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(54) **Abnormality detecting device for drafting device of spinning machine**

(57) A drafting device 11 drives front bottom rollers 12, middle bottom rollers 13, and back bottom rollers 14 each by two motors: front roller driving motors 16a and 16b, middle roller driving motors 17a and 17b, and back roller driving motors 18a and 18b. The driving motors are variable-speed-controlled through inverters 19a, 19b, etc. , which are provided with current sensors SA. The current sensors SA detect the amount of electric current supplied in correspondence with the load torques of the driving motors 16a, 16b, etc. A CPU 31 judges that there is abnormality when the difference between the load torques of the two motors driving each back roller is deviated from a set range.

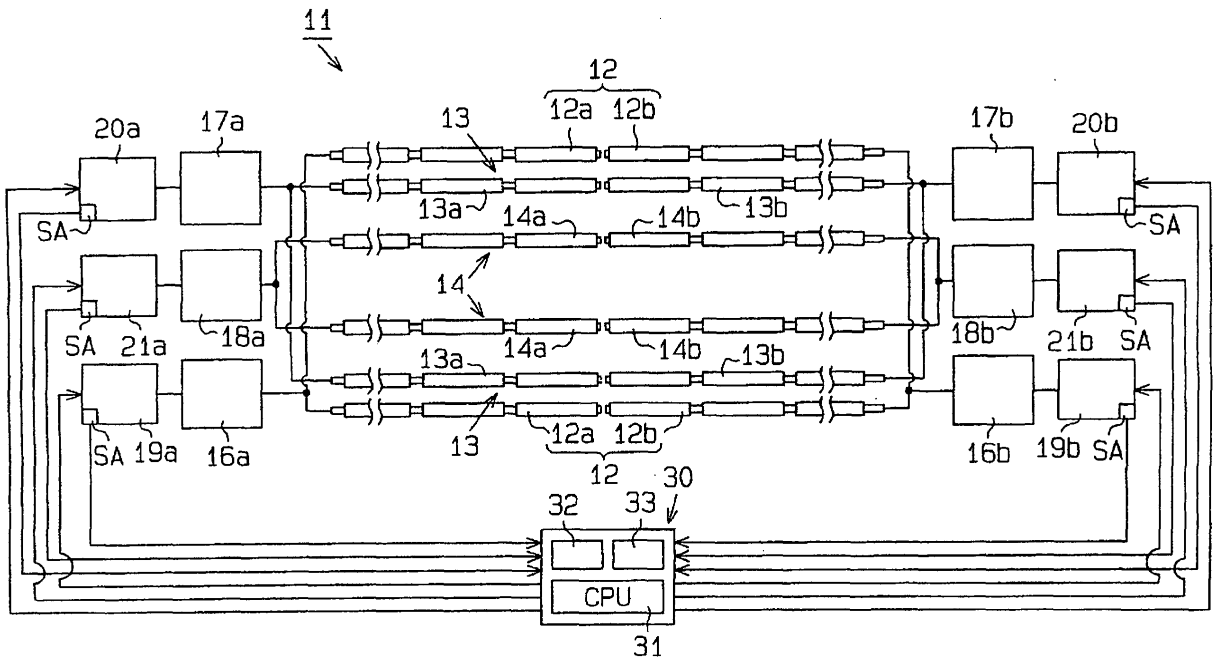

Fig. 1

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Description

Background of the Invention

Field of the Invention

[0001] The present invention relates to an abnormality detecting device for a drafting device of a spinning machine, and more specifically, to an abnormality detecting device for a drafting device of a spinning machine of the type in which the drafting rollers are driven by a plurality of motors.

Description of the Related Art

[0002] Generally speaking, a drafting device used in a spinning machine such as a ring fine spinning machine or a roving machine, is of a three-line type which consists of front, middle, and back rollers, in which front bottom, middle bottom, and back bottom rollers are driven by a single motor. Apart from this, there exists a device in which, in order to facilitate draft ratio change, the front bottom roller and the back bottom roller are respectively driven by separate motors, and a device which exhibits a large machine length as a result of an increase in the number of spindles, in which motors are provided at both ends of the machine, the bottom roller being driven from both sides of the machine.

[0003] In a drafting device of this type, it can occur, for some reason or other, that the supplied material is wound around the drafting roller, or that the apron is caught by the drafting roller. In such cases, when the driving is continued, there is the danger of the components of the drafting device being damaged.

[0004] When winding of the supplied material around the drafting roller, etc. as described above occurs, an excessive load is applied to the motor, and an over-current flows through the motor, resulting in a temperature rise. Conventionally, such an over-current or an increase in motor temperature to a degree not lower than a predetermined temperature is detected, and the operation of the machine is stopped, thereby preventing breakage of the components. However, in the abnormality detecting method, even when there is abnormality on the drafting device side, the driving of the motor is continued as long as the motor is not in an overload state, causing a fear of the components of the drafting device being damaged. Such a situation occurs, for example, when the same motor is mounted in machines of different specifications, and depending on the machine specifications, the load on the drafting device in an overload state can be smaller than the permissible motor load (see, for example, JP 2003-166135 A paragraphs [0004] through [0006], Fig. 1).

