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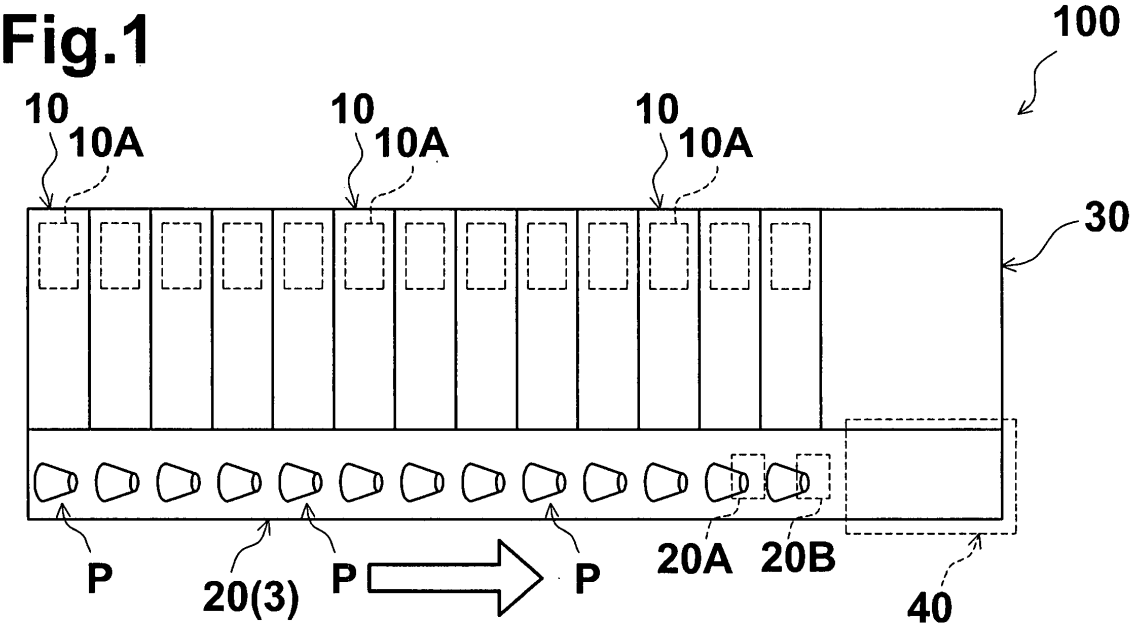
(54) Automatic winder

(57) An object of the present invention is to provide an automatic winder including a frame control device which can easily get package information of winding packages successively conveyed by a package conveyor.

The automatic winder includes a plurality of winding units 10 which form winding packages P by winding spun yarns unwound from supplying bobbins around takeup tubes, and a package conveyor 20 which carries winding packages P doffed from the plurality of winding units 10. A frame control device 30 which manages the entirety of this automatic winder 100 is provided. On one end side in the carrying direction of the package conveyor 20 is provided a winding package information transmitting device 40 which transmits package information of the respective winding packages P successively conveyed by the package conveyor 20 to the frame control device 30.

Fig.1



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Description

[0001] The present invention relates to an automatic winder.

[0002] It is regarded as important that a winding package formed by winding a spun yarn unwound from a supplying bobbin around a takeup tube is always maintained constant in quality such as weight and shape. Concerning weights of the winding packages, conventionally, an appropriate balance is placed on one end of a package conveyor, and an operator weighs conveyed winding packages by using this balance and enters results of weighing in a prescribed summary sheet. In addition, calculates an average and variations, and confirms identification of a package being short in weight. Concerning shapes of the winding packages, conventionally, an operator confirms shapes of conveyed winding packages, and when the shape of the conveyed winding package has a defect such as wrinkles, records the type of the defective shape in an appropriate summary sheet.

[0003] However, concerning weights of the winding packages, it is very troublesome for an operator to enter weighing results in the summary sheet, calculate an average and variations, and make confirmation, and erroneous entering of weighing results is inevitable. Concerning shapes of the winding packages, it is also very troublesome for an operator to record types of defective shapes in the summary sheet.

[0004] As a technique relating to this, Patent document 1 (Japanese Published Patent Application No. H06-32533) discloses a package inspection system. In this package inspection system, a plurality frames of automatic winders 1 including a plurality of stations arranged in parallel are installed in a spinning factory, and on each frame, a conveyor 5 which carries a package 2 doffed from each station to one end of the frame is provided. A package 2 carried by the conveyor 5 is conveyed to an inspection station 4 via an overhead conveyor 3 (refer to paragraph 0013). Then, in the course of the tray conveyor 16 set on this inspection station 4, an inspection device 17 for inspecting an appearance and a weight of a package conveyed together with information including a frame number and a station number of a winder as a production source, and inner layer defective information is provided (refer to paragraph 0016).

[0005] However, in the configuration of Patent document 1 described above, at one end side in a carrying direction of the conveyor 5, nothing except loading of a package 2 is disclosed.

[0006] The present invention was made in view of these points, and a main object thereof is to provide an automatic winder having a frame control device which can easily get package information of winding packages successively conveyed by a package conveyor.

[0007] A problem to be solved by the present invention is as described above, and a means for solving this problem and an effect thereof will be described next.

[0008] A first aspect of the present invention provides an automatic winder constructed as follows. Specifically, the automatic winder comprises a plurality of winding units which form winding packages by winding spun yarns unwound from supplying bobbins, and a package conveyor which carries the winding packages doffed from the plurality of winding units. A frame control device which manages the entirety of this automatic winder is provided. A winding package information transmitting device which transmits package information of the respective winding packages successively conveyed by the package conveyor to the frame control device is provided at one end side of a carrying direction of the package conveyor. The package information of the winding package includes a package weight information of this winding package. The winding package information transmitting device comprises a package weight measuring means which measures package weights of the respective winding packages successively conveyed toward the end in the carrying direction of the package conveyor. According to this, the frame control device can get package information of the respective winding packages successively conveyed by the package conveyor. The frame control device can know package weights of the respective winding packages successively conveyed by the package conveyor without involving an operator.

