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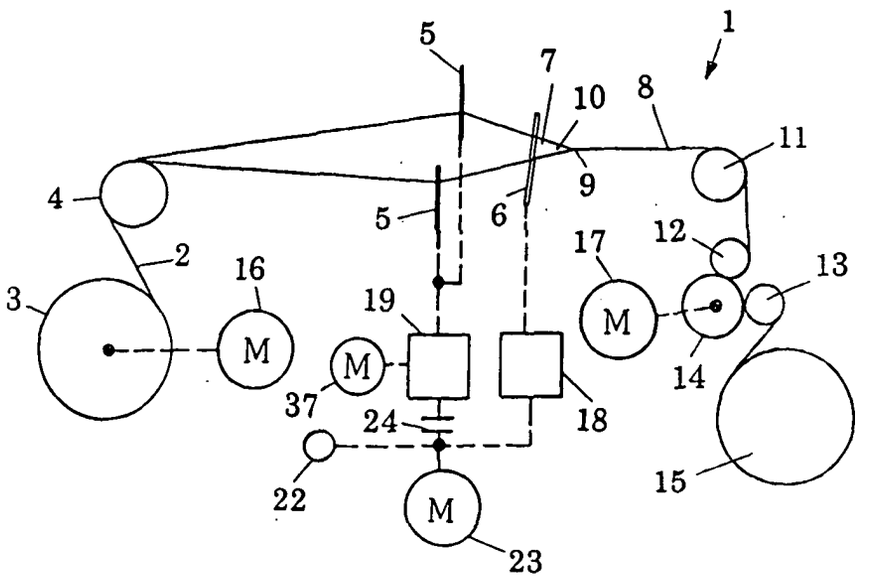
(54) Loom with filling bar preventing function

(57) A loom(1) with a filling bar preventing function comprises two or more filling bar preventing devices (21) , and a filling bar prevention data setting unit (20) that gives set values of filling bar preventing parameters to the two or more filling bar preventing devices (21). Set values for degrees of filling bars to be given to the filling bar preventing devices (21) are stored beforehand in the filling bar prevention data setting unit (20). Filling bar information about an expected degree of filling bars is given to the filling bar prevention data setting unit (20). The filling bar prevention data setting unit (20) selects the set values corresponding to the filling bar information given thereto, and gives the selected set values respectively to the filling bar preventing devices (21). The loom (1) operates according to the expected degree of filling bars to prevent the formation of filling bars effectively.

FIG.1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a loom with a filling bar preventing function capable of setting proper operating conditions for a plurality of filling bar preventing devices according to the degree of filling bars.

Description of the Related Art

[0002] Various filling bar preventing techniques have been proposed to cope with various causes of filling bars. A cloth fell controller disclosed in JP-A 54-106661 is a representative filling bar preventing techniques. This known cloth fell controller prevents the formation of filling bars due to the elongation of warp yarns while the loom is stopping by turning the warp beam on the loom in the normal direction to move the cloth fell so that warp tension decreases. JP-A 59-43145 discloses a leveling device incorporated into a shedding mechanism. This leveling device prevents the formation of filling bars due to the elongation of warp yarns while the loom is stopping by driving the heddle frames on the loom so as to reduce the size of a warp shed, preferably, so as to close a shed after the loom has stopped. A kick-back device disclosed in JP-A 61-63749 prevents the formation of filling bars by turning the warp beam in the normal or the reverse direction through a predetermined angle to displace the cloth fell prior to restarting the loom.

[0003] A starting torque setting device for setting a starting torque of a motor for driving the main shaft of a loom is disclosed in JP-A 57-51846. This starting torque setting device prevents the formation of filling bars by setting a high starting torque for the motor to change torque necessary for the first beating-up after the restart of the loom. A reverse-starting device included in the operating system of a loom is disclosed in JP-A 61-124651. This reverse-starting device prevents the formation of filling bars by reverse-starting the main shaft of the loom from a waiting position to a predetermined angular position prior to restarting the loom to increase force necessary for a beating-up operation at the restart of the loom. Since the main shaft is reversed and the main shaft turns through an increased angle before the first beating-up operation, the main shaft can be sufficiently accelerated and thereby a high force can be used for the beating-up operation immediately after the restart of the loom.

[0004] Those previously proposed filling bar preventing techniques are achieved by properly operating a main controller for controlling operations to start and stop the loom, a let-off controller for controlling the rotation of the warp beam, a take-up controller for controlling the rotation of a cloth roller, a shedding controller for controlling a shedding mechanism and a picking controller for controlling a picking mechanism at the stop, during the stop or at the restart of the loom.

[0005] Recent woven fabrics with a high added value require complicated weaving conditions. In weaving such a woven fabric with a high added value, filling bar preventing devices embodying the foregoing filling bar preventing techniques are unable to prevent filling bars when used individually. Therefore, at least two filling bar preventing devices embodying at least two foregoing filling bar preventing techniques are used in combination for the effective prevention of filling bars. However, the operating conditions for the two or more filling bar preventing devices need to be determined by a trial-and-error method every time the degree of filling bars changes. Such a method of determining the operating conditions for the filling bar preventing devices take time and filling bars are formed before the operating conditions for the filling bar preventing devices are determined properly. More over, the operating conditions for the filling bar preventing devices need to be determined individually, mistakes often occurs in entering set data occurs, and work for setting many data needs much time.

SUMMARY OF THE INVENTION

[0006] Accordingly, it is an object of the present invention to facilitate determining operating conditions for two or more filling bar preventing devices included in a loom according to the degree of filling bars.

[0007] According to one aspect of the present invention, a loom with a filling bar preventing function comprises two or more filling bar preventing devices, and a filling bar prevention data setting unit that stores set values for degrees of filling bars. The set values for degrees of filling bars to be given to the filling bar preventing devices are stored beforehand in the filling bar prevention data setting unit. The filling bar prevention data setting unit receives filling bar information about the degree of filling bars, selects the set values corresponding to the filling bar information, and gives the selected set data to the filling bar preventing devices. The filling bar preventing devices operate for the effective prevention of filling bars on the basis of those set values corresponding to the degree of filling bars.

[0008] The filling bar preventing devices include a filling bar preventing device that displaces the cloth fell of a fabric longitudinally in a period between the stop and the restart of the loom, a filling bar preventing device that reverses the main shaft of the loom prior to the restart of the loom, a filling bar preventing device that selectively determines a torque necessary for the first beating-up motion after the restart of the loom, and a filling bar preventing device that inserts a filling yarn in a shed by a picking device in a period from the elimination of a loom stopping cause and the restart of the loom to make filling bars imperceptible. Those filling bar preventing device respectively having different functional members or those filling bar preventing devices respec-

tively having the same functional members and respectively operating at different times are regarded as different filling bar preventing devices. From such a point of view, the loom according to the present invention is provided with at least two different filling bar preventing devices.

