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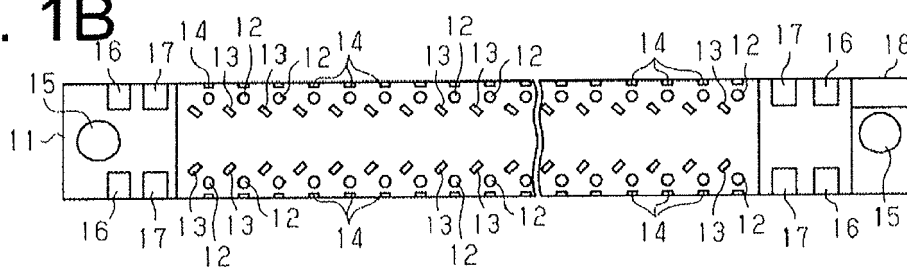
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(54) **APPARATUS FOR ASSISTING IN YARN PIECING IN RING TYPE SPINNING MACHINE**

(57) An apparatus for assisting in yarn piecing in a ring type spinning machine (11) having a plurality of spindles (12) and a plurality of yarn break detectors (13) provided for the respective spindles (12) includes a position detector (16, 17) that detects a position of a worker who provides yarn piecing service, a plurality of indicators (14,

15) that guides the worker to a position of one of the spindles (12A) having a yarn break, and a controller (18, 20) that controls the indicators (14, 15) based on the position of the spindle (12A) having the yarn break and the position of the worker.

FIG. 1B



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an apparatus for assisting in yarn piecing in a ring type spinning machine, and more particularly to an apparatus for assisting in yarn piecing in a ring type spinning machine, such as ring fine spinning machine and ring twisting machine, by guiding a worker attending to the ring type spinning machine to a position calling for yarn piecing service when a yarn break occurs.

[0002] In a textile spinning plant where a plurality of ring type spinning machines is installed in a side-by-side arrangement, when a yarn break occurs at a spindle of any one of the ring type spinning machines, a worker attending at spinning machine performs yarn piecing operation. Japanese Unexamined Utility Model Application Publication No. H5-77166 discloses a yarn break monitoring apparatus wherein a light-emitting device that emits light in response to a yarn break signal is provided for each of the spindles of a ring winding machine, the spindles are divided into a plurality of blocks or groups and an indicator lamp is provided for each of the blocks, and when a yarn break occurs at a spindle, the indicator lamp of the block to which the spindle belongs is turned on.

[0003] Furthermore, Japanese Unexamined Patent Application Publication No. S56-159318 discloses an illumination lamp in a spinning machine room. According to the publication, a plurality of working lamps is provided, one for each spindle of a spinning machine, above and along the length of the spinning machine. The lamps are kept off or dimmed when no yarn break is detected by a yarn break detection device that is provided for each spindle and, if a yarn break is detected by the yarn break detection device at any spindle, its lamp is turned on or brightened for indication of the presence of a yarn break.

[0004] A worker is assigned to attend to a plurality of spinning machines and to provide yarn piecing and cleaning service for the ring type spinning machines. According to the yarn break monitoring apparatus disclosed in Japanese Unexamined Utility Model Application Publication No. H5-77166, the worker can identify the location of a yarn break at a distance that is close to the worker through the indicator lamp being turned on at the spindle calling for yarn piecing service. However, the worker may not be able to recognize the indicator lamp from a long distance. Therefore, the worker needs to move around the ring type spinning machines to see if there is any indicator lamp being turned on. Such moving causes a waste of time and also may cause a delay in identification of a yarn break, thereby allowing the yarn break left unremedied for a long time. In addition, spinning machines of recent years have a longer machine frame, which makes it harder for a worker to identify the illumination of the indicator lamp from a long distance.

[0005] On the other hand, the yarn break detection de-

vice disclosed in Japanese Unexamined Patent Application Publication No. S56-159318 enables a worker to identify the position of the ring type spinning machine at which a yarn break has occurred by the illumination of the working lamp. With this configuration, however, when another worker turns on the working lamp for performing his/her job other than yarn piecing, the worker for yarn piecing service may erroneously recognize the illumination of the lamp as a sign calling for the remedy of a yarn break and move to the illuminating lamp, which only lowers the yarn piecing operation efficiency.

