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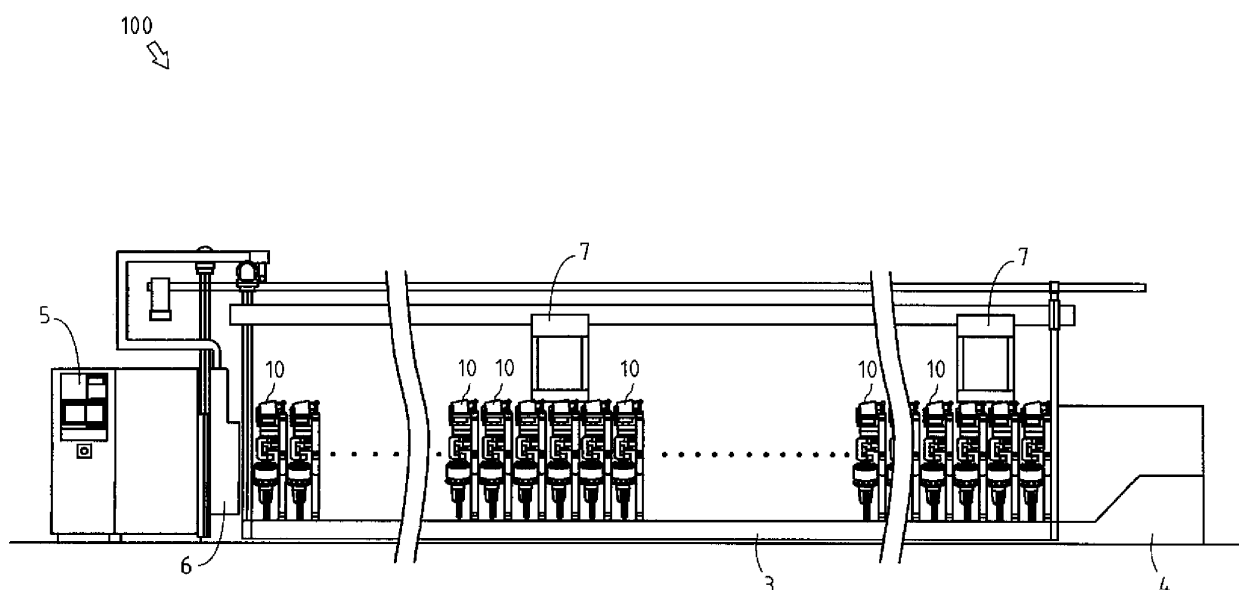
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(54) **Automatic winder**

(57) An automatic winder (100) includes a plurality of winding devices (10) adapted to wind a yarn Y from a yarn supplying bobbin (B1) to form a package P by automatic operation; and a machine base control main body (5) adapted to control an operation of the plurality of winding devices (10). The winding device (10) includes an automatic operation switch (12) adapted to switch execution or stop of a winding operation by automatic operation, and the machine base control main body (5) includes a control section (50) adapted to cause transition to a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin (B1) is executable regardless of a switching state of the automatic operation switch (12) of the plurality of winding devices (10).

cution or stop of a winding operation by automatic operation, and the machine base control main body (5) includes a control section (50) adapted to cause transition to a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin (B1) is executable regardless of a switching state of the automatic operation switch (12) of the plurality of winding devices (10).

FIG. 1



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a technique of an automatic winder.

2. Description of Related Art

[0002] An automatic winder is known as a device for rewinding a yarn into a package while removing a yarn defect of the yarn wound around a yarn supplying bobbin. The automatic winder is configured by a plurality of winding devices. In the automatic winder, a yarn supplying bobbin preparing operation for supplying a yarn supplying bobbin to each winding device is required in order to start the operation. For example, in a magazine type automatic winder, a preparing operation of setting the yarn supplying bobbin in a magazine of each winding device and having a yarn end of the yarn supplying bobbin sucked with a suction port at a middle of the magazine is required for the yarn supplying bobbin preparing operation. Furthermore, in the bobbin automatic supply type automatic winder, there is required the yarn supplying bobbin preparing operation of sticking out the yarn end of the yarn supplying bobbin and inserting the yarn end into a core tube of the yarn supplying bobbin, and supplying the yarn supplying bobbin to each winding device.

[0003] In the magazine type automatic winder, a negative pressure generating device for supplying negative pressure to the suction port at the middle of the magazine needs to be started when carrying out the yarn supplying bobbin preparing operation. In the bobbin automatic supply type automatic winder, the negative pressure generating device for supplying a negative pressure to a stick-out device and a device for supplying the yarn supplying bobbin to each winding device need to be started.

[0004] The magazine type automatic winder and the bobbin automatic supply type automatic winder both include a start/stop switch arranged in a machine base control main body and adapted to start or stop each device of the automatic winder, and an automatic operation switch arranged in each winding device and adapted to execute or stop the winding operation of each winding device. When carrying out the yarn supplying bobbin preparing operation, the start switch of the machine base control main body needs to be turned ON in order to start the yarn end suction port and the like. However, if the automatic operation switch of the winding device is already turned ON when the start switch of the machine base control main body is turned ON, the winding device is driven to perform the automatic operation although the yarn supplying bobbin is not supplied, and hence a bobbin holding device repeats the operation for receiving the bobbin. Such an operation leads to wasteful power consumption and lowering in the lifespan of the drive mechanism of the bobbin holding device.

anism of the bobbin holding device.

[0005] Thus, in the automatic winder, the automatic operation of each winding device is desirably stopped when carrying out the yarn supplying bobbin preparing operation, and an operator needs to perform the operation of turning OFF the automatic operation switch of each winding device before turning ON the start switch of the machine base control main body. Moreover, after the yarn supplying bobbin preparing operation is finished, the operation of turning ON the automatic operation switch of each winding device is required. Such a switching operation of the automatic operation switch of each winding device leads to an increase in the man-hour of the operation in the automatic winder configured by a number of winding devices.

[0006] In order to solve the above problems, a part of the winding device necessary for the yarn supplying bobbin preparing operation is to be operated. For example, Japanese Unexamined Patent Publication No. 2003-112854 discloses an automatic winder having a configuration of operating a part of the winding device. However, the automatic winder disclosed in Japanese Unexamined Patent Publication No. 2003-112854 does not have a configuration of operating a part of the winding device in the yarn supplying bobbin preparing operation.

BRIEF SUMMARY OF THE INVENTION

[0007] It is an object to provide an automatic winder in which a switching operation of an automatic operation switch of each winding device before and after a yarn supplying bobbin preparing operation can be omitted.

[0008] The problems to be solved by the present invention have been described above, and means for solving such problems will be described below.

