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(54) **YARN WINDING SYSTEM, AUTOMATIC WINDER, AND YARN WINDING METHOD**

VERBUNDSYSTEM, SPULMASCHINE UND SPULVERFAHREN

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(73) Proprietor: **Murata Machinery, Ltd.**
Kyoto-shi, Kyoto 601-8326 (JP)

(72) Inventors:
- **MASAI Tetsuji**
  Kyoto-shi
  Kyoto 612-8686 (JP)
- **KAWAMOTO Kenji**
  Kyoto-shi
  Kyoto 612-8686 (JP)
- **SHIMO Hironobu**
  Kyoto-shi
  Kyoto 612-8686 (JP)
- **HIDAKA Ichiro**
  Kyoto-shi
  Kyoto 612-8686 (JP)
- **HIRANO Keiji**
  Kyoto-shi
  Kyoto 612-8686 (JP)
- **IKKAI Tomoyuki**
  Kyoto-shi
  Kyoto 612-8686 (JP)
- **NAKAI Masato**
  Kyoto-shi
  Kyoto 612-8686 (JP)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

(56) References cited:
EP-A1- 2 455 318
EP-A2- 1 975 289
EP-A2- 2 108 723
WO-A1-2011/007513
JP-A- 2008 162 765
JP-A- 2009 046 797
JP-A- 2009 242 029
JP-A- H0 711 527
JP-A- H01 183 530
JP-A- H01 183 530
JP-A- H08 198 520
US-A- 5 269 478

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Description

Technical Field

[0001] The present invention relates to a yarn winding system, an automatic winder, and a yarn winding method.

Background Art

[0002] Conventionally, a yarn winding system including: a spinning frame including a plurality of spinning units each configured to form a yarn supply bobbin; and an automatic winder including a plurality of winder units each configured to wind yarn from the yarn supply bobbin to form a package has been known (see JP H6-76177, for example). In a yarn winding system described in Patent Literature 1, a medium is provided to a tray on which a bobbin is mounted and that is conveyed so as to travel between a spinning frame and an automatic winder. Onto this medium, information on yarn processing of the winder is written by a writing device. This yarn processing information written on the medium is read by a reading device to be managed by a management computer.

[0003] EP 2 108 723 A2 is related to a textile machine system and a textile machine in which wireless communication is provided between plural automatic winders and spinning machines. JP H01 183530 A and US 5 269 478 A are related to transmitting information from spinning machines to winders.

Summary of Invention

Technical Problem

[0004] In the yarn winding system described above, from a viewpoint of improving production efficiency and working quality, it is desired to optimize operation control of the automatic winder. Examples of such optimization of operation control may include appropriately changing the processing speed of the automatic winder in accordance with the processing status of the spinning frame as a previous step machine for the automatic winder, and causing the automatic winder to appropriately operate in accordance with a condition for completing spinning in the spinning frame.

[0005] In view of this, various aspects of the present invention aim to provide a yarn winding system, a spinning frame, an automatic winder, and a yarn winding method that enable optimization of operation control of the automatic winder.

Solution to Problem

[0006] A yarn winding system according to one aspect of the present invention is a yarn winding system including a spinning frame configured to form a yarn supply bobbin and an automatic winder configured to wind yarn from the yarn supply bobbin to form a package. The spinning frame includes: a generating unit configured to generate spinning information including information on at least one of a processing status of forming the yarn supply bobbin and a condition for completing spinning of the yarn supply bobbin; and a transmission unit configured to transmit the spinning information generated by the generating unit to the automatic winder. The automatic winder includes: a receiving unit configured to receive the spinning information; and a control unit configured to control operation of the automatic winder based on the spinning information received by the receiving unit.

[0007] In this yarn winding system, from the spinning frame to the automatic winder, the spinning information including information on at least one of the processing status of forming the yarn supply bobbin and the condition for completing spinning of the yarn supply bobbin is transmitted. Based on the spinning information received from the spinning frame, the automatic winder controls operation of the automatic winder. By controlling the operation of the automatic winder on the basis of the spinning information received from the spinning frame in this manner, operation control of the automatic winder can be optimized.

[0008] The spinning information includes information on the processing status of forming the yarn supply bobbin. The control unit may, based on the information on the processing status of forming the yarn supply bobbin, determine a winding speed when the automatic winder winds yarn from the yarn supply bobbin, and control operation of the automatic winder so as to wind yarn from the yarn supply bobbin at the determined winding speed. By this configuration, based on the processing status of forming the yarn supply bobbin in the spinning frame (e.g., supply timing of the yarn supply bobbin transferred from the spinning frame to the automatic winder), the automatic winder can appropriately control the winding speed of the automatic winder.

[0009] The spinning information includes information on a state at the end of yarn winding in the yarn supply bobbin as the information on the condition for completing spinning. The automatic winder includes, in a bobbin transfer unit configured to transfer the yarn supply bobbin from the spinning frame to the automatic winder, a bobbin preparation unit configured to perform preliminary preparation for processing yarn of the yarn supply bobbin. The control unit controls, based on the information on the end of yarn winding, bobbin preparing operation for the yarn supply bobbin in the bobbin preparation unit. By this configuration, based on the state at the end of yarn winding in the yarn supply bobbin formed by the spinning frame (e.g., information indicating the presence of bunch winding and indicating that the bobbin is a partial bobbin), the automatic winder can appropriately control the bobbin preparing operation in the bobbin preparation unit.

[0010] The spinning information may include timing information for identifying timing when the yarn supply bobbin has been formed. A tray configured to transfer the yarn supply bobbin may be provided with a storage unit

configured to store therein the timing information. The bobbin preparation unit may include a reading unit configured to read the timing information stored in the storage unit provided to the tray configured to transfer the yarn supply bobbin when the yarn supply bobbin is supplied to the bobbin preparation unit. The control unit may control operation of the bobbin preparation unit, based on spinning information including timing information that is the same as the timing information read by the reading unit. For example, in some cases, the condition for completing spinning of a yarn supply bobbin differs depending on timing when a yarn supply bobbin is formed, and yarn supply bobbins that have been formed at different timings are transferred in a mixed manner to the bobbin preparation unit. By the configuration described above, even in such cases, based on conditions for completing spinning that have been applied to yarn supply bobbins to be processed, operation of the bobbin preparation unit can be appropriately controlled.

[0011] [deleted]

[0012] [deleted]

[0013] According to a second aspect, there is provided an automatic winder according to claim 1.

[0014] [deleted]

[0015] According to a third aspect, there is provided a yarn winding method according to claim 5.

[0016] [deleted]

Advantageous Effects of Invention

[0017] According to one aspect of the present invention, operation control of the automatic winder can be optimized.

Brief Description of Drawings

[0018]

FIG. 1 is a front view of a yarn winding system according to one embodiment;

FIG. 2 is a perspective view of trays, an empty bobbin, and a yarn supply bobbin that are conveyed in the yarn winding system in FIG. 1;

FIG. 3 is a side view of a spinning unit of the yarn winding system in FIG. 1;

FIG. 4 is a side view of a winder unit of the yarn winding system in FIG. 1;

FIG. 5 is a schematic block diagram illustrating a functional configuration of the yarn winding system in FIG. 1; and

FIG. 6 is a flowchart illustrating an operation performed by the yarn winding system in FIG. 1.

Description of Embodiments

[0019] One embodiment of the present invention will now be described in detail with reference to the drawings. In the drawings, like or equivalent elements are designated by like numerals, and duplicate description is omitted.

[0020] As depicted in FIG. 1, a yarn winding system 1 includes a roving frame 2, a spinning frame 3, and an automatic winder 4. The roving frame 2 generates roved yarn from a sliver, and winds the roved yarn to form a roved yarn bobbin. The spinning frame 3 generates yarn from the roved yarn, and winds the yarn to form a yarn supply bobbin 11. The automatic winder 4 winds the yarn from the yarn supply bobbin 11 to form a package. The automatic winder 4 has a bobbin transfer device (bobbin transfer unit) 5. The bobbin transfer device 5 transfers the yarn supply bobbin 11 from the spinning frame 3 to the automatic winder 4, and transfers an empty bobbin 12 (bobbin around which yarn is not wound) from the automatic winder 4 to the spinning frame 3. The bobbin transfer device 5 is provided with a bobbin preparation device (bobbin preparation unit) 7 and a residual yarn processing device, for example. The bobbin preparation device 7 performs preliminary preparation for the automatic winder 4 to process the yarn of the yarn supply bobbin 11. When yarn remains on the bobbin 12 that has been discharged from the yarn supply bobbin 11, the residual yarn processing device removes the yarn to form an empty bobbin 12. For this purpose, the bobbin transfer device 5 has a complicated conveyance path having many curves.

