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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a textile machinery.

2. Description of the Related Art

[0002] Conventionally, as techniques of such field, there are known techniques described in Japanese Unexamined Patent Publication No. 5-8943 (Patent Document 1), Japanese Unexamined Patent Publication No. 2005-330596 (Patent Document 2), and Japanese Unexamined Patent Publication No. 2007-262607 (Patent Document 3). Patent Document 1 describes an automatic winder including a plurality of winding units, and two doffing carts respectively adapted to move between the winding units to perform a doffing operation. When a winding unit (a doffing requiring unit) which requires the doffing operation exists, the automatic winder moves the doffing cart in a direction towards the doffing requiring unit located closest to a current position of the doffing cart. Assigned regions of the two doffing carts to perform the doffing operation are overlapped, and one doffing cart moves to an opposite side such that the doffing carts do not interfere with one another.

[0003] Patent Document 2 describes a textile machinery including a plurality of spinning units, and a plurality of operation carts adapted to travel among the plurality of spinning units. The operation carts of the textile machinery execute the operation within a predefined operation region. Since the operation carts obtain current positions of one another, in case a certain operation cart becomes a hindrance when another operation cart moves, the operation cart that becomes a hindrance in the movement is retreated in advance.

[0004] Patent Document 3 describes a textile machinery including a plurality of spinning units, and a plurality of operation carts adapted to travel among the plurality of spinning units. When the operation becomes necessary at positions where the two operation carts interfere with one another such as when the two operation carts need to execute the operation with respect to adjacent spinning units, the operation carts of the textile machinery set an operation order according to a distance to a spinning unit in which the operation is necessary and execute the operation according to the set order.

[0005] Patent Document 1 merely describes about avoiding the interference of the doffing carts and does not specifically describe control of movement of the doffing cart when the doffing operation is required in a region where the assigned regions overlap and a region where the assigned regions do not overlap. When the doffing cart is moved in a direction towards the doffing requiring unit located closest to the current position of the doffing

cart, the doffing cart that does not perform the operation may arise, and efficiency of the entire automatic winder may possibly decrease. In Patent Documents 2 and 3, each operation cart can perform the operation only within an exclusive operation region.

[0006] US 2003/0036816 A1 relates to a method for the control of the travel movement of at least one service unit at a rotor-spinning machine, whereby the service unit services and/or controls an operating zone assigned to it containing a plurality of processing stations of the textile machine. The service units service an overlapping region of the operating zones.

[0007] EP 2 072 648 A2 describes a textile machine including a plurality of maintenance units operating in assigned operating zones.

BRIEF SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide a textile machinery capable of efficiently controlling an operation cart to execute an operation when a processing unit that can receive an operation from a plurality of operation carts exists.

[0009] This object is achieved by a textile machinery according to claim 1.

[0010] A textile machinery according to the present invention includes a plurality of processing units adapted to perform yarn processing, a plurality of operation carts, each operation cart being adapted to travel and execute an operation with respect to the processing units, and a control section adapted to select an operation executing cart from the plurality of the operation carts in accordance with an operation request from an operation requesting unit, which is one of the plurality of the processing units. At least a portion of the plurality of the processing units is arranged within an exclusive region where the operation requesting unit can receive the operation from only one of the operation carts, and at least different portion of the plurality of the processing units is arranged within an overlapping region where the operation requesting unit can receive the operation from the plurality of the operation carts. The operation cart is adapted to execute the operation with respect to at least one processing unit arranged within the exclusive region and at least one processing unit arranged within the overlapping region.

[0011] When the operation requesting unit is located within the overlapping region, the control section is adapted to select as the operation executing cart, one operation cart, which has a smallest number of occurrences of the operation requests within the exclusive region, from the plurality of the operation carts, which can execute the operation with respect to such an operation requesting unit. Accordingly, the operation on the operation requesting unit that can receive the operation from the plurality of the operation carts can be executed by the operation cart having an extra capacity in processing ability with respect to the operation request.

[0012] The processing unit preferably includes an

identifying means for identifying the operation executing cart that has executed the operation. Accordingly, the operation cart that executed the operation can be identified by the processing unit.

[0013] The textile machinery further preferably includes a plurality of range-end sensors for defining a travelling path of the operation cart. The travelling path of the operation cart can be reliably defined by the range-end sensors.

[0014] Preferably, a range-end sensor is provided at least at one end of range ends of the travelling path. The travelling path of the operation cart can be defined by the range-end sensor provided at least at one end of the range ends of the travelling path.

[0015] The textile machinery further includes a track rail adapted to guide the plurality of the operation carts to travel along the travelling path. Among the range-end sensors adapted to define the travelling path of adjacent operation carts, one of the range-end sensors is preferably provided on a first surface extending in a direction substantially parallel to a direction in which the track rail extends, and another one of the range-end sensors is preferably provided on a second surface which is a surface different from the first surface and which extends in the direction substantially parallel to the direction in which the track rail extends. If the travelling paths defined by the range-end sensors overlap, the range-end sensor adapted to define one travelling path and the range-end sensor adapted to define the other travelling path are respectively provided on different surfaces of the track rail. By providing the range-end sensors at different positions, a false detection of the range ends can be prevented and the travelling path can be reliably defined by the range-end sensors.

[0016] Each of the plurality of the processing units preferably includes a spinning device adapted to produce a spun yarn, and a winding device adapted to wind the spun yarn produced by the spinning device into a package. Accordingly, the operation cart for executing the operation on the processing unit including the spinning device and the winding device can be efficiently controlled.

[0017] The operation carts are preferably yarn joining carts. Each yarn joining cart is adapted to execute a yarn joining operation to join the spun yarn spun from the spinning device and the spun yarn from the package when the spun yarn is disconnected. The yarn joining cart adapted to execute the yarn joining operation thus can be efficiently controlled.

[0018] The spinning device is preferably a pneumatic spinning device adapted to produce the spun yarn by twisting a fiber bundle using a whirling airflow. The operation cart can be controlled to efficiently execute the operation with respect to the processing unit including the pneumatic spinning machine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a front view of a spinning machine according to one embodiment of the present invention;

FIG. 2 is a longitudinal cross-sectional view of the spinning machine of FIG. 1;

FIG. 3A is a schematic view of a spinning unit seen from a front side;

FIG. 3B is a schematic view of an upper rail and a yarn joining cart seen from above;

FIG. 4 is a block diagram illustrating an electrical configuration of the spinning machine; and

FIG. 5 is a flowchart illustrating a flow of processes in which a control device selects the spinning unit to which a yarn joining process is to be performed.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0020] Hereinafter, an embodiment of the present invention will be described in detail with reference to the drawings. "Upstream" and "downstream" respectively refer to upstream and downstream in a travelling direction of a yarn during spinning.

[0021] A spinning machine 1 illustrated in FIG. 1 includes a plurality of spinning units (processing units) 2 arranged in line. The spinning machine 1 includes a yarn joining cart 3, a blower box 80, and a motor box 5. In a factory where the spinning machine 1 is installed, a work passage extending in a direction in which the spinning units 2 are arranged is provided at a yarn path side of the yarn joining cart 3. The operator can perform operation, monitoring, and the like of each spinning unit 2 from the work passage.

[0022] As illustrated in FIG. 1, each spinning unit 2 includes a draft device 7, a pneumatic spinning device 9, a yarn accumulating device 12, a waxing device 14, and a winding device 13 arranged in this order from upstream to downstream. The draft device 7 is arranged in proximity to an upper end of a housing 6 of the spinning machine 1. A fiber bundle 8 fed from the draft device 7 is spun by the pneumatic spinning device 9. A spun yarn 10 fed from the pneumatic spinning device 9 is passed through a yarn clearer 52, fed further downstream by the yarn accumulating device 12, and applied with wax in the waxing device 14. Thereafter, the spun yarn 10 is wound by the winding device 13, and a package 45 is formed. A process of winding the spun yarn 10 into the package 45 is an example of yarn processing.

[0023] The draft device 7 drafts a sliver 15 into the fiber bundle 8. As illustrated in FIG. 2, the draft device 7 includes four roller pairs, i.e., a back roller pair 16, a third roller pair 17, a middle roller pair 19 provided with an apron belt 18, and a front roller pair 20. A bottom roller of each of the roller pairs 16, 17, 19, and 20 is driven by power from the motor box 5, or by power of electric motors (not illustrated) arranged individually. Each of the roller pairs 16, 17, 19, and 20 is driven with a different rotation speed. As a result, the draft device 7 can draft the sliver 15 supplied from the upstream into the fiber bundle 8,

and feed the fiber bundle 8 to the pneumatic spinning device 9 located downstream.

[0024] The pneumatic spinning device 9 applies twists to the fiber bundle 8 using a whirling airflow to produce the spun yarn 10. Although detailed description and illustration will be omitted, the pneumatic spinning device 9 includes a fiber guiding section, a whirling airflow generating nozzle, and a hollow guide shaft body. The fiber guiding section guides the fiber bundle 8 fed from the draft device 7 to a spinning chamber formed inside the pneumatic spinning device 9. The whirling airflow generating nozzle is arranged at a periphery of a path of the fiber bundle 8 to generate the whirling airflow in the spinning chamber. This whirling airflow causes a fiber end of the fiber bundle 8 in the spinning chamber to be reversed and to whirl. The hollow guide shaft body guides the spun yarn 10 from the spinning chamber to an outside of the pneumatic spinning device 9.

