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(54) **BOBBIN TREATMENT DEVICE**

(57) In a machine frame including an automatic unit and a bobbin processing device, wasteful power consumption is reduced. A bobbin processing device (103) is a device for sequentially supplying yarn supplying bobbins to an automatic winder (102). A first suction system (47) sucks air so as to process a yarn on the yarn supplying bobbin. A second suction system (51) sucks air so as to process a yarn on the yarn supplying bobbin. A first bobbin processing device blower (45) generates a

suction airflow for the first suction system (47). A second bobbin processing device blower (49) generates a suction airflow for the second suction system (51). A first air passage (131) is disposed between the first bobbin processing device blower (45) and the first suction system (47). A second air passage (132) is disposed between the second bobbin processing device blower (49) and the second suction system (51).

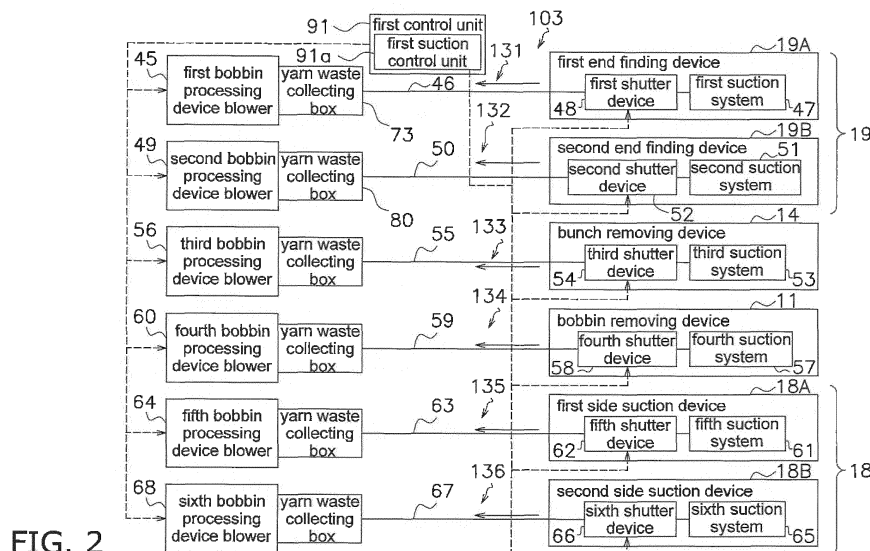


FIG. 2

Description

TECHNICAL FIELD

[0001] The present invention relates to a bobbin processing device for sequentially supplying yarn supplying bobbins to a yarn winding device.

BACKGROUND ART

[0002] Conventionally, an automatic winder including a plurality of units and a bobbin processing device constitute a machine frame. The bobbin processing device mounts a yarn-wound bobbin with yarn on a tray, and next performs various types of yarn processes, and finally supplies the yarn supplying bobbin to the automatic winder.

[0003] The machine frame includes one blower, which operates suction systems of a plurality of yarn processing devices of units of the automatic winder and the bobbin processing device.

[0004] In this case, even if the units of the automatic winder can operate at a low static pressure, the plurality of yarn processing devices of the bobbin processing device requires a high static pressure. Therefore, the blower is operated according to the state of the bobbin processing device. Thus, electric power is wastefully consumed.

[0005] Conventionally, there is known a structure in which the bobbin processing device is provided with a dedicated blower (see, for example, Patent Citation 1). In Patent Citation 1, one suction source is disposed for one end finding device and is switched between low pressure and high pressure, so that energy saving is realized.

PRIOR ART CITATIONS

PATENT CITATION

[0006] Patent Citation 1: EP2322460

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0007] The bobbin processing device includes, in addition to the end finding device, a plurality of yarn processing devices such as a residual yarn suction device, and a yarn unwinding device.

[0008] Therefore, energy saving of a plurality of suction systems cannot be realized specifically only by disposing one suction source for one end finding device as Patent Citation 1,

[0009] It is an object of the present invention to reduce the power consumption in a machine frame including an automatic unit and a bobbin processing device.

TECHNICAL SOLUTION

[0010] A plurality of aspects are described below as means for solving problem. These aspects can be arbitrarily combined as necessary.

[0011] A bobbin processing device according to one aspect of the present invention is a device for supplying a yarn supplying bobbin to a yarn winding device. The bobbin processing device includes a first suction system, a second suction system, a first suction source, a second suction source, a first air dispensing passage, and a second air dispensing passage.

[0012] The first suction system sucks air so as to process a yarn on the yarn supplying bobbin.

[0013] The second suction system sucks air so as to process a yarn on the yarn supplying bobbin.

[0014] The first suction source generates a suction airflow for the first suction system.

[0015] The second suction source generates a suction airflow for the second suction system.

[0016] The first air dispensing passage is disposed between the first suction source and the first suction system.

[0017] The second air dispensing passage is disposed between the second suction source and the second suction system.

[0018] In this device, the first suction source and the second suction source are provided for the first suction system and the second suction system respectively, and the first suction source and the second suction source generate suction airflows for the first suction system and the second suction system, respectively, so as to operate the first suction system and the second suction system.

[0019] With the structure described above, while the first suction system is performing the suction operation, the second suction system can stop the suction. In addition, the opposite is possible. In this way, power consumption of the bobbin processing device can be reduced,

[0020] The bobbin processing device may include a first shutter device and a second shutter device. The first shutter device is disposed in the first air dispensing passage so as to open or close between the first suction source and the first suction system. The second shutter device is disposed in the second air dispensing passage so as to open or close between the second suction source and the second suction system.

[0021] The first suction system and the second suction system may be disposed respectively in an end finding device that positions a yarn end of the yarn on the yarn supplying bobbin at a predetermined position and a side suction device that sucks the yarn end of the yarn on the yarn supplying bobbin laterally in a previous step of the end finding device.

[0022] The first suction system and the second suction system may be disposed respectively in a first end finding device and a second end finding device, which position a yarn end of the yarn on the yarn supplying bobbin at a predetermined position.

[0023] In this device, it may be possible, for example, that only the first end finding device normally performs the suction, and the second end finding device also performs the suction in a special case.

[0024] The first suction system and the second suction system may be disposed respectively in an end finding device that positions a yarn end of the yarn on the yarn supplying bobbin at a predetermined position and a bunch removing device disposed in a bobbin supplying device that supplies the yarn supplying bobbin to a tray.