[0021] The yarn supply bobbin 11 and the empty bobbin 12 are transferred in a manner being set on respective trays 6. As depicted in FIG. 2, each of the trays 6 has a disk-like base portion 61, a pin 62 protruding upward from the base portion 61, and a radio frequency (RF) tag 63 embedded in the base portion 61. The bottom portion 12a of each of the bobbins 12 is inserted into the pin 62, whereby the yarn supply bobbin 11 and the empty bobbin 12 are set on the respective trays 6 with the top portions 12b of the bobbins 12 facing upward. The RF tag (storage unit) 63 stores therein information on the yarn supply bobbin 11 set on the tray 6. In the yarn winding system 1, the status of the yarn supply bobbin 11 set on the tray 6 is managed by a radio frequency identification (RFID: individual identification using radio waves) technology.

[0022] As depicted in FIG. 1, the roving frame 2 includes a control device 21 configured to control operation of the roving frame 2 and a plurality of roving units 22 each configured to form a roved yarn bobbin. The control device 21 includes a display unit 21a such as a display and an operation unit 21b such as input keys. The display unit 21a displays, for example, an operating status of each of the roving units 22. The operation unit 21b is an entity to which an operator sets operating conditions, for example, of each of the roving units 22.

[0023] The spinning frame 3 includes a control device 31 configured to control operation of the spinning frame 3 and a plurality of spinning units 32 each configured to form a yarn supply bobbin 11. The control device 31 includes a display unit 31a such as a display and an operation unit 31b such as input keys. The display unit 31a

displays, for example, an operating status of each of the spinning units 32. The operation unit 31b is an entity to which the operator sets operating conditions, for example, of each of the spinning unit 32.

[0024] As depicted in FIG. 3, the spinning unit 32 includes a drafting device 33 and a twisting device 34.

[0025] The drafting device 33 includes a back roller pair 33a, a middle roller pair 33b, and a front roller pair 33c. Each pair of the back roller pair 33a, the middle roller pair 33b, and the front roller pair 33c are configured with a bottom roller and a top roller. Around the rollers constituting the middle roller pair 33b, apron belts are each wound. In the drafting device 33, the back roller pair 33a, the middle roller pair 33b, and the front roller pair 33c are rotated at a predetermined speed ratio, whereby a roved yarn 13 that has been unwound from a roved yarn bobbin is drafted.

[0026] The twisting device 34 includes a spindle shaft 35, a ring rail 36, a ring 37, and a traveller 38. The spindle shaft 35 holds the bottom portion 12a of a bobbin 12 with the top portion 12b of the bobbin 12 facing upward, and rotates the bobbin 12. The ring rail 36 is movable in the axial direction of the bobbin 12. The ring 37 is fixed to the ring rail 36. The traveller 38 is supported by the ring 37, and is movable along the ring 37.

[0027] In the twisting device 34, roved yarn 13 that has been drafted by the drafting device 33 is inserted into a space between the ring 37 and the traveller 38, and an end portion of the roved yarn 13 is fixed to the bobbin 12. In this state, when the spindle shaft 35 rotates the bobbin 12, the traveller 38 moves along the ring 37 in a manner being pulled by the roved yarn 13. At this time, the ring rail 36 gradually moves from the bottom portion 12a side to the top portion 12b side while reciprocating within a predetermined range along the axial direction of the bobbin 12. In the twisting device 34, rotation of the traveller 38 lags behind rotation of the bobbin 12, whereby the roved yarn 13 is twisted to form yarn 14, and the yarn 14 is wound by the bobbin 12 to form a yarn supply bobbin 11.

[0028] The spinning frame 3 including the spinning units 32 each configured as described above is of what is called a simultaneous doffing type. Specifically, the spinning frame 3 stocks a plurality of empty bobbins 12 transferred from the automatic winder 4 by the bobbin transfer device 5, simultaneously sets the empty bobbins 12 on the respective spinning units 32, and simultaneously starts yarn winding. When winding of yarn has been completed in the respective spinning units 32 and yarn supply bobbins 11 have been formed, the spinning frame 3 simultaneously doffs all of the yarn supply bobbins 11. Subsequently, the spinning frame 3 pulls empty bobbins 12 that have been already stocked out of the corresponding trays 6 and simultaneously sets the empty bobbins on the respective spinning units 32 again and, instead, simultaneously sets the doffed yarn supply bobbins 11 on the trays 6.

[0029] As depicted in FIG. 1, the automatic winder 4 includes a control device 41 configured to control operation of the automatic winder 4, a plurality of winder units 42 each configured to form a package, and the bobbin transfer device 5. The control device 41 includes a display unit 41a such as a display and an operation unit 41b such as input keys. The display unit 41a displays, for example, an operating status of each of the winder units 42. The operation unit 41b is an entity to which the operator sets operating conditions, for example, of each of the winder unit 42. The control device 41 also controls operation of the bobbin transfer device 5.

[0030] As depicted in FIG. 4, the winder unit 42 includes a winding device 43, a tension applying device 44, a yarn monitoring device 45, an upper yarn catching device 46, a lower yarn catching device 47, and a splicing device 48.

[0031] The winding device 43 includes a cradle 43a and a winding drum 43b. The cradle 43a supports a package 15. The winding drum 43b rotates the package 15 while traversing the yarn 14. Thus, the yarn 14 is wound from a yarn supply bobbin 11 set at a predetermined position to form the package 15. The tension applying device 44 applies a predetermined tension to the yarn 14 that is travelling from the yarn supply bobbin 11 to the package 15.

[0032] The yarn monitoring device 45 monitors the travelling yarn 14 to detect a yarn defect (thickness abnormality of yarn 14, mixing of foreign matter into yarn 14, etc.). When a yarn defect has been detected, the yarn 14 is cut by a cutter separately provided. When the yarn 14 has been cut, the upper yarn catching device 46 catches a yarn end of the yarn 14 on the package 15 side, and guides the yarn end to the splicing device 48. When the yarn 14 has been cut, the lower yarn catching device 47 catches a yarn end of the yarn 14 on the yarn supply bobbin 11 side, and guides the yarn end to the splicing device 48. The splicing device 48 splices the yarn ends that have been guided by the upper yarn catching device 46 and the lower yarn catching device 47 to each other.

[0033] As depicted in FIG. 1, the bobbin transfer device 5 includes an RF writer 51. When a yarn supply bobbin 11 is transferred from the spinning frame 3 to the automatic winder 4, the RF writer 51 writes information on the yarn supply bobbin 11 on the RF tag 63 of the tray 6 on which the yarn supply bobbin 11 is set. The information on the yarn supply bobbin 11 includes unit identification information for identifying a spinning unit 32 that has formed the yarn supply bobbin 11 and doffing information (timing information) for identifying timing of simultaneous doffing. More specifically, the doffing information is information indicating the timing of doffing, for example, the time when the simultaneous doffing was performed, the total number of doffing having been performed after the time set as a reference, and so on. The RF writer 51 may be provided to an exit of the spinning frame 3 in the transfer direction of the yarn supply bobbin 11. Alternatively, the RF writer 51 may be provided to every spinning unit 32.

[0034] When the yarn supply bobbin 11 has been set on the winder unit 42 of the automatic winder 4, the information written on the RF tag 63 by the RF writer 51 is read by an RF reader (reading unit) 49 provided to each of the winder units 42, and is transmitted to the control device 41 of the automatic winder 4. Based on this information, the control device 41 can identify the spinning unit 32 that has formed the yarn supply bobbin 11 and the timing of simultaneous doffing for the yarn supply bobbin 11 set on the winder unit 42.

[0035] The following describes, with reference to FIG. 5 and FIG. 6, a mechanism in which the spinning frame 3 transmits spinning information (described later in detail) to the automatic winder 4, and the automatic winder 4 controls operation of the automatic winder 4 (i.e., operation of each of the winder units 42 and the bobbin preparation device 7) on the basis of the spinning information.

[0036] As depicted in FIG. 5, the spinning frame 3 includes the control device (generating unit) 31 and a transmission unit 31c as functional elements constituting the mechanism described above. The automatic winder 4 includes the control device (control unit) 41, a receiving unit 41c, the respective winder units 42, and the bobbin transfer device 5. The bobbin transfer device 5 is provided with the bobbin preparation device 7. The bobbin preparation device 7 is provided with an RF reader 7a.

[0037] The control device 31 is an electronic control unit including a central processing unit (CPU), a read only memory (ROM), a random access memory (RAM), and so on. The control device 31 loads a program stored in the ROM into the RAM, and causes the CPU to execute the program, thereby performing various controls . The control device 31 may include a plurality of electronic control units. The control device 31 functions as a generating unit configured to generate spinning information including information on at least one of a processing status of forming a yarn supply bobbin 11 and a condition for completing spinning of the yarn supply bobbin 11.

[0038] The information on the processing status of forming a yarn supply bobbin 11 (hereinafter called "processing status information") is, for example, information indicating remaining time until yarn supply bobbins 11 are simultaneously doffed in a plurality of spinning units 32 by simultaneous doffing. The control device 31 can obtain the processing status information described above by, for example, monitoring the operating status of each of the spinning units 32, or referring to settings for operation of each of the spinning units 32.