[0025] The yarn accumulating device 12 is arranged downstream of the pneumatic spinning device 9. The yarn accumulating device 12 has a function of applying a predetermined tension to the spun yarn 10 to pull out the spun yarn 10 from the pneumatic spinning device 9, a function of accumulating the spun yarn 10 fed from the pneumatic spinning device 9 during a yarn joining operation by the yarn joining cart 3 to prevent slackening of the spun yarn 10, and a function of adjusting the tension such that a fluctuation of the tension at the winding device 13 side is not transmitted towards the pneumatic spinning device 9. As illustrated in FIG. 2, the yarn accumulating device 12 includes a yarn accumulating roller 21, a yarn hooking member 22, an upstream guide 23, an electric motor 25, a downstream guide 26, and a yarn accumulated amount detecting sensor 27.

[0026] The yarn hooking member 22 can be engaged (hooked) to the spun yarn 10, and integrally rotates with the yarn accumulating roller 21 while being engaged with the spun yarn 10 to wind the spun yarn 10 around an outer peripheral surface of the yarn accumulating roller 21.

[0027] The yarn accumulating roller 21 can have a prescribed amount of the spun yarn 10 wound around the outer peripheral surface thereof to accumulate the spun yarn 10. The yarn accumulating roller 21 is rotatably driven by the electric motor 25. When the yarn accumulating roller 21 is rotated, the spun yarn 10 wound around the outer peripheral surface of the yarn accumulating roller 21 is wound to tighten the yarn, and the spun yarn 10 located upstream of the yarn slack eliminating device 12 is pulled. In other words, when the yarn accumulating roller 21 is rotated at a predetermined rotation speed with the spun yarn 10 wound around the outer peripheral surface of the yarn accumulating roller 21, the yarn accumulating device 12 can apply a predetermined tension on the spun yarn 10 and pull out the spun yarn 10 at a predetermined speed from the pneumatic spinning device 9, and transport the spun yarn 10 towards the downstream at a predetermined speed.

[0028] The yarn accumulated amount detecting sensor 27 detects, in a non-contacting manner, an accumulated amount of the spun yarn 10 accumulated on the yarn accumulating roller 21, and transmits the accumulated amount to a control device 53 (see FIG. 4).

[0029] The upstream guide 23 is arranged slightly upstream of the yarn accumulating roller 21. The upstream guide 23 appropriately guides the spun yarn 10 with respect to the outer peripheral surface of the yarn accumulating roller 21. The upstream guide 23 prevents the twist of the spun yarn 10 propagating from the pneumatic spinning device 9 from being transmitted downstream of the upstream guide 23.

[0030] The yarn clearer 52 is arranged on a front side of the housing 6 of the spinning machine 1, and at a position between the pneumatic spinning device 9 and the yarn accumulating device 12. The spun yarn 10 spun by the pneumatic spinning device 9 is passed through the yarn clearer 52 before being wound by the yarn accumulating device 12. The yarn clearer 52 monitors the thickness of the travelling spun yarn 10, and when a yarn defect of the spun yarn 10 is detected, the yarn clearer 52 transmits a yarn defect detection signal to the control device 53.

[0031] Upon receiving the yarn defect detection signal, the control device 53 immediately stops ejection of compressed air from the whirling airflow generating nozzle of the pneumatic spinning device 9. The whirling airflow is then stopped, the twisting of the fiber bundle 8 is stopped, and introduction of the fiber bundle 8 to the pneumatic spinning device 9 is also stopped. A continuation of the fibers is disconnected in the pneumatic spinning device 9, and the spun yarn 10 is cut. Thereafter, the control device 53 further stops the draft device 7 and the like. The control device 53 transmits a control signal to the yarn joining cart 3, and the yarn joining cart 3 travels to the front of the spinning unit 2. Thereafter, the pneumatic spinning device 9 and the like are driven again, the yarn joining cart 3 performs the yarn joining operation, and winding is resumed.

[0032] As illustrated in FIG. 1 and FIG. 2, the yarn joining cart 3 includes a splicer (yarn joining device) 43, a suction pipe 44, and a suction mouth 46. When a yarn breakage or a yarn cut occurs in a spinning unit 2, the yarn joining cart 3 travels along a rail 41 to the relevant spinning unit 2 and stops. The suction pipe 44 sucks and catches a yarn end fed from the pneumatic spinning device 9 while being swung vertically with a shaft as a center, and guides the yarn end to the splicer 43. The suction mouth 46 sucks and catches a yarn end from the package 45 supported by the winding device 13 while being swung vertically with a shaft as the center, and guides the yarn end to the splicer 43. The splicer 43 joins the guided yarn ends.

[0033] The waxing device 14 is arranged downstream of the yarn accumulating device 12. The waxing device 14 applies wax to the spun yarn 10 travelling from the yarn accumulating device 12 towards the winding device

13.

[0034] The winding device 13 includes a cradle arm 71 supported to be swingable about a supporting shaft 70. The cradle arm 71 can rotatably support a bobbin 48 for winding the spun yarn 10.

[0035] The winding device 13 includes a winding drum 72 and a traverse device 75. The winding drum 72 is adapted to be driven while making contact with an outer peripheral surface of the bobbin 48 or an outer peripheral surface of the package 45. The traverse device 75 includes a traverse guide 76 capable of being engaged with the spun yarn 10. The winding device 13 drives the winding drum 72 with an electric motor (not illustrated) while reciprocating the traverse guide 76 by a driving means (not illustrated). The package 45 making contact with the winding drum 72 can be rotated and the spun yarn 10 can be wound into the package 45 while being traversed. A traverse guide 76 of the traverse device 75 is commonly driven in each spinning unit 2 by a common shaft for the plurality of the spinning units 2.

[0036] The blower box 80 stores therein an air supplying source (negative pressure source) for generating air to be supplied to each section of the spinning unit 2, the yarn joining cart 3, and the like.

[0037] Next, with reference to FIG. 3A and FIG. 3B, a moving region of the yarn joining cart 3 will be described. The spinning machine 1 according to the present embodiment includes a first yarn joining cart 31 and a second yarn joining cart 32 as the yarn joining cart 3. The spinning machine 1 includes forty spinning units 2. In order to identify each spinning unit 2, the spinning units 2 are assigned with unit numbers Y1, Y2, ..., Y39, and Y40 in this order from one end side of the spinning machine 1.

[0038] Both the first yarn joining cart 31 and the second yarn joining cart 32 include a travelling wheel 42 (see FIG. 1) that travels along the common rail 41 laid in the spinning machine 1, and each of the first yarn joining cart 31 and the second yarn joining cart 32 travels by driving the travelling wheel 42 by a travelling wheel driving motor 35 (see FIG. 4). The rail 41 is configured by an upper rail (track rail) 41a and a lower rail 41b. When the yarn joining cart 3 travels along the rail 41, the upper rail 41a guides an upper side of the yarn joining cart 3 and the lower rail 41b guides a lower side of the yarn joining cart 3.

[0039] The first yarn joining cart 31 is set to move in a moving region X1, which is a region for executing an operation on the spinning units 2 with the unit number Y1 to the unit number Y24. The first yarn joining cart 31 moves within the moving region (travelling path) X1, stops in front of the spinning unit 2 on which the operation is to be executed among the spinning units 2 with the unit numbers Y1 to Y24, and executes the yarn joining operation on the target spinning unit 2. The second yarn joining cart 32 is set to move within a moving region X2, which is a region for executing the operation on the spinning units 2 with the unit number Y17 to the unit number Y40. The second yarn joining cart 32 moves within the moving region (travelling path) X2, stops in front of the

spinning unit 2 on which the operation is to be executed among the spinning units 2 with the unit numbers Y17 to Y40, and executes the yarn joining operation on the target spinning unit 2.

[0040] The moving region X1 where the first yarn joining cart 31 moves includes an exclusive region S1 where only the first yarn joining cart 31 moves and an overlapping region T that overlaps the moving region X2 where the second yarn joining cart 32 moves. The exclusive region S1 faces the spinning units 2 with the unit numbers Y1 to Y16. The overlapping region T faces the spinning units 2 with the unit numbers Y17 to Y24. The moving region X2 where the second yarn joining cart 32 moves includes an exclusive region S2 where only the second yarn joining cart 32 moves and an overlapping region T that overlaps the moving region X1 where the first yarn joining cart 31 moves. The exclusive region S2 faces the spinning units 2 with the unit numbers Y25 to Y40. The yarn joining operation is performed on the spinning units 2 with the unit numbers Y1 to Y16 facing the exclusive region S1 by only the first yarn joining cart 31. The yarn joining operation is performed on the spinning units 2 with the unit numbers Y17 to Y24 facing the overlapping region T by the first yarn joining cart 31 and the second yarn joining cart 32. The yarn joining operation is performed on the spinning units 2 with the unit numbers Y25 to Y40 facing the exclusive region S2 by only the second yarn joining cart 32.

[0041] Next, with reference to FIG. 4, an electrical configuration of the spinning machine 1 will be described. The spinning machine 1 includes a central control device 4. The central control device 4 is connected to the control device 53 of each of the spinning units 2 via a signal line. The central control device 4 is arranged in an area other than the yarn joining cart 3 in the spinning machine 1. The central control device 4 receives a signal related to a state of the spinning unit 2 from the control device 53 of each spinning unit 2. Signals related to the state of the spinning unit 2 include a signal (a yarn joining request signal) indicating that the spun yarn 10 is disconnected and that the yarn joining operation is required, a signal indicating that some kind of abnormality occurred in the spinning unit 2 and thus the spinning unit 2 stopped, and the like.