[0009] The present invention relates to an automatic winder including a plurality of winding devices adapted to wind a yarn from a yarn supplying bobbin to form a package; and a machine base control main body adapted to control an operation of the plurality of winding devices, wherein the winding device includes an automatic operation switch adapted to switch execution or stop of a winding operation; and the machine base control main body includes a control section adapted to cause transition to a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin is executable regardless of a switching state of the automatic operation switch of the plurality of winding devices, and a preparation switch for causing the control section to execute the transition to the yarn supplying bobbin preparing mode.

[0010] According to the present invention, the yarn supplying bobbin preparing mode is a mode of operating a device necessary for the preparing operation of the yarn supplying bobbin, and stopping a device not necessary for the preparing operation of the yarn supplying bobbin in each device configuring the plurality of winding devices.

[0011] The present invention further includes a negative pressure supplying device adapted to supply a negative pressure to the plurality of winding devices, the negative pressure supplying device operating at a driving force lower than a driving force at which each of the winding devices is capable of executing the winding operation to supply the negative pressure in the yarn supplying bobbin preparing mode.

[0012] According to the present invention, the machine base control main body includes a start switch for starting each device, and a stop switch for stopping each device; and the control section operates the start switch and/or the stop switch as the preparation switch for causing transition to the yarn supplying bobbin preparing mode.

[0013] According to the present invention, the machine base control main body includes a setting section; and the control section sets the start switch or the stop switch as the preparation switch for executing the transition to the yarn supplying bobbin preparing mode from an operation state or a stop state of each of the devices in accordance with the setting of the setting section.

[0014] According to the present invention, the machine base control main body includes a start switch for starting each device, a stop switch for stopping each device, and a preparation switch serving as an operation section for operating each device in the yarn supplying bobbin preparing mode.

[0015] According to the present invention, the machine base control main body includes a setting section; and the control section sets a permission of making transition to the yarn supplying bobbin preparing mode from an operation state or a stop state of each of the devices by the preparation switch in accordance with the setting of the setting section.

[0016] The present invention further relates to an automatic winder including a plurality of winding devices adapted to wind a yarn from a yarn supplying bobbin to form a package; a machine base control main body adapted to control an operation of the plurality of winding devices; and a negative pressure supplying device adapted to supply a predetermined negative pressure to the plurality of winding devices, wherein the winding device includes a magazine type bobbin supplying device and an automatic operation switch adapted to switch execution or stop of a winding operation; the machine base control main body includes a start switch for starting each device, a stop switch for stopping each device, and a control section adapted to execute a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin is executable regardless of a switching state of the automatic operation switch of the plurality of winding devices; the control section causes transition to the yarn supplying bobbin preparing mode based on an operation of the start switch and/or the stop switch; the bobbin supplying device includes a yarn supplying bobbin accommodating device adapted to accommodate a plurality of yarn supplying bobbins and supply the yarn supplying bobbin to a yarn

supplying bobbin holding position, and a yarn end suction port adapted to suck a yarn end of the yarn supplying bobbin with the negative pressure supplied from the negative pressure supplying device; and the control section stops the winding operation of each of the winding devices and operates the negative pressure supplying device in the yarn supplying bobbin preparing mode.

[0017] According to the present invention, supply of negative pressure is limited by operating the negative pressure supplying device at a driving force lower than a driving force at which each winding device is capable of executing the winding operation.

[0018] The present invention further relates to an automatic winder including a plurality of winding devices adapted to wind a yarn from a yarn supplying bobbin to form a package; a tray type bobbin supplying device; an automatic operation switch adapted to switch execution or stop of a winding operation; a machine base control main body adapted to control an operation of the plurality of winding devices; a negative pressure supplying device adapted to supply a predetermined negative pressure to the plurality of winding devices; and a yarn end pull-out device adapted to pull out a yarn end of the yarn supplying bobbin with the negative pressure to prepare for a state in which the winding device is capable of receiving the yarn end, wherein the winding device includes the automatic operation switch for switching execution or stop of the winding operation; the machine base control main body includes a start switch for starting each device, a stop switch for stopping each device, and a control section adapted to execute a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin is executable regardless of a switching state of the automatic operation switch of the plurality of winding devices; and the control section causes transition to the yarn supplying bobbin preparing mode based on an operation of the start switch and/or the stop switch, and operates the bobbin supplying device, the negative pressure supplying device, and the yarn end pull-out device in the yarn supplying bobbin preparing mode.

[0019] According to the present invention, the control section operates the negative pressure supplying device at a driving force lower than a driving force at which each winding device is capable of executing the winding operation to supply a negative pressure in the yarn supplying bobbin preparing mode.

[0020] The present invention further includes a bobbin conveying device for conveying the yarn supplying bobbin to supply to each winding device, wherein the control section drives the bobbin conveying device in the yarn supplying bobbin preparing mode.

[0021] The present invention has the following effects.

[0022] The present invention can omit the switching operation of the automatic operation switch of each winding device before and after the yarn supplying bobbin preparing operation.

[0023] The present invention can prevent wasteful

power from being consumed by the operation of the device not necessary in the yarn supplying bobbin preparing operation, or prevent lowering in the lifespan of the driving mechanism since only the device necessary for the yarn supplying bobbin preparing operation is operated in the yarn supplying bobbin preparing mode.

[0024] The present invention can reduce the power consumption by generating a minimum negative pressure required in the yarn supplying bobbin preparing mode.

[0025] The present invention can prevent an operation mistake of an operator since transition is made to the yarn supplying bobbin preparing mode using the start/stop switch of the automatic winder.

[0026] The present invention can improve usability since whether or not transition is made to the yarn supplying bobbin preparing mode can be set in accordance with a usage status of the automatic winder.

[0027] The present invention can prevent the operation mistake of the operator since transition is made to the yarn supplying bobbin preparing mode using a switch adapted only for causing the transition to the yarn supplying bobbin preparing mode.

[0028] The present invention can improve the usability since whether or not transition is made to the yarn supplying bobbin preparing mode can be set in accordance with a convenience status of the automatic winder.

[0029] According to the present invention, in the magazine supplying type automatic winder, the switching operation of the automatic operation switch of each winding device before and after the yarn supplying bobbin preparing operation can be omitted.

[0030] According to the present invention, in the tray supplying type automatic winder, the switching operation of the automatic operation switch of each winding device before and after the yarn supplying bobbin preparing operation can be omitted.

[0031] The present invention can reduce the power consumption of the automatic winder by operating the negative pressure supplying device at a low driving force.

