

Description

[0001] The present invention relates to a textile machine including a plurality of operating units which apply predetermined processings to a textile product, and an automatic winder as an example of the textile machine.

[0002] As a textile machine, there is a conventional textile machine including a plurality of operating units which apply predetermined processings to a textile product. For example, Patent document 1 (Japanese Published Patent Application No.2002-326767) discloses an automatic winder including a plurality of winding units. In each winding unit of this automatic winder, a yarn unwound from a yarn supplying bobbin is wound around a winding tube held by a cradle while being traversed by a traverse drum (driving drum), and as a result, a winding package is formed. When the winding package is fully wound, the winding package is doffed by a doffing device, and thereafter, an empty winding tube is attached to the cradle and yarn winding by the winding unit is restarted.

[0003] In the above-described automatic winder, between the yarn supplying bobbin and the winding tube, a plurality of yarn processing sections which apply various processings to the yarn are arranged along a yarn path. For example, the yarn processing sections are a yarn clearer which detects a yarn defect, a cutter which cuts the yarn when the yarn defect is detected, and a splicing device which splices the yarn at the time of yarn breakage or yarn cut. These yarn processing sections are controlled by a unit controller provided for each winding unit. The unit controller of each winding unit is connected to a frame controller, and the frame controller outputs control signals to the unit controllers of the plurality of winding units so as to control the yarn winding processings of the winding units.

[0004] However, in the conventional automatic winder described above, a confirmation cannot be carried out as to whether regular components and devices are attached to each winding unit or whether a regular yarn supplying bobbin and winding tube are supplied to each winding unit. Therefore, even if a yarn supplying bobbin wound with a yarn different from a yarn that should be wound is supplied to the winding unit, such a fact cannot be detected. As a result, a yarn of a type different from a proper yarn is undesirably wound around the winding tube. Additionally, even if some component or device constituting the winding unit is used over its durable period or an improper component or device is attached, such a fact cannot be detected. As a result, operations of the winding unit may fail.

[0005] An object of the present invention is to provide a textile machine which can accurately grasp states of operating units with higher accuracy than in conventional techniques.

[0006] A textile machine of a first aspect of the invention includes a plurality of operating units which apply predetermined processings to a textile product and a monitoring device which respectively monitors the plu-

rality of operating units. The plurality of operating units respectively have a unit main body. Each unit main body is provided with an information acquiring and transmitting means which can communicate with a plurality of electronic components relating to the corresponding operating unit, and acquires verification information stored in the plurality of electronic components by wireless communications, and further transmits the acquired verification information to the monitoring device.

[0007] According to this constitution, the verification information stored in the electronic components relating to each operating unit is acquired by the information acquiring and transmitting means by wireless communications, and further transmitted from the information acquiring and transmitting means to the monitoring device. Therefore, the monitoring device can more highly accurately grasp a state of each operating unit, that is, whether a regular textile product has been supplied to the operating unit or whether components for applying predetermined processings to the textile product are regular.

[0008] According to a textile machine of a second aspect of the invention, in the first aspect of the invention, the information acquiring and transmitting means is at least one antenna spread over the corresponding unit main body.

[0009] According to this constitution, the information acquiring and transmitting means can be compactly constituted at low costs.

[0010] According to a textile machine of a third aspect of the invention, in the first or second aspect of the invention, the monitoring device comprises a verifying means for determining whether the electronic components are regular electronic components corresponding to each operating unit based on the verification information of the electronic components relating to each operating unit acquired via the information acquiring and transmitting means.

[0011] According to this constitution, based on verification information of the electronic components relating to each operating unit acquired by the monitoring means via the information acquiring and transmitting means, the verifying means determines whether the electronic components are regular. Therefore, when the verifying means determines that the electronic component is not regular (for example, when a regular member relating to the textile product is not supplied to the operating unit or when the component for applying predetermined processings to the textile product is not regular), processing by the corresponding operating unit can be prohibited or an operator can be informed of the abnormality.

[0012] According to a textile machine of a fourth aspect of the invention, in the third aspect of the invention, the electronic components relating to each operating unit are provided on element members attached to the unit main body in a replaceable manner. After the element members are attached to the unit main body and before predetermined processings are applied to the textile product in the operating unit corresponding to the unit main body,

the verifying means determines whether the electronic components are regular electronic components corresponding to the operating unit.

[0013] According to this constitution, after the element members necessary for applying predetermined processings to the textile product are attached to the unit main body, and until the predetermined processings are applied in the operating unit corresponding to the unit main body, the verifying means determines whether the electronic components provided on the element members are regular based on verification information of the electronic components. Therefore, a detection can be carried out in advance as to a state that the durable period has expired or a model, which differs from a regular model guaranteed with normal operation, is mounted and the element members may not operate normally.

[0014] According to a textile machine of a fifth aspect of the invention, in third aspect of the invention, the electronic components relating to each operating unit are provided on members relating to the textile product to be processed in the corresponding operating unit. After the members are received in each operating unit and before predetermined processings are applied to the textile product in the operating unit, the verifying means determines whether the electronic components are regular electronic components corresponding to the operating unit.

[0015] According to this constitution, after the members relating to the textile product are received in the operating unit, and until the predetermined processings are applied to the textile product, the verifying means determines whether electronic components provided on the members are regular based on the verification information of the electronic components. Therefore, even in an abnormal state in which a textile product different from a textile product that should be processed is received in the operating unit, such a state can be detected in advance, so that the processing by the operating unit in the abnormal state can be prevented.

[0016] According to a textile machine of a sixth aspect of the invention, in any one of the third to fifth aspects of the invention, when the verifying means determines that the electronic components are not regular electronic components corresponding to the operating unit, the verifying means outputs a signal for prohibiting predetermined processings to a control section of the operating unit corresponding to the thus determined electronic components.

[0017] According to this constitution, in an abnormal state in which a certain electronic component relating to the operating unit is not a regular electronic component corresponding to the operating unit and regular processing cannot be applied to the textile product, processing by the operating unit is prohibited, so that processing different from regular processing can be prevented from being conducted.