[0042] As illustrated in FIG. 3A, the spinning units 2 are assigned with the unit numbers Y1 to Y40. The unit number is stored in the control device 53 of each spinning unit 2. The information of the unit number is included in the yarn joining request signal and the like when the spinning unit 2 transmits the yarn joining request signal and the like to the central control device 4. The central control device 4 thus can recognize the spinning unit of which number is currently requesting the yarn joining operation.

[0043] The central control device 4 is also connected to a control device (a control section) 38 of the first yarn joining cart 31 and a control device (a control section) 38 of the second yarn joining cart 32 via a signal line. The central control device 4 transmits the yarn joining request

signal and/or various types of information to each control device 38 and acquires various types of information from the first yarn joining cart 31 and/or the second yarn joining cart 32. The various types of information transmitted from the central control device 4 to each control device 38 include information on positions of the first yarn joining cart 31 and the second yarn joining cart 32.

[0044] The first yarn joining cart 31 and the second yarn joining cart 32 each includes a splicer 43, the travelling wheel driving motor 35 for driving the travelling wheel 42, a position-defining-member detecting sensor 36 for detecting a position defining member (not illustrated) provided for each spinning unit 2, a cart-side transmitting section 37, the control device 38, and a range-end detecting sensor 39.

[0045] By operating the travelling wheel driving motor 35, the control device 38 of the first yarn joining cart 31 moves the first yarn joining cart 31 towards the spinning unit (an operation requesting unit) 2 that made the yarn joining request (the operation request). Based on a detection result of the position-defining-member detecting sensor 36, the control device 38 of the first yarn joining cart 31 positions and stops the first yarn joining cart 31 at a position facing the spinning unit 2 that made the yarn joining request, and then operates the splicer 43 to execute the yarn joining operation. Similarly to the control device 38 of the first yarn joining cart 31, the control device 38 of the second yarn joining cart 32 also controls the second yarn joining cart 32 to travel towards the spinning unit 2 that made the yarn joining request, and operates the splicer 43 to execute the yarn joining operation.

[0046] When the first yarn joining cart 31 arrives and stops at the target spinning unit 2, the cart-side transmitting section 37 of the first yarn joining cart 31 outputs a signal to a sensor (an identifying means) 61 arranged in the spinning unit 2 facing the stopped position. The control device 53 of the spinning unit 2 including the sensor 61 that received the signal outputs a signal including the unit number of the relevant spinning unit 2 via the central control device 4 to the control device 38 of the first yarn joining cart 31 stopped in front of the spinning unit 2. When the second yarn joining cart 32 arrives and stops at the target spinning unit 2, the cart-side transmitting section 37 of the second yarn joining cart 32 outputs a signal to the sensor 61 arranged in the spinning unit 2 facing the stopped position. The control device 53 of the spinning unit 2 including the sensor 61 that received the signal outputs a signal including the unit number of the relevant spinning unit 2 via the central control device 4 to the control device 38 of the second yarn joining cart 32 stopped in front of the spinning unit 2. The first yarn joining cart 31 and the second yarn joining cart 32 being stopped thus can respectively recognize currently stopped positions, as to in front of which of the plurality of the spinning units 2 each of the first yarn joining cart 31 and the second yarn joining cart 32 is stopped, that is, own positional information. When the first yarn joining cart 31 and the second yarn joining cart 32 start travelling

from such a position, the number of detections of the position-defining-member detecting sensor 36 is counted with the above positional information as a reference, and the first yarn joining cart 31 and the second yarn joining cart 32 can respectively recognize the current position.

[0047] As described above, the central control device 4 can obtain the position of the first yarn joining cart 31 and the second yarn joining cart 32 by receiving the signal output from the control device 53 of the spinning unit 2. The central control device 4 transmits information on the obtained position of the first yarn joining cart 31 to the second yarn joining cart 32, and transmits the information on the obtained position of the second yarn joining cart 32 to the first yarn joining cart 31. The first yarn joining cart 31 and the second yarn joining cart 32 thus can obtain the current positions of one another.

[0048] The signal transmitted from the cart-side transmitting section 37 of the first yarn joining cart 31 and/or the cart-side transmitting section 37 of the second yarn joining cart 32 to the sensor 61 of the spinning unit 2 includes an identification signal for identifying the first yarn joining cart 31 and/or the second yarn joining cart 32. The spinning unit 2 thus can recognize with which yarn joining cart 3, that is, the first yarn joining cart 31 or the second yarn joining cart 32, the yarn joining operation is being executed.

[0049] The control device 38 arranged in the first yarn joining cart 31 stores the moving region X1 set for the first yarn joining cart 31 and the moving region X2 set for the second yarn joining cart 32. The control device 38 arranged in the second yarn joining cart 32 stores the moving region X2 set for the second yarn joining cart 32 and the moving region X1 set for the first yarn joining cart 31. The control device 38 arranged in the first yarn joining cart 31 also stores the overlapping region T where the moving region overlaps with the second yarn joining cart 32, and the exclusive region S1 where only the first yarn joining cart 31 travels. The control device 38 arranged in the second yarn joining cart 32 also stores the overlapping region T where the moving region overlaps with the first yarn joining cart 31, and the exclusive region S2 where only the second yarn joining cart 32 travels.

[0050] The range-end detecting sensor 39 arranged in the first yarn joining cart 31 detects range ends of the moving region X1 of the first yarn joining cart 31. Specifically, the range-end detecting sensor 39 arranged in the first yarn joining cart 31 detects the range ends of the moving region X1 by detecting first range-end defining members (defining means, range-end sensors) 50a arranged on the upper rail 41a. Each of the first range-end defining members 50a is arranged at each of the range ends on both sides of the moving region X1. When the range end of the moving region X1 is detected by the range-end detecting sensor 39, the control device 38 of the first yarn joining cart 31 controls the travelling wheel driving motor 35 such that the first yarn joining cart 31 does not move beyond the moving region X1. Thus, in addition to recognition of the current position using the

position-defining-member detecting sensor 36 described above, the control device 38 of the first yarn joining cart 31 can also recognize the range ends of the moving region X1 by the range-end detecting sensor 39. By using such detection results, the first yarn joining cart 31 can more reliably be prevented from moving beyond the moving region X1.

[0051] The range-end detecting sensor 39 arranged in the second yarn joining cart 32 detects the range ends of the moving region X2 of the second yarn joining cart 32. Specifically, the range-end detecting sensor 39 arranged in the second yarn joining cart 32 detects the range ends of the moving region X2 by detecting second range-end defining members (defining means, range-end sensors) 50b arranged on the upper rail 41a. Each of the second range-end defining members 50b is arranged at each of the range ends on both sides of the moving region X2. When the range end of the moving region X2 is detected by the range-end detecting sensor 39, the control device 38 of the second yarn joining cart 32 controls the travelling wheel driving motor 35 such that the second yarn joining cart 32 does not move beyond the moving region X2. Thus, in addition to recognition of the current position using the position-defining-member detecting sensor 36 described above, the control device 38 of the second yarn joining cart 32 can also recognize the range ends of the moving region X2 by the range-end detecting sensor 39. By using such detection results, the second yarn joining cart 32 can more reliably be prevented from moving beyond the moving region X2.

[0052] The first range-end defining members 50a are arranged on a first surface 47a of the upper rail 41a. The second range-end defining members 50b are arranged on a second surface 47b of the upper rail 41a different from the first surface 47a. The range-end detecting sensor 39 arranged in the first yarn joining cart 31 and the range-end detecting sensor 39 arranged in the second yarn joining cart 32 have different surfaces of the upper rail 41a as detecting targets. In the present embodiment, the first surface 47a and the second surface 47b face one another.

[0053] The control device 38 of each of the first yarn joining cart 31 and the second yarn joining cart 32 is configured as a known microcomputer including a central processing unit (CPU), a read only memory (ROM), a random access memory (RAM), and the like (not illustrated), and executes a program previously stored in the ROM or the like.

[0054] Next, with reference to FIG. 5, a description will be made on details of the process in which the control devices 38 of the first yarn joining cart 31 and the second yarn joining cart 32 select the spinning unit 2 to which the yarn joining operation is to be executed. If the yarn joining request is made from a plurality of the spinning units 2 facing the moving region X1, the control device 38 of the first yarn joining cart 31 basically selects the spinning unit 2 located closest to the first yarn joining cart 31 as the target of the yarn joining operation from the

spinning units 2 that made the yarn joining request. Similarly to the control device 38 of the first yarn joining cart 31, the control device 38 of the second yarn joining cart 32 also selects the spinning unit 2 to be the target of the yarn joining operation. If the yarn joining request is not made, the first yarn joining cart 31 and the second yarn joining cart 32 stay at the current position or the predetermined position, and wait until the yarn joining request is made. The control device 38 of the first yarn joining cart 31 and the control device 38 of the second yarn joining cart 32 execute the same process. Hereinafter, the process executed by the control device 38 of the first yarn joining cart 31 will be representatively described.

[0055] Among the spinning units 2 that made the yarn joining request and facing the moving region X1, the control device 38 of the first yarn joining cart 31 specifies the spinning unit 2 located closest to the current position of the first yarn joining cart 31 as the yarn joining target. Then, a determination is made as to whether or not the position of the specified spinning unit 2 is facing the overlapping region T (step S101). If the specified spinning unit 2 is not facing the overlapping region T (step S101: NO), that is, if the specified spinning unit 2 is facing the exclusive region S1 of the first yarn joining cart 31, the control device 38 of the first yarn joining cart 31 controls each section such that the first yarn joining cart (an operation executing cart) 31 executes the yarn joining operation on the specified spinning unit 2 (step S105). During the yarn joining operation, if a signal is transmitted from the cart-side transmitting section 37 of the first yarn joining cart 31 to the sensor 61 of the spinning unit 2 on which the yarn joining operation is executed, the spinning unit 2 on which the yarn joining operation is executed can identify the yarn joining cart 3 that executed the yarn joining operation. After the yarn joining operation is completed, the process of step S101 described above is performed again.

