(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 626 660 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.03.2020 Bulletin 2020/13

(21) Application number: **18802240.4**

(22) Date of filing: **17.05.2018**

(51) Int Cl.:
B65H 63/00 *(2006.01)* ***B65H 63/04*** *(2006.01)*
D01H 13/00 *(2006.01)*

(86) International application number:
PCT/JP2018/019156

(87) International publication number:
WO 2018/212293 (22.11.2018 Gazette 2018/47)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **19.05.2017 JP 2017099429**

(71) Applicant: **Murata Machinery, Ltd.**
Kyoto-shi, Kyoto 601-8326 (JP)

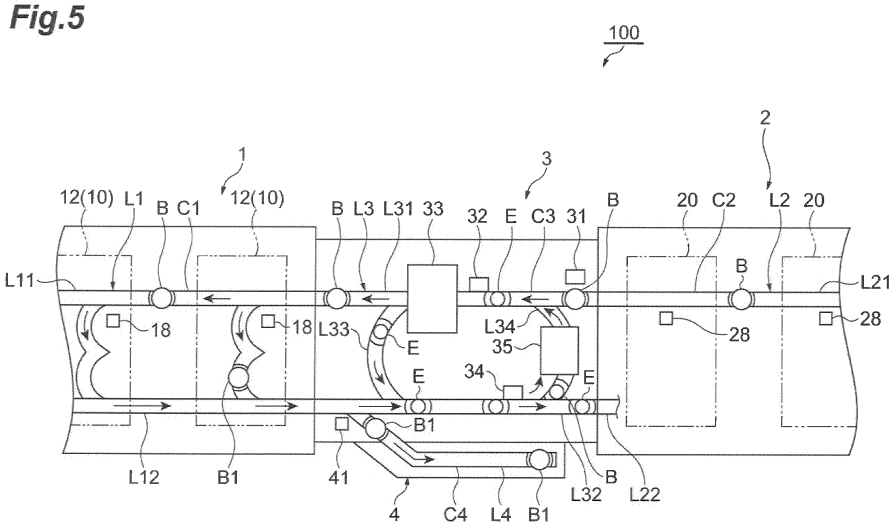
(72) Inventor: **KAWAMOTO Kenji**
Kyoto-shi
Kyoto 612-8686 (JP)

(74) Representative: **Stöckeler, Ferdinand et al**
Schoppe, Zimmermann, Stöckeler
Zinkler, Schenk & Partner mbB
Patentanwälte
Radlkoferstrasse 2
81373 München (DE)

(54) SPINNING SYSTEM AND WINDING PREVENTION METHOD

(57) A spinning system 100 includes an automatic winder 1 and a ring spinning frame 2. The spinning system 100 further includes : a spinning sensor 28, an off-quality bobbin determination unit 11c, and a yarn feeder 12. The spinning sensor 28 is installed in the ring spinning frame 2 to acquire quality information about quality of the spinning bobbin B. The off-quality bobbin determination unit 11c is configured to determine, for each spinning bobbin B, whether the quality of the spinning bobbin B satisfies a predetermined quality standard value, based on the quality information acquired by the spinning sensor 28. The yarn feeder 12 is configured to prevent yarn Y of the off-quality spinning bobbin B1 determined not to satisfy the quality standard value from being wound by the winding unit 10.

Fig.5



EP 3 626 660 A1

Description

Technical Field

[0001] The present invention relates to a spinning system and a winding preventing method.

Background Art

[0002] There is a spinning system including: a ring spinning frame having a plurality of spinning units configured to form spinning bobbins on which yarn is wound; an automatic winder having a plurality of winding units configured to wind yarn of the spinning bobbins to form packages; and a transportation device configured to transport the spinning bobbins from the ring spinning frame to the automatic winder. Such a spinning system is described, for example, in Patent Literature 1.

[0003] The winding unit of such an automatic winder determines the quality of yarn being wound, using a clearer and detects whether there is a yarn defect. If a yarn defect is detected, the winding unit stops winding yarn, performs yarn joining, and then resumes winding. When a yarn defect is frequently detected, the winding unit determines that the spinning bobbin under winding is an off-quality bobbin and ejects the off-quality bobbin to the outside.

Citation List

Patent Literature

[0004] Patent Literature 1: Japanese Unexamined Patent Publication No. H5-278950

Summary of Invention

Technical Problem

[0005] When the spinning bobbin supplied to the winding unit is an off-quality bobbin, stopping of winding, removal of a yarn defect, and yarn joining operation are repeated until the supplied spinning bobbin is determined to be an off-quality bobbin and ejected to the outside. This reduces the operating efficiency of the automatic winder.

[0006] An object of the present invention is therefore to provide a spinning system capable of winding yarn of a spinning bobbin without reducing the operating efficiency of the automatic winder, and a winding preventing method.

Solution to Problem

[0007] The present invention provides a spinning system including a ring spinning frame having a plurality of spinning units, each configured to form a spinning bobbin on which yarn is wound, and an automatic winder having a plurality of winding units, each configured to wind the yarn of the spinning bobbin formed by the ring spinning frame to form a package. The spinning system includes: a quality information acquisition unit installed in the ring spinning frame to acquire quality information about quality of the spinning bobbin; a determination unit configured to determine, for each spinning bobbin, whether the quality of the spinning bobbin satisfies a predetermined quality standard value, based on the quality information acquired by the quality information acquisition unit; and a winding preventing mechanism configured to prevent the yarn of the spinning bobbin determined not to satisfy the quality standard value in the determination unit from being wound by the winding unit.

[0008] In this spinning system, winding of yarn of the spinning bobbin that does not satisfy the quality standard value is prevented. With this configuration, the automatic winder can wind yarn of the spinning bobbin that satisfies the quality standard value without winding yarn of the spinning bobbin that does not satisfy the quality standard value. The spinning system therefore can wind yarn of the spinning bobbin without reducing the operating efficiency of the automatic winder.

[0009] The spinning system may include a transportation guide path configured to transport the spinning bobbin and an empty bobbin between the automatic winder and the ring spinning frame. The winding preventing mechanism may include an ejection device configured to eject the spinning bobbin determined not to satisfy the quality standard value to outside of the transportation guide path. In this case, the ejection device can eject the spinning bobbin that does not satisfy the quality standard value to the outside of the transportation guide path, thereby preventing yarn of the spinning bobbin that does not satisfy the quality standard value from being wound by the winding unit.

[0010] In the spinning system, the ejection device may be configured with an off-quality bobbin ejecting device including an off-quality bobbin ejection path branching from the transportation guide path. The off-quality bobbin ejecting device is configured to eject the spinning bobbin determined not to satisfy the quality standard value from the transportation guide path to the off-quality bobbin ejection path. In this case, the off-quality bobbin ejecting device can eject the spinning bobbin that does not satisfy the quality standard value from the transportation guide path to the off-quality bobbin ejection path, thereby preventing yarn of the spinning bobbin that does not satisfy the quality standard value from being wound by the winding unit.

[0011] In the spinning system, the off-quality bobbin ejection path may be disposed in the transportation guide path to branch from some point of the transportation guide path through which the spinning bobbin is transported from the ring spinning frame to the automatic winder. In this case, the off-quality bobbin ejecting device can eject the spinning bobbin that does not satisfy the quality standard value to the off-quality bobbin ejection path be-

fore the spinning bobbin that does not satisfy the quality standard value is transported from the ring spinning frame to the automatic winder.

[0012] In the spinning system, the ejection device may be configured with an off-quality bobbin removing device disposed on the transportation guide path to remove the spinning bobbin determined not to satisfy the quality standard value from the transportation guide path. In this case, the off-quality bobbin removing device can remove the spinning bobbin that does not satisfy the quality standard value from the transportation guide path, thereby preventing the yarn of the spinning bobbin that does not satisfy the quality standard value from being wound by the winding unit.

[0013] The spinning system may include a transportation guide path configured to transport the spinning bobbin and an empty bobbin between the automatic winder and the ring spinning frame. The automatic winder may include a yarn feeder configured to support the spinning bobbin transported through the transportation guide path, assist unwinding of the yarn of the spinning bobbin, and eject an empty bobbin after the yarn is completely unwound to the transportation guide path, and a winding device configured to unwind the yarn from the spinning bobbin and wind the unwound yarn. The winding preventing mechanism may be configured with the yarn feeder. When the spinning bobbin transported is the spinning bobbin determined not to satisfy the quality standard value, the yarn feeder may eject the spinning bobbin to the transportation guide path without the yarn being unwound from the spinning bobbin. With this configuration, when the spinning bobbin that does not satisfy the quality standard value is transported, the yarn feeder can eject the spinning bobbin to the transportation guide path without the yarn being unwound from the spinning bobbin, thereby preventing the yarn of the spinning bobbin that does not satisfy the quality standard value from being wound by the winding unit.

[0014] The spinning system may include an information writing unit configured to write a determination result of quality of the spinning bobbin in the determination unit, and an information reading unit configured to read the determination result written by the information writing unit. The spinning bobbin may be transported along the transportation guide path while being set in a tray. The information writing unit may write the determination result into a memory disposed in the tray. The information reading unit may read the determination result from the memory in the tray. The winding preventing mechanism may prevent the yarn of the spinning bobbin from being wound by the winding unit, based on the determination result read by the information reading unit. In this case, the winding preventing mechanism can specify the spinning bobbin that does not satisfy the quality standard value from among a plurality of transported spinning bobbins set in the trays, based on the determination result read by the information reading unit.

[0015] The spinning system may include a determination standard setting unit configured to accept an input operation of setting the quality standard value by an operator. The determination unit may determine whether quality of the spinning bobbin satisfies a quality standard value, based on the quality standard value accepted by the determination standard setting unit. In this case, the operator of the spinning system can operate the determination standard setting unit to set the quality of the spinning bobbin to be prevented from winding of the yarn in the winding unit.

[0016] In the spinning system, the quality information may include at least one of ambient temperature of the ring spinning frame, ambient humidity of the ring spinning frame, information indicating a state of each part of the spinning unit, and an operating state of the spinning unit. In this case, the determination unit can determine whether the quality of the spinning bobbin satisfies the quality standard value, based on the information such as ambient temperature of the ring spinning frame included in the quality information.

[0017] The present invention provides a winding preventing method performed in a spinning system including a ring spinning frame having a plurality of spinning units, each configured to form a spinning bobbin on which yarn is wound, and an automatic winder having a plurality of winding units, each configured to wind yarn of the spinning bobbin formed by the ring spinning frame to form a package. The winding preventing method includes: an acquisition step of acquiring, by a quality information acquisition unit installed in the ring spinning frame, quality information about quality of the spinning bobbin; a determination step of determining, by a determination unit, for each spinning bobbin, whether quality of the spinning bobbin satisfies a predetermined quality standard value, based on the quality information acquired in the acquisition step; and a winding preventing step of preventing, by a winding preventing mechanism, the yarn of the spinning bobbin determined not to satisfy the quality standard value in the determination step from being wound by the winding unit.