[0009] The automatic winder described above is preferably constructed as follows. Specifically, the package information of the winding package includes a package shape information of this winding package. The winding package information transmitting device comprises a package shape input means for inputting package shape informations of the respective winding packages successively conveyed toward the end in the carrying direction of the package conveyor. According to this, the frame control device can know package shape informations of the respective winding packages successively conveyed by the package conveyor.

[0010] Further, the automatic winder described above is preferably constructed as follows. Specifically, the package information of the winding package includes the presence or absence of this winding package. The winding package information transmitting device includes an existence input means for inputting the presences or absences of the respective winding packages successively conveyed toward the end in the carrying direction of the package conveyor. According to this, the frame control device can get a deficiency of each winding package in a line of winding packages successively conveyed by the package conveyor.

[0011] Further, the automatic winder described above is preferably constructed as follows. Specifically, the package conveyor includes an endless belt and a belt feed amount detecting means which detects feed amounts of this belt. The frame control device comprises a package existence determining means which determines the presences or absences of the winding package based on feed amounts of the belt received from the belt feed amount detecting means and package weights in-

cluded in package information of the respective winding packages received from the winding package information transmitting device. According to this, the frame control device can know a deficiency of each winding package in a line of winding packages successively conveyed by the package conveyor without involving an operator.

[0012] Fig. 1 is a schematic entire view of an automatic winder according to a first embodiment of the present invention;

Fig. 2 is a schematic construction view of a frame control device and a winding package information transmitting device according to the first embodiment of the present invention;

Fig. 3 is a view illustrating one display example of a display of the frame control device; and

Fig. 4 is a schematic construction view of a frame control device and a winding package information transmitting device according to a second embodiment of the present invention.

First Embodiment

[0013] Hereinafter, a first embodiment of the present invention will be described. Fig. 1 is a schematic entire view of an automatic winder according to the first embodiment of the present invention.

[0014] In this embodiment, an automatic winder 100 includes a plurality of winding units 10 arranged in a line at predetermined intervals, a package conveyor 20, a frame control device 30, and winding package information transmitting device 40.

[0015] The plurality of winding units 10 form winding packages P by winding spun yarns unwound from supplying bobbins around takeup tubes, and the respective winding units 10 have winding unit control devices 10A for controlling winding operations, individually.

[0016] The package conveyor 20 carries the winding packages P doffed, that is, loaded from these winding units 10 toward the frame control device 30, and includes an endless belt 3, a belt feed amount detecting section 20A such as an increment-type rotary encoder which detects a feed amount, that is, moving amount of this belt 3, and a package conveyor control device 20B which controls a carrying operation of the package conveyor 20.

[0017] The frame control device 30 manages the entirety of the automatic winder 100, and is disposed on one end side in the carrying direction of the package conveyor 20, that is, on a carrying exit side. This will be described in detail later.

[0018] The winding package information transmitting device 40 is provided adjacent to the frame control device 30 on the end side in the carrying direction of the package conveyor 20, and transmits package information of the respective winding packages P successively conveyed by this package conveyor 20 to the frame control device 30. A detailed construction thereof will be described later.

[0019] In this embodiment, the automatic winder 100 is appropriately provided with an automatic doffing device not shown which doffs winding packages P formed by the plurality of winding units 10, and an automatic supplying bobbin supplying device which appropriately supplies the supplying bobbins to the respective winding units 10.

[0020] Next, a construction of the frame control device 30 and the winding package information transmitting device 40 will be described in detail with reference to Fig. 2. Fig. 2 is a schematic construction view of the frame control device and the winding package information transmitting device according to the first embodiment of the present invention.

[0021] As shown in this drawing, the frame control device 30 includes a control section 31 consisting of an appropriate CPU, a storage section 32 consisting of an appropriate RAM or ROM, a display 33 consisting of a liquid crystal display, etc., and an operation panel 34 on which buttons, etc., are appropriately arranged. The frame control device 30 further includes a winding unit input-output section 35 which is electrically connected to respective winding unit control devices 10 A that the plurality of winding units 10 include individually, and monitors and controls winding operations of the plurality of winding units 10. The frame control device 30 further includes a package conveyor input-output section 36 which is electrically connected to the belt feed amount detecting section 20A and the package conveyor control device 20B of the package conveyor 20, and receives a feed amount of the belt 3 detected by the belt feed amount detecting section 20A and controls a carrying operation of the package conveyor 20. The frame control device 30 further includes a winding package input-output section 37 which is electrically connected to a package weight measuring section (package weight measuring means) 41, a package shape input section (package shape input means) 42, a package existence input section (package existence input means) 43, and a display and operation panel 44 of the winding package information transmitting device 40, and receives package information of the respective winding packages P successively conveyed from the package conveyor 20 transmitted from the winding package information transmitting device 40 (package weight measuring section 41, etc.) as required.

[0022] The storage section 32, the display 33, and the operation panel 34 are electrically connected to the control section 31.

[0023] The storage section 32 is constructed so as to transmit various data stored in this storage section 32 to the control section 31 in response to a request from the control section 31 and appropriately store various data transmitted from the control section 31. The display 33 is constructed so as to appropriately display various data on statuses of winding operations of the plurality of winding units 10, settings of winding operations of the winding units 10 stored in the storage section 32, and so on. As a matter of course, the display 33 can also display a status and setting of a carrying operation of the package con-

veyor 20 and package information of the respective winding packages P received from the winding package information transmitting device 40.

[0024] Similarly, the winding unit input-output section 35, the package conveyor input-output section 36, and the winding package input-output section 37 are also electrically connected to the control section 31.

[0025] As aforementioned, the winding package information transmitting device 40 includes the package weight measuring section 41, the package shape input section 42, the package existence input section 43, and the display and operation panel 44.

[0026] This package weight measuring section 41 measures package weights of respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20, and is constructed by providing an appropriate load cell on a back side of the belt 3 of the package conveyor 20. Package weights of the respective winding packages P measured by the package weight measuring section 41 are transmitted to the control section 31 via the winding package input-output section 37. In this sense, the package information of the winding package includes a package weight information of this winding package.

