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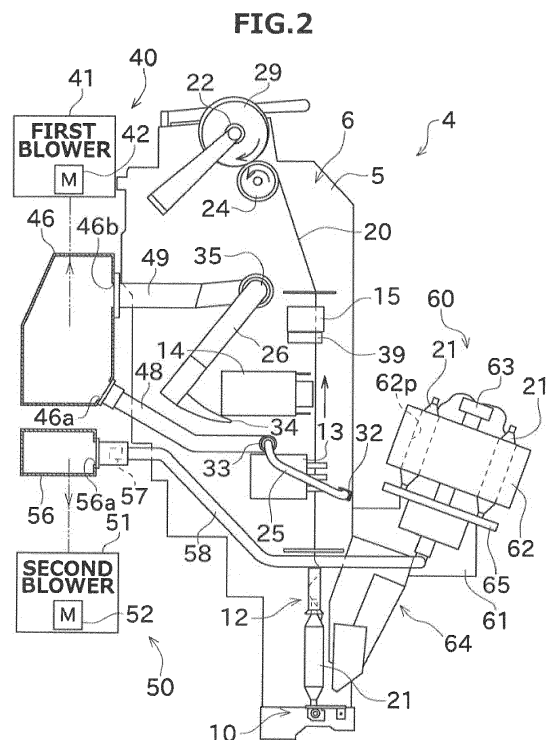
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(54) **TEXTILE MACHINE**

(57) A lower yarn guiding pipe (25) and an upper yarn guiding pipe (26) suck and collect yarn waste generated in a winder unit (4). A first suction current generating mechanism (40) includes a negative pressure electric motor (42) that generates a first suction current in the lower yarn guiding pipe (25) and the upper yarn guiding pipe (26). A yarn end holding section (63) sucks and holds a yarn end of a yarn supplying bobbin (21) accommodated in a pocket (62p) of a magazine-type bobbin feeding mechanism (60), and collects generated yarn waste. A second suction current generating mechanism (50) generates a second suction current in the yarn end holding section (63) by the action of a negative pressure electric motor (52) that is different from the negative pressure electric motor (42).



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a textile machine that includes a magazine-type bobbin feeding mechanism.

2. Description of the Related Art

[0002] Textile machines that include a magazine-type bobbin feeding mechanism are known in the art.

[0003] The automatic winder disclosed in Japanese Patent Application Laid-Open No. 2013-67445 includes a yarn supplying section that holds a bobbin from which the yarn is unwound, a winding section that winds the unwound yarn around a winding tube, a bobbin feeding section that feeds a bobbin to the yarn supplying section, and a yarn joining device that joins the yarn on the yarn supplying side and the yarn on the yarn winding side. The bobbin feeding section includes a magazine that is capable of accommodating a plurality of the bobbins. The magazine is rotatable around a vertical rotation axis.

[0004] The automatic winder disclosed in Japanese Patent Application Laid-Open No. 2013-67445 includes a duct to supply a negative pressure. Moreover, a hollow shaft body is formed in the rotation axis of the magazine, and the shaft body and the duct are connected to each other via a suction hose and the like.

[0005] With this configuration, the yarn end of the bobbin accommodated in the magazine can be sucked and held in an upper edge of the shaft body. The duct supplies a negative pressure to a guiding member that catches the yarn on the yarn supplying side by the action of air suction and guides the yarn to the yarn joining device, and a guiding member that catches the yarn on the winding side by the action of air suction and guides the yarn to the yarn joining device.

[0006] The cup magazine device disclosed in Japanese Published Examined Application No. H2-29587 supplies air to an air-blowing port via an air supplying pipe, causing the blown air to act from the bottom hole of the spinning bobbin cop located at unloading preparation position to efficiently suck the yarn end from the opening.

[0007] The automatic winder disclosed in Japanese Patent Application Laid-Open No. S57-77173 has a suction head attached to an upper part of the magazine moves up / down to open / close a suction port attached to the suction head or a suction pipe.

[0008] The automatic winder disclosed in European Patent Application Laid-Open No. 2799380, though it is not a magazine-type automatic winder, includes for each winder unit a separate suction device to generate a negative pressure, and the automatic winder supplies the negative pressure to a suction guiding member that

guides the yarn to the yarn joining device.

[0009] In the automatic winder disclosed in Japanese Patent Application Laid-Open No. 2013-67445, a negative pressure to suck the yarn end of the bobbin accommodated in the magazine, and a negative pressure for the guiding member that guides the yarn to the yarn joining device to suck the yarn end were supplied from one duct. Therefore, in a negative pressure source that supplies the negative pressure via the duct, it was necessary to use a driving source that had a large output capable of generating a strong suction current (the negative pressure). This requirement resulted in an increased cost and an increased size of the device.

[0010] Moreover, in the automatic winder disclosed in Japanese Patent Application Laid-Open No. 2013-67445, for example, even in a situation in which it is required to feed the bobbin to the magazine of each winding unit and hold the yarn in a state in which yarn winding of all the winding units of the automatic winder is stopped, a suction current is inevitably generated not only in the magazine but also in the guiding member that guides the yarn to the yarn joining device, resulting in energy wastage. Based on the above discussion, the configuration of the automatic winder disclosed in Japanese Patent Application Laid-Open No. 2013-67445 can be improved.

[0011] Furthermore, Japanese Published Examined Application No. H2-29587 and Japanese Patent Application Laid-Open No. S57-77173 do not disclose the configuration that allows supply of the negative pressure to the guiding member that guides the yarn to the yarn joining device. Moreover, European Patent Application Laid-Open No. 2799380 does not relate to the magazine-type bobbin feeding mechanism.

SUMMARY OF THE INVENTION

[0012] The present invention has been made in view of the above circumstances. It is an object of the present invention to provide a textile machine that facilitates cost reduction and downsizing of a driving source that generates a suction current to be generated in various structural components, and reduction of energy consumption as much as possible.

[0013] According to one aspect of the present invention, a textile machine includes a plurality of winder units that unwinds a yarn from a yarn supplying bobbin that is supported in a yarn supplying section to form a package; a sucking and collecting device arranged per winder unit to suck and collect yarn waste generated in the winder unit; a first suction current generating mechanism that includes a first driving source that generates a first suction current in the sucking and collecting device; and a second suction current generating mechanism that generates a second suction current by using a second driving source that is different from the first driving source. Each winder unit includes a magazine-type bobbin feeding mechanism to feed the yarn supplying bobbin to the yarn

supplying section. The magazine-type bobbin feeding mechanism includes a plurality of pockets for accommodating the yarn supplying bobbins; and a yarn end holding section that sucks and holds a yarn end of the yarn supplying bobbin accommodated in the pocket, and collects generated yarn waste. The second suction current generating mechanism generates the second suction current in the yarn end holding section.

[0014] The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is an external perspective view of an overall configuration of an automatic winder according to a first embodiment of the present invention.

FIG. 2 is a schematic partial cross-sectional side view of a winder unit.

FIG. 3 is a schematic side view of a magazine-type bobbin feeding mechanism included in the winder unit.

FIG. 4 is a view for schematically explaining a first suction current generating mechanism and a second suction current generating mechanism.

FIG. 5 is an external perspective view showing a configuration of a suction blower duct included in the first suction current generating mechanism and a distributing blower duct included in the second suction current generating mechanism.

FIG. 6 is a schematic partial cross-sectional side view showing a configuration around the magazine-type bobbin feeding mechanism of an automatic winder according to a second embodiment.

FIG. 7 is an enlarged cross-sectional view showing a detailed configuration of an air sucker.

FIG. 8 is a schematic partial cross-sectional side view of a winder unit included in an automatic winder according to a third embodiment.

DETAILED DESCRIPTION

[0016] Exemplary embodiments of the present invention are explained below with reference to the accompanying drawings.

First Embodiment

[0017] First, an overview of an automatic winder 1, which is a textile machine according to a first embodiment, is explained with reference to FIG. 1. FIG. 1 is an external perspective view of an overall configuration of the automatic winder 1 according to the first embodiment

of the present invention. The automatic winder (the textile machine) 1 according to the present embodiment includes, as shown in FIG. 1, a plurality of winder units 4 that is arranged side by side, a blower box 7 arranged at one end in the direction in which the plurality of the winder units 4 is arranged, and a main control device 8.

[0018] Each winder unit 4 includes a unit frame 5 arranged on one side (left or right) when seen from a front side, and a winding section 6 arranged in the lateral direction of the unit frame 5. Inside the unit frame 5 is arranged a not-shown unit controlling section that controls various structural components of the winding section 6. The main control device 8 is capable of communicating with the unit controlling section, and can centrally control the operation of the plurality of the winder units 4.

[0019] Next, the winder unit 4 is explained in detail with reference to FIG. 2. FIG. 2 is a schematic side view of the winder unit 4. The winder unit 4 is a device that forms a package 29 by unwinding a yarn from a yarn supplying bobbin 21 and winding the unwound yarn around a winding bobbin 22. Various structural components of the winder unit 4 are explained below.

[0020] The winding section 6 of the winder unit 4 includes a bobbin setting section (yarn supplying section) 10 and a traversing drum 24.

[0021] The bobbin setting section 10 holds at a predetermined position the yarn supplying bobbin 21 from which a yarn 20 is to be unwound.

[0022] The traversing drum 24 is rotationally driven by a not-shown electric motor and the like in a state of being in contact with the winding bobbin 22 so that the yarn 20 unwound from the yarn supplying bobbin 21 can be traversed at a predetermined width and wound around the winding bobbin 22.