[0005] Further, generally speaking, of the drafting rollers, the bottom roller is formed as a single line shaft by connecting together a plurality of roller shafts through threaded engagement of male and female screw portions formed at the ends thereof. Depending upon the direction of the load received by the bottom roller, the screw direction is determined so as to effect fastening. However, it can happen that a loosening force is applied to the threaded engagement of the screw portions due to fluctuations in drafting force, etc., resulting in generation of looseness in the screw portions. When looseness is generated, drafting cannot be performed at a predetermined draft ratio. In this state, the load on the motor is smaller than that during normal spinning. Thus, it is impossible to detect abnormality through detection of motor over-current or motor temperature.

[0006] As a method of solving the above problem, it might be possible to previously detect the load on the motor in normal spinning state through test run, store the obtained value in a storage device as a reference value, detect the load on the motor during actual spinning, compare the obtained value with the above reference value, and judge that there is abnormality when the difference exceeds a pre-set amount. However, the load on the motor may differ depending on the spinning conditions. For example, when the spinning rate is the same, the load on the motor differs between the spinning of cotton fiber and the spinning of synthetic fiber. Further, the load on the motor differs depending on the yarn count. Thus, it is necessary to store the reference values in correspondence with the spinning conditions.

Summary of the Invention

[0007] The present invention has been made in view of the above problems. It is an object of the present invention to provide an abnormality detecting device for a drafting device of a spinning machine which can detect generation of abnormality in the drafting device during spinning with a simple construction without need for storing a strict reference value.

[0008] To achieve the above object, there is provided, in accordance with the present invention, an abnormality detecting device for a drafting device of a spinning machine in which drafting rollers are driven by a plurality of motors. The abnormality detecting device is equipped with a torque detecting means for detecting the load torques of at least two of the plurality of motors, and a judging means which judges there is abnormality when the difference between the load torques of the two motor is deviated from a set range.

Brief Description of the Drawings

[0009]

Fig. 1 is a schematic plan view of a drafting device according to a first embodiment with top rollers omitted;

Fig. 2 is a plan view, partially in section, of how roller shafts are connected together; and

Fig. 3 is a schematic plan view of a drafting device according to a second embodiment with top rollers omitted.

Description of the Preferred Embodiment

(First Embodiment)

[0010] In the following, the first embodiment, which is applied to a ring fine spinning machine equipped with a pair (right and left) of drafting devices, will be described with reference to Figs. 1 and 2. Fig. 1 is a schematic plan view of a drafting device according to the first embodiment with a top roller omitted, and Fig. 2 is a plan view, partially in section, of how roller shafts are connected together.

[0011] As shown in Fig. 1, a drafting device 11 is of a three-line type construction, comprising a front line, a middle line, and a back line, and is equipped with front bottom rollers 12, middle bottom rollers 13, and back bottom rollers 14 as drafting rollers. The front bottom rollers 12 are supported at predetermined positions with respect to a roller stand (not shown), and the middle bottom rollers 13 and the back bottom rollers 14 are supported through the intermediation of support brackets (not shown) secured in position so as to allow longitudinal positional adjustment with respect to the roller stand. The middle bottom rollers 13 are equipped with an apron (not shown). Further, in correspondence with the bottom rollers 12 through 14, front top, middle top, and back top rollers (none of which are shown) are provided in a well-known construction.

[0012] Each of the bottom rollers 12 through 14 is divided into two line shafts 12a and 12b, 13a and 13b, and 14a and 14b, and respective two line shafts 12a and 12b, 13a and 13b, 14a and 14b, are arranged coaxially. In this embodiment, each of the bottom rollers 12 through 14 is divided at the longitudinal center, and each two line shafts 12a and 12b, 13a and 13b, 14a and 14b, is formed symmetrically. As shown in Fig. 2, each line shaft is formed by connecting a plurality of roller shafts 15 with each other through threaded engagement of male screw portions 15a and female screw portions 15b formed at the ends thereof. Fig. 2 shows the line shaft 12a of the front bottom roller 12.

[0013] Of the pair (right and left) of front bottom rollers 12, a pair of line shafts 12a situated on the left-hand side in Fig. 1 are driven by a first front roller driving motor 16a from one end of the machine, and a pair of line shafts 12b situated on the right-hand side in Fig. 1 are driven by a second front roller driving motor 16b from the other end of the machine. The rotation of the first front roller driving motor 16a is transmitted to each line shaft 12a through a gear row (not shown), and the rotation of the second front roller driving motor 16b is transmitted to each line shaft 12b through a gear row (not shown).