[0027] The package shape input section 42 is provided for inputting package shape informations of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20 to the frame control device 30, and includes sheets on which identification barcodes created for each of package shapes of "normal winding," "stepped winding," and "wrinkled winding" are printed, and a barcode reader which can read the identification barcodes. Package shape informations of the respective winding packages P inputted by an operator via the package shape input section 42 are transmitted to the control section 31 via the winding package input-output section 37. In this sense, the package information of the winding package includes a package shape information of this winding package.

[0028] The package existence input section 43 is provided for inputting the presences or absences of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20 to the frame control device 30, and includes an appropriate package existence switch 43a of, for example, a momentary switch type. The presences or absences of the respective winding package P inputted by an operator via this package existence input section 43 are transmitted to the control section 31 via the winding package input-output section 37. In this sense, the package information of the winding package includes the presence or absence of this winding package.

[0029] The display and operation panel 44 includes a conveyor start switch 44a which instructs start of a carrying operation of the winding packages P by the package conveyor 20, a conveyor stop switch 44b which instructs stop of the carrying operation of the winding packages P by this package conveyor 20, and a station number display 44c which displays a station number of the winding unit 10 from which a winding package P conveyed to the end in the carrying direction of the package conveyor was doffed, that is, formed. In this embodiment, for the sake of convenience, the package existence switch 43a is provided on the display and operation panel 44 together with the conveyor start switch 44a, etc.

[0030] Next, operations of the automatic winder 100 according to this embodiment will be described with reference to Fig. 1 and Fig. 2.

[0031] When an operator turns on a power supply of the automatic winder 100 by operating the operation panel 34, the control section 31 appropriately reads settings relating to winding operations of the plurality of winding units 10 from the storage section 32 and makes the winding units 10 to start winding via the winding unit input-output section 35. Thereby, the plurality of winding units 10 simultaneously start winding and then form winding packages P. The above-described doffing device that is not shown doffs quickly the winding packages P formed by the respective winding units 10 to the package conveyor 20. The winding units 10 which formed the winding packages P and from which the thus formed winding packages P were doffed by the doffing device start forming new winding packages P.

[0032] When the operator confirms that winding packages P are doffed to the package conveyor 20 from all or substantially all winding units 10, the operator rotates the belt 3 of the package conveyor 20 at a predetermined constant speed by actuating the package conveyor control device 20B by operating the conveyor start switch 44a. Thereby, the package conveyor 20 starts carrying at a time a plurality of winding packages P arranged in a line at predetermined intervals on the belt 3 of the package conveyor 20 in a direction (carrying direction of the package conveyor 20) indicated by an outline arrow in Fig. 1.

[0033] Each time the winding packages P are successively conveyed to the winding package information transmitting device 40, the winding package information transmitting device 40 acquires correspondence between a winding package P conveyed to the winding package information transmitting device 40 and a station number of the winding unit 10 from which this winding package P was doffed via the package conveyor control device 20B or belt feed amount detecting section 20A, the package conveyor input-output section 36, the control section 31, and the winding package input-output section 37. And the package information transmitting device 40 displays this station number on the station number display 44c of the display and operation panel 44.

[0034] The winding package information transmitting device 40 makes the package weight measuring section 41 measure package weights (package information) of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20, and transmits the measurement results

to the control section 31 via the winding package input-output section 37 by associating the results with station numbers. The control section 31 displays the package weights of the respective winding packages P received from the winding package information transmitting device 40 via the winding package input-output section 37 on the display 33 and stores and accumulates these in the storage section 32 while maintaining the association with the station numbers (see Fig. 3).

[0035] On the other hand, an operator inspects package shapes of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20. The package shapes mean, for example, "normal winding," "stepped winding," and "wrinkled winding," and the operator determines which of the package shapes each conveyed winding package P corresponds to. Then, the operator selects an identification barcode corresponding to the package shape of each winding package P among a plurality of identification barcodes printed on the above-described sheets, and reads this identification barcode by using the barcode reader and inputs it into the winding package information transmitting device 40. The winding package information transmitting device 40 transmits a package shape information (package information) corresponding to the inputted identification barcode to the control section 31 via the winding package input-output section 37 while associating it with a station number. The control section 31 displays package shapes of the respective winding packages P received from the winding package information transmitting device 40 via the winding package input-output section 37 on the display 33 and stores and accumulates these in the storage section 32 while maintaining the association with station numbers (see Fig. 3).

[0036] Further, the operator determines presences or absences of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20. In other words, the operator determines whether there is a deficiency of each winding package in a line of the winding packages P placed on the belt 3 of the package conveyor 20. In still other words, the operator determines whether a plurality of winding packages P are successively conveyed toward the end in the carrying direction of the package conveyor 20 at predetermined time intervals. If a winding package P that should be conveyed at a predetermined time interval is not conveyed, that is, if there is an absence of a winding package P conveyed in order toward the end in the carrying direction of the package conveyor 20, the operator depresses the package existence switch 43a. Thereby, the winding package information transmitting device 40 transmits information that a winding package P was not doffed from a winding unit 10 corresponding to a station number displayed on the station number display 44c differently from winding units 10 of other station numbers, to the control section 31 via the winding package input-output section 37. The control section 31 displays the presences or absences of the respective winding packages P received from the winding package information transmitting device 40 via the winding package input-output section 37 on the display 33 and stores and accumulates these in the storage section 32 while maintaining the association with the station numbers (see Fig. 3).

[0037] Then, when all winding packages P doffed onto the endless belt 3 of the package conveyor 20 are completely conveyed to the end in the carrying direction of the package conveyor 20, the operator pushes the conveyor stop switch 44b. The control section 31 that detected via the winding package input-output section 37 that the conveyor stop switch 44b was depressed, makes the package conveyor control device 20B stop the carrying operation of the package conveyor 20 via the package conveyor input-output section 36, and analyzes, in the following manner, the various data (package weight informations, package shape informations, and the presences or absences of the winding packages P) stored in the storage section 32 and displayed on the display 33. Hereinafter, see Fig. 3.