[0032] According to the present invention, in the tray supplying type automatic winder, the yarn supplying bobbin can be conveyed to each winding device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] FIG. 1 is a front view illustrating an overall configuration of an automatic winder according to a first embodiment of the present invention;

[0034] FIG. 2 is a schematic view illustrating a configuration of a winding device;

[0035] FIG. 3 is a configuration diagram illustrating a configuration of a machine base control main body;

[0036] FIG. 4 is a table diagram illustrating a yarn supplying bobbin preparing mode;

[0037] FIG. 5 is a front view illustrating an overall configuration of an automatic winder according to a second embodiment of the present invention; and

[0038] FIG. 6 is a schematic view illustrating a configuration of a winding device.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0039] An automatic winder 100 will be described with reference to FIG. 1. The automatic winder 100 serves as a first embodiment of an automatic winder of the present invention. The automatic winder 100 includes a plurality of winding devices 10, a machine base 3, a yarn supplying bobbin collecting device 4, a machine base control main body 5, a negative pressure generating device 6, and a doffing machine 7.

[0040] The machine base 3 is arranged in a longitudinal direction of the automatic winder 100. The yarn supplying bobbin collecting device 4 is arranged on one side of the automatic winder 100 in the longitudinal direction. The yarn supplying bobbin collecting device 4 is a device for collecting an empty yarn supplying bobbin B1 from which a yarn Y is unwound in each winding device 10 (see FIG. 2). The detailed description on the yarn supplying bobbin collecting device 4 will be omitted. The machine base control main body 5 is arranged on the other side of the automatic winder 100 in the longitudinal direction. The machine base control main body 5 will be specifically described later.

[0041] The doffing machine 7 is supported so as to travel the longitudinal direction at the upper side of the machine base 3. The doffing machine 7 is a device adapted to carry out a feeding operation of a package P (see FIG. 2), a setting operation of a bobbin B2 to a traverse drum 15 (see FIG. 2), a pickup operation of a yarn end, and the like.

[0042] The negative pressure generating device (negative pressure supplying device) 6 is a device for generating and supplying a negative pressure. The negative pressure generating device 6 is configured to supply negative pressure to each winding device 10 through a duct (not illustrated). The negative pressure generating device 6 is arranged adjacent to the machine base control main body 5. The negative pressure generating device 6 is configured so that the negative pressure to generate can be adjusted. For example, the negative pressure generating device 6 operates while limiting the supply of negative pressure by operating the negative pressure to generate at an ability of a predetermined percentage such as 80%, 60%, ..., 20% with respect to the maximum ability.

[0043] A plurality of winding devices 10 (60 in the first embodiment) are arranged in line in the longitudinal direction of the machine base 3. The winding device 10 will be described below in detail.

[0044] The winding device 10 will be described with reference to FIG. 2. The winding device 10 is a device adapted to wind the yarn Y unwound from a yarn supplying bobbin B1 around a bobbin B2 at the traverse drum 15 arranged on an upper side to form a package P. The

winding device 10 includes a yarn supplying device 20, a tension device (not illustrated), a yarn joining device 13, a yarn defect removing device 14, the traverse drum 15, a unit controller 55 (see FIG. 3), a unit main body 11, and an automatic operation switch 12.

[0045] The tension device is a device adapted to apply a predetermined tension on the travelling yarn Y. The tension device of the first embodiment may be a gate type in which movable comb teeth are arranged with respect to fixed comb teeth. The comb teeth on the movable side can be swung by a rotary solenoid (not illustrated) so that the comb teeth are in a meshed state or a released state.

[0046] The yarn joining device 13 is a device adapted to join a lower yarn from the yarn supplying bobbin B1 and an upper yarn from the bobbin B2 when the yarn defect removing device 14 detects a yarn defect or when a yarn breakage occurs while unwinding the yarn from the yarn supplying bobbin B1.

[0047] The yarn defect removing device 14 used herein may be a mechanical type or a type that uses fluid such as compressed air.

[0048] The winding device 10 also includes a driving motor for rotating the traverse drum 15 and an inverter for controlling the rotation speed of the driving motor.

[0049] The yarn supplying device 20 includes a yarn supplying bobbin holding device 21 for holding the yarn supplying bobbin B1, a yarn unwinding assisting device 22, and a bobbin supplying device 30. The bobbin supplying device 30 is a device adapted to supply the yarn supplying bobbin B1 to the yarn supplying bobbin holding device 21. The bobbin supplying device 30 of the first embodiment is a magazine type bobbin supplying device. The bobbin supplying device 30 includes a magazine (yarn supplying bobbin accommodating device) 31, a yarn end suction port 32, and a bobbin shoot 33.

[0050] The magazine 31 is arranged in such a position that a lower opening of an accommodation hole is directed towards the yarn supplying bobbin holding device 21. The magazine 31 is formed with a plurality of tubular accommodation holes for accommodating the yarn supplying bobbins B1 on a circumference having a center axis as the center. The magazine 31 is configured to intermittently rotate around the center axis by a driving mechanism.

[0051] The yarn end suction port 32 is a device for sucking and holding, with a negative pressure, the yarn end sticking out from the yarn supplying bobbins B1 accommodated in the accommodation hole of the magazine 31. The yarn end suction port 32 is connected to the negative pressure generating device 6 by way of a duct (not illustrated).

[0052] The bobbin shoot 33 guides the yarn supplying bobbin B1 from the lower opening of the accommodation hole of the magazine 31 to the yarn supplying bobbin holding device 21.

[0053] With such a configuration, the bobbin supplying device 30 intermittently rotates the magazine 31 around

the center axis so that one yarn supplying bobbin B1 is moved to a certain position of the lower opening, and the relevant yarn supplying bobbin B1 is dropped downward and guided by the bobbin shoot 33 to enter the yarn supplying bobbin holding device 21. The unit main body 11 includes the automatic operation switch 12, and the winding device 10 executes the winding operation from the yarn supplying bobbin B1 to the package P when the automatic operation switch 12 is turned ON.

[0054] The machine base control main body 5 will be described with reference to FIG. 3. The machine base control main body 5 includes a controller 50 serving as a control section, an operation section 60, and a setting section 70.

[0055] The controller 50 is arranged inside the machine base control main body 5. The controller 50 is connected to a unit controller 55 of each winding device 10. The controller 50 has a function of monitoring the operation in which each winding device 10 rewinds the yarn Y wound around the yarn supplying bobbin B1 into the package P while removing yarn defects of the yarn Y. The controller 50 also has a function of executing the yarn supplying bobbin preparing mode of realizing a state in which the yarn supplying bobbin B1 of a plurality of winding devices 10 can be rewound. The yarn supplying bobbin preparing mode will be specifically described later.

[0056] The unit controller 55 is connected to each device of the winding device 10 including the magazine 31 and the yarn end suction port 32.

[0057] The operation section 60 is arranged on the front side of the machine base control main body 5. Each switch for operating the automatic winder 100 is arranged in the operation section 60. The operation section 60 includes a start switch 61 and a stop switch 62. The start switch 61 is a switch to command the controller 50 to start up each device configuring the automatic winder 100. That is, each device configuring the automatic winder 100 is started when the start switch 61 is pushed so as to enter an operable state. The stop switch 62 is a switch to command the controller 50 to stop the automatic winder 100. That is, each device configuring the automatic winder 100 is stopped when the stop switch 62 is pushed so as to enter a stop state.