[0009] The control data setting operation for setting the set values for each filling bar preventing device includes the selection of a signal for turning on or off the filling bar preventing device, the selection of increasing or decreasing the set values of parameters, and the combination of the selection of a signal for turning on or off the filling bar preventing device, and the selection of increasing or decreasing the set values.

[0010] The values of parameters of operating conditions for each filling bar preventing device are entered into the filling bar prevention data setting unit by a manual data input operation, a data read operation for reading set data from a recording medium, such as a memory card, by a card reader, or a data read operation for reading data from a databases stored in a host computer. Patterns of the set values and the databases are determined empirically by a weaving mill or are provided by a loom maker.

[0011] Set values of the parameters of the operating conditions for each filling bar preventing device are selected from those set for different types of fabrics (filling bars specific to different types of fabrics) , from those set for different loom stopping causes including a weft stop and a warp stop, and corresponding to the loom stopping causes, from those of parameters dominating degrees of filling bars (duration of stop, warp tension, the condition of a shed) and corresponding to the loom stopping causes. Those set values of the parameters may be set for a plurality of operating conditions for each filling bar preventing device, and the filling bar preventing devices may be selectively operated depending on the type of the fabric. The set values of the parameters may be manually selected by operating data displayed on a screen or may be automatically selected according to signals representing a cause of stop.

[0012] The data on the operating conditions for each filling bar preventing device is given to the filling bar preventing device, for example, when the filling bar preventing device operates at the stop or the restart of the loom, or when the data on the operating conditions for the filling bar preventing device is set. For example, when the data on the operating conditions for the filling bar preventing device is given to the filling bar preventing device in setting the data on the operating conditions, set values are stored beforehand in the filling bar preventing device. The filling bar preventing device executes a predetermined filling bar preventing operation upon the reception of a command given thereto when a start signal is given to the loom.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The above and other objects, features and advantages of the present invention will become more apparent from the following description made in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic view of a loom;
Fig. 2 is a block diagram of a controller included in the loom;
Fig. 3 is a perspective view of a filling bar preventing data setting device;
Fig. 4 is a flow chart of a filling bar preventing device setting procedure;
Fig. 5 is a pictorial view of assistance in explaining a pattern read procedure;
Fig. 6 is a view of assistance in explaining a setting operation for setting a filling bar preventing procedures for filling bar preventing devices;
Fig. 7 is a view of assistance in explaining a setting operation for setting filling bar preventing conditions for a filling bar preventing device;
Fig. 8 is a view of assistance in explaining a setting operation for setting filling bar preventing conditions for preventing wavy set marks; and
Fig. 9 is a view of assistance in explaining a set value determining procedure for determining set values according to the degree of filling bars.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Referring to Fig. 1 showing an essential part of a loom 1, warp yarns 2 are let off from a warp beam 3 in a sheet. The warp yarns 2 are extend around a back roller 4 and through heddles held by heddle frames 5 and a reed 6 to the cloth fell 9 of a fabric 8. The heddle frames 5 are driven to form a shed 7 by raising certain groups of the warp yarns and lowering other groups of the warp yarns 2. A filling yarn 10 is inserted in the shed 7 of the warps 2 and is beaten up into the cloth fell 9 of the cloth 8 by the reed 6. The fabric 8 is taken up on a cloth roller 15 by a takeup device including a guide roller 11, a first pressure roller 12, a surface roller 14, and a second pressure roller 13. The warp beam 3 and the surface roller 14 are driven by a let-off motor 16 and a take-up motor 17, respectively. A main motor 23 drives a main shaft 22. The rotation of the main shaft 22 is converted into a linear motion for driving the reed 6 for a beating-up operation by a rotary-to-linear motion converting mechanism 18. The power of the main shaft 22 is transmitted through an electromagnetic clutch 24 and a rotary-to-linear motion converting mechanism 19 to a shedding mechanism to drive the heddle frames 5 for a shedding motion.

[0015] Referring to Fig. 2, there are shown a filling bar prevention data setting unit 20 for setting filling bar prevention data, a main controller 25 for controlling the

loom 1, a take-up controller 26, a let-off controller 27, a shedding controller 28, and auxiliary devices 29 including a picking device.

[0016] The filling bar prevention data setting unit 20 includes a storage device 30, an I/O port 31 and a CPU 32. The storage device 30 stores set filling bar prevention data on filling bar preventing conditions for different degrees of filling bars. When a loom stop signal representing a cause of stop of the loom 1 and a degree of filling bars is given through the I/O port 31 to the CPU 32 by the main controller 25, the take-up controller 26, the let-off controller 27 or the shedding controller 28, the CPU 32 selects set filling bar prevention data corresponding to the loom stop signal given thereto from the storage device 30, and sends the selected set filling bar prevention data through the I/O port 31 to the main controller 25, the take-up controller 26, the let-off controller 27 and the shedding controller 28. The filling bar prevention data setting unit 20 is provided with a card I/F 34 for reading data from a memory card 33, an input device 35 having operating keys, and a display 36. The CPU 32 is connected to the card I/F 34, the input device 35 and the display 36 through the I/O port 31.

[0017] Primarily, the main controller 25, the take-up controller 26, the let-off controller 27 and the shedding controller 28 control the operation of the main motor 23, the take-up motor 17, the let-off motor 16, and a leveling motor 37 and an electromagnetic clutch 24, respectively. The main controller 25, the take-up controller 26, the let-off controller 27 and the shedding controller 28 serves also as filling bar preventing devices 21 that exercise their filling bar preventing functions. According to the present invention, the loom 1 is required to be provided with two or more filling bar preventing devices 21. Therefore, at least two of the main controller 25, the take-up controller 26, the let-off controller 27, the shedding controller 28 and the picking device must be capable of functioning also as the filling bar preventing devices 21.

[0018] As mentioned above in connection with the description of the related art, the filling bar preventing device 21 included in the main controller 25 serves as a main motor torque control device that controls the starting torque of the main motor 23 as mentioned in JP-A 57-51846 to increase the starting torque of the main motor 23 at the start of the loom 1 to increase force for driving the reed 6 for the first beating-up motion so that the formation of filling bars may be prevented or a reversing control device that reverses the main shaft 22 through a predetermined angle from a waiting position to a restarting position prior to the restart of the loom 1, and then starts the main motor 23 to increase force for driving the reed 6 for the first heating-up motion so that the formation of filling bars may be prevented as mentioned in JP-A 61-124651.