[0018] A textile machine of a seventh aspect of the invention comprises a plurality of winding units as the

operating units, which apply predetermined processings to yarns as the textile products and rewind yarns of yarn supplying bobbins into winding packages, and also the monitoring device, which respectively monitors the plurality of winding units. The plurality of winding units respectively have the unit main body. Each unit main body is provided with an antenna as the information acquiring and transmitting means, which can communicate with the plurality of electronic components relating to the corresponding winding unit, and acquires the verification information stored in the plurality of electronic components by wireless communications and further transmits the acquired verification information to the monitoring device. The above-described constitutions are useful application examples of the present invention.

[0019]

Fig. 1 is a front view showing a general construction of an automatic winder of an embodiment of the present invention;

Fig. 2 is a front view of a winding unit; and

Fig. 3 is a flowchart for state monitoring processing of the winding unit by a host controller.

First Embodiment

[0020] Next, an embodiment of the present invention will be described. This embodiment is an example of application of the present invention to an automatic winder as a textile machine which forms a winding package by unwinding a yarn from a yarn supplying bobbin and winding the yarn around a winding tube. Fig. 1 is a front view showing a general construction of the automatic winder of the present embodiment, and Fig. 2 is a front view of a winding unit of the automatic winder.

[0021] As shown in Fig. 1 and Fig. 2, an automatic winder 1 includes a plurality of winding units 2 (operating units) arranged in a row, a doffing device 3 provided capable of traveling in an arrangement direction of the winding units 2 along the winding units 2, and a control section 40. The control section 40 is arranged on one end side of all winding units 2.

[0022] As shown in Fig. 2, each winding unit 2 has a yarn supplying section 10 and a yarn winding section 16. A yarn supplying bobbin 4, around which a yarn 5 as a textile product is wound, is supplied to the yarn supplying section 10. The yarn 5 unwound from the yarn supplying bobbin 4 is wound around a winding tube 7 by the yarn winding section 16. Accordingly, a winding package 6 having a predetermined yarn length and a predetermined shape is formed.

[0023] In a yarn running path between the yarn supplying bobbin 4 of the yarn supplying section 10 and the yarn winding section 16, in order from the yarn supplying bobbin 4 side, an unwinding assisting device 11, a tensioning device 12, a fluff suppressing device 13, a splicing device 14, and a clearer 15 are arranged. The yarn supplying section 10 and the yarn winding section 16 of the

winding unit 2 and the respective devices arranged therebetween correspond to a plurality of processing sections each of which performs a part of yarn winding processings for forming a winding package 6. The plurality of processing sections such as the yarn winding section 16 are respectively attached to a unit main body 30 disposed upright for each winding unit 2, and at least a part of such processing sections (the fluff suppressing device 13 and the splicing device 14, etc.: element members) are replaceable (detachable from the unit main body 30) for maintenance or the like.

[0024] The unwinding assisting device 11 is constituted to assist unwinding of the yarn 5 from the yarn supplying bobbin 4 by reducing a balloon resistance by lowering a tubular body covering a core tube of the yarn supplying bobbin 4 while the yarn is being unwound from the yarn supplying bobbin 4.

[0025] The tensioning device 12 applies predetermined tension to the running yarn 5. In the present embodiment, the tensioning device 12 is a gate type tensioning device having a fixed comb 12a and a movable comb 12b movably disposed with respect to the fixed comb 12a.

[0026] The fluff suppressing device 13 suppresses the fluff of the yarn 5 unwound from the yarn supplying bobbin 4 by twisting fluff of a fiber group constituting the yarn 5 by false-twisting the yarn 5. The fluff suppressing device 13 of the present embodiment is a so-called disk type fluff suppressing device which includes a plurality of friction disks 13a, and false-twists the yarn 5 while the yarn 5 runs between the plurality of rotating disks 13a. Other than this disk type, an air type fluff suppressing device may be used which suppresses the fluff of the yarn 5 by ballooning the yarn 5 by forming a whirling flow by jetting a gas such as air to the yarn 5.

[0027] The splicing device 14 splices a yarn (lower yarn) on the yarn supplying bobbin 4 side and a yarn (upper yarn) on the winding package 6 side when the clearer 15 detects a yarn defect and cuts the yarn or when a yarn breakage generates while unwinding the yarn 5 from the yarn supplying bobbin 4. The splicing device 14 of the present embodiment is a so-called air type splicing device (air splicer) having an untwisting nozzle which untwists an upper yarn end and a lower yarn end, and a twisting nozzle which twists the untwisted yarn ends together by making the whirling air flow to act on the yarn ends. The clearer 15 detects a yarn defect such as slub, and is provided with a cutter 15a for cutting the yarn when a yarn defect is detected.

[0028] A lower yarn capturing and guiding member 18 is provided below the splicing device 14, and an upper yarn capturing and guiding member 19 is provided above the splicing device 14. The lower yarn capturing and guiding member 18 sucks and captures the lower yarn on the yarn supplying bobbin 4 side, and guides the yarn to the splicing device 14. The upper yarn capturing and guiding member 19 sucks and captures the upper yarn on the winding package 6 side, and guides the yarn to the splic-

ing device 14. The upper yarn capturing and guiding member 19 is constituted in a pipe shape, and is arranged capable of rotating around a shaft 19a. A mouth 19b is provided at a tip end portion of the upper yarn capturing and guiding member 19. Similarly, the lower yarn capturing and guiding member 18 is also constituted in a pipe shape, and is arranged capable of rotating around a shaft 18a. A suction port 18b is provided at a tip end portion of the lower yarn capturing and guiding member 19. An appropriate negative pressure source is connected to the upper yarn capturing and guiding member 19 and the lower yarn capturing and guiding member 18. Air is sucked from the mouth 19b and the suction port 18b to capture the yarn ends.