[0058] The setting section 70 is arranged on the front side of the machine base control main body 5. The setting section 70 is adapted to set the various types of settings of the automatic winder 100 with respect to the controller 50. The setting section 70 includes setting buttons 71 and a liquid crystal display unit 72. The liquid crystal display unit 72 displays various types of settings set by the setting buttons 71.

[0059] The yarn supplying bobbin preparing mode will be described. In the automatic winder 100, the yarn supplying bobbin preparing operation for supplying the yarn supplying bobbin B1 to each winding device 10 is necessary when starting the operation. For example, in the automatic winder 100 including the magazine type bob-

bin supplying device 30 of the first embodiment, the operation of setting the yarn supplying bobbin B1 in the magazine 31 of each winding device 10 and causing the yarn end suction port 32 to suck the yarn end of the yarn supplying bobbin B1 is necessary for the yarn supplying bobbin preparing operation. The yarn supplying bobbin preparing mode is a state of operating each device of the automatic winder 100 so that the operator can efficiently carry out the yarn supplying bobbin preparing operation.

[0060] According to the yarn supplying bobbin preparing mode of the first embodiment, in the automatic winder 100, the negative pressure generating device 6 supplies, in a limited manner, the negative pressure by the operation of 60%, the operation (driving force) at which the winding device 10 executes the winding operation being 100%, and the other devices are not operated even if the automatic operation switch 12 is turned ON. Furthermore, in each winding device 10, only the yarn end suction port 32 of the bobbin supplying device 30 is operated, and the magazine 31 of the bobbin supplying device 30, the yarn supplying bobbin holding device 21 of the winding device 10, and other devices are not operated. The operations and the like of the device in the yarn supplying bobbin preparing mode are stored in the controller 50 and the unit controller 55 in advance.

[0061] The setting of the yarn supplying bobbin preparing mode will be described with reference to FIG. 4. FIG. 4 illustrates a setting pattern of the yarn supplying bobbin preparing mode displayed on the liquid crystal display unit 72. A shaded setting pattern (3) is currently set.

[0062] The setting section 70 sets the preparation switch adapted to execute the transition to the yarn supplying bobbin preparing mode. The operator selects and sets setting patterns (1) to (4) in which the permission of making the transition of the yarn supplying bobbin preparing mode is set with the setting button 71.

[0063] The start switch 61 is set as the preparation switch when the yarn supplying bobbin preparing mode at the time of startup is set to ON. If the start switch 61 is pushed once when each device configuring the automatic winder 100 is in the stop state, the controller 50 serving as the control section causes each device configuring the automatic winder 100 to transition to the yarn supplying bobbin preparing mode, and if the start switch 61 is pushed once more, the controller 50 causes each device configuring the automatic winder 100 to transition to the operation state so that the winding device 10 in which the automatic operation switch 12 is turned ON executes the winding operation.

[0064] If the yarn supplying bobbin preparing mode at the time of startup is set to OFF and each device configuring the automatic winder 100 is in the stop state, the controller 50 serving as the control section causes each device configuring the automatic winder 100 to transition to the operation state when the start switch 61 is pushed once. In this case, each device configuring the automatic winder 100 does not make transition to the yarn supplying

bobbin preparing mode by the start switch 61.

[0065] The stop switch 62 is set as the preparation switch when the yarn supplying bobbin preparing mode at the time of stop is set to ON. If the stop switch 62 is pushed once when each device configuring the automatic winder 100 is in the operation state, the controller 50 serving as the control section causes each device configuring the automatic winder 100 to transition to the yarn supplying bobbin preparing mode, and if the stop switch 62 is pushed once more, the controller 50 causes each device configuring the automatic winder 100 to transition to the stop state.

[0066] If the yarn supplying bobbin preparing mode at the time of stop is set to OFF and each device configuring the automatic winder 100 is in the operation state, the controller 50 serving as the control section causes each device configuring the automatic winder 100 to transition to the stop state when the stop switch 62 is pushed once. In this case, each device configuring the automatic winder 100 does not make transition to the yarn supplying bobbin preparing mode by the stop switch 62.

[0067] For example, in the setting pattern (3), the yarn supplying bobbin preparing mode at the time of startup is set to OFF and the yarn supplying bobbin preparing mode at the time of stop is set to ON. That is, the stop switch 62 is set as the preparation switch. In the setting pattern (3), each device configuring the automatic winder 100 makes transition to the operation state when the start switch 61 is pushed at the time of the stop state. Each device configuring the automatic winder 100 makes transition to the yarn supplying bobbin preparing mode when the stop switch 62 is pushed at the time of the operation state. If the start switch 61 is pushed after the preparation of the yarn supplying bobbin is completed, each device configuring the automatic winder 100 makes transition to the operation state. Transition can be made to the stop state by further pushing the stop switch 62 during the yarn supplying bobbin preparing mode.

[0068] The effects of the automatic winder 100 of the first embodiment will be described. In the conventional automatic winder, when the start switch of the machine base control main body 5 is pushed, the yarn winding operation is immediately started if the automatic operation switch 12 of each winding device 10 is already turned ON. Thus, the operator needs to carry out the operation of turning OFF the automatic operation switch 12 of each winding device 10 before pushing the start switch 61 of the machine base control main body 5. At the same time, after the yarn supplying bobbin preparing operation is finished, the operation of turning ON the automatic operation switch 12 of each winding device 10 has been necessary.

[0069] According to the automatic winder 100, by setting the yarn supplying bobbin preparing mode, the switching operation of the automatic operation switch 12 of each winding device 10 before and after the yarn supplying bobbin preparing operation can be omitted.

[0070] Furthermore, since only the devices (negative

pressure generating device 6 and yarn end suction port 32) necessary for the yarn supplying bobbin preparing operation are operated in the yarn supplying bobbin preparing mode, wasteful power can be prevented from being consumed by the operation of the device not necessary in the yarn supplying bobbin preparing operation, or the lowering in the lifespan of the driving mechanism of the yarn supplying bobbin holding device 21 or the magazine 31 can be prevented.

[0071] Moreover, in the yarn supplying bobbin preparing mode, the power consumption can be reduced by operating the negative pressure generating device 6 at the operation of 60%, the operation (driving force) at which the winding device 10 executes the winding operation being 100%, to generate the required minimum negative pressure.

[0072] In the yarn supplying bobbin preparing mode, transition is made to the yarn supplying bobbin preparing mode by turning ON the start switch 61 or the stop switch 62 of the automatic winder 100, and thus the operation mistake of the operator can be prevented.

[0073] Furthermore, the timing of making transition to the yarn supplying bobbin preparing mode can be set by the setting section 70 in accordance with the convenience status of the automatic winder 100, and thus the usability can be improved.