[0038] Specifically, the control section 31 calculates and analyzes an average, a maximum value, a minimum value, and a deviation (indicated by ± (%)) from the average, and a standard deviation of package weights of the respective winding packages P, and displays the results of the calculation and analysis on the display 33. When calculating these average, etc., the control section 31 appropriately skips reading of the package weight data based on package information shown in a column of "presence/absence" in this figure. In the case of this drawing, a winding package P was not doffed in the winding unit 10 of a station number 14, so that package weight data of the station number 14 is appropriately skipped in reading.

[0039] In Fig. 3, "manage ± (%)" means an allowable range of deviations from the average as specifications. To inform and alert the operator of a station number of a winding unit 10 from which a winding package P that is short in package weight and deviates from the allowable range to a lower side, that is, to a side of a lighter package weight was doffed, the control section 31 displays a black square in a row of this station number in a column of "short in weight" show in this figure. As shown in Fig. 3, on the display 33, in addition to the various data (package weights, package shapes, and the presences or absences of the winding packages P), for example, lot names, yarn types, yarn counts, yarn speeds, and settings as specifications of package weights and a presence or absence of bunch winding, etc., may be appropriately displayed.

[0040] As described above, in the first embodiment, the automatic winder 100 is constructed as follows.

[0041] Specifically, the automatic winder 100 comprises a plurality of winding units 10 which form winding packages P by winding spun yarns unwound from supplying bobbins, and a package conveyor 20 which carries winding packages P doffed from the plurality of winding units

10. Further, a frame control device 30 which manages the entirety of the automatic winder 100 is provided. At the end side in the carrying direction of the package conveyor 20, a winding package information transmitting device 40 which transmits package information of the respective winding packages P successively conveyed by this package conveyor 20 to the frame control device 30 is provided. The package information of the winding package P includes a package weight information of this winding package P. The winding package information transmitting device 40 comprises a package weight measuring section 41 which measures package weights of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20.

[0042] According to this, the frame control device 30 can get package information of the respective winding packages P successively conveyed by the package conveyor 20. Further, the frame control device 30 can get package weight informations of the respective winding packages P successively conveyed by the package conveyor 20 without involving an operator. Therefore, in comparison with the conventional case, the operator is not required to record the package weights on an appropriate recording sheet, so that a burden on the operator is reduced. By tallying the package weights as shown in Fig. 3 and accumulating these in the storage section 32, various wide traceability feedback environments are realized for finding out what is a problem in operation settings of the winding unit 10 and how was the winding unit 10 that tended to cause a failure of package weight shortage operated, etc.

[0043] The automatic winder 100 is constructed as follows. Specifically, the package information of the winding package P includes a package shape information of the winding package P. The winding package information transmitting device 40 comprises a package shape input section 42 for inputting package shape informations of respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20. According to this, the frame control device 30 can get package shape informations of the respective winding packages P successively conveyed by the package conveyor 20. By summarizing and accumulating the package shape informations in the storage section 32, various wide traceability feedback environments are realized for finding out what is a problem in operation settings of the winding unit 10 and how was the winding unit 10 that tended to cause a failure of defective shape operated, etc.

[0044] The above-described automatic winder 100 is constructed as follows. Specifically, the package information of the winding package P includes the presence or absence of this winding package P. The winding package information transmitting device 40 comprises a package existence input section 43 for inputting the presences or absences of the respective winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20. According to this, the frame control device 30 can know a deficiency of each winding package in a line of winding packages P successively conveyed by the package conveyor 20. Therefore, when package weights are tallied and analyzed as shown in Fig. 3, data that should not be considered can be skipped, so that the analysis can be made convenient.

[0045] The above-described first embodiment can be varied as follows.

[0046] In the first embodiment, correspondence between a winding package P conveyed to the winding package information transmitting device 40 and a station number of a winding unit 10 from which this winding package P was doffed is acquired via the package conveyor control device 20B (or belt feed amount detecting section 20A), however, instead of this, the following construction is also possible. Specifically, the winding package information transmitting device 40 includes a package detection sensor (package detecting means) which can detect that a winding package P is conveyed to the winding package information transmitting device 40. The winding package information transmitting device 40 regards a winding package P conveyed first to the winding package information transmitting device 40 since a carrying operation of the package conveyor 20 is started by an operation on the conveyor start switch 44a by an operator as a winding package P doffed from the winding unit 10 of the station number 1 (for the sake of description convenience, a station number of a winding unit 10 closest to the winding package information transmitting device 40 is set as a station number 1). Similarly, the winding package information transmitting device 40 regards winding packages P successively conveyed to the winding package information transmitting device 40 (to the end in the carrying direction of the package conveyor 20) as winding packages P doffed from the winding units 10 of the station numbers 2, 3.... Even in this construction, similar to the first embodiment, correspondence between a winding package P conveyed to the winding package information transmitting device 40 and a station number of a winding unit 10 from which this winding package P was doffed can be acquired. In this exemplary variation, when operating the conveyor start switch 44a, if there is a deficiency of each winding package in a line of winding packages P doffed on the belt 3 of the package conveyor 20, the operator must place a pseudo winding package P at this deficient portion on the belt 3 before operating the conveyor start switch 44a. Thereby, the correspondence between the winding package P and the station number of the winding unit 10 from which the winding package P was doffed is maintained. The operator appropriately makes the winding package information transmitting device 40 recognize this pseudo winding package P via, for example, the package existence switch 43a.

[0047] To the construction of the automatic winder 100 of the first embodiment, a construction which urges an operator to exclude a winding package P from other winding packages P when this winding package P short in

package weight is conveyed to the end in the carrying direction of the package conveyor 20 may be added. For example, the following construction is added. Specifically, the display and operation panel 44 of the winding package information transmitting device 40 is provided with a winding package excluding instruction indicator lamp (winding package excluding instruction indicating means). This winding package excluding instruction indicator lamp instructs an operator to exclude a winding package P conveyed to the end in the carrying direction of the package conveyor 20 by lighting or flashing, and operates as follows.