[0029] The yarn winding section 16 includes a cradle 21 having a pair of cradle arms for rotatably and detachably supporting the winding tube 7, and a driving motor 22 which is provided on one of the cradle arms and drives and rotates the winding tube 7. The yarn winding section 16 is composed in a manner that a winding package 6 is formed by winding the yarn 5 around the winding tube 7 by directly driving and rotating the winding tube 7 by the driving motor 22 (direct drive method). A roller 23 is provided below the winding package 6. The roller 23 makes contact with a peripheral surface of the winding package 6 and rotates by following the rotation of the winding package 6.

[0030] A traverse device 17 is provided near the roller 23. This traverse device 17 includes a traverse guide 17b attached to a tip end of a narrow and long arm member 17a and a traverse motor 17c which drives and pivotally reciprocates the arm member 17a. The yarn 5 is wound around the winding package 6 while being traversed by the traverse guide 17b.

[0031] As a method for driving and rotating the winding tube 7, other than the above-described direct drive method, a method using a driving drum may also be used in which the driving drum actively rotates in a contact state with the peripheral surface of the winding package 6. In addition, the traverse device 17 can be omitted when a driving drum having a traverse groove formed on its surface is used so as to drive the winding package 6 while traversing the yarn.

[0032] The cradle 21 is constituted capable of rotating around a support shaft that is not shown, and accordingly, the peripheral surface of the winding package 6 formed around the winding tube 7 can make contact with or depart from a peripheral surface of the roller 23. The cradle 21 is further constituted so as to open and close so that whereby doffing, the winding package 6 can be released and a new winding tube 7 can be loaded.

[0033] As shown in Fig. 1, when the winding package 6 formed by the winding unit 2 is fully wound, the doffing device 3 travels to a position facing the winding unit 2 and then performs a doffing operation for detaching the winding package 6 in the fully-wound state from the cradle 21. In more detail, the doffing device 3 discharges the winding package 6 in the fully-wound state by opening

the cradle 21 after spacing the winding package 6 from the roller 23, and further, supplies a new winding tube 7 from a winding tube storage section that is not shown and sets the new winding tube 7 to the cradle 21.

[0034] The overall operations of the automatic winder 1 described above are controlled by a host controller 31 (control and monitoring device) provided in the control section 40. As shown in Fig. 1, the host controller 31 is connected to the plurality of unit controllers (unit control sections) 32 which respectively control the plurality of winding units 2, and a doffing controller 33 which controls the doffing device 3 via communication lines. Each of the host controller 31, the unit controllers 32, and the doffing controller 33 respectively includes a Central Processing Unit (CPU) as an arithmetic processing unit, a Read-Only Memory (ROM) storing programs to be executed by the CPU and data to be used in the programs, a Random Access Memory (RAM) for temporarily storing data when executing a program, and an input/output interface which inputs and outputs data from and to the outside.

[0035] In the host controller 31, for each winding unit 2, type information (lot information) of a winding package 6 to be manufactured in the corresponding winding unit 2 is set. This lot information includes information such as a yarn type of the yarn supplying bobbin 4, a yarn speed, and a package weight. The host controller 31 outputs a signal based on the lot information to the unit controller 32 of each winding unit 2. Then, based on the signal input from the host controller 31, the unit controller 32 controls controlled components of the plurality of processing sections constituting the winding unit 2, such as a bobbin tray 20 which supplies a yarn supplying bobbin 4, the driving motor 22 of the yarn winding section 16, the tensioning device 12, the fluff suppressing device 13, the splicing device 14, and the traverse driving motor 17c of the traverse device 17, etc., for executing a yarn winding processing according to the set lot information.

[0036] When information showing that the winding package 6 has been fully wound is input from the unit controller 32 of one of the winding units 2, the host controller 31 outputs an instruction to the winding unit 2 to perform a doffing operation. Then, the doffing controller 33 moves the doffing device 3 to a position near the target winding unit 2 and controls the doffing device 3 to perform a doffing operation.

[0037] As shown in Fig. 2, in the present embodiment, in each winding unit 2, an Integrated Circuit (IC) tag (electronic component) 40 is provided on the bobbin tray 20 which supplies a yarn supplying bobbin 4 to the yarn supplying section 10. For example, the IC tag 40 stores a yarn type of the yarn supplying bobbin 4, a color of a tube 4a of the yarn supplying bobbin 4, information on a spinning machine that is a supply source of the yarn supplying bobbin 4. An IC tag (electronic component) 41 is also embedded in the winding tube 7 supplied from the winding tube storage section that is not shown. For example, the IC tag 41 stores information such as a type of a yarn that should be wound around the winding tube 7 and a

color of a winding tube 7 corresponding to the type of the yarn. Instead of providing the IC tag 40 on the bobbin tray 20, an IC tag may be embedded in the tube 4a of the yarn supplying bobbin 4, and such IC tag may store information such as the yarn type of the yarn supplying bobbin 4, the color of the tube 4a, and information on the spinning machine, etc.

[0038] Further, among the plurality of devices (processing sections) provided between the yarn supplying section 10 and the yarn winding section 16, in the present embodiment, the splicing device 14 and the fluff suppressing device 13 (element members) are also provided with IC tags (electronic components) 42 and 43, respectively. For example, the IC tags 42 and 43 store information (for example, a model number, etc., of a regular unit that is suitable for such winding unit 2) showing that the splicing device 14 and the fluff suppressing device 13 correspond to the winding unit 2 to which the splicing device 14 and the fluff suppressing device 13 will be attached, and normal operations are guaranteed, and information on operations of the splicing device 14 and the fluff suppressing device 13 such as the number of times the operation has been carried out or operation times.

[0039] In the host controller 31, verification information is set for each winding unit 2. This verification information includes lot verification information and component verification information. For example, the lot verification information is a color of the winding tube 7 and a color of the tube 4a of the yarn supplying bobbin 4, etc., for verifying that the winding tube 7 and the yarn supplying bobbin 4 correspond to the winding unit 2 to which the winding tube 7 and the yarn supplying bobbin 4 are supplied. The component verification information is information for verifying that the splicing device 14 and the fluff suppressing device 13, etc., correspond to the winding unit 2 to which the splicing device 14 and the fluff suppressing device 13, etc., are attached.

