



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.06.2012 Bulletin 2012/24

(51) Int Cl.:
D01H 5/52 (2006.01)

(21) Application number: **11192924.6**

(22) Date of filing: **12.12.2011**

(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

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(30) Priority: **13.12.2010 JP 2010276907**

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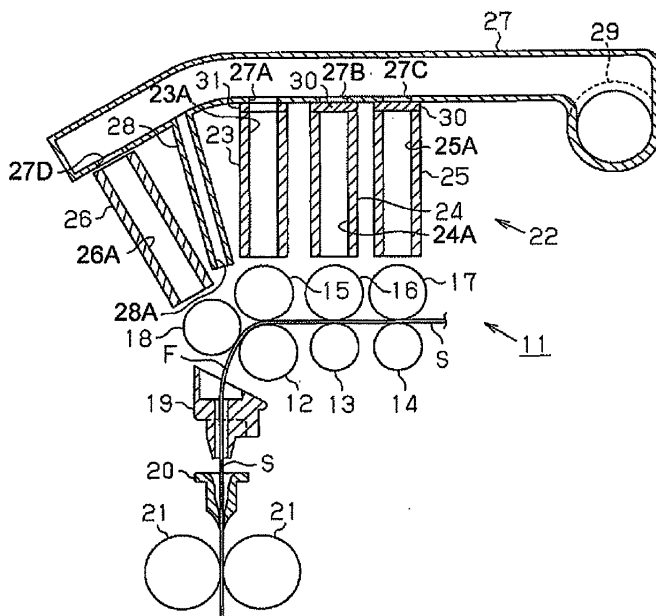
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(54) **Drafting device in fore-spinning process**

(57) The drafting device in a fore-spinning process is characterized in that a drafting part clearer includes a plurality of support arms, a plurality of pairs of pressure devices and a suction duct. The support arms support a plurality of top rollers, respectively. Each support arm has an arm body through which a suction hole extends vertically at a position corresponding to the top roller. Each pair of pressure devices is mounted to the corre-

sponding support arm on opposite sides of the support hole of the support arm. The suction duct has a plurality of suction ports. With the support arms set in operative position, the suction duct is movable between operative position in which the suction ports are located in facing relation to the corresponding support holes so that suction is created in the support holes and retracted position in which pivotal movement of the support arm is allowed.

FIG. 1



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a drafting device in a fore-spinning process and, more particularly, to a drafting device in a fore-spinning process having a drafting part clearer for the top rollers of the drafting device.

[0002] In a drafting device used in a fore-spinning process wherein a plurality of slivers are drafted and combined into a single sliver, such as the process performed by a drawing frame or a comber, a sheet-metal frame construction is used as support arm for supporting four top rollers, namely turning roller, front roller, middle roller and back roller.

[0003] Floating fiber or cotton dust which is not held between paired draft rollers of the drafting device is likely to be attached to and entangled around the draft rollers of the drafting device. Consequently, drafted sliver may vary in weight or sliver may not be drafted. Fig. 8 shows a clearer for clearing the top rollers of a 5-over-4 roller drafting device used in a drawing frame (see Japanese Utility Model Application Publication No. 7-33981).

[0004] The clearer includes an Ermen's clearer E and three wiper bars 75. The Ermen's clearer E has an endless clearer cloth 73 movable in contact with the front top roller 71 and the turning top roller 72 of the drafting device D. The wiper bars 75 are disposed at positions that are upstream of the front top roller 71 as seen in the moving direction of the sliver S, in contact with the respective top rollers 74 for clearing the top rollers 74. A suction head 76 is disposed above the drafting device D and has a suction port 78 through which cotton dust or floating fiber cleared from the clearer cloth 73 by the comb 77 is drawn, and a plurality of ducts (suction pipes) 79 each having a suction port 79A through which cotton dust or floating fiber cleared by the wiper bar 75 is drawn.

[0005] Meanwhile, pressing arms of portal type are proposed as the support arm for supporting the top rollers of a drafting device with the top rollers pressed against bottom rollers of the drafting device (see Japanese Patent Application Publication No. 2004-60141). The pressing arms support the top rollers, respectively, and each pressing arm is pivotable in a plane perpendicular to the sliver moving direction. As shown in Fig. 9, each of the portal pressing arms 80 (only one being shown) includes pneumatic cylinders 81A, 81B, a common support element 82, and cover elements 83A, 83B. The pressing arms 80 are pivotable around a pivot bearing 85 with the top rollers 84 upward, as shown in Fig. 9. Bearings 86A, 86B receive the top roller 84 and are pressed by rams (piston rods) 87A, 87B of the pneumatic cylinders 81A, 81 B, respectively.

[0006] The above-described clearer of the Japanese Utility Model Application Publication No. 7-33981 which includes the Ermen's clearer E clearing cotton dust from the front top roller 71, the wiper bars 75 clearing cotton

dust from the top rollers 74, and a suction head 76 clearing the cotton dust or floating fiber by suction is complicated and the device is increased in size, accordingly.

[0007] Since the drafting device has three, four or five pairs of draft rollers, it is necessary in a support arm having a sheet-metal frame construction supporting all the top rollers to prepare support arms of different structure for different number of pairs of draft rollers. In the Japanese Patent Application Publication No. 2004-60141 wherein the pressing arms 80 have substantially the same structure, if the number of pairs of draft rollers of the drafting device is changed, however, it is only necessary to prepare the same number of pressing arms 80 as the pairs of draft rollers.

[0008] However, the pressing arm 80 fails to consider clearing the top roller 84. If the pressing arm 80 is applied to a suction clearer wherein fiber is drawn by low suction or vacuum before being entangled around the top roller, it is necessary to insert into the space between the supporting elements 82 of the pressing arms 80 a relatively thick suction pipe communicating with the suction duct located above the pressing arm 80 thereby to bring the distal end of the suction pipe close to the top roller. However, the distance between the support elements 82 of any two adjacent pressing arms 80 cannot exceed the distance determined by minimum roller gauge, so that it is difficult to use a suction pipe having a large thickness. In addition, a mechanism for moving a plurality of suction pipes inserted between the pressing arms 80 to their retracted position simultaneously is complicated. Further, if the suction pipe is disposed below the pressing arms 80, the pneumatic cylinders 81A, 81 B need to be formed with an enlarged length, which is disadvantageous in the rigidity of the pressing arm 80.