[0014] Similarly, of the pair (right and left) of middle bottom rollers 13, a pair of line shafts 13a situated on the left-hand side in Fig. 1 are driven by a first middle roller driving motor 17a from one end of the machine, and a pair of line shafts 13b situated on the right-hand side in Fig. 1 are driven by a second middle roller driving motor 17b from the other end of the machine. The rotation of the first middle roller driving motor 17a is transmitted to each line shaft 13a through a gear row (not shown), and the rotation of the second middle roller driving motor 17b is transmitted to each line shaft 13b through a gear row (not shown).

[0015] Similarly, of the pair (right and left) of back bottom rollers 14, a pair of line shafts 14a situated on the left-hand side in Fig. 1 are driven by a first back roller driving motor 18a from one end of the machine, and a pair of line shafts 14b situated on the right-hand side in Fig. 1 are driven by a second back roller driving motor 18b from the other end of the machine. The rotation of the first back roller driving motor 18a is transmitted to each line shaft 14a through a gear row (not shown), and the rotation of the second back roller driving motor 18b is transmitted to each line shaft 14b through a gear row (not shown).

[0016] As the driving motors 16a, 16b, 17a, 17b, 18a, and 18b, there are used variable-speed motors that are drive-controlled through inverters 19a, 19b, 20a, 20b, 21a, and 21b, respectively. The inverters 19a, 19b, 20a, 20b, 21a, and 21b are controlled by a control device 30. Each of the inverters 19a, 19b, 20a, 20b, 21a, and 21b inputs a direct current obtained through conversion of commercial power by an AC/DC converter (not shown), outputting an electric current corresponding to the load to rotate the driving motors 16a, 16b, 17a, 17b, 18a, and 18b at a predetermined RPM. Each of the inverters 19a, 19b, 20a, 20b, 21a, and 21b is equipped with a current sensor SA for detecting the amount of electric current (motor current amount) flowing through each of the driving motors 16a, 16b, 17a, 17b, 18a, and 18b. The amount of electric current supplied to a motor is in proportion to the load torque of the motor, so that the current sensor SA functions as a torque detecting means for indirectly detecting the load torque of the motor.

[0017] The control device 30 is equipped with a CPU (central processing unit) 31, a ROM 32, a RAM 33, an input device, and an input/output interface (not shown). The control device 30 is electrically connected to the current sensors SA of the inverters 19a, 19b, 20a, 20b, 21a, and 21b. The CPU 31 controls the driving motors 16a, 16b, etc. through the inverters 19a, 19b, etc.

[0018] Based on the output signals of the current sensors SA, the CPU 31 as the judging means obtains the load torque difference between the two front roller driving motors 16a and 16b, the load torque difference between the two middle roller driving motors 17a and 17b, and the load torque difference between the two back roller driving motors 18a and 18b. Then, the CPU 31 makes a judgment as to whether the differences are deviated from a set range or not, and when the differences are deviated therefrom, judges that there is abnormality.

Here, the "set range" refers to a value obtained by adding a permissible error to the load torque fluctuation amount attributable to the unevenness in thickness, or the like of the supplied material (roving) , and is previously obtained through test. The set range is not changed according to the spinning yarn count or the fiber type but is set to a common range.

[0019] Further, the CPU 31 also controls motors (not shown) for driving a lifting drive system and a spindle drive system, and the control device 30 also functions as the control device for the fine spinning machine. When it is determined that there is abnormality, the CPU 31 effects control so as to stop the operation of the fine spinning machine.

[0020] The ROM 32 stores program data, and various items of data necessary for the execution thereof. The program data includes correspondence data between spinning conditions and rotating speeds, a map, etc. The correspondence data are ones between the spinning conditions, such as various fiber materials, spinning yarn count, and twist number, and the spindle rotating speed during normal operation and the motor rotating speed of a draft drive system and the lifting drive system. The map indicates the relationship between RPM and current supply amount for various winding amounts. Further, the ROM 32 stores the range of supply current amount corresponding to the load torque during normal operation. When, as abnormality in the drafting device 11, looseness is generated in the roller shaft 15 constituting the line shaft 12a, etc., this value is used to make a judgment as to on which side of the line shaft the abnormality has been generated.

[0021] The RAM 33 temporarily stores data inputted by the input device, computation results obtained by the CPU 31, etc. The input device is used to input the spinning condition data, such as the spinning yarn count, fiber type (material), maximum spindle RPM during spinning operation, spinning length, lift length, chase length, and the length of the bobbin used.