[0006] The present invention has been made in view of the above problems and is directed to providing an apparatus for assisting in yarn piecing in a ring type spinning machine that reduces the waste of time spent by a worker for yarn piecing and enables the worker to identify the spindle at which a yarn break has occurred.

SUMMARY OF THE INVENTION

[0007] In accordance with an aspect of the present invention, there is provided an apparatus for assisting in yarn piecing in a ring type spinning machine that solves the above problems. The apparatus for assisting in yarn piecing in a ring type spinning machine has a plurality of spindles and a plurality of yarn break detectors provided for the respective spindles. The apparatus for assisting in yarn piecing includes a position detector that detects a position of a worker who provides yarn piecing service, a plurality of indicators that guides the worker to a position of one of the spindles having a yarn break, and a controller that controls the indicators based on the position of the spindle having the yarn break and the position of the worker.

[0008] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1A is a schematic plan view showing an arrangement of ring type spinning machines and position detectors according to an embodiment of the present invention;

FIG. 1B is a schematic plan view showing a layout of spindles of a ring type spinning machine, yarn break detection sensors, and indicators;

FIG. 2 is a schematic plan view illustrating ring type spinning machines of a background art;

FIG. 3 is an explanatory schematic plan view illustrating the operation of the apparatus for assisting in yarn piecing according to the embodiment of the

present invention; and

FIG. 4 is a schematic plan view showing an arrangement of large lamps according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] The following will describe an embodiment of the present invention with reference to FIGS. 1 to 3.

[0011] Referring to FIG. 1A, a plurality of ring type spinning machines 11 is arranged side by side to each other. Referring to FIG. 1 B, each ring type spinning machine 11 includes a plurality of spindles 12 each having a yarn break sensor 13 as the yarn break detector of the present invention and a yarn break indicator lamp 14. A light-emitting diode (LED) is used for the yarn break indicator lamp 14. Large lamps 15 are provided at the opposite ends of each ring type spinning machine 11. In this embodiment, the yarn break indicator lamps 14 and the large lamps 15 also function as the indicators that guide the worker to the spindle 12 at which a yarn break has occurred.

[0012] Each ring type spinning machine 11 has at each of the opposite longitudinal ends thereof two pairs of a first motion sensor 16 and a second motion sensor 17. Specifically, a pair of the first and the second motion sensors 16, 17 is provided on each of the opposite lateral sides of the ring type spinning machine 11. The first and the second motion sensors 16, 17 correspond to the position detectors that detect the position of the worker. In each pair of the first and the second motion sensors 16, 17, the first motion sensor 16 is disposed outward of the second motion sensor 17 and adjacent to the ends of the ring type spinning machine 11. Infrared sensors are used as the motion sensors 16, 17.

[0013] Each ring type spinning machine 11 has at one end thereof a control device 18. The control device 18 is connected to the yarn break sensor 13 via a signal line (not shown) through which the control device 18 receives yarn break detection signals of the yarn break sensor 13. Each control device 18 is connected to each of the motion sensors 16, 17 through signal lines (not shown) to receive motion detection signals from the motion sensors 16, 17. Having received motion detection signals from the first motion sensor 16 and then from the second motion sensor 17 in this order, the control device 18 determines that the worker has entered an aisle between the two adjacent ring type spinning machines 11. When the control device 18 receives motion detection signals from the second motion sensor 17 and then from the first motion sensor 16 in this order, on the other hand, the control device 18 determines that the worker has exited from the aisle between the two ring type spinning machines 11.

[0014] Each control device 18 is connected to a host computer 20 via a local area network (LAN) 19. The host computer 20 includes a CPU 21 and a memory 22. The

host computer 20 receives from the respective control devices 18 information on yarn break detection signals from the yarn break sensors 13 in each ring type spinning machine 11 and makes determination as to at which spindle 12 of which spinning machine 11 a yarn break has occurred, based on the yarn break detection signals. The host computer 20 also receives from the control device 18 information on motion detection signals from the motion sensors 16, 17 and makes determination as to along which ring type spinning machine 11 the worker is present, based on the motion detection signals.