[0009] The present invention which has been made in view of the above problems is directed to a drafting device in a fore-spinning process having a drafting part clearer, wherein a pair of pressure devices that are operable to press a top roller against its corresponding bottom roller is supported by a common support arm and clearing of the top roller is accomplished by a simple suction structure.

SUMMARY OF THE INVENTION

[0010] In accordance with an aspect of the present invention, the drafting device in a fore-spinning process having a drafting part clearer is characterized in that the drafting device includes a plurality of top rollers each having a top roller body and the drafting part clearer includes a plurality of support arms, a plurality of pairs of pressure devices and a suction duct. The support arms support the respective top rollers. Each support arm has an arm body through which a suction hole extends vertically at a position corresponding to the top roller body with the support arms set in operative position. Each pair of pressure devices is mounted to the corresponding support arm on opposite sides of the support hole of the support

arm. The suction duct has a plurality of suction ports. With the support arms set in the operative position, the suction duct is movable between operative position in which the suction ports are located in facing relation to the corresponding support holes so that suction is created in the support holes from above and retracted position in which pivotal movement of the support arm is allowed.

[0011] It is noted that the term "fore-spinning process" means a process performed by a machine such as drawing frame or comber in which a plurality of slivers is drafted by a drafting device and combined into a single sliver, or a process performed by a machine such as carding machine in which a wide fiber bundle (web) drafted by a drafting device is formed into a sliver.

[0012] It is noted that the term "operative position of the support arm" means the position of the support arm in which the top roller and its associated bottom roller cooperative to press therebetween a sliver or a fiber bundle.

[0013] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The invention together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1 is a schematic side view partly in section showing a drafting device according to an embodiment of the present invention;

Fig. 2 is a cross sectional view showing a support arm of the drafting device of Fig. 1;

Fig. 3 is a schematic perspective view showing the drafting device of Fig. 1 with the suction duct thereof set in its operative position;

Fig. 4 is a schematic perspective view showing the drafting device of Fig. 1 with the suction duct thereof set in its retracted position;

Fig. 5 is a front view illustrating the operation of the support arm of the drafting device of Fig. 1;

Fig. 6 is a fragmentary cross sectional view illustrating the operation of opening adjusting member of the drafting device of Fig. 1;

Fig. 7A is a cross sectional view showing a support arm of a drafting device according to a modification of the embodiment;

Fig. 7B is a partially-cutaway front view showing a support arm of a drafting device according to another modification of the embodiment;

Fig. 8 is a cross sectional view showing a clearer according to a background art; and

Fig. 9 is a front view showing a top roller support arm according to a background art.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0015] The following will describe the drafting device as used in a comber in a fore-spinning process according to an embodiment of the present invention with reference to Figs. 1 through 6. Referring to Fig. 1, the drafting device that is designated by reference numeral 11 includes a front bottom roller 12, a middle bottom roller 13 and a back bottom roller 14 for drafting a plurality of slivers S supplied from a plurality of combing heads of a comber (not shown). Each of the bottom rollers 12, 13 and 14 is supported by a roller stand (not shown). A front top roller 15, a middle top roller 16 and a back top roller 17 are located above the front bottom roller 12, the middle bottom roller 13 and the back bottom roller 14, respectively. A turning top roller 18 is located adjacent to the front bottom roller 12 for changing the direction of movement of the fleece F delivered from the front bottom roller 12 and the front top roller 15 downward. That is, the drafting device 11 is of a 4-over-3 roller type.

[0016] A gatherer 19 is located adjacent to the front bottom roller 12 and the turning top roller 18. A coiler mechanism has a coiler trumpet 20 disposed below the gatherer 19 and a pair of coiler calender rollers 21 disposed below the coiler trumpet 20. The coiler mechanism has a tube wheel (not shown) used to store in a sliver can the slivers S that are moved from the gatherer 19 downward and recompressed by the coiler calender roller 21.

[0017] A drafting part clearer 22 is located above the drafting device 11 for clearing the top rollers 15-18. As shown in Fig. 1, the drafting part clearer 22 has support arms 23, 24, 25, 26 which support the top rollers 15-18 and has axially therethrough suction holes 23A, 24A, 25A, 26A, respectively, and a suction duct 27 having suction ports 27A, 27B, 27C, 27D via which suction is created in the suction holes 23A, 24A, 25A, 26A from above, respectively, as will be understood from later description.

[0018] The suction duct 27 is swingable or movable between the operative position shown in Fig. 1 and the retracted position shown in Fig. 4. When the suction duct 27 is set in its operative position, the support arms 23-26 are set in their operative position and the suction ports 27A-27D are set in facing relation to the suction holes 23A-26A so that suction is created in the suction holes 23A-26A. When the suction duct 27 is set in its retracted position, the suction duct 27 allows the pivotal movement of the support arms 23-26. As shown in Fig. 1, a flat suc-

tion tube 28 extends from the lower surface of the suction duct 27 and has a suction port 28A. When the suction duct 27 is set in the operative position, the lower end of the suction port 28A is located adjacent to the front top roller 15 and the turning top roller 18.

[0019] As shown in Figs. 1, 3 and 4, the suction duct 27 has a cylindrical portion 29 extending parallel to the bottom rollers 12-14 of the drafting device 11 and is movable around the cylindrical portion 29. The cylindrical portion 29 is connected to suction source or vacuum source via a duct (not shown) so that suction is present in the suction duct 27.

