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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a spinning unit and a spinning machine including with a draft device.

2. Description of the Related Art

[0002] Conventionally, there are known a spinning unit and a spinning machine adapted to draft a fiber bundle by a draft device and twist the drafted fiber bundle to produce a spun yarn.

[0003] The draft device includes a plurality of roller pairs such as a back roller pair, a middle roller pair, and a front roller pair, which are arranged in this order from upstream towards downstream in a drafting direction of the fiber bundle. Each of the roller pairs includes a bottom roller, which is a driving roller, and a top roller, which makes contact with the bottom roller and rotates accompanying rotation of the bottom roller. Each of the top rollers is integrally held by a draft cradle (hereinafter simply referred to as a cradle). The cradle is swingable with a swing shaft provided at one end as a center. When the cradle is swung with the swing shaft as the center, each of the top rollers makes contact with or moves away from each of the bottom rollers. A position where the cradle is closed and each of the top rollers makes contact with each of the bottom rollers is a drafting position. A position where the cradle is opened for maintenance or the like and each of the top rollers is moved away from each of the bottom rollers is a non-drafting position.

[0004] When the draft device is operated, the most-downstream front roller pair rotates at a highest speed. Fiber dusts from the fiber bundle are blown up from the front top roller. When such fiber dusts are wound around the front top roller, in a worst case, drafting may not be continued. Thus, a suction section adapted to suck the fiber dusts is provided near the front top roller.

[0005] The suction section has a suction opening at an upper part of the front top roller (a side opposite to a side where the bottom roller is provided). A suction transporting pipe is arranged from the suction opening via an upper part of the cradle (the side opposite to the side where the bottom rollers are provided) to a connection opening located behind the swing shaft (upstream in the drafting direction). A suction source is connected to a main piping, which is a common suction transporting pipe for the spinning units . A branched piping is arranged from the main piping to a back side of the cradle. The branched piping and the connection opening located behind the cradle are connected with an accordion hose.

[0006] However, in the conventional suction section, since the accordion hose is connected to the connection opening located behind the swing shaft of the cradle, the accordion hose may easily detach from the connection opening when the cradle is opened to the non-drafting position. Thus, reattachment of the accordion hose may be required when performing maintenance on the cradle, and a workload has been caused on an operator. Since the accordion hose is greatly deformed, the hose may also be damaged. Since a piping of suction air is greatly circumvented with the accordion hose, the suction section is made large.

[0007] The operator may not notice that the accordion hose is detached from the connection opening. If the spinning unit is operated under such a state, the fiber dusts cannot be sucked by the spinning unit, and the fiber bundle may be wound around the front top roller. Since the spinning machine consumes an unnecessary air flow rate when the suction air leaks, the air flow rate may be lowered in other normal spinning units. Thus, if the accordion hose is detached from the connection opening, yarn quality may be lowered not only in the target spinning unit but also in the other spinning units.

[0008] There is also known a draft device adapted to connect and shut the suction transporting pipe near the swing shaft of the cradle instead of using the accordion hose (see Japanese Unexamined Patent Publication No. 2004-218104 and Japanese Unexamined Utility Model Publication No. 54-139726). However, in the draft device disclosed in Japanese Unexamined Patent Publication No. 2004-218104, the suction transporting pipe is provided in a boss member and inside a slider, which slidably moves and rotates with respect to the boss member. The suction transporting pipe itself thus forms a movable section, and reliable connection and shutting are difficult to be performed. Furthermore, in the draft devices disclosed in Japanese Unexamined Patent Publication No. 2004-218104 and Japanese Unexamined Utility Model Publication No. 54-139726, the suction transporting pipe is arranged from the suction opening through the upper part of the cradle to the swing shaft.

[0009] Document US 5 107 669 A, which represents the closest prior art, describes a drafting unit for a spinning machine having a load carrier which can be swivelied around a carrying rod extending in parallel with respect to bottom rollers. A carrying part is provided for a cleaning device which comprises two cleaning rags constructed as continuous loops, and which is constructed as a frame with two legs extending in parallel with respect to the load carrier and one crosshead. The frame is pivotally disposed at the load carrier in the vicinity of the carrying rod so as to accommodate lifting of the cleaning rags out of their cleaning position without requiring opening of the drafting unit.

[0010] Further related prior art may be found in US 3 251 100 A, JP S54 139726 U, JP 2007 107146 A and JP H07 197332 A.

BRIEF SUMMARY OF THE INVENTION

[0011] An object of the present invention is to provide a spinning unit, and a spinning machine in which a suction

transporting pipe is not detached by opening and closing of a cradle, fiber dusts are reliably sucked, and an unnecessary air flow rate is not consumed by leakage of suction air during operation.

[0012] A spinning unit according to a first aspect of the invention includes a draft device, a spinning device, and a winding device. The spinning device is adapted to spin the fiber bundle drafted by the draft device using whirling airflow. The winding device is adapted to wind a spun yarn spun by the spinning device into a package. The spinning unit further includes a blowing section. The blowing section is adapted to remove fiber dusts accumulated on the spinning device by compressed air. The blowing section further includes a blowing opening, a first blowing pipe, and a second blowing pipe. The blowing opening is adapted to blow the compressed air against the spinning device. The first blowing pipe is adapted to transport the compressed air to the blowing opening. The second blowing pipe is provided independently from the first blowing pipe, and is adapted to be under a connected state with the first blowing pipe at the drafting position, and an unconnected state by being separated from the first blowing pipe at the non-drafting position.

[0013] The draft device according to the first aspect of the invention includes a plurality of roller pairs, a switching section, and a suction section. Each roller pair includes a top roller and a bottom roller adapted to draft a fiber bundle. The switching section is adapted to switch the top roller and the bottom roller between a drafting position and a non-drafting position. The suction section is adapted to suck fiber dusts blown up from the top roller. The switching section includes a cradle and swing shaft. The cradle is adapted to rotatably support a plurality of top rollers. The swing shaft is arranged upstream in the drafting direction of the fiber bundle and is adapted to swing the cradle to the drafting position and the non-drafting position. The suction section includes a suction opening, a first suction transporting pipe, and a second suction transporting pipe. The suction opening is adapted to suck the fiber dusts in proximity of at least one of the top rollers. The first suction transporting pipe is supported by the cradle and is adapted to transport the fiber dusts sucked through the suction opening. The second suction transporting pipe is provided independently from the first suction transporting pipe and is adapted to be under a connected state by making contact with the first suction transporting pipe at the drafting position, and an unconnected state by being separated from the first suction transporting pipe at the non-drafting position. The first suction transporting pipe and the second suction transporting pipe are connected at downstream of the most-downstream roller pair in the drafting direction of the fiber bundle.

[0014] The draft device according to first aspect of the invention relates to the draft device according to the first aspect, and further includes a leakage preventing member. The leakage preventing member is adapted to prevent leakage of suction air from between the first suction transporting pipe and the second suction transporting pipe when the first suction transporting pipe and the second suction transporting pipe are under the connected state. The leakage preventing member is provided with an opening connected to the suction transporting pipe to pass the suction air and an opening connected to the blowing pipe to pass the compressed air.

[0015] The spinning unit according to a second aspect of the invention relates to the spinning unit according to the second aspect, wherein the leakage preventing member is formed of synthetic rubber material.

[0016] The spinning unit according to a third aspect of the invention relates to the spinning unit according to the first or second aspect, wherein the leakage preventing member is provided on one of the first suction transporting pipe and the second suction transporting pipe. A connecting member is provided on another one of the first suction transporting pipe and the second suction transporting pipe, and is adapted to make contact with the leakage preventing member when the first suction transporting pipe and the second suction transporting pipe are under the connected state. When the first suction transporting pipe and the second suction transporting pipe are under the connected state, and the first suction transporting pipe and the second suction transporting pipe are internally negative-pressured, the leakage preventing member adsorbs the connecting member.

[0017] The spinning unit according to a fourth aspect of the invention relates to the spinning unit according to the third aspect, wherein the leakage preventing member includes an adsorbing section adapted to form an air chamber by being connected to the connecting member. The air chamber is connected to the first suction transporting pipe and the second suction transporting pipe. The adsorbing section is adsorbed to the connecting member by the first suction transporting pipe and the second suction transporting pipe being internally negative-pressured.

[0018] The spinning unit according to a fifth aspect of the invention relates to the spinning unit according to any one of the first to fourth aspects, and the draft device further includes a device frame. The device frame is adapted to support the bottom roller and the swing shaft. The second suction transporting pipe is provided on the device frame.

[0019] The spinning unit according to a sixth aspect of the invention relates to the spinning unit according to any one of the first to fifth aspects, wherein the leakage preventing member has two openings (for the compressed air and said openings are formed at both sides of the opening connected to the suction transporting pipe to pass the suction air.

[0020] The spinning unit according to a seventh aspect of the invention relates to the spinning unit according to any one of the first to sixth aspects, wherein the leakage preventing member has two openings connected to the suction transporting pipe to pass the suction air.

[0021] The spinning unit according to an eighth aspect

of the invention relates to the spinning unit according to any one of the first to seventh aspects, wherein the draft device comprises a first leakage preventing member (53) and a second leakage preventing member (54) having compressibility such that the first leakage preventing member (53) and the second leakage preventing member (54) are slightly compressed when brought in contact with one another.

[0022] A spinning machine according to a ninth aspect of the invention includes a plurality of spinning units according to any one of the first to the eighth aspects.

[0023] According to the spinning unit of the first aspect, the fiber dusts can be reliably sucked by the suction section, and the fiber dusts are not mixed into the fiber bundle guided to the spinning device. Therefore, quality of the package wound by the winding device is improved.

[0024] In addition, according to the spinning unit of the first aspect, since the connected state and the unconnected state are switched by the contact and separation of the first blowing pipe and the second blowing pipe, the first blowing pipe and the second blowing pipe are automatically switched to the connected state at the drafting position. Therefore, at the drafting position, the fiber dusts accumulated on the spinning device can be reliably removed with the compressed air

[0025] According to the draft device of the spinning unit of the first aspect, since the connected state and the unconnected state are switched by the contact and separation of the first suction transporting pipe and the second suction transporting pipe, the first suction transporting pipe and the second suction transporting pipe are automatically switched to the connected state at the drafting position. Therefore, by the switching between the drafting position and the non-drafting position, the suction transporting pipe is not detached as in the prior art which uses the accordion hose, and the fiber dusts can be reliably sucked by the suction section. Furthermore, the unnecessary air flow rate is not consumed by the leakage of suction air during the operation of the draft device. A distance from the connecting section of the first suction transporting pipe and the second suction transporting pipe to the suction opening can be shortened. Compared to the configuration in which the piping is arranged from the suction opening through the cradle to the swing shaft as in the prior art, the piping is not required to circumvent the cradle, and hence the cradle can be made small.

[0026] According to the draft device of the spinning unit of the first aspect, the suction air is prevented from leaking, and the suction section can reliably suck the fiber dusts blown up from the top roller.

[0027] According to the spinning unit of the second aspect, the leakage of the suction air from the connecting section of the first suction transporting pipe and the second suction transporting pipe can be reliably prevented at the drafting position.

[0028] According to the spinning unit of the third aspect, under a state in which the suction section is operated at the drafting position, the leakage preventing member adsorbs the connecting member. Thus, the leakage of the suction air from the connecting section of the first suction transporting pipe and the second suction transporting pipe can be reliably prevented.

[0029] According to the spinning unit of the fourth aspect, under the state in which the suction section is operated at the drafting position, the leakage preventing member adsorbs the connecting member. Accordingly, the leakage of the suction air from the connecting section of the first suction transporting pipe and the second suction transporting pipe can be reliably prevented.

[0030] According to the spinning unit of the fifth aspect, since the cradle is arranged close to the device frame, the distance from the connecting section of the first suction transporting pipe and the second suction transporting pipe to the suction opening can be made short. Since the distance of the suction transporting pipe becomes short, the cradle can be made small.