[0015] The control devices 18 and the host computer 20 cooperate to form the controller of the present invention that controls the yarn break indicator lamps 14 and the large lamps 15 as the indicators of the present invention based on the position of a yarn break and the position of the worker. When a yarn break has occurred in any one of the ring type spinning machines 11, the host computer 20 instructs and causes the control device 18 of the ring type spinning machine 11 having the yarn break to turn on the large lamps 15 and blink the yarn break indicator lamp 14 of the spindle 12 at which the yarn break has occurred for prompting the worker to move to that spindle. In response to the instruction, the control device 18 turns on the large lamps 15 and the yarn break indicator lamp 14.

[0016] In the case that yarn breaks occurred in multiple ring type spinning machines 11 and the number of the yarn breaks or the number of the spindles having the yarn breaks is different among the ring type spinning machines 11, the host computer 20 outputs an instruction to the control device 18 of the ring type spinning machine 11 having the largest number of yarn breaks to control the large lamps 15 of the ring type spinning machine 11 and the yarn break indicator lamps 14 of the spindles 12 calling for yarn piecing service so that the worker is prompted to move preferentially to the ring type spinning machine 11 which has the largest number of yarn breaks.

[0017] In the case that yarn breaks occurred at multiple ring type spinning machines 11 and the number of the yarn breaks is the same among such ring type spinning machines 11, the host computer 20 outputs an instruction to the control device 18 of the ring type spinning machine 11 that is then closest to the worker to control the large lamps 15 of the ring type spinning machine 11 and the yarn break indicator lamps 14 of the spindles 12 having the yarn breaks so that the worker is prompted to move preferentially to the above ring type spinning machine 11 which has the largest number of yarn breaks.

[0018] The operation of the apparatus thus configured will next be described.

[0019] In a textile spinning plant, a large number of ring type spinning machines 11 are arranged side by side to each other and plural workers are allocated in the plant to attend to specified ring type spinning machines 11, respectively. In the following description, a worker is assigned to attend to, for example, six ring type spinning machines 11.

[0020] FIG. 2 shows a schematic view illustrating the operation of an apparatus according to the background art. During the operation of the ring type spinning machines 11, the yarn break sensor 13 in each of the spindles 12 monitors a yarn being spun to check for any yarn break. If a yarn break is detected by the yarn break sensor 13 at any spindle 12, the yarn break indicator lamp 14 of the spindle 12 having the yarn break (hereinafter designated as yarn-broken spindle 12A) is turned on and, at the same time, the large lamps 15 provided at the opposite ends of the ring type spinning machine 11 in which the yarn-broken spindle 12A is located are turned on. The large lamps 15 of the ring type spinning machines 11 having yarn breaks are turned on irrespective of the number of the yarn breaks. Referring to FIG. 2, there are installed, for example, six ring type spinning machines 11, as numbered from 1 to 6. If yarn breaks have occurred in the third to the fifth ring type spinning machines 11, as indicated by X, or specifically, if the third and the fourth ring type spinning machines 11 have one yarn break, respectively, and the fifth ring type spinning machine 11 has two yarn breaks, the large lamps 15 of the third to the fifth ring type spinning machines 11 having the yarn breaks are all turned on.

[0021] The worker who is then present at a position in an aisle indicated by a triangle in FIG 2, between the second and the third ring type spinning machines 11, notices the large lamps 15 of the third ring type spinning machine 11 being turned on. Then, the worker moves while checking to see whether the yarn-broken spindle 12A having its yarn break indicator lamp 14 being turned on is located on the side of the third ring type spinning machine 11 where the worker is present or on the opposite side of the third ring type spinning machine 11. The worker moves out of the aisle between the second and the third ring type spinning machines 11 and then enters the aisle between the third and the fourth ring type spinning machines 11 to check for any yarn break indicator lamp 14 being turned on on either of the facing sides of the third and the fourth ring type spinning machines 11. The worker having found the yarn-broken spindles 12A provides yarn piecing service for each of the yarn-broken spindles 12A. Therefore, despite its larger number of yarn-broken spindles 12A than the third and the fourth ring type spinning machines 11, the yarn piecing service for the yarn-broken spindles 12A in the fifth ring type spinning machine 11 is postponed.