[0023] As shown in FIGS. 1 and 2, the winder unit 4 includes on the front side thereof a magazine-type bobbin feeding mechanism 60 that allows an operator to supply the yarn supplying bobbin 21. The bobbin feeding mechanism 60 includes a magazine can 62 and the like that has a plurality of pockets 62p (specifically, nine) formed thereon so that the operator can set the yarn supplying bobbins 21 in the pockets 62p. When all the yarn 20 is unwound from the yarn supplying bobbin 21 set in the bobbin setting section 10 and the empty yarn supplying bobbin is discharged by a not-shown discharging mechanism, the yarn supplying bobbin 21 that is stocked in the bobbin feeding mechanism 60 gets set in the bobbin setting section 10 (yarn supplying bobbin replacement). The detailed configuration of the bobbin feeding mechanism 60 is explained later.

[0024] The winding section 6 includes various devices arranged on a traveling path of the yarn 20 between the bobbin setting section 10 and the traversing drum 24. Specifically, an unwinding assisting device 12, a tension applying device 13, a yarn joining device 14, and a yarn quality measuring device 15 are arranged in this order from the bobbin setting section 10 side toward the traversing drum 24 side as the main devices in the traveling

path of the yarn 20.

[0025] The unwinding assisting device 12 assists in the unwinding of the yarn 20 by causing a movable member to come into contact with a balloon formed above the yarn supplying bobbin 21 by the swaying action of the yarn 20 unwound from the yarn supplying bobbin 21 and thereby appropriately controlling size of the balloon.

[0026] The tension applying device 13 applies a predetermined tension on the traveling yarn 20. The tension applying device 13 according to the present embodiment has a gate-type structure with movable comb teeth arranged with respect to fixed comb teeth. The movable comb teeth are moved by a rotary-type solenoid, so that the movable comb teeth and the fixed comb teeth are either in an engaged state or in a released state.

[0027] The yarn quality measuring device 15 monitors the thickness of the yarn 20 and detects defects such as slub (hereinafter, "yarn defect") generated in the yarn 20. Moreover, a cutter 39 that immediately cuts the yarn 20 when the yarn quality measuring device 15 detects a yarn defect is arranged on the upstream side (below) of the yarn quality measuring device 15 on the yarn path.

[0028] The yarn joining device 14 joins a lower yarn on the yarn supplying bobbin 21 side and an upper yarn on the package 29 side when the yarn 20 is cut by the cutter 39 upon detection of the yarn defect by the yarn quality measuring device 15, when the yarn 20 that is being unwound from the yarn supplying bobbin 21 breaks, when the yarn supplying bobbin 21 is replaced, and the like. The yarn joining device 14 according to the present embodiment is of a kind in which compressed air is supplied from a not-shown compressor and the yarn is joined by twisting the ends together.

[0029] A lower yarn guiding pipe (sucking and collecting device) 25 that sucks, catches, and guides the lower yarn from the yarn supplying bobbin 21 side, and an upper yarn guiding pipe (sucking and collecting device) 26 that sucks, catches, and guides the upper yarn from the package 29 side are respectively arranged on the lower side and the upper side of the yarn joining device 14. A suction port 32 is formed at the tip end of the lower yarn guiding pipe 25, and a suction mouth (suction port) 34 is arranged at the tip end of the upper yarn guiding pipe 26. As explained later, the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 are connected to a first blower 41 that operates as a negative pressure source via pipes 48 and 49, a suction blower duct 46, and the like. Accordingly, a suction current can be generated in the suction port 32 and the suction mouth 34.

[0030] With this configuration, when the yarn supplying bobbin 21 is replaced and the like, the suction port 32 of the lower yarn guiding pipe 25 pivots downward to suck and catch the lower yarn, and then pivots upward around a shaft 33 to guide the lower yarn till the yarn joining device 14. Moreover, almost at the same time, the suction mouth 34 of the upper yarn guiding pipe 26 sucks and catches the upper yarn that is being unwound from the package 29 driven in the reverse direction, and then piv-

ots downward around a shaft 35 to guide the upper yarn till the yarn joining device 14. Then, the lower yarn and the upper yarn are joined in the yarn joining device 14. The yarn waste generated at the time of yarn joining is sucked from the suction port 32 and the suction mouth 34 and collected.

[0031] With the above configuration, each winder unit 4 of the automatic winder 1 can form the package 29 of a predetermined length by unwinding the yarn 20 from the yarn supplying bobbin 21 supported in the bobbin setting section 10 and winding the unwound yarn 20 around the winding bobbin 22.

[0032] The magazine-type bobbin feeding mechanism 60 is explained in detail below with reference to FIG. 3. The bobbin feeding mechanism 60 mainly includes a magazine holding section 61, the magazine can 62, a yarn end holding section 63, a yarn supplying bobbin guiding section 64, and a bobbin receiving plate 65.

[0033] The magazine holding section 61 holds the magazine can 62, and extends in a front upward direction from a lower part of the winder unit 4. The magazine can 62 is attached to the tip end of the magazine holding section 61.

[0034] The magazine can 62 is a cylindrical member for stocking a plurality of the yarn supplying bobbins 21. In the magazine can 62, the plurality of the pockets 62p is arranged at equal intervals on the circumference thereof, and the yarn supplying bobbin 21 can be accommodated (set) in an inclined state in each pocket 62p. The magazine can 62 is intermittently rotatable by a not-shown driving mechanism.

[0035] The yarn end holding section 63 sucks and holds (catches) a yarn end of the yarn supplying bobbin 21 accommodated in the pocket 62p at the time of yarn end preparation and the like. Moreover, the yarn end holding section 63 can collect the yarn waste generated when the yarn end of the yarn supplying bobbin 21 is caught. As explained later in detail, the yarn end holding section 63 is connected to a second blower 51 that is a negative pressure source different from the first blower 41 via a pipe 58, a distributing blower duct 56, and the like shown in FIG. 2 and the like. Accordingly, a suction current can be generated at a suction port located at an upper end of the yarn end holding section 63.

[0036] The yarn supplying bobbin guiding section 64 causes the yarn supplying bobbin 21 dropping from the magazine can 62 to fall obliquely to guide to the bobbin setting section 10.

[0037] The bobbin receiving plate 65 is a disk-shaped member that receives the lower ends of the yarn supplying bobbins 21 accommodated in the pockets 62p. A not-shown cutout portion through which the yarn supplying bobbin 21 can pass is formed on the bobbin receiving plate 65 at a position at which the cutout portion is positioned just above the yarn supplying bobbin guiding section 64. When the magazine can 62 rotates intermittently with respect to the bobbin receiving plate 65 and one of the yarn supplying bobbins 21 accommodated in the

pockets 62p of the magazine can 62 reaches above the cutout portion, the yarn supplying bobbin 21 falls inside the yarn supplying bobbin guiding section 64 through the cutout portion. Accordingly, the yarn supplying bobbin 21 is set in the bobbin setting section 10.

[0038] Before the yarn supplying bobbin 21 is set, the yarn end of the yarn supplying bobbin 21 is held by the yarn end holding section 63. Therefore, when the yarn supplying bobbin 21 falls from the magazine can 62 and is set in the bobbin setting section 10, the yarn end gets unwound (extends upward). In this state, the yarn end is collected by a not-shown lever included in the winder unit 4, guided near the suction port 32 of the lower yarn guiding pipe 25, cut by a not-shown appropriate cutter, and caught by the lower yarn guiding pipe 25. Moreover, almost at the same time, the excessive yarn end pulled from the yarn supplying bobbin 21 is sucked as yarn waste by the yarn end holding section 63. Then, the yarn end of the yarn supplying bobbin 21 caught by the lower yarn guiding pipe 25 is guided to the yarn joining device 14, and the yarn joining as explained above is performed. After the yarn joining is complete by the yarn joining device 14, the yarn 20 is unwound from the yarn supplying bobbin 21 set in the bobbin setting section 10 and the yarn 20 is wound again.

[0039] Next, configurations included in the automatic winder 1 to generate a suction current in various structural components of the automatic winder 1 are explained in detail mainly with reference to FIGS. 2, 4, and 5.

[0040] The automatic winder 1 according to the present embodiment mainly includes a first suction current generating mechanism 40 and a second suction current generating mechanism 50 as the configurations to generate a suction current in the various structural components (components where suction is required). The suction current generating mechanisms are explained below in detail.

[0041] The first suction current generating mechanism 40 shown in FIG. 4 generates a suction current in the various structural components for sucking and collecting the yarn waste generated in each winder unit 4 (excluding the yarn waste generated in the bobbin feeding mechanism 60). Specifically, the first suction current generating mechanism 40 can generate a suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26. The first suction current generating mechanism 40 includes the first blower 41, a filter 44, a dust case 45, and the suction blower duct 46. The blower box 7 houses inside thereof the first blower 41, the filter 44, and the dust case 45.

[0042] The first blower 41 includes a negative pressure electric motor 42 and a fan 43. The negative pressure electric motor 42 is a driving source (first driving source) that generates a negative pressure. The fan 43 is fixed to an output shaft of the negative pressure electric motor 42. When the fan 43 is rotationally driven by the negative pressure electric motor 42, a suction current (air current) that flows in the direction of arrows shown in FIG. 4 is

formed. The filter 44 is arranged immediately upstream of the fan 43 in the suction current direction. The dust case 45 accommodates the filter 44. The yarn waste flown in by the action of the suction current is caught by the filter 44 and collected in the dust case 45. The operator regularly recovers the yarn waste collected in the dust case 45.