[0020] The suction duct 27 has gum-magnet cover members 30 that are magnetically attached to the lower surface of the suction duct 27 at the positions corresponding to the suction ports 27B, 27C so as to cover the suction ports 27B, 27C, respectively, as shown in Fig. 1. Each gum-magnet cover member 30 serves as the opening adjusting member for adjusting the suction ports 27B, 27C, respectively. Moving the position of each cover member 30, the opening of the suction ports 27B, 27C is continuously adjustable between 0% and 100%. A gum-magnet annular member 31 is magnetically attached to the lower surface of the suction duct 27 at the position corresponding to the suction ports 27A so as to surround the suction port 27A. The gum-magnet annular member 31 has the same thickness as the cover member 30. The suction duct 27 is made at least at the part thereof to which the cover members 30 are attached, of material, such as steel.

[0021] The support arms 23-26 will now be described in more detail. Since the support arms 23-26 have substantially the same structure, the support arm 23 for the front top roller 15 will be described on behalf of the support arms 23-26. As shown in Fig. 2, the suction hole 23A extends vertically through an arm body 33 of the support arm 23 and corresponds at the lower end thereof to a top roller body 32 of the top roller 15. A pair of pressure devices 34 is mounted to the arm body 33 at positions on the opposite sides of the suction hole 23A. The support arm 23 has a pair of support members 35 that support the ends of the rotary shafts 32A each projecting from the top roller body 32. Each rotary shaft 32A is rotatably supported by a bearing 36.

[0022] The pair of pressure devices 34 includes pneumatic cylinders 37A, 37B each having a piston 38 with a piston rod 38A. The arm body 33 has a pair of holes 39 each having a large-diameter hole and a small-diameter hole slidably receiving therein the piston 38 and the piston rod 38A, respectively. Each piston rod 38A is contactable at the distal end thereof with the bearing 36. A pair of housings 40, 41 is fixed on the arm body 33 so as to cover the large-diameter holes of the holes 39. A duct 42 communicating with compressed air source (not shown) is connected to the housing 40. Two housings 40, 41 are in communication with each other via a duct (part of which is shown in Figs. 3 and 4) so that pressurized air supplied from the compressed air source to the pneumatic cylinder

37A is supplied further to the pneumatic cylinder 37B.

[0023] As shown in Fig. 2, the support arm 23 is pivotally supported at one end thereof adjacent to the pneumatic cylinder 37A by a support bracket (not shown) via a shaft 43. The support arm 23 has at the other end thereof adjacent to the pneumatic cylinder 37B a pivoted lever 45. The pivoted lever 45 is engaged with a retainer 44 formed on a frame of the comber when the support arm 23 is set in the operative position where the front top roller 15 and the front bottom roller 12 cooperate to hold therebetween a fiber bundle to be drafted. The pivoted lever 45 indicated by the solid line of Fig. 2 may be disengaged from the retainer 44, as indicated by the chain double-dashed line of Fig. 2, by turning the pivoted lever 45 counterclockwise.

[0024] The following will describe the operation of the drafting device 11. The drafting device 11 is operated with the support arms 23-26 set in the operative position and the suction ports 27A-27D of the suction duct 27 set in facing relation to the suction holes 23A-26A of the support arms 23-26, as shown in Fig. 1. The bottom rollers 12-14 are driven so as to provide the desired draft ratio in accordance with operating condition. A plurality of slivers S is drafted at a predetermined draft ratio into a fleece F which is delivered from the front bottom roller 12 and the front top roller 15. The fleece F is then bundled into a single sliver S via the gatherer 19 and the coiler trumpet 20. After being recompressed by the coiler calender roller 21, the sliver S is stored in the sliver can via the tube wheel.

[0025] While the drafting device 11 is operating, the suction duct 27 is set in the operative position and the suction ports 27A-27D are located in facing relation to the upper ends of the suction holes 23A-26A of the support arms 23-26 so that suction is created in the suction holes 23A-26A, as shown in Figs. 1 and 3. The suction duct 27 set in the operative position is located above the support arms 23-25 with the annular member 31 and the cover members 30 placed in contact with the upper surfaces of the support arms 23-25, respectively. The top rollers 15-18 are subjected to strong suction force acting through the suction ports 27A-27D and the suction holes 23A-26A, respectively. The vicinities of the front top roller 15 and the turning top roller 18 where floating fiber tends to be produced also receive suction force acting through the suction port 28A of the suction tube 28. Such fiber is removed by suction force acting in the suction holes 23A-26A before being entangled around the top rollers 15-18.

[0026] When a plurality of slivers S supplied from a plurality of combing heads is arranged between the bottom rollers 12-14 and the top rollers 15-18 in the preparation for operation of the comber, or when maintenance of the bottom rollers 12-14 is to be performed, the support arms 23-26 need to be set in their retracted position as indicated by the chain double-dashed line of Fig. 5 that causes no interference by the top rollers 15-18. It is noted that Fig. 5 shows only the support arm 23 for the front top roller 15. For this purpose, the suction duct 27 needs

to be placed in the retracted position before the support arms 23-26 are placed in their retracted position. The suction duct 27 is movable between the operative position and the retracted position by swinging around the cylindrical portion 29 extending parallel to the bottom rollers 12-14 of the drafting device 11. The provision of any flat suction tubes for the top rollers 15-18 instead of the suction holes 23A-26A of the support arms 23-26 causes part of the suction tubes to interfere with the support arms 23-26 when the suction duct 27 is pivoted. In the present embodiment wherein the suction duct 27 has the suction ports 27A-27D and the flat suction tube 28 at the position that causes no interference to the pivotal movement of the suction duct 27, however, the suction duct 27 is moved between the operative position and the retracted position without any trouble.

[0027] The opening of the suction ports 27B and 27C is adjustable so that appropriate suction is created in the suction holes 23A-26A through the suction ports 27A-27D. Such adjustment of the opening is performed by changing the position of the cover member 30, as shown in Fig. 6.

[0028] The above-described embodiment of the present invention offers the following advantageous effects.