[0056] If the specified spinning unit 2 is facing the overlapping region T (step S101: YES), the control device 38 of the first yarn joining cart 31 determines whether or not the yarn joining request is made from the spinning unit 2 facing the exclusive region S2 with respect to the second yarn joining cart 32, that is, a presence or an absence of the spinning unit 2 of which the yarn joining operation is necessary to be executed by the second yarn joining cart 32 (step S102). In case of the presence of the spinning unit 2 of which the yarn joining operation is necessary to be executed by the second yarn joining cart 32 (step S102: YES), the control device 38 of the first yarn joining cart 31 controls each section such that the first yarn joining cart 31 executes the yarn joining operation on the specified spinning unit 2 (step S105). In case of the absence of the spinning unit 2 of which the yarn joining operation is necessary to be executed by the second yarn joining cart 32 (step S102: NO), the control device 38 of the first yarn joining cart 31 determines whether or not the current position of the second yarn joining cart 32 is within a prescribed distance from the overlapping

region T (step S103). Other than the case of the absence of the spinning unit 2 of which the yarn joining operation is necessary to be executed by the second yarn joining cart 32, when the number of the spinning units 2 on which the second yarn joining cart 32 is to execute the yarn joining operation and the number of the spinning units 2 on which the first yarn joining cart 31 is to execute the yarn joining operation are the same, a determination of NO may be made in step S102, and the process may proceed to the process of step S103.

[0057] If the current position of the second yarn joining cart 32 is not within the prescribed distance from the overlapping region T (step S103: NO), the control device 38 of the first yarn joining cart 31 performs the control such that the first yarn joining cart 31 executes the yarn joining operation on the specified spinning unit 2 (step S105). If the current position of the second yarn joining cart 32 is within the prescribed distance from the overlapping region T (step S103: YES), the control device 38 of the first yarn joining cart 31 does not execute the yarn joining operation on the spinning unit 2 facing the overlapping region T, and controls each section so as to execute the yarn joining operation on the spinning unit 2 facing the exclusive region S1 (step S104). In this case, among the spinning units 2 that made the yarn joining request and facing the exclusive region S1, the first yarn joining cart 31 executes the yarn joining operation on the spinning unit 2 located closest to the current position of the first yarn joining cart 31. The yarn joining operation of the spinning unit 2 that made the yarn joining request and facing the overlapping region T is entrusted to the second yarn joining cart 32, and the first yarn joining cart 31 executes the yarn joining operation on the spinning unit 2 facing the exclusive region S1. In this case, the second yarn joining cart 32 may be assumed as being located close to the spinning unit 2 that made the yarn joining request and facing the overlapping region T and having an extra capacity in processing ability of the yarn joining operation than the first yarn joining cart 31. Thus, the first yarn joining cart 31 does not execute the yarn joining operation on the spinning unit 2 facing the overlapping region T, and the yarn joining operation is entrusted to the second yarn joining cart 32. As a result, operation efficiency of the yarn joining operation is improved. After the yarn joining operation on the spinning unit 2 facing the exclusive region S1 is completed, the process of step S101 described above is performed again.

[0058] Next, the operations of the first yarn joining cart 31 and the second yarn joining cart 32 in the case where the yarn joining request is made from the spinning unit 2 will be described with specific examples. As illustrated in FIG. 3A, assume that the yarn joining request is made from the spinning units 2 with the unit numbers Y20, Y38, and Y39. The current position of the first yarn joining cart 31 is assumed to be in front of the spinning unit 2 with the unit number Y14 and the current position of the second yarn joining cart 32 is assumed to be in front of the spinning unit 2 with the unit number Y22.

[0059] First, the operation will be described from a standpoint of the second yarn joining cart 32. The control device 38 of the second yarn joining cart 32 specifies the spinning unit 2 with the unit number Y20, which is located closest to the current position of the second yarn joining cart 32, as the yarn joining target. Since the spinning unit 2 with the unit number Y20 is facing the overlapping region T (step S101: YES), the control device 38 of the second yarn joining cart 32 determines a presence or an absence of the spinning unit 2 of which the yarn joining operation is necessary to be executed by the first yarn joining cart 31 (step S102). The first yarn joining cart 31 does not need to execute the yarn joining operation on the spinning unit 2 facing the exclusive region S1 (step S102: NO), and the first yarn joining cart 31 is located within a prescribed distance from the overlapping region T (herein, a distance of five spinning units 2) (step S103: YES). Therefore, the yarn joining operation of the spinning unit 2 facing the overlapping region T is entrusted to the first yarn joining cart 31, and the second yarn joining cart 32 executes the yarn joining operation on the spinning unit 2 with the unit number Y38 (step S104). After executing the yarn joining operation on the spinning unit 2 with the unit number Y38, the second yarn joining cart 32 executes the yarn joining operation on the spinning unit 2 with the unit number Y39. In this case, the first yarn joining cart 31 executes the yarn joining operation on the spinning unit 2 with the unit number Y20 facing the overlapping region T.

[0060] Next, the operation will be described from a standpoint of the first yarn joining cart 31. The control device 38 of the first yarn joining cart 31 specifies the spinning unit 2 with the unit number Y20, which is located closest to the current position of the first yarn joining cart 31, as the yarn joining target. Since the spinning unit 2 with the unit number Y20 is facing the overlapping region T (step S101: YES), the control device 38 of the first yarn joining cart 31 determines a presence or an absence of the spinning unit 2 of which the yarn joining operation is necessary to be executed by the second yarn joining cart 32 (step S102). The second yarn joining cart 32 has received the yarn joining request from the spinning units 2 with the unit numbers Y38 and Y39 facing the exclusive region S2 (step S102: YES). Thus, the first yarn joining cart 31 executes the yarn joining operation on the spinning unit 2 with the unit number Y20 facing the overlapping region T (step S105). The second yarn joining cart 32 executes the yarn joining operation on the spinning units 2 with the unit numbers Y38 and Y39.

[0061] As described above, in the spinning machine 1 according to the present embodiment, when the yarn joining operation is required to be executed with respect to the spinning unit 2 facing the overlapping region T, that is, the spinning unit 2 that can receive the yarn joining operation from the first yarn joining cart 31 and the second yarn joining cart 32, the yarn joining cart 3 to execute the yarn joining operation is selected in accordance with occurrence status of the yarn joining request made from

the spinning units 2 facing the exclusive regions S1 and S2 of each yarn joining cart 3. Thus, the yarn joining cart 3 can be selected according to the processing ability with respect to the yarn joining request, and the yarn joining operation can be executed with respect to the spinning unit 2 facing the overlapping region T by the yarn joining cart 3 selected according to the processing ability. Therefore, when the spinning unit 2 that can receive the yarn joining operation from the plurality of the yarn joining carts 3 exists, the spinning machine 1 according to the present embodiment can efficiently control the yarn joining cart 3 for executing the yarn joining operation.

[0062] If the yarn joining operation is required to be executed with respect to the spinning unit 2 facing the overlapping region T, the yarn joining cart 3 having a smallest number of occurrences of the yarn joining request from the spinning units 2 facing the exclusive regions S1 and S2 is selected as the yarn joining cart 3 to execute the yarn joining operation. The yarn joining operation thus can be executed with respect to the spinning unit 2 facing the overlapping region T by the yarn joining cart 3 having an extra capacity in the processing ability with respect to the yarn joining request.

[0063] As to the yarn joining cart 3 having a large number of occurrences of the yarn joining request from the spinning unit 2 facing the exclusive regions S1 or S2, the yarn joining operation is executed with respect to only the spinning unit 2 facing the exclusive region of such a yarn joining cart 3, and the yarn joining operation with respect to the spinning unit 2 facing the overlapping region T can be executed by the yarn joining cart 3 having the small number of occurrences of the yarn joining request from the spinning unit 2 facing the exclusive region S1 or S2. Accordingly, the yarn joining operation does not concentrate on the yarn joining cart 3 having the large number of occurrences of the yarn joining request, and the yarn joining cart 3 for executing the yarn joining operation can be efficiently controlled.

[0064] When the yarn joining operation is required to be executed with respect to the spinning unit 2 facing the overlapping region T, the yarn joining cart 3 for executing the yarn joining operation is selected by considering the distance from the overlapping region T to the yarn joining cart 3. Accordingly, the yarn joining cart 3 can be rapidly moved to the spinning unit 2 that made the yarn joining request.

[0065] The spinning unit 2 facing the overlapping region T is subjected to the yarn joining operation by a plurality of the yarn joining carts 3. By transmitting a signal including the identification information of the yarn joining cart 3 that executes the yarn joining operation from the cart-side transmitting section 37 of the yarn joining cart 3 that executes the yarn joining operation towards the sensor 61 of the spinning unit 2 on which the yarn joining operation is executed, the spinning unit 2 can identify the yarn joining cart 3 that executed the yarn joining operation.

