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(54) Method for setting set values in loom

(57) A loom (1) includes a setting device (31) having a display portion (45) that displays loom data and an input portion (44) which allows numerical input of a set value of at least one setting parameter for each of at least two selection numbers; and a control device (41) which stores the set value for each of the selection numbers and is connected with at least one electrical actuator (9, 13, 14, 19, 23, 34, 43), the control device (41) controlling at least one electrical actuator (9, 13, 14, 19, 23, 34, 43) based on the set value corresponding to each selection number. In the loom (1), after an operator inputs a set value of a setting parameter for a first selection number, the operator performs a transferring operation in order to set a set value of the same setting parameter for a second selection number. Thus, the input set value for the first selection number is set as the set value for the second selection number with respect to the same setting parameter.

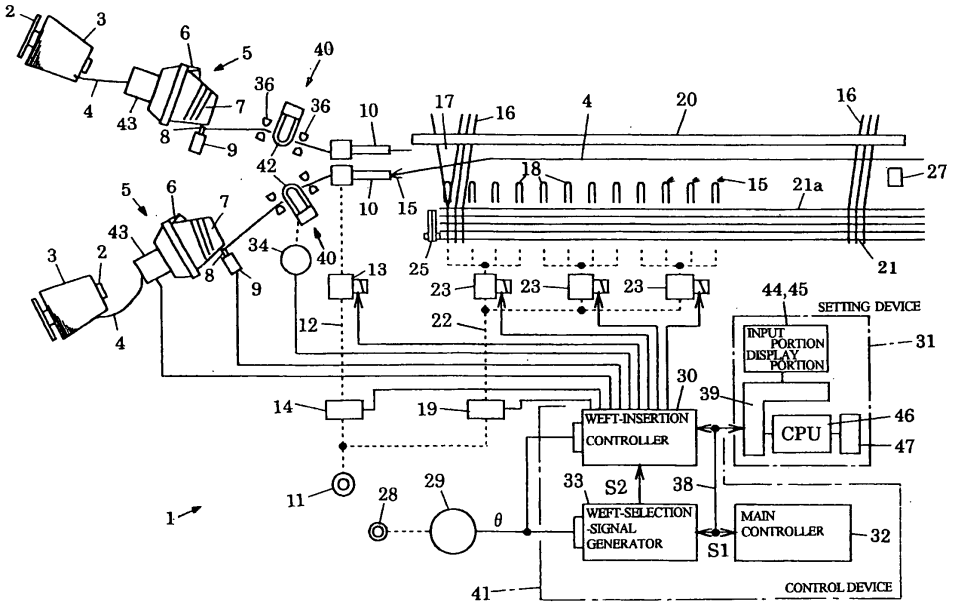

FIG. 1

EP 1 647 618 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a method for inputting and setting various types of set values in a loom.

2. Description of the Related Art

[0002] According to Japanese Unexamined Patent Application Publication No. 2-112449, a plurality of control devices, such as a timing controller for controlling, for example, a jet-emission timing of weft-insertion nozzles and a discharge controller of warp beam, are connected to a setting device used for inputting control conditions, such that the control devices and the setting device are capable of sending and receiving data with respect to each other. In a setting device of a multicolor weft-insertion loom, for example, an operator may input set values of different setting parameters, such as a jet-emission timing value for each of the weft-insertion nozzles and a target tension value for controlling the tension of warp yarns. The setting device then transfers the set values to each of the control devices.

[0003] However, in such conventional art, a large number of set values must be manually input every time the cloth being woven is switch to another type of cloth. This is problematic in that it could lead to input errors or that the setting process is time consuming.

[0004] On the other hand, Japanese Unexamined Patent Application Publication No. 61-239057 discloses a technology in which a host computer that stores set values corresponding cloth specifications as a database is connected to a setting device for a loom in a communicable manner. In detail, the host computer receives cloth specification data from the setting device for the loom, and sends corresponding set-value data to the setting device. Thus, such set-value data is set as the set values. Furthermore, Japanese Patent No. 2564877 discloses a technology of transferring set values between a plurality of looms, and Japanese Unexamined Patent Application Publication No. 63-175143 discloses a technology of transferring entire set-value data between looms by using a memory card as a medium.

[0005] Although the technology of transferring entire set values between looms is known, as disclosed in Japanese Unexamined Patent Application Publication No. 61-239057 and Japanese Patent No. 2564877, there are no technologies up to this point that are related with transferring of a plurality of set values of setting parameters within the same loom.

[0006] Specifically, a multicolor weft-insertion air-jet loom is provided with a plurality of main nozzles in correspondence with the types of weft yarns, that is, weft selection numbers, and at least two sub nozzles disposed along a weft-traveling path. When one of the types of weft yarns is selected, the main nozzle corresponding to the weft yarn and the sub nozzles emit air jets in a relay manner so that the weft yarn is inserted. Consequently, the relay jet-emission operation is performed by opening and closing electromagnetic valves that correspond to the nozzles based on a jet-emission timing preliminarily set for each nozzle.

[0007] On the other hand, in order to prevent the weft yarn from being damaged during a weft measuring process, weft yarns of the same type are set in at least two weft-insertion devices installed in the loom. Specifically, at least two weft-insertion devices and at least two weft measuring/holding drum units are alternately operated based on weft selection signals so as to perform the weft insertion process. In such devices corresponding to weft yarns of the same type, the same set values are used between the weft selection signals.

[0008] Accordingly, even though the same type of weft yarn is used between the devices in which the nozzles and the weft measuring/holding drum units are selectively operated based on the output of the weft selection signals, the same set values of jet-emission timings for the nozzles and the same set values of weft-release timing for the weft measuring/holding drum units must be set in the devices. For an operator, such a setting process is troublesome. Moreover, since such set values are adjusted quite frequently due to changes in operational conditions, every time one of the set values is changed, the value corresponding to the changed set value must be similarly reset. This is problematic that it could lead to input errors or that the overall resetting process is time consuming.

SUMMARY OF THE INVENTION

[0009] Accordingly, it is an object of the present invention to provide a laborsaving method for setting set values in a loom by using the set values for one selection number as set values for another selection number with respect to the same setting parameters.

[0010] According to the present invention, when an operator inputs a set value for one selection number with respect to a certain setting parameter into a setting device, and the same set value is to be subsequently set as the set value for another selection number, the setting device sets the input set value as the set value for the forwarding selection number in response to a transferring operation performed by the operator.

[0011] In detail, the present invention provides a method for setting set values in a loom that includes a setting device having a display portion that displays data of the loom and an input portion which allows numerical input of a set value of at least one setting parameter for each of at least two selection numbers; and a control device which stores the set value for each of the selection numbers and is connected with at least one electrical actuator, the control device controlling said at least one electrical actuator based on the set value corresponding to each

selection number which is renewed by rotating the loom main shaft. The method includes the steps of allowing an operator to input a value in the setting device as a set value of a setting parameter for a first selection number; allowing the operator to perform a transferring operation in order to set a set value of the same setting parameter for a second selection number; and setting the input set value for the first selection number as the set value for the second selection number with respect to the same setting parameter via the setting device in response to the transferring operation performed by the operator.

[0012] In view of controlling a weft insertion process, each selection number and its corresponding set value may be stored in one of the following manners.

(1) Each selection number may be defined by a differentiation number used for selecting a set value for each weft-insertion pick number and may indicate a weft selection number used also as data of a corresponding unit number subject to be controlled. Each setting parameter may include a set of set values, which are set for each weft selection number defining a selection number. In detail, for each weft selection number determined in correspondence with the type of weft yarn, set values of jet-emission timing and jet-emission pressure for weft-insertion nozzles are stored. On the other hand, for each weft-insertion pick number, a weft selection number is preliminarily stored so as to constitute a weft selection pattern. During an operation of the loom, in response to each rotation of a main shaft of the loom, the weft-insertion pick number is renewed, and the weft selection number corresponding to the renewed weft-insertion pick number is specified based on the weft selection pattern. Thus, the corresponding set values are read. The jet-emission timing for the weft-insertion nozzles, which is one of the setting parameters, may include, for example, the starting timing and the ending timing of jet-emission. When a set value for a certain weft selection number is to be set as a set value for another weft selection number, the setting device displays a screen that allows an input of a forwarding weft selection number, i.e. a forwarding differentiation number, as display data. Based on the forwarding weft selection number data input in the setting device by the operator, the setting device transfers the set value so that the set value is set as a new set value for the forwarding weft selection number.

(2) Each selection number may be defined by a weft-insertion pick number, such that a set value of each setting parameter is set for each weft-insertion pick number. Moreover, for each weft-insertion pick number, a specification number may be set and stored such that the specification number is used for specifying a corresponding weft selection number used as a basis for the corresponding set value. Accordingly, for each weft-insertion pick number, set values for the jet-emission timing and the jet-emission pressure for each weft-insertion nozzle with respect to the selected weft yarn are stored, and moreover, a specification number used for specifying the weft selection number of the stored set values is stored. Thus, during an operation of the loom, the set values corresponding to the renewed weft-insertion pick number can be read so as to drive the corresponding electrical actuators. When a set value corresponding to a first weft selection number is to be set as a set value corresponding to a second weft selection number with respect to the same setting parameter, the specification number for a first weft-insertion pick number from which the set value is to be transferred is read. The read specification number is then compared with a specification number given to a second weft-insertion pick number, and if the two specification numbers are the same, the input set value is set as a new set value for the second weft-insertion pick number.