[0018] In this winding preventing method, winding of the yarn of the spinning bobbin that does not satisfy the quality standard value is prevented in the winding preventing step. With this configuration, the automatic winder can wind yarn of the spinning bobbin that satisfies the quality standard value, without winding yarn of the spinning bobbin that does not satisfy the quality standard value. With this configuration, in the winding preventing method, the yarn of the spinning bobbin can be wound without reducing the operating efficiency of the automatic winder.

Advantageous Effects of Invention

[0019] According to the present invention, yarn of a spinning bobbin can be wound without reducing the operating efficiency of the automatic winder.

Brief Description of Drawings

[0020]

FIG. 1 is a schematic diagram illustrating a configuration in which an automatic winder and a ring spinning frame in an embodiment are coupled to each other.
FIG. 2 is a perspective view of a tray, an empty bobbin, and a spinning bobbin transported in the spinning system in FIG. 1.
FIG. 3 is a side view of a spinning unit of the spinning system in FIG. 1.
FIG. 4 is a control block diagram of the spinning system in FIG. 1.
FIG. 5 is a plan view of the spinning system in FIG. 1.
FIG. 6 is a front view of an automatic winder in the spinning system in FIG. 1.
FIG. 7 is a plan view of a spinning system in a first modification.
FIG. 8 is a control block diagram of the spinning system in the first modification.
FIG. 9 is a side view of an off-quality bobbin removing device in a spinning system in a second modification.

Description of Embodiments

[0021] Embodiments of the present invention will be described below with reference to the drawings. It is noted that the same or corresponding parts are denoted by the same reference signs and an overlapping description will be omitted.

[0022] As illustrated in FIG. 1, a spinning system 100 includes an automatic winder 1, a ring spinning frame 2, and a transportation device 3. The ring spinning frame 2 generates yarn Y from roved yarn and winds the yarn Y onto an empty bobbin E (bobbin on which yarn Y is not wound) to form a spinning bobbin B. The automatic winder 1 winds yarn Y on the spinning bobbin B to form a package P. The transportation device 3 transports a spinning bobbin B from the ring spinning frame 2 to the automatic winder 1 and transports an empty bobbin E from the automatic winder 1 to the ring spinning frame 2.

[0023] The spinning bobbin B and the empty bobbin E, each set (placed) on a tray T, are transported. As illustrated in FIG. 2, the tray T has a disc-shaped base T1, a pin T2 projecting upward from the base T1, and a radio frequency (RF) tag (memory) T3 provided at the base T1. The RF tag T3 may be contained in the base T1 or may be attached to an outer surface of the base T1. The RF tag T3 does not necessarily have a rectangular shape as illustrated in FIG. 2 and may have, for example, a doughnut shape (ring shape) . The spinning bobbin B and the empty bobbin E are each set on a tray T such that the pin T2 is inserted in the bottom Ea of the bobbin E whereby the top Eb of the bobbin E faces upward. The RF tag T3 stores information about the spinning bobbin B set on the tray T. In the spinning system 100, the condition of the spinning bobbin B set on the tray T is managed by radio frequency identification (RFID) technology. The configuration of the tray T is not limited to the embodiment above. For example, the base T1 does not necessarily have a disc shape, and the means for setting the spinning bobbin B and the empty bobbin E is not necessarily insertion of the pin T2. The RF tag T3 may be installed at any place that can be written and read by an RF writer (information writing unit) 31 and RF readers (information reading unit) 18 and 41 described later.

[Configuration of Ring Spinning Frame]

[0024] The ring spinning frame 2 performs a spinning process preceding the automatic winder 1. As illustrated in FIG. 1, the ring spinning frame 2 includes a machine control device 21 configured to control the ring spinning frame 2 and a plurality of spinning units 20 configured to form spinning bobbins B. The machine control device 21 has a display unit 21a such as a screen and an operation unit 21b such as input keys. The display unit 21a displays, for example, the operating status of each spinning unit 20. The operation unit 21b is operated, for example, by an operator to set the operating condition of each spinning unit 20. The display unit 21a and the operation unit 21b may be configured with a touch panel.

[0025] As illustrated in FIG. 3, the spinning unit 20 has a drafting device 22 and a twisting device 23.

[0026] The drafting unit 22 has a back roller pair 22a, a middle roller pair 22b, and a front roller pair 22c. The back roller pair 22a, the middle roller pair 22b, and the front roller pair 22c each include a bottom roller and a top roller. An apron belt is looped around each roller of the middle roller pair 22b. In the drafting device 22, the back roller pair 22a, the middle roller pair 22b, and the front roller pair 22c are rotated at a predetermined speed ratio whereby roved yarn Y1 unwound from a roved yarn bobbin is drafted.

[0027] The twisting device 23 has a spindle 24, a ring rail 25, a ring 26, and a traveler 27. The spindle 24 holds the bottom Ea of the bobbin E with the top Eb of the bobbin E facing upward and rotates the bobbin E. The ring rail 25 is movable in the axis direction of the bobbin E. The ring 26 is fixed to the ring rail 25. The traveler 27 is supported on the ring 26 and movable along the ring 26.

[0028] In the twisting device 23, the roved yarn Y1 drafted in the drafting device 22 is inserted into a gap between the ring 26 and the traveler 27, and an end of the roved yarn Y1 is fixed to the bobbin E. When the spindle 24 rotates the bobbin E in this state, the traveler 27 moves along the ring 26 so as to be pulled by the roved yarn Y1. Here, the ring rail 25 gradually moves from the bottom Ea side to the top Eb side while reciprocating in a predetermined range along the axis direction of the bobbin E. In the twisting device 23, the rotation of the traveler 27 lags behind the rotation of the bobbin E whereby the roved yarn Y1 is twisted to generate yarn Y, and the yarn Y is wound onto a bobbin E to form a

spinning bobbin B.

[0029] The ring spinning frame 2 having a plurality of spinning units 20 configured as described above is configured as a simultaneous doffing type. That is, the ring spinning frame 2 has a stock of empty bobbins E transported by the transportation device 3 from the automatic winder 1 and sets the empty bobbins E in the spinning units 20 simultaneously to start winding of yarn Y simultaneously. When winding of yarn Y is finished and a spinning bobbin B is formed in each spinning unit 20, the ring spinning frame 2 doffs all the spinning bobbins B simultaneously. The ring spinning frame 2 then pulls out the empty bobbins E stocked meanwhile from the trays T, sets the empty bobbins E in the spinning units 20 simultaneously again, and in turn sets the doffed spinning bobbins B on the trays T simultaneously. The doffed spinning bobbins B are transported to the automatic winder 1 through the transportation device 3.

[0030] As illustrated in FIG. 4, a spinning sensor (quality information acquisition unit) 28 and a sensor management controller 29 are installed in the ring spinning frame 2. In the present embodiment, the spinning sensor 28 is installed for each of a plurality of spinning units 20 in the ring spinning frame 2. The spinning sensor 28 acquires quality information of the spinning bobbin B formed in the spinning unit 20. However, only one spinning sensor 28 may be provided for a plurality of spinning units 20 or one or more spinning sensors 28 may be provided for each spinning unit 20.

[0031] The spinning sensor 28 acquires, as quality information, at least one of the surrounding environment of the ring spinning frame 2 (for example, ambient temperature, ambient humidity), information indicating the state of each part of the spinning unit 20 (for example, installation failure, wear of equipment or parts), and the operating state of the spinning unit 20 (for example, the speed at which a spinning bobbin B is formed in each spinning unit 20 (for example, the rotation speed of the traveler 27, the rotation speed of the spinning bobbin B)).

[0032] The sensor management controller 29 controls quality information acquired by each spinning sensor 28. The sensor management controller 29 outputs the quality information to control to the machine control device 11 of the automatic winder 1.

[0033] As illustrated in FIG. 5, the ring spinning frame 2 includes a transportation guide path L2 for transporting trays T and a transportation conveyor C2. The transportation guide path L2 includes a transportation guide path L21 for transporting a tray T in which a spinning bobbin B formed by each spinning unit 20 is set to the transportation device 3 and a transportation guide path L22 for receiving a tray T in which an empty bobbin E is set from the transportation device 3. The transportation conveyor C2 transports a tray T in which a spinning bobbin B or an empty bobbin E is set along the transportation guide path L2.

[Configuration of Automatic Winder]

[0034] As illustrated in FIG. 4 and FIG. 6, the automatic winder 1 includes a plurality of winding units 10 configured to form packages P from spinning bobbins B, a doffer 19 configured to doff the package P, and a machine control device 11 configured to control each winding unit 10 and the doffer 19.

<Transportation Guide Path>

[0035] As illustrated in FIG. 5, the automatic winder 1 includes a transportation guide path L1 for transporting trays T and a transportation conveyor C1. The transportation guide path L1 includes a transportation guide path L11 for transporting a tray T in which a spinning bobbin B transported from the transportation device 3 is set to each winding unit 10 and a transportation guide path L12 for transporting a tray T in which an empty bobbin E after yarn Y is wound in the winding unit 10 is set to the transportation device 3. The transportation conveyor C1 transports the tray T in which a spinning bobbin B or an empty bobbin E is set along the transportation guide path L1.

<Winding Unit>

[0036] As illustrated in FIG. 6, the winding unit 10 includes a yarn feeder 12, a tension applying device 13, a yarn joining device 14, a yarn clearer 15 (hereinafter simply referred to as clearer), and a winding device 16 in order from the upstream side to the downstream side of the yarn path. As illustrated in FIG. 4, the winding unit 10 further includes a unit controller 17 and an RF reader (information reading unit) 18.

[0037] The yarn feeder 12 supports a spinning bobbin B transported through the transportation guide path L11 and assists unwinding of yarn Y from the spinning bobbin B. The yarn feeder 12 ejects the empty bobbin E after yarn Y is completely unwound to the transportation guide path L12.

[0038] The tension applying device 13 applies a predetermined tension to yarn Y traveling from the yarn feeder 12 toward the winding device 16.

[0039] The yarn joining device 14 is a device that joins ends of yarn Y broken for some reason such as cutting yarn Y due to detection of a yarn defect.

[0040] The clearer 15 monitors the state of yarn Y traveling from the yarn feeder 12 toward the winding device 16 between the yarn feeder 12 and the winding device 16 and detects a yarn defect (for example, yarn thickness abnormality, inclusion of foreign substances in the yarn). The clearer 15 determines whether to remove the yarn defect being detected, based on the set clearing condition. If it is determined to remove a yarn defect, yarn Y is cut by a cutter to remove the yarn defect. The cutter is attached to the clearer 15. However, the cutter may be provided separately from the clearer 15.

[0041] The winding device 16 unwinds yarn Y from the

spinning bobbin B supported by the yarn feeder 12 and winds the unwound yarn Y to form a package P.

[0042] The RF reader 18 reads the determination result as to whether the transported spinning bobbin B satisfies a quality standard value, from the RF tag T3 on the tray T in which the spinning bobbin B transported to the winding unit 10 is set. The detail of information stored in the RF tag T3 will be described later.

