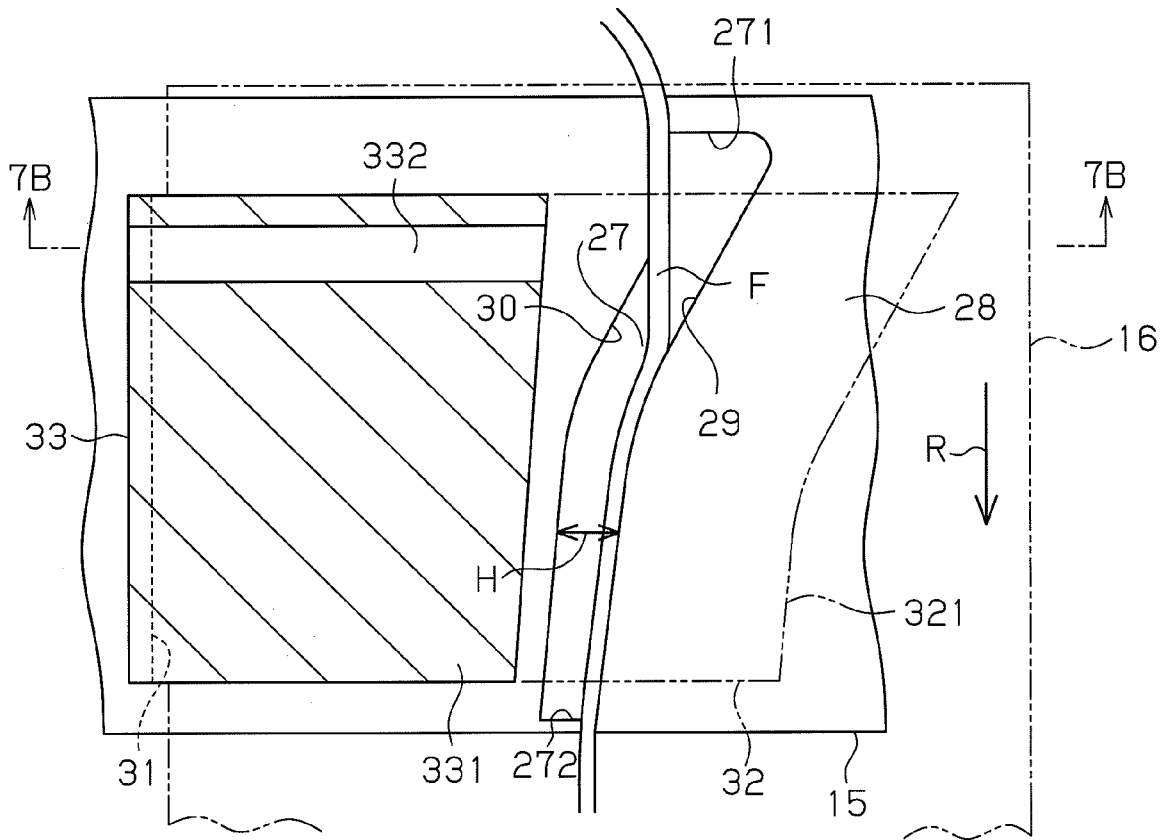


Fig.7B

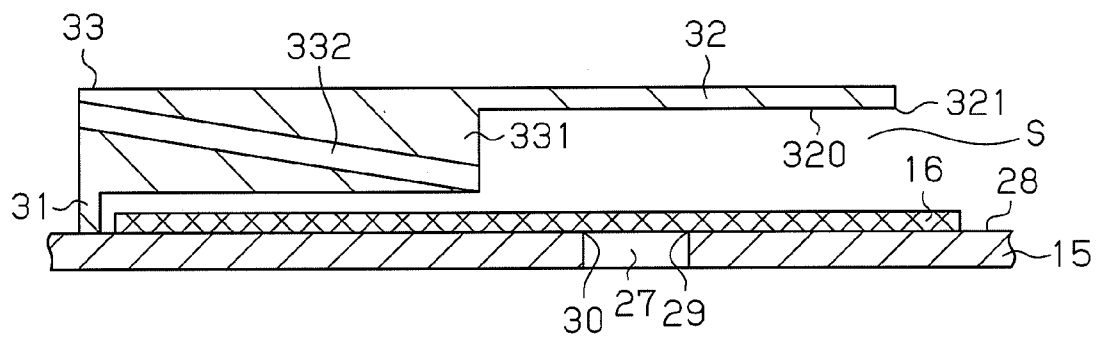


Fig.8

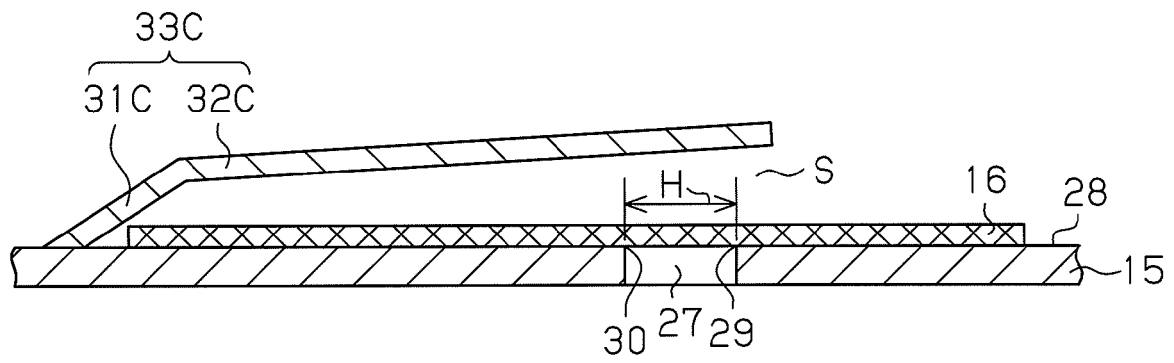
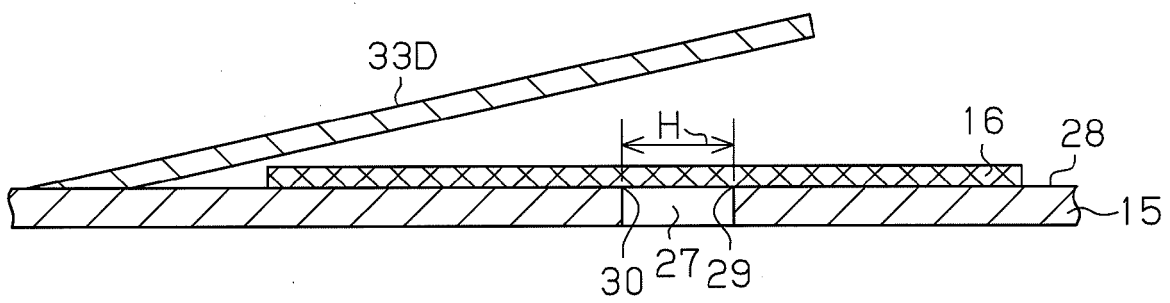


Fig.9





EUROPEAN SEARCH REPORT

Application Number
EP 10 19 1469

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	DE 100 42 689 A1 (STAHLECKER FRITZ [DE]; STAHLECKER HANS [DE]) 14 March 2002 (2002-03-14) * claim 1; figures 1,8 * -----	1-7	INV. D01H5/72 D01H5/26 D01H5/86
A	DE 10 2007 003525 A1 (SPINDELFABRIK SUESSEN GMBH [DE]) 31 July 2008 (2008-07-31) * figures 3,4 * -----	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			D01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 March 2011	Examiner Dupuis, Jean-Luc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 19 1469

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-03-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 10042689 A1	14-03-2002	JP 2002069762 A	08-03-2002

DE 102007003525 A1	31-07-2008	BR PI0800047 A	02-09-2008
		CN 101225564 A	23-07-2008
		JP 4613210 B2	12-01-2011
		JP 2008174895 A	31-07-2008
		TR 200800289 A2	22-09-2008

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2002069762 A [0002]