[0031] According to the spinning machine of the ninth aspect, the fiber dusts can be reliably sucked by the suction section, and the fiber dusts are not mixed into the fiber bundle guided to the spinning device. Therefore, the quality of the package wound by each winding device is improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

FIG. 1 is a front view of a spinning machine according to a first embodiment of the present invention;

FIG. 2 is a schematic side view of a spinning unit according to the first embodiment of the present invention;

FIG. 3 is a side view of a draft device according to the first embodiment of the present invention, in which the draft device is located at a drafting position;

FIG. 4 is a side view of the draft device according to the first embodiment of the present invention, in which the draft device is located at a non-drafting position;

FIG. 5A is a view illustrating a suction section seen from a direction of an arrow A in FIG. 3;

FIG. 5B is a view illustrating a suction section seen from a direction of an arrow B in FIG. 4;

FIG. 6A is a plan view of a first leakage preventing member according to the first embodiment of the present invention;

FIG. 6B is a plan view of a second leakage preventing member according to the first embodiment of the present invention;

FIG. 7A is a view illustrating a suction section under a state in which a draft device according to a second embodiment of the present invention is located at the drafting position;

FIG. 7B is a view illustrating the suction section under a state in which the draft device according to the second embodiment of the present invention is lo-

cated at the non-drafting position;

FIG. 8A is a plan view of a leakage preventing member according to the second embodiment of the present invention;

FIG. 8B is a perspective view of the leakage preventing member according to the second embodiment of the present invention;

FIG. 9A is a plan view of a connecting member according to the second embodiment of the present invention;

FIG. 9B is a perspective view of the connecting member according to the second embodiment of the present invention;

FIG. 10A is an enlarged view of the leakage preventing member and the connecting member under a connected state according to the second embodiment of the present invention;

FIG. 10B is a cross-sectional view taken along line A-A of FIG. 10A;

FIG. 11A is a plan view of a connecting member of another example; and

FIG. 11B is a perspective view of the connecting member of another example.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0033] Embodiments of the invention will be hereinafter described with reference to the drawings. A draft device D, and a spinning unit U and a spinning machine M provided with the same according to a first embodiment of the present invention will be described with reference to FIG. 1 to FIG. 6B.

[0034] An outline of the spinning machine M will be described. "Upstream" and "downstream" respectively refer to upstream and downstream in a travelling direction of a fiber bundle F and a spun yarn Y in a spinning unit U.

[0035] As illustrated in FIG. 1 and FIG. 2, the spinning machine M includes a plurality of spinning units U arranged in line, a yarn joining cart 3, a blower box 4, and a motor box 5. Each spinning unit U includes a draft device D, a spinning device 11, a yarn clearer 12, a yarn slack eliminating device 13, and a winding device 21.

[0036] As illustrated in FIG. 2, the draft device D drafts the fiber bundle (a sliver) F supplied through a trumpet T from a can (not illustrated) arranged at a back of the spinning unit U. The draft device D of the present embodiment includes a plurality of roller pairs R in which a feeding speed gradually becomes faster from the upstream towards the downstream in the travelling direction of the fiber bundle F. Each of the roller pairs R respectively includes top rollers RB1, RT1, RM1, and RF1, and bottom rollers RB2, RT2, RM2, and RF2 (see FIG. 3). The draft device D will be specifically described later.

[0037] The spinning device 11 uses whirling airflow to apply twists to the fiber bundle F to produce the spun yarn Y. Although detailed description and illustration will be omitted, the spinning device 11 includes a fiber guiding section, a whirling airflow generating nozzle, and a hollow guide shaft body. The fiber guiding section guides the fiber bundle F fed from the draft device D to a spinning chamber formed inside the spinning device 11. The whirling airflow generating nozzle is arranged at a periphery of a path of the fiber bundle F to generate the whirling airflow in the spinning chamber. This whirling airflow causes a fiber end of the fiber bundle F in the spinning chamber to be reversed and to whirl. The hollow guide shaft body guides the spun yarn Y from the spinning chamber to outside the spinning device 11. Driving and stopping of the spinning device 11 are controlled by a unit controller (not illustrated) . The spinning device 11 may be an air-jet spinning device in which a needle-like member is not provided but a function of the needle-like member is realized by a downstream end of the fiber guiding section, or an air-jet spinning device including a pair of air-jet nozzles for applying twists in directions opposite to each other.

[0038] The yarn clearer 12 monitors a thickness of the spun yarn Y fed from the spinning device 11. When a yarn defect of the spun yarn Y is detected, the yarn clearer 12 transmits a yarn defect detection signal to the unit controller (not illustrated).

[0039] The yarn slack eliminating device 13 applies a predetermined tension on the spun yarn Y to pull out the spun yarn Y from the spinning device 11. The yarn slack eliminating device 13 adjusts the tension such that a fluctuation of tension from the winding device 21 is not transmitted towards the spinning device 11. During operation by the yarn joining cart 3, the yarn slack eliminating device 13 accumulates the spun yarn Y fed from the spinning device 11 to prevent slackening of the spun yarn Y.

[0040] The winding device 21 winds the spun yarn Y fed from the spinning device 11 to form a package P. The winding device 21 includes a cradle arm 22, a winding drum 23, and a traverse device 24. The cradle arm 22 rotatably supports the package P (a bobbin). The winding drum 23 makes contact with an outer peripheral surface of the package P (the bobbin) to rotate the package P (the bobbin). The traverse device 24 traverses the spun yarn Y. The winding device 21 rotates the winding drum 23 while traversing the spun yarn Y by the traverse device 24 to rotate the package P (the bobbin) and wind the spun yarn Y.

[0041] When receiving the yarn defect detection signal from the yarn clearer 12, the unit controller immediately cuts the spun yarn Y with a cutter 14, and stops the draft device D, the spinning device 11, and the like. The unit controller transmits a control signal to the yarn joining cart 3, and the yarn joining cart 3 travels to front of the spinning unit U. Thereafter, the unit controller drives the spinning device 11 or the like again, the yarn joining cart 3 performs a yarn joining operation, and winding is resumed. Instead of using the cutter 14, the spinning unit U may stop the supply of air to the spinning device 11 and cut the spun yarn Y by stopping the production of the spun yarn Y.

[0042] As illustrated in FIG. 1 and FIG. 2, the yarn joining cart 3 includes a cart section 25, and a splicer 26, a suction pipe 27, and a suction mouth 28 which are mounted on the cart section 25. When a yarn breakage or a yarn cut occurs in a spinning unit U, the yarn joining cart 3 travels to the relevant spinning unit U. The suction pipe 27 sucks and catches a yarn end fed from the spinning device 11 and guides the yarn end to the splicer 26. The suction mouth 28 sucks and catches a yarn end from the package P and guides the yarn end to the splicer 26. The splicer 26 joins the guided yarn ends.

[0043] The blower box 4 includes a blower (a suction source). A main piping 71 (see FIG. 4), which is a common suction transporting pipe for the spinning units U, is connected to the blower box 4. The main piping 71 is arranged at a rear portion of the spinning units U (upstream in the drafting direction). The blower box 4 sucks, transports, and collects the fiber dusts or the like generated in each spinning unit U through the main piping 71.

[0044] The motor box 5 includes a motor as a driving source of the spinning machine M, a decelerator for transmitting power to each section of the spinning machine M, and the like.

[0045] Next, the draft device D will be described in detail. As illustrated in FIG. 3 to FIG. 6B, the draft device D includes a plurality of roller pairs R, a cradle 31 serving as a switching section, a device frame 32, and a suction section 41.

[0046] As illustrated in FIG. 3, in the present embodiment, the plurality of roller pairs R include a back roller pair RB, a third roller pair RT, a middle roller pair RM, and a front roller pair RF. The middle roller pair RM is provided with an apron belt E. The roller pairs RB, RT, RM, and RF are arranged at a predetermined interval from the upstream towards the downstream in the travelling direction of the fiber bundle F. Each of the roller pairs RB, RT, RM, and RF respectively includes the top rollers RB1, RT1, RM1, and RF1 on an upper side, and the bottom rollers RB2, RT2, RM2, and RF2 on a lower side. The bottom rollers RB2, RT2, RM2, and RF2 are driving rollers. The top rollers RB1, RT1, RM1, and RF1 are driven rollers that respectively make contact with the bottom rollers RB2, RT2, RM2, and RF2 and rotate accompanying the rotation of the bottom rollers RB2, RT2, RM2, and RF2. A rotation speed of each of the roller pairs RB, RT, RM, and RF gradually increases from the upstream towards the downstream. The spinning device 11 is arranged downstream of the front roller pair RF.

[0047] The back top roller RB1, the third top roller RT1, the middle top roller RM1, and the front top roller RF1 are integrally and swingably attached to the cradle 31. Each of the top rollers RB1, RT1, RM1, and RF1 for two adjacent spinning units U is attached to the cradle 31 (see FIG. 1) . The back bottom roller RB2, the third bottom roller RT2, the middle bottom roller RM2, and the front bottom roller RF2 are respectively provided on the device frame 32 in correspondence with each of the top rollers RB1, RT1, RM1, and RF1 of the cradle 31.

[0048] As illustrated in FIG. 3 and FIG. 4, the cradle 31 is swingable with respect to the device frame 32 with a swing shaft 33 as a center. The swing shaft 33 is provided in an upstream portion of the cradle 31. Therefore, when the cradle 31 is swung, each of the top rollers RB1, RT1, RM1, and RF1 moves close to or moves away from each of the bottom rollers RB2, RT2 , RM2, and RF2. A position where the cradle 31 is closed and each of the top rollers RB1, RT1, RM1, and RF1 makes contact with each of the bottom rollers RB2, RT2, RM2, and RF2 is the drafting position. A position where the cradle 31 is opened for maintenance and the like and each of the top rollers RB1, RT1, RM1, and RF1 and each of the bottom rollers RB2, RT2, RM2, and RF2 moves away from one other is the non-drafting position. Therefore, the cradle 31 can switch the top rollers RB1, RT1, RM1, and RF1 and the bottom rollers RB2, RT2, RM2, and RF2 between the drafting position and the non-drafting position.

[0049] The operator operates a handle 34 to perform a swinging operation of the cradle 31. When the cradle 31 is closed to the drafting position, a hook section 35 at a tip-end of a lower part of the handle 34 is engaged with a fixed roller 36 on the device frame 32 side, and a pressure contacting state of each of the top rollers RB1, RT1, RM1, and RF1 and each of the bottom rollers RB2, RT2, RM2, and RF2 is maintained.

[0050] Since a distance between each of the roller pairs RB, RT, RM, and RF is determined by a fiber length of the fiber bundle (the sliver) F to be drafted, the distance is reviewed every time a type of the fiber bundle (the sliver) F as a material is changed. Therefore, among the bottom rollers RB2, RT2, RM2, and RF2 , the middle bottom roller RM2 and the front bottom roller RF2 are fixed to the device frame 32, but the position of the back bottom roller RB2 and the third bottom roller RT2 may respectively be changed towards the upstream or downstream with respect to the device frame 32.

[0051] The suction section 41 sucks the fiber dusts blown up from the top roller. In the present embodiment, the suction section 41 sucks the fiber dusts blown up from the front top roller RF1. As illustrated in FIG. 3 to FIG. 6B, the suction section 41 includes a suction opening 42, a first suction transporting pipe 43, and a second suction transporting pipe 44.

[0052] The suction opening 42 sucks the fiber dusts at the downstream of the front top roller RF1. The suction opening 42 is an opening of a suction mouth member 45. As described above, each of the top rollers RB1, RT1, RM1, and RF1 for two adjacent spinning units U is attached to the cradle 31. Thus, as illustrated in FIG. 5A and FIG. 5B, the suction mouth member 45 is arranged in correspondence with each of the front top rollers RF1. As illustrated in FIG. 3, FIG. 5A, and FIG. 5B, the suction mouth member 45 is arranged at a position located downstream of the front top roller RF1 and slightly above a contacting (nipping) position of the front top roller RF1 and the front bottom roller RF2. This position is a position where the fiber dusts are blown up by an accompanying

airflow generated by the rotation of the front top roller RF1, and the fiber dusts can be efficiently sucked. Since the position of the front top roller RF1 is fixed even when the type of the fiber bundle (the sliver) F is changed, the position where the suction mouth member 45 (the suction opening 42) is arranged may also be fixed.

[0053] The first suction transporting pipe 43 is connected to the suction opening 42 to cause a suction force at the suction opening 42, and transports the fiber dusts sucked through the suction opening 42. The first suction transporting pipe 43 is supported on the cradle 31 side. As illustrated in FIG. 5A and FIG. 5B, the first suction transporting pipe 43 is branched in middle. Branched portions are curved towards the front top rollers RF1 on both sides. Each end of the branched portions is connected to the suction mouth member 45. A first connecting section 51 is provided at the other end of the first suction transporting pipe 43. As illustrated in FIG. 3, FIG. 5A, and FIG. 5B, the first connecting section 51 is arranged at a position located in proximity to the downstream of the front roller pair RF, and at a substantially intermediate position of the spinning devices 11 of the adjacent spinning units U. The first connecting section 51 includes a first leakage preventing member 53. The first leakage preventing member 53 will be described later.

[0054] The second suction transporting pipe 44 is connected to the first suction transporting pipe 43 to cause the suction force at the first suction transporting pipe 43 and the suction opening 42, and transports the fiber dusts sucked through the suction opening 42. The second suction transporting pipe 44 is provided independently from the first suction transporting pipe 43. The second suction transporting pipe 44 is arranged on the device frame 32 side.