[0040] As shown in Fig. 2, a plurality (for example, three) of antennas 35 (information acquiring and transmitting means) extending vertically are spread over the unit main body 30. The antennas 35 are connected to the unit controller 32. The unit controller 32 is connected to the host controller 31, and the host controller 31 is provided with a reader/writer. The antennas 35 wirelessly transmit signals (radio waves and electromagnetic waves) at predetermined timings to the IC tags 40 to 43 provided on the bobbin tray 20, the winding tube 7, the splicing device 14, and the fluff suppressing device 13, respectively, and wirelessly receive signals (radio waves and electromagnetic waves) transmitted from the IC tags 40 to 43 in response to the signals from the antennas 35. Accordingly, the antennas 35 acquire various information recorded on the IC tags 40 to 43. When the IC tags 40 to 43 are so-called active IC tags having batteries for transmission, the IC tags 40 to 43 can actively transmit signals to the antennas 35 without receiving radio waves from the antennas 35. Information thus acquired by the

antennas 35 is transmitted to the unit controller 32, and sent to the host controller 31 from the unit controller 32.

[0041] When a splicing operation is conducted by the splicing device 14 during operation of the winding unit 2, the antenna 35 transmits a signal to the IC tag 42 provided on the splicing device 14 to update information on the number of times the operation has been carried out or operation times recorded on this IC tag 42. Similarly, when the fluff suppressing device 13 operates, the antenna 35 updates the information on the number of times the operation has been carried out or operation times recorded on the IC tag 43 provided on the fluff suppressing device 13. Accordingly, the IC tags 42 and 43 of the splicing device 14 and the fluff suppressing device 13 always hold the latest information on the number of times the operation has been carried out (or operation times). In addition, the plurality of antennas 35 are preferably spread over the unit main body 30 so as to be able to communicate with every item relating to the winding unit 2.

[0042] According to the constitution described above, the host controller 31 can monitor the state of each winding unit 2 based on various pieces of information acquired by the antennas 35 of the winding unit 2 and sent via the unit controller 32. The host controller 31 (verifying means) further collates various pieces of information described above with verification information that the host controller 31 itself stores, and when the host controller 31 determines that a certain winding unit 2 is abnormal, the host controller 31 outputs a signal for prohibiting yam winding processing to the unit controller 32 of the winding unit 2.

[0043] State monitoring processing to be conducted by the host controller 31 for the winding units 2 will be described in more detail with reference to the flowchart of Fig. 3. In Fig. 3, Si (i = 10, 11, 12...) indicates each step of the processing. The series of steps are performed for determining whether the yam winding processing can be permitted to be performed in a target winding unit 2 immediately after the automatic winder 1 starts or immediately after doffing is performed by the doffing device 3 and an empty winding tube 7 is set to the cradle 21.

[0044] First, when a bobbin tray 20 is fed to each operating unit 2, a yam type (color of a tube 4a) of a yam supplying bobbin 4 acquired from the IC tag 40 of the bobbin tray 20 received in the operating unit 2 is verified with a yam type (a color of the tube) included in the lot information set for the target winding unit 2 (step S 10). Then, when the IC tag 40 of the bobbin tray 20 is regular and the yam type of the yam supplying bobbin 4 actually supplied to the yam supplying section 10 is consistent with the lot information (step S 10: Yes), the process directly proceeds to step S 11. On the other hand, when the yam type of the yam supplying bobbin 4 is not consistent with the lot information (step S 10: No), a determination is made that a regular yam supplying bobbin 4 is not supplied to the yam supplying section 10, and a signal for prohibiting yam winding processing is output to the

unit controller 32 (step S15).

[0045] In addition to the yam type of the yam supplying bobbin 4, information on a supply source of the yam supplying bobbin 4 corresponding to the bobbin tray 20 is also sent to the host controller 31 from the IC tag 40 of the bobbin tray 20. Accordingly, the host controller 31 can identify the supply source (spinning machine) of each yam supplying bobbin 4 in accordance with the received information. Therefore, for example, information as to which of the spinning machines is supplying the yam supplying bobbins that have many yam breakages can be obtained, and further, this information can be used for maintenance.

[0046] Next, when a winding tube 7 is supplied from a winding tube supplying device (not shown), the type of the winding tube 7 (color of the winding tube 7) acquired from the IC tag 41 of the winding tube 7 received by the operating unit 2 is verified with a type of the winding tube 7 (color of the winding tube 7) included in lot information set for the target winding unit 2 (step S11). Then, when the IC tag 41 of the winding tube 7 is regular and the type of the winding tube 7 actually set to the cradle 21 is consistent with the lot information (step S11: Yes), the process proceeds to step S12. On the other hand, when the type of the winding tube 7 is not consistent with the lot information (step S11: No), a determination is made that an appropriate winding tube 7 is not set to the cradle 21 and a signal for prohibiting yam winding processing is output to the unit controller 32 (step S 15).

[0047] Generally, as the winding tube 7, a winding tube with predetermined specifications (for example, colored as predetermined) corresponding to lot information of a winding package 6 to be manufactured is used. Specifically, the type of the winding package 6 manufactured in the winding unit 2 can be identified from the winding tube 7. However, if a winding tube 7 different from the predetermined specifications corresponding to the lot information is erroneously supplied to the cradle 21 due to a mistake of an operator who replenishes the winding tube supplying device with the winding tube 7, even when a yam of a type consistent with the lot information is wound, a manufactured winding package 6 is erroneously determined as a defective package wound with a yam that is not consistent with the lot information according to the specifications of the winding tube 7. However, in the present embodiment, at step S11, a determination is carried out as to whether the winding tube 7 set to the cradle 21 is a winding tube 7 consistent with the lot information, and when the set winding tube 7 is not consistent with the lot information, yam winding processing is prohibited. Accordingly, a winding tube 7 of a type not consistent with the lot information is prevented from being used.