[0043] The suction blower duct 46 distributes the negative pressure generated by the rotation of the fan 43 to each of the winder units 4. The suction blower duct 46 is an elongated cylindrical member having a polygonal cross section as shown in FIG. 5. As shown in FIG. 4, one end of the suction blower duct 46 in the longitudinal direction is connected to (i.e., communicates with) the dust case 45. The suction blower duct 46 is arranged so as to extend laterally on the back side of the automatic winder 1.

[0044] As shown in FIG. 2, the suction port 32 of the lower yarn guiding pipe 25 of each winder unit 4 is connected to the suction blower duct 46 via the pipe 48, and the suction mouth 34 of the upper yarn guiding pipe 26 of each winder unit 4 is connected to the suction blower duct 46 via the pipe 49. More specifically, in the suction blower duct 46, as shown in FIG. 5, a plurality of first openings 46a is formed in the suction blower duct 46 in the longitudinal direction thereof at the same interval as the length in the width direction of the winder unit 4. Moreover, a plurality of second openings 46b is formed on the suction blower duct 46 in the longitudinal direction thereof at the same interval as the length in the width direction of the winder unit 4. The pipe 48 that extends from the lower yarn guiding pipe 25 is connected to the first openings 46a. The pipe 49 that extends from the upper yarn guiding pipe 26 is connected to the second openings 46b.

[0045] With this configuration, the yarn waste and the like generated at the time of yarn joining and the like passes through the lower yarn guiding pipe 25 or the upper yarn guiding pipe 26, and gets sucked in the suction blower duct 46 via the pipes 48 and 49. The yarn waste entered in the suction blower duct 46 flows inside the suction blower duct 46 in the direction of the arrows shown in FIG. 4 (the side on which the first blower 41 is arranged) and gets caught by the filter 44. Accordingly, the yarn waste and the like generated in the lower yarn guiding pipe 25, the upper yarn guiding pipe 26, and the like gets collected in the dust case 45.

[0046] Because the first blower 41 according to the present embodiment generates the suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 of all the winder units 4 of the automatic winder 1 in this manner, the negative pressure electric motor 42 is in a driven (operating) state even if only some of the winder units 4 of the automatic winder 1 are performing winding of the yarn 20. In other words, unless the winding of the yarn 20 in all the winder units 4 of the automatic winder 1 stops, the driving of the negative pressure electric motor 42 cannot be stopped.

[0047] The second suction current generating mecha-

nism 50 shown in FIG. 4 generates a suction current in the yarn end holding section 63 to suck and collect the yarn waste generated in the magazine-type bobbin feeding mechanism 60 of each winder unit 4. The second suction current generating mechanism 50 mainly includes the second blower 51, a filter 54, a dust case 55, and the distributing blower duct 56. The blower box 7 houses inside thereof the second blower 51, the filter 54, and the dust case 55.

[0048] The second blower 51 includes a negative pressure electric motor 52 and a fan 53. The negative pressure electric motor 52 is a driving source (second driving source) that generates a negative pressure. The fan 53 is fixed to an output shaft of the negative pressure electric motor 52. When the fan 53 is rotationally driven by the negative pressure electric motor 52, a suction current (air current) that flows in the direction of arrows shown in FIG. 4 is formed. The filter 54 is arranged immediately upstream of the fan 53 in the suction current direction. The dust case 55 accommodates the filter 54. The yarn waste flown in by the action of the suction current is caught by the filter 54 and collected in the dust case 55. The operator regularly recovers the yarn waste collected in the dust case 55.

[0049] The distributing blower duct 56 distributes the suction current generated by the rotation of the fan 53 to each of the winder units 4. The distributing blower duct 56 is an elongated cylindrical member having a rectangular cross section as shown in FIG. 5. One end in the longitudinal direction of the distributing blower duct 56 is connected to (i.e., communicates with) the dust case 55. The distributing blower duct 56 is arranged in parallel to the suction blower duct 46 and extends laterally on the back side of the automatic winder 1.

[0050] As shown in FIG. 2, the yarn end holding section 63 of the bobbin feeding mechanism 60 of each winder unit 4 is connected to the distributing blower duct 56 via the pipe 58. More specifically, in the distributing blower duct 56, as shown in FIG. 5, a plurality of third openings 56a is formed in the distributing blower duct 56 in the longitudinal direction thereof at predetermined intervals (at positions corresponding to the respective winder units 4). The pipe 58 that extends from the yarn end holding section 63 is connected to the third openings 56a.

[0051] Furthermore, according to the present embodiment, a shutter 57 constituted by an opening / closing mechanism of a plate member is arranged between one third opening 56a and one yarn end holding section 63. The shutter 57 constitutes a part of the second suction current generating mechanism 50. The shutter 57 is openable / closable by the control performed by the unit controlling section or the main control device 8.

[0052] With this configuration, the yarn waste and the like generated when the yarn end of the yarn supplying bobbin 21 is being held by the yarn end holding section 63 passes through the yarn end holding section 63, and gets sucked in the distributing blower duct 56 via the pipe 58. The yarn waste entered in the distributing blower duct

56 flows inside the distributing blower duct 56 in the direction of the arrows shown in FIG. 4, and gets caught by the filter 54. Accordingly, the yarn waste and the like generated in the yarn end holding section 63 gets collected in the dust case 55.

[0053] In this manner, the automatic winder 1 according to the present embodiment separately includes the driving source (the negative pressure electric motor 42) for the first suction current generating mechanism 40 and the driving source (the negative pressure electric motor 52) for the second suction current generating mechanism 50. By dividing the workload of generating the negative pressure among a plurality of the driving sources, electric motors having the appropriate output according to the respective load can be used as the negative pressure electric motor 42 and the negative pressure electric motor 52. Accordingly, compact and inexpensive motors can be used as the negative pressure electric motor 42 and the negative pressure electric motor 52. Furthermore, by using the negative pressure electric motor 42 and the negative pressure electric motor 52 of specifications according to the respective purpose as explained above, using the conventional high output electric motor becomes unnecessary and the overall cost of the automatic winder 1 can be reduced.

[0054] Moreover, by arranging separate driving sources, generation of the negative pressure becomes mutually independent and easy to control. In other words, for example, even in a situation in which it is required to feed the yarn supplying bobbin 21 to the bobbin feeding mechanism 60 and perform the yarn end preparation in a state in which the winding of the yarn 20 in all the winder units 4 of the automatic winder 1 is stopped, the operation can be performed by stopping the negative pressure electric motor 42 and driving (operating) only the negative pressure electric motor 52. Accordingly, energy consumption can be reduced.

[0055] Moreover, because the first blower 41 that generates the suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26, and the second blower 51 that generates the suction current in the yarn end holding section 63 of the bobbin feeding mechanism 60 are included as the separate blowers, a respectively appropriate suction current (negative pressure) can be generated. Therefore, collection of the yarn waste generated in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26, and suction of the yarn end by the yarn end holding section 63 of the bobbin feeding mechanism 60 (collection of the yarn waste) can be performed efficiently. Normally, a strong negative pressure is necessary in the upper yarn guiding pipe 26 because the yarn 20 needs to be sucked in all areas in the width direction of the package 29; however, a strong negative pressure is not necessary in the yarn end holding section 63 because the operator pulls the yarn 20 from the yarn supplying bobbin 21 and then causes the yarn 20 to be sucked. In the present embodiment, by considering the circumstances such as the ones explained above, be-

cause an appropriate negative pressure can be generated by each blower (including the negative pressure electric motor), the energy consumption can be reduced.

[0056] Moreover, the second blower 51 distributes the suction current generated by the rotation of the fan 53 to the yarn end holding section 63 of the bobbin feeding mechanism 60 included in a plurality of the winder units 4. Accordingly, the suction current can be generated in a plurality of the yarn end holding sections 63 by the action of the negative pressure generated by the rotation of one fan 53, and the configuration of the second suction current generating mechanism 50 can be simplified.

[0057] Moreover, in the yarn end holding section 63 of each magazine-type bobbin feeding mechanism 60, by opening / closing the corresponding shutter 57, the suction current can be generated in or the same can be stopped in each yarn end holding section 63. Therefore, the suction current can be generated only in the bobbin feeding mechanism 60 to which the yarn supplying bobbin 21 is to be fed to perform the yarn end preparation and the like, and thus, components to which the suction current is to be distributed can be limited to the ones where the suction current is necessary, making it possible to reduce the energy consumption.

[0058] As explained above, the automatic winder 1 of the present embodiment includes the plurality of the winder units 4, the lower yarn guiding pipe 25, the upper yarn guiding pipe 26, and the first suction current generating mechanism 40. Each of the winder units 4 unwinds the yarn 20 from the yarn supplying bobbin 21 supported in the bobbin setting section 10 to form the package 29. The lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 suck and collect the yarn waste generated in the winder unit 4. The first suction current generating mechanism 40 includes the negative pressure electric motor 42 that generates a suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26. Each winder unit 4 includes the magazine-type bobbin feeding mechanism 60 to feed the yarn supplying bobbin 21 to the bobbin setting section 10. The magazine-type bobbin feeding mechanism 60 includes the plurality of the pockets 62p, the yarn end holding section 63, and the second suction current generating mechanism 50. Each of the pockets 62p is capable of accommodating the yarn supplying bobbin 21. The yarn end holding section 63 sucks and holds a yarn end of the yarn supplying bobbin 21 accommodated in the pocket 62p, and collects the generated yarn waste. In the second suction current generating mechanism 50, the negative pressure electric motor 52 that is different from the negative pressure electric motor 42 generates a suction current in the yarn end holding section 63.