[0025] The first suction system and the second suction system may be disposed respectively in an end finding device that positions a yarn end of the yarn on the yarn supplying bobbin at a predetermined position and a bobbin removing device that sucks and removes a residual yarn on the yarn supplying bobbin.

[0026] The bobbin processing device may further include a first control unit that controls operations of the first suction source and the second suction source.

[0027] The bobbin processing device may further include a third suction system, a third suction source, and a third air dispensing passage. The third suction system sucks air so as to process a yarn on the yarn supplying bobbin. The third suction source generates a suction air flow for the third suction system. The third air dispensing passage is disposed between the third suction source and the third suction system.

ADVANTAGEOUS EFFECTS

[0028] The bobbin processing device according to the present invention can reduce power consumption of the bobbin processing device.

BRIEF DESCRIPTION OF DRAWINGS

[0029]

Fig. 1 is a schematic plan view of an automatic winder system in a first embodiment.

Fig. 2 is a block diagram illustrating a suction control structure of a bobbin processing device.

Fig. 3 is a schematic diagram illustrating a suction structure of two end finding devices.

Fig. 4 is a block diagram illustrating a suction control structure of an automatic winder.

DESCRIPTION OF EMBODIMENTS

1. First Embodiment

(1) Automatic Winder System

[0030] With reference to Fig. 1, an automatic winder system 101 including a bobbin processing device 103 as a first embodiment of the present invention is described. Fig. 1 is a schematic plan view of the automatic winder system in the first embodiment.

[0031] The automatic winder system 101 includes an automatic winder 102 (one example of the yarn winding device), the bobbin processing device 103, and a bobbin supplying device 104. The automatic winder 102 is disposed on the left side of the bobbin processing device 103 in the diagram. The bobbin processing device 103 is disposed between the bobbin supplying device 104 and the automatic winder 102.

[0032] The automatic winder 102 includes a plurality of winding units 105. The winding unit 105 is a device that unwinds a spun yarn wound around a yarn supply bobbin tube 5B (yarn supplying bobbin) onto a winding tube so as to produce a product package of spun yarn.

[0033] The bobbin processing device 103 draws out from a tray 3 an empty bobbin tube 5A ejected from the automatic winder 102, and mounts the yarn supply bobbin tube 5B on the tray 3 so as to supply the same to the automatic winder 102.

[0034] The bobbin supplying device 104 is a device that supplies the yarn supply bobbin tube 5B to the bobbin processing device 103.

[0035] Note that the empty bobbin tube 5A means a cylinder itself without spun yarn. The yarn supply bobbin tube 5B means a bobbin tube with spun yarn produced by a fine spinning frame (not shown) and wound around the cylinder.

(2) Automatic Winder

[0036] As illustrated in Fig. 1, the automatic winder 102 is provided with a supply path 106 for conveying the yarn supply bobbin tube 5B to each of the winding units 105. In addition, the automatic winder 102 is provided with a collection path 107 for conveying the empty bobbin tubes 5A ejected from each of the winding units 105. The supply path 106 and the collection path 107 are constituted of a belt conveyor and the like, and convey the empty bobbin tube 5A using the tray 3.

(3) bobbin processing device

[0037] The bobbin processing device 103 includes a tray conveyor line 108 as conveying means for the yarn supply bobbin tube 5B or the empty bobbin tube 5A, which is placed on the tray 3 and conveyed. The tray conveyor line 108 is connected to the supply path 106 and the collection path 107 of the automatic winder 102. The tray 3 on which the yarn supply bobbin tube 5B is mounted is supplied from the bobbin processing device 103 to the winding units 105 via the tray conveyor line 108 and the supply path 106. The tray 3 on which the empty bobbin tube 5A is mounted is conveyed from the winding unit 105 to the collection path 107 and the tray conveyor line 108.

[0038] The tray conveyor line 108 includes a main conveyor line 121 and a second bunch process line 122.

[0039] The main conveyor line 121 is a path that conveys the empty bobbin tube 5A ejected from the auto-

matic winder 102, replaces the empty bobbin tube 5A with the yarn supply bobbin tube 5B on the way of conveyance, and conveys the yarn supply bobbin tube 5B to the automatic winder 102. The main conveyor line 121 is formed schematically in a U shape. Here, a starting point of the main conveyor line 121 is connected to a terminal end of the collection path 107, and a terminal end of the main conveyor line 121 is connected to a starting point of the supply path 106.

[0040] A bobbin removing device 11 determines, when the empty bobbin tube 5A with a residual yarn remaining thereon comes back from the automatic winder 102, whether or not the yarn around the bobbin can be taken up. If it cannot be taken up, the bobbin removing device 11 extracts and recycles from the tray 3. The bobbin removing device 11 includes a fourth suction system 57 (Fig. 2) for sucking and removing the residual yarn that cannot be unwound, from the empty bobbin tube 5A.

[0041] A yarn bobbin tube supplying device 13 is a device that mounts the yarn supply bobbin tube 5B produced by the fine spinning frame so as to stand on the tray 3. The yarn supply bobbin tube 5B is supplied to the yarn bobbin tube supplying device 13 from the bobbin supplying device 104.

[0042] Although not illustrated, the yarn bobbin tube supplying device 13 includes a bobbin input device, a bobbin individualization device, a bobbin sorting device, and a pair of bobbin chutes. The yarn bobbin tube supplying device 13 can supply the yarn supply bobbin tube 5B to the tray 3 simultaneously at two positions using the bobbin sorting device and the pair of bobbin chute. Each of the bobbin chutes sets the yarn supply bobbin tube 5B so as to be inserted in a mounting portion of the tray 3. The bobbin chute is constituted of, for example, a cone-like cylinder that is divided into two pieces in the axial direction.

[0043] The yarn bobbin tube supplying device 13 includes a bunch removing device 14 (Fig. 2). The bunch removing device 14 includes a third suction system 53 (one example of the third suction system, Fig. 2) that sucks and removes a bottom bunch (a winding end part when the bobbin is formed by the fine spinning frame).

[0044] In the main conveyor line 121, a first bunch unwinding device 15A, a first yarn end processing device 17A, and a first end finding device 19A are arranged in this order on a downstream side of the yarn bobbin tube supplying device 13 in the conveying direction.