[0048] Next, based on information on operations of the splicing device 14 acquired from the IC tag 42 provided on the splicing device 14, a determination is carried out as to whether the splicing device 14 is regular (step S12). In detail, when information (authentication information) showing that the splicing device 14 corresponds to the

winding unit 2 to which the splicing device 14 is provided is acquired from the IC tag 42, a determination is made that the IC tag 42 is regular, that is, the splicing device 14 is regular (step S12: Yes), and the process proceeds to step S 13. On the other hand, when the information acquired from the IC tag 42 is different from information showing that the splicing device 14 is regular or when no IC tag 42 is provided on the splicing device 14 and said information cannot be acquired at all, a determination is made that the splicing device 14 may not operate normally (step S 12: No), and a signal for prohibiting yarn winding processing is output to the unit controller 32 (step S15).

[0049] The information (authentication information) showing that the splicing device 14 corresponds to the winding unit 2 to which the splicing device 14 attached includes the number of times the operation has been carried out (or operation times), that is, the remaining number of times the splicing device 14 can carry out the operation (or durable remaining period). Specifically, the host controller 31 stores the number of times the operation has been carried out (or operation times) of the splicing device 14 of each winding unit 2, and when starting each winding unit 2, collates the number of times the operation has been carried out (or operation times) acquired from the IC tag 42 of the splicing device 14 with the number of times the operation has been carried out (or operation times) of the splicing device 14 stored in the host controller 31. When these numbers match each other, this shows that the splicing device 14 corresponds to the winding unit 2 to which the splicing device 14 is attached. Accordingly, when the splicing device 14 is temporarily detached from the winding unit 2 for maintenance and then attached again to the winding unit 2, the splicing device 14 can be prevented from being attached to a winding unit 2 different from the original winding unit by mistake, and an error can be prevented from generating when grasping the number of times the operation has been carried out (or operation times) of the splicing device 14.

[0050] Similarly, based on information on operations of the fluff suppressing device 13 acquired from the IC tag 43 provided on the fluff suppressing device 13, a determination is carried out as to whether the fluff suppressing device 13 is regular (step S 13). In detail, when information (authentication information) showing that the fluff suppressing device 13 corresponds to the winding unit 2 to which the fluff suppressing device 13 is attached is acquired from the IC tag 43, a determination is made that the IC tag 43 is regular, that is, the fluff suppressing device 13 is regular (step S 13 : Yes), and the process proceeds to step S14. On the other hand, when information acquired from the IC tag 43 is different from information showing that the fluff suppressing device 13 is regular or when the IC tag 43 is not provided on the fluff suppressing device 13 and said information cannot be acquired at all, a determination is made that the fluff suppressing device 13 may not normally operate (step S 13: No). Then, a

signal for prohibiting yarn winding processing is output to the unit controller 32 (step S 15).

[0051] Similarly to the above-described splicing device 14, information (authentication information) showing that the fluff suppressing device 13 corresponds to the winding unit 2 to which the fluff suppressing device 13 is attached also includes the number of times the operation has been carried out (or operation times), that is, the remaining number of times the fluff suppressing device 13 can carry out operations (or remaining durable period).

[0052] Specifically, the host controller 31 detects in advance a state that a splicing device 14 or a fluff suppressing device 13 different from a regular one is loaded to the winding unit 2 and the splicing device 14 or fluff suppressing device 13 may not operate normally. Further, when such a state is detected, yarn winding processing by the winding unit 2 is prohibited to prevent the winding unit 2 from malfunctioning.

[0053] According to steps S10 to S 13 described above, when a determination is made that the yarn supplying bobbin 4 and the winding tube 7 are consistent with lot information, and the splicing device 14 and the fluff suppressing device 13 will operate normally, and the state of the winding unit 2 is normal, the host controller 31 outputs a signal to permit the unit controller 32 to perform yarn winding processing. Accordingly, yarn winding processing in the winding unit 2 is started.

[0054] The automatic winder 1 described above has the following effects.

When a yarn supplying bobbin 4 and a winding tube 7 are supplied in a state that a splicing device 14 and a fluff suppressing device 13 are attached, before starting yarn winding processing, in each winding unit 2, information recorded on the IC tags 40 to 43 respectively provided on the yarn supplying bobbin 4, the winding tube 7, the splicing device 14, and the fluff suppressing device 13 are respectively acquired by the antennas 35 of the winding unit 2. This information is sent from the unit controller 32 to the host controller 31. Therefore, types of the yarns 5 to be wound, states of the respective winding units 2 such as types of the winding tubes 7 and consistencies and operation states of the splicing devices 14 and the fluff suppressing devices 13 can be grasped by the unit controllers 32 and the host controller 31 with higher accuracy than in the conventional constitution.

[0055] Further, based on information acquired by the antennas 35 of the winding unit 2 from the IC tags 40 to 43 provided on the yarn supplying bobbin 4, the winding tube 7, the splicing device 14, and the fluff suppressing device 13, the host controller 31 determines whether a state of the corresponding winding unit 2 is normal or not. When a determination is made that the state of the corresponding winding units 2 is abnormal, the host controller 31 transmits a signal for prohibiting yarn winding processing by the plurality of processing sections such as the yarn winding section 16 constituting the winding unit 2 to the unit controller 32 of the corresponding wind-

ing unit 2. Therefore, processing by the winding unit 2 in an abnormal state is prevented from being conducted.

[0056] Next, modifications obtained by changing the embodiment described above will be described. Same reference numeral will be used for the same component as in the above-described embodiment and description thereof will be omitted as appropriate.

[0057] 1) When the host controller 31 determines that a state of a certain winding unit 2 is abnormal, instead of outputting a prohibiting signal to a corresponding unit controller 32, warning indication using a warning lamp or a warning message may be carried out to notify an operator of the abnormality. Alternatively, a prohibiting signal may be output to the unit controller 32 and warning indication may be carried out for the operator.