[0022] Referring to FIG. 3 illustrating the operation of the apparatus for assisting in yarn piecing according to the present embodiment, the worker is present at a position in an aisle indicated by a rectangle between the second and the third spinning machines 11 and a plurality of yarn breaks has occurred, namely one yarn break in the third and the fourth ring type spinning machines 11, respectively, and two or more yarn breaks (two yarn breaks in FIG. 3) in the fifth ring type spinning machine 11. In the above case, according to the apparatus for assisting in yarn piecing of the present embodiment, not

all of the large lamps 15 of the ring type spinning machines 11 having the spindles 12A having the yarn breaks are turned on at the same time. While the ring type spinning machines 11 are in operation, the host computer 20 is informed of any yarn breaks in each of the ring type spinning machines 11 and the current position of the worker, based on the yarn break detection information from the yarn break sensors 13 and the motion detection information from the motion sensors 16, 17 in each of the ring type spinning machine 11. Then the host computer 20 (or the CPU 21) determines a preferential order according to which yarn breaks at respective yarn-broken spindles 12A in plural ring type spinning machines 11 should be remedied, that provides possibly the shortest average period of time during which the yarn-broken spindle 12A is left unremedied before the yarn piecing is all completed. For the worker to be guided to the respective yarn-broken spindles 12A whose yarn break need be remedied according to the preferential order, the host computer 20 (or the CPU 21) instructs and causes the control device 18 of the respective ring type spinning machines 11 having a yarn-broken spindle 12A to turn on the large lamps 15 and to blink the yarn break indicator lamps 14 to show the worker the direction to the yarn-broken spindle 12A calling for yarn piecing service.

[0023] When yarn breaks have occurred in multiple ring type spinning machines 11, the host computer 20 outputs an instruction to the control device 18 of the fifth spinning machine 11 that has the largest number of yarn breaks to turn on the large lamps 15 of the fifth spinning machine 11, as indicated by shaded circles in FIG. 3, so that the worker is preferentially guided to the fifth spinning machine 11. In order to guide the worker to the yarn-broken spindles 12A in the fifth spinning machine 11, the host computer 20 also outputs an instruction to the control device 18 of the fifth spinning machine 11 to turn on the yarn break indicator lamps 14 of the yarn-broken spindles 12A and also to sequentially blink the yarn break indicator lamps 14 of the other spindles 12 in the fifth spinning machine 11 in such a way that guides or directs the worker to the yarn-broken spindles 12A, as indicated by outlined arrows in the fifth spinning machine 11 in FIG. 3. In order to guide the worker to exit from the aisle between the second and the third spinning machines 11, the host computer 20 outputs an instruction to the control devices 18 of the second and the third spinning machines 11 to blink the yarn break indicator lamps 14 on the facing sides of the second and the third spinning machines 11 sequentially in opposite directions from an intermediate position where the worker is presumed to be positioned, for guiding or directing the worker toward either of the opposite ends of the ring type spinning machines 11, as indicated by outlined arrows in the second and the third spinning machines 11 in FIG. 3.

[0024] As a result of such instructions of the host computer 20, the large lamps 15 of the fifth ring type spinning machine 11 are turned on, and the yarn break indicator lamps 14 of the second, the third, and the fifth spinning

machines 11 are caused to blink. The worker is guided by the yarn break indicator lamps 14 of the second and the third spinning machines 11 to exit from the aisle between such two spinning machines 11 and then is guided by the large lamps 15 of the fifth spinning machine 11 to either of the opposite ends thereof. Subsequently, the worker is guided by the blinking yarn break indicator lamps 14 of the fifth spinning machine to the yarn-broken spindles 12A calling for yarn piecing service.