[0066] By arranging the first range-end defining mem-

bers 50a at the range ends of the moving region X1 and detecting the first range-end defining member 50a by the range-end detecting sensor 39 of the first yarn joining cart 31, the first yarn joining cart 31 can detect the range end of the moving region X1. By performing the control on the movement of the first yarn joining cart 31 based on the detection result of the range end, the first yarn joining cart 31 can be prevented from moving beyond the moving region X1. By arranging the second range-end defining members 50b at the range ends of the moving region X2 and detecting the second range-end defining member 50b by the range-end detecting sensor 39 of the second yarn joining cart 32, the second yarn joining cart 32 can be prevented from moving beyond the moving region X2.

[0067] If the moving region X1 and the moving region X2 overlap, the first range-end defining members 50a for defining the range of the moving region X1 and the second range-end defining members 50b for defining the range of the moving region X2 are arranged on different surfaces of the upper rail 41a. By arranging the first range-end defining members 50a and the second range-end defining members 50b at different positions, the false detection of the range end can be prevented and the moving regions X1 and X2 can be more reliably defined.

[0068] Since the movement of the yarn joining cart 3 can be controlled as described above with respect to the spinning unit 2 including the draft device 7, the pneumatic spinning device 9, and the winding device 13, the efficiency of the yarn joining operation by the yarn joining cart 3 can be improved.

[0069] One embodiment of the present invention has been described above, but the present invention is not limited to the above embodiment, and modifications may be made within a scope of not changing the gist described in each claim.

[0070] For example, in the spinning machine 1 and the spinning unit 2 of the embodiment, the spun yarn 10 is pulled out from the pneumatic spinning device 9 by the yarn accumulating roller 21 that winds and accumulates a prescribed amount of the spun yarn 10. The present invention may be applied to a spinning machine and a spinning unit in which a spun yarn is pulled out from a pneumatic spinning device with a delivery roller and a nip roller.

[0071] In the spinning machine 1 and the spinning unit 2 of the embodiment, the yarn path is set such that the spun yarn 10 travels downward from the draft device 7 at an upper part towards the winding device 13 at a lower part. The present invention may be applied to a spinning machine and a spinning unit in which a yarn path is arranged such that the spun yarn travels from bottom to top in a machine height direction.

[0072] In the spinning machine 1 and the spinning unit 2 of the embodiment, the pneumatic spinning device 9 may include a needle held by the fiber guiding section, and arranged to protrude into the spinning chamber. The needle prevents the twists of the fiber bundle 8 from being

propagated towards the upstream of the pneumatic spinning device 9. In place of the needle, the pneumatic spinning device 9 may prevent the propagation of the twists of the fiber bundle 8 by a downstream end of the fiber guiding section. The pneumatic spinning device 9 may include a pair of pneumatic nozzles adapted to apply twists in opposite directions from one another.

[0073] In the spinning machine 1 and the spinning unit 2 of the embodiment, at least some of the plurality of the bottom rollers of the draft device 7 and the traverse guide 76 of the traverse device 75 are commonly driven for each spinning unit 2. The present invention may be applied to a spinning machine and a spinning unit of a type in which each section of the spinning unit (e.g., the draft device, the pneumatic spinning device, the yarn winding device, and the like) is independently driven in each spinning unit 2.

[0074] The spinning machine 1 of the embodiment includes forty spinning units 2. The number of the spinning units 2 is not limited to forty. The spinning machine 1 of the embodiment includes two yarn joining carts 3. The number of yarn joining carts 3 is not limited to two.

[0075] In the spinning machine 1 of the embodiment, the travelling of the yarn joining cart 3 is controlled by the control device 38 arranged in the yarn joining cart 3. Alternatively, for example, the central control device 4 may perform the control process of the travelling of the yarn joining cart 3, the determination process of the spinning unit 2 on which the yarn joining operation is executed, and the like.

[0076] In the spinning machine 1 of the embodiment, the first range-end defining members 50a and the second range-end defining members 50b are arranged on the upper rail 41a. However, the present invention is not limited thereto, and the first range-end defining members 50a and the second range-end defining members 50b may be arranged on the lower rail 41b, for example. As illustrated in FIG. 3A and FIG. 3B, the first range-end defining members 50a and the second range-end defining members 50b are arranged at both ends of the moving regions X1 and X2, respectively, but the first range-end defining members 50a and the second range-end defining members 50b may be arranged at either one of the ends.

[0077] In the embodiment, the first range-end defining members 50a and the second range-end defining members 50b arranged on the upper rail 41a are detected by the range-end detecting sensor 39 to respectively prevent the first yarn joining cart 31 and the second yarn joining cart 32 from moving beyond the moving region X1 and the moving region X2. Alternatively, for example, a bumper for regulating the movement of the yarn joining cart 3 by making physical contact may be arranged to prevent the yarn joining cart 3 from moving beyond the moving region.

[0078] In the embodiment, the control described above is performed on the yarn joining cart 3 for executing the yarn joining operation arranged in the spinning machine

1. In place of the yarn joining cart 3, the control described above may be performed on a doffing cart that removes the fully-wound package 45 from the winding device 13 and move the package 45 to a prescribed position. The present invention is not limited to the yarn joining cart 3 arranged in the spinning machine 1, and the control described above may be applied on an operation cart travelling among a plurality of processing units of a textile machinery such as an automatic winder adapted to wind the spun yarn to form a package.

[0079] The yarn clearer 52 of the embodiment monitors the thickness of the spun yarn 10 and detects the yarn defect of the spun yarn 10. The yarn clearer 52 may monitor a presence or an absence of foreign substances contained in the spun yarn 10, and may detect the foreign substance as the yarn defect.

Claims

1. A textile machinery comprising:

a plurality of processing units adapted to perform yarn processing,

a plurality of operation carts (3, 31, 32), each operation cart (3, 31, 32) being adapted to travel and execute an operation with respect to the processing units, and

a control section (38, 4) adapted to select an operation executing cart (31) from the plurality of the operation carts (3, 31, 32) in accordance with an operation request from an operation requesting unit (2), which is one of the plurality of the processing units, the operation executing cart (31) being adapted to execute an operation with respect to the operation requesting unit (2), wherein at least a portion of the plurality of the processing units is arranged within an exclusive region (S1, S2) where the operation requesting unit (2) can receive the operation from only one of the operation carts (31, 32), and at least a different portion of the plurality of the processing units is arranged within an overlapping region (T) where the operation requesting unit (2) can receive the operation from the plurality of the operation carts (31, 32), and

wherein the operation cart (3, 31, 32) is adapted to execute the operation with respect to at least one processing unit arranged within the exclusive region (S1) and at least one processing unit arranged within the overlapping region (T),

characterized in that

when the operation requesting unit (2) is located within the overlapping region (T), the control section (38, 4) is adapted to select as the operation executing cart (31), one operation cart (3, 31, 32), which has a smallest number of occurrences of the operation requests within the ex-

clusive region (S1, S2), from the plurality of the operation carts (3, 31, 32), which can execute the operation with respect to such an operation requesting unit (2).

2. The textile machinery according to claim 1, wherein the processing unit includes an identifying means (61) for identifying the operation executing cart (31) that has executed the operation. 5
3. The textile machinery according to claim 1 or claim 2, further comprising a plurality of range-end sensors (50a, 50b) for defining a travelling path (X1, X2) of the operation cart (3, 31, 32). 10
4. The textile machinery according to claim 3, wherein a range-end sensor (50a, 50b) is provided at respective range ends of the travelling path (X1, X2). 15
5. The textile machinery according to claim 4, further comprising a track rail (41a) adapted to guide the plurality of the operation carts (3, 31, 32) to travel along the travelling path (X1, X2), 20
 wherein among the range-end sensors adapted to define the travelling path (X1, X2) of the adjacent operation carts (3, 31, 32), one of the range-end sensors (50a) is provided on a first surface extending in a direction substantially parallel to a direction in which the track rail (41a) extends, and another one of the range-end sensors (50b) is provided on a second surface which is a surface different from the first surface and which extends in the direction substantially parallel to the direction in which the track rail (41a) extends. 25
6. The textile machinery according to any one of claim 1 through claim 5, wherein each of the plurality of the processing units includes: 30

a spinning device (9) adapted to produce a spun yarn (10), and 35
 a winding device (13) adapted to wind the spun yarn (10) produced by the spinning device (9) into a package (45). 40

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7. The textile machinery according to claim 6, wherein the operation carts (3, 31, 32) are yarn joining carts, each yarn joining cart being adapted to execute a yarn joining operation to join the spun yarn (10) spun from the spinning device (9) and the spun yarn (10) from the package (45). 50
8. The textile machinery according to claim 6 or claim 7, wherein the spinning device (9) is a pneumatic spinning device adapted to produce the spun yarn (10) by twisting a fiber bundle (8) using a whirling airflow. 55

