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(54) Information display system for textile machine

(57) An information display apparatus for a textile machine (20) includes a storage unit (14,34) that stores a display control program, a display unit (13,53), and a display control unit (11,31) that executes the display control program to display information expressed in language for operating or supporting the operation of the textile machine on the display unit. The information expressed in language is stored in the storage unit and includes a language display data set including information items corresponding to readout labels, the display control program (A,D) being designed such that the information items are read out using the readout labels (C01) and displayed on the display unit (13,53). The information display apparatus is provided with an editing unit for executing an editing program that allows an operator to edit the language display data set and make a new language display data set using an input unit and writing the new language display data set into the storage unit. The display control unit reads the information items from the language display data set written in the storage unit using the readout labels and displays the read information items on the display unit.

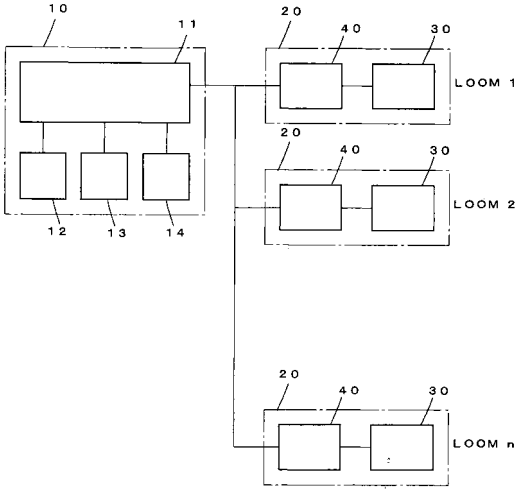

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to information display apparatuses used in textile machines, and more particularly, to a technique for displaying information regarding operational states and settings of a textile machine in a form familiar to a user.

2. Description of the Related Art

[0002] In accordance with the recent development of electronic technology, textile machines have been operated together with display devices that can display the operational states of the machines and through which numerical values corresponding to the machine settings are input. For example, Japanese Unexamined Patent Application Publication No. 5-78954 (paragraphs [0010] to [0012] and [0026] to [0062], Figs. 1 and 2) discloses a setting apparatus including a liquid crystal display device or the like that is used in a loom, which is an example of a textile machine. In this apparatus, to set information regarding the machine, first, a plurality of currently set values are shown on the display device together with corresponding display items expressed in characters (e.g., "warp tension set value" expressed in characters in a warp-tension setting screen). Then, an operator selects an item to be updated and inputs a new set value using numeric keys. Such a display device can display not only the setting screens but also display screens for displaying information regarding the operational state, the operation history, etc., when an operation for switching the display is performed. The display screen for displaying information regarding the operational state may show, for example, measured values indicating the control state (e.g., warp tension, weft arrival timing, etc.), and the display screen for displaying information regarding the operation history may show, for example, the operating rate per unit time, the number of stoppages, etc. The user performs adjustments of weft insertion, warp shedding motion, take-up motion, and warp let-off motion using the above-described information.

[0003] In a weaving factory where a plurality of looms are operated, a computer is used to collect operational information regarding operational states of the looms. Japanese Unexamined Patent Application Publication No. 61-231246 (pages 2 to 4, Fig. 6) discloses a system including a host computer that functions as an operational-information-collecting apparatus and that is communicably connected to a plurality of looms in a weaving factory. The host computer reads out operational data, such as numerical data representing the operating rate, the number of stoppages for each cause of stoppage, the number of stoppages per unit time, and the number of stoppages per predetermined number of weft picks, from each loom. The thus obtained numerical information is shown next to the corresponding item information (that is, "operating rate", "number of stoppages", etc., expressed in language) for each loom in an operation report. Such an operational-information-collecting apparatus can not only display the operation report on a display device but also output the report in a printed form using a printer.

[0004] In general, a microcomputer is used as the above-described setting apparatus for a loom or the operational-information-collecting apparatus for collecting the operational information, and processing programs for causing the microcomputer to execute the above-described functions are provided by a loom manufacturer. The display items used in the programs provided to the user by the manufacturer are determined on the basis of commonly used terms. However, the operational information used for operation management of looms differs between the users and weaving factories. In addition, the same operational information is often called by different names (i.e., display items) depending on the user or the weaving factory. Since the user cannot change the display items, the operation report output by the operational-information-collecting apparatus does not use the display items familiar to each user, and is therefore not easy to read.

[0005] Recently, the above-described looms and operational-information-collecting apparatuses have been shipped not only in Japan but also in other countries where the official language is English, French, etc. Accordingly, loom manufacturers preferably provide processing programs using terms commonly used in local areas. However, in practice, it is difficult to cover languages other than, for example, English that is commonly used throughout the world. In addition, it is extremely difficult to provide processing programs using display items that differ for each user and weaving factory, as described above, to each of the users in different countries. The problem that it is difficult to recognize the output operational information is serious for local operators and managers who work in their weaving factories every day. In addition, a similar problem occurs in the setting apparatus provided in each machine to display information regarding the operational state and settings of the machine together with information expressed in language. This problem occurs not only in weaving factories but also in other textile factories, such as yarn supply factories having many spinning machines and twisting machines and warp preparation factories having warping machines and sizing machines.

SUMMARY OF THE INVENTION

[0006] In light of the above-described situation, an object of the present invention to provide an information display apparatus for a textile machine that displays information expressed in language in a form familiar to end-users, such as operators and managers of a textile factory.

[0007] According to an aspect of the present invention, an information display apparatus for a textile machine includes a storage unit that stores a display control program, an output unit, and a display control unit that executes the display control program to display information expressed in language for operating the textile machine or supporting the operation of the textile machine on the output unit. The information expressed in language is stored in the storage unit and includes at least one language display data set including a plurality of information items corresponding to readout labels, the display control program being designed such that the information items are read out from the language display data set using the readout labels and displayed on the output unit. The information display apparatus is provided with an editing unit for executing an editing program that allows an operator to edit the language display data set and make a new language display data set using an input unit and writing the new language display data set into the storage unit. The display control unit reads the information items from the language display data set written in the storage unit using the readout labels and causes the output unit to display the read information items.

[0008] According to the present invention, the information display apparatus carries out a display function on the basis of the display control program and the language display data set that are stored separately from each other in the storage unit. The information expressed in language for operating or supporting the operation of the machine includes the language display data set including the information items that can be read using the readout labels. When a display command is issued, the display control program causes the information display unit to read out the information items from the language display data set using the readout labels and causes the output unit to display the read information items. The local user uses the editing unit included in the information display apparatus to edit the language display data set provided by the manufacturer using the input unit to obtain a new language display data set that can be easily recognized by the local operators. The thus obtained new language display data set is stored in the storage area of the storage unit. The display control unit executes the display control program so that the information items are read out using readout labels from the language display data set edited by the local user and is displayed by the output unit. Thus, the local user updates the information expressed in language for operating or supporting the operation of the machine into contents suitable for each factory using the editing unit. Accordingly, the information display apparatus displays the information expressed in language in a form familiar to the local operators, so that the operators can quickly and accurately understand the displayed information. As a result, when a problem occurs at the site, removal of the cause of stoppage, adjustment of the machine, etc., can be more quickly performed.

[0009] The textile machine may be, for example, a loom for manufacturing woven cloth, a warp preparation machine, such as a warping machine and a sizing machine, for preparing warp to be supplied to the loom, a yarn preparation machine, such as a spinning machine and a twisting machine, for manufacturing weft and warp, etc.

[0010] In the above-described information display apparatus for the textile machine, only one language display data set may be stored in the storage unit. Alternatively, two or more language display data sets may be stored and one of the language display data sets may be selected as necessary. In the former case, the language display data set provided by the manufacture may be directly edited using the editing unit. In the latter case, the language display data set provided by the textile machine manufacturers and a language display data set obtain as a result of editing by the user may be stored independently. In this case, only the editable language display data set can be changed by the user.

[0011] More specifically, the at least one language display data set may include a first language display data set provided by a textile machine manufacturer and a second language display data set edited by the operator on the basis of the first language display data set. In this case, the editing program is designed such that the second language display data set can be edited and the display control program is designed such that one of the language display data sets can be selected, and the display control unit selects one of the language display data sets on the basis of selection information, reads the information items from the selected language display data set using the readout labels, and causes the output unit to display the read information items. Accordingly, a desired language display data set can be selected from a plurality of kinds of language display data sets and be displayed. Since the local operator can select the data set edited by the operator in advance, the work efficiency can be prevented from being reduced. In addition, when, for example, a trouble occurs in the machine and a request for support is submitted to the manufacturer, an operator of the manufacturer can switch the language selection information irrespective of the result of editing by the local user. Accordingly, the display can be switched to those based on the data set provided by the manufacturer and the condition of the machine can be accurately recognized by the operator of the manufacturer. Thus, support including machine adjustment and the like can be quickly provided.

[0012] With regard to the above-described language display data sets, the editing program may have a function of editing the second language display data in a language different from the language of the information items included in the first language display data set. Accordingly, the output unit displays the information items from the language display

data set edited by the local user in a form familiar to the local operator, so that the operator can quickly and accurately understand the displayed information.

[0013] The information expressed in language that is stored in the language display data set is information for operating or supporting the operation of the textile machine. For example, the information may include display items corresponding to numerical values representing setting information of the textile machine or display items corresponding to information regarding an operational state of the textile machine. In addition, the information may also include causes of stoppage, errors, warning alarms, trouble indication, and support information including instruction for the operator when the warning alarms are activated or troubles occur, methods for checking or adjusting the textile machine, and troubleshooting procedures.

[0014] The information display apparatus for the textile machine may include a setting apparatus attached to the textile machine to provide at least one of a function of inputting setting information of the textile machine and a function of displaying an operational state of the textile machine. Alternatively, the information display apparatus for the textile machine may also include the information display apparatus includes an operational-information-collecting apparatus that is communicably connected to one or more textile machines and collects the operational information of the textile machines based on the operational states of the textile machines.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a diagram illustrating the overall structure of an operational-information-collecting apparatus that functions as an information display apparatus according to a first embodiment of the present invention;
Fig. 2 is a schematic diagram illustrating the relationship between software programs and data stored in a storage unit included in the operational-information-collecting apparatus according to the first embodiment;
Fig. 3 is a diagram of a report by shift output by the operational-information-collecting apparatus according to the first embodiment;
Fig. 4 is a diagram illustrating a language display data group according to the first embodiment;
Fig. 5 is a diagram illustrating the overall structure of a loom setting apparatus that functions as an information display apparatus according to a second embodiment of the present invention;
Fig. 6 is a schematic diagram illustrating the relationship between software programs and data stored in a storage unit of an editing device and a storage unit of the setting apparatus according to the second embodiment;
Fig. 7 is a diagram illustrating a display example of the setting apparatus according to the second embodiment;
Fig. 8 is a diagram illustrating another display example of the setting apparatus according to the second embodiment;
Fig. 9 is a diagram illustrating another display example of the setting apparatus according to the second embodiment;
Fig. 10 is a diagram illustrating another display example of the setting apparatus according to the second embodiment;
Fig. 11 is a diagram illustrating another display example of the setting apparatus according to the second embodiment; and
Fig. 12 is a diagram illustrating another display example of the setting apparatus according to the second embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Embodiments of the present invention will be described below with reference to the accompanying drawings. In the embodiments, looms will be explained as an example of textile machines.