[0043] The unit controller 17 controls the operation of each part of the winding unit 10 such as the yarn feeder 12 based on an instruction from the machine control device 11. The unit controller 17 controls the operation of the yarn feeder 12 based on the determination result as to whether the spinning bobbin B read by the RF reader 18 satisfies the quality standard value. The detail of the operation of the yarn feeder 12 when the spinning bobbin B does not satisfy the quality standard value will be described later.

<Doffer>

[0044] The doffer 19 doffs a package P formed in each winding unit 10. One doffer 19 is provided for a plurality of winding units 10. The doffer 19 sends the doffed package P to a predetermined position (for example, a conveyor provided at the back of a machine).

<Machine Control Device>

[0045] As illustrated in FIG. 4 and FIG. 6, the machine control device 11 includes a display unit 11a, an operation unit (determination standard setting unit) 11b, and an off-quality bobbin determination unit (determination unit) 11c. The machine control device 11 is configured with, for example, an electronic control unit including a central processing unit (CPU), a read only memory (ROM), a random access memory (RAM), an electrically erasable programmable read only memory (EEPROM), a communication device, a storage device, a display device, and an operation device.

[0046] The display unit 11a and the operation unit 11b are configured as a touch panel in the present embodiment. The display unit 11a and the operation unit 11b are not necessarily configured with a touch panel. The display unit 11a displays at least a winding condition and operating data in the winding unit 10. The operation unit 11b is operated, for example, by an operator to set the operating condition of each winding unit 10.

[0047] The off-quality bobbin determination unit 11c acquires quality information of the spinning bobbin B acquired by each spinning sensor 28 via communication from the sensor management controller 29. The off-quality bobbin determination unit 11c determines, for each spinning bobbin B, whether the quality of the spinning bobbin B satisfies a predetermined quality standard value, based on the acquired quality information. Hereinafter the spinning bobbin B that does not satisfy the quality standard value is referred to as off-quality bobbin B1 (see FIG. 5). The off-quality bobbin determination unit 11c outputs the determination result (whether the spinning bobbin B is an off-quality bobbin B1) to the RF writer 31 of the transportation device 3. This determination result includes identification information for specifying the spinning unit 20 that has formed the spinning bobbin B. The spinning unit 20 that has formed the spinning bobbin B can be specified based on the installation position of the spinning sensor 28 that has acquired the quality information of this spinning bobbin B.

[0048] Here, the off-quality bobbin B1 tends to include more yarn defects to be removed than a spinning bobbin B that satisfies the quality standard value. When the off-quality bobbin B1 is wound by the winding unit 10, the winding operation efficiency tends to decrease because the yarn defect removing operation is frequent.

[0049] The quality standard value may be changed by an operator. For example, the operation unit 11b of the machine control device 11 may accept an input operation of setting a quality standard value by an operator. The off-quality bobbin determination unit 11c then may determine whether the quality of the spinning bobbin B satisfies a quality standard value, based on the quality standard value changed by the operator's input operation. The operation unit configured to accept an input operation of setting a quality standard value by an operator is not limited to the operation unit 11b provided in the machine control device 11 and may be an operation unit other than the operation unit 11b.

[Configuration of Transportation Device]

[0050] As illustrated in FIG. 5, the transportation device 3 transports a spinning bobbin B from the ring spinning frame 2 to the automatic winder 1 and transports an empty bobbin E from the automatic winder 1 to the ring spinning frame 2 as previously mentioned.

[0051] The transportation device 3 includes a transportation guide path L3 for transporting trays T and a transportation conveyor C3. The transportation guide path L3 includes a transportation guide path L31 for transporting a tray T in which a spinning bobbin B transported from the ring spinning frame 2 is set to the automatic winder 1 and a transportation guide path L32 for transporting a tray T in which an empty bobbin E after yarn Y is wound in the automatic winder 1 to the ring spinning frame 2. That is, the transportation guide path L31 couples the transportation guide path L21 of the ring spinning frame 2 to the transportation guide path L11 of the automatic winder 1. The transportation guide path L32 couples the transportation guide path L22 of the ring spinning frame 2 to the transportation guide path L12 of the automatic winder 1.

[0052] The transportation guide path L3 includes bypass guide paths L33 and L34 coupling the transportation guide path L31 and the transportation guide path L32. The bypass guide path L33 is provided closer to the automatic winder 1 than the bypass guide path L34.

[0053] In this way, the transportation guide path L2 provided in the ring spinning frame 2, the transportation guide path L3 provided in the transportation device 3, and the transportation guide path L1 provided in the automatic winder 1 constitute a transportation guide path that transports a spinning bobbin B and an empty bobbin E between the automatic winder 1 and the ring spinning frame 2.

[0054] The transportation device 3 includes an RF writer (information writing unit) 31, a remaining yarn volume checking sensor 32, a yarn end preparing device 33, a yarn presence/absence checking sensor 34, a remaining yarn removing device 35, and an off-quality bobbin ejecting device (winding preventing mechanism, ejection device) 4.

[0055] The RF writer 31 is provided in the vicinity of the transportation guide path L31 that transports the spinning bobbin B formed in the ring spinning frame 2 to the automatic winder 1. When a spinning bobbin B is transported from the ring spinning frame 2 to the automatic winder 1, the RF writer 31 writes the determination result by the off-quality bobbin determination unit 11c in the spinning bobbin B (whether the spinning bobbin B is an off-quality bobbin B1 and identification information of the spinning unit 20 that has formed this spinning bobbin B) into the RF tag T3 on the tray T in which the spinning bobbin B is set.

[0056] The RF writer 31 is not necessarily provided in the transportation device 3. The RF writer 31 may be provided at the exit of the ring spinning frame 2 in the transportation direction of the spinning bobbin B. The RF writer 31 may be provided for each spinning unit 20. When different trays are used in the ring spinning frame 2 and the automatic winder 1, the transportation device 3 may further include a transfer unit, and the spinning bobbin B may be transferred in the transfer unit from a tray for the ring spinning frame 2 to a tray for the automatic winder 1. In this case, the RF writer 31 is provided in the transfer unit or at a short distance from the transfer unit downstream in the transportation direction of the spinning bobbin B, and information about the spinning bobbin B is written into an RF tag attached to a tray for the automatic winder 1.

[0057] The remaining yarn volume checking sensor 32 detects the remaining yarn volume on a bobbin (spinning bobbin B and empty bobbin E) transported along the transportation guide path L31. When a bobbin transported along the transportation guide path L31 is a spinning bobbin B having yarn Y (left), the yarn end preparing device 33 performs yarn end processing for the spinning bobbin B in order to catch a yarn end in the automatic winder 1. When a bobbin transported along the transportation guide path L31 is an empty bobbin E with no yarn Y left, the yarn end preparing device 33 does not perform yarn end processing.

[0058] The transportation conveyor C3 transports the spinning bobbin B subjected to yarn end processing in the yarn end preparing device 33 to the automatic winder 1 along the transportation guide path L31. When the remaining yarn volume checking sensor 32 detects that a bobbin transported along the transportation guide path L31 is an empty bobbin E with no yarn Y left, the transportation conveyor C3 transports the empty bobbin E from the transportation guide path L31 to the transportation guide path L32 through the bypass guide path L33.

[0059] The yarn presence/absence checking sensor 34 detects whether yarn Y is left on the bobbin (spinning bobbin B or empty bobbin E) transported along the transportation guide path L32. When the bobbin transported along the transportation guide path L32 is a spinning bobbin B with yarn Y left, the transportation conveyor C3 transports the spinning bobbin B with yarn Y left from the transportation guide path L32 to the remaining yarn removing device 35 through the bypass guide path L34.

[0060] The remaining yarn removing device 35 removes yarn Y from the spinning bobbin B with yarn Y left, transported along the bypass guide path L34, to produce an empty bobbin E. The empty bobbin E from which yarn Y has been removed by the remaining yarn removing device 35 is transported by the transportation conveyor C3 from the bypass guide path L34 to the transportation guide path L31.

[0061] The off-quality bobbin ejecting device 4 ejects an off-quality bobbin B1, returned to the transportation device 3 without winding yarn Y in the winding unit 10, to the outside of the transportation guide path L3. The configuration that returns the off-quality bobbin B1 to the transportation device 3 without winding yarn Y in the winding unit 10 will be described in detail later.

[0062] As illustrated in FIG. 4 and FIG. 5, the off-quality bobbin ejecting device 4 includes an RF reader 41, an ejection controller 42, an off-quality bobbin ejection path L4, and an ejection conveyor C4. The off-quality bobbin ejection path L4 branches from some point of the transportation guide path L32 for transporting a tray T from the automatic winder 1 to the ring spinning frame 2. The ejection conveyor C4 captures a tray T in which an off-quality bobbin B1 is set from the transportation guide path L32 to the off-quality bobbin ejection path L4, based on control by the ejection controller 42.

[0063] The RF reader 41 is provided in the vicinity of the transportation guide path L32 and at a position closer to the automatic winder 1 than the junction between the transportation guide path L32 and the off-quality bobbin ejection path L4. The RF reader 41 reads the determination result in the off-quality bobbin determination unit 11c (whether the spinning bobbin B set in the tray T is an off-quality bobbin B1) in a contactless manner, from the RF tag T3 on the tray T transported along the transportation guide path L32. The RF reader 41 outputs the read determination result to the ejection controller 42.

[0064] When the determination result read by the RF reader 41 indicates an off-quality bobbin B1, the ejection controller 42 controls the ejection conveyor C4 such that the off-quality bobbin B1 is ejected from the transportation guide path L32 to the off-quality bobbin ejection path

L4.

[Configuration for Preventing Winding of Yarn of Spinning Bobbin]

[0065] When the spinning bobbin B transported from the transportation device 3 is an off-quality bobbin B1, the winding unit 10 does not wind yarn Y from the off-quality bobbin B1. Specifically, as illustrated in FIG. 4 and FIG. 5, when a spinning bobbin B is set in the yarn feeder 12 of the winding unit 10 (when a spinning bobbin B is supported by the yarn feeder 12), the RF reader 18 reads the determination result in the off-quality bobbin determination unit 11c (whether the spinning bobbin B set in the tray T is an off-quality bobbin B1) in a contactless manner, from the RF tag T3 on the tray T in which the spinning bobbin B is set. The RF reader 18 outputs the read determination result to the unit controller 17.

[0066] When the determination result read by the RF reader 18 indicates an off-quality bobbin B1, the unit controller 17 controls the yarn feeder 12 such that the off-quality bobbin B1 is ejected to the transportation guide path L12 without unwinding yarn Y from the off-quality bobbin B1, that is, without supplying yarn Y to the winding device 16. When the determination result read by the RF reader 18 does not indicate an off-quality bobbin B1, the unit controller 17 controls the operation of each part of the winding unit 10 to supply yarn Y of the spinning bobbin B set in the yarn feeder 12 to the winding device 16.