[0039] The information on the condition for completing spinning of a yarn supply bobbin 11 (hereinafter called "completion condition information") is, for example, information on a condition that needs to be satisfied when a yarn supply bobbin 11 is doffed in each of the spinning units 32 (doffing condition) . The completion condition information is, for example, information on a state at the end of yarn winding in the yarn supply bobbin 11. Examples of the information on a state at the end of yarn winding include information indicating whether what is called bunch winding has been performed in the state at the end of yarn winding in the yarn supply bobbin 11 and information indicating whether the yarn supply bobbin has been formed into a partial bobbin in the state thereof.

[0040] In the present embodiment, as one example, the control device 31 generates, as the spinning information, data including the processing status information, the completion condition information, and doffing information for identifying timing when the yarn supply bobbin 11 has been formed, and transmits the spinning information to the automatic winder 4 via the transmission unit 31c. The timing when the control device 31 generates and transmits the spinning information to the automatic winder 4 may be optionally set. In the present embodiment, as one example, the control device 31 periodically generates spinning information at predetermined intervals that are set in advance, and transmits the spinning information to the automatic winder 4. By this setting, the automatic winder 4 can grasp the processing status of the spinning frame 3 in a timely manner, and every time the automatic winder grasps the status, the winding speed of each of the winder units 42 can be appropriately controlled (details thereof will be described later).

[0041] The transmission unit 31c transmits the spinning information generated by the control device 31 to the automatic winder 4. Transmission by the transmission unit 31c may be performed through wired communication using a cable, for example, or may be performed through wireless communication. When the transmission by the transmission unit 31c is performed through wireless communication, radio waves, infrared rays, or light may be used as a conveyance medium. In FIG. 5, the transmission unit 31c is illustrated as an element separate from the control device 31. However, the transmission unit 31c may be included in the control device 31. In other words, the transmission unit 31c may be a communication function implemented in the control device 31.

[0042] The receiving unit 41c receives the spinning information transmitted from the spinning frame 3. Reception by the receiving unit 41c may be performed through wired communication using a cable, for example, or may be performed through wireless communication. When the reception by the receiving unit 41c is performed through wireless communication, radio waves, infrared rays, or light may be used as a conveyance medium. In FIG. 5, the receiving unit 41c is illustrated as an element separate from the control device 41. However, the receiving unit 41c may be included in the control device 41. In other words, the receiving unit 41c may be a communication function implemented in the control device 41.

[0043] The control device 41 is an electronic control unit including a CPU, a ROM, and a RAM. The control device 41 loads a program stored in the ROM into the RAM, and causes the CPU to execute the program to perform various controls . The control device 41 may include a plurality of electronic control units. Based on the

spinning information received by the receiving unit 41c, the control device 41 controls operation of the automatic winder 4. Specifically, the control device 41 determines operation of each of the winder units 42 on the basis of the spinning information, and transmits a control signal indicating the determined operation to the winder unit 42 in a timely manner, thereby controlling the operation of the winder unit 42.

[0044] Based on the processing status information included in the spinning information, the control device 41 determines a winding speed when each of the winder units 42 winds yarn from the corresponding yarn supply bobbin 11, and controls operation of the winder unit 42 so as to wind yarn from the yarn supply bobbin 11 at the determined winding speed.

[0045] As described above, while yarn supply bobbins 11 are transferred from the spinning frame 3 to the automatic winder 4, empty bobbins 12 are transferred from the automatic winder 4 to the spinning frame 3. Herein, the fact that a pace (supply pace) at which each of the yarn supply bobbins 11 is transferred from the spinning frame 3 to the automatic winder 4 in a unit time is slower than a pace (discharge pace) at which each of the empty bobbins 12 is transferred from the automatic winder 4 to the spinning frame 3 in a unit time means that the automatic winder 4 has enough processing capacity. This means that the winding speed of each of the winder units 42 can be reduced. In contrast, the fact that the supply pace is faster than the discharge pace means that the automatic winder 4 does not have enough processing capacity. This means that the winding speed of each of the winder units 42 needs to be increased in order to balance the processing speeds of the spinning frame 3 and the automatic winder 4.

[0046] In view of this, the control device 41 calculates the supply pace of each of the yarn supply bobbins 11 on the basis of the processing status information included in the spinning information, and determines the winding speed of each of the winder units 42 such that the supply pace and the pace of a winding process in the winder unit 42 (i.e., discharge pace of the empty bobbin 12) are balanced. Thus, when the supply pace is faster than the discharge pace, the control device 41 can balance the processing of the spinning frame 3 and the processing of the automatic winder 4 by increasing the winding speed of each of the winder units 42. When the supply pace is slower than the discharge pace, the control device 41 can improve the winding quality (i.e., quality of a package 15) of each of the winder units 42 by reducing the winding speed of the winder unit 42.

[0047] Furthermore, based on the information on the end of yarn winding included in the spinning information, the control device 41 controls bobbin preparing operation for each of the yarn supply bobbins 11 in the bobbin preparation device 7 provided to the bobbin transfer device 5. For example, it is transmitted to the control device 41, whether the bunch winding has been performed in the yarn supply bobbin 11 on the basis of the information on the end of yarn winding. If it is determined that the bunch winding has been performed in a yarn supply bobbin 11, the control device 41 controls operation of the bobbin preparation device 7 so as to omit operations that are unnecessary when the bunch winding has been performed (e.g., operations such as cutting of a yarn end of the yarn supply bobbin 11 by a yarn-end cutting device (not depicted) provided to the bobbin preparation device 7 and suctioning of the yarn end of the yarn supply bobbin 11 by a yarn-end suction device (not depicted) provided to the bobbin preparation device 7). Consequently, unnecessary operations can be prevented from being performed in the bobbin preparation device 7.

[0048] Furthermore, for example, the control device 41 determines whether each of the yarn supply bobbins 11 has been formed into a partial bobbin, based on the information on the end of yarn winding. If it is determined that a yarn supply bobbin 11 has been formed into a partial bobbin, the control device 41 controls operation of the bobbin preparation device 7 such that, for example, search operation (operation for searching a yarn end of the yarn supply bobbin 11) by the yarn-end cutting device and the yarn-end suction device described above is performed within a range corresponding to the partial bobbin (e.g., a predetermined range on the bottom portion 12a side). Consequently, the search operation can be prevented from being performed in an unnecessary range, and also the yarn end can be found quickly. By controlling the bobbin preparing operation in the bobbin preparation device 7 in accordance with the state at the end of yarn winding in each of the yarn supply bobbins 11 as described above, operation of the bobbin preparation device 7 can be optimized.

[0049] In some cases, the condition for completing spinning of a yarn supply bobbin 11 differs depending on timing of simultaneous doffing in the spinning frame 3. For example, there are cases in which the condition for completing spinning is set such that the bunch winding is performed in yarn supply bobbins 11 in simultaneous doffing at the first timing and the bunch winding is not performed in yarn supply bobbins 11 in simultaneous doffing at the second timing later than the first timing. Examples of a factor contributing the case in which the bunch winding is not performed in yarn supply bobbins 11 in simultaneous doffing at the second timing include a case in which roved yarns wound around roved yarn bobbins set on the spinning frame 3 have been completely consumed in many spinning units 32, and a case in which doffing has to be performed in an unfinished state due to trouble with the spinning frame 3. There is a case in which yarn supply bobbins 11 that have been formed at the first and second timings at which the conditions for completing spinning are different as described above are transferred in a mixed manner to the bobbin preparation device 7. In this case, when preparatory work is performed for yarn supply bobbins 11 formed at the first timing, the control device 41 needs to control operation of the bobbin preparation device 7 on the basis of comple-

tion condition information (i.e., completion condition information applied to the yarn supply bobbins 11 formed at the first timing) included in first spinning information including doffing information indicating the first timing. Similarly, when preparatory work is performed for yarn supply bobbins 11 formed at the second timing, the control device 41 needs to control operation of the bobbin preparation device 7 on the basis of completion condition information (i.e., completion condition information applied to the yarn supply bobbins 11 formed at the second timing) included in second spinning information including doffing information indicating the second timing. The automatic winder 4 is configured to be able to implement this control. The following describes this mechanism.

[0050] To begin with, the control device 41 periodically receives spinning information from the spinning frame 3 via the receiving unit 41c, thereby accumulating the first spinning information including doffing information indicating the first timing and the second spinning information including doffing information indicating the second timing. When each of the yarn supply bobbins 11 is supplied to the bobbin preparation device 7, the RF reader 7a provided to the bobbin preparation device 7 reads information written on an RF tag 63 provided to the corresponding tray 6 transferring the yarn supply bobbin 11, and transmits the information to the control device 41. Thus, the control device 41 acquires doffing information indicating timing when the yarn supply bobbin 11 supplied to the bobbin preparation device 7 has been formed.