First Embodiment

[0017] Fig. 1 shows an operational-information-collecting apparatus 10 provided for a plurality of looms 20 installed in a weaving factory. The operational-information-collecting apparatus 10 basically includes a host computer 11 composed of a personal computer or a server, an input unit 12 connected to the host computer 11 and having a keyboard and a mouse that functions as a pointing device, an output unit 13 composed of a display device or the like, a storage unit 14, and a readout unit (not shown) for reading software programs and data from a storage medium like a compact disk read-only memory (CD-ROM).

[0018] Each loom 20 basically includes a controller 40 that controls the operation of the loom 20 and a setting apparatus 30 connected to the controller 40. The host computer 11 is connected to the controller 40 of each loom 20 such that information can be transmitted therebetween.

[0019] Although not shown in the figure, each controller 40 receives signals from sensors including an angular sensor, such as an encoder connected to a main shaft, a yarn breakage sensor, a weft feeler, a warp tension sensor, etc., that are connected to the loom 20. When, for example, the loom 20 is an air jet loom, the controller 40 serves a function of

controlling the overall operation and stopping of the loom 20; a function of controlling actuators (not shown) that drives a main nozzle, sub-nozzles, a weft measuring/storing device, etc., in weft insertion motion for inserting a weft yarn into a warp shed; a function of controlling a warp tension at a desired tension; a function of detecting a warp breakage, a weft insertion failure, and other control troubles; and a function of measuring a take-up length, which is the production of woven cloth. In addition, the controller 40 also has a function of calculating operational information, such as the production of woven cloth, the stop time(down time), and the operating rate, on the basis of the operation and control state of the loom 20. The setting apparatus 30 connected to the controller 40 functions as a man-machine interface between the operator and the loom 20. More specifically, the setting apparatus 30 serves a function of setting values required to control the loom 20 and to calculate the above-described operational information and a function of displaying the operational and control states of the loom 20. The operational information calculated by the controller 40 is displayed on a display screen provided on the setting apparatus 30 in response to a request issued from the setting apparatus 30. In addition, the controller 40 also has a function of transmitting the operational information to the host computer 11 along with the machine number assigned to the corresponding loom 20 in response to a request from the host computer 11.

[0020] The operational-information-collecting apparatus 10 has a function of receiving the operational information from each loom 20 in association with the machine number thereof and outputting the received operational information for each machine or operation shift. This function is carried out using software programs and data (display control program A, editing program B, and language display data C, which will be described below) provided from software manufacturers including loom manufacturers. The software programs and data provided in the form of a storage medium, such as a CD-ROM, are stored in the storage unit 14 via the readout unit (not shown) and the host computer 11. The operator inputs a command corresponding to a program to be activated through the input unit 12, so that the host computer 11 selectively executes the program corresponding to the input. More specifically, the host computer 11 is capable of functioning as a display control unit and an editing device according to the present invention by executing the display control program A and the editing program B.

[0021] Fig. 2 schematically shows the relationship between the software programs executed by the host computer 11 and data referred to when the software programs are executed. When the operational information is collected, the display control program A is used to periodically read the operational information from each of a plurality of machines and display the obtained operational information, which is expressed in numerical values, on a display screen of the output unit 13 that functions as a display device. The operational information may be displayed for each machine number or operation shift. In addition, the operational information of the overall factory may be calculated on the basis of the operational information of each machine and displayed on the display screen. The language display data C includes a plurality of display items stored in association with readout labels and expressed in language to represent definitions and meanings of the numerical values showing the operational information. The editing program B is used to edit the display items included in the language display data C.

[0022] In the present embodiment, a weaving factory having one hundred looms 20 is considered. The operational-information-collecting apparatus 10 is installed in, for example, a control room of the weaving factory. Fig. 3 shows an example of a display screen of the display device 13 included in the operational-information-collecting apparatus 10. The display screen shows a report by shift, that is, an operation report for each shift of each machine showing data in the ascending order of the machine number and the shift number. Fig. 3 shows a report by shift for one day (October 28, 2004), which is two days before the current day (October 30, 2004), displayed in English. Each row of the report shows the record-identifying items of the operational information, i.e., the date, the shift number, and the machine number, and numerical values of the operational information, in that order from the left. The numerical values of the operational information include the operating rate; the stop time, the number of stoppages, and the number of stoppages per hour for each of total stop, weft stop, and warp stop; and the number of stoppages for each cause, in that order from the left. With regard to the number of stoppages for each cause, the number of stoppages caused by weft feelers (H1 feelers) provided to detect weft insertion failure for each kind of weft yarns and weft feelers (H2 feelers) provided to detect blow-off or long pick is shown for weft stop, and the number of stoppages caused by droppers, leno yarns (right and left), which are selvedge yarns, catch-cords, and manual stop is shown for warp stop. Accordingly, the numerical values of the operational information corresponding to the machine numbers and the shift numbers are successively arranged along the columns. The bottom row shows the average operational information of the overall factory calculated on the basis of the operational information of each loom.

[0023] Display items (information expressed in language) representing the meanings of numerical values are shown on the top row of the numerical values of the operational information. Fig. 3 is an example in which the display items are shown in English. More specifically, the display items corresponding to the record items are shown as "Date", "Shift No.", and "Loom No.", and the display items corresponding to the operational information are shown as "Efficiency of loom", "Total stop", "minutes", and so on, in English. Accordingly, the above-mentioned display items correspond to the "information expressed in language" according to the present invention. In addition, "Report by shift" is shown above the display items to indicate that a report by shift is currently being displayed.

[0024] An icon "Return" for returning to a menu screen is displayed, and operational information display screens other

than the above-described screen that displays the report by shift can be selected from the menu screen. The screen returns to the initial screen when this icon is clicked with the mouse included in the input unit 12. In addition, another icon "Save and Return" for returning to the initial screen after storing the current report by shift in the storage unit 14 so that it can be viewed later is also displayed. Accordingly, the current report by shift can be stored in a collection result storage file, as shown in Fig. 2.

[0025] In addition to the report by shift, the operation report output by the operational information display apparatus may also be a report by time period, such as day, hour, week, and month, a report by cloth or beam, which is based on the length or warp consumption, a report by operator, etc. These reports are made and output on the basis of information transmitted from each loom. In addition, instead of directly displaying the numerical values as described above, the operation report may also be graphically displayed using line graphs or bar graphs showing ratios.

[0026] According to the present invention, the above-mentioned display items are stored independently of the processing programs as a language display data group, and only the language display data group can be edited using the editing program. Fig. 4 is a diagram showing a part of the language display data group that is referred to when the processing program A is executed by the operational-information-collecting apparatus 10. The language display data group includes a plurality of kinds of language display data sets, each language display data set including a plurality of display items that are stored in association with readout labels that serve as identifiers for reading out the display items.

[0027] The language display data group shown in Fig. 4 includes language display data sets of different kinds of languages that are stored in respective storage areas. More specifically, a storage area for standard languages (STD) stores two kinds of language display data sets written in Japanese and English that are provided by the loom manufacturer. In addition, a storage area for editing languages (EDIT) is designed to be capable of storing three kinds of language display data sets obtained as a result of editing in different languages using the editing program. Kind labels C02 (SD1, SD2, EX1, EX2, and EX3) are respectively assigned to the above five kinds of language display data sets in the mentioned order, and are used in the process of selecting a desired language display data set when the operational information is displayed. In each of the five kinds of language display data sets, the display items to be displayed together with the operational information are stored in association with readout labels C01 (e.g., "a0001" to "xzzzz"). Fig. 4 shows a state in which display items in Korean, which is a language other than Japanese or English, are input by a local user in a storage area corresponding to the kind label C02 (EX1).

[0028] The display control program A, which is a processing program, includes the operational information expressed in numerical values (e.g., the operating rate and the number of stoppages) and the information of readout labels corresponding to the display items to be displayed with the operational information. The display control program A is designed to carry out a first step of selecting a data set of language designated by the operator from a plurality of kinds of language display data sets stored as described above using a kind label; a second step of reading out the operational information from each machine; a third step of successively reading out the display items corresponding to the operational information to be displayed from the selected language display data set using the readout labels when a command to display the operational information is received; and a fourth step of displaying the display items read in the third step and the numerical values of the operational information next to each other in a screen display form designed by the loom manufacturer. Accordingly, the host computer 11 displays the operational information on the screen of the display device 13 as shown in, for example, Fig. 3. When, for example, the operator selects the Korean display data set that is edited in the above-described manner, the host computer 11, which functions as the display control unit, selects the Korean language display data set in the first step of the display control program A and outputs the report by shift showing display items in Korean. However, the report by shift in English is shown in Fig. 3 for convenience of explanation.

[0029] In view of the cost of the operational-information-collecting apparatus 10, the host computer 11 is preferably a commercial personal computer that is being rapidly developed. When, for example, such a commercial computer is used, the operation of the computer is preferably controlled by an operating system like Windows (registered trademark of Microsoft Corporation) that is in widespread use throughout the world and that supports many languages, and the processing program for collecting the operational information (that is, the display control program according to the present invention) is preferably based on a spreadsheet software program that is compatible with the operating system. In such a case, the host computer, the operating system, and the spreadsheet software program are prepared by the user and the loom manufacturer provides a dedicated software program that includes a plurality of macros for collecting the operational information of each loom and that runs in the above-described spreadsheet software program. In this system, the language display data group may at least be readable using the spreadsheet software program and the display items may be edited using the editing function of the spreadsheet software program. In other words, the spreadsheet software program that can edit the data in different languages and software including character fonts for displaying characters of the local language and a front-end processor that converts information input in Roman letters into the local language correspond to the above-described editing program. In addition, the spreadsheet software program, the above-described dedicated software program provided by the manufacture, and software including character fonts for displaying characters of the local language correspond to the display control program A.

[0030] In the first embodiment, the operational-information-collecting apparatus 10 carries out the display function on

the basis of the display control program A and the language display data group C that are stored separately from each other in the storage unit 14. The information expressed in language for operating or supporting the operation of the machines includes the language display data group C including information items that can be read using the readout labels CO1. When a display command is issued, the display control program A reads out the corresponding information items from the language display data group C using the readout labels C01 and causes the output unit 13 to display the obtained information items. The operational-information-collecting apparatus 10 that executes the editing program B serves the function as the editing device for editing the above-described language display data group C. Accordingly, the local user activates the editing program B and edits the language display data group C provided by the manufacturer using the input unit 12 to obtain a new language display data set that can be easily recognized by the local operators. The thus obtained new language display data set is stored in a storage area of the storage unit 14 corresponding to the kind labels EX1 to EX3. The host computer 11 that functions as the display control unit executes the display control program A so that the information items are read out using readout labels C01 from the language display data set edited by the local user and is displayed by the output unit 13. Thus, the local user updates the information expressed in language for operating or supporting the operation of the machines into contents suitable for each factory using the editing device. Accordingly, the information display apparatus displays the information expressed in language in a form familiar to the local operators, so that the operators can quickly and accurately understand the displayed information. As a result, when a problem occurs at the site, removal of the cause of stoppage, adjustment of the machines, etc., can be more quickly performed.

[0031] The display items are edited as necessary. For example, some users (or weaving factories) may use display items different from those used in the data provided by the manufacturer for representing the operational information expressed in numerical values. In such a case, display items obtained by editing the standard display items provided by the manufacturer into those used by the user can be stored in the storage area for editing languages (EDIT) as the edited language display data set. According to the present invention, editing of the display items is not limited to those between different languages, and the display items may also be edited in the same language. When, for example, the user has no problem in using one of the standard language display data sets provided by the manufacturer, the user may use the language display data set provided by the manufacturer without editing it.