[0067] The yarn feeder 12 thus constitutes a winding preventing mechanism that prevents yarn Y of the off-quality bobbin B1 from being wound by the winding device 16. The yarn feeder 12 can prevent yarn Y of the off-quality bobbin B1 from being wound by the winding device 16, based on the determination result by the off-quality bobbin determination unit 11c read by the RF reader 18.

[0068] The RF reader 18 reads the identification information for specifying the spinning unit 20 that has formed the spinning bobbin B from the RF tag T3 on the tray T when the spinning bobbin B is set in the yarn feeder 12. The RF reader 18 outputs the read identification information for specifying the spinning unit 20 to the machine control device 11. The machine control device 11 thus can specify the spinning unit 20 that has formed the spinning bobbin B, for the spinning bobbin B set in the yarn feeder 12. However, the machine control device 11 does not necessarily specify the spinning unit 20 that has formed the spinning bobbin B.

[0069] As described above, when an off-quality bobbin B1 that does not satisfy the quality standard value is transported, the yarn feeder 12 of the winding unit 10 ejects the off-quality bobbin B1 to the transportation guide path L12 without yarn Y being unwound from the off-quality bobbin B1 and returns the off-quality bobbin B1 to the transportation device 3. That is, the yarn feeder 12 of the winding unit 10 prevents winding of yarn Y of the off-quality bobbin B1. The automatic winder 1 thus can wind yarn Y of the spinning bobbin B that satisfies the quality standard value without winding yarn Y of the off-quality bobbin B1. The spinning system 100 thus can wind yarn Y of the spinning bobbin B without reducing the operating efficiency of the automatic winder 1.

[0070] The off-quality bobbin ejecting device 4 ejects the off-quality bobbin B1 from the transportation guide path L32 to the off-quality bobbin ejection path L4. This prevents the off-quality bobbin B1 from being transported to the automatic winder 1 again. In this way, the off-quality bobbin ejecting device 4 also can prevent yarn Y of the off-quality bobbin B1 from being wound by the winding unit 10.

[0071] The RF writer 31 writes the determination result determined by the off-quality bobbin determination unit 11c into the RF tag T3 on the tray T. The RF reader 18 reads the determination result from the RF tag T3. The winding unit 10 thus can specify the off-quality bobbin B1 that does not satisfy the quality standard value from among a plurality of transported spinning bobbins B set on trays T, based on the determination result read by the RF reader 18.

[0072] The operation unit 11b of the winding unit 10 accepts an input operation of setting a quality standard value by an operator. The off-quality bobbin determination unit 11c then may determine whether the quality of the spinning bobbin B satisfies a quality standard value, based on the accepted quality standard value. In this case, the operator of the spinning system 100 can operate the operation unit 11b to set the quality of the spinning bobbin B to be prevented from winding of yarn Y in the winding unit 10.

[0073] The spinning sensor 28 acquires, as quality information, at least one of the surrounding environment of the ring spinning frame 2, information indicating the state of each part of the spinning unit 20, and the operating state of the spinning unit 20. In this case, the off-quality bobbin determination unit 11c determines whether the quality of the spinning bobbin B satisfies the quality standard value, based on the information such as the surrounding environment of the ring spinning frame 2 included in the quality information.

[0074] A winding preventing method performed in the spinning system 100 includes an acquisition step of acquiring, by the spinning sensor 28 installed in the ring spinning frame 2, quality information about the quality of a spinning bobbin B, a determination step of determining, by the off-quality bobbin determination unit 11c, for each spinning bobbin B, whether the quality of the spinning bobbin B satisfies a predetermined quality standard value, based on the quality information acquired in the acquisition step, and a winding preventing step of preventing, by the yarn feeder 12, yarn Y of the spinning bobbin B determined not to satisfy the quality standard value in the determination step from being wound by the winding unit 10. According to this winding preventing method, yarn Y of the spinning bobbin B can be wound without reducing the operating efficiency of the ring spinning

frame 2 as described above.

(First Modification)

[0075] A first modification of the spinning system will now be described. In the following description, like components as those in the spinning system 100 in the embodiment are denoted by the same reference signs and will not be further elaborated. As illustrated in FIG. 7 and FIG. 8, a spinning system 100A in the first modification includes a transportation device 3A instead of the transportation device 3 in the spinning system 100 in the embodiment.

[0076] The transportation device 3A includes an off-quality bobbin ejecting device (winding preventing mechanism, ejection device) 5 instead of the off-quality bobbin ejecting device 4 of the transportation device 3 in the embodiment. The off-quality bobbin ejecting device 5 ejects an off-quality bobbin B1 from the transportation guide path L31 through which spinning bobbins B are transported.

[0077] The off-quality bobbin ejecting device 5 includes an ejection controller 51, an off-quality bobbin ejection path L5, and an ejection conveyor C5. The off-quality bobbin ejection path L5 branches from some point of the transportation guide path L31 for transporting a tray T (spinning bobbin B) from the ring spinning frame 2 to the automatic winder 1. The off-quality bobbin ejection path L5 is coupled to a position closer to the ring spinning frame 2 than the junction between the bypass guide path L34 and the transportation guide path L31 in the transportation guide path L31. The ejection conveyor C5 captures a tray T in which the off-quality bobbin B1 is set from the transportation guide path L31 to the off-quality bobbin ejection path L5, based on the control by the ejection controller 51.

[0078] The ejection controller 51 acquires the determination result from the off-quality bobbin determination unit 11c and specifies the spinning unit 20 that has formed the off-quality bobbin B1, based on the acquired determination result. The ejection controller 51 controls the ejection conveyor C5 such that the off-quality bobbin B1 is ejected to the off-quality bobbin ejection path L5 when the spinning bobbin B (off-quality bobbin B1) formed by the specified spinning unit 20 passes through the junction between the off-quality bobbin ejection path L5 and the transportation guide path L31.

[0079] Here, the ring spinning frame 2 doffs all the spinning bobbins B simultaneously and sets the doffed spinning bobbins B on trays T simultaneously to transport the trays T to the transportation device 3. Accordingly, a plurality of spinning bobbins B formed by a plurality of spinning units 20 are transported to the transportation device 3 in order, for example, in the arrangement order of the spinning units 20. With this configuration, the ejection controller 51 has already specified the identification information of the spinning unit 20 that has formed the off-quality bobbin B1, based on the acquired determination result, and therefore can specify the off-quality bobbin B1, for example, based on the order of the spinning bobbins B successively transported along the transportation guide path L31.

[0080] That is, the off-quality bobbin ejecting device 5 can eject the off-quality bobbin B1 without reading the determination result from the RF tag T3. In this case, the RF writer 31 need not write the determination result as to whether the spinning bobbin B satisfies a quality standard value into the RF tag T3 on the tray T. For example, the RF writer 31 may write only the identification information of the spinning unit 20 that has formed the spinning bobbin B into the RF tag T3 on the tray T. When the determination result of the spinning bobbin R and the identification information of the spinning unit 20 are written in the RF tag T3, the RF writer 31 can acquire the determination result and the identification information from the off-quality bobbin determination unit 11c through the ejection controller 51. However, the RF writer 31 may directly acquire the determination result and the identification information from the off-quality bobbin determination unit 11c. When the off-quality bobbin ejecting device 5 ejects the off-quality bobbin B1 without reading the determination result from the RF tag T3, the RF writer 31 and the RF reader 18 are not necessarily provided.

[0081] In this way, the off-quality bobbin ejecting device 5 can eject the off-quality bobbin B1 from the transportation guide path L31 for transporting the spinning bobbin B to the off-quality bobbin ejection path L5 outside the transportation guide path L31. With this configuration, the spinning system 100A can prevent yarn Y of the off-quality bobbin B1 from being wound by the winding unit 10 and can wind yarn Y of the spinning bobbin B without reducing the operating efficiency of the automatic winder 1.

[0082] The off-quality bobbin ejection path L5 of the off-quality bobbin ejecting device 5 is coupled to the transportation guide path L31 for transporting the spinning bobbin B from the ring spinning frame 2 to the automatic winder 1. With this configuration, the off-quality bobbin ejecting device 5 can eject the off-quality bobbin B1 to the off-quality bobbin ejection path L5 before the off-quality bobbin B1 is transported from the ring spinning frame 2 to the automatic winder 1.

[0083] The off-quality bobbin ejecting device 5 in the first modification may read the determination result stored in the RF tag T3 on the tray T with the RF reader and eject the off-quality bobbin B1 from the transportation guide path L31 to the off-quality bobbin ejection path L5, in the same manner as the off-quality bobbin ejecting device 4 in the embodiment. That is, the off-quality bobbin ejecting device 4 in the embodiment may be provided for the transportation guide path L31.

[0084] The position at which the off-quality bobbin ejecting device 5 is provided is not limited to the transportation guide path L31. For example, the off-quality bobbin ejecting device 5 may be provided at any position in the transportation guide paths L1 to L3 through which

the off-quality bobbin B1 passes. That is, the off-quality bobbin ejecting device 5 is not necessarily provided in the transportation device 3 and may be provided in the automatic winder 1 or the ring spinning frame 2.

(Second Modification)

[0085] A second modification of the spinning system will now be described. The spinning system in the second modification includes an off-quality bobbin removing device (winding preventing mechanism, ejection device) 6 illustrated in FIG. 9, instead of the off-quality bobbin ejecting device 5 in the first modification. The off-quality bobbin removing device 6 is provided on the transportation guide path L31 for transporting a spinning bobbin B from the ring spinning frame 2 to the automatic winder 1.

[0086] The off-quality bobbin removing device 6 includes a bobbin remover 61, a bobbin loader 62, an off-quality bobbin storage 63, and an RF reader (information reading unit) 64. The RF reader 64 reads the determination result as to whether the transported spinning bobbin B is an off-quality bobbin B1, from the RF tag T3 on the tray T in which the spinning bobbin B transported to the off-quality bobbin removing device 6 is set, in the same manner as the RF reader 18 in the embodiment.

[0087] The bobbin remover 61 is a member extending in the top-bottom direction. When the determination result read by the RF reader 64 indicates an off-quality bobbin B1, the bobbin remover 61 pulls out the transported off-quality bobbin B1 from the tray T. For example, the bobbin remover 61 includes a plurality of not-illustrated rollers and allows the rollers to rotate to pull out the off-quality bobbin B1 from the tray T. When the transported spinning bobbin B is not an off-quality bobbin B1, the bobbin remover 61 does not pull out the spinning bobbin B from the tray T. In this way, the bobbin remover 61 pulls out the off-quality bobbin B1 from the tray T, whereby the of f-quality bobbin B1 is ejected to the outside of the transportation guide path L31 (removed from the transportation guide path L31).

[0088] An upper portion of the bobbin loader 62 is attached to an upper portion of the bobbin remover 61. A lower end of the bobbin loader 62 extends to the vicinity of an upper portion of the off-quality bobbin storage 63. The bobbin remover 61 pulls up the off-quality bobbin B1 pulled out from the tray T and feeds the off-quality bobbin B1 to the bobbin loader 62. The bobbin loader 62 is formed in the shape of a slider and slidably drops the off-quality bobbin B1 fed from the bobbin remover 61 into the off-quality bobbin storage 63.