[0055] A second connecting section 52 adapted to realize a connected state or an unconnected state with respect to the first connecting section 51 of the first suction transporting pipe 43 is provided at one end of the second suction transporting pipe 44. The second connecting section 52 is arranged at a position located in proximity to the downstream of the front roller pair RF, and at a substantially intermediate position of the spinning devices 11 of the adjacent spinning units U. Accordingly, as illustrated in FIG. 3 and FIG. 5A, at the drafting position, since the cradle 31 is closed, the second connecting section 52 makes contact with the first connecting section 51, and the first section transporting pipe 43 and the second suction transporting pipe 44 are provided under the connected state. As illustrated in FIG. 4 and FIG. 5B, at the non-drafting position since the cradle 31 is opened, the first connecting section 51 and the second connecting section 52 are separated, and the first suction transporting pipe 43 and the second suction transporting pipe 44 are provided under the unconnected state. The second connecting section 52 includes a second leakage preventing member 54. The second leakage preventing member 54 will be described later.

[0056] As illustrated in FIG. 3, the main piping 71 is connected to the other end of the second suction transporting pipe 44. The main piping 71 is a suction transporting pipe arranged at the rear portion of the spinning units U, and is a common suction transporting pipe for the spinning units U. The main piping 71 is connected to a blower (the suction source) of the blower box 4.

[0057] When the first suction transporting pipe 43 and the second suction transporting pipe 44 are under the connected state, the first leakage preventing member 53 and the second leakage preventing member 54 prevent the leakage of the suction air from between the first suction transporting pipe 43 and the second suction transporting pipe 44. A shape of the first leakage preventing member 53 is substantially equal to a shape of the second leakage preventing member 54. As illustrated in FIG. 6A, the first leakage preventing member 53 is provided with an opening 55 connected to the first suction transporting pipe 43 to enable the suction air, the fiber dusts, and the like to pass. As illustrated in FIG. 6B, the second leakage preventing member 54 is provided with an opening 56 connected to the second suction transporting pipe 44 to enable the suction air, the fiber dusts, and the like to pass. At the drafting position, since the cradle 31 is closed, the first leakage preventing member 53 of the first connecting section 51 makes contact with the second leakage preventing member 54 of the second connecting section 52, and the opening 55 and the opening 56 are connected. As a result, the first suction transporting pipe 43 and the second suction transporting pipe 44 are connected under a state in which the suction air does not leak out.

[0058] The first leakage preventing member 53 and the second leakage preventing member 54 preferably have compressibility such that the first leakage preventing member 53 and the second leakage preventing member 54 are slightly compressed when made in contact with one another. By having the compressibility, a slight dimensional error of the first suction transporting pipe 43 and the second suction transporting pipe 44 can be absorbed to realize reliable connection. For example, an independent foaming elastic body may be used for the first leakage preventing member 53 and the second leakage preventing member 54. Materials other than the independent foaming elastic body can be used, and for example, a synthetic rubber material may be used.

[0059] The draft device D of the present embodiment includes a blowing section 61 adapted to remove the fiber dusts accumulated on the spinning device 11 with compressed air. In the spinning unit U, when a yarn breakage or a yarn cut occurs, the hollow guide shaft body of the spinning device 11 is moved in a direction away (opening) from the fiber guiding section. In such a case, the blowing section 61 blows the compressed air to the spinning device 11 (specifically, an entrance of the fiber guiding section) to remove the fiber dusts. As illustrated in FIG. 3 to FIG. 6B, the blowing section 61 includes a blowing opening 62, a first blowing pipe 63, and a second blowing pipe 64.

[0060] The blowing opening 62 is adapted to blow the compressed air to the spinning device 11 (specifically, the entrance of the fiber guiding section). The blowing opening 62 is an opening provided adjacent to the suction opening 42 of the suction mouth member 45. The blowing opening 62 is formed such that the blowing opening 62 is directed towards the spinning device 11 which is located away (opened) with respect to the front roller pair RF at the drafting position. To correspond to the spinning devices 11 of the two adjacent spinning units U, the blowing opening 62 is each provided at the suction mouth members 45 on both sides.

[0061] The first blowing pipe 63 is adapted to feed the compressed air to the blowing opening 62. The first blowing pipe 63 is individually provided in correspondence with each blowing opening 62. One end of the first blowing pipe 63 is attached to the suction mouth member 45. The first blowing pipe 63 is supported on the cradle 31 side. The other end of the first blowing pipe 63 is connected to the first connecting section 51, which is shared with the suction section 41. As illustrated in FIG. 6A, openings 57 adapted to pass the compressed air are formed at both sides of the opening 55 in the first leakage preventing member 53.

[0062] The second blowing pipe 64 is connected to the first blowing pipe 63 and is adapted to feed the compressed air to the first blowing pipe 63 and the blowing opening 62. The second blowing pipe 64 is provided independently from the first blowing pipe 63. The second blowing pipe 64 is arranged on the device frame 32 side. One end of the second blowing pipe 64 is connected to the second connecting section 52, which is shared with the suction section 41. As illustrated in FIG. 6B, openings 58 adapted to pass the compressed air are formed at both sides of the opening 56 in the second leakage preventing member 54.

[0063] The other end of the second blowing pipe 64 is connected to a supply source (not illustrated) of the compressed air via a valve (not illustrated).

[0064] According to the above configuration, as illustrated in FIG. 3 and FIG. 5A, at the drafting position, since the cradle 31 is closed, the first connecting section 51 makes contact with the second connecting section 52, and the first blowing pipe 63 and the second blowing pipe 64 are provided under the connected state. If the valve (not illustrated) is opened in such a state, the compressed air can be blown from the blowing opening 62 against the relevant spinning device 11 of the spinning unit U. As illustrated in FIG. 4 and FIG. 5B, at the non-drafting position, since the cradle 31 is opened, the first connecting section 51 and the second connecting section 52 are separated, and the first blowing pipe 63 and the second blowing pipe 64 are provided under the unconnected state.

[0065] The draft device D, and the spinning unit U and the spinning machine M including the same according to the present embodiment described above have the following effects.

[0066] According to the draft device D, the suction section 41 includes the first suction transporting pipe 43 adapted to transport the fiber dusts sucked through the suction opening 42, and the second suction transporting pipe 44 provided independently from the first suction transporting pipe 43 and adapted to be under the connected state by making contact with the first suction transporting pipe 43 at the drafting position, and the unconnected state by being separated from the first suction transporting pipe 43 at the non-drafting position. By the contact and separation of the first suction transporting pipe 43 and the second suction transporting pipe 44, switching is made between the connected state and the unconnected state. Thus, the first suction transporting pipe 43 and the second suction transporting pipe 44 are automatically switched to the connected state at the drafting position. Therefore, by the switching between the drafting position and the non-drafting position, the suction transporting pipe is not detached as in the prior art in which the accordion hose is used, and the fiber dusts can be reliably sucked. Furthermore, the unnecessary air flow rate is not consumed by the leakage of suction air during the operation of the draft device D.

[0067] The suction opening 42 of the suction section 41 is arranged downstream of the plurality of front top rollers RF1 in the drafting direction of the fiber bundle F. The first suction transporting pipe 43 is supported by the cradle 31. The switching section carries out the switching between the connected state by the contact of the first suction transporting pipe 43 and the second suction transporting pipe 44 and the unconnected state by the separation of the pipes 43 and 44 at the downstream in the drafting direction of the fiber bundle F. Thus, a distance from the connecting section of the first suction transporting pipe 43 and the second suction transporting pipe 44 (the first connecting section 51 and the second connecting section 52) to the suction opening 42 can be shortened. Compared to the configuration in which the piping is arranged from the suction opening through the cradle to the swing shaft as in the prior art, the piping (the first suction transporting pipe 43) is not required to circumvent the cradle 31, and hence the cradle 31 can be made small.

[0068] The draft device D is provided with the first leakage preventing member 53 and the second leakage preventing member 54 adapted to prevent the leakage of the suction air from between the first suction transporting pipe 43 and the second suction transporting pipe 44 when the first suction transporting pipe 43 and the second suction transporting pipe 44 are under the connected state. Thus, the suction air does not leak out, and the suction section 41 can reliably suck the fiber dusts blown up from the front top roller RF1.

[0069] The first leakage preventing member 53 and the second leakage preventing member 54 are independent foaming elastic bodies. Therefore, at the drafting position, the leakage of the suction air from the connecting section of the first suction transporting pipe 43 and the

second suction transporting pipe 44 (the first connecting section 51 and the second connecting section 52) can be reliably prevented.

[0070] The draft device D includes the device frame 32 adapted to support the bottom rollers RB2, RT2, RM2, and RF2, and the swing shaft 33. The second suction transporting pipe 44 is arranged on the device frame 32. Since the cradle 31 is arranged close to the device frame 32, the distance from the connecting section of the first suction transporting pipe 43 and the second suction transporting pipe 44 (the first connecting section 51 and the second connecting section 52) to the suction opening 42 can be made short. Since the distance of the first suction transporting pipe 43 becomes short, the cradle 31 can be made small.

[0071] According to the spinning unit U and the spinning machine M, the fiber dusts can be reliably sucked by the suction section 41, and the fiber dusts are not mixed into the fiber bundle F guided to the spinning device 11. Therefore, the quality of the package P wound by the winding device 21 is improved.

[0072] The blowing section 61 includes the first blowing pipe 63 adapted to feed the compressed air to the blowing opening 62, and the second blowing pipe 64 provided independently from the first blowing pipe 63, and adapted to be under the connected state by making contact with the first blowing pipe 63 at the drafting position and to be under the unconnected state by being separated from the first blowing pipe 63 at the non-drafting position. By the contact and separation of the first blowing pipe 63 and the second blowing pipe 64, the switching is made between the connected state and the unconnected state. Thus, the first blowing pipe 63 and the second blowing pipe 64 can be automatically switched to the connected state at the drafting position. Therefore, at the drafting position, the fiber dusts accumulated on the spinning device 11 can be reliably removed by the compressed air blown from the blowing section 61.

[0073] Next, a draft device D, and a spinning unit U and a spinning machine M including the same according to a second embodiment of the present invention will be described with reference to FIG. 7A to FIG. 10B. The present embodiment differs from the first embodiment in that an eleventh leakage preventing member 153 and a connecting member 170 are provided at a connecting section (an eleventh connecting section 151 and a twelfth connecting section 152) of the first suction transporting pipe 43 and the second suction transporting pipe 44. The eleventh leakage preventing member 153 and the connecting member 170 are provided under an adsorbed state during the operation of the suction section 41 to prevent the leakage of the suction air. A detailed description on configurations similar to the first embodiment will be omitted.

[0074] As illustrated in FIG. 7A and FIG. 7B, the first suction transporting pipe 43 is provided with the eleventh connecting section 151. The eleventh connecting section 151 includes the eleventh leakage preventing member 153. The second suction transporting pipe 44 is provided with the twelfth connecting section 152 adapted to be under the connected state or the unconnected state with respect to the eleventh connecting section 151 of the first suction transporting pipe 43. The twelfth connecting section 152 is provided with the connecting member 170.

[0075] The eleventh leakage preventing member 153 and the connecting member 170 prevent the leakage of the suction air from between the first suction transporting pipe 43 and the second suction transporting pipe 44. Specifically, when the first suction transporting pipe 43 and the second suction transporting pipe 44 are under the connected state, the suction section 41 is operated, and the first suction transporting pipe 43 and the second suction transporting pipe 44 are internally negative-pressured. As a result, the eleventh leakage preventing member 153 adsorbs the connecting member 170 to be in a closely attached state, and prevents the leakage of the suction air. The eleventh leakage preventing member 153 and the connecting member 170 also prevent the leakage of the compressed air from between the first blowing pipe 63 and the second blowing pipe 64.

[0076] As illustrated in FIG. 8A and FIG. 8B, the eleventh leakage preventing member 153 includes a base section 160, an adsorbing section 161, a first supporting section 162, and a second supporting section 163. The eleventh leakage preventing member 153 is formed of a synthetic rubber material. The base section 160 is connected to the first suction transporting pipe 43 and the first blowing pipe 63. The adsorbing section 161 makes contact with and is adsorbed to the connecting member 170. The first supporting section 162 and the second supporting section 163 connect the base section 160 and the adsorbing section 161.