Patentansprüche

1. Eine Textilmaschinenanlage, die folgende Merkmale aufweist:

eine Mehrzahl von Verarbeitungseinheiten, die dazu angepasst sind, eine Garnverarbeitung durchzuführen,
 eine Mehrzahl von Operationswagen (3, 31, 32), wobei jeder Operationswagen (3, 31, 32) dazu angepasst ist, bezüglich der Verarbeitungseinheiten zu laufen und eine Operation auszuführen, und
 einen Steuerabschnitt (38, 4), der dazu angepasst ist, gemäß einer Operationsanforderung von einer Operationsanforderungseinheit (2), die eine der Mehrzahl der Verarbeitungseinheiten ist, aus der Mehrzahl der Operationswagen (3, 31, 32) einen Operationsausführungswagen (31) auszuwählen, wobei der Operationsausführungswagen (31) dazu angepasst ist, eine Operation bezüglich der Operationsanforderungseinheit (2) auszuführen,
 wobei zumindest ein Teil der Mehrzahl der Verarbeitungseinheiten in einer exklusiven Region (S1, S2) angeordnet ist, wo die Operationsanforderungseinheit (2) die Operation von lediglich einem der Operationswagen (31, 32) empfangen kann, und zumindest ein anderer Teil der Mehrzahl der Verarbeitungseinheiten in einer Überlappungsregion (T) angeordnet ist, wo die Operationsanforderungseinheit (2) die Operation von der Mehrzahl der Operationswagen (31, 32) empfangen kann, und
 wobei der Operationswagen (3, 31, 32) dazu angepasst ist, die Operation bezüglich zumindest einer Verarbeitungseinheit, die in der exklusiven Region (S1) angeordnet ist, und zumindest einer Verarbeitungseinheit, die in der Überlappungsregion (T) angeordnet ist, auszuführen,
dadurch gekennzeichnet, dass
 dann, wenn sich die Operationsanforderungseinheit (2) in der Überlappungsregion (T) befindet, der Steuerabschnitt (38, 4) dazu angepasst ist, aus der Mehrzahl der Operationswagen (3, 31, 32), die die Operation bezüglich einer derartigen Operationsanforderungseinheit (2) ausführen können, als Operationsausführungswagen (31) einen Operationswagen (3, 31, 32) auszuwählen, der eine kleinste Anzahl von Auftretensfällen der Operationsanforderungen in der exklusiven Region (S1, S2) aufweist.

2. Die Textilmaschinenanlage gemäß Anspruch 1, bei der die Verarbeitungseinheit eine Identifizierungseinrichtung (61) zum Identifizieren desjenigen Operationsausführungswagens (31), der die Operation ausgeführt hat, umfasst.

3. Die Textilmaschinenanlage gemäß Anspruch 1 oder 2, die ferner eine Mehrzahl von Bereichsende-Sensoren (50a, 50b) zum Definieren eines Laufweges (X1, X2) des Operationswagens (3, 31, 32) aufweist.
4. Die Textilmaschinenanlage gemäß Anspruch 3, bei der an jeweiligen Bereichsenden des Laufweges (X1, X2) ein Bereichsende-Sensor (50a, 50b) vorgesehen ist.
5. Die Textilmaschinenanlage gemäß Anspruch 4, die ferner einen Schienenstrang (41a) aufweist, der dazu angepasst ist, die Mehrzahl der Operationswagen (3, 31, 32) so zu lenken, dass sie entlang des Laufweges (X1, X2) laufen, wobei unter den Bereichsende-Sensoren, die dazu angepasst sind, den Laufweg (X1, X2) der benachbarten Operationswagen (3, 31, 32) zu definieren, einer der Bereichsende-Sensoren (50a) auf einer ersten Oberfläche vorgesehen ist, die sich in einer Richtung erstreckt, die im Wesentlichen parallel zu einer Richtung ist, in der sich der Schienenstrang (41 a) erstreckt, und ein anderer der Bereichsende-Sensoren (50b) auf einer zweiten Oberfläche vorgesehen ist, die eine sich von der ersten Oberfläche unterscheidende Oberfläche ist und die sich in einer Richtung erstreckt, die im Wesentlichen parallel zu der Richtung ist, in der sich der Schienenstrang (41 a) erstreckt.
6. Die Textilmaschinenanlage gemäß einem der Ansprüche 1 bis 5, bei der jede der Mehrzahl der Verarbeitungseinheiten folgende Merkmale umfasst:
 - eine Spinnvorrichtung (9), die dazu angepasst ist, ein gesponnenes Garn (10) zu erzeugen, und
 - eine Aufwickelvorrichtung (13), die dazu angepasst ist, das durch die Spinnvorrichtung (9) erzeugte gesponnene Garn (10) zu einem Garnkörper (45) aufzuwickeln.
7. Die Textilmaschinenanlage gemäß Anspruch 6, bei der die Operationswagen (3, 31, 32) Garnzusammenführungswagen sind, wobei jeder Garnzusammenführungswagen dazu angepasst ist, eine Garnzusammenführungsoperation auszuführen, um das gesponnene Garn (10), das von der Spinnvorrichtung (9) gesponnen wurde, und das gesponnene Garn (10) von dem Garnkörper (45) zusammenzuführen.
8. Die Textilmaschinenanlage gemäß Anspruch 6 oder 7, bei der die Spinnvorrichtung (9) eine pneumatische Spinnvorrichtung ist, die dazu angepasst ist, das gesponnene Garn (10) zu erzeugen, indem sie unter Verwendung eines Wirbelluftstroms ein Faserbündel (8) dreht.

Revendications

1. Machine textile comprenant:

- 5 une pluralité d'unités de traitement adaptées pour réaliser un traitement de fil, une pluralité de chariots d'opération (3, 31, 32), chaque chariot d'opération (3, 31, 32) étant adapté pour se déplacer et exécuter une opération relative aux unités de traitement, et
- 10 un segment de commande (38, 4) adapté pour sélectionner un chariot d'exécution d'opération (31) parmi la pluralité de chariots d'opération (3, 31, 32) en fonction d'une demande d'opération d'une unité de demande d'opération (2), qui est l'une de la pluralité d'unités de traitement, le chariot d'exécution d'opération (31) étant adapté pour exécuter une opération relative à l'unité de demande d'opération (2),
- 15 dans laquelle au moins une partie de la pluralité d'unités de traitement sont disposées dans une région exclusive (S1, S2) où l'unité de demande d'opération (2) peut recevoir l'opération de seulement l'un des chariots d'opération (31, 32), et au moins une partie différente de la pluralité d'unités de traitement sont disposées dans une zone venant en recouvrement (T) où l'unité de demande d'opération (2) peut recevoir l'opération de la pluralité de chariots d'opération (31, 32), et
- 20 dans laquelle le chariot d'opération (3, 31, 32) est adapté pour exécuter l'opération relative à au moins une unité de traitement disposée dans la zone exclusive (S1) et au moins une unité de traitement disposée dans la zone venant en recouvrement (T),
- 25 **caractérisée par le fait que** lorsque l'unité de demande d'opération (2) se situe dans la zone venant en recouvrement (T), le segment de commande (38, 4) est adapté pour sélectionner, comme chariot d'exécution d'opération (31), un chariot d'opération (3, 31, 32) qui présente un nombre le plus petit d'occurrences des demandes d'opération dans la région exclusive (S1, S2) parmi la pluralité de chariots d'opération (3, 31, 32) qui peuvent exécuter l'opération relative à une telle unité de demande d'opération (2).
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- 35
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2. Machine textile selon la revendication 1, dans laquelle l'unité de traitement comprend un moyen d'identification (61) destiné à identifier le chariot d'exécution d'opération (31) qui a exécuté l'opération.

- 55 3. Machine textile selon la revendication 1 ou la revendication 2, comprenant par ailleurs une pluralité de capteurs de fin de course (50a, 50b) destinés à définir un trajet de déplacement (X1, X2) du chariot

d'opération (3, 31, 32).

4. Machine textile selon la revendication 3, dans laquelle le capteur de fin de course (50a, 50b) est prévu aux fins de course respectives du trajet de déplacement (X1, X2). 5

5. Machine textile selon la revendication 4, comprenant par ailleurs un rail de guidage (41a) adapté pour guider la pluralité de chariots d'opération (3, 31, 32) de sorte qu'ils se déplacent le long du trajet de déplacement (X1, X2), 10
 dans laquelle, parmi les capteurs de fin de course adaptés pour définir le trajet de déplacement (X1, X2) des chariots d'opération (3, 31, 32) adjacents, 15
 l'un des capteurs de fin de course (50a) est prévu sur une première surface s'étendant dans une direction sensiblement parallèle à une direction dans laquelle s'étend le rail de guidage (41a), et un autre 20
 des capteurs de fin de course (50b) est prévu sur une deuxième surface qui est une surface différente de la première surface et qui s'étend dans la direction sensiblement parallèle à la direction dans laquelle s'étend le rail de guidage (41a). 25

6. Machine textile selon l'une quelconque de la revendication 1 à la revendication 5, dans laquelle chacune de la pluralité d'unités de traitement comporte: 30
 un dispositif de filage (9) adapté pour produire un fil filé (10), et
 un dispositif de bobinage (13) adapté pour bobiner le fil filé (10) produit par le dispositif de filage (9), pour obtenir une bobine (45). 35

7. Machine textile selon la revendication 6, dans laquelle les chariots d'opération (3, 31, 32) sont des chariots de raccordement de fils, chaque chariot de raccordement de fils étant adapté pour exécuter une opération de raccordement de fils pour raccorder le 40
 fil filé (10) du dispositif de filage (9) et le fil filé (10) de la bobine (45).