Second Embodiment

[0032] Fig. 5 shows a block diagram of a setting apparatus 30 provided on each loom for inputting set values of the loom and displaying information regarding the operational state of the loom and an editing device 50 for editing information expressed in language displayed by the setting apparatus 30. The setting apparatus 30 basically includes a microcomputer 31, a touch panel 32 having an input function and a color graphic display function, a card interface (I/F) 35 for writing and reading information to/from a memory card 56, and a storage unit 34 that stores a processing program for controlling the overall operation of the setting apparatus 30 with the microcomputer 31 to execute the above-described setting function and information display function. More specifically, the storage unit 34 stores a display control program and language display data groups according to the present invention. In addition, similar to the first embodiment, the setting apparatus 30 is connected to a controller 40 that controls the loom.

[0033] The editing device 50, which is provided separately from the setting apparatus 30 of the loom, basically includes an editing computer 51 composed of a commercial personal computer or the like, an input unit 52 connected to the editing computer 51 and having a keyboard and a mouse that functions as a pointing device, an output unit 53 having a display device or the like, a storage unit 54, a card interface (1/F) 55 for writing information to the memory card 56, and a readout unit (not shown) for reading software programs and data from a storage medium like a compact disk read-only memory (CD-ROM).

[0034] Fig. 6 schematically shows the relationship between a program stored in the editing device 50 and a program stored in the setting apparatus 30. Referring to Fig. 6, an editing program E is stored in the storage unit 54, and a display control program D is stored in the storage unit 34.

[0035] In the present embodiment, a language display data group having a plurality of kinds of language display data sets includes standard language display data F1 that is provided by the manufacturer and editing language display data F2 that is edited by the user as necessary, the language display data F1 and F2 being independently stored in the storage unit 34. The user edits the editing language display data F2 as necessary using the editing device 50 installed in, for example, a control room, and saves the result of editing in the memory card 56. Then, the operator causes the setting apparatus 30 to read the contents of the memory card 56 and stores the editing language display data F2 in the storage unit 34. The operator selects one of the language display data sets using the touch panel 32. Then, similar to the first embodiment, when a display command is issued, information is read out from the selected language display data set using the readout labels C01.

[0036] When the editing language display data F2 is written into the setting apparatus 30 from the editing device 50, additional new information such as character font data required by the setting apparatus 30 for display may also be

transmitted along with the editing language display data F2. In addition, instead of using the above-described memory card for data transmission, the data may also be transmitted by directly connecting the editing device 50 to the setting apparatus 30. In this case, similar to the first embodiment, a host computer connected to each machine may be used.

[0037] In the present embodiment, the language display data sets representing information expressed in language and included in the language display data F1 and F2 differ from those of the first embodiment in that the language display data sets indicate inputs of set values of the loom and information regarding the operational state or support of operation of the loom. However, similar to the first embodiment, a plurality of display items are stored in association with readout labels C01 and kind labels C02 in a readable manner, although not shown in the figure for convenience of explanation. In addition, the function of the processing program D for controlling the setting apparatus 30 differs from that of the first embodiment in that the set values and information regarding the operational state and support of operation of the machine are displayed. However, similar to the first embodiment, when the operator issues a display command by operating the screen, processing steps similar to the above-described first to fourth steps are performed and information is read out from the corresponding data set using the readout labels C01 and displayed on the touch panel 32 in a display form designed in advance.

[0038] The information expressed in language by the setting apparatus 30 of the loom will be described below with reference to Figs. 7 to 11. With regard to the following description of the display screens, an air jet loom capable of multi-color weft insertion is considered as an example. In a typical air jet loom, a weft yarn stored in a weft measuring/storing device is released by a length corresponding to a single pick and is inserted into a warp shed by a main nozzle and a plurality of sub-nozzles by relay ejection. An optical weft feeler having a detection area on a weft insertion path at a position near an end opposite to the weft insertion end is used to determine whether or not the weft yarn is normally inserted. When a weft insertion failure occurs during the operation of the loom, the loom is immediately stopped. Then, the weft yarn that has caused the failure is removed from the shed and the operation of the loom is restarted by an automatic pick repair (APR) unit. In the display screens described below, if the operator selects Korean, which is a language other than Japanese or English, information is expressed in Korean. However, similar to the first embodiment, English display will be explained below for convenience.

[0039] In Fig. 7, a screen 36 shows a set-value input screen for inputting weft-insertion conditions for a weft-insertion device included in the loom. In the screen, a display area G1 displays "Main/normal" as the information expressed in language to indicate that the current display screen corresponds to a main nozzle under a normal rotational state. In addition, a display area G2 shows "C1", "C2", "Retaining pin", "Main", "Auxiliary main", "ON", and "OFF" that indicate display fields of current set values of operating timings for a retaining pin and weft insertion nozzles including a main nozzle and an auxiliary main nozzle in each of two weft measuring/storing devices provided for two kinds of weft yarns, the display fields showing numerical values of the corresponding current set values. The above-described display control program is designed such that each of the set values can be updated or input by touching the corresponding display field to cause numeric keys (not shown) to appear on the screen and then touching the numeric keys to input a new set value. In addition, the screen also shows icons "1st pick", "2nd pick", "Sub-nozzle", and "Close" at the bottom. The icons "1st pick" and "2nd pick" are used to switch the screen to similar setting screens for first and second picks in a transient operation of the loom after the loom is activated, and the icon "Sub-nozzle" is used to switch the screen to a setting screen for a sub nozzle, which is another weft insertion nozzle. In addition, the icon k0 "Close" is used to close this screen and return to the initial screen. These setting screens appear when the corresponding icons are touched.

[0040] In Fig. 8, the screen 36 displays statistic values of weft arrival timings showing the weft-insertion state, which is one of the control states of the loom. The weft arrival timing corresponds to a main shaft angle at the time when the above-mentioned weft feeler detects the weft yarn. The weft arrival timing is stored for each pick until the number of picks reaches a predetermined sampling number, and the thus obtained weft arrival timings are used to determined the statistic values including the average value, the maximum and minimum values, and the standard deviation that shows the degree of variation. In the screen 36 shown in Fig. 8, a display area G4 graphically displays the static values of the last one-hundred sampling periods in the form of a line graph and a candle chart using different colors. In this screen, display items corresponding to the "information expressed in language" include "Weft arrival angle" and "Standard deviation" representing the meanings of the vertical axes of the graphic display and "Sampling number" shown in a display area G5 to indicate an input field for selecting the sampling number based on which the static values are calculated. Similar to Fig. 7, the screen shows an icon k0 "Close" at the bottom.

[0041] In Fig. 9, the screen 36 displays information regarding woven cloth production. In this screen 36, a display area G6 shows "Counter" to indicate that the current display screen shows the numerical values of a woven-cloth production length counter. In addition, the current date, time, and the operation shift number are also displayed. A display area G7 shows the numerical value information of the length of woven cloth together with the display item "Woven cloth". In addition, a lower half section of a display area G8 shows the set value of the final cut length of the woven cloth in the form of the product of the length per bolt(piece) and the number of pieces and the remaining length of the warp beam in the form of the result of subtraction of the consumed length from the initial warping length. In addition, "Doffing" and "Beam" and their units "pcs" and "meters" are displayed in the above-mentioned areas as the "information expressed

in language". An upper half of the area G8 graphically shows the percentage of the length of woven cloth in the set value of the final cut length and the percentage of the consumed length of warp in the initial warping length. In addition, the expected remaining time until the final cut is performed, which is calculated on the basis of the final cut length, the length of woven cloth, and the rotational speed of the loom, and the expected remaining time until the warp beam runs out are displayed in numerical values on the right of the graphical display. As the "information expressed in language", "Cloth", "Beam", "days", "hrs", and "min" are shown in correspondence with the numerical values representing the expected remaining times. A display area G9 shows the numerical information of the operating rate of the loom (loom efficiency), the set rotational speed of the loom, and the beam diameter of the warp beam and display items "Efficiency", "Loom rpm", and "Beam dia." as the "information expressed in language" corresponding to the numerical information. Similar to Fig. 7, the screen shows the icon k0 "Close" at the bottom. As described above, the display items shown as the information expressed in language include not only those corresponding to the numerical values but also those for graphically displaying the magnitudes thereof.

[0042] In Fig. 10, the screen 36 displays a report by shift, which is one of the control states of the loom. In this screen 36, a display area G10 shows "Shift Report" to indicate that the current display screen shows the report by shift. In addition, the current date, time, and operation shift number are also displayed. A display area G11 shows the date, the shift number, and the start and end times of the operation shift corresponding to the report by shift being displayed. In addition, numerical values of the operating rate, the loom rotational speed(loom rpm), the length of woven cloth, the monitored time based on which the report by shift is made, and the operated time of the loom are displayed along with the corresponding display items, as shown in the figure. In addition, cursor keys k3 and k4 for switching the display of the report by shift are provided, and one of a plurality of reports by shift that are stored automatically may be selectively displayed by operating one of the cursor keys k3 and k4.

[0043] Display areas G12 and G13 show the numerical values similar to those of the report by shift shown in Fig. 3 in different arrangements together with the corresponding display items. A display area G14 shows the operational state of the APR unit in that operation shift together with the corresponding display items.

[0044] In Figs. 7 to 10, the display items corresponding to the numerical values expressing the operational state of the loom or the set values are described as examples of the "information expressed in language" according to the present invention. However, the information expressed in language by the setting apparatus is not limited to those indicating the definitions (meanings) of the numerical values. More specifically, the information expressed in language may also include causes of loom stoppage, warning alarms, trouble indications, and support information for diagnosing and troubleshooting.

[0045] In Fig. 11, the screen 36 displays a cause of stoppage as an example of information relating to the operational state of the loom. In this screen 36, a display area G15 displays "Cause of stoppage" to indicate that the current display screen shows the cause of stoppage. In addition, the elapsed time after the stoppage of the loom is displayed together with the corresponding display item "Down time". In addition, a display area G16 displays "stopped by dropper" to indicate that the cause of stoppage is warp breakage. In this screen, the "information expressed in language" includes "Stop cause", "Down time", "hrs", "min", "sec", and "Stopped By Dropper ".

[0046] In Fig. 12, the screen 36 displays support information for troubleshooting of the loom. In this screen 36, a display area G17 shows "Maintenance" and "Trouble" to indicate that the current display screen shows the information for troubleshooting. In addition, a number indicating the code of trouble that has occurred and three numbers corresponding to other codes of trouble are displayed. The code "120" denoted by M1 is highlighted, which shows that the support information shown in a display area G18 corresponds to the trouble of the code "120". When the operator touches other codes, e.g., "375", the support information corresponding to the trouble of that code appears.

[0047] The display area G18 shows the detailed information of the cause of trouble of the code 120 and confirmation items corresponding to that trouble in that order from the top. In this example, a confirmation item (1) is selected from two confirmation items (1) and (2), and the item (1) is underlined accordingly. A display area G19 displays instructions corresponding to the confirmation item (1) in language. The display of the display area G19 can be changed, that is, the selected confirmation item can be changed by operating cursor keys k5 and k6.

[0048] According to the second embodiment, the display control program D, on the basis of which the setting apparatus 30 serves the display function, is stored separately from the language display data group. The language display data group includes the first language display data F1 provided by the loom manufacturer and the second language display data F2 edited by the operator on the basis of the data provided by the loom manufacturer. The first language display data F1 includes two data sets written in Japanese and English and associated with the kind labels SD1 and SD2, and the second language display data F2 includes a plurality of kinds of data sets written in languages other than Japanese and English and associated with the kind labels EX1 to EX3.