[0019] The main controller 25 controls the main motor 23 according to input signals given thereto including an angular position signal representing an angular position of the main shaft 22 provided by an angular position sensor 38, signals provided by operating operating buttons 39, such as a start button, a stop button, an inching button and a reversing button, and signals provided by stopping cause sensors including a warp stop sensor 40 and a weft feeler 41.

[0020] The filling bar preventing device 21 included in the let-off controller 27 functions as a cloth fell control device or a kick-back device. As mentioned in JP-A 54-106661, the cloth fell control device turns the warp beam 3 through a predetermined angle when the loom 1 stopped to shift the cloth fell 9 so that warp tension may be decreased to prevent the formation of filling bars attributable to the elongation of warp yarns 2 during the stop of the loom 1. As mentioned in JP-A 61-63749, the kick-back device turns the warp beam 3 through a predetermined angle in the normal or the reverse direction to shift the cloth fell 9 before restarting of the loom so that the formation of filling bars may be prevented.

[0021] The filling bar preventing device 21 of the shedding controller 28 is a leveling device included in a shedding device. As mentioned in JP-A 59-43145, the filling bar preventing device 21 disengages the electromagnetic clutch 24 to disconnect the rotary-to-linear motion converting mechanism 19 from the main shaft 22, drives the rotary-to-linear motion converting mechanism 19 by the leveling motor 37 to drive the heddle frames 5 so that the size of the shed may be decreased, more preferably, so that the shed may be closed to prevent the formation of filling bars due to the elongation of the warp yarns 2.

[0022] The filling bar preventing device 21 of the take-up controller 26 does not operate independently. This filling bar preventing device operates for driving the take-up motor 17 so as to rotate the surface roller 14 in the normal direction for winding the fabric 8 to assist the operation of the filling bar preventing device 21 (cloth fell control function or kick-back function) of the let-off controller 27 or the operation of the filling bar preventing device 21 (reversing function) of the main controller 25. The length of the fabric 8 taken up by the operation of the filling bar preventing device 21 of the take-up controller 26 may be equal to or different from the length of the warp yarns 2 let off by the operation of the filling bar preventing device 21 of the let-off controller 27.

[0023] Referring to Fig. 3 showing the filling bar prevention data setting unit 20, the input device 35 having menu keys 42, function keys 43 and numeric keys 44, cursor movement keys 45, and the screen of a display 36 are arranged on the front wall of a casing. A slot 46 for receiving the memory card 33 is formed in a side wall of the casing. The storage device 30, the I/O port 31 and the CPU 32 are contained in the casing of the filling bar prevention data setting unit 20.

[0024] Fig. 4 is a flow chart of a filling bar prevention data setting procedure for setting filling bar prevention data for the two or more filling bar preventing devices 21. The filling bar prevention data setting procedure is

started. Then, an operator enters set data on the degree of filling bars into the filling bar preventing devices 21 after reading a pattern from the filling bar preventing devices 21 or after completing operations for producing patterns to set new patterns in the filling bar preventing devices 21. The term "pattern" signifies a table of set data set for the filling bar preventing device 21 and corresponding to the degree of filling bars. The patterns corresponding to the degrees of filling bars are determined for types, i.e., quality numbers, of fabrics. The pattern may be stored in and read from the storage device 30, or may be read from the memory card 33. The pattern may be read from databases that can be accessed by the loom 1.

[0025] Then, the loom 1 is operated by an operator for a trial weaving operation according to the new set pattern for a predetermined time. After the loom 1 has been stopped after the trial weaving operation, the fabric 8 is inspected for filling bars to see whether or not filling bars are formed. If any filling bars are not formed, the filling bar prevention data setting operation is ended. If filling bars are formed in the fabric 8 during the trial weaving operation, the filling bar prevention data setting procedure returns to a step of reading a pattern when another pattern needs to be read or returns to a step of setting a degree of filling bars when another degree of filling bars needs to be set. The, loom 1 is operated again for the trial weaving operation. Thus, the filling bar prevention data setting procedure is repeated until no filling bar is formed in the fabric 8 to set the loom 1 in an optimum state.

[0026] Fig. 5 shows a pattern read operation to be performed in a pattern read step. The operator depresses the menu key 42 for "Setting". Then, a picture shown in Fig. 5(1) is displayed on the screen of the display 36. Then, the operator depresses the function key 43, i.e., the function key f7 for "Automatic filling bar prevention data setting" to display a filling bar prevention data menu shown in Fig. 5(2) on the screen of the display 36. Then, the cursor movement key 45, i.e., a right movement key or a left movement key, is operated to select a "Filling bar prevention data setting menu", and an enter key "ENT" included in the numeric keys 44 is depressed to display a filling bar prevention data setting menu shown in Fig. 5(3) on the screen of the display 36. Thus, patterns 1 to 10 stored in the storage device 30 are displayed or the memory card 33 is inserted in the slot 47 and the function key 43, i.e., the function key f7 for "Automatic filling bar prevention data setting", is depressed to display the patterns 1 to 10 stored in the memory card 33. Then, the numeric key for "1" is depressed to select a pattern denoted by a pattern code "1234" to be read for the fabric, the key "ENT" is depressed, and then the function key f8 for "Setting" is depressed to start reading the pattern. After the selected pattern has been read, the filling bar prevention data menu shown in Fig. 5(2) is displayed again on the screen of the display 36.

[0027] Fig. 6 shows set data for the two or more filling bar preventing devices 21 for high, medium and low degrees of filling bars. Fig. 6 (a) shows set data on an on state to perform a filling bar preventing operation and an off state not to perform a filling bar preventing operation for the two filling bar preventing devices 21, i.e., devices A and B, for high and low degrees of filling bars. Fig. 6(b) shows set data a1 to a3 on operating conditions for the filing bar preventing device 21, i.e., the device A, and set data c1 to c3 on operating conditions for the filling bar preventing device, i.e., the device C, for high, medium and low degrees of filling bars. Fig. 6(c) shows set data a1 to a3 on operating conditions for the filing bar preventing device 21, i.e., the device A, set data c1 to c3 on operating conditions for the filling bar preventing device 21, i.e., the device C, and set data on an on state to perform a filling bar preventing operation and an off state not to perform a filling bar preventing operation for the filling bar preventing device 21, i.e., the device B for high, medium and low degrees of filling bars.