[0089] The off-quality storage 63 is formed like a box having an opening at the top. The off-quality bobbin storage 63 stores the off-quality bobbin B1 dropped from the bobbin loader 62.

[0090] In this way, the off-quality bobbin removing device 6 removes the off-quality bobbin B1 from the transportation guide path L31 by pulling out the off-quality bobbin B1 from the tray T. With this configuration, the spinning system in the second modification can prevent yarn Y of the off-quality bobbin B1 from being wound by the winding unit 10 and can wind yarn Y of the spinning bobbin B without reducing the operating efficiency of the automatic winder 1.

[0091] The bobbin remover 61 of the off-quality bobbin removing device 6 may acquire the determination result from the off-quality bobbin determination unit 11c and specify the spinning unit 20 that has formed the off-quality bobbin B1, based on the acquired determination result, in the same manner as the off-quality bobbin ejecting device 5 in the second modification. The bobbin remover 61 then may pull out the off-quality bobbin B1 from the tray T when the spinning bobbin B (off-quality bobbin B1) formed in the specified spinning unit 20 passes through the bobbin remover 61. In this case, the off-quality bobbin removing device 6 can remove the off-quality bobbin B1 without reading the determination result from the RF tag T3.

[0092] The off-quality bobbin removing device 6 in the second modification is not limited to the configuration that pulls up the off-quality bobbin B1 from the tray T. The off-quality bobbin removing device 6 may be any other configuration that can remove the off-quality bobbin B1 from the tray T. The position at which the off-quality bobbin removing device 6 is provided is not limited to the transportation guide path L31. For example, the off-quality bobbin removing device 6 may be provided in the remaining yarn removing device 35. In this way, the off-quality bobbin removing device 6 may be provided at any position in the transportation guide paths L1 to L3 through which the off-quality bobbin B1 passes. That is, the off-quality bobbin removing device 6 is not necessarily provided in the transportation device 3 and may be provided in the automatic winder 1 or the ring spinning frame 2.

[0093] Although an embodiment and various embodiments of the present invention have been described above, the present invention is not limited to the foregoing embodiment and modifications. For example, the off-quality bobbin determination unit 11c configured to determine the quality of the spinning bobbin B based on the quality information acquired by the spinning sensor 28 is not necessarily provided in the machine control device 11 of the automatic winder 1. For example, the off-quality bobbin determination unit 11c may be provided in the spinning sensor 28 itself, may be provided in the machine control device 21 of the ring spinning frame 2, may be provided in the sensor management controller 29 that controls the spinning sensor 28, or may be provided in the unit controller 17 of the winding unit 10.

[0094] In the foregoing embodiment and modifications, the quality information of the spinning bobbin B for determining whether the spinning bobbin B is an off-quality bobbin B1 is acquired from the sensor management controller 29, but this quality information may be written in the RF tag T3 on the tray T. The unit controller 17 of the winding unit 10 then may determine whether the spinning bobbin B is an off-quality bobbin B1 based on the quality

information written in the RF tag T3. Specifically, the RF writer 31 provided in the transportation device 3 acquires the quality information of each spinning bobbin B acquired by the spinning sensor 28 via communication from the sensor management controller 29 and writes the acquired quality information into the RF tag T3 on the tray T in which the spinning bobbin B is set. In this case, the RF writer 31 may or may not write the identification information for specifying the spinning unit 20 that has formed the spinning bobbin B together. Each winding unit 10 includes an RF writer in addition to the RF reader 18. When a spinning bobbin B is transported to the winding unit 10, the RF reader 18 reads the quality information of the spinning bobbin B from the RF tag T3 on the tray T in which the spinning bobbin B is set. Each unit controller 17 determines whether the spinning bobbin B is an off-quality bobbin B1, based on the quality information of the spinning bobbin B read by the RF reader 18. When the determination result by the unit controller 17 indicates an off-quality bobbin B1, the RF writer provided in the winding unit 10 writes an ejection flag of the off-quality bobbin B1 into the RF tag T3. The RF reader 41 of the off-quality bobbin ejecting device 4 then reads the ejection flag from the RF tag T3. When the ejection flag is read by the RF reader 41, the off-quality bobbin ejecting device 4 ejects the tray T with the ejection flag (tray T in which the off-quality bobbin B1 is set) to the off-quality bobbin ejection path L4.

[0095] The RF readers 18, 41, and 64 do not necessarily read information from the RF tag T3 in a contactless manner but may read information by a contact method.

[0096] In the foregoing embodiment and modifications, the remaining yarn volume checking sensor 32, the yarn end preparing device 33, the yarn presence/absence checking sensor 34, the remaining yarn removing device 35, and the bypass guide paths L33, L34 are provided in the transportation device 3, 3A. However, they may be eliminated as appropriate.

Industrial Applicability

[0097] Yarn of a spinning bobbin can be wound without reducing the operating efficiency of the automatic winder.

Reference Signs List

[0098] 1 ... automatic winder, 2 ... ring spinning frame, 4, 5 ... off-quality bobbin ejecting device (winding preventing mechanism, ejection device), 6 ... off-quality bobbin removing device (winding preventing mechanism, ejection device), 10 ... winding unit, 11b ... operation unit (determination standard setting unit), 11c ... off-quality bobbin determination unit (determination unit), 12 ... yarn feeder (winding preventing mechanism), 16 ... winding device, 18, 41, 64 ... RF reader (information reading unit), 20 ... spinning unit, 28 ... spinning sensor (quality information acquisition unit), 31 ... RF writer (information writing unit), 100 ... spinning system, B ... spinning bobbin, B1 ... off-quality bobbin (spinning bobbin that does not satisfy a quality standard value), E ... empty bobbin, L1 to L3 ... transportation guide path, L4, L5 ... off-quality bobbin ejection path, P ... package, T ... tray, T3 ... RF tag (memory), Y ... yarn.

Claims

1. A spinning system including a ring spinning frame having a plurality of spinning units, each configured to form a spinning bobbin on which yarn is wound, and an automatic winder having a plurality of winding units, each configured to wind the yarn of the spinning bobbin formed by the ring spinning frame to form a package, the spinning system further comprising:

   a quality information acquisition unit installed in the ring spinning frame to acquire quality information about quality of the spinning bobbin;
   a determination unit configured to determine, for each spinning bobbin, whether the quality of the spinning bobbin satisfies a predetermined quality standard value, based on the quality information acquired by the quality information acquisition unit; and
   a winding preventing mechanism configured to prevent the yarn of the spinning bobbin determined not to satisfy the quality standard value in the determination unit from being wound by the winding unit.

2. The spinning system according to claim 1, further comprising a transportation guide path configured to transport the spinning bobbin and an empty bobbin between the automatic winder and the ring spinning frame, wherein the winding preventing mechanism includes an ejection device configured to eject the spinning bobbin determined not to satisfy the quality standard value to outside of the transportation guide path.

3. The spinning system according to claim 2, wherein the ejection device is configured with an off-quality bobbin ejecting device including an off-quality bobbin ejection path branching from the transportation guide path, the off-quality bobbin ejecting device being configured to eject the spinning bobbin determined not to satisfy the quality standard value from the transportation guide path to the off-quality bobbin ejection path.

4. The spinning system according to claim 3, wherein the off-quality bobbin ejection path is disposed in the transportation guide path to branch from some point of the transportation guide path through which the spinning bobbin is transported from the ring spinning

frame to the automatic winder.

5. The spinning system according to claim 2, wherein the ejection device is configured with an off-quality bobbin removing device disposed on the transportation guide path to remove the spinning bobbin determined not to satisfy the quality standard value from the transportation guide path.

6. The spinning system according to claim 1, further comprising a transportation guide path configured to transport the spinning bobbin and an empty bobbin between the automatic winder and the ring spinning frame, wherein
the automatic winder comprises:

a yarn feeder configured to support the spinning bobbin transported through the transportation guide path, assist unwinding of the yarn of the spinning bobbin, and eject an empty bobbin after the yarn is completely unwound to the transportation guide path; and
a winding device configured to unwind the yarn from the spinning bobbin and wind the unwound yarn,

the winding preventing mechanism is configured with the yarn feeder, and
when the spinning bobbin transported is the spinning bobbin determined not to satisfy the quality standard value, the yarn feeder ejects the spinning bobbin to the transportation guide path without the yarn being unwound from the spinning bobbin.

7. The spinning system according to any one of claims 2 to 6, further comprising:

an information writing unit configured to write a determination result of quality of the spinning bobbin in the determination unit; and
an information reading unit configured to read the determination result written by the information writing unit, wherein
the spinning bobbin is transported along the transportation guide path while being set in a tray,
the information writing unit writes the determination result into a memory disposed in the tray,
the information reading unit reads the determination result from the memory in the tray, and
the winding preventing mechanism prevents the yarn of the spinning bobbin from being wound by the winding unit, based on the determination result read by the information reading unit.

8. The spinning system according to any one of claims 1 to 7, further comprising a determination standard setting unit configured to accept an input operation of setting the quality standard value by an operator, wherein the determination unit determines whether quality of the spinning bobbin satisfies a quality standard value, based on the quality standard value accepted by the determination standard setting unit.

9. The spinning system according to any one of claims 1 to 8, wherein the quality information includes at least one of ambient temperature of the ring spinning frame, ambient humidity of the ring spinning frame, information indicating a state of each part of the spinning unit, and an operating state of the spinning unit.

10. A winding preventing method performed in a spinning system including a ring spinning frame having a plurality of spinning units, each configured to form a spinning bobbin on which yarn is wound, and an automatic winder having a plurality of winding units, each configured to wind yarn of the spinning bobbin formed by the ring spinning frame to form a package, the winding preventing method comprising:

an acquisition step of acquiring, by a quality information acquisition unit installed in the ring spinning frame, quality information about quality of the spinning bobbin;
a determination step of determining, by a determination unit, for each spinning bobbin, whether quality of the spinning bobbin satisfies a predetermined quality standard value, based on the quality information acquired in the acquisition step; and
a winding preventing step of preventing, by a winding preventing mechanism, the yarn of the spinning bobbin determined not to satisfy the quality standard value in the determination step from being wound by the winding unit.