[0022] Next, the operation of the device constructed as described above will be described. Prior to the operation of the fine spinning machine, the spinning conditions, such as the fiber material, spinning yarn count, and twist number, are inputted to the control device 30 by the input device. When the operation of the fine spinning machine is started, the rotation of the driving motors 16a, 16b, 17a, 17b, 18a, and 18b is controlled through the inverters 19a, 19b, 20a, 20b, 21a, and 21b based on a command from the control device 30 and in conformity with the spinning conditions. Further, the driving motors of the spindle drive system and the lifting drive system are controlled so as to attain a predetermined rotating speed.

[0023] When the fine spinning machine is operated, the roving passes the intervals between the back, middle, and front rollers of the drafting device 11 to be thereby drafted, and is then taken up on a bobbin, which is integrally rotated with the spindle, in a take-up portion (not shown).

[0024] The amount of electric current supplied to the driving motors 16a, 16b, etc. as detected by the current sensors SA of the inverters 19a, 19b, etc. is inputted to the control device 30. The CPU 31 makes a judgment as to whether or not there is any deviation from the set range of the difference between the amounts of electric current supplied to the two driving motors driving the same drafting rollers, that is, the first and second front roller driving motors 16a and 16b, the first and second middle roller driving motors 17a and 17b, and the first and second back roller driving motors 18a and 18b. When there is any deviation, it is determined that there is abnormality, and an abnormality signal is outputted. Based on the abnormality signal, operation stop control for the machine is executed, and an informing means, such as a buzzer or an alarm lamp, is driven, whereby the operator is informed of the alarm condition.

[0025] The amount of electric current supplied to the driving motors 16a, 16b, 17a, 17b, 18a, and 18b is in proportion to the magnitude of the load torque. Further, the load torque of each drafting roller is substantially fixed within a range corresponding to the unevenness in roving thickness unless the spinning material and drafting ratio are changed. In the drafting device 11, the front bottom rollers 12, the middle bottom rollers 13, and the back bottom rollers 14 are divided into two at the longitudinal center, with each being driven by two driving motors. Thus, when there is no abnormality in spinning, the load torque difference between the two motors driving each category of bottom rollers 12 through 14, for example, the load torque difference between the first front roller driving motor 16a and the second front roller driving motor 16b, is small and within the set range, with the difference between the amounts of electric current supplied to the two driving motors 16a and 16b being also within the set range. However, when abnormality, such as winding of roving around the drafting rollers or gripping of the apron, is generated, and the load torque for driving the drafting rollers increases, the load torque of the driving motors also increases, with the result that the difference is deviated from the set range. When such abnormality were simultaneously generated at positions symmetrical with respect to the longitudinal center of the drafting rollers, abnormality could not be detected by the difference between the amounts of electric current supplied to the two driving motors 16a and 16b, etc. However, the possibility of occurrence of such a situation is very low. Thus, even when the driving motors 16a, 16b, 17a, 17b, 18a, and 18b do not attain an over-load state, it is possible to detect abnormality in the load of the drafting rollers.

[0026] This embodiment provides the following effects:

(1) The load torque of two of the plurality of motors (the driving motors 16a, 16b, etc.) for driving the drafting rollers (the front bottom rollers 12, the mid-

dle bottom rollers 13, and the back bottom rollers 14), is detected by the torque detecting means, and there is provided a judgment means (CPU 31), which judges that there is abnormality when the difference between the load torque of the two motors is deviated from a set range. When the spinning conditions are changed, the changing amount of the difference between the load torque is small, so that it is possible to make an accurate judgment as to whether there is any abnormality or not through comparison of a common reference range with the detected load torque difference without need for setting a reference value for a judgment as to whether there is any abnormality or not in the spinning for each spinning condition. As a result, it is possible to detect generation of abnormality in the drafting device 11 during spinning with a simple construction without need for storing a strict reference value.

(2) The two motors are the motors (the driving motors 16a, 16b, etc.) for driving the drafting rollers (the front bottom rollers 12, etc.) that are driven from both sides. Thus, it is possible to detect abnormality in the drafting device 11 during spinning with a simple construction without need for storing a strict reference value.

(3) The drafting rollers (the front bottom rollers 12, etc.) are divided into two at the longitudinal center, and CPU 31 compares load torques of the two motors driving the drafting rollers 12 through 14 in the same line. Thus, based on whether the detected difference between the load torque is negative (minus) or positive (plus), it is possible to identify the side of the line shafts (the line shafts 12a, 12b, etc.) on which abnormality has been generated. Generally speaking, when there is abnormality, the torque for driving the line shafts on the abnormality generation side increases. In this embodiment, however, the line shafts 12a, 12b, etc. are driven from one side, and the other ends thereof are formed as free ends, so that looseness can be generated in screw portions of the roller shafts 15 forming the line shafts 12a, 12b, etc. In this case, the load torque of the driving motor for the line shaft in which looseness has been generated is reduced, so that a judgment that abnormality has been generated on the side where the load torque is relatively large would be an erroneous judgment. In this embodiment, however, the range of supply current corresponding to the load torque during normal operation is stored. Thus, when making a judgment as to whether there is abnormality or not, the CPU 31 also makes a judgment as to whether the load torque is smaller than that in the normal state or not from the output signals of the current sensors SA of the inverters 19a, 19b, etc. Accordingly, based on the judgment result, it is possible to correctly judge the line shaft side where the abnormality has been generated. When the load torque is smaller than the value thereof in the normal state, it is determined that abnormality has been generated on the side of the drafting rollers driven by the motors whose load torque is smaller. Further, it is also possible to make a judgment as to whether any abnormality is one involving an increase in load torque or one involving a reduction therein.