[0045] The first bunch unwinding device 15A is a device for realizing the same function as the bunch removing device 14 of the yarn bobbin tube supplying device 13, so as to remove the bottom bunch that was not removed by the bunch removing device 14. The first bunch unwinding device 15A includes a suction system (not shown).

[0046] The first yarn end processing device 17A is a device that cuts back wind yarn wound on a yarn layer surface of the yarn supply bobbin tube 5B so that a yarn end can be easily drawn out. The first yarn end process-

ing device 17A includes a suction system (not shown).

[0047] The first end finding device 19A is a device that separates the yarn end from the surface of the yarn supply bobbin tube 5B for pick finding, winds the pick-found yarn around a cylinder apex, and inserts an end portion of the yarn into a cylinder top hole. The first end finding device 19A includes a first suction system 47 (one example of the first suction system, Fig. 2) that sucks the yarn end for pick finding.

[0048] Note that a first side suction device 18A may be disposed as an option between the first yarn end processing device 17A and the first end finding device 19A. The first side suction device 18A is a device that sucks the yarn end laterally so as to assist the pick finding process in post stage. The first side suction device 18A includes a side suction mouse (not shown) as a fifth suction system 61 for sucking the yarn end.

[0049] The second bunch process line 122 is a passage for reprocessing of the yarn supply bobbin tube 5B that failed in the pick finding process in the first bunch unwinding device 15A, for example. The second bunch process line 122 is a bypass passage for returning from the trailing portion to the leading portion of the main conveyor line 121.

[0050] A second bunch unwinding device 15B, a second yarn end processing device 17B, and a second end finding device 19B are disposed in this order in the second bunch process line 122. In addition, a second side suction device 18B may be disposed as an option. These devices are the same as described above. Note that as illustrated in Fig. 2, the first side suction device 18A and the second side suction device 18B constitute the side suction 18 in this embodiment. In addition, the first end finding device 19A and the second end finding device 19B constitute the end finding device 19 in this embodiment.

(4) Flow of Tray

[0051] A flow of the tray 3 is described below.

[0052] In the yarn bobbin tube supplying device 13, the bunch removing device 14 (Fig. 2) removes the bottom bunch formed on the yarn supply bobbin tube 5B. Next, when an empty tray 3 reaches a position just below the bobbin chute (not shown) of the yarn bobbin tube supplying device 13, the yarn supply bobbin tube 5B is placed in a substantially upright state on the empty tray 3.

[0053] Next, the tray 3 is conveyed toward the first bunch unwinding device 15A on the downstream side in the main conveyor line 121. In the first bunch unwinding device 15A, removal of the bottom bunch formed on the yarn supply bobbin tube 5B is performed again. The purpose is to securely remove the bottom bunch that was not removed by the bunch removing device 14.

[0054] Next, the yarn supply bobbin tube 5B is conveyed toward the first yarn end processing device 17A in the main conveyor line 121. In the first yarn end processing device 17A, the back-wind yarn wound on

the yarn layer surface of the yarn supply bobbin tube 5B is cut so that a tip winding part is formed.

[0055] Next, the yarn supply bobbin tube 5B is conveyed toward the first end finding device 19A in the main conveyor line 121. In the first end finding device 19A, the tip winding part is sucked upward, and a yarn end part is inserted into the inside of the cylinder of the yarn supply bobbin tube 5B.

[0056] Next, the yarn supply bobbin tube 5B is further conveyed to the downstream side in the main conveyor line 121 and is supplied to the supply path 106 of the automatic winder 102. The yarn supply bobbin tube 5B is conveyed in the supply path 106 and is supplied to one of the winding units 105.

[0057] In the winding unit 105, unwinding of yarn from the yarn supply bobbin tube 5B is performed, and the unwound yarn is wound on a package.

[0058] The tray 3 with the empty bobbin tube 5A from which the yarn is entirely unwound is ejected from the winding unit 105 and is returned to the main conveyor line 121 of the bobbin processing device 103 again via the collection path 107.

[0059] In the main conveyor line 121, the bobbin removing device 11 draws out the empty bobbin tube 5A placed on the tray 3.

(5) Suction Control Structure of Bobbin processing device

[0060] With reference to Fig. 2, a suction control structure of the bobbin processing device 103 is described. Fig. 2 is a block diagram illustrating the suction control structure of the bobbin processing device.

[0061] The bobbin processing device 103 includes a first bobbin processing device blower 45 (one example of the first suction source). The first bobbin processing device blower 45 is a device for supplying a suction force to the first end finding device 19A.

[0062] The bobbin processing device 103 includes a first bobbin processing device suction duct 46. The first bobbin processing device suction duct 46 is disposed between the first bobbin processing device blower 45 and the first suction system 47.

[0063] As illustrated in Fig. 3, the first bobbin processing device blower 45 includes a motor 71, a fan 72, and a yarn waste collecting box 73, which are housed in a blower box 70. Fig. 3 is a schematic diagram illustrating a suction structure of two end finding devices.

[0064] The yarn waste collecting box 73 is a device for collecting sucked and removed yarn waste and cotton waste, and includes an air filter 74. This structure enables the yarn waste collecting box 73 to separate suction airflow from yarn waste and cotton waste carried by the suction airflow.

[0065] The first end finding device 19A includes the first suction system 47 for positioning the yarn end of the yarn supply bobbin tube 5B at a predetermined position. The first end finding device 19A includes a first shutter

device 48.

[0066] A first air passage 131 is disposed between the first bobbin processing device blower 45 and the first suction system 47. The first air passage 131 includes the first bobbin processing device suction duct 46. The first shutter device 48 is disposed in the first air passage 131 and can open/close the first air passage 131 between the first bobbin processing device blower 45 and the first suction system 47. The first shutter device 48 includes, for example, a shutter and an air cylinder (the same is true in the following description). The first shutter device 48 is a shutter cutter, for example.

[0067] The bobbin processing device 103 includes a second bobbin processing device blower 49 (one example of the second suction source). The second bobbin processing device blower 49 is a device for supplying a suction force to the second end finding device 19B.

[0068] The bobbin processing device 103 includes a second bobbin processing device suction duct 50. The second bobbin processing device suction duct 50 is disposed between the second bobbin processing device blower 49 and a second suction system 51 (described later).