[0059] Accordingly, because separate driving sources (negative pressure electric motors) are arranged for the first suction current generating mechanism 40 and the second suction current generating mechanism 50, electric motors having the appropriate output according to the respective load can be used as the negative pressure

electric motor 42 and the negative pressure electric motor 52. Accordingly, compact and inexpensive motors can be used as the negative pressure electric motor 42 and the negative pressure electric motor 52. Moreover, for example, even in a situation in which it is required to feed the yarn supplying bobbin 21 to the bobbin feeding mechanism 60 and perform the yarn end preparation in a state in which the winding of the yarn 20 in all the winder units 4 is stopped, the operation can be performed by stopping the negative pressure electric motor 42 and driving only the negative pressure electric motor 52. Accordingly, the energy consumption can be reduced.

[0060] Moreover, in the automatic winder 1 according to the present embodiment, the first suction current generating mechanism 40 includes the first blower 41. The second suction current generating mechanism 50 includes the second blower 51 that is different from the first blower 41.

[0061] By including two separate blowers, that is, the first blower 41 for the sucking and collecting device (for the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26), and the second blower 51 for the yarn end holding section 63 of the magazine-type bobbin feeding mechanism 60, a respectively appropriate suction current (negative pressure) can be generated. As a result, collection of the yarn waste by the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26, and suction of the yarn end by the yarn end holding section 63 of the bobbin feeding mechanism 60 (collection of the yarn waste) can be performed with minimum required energy. Accordingly, the energy consumption can be reduced.

[0062] Moreover, in the automatic winder 1 according to the present embodiment, the second blower 51 includes the distributing blower duct 56 that distributes the suction current to the yarn end holding sections 63 of the plurality of the winder units 4 to generate a suction current therein.

[0063] Accordingly, the suction current generated by one negative pressure electric motor 52 can be distributed to the yarn end holding sections 63 of the plurality of the magazine-type bobbin feeding mechanisms 60.

[0064] Moreover, the automatic winder 1 according to the present embodiment includes the shutter 57 that is operated to switch between generation of the suction current to the yarn end holding section 63 of each winder unit 4 and stopping the same.

[0065] Accordingly, in the yarn end holding section 63 of each magazine-type bobbin feeding mechanism 60, by opening / closing the corresponding shutter 57, the suction current can be generated to or the same can be stopped. Therefore, the suction current can be generated only when feeding the yarn supplying bobbin 21 and preparing the yarn end or when the yarn supplying bobbin 21 is replaced in each bobbin feeding mechanism 60, making it possible to reduce the energy consumption.

[0066] Moreover, in the automatic winder 1 according to the present embodiment, the first suction current generating mechanism 40 includes the suction blower duct

46 that distributes the suction current from the first blower 41 to the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 of the plurality of the winder units 4 to generate a suction current therein.

[0067] Accordingly, by driving the negative pressure electric motor 42, the suction currents can be simultaneously generated in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 of the plurality of the winder units 4. Furthermore, because the negative pressure electric motor 42 is arranged separately from the negative pressure electric motor 52 for the yarn end holding section 63 of the magazine-type bobbin feeding mechanism 60, even if the negative pressure electric motor 42 is stopped when the winding of the yarn 20 in all the winder units 4 is stopped, the yarn end preparation performed when the yarn supplying bobbin 21 is fed to the bobbin feeding mechanism 60 can be performed seamlessly. Accordingly, the energy consumption can be reduced.

Second Embodiment

[0068] An automatic winder (textile machine) 1 according to a second embodiment is explained below with reference to FIGS. 6 and 7. FIG. 6 is a schematic partial cross-sectional side view showing a configuration around the magazine-type bobbin feeding mechanism 60 of the automatic winder 1 according to the second embodiment. FIG. 7 is an enlarged cross-sectional view showing a detailed configuration of an air sucker 71. In the following explanation, structural elements having the same or similar configuration as those explained in the above embodiment are indicated by the same reference numerals as those in the above embodiment and explanation thereof may be omitted.

[0069] The automatic winder 1 according to the second embodiment includes a second suction current generating mechanism 50x that jets air from a plurality of ports 71c to generate an air current that flows from a first flow path inlet hole 71d toward a first flow path outlet hole 71e, and generates a suction current in the yarn end holding section 63 by the action of the air current.

[0070] The second suction current generating mechanism 50x mainly includes the air sucker 71, a valve 72, a yarn waste collecting box 73, and a shutter 74. The second suction current generating mechanism 50x is explained below in detail with reference to FIGS. 6 and 7. Each bobbin feeding mechanism 60 includes the air sucker 71, the valve 72, the yarn waste collecting box 73, and the shutter 74.

[0071] The compressed air generated by a compressor 75 that is arranged in a textile mill and the like is supplied to the air sucker 71. In the air sucker 71, a suction current can be generated by releasing the compressed air from the ports 71c. A cross-section of the air sucker 71 according to the present embodiment is shown in detail in FIG. 7. The air sucker 71 is substantially cylindrical in shape, and includes a first flow path 71a having

a cylindrical shape to generate a suction current along the axis line of the air sucker 71. In the air sucker 71, a second flow path 71b to supply the compressed air is formed in a cylindrical shape so as to surround the first flow path 71a. The second flow path 71b and the compressor 75 shown in FIG. 6 are connected via an appropriate pipe 76.

[0072] In the air sucker 71, the ports 71c are formed so as to connect the first flow path 71a and the second flow path 71b. The ports 71c are formed in an inclined manner so as to go away from the suction port of the yarn end holding section 63 as moving toward the first flow path 71a. With this configuration, when the compressed air supplied to the second flow path 71b is jetted into the first flow path 71a via the ports 71c, because of the known Bernoulli effect, a suction current (air current) that flows from a first flow path inlet hole 71d toward a first flow path outlet hole 71e (in the direction of an arrow shown in FIG. 6) is generated in the first flow path 71a of the air sucker 71.

[0073] As shown in FIG. 6, in the middle of a path for supplying the compressed air to the air sucker 71, the valve 72, which is a solenoid valve, is arranged to switch between whether to supply the compressed air to the second flow path 71b of the air sucker 71 or not. In other words, the valve 72 is operated to switch between generation of the suction current in the air sucker 71 and stopping the same, and consequently, to switch between generation of the suction current in the yarn end holding section 63 and stopping the same. The valve 72 is opened / closed by the control performed by the unit controlling section or the main control device 8.

[0074] The yarn waste collecting box 73 collects the yarn waste sucked by the action of the air sucker 71. The yarn waste collecting box 73 according to the present embodiment is arranged on the opposite side of the suction port of the yarn end holding section 63 with the air sucker 71 positioned in between. The yarn waste collecting box 73 according to the present embodiment is a cylindrical member, and the upstream end thereof is connected to an outlet of the suction flow of the air sucker 71. The yarn waste collecting box 73 is connected to the suction blower duct 46 of the first suction current generating mechanism 40 via the pipe 58. Moreover, a not-shown filter to release the air jetted from the air sucker 71 is arranged in the yarn waste collecting box 73.

[0075] The shutter 74 is an opening / closing member that allows or interrupts communication of the yarn waste collecting box 73 with the suction blower duct 46. The shutter 74 according to the present embodiment is slidable by the operator between a position at which the shutter 74 closes an end located on the downstream side of the yarn waste collecting box 73 and a position at which the shutter 74 opens the same.

[0076] The compressor 75 shown in FIG. 6 compresses air by driving an electric motor 77. In the present embodiment, the electric motor 77 is equivalent to the driving source (second driving source) that generates a suction

current in the yarn end holding section 63. Generally, a large-sized compressor common to all textile machines installed in the mill is used as the compressor 75. However, the configuration of the compressor 75 is not limited to such a configuration and a compressor that is dedicated to the automatic winder 1 can be used. Alternately, one compressor 75 can be arranged per bobbin feeding mechanism 60, or can be shared among a plurality of the bobbin feeding mechanisms 60.

[0077] With such a configuration, in the automatic winder 1 according to the second embodiment, by generating the suction current with the air sucker 71, the yarn end of the yarn 20 of the plurality of the yarn supplying bobbins 21 can be reliably sucked and held in the suction port of the yarn end holding section 63. Furthermore, the cost required for jetting the compressed air and then performing suction with the Bernoulli Effect can be reduced compared to the cost required for performing suction by the rotation of a fan. Therefore, the configuration according to the present embodiment is particularly advantageous.

[0078] Moreover, in the automatic winder 1 according to the second embodiment, by opening / closing the valve 72, it is possible to easily switch between whether to generate the suction current inside each yarn end holding section 63 or not. Such a configuration makes it possible to switch between whether to generate the suction current to each bobbin feeding mechanism 60 or not, and, for example, the suction current can be caused to act on the corresponding yarn end holding section 63 only when feeding the yarn supplying bobbin 21 and preparing the yarn end or when the yarn supplying bobbin 21 is replaced in each bobbin feeding mechanism 60. Accordingly, the energy wastage can be reduced.

[0079] Moreover, in the automatic winder 1 according to the second embodiment, the yarn 20 is held by the yarn end holding section 63 when the shutter 74 is closed, making it possible to accumulate the yarn waste generated in the yarn end holding section 63 in the yarn waste collecting box 73. When a certain amount of the yarn waste accumulates in the yarn waste collecting box 73, the operator can open the shutter 74. When the shutter 74 is opened, the accumulated yarn waste is sucked into the suction blower duct 46 of the first suction current generating mechanism 40. With such a configuration, the yarn waste sucked by the first suction current generating mechanism 40 and the yarn waste sucked by the second suction current generating mechanism 50x can be collected together in the dust case 45. Moreover, by sucking the yarn waste in the suction blower duct 46 after a certain amount of the yarn waste is collected, the driving (operating) timespan of the negative pressure electric motor 42 can be shortened.