[0025] When the yarn piecing for the yarn-broken spindles 12A of the fifth spinning machine is completed, the third, the fourth, and the fifth spinning machines 11 have one yarn-broken spindle 12A, respectively. In such a case, the host computer 20 outputs an instruction to any appropriate control device 18 to turn on its associated large lamps 15 so that the worker is guided preferentially to the ring type spinning machine 11 that is at the closest distance from the current position of the worker. In the case of FIG. 3 in which the worker is then in the aisle between the fourth and the fifth spinning machines 11 after completion of yarn piecing operation at the yarn-broken spindles 12A in the fifth spinning machine 11, the host computer 20 outputs to the control device 18 of the fourth spinning machine a control instruction to turn on the yarn break indicator lamps 14 and the large lamps 15 of the fourth spinning machines 11 so that the worker is guided into the aisle between the third and the fourth spinning machines 11, that is, guided to the side of the fourth spinning machine 11 on which the yarn-broken spindle 12A is present. The host computer 20 also outputs to the control device 18 of the fifth spinning machine an instruction for causing the yarn break indicator lamps 14 of the fifth spinning machine to blink sequentially in the direction in which the worker is guided to exit from the aisle between the fourth and the fifth spinning machines 11. The worker guided by the blinking of the yarn break indicator lamps 14 exits from the aisle between the fourth and the fifth spinning machines 11, makes sure of the large lamps 15 of the fourth spinning machine 11 being turned on, and then checks the aisle between the fourth and the third spinning machines 11. Then, the worker is guided by the blinking of the yarn break indicator lamps 14 of the fourth spinning machine 11 to the yarn-broken spindle 12A calling for yarn piecing service.

[0026] When the worker has finished the yarn piecing at the yarn-broken spindle 12A in the fourth spinning machine 11, the host computer 20 outputs an instruction to control the large lamps 15 and the yarn break indicator lamps 14 so that the worker is guided to the yarn-broken spindle 12A of the third spinning machine 11. As shown in FIG. 3, the third spinning machine 11 has a yarn-broken spindle 12A at a position along the aisle between the third and the fourth spinning machines 11. The host computer 20 recognizes that the worker having completed the yarn piecing at the fourth spinning machine 11 is present in the aisle between the third and the fourth spinning machines 11. Therefore, the host computer 20 outputs to the control device 18 of the third spinning machine

11 a control instruction to turn on the large lamps 15 and the yarn break indicator lamp 14 of the yarn-broken spindle 12A and to blink the yarn break indicator lamps 14 of the remaining spindles 12 of the third spinning machine 11 sequentially in the direction in which the worker is guided to the yarn-broken spindle 12A. The worker is guided by the blinking yarn break indicator lamps 14 to the yarn-broken spindle 12A for yarn piecing.

[0027] The present embodiment offers the following effects.

(1) The apparatus for assisting in yarn piecing is adapted for use in a ring type spinning machine 11 that includes a yarn break detector (or the yarn break sensor 13) provided for each of the spindles 12 of the ring type spinning machine 11. The apparatus for assisting in yarn piecing further includes the position detector (or the motion sensors 16, 17) that detects the position of a worker attending to the ring type spinning machines 11 for yarn piecing operation, the indicators (or the yarn break indicator lamps 14 and the large lamps 15) that guide the worker to the spindle having a yarn break, and the controller (the host computer 20 and the control device 18) that controls the indicators based on the position of the spindle having the yarn break and the position of the worker.

According to the configuration, the controller recognizes the position of the worker based on a position detection signal from the position detector. If a yarn break occurs, the controller identifies the position of the spindle having the yarn break based on a yarn break detection signal from the yarn break detector and controls the indicators to show the worker the direction to the spindle having the yarn break. By thus guiding, the worker can move efficiently to a position where he/she can visibly confirm the lighting of the yarn break indicator lamp 14 of the yarn-broken spindle 12A without moving an unnecessary distance. Accordingly, waste of time which may be spent by the worker moving a distance that is longer than is necessary is reduced and the worker identifies precisely the yarn-broken spindle 12A.

(2) The indicators correspond to the yarn break indicator lamps 14. The yarn break indicator lamps 14 blink sequentially in a direction to show the worker the direction to the yarn-broken spindle 12A. Because the yarn break indicator lamps 14 mounted to the ring type spinning machines 11 are used as the indicators for guiding, no additional indicator dedicated to guiding is needed.