[0013] The controlling operation of the units subject to be controlled is performed in one of the following manners.

(1) For electrical actuators for units that are used in common in the operation of the loom, a plurality of set values is set for each selection number. During an operation of the loom, the control device reads the set values corresponding to the renewed weft-insertion pick number via the corresponding selection number so as to control the electrical actuators. A unit that is used in common in the operation of the loom may be, for example, sub nozzles. In this case, the corresponding electrical actuators are an electromagnetic valve and a pressure adjustment valve for each sub nozzle.

(2) For each of electrical actuators for units that are used selectively during an operation of the loom, a set value may be set with respect to a common setting parameter, such as a pressure value. During an operation of the loom, the control device controls each electrical actuator selected in correspondence with the renewed weft-insertion pick number based on the corresponding set value. The units that are selectively used may include, for example, a main nozzle, a weft measuring/holding unit, and a weft braking unit which are provided for each type of weft yarn. In this case, the corresponding electrical actuators may be, for example, an electromagnetic valve and a pressure adjustment valve for the corresponding main nozzle, a driving motor for the corresponding weft measuring/holding unit, an operating unit such as a solenoid for a corresponding stopper pin, and a motor for the corresponding weft braking unit.

[0014] The following are three types of control operations of the loom, each of which is performed in corre-

spondence with each weft-insertion pick number. The three types are: (1) a weft selection control operation, (2) a pick-density control operation, and (3) a warp shed control operation.

(1) The weft selection control operation is directed to a multicolor weft-insertion loom in which weft yarns are selectively inserted in correspondence with weft-insertion pick numbers. In this case, set values for controlling means related with the weft yarns and weft insertion are switched. The controlling means and the set values for the controlling means may include, for example, jet-emission timings and pressure values of weft-insertion nozzles (main nozzles and sub nozzles); ON-OFF timings and an amount of movement of each of weft braking units and weft retracting units; a measuring amount (drum diameter, the winding number for one pick) in each weft measuring/holding unit; approaching and withdrawing timings of each stopper pin; parameters related with winding control and release-hold control, such as a rotational acceleration rate of each rotating yarn guide and an attachment position data of each release sensor; jet-emission ON-OFF timings and a jet-emission pressure of a weft stretching unit (stretch nozzle); and jet-emission ON-OFF timings and a jet-emission pressure of a tuck-in unit (needleless tuck-in unit) .

(2) The pick-density control operation is directed to a loom in which a weft pick density value can be switched in correspondence with each weft-insertion pick number. In response to switching of the pick density, or in other words, switching of a cloth construction, set values of, for example, jet-emission ON-OFF timings and a jet-emission pressure of a tuck-in unit (needleless tuck-in unit) are changed in correspondence with each selection number for pick density.

(3) The warp shed control operation is performed by an electrically-driven shedding unit that drives each of heald frames via a corresponding motor provided for the heald frame. In an electrically-driven shedding unit, each heald frame is driven by forming a motional curve according to a rotational angle of the main shaft based on setting parameters (such as a cross timing, the dimension of the shed, and the amount of stroke action) input for each heald frame. These setting parameters may include set values that are transferred as set values for the other heald frame.

[0015] Each of the setting parameters including at least one set value may be set in smallest units, such as for each electrical actuator or for each action in an electrical actuator. For example, in a case where the jet emission for a first group of sub nozzles is to be controlled, the jet-emission timing set for each electrical actuator (including the starting timing and the ending timing of jet emission) may be treated as one setting parameter, and the two timings included in the jet-emission timing may be transferred together. Alternatively, each action in an electrical actuator (that is, each of the starting timing and the ending timing of jet emission) may be treated as one setting parameter so that each action is independently transferred.

[0016] Furthermore, different set values may be set with respect to each setting parameter in accordance with the operational state of the loom, such as the activation operational state and a steady operational state. For example, in a case where different jet-emission timing values are to be set between a transient operational state (first pick and second pick) just after the activation of the loom and a steady operational state, the jet-emission timing for the transient operational state and the jet-emission timing for the steady operational state may each be treated as one setting parameter so as to be subject to a transferring operation.

[0017] Furthermore, in a case where a forwarding selection number is to be selected in the setting device, the selection number subject to receiving the set values is not limited to one of the remaining selection numbers. Alternatively, two or more selection numbers or the entire remaining selection numbers may be selected so as to perform a writing process for these selected numbers at once. Furthermore, in a case where a setting parameter is to be transferred in one transferring process, the setting parameter subject to transferring is not limited to one. Alternatively, two or more related setting parameters may be transferred together (specifically, for each weft-insertion device or for each loom condition).

[0018] According to the present invention, when a set value of a setting parameter input for a first selection number is to be set as the set value of the same setting parameter for a second selection number, the previously-input set value for the first selection number is transferred to the second selection number so that the input set value is written as a new set value for the second selection number. Accordingly, accidents induced by numerical input errors that occurred in conventional methods are prevented, thereby ensuring a proper setting process and shortening the time required for the setting process.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

Fig. 1 is a schematic diagram illustrating a relevant section of a fluidic jet loom 1 defining a loom, a setting device 31, and a control device 41 to which a method for setting set values in a loom according to the present invention is applied;

Fig. 2 is a flow chart illustrating steps for inputting set values and for transferring the set values included in a method for setting set values in a loom according to a first embodiment of the present invention;

Fig. 3 is a schematic diagram of a display screen via which the set values are being input according to the method in the first embodiment of the present invention;

Fig. 4 is a schematic diagram of the display screen in a state where the set values are input according to the method in the first embodiment of the present invention;

Fig. 5 is a schematic diagram of the display screen in which the previously-input set values are being transferred according to the method in the first embodiment of the present invention;

Fig. 6 is a schematic diagram of the display screen in a state where the set values are transferred according to the method in the first embodiment of the present invention;

Fig. 7 is a schematic diagram of the setting device 31 and the control device 41 in which a method for setting set values in a loom according to a second embodiment of the present invention is applied; and

Fig. 8 is a schematic diagram of a display screen via which set values are being input and transferred according to the method in the second embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Fig. 1 illustrates a fluidic jet loom 1 serving as a loom. The fluidic jet loom 1 is a two-color weft insertion type and includes two weft-insertion devices respectively for two colors of weft yarns 4. In each weft-insertion device, the corresponding weft yarn 4 is pulled out from a yarn supplier 3 supported by a holder 2, and is guided to, for example, a rotatable weft-guide 6 provided in a weft measuring/holding drum unit 5 of a weft winding type. While a stopper pin 8 holds the weft yarn 4 on a yarn-winding surface provided on the outer periphery of a drum 7 in a stationary state, the rotatable weft-guide 6 rotates so as to wind the weft yarn 4 around the drum 7. Thus, the weft yarn 4 is measured to a predetermined length required for one cycle of weft insertion, and is held until the weft insertion process for the measured weft yarn 4 is performed. The rotatable weft-guide 6 is driven by a driving motor 43.

[0021] When the weft insertion process is to be performed by each of the weft-insertion devices, the corresponding stopper pin 8 is driven by an operating unit 9 so as to be withdrawn from the yarn-winding surface of the drum 7. The weft yarn 4 wound around the yarn-winding surface of the drum 7, that is, the predetermined length of weft yarn 4 required for one cycle of weft insertion, is thus released from the drum 7. Subsequently, due to a pulling force of weft-insertion nozzles, the two weft yarns 4 in the two weft-insertion devices respectively travel through two guides 36, 36 and two weft braking units 40 so as to be guided to two main nozzles 10 used for weft insertion.

[0022] The weft braking units 40 are disposed between the weft measuring/holding drum units 5 and the main nozzles 10. Each weft braking unit 40 is provided with, for example, a bending weft brake 42 and a brake-driving motor 34 such that when the weft insertion process is to be performed, a braking force is applied to the weft yarn 4 pulled out from the corresponding weft measuring/holding drum unit 5 at a predetermined braking timing. When a braking force is not applied to the weft yarn 4, the bending weft brake 42 supports the tense weft yarn 4 in a linear fashion. In contrast, when a braking force is to be applied to the weft yarn 4, the weft brake 42 is rotated by a predetermined angle so as to bend the path of the weft yarn 4. Consequently, this increases the contact resistance (frictional resistance) between the bent section of the weft yarn 4 and the weft brake 42 such that this resistance is used as the braking force.

[0023] For each cycle of weft insertion, one of the main nozzles 10 emits an air jet 15 into a shed 17 formed between sets of warp yarns 16 for a jet-emission period extending from a start to an end of jet emission. Thus, the corresponding weft yarn 4 measured to the predetermined length required for one cycle of weft insertion is inserted into the shed 17. The weft yarn 4 thus travels through a weft-traveling path in the shed 17 so as to extend through the shed 17. The air jet 15 is supplied from an air-jet source 11 and travels through a pressure adjustment valve 14, an air supplying tube 12, and an electromagnetic valve 13 provided in the air supplying tube 12, and is supplied during the jet-emission period for weft insertion. The pressure adjustment valve 14 is provided for setting the air jet 15 to be supplied to the corresponding main nozzle 10 at a predetermined pressure value.