[0080] As explained above, in the automatic winder 1 according to the second embodiment, the second suction current generating mechanism 50x includes the air sucker 71 that generates a suction current upon receiving the compressed air.

[0081] Accordingly, by the action of the air current generated when the air is jetted, a suction current that flows from the first flow path inlet hole 71d of the air sucker 71 toward the first flow path outlet hole 71e can be generated and the yarn end can be reliably held. Accordingly, in the yarn end holding section 63 that often sucks a plurality of the yarn ends (for example, eight yarn ends) simultaneously, the suction current can be generated by the air sucker 71 and the yarn ends can be reliably held. Moreover, by using the compressed air that is easy to handle, the configuration of the second suction current generating mechanism 50x can be simplified.

[0082] The automatic winder 1 according to the second embodiment includes the valve 72 as a switching device to switch between generation of the suction current in the air sucker 71 and stopping the same.

[0083] With this configuration, a suction current can be generated or the same can be stopped in the air sucker 71 by switching the state of the valve 72. Accordingly, the suction current can be generated only when feeding the yarn supplying bobbin 21 and preparing the yarn end or when the yarn supplying bobbin 21 is replaced in each bobbin feeding mechanism 60, making it possible to reduce the energy consumption.

[0084] Moreover, the automatic winder 1 according to the second embodiment includes the yarn waste collecting box 73 that collects the yarn waste sucked by the air sucker 71. The yarn waste collecting box 73 is connected to the suction blower duct 46 of the first suction current generating mechanism 40. Moreover, in the automatic winder 1, the shutter 74 is arranged as an opening / closing member to allow or interrupt communication of the yarn waste collecting box 73 with the suction blower duct 46 of the first suction current generating mechanism 40.

[0085] Accordingly, the yarn waste sucked by the air sucker 71 can be collected in the yarn waste collecting box 73 and then can be sucked into the suction blower duct 46 of the first suction current generating mechanism 40 by opening the shutter 74 from time to time. Therefore, the yarn waste generated in the automatic winder 1 can be collected at a predetermined location (the suction side of the first suction current generating mechanism 40).

[0086] Moreover, the automatic winder 1 according to the present embodiment includes the yarn waste collecting box 73.

[0087] With this configuration, the yarn waste sucked by the air sucker 71 can be collected in the yarn waste collecting box 73 and can be collectively recovered later.

Third Embodiment

[0088] An automatic winder (textile machine) 1 according to a third embodiment is explained below with reference to FIG. 8. FIG. 8 is a schematic partial cross-sectional side view of a winder unit 4 included in the automatic winder 1 according to the third embodiment.

[0089] The automatic winder 1 according to the third embodiment includes a first suction current generating

mechanism 40x having a configuration different than that of explained in the first embodiment.

[0090] Each winder unit 4 includes the first suction current generating mechanism 40x. The first suction current generating mechanism 40x includes a blower 81, a filter 84, and a dust case 85. The blower 81 mainly includes a negative pressure electric motor 82 and a fan 83.

[0091] The negative pressure electric motor 82 is a driving source that generates a negative pressure. The fan 83 is fixed to an output shaft of the negative pressure electric motor 82. When the fan 83 is rotationally driven, a suction current (air current) that flows in the direction of arrows shown in FIG. 8 is formed. The filter 84 is arranged immediately upstream of the fan 83 in direction of the suction current. The dust case 85 accommodates the filter 84. The yarn waste flown in the lower yarn guiding pipe 25 or the upper yarn guiding pipe 26 by the action of the suction current is caught by the filter 84, and is collected in the dust case 85. The operator regularly recovers the yarn waste collected in the dust case 85.

[0092] With this configuration, the yarn waste generated during yarn joining and the like passes through the lower yarn guiding pipe 25 or the upper yarn guiding pipe 26, and gets sucked in the dust case 85 and gets caught by the filter 84. Accordingly, the yarn waste and the like generated during yarn joining and the like is collected in the dust case 85.

[0093] In this manner, the blower 81 included in the automatic winder 1 according to the third embodiment generates a suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 at the time of yarn joining in each winder unit 4. With this configuration, the suction current can be generated in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 only for some winder units 4 that are performing joining of the yarn 20 among the winder units 4 of the automatic winder 1. In other words, it is possible to stop the blowers 81 corresponding to some winder units 4 that are not performing joining of the yarn 20, and only the minimum required blowers 81 can be operated. Accordingly, the energy consumption can be reduced.

[0094] In the automatic winder 1 according to the third embodiment, the configuration that generates a suction current in each yarn end holding section 63 can be the second suction current generating mechanism 50 as shown in FIGS. 2 and 4, or can be the second suction current generating mechanism 50x as shown in FIG. 6. In any of these configurations, when the yarn 20 is caught by the yarn end holding section 63 and the winding of the yarn 20 is stopped, generation of the suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 is avoided, resulting in reduction of the energy consumption.

[0095] As explained above, in the automatic winder 1 according to the third embodiment, each winder unit 4 includes the blower 81.

[0096] Accordingly, for each winder unit 4, operation can be switched between generation of the suction cur-

rent in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 and stopping the same depending on whether the yarn joining of the yarn 20 is being performed or not, and the driving timespan of the negative pressure electric motor 82 included in each blower 81 can be shortened, thereby reducing the energy consumption. Moreover, because the negative pressure electric motor 82 for the blower 81 is included separately from the electric motor for the yarn end holding section 63 of the magazine-type bobbin feeding mechanism 60 (the negative pressure electric motor 52 or the electric motor 77), generating a suction current in the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 even when it is sufficient to generate a suction current only in the yarn end holding section 63 at the time of the yarn end preparation and the like, as it happens in the conventional textile machines, can be avoided, and the energy consumption can be reduced.

[0097] Exemplary embodiments of the present invention are explained above. The configurations explained above can, however, be modified as explained below.

[0098] In the third embodiment explained above, each winder unit 4 includes the blower 81. However, the present invention is not necessarily limited to such configuration. For example, 60 winder units 4 arranged side by side can be divided into groups of 12 winder units each, and each group can include one first suction current generating mechanism 40 (one first blower 41, one negative pressure electric motor 42) to distribute a suction current to the sucking and collecting device. Even with such configuration, only the blower corresponding to the group that includes the winder unit 4 in which a suction current needs to be generated can be operated, and other blowers can be stopped, thereby making it possible to reduce the energy consumption.

[0099] Even though the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 act as the sucking and collecting device in the above embodiments, the present invention is not limited to only this configuration. A configuration in which the yarn waste is collected from other parts in which the yarn waste is likely to be generated can be adopted. Moreover, in each of the suction current generating mechanisms explained above, not only the yarn waste but also fiber waste can be collected by the action of the suction current.

[0100] The configuration of the air sucker 71 shown in the second embodiment is merely an example, and an air sucker of any known configuration can be used instead.

[0101] A configuration in which the automatic winder 1 includes both the distributing blower duct 56 shown in FIG. 4 and the like, and the air sucker 71 shown in FIG. 6, and the yarn waste collected in the yarn waste collecting box 73 by the action of the suction current generated in the air sucker 71 is sucked into the distributing blower duct 56 in a timely manner by opening the shutter 74 and the shutter 57 can be adopted.

[0102] In the second suction current generating mech-

anism 50 according to the first embodiment, the shutter 57 is arranged for each winder unit, but the present invention is not necessarily limited to such a configuration. Moreover, the shutter 57 can be excluded.

[0103] The problems to be solved by the present invention are given above, and the means to solve these problems and advantageous effects thereof are explained below.

[0104] According to one aspect of the present invention, a textile machine having a configuration explained below is provided. The textile machine includes a plurality of winder units; a sucking and collecting device; a first suction current generating mechanism; and a second suction current generating mechanism. The winder unit unwinds a yarn from a yarn supplying bobbin that is supported in a yarn supplying section to form a package. The sucking and collecting device sucks and collects yarn waste generated in each winder unit. The first suction current generating mechanism includes a first driving source that generates a first suction current in the sucking and collecting device. Each winder unit includes a magazine-type bobbin feeding mechanism to feed the yarn supplying bobbin to the yarn supplying section. The magazine-type bobbin feeding mechanism includes a plurality of pockets; and a yarn end holding section. One pocket accommodates one yarn supplying bobbin. The yarn end holding section sucks and holds a yarn end of the yarn supplying bobbin accommodated in the pocket, and collects generated yarn waste. The second suction current generating mechanism generates a second suction current in the yarn end holding section by using a second driving source that is different from the first driving source.

[0105] With this configuration, because separate driving sources are arranged for the first suction current generating mechanism and the second suction current generating mechanism, electric motors having the appropriate output according to the respective load can be used as the first driving source and the second driving source. Accordingly, the first driving source and the second driving source can be made compact and inexpensive. Moreover, for example, even in a situation in which it is required to feed the yarn supplying bobbin to the bobbin feeding mechanism and perform the yarn end preparation in a state in which the yarn winding of all the winder units is stopped, operation can be performed by stopping the first driving source and driving only the second driving source. Accordingly, the energy consumption can be reduced.

[0106] In the above textile machine, it is preferable to adopt a configuration explained below. That is, the first suction current generating mechanism includes a first blower. The second suction current generating mechanism includes a second blower that is different from the first blower.