[0028] Fig. 7 shows a table of set data on amounts of normal rotation, amounts of reverse rotation, starting angular positions to be performed by the respective filling bar preventing devices 21 of the main controller 21 and the let-off controller 27 for removing heavy filling bars and light filling bars. Filling bar preventing operations to be carried out by the filling bar preventing devices 21 are a kick-back operation, a waiting position setting operation, a reverse let-off operation and a cloth fell control operation as shown in the table shown in Fig. 7. The set data are those on amounts of reverse operation (numbers of picks), amounts of normal operation (number of picks) and starting angular positions (degrees).

[0029] The kick-back operation turns the warp beam 3 in the normal or the reverse direction by the set amount of reverse or normal operation to shift the position of the cloth fell 9 prior to restarting the loom 1. The set data may be adjusted according to the duration of stop of the loom, i.e., time between the stop and the restart of the loom 1.

[0030] The waiting angular position setting operation sets the main shaft 22 at the waiting angular position when the loom 1 stops. Suppose that the warp yarns 2 are raised and lowered to close a shed at an angular position of 320°, the size of the shed increases as the angular position increases or decreases from the angular position 320°, and the warp tension increases accordingly. The loom 1 restarts with the main shaft 22 at the waiting angular position. Force available for the first beating-up motion increases as the waiting angular position advances from an angular position of 0° for a beating-up motion.

[0031] The reverse let-off operation reverses the warp beam 3 through the set amount of operation every time the main shaft 22 is reversed, i.e., every time the main shaft 22 is reversed past the angular position for the beating-up motion, by a mending device or the like after the loom 1 has stopped.

[0032] The cloth fell control operation turns the warp beam 3 by the set amount of operation in the normal direction to advance the cloth fell 9 while the loom 1 is stopped.

[0033] The take-up motor 17 for driving the surface roller 14 may be operated for those operations excluding the waiting angular position setting operation, namely, the kick-back operation, the reverse let-off operation and the cloth fell control operation. Preferably, both the let-off motor 16 and the take-up motor 17 are operated. Different set data may be set for the let-off device and the take-up device, respectively.

[0034] A starting torque setting operation and a main shaft reversing operation are other effective means for preventing heavy and light filling bars. The starting torque setting operation sets a starting torque for the main motor 23 or sets a drive current to be supplied to the main motor 23 to set a force available for the first beating-up motion after the restart of the loom 1. A superstarting device (Δ-Y start) and a current limiting device reduce the starting torque of the main motor 23 when heavy filling bars are formed and increases the starting torque of the main motor 23 when light filling bars are formed.

[0035] The main shaft reversing operation reverses the main shaft 22 from the waiting position through a predetermined angle to increase the starting torque of the main motor 23 available for the first beating-up motion after the restart of the loom 1. The main shaft reversing operation that does not reverse the main shaft 22 past the beating-up angle is called a back starting operation. The main shaft reversing operation that reverses the main shaft 22 past the beating-up angle through an angle greater than 360°, starts and operates the loom 1 such that a blank picking operation is performed, and makes the loom 1 starts an actual picking operation after a phase where the cloth fell 9 is at a desired position is called a blank starting operation. When light filling bars are formed, the loom 1 may be restarted by a starting operation that reverses the main shaft 22 through a large angle (back start → blank start) . Angular positions of the reversed main shaft 22 or angles through which the main shaft 22 is reversed are the set data for filling bar prevention.

[0036] Fig. 8 shows a table of set data on amounts of feed, amounts of reverse rotation and amounts of normal rotation for preventing wavy set marks, i.e., filling bars formed when the loom 1 is stopped for a long time with the shed formed, and filling marks mainly by the filling bar preventing operations of the filling bar preventing device 21 of the let-off controller 27. As obvious from the table shown in Fig. 8, the filling bar preventing operations that is carried out by the filling bar preventing device 21 are the cloth fell control operation and the kick-back operation. The set data are those on amounts of feed (number of picks), amounts of reverse rotation (number of picks) and amounts of normal rotation (number of picks).

[0037] The filling bar preventing operation of the filling bar preventing device 21 of the take-up controller 26 using the set data shown in Fig. 8 may drive the take-up motor 17 to rotate the surface roller 14. Preferably, the filling bar preventing operation of the filling bar preventing device 21 drives both the let-off motor 16 and the take-up motor 17. Different set data may be set for the let-off device and the take-up device, respectively.

[0038] A waiting angular position setting operation, a loom operation and a shedding control operation are other effective means for wavy set mark prevention. The waiting angular position setting operation, similarly to the aforesaid waiting angular position setting operation, sets the main shaft 22 at the waiting angular position when the loom 1 stops. Suppose that the warp yarns 2 are raised and lowered to close a shed at an angular position of 320°, the size of the shed increases as the angular position increases or decreases from the angular position 320°, and the warp tension increases accordingly. The loom 1 restarts with the main shaft 22 at the waiting angular position. Force available for the first beating-up motion increases as the waiting angular position advances from an angular position of 0° for a beating-up motion. The waiting angular position may be advanced to avoid the beating-up operation while the main shaft 22 is reversed from an angular position at the stop of the loom 1 to the predetermined waiting angular position.

[0039] One picked filling yarn 10 is extracted from the shed 7, a filling yarn 10 is inserted in the shed 7 by the picking device, not shown,, and then the loom 1 is restarted. This starting method is called a one-filling starting method. In this connection, the picking device is one of the filling bar preventing devices 21. The size of the shed 7 is reduced by driving the heddle frames 5 for leveling so as to reduce the size of a warp shed while the loom 1 is stopped.

[0040] Desirably, the set pattern can be edited by a pattern setting device using a menu, not shown. Desirably, patterns are set respectively for loom stopping causes, and each filling bar preventing device 21 is operated on the basis of the set pattern for the loom stopping cause. Patterns may be set respectively for parameters dominating the degree of filling bars. Stop time for which the loom 1 remains stopping is a passive parameter affecting the degree of filling bars. Warp tension, pick spacing (weft density) and weave structure are positive parameters. Degrees of filling bars can be set in an automatic setting mode instead of an interactive setting mode. More concretely, degrees of expected filling bars can be automatically estimated on the basis of a plurality of parameters dominating the degree of filling bars, using an algorithm, and set values corresponding to the estimated degrees can be given to the filling bar preventing devices.

[0041] Light filling bars, heavy filling bars and wavy set marks have been mentioned by way of example. The present invention is applicable to preventing filling bars

due to the stop of the loom other than those filling bars and wavy set marks. An open set mark, i.e., a partial filling bar, due to unsuccessful picking caused by, for example, by an obstruction to the travel of a picked filling yarn by the warp yarns is another example of filling bars. Although set patterns for the filling bar preventing devices that can be thought for the present, possible filling bar preventing devices are not limited thereto. Patterns may be set for degrees of filling bars for all the filling bar preventing devices or may be set for two or more filling bar preventing devices selected in order of filling bar preventing effect. Although the set values shown in Figs. 7 and 8 set for the kick-back device and the cloth fell controller, i.e., the filling bar preventing devices, correspond to the number of picks, the set values may correspond to lengths.