[0069] As illustrated in Fig. 3, the second bobbin processing device blower 49 includes a motor 78, a fan 79, and a yarn waste collecting box 80, which are housed in a blower box 76. The yarn waste collecting box 80 is a device for collecting sucked and removed yarn waste and cotton waste, and includes an air filter 81.

[0070] The second end finding device 19B includes the second suction system 51 (one example of the second suction system) for positioning the yarn end of the bobbin at a predetermined position. The second end finding device 19B includes a second shutter device 52.

[0071] A second air passage 132 is disposed between the second bobbin processing device blower 49 and the second suction system 51. The second air passage 132 includes the second bobbin processing device suction duct 50. The second shutter device 52 is disposed in the second air passage 132 and can open/close the second air passage 132 between the second bobbin processing device blower 49 and the second suction system 51. The second shutter device 52 is a shutter cutter, for example.

[0072] The bunch removing device 14 includes the third suction system 53 for unwinding the bottom bunch. The bunch removing device 14 includes a third shutter device 54.

[0073] A third air passage 133 is disposed between a third bobbin processing device blower 56 and the third suction system 53. The third air passage 133 includes a third bobbin processing device suction duct 55. The third shutter device 54 is disposed in the third air passage 133 and can open/close the third air passage 133 between the third bobbin processing device blower 56 and the third suction system 53. The third shutter device 54 is a shutter cutter, for example.

[0074] Note that the third bobbin processing device blower 56 is equipped with a yarn waste collecting box,

but description thereof is omitted (the same is true in the following description).

[0075] The bobbin removing device 11 includes a residual yarn process device as the fourth suction system 57 that sucks residual yarn on the bobbin. The bobbin removing device 11 includes a fourth shutter device 58.

[0076] A fourth air passage 134 is disposed between a fourth bobbin processing device blower 60 and the fourth suction system 57. The fourth air passage 134 includes a fourth bobbin processing device suction duct 59. The fourth shutter device 58 is disposed in the fourth air passage 134 and can open/close the fourth air passage 134 between the fourth bobbin processing device blower 60 and the fourth suction system 57.

[0077] The first side suction device 18A includes the fifth suction system 61 that sucks the yarn end laterally. The first side suction device 18A includes a fifth shutter device 62.

[0078] A fifth air passage 135 is disposed between a fifth bobbin processing device blower 64 and the fifth suction system 61. The fifth air passage 135 includes a fifth bobbin processing device suction duct 63. The fifth shutter device 62 is disposed in the fifth air passage 135 and can open/close the fifth air passage 135 between the fifth bobbin processing device blower 64 and the fifth suction system 61. The fifth shutter device 62 is a shutter cutter, for example.

[0079] The second side suction device 18B includes a sixth suction system 65 that sucks the yarn end laterally. The second side suction device 18B includes a sixth shutter device 66.

[0080] A sixth air passage 136 is disposed between a sixth bobbin processing device blower 68 and the sixth suction system 65. The sixth air passage 136 includes a sixth bobbin processing device suction duct 67. The sixth shutter device 66 is disposed in the sixth air passage 136 and can open/close the sixth air passage 136 between the sixth bobbin processing device blower 68 and the sixth suction system 65. The sixth shutter device 66 is a shutter cutter, for example.

[0081] The bobbin processing device 103 includes a first control unit 91. The first control unit 91 is housed in a control box 82 illustrated in Fig. 3. The first control unit 91 is a computer system including a processor (e.g. a CPU), a storage device (e.g. a ROM, a RAM, an HDD, an SSD, and the like), and various interfaces (e.g. an A/D converter, a D/A converter, a communication interface, and the like). The first control unit 91 executes a program stored in a storage unit (corresponding to a part or the whole of storage area of the storage device) so as to perform various control operations.

[0082] The first control unit 91 may be constituted of a single processor or may be constituted of a plurality of processors independent of each other for individual controls.

[0083] A part or the whole of functions of individual elements of the first control unit 91 may be realized as a program that can be executed by the computer system

constituting the control unit. Specifically, the ROM of the first control unit 91 stores control software that allows the CPU or the like to function as a first suction control unit 91a (described later). Other than that, a part of functions of individual elements of the control unit may be constituted of a custom IC.

[0084] Although not illustrated, the first control unit 91 is connected to a sensor for detecting a size, a shape, and a position of an object, sensors and switches for detecting states of the individual devices, and an information input device.

[0085] As described above, the first control unit 91 includes the first suction control unit 91a for controlling operations of the suction system and the blower. The first suction control unit 91a drives the first bobbin processing device blower 45, the second bobbin processing device blower 49, the third bobbin processing device blower 60, the fourth bobbin processing device blower 64, the fifth bobbin processing device blower 68, the first shutter device 48, the second shutter device 52, the third shutter device 54, the fourth shutter device 58, the fifth shutter device 62, and the sixth shutter device 66, so as to change suction pressures of the individual suction systems. Note that as communication unit between a first suction control unit 73a and the individual suction systems, it is possible to adopt one of serial communication such as bus communication and parallel communication with a plurality of wires. In addition, it may also be possible to provide a transmitter-receiver so as to perform wireless communication.

(6) Suction Control Structure of Automatic Winder

[0086] With reference to Fig. 4, a suction control structure of the automatic winder 102 is described. Fig. 4 is a block diagram illustrating a suction control structure of the automatic winder.

[0087] The automatic winder 102 includes a bobbin winder device blower 75. The bobbin winder device blower 75 is a device for supplying a suction force to the plurality of suction systems of the automatic winder 102.

[0088] The automatic winder 102 includes an automatic winder suction duct 77. The automatic winder suction duct 77 includes a main duct 77a extending from the bobbin winder device blower 75 and a plurality of branch ducts 77b branching from the main duct 77a.

[0089] Each of the winding units 105 includes a suction system 97 and a unit shutter device 99. The unit shutter device 99 is disposed in the branch duct 77b, for example, and can open/close the air passage between the bobbin winder device blower 75 and the suction system 97.

[0090] The automatic winder 102 includes a second control unit 93. The second control unit 93 is disposed for each of the winding units 105. The second control unit 93 can communicate with the first control unit 91 directly or indirectly.