(1) The support arms 23-26 supporting the top rollers 15-18 have the arm bodies 33 of the support arms 23-26 through which the suction holes 23A-26A extend vertically at the positions corresponding to the top roller body 32 of the top roller 15. Four pairs of pressure devices 34 are mounted to the respective support arms 23-26 so that each pair of pressure devices 34 is located on the opposite sides of the suction holes 23A-26A. With the support arms 23-26 set in the operative position, the suction duct 27 is movable between the operative position in which the suction ports 27A-27D are located in facing relation to the suction holes 23A-26A and suction is created in the suction holes 23A-26A from above, respectively, and the retracted position in which the pivotal movement of the support arms 23-26 is allowed. Therefore, the pressure devices 34 that are operable to press the top rollers 15-18 against the bottom rollers 12-14 are supported by the common support arm. In addition, clearing of the top rollers 15-18 can be accomplished by the drafting part clearer 22 that has a simpler structure than the conventional counterpart. The suction duct 27 has no suction tube that extends to the position adjacent to the top rollers 15-18 except the suction tube 28, so that the shape of the suction duct 27 is simplified and the cost of the drafting device 11 is reduced.

(2) The suction holes 23A-26A, which have therein suction force acting on the top rollers 15-18, are located between the paired pressure devices 34 provided on the opposite sides of the respective support

arms 23-26. Thus, the space for the suction holes 23A-26A is secured easily. In addition, as compared to the case where the members that form the suction holes such as 23A-26A are provided separately from the support arms such as 23-26, the support arms 23-26 of the present embodiment are movable between the operative position and the retracted position in a simple structure without any trouble.

(3) The suction duct 27 has the suction ports 27A-27D formed in facing relation to the suction holes 23A-26A of the support arms 23-26, respectively. The suction duct 27 also has the opening adjusting member (cover members 30) for adjusting the opening of the respective suction ports 27B, 27C located in facing relation to the suction holes 24A, 25A of the support arms 24, 25 that support the top rollers 16, 17 located upstream of the front top roller 15 as seen in the direction in which the sliver S is moved. When the opening of the suction ports 27B, 27C is adjusted or restricted by the opening adjusting member, therefore, the suction force acting through the suction ports 27A, 27D on the front top roller 15 and the turning top roller 18 is enhanced without increasing the suction power of the suction source.

(4) The suction duct 27 has the cylindrical portion 29 extending parallel to the bottom rollers 12-14 of the drafting device 11. The suction duct 27 is pivotally movable between the operative position and the retracted position around the cylindrical portion 29 and communicable with the suction source via the cylindrical portion 29. Thus, the structure wherein the suction duct 27 is movable between the operative position and the retracted position and the suction duct 27 is communicable with the suction source is simplified.

(5) In the present embodiment wherein the pressure devices 34 include the pneumatic cylinders 37A, 37B, the adjustment of pressure for the top rollers is simplified as compared to the case where cylinders having springs are used as the pressure devices.

(6) For supplying pressurized air to the pneumatic cylinders 37A, 37B located on the opposite sides of each of the support arms 23-26, one pneumatic cylinder 37A is connected to the compressed air source via the duct 42 and the pressurized air supplied to the pneumatic cylinder 37A is also supplied to the pneumatic cylinder 37B via a duct. In the above-described structure, therefore, the structure for supplying pressurized air to the pneumatic cylinders 37A, 37B is simplified as compared to the structure for supplying the pressurized air from the compressed air source separately to the pneumatic cylinders 37A, 37B.

(7) With the suction duct 27 set in the operative position, the flat suction tube 28 is provided extending from the lower surface of the suction duct 27 to a position adjacent to the front top roller 15 so as to point toward a position between the front top roller 15 and the turning top roller 18. The suction tube 28 is located between the support arms 23, 26 that are widely spaced. Therefore, the front top roller 15 around which floating fiber such as fly tends to be entangled is prevented efficiently from such entanglement of fly without preventing the pivotal movement of the suction duct 27.

(8) The gum-magnet cover member 30 is provided as the opening adjusting member. The adjustment of the opening of the suction ports 27B, 27C is accomplished by moving the cover member 30 that is magnetically attached to the lower surface of the suction duct 27. Therefore, the present embodiment provides a simple structure for adjusting the opening of the suction ports 27B, 27C in a stepless manner.

[0029] The present invention has been described in the context of the above-described embodiment, but it is not limited to the embodiment. It is obvious to those skilled in the art that the invention may be practiced in various manners as exemplified below.

[0030] The pressure devices 34 are not limited to the pneumatic cylinders 37A, 37B, but may be provided by the devices each having a coil spring 46 urging a piston 38 along a piston rod 38A, as shown in Fig. 7A. In this case, the structure for supplying compressed air may be dispensed with, so that the structure of the drafting device 11 having the drafting part clearer 22 may be simplified and the manufacturing cost is reduced, accordingly.

[0031] Each of the support arms 23-26 may have a fluid passage 47 via which pressurized air supplied to the pneumatic cylinder 37A is also supplied to the pneumatic cylinder 37B. The support arm 23 will be now described on behalf of the support arms 23-26. As shown in Fig. 7B, the support arm 23 has a groove 48 and a pair of holes 49. The groove 48 is formed in the upper part of the arm body 33 extending to the position adjacent to the holes 39 and opened upward without a cover 50 which will be mentioned later. The groove 48 communicates with the paired holes 39 via the paired holes 49, respectively. The cover 50 is provided on the top of the groove 48 so as to seal the groove 48. In this case, it is not necessary for the pneumatic cylinder 37B to have a housing such as 41 shown in Fig. 2. Thus, the structure for supplying pressurized air to the pneumatic cylinders 37A, 37B is simplified as compared to the structure for supplying pressurized air from the compressed air source to the pneumatic cylinders 37A, 37B separately.