[0024] While the weft yarn 4 travels through the weft-traveling path in the shed 17, a single group or multiple groups of sub nozzles 18 discharge(s) air jets 15 toward the traveling weft yarn 4 in a relay manner in accordance with the traveling rate of the weft yarn 4. This gives momentum to the weft yarn 4 traveling in the shed 17 in the direction of weft insertion. The air jets 15 from the sub nozzles 18 are supplied from the air-jet source 11 and travel through a pressure adjustment valve 19, an air supplying tube 22, and electromagnetic valves 23 provided in the air supplying tube 22 so as to be supplied to the sub nozzles 18 in each group. The pressure adjustment valve 19 sets the air jets 15 to be supplied to the sub nozzles 18 at a predetermined pressure value.

[0025] The jet emission from the main nozzles 10 and the multiple groups of sub nozzles 18 achieves proper weft insertion of the weft yarns 4. Each inserted weft yarn 4 is beaten against a cloth fell 21a with a reed 20 so as to be woven into cloth 21. Subsequently, a trailing end of the inserted weft yarn 4 near the corresponding main nozzle 10 is cut with a yarn cutter 25.

[0026] A weft sensor unit 27 is disposed at a position facing the traveling path of the weft yarns 4 (that is, at a position facing the slits formed between dents of a profile reed) and is for determining whether each weft yarn 4 is properly inserted. The weft sensor unit 27 faces the

weft-traveling path at a position near the leading end of the inserted weft yarn 4 and detects the weft yarn 4 at this position. Specifically, such a position is where a properly inserted weft yarn 4 should reach. The weft sensor unit 27 detects an arrival of the weft yarn 4 within a predetermined detection period and determines whether or not the weft insertion is properly performed. If proper weft insertion is determined, the weft sensor unit 27 outputs a weft arrival signal. In contrast, if the weft sensor unit 27 detects a weft insertion failure, the weft sensor unit 27 outputs a weft-insertion aborting signal. For each pick of weft yarn 4, one of these signals is sent to a main controller 32.

[0027] The driving motors 43 in the weft measuring/holding drum units 5, the operating units 9 for the weft measuring/holding drum units 5, the motors 34 for the weft braking units 40, the electromagnetic valves 13 corresponding to the main nozzles 10, the electromagnetic valves 23 corresponding to the sub nozzles 18, and the pressure adjustment valves 14, 19 define electrical actuators that are controlled by a weft-insertion controller 30.

[0028] The weft-insertion controller 30 controls the weft insertion process for the selected one of weft yarns 4 by being in control of: a signal corresponding to a rotational angle θ of a main shaft 28 of the fluidic jet loom 1 sent from an angle detector 29 linked with the main shaft 28; an operation signal S1 sent from the main controller 32; a weft selection signal S2 sent from a weft-selection-signal generator 33; a rotation speed and an amount of rotation of the driving motor 43 in the weft measuring/holding drum unit 5 corresponding to the selected weft yarn 4 based on set values preliminarily set in a setting device 31; an approaching and withdrawing movement of the corresponding stopper pin 8 via the operating unit 9 thereof; a rotation speed and an amount of rotation of the brake-driving motor 34 for the corresponding weft braking unit 40; ON/OFF (opening/closing) operations of the electromagnetic valves 13, 23; and pressure adjustment units for the pressure adjustment valves 14, 19.

[0029] The weft-insertion controller 30, the setting device 31, the main controller 32, and the weft-selection-signal generator 33 are capable of communicating in a bi-directional manner via a control bus 38. The setting device 31 includes a touchscreen having both a display portion 45 that displays loom data and an input portion 44 which allows input of set values; a CPU 46; and a memory 47 connected with the CPU 46. The touchscreen, the CPU 46, and the memory 47 are connected to the control bus 38 via a port 39. On the other hand, the weft-insertion controller 30, the main controller 32, and the weft-selection-signal generator 33 constitute a control device 41.

[0030] As mentioned above, when each cycle of the weft insertion process is to be performed, the weft-insertion controller 30 controls one of the weft-insertion devices so that the corresponding stopper pin 8 withdraws from the drum 7 via the operating unit 9. Thus, the weft yarn 4 wound around and held on the drum 7 of the weft measuring/holding drum unit 5 is released. In response to a jet-emission effect of the corresponding main nozzle 10 via the electromagnetic valve 13, the released weft yarn 4 is inserted into the shed 17 formed between the sets of warp yarns 16. Then, at the braking timing for the weft yarn 4, the brake-driving motor 34 rotates the corresponding weft brake 42 by a predetermined angle so that a braking force is applied onto the weft yarn 4. Subsequently, the operating unit 9 allows the stopper pin 8 to approach the drum 7 so as to stop the weft yarn 4 from being pulled out any further. Accordingly, one cycle of the weft insertion process is completed. During this cycle of the weft insertion process, the weft-insertion controller 30 controls the ON/OFF operations of the electromagnetic valves 23 so that the air jets 15 are emitted from the sub nozzles 18.

[0031] Accordingly, in each weft insertion cycle, the units of the corresponding weft-insertion device to be controlled by the weft-insertion controller 30 are the driving motor 43 in the weft measuring/holding drum unit 5, the operating unit 9, the brake-driving motor 34 for the weft braking unit 40, the electromagnetic valve 13 for the main nozzle 10, the electromagnetic valves 23 for the sub nozzles 18, and the pressure adjustment valves 14, 19 for setting the pressure of the air jets 15. In other words, these units define the electrical actuators mentioned above. The control device 41 controls these electrical actuators based on the set values input via the setting device 31.

[0032] A method for setting set values in a loom according to the present invention is directed to a loom (fluidic jet loom 1) which includes the setting device 31 having the display portion 45 that displays data related with the fluidic jet loom 1 and the input portion 44 which allows numerical input of set values for each of at least two selection numbers, the set values corresponding to the same setting parameter; and the control device 41 which stores set values for each selection number and is connected with electrical actuators, the control device 41 controlling the electrical actuators based on the set values corresponding to each selection number. When set values of each setting parameter for a second selection number are to be set after an operator inputs the set values of the same setting parameter for the first selection number, the operator performs a transferring operation on the setting device 31. Thus, the setting device 31 sets the input set values for the first selection number as the set values for the second selection number with respect to the same setting parameter. First Embodiment

[0033] A first embodiment is an example in which each selection number is defined by a differentiation number used for selecting the corresponding set values for each weft-insertion pick number. Each differentiation number indicates a weft selection number, which is used also as data of the corresponding unit number subject to be controlled. In the first embodiment, each setting parameter

includes a set of set values, which are set for each weft selection number.

[0034] In detail, for each weft selection number in correspondence with the type of weft yarn 4 thereof, set values for a jet-emission timing and a jet-emission pressure are input to the input portion 44 in the setting device 31 as setting parameters for the corresponding main nozzle 10, and set values for approaching-withdrawing timings are input to the input portion 44 as a setting parameter for the corresponding stopper pin 8. Furthermore, set values of various setting parameters are preliminarily stored in the memory 47 for each selection number, and moreover, a weft selection number for each of the weft-insertion pick numbers constituting a weft selection pattern is also preliminarily stored in the memory 47. After an operator inputs set values of each setting parameter for a certain weft selection number, the same values can be set as the set values of the same setting parameter for another weft selection number. In this case, the operator performs a transferring operation so that the setting device 31 displays a screen that allows the operator to input a forwarding weft selection number, i.e. a differentiation number, to which the set values are to be transferred. In response to this, the operator inputs the forwarding weft selection number into the setting device 31. Based on the input forwarding number data, the setting device 31 transfers the set values and sets these values as the set values for the forwarding selection number. These set values are then transferred to the control device 41 according to the forwarding data of the selected weft selection number, whereby control conditions are set in the control device 41. During an operational state of the loom 1, every time a weft-insertion pick number is renewed, the corresponding weft selection number is specified based on the stored weft selection pattern, whereby the set values corresponding to the weft selection number are read out. Accordingly, the stopper pin 8 of the weft measuring/holding drum unit 5 corresponding to the specified weft selection number, and the electrical actuators for the main nozzle 10 corresponding to the specified weft selection number, such as the operating unit 9, the electromagnetic valve 13, and the pressure adjustment valve 14, are selected and controlled based on the read set values. The main nozzle 10 in each weft insertion device is subsidiarily provided with a secondary main nozzle.