[0058] 2) In the aforementioned embodiment, the IC tag 40 storing information such as a yarn type of the yarn supplying bobbin 4 is provided on the bobbin tray 20 that supplies the yarn supplying bobbin 4. However, when the winding unit 2 does not include the bobbin tray 20 as in the case of a magazine type in which a yarn supplying bobbin 4 is supplied from a magazine holding a plurality of yarn supplying bobbins 4, the tube 4a of the yarn supplying bobbin 4 may be provided with the IC tag 40.

[0059] Even when the winding unit 2 is a bobbin tray type, when the tube 4a of the yarn supplying bobbin 4 is provided with the IC tag 40, even if a yarn supplying bobbin 4 wound with a yarn different from a yarn type corresponding to the bobbin tray 20 is supplied to the yarn supplying section 10, the host controller 31 can detect such a state in which an abnormal yarn supplying bobbin 4 is loaded to the yarn supplying section 10.

[0060] 3) In each winding unit 2 of the aforementioned embodiment, the splicing device 14 and the fluff suppressing device 13 are respectively provided with the IC tags 42 and 43, and predetermined information are acquired by the antennas 35 from the respective IC tags 42 and 43. However, as another embodiment, processing sections (for example, the yarn winding section 16, the tensioning device 12, the clearer 15 or the like) other than the splicing device 14 and the fluff suppressing device 13 may be provided with IC tags, and predetermined information on these processing sections may be respectively acquired by the antennas 35.

[0061] Alternatively, components (for example, a nozzle (an untwisting nozzle or a twisting nozzle) of the splicing device 14 (air splicer), and the friction disk 13a of the fluff suppressing device 13) of the plurality of processing sections constituting the winding unit 2 may be provided with IC tags, and information may be acquired by the antennas 35 from these IC tags so that the host controller 31 can monitor the states of each component.

[0062] 4) The information acquiring and transmitting means for acquiring information from the yarn supplying bobbin and the splicing device is not limited to the antennas 35 of the aforementioned embodiment. For example, the information acquiring and transmitting means may be a radio wave or electromagnetic wave reader or read-

er/writer. The IC tags 40 to 43 may be Radio Frequency Identification (RFID) tags and the like. Further, only one antenna 35 may be provided for one winding unit 2. In this case, the antenna 35 is also preferably spread so that communication can be carried out with all components relating to the winding unit 2.

[0063] In the above-described embodiment, each unit main body 30 is provided with an antenna 35 which can communicate with a plurality of IC tags 40 to 43 relating to a corresponding operating unit 2, and acquire verification information stored in the plurality of IC tags 40 to 43 by wireless communications and transmits the acquired verification information to the host controller 31. By using such an antenna 35 capable of communicating with the plurality of IC tags 40 to 43, a detecting means is not required to be provided for each of the IC tags 40 to 43. As a result, by a very simple constitution, information on the components relating to the IC tags 40 to 43 can be monitored. In this sense, the antenna 35 has a communication area covering, for example, "the inside of the unit main body 30."

[0064] The above-described embodiment and modifications thereof are application examples of the present invention to an automatic winder which forms a winding package by winding a yarn unwound from a yarn supplying bobbin around a winding tube. However, the application of the present invention is not limited to the automatic winder, and the present invention can also be applied to textile machines other than the automatic winder.

Claims

1. A textile machine comprising:

a plurality of operating units (2) which apply predetermined processings to a textile product (5) and
a monitoring device (31) which respectively monitors the plurality of operating units (2), wherein
the plurality of operating units (2) respectively have a unit main body (30), and
each unit main body (30) is provided with an information acquiring and transmitting means (35) which can communicate with a plurality of electronic components (40, 41, 42, and 43) relating to the corresponding operating unit (2), and acquires verification information stored in the plurality of electronic components (40, 41, 42, and 43) by wireless communications, and further transmits the acquired verification information to the monitoring device (31).

2. The textile machine according to Claim 1, wherein the information acquiring and transmitting means (35) is at least one antenna (35) spread over the corresponding unit main body (30).

3. The textile machine according to Claim 1 or 2, wherein the monitoring device (31) comprises a verifying means (31) for determining whether the electronic components (40, 41, 42, and 43) are regular electronic components (40, 41, 42, and 43) corresponding to each operating unit (2) based on the verification information of the electronic components (40, 41, 42, and 43) relating to each operating unit (2) acquired via the information acquiring and transmitting means (35). 5 10
4. The textile machine according to Claim 3, wherein the electronic components (40, 41, 42, and 43) relating to each operating unit (2) are provided on element members attached to the unit main body (30) in a replaceable manner, and after the element members are attached to the unit main body (30) and before predetermined processings are applied to the textile product (5) in the operating unit (2) corresponding to the unit main body (30), the verifying means (31) determines whether the electronic components (40, 41, 42, and 43) are regular electronic components (40, 41, 42, and 43) corresponding to the operating unit (2). 15 20 25
5. The textile machine according to Claim 3, wherein the electronic components (40, 41, 42, and 43) relating to each operating unit (2) are provided on members relating to the textile product (5) to be processed in the corresponding operating unit (2), and after the members are received in each operating unit (2) and before predetermined processings are applied to the textile product (5) in the operating unit (2), the verifying means (31) determines whether the electronic components (40, 41, 42, and 43) are regular electronic components (40, 41, 42, and 43) corresponding to the operating unit (2). 30 35
6. The textile machine according to any one of Claims 3 to 5, wherein when the verifying means (31) determines that at least one of the electronic components (40, 41, 42, and 43) are not regular electronic components (40, 41, 42, and 43) corresponding to the operating unit (2), the verifying means (31) outputs a signal for prohibiting predetermined processings to a control section of the operating unit (2) corresponding to the thus determined electronic components (40, 41, 42, and 43). 40 45
7. The textile machine according to any one of Claims 1 to 6, comprising: 50
 - a plurality of winding units (2) as the operating units (2) which apply predetermined processings to yarns as the textile products (5) and re-wind yarns of yarn supplying bobbins into winding packages; and 55
 - the monitoring device (31) which respectively

monitors the plurality of winding units (2), wherein the plurality of winding units (2) respectively have the unit main body (30), and each unit main body (30) is provided with an antenna as the information acquiring and transmitting means (35) which can communicate with the plurality of electronic components (40, 41, 42, and 43) relating to the corresponding winding unit (2), and acquires the verification information stored in the plurality of electronic components (40, 41, 42, and 43) by wireless communications and further transmit the acquired verification information to the monitoring device (31).