[0042] Although the foregoing set patterns, i.e., amounts of operation, and on/off state of the filling bar preventing devices, are set for degrees of filling bars, the same may be set for types of filling bars. It goes without saying that it is desirable to take types of fabrics into consideration in setting the set patterns.

[0043] Fig. 9 is a view of assistance in explaining a set value determining procedure for determining set values according to the degree of filling bars. The operator depresses the menu key 42 for "Setting". Then, a basic setting menu shown in Fig. 9(1) is displayed on the screen of the display 36. Then, the operator depresses the function key 43, i.e., the function key f7 for "Automatic filling bar prevention data setting" to display a filling bar prevention data menu shown in Fig. 9 (2) on the screen of the display 36. Then, the cursor movement key 45 is operated to select "Heavy/light filling bar" or "Wavy set mark", and an enter key "ENT" included in the numeric keys 44 is depressed to display a heavy/light filling bar prevention data menu or a wavy set mark prevention data menu on the screen of the display 36. The operator depresses the function key 42 for "f3" or "f4", and operates the cursor movement key, i.e., the right movement key or the left movement key, to move the cursor to set a degree of filling bars, and depresses an "OK" key. After the completion of the set value determining procedure, the basic setting menu shown in Fig. 9(1) is displayed.

[0044] When information about the degree of filling bars is given to the setting unit, the setting unit reads set values corresponding to the degree of filling bars from the storage device, and gives the set values to the filling bar preventing devices. Thus, the two or more filling bar preventing devices can be accurately and easily set for operation.

[0045] Since a plurality of types of set values for degrees of filling bars are stored beforehand in the setting device, proper set values can be selectively given to the filling bar preventing devices by a selecting operation. Since set values are determined for types of filling bars, proper set values can be easily selected to prevent filling bars.

[0046] Since a plurality of set values are determined for different stopping causes, the correspondence between the stopping cause and the set value can be easily confirmed. Since the degrees of filling bars are the values of parameters of the set value, proper set values can be easily selected for a degree of filling bars. When set values for degrees of filling bars are editable set values can be determined for a wide variety of factors. Thus, the filling bar preventing system is capable of properly coping with various causes of filling bars.

[0047] The features disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

Claims

1. A loom(1) with a filling bar preventing function comprising: two or more filling bar preventing devices (21); and a filling bar prevention data setting unit (20) that gives set values of filling bar preventing parameters to the two or more filling bar preventing devices (21);

   wherein set values for degrees of filling bars to be given to the filling bar preventing devices (21) are stored beforehand in the filling bar prevention data setting unit (20), the filling bar prevention data setting unit (20) receives filling bar information about a degree of filling bars, selects the set values corresponding to the filling bar information given thereto, and gives the selected set values respectively to the filling bar preventing devices (21).

2. The loom (1) with a filling bar preventing function according to claim 1, wherein the filling bar prevention data setting unit (20) stores set values of a plurality of parameters for degrees of filling bars, and gives the set values corresponding to a degree of filling bars to the filling bar preventing devices (21).

3. The loom (1) with a filling bar preventing function according to claim 2, wherein the set values of the plurality of parameters are determined for types of filling bars.

4. The loom (1) with a filling bar preventing function according to claim 3, wherein the set values of the plurality of parameters are determined for loom stopping causes.

5. The loom (1) with a filling bar preventing function according to claim 3 or 4, wherein the set values are set for parameters of the degree of filling bars.

6. The loom (1) with a filling bar preventing function according to claim 1, wherein the filling bar preven-

tion data setting unit (20) is capable of editing set values for degrees of filling bars.

7. The loom (1) with a filling bar preventing function according to claim 1, wherein the filling bar preventing devices (21) are at least two of a main controller (25), a take-up controller (26), a let-off controller (27), a shedding controller (28), and a picking device.