[0035] Specifically, the first embodiment is an example in which two weft yarns 4 of the same color (the same type of weft yarns 4) are alternately inserted according to the fluidic jet loom 1 of a two-color weft insertion type. In detail, a set value input in the setting device 31 for determining a jet-emission timing of one of the main nozzles 10 corresponding to color C1 is set as a set value for the other main nozzle 10 corresponding to color C2, which is the same type of weft yarn 4 as color C1. In this example, every time the rotational angle θ of the main shaft 28 exceeds 0°, the weft-selection-signal generator 33 renews the weft-insertion pick number and changes the weft selection signal S2 based on the weft selection pattern. Thus, the two weft-insertion devices and the two weft measuring/holding drum units 5 are selectively operated, such that the two weft yarns 4 of the same type are selectively inserted. In this case, the selection is made in the following order: the first pick is C1, the second pick is C2, the third pick is C1, the fourth pick is C2, and so on. In this example, each selection number is defined by a differentiation number (C1 or C2) used for selecting the corresponding set values for each of the weft-insertion pick numbers (first pick, second pick, third pick, fourth pick, and so on).

[0036] Fig. 2 illustrates the steps included in the first embodiment in which the set values are input and are subsequently transferred. Figs. 3 to 6 illustrate display examples of an input window 54 of the touchscreen included in the setting device 31 and having the input portion 44 and the display portion 45. Referring to Fig. 2, in step p1 following the start of the operation, an operator may input a command in the input portion 44 so that the display portion 45 displays a "MAIN NOZZLE/STEADY OPERATION" section of the input window 54 as shown in Figs. 3 to 6. Then, with respect to the first color C1 and the second color C2 which are the selection numbers of the weft yarns 4, the operator may touch each of input boxes 48 in order to enter a set value of the corresponding setting parameter. The setting parameters may include set values for ON-OFF timings for the stopper pins 8, set values for ON-OFF timings for the main nozzles 10, and set values for ON-OFF timings for the secondary main nozzles. In response to touching each of the input boxes 48, the input window 54 displays an operation keypad 24 on the same window, as shown in Fig. 3.

[0037] In step p2, the operator may operate the operation keypad 24 by touching the numerical keys in sequence to enter digits so that each timing set-value of the corresponding setting parameter can be input. Subsequently, by touching an "ENT" key, the numerical value is input, and the operation keypad 24 disappears from the window. This input process is similarly repeated for the remaining unset input boxes 48. As a result, Fig. 4 illustrates an example in which the set values for the approaching-withdrawing timings for one of the stopper pins 8 are set to 72° for an ON timing (withdraw-release timing) and 260° for an OFF timing (approach-hold timing); the set values for one of the main nozzles 10 are set at 82° for an ON timing (jet-emission timing) and at 172° for an OFF timing (jet-emission ending timing); and the set values for one of the secondary main nozzles are set at 82° for an ON timing (jet-emission timing) and at 162° for an OFF timing (jet-emission ending timing). In this case, these set values of the timings for each setting parameter are written in the memory 47 as data of the corresponding weft selection number, i.e. the first color (C1) .

[0038] As mentioned above, the reference numerals "C1" and "C2" respectively indicate the first color and the second color of weft yarns 4, and define the weft selection numbers one of which being given preliminarily to every

weft-insertion pick. In other words, according to the first embodiment, the reference numerals "C1" and "C2" define the selection numbers (i.e. the differentiation numbers). Accordingly, the selection numbers correspond to the weft selection numbers one of which being given preliminarily to every weft-insertion pick. Specifically, one of the weft selection numbers is given to each weft-insertion pick based on the weft selection signal S2 output from the weft-selection-signal generator 33.

[0039] The secondary main nozzles are not shown in the drawings. Generally, referring to Fig. 1, the secondary main nozzles are provided at the upstream side of the main nozzles 10 and are disposed in series with respect to the main nozzles 10. During the weft insertion process, each secondary main nozzle helps the corresponding main nozzle 10 by emitting the air jet 15. On the other hand, a "1ST PICK" box and a "2ND PICK" box displayed on the input window 54 respectively indicate a first-pick setting key 35 and a second-pick setting key 37. In detail, due to the fact that the loom 1 is generally in a transient operational state for the first two picks just after the activation, set values that are different from those set for the steady operational state can be input for the first two picks by touching the first-pick setting key 35 and the second-pick setting key 37.

[0040] In step p3, after visually checking the input set values, the operator may touch a transfer start key 26 in the input window 54 in order to transfer the set values between the weft colors C1 and C2. Subsequently, referring to Fig. 5, the setting device 31 enters a set-value transfer mode and thus displays a transfer menu 49 of a "SET-VALUE TRANSFER MODE" subsection on the input window 54. Then, in step p4, the operator may touch one of keys 50 corresponding to the weft selection number C1 from which the set values are to be transferred, and one of keys 51 corresponding to the weft selection number C2 to which the set values are to be transferred, whereby the two keys are highlighted. Subsequently, by touching a transfer enter key 52, the previously input set values of the setting parameters for the weft selection number C1, i.e. the set values of the timings for the stopper pin 8, the main nozzle 10, and the secondary main nozzle for the weft selection number C1, are transferred such that the same values are set as the set values for the weft selection number C2. The transfer menu 49 then disappears. In step p5, referring to Fig. 6, due to the transferring of the set values, the data of the first color C1 is directly transferred and set as the data of the second color C2 with respect to the stopper pins 8, the main nozzles 10, and the secondary main nozzles. At the same time, the data of the first color C1 and the data of the second color C2 are stored in the memory 47, and are also sent to the weft-insertion controller 30 where the data are stored and set in a memory portion thereof in a readable manner.

[0041] Accordingly, due to the fact that the two colors C1 and C2 of weft yarns 4 are alternately inserted, the weft selection numbers preliminarily set in correspondence with the weft-insertion picks are set in the following manner: the first pick corresponds to the first color C1, the second pick corresponds to the second color C2, and so on. With respect to the group of units subject to be controlled based on each of the weft selection numbers C1 (first color) and C2 (second color), namely, the group of stopper pin 8, main nozzle 10, and secondary main nozzle corresponding to each of the first and second colors, set values are input for each of the setting parameters, such as an operational timing and pressure values for the nozzles. Although not shown in the drawings, the set values for the sub nozzles 18 and other units that are subject to be controlled can also be input via another window. For example, similar to the jet-emission control of the main nozzles 10, the jet-emission of the sub nozzles 18 may be controlled such that the jet-emission timing and the jet-emission pressure may be set differently between different types of weft yarns 4. In such a case, the set values for the sub nozzles 18 are input and set via a window, not shown, for each selected type of weft yarn 4.

[0042] Accordingly, when the required set values are set as control data, the fluidic jet loom 1 becomes operational. During the operation of the fluidic jet loom 1, according to the weft selection signal S2 corresponding to the weft-insertion pick number renewed in response to the rotation of the main shaft 28, the control device 41 (weft-insertion controller 30) reads the set values that correspond to one of the first color C1 and second color C2 based on the weft selection pattern. Specifically, the weft selection pattern includes weft selection numbers one of which being given to each weft-insertion pick, and may be set in the following manner: the first pick corresponds to first color C1, the second pick corresponds to second color C2, and so on. Based on the read set values, the control device 41 controls the stopper pin 8, the main nozzle 10, and the secondary main nozzle corresponding to the weft selection signal S2. Accordingly, the two weft-insertion devices are alternately controlled.

Second Embodiment

[0043] A second embodiment is an example in which each weft-insertion pick number itself defines a selection number, and the weft-insertion nozzles (the main nozzles 10 and the sub nozzles 18) are subject to be controlled. Moreover, in this example, the set values for the jet-emission timing and the jet-emission pressure are input for each weft-insertion pick number.

[0044] In detail, for each weft-insertion pick number, set values for the jet-emission timing and the jet-emission pressure are input to the input portion 44 in the setting device 31 as the setting parameters for the corresponding main nozzle 10, and set values for approaching-withdrawing timings are input to the input portion 44 as the setting parameter for the corresponding stopper pin 8. Moreover, in correspondence with each weft-insertion pick number, the set values of each setting parameter

and the corresponding weft selection number defining a specification number used as a basis for specifying the set values are stored in the memory 47. After an operator inputs set values of each setting parameter for a certain weft selection number, the same values can be set as the set values of the same setting parameter for another weft selection number. In this case, the operator performs a transferring operation. In response to this, the weft selection number defining a specification number given to the weft-insertion pick number from which the set values are to be transferred is read. The read weft selection number defining the specification number is then compared with the specification number given to each of the remaining weft-insertion pick numbers. When the read specification number and the specification number for one of the remaining specification numbers are the same, the previously-input set values are set as new set values for the corresponding remaining weft-insertion pick number. Accordingly, the previously-input set values are transferred so as to be set as the set values for each weft-insertion pick number with the same specification number. Thus, control conditions including set values for each weft-insertion pick number are set in the control device 41. During an operational state of the loom 1, every time a weft-insertion pick number is renewed, the corresponding set values are read, and the electrical actuators for the sub nozzles 18, such as the electromagnetic valves 23 and the pressure adjustment valve 19, are controlled based on the read set values. Furthermore, during the operation of the loom 1, a weft selection number defining a specification number is read for each weft-insertion pick number, such that the stopper pin 8 of the corresponding weft measuring/holding drum unit 5 and the corresponding main nozzle 10 are selected and controlled by the control device 41 based on the read set values, as in the first embodiment. For the second embodiment, however, the detail description of the transferring process of the set values will be omitted.