[0051] Subsequently, the control device 41 extracts, from among the accumulated pieces of spinning information, spinning information including doffing information that is the same as the doffing information (doffing information indicating timing when the yarn supply bobbin 11 has been formed, which is, for example, information for identifying in what number doffing the yarn supply bobbin 11 has been doffed.) received from the RF reader 7a, and controls operation of the bobbin preparation device 7 on the basis of this spinning information. Specifically, when the doffing information received from the RF reader 7a indicates the first timing (e.g., the first doffing), the control device 41 controls the bobbin preparing operation of the bobbin preparation device 7 on the basis of completion condition information included in the first spinning information. When the doffing information received from the RF reader 7a indicates the second timing (e.g., the second doffing), the control device 41 controls the bobbin preparing operation of the bobbin preparation device 7 on the basis of completion condition information included in the second spinning information. Thus, based on the condition for completing spinning that has been applied to each of the yarn supply bobbins 11 supplied to the bobbin preparation device 7 (e.g., information on the end of yarn winding, such as whether the bunch winding has been performed and whether the yarn supply bobbin has been formed into a partial bobbin), the bobbin preparing operation of the bobbin preparation device 7 can be appropriately controlled.

[0052] The following describes operation of the yarn winding system 1 (operation including a yarn winding method according to the present embodiment) with reference to FIG. 6. As depicted in FIG. 6, to begin with, the control device 31 of the spinning frame 3 generates spinning information including at least one of processing status information and completion condition information (step S1, generating step) . Subsequently, the transmission unit 31c of the spinning frame 3 transmits the spinning information generated at step S1 to the automatic winder 4 (step S2, transmitting step).

[0053] Subsequently, the receiving unit 41c of the automatic winder 4 receives the spinning information (step S3, receiving step) . The spinning information received by the receiving unit 41c is delivered to the control device 41. Based on the processing status information included in the spinning information, the control device 41 controls the winding speed of each of the winder units 42 (step S4, control step) . Specifically, the control device 41 calculates the supply pace of each of the yarn supply bobbins 11 on the basis of the processing status information included in the spinning information, and determines the winding speed of each of the winder units 42 such that the supply pace and the pace of a winding process in the winder unit 42 (i.e., discharge pace of the empty bobbin 12) are balanced. The control device 41 then controls operation of each of the winder units 42 so as to wind yarn from the corresponding yarn supply bobbin 11 at the determined winding speed.

[0054] When each of the yarn supply bobbins 11 is supplied to the bobbin preparation device 7, the RF reader 7a provided to the bobbin preparation device 7 reads doffing information written on the RF tag 63 provided to the corresponding tray 6 transferring the yarn supply bobbin 11, and transmits the doffing information to the control device 41 (step S5). Subsequently, based on spinning information including doffing information that is the same as the doffing information received from the RF reader 7a, the control device 41 controls the bobbin preparing operation of the bobbin preparation device 7. (step S6, control step). Specifically, as described above, the control device 41 controls operation of the bobbin preparation device 7, for example, based on information on the end of yarn winding in the yarn supply bobbin 11 included in the spinning information.

[0055] As described in the foregoing, in the yarn winding system 1, from the spinning frame 3 to the automatic winder 4, spinning information including information on at least one of the processing status of forming a yarn supply bobbin 11 and the condition for completing spinning of the yarn supply bobbin 11 is transmitted. Based on the spinning information received from the spinning frame 3, the control device 41 of the automatic winder 4 controls operation of the automatic winder 4 (i.e., operation of each of the winder units 42, and operation of the bobbin preparation device 7, etc.). By controlling the operation of the automatic winder 4 on the basis of the spinning information received from the spinning frame 3 in

this manner, operation control of the automatic winder 4 can be optimized.

[0056] In the yarn winding system 1, the spinning information includes information on the processing status of forming the yarn supply bobbin 11. Based on the information on the processing status of forming the yarn supply bobbin 11, the control device 41 determines the winding speed when each of the winder units 42 winds yarn from the corresponding yarn supply bobbin 11, and controls operation of the winder unit 42 so as to wind yarn from the yarn supply bobbin 11 at the determined winding speed. Thus, based on the processing status of forming the yarn supply bobbin 11 in the spinning frame 3 (e.g., supply timing of the yarn supply bobbin 11 transferred from the spinning frame 3 to the automatic winder 4), the automatic winder 4 can appropriately control the winding speed of the winder unit 42.

[0057] In the yarn winding system 1, the spinning information includes information on a state at the end of yarn winding in a yarn supply bobbin 11 as the information on the condition for completing spinning. The automatic winder 4 includes, in the bobbin transfer device 5 configured to transfer each of the yarn supply bobbins 11 from the spinning frame 3 to the automatic winder 4, the bobbin preparation device 7 configured to perform preliminary preparation for processing yarn of the yarn supply bobbin 11. Based on the information on the end of yarn winding, the control device 41 controls bobbin preparing operation for the yarn supply bobbin 11 in the bobbin preparation device 7. Thus, based on the state at the end of yarn winding in a yarn supply bobbin 11 formed by the spinning frame 3 (e.g., information indicating the presence of the bunch winding and indicating that the yarn supply bobbin is a partial bobbin), the automatic winder 4 can appropriately control the bobbin preparing operation in the bobbin preparation device 7.

[0058] In the yarn winding system 1, the spinning information includes doffing information for identifying timing when a yarn supply bobbin 11 has been formed. Each tray 6 configured to transfer a yarn supply bobbin 11 is provided with the RF tag 63 configured to store therein the doffing information. The bobbin preparation device 7 has the RF reader 7a. When a yarn supply bobbin 11 is supplied to the bobbin preparation device 7, the RF reader 7a reads the doffing information stored in the RF tag 63 provided to the tray 6 configured to transfer the yarn supply bobbin 11. Based on spinning information including doffing information that is the same as the doffing information read by the RF reader 7a, the control device 41 controls operation of the bobbin preparation device 7. For example, in some cases, the condition for completing spinning of a yarn supply bobbin 11 differs depending on timing when a yarn supply bobbin 11 is formed, and yarn supply bobbins 11 that have been formed at different timings are transferred in a mixed manner to the bobbin preparation device 7. By the configuration described above, even in such cases, based on conditions for completing spinning that have been applied to yarn supply bobbins 11 to be processed, operation of the bobbin preparation device 7 can be appropriately controlled.

[0059] When attention is focused on each of the spinning frame 3 and the automatic winder 4, the spinning frame 3 and the automatic winder 4 have the following effects. Specifically, in the spinning frame 3, the spinning information is transmitted to the automatic winder 4, whereby the automatic winder 4 can grasp the information on at least one of the processing status of forming a yarn supply bobbin 11 and the condition for completing spinning in the yarn supply bobbin 11. Thus, in the automatic winder 4, operation control of each of the winder units 42 based on the spinning information can be optimized. In the automatic winder 4, operation of the automatic winder 4 is controlled based on the spinning information received from the spinning frame 3, whereby operation control of the automatic winder 4 can be optimized.

[0060] Although one embodiment of the present invention has been described above, the present invention is not limited to the embodiment. For example, transmission of the spinning information from the spinning frame 3 to the automatic winder 4 does not have to be performed directly between the spinning frame 3 and the automatic winder 4, and may be performed via a predetermined repeating device, for example.

Reference Signs List

[0061] 1... yarn winding system, 3... spinning frame, 4... automatic winder, 5... bobbin transfer device (bobbin transfer unit), 7... bobbin preparation device (bobbin preparation unit), 7a... RF reader (reading unit), 31... control device (generating unit), 31c... transmission unit, 41... control device (control unit), 41c... receiving unit, 63... RF tag (storage unit)

Claims

1. An automatic winder (4) configured to wind yarn from a yarn supply bobbin (11) to form a package (15), the automatic winder (4) comprising:

   a receiving unit (41c) configured to receive, from a spinning frame (3) configured to form the yarn supply bobbin (11), spinning information including information on at least one of a processing status of forming the yarn supply bobbin (11) and a condition for completing spinning of the yarn supply bobbin (11); and
   a control unit (41) configured to control operation of the automatic winder (4) based on the spinning information received by the receiving unit (41c);
   wherein the spinning information includes information on a state at the end of yarn winding in

the yarn supply bobbin (11) as the information on the condition for completing spinning, wherein the information on the processing status of forming a yarn supply bobbin (11) is information indicating remaining time until yarn supply bobbins (11) are simultaneously doffed, wherein the information on a state at the end of yarn winding in the yarn supply bobbin (11) is information indicating whether bunch winding has been performed or information whether the yarn supply bobbin (11) has been formed into a partial bobbin;

characterized in that the automatic winder (4) includes, in a bobbin transfer unit (5) configured to transfer the yarn supply bobbin (11) to the automatic winder (4), a bobbin preparation unit (7) configured to perform preliminary preparation for processing yarn of the yarn supply bobbin (11), and

the control unit (41), based on the information on the end of yarn winding, controls bobbin preparing operation for the yarn supply bobbin (11) in the bobbin preparation unit (7).

2. A yarn winding system (1) comprising:

a spinning frame (3) configured to form a yarn supply bobbin (11); and

an automatic winder (4) according to claim 1, wherein

the spinning frame (3) includes:

a generating unit (31) configured to generate spinning information including information on at least one of a processing status of forming the yarn supply bobbin (11) and a condition for completing spinning of the yarn supply bobbin (11); and

a transmission unit configured to transmit the spinning information generated by the generating unit (31) to the automatic winder (4).