[0107] With this configuration, by arranging two separate blowers, that is, the first blower for the sucking and collecting device and the second blower for the yarn end holding section of the magazine-type bobbin feeding mechanism, a respectively appropriate suction current

(negative pressure) can be generated. As a result, collection of the yarn waste by the sucking and collecting device, and suction of the yarn end by the yarn end holding section of the bobbin feeding mechanism (collection of the yarn waste) can be performed with minimum required energy. Accordingly, the energy consumption can be reduced.

[0108] In the above textile machine, it is preferable that the second blower includes a distributing blower duct that distributes the second suction current to the yarn end holding sections of the plurality of the winder units to generate a suction current therein.

[0109] With this configuration, the second suction current generated by one second driving source can be distributed to the yarn end holding sections of a plurality of the magazine-type bobbin feeding mechanisms.

[0110] In the above textile machine, the first blower can include a suction blower duct that distributes the first suction current to the sucking and collecting devices of the plurality of the winder units.

[0111] With this configuration, by driving the first driving source, the first suction currents can be simultaneously generated in the sucking and collecting devices of the plurality of the winder units. Furthermore, because the first driving source is arranged separately from the second driving source for the yarn end holding section of the magazine-type bobbin feeding mechanism, even if the first driving source is stopped when the yarn winding of all the winder units is stopped, the yarn end preparation performed when the yarn supplying bobbin is fed to the bobbin feeding mechanism can be performed seamlessly. Accordingly, the energy consumption can be reduced.

[0112] In the above textile machine, each winder unit can include the first blower.

[0113] With this configuration, in each winder unit, operation can be switched between generation of the first suction current to the sucking and collecting device and stopping the same depending on whether the yarn joining is being performed or not, and the driving timespan of the first driving source included in the first blower can be shortened, thereby reducing the energy consumption. Moreover, because the first driving source is arranged separately from the second driving source for the yarn end holding section of the magazine-type bobbin feeding mechanism, generating the first suction current in the sucking and collecting device even when it is sufficient to generate a suction current only to the yarn end holding section at the time of the yarn end preparation and the like, as it happens in the conventional textile machines, can be avoided, and the energy consumption can be reduced.

[0114] In the above textile machine, it is preferable that the second suction current generating mechanism includes, corresponding to each of the yarn end holding sections, an air sucker that generates the second suction current upon receiving compressed air.

[0115] With this configuration, by the action of the air current generated when air is jetted, the second suction

current that flows from a first flow path inlet hole of the air sucker toward a first flow path outlet hole can be generated, and the yarn end can be reliably held. Because the compressed air that is easy to handle has been used, the configuration of the second suction current generating mechanism can be simplified.

[0116] In the above textile machine, it is preferable to adopt a configuration explained below. That is, the second suction current generating mechanism includes, corresponding to each of the yarn end holding sections, an air sucker; a yarn waste collecting box; and an opening / closing member. The air sucker generates the second suction current upon receiving compressed air. The yarn waste collecting box collects yarn waste sucked by the air sucker. The opening / closing member is arranged between the yarn waste collecting box and the suction blower duct of the first suction current generating mechanism and allows or interrupts communication of the yarn waste collecting box with the suction blower duct of the first suction current generating mechanism.

[0117] With this configuration, the yarn waste sucked by the air sucker can be collected in the yarn waste collecting box and then can be sucked into the duct of the first suction current generating mechanism by opening the opening / closing member from time to time. Therefore, the yarn waste generated in the textile machine can be collected at a predetermined location (the suction side of the first suction current generating mechanism).

[0118] It is preferable that the above textile machine includes a switching device that is operated to switch between generation of the second suction current in the air sucker and stopping the same.

[0119] With this configuration, by operating the corresponding switching device, the second suction current can be generated or the same can be stopped in the air sucker of each magazine-type bobbin feeding mechanism. Accordingly, the second suction current can be generated only when feeding the yarn supplying bobbin and preparing the yarn end or when the yarn supplying bobbin is replaced in each bobbin feeding mechanism, making it possible to reduce the energy consumption.

[0120] It is preferable that the above textile machine includes the yarn waste collecting box.

[0121] With this configuration, the yarn waste sucked by the air sucker can be collected in the yarn waste collecting box and can be collectively recovered later.

[0122] In the above explanation, the meaning of "a plurality of" also includes "a predetermined number of".

[0123] Although the invention has been explained with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the scope of the claims.

Claims

1. A textile machine (1) comprising:

a plurality of winder units (4) configured to unwind a yarn from a yarn supplying bobbin (21) that is supported in a yarn supplying section (10) to form a package (29);
a sucking and collecting device (25, 26) arranged per winder unit (4) to suck and collect yarn waste generated in the winder unit (4);
a first suction current generating mechanism (40) that includes a first driving source (42) configured to generate a first suction current in the sucking and collecting device (25, 26); and
a second suction current generating mechanism (50) configured to generate a second suction current by using a second driving source (52) that is different from the first driving source (42),
wherein
each winder unit (4) includes a magazine-type bobbin feeding mechanism (60) to feed the yarn supplying bobbin (21) to the yarn supplying section (10), wherein

the magazine-type bobbin feeding mechanism (60) includes,

a plurality of pockets (62p) for accommodating the yarn supplying bobbins (21); and
a yarn end holding section (63) configured to suck and hold a yarn end of the yarn supplying bobbin (21) accommodated in the pocket (62p), and to collect generated yarn waste, and

the second suction current generating mechanism (50) is configured to generate the second suction current in the yarn end holding section (63).

2. The textile machine (1) as claimed in Claim 1, wherein the first suction current generating mechanism (40) includes a first blower (41), and the second suction current generating mechanism (50) includes a second blower (51) that is different from the first blower (41).

3. The textile machine (1) as claimed in Claim 2, wherein the second blower (51) includes a distributing blower duct (56) configured to distribute the second suction current to the yarn end holding sections (63) of the plurality of the winder units (4) to generate a suction current therein.

4. The textile machine (1) as claimed in Claim 2 or 3, wherein the first blower (41) includes a suction blower duct (46) configured to distribute the first suction current

to the sucking and collecting devices (25, 26) of the plurality of the winder units (4).

5. The textile machine (1) as claimed in Claim 2 or 3, wherein each winder unit (4) includes the first blower (41). 5

6. The textile machine (1) as claimed in any one of Claims 1 to 5, wherein the second suction current generating mechanism (50) includes, corresponding to each of the yarn end holding sections (63), an air sucker (71) configured to generate the second suction current upon receiving compressed air. 10

7. The textile machine (1) as claimed in Claim 4, wherein the second suction current generating mechanism (50) includes, corresponding to each of the yarn end holding sections (63), 15

an air sucker (71) configured to generate the second suction current upon receiving compressed air; 20

a yarn waste collecting box (73) configured to collect yarn waste sucked by the air sucker (71); 25

and

an opening/closing member (74) that is arranged between the yarn waste collecting box (73) and the suction blower duct (46) of the first suction current generating mechanism (40) and is configured to allow or interrupt communication of the yarn waste collecting box (73) with the suction blower duct (46) of the first suction current generating mechanism (40). 30

8. The textile machine (1) as claimed in Claim 6 or 7, wherein the textile machine (1) includes a switching device (72) that is operable to switch between generation of the second suction current in the air sucker (71) and stopping the same. 35 40