(4) Two driving motors are provided for each category of bottom rollers: the front bottom rollers 12, the middle bottom rollers 13, and the back bottom rollers 14, so that it is possible to identify the category of bottom rollers in which abnormality has been generated, thus making it easier for the operator to locate the portion in the abnormal state.

(Second Embodiment)

[0027] Next, the second embodiment will be described with reference to Fig. 3. This embodiment differs from the first embodiment in that all the bottom rollers 12 through 14 are each formed of a single line shaft 12c, 13c, 14c, and each of the front bottom roller 12, the middle bottom roller 13, and the back bottom roller 14 is driven from both sides by two motors. The portions that are the same as those of the first embodiment are indicated by the same reference numerals, and a detailed description thereof will be omitted, the description being centered on the differences.

[0028] The bottom rollers 12 through 14 constituting the drafting device 11 extend parallel to each other between gear boxes 22 and 23. One gear box 22 contains a gear row (drive gearing) (not shown) which transmits to the right and left bottom rollers 12 through 14 the rotation of a driving shaft 26 to which the rotation of a first driving motor 24a is transmitted through a belt transmission mechanism 25. The other gear box 23 also contains a gear row (drive gearing) (not shown) which transmits to the right and left bottom rollers 12 through 14 the rotation of a driving shaft 26 to which the rotation of a second driving motor 24b is transmitted through a belt transmission mechanism 25.

[0029] The first and second driving motors 24a and 24b are connected to inverters 27a and 27b, and are variable-speed-controlled by the control device 30 through the inverters 27a and 27b. The inverters 27a and 27b input a direct current obtained through conversion of commercial power by an AC/DC converters (none of which are shown), and, in order to rotate the driving motors 24a and 24b at a predetermined RPM, supply an electric current corresponding to the load to the driving motors 24a and 24b. The inverters 27a and 27b are equipped with current sensors SA as the torque detecting means for detecting the amounts of electric current supplied to the driving motors 24a and 24b.

[0030] In this embodiment, during operation of the drafting device 11, the load torques acting the two driving motors 24a and 24b are indirectly detected by the current sensors SA. In the construction in which the front bottom rollers 12, the middle bottom rollers 13, and the back bottom rollers 14 are driven from both sides of the machine, unless abnormality such as winding of fibers is generated in the drafting device 11, the loads acting on the two driving motors 24a and 24b are equivalent to each other, and the load torque difference is within a set range. When abnormality such as winding of fibers around a drafting roller is generated, the values of the load torques acting on the first and second driving motors 24a and 24b differ according to the difference in the distance between the position of occurrence of the abnormality and the drafting roller end.

[0031] The CPU 31 constantly monitors to check whether the load torque difference is deviated from the set range or not based on the output signals from the current sensors SA of the inverters 27a and 27b. When the load torque difference is deviated, it is determined that there is abnormality, and an abnormality signal is outputted. Based on the abnormality signal, operation stop control is executed on the machine, and an informing means is driven to inform the operator of an alarm condition.

[0032] In addition to the same effects as the effects (1) and (2) of the first embodiment described above, this embodiment provides the following effects:

(5) Since all the bottom rollers 12, 13, and 14 are driven by the two driving motors 24a and 24b, simplification in construction is attained as compared with that of the first embodiment.

(6) Since the bottom rollers 12, 13, and 14 are each formed of a single line shaft 12c, 13c, 14c, and are driven from both sides, no looseness is generated in the roller shafts 15 forming the line shafts. Thus, there is no need to store the range of supply current amount corresponding to the load torque for normal operation, so that it is possible to exclude generation of looseness in the roller shafts 15 forming the line shaft 12a, etc. as abnormality in the drafting device 11.

[0033] The present invention is not restricted to the above embodiments but may be embodied, for example, as follows:

[0034] In the first embodiment, it is possible not to store the range of supply current amount corresponding to the load torque for normal operation, and to omit the judgment as to whether the load torque is smaller than the value during normal operation or not. In this case also, generation of abnormality can be accurately detected.

[0035] In dividing the draft rollers into two in the longitudinal direction, the dividing position is not restricted to the center. When the division into two is effected at a position deviated from the center, a load torque in proportion to the lengths of the line shafts and the number of spindles is applied to each of the two motors driving the drafting rollers, so that there is a difference in the load torques between the two motors in the normal state. Thus, by using a permissible deviation amount from the difference as the set range, it is possible to make a judgment as to whether there is abnormality or not as in the case of the first embodiment.