[0048] Specifically, the winding package information transmitting device 40 makes the package weight measuring section 41 measure package weights of winding packages P successively conveyed toward the end in the carrying direction of the package conveyor 20, and the winding package information transmitting device 40 transmits measurement results to the control section 31 via the winding package input-output section 37. When the control section 31 determines that the package weight of the winding package P received from the winding package information transmitting device 40 via the winding package input-output section 37 is short based on an average of package weights of winding packages P (limited to winding packages of the same lot name) obtained during a first carrying operation and the above-described "manage ± (%)" (see Fig. 3) (on the assumption that carrying operations of the package conveyor 20 that are started by an operation on the conveyor start switch 44a and ended by an operation on the conveyor stop switch 44b are counted as first, second..., and the current winding package P is conveyed in response to a second carrying operation), the control section 31 makes the winding package excluding instruction indicator lamp provided on the winding package information transmitting device 40 light or flash via the winding package input-output section 37 to urge and/or instruct the operator to exclude this winding package P from other winding package P. The first carrying operation is necessary for data collection of package weights of the respective winding packages P, so that it is preferable that the excluding instruction is refrained at the time of the first carrying operation, and is issued only at the time of second and subsequent carrying operations.

[0049] By providing the winding package excluding instruction indicator lamp that operates as described above, an operator can exclude a winding package P short in package weight from other winding packages P at the end in the carrying direction of the package conveyor 20. Furthermore such a defective package (winding package P short in package weight) can be excluded at the end of the package conveyor 20, so that in comparison with the case where the defective package is excluded in various post processes (for example, a yarn doubling process and a warping process) on the downstream side of this package conveyor 20, a defective can be excluded at an earlier stage, and in this sense, the present invention is very useful in terms of management.

Second Embodiment

[0050] Next, a second embodiment of the present invention will be described. Fig. 4 is a schematic construction view of a frame control device and a winding package information transmitting device of the second embodiment of the present invention. Hereinafter, a difference of the second embodiment from the first embodiment described above will be described, and overlapping description will be omitted.

[0051] The frame control device 30 of the first embodiment described above is constructed so as to know a deficiency of each winding package in winding packages P doffed on the endless belt 3 of the package conveyor 20 in response to an operation on the package existence switch 43 a by an operator.

[0052] On the other hand, a frame control device 30 of the present embodiment includes, as shown in Fig. 4, a package existence determining section (package existence determining means) 38. This package existence determining section 38 acquires from the control section 31 feed amounts of the endless belt 3 of the package conveyor 20 transmitted to the control section 31 from the package feed amount detecting section 20A via the package conveyor input-output section 36, package weights of the respective winding packages P transmitted from the package weight measuring section 41 to the control section 31 via the winding package input-output section 37, and based on the feed amounts of the endless belt 3 and the package weights, determines presences or absences of winding packages P (deficiency). In detail, the package existence determining section 38 obtains a station number based on a feed amount of the belt 3 acquired from the control section 31, and at substantially the same time, compares a package weight acquired from the control section 31 with a predetermined threshold, whereby the package existence determining section determines which station number the winding unit 10 from which the winding package P was not doffed is of. The predetermined threshold is, for example, a value half an average value (about 2000 grams in Fig. 3) of the winding packages P (for example,1000 grams), and is set in advance in the storage section 32 by an operator.

[0053] As described above, in the second embodiment, the automatic winder 100 is constructed as follows. Specifically, the package conveyor 20 comprises an endless belt 3 and a belt feed amount detecting section 20A which detects feed amounts of this belt 3. The frame control device 30 comprises a package existence determining section 38 which determines the presences or absences of the winding package P based on feed amounts of the belt 3 received from the belt feed amount detecting section 20A and package weights included in package information of the respective winding packages P received from the winding package information transmitting device 40. According to this, the frame control device 30

can get a deficiency of each winding package in a line of the winding packages P successively conveyed from the package conveyor 20 without involving an operator.

Claims

1. An automatic winder comprising:

a plurality of winding units (10) which form winding packages (P) by winding spun yarns unwound from supplying bobbins; and
a package conveyor (20) which carries the winding packages (P) doffed from the plurality of winding units (10), **characterized in that**
a frame control device (30) which manages the entirety of this automatic winder is provided,
a winding package information transmitting device (40) which transmits package information of the respective winding packages (P) successively conveyed by the package conveyor (20) to the frame control device (30) is provided at one end side of a carrying direction of the package conveyor (20),
the package information of the winding package (P) includes a package weight information of this winding package (P), and
the winding package information transmitting device (40) comprises a package weight measuring means (41) which measures package weights of the respective winding packages (P) successively conveyed toward the end in the carrying direction of the package conveyor (20).

2. The automatic winder according to Claim 1, wherein
the package information of the winding package (P) includes a package shape information of this winding package (P), and
the winding package information transmitting device (40) comprises a package shape input means (42) for inputting package shapes of the respective winding packages (P) successively conveyed toward the end in the carrying direction of the package conveyor (20).

3. The automatic winder according to Claim 1 or 2, wherein
the package information of the winding package (P) includes the presence or absence of this winding package (P), and
the winding package information transmitting device (40) comprises a package existence input means (43) for inputting the presences or absences of the respective winding packages (P) successively conveyed toward the end in the carrying direction of the package conveyor (20).

4. The automatic winder according to any one of Claims 1 to 3, wherein
the package conveyor (20) comprises an endless belt (3) and a belt feed amount detecting means (20A) which detects feed amounts of this belt (3), and
the frame control device (30) comprises a package existence determining means (38) which determines the presences or absences of the winding package (P) based on feed amounts of the belt (3) received from the belt feed amount detecting means (20A) and package weights included in package information of the respective winding packages (P) received from the winding package information transmitting device (40).