[0074] In the first embodiment, a configuration of making transition to the yarn supplying bobbin preparing mode using the start switch 61 or the stop switch 62 of the automatic winder 100 has been adopted, but the present invention is not limited thereto. For example, a preparation switch for making transition to the yarn supplying bobbin preparing mode when operated may be separately provided. According to such a configuration, the operation mistake of the operator can be prevented since the transition is made to the yarn supplying bobbin preparing operation using the preparation switch.

[0075] An automatic winder 200 of a second embodiment will be described with reference to FIG. 5. The automatic winder 200 serves as a second embodiment of the automatic winder of the present invention. The automatic winder 200 includes the winding devices 10, the machine base 3, a yarn supplying bobbin processing device 8, the machine base control main body 5, the negative pressure generating device 6, the doffing machine 7, the unit main body 11, and the automatic operation switch 12.

[0076] The yarn supplying bobbin processing device 8 is a device adapted to mount the yarn supplying bobbin B1 on a tray, automatically supply the yarn supplying bobbin B1 to the respective winding device 10 with a conveyor (see FIG. 6), and automatically collect the yarn supplying bobbin B1 from which all the yarn Y is pulled out. The yarn supplying bobbin processing device 8 includes a yarn supplying bobbin supplying section (bobbin supplying device) 81 adapted to mount the yarn supplying bobbin B1 on the tray one at a time, a yarn end pull-out device 82 adapted to pull out, that is, stick out the

yarn end of the yarn supplying bobbin B1 mounted on the tray, and a yarn supplying bobbin collecting section (not illustrated) adapted to collect the yarn supplying bobbin B1 from which all the yarn Y is pulled out.

[0077] The configurations of other devices are similar to the automatic winder 100 of the first embodiment, and thus the description will be omitted.

[0078] The winding device 10 will be described with reference to FIG. 6. The winding device 10 includes the yarn supplying device 20, a tension device 17, the yarn joining device 13, the yarn defect removing device 14, the traverse drum 15, and the unit controller 55 (see FIG. 3).

[0079] The yarn supplying device 20 includes the yarn supplying bobbin holding device 21 adapted to hold the yarn supplying bobbin B1, the yarn unwinding assisting device 22, and the conveyor (bobbin conveying device) 24. The conveyor 24 forms a conveyance path from the yarn supplying bobbin supplying section 81 to the yarn supplying bobbin collecting section via each winding device 10.

[0080] The configurations of other devices are similar to the winding device 10 of the first embodiment, and thus the description thereof will be omitted.

[0081] According to the yarn supplying bobbin preparing mode of the second embodiment, in the automatic winder 200, the negative pressure generating device 6 supplies, in a limited manner, the negative pressure by the operation of 60%, the operation (driving force) at which the winding device 10 executes the winding operation being 100%, where the yarn supplying bobbin supplying section 81, the yarn end pull-out device 82, the yarn supplying bobbin collecting section, and the conveyor 24 are operated and the other devices and the like are not operated.

[0082] The setting of the yarn supplying bobbin preparing mode is similar to the automatic winder 100 of the first embodiment, and hence the description thereof will be omitted.

[0083] The effects of the automatic winder 200 of the second embodiment will be described. According to the automatic winder 200, the switching operation of the automatic operation switch 12 of each winding device 10 before and after the yarn supplying bobbin preparing operation can be omitted by setting the yarn supplying bobbin preparing mode.

[0084] The yarn supplying bobbin processing device 8 is adopted for the automatic yarn supplying bobbin supplying device of the present invention, but the present invention is not limited thereto. The automatic yarn supplying bobbin supplying device may be a link type automatic yarn supplying bobbin supplying device that directly connects the spinning machine and the automatic winder 100.

[0085] A configuration of executing one part of the operation of the automatic winder 100 to execute up to the yarn hooking operation may be adopted for the yarn supplying bobbin preparing mode of the present invention.

[0086] An arm type traverse device may be adopted instead of the traverse drum 15 of the present embodiment.

Claims

1. An automatic winder (100, 200) comprising:

a plurality of winding devices (10) adapted to wind a yarn from a yarn supplying bobbin to form a package; and
a machine base control main body (5) adapted to control an operation of the plurality of winding devices (10), **characterized in that** the winding device (10) includes an automatic operation switch (12) adapted to switch execution or stop of a winding operation; and
the machine base control main body (5) includes a control section (50) adapted to cause transition to a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin is executable regardless of a switching state of the automatic operation switches (12) of the plurality of winding devices (10), and a preparation switch (61, 62) for causing the control section (50) to execute the transition to the yarn supplying bobbin preparing mode.

2. The automatic winder (100, 200) according to claim 1, **characterized in that** the yarn supplying bobbin preparing mode is a mode of operating a device necessary for the preparing operation of the yarn supplying bobbin, and stopping a device not necessary for the preparing operation of the yarn supplying bobbin in each device configuring the plurality of winding devices (10).

3. The automatic winder (100, 200) according to claim 1 or 2, further **characterized by** comprising a negative pressure supplying device (6) adapted to supply a negative pressure to the plurality of winding devices (10), the negative pressure supplying device (6) operating at a driving force lower than a driving force at which each of the winding devices (10) is capable of executing the winding operation to supply the negative pressure in the yarn supplying bobbin preparing mode.

4. The automatic winder (100, 200) according to claim 3, **characterized in that** the machine base control main body (5) includes a start switch (61) for starting each device, and a stop switch (62) for stopping each device; and the control section (50) operates the start switch (61) and/or the stop switch (62) as the preparation switch (61, 62) for causing transition to the yarn supplying

bobbin preparing mode.

5. The automatic winder (100, 200) according to claim 4, **characterized in that**

the machine base control main body (5) includes a setting section (70); and
the control section (50) sets the start switch (61) or the stop switch (62) as the preparation switch (61, 62) for executing the transition to the yarn supplying bobbin preparing mode from an operation state or a stop state of each of the devices in accordance with the setting of the setting section (70).

6. The automatic winder (100, 200) according to claim 3, **characterized in that** the machine base control main body (5) further includes a start switch (61) for starting each device and a stop switch (62) for stopping each device apart from the preparation switch.

7. The automatic winder (100, 200) according to claim 6, **characterized in that**

the machine base control main body (5) includes a setting section (70); and
the control section (50) sets a permission of making transition to the yarn supplying bobbin preparing mode from an operation state or a stop state of each of the devices by the preparation switch in accordance with the setting of the setting section (70).