(3) The indicators are controlled so as to guide the worker preferentially to the ring type spinning machine having the largest number of yarn breaks. When yarn breaks occurred at multiple ring type spinning machines and the number of yarn breaks is different among the ring type spinning machines, the worker is guided preferentially to the ring type

spinning machine having the largest number of yarn breaks. Therefore, the average time during which the yarn-broken spindles 12A are left unremedied is shortened.

(4) When the number of yarn breaks is the same among the multiple ring type spinning machines, the indicators are controlled so as to guide the worker preferentially to the ring type spinning machine that is then closest to the worker. In the above case, when the number of yarn breaks is the same among the multiple ring type spinning machines, if the yarn piecing is provided at a yarn-broken spindle of a ring type spinning machine that is furthest from the worker, the time spent by the worker for moving to the yarn piecing position becomes longer, and the average time during which the yarn-broken spindles 12A are left unremedied becomes longer accordingly, as compared with the case that the yarn piecing is provided in the ring type spinning machine that is closest to the worker. However, in this embodiment in which the indicators are controlled so as to guide the worker preferentially to the ring type spinning machine that is closest to the worker, the average time during which the yarn-broken spindles 12A are left unremedied is shortened.

[0028] The present invention is not limited to the above embodiments, but may variously be modified as follows.

[0029] Instead of connecting the control devices 18 of the respective ring type spinning machines 11 to the host computer 20, it may be so configured that the control devices 18 are connected to one another via communication device and one of the control devices 18 serves as the host computer.

[0030] A radio frequency identification (RFID) system may be provided at the ends of the respective ring type spinning machines 11 so that the workers for providing yarn piecing service are discriminated from the workers assigned, for example, to roving replacement. By having the workers for yarn piecing carry an RFID tag with him/her, recognition of the workers for yarn pieces may be accomplished with high precision.

[0031] As the indicator for guiding the worker along the longitudinal direction of the ring type spinning machines 11, other indicators, such as indicator lamps showing an arrow, may be provided instead of the yarn break indicator lamps 14.

[0032] As the indicators for guiding the worker along the longitudinal direction of the ring type spinning machines 11, a plurality of ordinary indicator lamps, e.g. lamps with no signs like an arrow, may be provided as the yarn break indicator lamps 14 and controlled and operated to blink sequentially in the direction for guiding the worker to the yarn-broken spindle 12A. The interval at which such indicator lamps are arranged may be larger than the interval at which the spindles 12 are disposed.

[0033] As shown in FIG. 4, two large lamps 15 may be provided at each of the opposite ends of the respective

ring type spinning machine 11 along the width thereof. In this case, the illumination of the large lamps 15 informs the worker of which side of the ring type spinning machine 11 has a yarn break.

[0034] The global positioning system (GPS) may be used for locating the position of the worker.

[0035] It may be so configured that the host computer 20 starts estimation of the position of the worker when it is confirmed that the worker has entered into an aisle between the ring type spinning machines 11 at least either one of which includes a yarn-broken spindle 12A based on motion detection signals from the motion sensors 16, 17. Specifically, the position of the worker may be estimated based on a predetermined moving speed of the worker and the time elapsed after the entrance of the worker into the aisle. In the case that the machine frame of the ring type spinning machine 11 is long, the host computer 20 may output to the control device 18 a control instruction so that only selected yarn break indicator lamps 14 near the worker blink sequentially instead of driving all of the yarn break indicator lamps 14 except the one for the yarn-broken spindle 12A, which reduces the power consumption for driving the yarn break indicator lamps 14.

[0036] According to the present invention, the motion sensors are not limited to infrared sensors, but electrostatic capacitance sensors may be used.

[0037] The ring type spinning machines are not limited to the ring type spinning machines 11, but the apparatus of the present invention is also applicable to ring twisting machines.