FIG.1

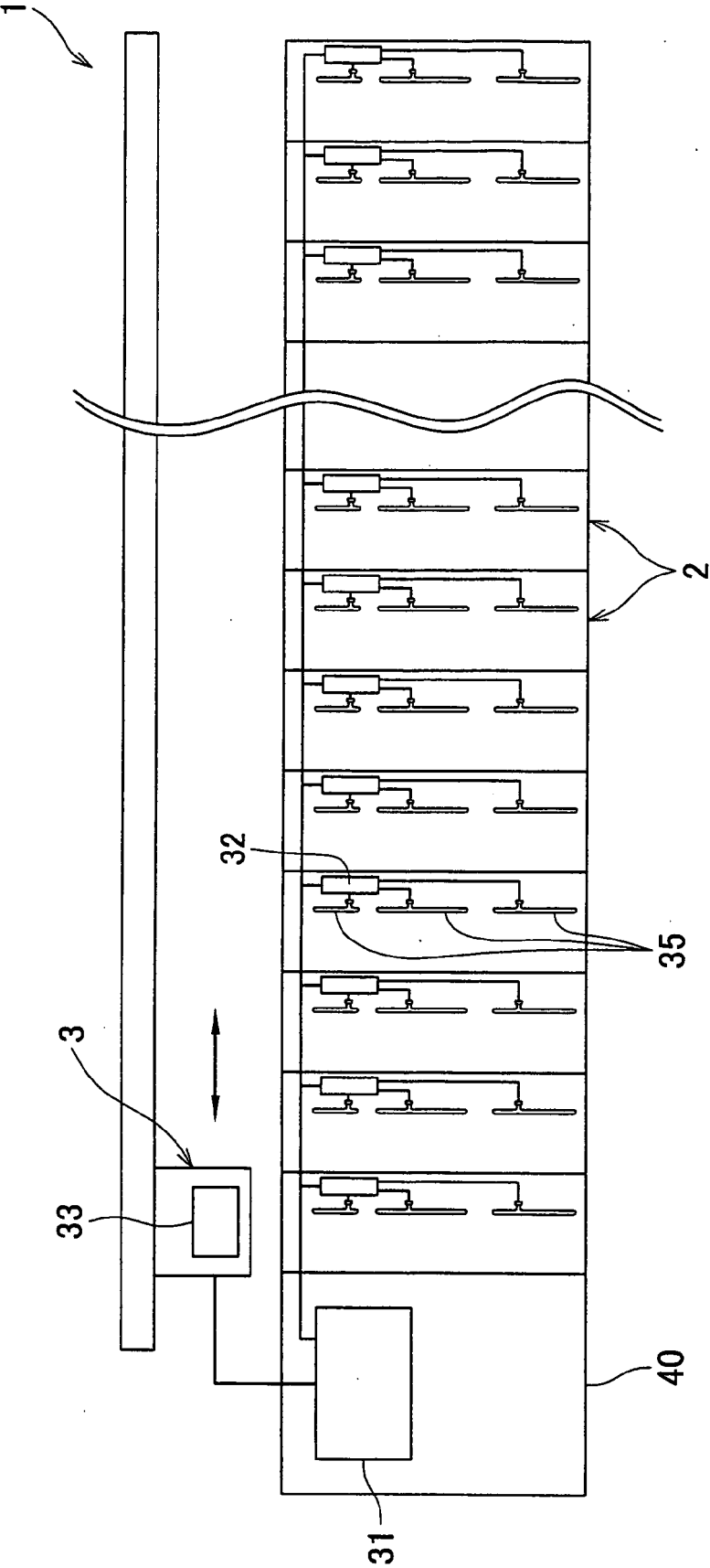


FIG. 2

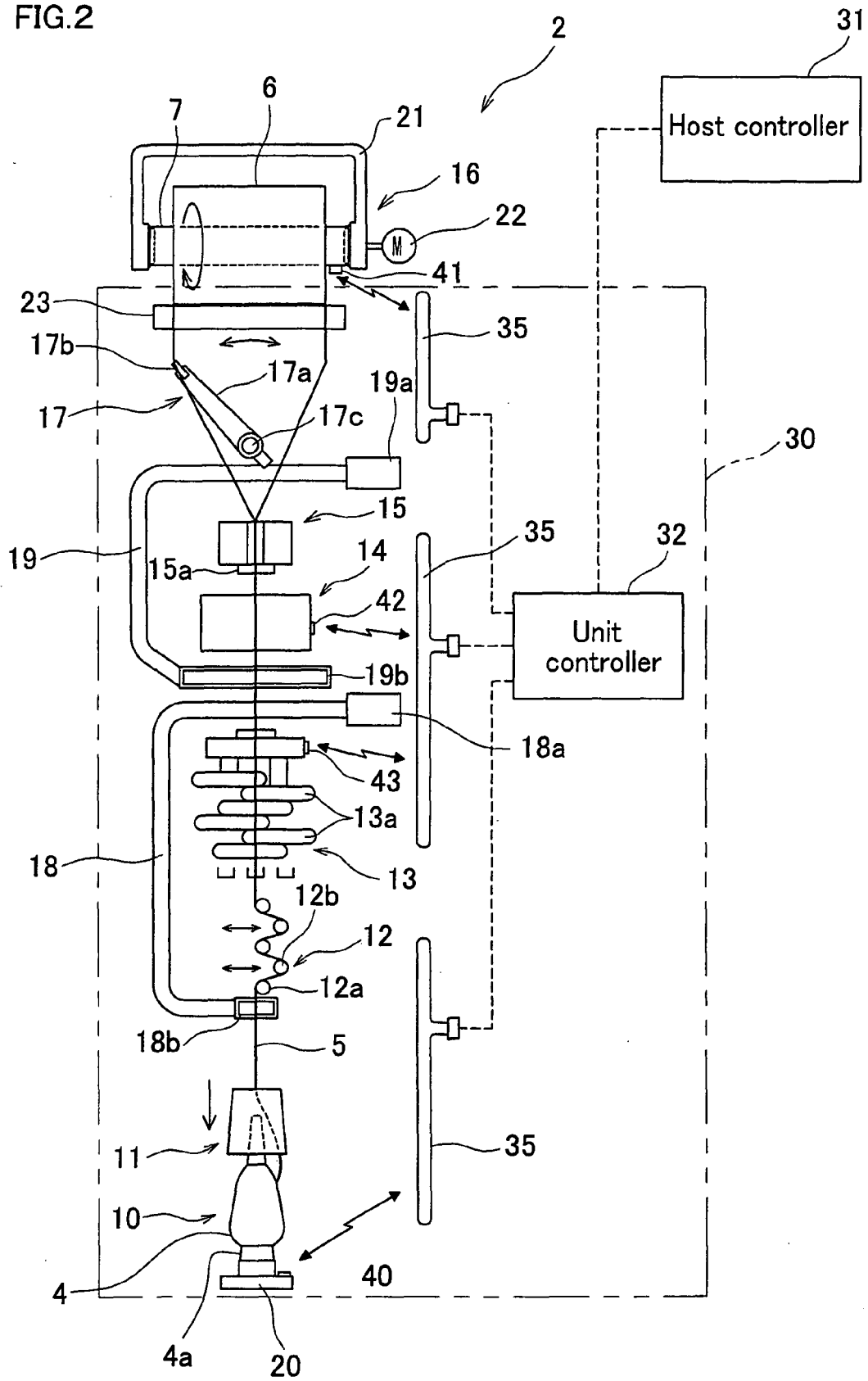