3. The yarn winding system (1) according to claim 2, wherein

the spinning information includes information on the processing status of forming the yarn supply bobbin (11), and

the control unit (41), based on the information on the processing status of forming the yarn supply bobbin (11), determines a winding speed when the automatic winder (4) winds yarn from the yarn supply bobbin (11), and controls operation of the automatic winder (4) so as to wind yarn from the yarn supply bobbin (11) at the determined winding speed.

4. The yarn winding system (1) according to claim 2 or 3, wherein

the spinning information include timing information for identifying timing when the yarn supply bobbin (11) has been formed,

a tray (6) configured to transfer the yarn supply bobbin (11) is provided with a storage unit (63) configured to store therein the timing information,

the bobbin preparation unit (7) includes a reading unit (7a) configured to read the timing information stored in the storage unit (63) provided to the tray (6) configured to transfer the yarn supply bobbin (11) when the yarn supply bobbin (11) is supplied to the bobbin preparation unit (7), and

the control unit (41) controls operation of the bobbin preparation unit (7), based on spinning information including timing information that is the same as the timing information read by the reading unit (7a).

5. A yarn winding method performed by a spinning frame (3) configured to form a yarn supply bobbin (11) and an automatic winder (4) configured to wind yarn from the yarn supply bobbin (11) to form a package (15), the yarn winding method comprising:

a generating step of generating spinning information including information on at least one of a processing status of forming the yarn supply bobbin (11) and a condition for completing spinning of the yarn supply bobbin (11);

a transmitting step of transmitting the spinning information generated at the generating step to the automatic winder (4);

a receiving step of receiving the spinning information in the automatic winder (4); and

a control step of controlling operation of the automatic winder (4) based on the spinning information received at the receiving step in the automatic winder (4)

wherein the spinning information includes information on a state at the end of yarn winding in the yarn supply bobbin (11) as the information on the condition for completing spinning, wherein the information on the processing status of forming a yarn supply bobbin (11) is information indicating remaining time until yarn supply bobbins (11) are simultaneously doffed, wherein the information on a state at the end of yarn winding in the yarn supply bobbin (11) is information indicating whether bunch winding has been performed or information whether the yarn supply bobbin (11) has been formed into a partial bobbin;

characterized in that the automatic winder (4)

includes, in a bobbin transfer unit (5) configured to transfer the yarn supply bobbin (11) from the spinning frame (3) to the automatic winder (4), a bobbin preparation unit (7) which performs preliminary preparation for processing yarn of the yarn supply bobbin (11), and
the control unit (41), based on the information on the end of yarn winding, controls bobbin preparing operation for the yarn supply bobbin (11) in the bobbin preparation unit (7).

Patentansprüche

1. Automatischer Wickler (4), der konfiguriert ist, um den Faden von einer Fadenzufuhrspule (11) aufzuwickeln, um eine Packung (15) zu bilden, wobei der automatische Wickler (4) Folgendes umfasst:

   eine Empfangseinheit (41c), die konfiguriert ist, um von einem Spinnrahmen (3), der konfiguriert ist, um die Fadenzufuhrspule (11) zu bilden, Spinninformationen zu empfangen, einschließlich Informationen über mindestens einen Verarbeitungsstatus des Bildens der Fadenzufuhrspule (11) und eine Bedingung für den Abschluss des Spinnens der Fadenzufuhrspule (11); und
   eine Steuereinheit (41), die konfiguriert ist, um den Betrieb des automatischen Wicklers (4) auf der Grundlage der von der Empfangseinheit (41c) empfangenen Spinninformation zu steuern;
   wobei die Spinninformationen Informationen über einen Zustand am Ende des Fadenwickelns in der Fadenzufuhrspule (11) als die Informationen über die Bedingung für die Beendigung des Spinnens einschließen, wobei die Informationen über den Bearbeitungsstatus des Bildens einer Fadenzufuhrspule (11) Informationen sind, die die verbleibende Zeit angeben, bis die Fadenzufuhrspulen (11) gleichzeitig abgezogen werden, wobei die Informationen über einen Zustand am Ende des Fadenwickelns in der Fadenzufuhrspule (11) Informationen sind, die anzeigen, ob eine Bündelwicklung durchgeführt wurde, oder Informationen, ob eine Fadenzufuhrspule (11) zu einer Teilspule gebildet wurde;
   dadurch gekennzeichnet, dass
   der automatische Wickler (4) in einer Spulenübergabeeinheit (5), die konfiguriert ist, um die Fadenzufuhrspule (11) zu dem automatischen Wickler (4) zu transferieren, eine Spulenvorbereitungseinheit (7) einschließt, die konfiguriert ist, um eine vorläufige Vorbereitung zur Verarbeitung vom Faden der Fadenzufuhrspule (11) durchzuführen, und
   die Steuereinheit (41), die auf der Grundlage der Informationen über das Ende des Fadenwickelns den Spulenvorbereitungsvorgang für die Fadenzufuhrspule (11) in der Spulenvorbereitungseinheit (7) steuert.

2. Fadenwickelsystem (1), umfassend:

   einen Spinnrahmen (3), die konfiguriert ist, um eine Fadenzufuhrspule (11) zu bilden; und
   einen automatischen Wickler (4) nach Anspruch 1, wobei der Spinnrahmen (3) Folgendes einschließt:

      eine Erzeugungseinheit (31), die konfiguriert ist, um Spinninformationen zu erzeugen, einschließlich Informationen über mindestens einen Verarbeitungsstatus des Bildens der Fadenzufuhrspule (11) und eine Bedingung für den Abschluss des Spinnens der Fadenzufuhrspule (11); und
      eine Übertragungseinheit, die konfiguriert ist, um die von der Erzeugungseinheit (31) erzeugte Spinninformation an den automatischen Wickler (4) zu übertragen.

3. Fadenwickelsystem (1) nach Anspruch 2, wobei

   die Spinninformationen Informationen über den Verarbeitungsstatus des Bildens der Fadenzufuhrspule (11) einschließen, und
   die Steuereinheit (41) auf der Grundlage der Informationen über den Bearbeitungsstatus des Bildens der Fadenzufuhrspule (11) eine Wickelgeschwindigkeit zu bestimmen, wenn der automatische Wickler (4) den Faden von der Fadenzufuhrspule (11) spult, und den Betrieb des automatischen Wicklers (4) steuert, um den Faden von der Fadenzufuhrspule (11) mit der bestimmten Wickelgeschwindigkeit zu wickeln.

4. Fadenwickelsystem (1) nach Anspruch 2 oder 3, wobei

   die Spinninformationen Zeitinformationen zur Identifizierung des Zeitpunkts einschließen, zu dem die Fadenzufuhrspule (11) gebildet worden ist,
   eine Ablage (6), die konfiguriert ist, um die Fadenzufuhrspule (11) zu transportieren, mit einer Speichereinheit (63) bereitgestellt ist, die konfiguriert ist, um darin die Zeitsteuerungsinformationen zu speichern,
   die Spulenvorbereitungseinheit (7) eine Leseeinheit (7a) einschließt, die konfiguriert ist, um die in der Speichereinheit (63) gespeicherten Zeitinformationen zu lesen, die an der Ablage (6) bereitgestellt ist, die konfiguriert ist, um die Fa-

denzufuhrspule (11) zu übertragen, wenn die Fadenzufuhrspule (11) der Spulenvorbereitungseinheit (7) zugeführt wird, und
die Steuereinheit (41) den Betrieb der Spulenvorbereitungseinheit (7) auf der Grundlage von Spinninformationen steuert, einschließlich Zeitinformationen, die mit den von der Leseeinheit (7a) gelesenen Zeitinformationen übereinstimmen.