[0049] The editing computer 51 that can execute the editing program E functions as a device for editing the language display data F2. The local user activates the editing program E and edits the language display data F1 provided by the manufacturer into contents that can be easily recognized by the local operators using the input unit 52. The language display data F2 obtained as the result of editing is stored in the memory card 56, and is then written into the storage unit

34 by the setting apparatus 30.

[0050] The display control program D is designed to select one of the plurality of kinds of data sets and includes language selection information displayed by the operator using the touch panel 32. The microcomputer 31, which functions as the display control unit in the setting apparatus 30, executes the display control program D and selects the language display data set (for example, the data set associated with the kind label EX1) corresponding to the language selection information (for example, Korean). The information is read out from the selected data set using the readout labels C01 and is displayed on the touch panel 32 that functions as the output unit. Since the local operator can select the data set edited by the operator in advance, the information can be displayed in a form familiar to the local operator, similar to the first embodiment. Therefore, the work efficiency can be prevented from being reduced. In addition, when, for example, a trouble occurs in the machine and a request for support is submitted to the manufacturer, an operator of the manufacturer can switch the language selection information back to, for example, Japanese, irrespective of the result of editing by the local user. Accordingly, the display can be switched to those based on the data set provided by the manufacturer (for example, the language display data set associated with the kind label SD1) and the condition of the machine can be accurately recognized by the operator of the manufacturer. Thus, support including machine adjustment and the like can be quickly provided.

[0051] The above-described first and second embodiments may be modified as described below.

[0052] Although five kinds of language display data sets are provided in the above-described first and second embodiments, the present invention is not limited to this. The number of language display data sets is not limited as long as one or more language display data sets are provided by the manufacturer and one or more language data sets are editable by the user. Alternatively, one language display data set may be provided by the manufacturer and be edited and updated by the user.

[0053] In addition, the readout labels C01 used for reading the information from the language display data set may be provided in the form of addresses in a storage unit instead of those expressed by characters.

[0054] Although looms are described in the first and second embodiments to explain the operational-information-collecting apparatus and the setting apparatus, the present invention is not limited to this. The present invention may also be applied to various types of textile machines including a warp preparation machine, such as a warping machine and a sizing machine, for preparing warp to be supplied to a loom, a yarn preparation machine, such as a spinning machine and a twisting machine, for manufacturing weft and warp, etc.

Claims

1. An information display apparatus for a textile machine (20), comprising a storage unit (14, 34) that stores a display control program (A, D), an output unit (13, 53), and a display control unit (11, 31) that executes the display control program (A, D) to display information expressed in language for operating the textile machine (20) or supporting the operation of the textile machine (20) on the output unit (13, 53),
   wherein the information expressed in language is stored in the storage unit (14, 34) and includes at least one language display data set including a plurality of information items corresponding to readout labels (C01), the display control program (A, D) being designed such that the information items are read out from the language display data set using the readout labels (C01) and displayed on the output unit (13, 53),
   wherein the information display apparatus is provided with editing means (11, 50) for executing an editing program that allows an operator to edit the language display data set and make a new language display data set using an input unit and writing the new language display data set into the storage unit (14, 34), and
   wherein the display control unit (11, 31) reads the information items from the language display data set written in the storage unit (14, 34) using the readout labels (CO1) and displays the read information items on the output unit (13, 53).

2. The information display apparatus according to claim 1, wherein said at least one language display data set includes a first language display data set provided by a textile machine manufacturer and a second language display data set edited by the operator on the basis of the first language display data set,
   wherein the editing program is designed such that the second language display data set can be edited and the display control program (A, D) is designed such that one of the language display data sets can be selected, and
   wherein the display control unit (11, 31) selects one of the language display data sets on the basis of selection information, reads the information items from the selected language display data set using the readout labels (C01), and causes the output unit (13, 53) to display the read information items.

3. The information display apparatus according to claim 2, wherein the editing program has a function of editing the second language display data in a language different from the language of the first language display data set.

4. The information display apparatus according to one of claims 1 to 3, wherein the information items of each language display data set include display items corresponding to information regarding an operational state of the textile machine (20).

5. The information display apparatus according to one of claims 1 to 3, wherein the information items of each language display data set include display items corresponding to setting information of the textile machine (20).

6. The information display apparatus according to one of claims 1 to 5, wherein the information display apparatus includes a setting apparatus (30) attached to the textile machine (20) to provide at least one of a function of inputting setting information of the textile machine (20) and a function of displaying an operational state of the textile machine (20).

7. The information display apparatus according to claim 4, wherein the information display apparatus includes an operational-information-collecting apparatus (10) that is communicably connected to one or more textile machines (20) and collects the operational information of the textile machines (20) based on the operational states of the textile machines (20).