[0045] Fig. 7 illustrates the structure of, for example, the setting device 31 according to the second embodiment. Fig. 8 illustrates a display example of the input window 54 according to the setting device 31.

[0046] In Fig. 7, the setting device 31 is provided with a memory unit 53 in place of the weft-selection-signal generator 33. For each weft-insertion pick number, the memory unit 53 stores set values of the jet-emission timings and the jet-emission pressures for the main nozzles 10 and the sub nozzles 18 corresponding to the selection number of the selected type of weft yarn 4, and weft selection data defining a selection number for specifying such set values.

[0047] Fig. 8 illustrates a state where the input portion 44 in the touchscreen is operated by the operator so that the input window 54 is displayed. Specifically, Fig. 8 shows a state where set values of the jet-emission timings for a first group of sub nozzles 18 are preliminarily input with respect to weft-insertion pick numbers N to (N + 2). The process prior to this state in Fig. 8 will be described below in detail. In step p1 following the start of the operation, when the set values of the jet-emission timing for the sub nozzles 18 are to be input by the operator, the operator first inputs a command in the input portion 44 so that the display portion 45 displays a "FIRST GROUP" subsection in a "SUB NOZZLE/STEADY OPERATION" section of the input window 54 as shown in Fig. 8. The "FIRST GROUP" subsection corresponds to a first group consisting of four of the sub nozzles 18 disposed proximate the main nozzles 10. The operator then operates two scroll keys 55 provided for scrolling the window in the vertical direction so that the weft-insertion pick number N is displayed. Subsequently, the operator touches each of the corresponding input boxes 48 in order to enter a set value of the corresponding parameter, which, in this case, is a set value of the jet-emission timing for the first group of sub nozzles 18. Similar to the first embodiment, the operation keypad 24, not shown in Fig. 8, is then displayed. Thus, for the weft-insertion pick number N, the set values of the jet-emission timing for the sub nozzles 18 in the first group are set at 72° for an ON timing (jet-emission timing) and at 180° for an OFF timing (jet-emission ending timing), and moreover, a number 1 corresponding to the first color is set as the weft selection number. Subsequently, the weft-insertion pick number (N + 1) is selected. For the weft-insertion pick number (N + 1), the set values are input to the corresponding input boxes 48. Thus, for the weft-insertion pick number (N + 1), the set values of the jet-emission timing for the sub nozzles 18 in the first group are set at 82° for an ON timing (jet-emission timing) and at 172° for an OFF timing (jet-emission ending timing), and moreover, a number 2 corresponding to the second color is set as the weft selection number. On the other hand, weft selection numbers defining specification numbers for all weft-insertion pick numbers are preliminarily input via another input window, not shown. The setting device 31 stores these input set values in the memory unit 53 in correspondence with the weft-insertion pick numbers.

[0048] Subsequently, in order to set the set values of the jet-emission timing, namely, the ON/OFF timing set values, corresponding to the weft selection number 2 for the previously-set weft-insertion pick number (N + 1) as the set values for another weft-insertion pick number that is above (N + 1) by one or more and that has the same weft selection number, the operator may touch the input box 48 for the weft selection number and the two input boxes 48, 48 for the two jet-emission timing set-values that correspond to the weft-insertion pick number (N + 1) from which the set values are to be transferred. Thus, these input boxes 48 are highlighted or blinked. Then, the operator may touch and press the transfer start key 26. Consequently, each input box 48 that indicates the number 2, which defines a specification number, becomes in a selected state. The CPU 46 in the setting device 31 thus sequentially reads out weft selection numbers stored in the memory unit 53 and compares each of the read weft selection numbers with the weft selection

number 2. When a read selection number is the same as the weft selection number 2, the same values as the two jet-emission timing set-values in the two corresponding selected input boxes 48 are directly transferred to the weft-insertion pick number corresponding to the read selection number. These new set values for the weft-insertion pick number corresponding to the read selection number are then stored in the memory unit 53. Accordingly, this transferring and storing process is performed for all weft-insertion pick numbers. In the current state of the setting process shown in Fig. 8, the CPU 46 compares the weft selection number "2" corresponding to a weft-insertion pick number (N + 2) with the previously-input weft selection number. Because the weft selection number 2 for the weft-insertion pick number (N + 2) is the same as the weft selection number 2 for the weft-insertion pick number (N + 1), the set values for the weft-insertion pick number (N + 1) (82° for an ON timing (jet-emission timing) and 172° for an OFF timing (jet-emission ending timing)) are set in the input boxes 48 of the weft-insertion pick number (N + 2) as new set values. The display on the input window 54 is then renewed so as to reach the state shown in Fig. 8.

[0049] The term "STEADY OPERATION" in the "SUB NOZZLE/STEADY OPERATION" section shown in Fig. 8 indicates that the current window is for inputting set values for a steady operation of the loom 1. In addition to inputting various set values for the sub nozzles 18, the set values for, for example, each of the main nozzles 10 and the stopper pins 8 may vary depending on the operational state of the loom 1. On the other hand, in order to input set values for a transient operational state just after the activation of the loom 1, each of the setting keys 35, 37 may be touched and pressed so that corresponding input window for inputting set values for the first pick or the second pick is displayed.

[0050] The operator may input new set values for each of the remaining weft-insertion pick numbers by following the same process described above, or may sequentially transfer the previously-input set values to each of the remaining weft-insertion pick numbers as new set values. Here, each weft selection number defines a specification number for specifying the setting parameters, and can be input for each weft-insertion pick number. During a setting process for the weft-insertion pick numbers, a specification number may be input for each pick. Alternatively, the specification numbers may preliminarily be input for all of the weft-insertion pick numbers at once. In the input window 54, the weft-insertion pick numbers below N and the weft-insertion pick numbers above (N + 4) can be displayed by operating the scroll keys 55 provided at the left side of the input window 54.

[0051] Although not shown in the drawings, the set value of the jet-emission pressure for the sub nozzles 18, and the set values of the jet-emission timing, the jet-emission ending timing, and the jet-emission pressure for the main nozzles 10 may also be set in a similar manner by displaying the corresponding sections on the input window 54 and inputting the appropriate values. These set values are stored in the memory 47 and are transferred to the memory unit 53 in the control device 41.

[0052] Accordingly, during the operation of the fluidic jet loom 1, every time a weft-insertion pick number is renewed, the control device 41 (weft-insertion controller 30) reads the corresponding set values from the memory unit 53 and controls the units that are subject to be controlled based on the read set values. Under the condition that the main shaft 28 of the loom 1 rotates in the normal direction, the weft-insertion pick number increases by one (+1) every time the rotational angle θ of the main shaft 28 exceeds 0°, and is thus renewed in sequence.

Modifications

[0053] With respect to the first embodiment in which the set values are switched based on the weft selection signal S2, a modification is permissible in which the following weft-insertion-related setting parameters are applied, which are:

(1) the pressure value of the weft-insertion nozzles, i.e. the main nozzles 10, and the jet-emission (ON/OFF) timing and pressure values of the sub nozzles 18 (specifically, this is effective in a case where the timings and the pressures are changed according to each type of weft color, and the set values for all groups of sub nozzles 18 may be transferable, or the set values for only a specific group may be transferable based on a group selection);

(2) the ON/OFF timing and the amount of stroke action of the weft braking units 40;

(3) parameters other than the operational timing of the stopper pins 8 in the weft measuring/holding drum units 5 (such as the drum diameter, the winding acceleration rate, and an attachment position of each release sensor, not shown, for the corresponding weft yarn 4, that is, a phase difference between the corresponding stopper pin 8 and the release sensor, when the weft-stopping process is to be performed by the stopper pin 8 based on a yarn signal from the release sensor);

(4) the jet-emission timing and the pressure of a stretching nozzle in a weft stretching unit which applies tension to the inserted weft yarn 4 with, for example, an air-jet effect between a period extending from the final point of the weft insertion to the end of a beating motion in response to the reception of the leading end of the inserted weft yarn 4; and

(5) the jet-emission timings and the pressures of supporting nozzles and folding nozzles provided in a needleless tuck-in unit which folds back the ends of the inserted weft yarn 4 towards the shed 17 after the weft-insertion/beating processes, the supporting nozzles supporting the ends of the inserted weft yarn 4 until the beating motion, the folding nozzles folding back the ends of the inserted weft yarn 4 towards

the shed 17 with an air jet.

[0054] Furthermore, another modification may be applicable to parameters other than the weft-insertion-related setting parameters. For example, supposing that an electrically-driven shedding unit is provided such that it drives warp heald frames in synchronization with the rotation of the main shaft 28 of the loom 1 via motors provided for the corresponding heald frames, the setting parameters for the heald frames may include, for example, a crossing timing in which the shed 17 between the sets of warp yarns 16 is closed; a frame height indicating the vertical position of each heald frame at the crossing timing; a motional curve of each heald frame formed in correspondence with the rotational angle θ of the main shaft 28 of the loom 1 (the motional curve including, for example, a dwell value that indicates a period of a stationary state in which the shed 17 is opened by a largest degree); and the dimension of the shed 17 when the shed 17 is opened by a largest degree. Thus, these multiple setting parameters must be preliminarily set for each weft-insertion pick number or for each heald frame. With respect to one or more setting parameters listed above, the set values may be transferred such that the same set values may be set between different heald frames or different weft-insertion pick numbers defining selection numbers. Furthermore, the shedding unit is not limited to a type that drives each heald frame. For example, an electrically-driven jacquard unit in which each harness cord is provided with an electrical actuator may alternatively be applied.