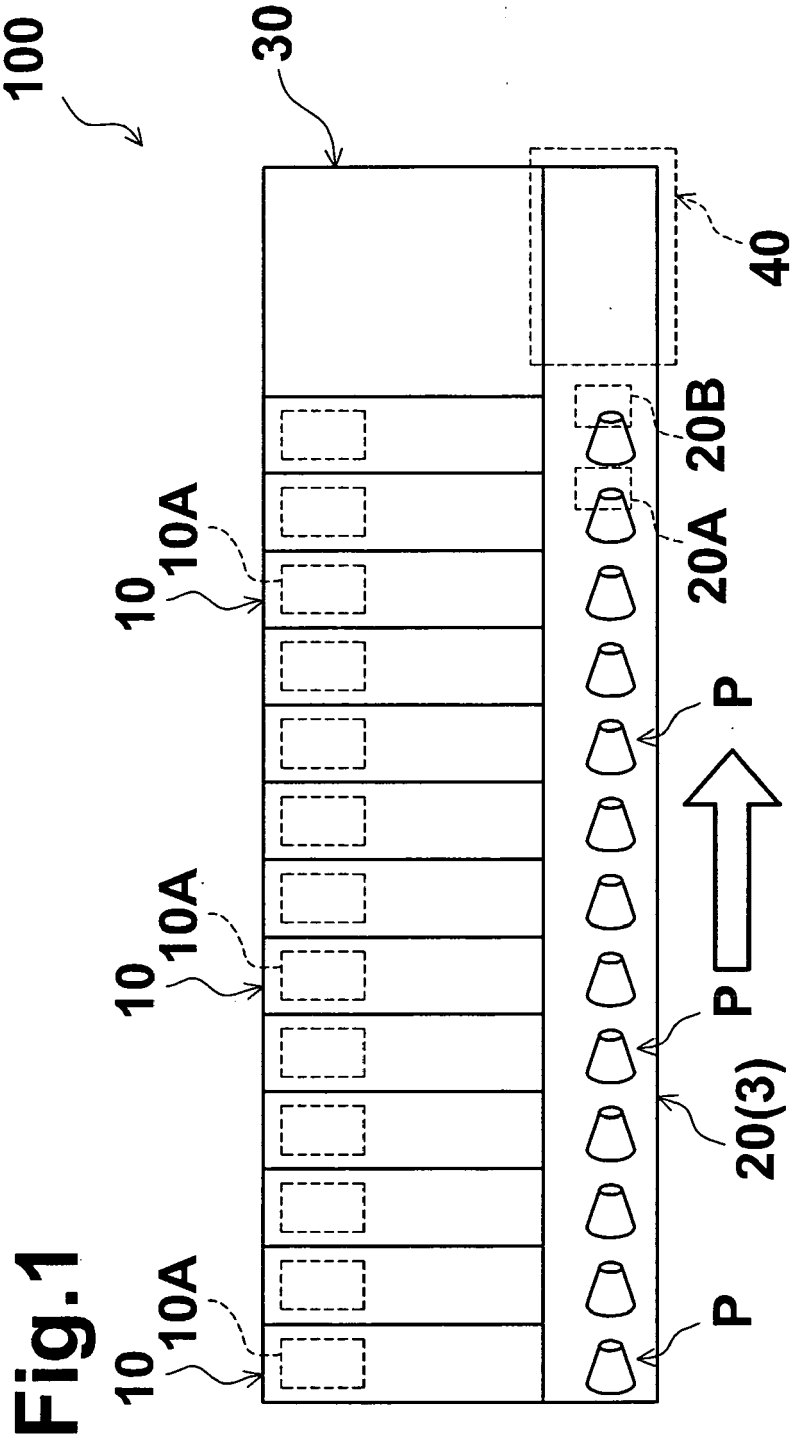


Fig.1

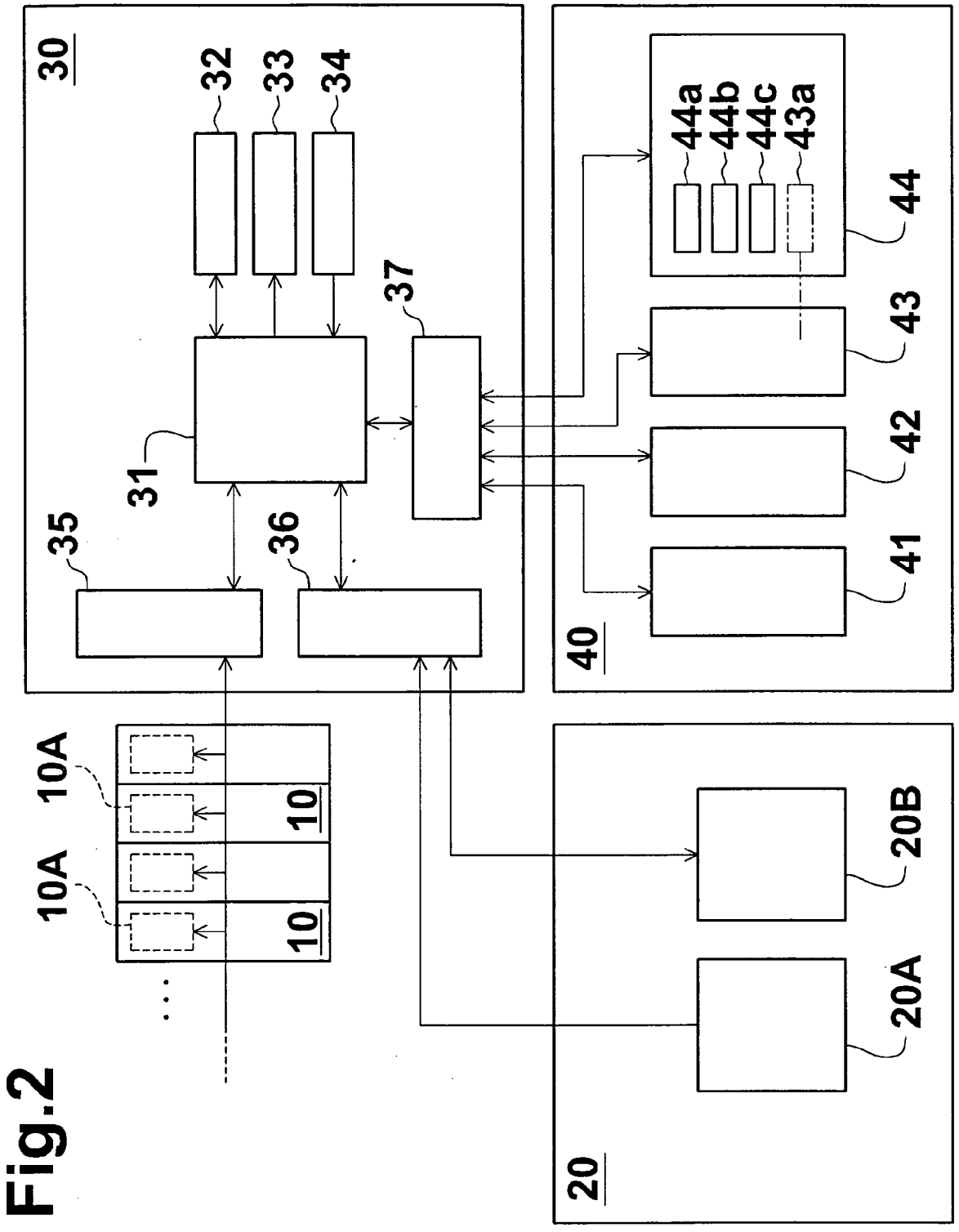