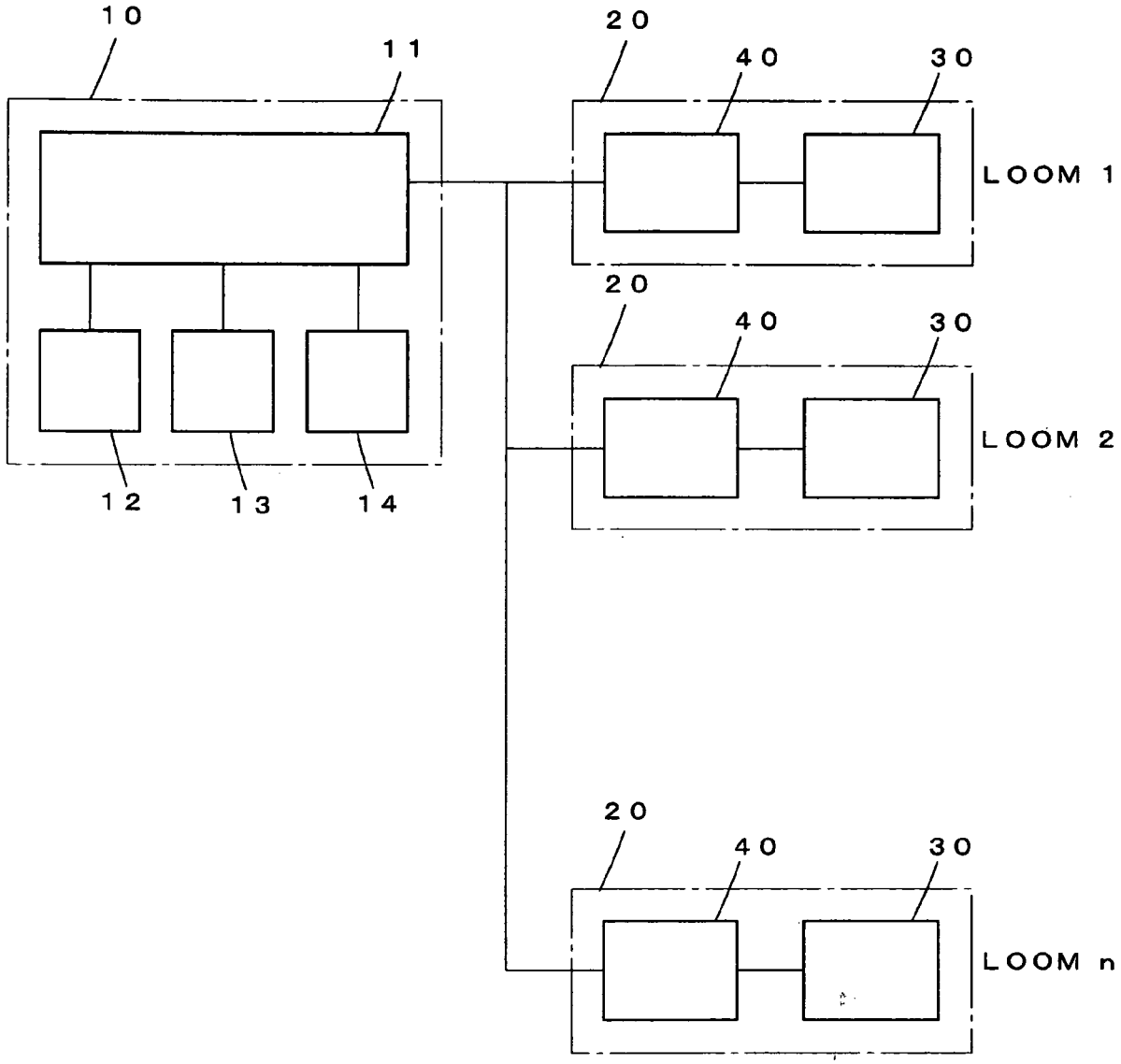


FIG. 1

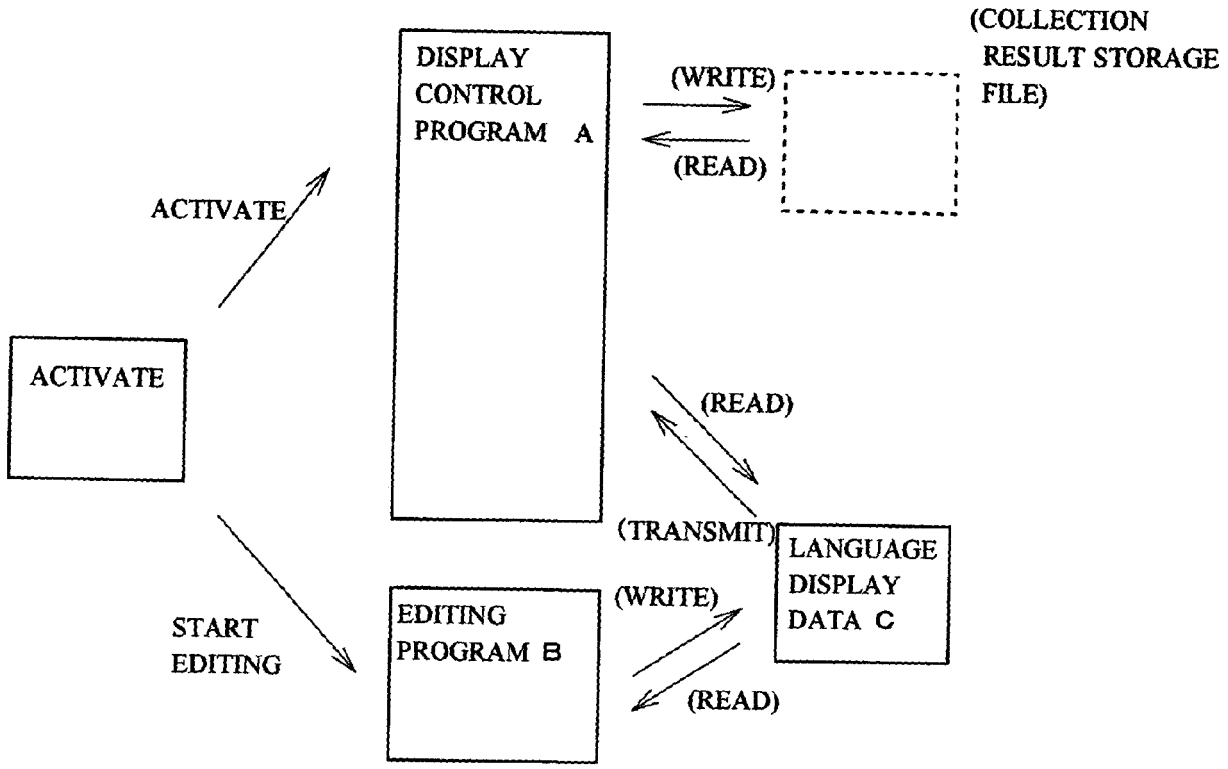
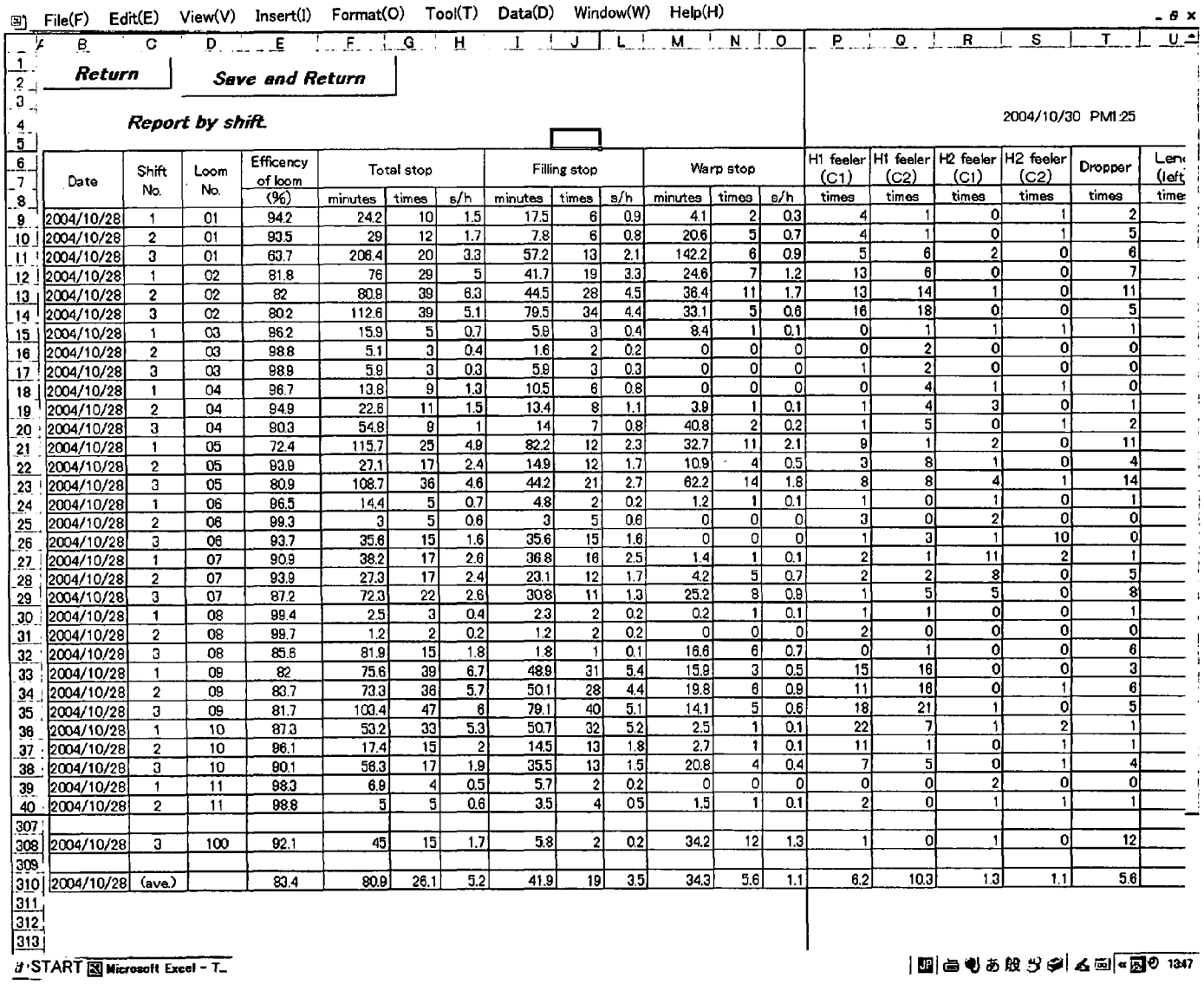

DISPLAY
CONTROL
PROGRAM A
(WRITE)
(READ)
(COLLECTION
RESULT STORAGE
FILE)
ACTIVATE
ACTIVATE
(READ)
(TRANSMIT)
LANGUAGE
DISPLAY
DATA C
START
EDITING
EDITING
PROGRAM B
(WRITE)
(READ)

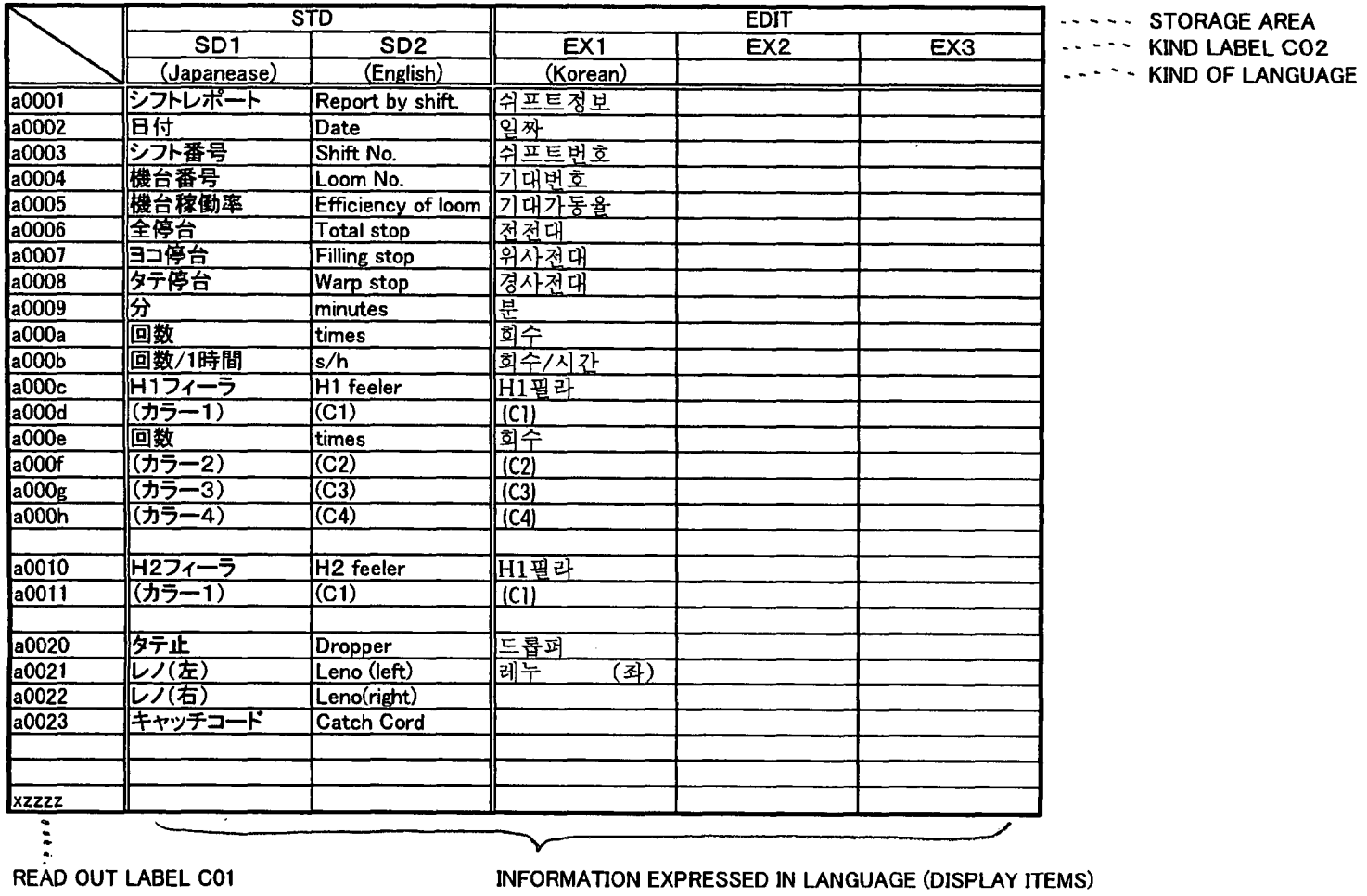
FIG. 2



Date	Shift No.	Loom No.	Efficency of loom	Total stop			Filling stop			Warp stop			H1 feeler (C1)	H1 feeler (C2)	H2 feeler (C1)	H2 feeler (C2)	Dropper	Len (left
			(%)	minutes	times	s/h	minutes	times	s/h	minutes	times	s/h	times	times	times	times	times	time
2004/10/28	1	01	94.2	24.2	10	1.5	17.5	6	0.9	4.1	2	0.3	4	1	0	1	2	
2004/10/28	2	01	93.5	29	12	1.7	7.8	6	0.8	20.6	5	0.7	4	1	0	1	5	
2004/10/28	3	01	63.7	206.4	20	3.3	57.2	13	2.1	142.2	6	0.9	5	6	2	0	6	
2004/10/28	1	02	81.8	76	29	5	41.7	19	3.3	24.6	7	1.2	13	6	0	0	7	
2004/10/28	2	02	82	80.9	39	6.3	44.5	28	4.5	36.4	11	1.7	13	14	1	0	11	
2004/10/28	3	02	80.2	112.6	39	5.1	79.5	34	4.4	33.1	5	0.6	16	18	0	0	5	
2004/10/28	1	03	96.2	15.9	5	0.7	5.9	3	0.4	8.4	1	0.1	0	1	1	1	1	
2004/10/28	2	03	98.8	5.1	3	0.4	1.6	2	0.2	0	0	0	0	2	0	0	0	
2004/10/28	3	03	98.9	5.9	3	0.3	5.9	3	0.3	0	0	0	1	2	0	0	0	
2004/10/28	1	04	96.7	13.8	9	1.3	10.5	6	0.8	0	0	0	0	4	1	1	0	
2004/10/28	2	04	94.9	22.6	11	1.5	13.4	8	1.1	3.9	1	0.1	1	4	3	0	1	
2004/10/28	3	04	90.3	54.8	8	1	14	7	0.8	40.8	2	0.2	1	5	0	1	2	
2004/10/28	1	05	72.4	115.7	25	4.9	82.2	12	2.3	32.7	11	2.1	9	1	2	0	11	
2004/10/28	2	05	93.9	27.1	17	2.4	14.9	12	1.7	10.9	4	0.5	3	8	1	0	4	
2004/10/28	3	05	80.9	108.7	36	4.6	44.2	21	2.7	62.2	14	1.8	8	8	4	1	14	
2004/10/28	1	06	96.5	14.4	5	0.7	4.8	2	0.2	1.2	1	0.1	1	0	1	0	1	
2004/10/28	2	06	99.3	3	5	0.6	3	5	0.6	0	0	0	3	0	2	0	0	
2004/10/28	3	06	93.7	35.6	15	1.6	35.6	15	1.6	0	0	0	1	3	1	10	0	
2004/10/28	1	07	90.9	38.2	17	2.6	36.8	16	2.5	1.4	1	0.1	2	1	11	2	1	
2004/10/28	2	07	93.9	27.3	17	2.4	23.1	12	1.7	4.2	5	0.7	2	2	8	0	5	
2004/10/28	3	07	87.2	72.3	22	2.6	30.8	11	1.3	25.2	8	0.9	1	5	5	0	8	
2004/10/28	1	08	99.4	2.5	3	0.4	2.3	2	0.2	0.2	1	0.1	1	1	0	0	1	
2004/10/28	2	08	99.7	1.2	2	0.2	1.2	2	0.2	0	0	0	2	0	0	0	0	
2004/10/28	3	08	85.6	81.9	15	1.8	1.8	1	0.1	16.6	6	0.7	0	1	0	0	6	
2004/10/28	1	09	82	75.6	39	6.7	48.9	31	5.4	15.9	3	0.5	15	16	0	0	3	
2004/10/28	2	09	83.7	73.3	38	5.7	50.1	28	4.4	19.8	6	0.9	11	16	0	1	6	
2004/10/28	3	09	81.7	103.4	47	6	79.1	40	5.1	14.1	5	0.6	18	21	1	0	5	
2004/10/28	1	10	87.3	53.2	33	5.3	50.7	32	5.2	2.5	1	0.1	22	7	1	2	1	
2004/10/28	2	10	96.1	17.4	15	2	14.5	13	1.8	2.7	1	0.1	11	1	0	1	1	
2004/10/28	3	10	90.1	56.3	17	1.9	35.5	13	1.5	20.8	4	0.4	7	5	0	1	4	
2004/10/28	1	11	98.3	6.9	4	0.5	5.7	2	0.2	0	0	0	0	0	2	0	0	
2004/10/28	2	11	98.8	5	5	0.6	3.5	4	0.5	1.5	1	0.1	2	0	1	1	1	
2004/10/28	3	100	92.1	45	15	1.7	5.8	2	0.2	34.2	12	1.3	1	0	1	0	12	
2004/10/28	(ave.)		83.4	80.9	26.1	5.2	41.9	19	3.5	34.3	5.6	1.1	6.2	10.3	1.3	1.1	5.6	