8. The automatic winder (100) according to any one of claims 3 to 7, **characterized in that**

the winding device (10) includes a magazine type bobbin supplying device (30);
the magazine type bobbin supplying device (30) includes a yarn supplying bobbin accommodating device (31) adapted to accommodate a plurality of yarn supplying bobbins and supply the yarn supplying bobbin to a yarn supplying bobbin holding position, and a yarn end suction port (32) adapted to suck a yarn end of the yarn supplying bobbin with the negative pressure supplied from the negative pressure supplying device (6); and
the control section (50) stops the winding operation of each of the winding devices (10) and operates the negative pressure supplying device (6) in the yarn supplying bobbin preparing mode.

9. The automatic winder (200) according to any one of claims 3 to 7, **characterized by** further comprising:

a tray type bobbin supplying device (81); and
a yarn end pull-out device (82) adapted to pull out a yarn end of the yarn supplying bobbin with the negative pressure to prepare for a state in which the winding device (10) is capable of receiving the yarn end, wherein
the control section (50) operates the tray type bobbin supplying device (81), the negative pres-

- sure supplying device (6), and the yarn end pull-out device (82) in the yarn supplying bobbin preparing mode.
10. The automatic winder (200) according to claim 9, **characterized by** further comprising:
- a bobbin conveying device for conveying the yarn supplying bobbin to supply to each winding device (10), wherein
the control section (50) drives the bobbin conveying device in the yarn supplying bobbin preparing mode.
11. Method of operating an automatic winder (100, 200) comprising:
- A plurality of winding devices (10) winding a yarn from a yarn supplying bobbin to form a package; and a machine based control main body (5) controlling an operation of the plurality of winding devices (10), **characterized by** the following steps: switching execution or stop of a winding operation by an automatic switch (12) included in the winding device (10) and
transiting the winding device to a yarn supplying bobbin preparing mode realizing a state in which a preparing operation of the yarn supplying bobbin is executed regardless of a switching state of the automatic switches (12) of the plurality of winding devices (10) by a control section (50) included in the machine base control main body (5) and transiting the control section (50) to the yarn supplying bobbin preparing mode according to the setting of a preparation switch (61, 62).
12. Method according to claim 11, **characterized in that** the yarn supplying bobbin preparing step operates only the devices necessary for the preparing operation of the yarn supplying bobbin and stops all devices not necessary for the preparing operation of the yarn supplying bobbin in each device of the plurality of winding devices (10).
13. Method according to claim 11 or 12, **characterized in that** the automatic winder is provided with a negative pressure supplying device (6) supplying a negative pressure to the plurality of winding devices (10) and by operating the negative pressure supplying device (6) at a driving force lower than a driving force at which each of the winding devices (10) executes the winding operation thus supplying the negative pressure in the yarn supplying bobbin preparing mode.
14. Method according to claims 13, **characterized in that** a start switch (61) in the machine base control main body (5) starts each device and a stop switch (62) in the machine base control main body (5) stops each device; and
the control section (50) operates the starts switch (61) and/or the stop switch (62) as the preparation switch (61, 62), thus transiting to the yarn supplying bobbin preparing mode.
15. Method according to claim 14, **characterized in that** the machine base control main body is provided with a setting section (70); and the control section (50) sets the starts switch (61) or the stop switch (62) as the preparation switch (61, 62) for transiting from an operation state or a stop state of each of the devices into the yarn supplying bobbin preparation mode depending on the setting of the setting section (70).
16. Method according to claim 13, **characterized in that** each device is started by a start switch (61) in the machine base control main body (5) and each device is stopped by a stopped switch (62) in the machine base control main body (5) which is not used as the preparation switch.
17. Method according to claim 16, **characterized in that** the machine base control main body (5) includes a setting section and
the control section sets the start switch (61) or the stop switch (62) as the preparation switch (61, 62), thus transiting to the yarn supplying bobbin preparing mode from an operation state or a stop state of each of the devices according to the setting of the setting section (70).
18. Method according to claim 13, **characterized in that** the machine based control main body (5) further includes a start switch (61) to start each device and a stop switch (62) to stop each device apart from the preparation switch.
19. Method according to claim 16, **characterized in that** the machine base control main body (5) includes a setting section and that the control section (50) controls the transitions to the yarn supplying bobbin preparing mode from an operation state or a stop state of each of the devices depending on the position of the preparation switch according to the setting of the setting section (70).
20. Method according to any one of claims 13 to 17, **characterized in that** the winding device (10) includes a magazine type bobbin supplying device (30); the magazine type bobbin supplying device (30) accommodates a plurality of yarn supplying bobbins in a yarn supplying bobbin accommodating device (31) and supplies the yarn supplying bobbin to a yarn supplying bobbin holding position and a yarn end suction port (32) sucks a yarn end of the yarn supplying bobbin with the negative pressure provided

by the negative pressure supplying device; and the control section (50) stops the winding operation of each of the winding devices (10) and controls the negative pressure applying device (6) in the yarn supplying bobbin preparing mode.

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21. Method according to anyone of claims 13 to 17, **characterized by** a tray type bobbin supplying device (81) and in that a yarn end pull-out device (82) pulls out a yarn end of the yarn supplying bobbin with the negative pressure and prepares the winding device (10) for receiving the yarn end, wherein the control section (50) controls the tray type bobbin supplying device (81), the negative pressure supplying device (6), and the yarn end pull out device (82) in the yarn supplying bobbin preparing mode.
22. Method according to claim 19, **characterized in that** a bobbin conveying device conveys the yarn supplying bobbin to each winding device (10), wherein the control section (50) controls the bobbin conveying device in the yarn supplying bobbin preparing mode.