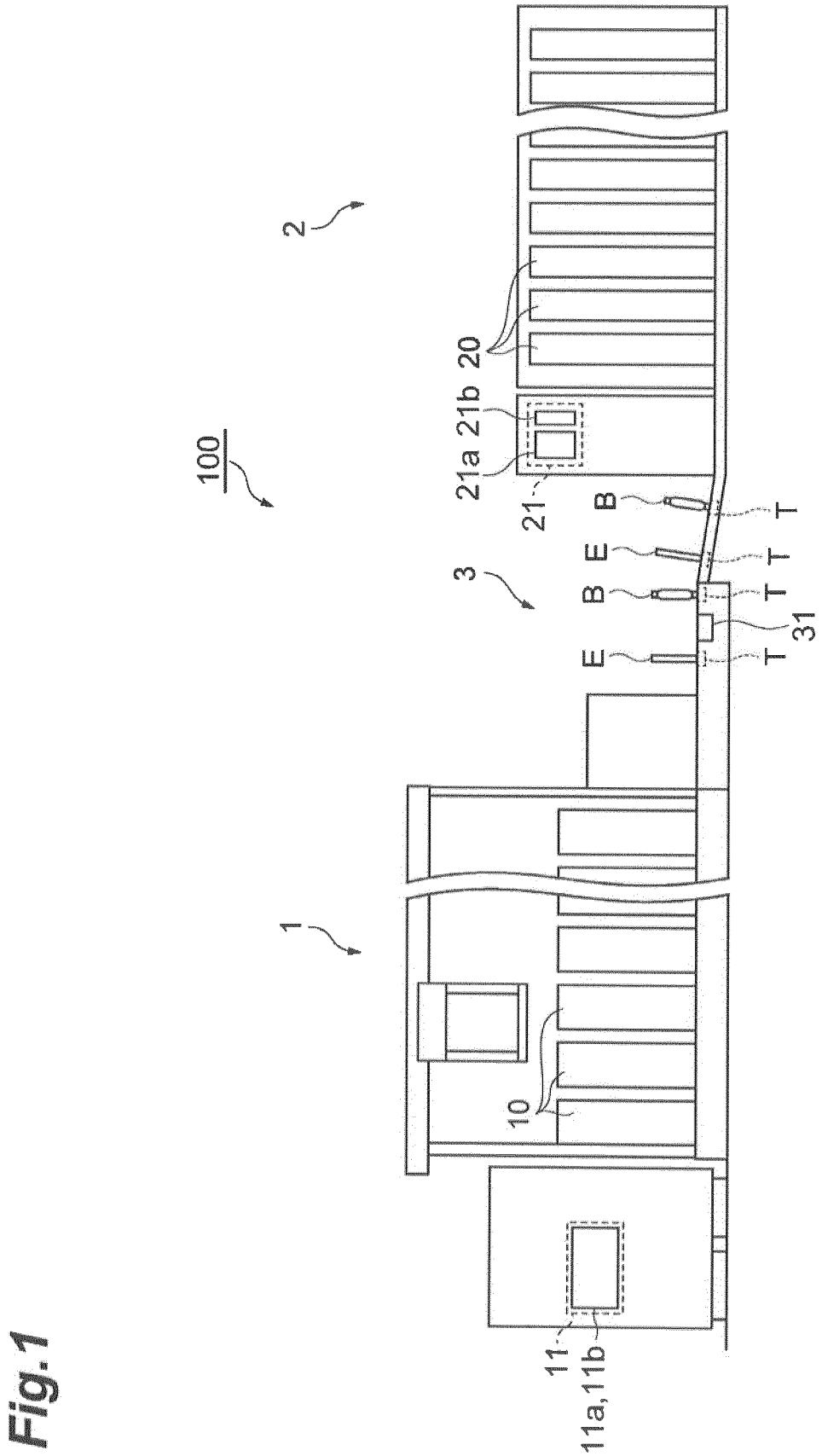


Fig.1

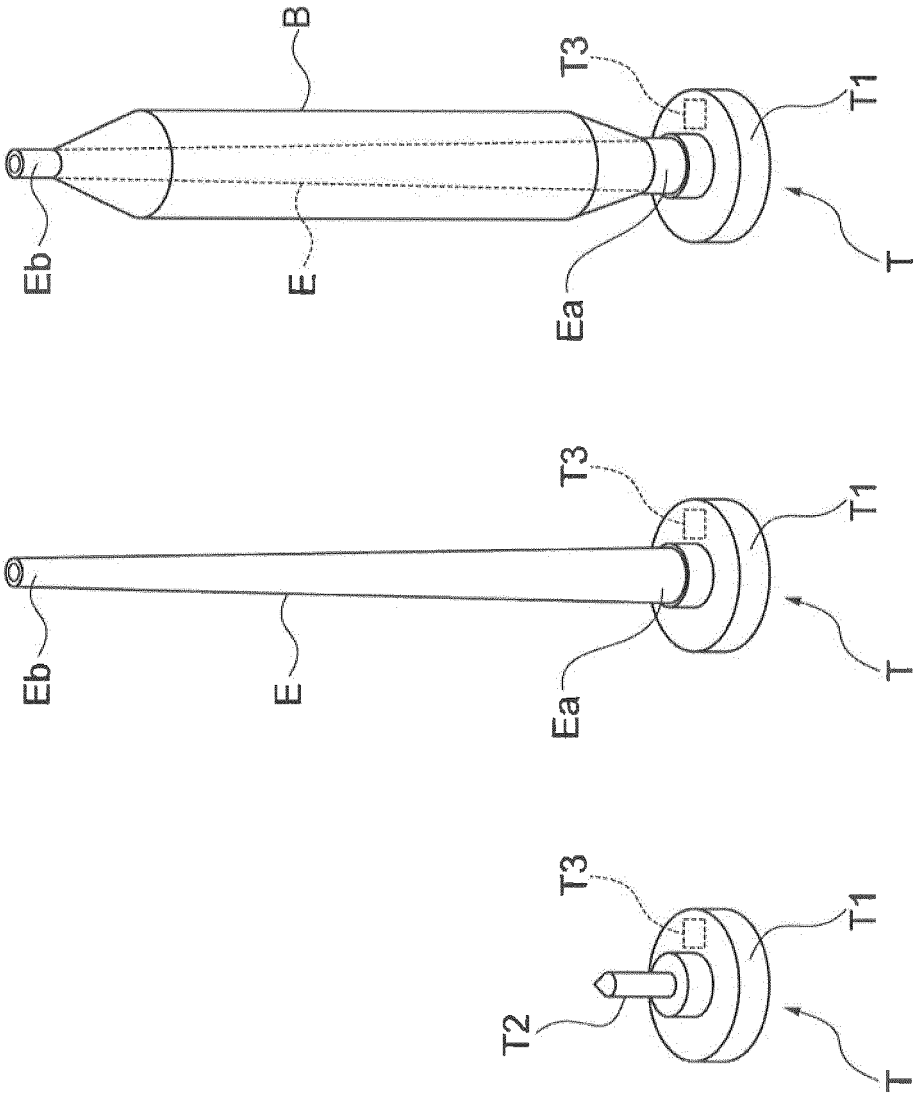


Fig.2

Fig.3

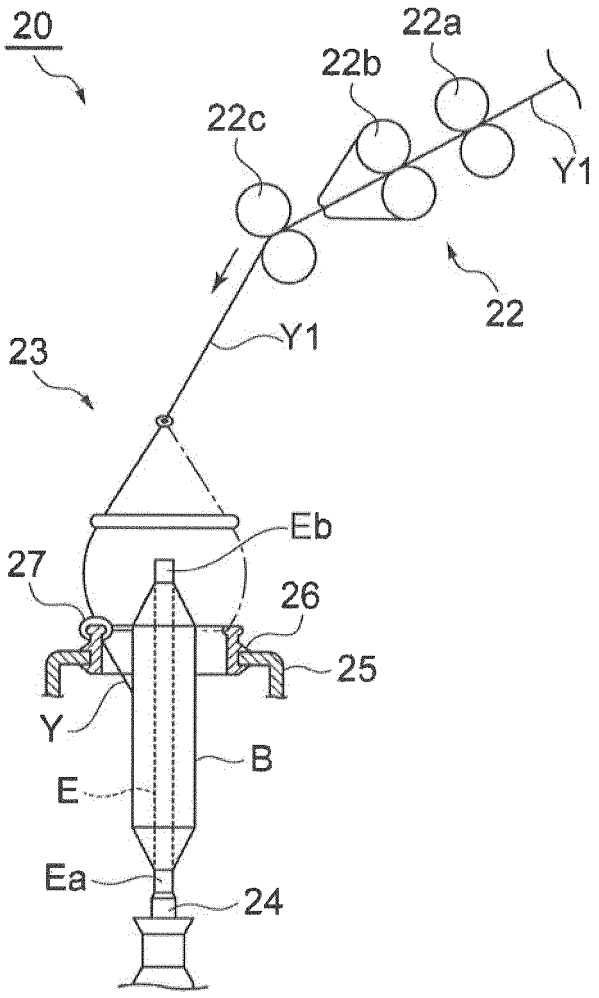


Fig.4

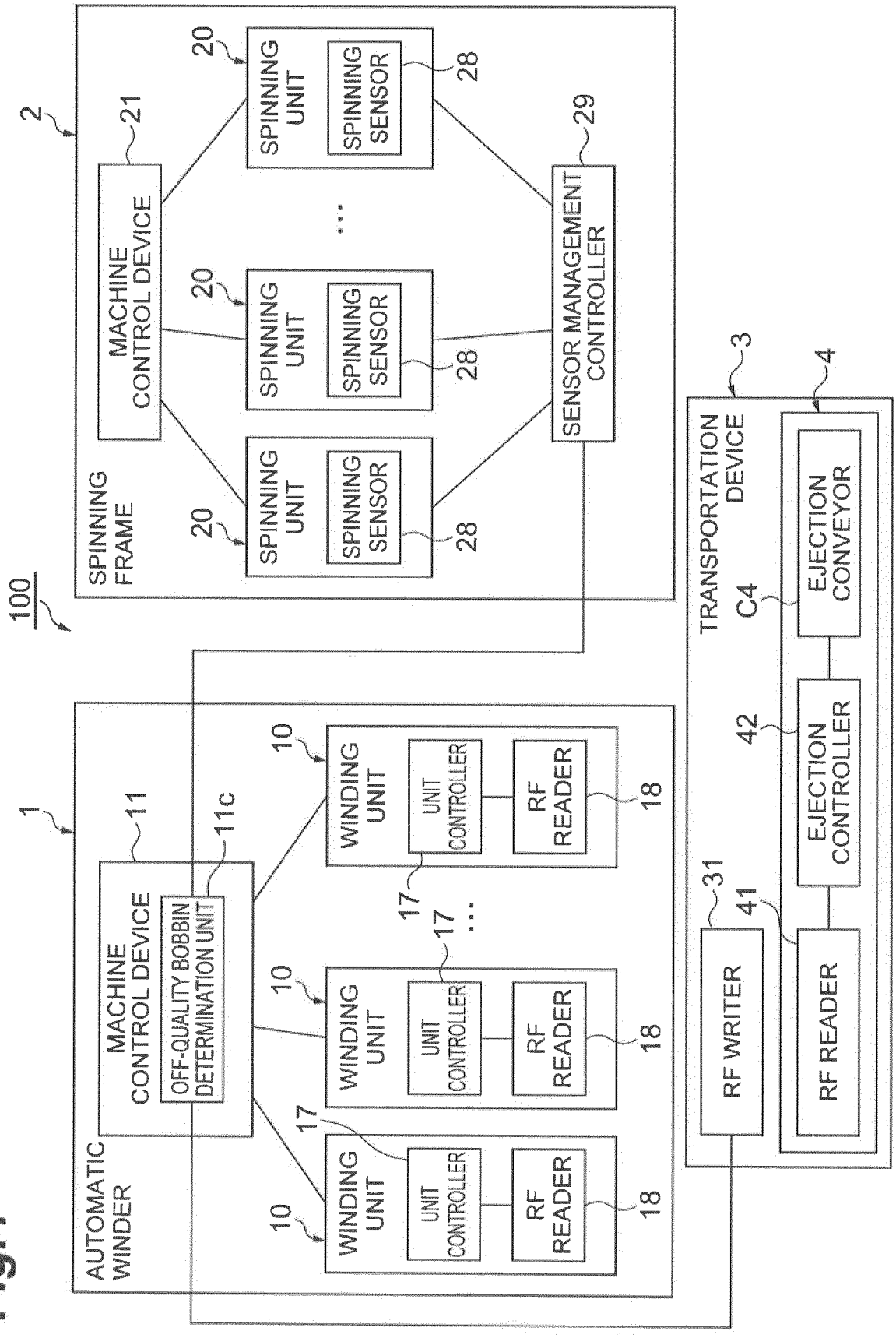
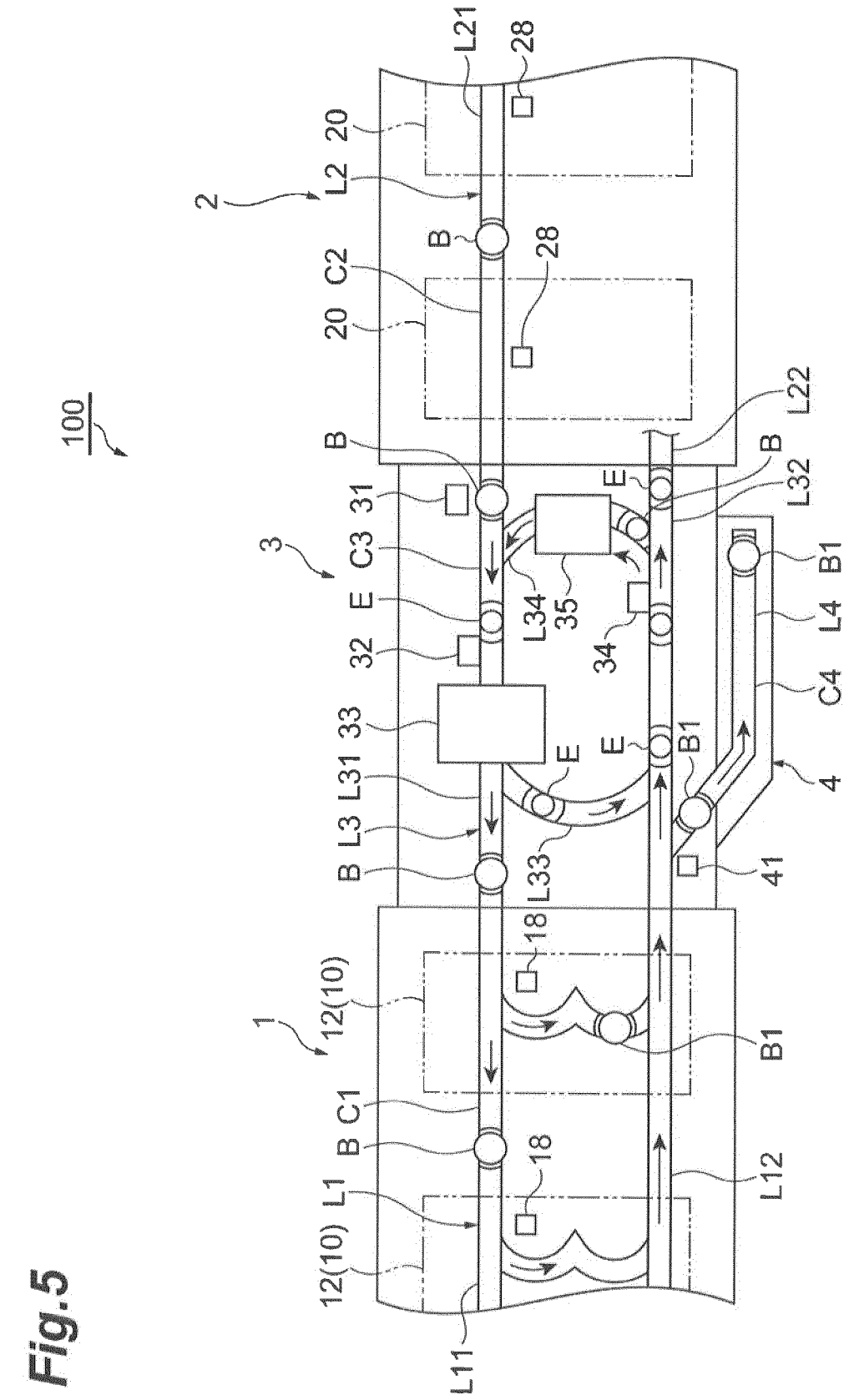

100
2
SPINNING FRAME
MACHINE CONTROL DEVICE
21
SPINNING UNIT
20
SPINNING SENSOR
28
SENSOR MANAGEMENT CONTROLLER
29
1
AUTOMATIC WINDER
MACHINE CONTROL DEVICE
11
OFF-QUALITY BOBBIN DETERMINATION UNIT
11c
WINDING UNIT
10
UNIT CONTROLLER
17
RF READER
18
3
TRANSPORTATION DEVICE
RF WRITER
31
RF READER
41
4
EJECTION CONTROLLER
42
EJECTION CONVEYOR
C4