[0036] As an electric current amount detecting means for detecting the amount of electric current supplied to the driving motors 16a, 16b, etc., it is possible to use, instead of the current sensors SA, which directly detect electric current amount, sensors detecting a voltage corresponding to the electric current amount.

[0037] As the torque detecting means for detecting the load torque acting on the driving motors 16a, 16b, etc., it is also possible toprovide, instead of the construction in which the amount of electric current supplied to the driving motors 16a, 16b, etc. is detected, a torque detecting means for detecting a change in torque in the rotating portions between the output shafts of the driving motors 16a, 16b, etc. and the side end portions of the drafting roller driving motors. As the torque detecting means, a torque converter or the like is used. The torque converter converts torque to an electric signal (e.g., voltage). Further, it is also possible to attach strain gauges to the ends of the drafting rollers on the driving motors 16a, 16b side to detect the load torques of the drafting rollers. In these constructions, it is possible to directly detect the load torques. Since the portions of detection are the rotating portions from the driving motor side end portions of the drafting rollers to the output shafts of the driving motors, it is possible to reliably detect the loads on the drafting rollers.

[0038] The means for monitoring the difference between the load torques acting on the driving motors 16a, 16b, etc. and judging that there is abnormality when the difference between the load torques is deviated from the set range, is not restricted to the construction using the CPU 31. For example, it is also possible to use a comparator in making a judgment as to whether the difference between the load torques acting on the driving motors 16a, 16b, etc. is deviated from the set range or not. Further, it is also possible to make a judgment as to whether there is any abnormality or not by comparing the difference between voltage values or current values, which is the output signal of the torque converter, with a reference value by the comparator.

[0039] The present invention is not restricted to the construction in which the set range for use in the comparison with the difference between the load torques acting on the driving motors 16a, 16b, etc. is previously stored as data in the ROM 32, etc. of the control device 30; it is also possible to store the same in the RAM 33 by the input device.

[0040] The present invention is not restricted to the construction in which the bottom rollers 12 through 14 are driven from both sides of the machine by the driving motors 16a, 16b, etc., respectively; it is also possible to drive part of the bottom rollers (for example, the middle bottom rollers 13) from both sides of the machine, driving the remaining bottom rollers from one side of the machine.

[0041] Instead of the construction in which the drafting rollers in the same line are driven by two motors, it is also possible to adopt a construction in which the drafting rollers in the same line are driven by one motor while drafting rollers in the different lines are respectively driven by separate motors, abnormality being detected by making a judgment as to whether the difference between the load torques of the motors is deviated from a set range or not. For example, it is possible to drive the front bottom rollers 12 by a single driving motor, and to drive the middle bottom rollers 13 and the back bottom rollers 14 by a single driving motor, in which, when the difference between the load torques of the two driving motors is deviated from a set range, it is determined that there is abnormality. Also, in the first embodiment, differences between lord torques of motors driving drafting rollers in different lines may be used for abnormality detection.

[0042] Instead of immediately stopping the operation of the spinning machine by the control device 30, upon output of an abnormality detection signal from the abnormality detecting device, it is also possible to perform control so as to stop the operation of the spinning machine at the point when the abnormality detection signal has continued for a predetermined period of time. In this case, when the load torque abnormality is of a transient nature, there is no need to stop or re-start the machine.

[0043] The drafting device 11 is not restricted to the three-line type; it may also be a device having four or more drafting rollers on one side.

[0044] As the motors for driving the drafting rollers, it is also possible to use servo motors instead of the motors controlled through inverters.

[0045] The present invention is not restricted to a ring fine spinning machine. The present invention may be applied to other spinning machines such as a ring fine spinning machine which spins a spun yarn directly without making a roving by drafting a sliver, a binding spinner, or a roving machine.

[0046] In the present invention, the judgment means identifies a drafting roller in which abnormality has been generated based on the actual difference between the load torques of the two motors and on the difference between the load torques of the motors with respect to the load torque thereof in the normal state. In the present invention, when making an abnormality judgment from the difference between the load torques of the two motors, the judgment means makes a judgment as to the load torque of which motor is deviated from the normal value based on the difference between the load torque of each motor in the normal state, whereby it is possible to identify more accurately the drafting roller in which abnormality has been generated.

Claims

1. An abnormality detecting device for a drafting device (11) of a spinning machine comprising a plurality of lines in which drafting rollers (12, 13, 14) are driven by a plurality of motors (16a, 16b, 17a, 17b, 18a, 18b) and in which a torque detecting means (SA) for detecting the load torques of at least two of the plurality of motors (16a, 16b, 17a, 17b, 18a, 18b) is provided,

   characterized in that the abnormality detecting device is provided with a judgment means (31) for judging that there is abnormality when the difference between the load torques of the two motors is deviated from a set range.