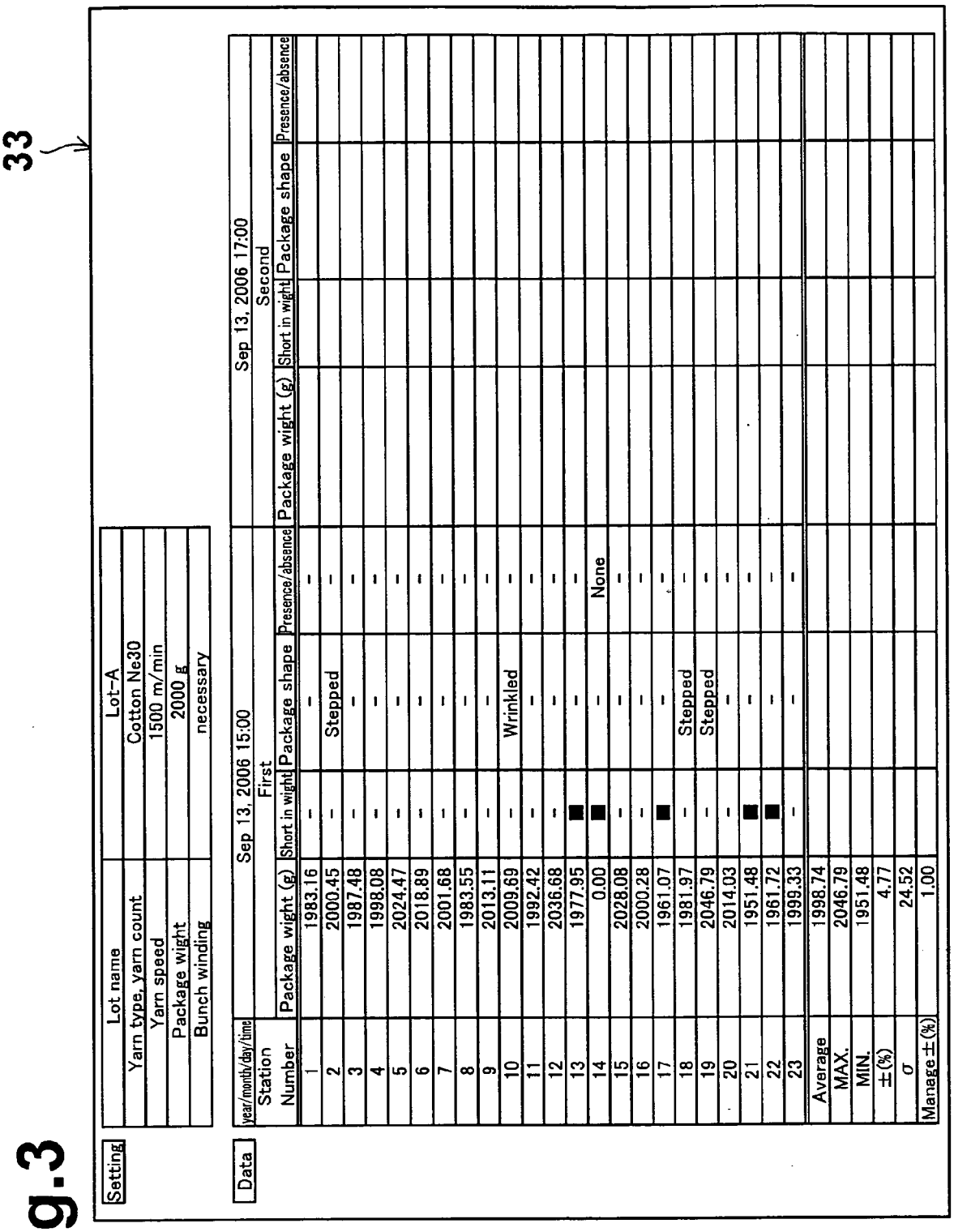
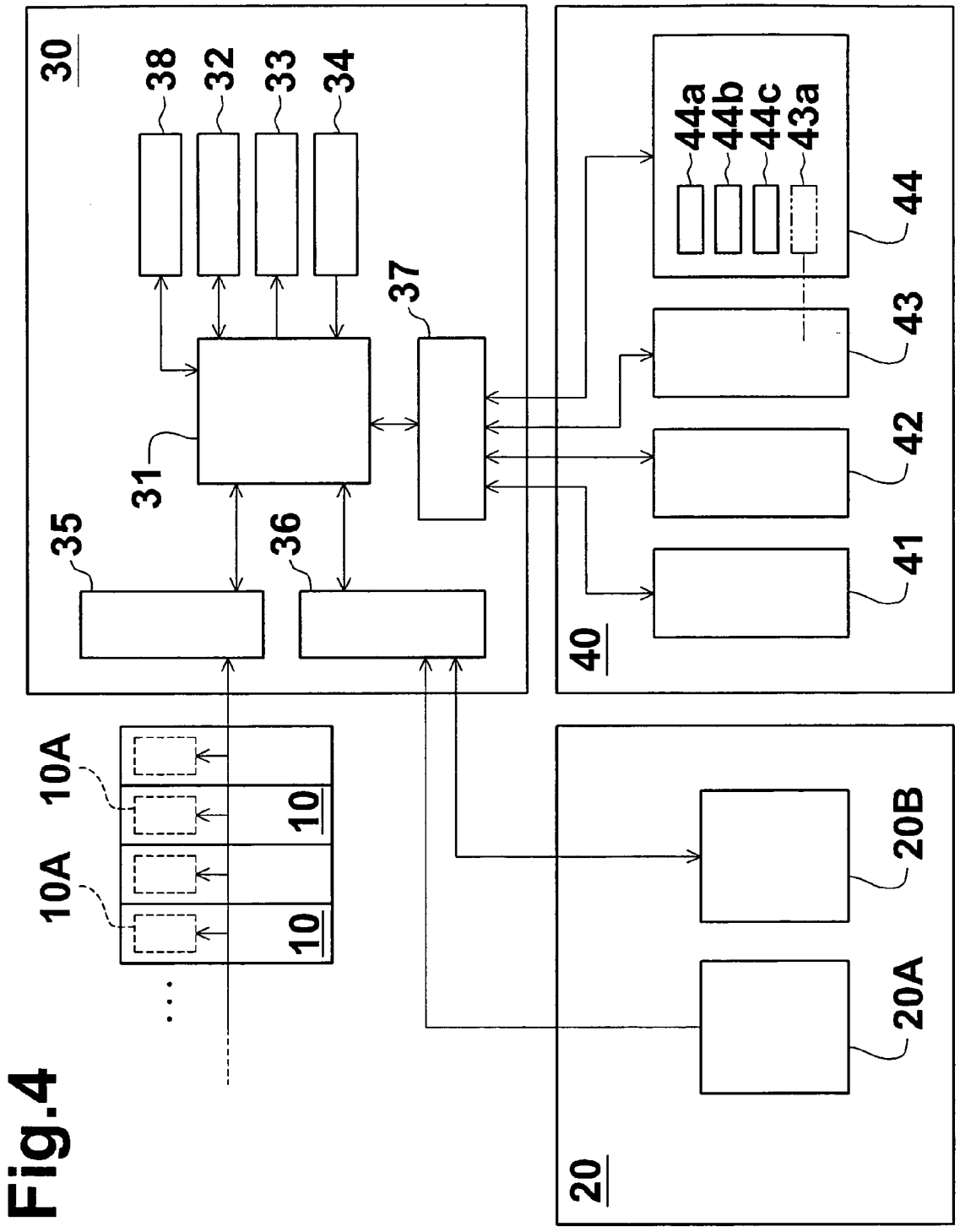