[0077] An opening 155 formed through the base section 160, the adsorbing section 161, and the first supporting section 162 is provided on a center axis of the eleventh leakage preventing member 153. The opening 155 is connected to the first suction transporting pipe 43 to pass through the suction air, the fiber dusts, and the like. Openings 157 are formed through the base section 160, the adsorbing section 161, and the second supporting section 163, and at both sides of the opening 155. Each of the openings 157 is connected to the first blowing pipe 63 to feed the compressed air. Specific configuration of the adsorbing section 161 will be described later.

[0078] As illustrated in FIG. 9A and FIG. 9B, the connecting member 170 includes a base section 171 and an adsorbing surface 172. The base section 171 is connected to the second suction transporting pipe 44 and the second blowing pipe 64. The adsorbing surface 172 is a flat portion adsorbed by the adsorbing section 161 of the eleventh leakage preventing member 153. An opening 156 formed through the base section 171 and the adsorbing surface 172 is provided on a center axis of the connecting member 170. The opening 156 is connected to the second suction transporting pipe 44 to pass through the suction air, the fiber dusts, and the like. Open-

ings 158 are formed through the base section 171 and the adsorbing surface 172, and at both sides of the opening 156. Each of the openings 158 is connected to the second blowing pipe 64 to feed the compressed air. The connecting member 170 is formed of synthetic resin material or metal material.

[0079] Next, a specific configuration of the adsorbing section 161 of the eleventh leakage preventing member 153 will be described. As illustrated in FIG. 8A and FIG. 8B, and FIG. 9A and FIG. 9B, a contour of the adsorbing section 161 is substantially equal to a contour of the adsorbing surface 172 of the connecting member 170. A first peripheral wall 164 is formed along an outer peripheral edge of the adsorbing section 161. The first peripheral wall 164 makes contact with the adsorbing surface 172 of the connecting member 170 with the eleventh leakage preventing member 153 connected to the connecting member 170 to ensure air tightness. The first peripheral wall 164 is formed to uniformly make contact with the adsorbing surface 172 of the connecting member 170. Second peripheral walls 165 are formed at a periphery of the openings 157. Under a state in which the eleventh leakage preventing member 153 is connected to the connecting member 170 to prevent leakage of the compressed air, the second peripheral walls 165 make contact with the periphery of the openings 158 formed in the adsorbing surface 172 of the connecting member 170. Each portion constituting the adsorbing section 161 is preferably formed to have flexibility such that a slight dimensional error with respect to the connecting member 170 is adsorbed and air tightness is ensured.

[0080] According to the above configuration, as illustrated in FIG. 7A and FIG. 10A, at the drafting position, since the cradle 31 is closed, the eleventh leakage preventing member 153 of the eleventh connecting section 151 makes contact with the connecting member 170 of the twelfth connecting section 152. As a result, as illustrated in FIG. 10B, an air chamber 166 is formed between the adsorbing section 161 and the adsorbing surface 172. The air chamber 166 is connected to the first suction transporting pipe 43 and the second suction transporting pipe 44. When the suction section 41 is operated, and the first suction transporting pipe 43 and the second suction transporting pipe 44 are internally negative-pressured, the air chamber 166 also becomes negative-pressured. Accordingly, the eleventh leakage preventing member 153 adsorbs the connecting member 170 to be connected in a closely attached state. Furthermore, as illustrated in FIG. 7B, at the non-drafting position, since the cradle 31 is opened, the eleventh leakage preventing member 153 of the eleventh connecting section 151 is separated from the connecting member 170 of the twelfth connecting section 152, and the first suction transporting pipe 43 and the second suction transporting pipe 44 are provided under the unconnected state.

[0081] The draft device D, and the spinning unit U and the spinning machine M including the same according to the present embodiment described above have the following effects.

[0082] The eleventh leakage preventing member 153 includes the adsorbing section 161 configuring the air chamber 166 while being connected to the connecting member 170. The air chamber 166 is connected to the first suction transporting pipe 43 and the second suction transporting pipe 44. Under a state in which the suction section 41 is operating at the drafting position, the first suction transporting pipe 43 and the second suction transporting pipe 44 are internally negative-pressured and the air chamber 166 also becomes negative-pressured such that the adsorbing section 161 is adsorbed to the connecting member 170. Thus, the leakage of the suction air from the connecting section of the first suction transporting pipe 43 and the second suction transporting pipe 44 can be reliably prevented.

[0083] The eleventh leakage preventing member 153 is formed of synthetic rubber material. Thus, the eleventh leakage preventing member 153 is less likely to be deformed and altered over a long period of time, and can reliably prevent the leakage of the suction air from the connecting section of the first suction transporting pipe 43 and the second suction transporting pipe 44.

[0084] The embodiments of the present invention have been described above, but the present invention is not limited to the above embodiments and various modifications can be made. For example, the spinning machine has been described in the present embodiment, but the present invention is not limited to a spinning machine and may be a ring spinning machine, a roving frame, a drawing frame, or the like as long as the draft device D is provided.

[0085] In the spinning unit U, the yarn slack eliminating device 13 pulls out the spun yarn Y from the spinning device 11. However, a delivery roller and a nip roller may be provided between the spinning device 11 and the yarn slack eliminating device 13, and the spun yarn Y may be pulled out from the spinning device 11 with such rollers.

[0086] In the second embodiment, the eleventh leakage preventing member 153 is provided on the eleventh connecting section 151 on the cradle 31 side, and the connecting member 170 is provided on the twelfth connecting section 152 on the device frame 32 side. However, the connecting member 170 may be provided on the eleventh connecting section 151 on the cradle 31 side, and the eleventh leakage preventing member 153 may be provided on the twelfth connecting section 152 on the device frame 32 side.

[0087] In the second embodiment, the adsorbing surface 172 of the connecting member 170 is a flat portion to be adsorbed by the adsorbing section 161 of the connecting member 170, but an entire surface of the adsorbing surface 172 may not be flat. For example, as illustrated in FIG. 11A and FIG. 11B, a third peripheral wall 174 and fourth peripheral walls 175 may be respectively formed at a portion to make contact with the first peripheral wall 164 and the second peripherals walls 165 of the adsorbing section 161, and other portions may be re-

cessed portions. A width of the third peripheral wall 174 and the fourth peripheral walls 175 is preferably slightly wider than a width of the first peripheral wall 164 and the second peripheral walls 165. In this case, the first peripheral wall 164 and the third peripheral wall 174, and the second peripheral walls 165 and the fourth peripheral walls 175 reliably make contact with one another, respectively.

Claims

1. A spinning unit comprising:

a draft device (D),
a spinning device (11) adapted to spin the fiber bundle (F) drafted by the draft device (D) using whirling airflow, and
a winding device (21) adapted to wind a spun yarn (Y) spun by the spinning device (11) into a package (P);
the spinning unit further comprising a blowing section (61) adapted to remove fiber dusts accumulated on the spinning device (11) by compressed air,
wherein the blowing section (61) includes:

a blowing opening (62) adapted to blow the compressed air against the spinning device (11),
a first blowing pipe (63) adapted to transport the compressed air to the blowing opening (62), and
a second blowing pipe (64) provided independently from the first blowing pipe (63), and adapted to be under a connected state with the first blowing pipe (63) at a drafting position, and an unconnected state by being separated from the first blowing pipe (63) at a non-drafting position;
the draft device (D) comprising:

a plurality of roller pairs (R) adapted to draft a fiber bundle (F), each roller pair (R) including a top roller (RB1, RT1, RM1, RF1) and a bottom roller (RB2, RT2, RM2, RF2),
a switching section adapted to switch the top roller (RB1, RT1, RM1, RF1) and the bottom roller (RB2, RT2, RM2, RF2) between the drafting position and the non-drafting position, and
a suction section (41) adapted to suck fiber dusts,
wherein the switching section includes:

a cradle (31) adapted to rotatably support a plurality of the top rollers (RB1, RT1, RM1, RF1), and
a swing shaft (33) arranged upstream in a drafting direction of the fiber bundle (F) and adapted to swing the cradle (31) to the drafting position and the non-drafting position,
wherein the suction section (41) includes:

a suction opening (42) adapted to suck the fiber dusts in proximity of at least one of the top rollers (RB1, RT1, RM1, RF1) ,
a first suction transporting pipe (43) supported by the cradle (31) and adapted to transport the fiber dusts sucked through the suction opening (42), and
a second suction transporting pipe (44) provided independently from the first suction transporting pipe (43) and adapted to be under a connected state by making contact with the first suction transporting pipe (44) at the drafting position, and an unconnected state by being separated from the first suction transporting pipe (43) at the non-drafting position, and
wherein the first suction transporting pipe (43) and the second suction transporting pipe (44) are connected at downstream of the most-downstream roller pair (RF) in the drafting direction of the fiber bundle (F); the draft device further comprising a leakage preventing member (53, 54; 153) adapted to prevent leakage of suction air from between the first suction transporting pipe (43) and the second suction transporting pipe (44) when the first suction transporting pipe (43) and the second suction transporting pipe (44) are under the connected state;
wherein
the leakage preventing member (53, 54; 153) is provided with an opening (55, 56; 155) to connect the first suction transporting pipe (43) to the

second suction pipe (44) at the drafting position to pass the suction air and an opening (57, 58; 157) to connect the first blowing pipe (63) to the second blowing pipe (64) at the drafting position to pass the compressed air.

2. The spinning unit according to claim 1, wherein the leakage preventing member (53, 54) is formed of synthetic rubber material.

3. The spinning unit according to claim 1 or claim 2, wherein the leakage preventing member (53, 54) is provided on one of the first suction transporting pipe (43) and the second suction transporting pipe (44), a connecting member (170) is provided on another one of the first suction transporting pipe (43) and the second suction transporting pipe (44), and is adapted to make contact with the leakage preventing member (53, 54) when the first suction transporting pipe (43) and the second suction transporting pipe (44) are under the connected stated, and
when the first suction transporting pipe (43) and the second suction transporting pipe (44) are under the connected state, and the first suction transporting pipe (43) and the second suction transporting pipe (44) are internally negative-pressured, the leakage preventing member (53, 54) adsorbs the connecting member (170) .

4. The spinning unit according to claim 3, wherein the leakage preventing member (53, 54) includes an adsorbing section (161) adapted to form an air chamber (166) by being connected to the connecting member (170), and
the adsorbing section (161) is adsorbed to the connecting member (170) by the air chamber (166) being connected to the first suction transporting pipe (43) and the second suction transporting pipe (44), and by the first suction transporting pipe (43) and the second suction transporting pipe (44) being internally negative-pressured.

5. The spinning unit according to any one of claim 1 through claim 4, further comprising a device frame (32) adapted to support the bottom roller (RB2, RT2, RM2, RF2) and the swing shaft (33),
wherein the second suction transporting pipe (44) is provided on the device frame (32).

6. The spinning unit according to any one of claims 1 to 5, wherein the leakage preventing member (53, 54; 153) has two openings (57, 58; 157) for the compressed air and said openings (57, 58; 157) are formed at both sides of the opening (55, 56; 155) connected to the suction transporting pipe (43; 44) to pass the suction air.

7. The spinning unit according to any one of claims 1 to 6, wherein the draft device comprises a first leakage preventing member (53) and a second leakage preventing member (54) having compressibility such that the first leakage preventing member (53) and the second leakage preventing member (54) are slightly compressed when brought in contact with one another.