8. Machine textile selon la revendication 6 ou la revendication 7, dans laquelle le dispositif de filage (9) est 45
 un dispositif de filage pneumatique adapté pour produire le fil filé (10) par torsion d'un faisceau de fibres (8) à l'aide d'un flux d'air tourbillonnant. 50

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FIG. 1

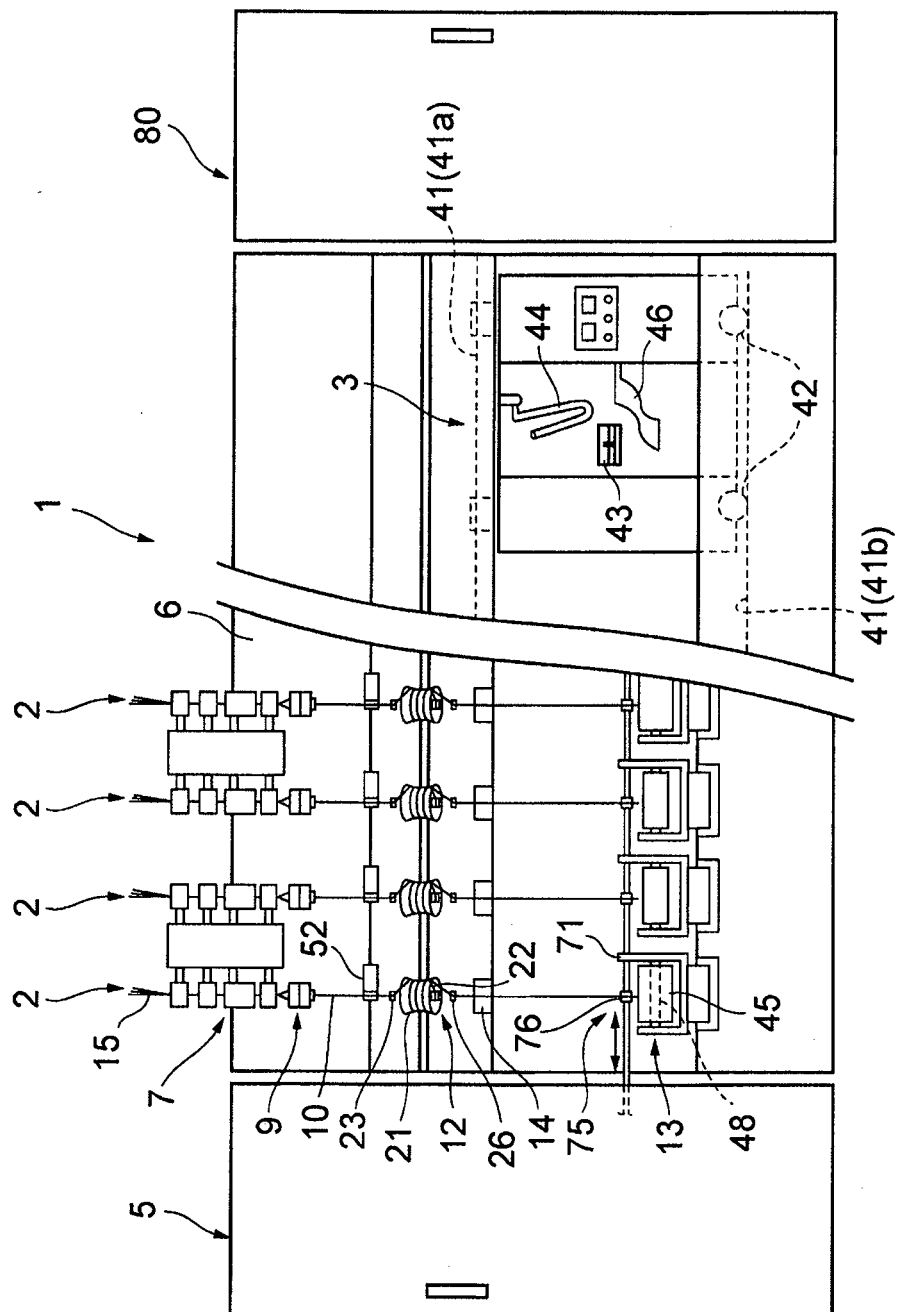


FIG. 2

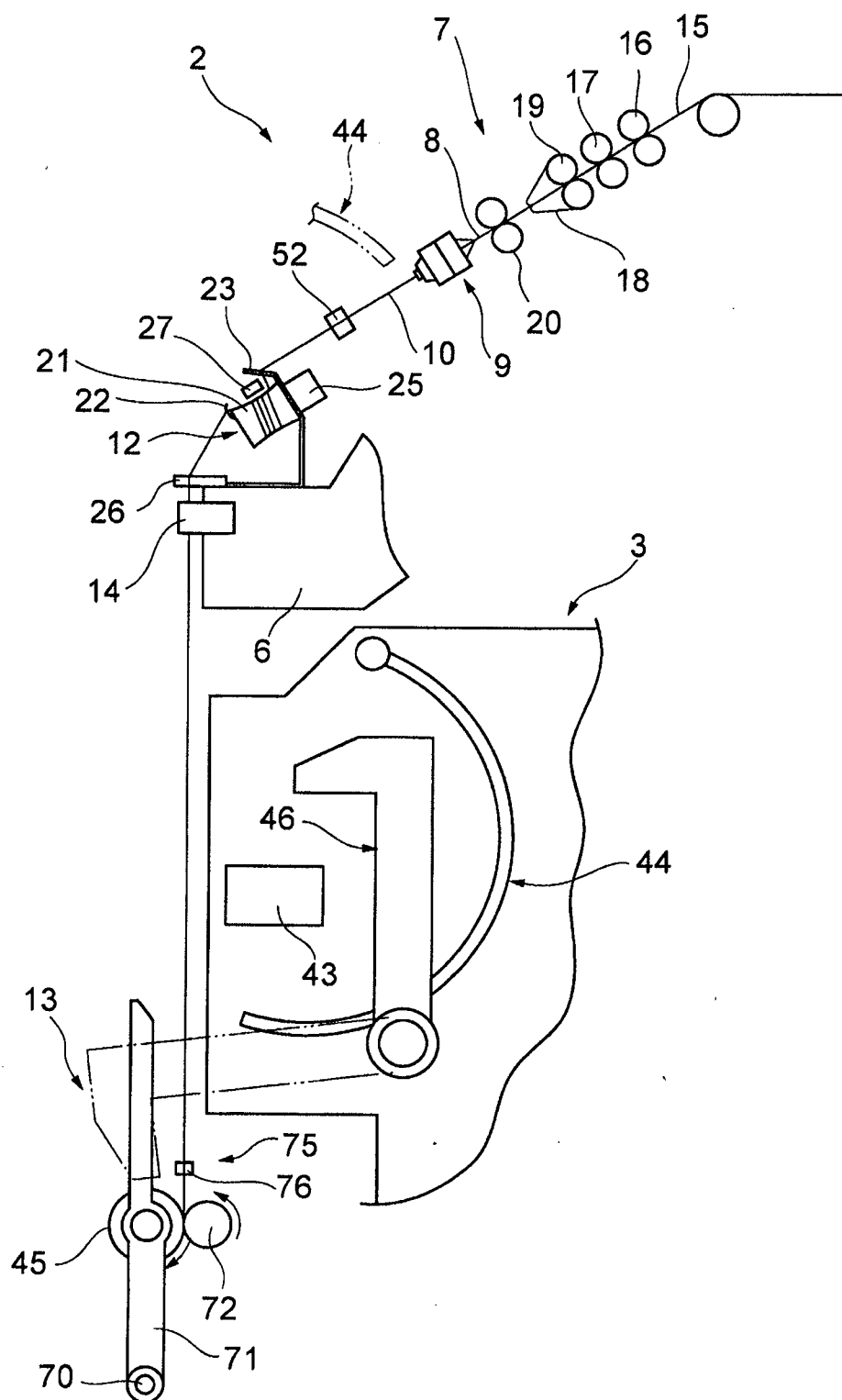


FIG. 3

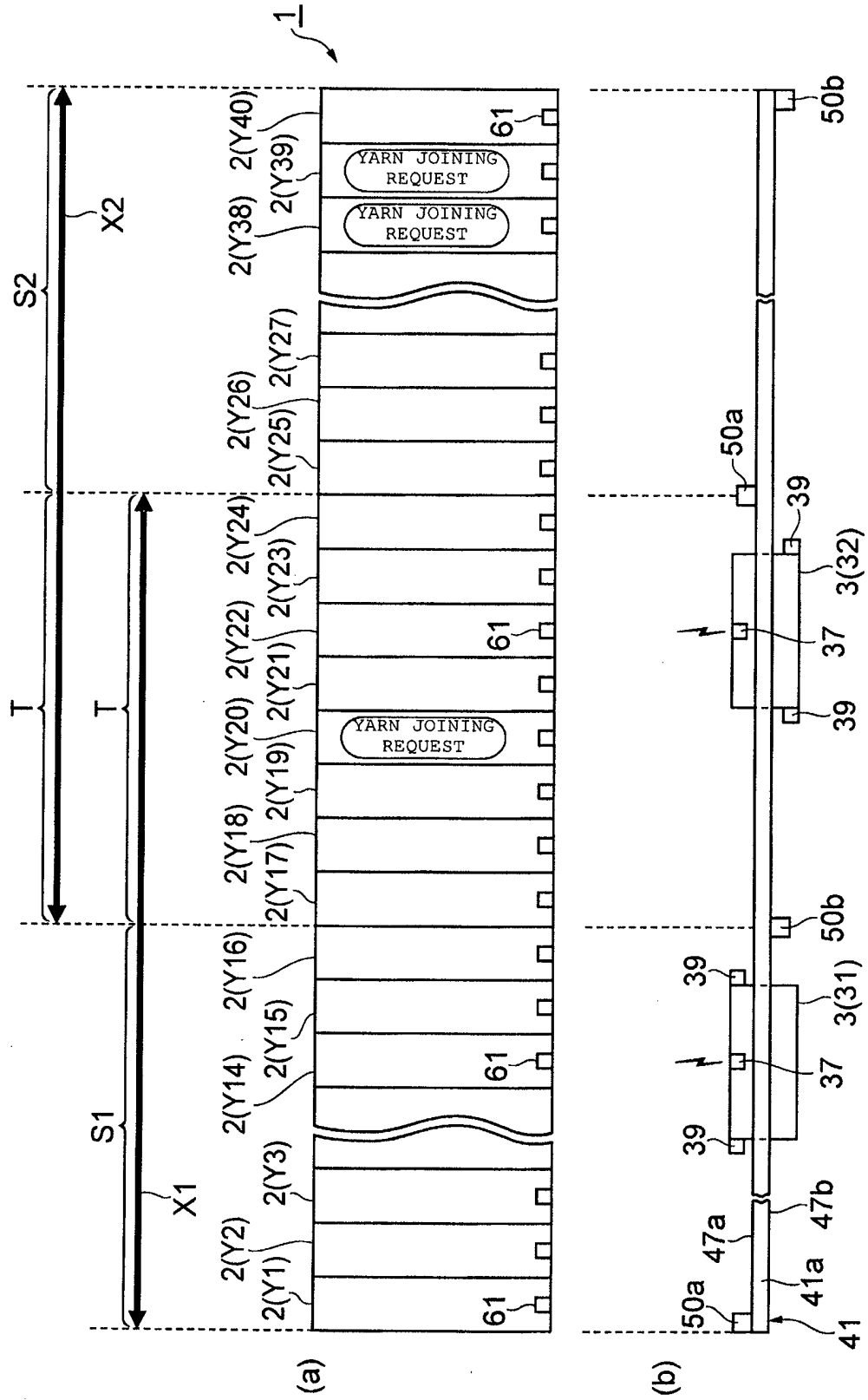


FIG. 4

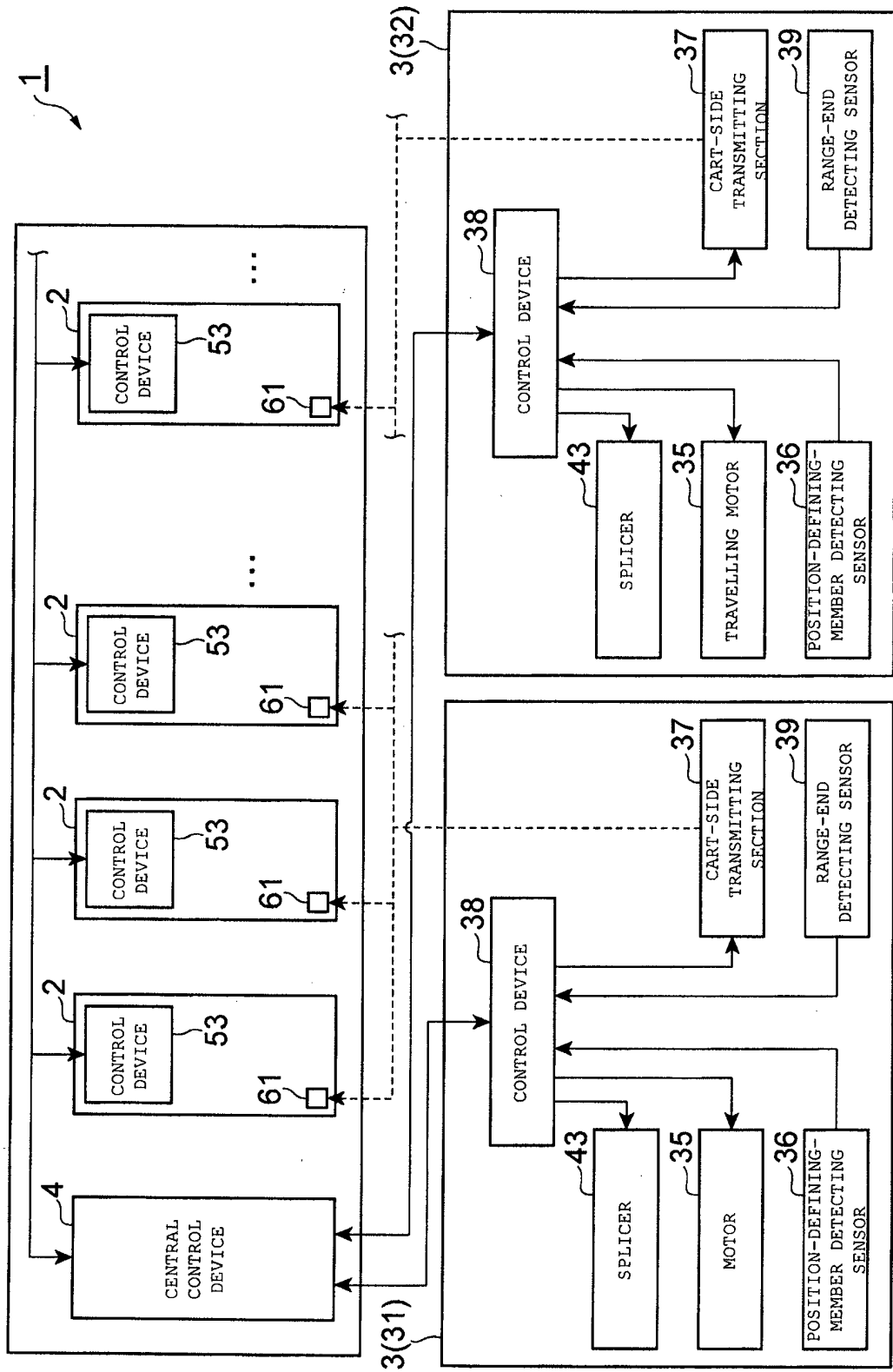
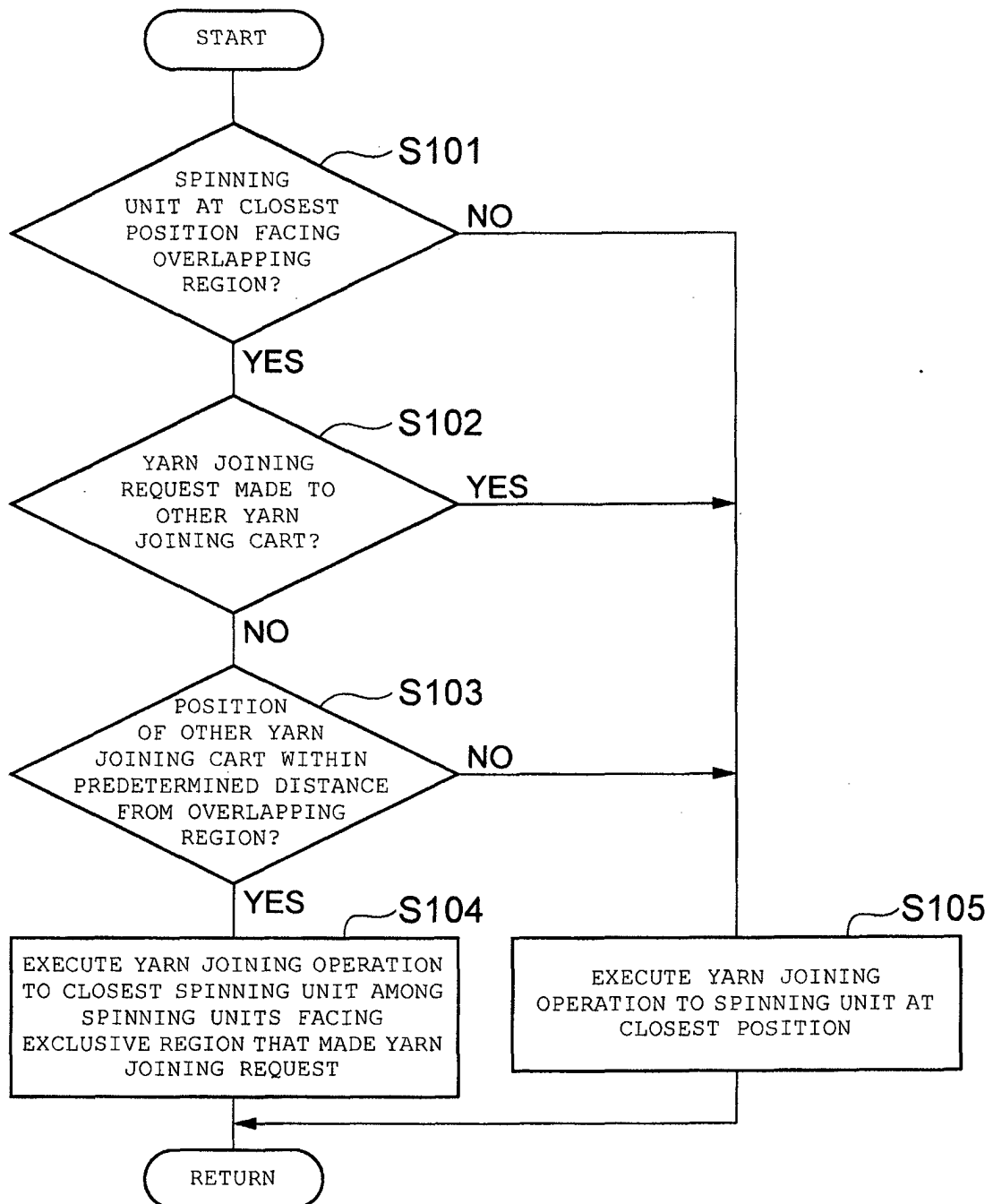


FIG. 5



REFERENCES CITED IN THE DESCRIPTION

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