9. The yarn waste collecting box (73) included in the textile machine (1) as claimed in Claim 7. 45

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FIG.1

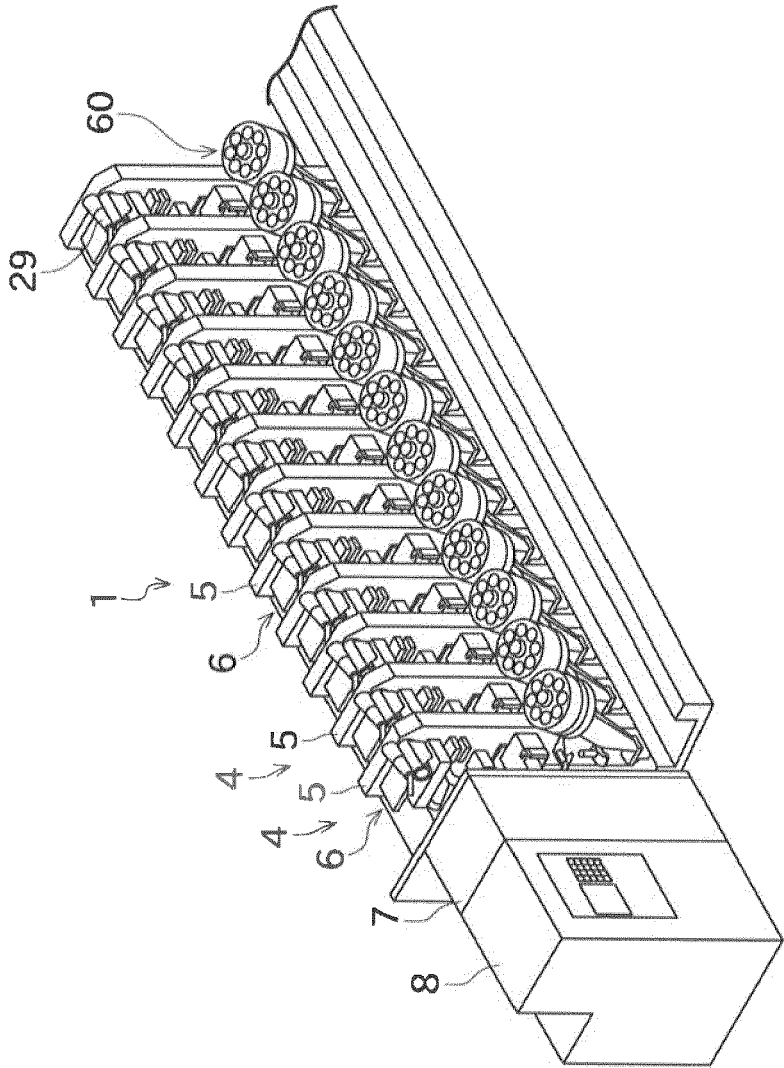


FIG.2

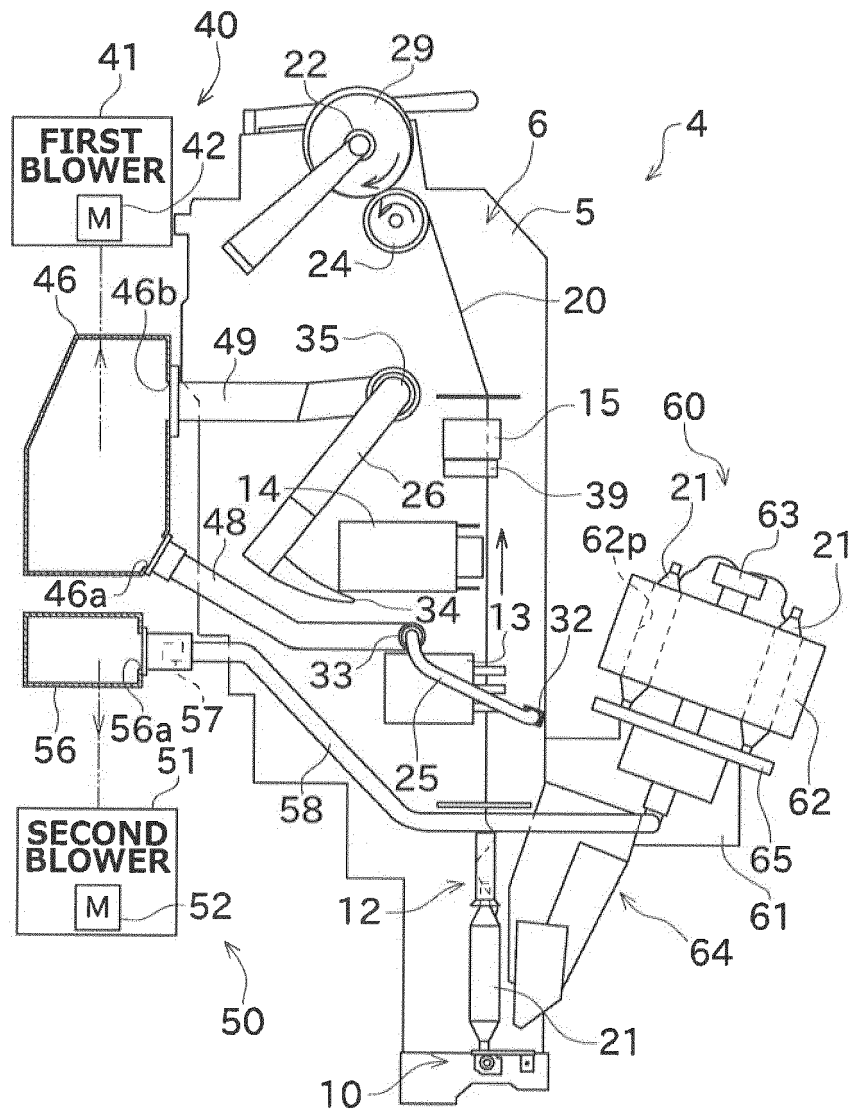


FIG.3

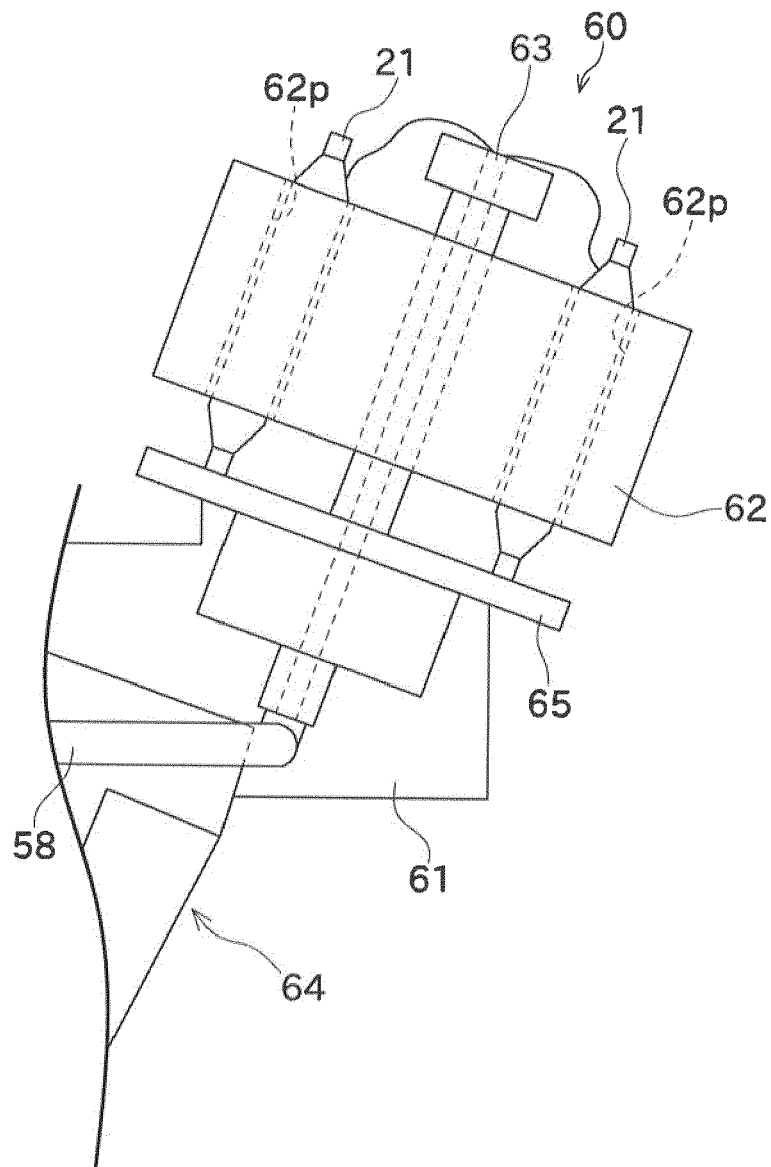


FIG. 4