30
32
33
34
37
31
35
36
40
44a
44b
44c
43a
44
43
42
41
10A
10A
10
10
20
20B
20A

Fig.2

Fig.3


33
Setting
Lot name
Lot-A
Yarn type, yarn count
Cotton Ne30
Yarn speed
1500 m/min
Package wight
2000 g
Bunch winding
necessary
Data
year/month/day/time
Sep 13, 2006 15:00
Sep 13, 2006 17:00
Station Number
First
Second
Package wight (g)
Short in wight
Package shape
Presence/absence
1 1983.16 - - - - - -
2 2000.45 - Stepped - - - -
3 1987.48 - - - - - -
4 1998.08 - - - - - -
5 2024.47 - - - - - -
6 2018.89 - - - - - -
7 2001.68 - - - - - -
8 1983.55 - - - - - -
9 2013.11 - - - - - -
10 2009.69 - Wrinkled - - - -
11 1992.42 - - - - - -
12 2036.68 - - - - - -
13 1977.95 ■ - - - - -
14 0.00 ■ - None - - -
15 2028.08 - - - - - -
16 2000.28 - - - - - -
17 1961.07 ■ - - - - -
18 1981.97 - Stepped - - - -
19 2046.79 - Stepped - - - -
20 2014.03 - - - - - -
21 1951.48 ■ - - - - -
22 1961.72 ■ - - - - -
23 1999.33 - - - - - -
Average 1998.74
MAX. 2046.79
MIN. 1951.48
±(%) 4.77
σ 24.52
Manage±(%) 1.00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44a
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44c
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10A
10A
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20B
20A

Fig.4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 01 8259

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 43 33 809 A1 (MURATA MACHINERY LTD [JP]) 7 April 1994 (1994-04-07) * column 1, lines 51-65 * * column 2, line 40 - column 4, line 21 * * column 4, lines 59-65 * * claims 1-3; figures *	1-3	INV. B65H63/00 B65H63/08 B65H67/06
Y	JP 11 286372 A (MURATA MACHINERY LTD) 19 October 1999 (1999-10-19) * abstract; figures *	1-3	
Y	US 2001/039791 A1 (STAHLECKER GERD [DE]) 15 November 2001 (2001-11-15) * paragraphs [0006] - [0009], [0014] - [0017], [0019]; figures *	1-3	
A	DE 37 07 552 A1 (GEBALD GREGOR [DE]; LANGEN MANFRED [DE]) 22 September 1988 (1988-09-22) * the whole document *	1-3	
D,A	JP 06 032533 A (MURATA MACHINERY LTD) 8 February 1994 (1994-02-08) * abstract; figures *	1-4	TECHNICAL FIELDS SEARCHED (IPC) B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 December 2007	Lemmen, René

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

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19-12-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4333809 A1	07-04-1994	IT 1262030 B	18-06-1996
		JP 6115815 A	26-04-1994
JP 11286372 A	19-10-1999	NONE	
US 2001039791 A1	15-11-2001	NONE	
DE 3707552 A1	22-09-1988	NONE	
JP 6032533 A	08-02-1994	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H0632533 B **[0004]**