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FIG. 1

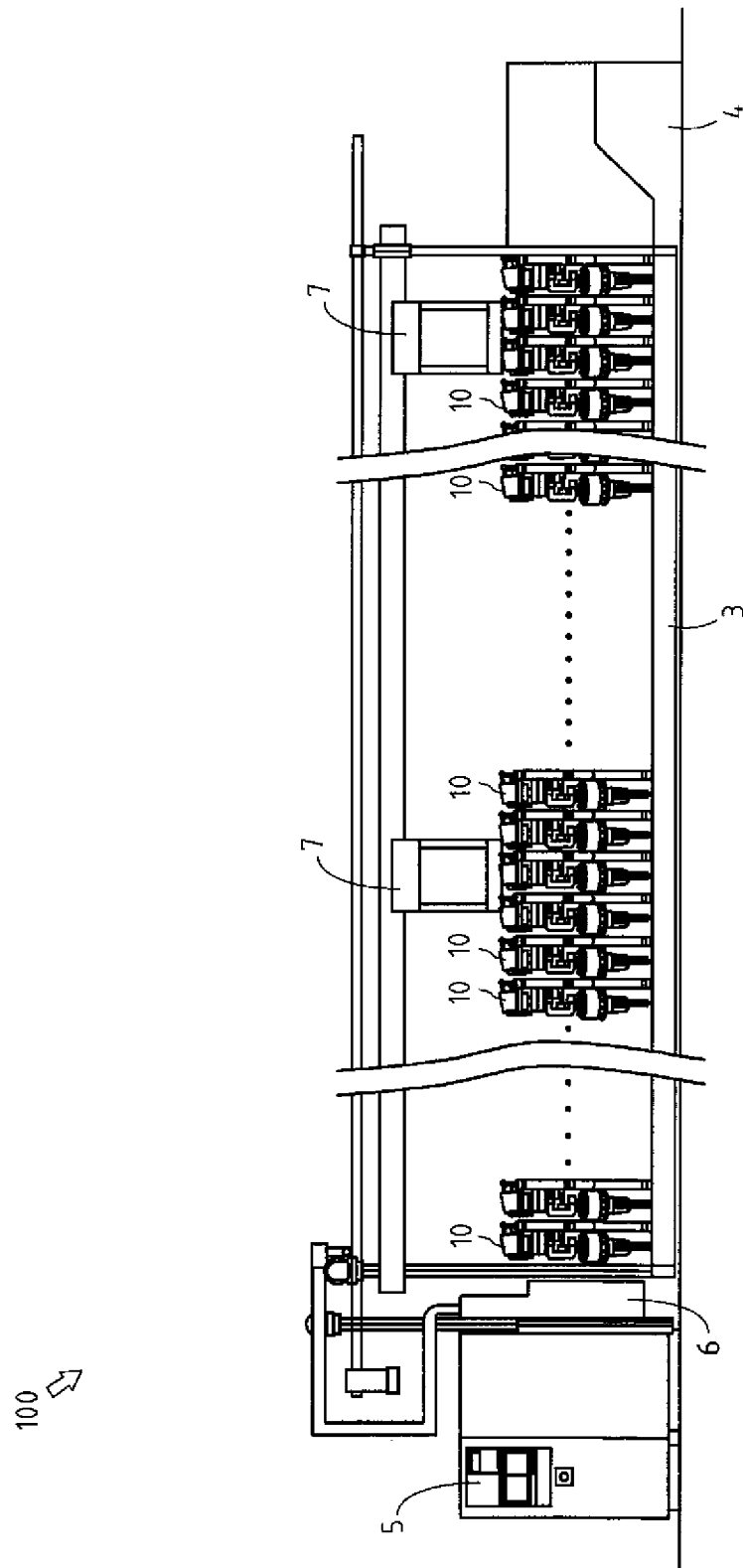


FIG. 2

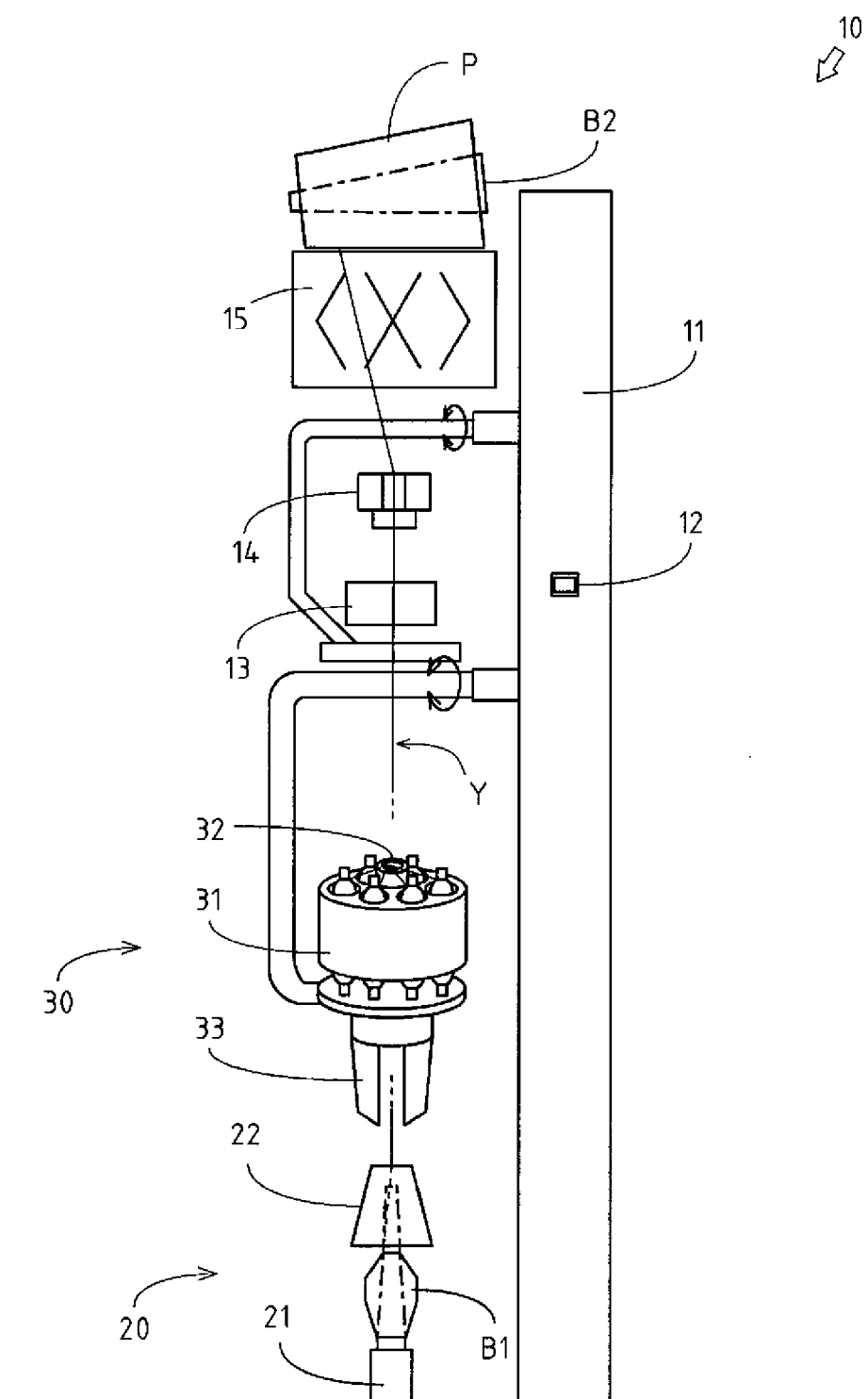


FIG. 3

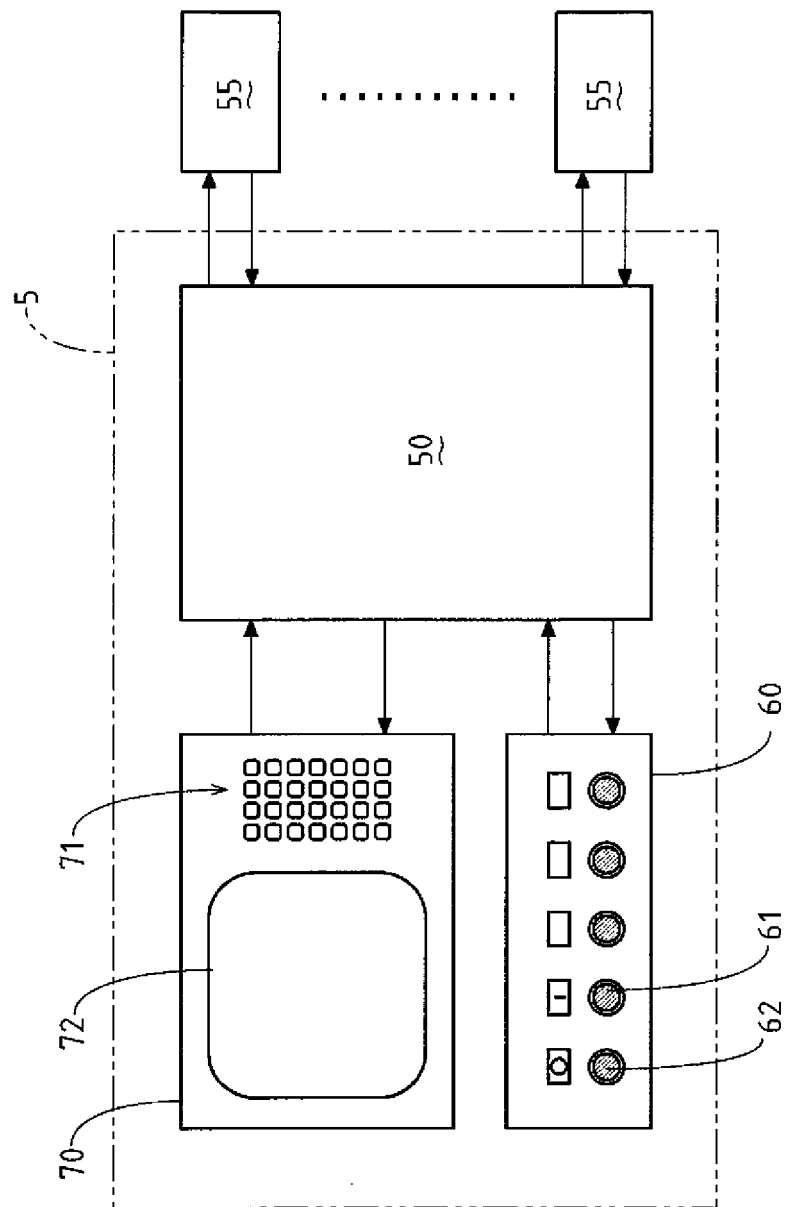
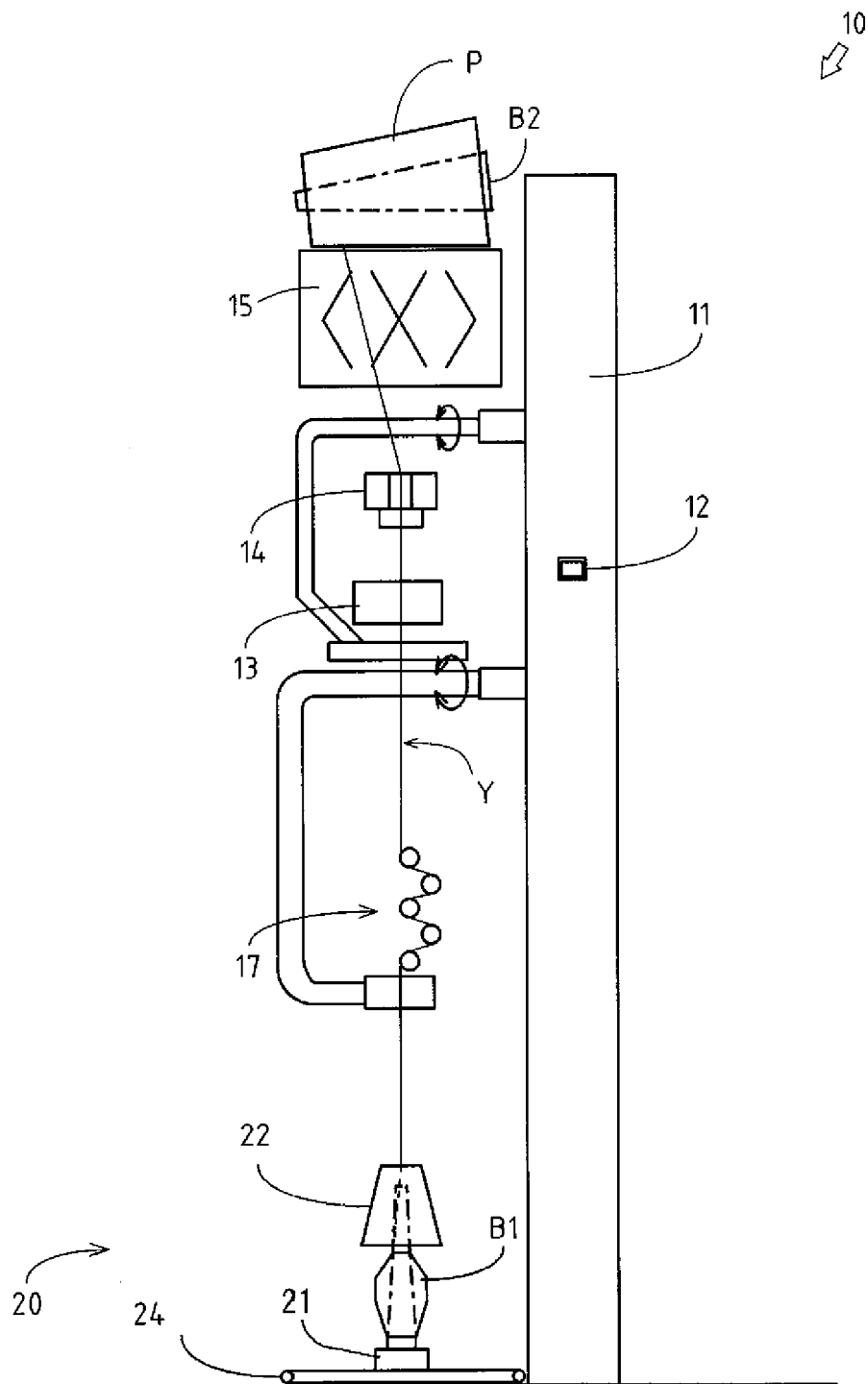


FIG. 4

	YARN SUPPLYING BOBBIN PREPARING MODE AT TIME OF START	YARN SUPPLYING BOBBIN PREPARING MODE AT TIME OF STOP
(1)	OFF	OFF
(2)	ON	OFF
(3)	OFF	ON
(4)	ON	ON

FIG. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003112854 A [0006]