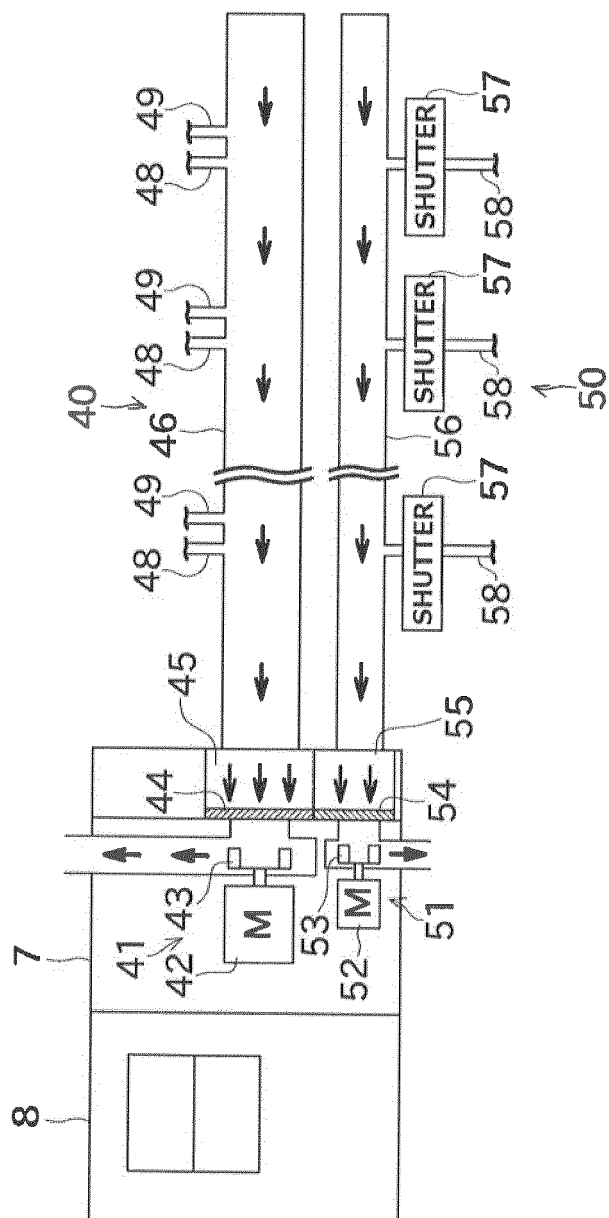


FIG.5

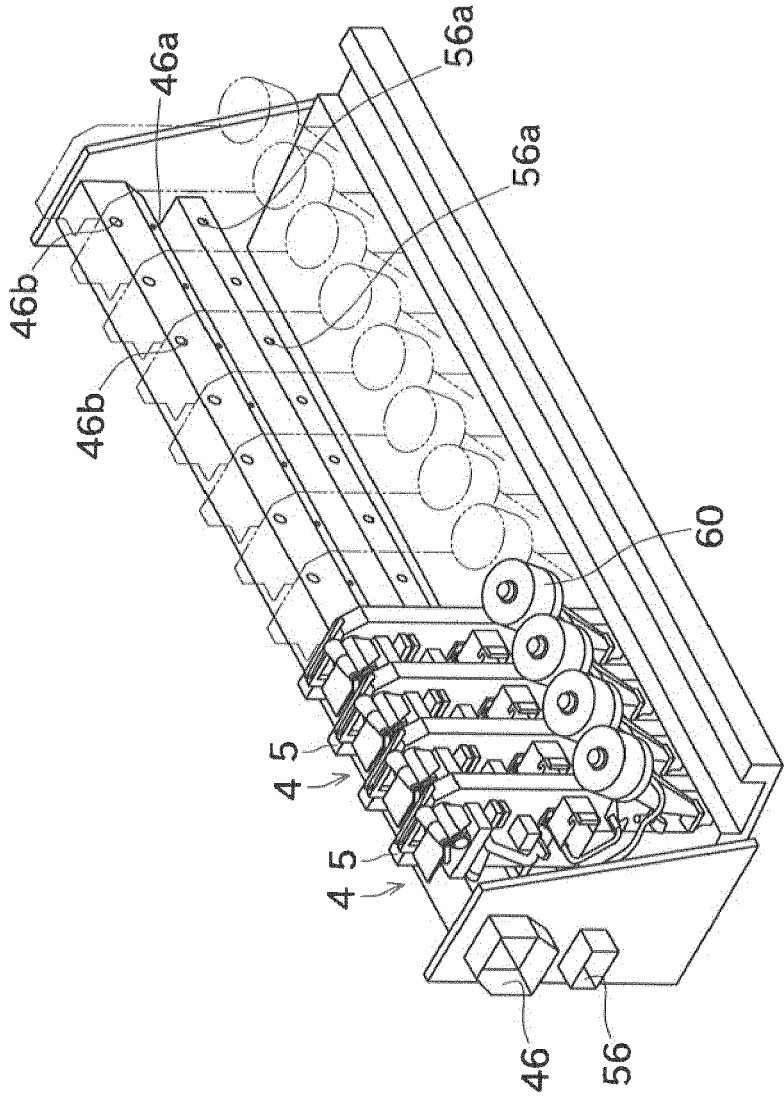


FIG.6

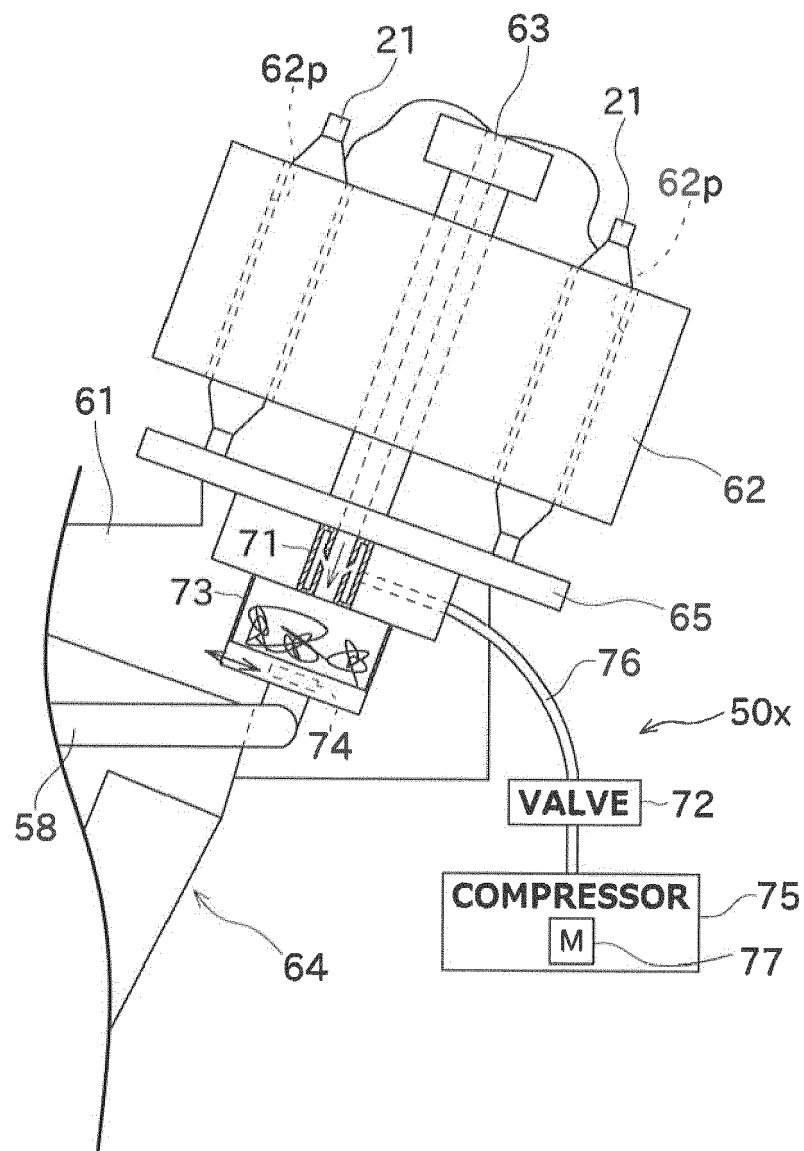


FIG.7

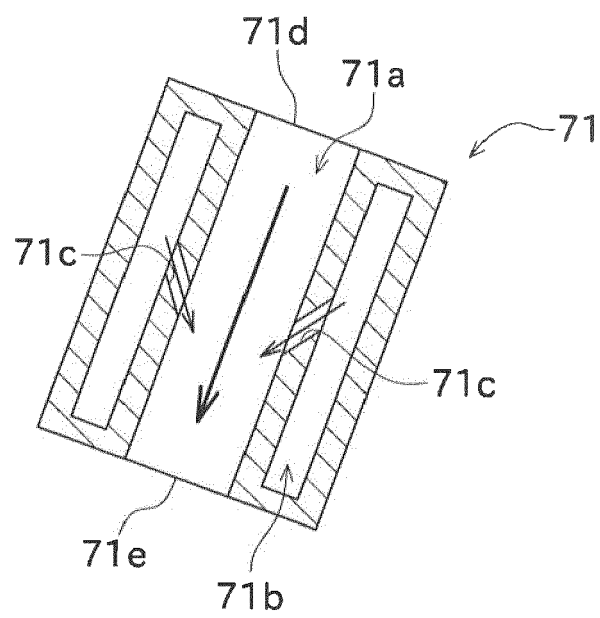
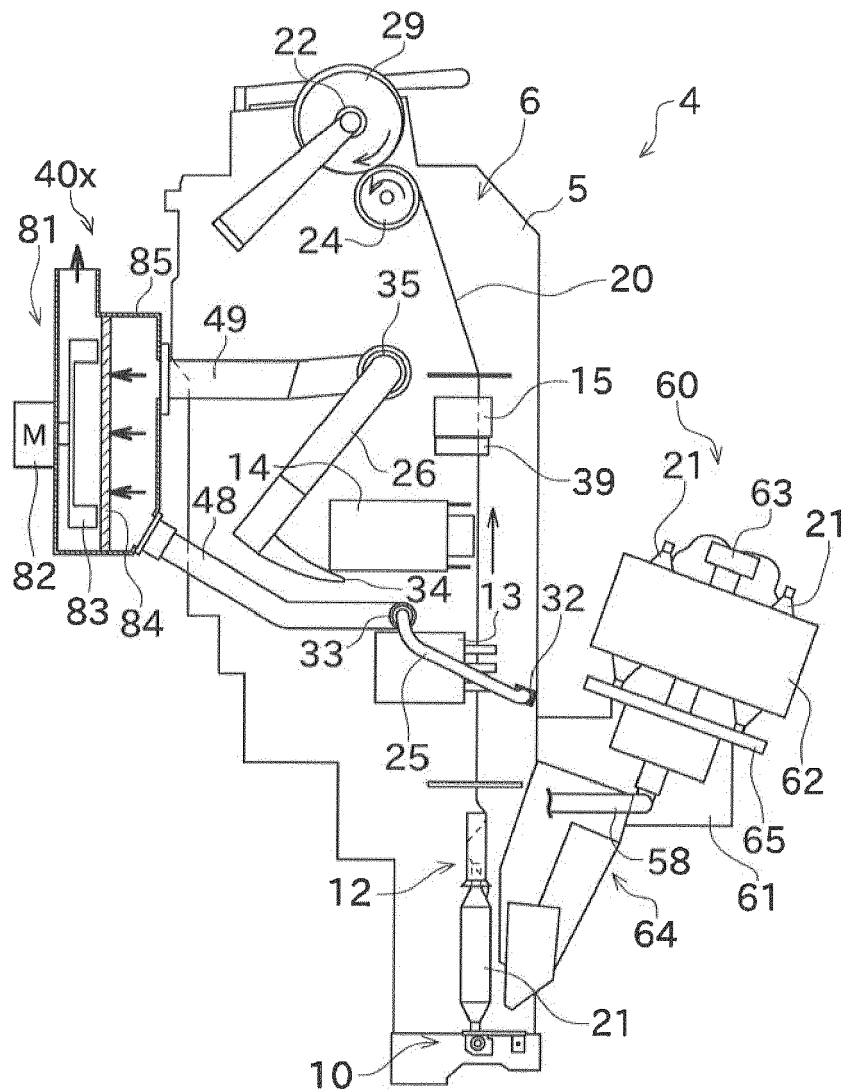


FIG.8





EUROPEAN SEARCH REPORT

Application Number
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