[0055] Although set values described below are not directly for the electrical actuators, setting parameters may alternatively be set according to the types of weft yarns 4 with respect to the weft-insertion control operation. For example, in a case where the pressure and one of the jet-emission and jet-emission ending timings are to be controlled based on an amount of deviation from a target value of a weft arrival timing, the setting parameters may include, for example, set values of a target arrival timing, an amount of compensation (gain), and a compensation condition. Furthermore, as means for setting the conditions for yarn detection, weft sensors (such as a weft sensor unit, a cut-yarn sensor unit, and an entangled-yarn detector), for example, may be provided in correspondence with the types of weft yarns 4, such that the setting parameters may include, for example, set values of an amplification degree of a yarn signal, a threshold value, and a condition for determining a yarn failure. Using the same method as in the first and second embodiments described above, these input set values can be transferred in similar manner.

[0056] In each of the above embodiments, in addition to the weft selection control, a switch signal corresponding to the operational state of the loom (fluidic jet loom 1) may simultaneously be used. In detail, the set values of the jet-emission timing and the jet-emission pressure for the weft-insertion nozzles may be set differently between the transient operational state (first and second picks) just after the activation of the loom 1 and the steady operational state. In that case, similar to Figs. 3 to 6, the set values may be input and transferred via a setting window provided specifically for the transient operational state. During the activation state of the loom 1, the corresponding set values for the transient operational state may be selected for each rotation. On the other hand, when the loom 1 reaches a steady operational state, the set values for the steady operational state may be selected. Thus, the control operation is performed according to each operational state.

[0057] With respect to the selection control in each of the above embodiments, a switch signal (i.e. a pick-density selection signal) for cloth constructions, for example, may alternatively be used instead of the weft selection signal. Specifically, in a loom in which set values of, for example, the rotational speed of the loom, the pick density, and the warp tension are changeable, when the current cloth construction is to be switched to another type, these set values are set according to the selection number corresponding to another type of cloth construction. In that case, regardless of different selection numbers, the same set values may be used to set the set values for the corresponding cloth construction.

[0058] Although numerical characters are used as the selection numbers in the above embodiments, other notations may be used, such as symbols, alphabetical characters, and signs. Accordingly, the term "number" may include other substantially equivalent notations.

[0059] Furthermore, the present invention is applicable to an automatic determination system for the set values. In that case, instead of transferring the set values, the parameters that are the basis of the set values may be transferred. For example, with respect to a function that automatically determines, for example, the jet-emission timing and the jet-emission pressure of the weft-insertion nozzles based on parameters, such as a weft-beating timing, a target arrival timing, weft-type data and a rotational speed of the loom, the parameters having a list of the above set values may be read and replaced.

Claims

1. A method for setting set values in a loom (1) which includes a setting device (31) having a display portion (45) that displays data of the loom (1) and an input portion (44) which allows numerical input of a set value of at least one setting parameter for each of at least two selection numbers; and a control device (41) which stores the set value for each of the selection numbers and is connected with at least one electrical actuator (9, 13, 14, 19, 23, 34, 43), the control device (41) controlling said at least one electrical actuator (9, 13, 14, 19, 23, 34, 43) based on the set value corresponding to each selection number which is renewed by rotating the main shaft,

wherein the method comprises the steps of:

allowing an operator to input a value in the setting device (31) as a set value of a setting parameter for a first one of said at least two selection numbers;
allowing the operator to perform a transferring operation in order to set a set value of the same setting parameter for a second one of said at least two selection numbers, and
setting the input set value for the first selection number as the set value for the second selection number with respect to the same setting parameter via the setting device (31) in response to the transferring operation performed by the operator.

2. The method according to Claim 1, wherein each selection number is defined by a differentiation number used for selecting a set value for each weft-insertion pick number,
wherein the display portion (45) provided in the setting device (31) is capable of displaying the data of the loom (1) on a screen,
wherein the setting device (31) stores each input set value in correspondence with the differentiation number thereof, and
wherein prior to said setting step, the setting device (31) displays the screen that allows an input of a forwarding differentiation number as display data.

3. The method according to Claim 1, wherein each selection number is defined by a weft-insertion pick number,
wherein the display portion (45) provided in the setting device (31) is capable of displaying display data on a screen,
wherein the setting device (31) allows an input of a set value and a specification number for each weft-insertion pick number, each specification number being used for specifying the corresponding set value and a corresponding selection number used as a basis for the set value,
wherein the setting device (31) stores the input set values and the specification numbers in correspondence with the weft-insertion pick numbers thereof, and
wherein after the operator inputs the set value of the setting parameter for the first selection number in the setting device (31), and when the set value of the same setting parameter for the second selection number is to be set, the setting device (31) reads the specification number corresponding to the input set value for a first weft-insertion pick number defining the first selection number and compares the read specification number with a specification number given to a second weft-insertion pick number defining the second selection number, and wherein when the two specification numbers are the same, the setting device (31) sets the input set value for the first weft-insertion pick number as a new set value for the second weft-insertion pick number.

4. The method according to any one of Claims 1 to 3, wherein the control device (41) is connected with said at least one electrical actuator (9, 13, 14, 19, 23, 34, 43) for a unit included in the loom (1) that is used regularly during an operation of the loom (1), and
wherein the control device (41) controls said at least one electrical actuator (9, 13, 14, 19, 23, 34, 43) according to the new set value for the renewed second weft-insertion pick number based on the corresponding selection number.

5. The method according to any one of Claims 1 to 3, wherein said at least one electrical actuator (9, 13, 14, 19, 23, 34, 43) comprises a plurality of electrical actuators (9, 13, 14, 19, 23, 34, 43) for units included in the loom (1) that are used selectively during an operation of the loom (1),
wherein the control device (41) is connected with the plurality of electrical actuators (9, 13, 14, 19, 23, 34, 43),
wherein the control device (41) preliminarily stores a unit number for each weft-insertion pick number, the unit numbers being given to the units included in the loom (1) and each defining the selection number, and
wherein the control device (41) controls the electrical actuators (9, 13, 14, 19, 23, 34, 43) corresponding to the renewed remaining weft-insertion pick number based on the set value corresponding to the selection number.

6. The method according to Claim 2, wherein each differentiation number defines a weft selection number corresponding to one of types of weft yarns, and
wherein said at least one setting parameter includes at least one of a jet-emission condition of a weft-insertion nozzle; an operational condition of a weft braking unit (40); and a setting condition related with measuring and holding operations of a weft measuring/holding unit (5), the jet-emission condition including a jet-emission timing, a jet-emission ending timing, and a jet-emission pressure of the weft-insertion nozzle, the operational condition including an operational timing and an amount of movement of the weft braking unit (40), the setting condition including a take-up diameter, the number of releases, and a release timing of the weft measuring/holding unit (5).

7. The method according to Claim 3, wherein each specification number defines a weft selection number corresponding to one of types of weft yarns,

and

wherein said at least one setting parameter includes at least one of a jet-emission condition of a weft-insertion nozzle; an operational condition of a weft braking unit (40); and a setting condition related with measuring and holding operations of a weft measuring/holding unit (5), the jet-emission condition including a jet-emission timing, a jet-emission ending timing, and a jet-emission pressure of the weft-insertion nozzle, the operational condition including an operational timing and an amount of movement of the weft braking unit (40), the setting condition including a take-up diameter, the number of releases, and a release timing of the weft measuring/holding unit (5) .