FIG.1

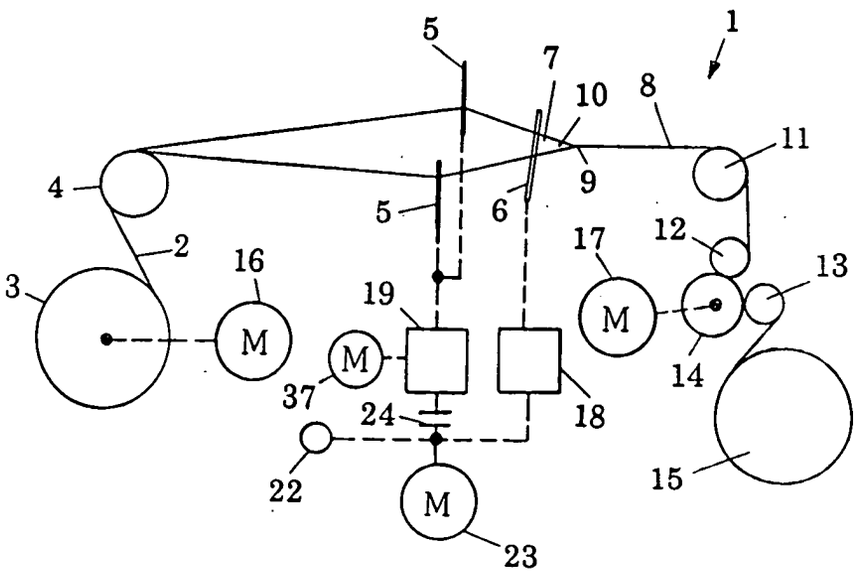


FIG.2

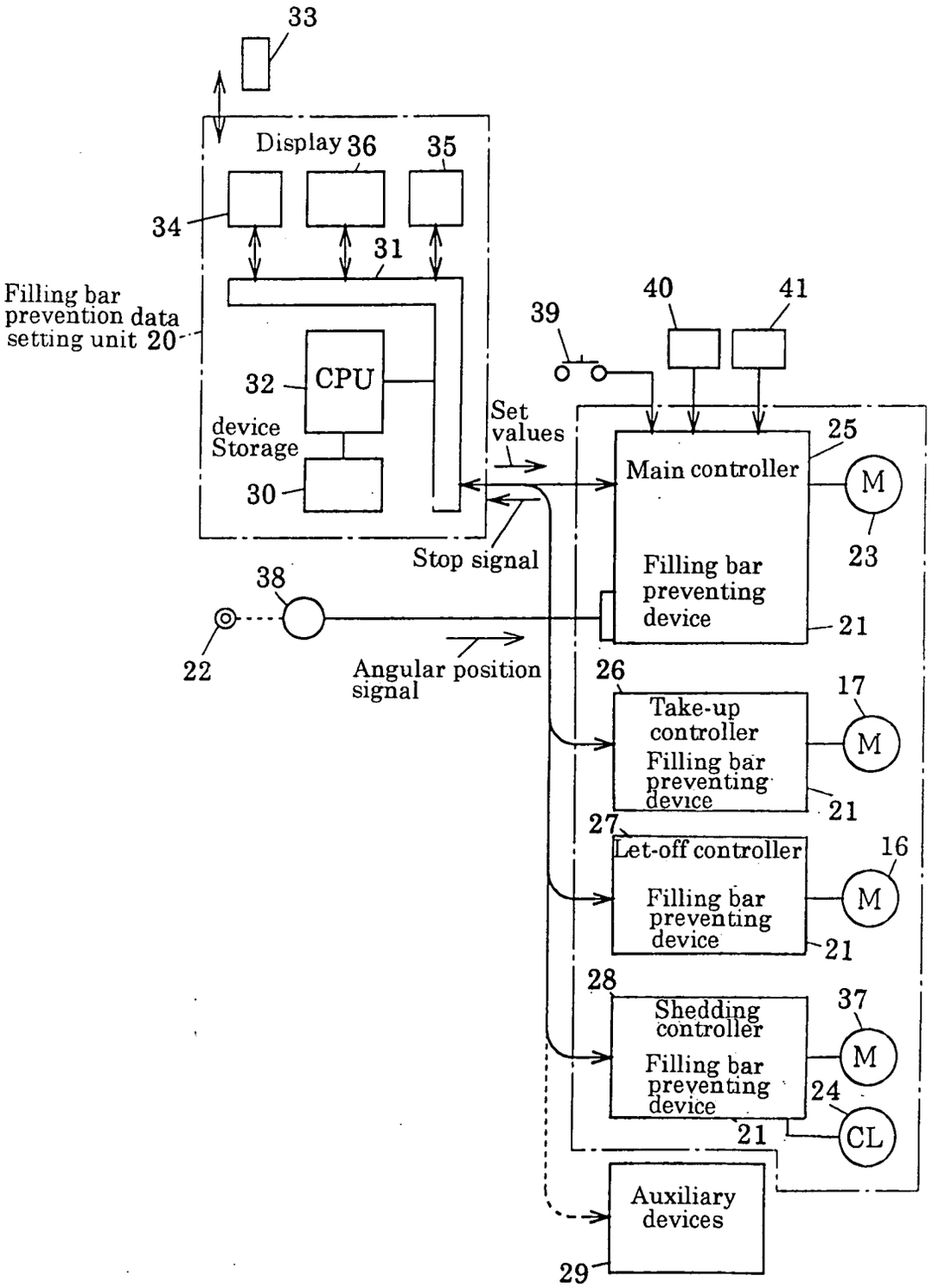

33
Display
36
35
34
31
Filling bar prevention data setting unit 20
32
CPU
device Storage
30
39
40
41
Set values
Stop signal
Main controller
25
M
23
Filling bar preventing device
21
38
22
Angular position signal
26
Take-up controller
Filling bar preventing device
17
M
21
27
Let-off controller
Filling bar preventing device
16
M
21
28
Shedding controller
Filling bar preventing device
37
M
24
CL
21
Auxiliary devices
29

FIG.3

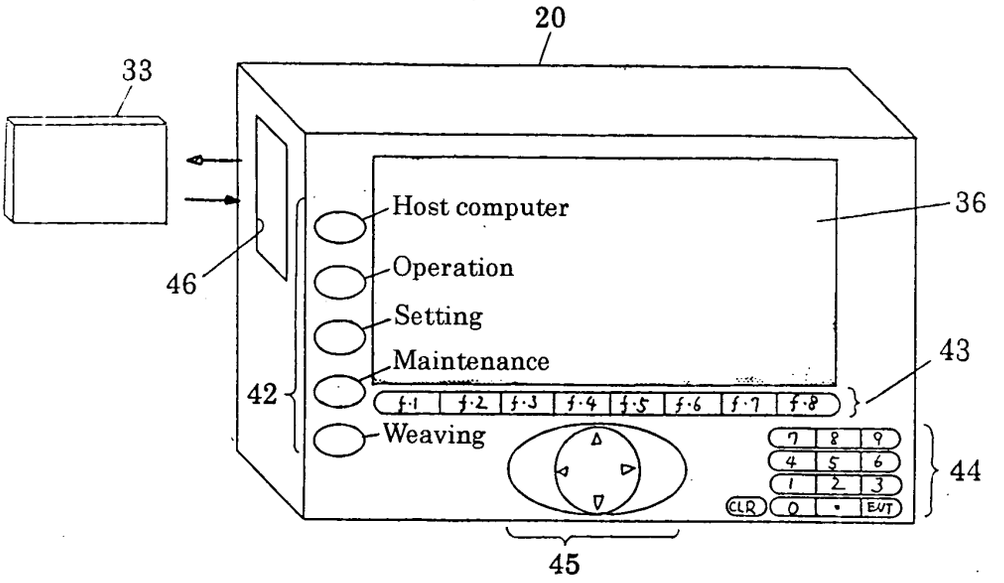

20
33
36
Host computer
Operation
Setting
Maintenance
Weaving
46
42
43
44
45
f·1
f·2
f·3
f·4
f·5
f·6
f·7
f·8
7
8
9
4
5
6
1
2
3
CLR
0
•
EXIT