[0038] Determination as to whether the worker has entered or exited from an aisle may be made based on motion detection signals from only one pair of motion sensors 16, 17 disposed at each of the ring type spinning machines 11, instead of two pairs of such motion sensors 16, 17 as in the embodiment shown FIG. 1. Specifically, the entrance and exit of the worker into and out of an aisle between any two adjacent spinning machines may be determined based on the order of motion detection signals received from the motion sensors 16, 17 at the opposite ends of the ring type spinning machine 11. More specifically, upon receipt of a first motion detection signal from the motion sensors 16, 17, the host computer 20 determines that the worker has entered an aisle, and determines that the worker has exited from the aisle when a second motion detection signal is received.

[0039] An apparatus for assisting in yarn piecing in a ring type spinning machine (11) having a plurality of spindles (12) and a plurality of yarn break detectors (13) provided for the respective spindles (12) includes a position detector (16, 17) that detects a position of a worker who provides yarn piecing service, a plurality of indicators (14, 15) that guides the worker to a position of one of the spindles (12A) having a yarn break, and a controller (18, 20) that controls the indicators (14, 15) based on the position of the spindle (12A) having the yarn break and the position of the worker.

Claims

1. An apparatus for assisting in yarn piecing in a ring type spinning machine (11) having a plurality of spindles (12) and a plurality of yarn break detectors (13) provided for the respective spindles (12), **characterized by** comprising:

a position detector (16, 17) that detects a position of a worker who provides yarn piecing service;

a plurality of indicators (14, 15) that guides the worker to a position of one of the spindles (12A) having a yarn break; and

a controller (18, 20) that controls the indicators (14, 15) based on the position of the spindle (12A) having the yarn break and the position of the worker.

2. The apparatus for assisting in yarn piecing according to claim 1, **characterized in that** the indicators (14, 15) are yarn break indicator lamps (14) provided for the respective spindles (12), and the controller (18, 20) controls the yarn break indicator lamps (14) to blink sequentially in a direction in which the worker is guided to the position of the spindle (12A) having the yarn break.

3. The apparatus for assisting in yarn piecing according to claim 1 or 2, **characterized in that**, when a plurality of the yarn breaks occurs at a plurality of the ring type spinning machines (11), the controller (18, 20) controls the indicators (14, 15) to guide the worker preferentially to the ring type spinning machine (11) having the largest number of the yarn breaks.

4. The apparatus for assisting in yarn piecing according to claim 1 or 2, **characterized in that**, when a plurality of the yarn breaks occurs at a plurality of the ring type spinning machines (11) and the number of the yarn breaks is the same among the ring type spinning machines (11), the controller (18, 20) controls the indicators (14, 15) to guide the worker preferentially to the ring type spinning machine (11) that is closest to the worker.