[0032] The suction duct 27 may have the suction ports so that suction is created only in the suction holes 23A, 26A located in facing relation to the front top roller 15 and the turning top roller 18. The front top roller 15 and the

turning top roller 18 are susceptible to entanglement of fly or fleece. Depending on the types of fibers to be drafted, drafting operation may be accomplished successfully without providing suction force to the middle top roller 16 and the back top roller 17. In such a case, the suction duct 27 may have the suction ports 27A, 27D only, dispensing with the suction ports 27B, 27C for the suction holes 24A, 25A of the support arms 24, 25.

[0033] The suction duct 27 having the opening adjusting member may be used with the opening of the suction ports 27B, 27C set at zero so that no suction is created in the suction holes 24A, 25A of the support arms 24, 25. In this case, the suction duct 27 can be used advantageously in dealing with such fiber that should be drafted with the middle top roller 16 and the back top roller 17 subjected to suction.

[0034] The opening adjusting member of the suction duct 27 is not limited to the gum-magnet cover member 30. The suction duct 27 may have any pivotable or slidable shutter. In either case, the opening of the suction duct 27 may be adjusted in a stepless manner.

[0035] The opening adjusting member of the suction duct 27 is not limited to the structure wherein the opening of the suction duct 27 is adjustable in a stepless manner. For example, the opening adjusting member may be moved to two positions, namely fully-opened position and fully-closed position, or alternatively to three positions, namely fully-opened position, partially-opened position and fully-closed position.

[0036] When the gum-magnet cover member 30 is used as the opening adjusting member, it may be so arranged that only the part of the suction duct 27 to which the cover member 30 is attached by magnetic force is made of magnetic material, and the rest of the suction duct 27 is made of resin material or fiber-reinforced resin material.

[0037] The support that pivotally supports the suction duct 27 is not limited to the cylindrical portion 29 that also serves to make communication between the suction duct 27 and the suction source, but the duct support may be provided separately from the part communicating with the suction source.

[0038] The suction duct 27 may dispense with the suction tube 28.

[0039] The drafting device 11 is not limited to the 3 roller type, but may be of a 4 roller type or of a 5 roller type. Alternatively, the drafting device 11 may be of a 2 roller type having a front roller and a back roller.

[0040] The drafting device 11 may dispense with the turning top roller 18 located downstream of the front top roller 15 with respect to the moving direction of the sliver S.

[0041] The drafting device according to the present invention is applicable not only to the drawing frame and the comber, but also to the spinning machine, such as a sliver lap machine or a ribbon lap machine, having a process in which a plurality of slivers is drafted by the drafting device and combined into a single sliver.

[0042] The drafting device according to the present invention is applicable not only to the drawing frame, the comber, and the spinning machine, such as a sliver lap machine or a ribbon lap machine, having a process in which a plurality of slivers is drafted by the drafting device and combined into a single sliver, but also to the spinning machine, such as a carding machine, having a process in which a wide fiber bundle (web) drafted by the drafting device is formed into a sliver.

[0043] The drafting device in a fore-spinning process is characterized in that a drafting part clearer includes a plurality of support arms, a plurality of pairs of pressure devices and a suction duct. The support arms support a plurality of top rollers, respectively. Each support arm has an arm body through which a suction hole extends vertically at a position corresponding to the top roller. Each pair of pressure devices is mounted to the corresponding support arm on opposite sides of the support hole of the support arm. The suction duct has a plurality of suction ports. With the support arms set in operative position, the suction duct is movable between operative position in which the suction ports are located in facing relation to the corresponding support holes so that suction is created in the support holes and retracted position in which pivotal movement of the support arm is allowed.

Claims

1. A drafting device (11) in a fore-spinning process having a drafting part clearer (22),
characterized in that
the drafting device (11) includes a plurality of top rollers (15, 16, 17, 18) each having a top roller body (32), and the drafting part clearer (22) includes a plurality of support arms (23, 24, 25, 26), a plurality of pairs of pressure devices (34) and a suction duct (27),
wherein the support arms (23, 24, 25, 26) support the respective top rollers (15, 16, 17, 18), each support arm (23, 24, 25, 26) having an arm body (33) through which a suction hole (23A, 24A, 25A, 26A) extends vertically at a position corresponding to the top roller body (32) with the support arms (23, 24, 25, 26) set in operative position,
wherein each pair of pressure devices (34) is mounted to the corresponding support arm (23, 24, 25, 26) on opposite sides of the support hole (23A, 24A, 25A, 26A) of the support arm (23, 24, 25, 26),
wherein the suction duct (27) has a plurality of suction ports (27A, 27B, 27C, 27D), wherein with the support arms (23, 24, 25, 26) set in the operative position, the suction duct (27) is movable between operative position in which the suction ports (27A, 27B, 27C, 27D) are located in facing relation to the corresponding support holes (23A, 24A, 25A, 26A) so that suction is created in the support holes (23A, 24A, 25A, 26A) from above and retracted position in

which pivotal movement of the support arm (23, 24, 25, 26) is allowed.