[0091] The second control unit 93 includes a second

suction control unit 93a for controlling a suction operation of the suction system 97. The second suction control unit 93a drives the unit shutter device 99 so as to change suction pressure of each suction system 97.

(7) Effect of Embodiment

[0092] The suction operation in a combination of the first end finding device 19A and the second end finding device 19B is described as one example of the plurality of suction systems (the first suction system and the second suction system).

[0093] In the bobbin processing device 103 described above, the first bobbin processing device blower 45 and the second bobbin processing device blower 49 are disposed for the first suction system 47 and the second suction system 51, respectively. The first bobbin processing device blower 45 and the second bobbin processing device blower 49 generate suction airflows for the first suction system 47 and the second suction system 51, respectively, so as to operate the first suction system 47 and the second suction system 51. Note that stop of the suction operation described above unit stopping of the motor or closing of an air inlet of the blower by a shutter (not shown). In this way, power consumption can be reduced.

[0094] With the structure described above, while the first suction system 47 is performing the suction operation, the second suction system 51 can stop the suction. In addition, the opposite is possible. In this way, power consumption of the bobbin processing device can be reduced.

[0095] As a first example of the above description, it may be possible that the second end finding device 19B normally stops the suction operation and performs the suction operation only when capacity of the first end finding device 19A is exceeded. In other words, the state where only one of them operates and the state where both of them operate are alternately repeated.

[0096] As a second example of the above description, if the first end finding device 19A and the second end finding device 19B operate for different kinds of yarn, it may be possible to stop the suction operation of the second end finding device 19B while the first end finding device 19A is performing the suction operation, and to stop the suction operation of the first end finding device 19A while the second end finding device 19B is performing the suction operation. In other words, the state where one of them operates and the state where the other operates are alternately repeated.

[0097] In the above description, the first suction system 47 and the second suction system 51 are used for describing the combination of the first suction system and the second suction system. However, the combination example of the first suction system and the second suction system may be other combination among a plurality of suction systems including the third suction system 53, the fourth suction system 57, the fifth suction system 61,

and the sixth suction system 65, as other suction systems.

(8) Variations

[0098] In the embodiment described above, the dedicated blower is disposed in every suction system of the bobbin processing device 103, but the dedicated blower may be disposed in some of the suction systems.

[0099] The minimum structure of the suction systems in which the dedicated blower is disposed is, for example, a combination of the first end finding device 19A and the second end finding device 19B, a combination of the first end finding device 19A and the first side suction device 18A, a combination of the first end finding device 19A and the bunch removing device 14, a combination of the first end finding device 19A and the bobbin removing device 11, or a combination of other two devices.

[0100] In the case described above, the suction system of the bobbin processing device in which a dedicated blower is not disposed is connected to one or more common blowers. The common blower may be dedicated one for the bobbin processing device 103 or may be shared with the automatic winder 102.

2. Other Embodiment

[0101] Although one embodiment of the present invention is described above, the present invention is not limited to the embodiment described above but can be modified variously within the scope of the present invention without deviating from the spirit thereof. In particular, the plurality of examples and variations described in this specification can be arbitrarily combined as necessary.

[0102] The number of the suction systems and the type thereof in the bobbin processing device are not limited to those in the embodiment. For instance, number of the end finding devices may be one. In addition, although the bobbin processing device 103 is disposed between the bobbin supplying device 104 and the automatic winder 102 in the embodiment described above, the present invention can be applied to a structure in which the bobbin processing device 103 is disposed between a ring fine spinning frame and the automatic winder 102.

[0103] The bobbin processing device may include a suction system without a shutter device.

[0104] Although a suction switch mechanism is the shutter device disposed in each suction system in the embodiment described above, this is not particularly a limitation. In other words, instead of disposing the shutter device in the suction system, other type of suction switch mechanism may be adopted. The other type of suction switch mechanism may be, for example, a shutter device for intensively operating the plurality of suction systems, or may be a structure for switching the pressure generated by the blower between high pressure and low pressure so that suction switching is performed.

[0105] The control unit of the bobbin processing device

may use an inverter to switch between high pressure and low pressure.

[0106] Each blower may be constituted of a plurality of blowers.

INDUSTRIAL APPLICABILITY

[0107] The present invention can be widely applied to bobbin processing devices for supplying yarn supplying bobbins to a yarn winding device.

REFERENCE SIGNS LIST

[0108]

3 tray
5A empty bobbin tube
5B yarn supply bobbin tube
11 bobbin removing device
13 yarn bobbin tube supplying device
14 bunch removing device
15A first bunch unwinding device
15B second bunch unwinding device
17A first yarn end processing device
17B second yarn end processing device
18 side suction
18A first side suction device
18B second side suction device
19 end finding device
19A first end finding device
19B second end finding device
45 first bobbin processing device blower
46 first bobbin processing device suction duct
47 first suction system
48 first shutter device
49 second bobbin processing device blower
50 second bobbin processing device suction duct
51 second suction system
52 second shutter device
53 third suction system
54 third shutter device
55 duct
56 third bobbin processing device blower
57 fourth suction system
58 fourth shutter device
59 duct
60 fourth bobbin processing device blower
61 fifth suction system
62 fifth shutter device
63 duct
64 fifth bobbin processing device blower
65 sixth suction system
66 sixth shutter device
67 duct
68 sixth bobbin processing device blower
70 blower box
71 motor
72 fan

73 yarn waste collecting box
74 air filter
75 bobbin winder device blower
76 blower box
5 77 automatic winder suction duct
77a main duct
77b branch duct
78 motor
79 fan
10 80 yarn waste collecting box
81 air filter
82 control box
91 first control unit
91a first suction control unit
15 93 second control unit
93a second suction control unit
97 suction system
99 unit shutter device
101 automatic winder system
20 102 automatic winder
103 bobbin processing device
104 bobbin supplying device
105 winding unit
106 supply path
25 107 collection path
108 tray conveyor line
121 main conveyor line
122 second bunch process line
131 first air passage
30 132 second air passage
133 third air passage
134 fourth air passage
135 fifth air passage
136 sixth air passage
35

Claims

1. A bobbin processing device for supplying a yarn supplying bobbin to a yarn winding device, the bobbin processing device comprising:
- 40
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- a first suction system configured to suck air so as to process a yarn on the yarn supplying bobbin;
a second suction system configured to suck air so as to process a yarn on the yarn supplying bobbin;
a first suction source configured to generate a suction airflow for the first suction system;
a second suction source configured to generate a suction airflow for the second suction system;
a first air dispensing passage disposed between the first suction source and the first suction system; and
a second air dispensing passage disposed between the second suction source and the second suction system.