Fig.5


100
2
L21
28
20
L2
B
C2
3
C3
31
E
32
33
L31
L3
L34
35
34
L22
L32
B1
L4
C4
4
41
L33
1
12(10)
C1
L1
L11
18
L12

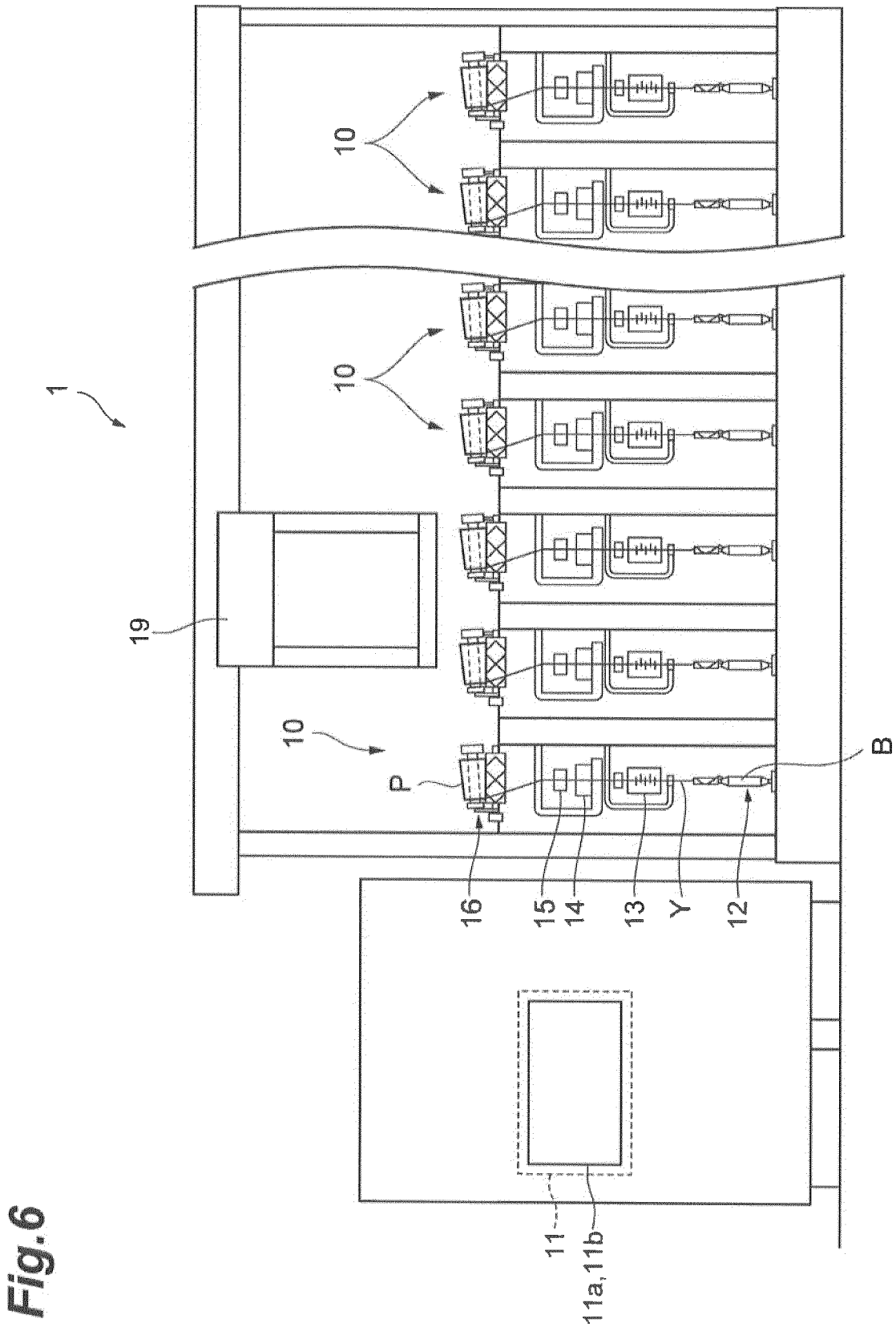


Fig.6

Fig.7

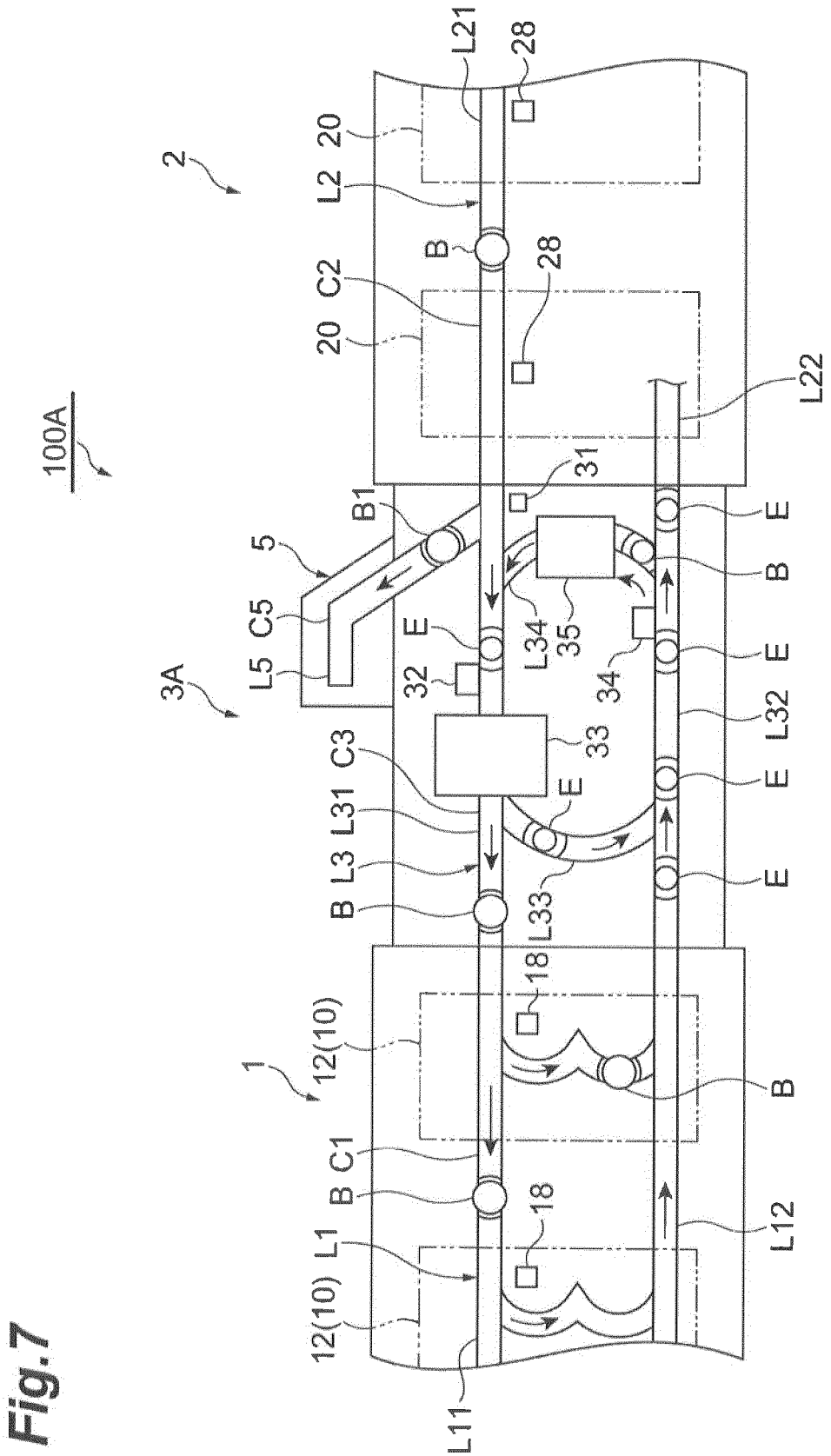

100A
2
3A
1
L21
28
20
L2
B
C2
L22
31
B1
5
C5
L5
E
32
L34
35
34
33
C3
L31
L3
B
L33
18
12(10)
C1
L1
L11
L12
L32

Fig.8

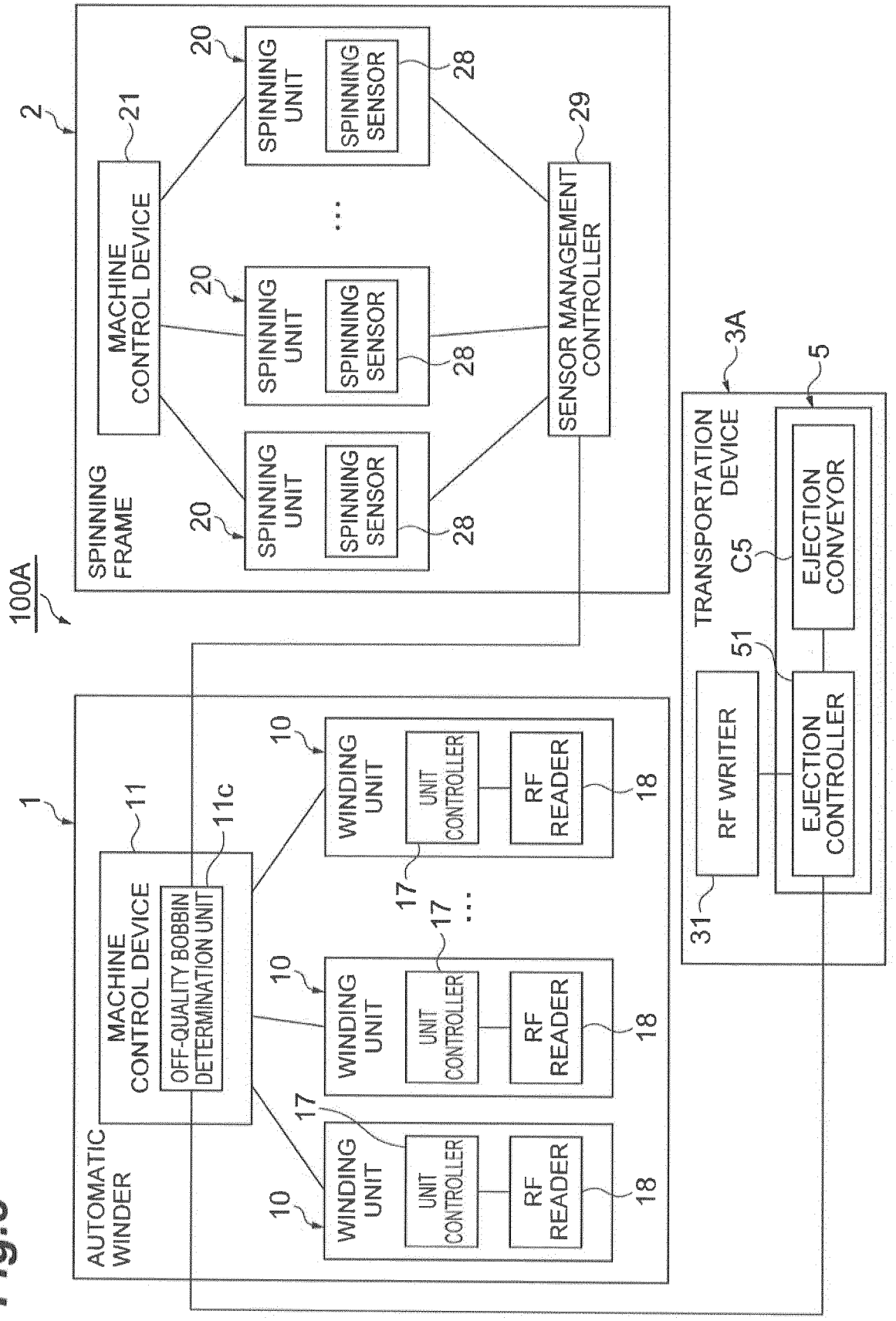
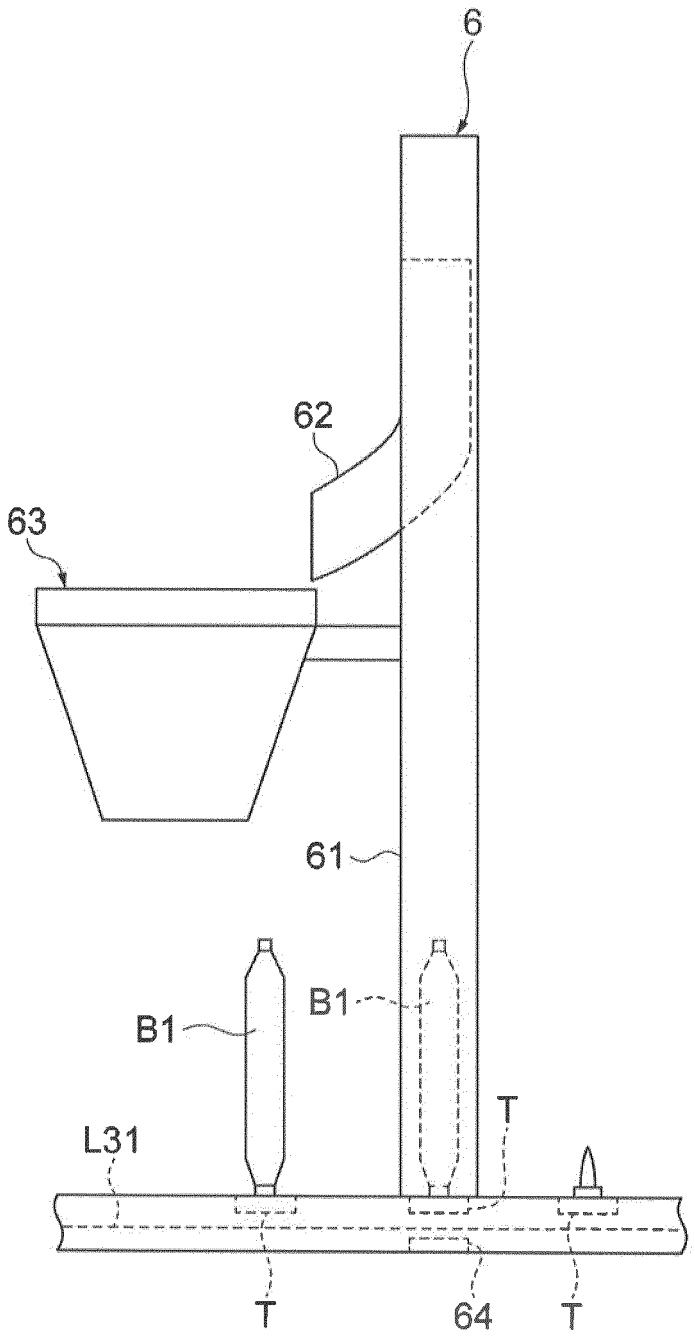

100A
SPINNING FRAME
2
MACHINE CONTROL DEVICE
21
SPINNING UNIT
20
SPINNING SENSOR
28
SENSOR MANAGEMENT CONTROLLER
29
AUTOMATIC WINDER
1
MACHINE CONTROL DEVICE
11
OFF-QUALITY BOBBIN DETERMINATION UNIT
11c
WINDING UNIT
10
UNIT CONTROLLER
17
RF READER
18
TRANSPORTATION DEVICE
3A
C5
5
RF WRITER
31
EJECTION CONTROLLER
51
EJECTION CONVEYOR

Fig.9



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/019156

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. B65H63/00(2006.01)i, B65H63/04(2006.01)i, D01H13/00(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl. B65H61/00-63/08, D01H1/00-17/02

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 08-144137 A (KANEBO LIMITED) 04 June 1996, paragraphs [0002], [0012]-[0015], fig. 1 (Family: none)	1, 6-10 2-5
Y A	JP 07-011526 A (MURATA MACHINERY LTD.) 13 January 1995, paragraphs [0014]-[0018], fig. 1 (Family: none)	1, 6-10 2-5

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23.07.2018	31.07.2018

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/019156

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2008-162765 A (MURATA MACHINERY LTD.) 17 July 2008, paragraphs [0019]-[0023], [0036], [0043], [0044], fig. 1, 2 & EP 1939123 A1, paragraphs [0020]-[0024], [0037], [0044], [0045], fig. 1, 2 & CN 101209788 A	1, 6-10 2-5

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP H5278950 B **[0004]**