8. A spinning machine comprising a plurality of spinning units (U) according to any one of claims 1 to 7.

Patentansprüche

1. Spinneinheit, umfassend:

ein Streckwerk (D),
eine Spinnvorrichtung (11), die ausgebildet ist, ein Faserbündel (F), das durch das Streckwerk (D) verstreckt wurde, unter Verwendung eines wirbelnden Luftstroms zu spinnen, und
eine Wickelvorrichtung (21), die ausgebildet ist, ein gesponnenes Garn (Y), das durch die Spinnvorrichtung (11) gesponnen wurde, in ein Packet (P) zu wickeln;
wobei die Spinneinheit weiter einen Gebläseabschnitt (61) umfasst, der ausgebildet ist, Faserstaub, der sich auf der Spinnvorrichtung (11) angesammelt hat, durch Druckluft zu entfernen,
wobei der Gebläseabschnitt (61) beinhaltet:

eine Gebläseöffnung (62), die ausgebildet ist, die Druckluft gegen die Spinnvorrichtung (11) zu blasen,
ein erstes Gebläserohr (63), das ausgebildet ist, die Druckluft zur Gebläseöffnung (62) zu transportieren, und
ein zweites Gebläserohr (64), das unabhängig vom ersten Gebläserohr (63) vorgesehen ist und ausgebildet ist, an einer Streckposition in einem mit dem ersten Gebläserohr (63) verbundenen Zustand zu sein und an einer Nicht-Streckposition in einem nicht verbundenen Zustand zu sein, indem es von dem ersten Gebläserohr (63) getrennt wird;
wobei das Streckwerk (D) umfasst:

eine Vielzahl von Walzenpaaren (R), die ausgebildet sind, ein Faserbündel (F) zu verstrecken, wobei jedes Walzenpaar (R) eine obere Walze (RB1, RT1, RM1, RF1) und eine untere Walze (RB2, RT2, RM2, RF2) beinhaltet,
einen Schaltabschnitt, der ausgebildet

ist, die obere Walze (RB1, RT1, RM1, RF1) und die untere Walze (RB2, RT2, RM2, RF2) zwischen der Streckposition und der Nicht-Streckposition umzuschalten, und
einen Saugabschnitt (41), der ausgebildet ist, Faserstaub zu saugen,
wobei der Schaltabschnitt beinhaltet:

einen Schlitten (31), der ausgebildet ist, eine Vielzahl von oberen Walzen (RB1, RT1, RM1, RF1) drehend zu tragen, und
eine Schwenkachse (33), die stromaufwärts in einer Streckrichtung des Faserbündels (F) angeordnet und ausgebildet ist, den Schlitten (31) zu der Streckposition und der Nicht-Streckposition zu schwenken,
wobei der Saugabschnitt (41) beinhaltet:

eine Saugöffnung (42), die ausgebildet ist, den Faserstaub in einer Nähe von zumindest einer der oberen Walzen (RB1, RT1, RM1, RF1) anzusaugen,
ein erstes Saugtransportrohr (43), das durch den Schlitten (31) getragen wird und ausgebildet ist, den Faserstaub zu transportieren, der durch die Saugöffnung (42) angesaugt wird, und
ein zweites Saugtransportrohr (44), das unabhängig vom ersten Saugtransportrohr (43) vorgesehen ist und ausgebildet ist, an der Streckposition in einem verbundenen Zustand zu sein, indem es mit dem ersten Saugtransportrohr (44) in Kontakt gelangt, und an der Nicht-Streckposition in einem unverbundenen Zustand zu sein, indem es vom ersten Saugtransportrohr (43) getrennt ist, und
wobei das erste Saugtransportrohr (43) und das zweite Saugtransportrohr (44) stromabwärts des am weitesten stromabwärts liegenden Walzenpaares (RF) in der Streckrichtung des Faserbündels (F) verbunden sind; das Streckwerk weiter umfassend ein Ausströmungsverhinderungselement (53, 54; 153), das ausgebildet ist, ein Ausströmen von Saugluft zwischen dem ersten Saugtransportrohr (43) und dem zweiten Saugtransportrohr (44) zu verhindern, wenn das erste Saugtransportrohr (43) und das zweite Saugtransportrohr (44) im verbundenen Zustand sind;
wobei das Ausströmungsverhinderungselement (53, 54; 153) mit einer Öffnung (55, 56; 155) zum Verbinden des ersten Saugtransportrohrs (43) mit dem zweiten Saugtransportrohr (44) an der Streckposition versehen ist, um die Saugluft durchzuleiten, und einer Öffnung (57, 58; 157), um das erste Gebläserohr (63) mit dem zweiten Gebläserohr (64) an der Streckposition zu verbinden, um die Druckluft durchzuleiten.

2. Spinneinheit nach Anspruch 1, wobei das Ausströmungsverhinderungselement (53, 54) aus synthetischem Kautschukmaterial gebildet ist.

3. Spinneinheit nach Anspruch 1 oder Anspruch 2, wobei das Ausströmungsverhinderungselement (53, 54) an einem von dem ersten Saugtransportrohr (43) und dem zweiten Saugtransportrohr (44) vorgesehen ist,
ein Verbindungselement (170) an dem anderen von dem ersten Saugtransportrohr (43) und dem zweiten Saugtransportrohr (44) vorgesehen ist und ausgebildet ist, mit dem Ausströmungsverhinderungselement (53, 54) in Kontakt zu gelangen, wenn das erste Saugtransportrohr (43) und das zweite Saugtransportrohr (44) im verbundenen Zustand sind, und
wenn das erste Saugtransportrohr (43) und das zweite Saugtransportrohr (44) im verbundenen Zustand sind und das erste Saugtransportrohr (43) und das zweite Saugtransportrohr (44) im Inneren unter Unterdruck stehen, das Ausströmungsverhinderungselement (53, 54) das Verbindungselement (170) adsorbiert.

4. Spinneinheit nach Anspruch 3, wobei das Ausströmungsverhinderungselement (53, 54) einen Adsorptionsabschnitt (161) beinhaltet, der ausgebildet ist, eine Luftkammer (166) zu bilden, indem er mit dem Verbindungselement (170) verbunden wird, und

der Adsorptionsabschnitt (161) an dem Verbindungselement (170) adsorbiert wird, indem die Luftkammer (166) mit dem ersten Saugtransportrohr (43) und dem zweiten Saugtransportrohr (44) verbunden wird, und indem das erste Saugtransportrohr (43) und das zweite Saugtransportrohr (44) im Inneren unter Unterdruck gesetzt werden.

5. Spinneinheit nach einem der Ansprüche 1 bis 4, weiter umfassend ein Vorrichtungsgestell (32), das ausgebildet ist, die untere Walze (RB2, RT2, RM2, RF2) und die Schwenkachse (33) zu tragen,
wobei das zweite Saugtransportrohr (44) an dem Vorrichtungsgestell (32) vorgesehen ist.

6. Spinneinheit nach einem der Ansprüche 1 bis 5, wobei das Ausströmungsverhinderungselement (53, 54; 153) zwei Öffnungen (57, 58; 157) für die Druckluft aufweist und die Öffnungen (57, 58; 157) an beiden Seiten der Öffnung (55, 56; 155) verbunden mit dem Saugtransportrohr (43, 44) gebildet sind, um die Saugluft durchzuleiten.

7. Spinneinheit nach einem der Ansprüche 1 bis 6, wobei das Streckwerk ein erstes Ausströmungsverhinderungselement (53) und ein zweites Ausströmungsverhinderungselement (54) umfasst, die Komprimierbarkeit aufweisen, sodass das erste Ausströmungsverhinderungselement (53) und das zweite Ausströmungsverhinderungselement (54) leicht zusammengepresst werden, wenn sie miteinander in Kontakt gebracht werden.

8. Spinnmaschine, umfassend eine Vielzahl von Spinneinheiten (U) nach einem der Ansprüche 1 bis 7.

Revendications

1. Unité de filage comprenant :

un dispositif de tirage (D),
un dispositif de filage (11) qui est à même de filer le faisceau de fibres (F) étiré par le dispositif de tirage (D) en utilisant un écoulement d'air tourbillonnant et
un dispositif d'enroulement (21) qui est à même d'enrouler un fil filé (Y) filé par le dispositif de filage (11) en un paquet (P) ;
l'unité de filage comprenant en outre une section de soufflage (61) qui est à même d'éliminer des poussières de fibres accumulées sur le dispositif de filage (11) par de l'air comprimé,
dans laquelle la section de soufflage (61) inclut :

une ouverture de soufflage (62) qui est à même de souffler l'air comprimé contre le dispositif de filage (11),
un premier tuyau de soufflage (63) qui est à même de transporter l'air comprimé à l'ouverture de soufflage (62) et
un second tuyau de soufflage (64) fourni indépendamment du premier tuyau de soufflage (63) et qui est à même de se trouver dans un état raccordé avec le premier tuyau de soufflage (63) en position de tirage et dans un état non raccordé en étant séparé du premier tuyau de soufflage (63) en position de non-tirage ;
le dispositif de tirage (D) comprenant :

une pluralité de paires de rouleaux (R) qui est à même d'étirer un faisceau de fibres (F), chaque paire de rouleaux (R) incluant un rouleau supérieur (RB1, RT1, RM1, RF1) et un rouleau inférieur (RB2, RT2, RM2, RF2),
une section de commutation qui est à même de commuter le rouleau supérieur (RB1, RT1, RM1, RF1) et le rouleau inférieur (RB2, RT2, RM2, RF2) entre la position de tirage et la position de non-tirage et
une section d'aspiration (41) qui est à même d'aspirer des poussières de fibres,
dans laquelle la section de commutation inclut :

un berceau (31) qui est à même de supporter à rotation une pluralité des rouleaux supérieurs (RB1, RT1, RM1, RF1) et
un arbre oscillant (33) agencé en amont dans une direction de tirage du faisceau de fibres (F) et qui est à même de faire osciller le berceau (31) en position de tirage et en position de non-tirage,
dans laquelle la section d'aspiration (41) inclut :

une ouverture d'aspiration (42) qui est à même d'aspirer les poussières de fibres à proximité d'au moins l'un des rouleaux supérieurs (RB1, RT1, RM1, RF1),
un premier tuyau de transport d'aspiration (43) supporté par le berceau (31) et qui est à même de transporter les poussières de fibres aspirées à travers l'ouverture d'aspiration (42) et
un second tuyau de transport d'aspiration (44) fourni indé-

pendamment du premier tuyau de transport d'aspiration (43) et qui est à même de se trouver dans un état raccordé en venant en contact avec le premier tuyau de transport d'aspiration (44) en position de tirage et dans un état non raccordé par séparation d'avec le premier tuyau de transport d'aspiration (43) en position de non-tirage, et
dans laquelle le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) sont raccordés en aval de la paire de rouleaux la plus en aval (RF) dans la direction de tirage du faisceau de fibres (F); le dispositif de tirage comprenant en outre un élément de prévention de fuite (53, 54; 153) qui est à même d'empêcher la fuite d'air d'aspiration d'entre le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) lorsque le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) sont à l'état raccordé ;
dans laquelle :
l'élément de prévention de fuite (53, 54; 153) est pourvu d'une ouverture (55, 56 ; 155) pour raccorder le premier tuyau de transport d'aspiration (43) au second tuyau de transport d'aspiration (44) en position de tirage afin de laisser passer l'air d'aspiration et d'une ouverture (57, 58 ; 157) pour raccorder le premier tuyau de soufflage (63) au second tuyau de soufflage (64) en position de tirage pour laisser passer l'air comprimé.

2. Unité de filage selon la revendication 1, dans laquelle l'élément de prévention de fuite (53, 54) est formé d'un matériau de type caoutchouc synthétique.

3. Unité de filage selon la revendication 1 ou la revendication 2, dans laquelle l'élément de prévention de fuite (53, 54) est disposé sur l'un du premier tuyau de transport d'aspiration (43) et du second tuyau de transport d'aspiration (44),
un élément de raccordement (170) est disposé sur un autre du premier tuyau de transport d'aspiration (43) et du second tuyau de transport d'aspiration (44) et est à même d'établir un contact avec l'élément de prévention de fuite (53, 54) lorsque le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) sont à l'état raccordé et,
lorsque le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) se trouvent à l'état raccordé et que le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) sont sous pression interne négative, l'élément de prévention de fuite (53, 54) adsorbe l'élément de raccordement (170).

4. Unité de filage selon la revendication 3, dans laquelle l'élément de prévention de fuite (53, 54) inclut une section d'adsorption (161) qui est à même de former une chambre à air (166) par raccordement avec l'élément de raccordement (170) et
la section d'adsorption (161) est adsorbée dans l'élément de raccordement (170) par la chambre à air (166) qui est raccordée au premier tuyau de transport d'aspiration (43) et au second tuyau de transport d'aspiration (44) et par le fait que le premier tuyau de transport d'aspiration (43) et le second tuyau de transport d'aspiration (44) sont sous pression interne négative.

5. Unité de filage selon l'une quelconque de la revendication 1 à la revendication 4, comprenant en outre un châssis de dispositif (32) qui est à même de supporter le rouleau inférieur (RB2, RT2, RM2, RF2) et l'arbre oscillant (33),
dans laquelle le second tuyau de transport d'aspiration (44) est disposé sur le châssis de dispositif (32).

6. Unité de filage selon l'une quelconque de la revendication 1 à la revendication 5, dans laquelle l'élément de prévention de fuite (53, 54; 153) a deux ouvertures (57, 58 ; 157) pour l'air comprimé et lesdites ouvertures (57, 58 ; 157) sont formées sur les deux côtés de l'ouverture (55, 56 ; 155) raccordés au tuyau de transport d'aspiration (43 ; 44) pour laisser passer l'air d'aspiration.

7. Unité de filage selon l'une quelconque des revendications 1 à 6, dans laquelle le dispositif de tirage comprend un premier élément de prévention de fuite (53) et un second élément de prévention de fuite (54) ayant une compressibilité telle que le premier élément de prévention de fuite (53) et le second élément de prévention de fuite (54) soient légèrement comprimés lorsqu'ils sont amenés en contact l'un avec l'autre.