2. An abnormality detecting device for a drafting device (11) of a spinning machine according to Claim 1, wherein the spinning machine is a fine spinning machine further comprising drafting rollers (12, 13, 14) driven from both sides,

   characterized in that the two motors are motors driving the drafting rollers (12, 13, 14) in a same line thereof from both sides, and

   the judgment means (31) compares load torques of the two motors driving the drafting rollers (12,13,14) in the same line.

3. An abnormality detecting device for a drafting device (11) of a spinning machine according to Claim 2,

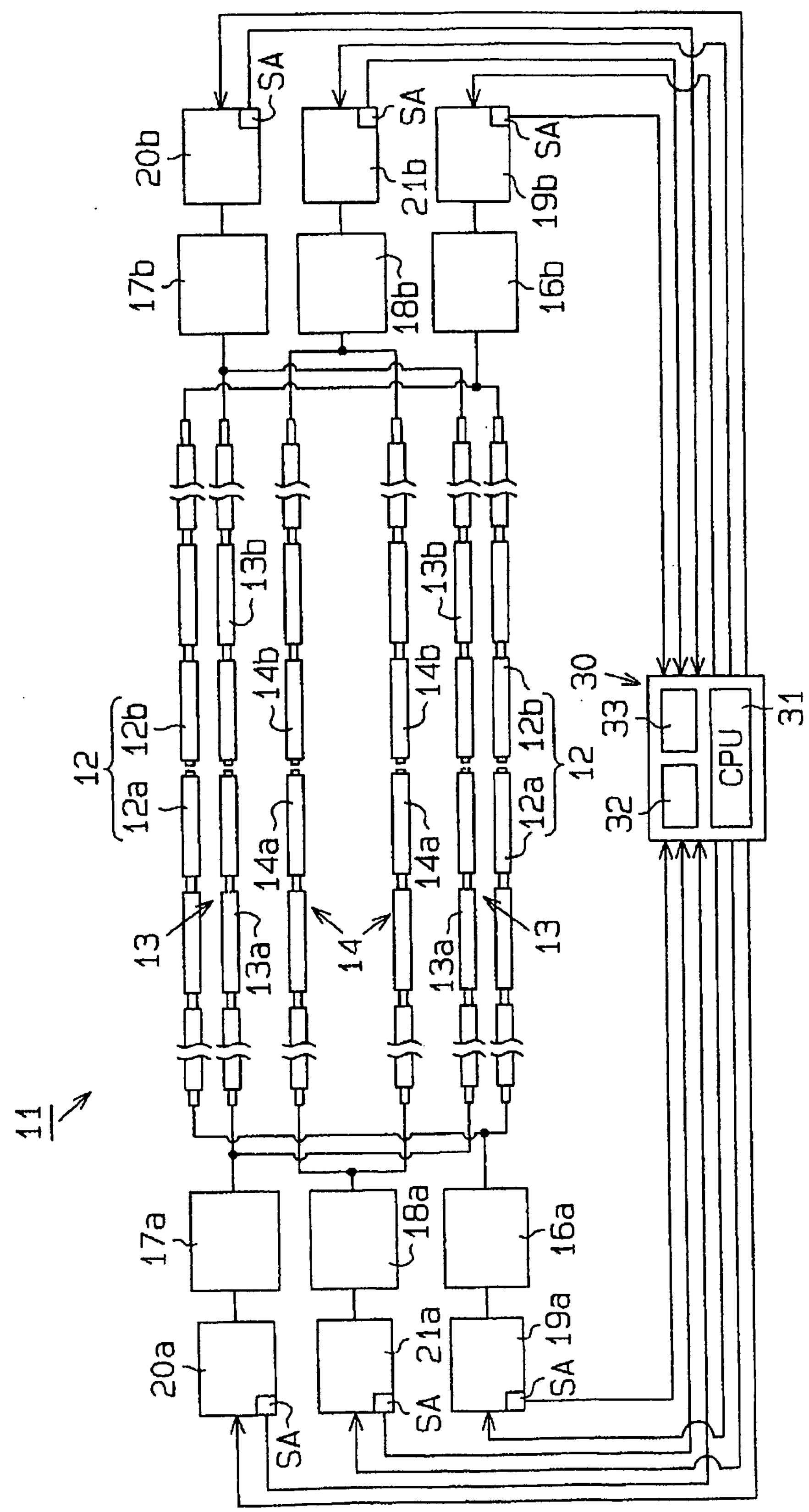
   characterized in that the drafting rollers (12, 13, 14) are divided into two in the longitudinal direction, and

   the judgment means (31) identifies a side of the drafting roller in which abnormality has been generated based on whether the difference between the load torques is negative or positive.