5. Verfahren zum Aufwickeln eines Fadens, das durch einen Spinnrahmen (3), der konfiguriert ist, um eine Fadenzufuhrspule (11) zu bilden, und einen automatischen Wickler (4), der konfiguriert ist, um einen Faden von der Fadenzufuhrspule (11) aufzuwickeln, um eine Packung (15) zu bilden, durchgeführt wird, wobei das Verfahren zum Aufwickeln eines Fadens Folgendes umfasst:

einen Erzeugungsschritt zur Erzeugung von Spinninformationen, einschließlich Informationen über mindestens einen Verarbeitungsstatus des Bildens der Fadenzufuhrspule (11) und eine Bedingung für den Abschluss des Spinnens der Fadenzufuhrspule (11);
einen Übertragungsschritt zum Übertragen der im Erzeugungsschritt erzeugten Spinninformationen an den automatischen Wickler (4);
einen Empfangsschritt zum Empfangen der Spinninformationen in dem automatischen Wickler (4); und
einen Steuerschritt zur Steuerung des Betriebs des automatischen Wicklers (4) auf der Grundlage der bei dem Empfangsschritt in dem automatischen Wickler (4) empfangenen Spinninformationen,
wobei die Spinninformationen Informationen über einen Zustand am Ende des Fadenwickelns in der Fadenzufuhrspule (11) als die Informationen über die Bedingung für die Beendigung des Spinnens einschließen, wobei die Informationen über den Bearbeitungsstatus des Bildens einer Fadenzufuhrspule (11) Informationen sind, die die verbleibende Zeit angeben, bis die Fadenzufuhrspulen (11) gleichzeitig abgezogen werden, wobei die Informationen über einen Zustand am Ende des Fadenwickelns in der Fadenzufuhrspule (11) Informationen sind, die anzeigen, ob eine Bündelwicklung durchgeführt wurde, oder Informationen, ob eine Fadenzufuhrspule (11) zu einer Teilspule gebildet wurde;
dadurch gekennzeichnet, dass
der automatische Wickler (4) in einer Spulenübergabeeinheit (5), die konfiguriert ist, um die Fadenzufuhrspule (11) vom Spinnrahmen (3) an den automatischen Wickler (4) zu übergeben, eine Spulenvorbereitungseinheit (7) einschließt, die eine vorläufige Vorbereitung zur Verarbeitung vom Faden der Fadenzufuhrspule (11) durchführt, und
die Steuereinheit (41), die auf der Grundlage der Informationen über das Ende des Fadenwickelns den Spulenvorbereitungsvorgang für die Fadenzufuhrspule (11) in der Spulenvorbereitungseinheit (7) steuert.

Revendications

1. Enrouleur automatique (4) configuré pour enrouler un fil à partir d'une bobine d'alimentation en fil (11) de manière à former un paquet (15), l'enrouleur automatique (4) comprenant :

une unité de réception (41c) configurée pour recevoir, à partir d'un métier à filer (3) configuré pour former la bobine d'alimentation en fil (11), des informations de filage incluant des informations sur au moins un d'un statut de traitement de formation de la bobine d'alimentation en fil (11) et d'une condition pour terminer un filage de la bobine d'alimentation en fil (11) ; et
une unité de commande (41) configurée pour commander le fonctionnement de l'enrouleur automatique (4) sur la base des informations de filage reçues par l'unité de réception (41c) ;
dans lequel les informations de filage incluent des informations sur un état à la fin d'un enroulement de fil dans la bobine d'alimentation en fil (11) en tant que les informations sur la condition pour terminer un filage ; dans lequel les informations sur le statut de traitement de formation d'une bobine d'alimentation en fil (11) sont des informations indiquant un temps restant jusqu'à ce que des bobines d'alimentation en fil (11) soient simultanément ôtées, dans lequel les informations sur un état à la fin d'un enroulement de fil dans la bobine d'alimentation en fil (11) sont des informations indiquant si un enroulement de mèche a été réalisé ou des informations indiquant si la bobine d'alimentation en fil (11) a été formée en une bobine partielle ;
caractérisé en ce que
l'enrouleur automatique (4) inclut, dans une unité de transfert de bobine (5) configurée pour transférer la bobine d'alimentation en fil (11) à l'enrouleur automatique (4), une unité de préparation de bobine (7) configurée pour mettre en oeuvre une préparation préliminaire pour un traitement d'un fil de la bobine d'alimentation en fil (11), et
l'unité de commande (41), sur la base des informations sur la fin d'un enroulement de fil, commande une opération de préparation de bobine pour la bobine d'alimentation en fil (11) dans

l'unité de préparation de bobine (7).

2. Système d'enroulement de fil (1) comprenant :

un métier à filer (3) configuré pour former une bobine d'alimentation en fil (11) ; et
un enrouleur automatique (4) selon la revendication 1, dans lequel le métier à filer (3) inclut :

une unité de génération (31) configurée pour générer des informations de filage incluant des informations sur au moins un d'un statut de traitement de formation de la bobine d'alimentation en fil (11) et d'une condition pour terminer un filage de la bobine d'alimentation en fil (11) ; et
une unité de transmission configurée pour transmettre les informations de filage générées par l'unité de génération (31) à l'enrouleur automatique (4).

3. Système d'enroulement de fil (1) selon la revendication 2, dans lequel

les informations de filage incluent des informations sur le statut de traitement de formation de la bobine d'alimentation en fil (11), et
l'unité de commande (41), sur la base des informations sur le statut de traitement de formation de la bobine d'alimentation en fil (11), détermine une vitesse d'enroulement lorsque l'enrouleur automatique (4) file un fil à partir de la bobine d'alimentation en fil (11), et commande le fonctionnement de l'enrouleur automatique (4) de manière à filer un fil à partir de la bobine d'alimentation en fil (11) à la vitesse d'enroulement déterminée.

4. Système d'enroulement de fil (1) selon la revendication 2 ou 3, dans lequel

les informations de filage incluent des informations temporelles pour identifier un moment auquel la bobine d'alimentation en fil (11) a été formée,
un plateau (6) configuré pour transférer la bobine d'alimentation en fil (11) est fourni avec une unité de stockage (63) configurée pour y stocker les informations temporelles,
l'unité de préparation de bobine (7) inclut une unité de lecture (7a) configurée pour lire les informations temporelles stockées dans l'unité de stockage (63) fournies au plateau (6) configuré pour transférer la bobine d'alimentation en fil (11) lorsque la bobine d'alimentation en fil (11) est fournie à l'unité de préparation de bobine (7), et
l'unité de commande (41) commande le fonctionnement de l'unité de préparation de bobine (7), sur la base d'informations de filage incluant des informations temporelles qui sont les mêmes que les informations temporelles lues par l'unité de lecture (7a).

5. Procédé d'enroulement de fil mis en oeuvre par un métier à filer (3) configuré pour former une bobine d'alimentation en fil (11) et un enrouleur automatique (4) configuré pour enrouler un fil à partir de la bobine d'alimentation en fil (11) de manière à former un paquet (15), le procédé d'enroulement de fil comprenant :

une étape de génération consistant à générer des informations de filage incluant des informations sur au moins un d'un statut de traitement de formation de la bobine d'alimentation en fil (11) et d'une condition pour terminer un filage de la bobine d'alimentation en fil (11) ;
une étape de transmission consistant à transmettre les informations de filage générées à l'étape de génération à l'enrouleur automatique (4) ;
une étape de réception consistant à recevoir les informations de filage dans l'enrouleur automatique (4) ; et
une étape de commande consistant à commander le fonctionnement de l'enrouleur automatique (4) sur la base des informations de filage reçues à l'étape de réception dans l'enrouleur automatique (4)
dans lequel les informations de filage incluent des informations sur un état à la fin d'un enroulement de fil dans la bobine d'alimentation en fil (11) en tant que les informations sur la condition pour terminer un filage ; dans lequel les informations sur le statut de traitement de formation d'une bobine d'alimentation en fil (11) sont des informations indiquant un temps restant jusqu'à ce que des bobines d'alimentation en fil (11) soient simultanément ôtées, dans lequel les informations sur un état à la fin d'un enroulement de fil dans la bobine d'alimentation en fil (11) sont des informations indiquant si un enroulement de mèche a été mis en oeuvre ou des informations indiquant si la bobine d'alimentation en fil (11) a été formée en une bobine partielle ;
caractérisé en ce que
l'enrouleur automatique (4) inclut, dans une unité de transfert de
bobine (5) configurée pour transférer la bobine d'alimentation en fil (11) à partir du métier à filer (3) jusqu'à l'enrouleur automatique (4), une unité de préparation de bobine (7) qui met en oeuvre une préparation préliminaire pour un traitement d'un fil de la bobine d'alimentation en fil (11), et

l'unité de commande (41), sur la base des informations sur la fin d'un enroulement de fil, commande une opération de préparation de bobine pour la bobine d'alimentation en fil (11) dans l'unité de préparation de bobine (7).