8. Fileuse comprenant une pluralité d'unités de filage

(U) selon l'une quelconque des revendications 1 à 7.

FIG. 1

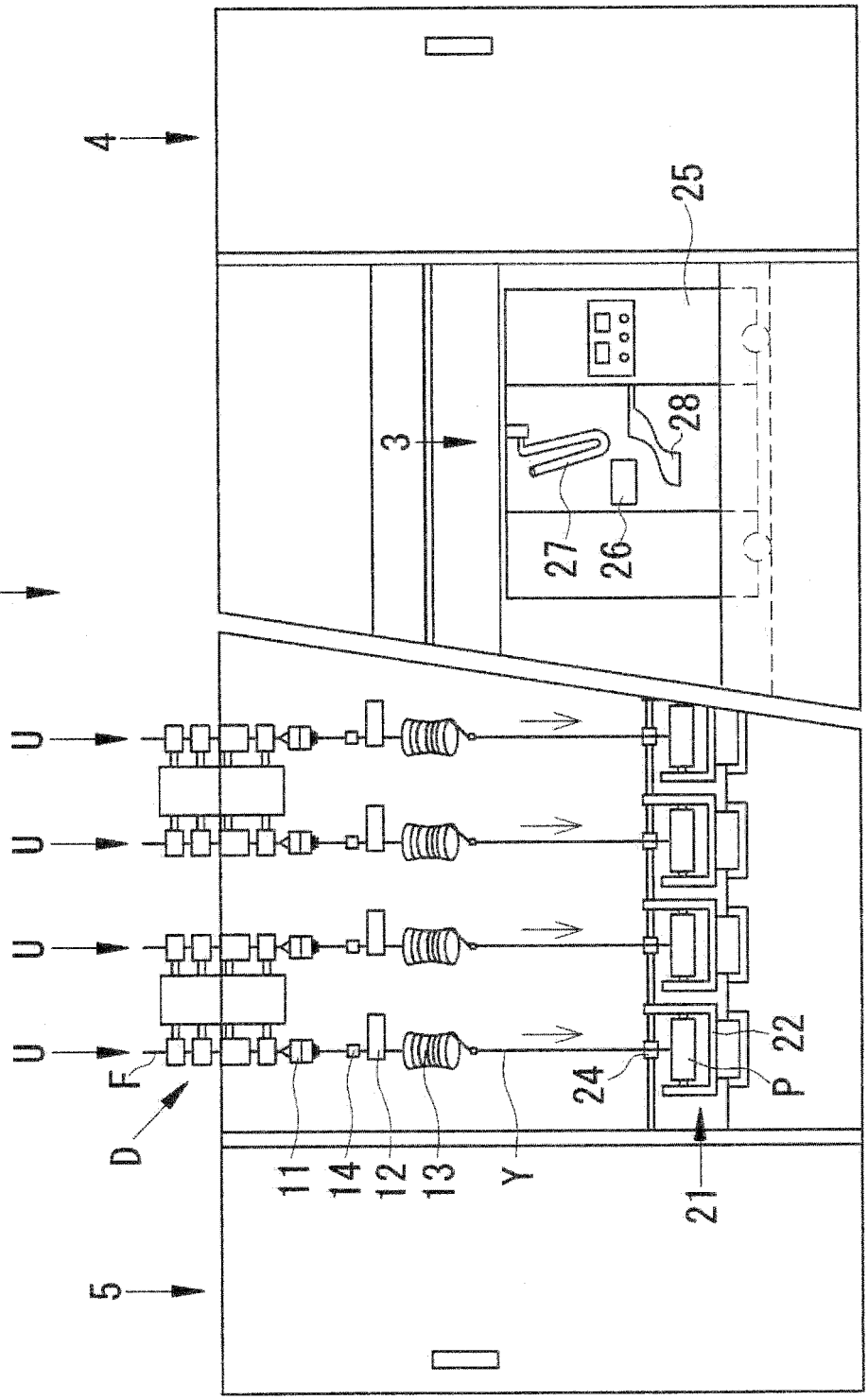


FIG. 2

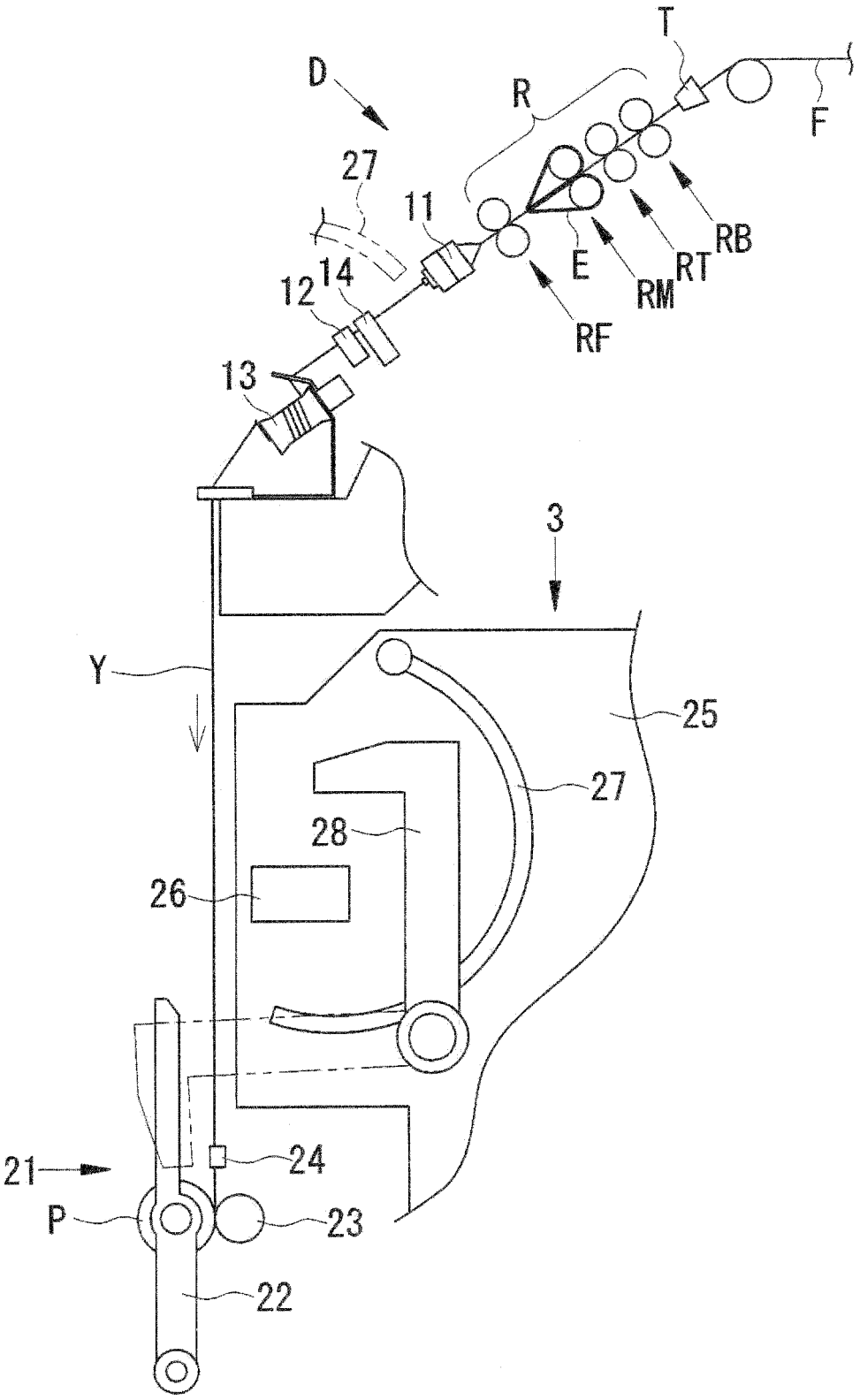


FIG. 3

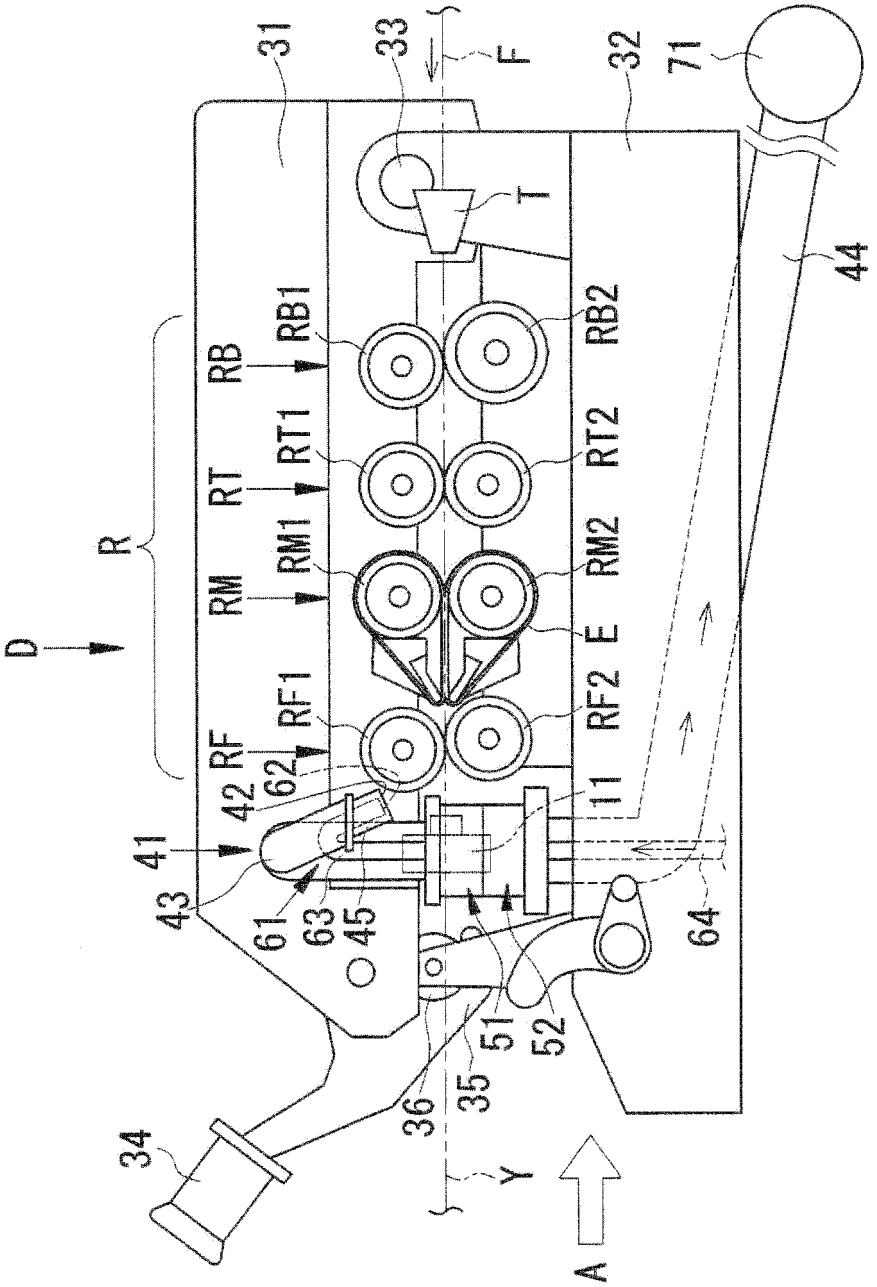

31
33
F
32
71
T
44
RB1
RB
RB2
RT1
RT
RT2
RM1
RM
RM2
R
D
E
RF1
RF
RF2
62
42
11
41
43
61
63
45
64
51
52
36
35
34
Y
A

FIG. 4

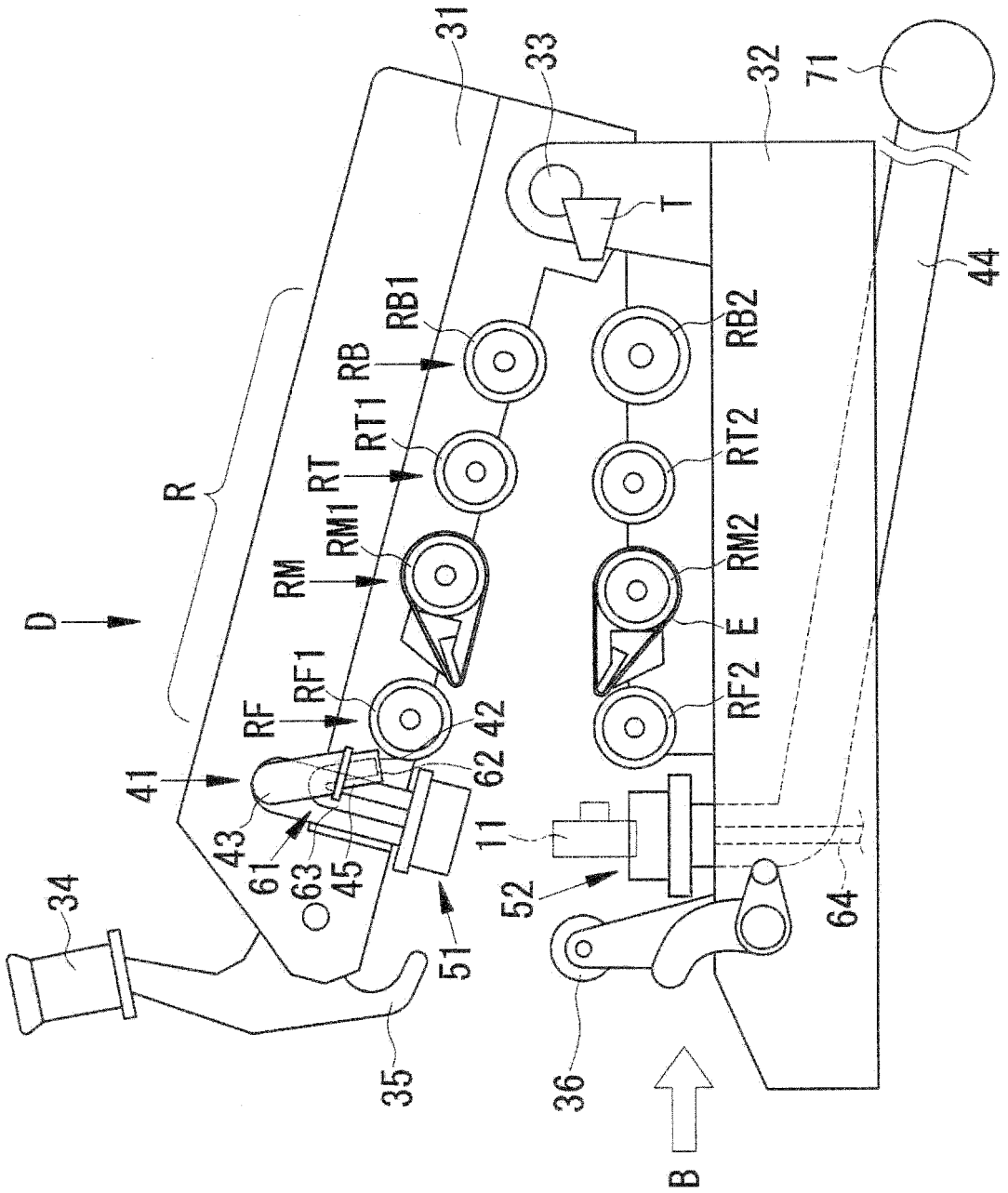

31
33