FIG. 3

EP 1 700 940 A1



	STD		EDIT		
	SD1	SD2	EX1	EX2	EX3
	(Japanease)	(English)	(Korean)		
a0001	シフトレポート	Report by shift.	쉬프트정보		
a0002	日付	Date	일짜		
a0003	シフト番号	Shift No.	쉬프트번호		
a0004	機台番号	Loom No.	기대번호		
a0005	機台稼働率	Efficiency of loom	기대가동율		
a0006	全停台	Total stop	전전대		
a0007	ヨコ停台	Filling stop	위사전대		
a0008	タテ停台	Warp stop	경사전대		
a0009	分	minutes	분		
a000a	回数	times	회수		
a000b	回数/1時間	s/h	회수/시간		
a000c	H1フィーラ	H1 feeler	H1필라		
a000d	(カラー1)	(C1)	(C1)		
a000e	回数	times	회수		
a000f	(カラー2)	(C2)	(C2)		
a000g	(カラー3)	(C3)	(C3)		
a000h	(カラー4)	(C4)	(C4)		
a0010	H2フィーラ	H2 feeler	H1필라		
a0011	(カラー1)	(C1)	(C1)		
a0020	タテ止	Dropper	드롭퍼		
a0021	レノ(左)	Leno (left)	레누 (좌)		
a0022	レノ(右)	Leno(right)			
a0023	キャッチコード	Catch Cord			
xzzzz					

READ OUT LABEL C01

INFORMATION EXPRESSED IN LANGUAGE (DISPLAY ITEMS)

- - - - - STORAGE AREA
- - - - - KIND LABEL C02
- - - - - KIND OF LANGUAGE

FIG. 4

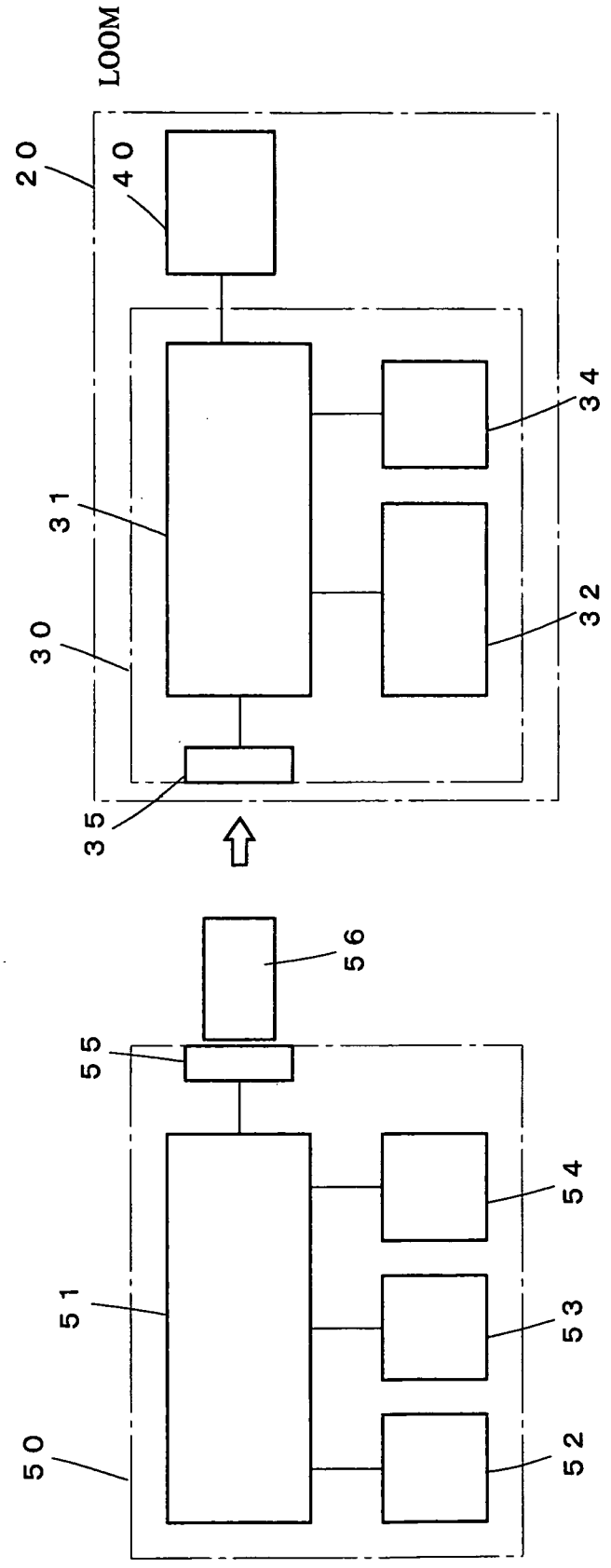


FIG. 5

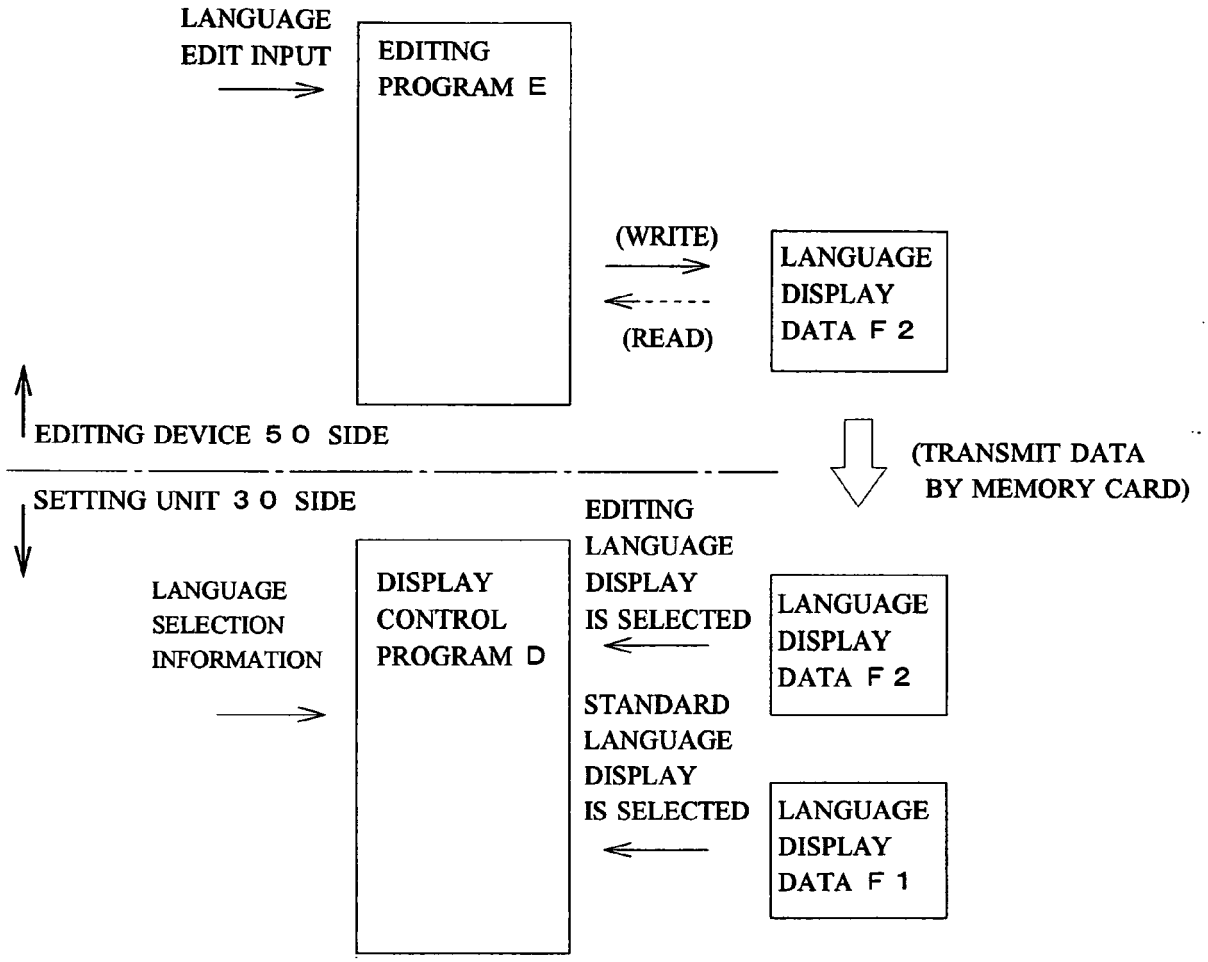

LANGUAGE
EDIT INPUT
EDITING
PROGRAM E
(WRITE)
(READ)
LANGUAGE
DISPLAY
DATA F 2
EDITING DEVICE 5 0 SIDE
(TRANSMIT DATA
BY MEMORY CARD)
SETTING UNIT 3 0 SIDE
EDITING
LANGUAGE
DISPLAY
IS SELECTED
LANGUAGE
DISPLAY
DATA F 2
LANGUAGE
SELECTION
INFORMATION
DISPLAY
CONTROL
PROGRAM D
STANDARD
LANGUAGE
DISPLAY
IS SELECTED
LANGUAGE
DISPLAY
DATA F 1