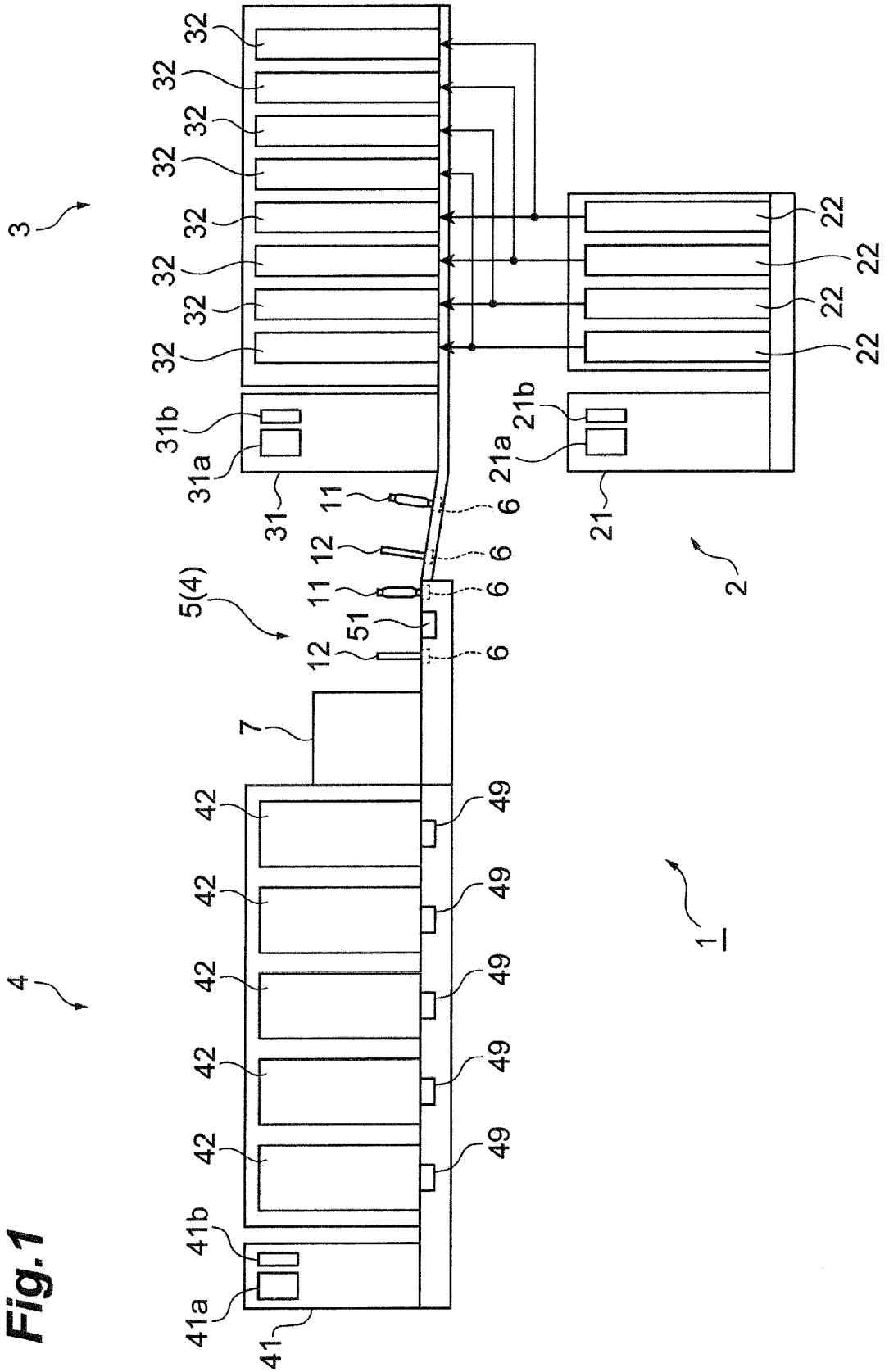


Fig.1

Fig.2

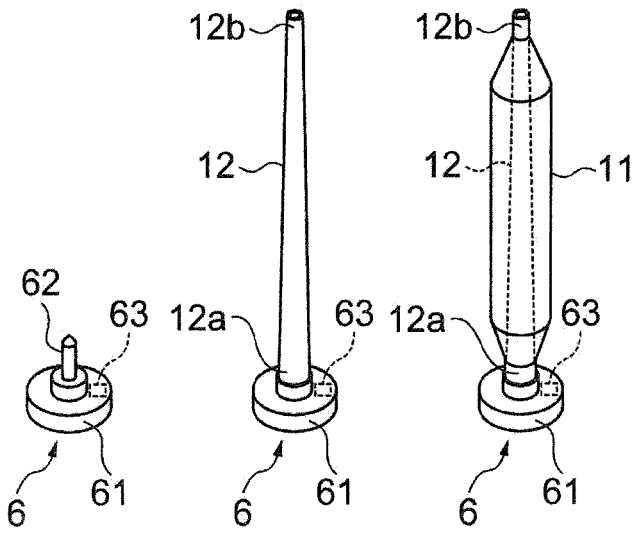


Fig.3

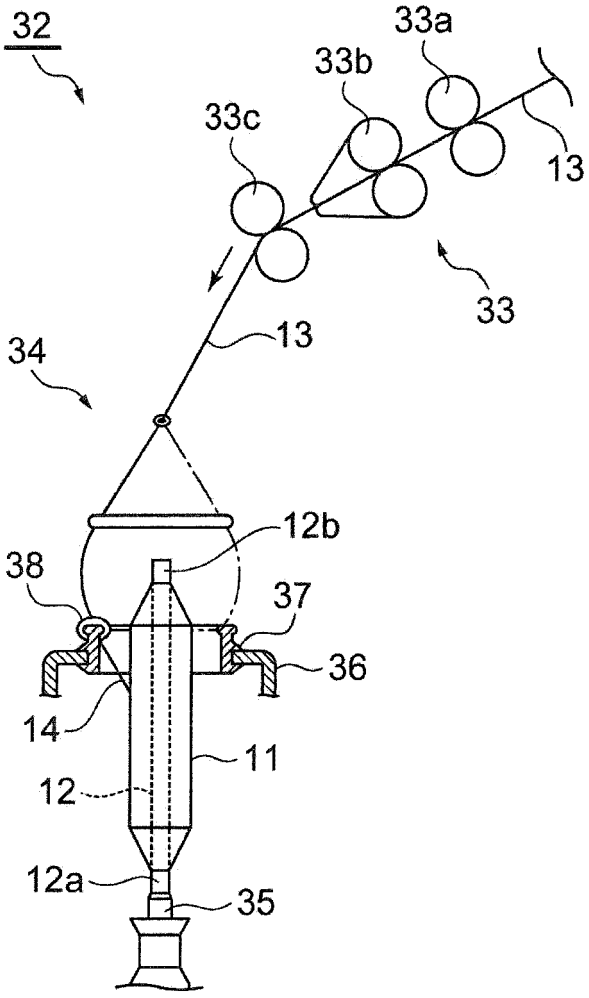


Fig.4

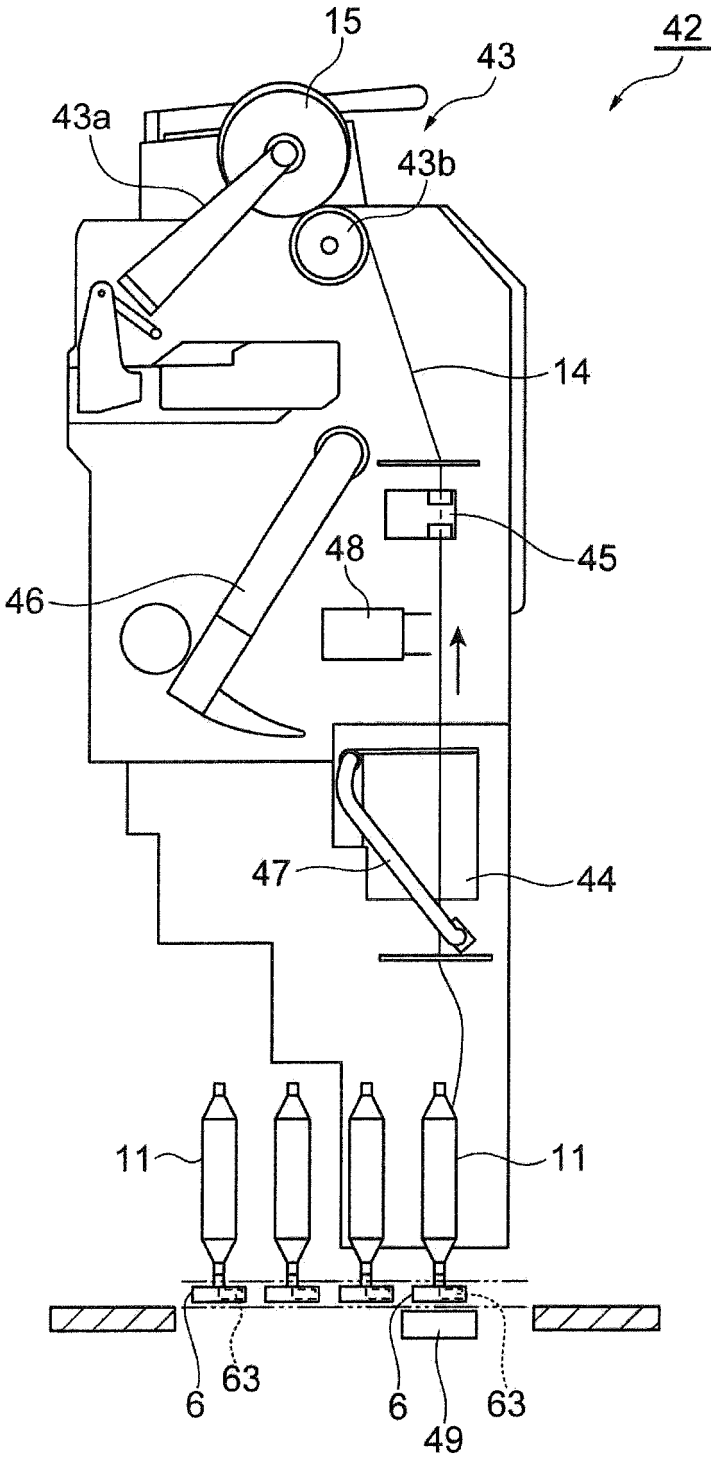


Fig.5

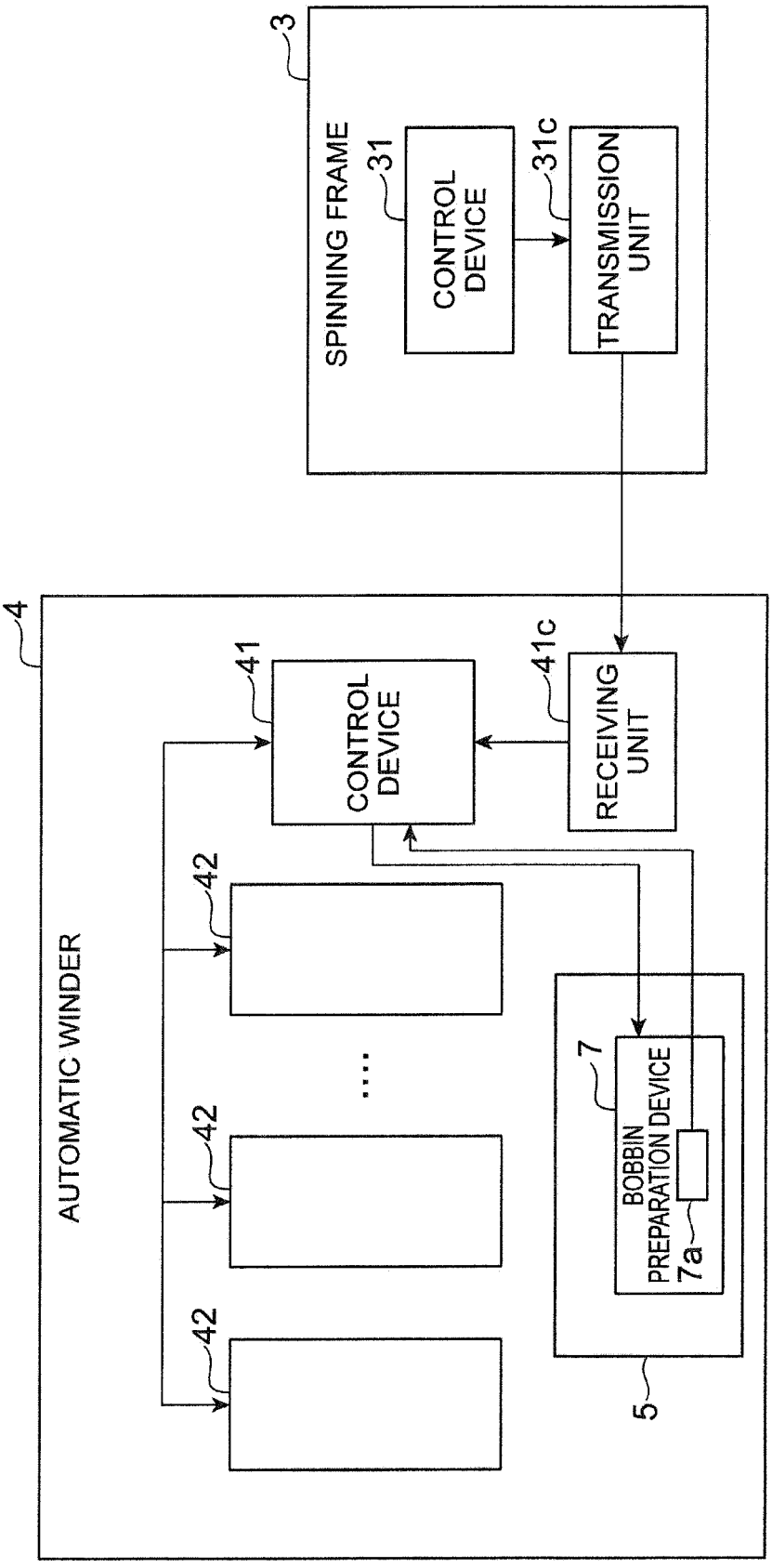
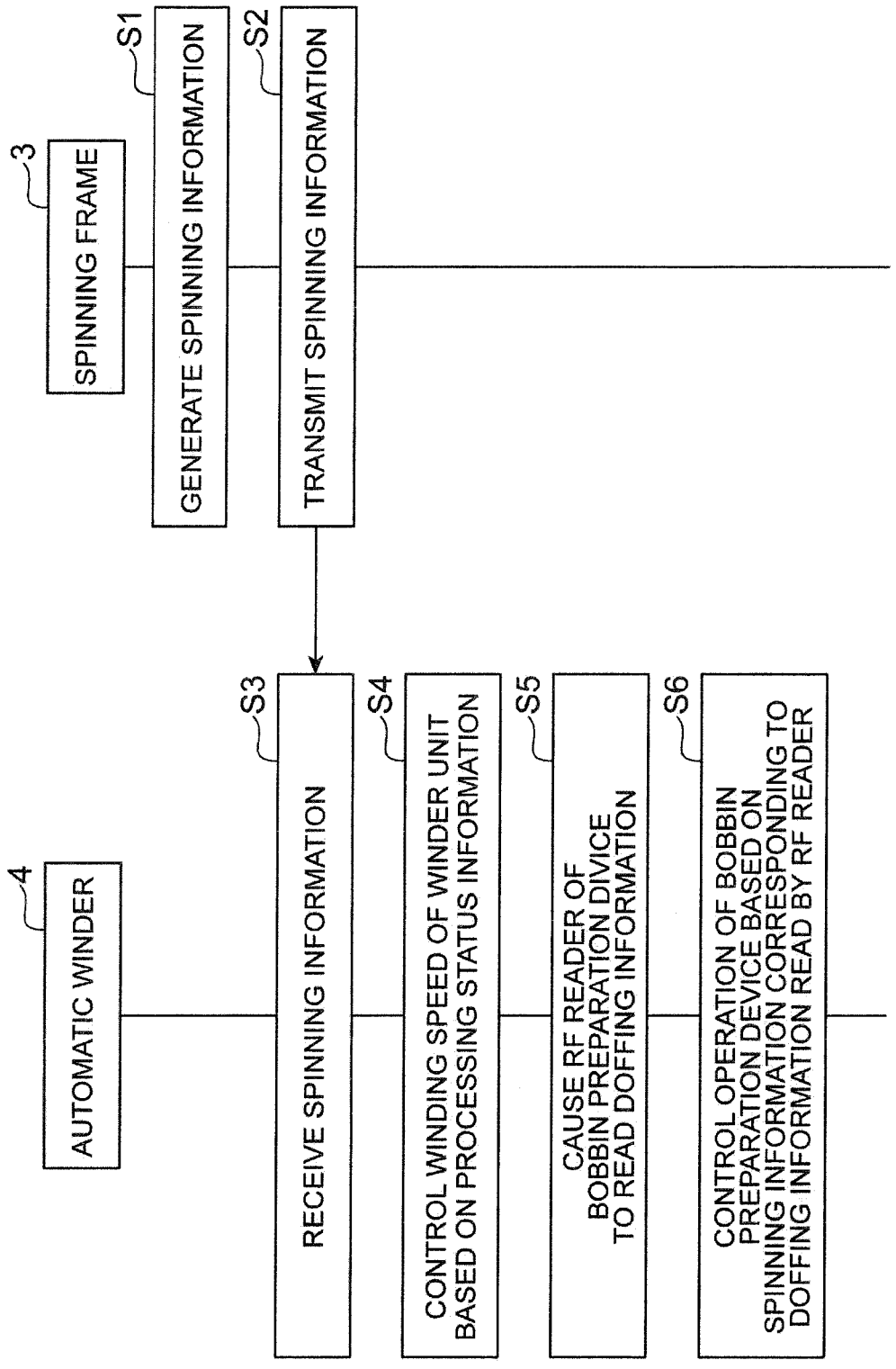

3
SPINNING FRAME
31
CONTROL DEVICE
31c
TRANSMISSION UNIT
4
AUTOMATIC WINDER
41
CONTROL DEVICE
41c
RECEIVING UNIT
42
42
42
....
7
BOBBIN PREPARATION DEVICE
7a
5

Fig.6


3
SPINNING FRAME
S1
GENERATE SPINNING INFORMATION
S2
TRANSMIT SPINNING INFORMATION
4
AUTOMATIC WINDER
S3
RECEIVE SPINNING INFORMATION
S4
CONTROL WINDING SPEED OF WINDER UNIT BASED ON PROCESSING STATUS INFORMATION
S5
CAUSE RF READER OF BOBBIN PREPARATION DIVICE TO READ DOFFING INFORMATION
S6
CONTROL OPERATION OF BOBBIN PREPARATION DEVICE BASED ON SPINNING INFORMATION CORRESPONDING TO DOFFING INFORMATION READ BY RF READER

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H676177 B **[0002]**
- EP 2108723 A2 **[0003]**
- JP H01183530 A **[0003]**
- US 5269478 A **[0003]**