2. The drafting device (11) according to claim 1, **characterized in that** one of the top rollers (15, 16, 17, 18) is a front top roller (15), wherein the suction ports (27A, 27B, 27C, 27D) are located in facing relation to the suction holes (23A, 24A, 25A, 26A) of all the support arms (23, 24, 25, 26), respectively, wherein the suction duct (27) has an opening adjusting member (30) for adjusting opening of the suction port (27B, 27C) located in facing relation to the suction hole (24A, 25A) of the support arm (24, 25) that supports the top roller (16, 17) located upstream of the front top roller (15) as seen in a direction in which a sliver (S) is moved.
3. The drafting device (11) according to claim 2, **characterized in that** the opening adjusting member (30) is made of a gum magnet that is magnetically attached to the suction duct (27) so as to cover the suction port (27B, 27C).
4. The drafting device (11) according to any one of claims 1 through 3, **characterized in that** the top rollers (15, 16, 17, 18) include a front top roller (15) and a turning top roller (18), wherein the suction ports (27A, 27D) are formed so that suction is created only in the suction holes (23A, 26A) located in facing relation to the front top roller (15) and the turning top roller (18).
5. The drafting device (11) according to any one of claims 1 through 4, **characterized in that** the suction duct (27) has a cylindrical portion (29) extending parallel to bottom rollers (12, 13, 14) of the drafting device (11) and is movable around the cylindrical portion (29), wherein the suction duct (27) is communicable with a suction source via the cylindrical portion (29).
6. The drafting device (11) according to any one of claims 1 through 5, **characterized in that** each pair of pressure devices (34) has a pair of pneumatic cylinders (37A, 37B), wherein each support arm (23, 24, 25, 26) has a fluid passage (47) via which pressurized air supplied to one of the pneumatic cylinders (37A, 37B) is supplied to the other of the pneumatic cylinders (37A, 37B).
7. The drafting device (11) according to any one of claims 1 through 6, **characterized in that** the top rollers (15, 16, 17, 18) include a front top roller (15) and a turning top roller (18), wherein a flat suction tube (28) is provided extending from a lower surface of the suction duct (27) so as to point toward a position between the front top roller (15) and the turning top roller (18) with the suction duct (27) set in the operative position.