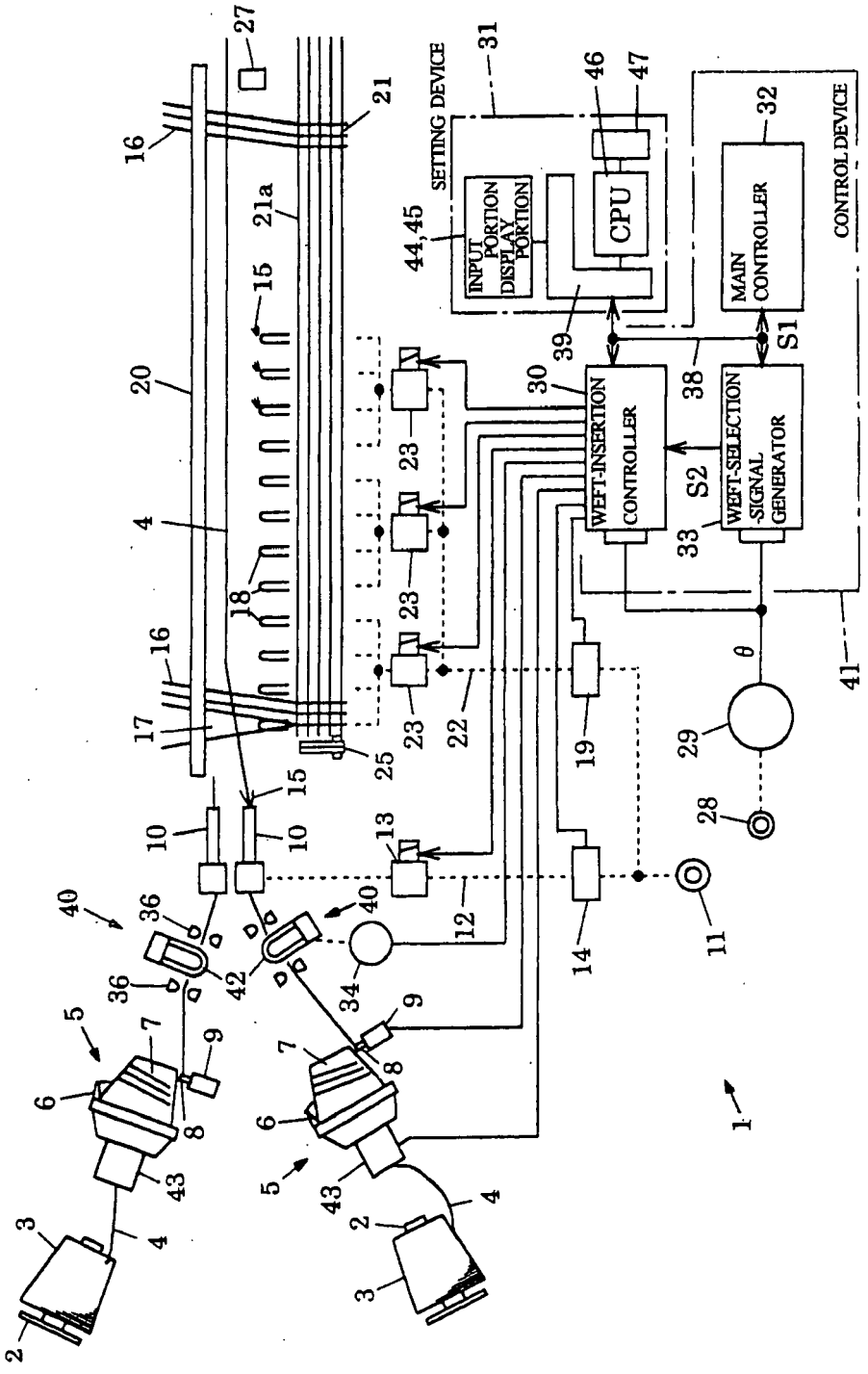
SETTING DEVICE
INPUT PORTION
DISPLAY PORTION
CPU
MAIN CONTROLLER
CONTROL DEVICE
WEFT-INSERTION CONTROLLER
WEFT-SELECTION -SIGNAL GENERATOR
S1
S2
θ

FIG. 1

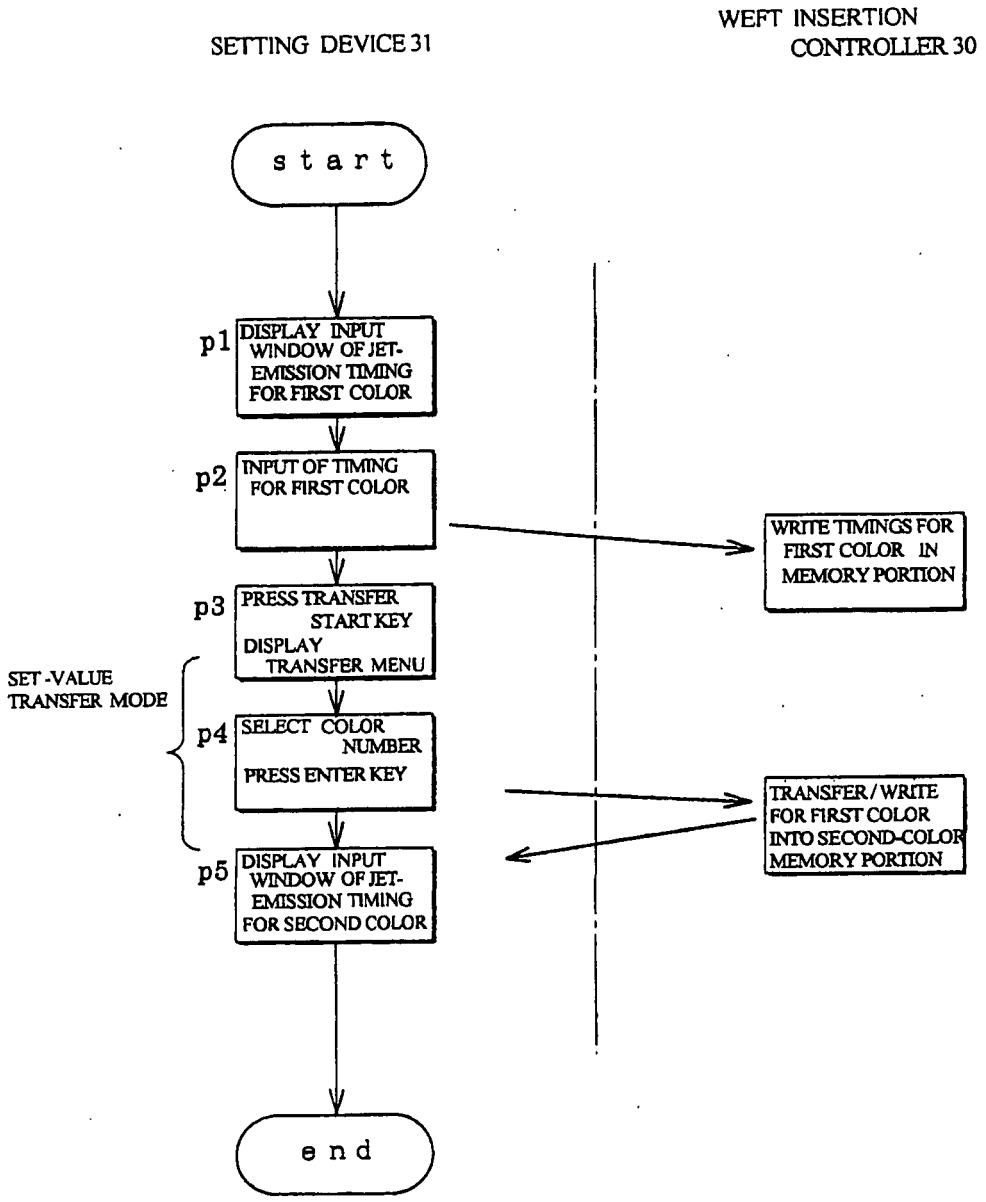
SETTING DEVICE 31
WEFT INSERTION CONTROLLER 30
start
p1
DISPLAY INPUT WINDOW OF JET-EMISSION TIMING FOR FIRST COLOR
p2
INPUT OF TIMING FOR FIRST COLOR
WRITE TIMINGS FOR FIRST COLOR IN MEMORY PORTION
p3
PRESS TRANSFER START KEY
DISPLAY TRANSFER MENU
SET-VALUE TRANSFER MODE
p4
SELECT COLOR NUMBER
PRESS ENTER KEY
TRANSFER / WRITE FOR FIRST COLOR INTO SECOND-COLOR MEMORY PORTION
p5
DISPLAY INPUT WINDOW OF JET-EMISSION TIMING FOR SECOND COLOR
end

FIG.2

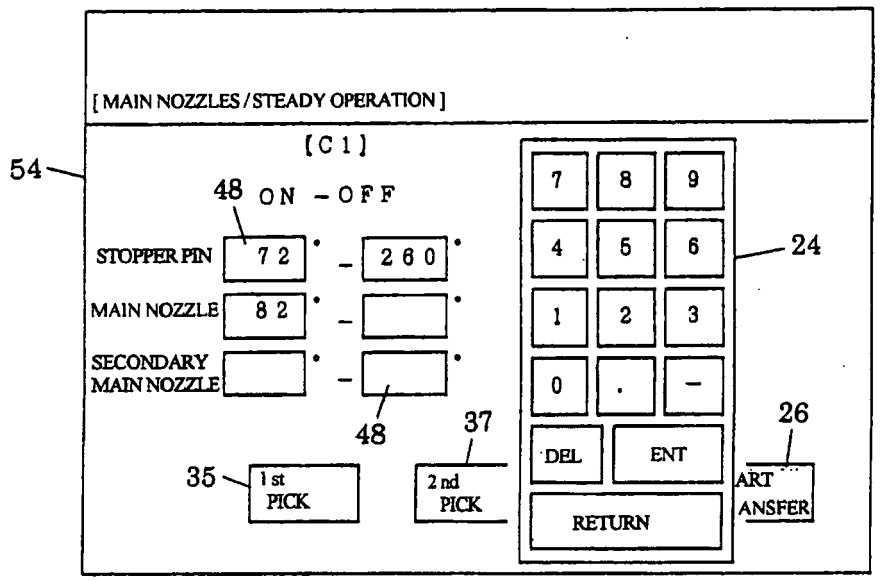
[MAIN NOZZLES / STEADY OPERATION]
[C1]
54
48
ON -OFF
STOPPER PIN
72
260
MAIN NOZZLE
82
SECONDARY MAIN NOZZLE
48
37
35
1st PICK
2nd PICK
7
8
9
4
5
6
24
1
2
3
0
.
-
DEL
ENT
RETURN
26
ART
ANSFER