FIG.4

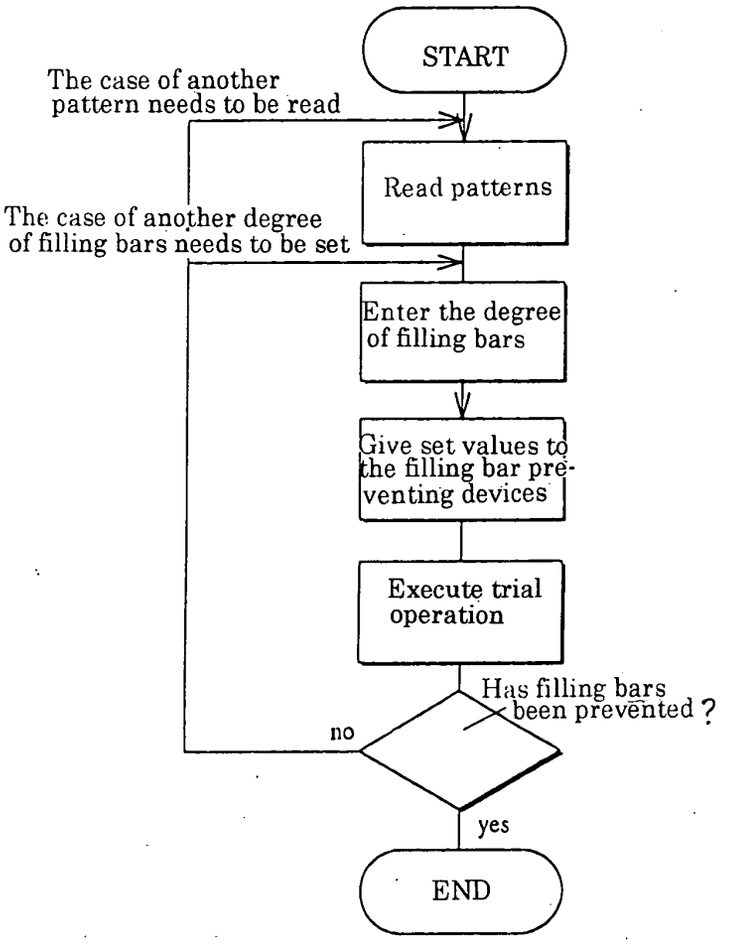
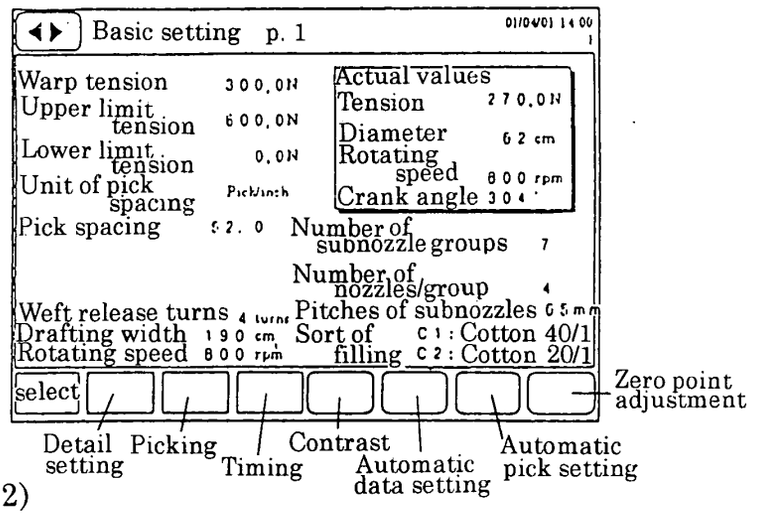
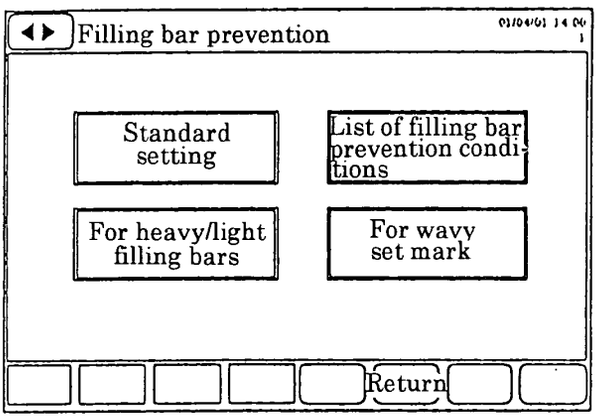

START
The case of another pattern needs to be read
Read patterns
The case of another degree of filling bars needs to be set
Enter the degree of filling bars
Give set values to the filling bar preventing devices
Execute trial operation
Has filling bars been prevented ?
no
yes
END

FIG.5

(1)


Basic setting p. 1
Warp tension 300.0N
Upper limit tension 600.0N
Lower limit tension 0.0N
Unit of pick spacing Pick/inch
Pick spacing 52.0
Actual values
Tension 270.0N
Diameter 62 cm
Rotating speed 800 rpm
Crank angle 304°
Number of subnozzle groups 7
Number of nozzles/group 4
Weft release turns 4 turns
Pitches of subnozzles 0.5mm
Drafting width 190 cm
Rotating speed 800 rpm
Sort of filling C1: Cotton 40/1
C2: Cotton 20/1
select
Zero point adjustment
Detail setting
Picking Timing
Contrast
Automatic data setting
Automatic pick setting

(2)


Filling bar prevention
Standard setting
List of filling bar prevention conditions
For heavy/light filling bars
For wavy set mark
Return

(3)

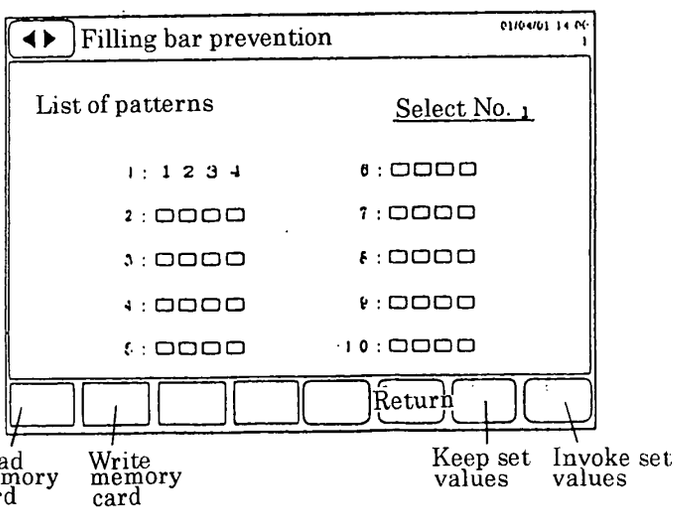

Filling bar prevention
List of patterns
Select No. 1
1: 1 2 3 4
2: □□□□
3: □□□□
4: □□□□
5: □□□□
6: □□□□
7: □□□□
8: □□□□
9: □□□□
10: □□□□
Return
Read memory card
Write memory card
Keep set values
Invoke set values

FIG.6

(a)

Filling bar prevention data setting	Heavy←→Light	
Filling bar preventing device	High	Low
Filling bar preventing device A	○	×
Filling bar preventing device B	○	○

Filling bar preventing device A,
Filling bar preventing device B

○ On × Off

(b)

	Heavy← →Light		
Filling bar preventing device	High	Medium	Low
Filling bar preventing device A	a1	a2	a3
Filling bar preventing device C	c1	c2	c3

a1～a3 Set values for filling bar preventing device A

c1～c3 Set values for filling bar preventing device C

a1 ≠ a2 or a1 ≠ a3
c1 ≠ c2 or c1 ≠ c3

(c)