4. An abnormality detecting device for a drafting device (11) of a spinning machine according to Claim 2,

   characterized in that the drafting rollers (12, 13, 14) are divided into two in the longitudinal direction, and

   the judgment means (31) identifies a drafting roller (12, 13, 14) in which abnormality has been generated based on the difference between the load torques of the two motors and on the difference between the load torque of each motor with respect to the load torque thereof in the normal state.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32
CPU
31
17a
18a
16a
20a
SA
21a
SA
19a
SA

Fig. 1

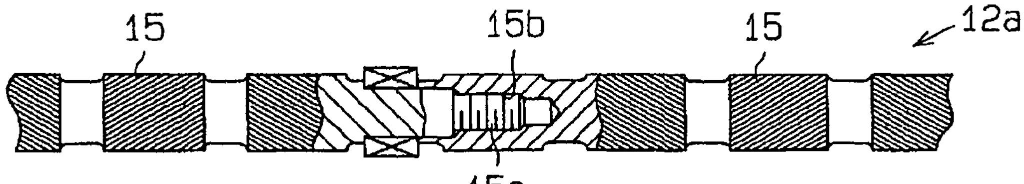
15
15b
15
12a
15a

Fig. 2

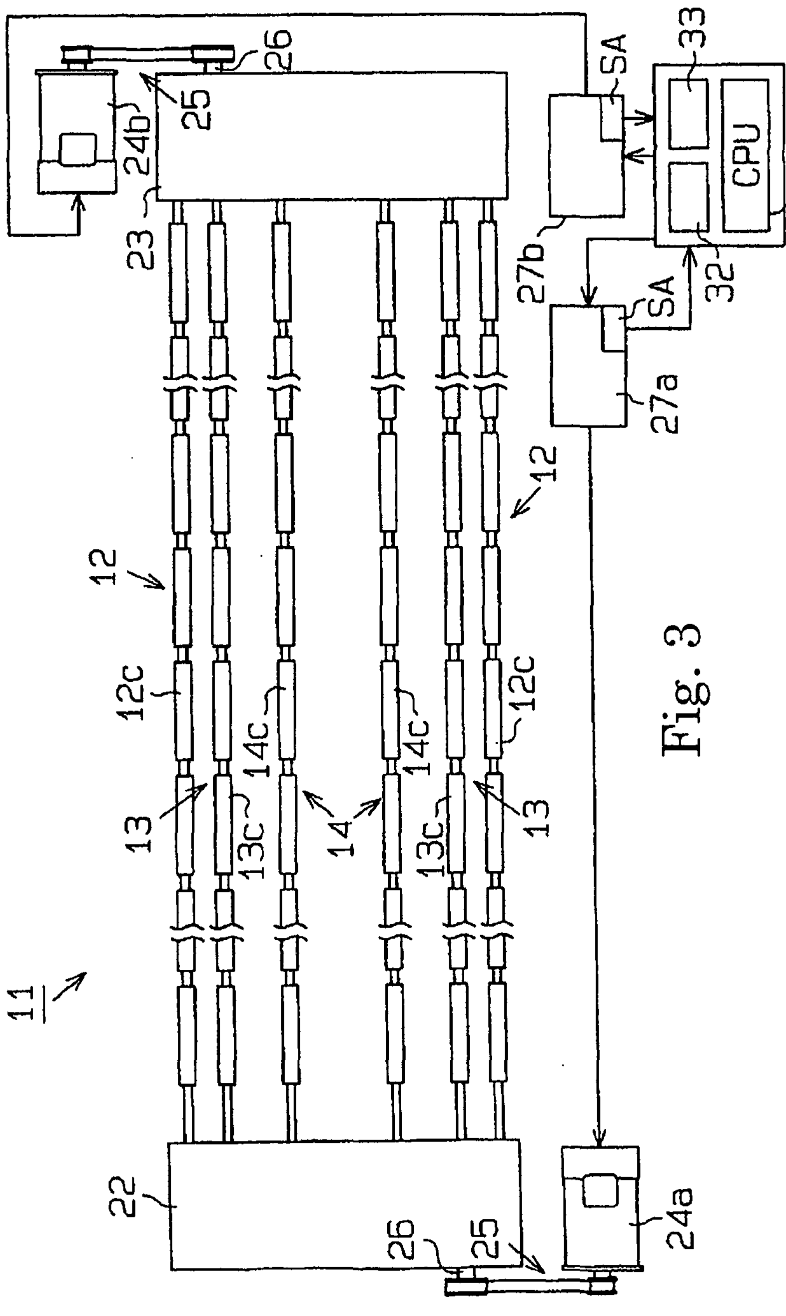
26
25
24b
23
SA
33
30
CPU
31
27b
32
SA
27a
12
12
12c
14c
14c
12c
13
13c
14
13c
13
11
22
26
25
24a

Fig. 3