FIG. 1

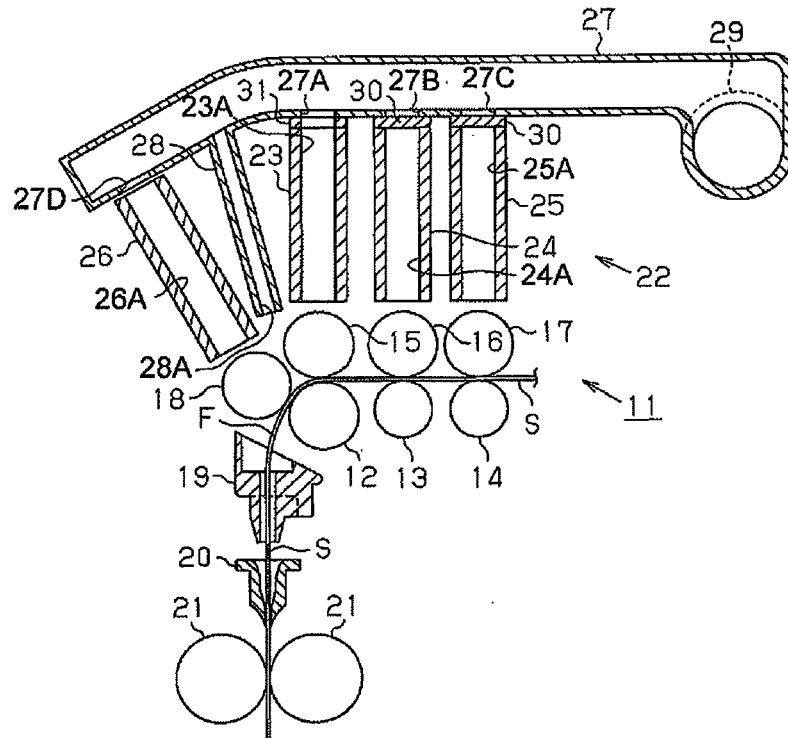


FIG. 2

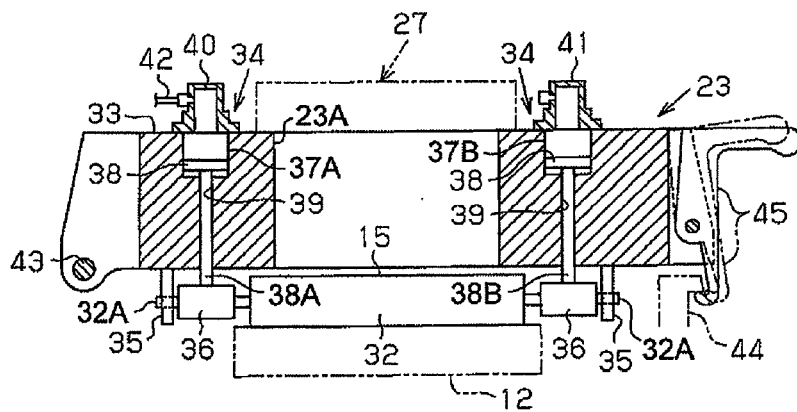


FIG. 3

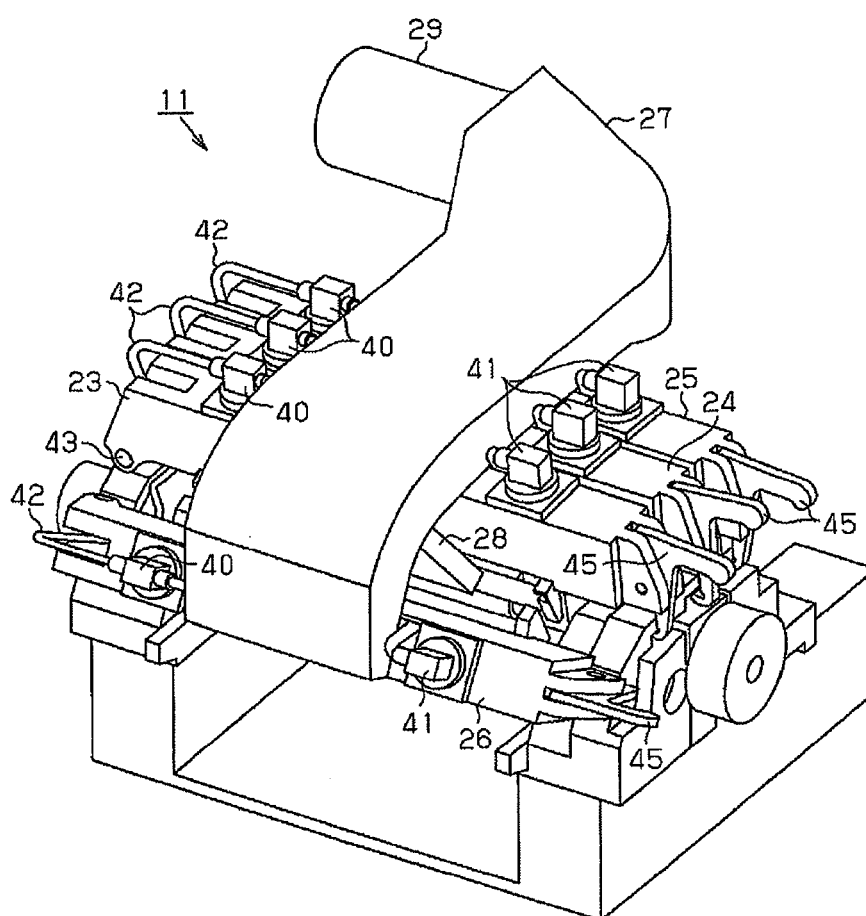


FIG. 4

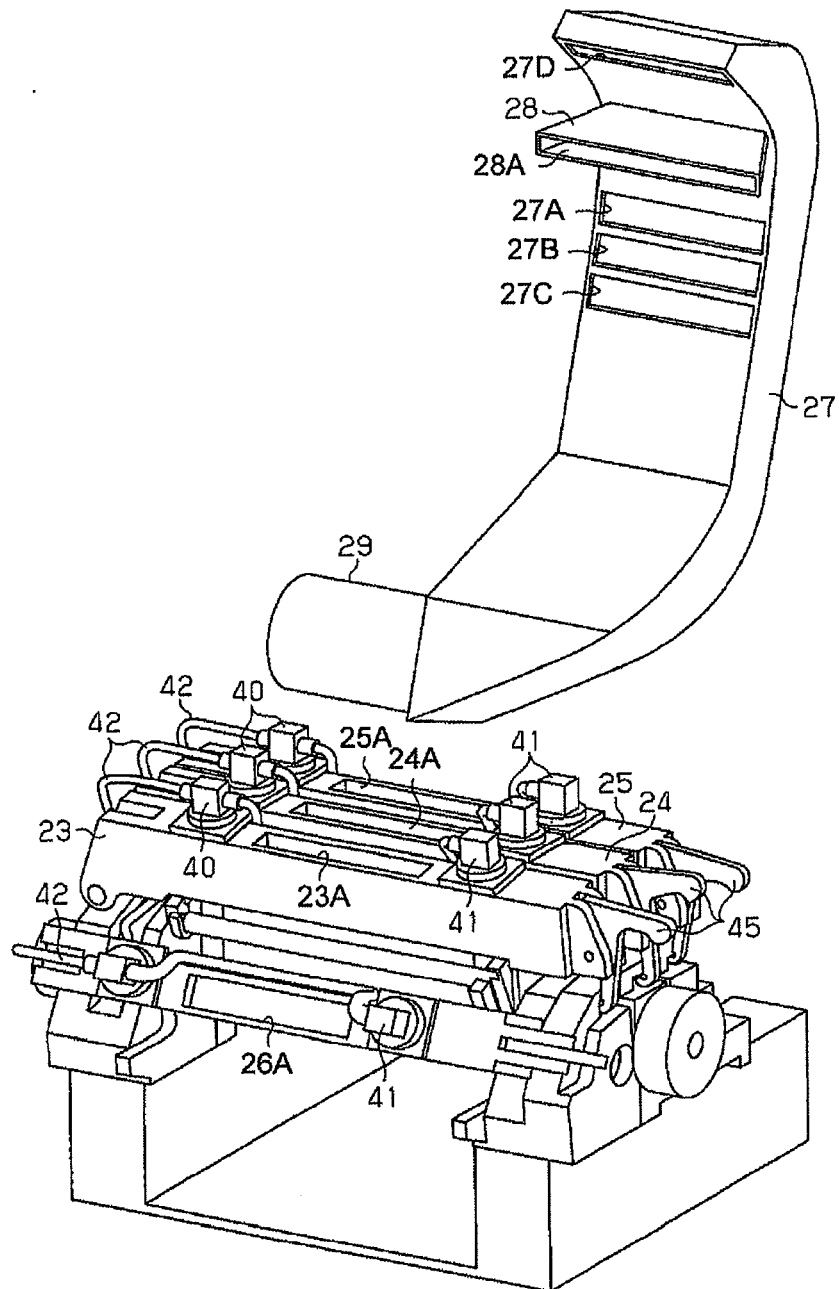


FIG. 5

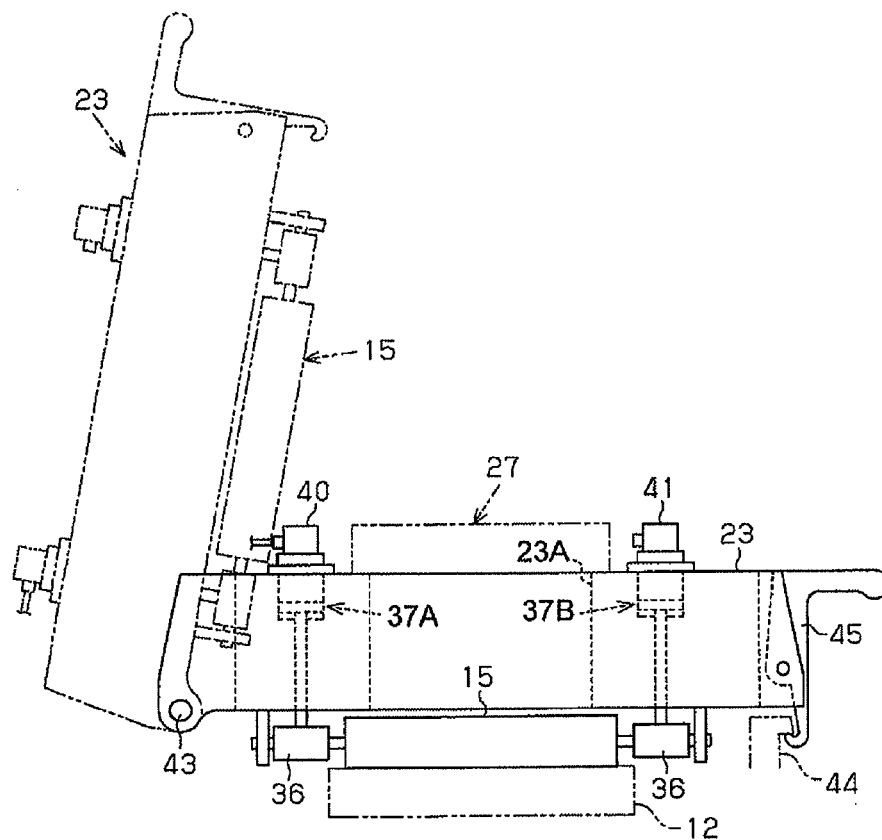


FIG. 6

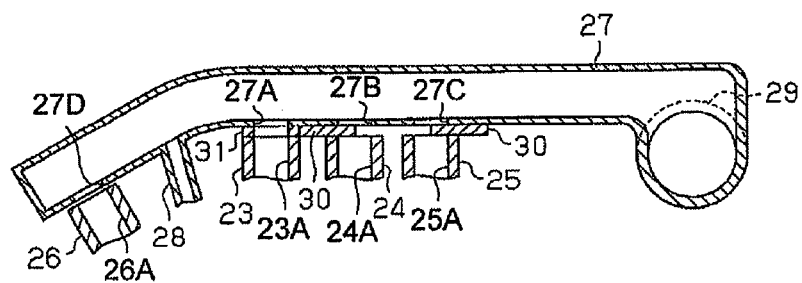


FIG. 7A