	Heavy← →Light		
Filling bar preventing devices	High	Medium	Low
Filling bar preventing device A	a1	a2	a3
Filling bar preventing device B	○	×	×
Filling bar preventing device C	c1	c2	c3

a1～a3 Set values for filling bar preventing device A

c1～c3 Set values for filling bar preventing device C

a1 ≠ a2 or a1 ≠ a3
c1 ≠ c2 or c1 ≠ c3

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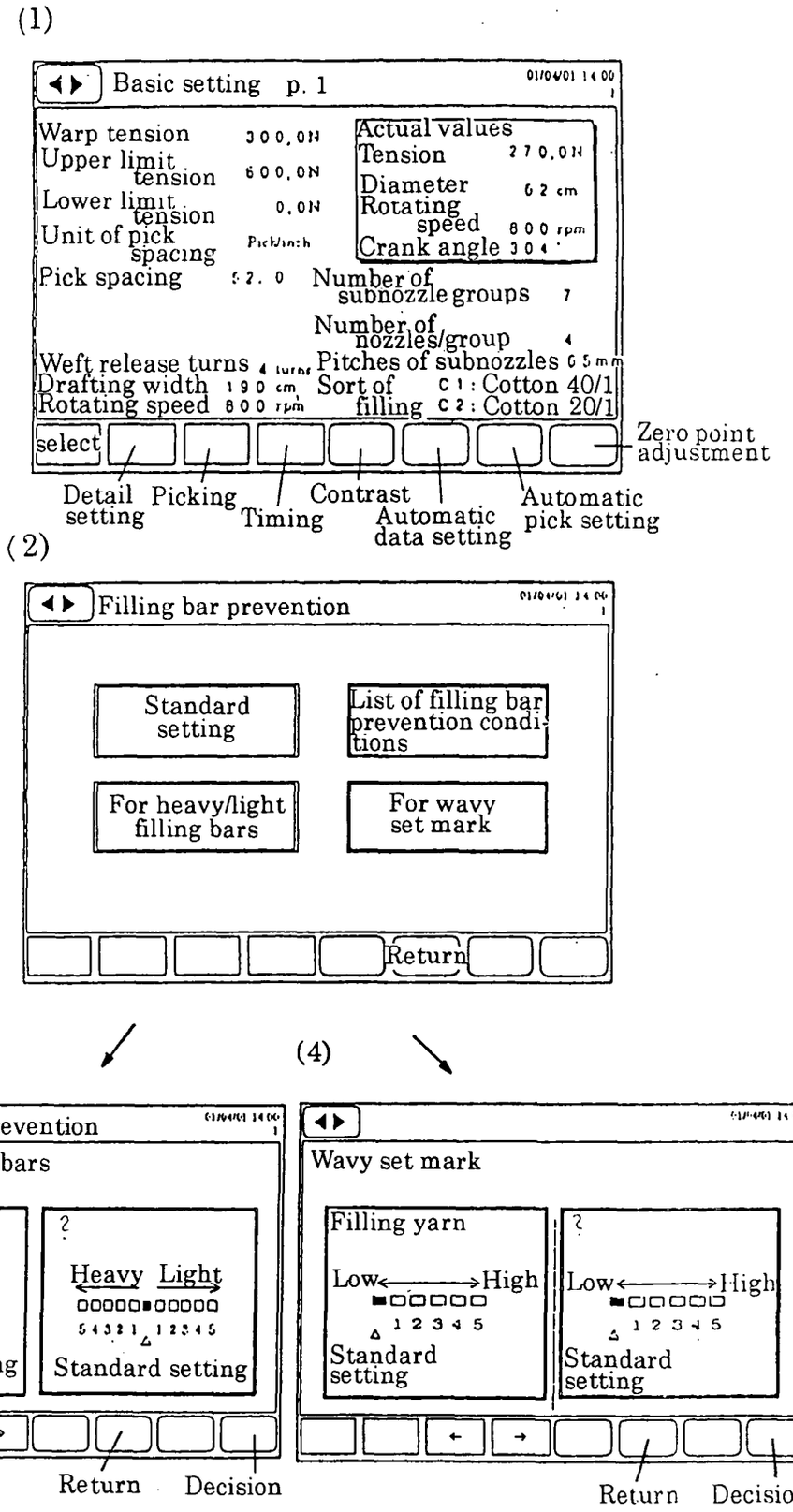
FIG.7

Filling bar preventing device	Code	Light filling bar High ←				→ Low	Standard	Heaving filling bar Low ←				→ High
		-5	-4	-3	-2	-1	0	1	2	3	4	5
Kick-back device	Amount of reverse rotation (picks)	2.0	2.0	1.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	Amount of normal rotation (picks)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waiting position setting	(Starting angular position) (°)	280	300	320	320	320	320	320	320	330	330	340
Reverse let-off motion	Reverse rotation (picks)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.8
Cloth fell position control	Normal rotation (picks)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.8	1.0

FIG.8

Filling bar preventing device	Code	Standard	Light wavy set mark →				Heavy wavy → set mark
		0	1	2	3	4	5
Cloth fell control device	Feed (picks)	0.0	1.0	1.0	2.0	2.0	3.0
Kick-back device	Reverse rotation (picks)	0.0	1.0	1.5	2.0	2.5	3.0
	Normal rotation (picks)	0.0	0.0	0.0	0.0	0.0	0.0

FIG.9


(1)
Basic setting p. 1
Warp tension 300.0N
Upper limit tension 600.0N
Lower limit tension 0.0N
Unit of pick spacing Pick/inch
Pick spacing 52.0
Actual values
Tension 270.0N
Diameter 62 cm
Rotating speed 800 rpm
Crank angle 304°
Number of subnozzle groups 7
Number of nozzles/group 4
Weft release turns 4 turns
Drafting width 190 cm
Rotating speed 800 rpm
Pitches of subnozzles 0.5mm
Sort of filling C1: Cotton 40/1
C2: Cotton 20/1
select
Zero point adjustment
Detail setting
Picking
Timing
Contrast
Automatic data setting
Automatic pick setting
(2)
Filling bar prevention
Standard setting
List of filling bar prevention conditions
For heavy/light filling bars
For wavy set mark
Return
(3)
(4)
Filling bar prevention
Heavy/light filling bars
Filling yarn
Heavy Light
Standard setting
Standard setting
Return
Decision
Wavy set mark
Filling yarn
Low High
Standard setting
Low High
Standard setting
Return
Decision