32
71
44
T
RB1
RB
RT1
RT
RM1
RM
RF1
RF
R
D
41
43
61
63
45
62
42
11
52
51
34
35
36
B
RB2
RT2
RM2
E
RF2
64

FIG. 5A

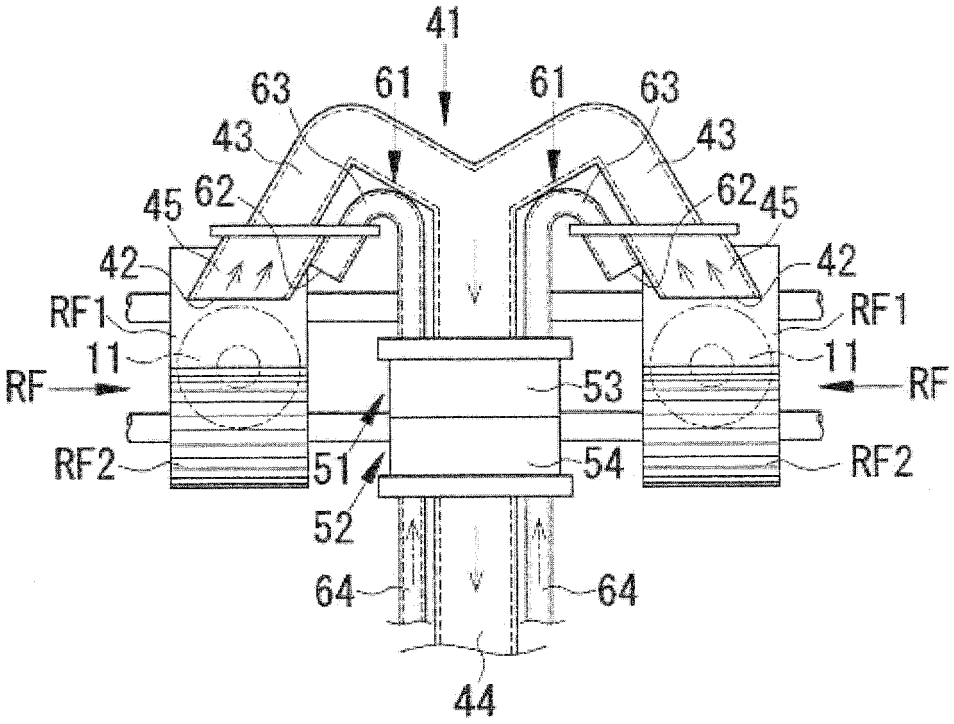

41
63
61
61
63
43
43
45
62
62
45
42
42
RF1
RF1
11
11
RF
RF
53
51
54
RF2
RF2
52
64
64
44

FIG. 5B

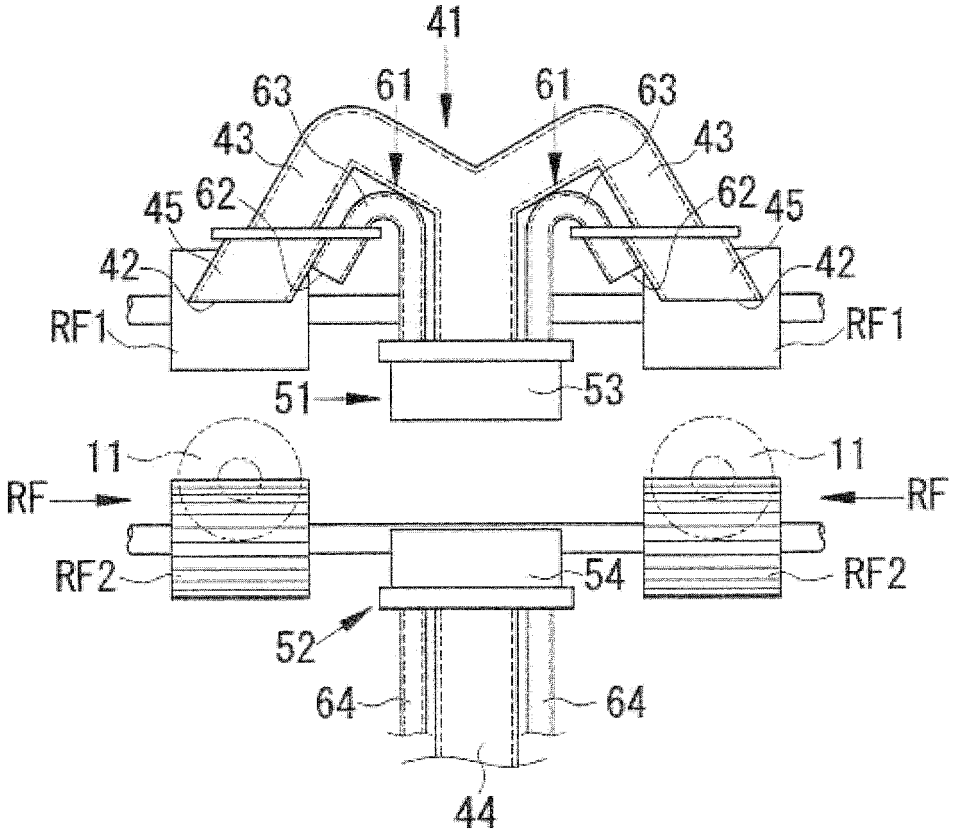

41
63
61
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63
43
43
45
62
62
45
42
42
RF1
RF1
51
53
11
11
RF
RF
54
RF2
RF2
52
64
64
44