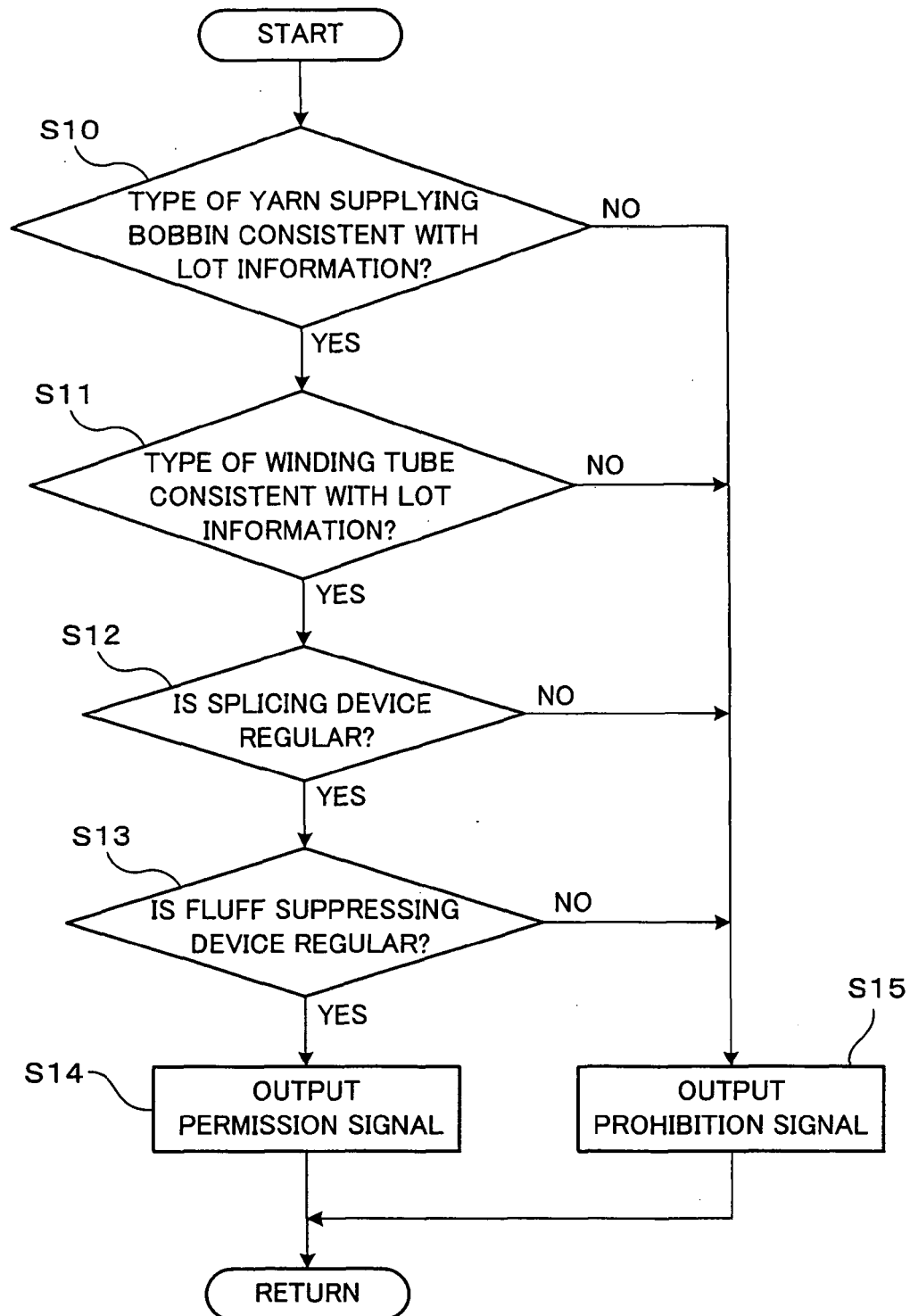


FIG. 3





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