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FIG. 1A

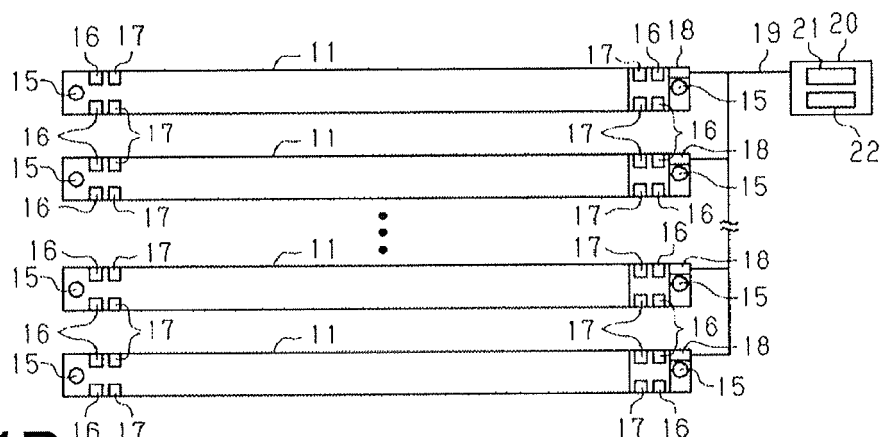


FIG. 1B

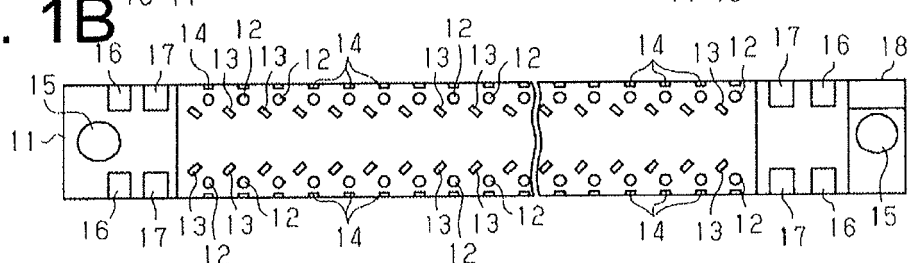
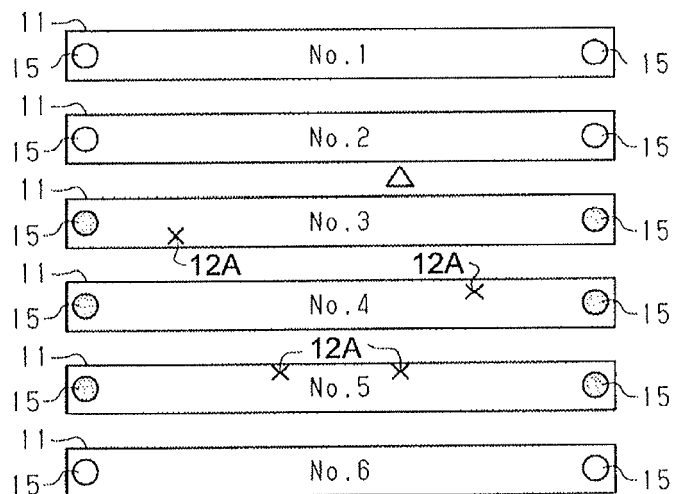


FIG. 2



Background Art

FIG. 3

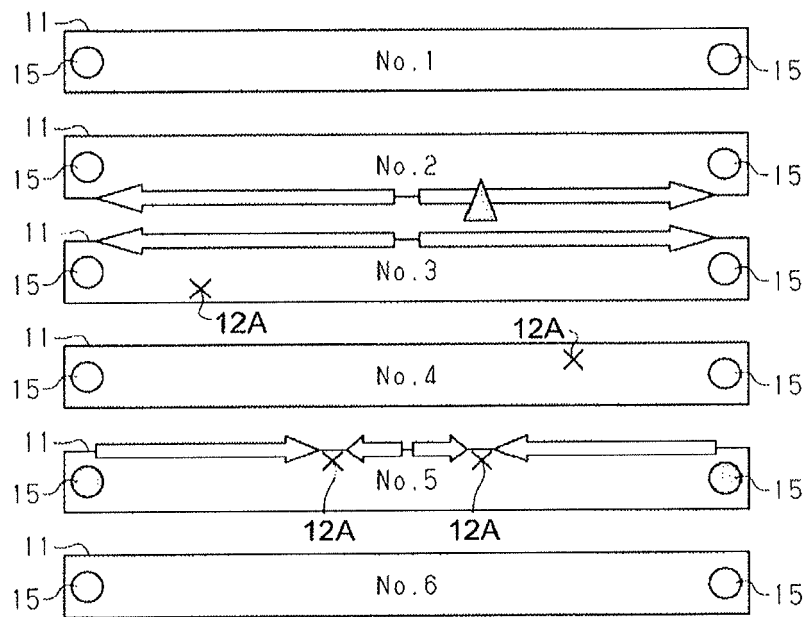
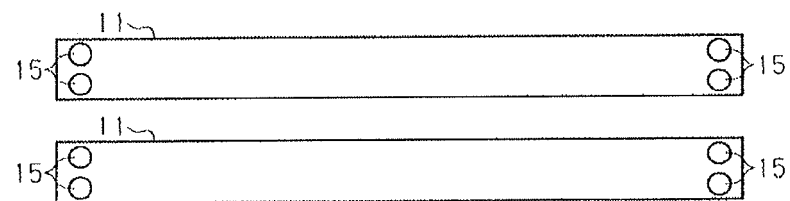


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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