FIG. 6

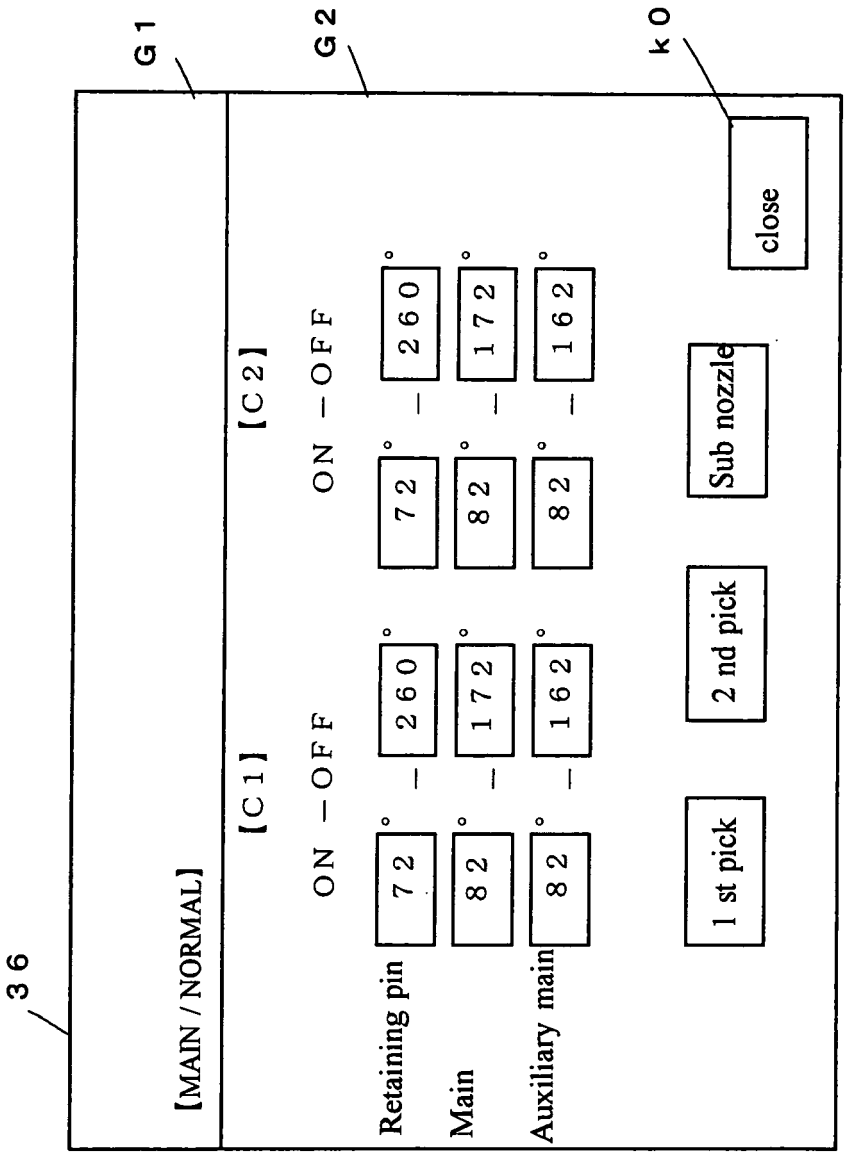

36
[MAIN / NORMAL]
G1
G2
k0
[C1]
[C2]
ON
OFF
Retaining pin
Main
Auxiliary main
72°
260°
82°
172°
82°
162°
1 st pick
2 nd pick
Sub nozzle
close

FIG. 7

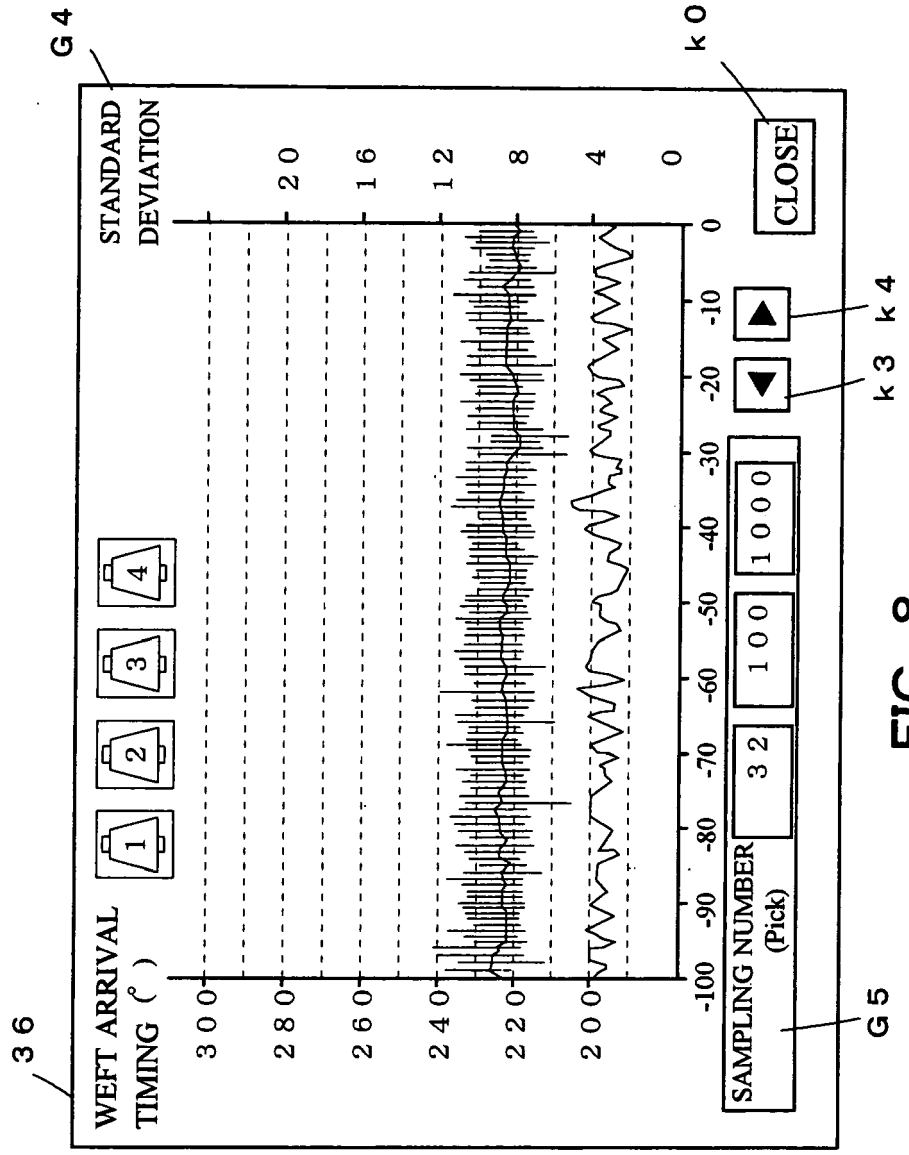

G 4
k O
STANDARD DEVIATION
CLOSE
WEFT ARRIVAL TIMING (°)
1
2
3
4
300
280
260
240
220
200
20
16
12
8
4
0
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
k 4
k 3
SAMPLING NUMBER (Pick)
32
100
1000
G 5
36

FIG. 8

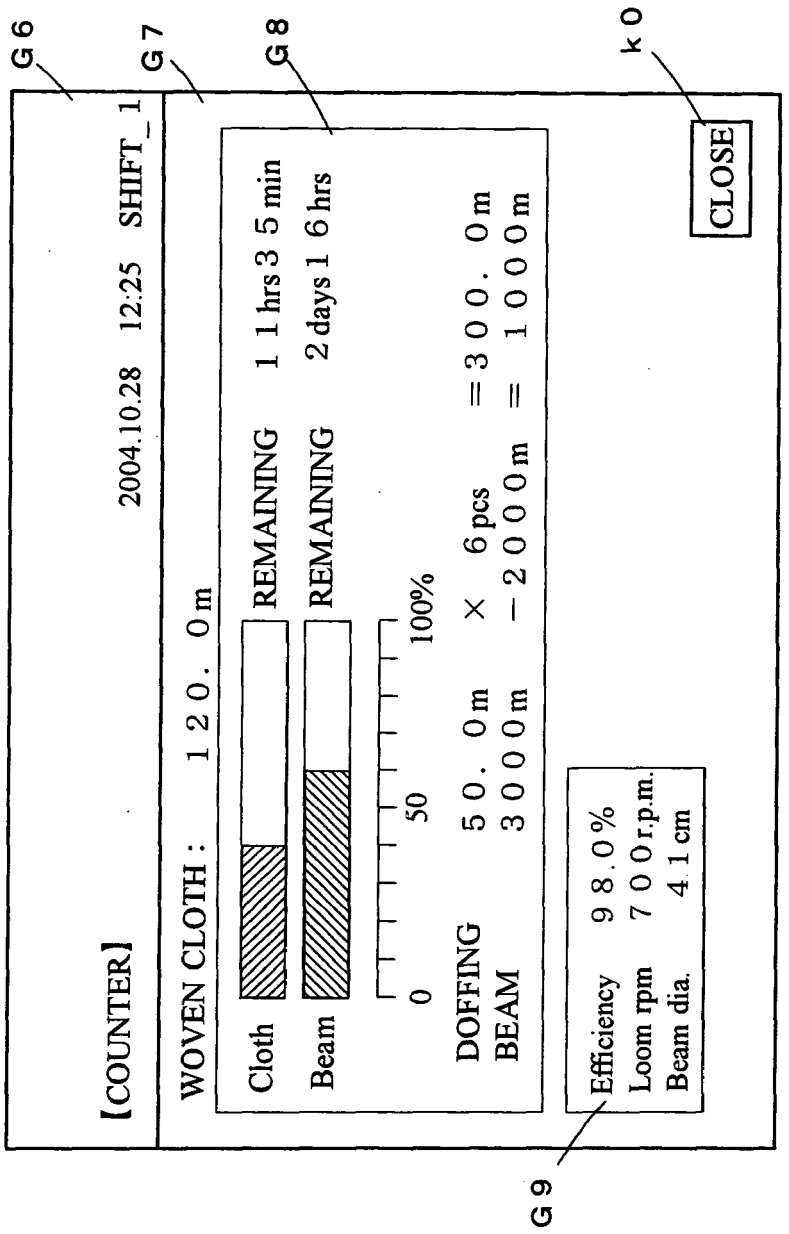

G6
G7
G8
k0
G9
[COUNTER]
2004.10.28 12:25 SHIFT_1
WOVEN CLOTH : 120. 0m
Cloth
REMAINING 11hrs35min
Beam
REMAINING 2days16hrs
0
50
100%
DOFFING 50. 0m × 6pcs =3000. 0m
BEAM 3000m −2000m = 1000m
Efficiency 98.0%
Loom rpm 700r.p.m.
Beam dia. 41cm
CLOSE