2. The bobbin processing device according to claim 1, further comprising:

a first shutter device disposed in the first air dispensing passage so as to open or close between the first suction source and the first suction system; and
a second shutter device disposed in the second air dispensing passage so as to open or close between the second suction source and the second suction system.

a third suction source configured to generate a suction airflow for the third suction system; and a third air dispensing passage disposed between the third suction source and the third suction system.

3. The bobbin processing device according to claim 1 or 2, wherein the first suction system and the second suction system are disposed respectively in an end finding device configured to position a yarn end of the yarn on the yarn supplying bobbin at a predetermined position and a side suction device configured to suck the yarn end of the yarn on the yarn supplying bobbin laterally in a previous step of the end finding device.

4. The bobbin processing device according to claim 1 or 2, wherein the first suction system and the second suction system are disposed respectively in a first end finding device and a second end finding device, which position a yarn end of the yarn on the yarn supplying bobbin at a predetermined position.

5. The bobbin processing device according to claim 1 or 2, wherein the first suction system and the second suction system are disposed respectively in an end finding device configured to position a yarn end of the yarn on the yarn supplying bobbin at a predetermined position and a bunch removing device disposed in a bobbin supplying device configured to supply the yarn supplying bobbin to a tray.

6. The bobbin processing device according to claim 1 or 2, wherein the first suction system and the second suction system are disposed respectively in an end finding device configured to position a yarn end of the yarn on the yarn supplying bobbin at a predetermined position and a bobbin removing device configured to suck and remove a residual yarn on the yarn supplying bobbin.

7. The bobbin processing device according to any one of claims 1 to 6, further comprising a first control unit configured to control operations of the first suction source and the second suction source.

8. The bobbin processing device according to any one of claims 1 to 7, further comprising:

a third suction system configured to suck air so as to process a yarn on the yarn supplying bobbin;