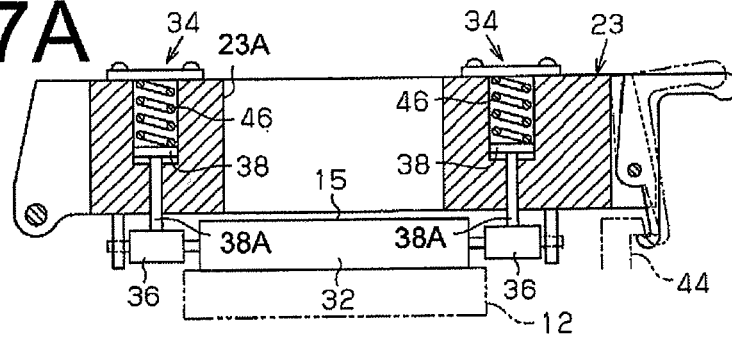


FIG. 7B

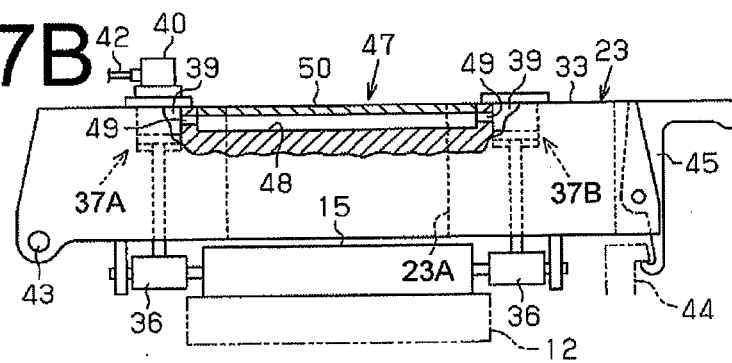


FIG. 8
(BACKGROUND ART)

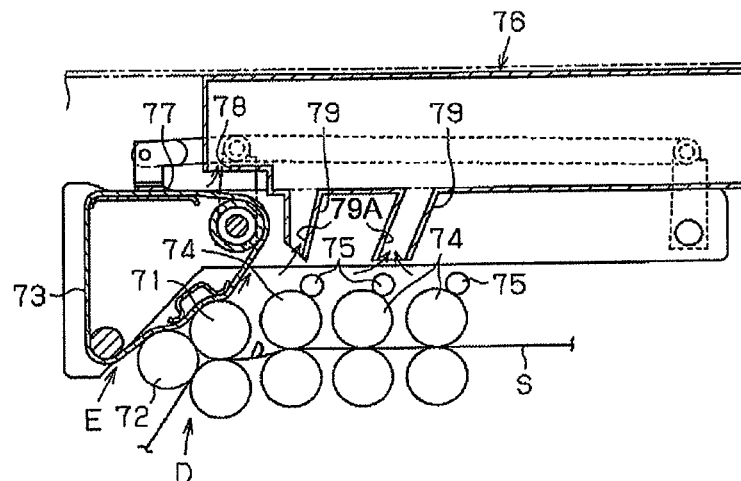
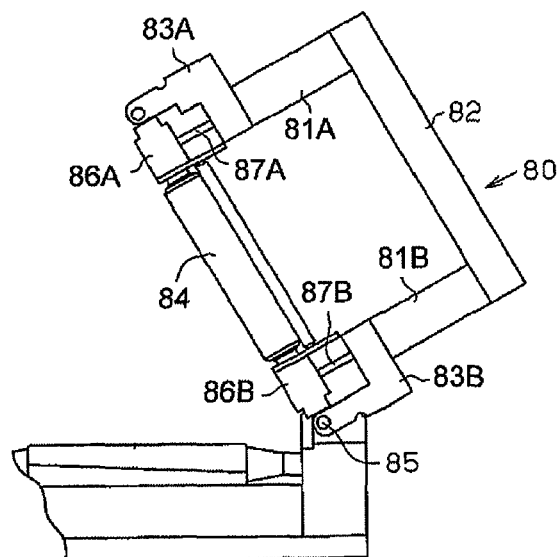


FIG. 9
(BACKGROUND ART)



REFERENCES CITED IN THE DESCRIPTION

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