FIG. 9

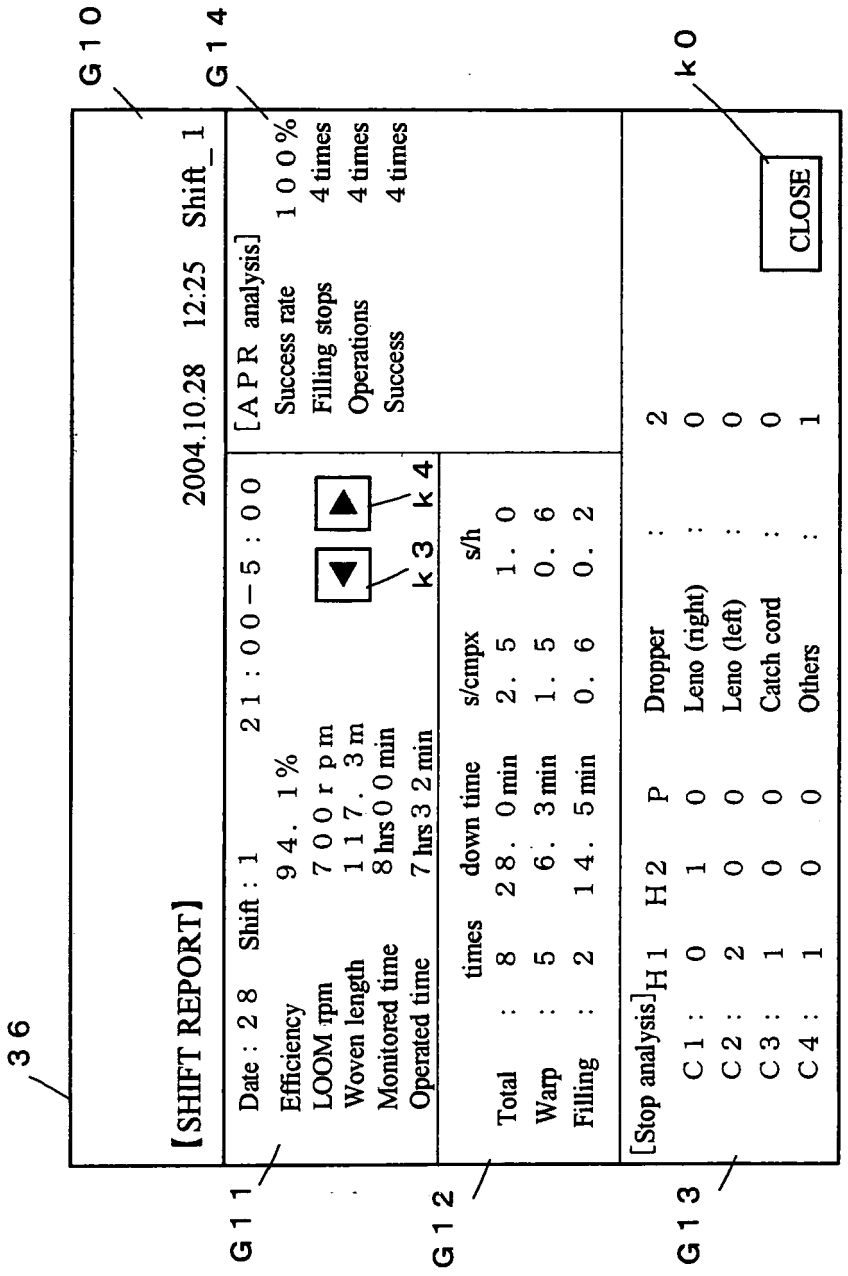

36
G10
G14
【SHIFT REPORT】
2004.10.28 12:25 Shift_1
Date : 28 Shift : 1 21 : 00 – 5 : 00
Efficiency 94. 1%
LOOM rpm 700rpm
Woven length 117. 3m
Monitored time 8hrs00min
Operated time 7hrs32min
k3 k4
[APR analysis]
Success rate 100%
Filling stops 4 times
Operations 4 times
Success 4 times
times down time s/cmpx s/h
Total : 8 28. 0min 2. 5 1. 0
Warp : 5 6. 3min 1. 5 0. 6
Filling : 2 14. 5min 0. 6 0. 2
G11
G12
G13
k0
[Stop analysis] H1 H2 P Dropper : 2
C1 : 0 1 0 Leno (right) : 0
C2 : 2 0 0 Leno (left) : 0
C3 : 1 0 0 Catch cord : 0
C4 : 1 0 0 Others : 1
CLOSE

FIG. 10

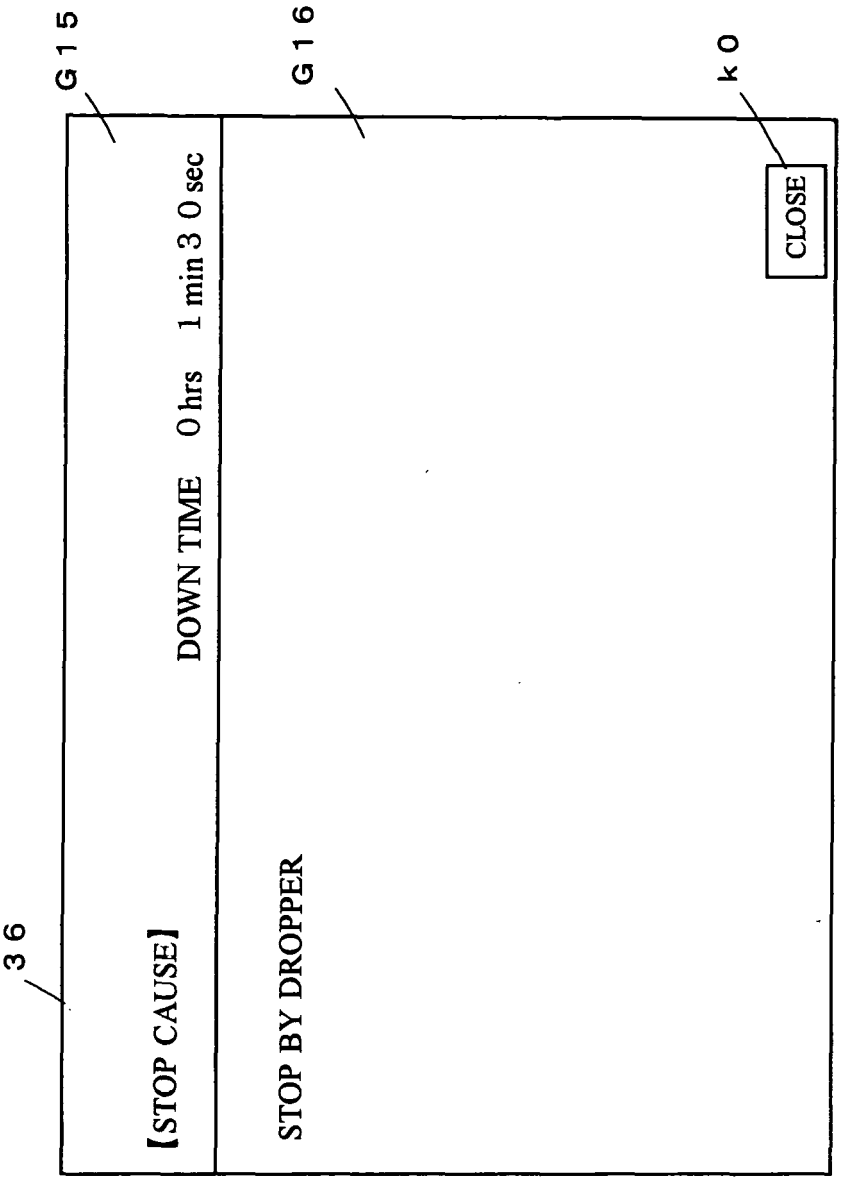

36
[STOP CAUSE]
STOP BY DROPPER
DOWN TIME 0 hrs 1 min 30 sec
G15
G16
k0
CLOSE

FIG. 11

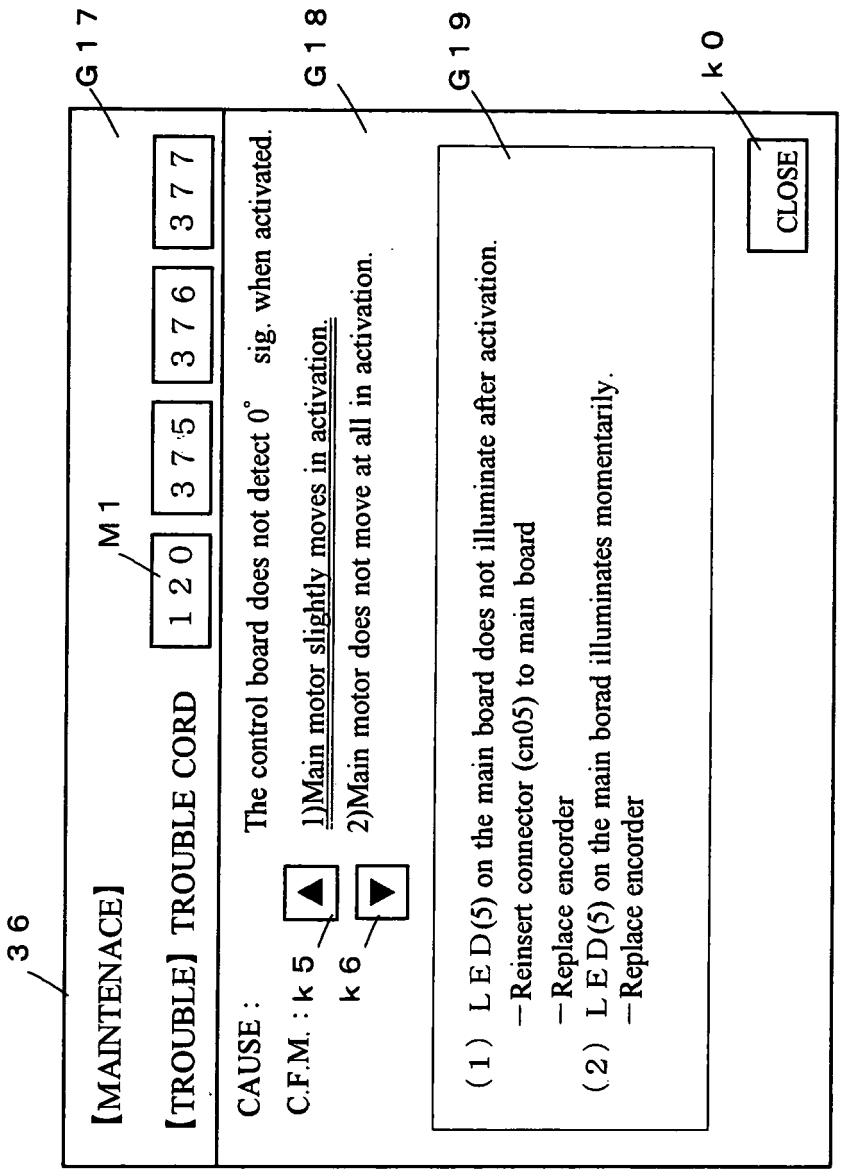

36
[MAINTENACE]
[TROUBLE] TROUBLE CORD
M1
120
375
376
377
G17
CAUSE :
C.F.M. : k5
k6
The control board does not detect 0° sig. when activated.
1)Main motor slightly moves in activation.
2)Main motor does not move at all in activation.
G18
(1) LED(5) on the main board does not illuminate after activation.
—Reinsert connector (cn05) to main board
—Replace encorder
(2) LED(5) on the main borad illuminates momentarily.
—Replace encorder
G19
k0
CLOSE

FIG. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 06 00 3243

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	EP 0 589 830 A (KABUSHIKI KAISHA TOYODA JIDOSHOKKI SEISAKUSHO; TOYODA AUTOMATIC LOOM W) 30 March 1994 (1994-03-30) * page 3, line 1 - page 4, line 23; figures 1-4 *	1	D03D51/00 D03J1/00
A	EP 1 394 307 A (TSUDAKOMA KOGYO KABUSHIKI KAISHA) 3 March 2004 (2004-03-03) * paragraphs [0005] - [0019] *	1	
D,A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 409 (C-1091), 30 July 1993 (1993-07-30) & JP 05 078954 A (TSUDAKOMA CORP), 30 March 1993 (1993-03-30) * abstract *	1	

TECHNICAL FIELDS SEARCHED (IPC)

D03D
D03J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 March 2006	Dreyer, C

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31-03-2006

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- JP 61231246 A **[0003]**