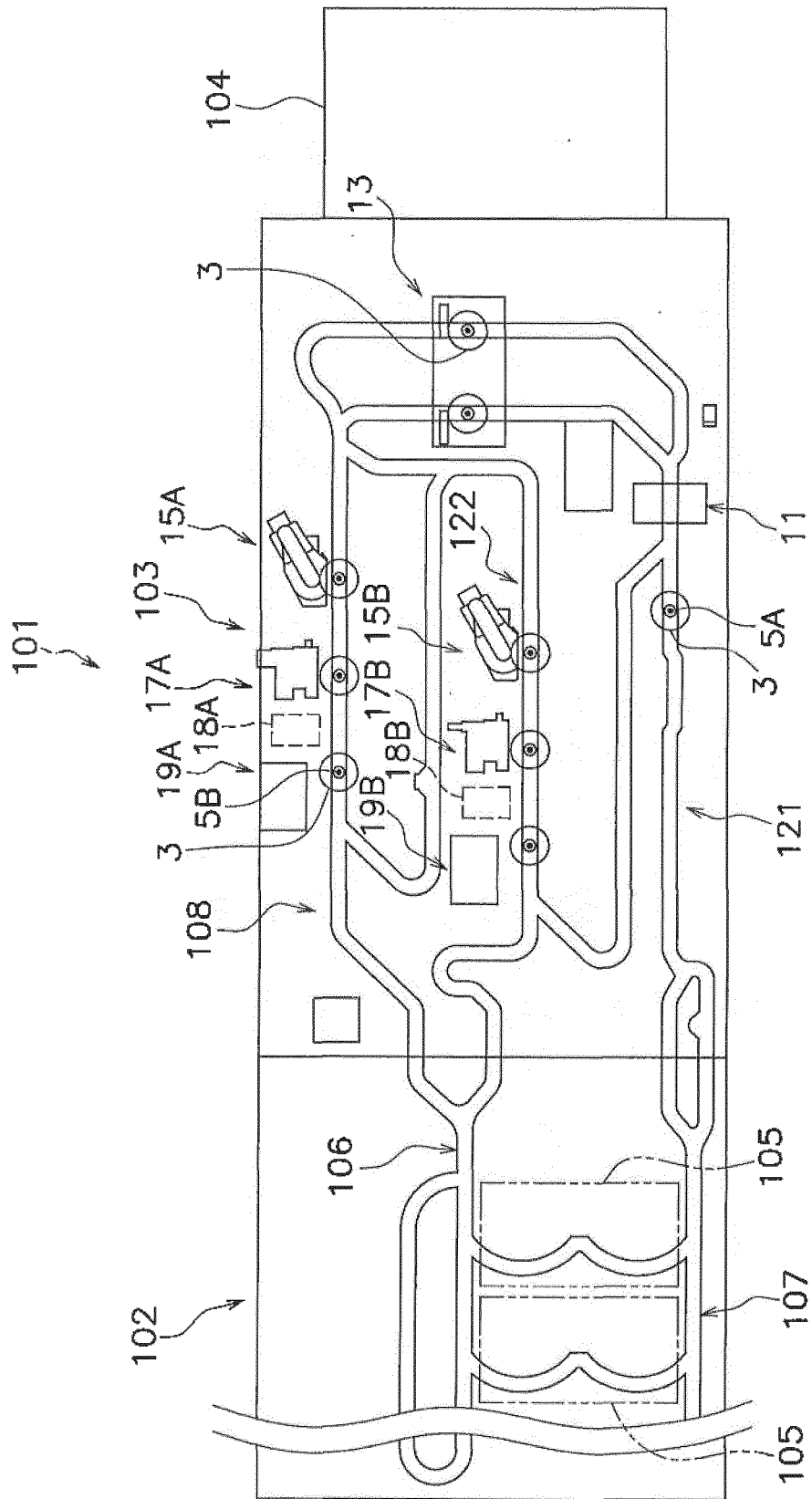


FIG. 1

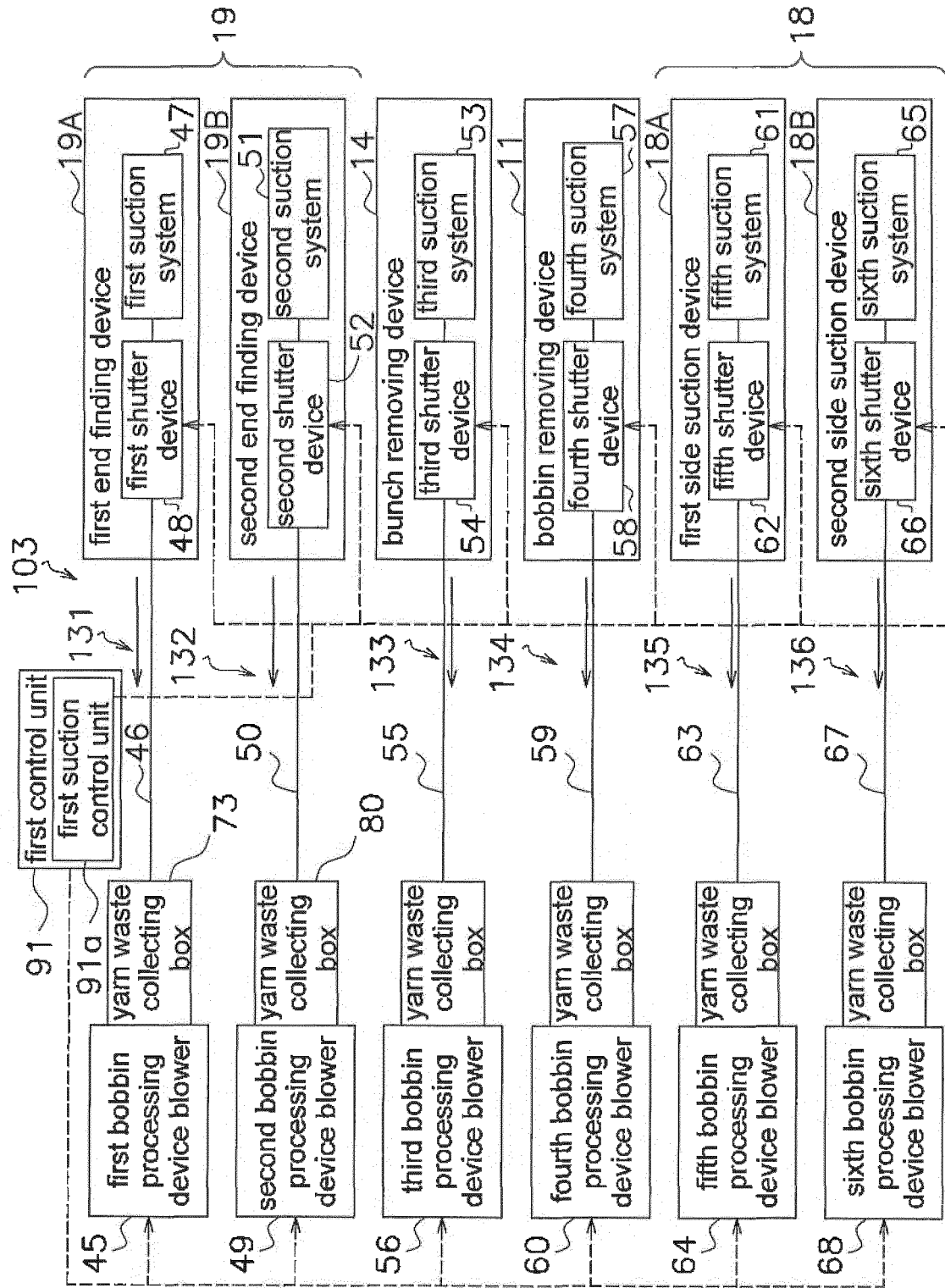


FIG. 2

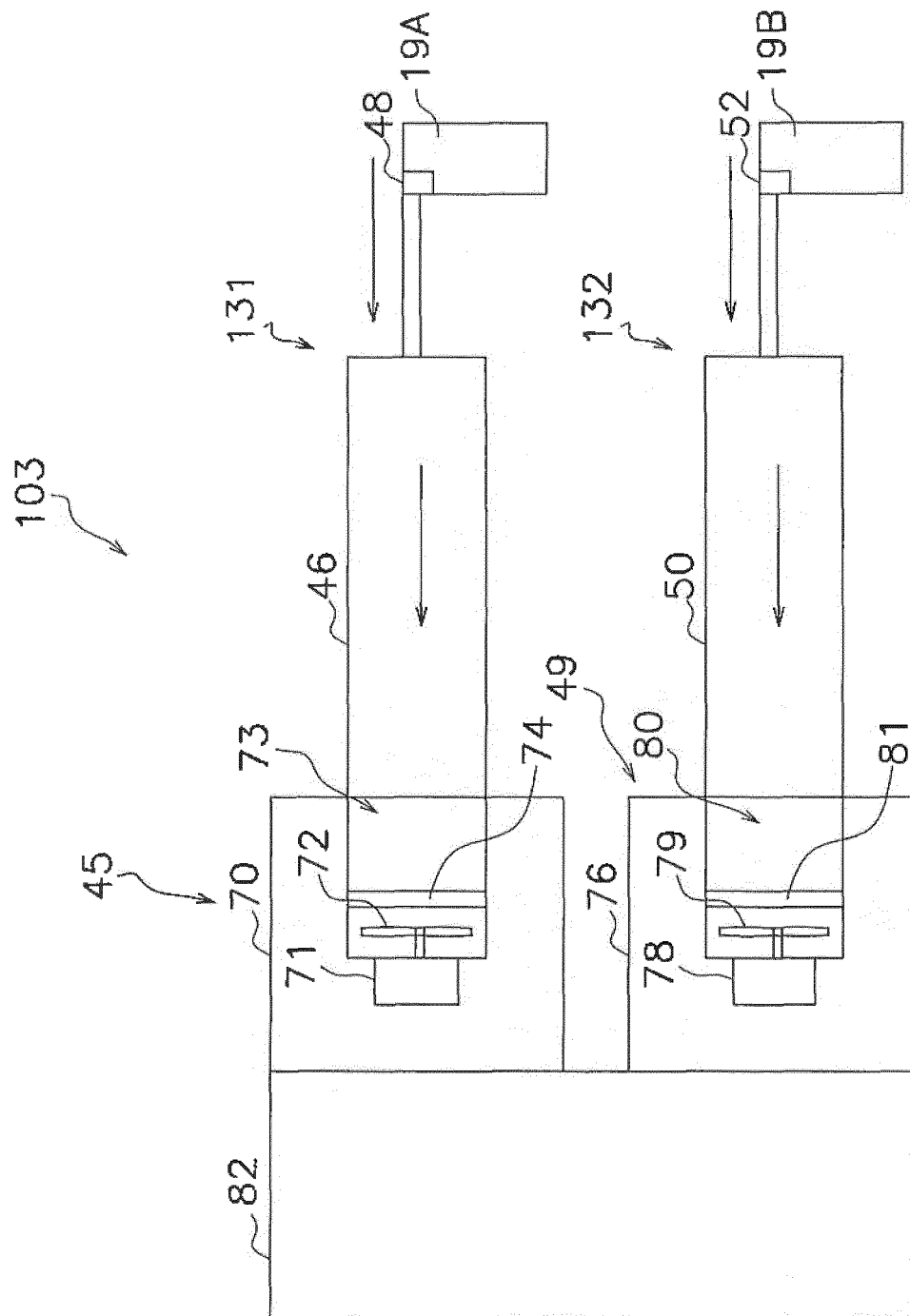


FIG. 3

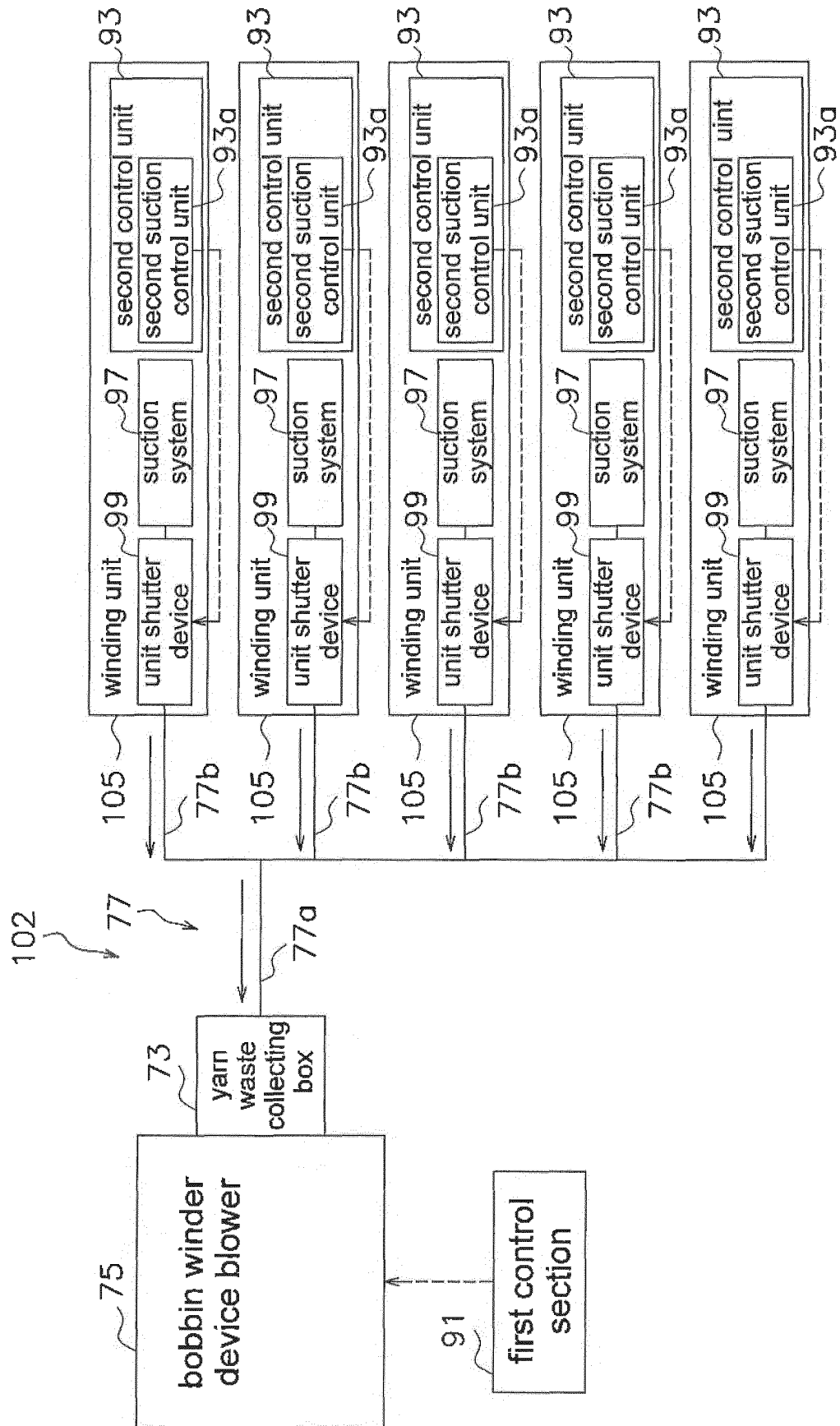


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/011181

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. B65H67/08 (2006.01) i, D01H15/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. B65H67/00-67/08, D01H15/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2018

Registered utility model specifications of Japan 1996-2018

Published registered utility model applications of Japan 1994-2018

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2003-321162 A (MURATA MACHINERY LTD.) 11 November 2003, paragraphs [0015]-[0033], fig. 1-5 (Family: none)	1-8
Y	JP 2010-236102 A (MURATA MACHINERY LTD.) 21 October 2010, paragraph [0104] (Family: none)	1-8



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search
05.06.2018Date of mailing of the international search report
19.06.2018Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/011181

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 058108/1989 (Laid-open No. 149665/1990) (MURATA MACHINERY LTD.) 20 December 1990, page 4, line 17 to page 9, line 8, fig. 1 (Family: none)	2-8
Y	JP 07-133072 A (MURATA MACHINERY LTD.) 23 May 1995, paragraphs [0037]-[0041], fig. 1 (Family: none)	3, 7-8

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2322460 A [0006]