FIG. 6A

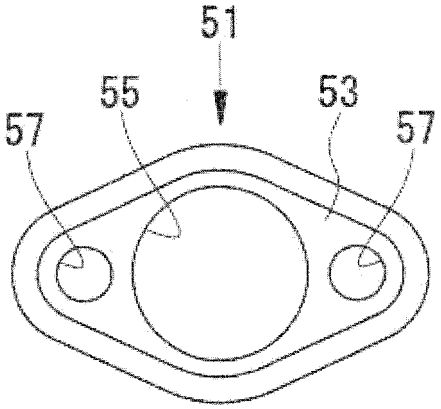


FIG. 6B

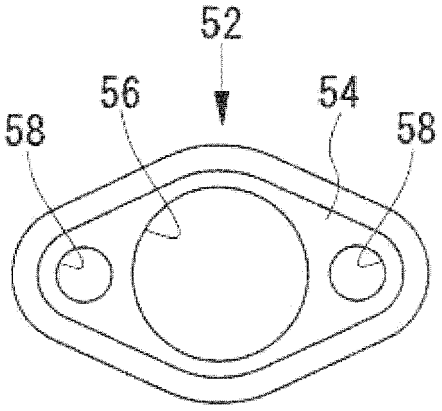


FIG. 7A

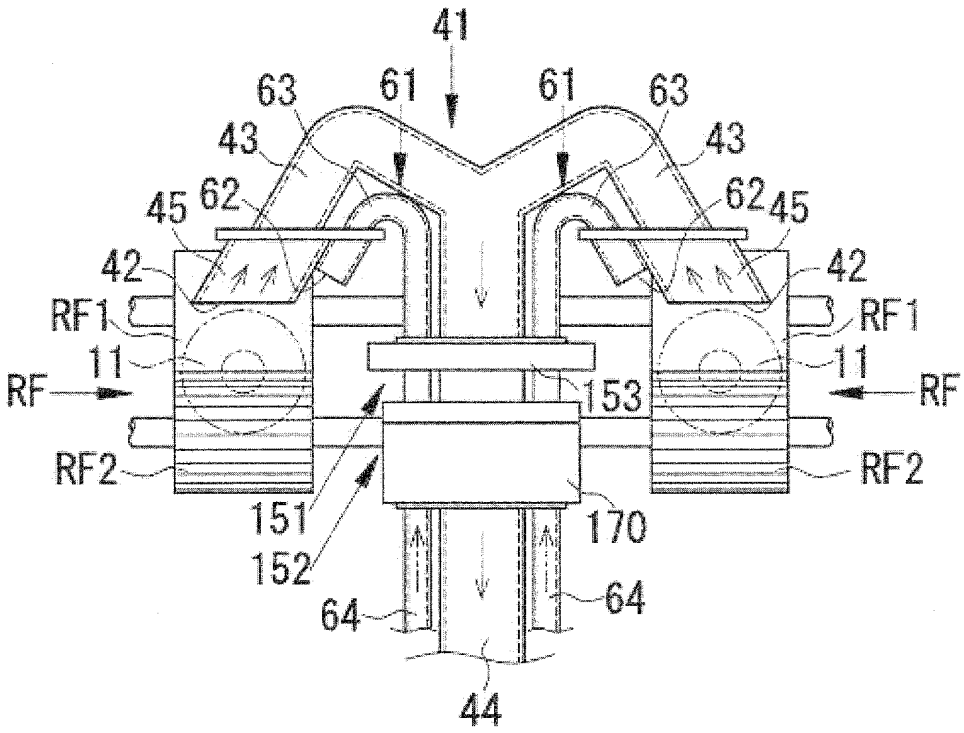

41
63
61
61
63
43
43
45
62
62
45
42
42
RF1
RF1
11
11
RF
RF
153
RF2
RF2
151
170
152
64
64
44

FIG. 7B

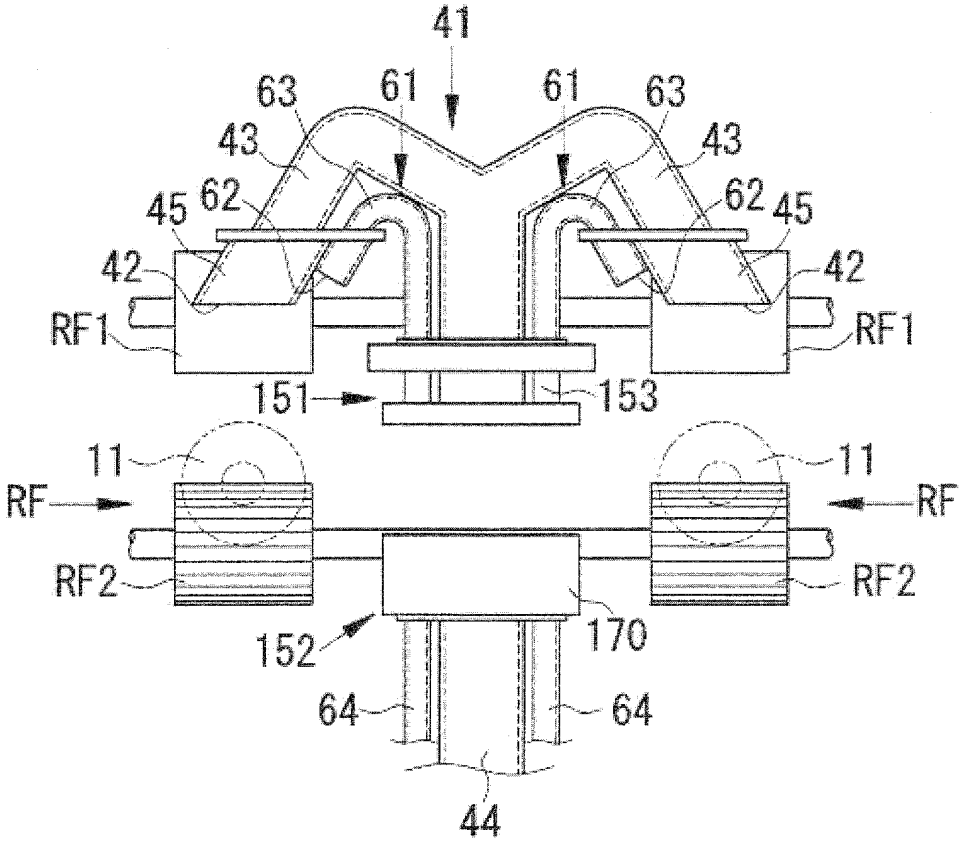

41
63
61
61
63
43
43
45
62
62
45
42
42
RF1
RF1
151
153
11
11
RF
RF
RF2
RF2
152
170
64
64
44

FIG. 8A

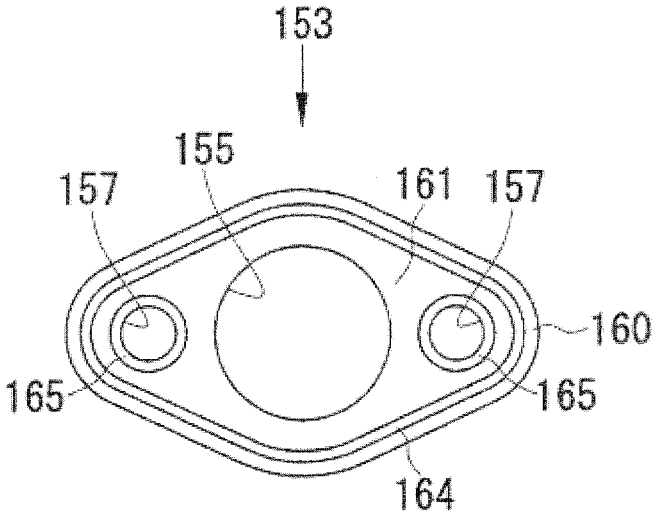

153
155
157
161
157
160
165
165
164

FIG. 8B

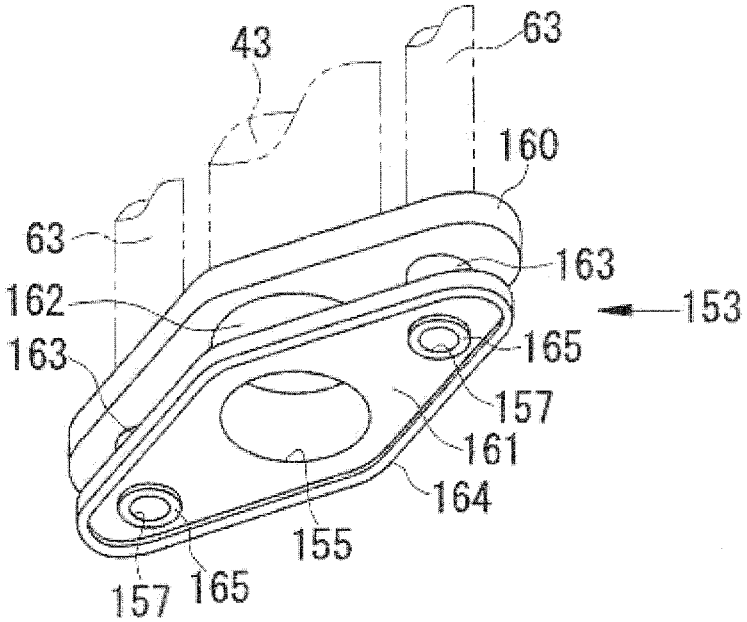

43
63
160
63
163
162
153
163
165
157
161
164
155
157
165

FIG. 9A

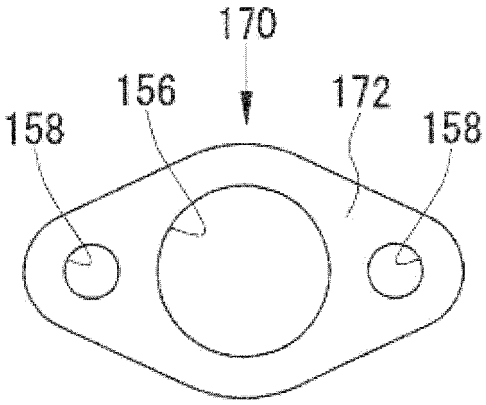


FIG. 9B

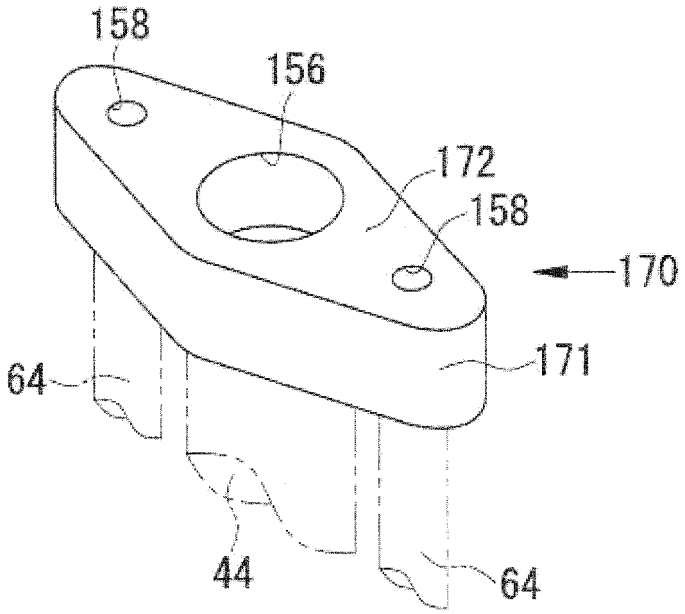


FIG. 10A

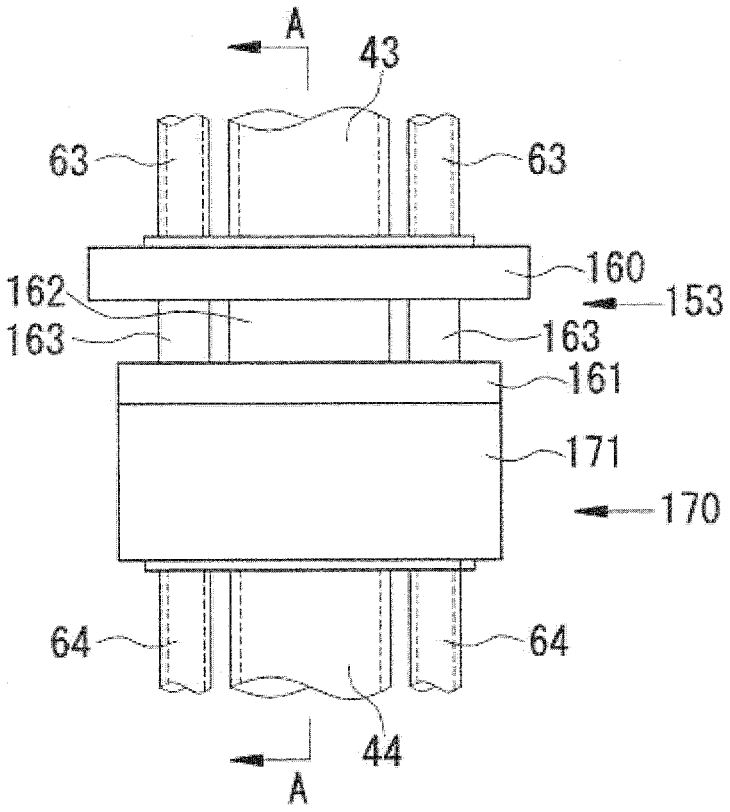


FIG. 10B

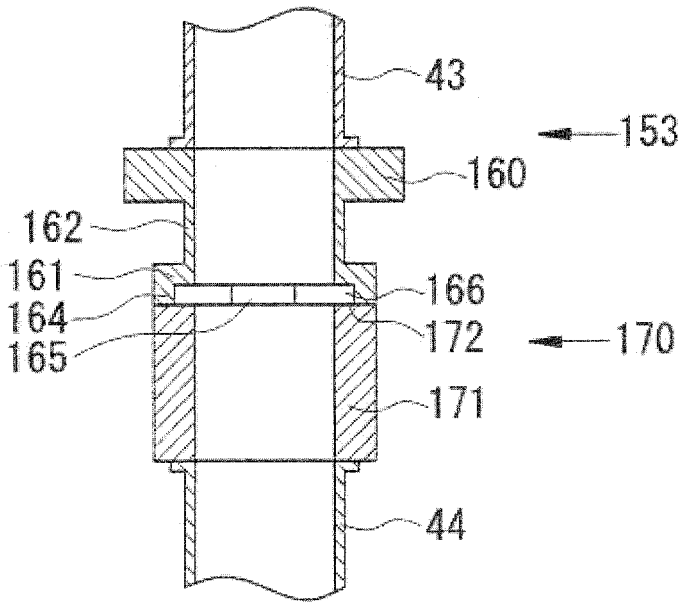


FIG. 11A

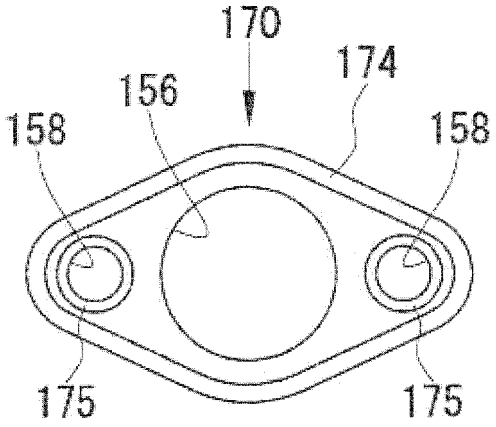
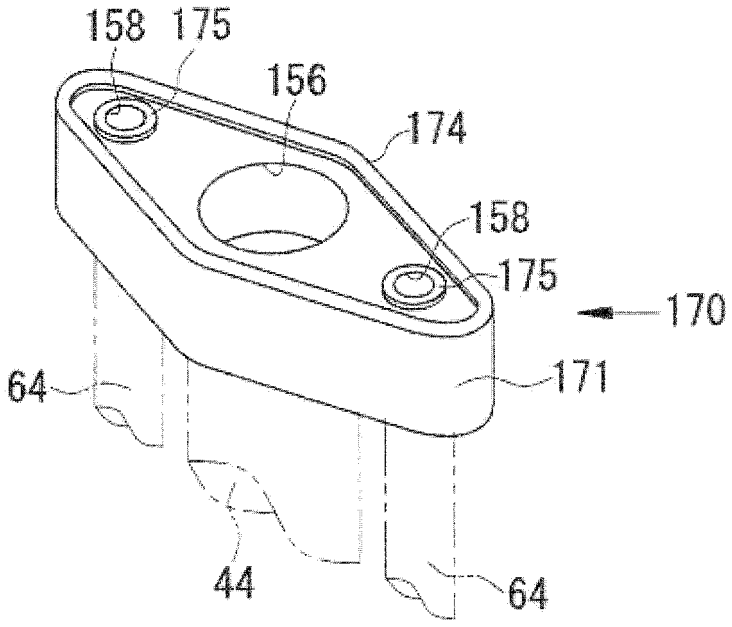


FIG. 11B



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