FIG. 3

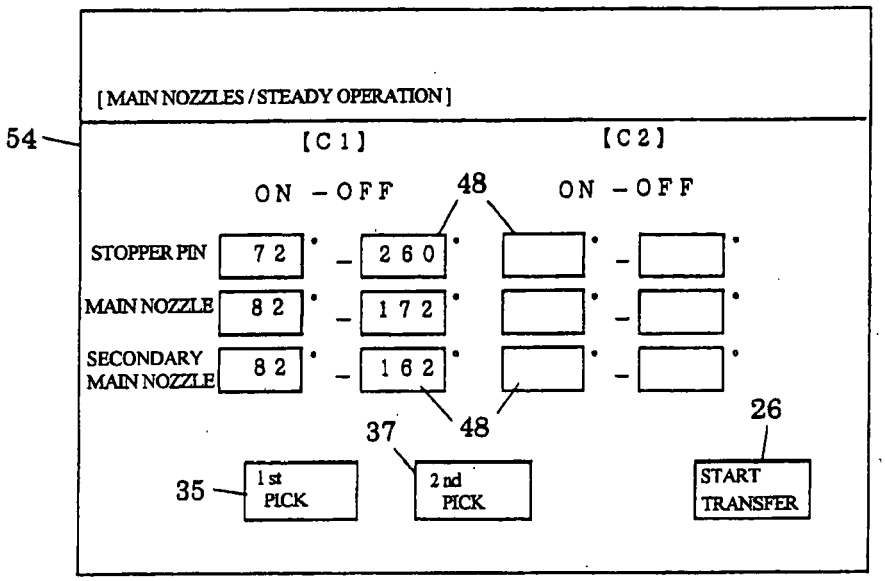
[MAIN NOZZLES / STEADY OPERATION]
54
[C1]
[C2]
ON -OFF
ON -OFF
48
STOPPER PIN
72
260
MAIN NOZZLE
82
172
SECONDARY MAIN NOZZLE
82
162
48
37
26
35
1st PICK
2nd PICK
START TRANSFER

FIG. 4

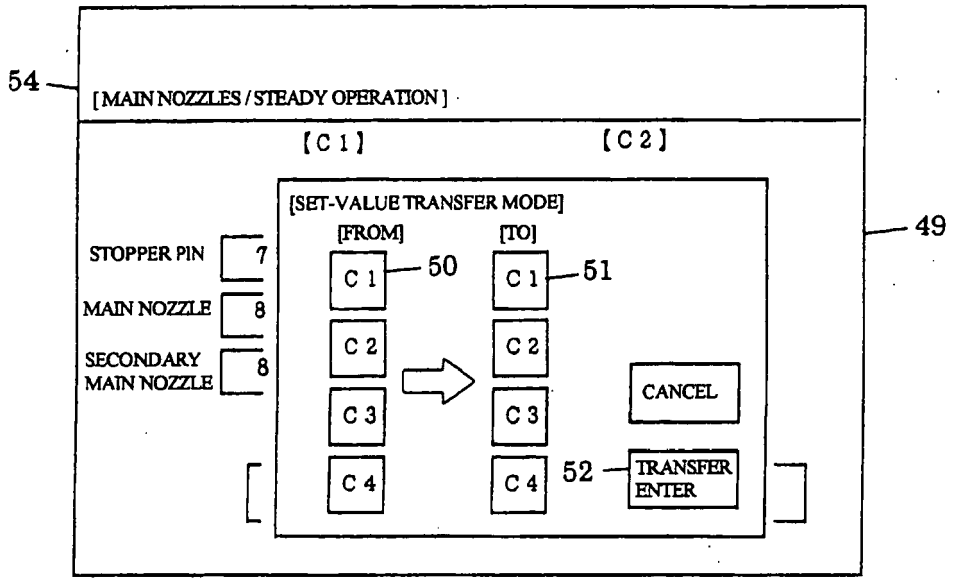
54
[MAIN NOZZLES / STEADY OPERATION]
【C 1】
【C 2】
[SET-VALUE TRANSFER MODE]
[FROM]
[TO]
STOPPER PIN
7
MAIN NOZZLE
8
SECONDARY MAIN NOZZLE
8
C 1
C 2
C 3
C 4
50
C 1
C 2
C 3
C 4
51
CANCEL
52
TRANSFER ENTER
49

FIG. 5

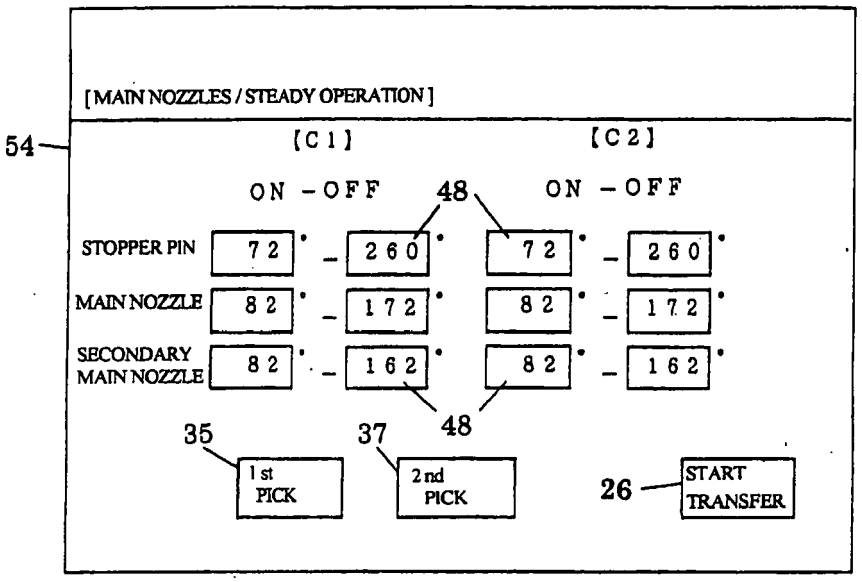
[MAIN NOZZLES / STEADY OPERATION]
54
[C1]
[C2]
ON -OFF
48
ON -OFF
STOPPER PIN
72
260
72
260
MAIN NOZZLE
82
172
82
172
SECONDARY MAIN NOZZLE
82
162
82
162
48
35
37
1st PICK
2nd PICK
26
START TRANSFER

FIG. 6

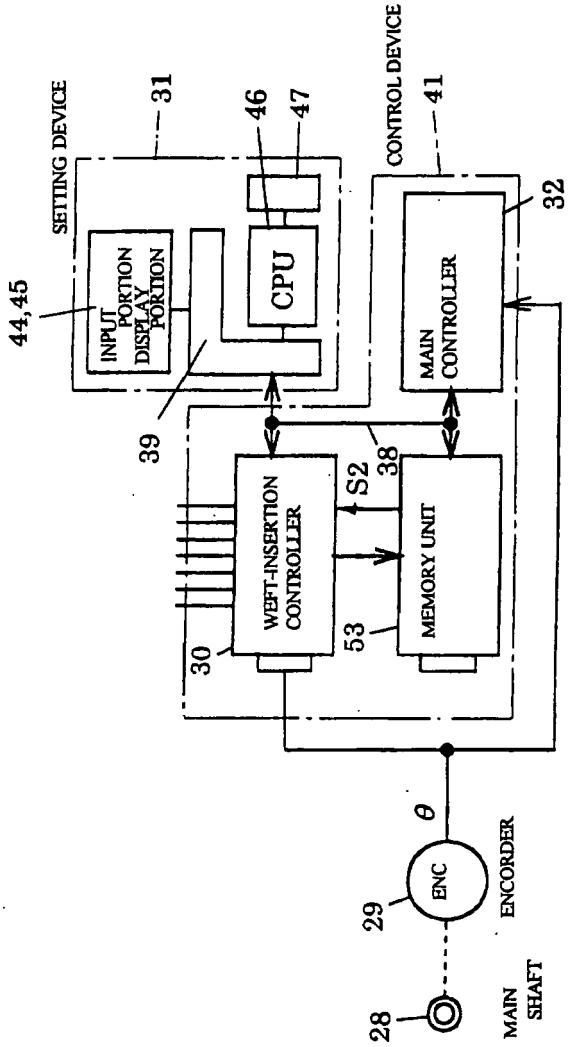
SETTING DEVICE
31
46
47
CONTROL DEVICE
41
32
44,45
INPUT PORTION
DISPLAY PORTION
CPU
MAIN CONTROLLER
39
S2
38
WEFT-INSERTION CONTROLLER
MEMORY UNIT
30
53
θ
ENC
ENCORDER
29
28
MAIN SHAFT

FIG. 7

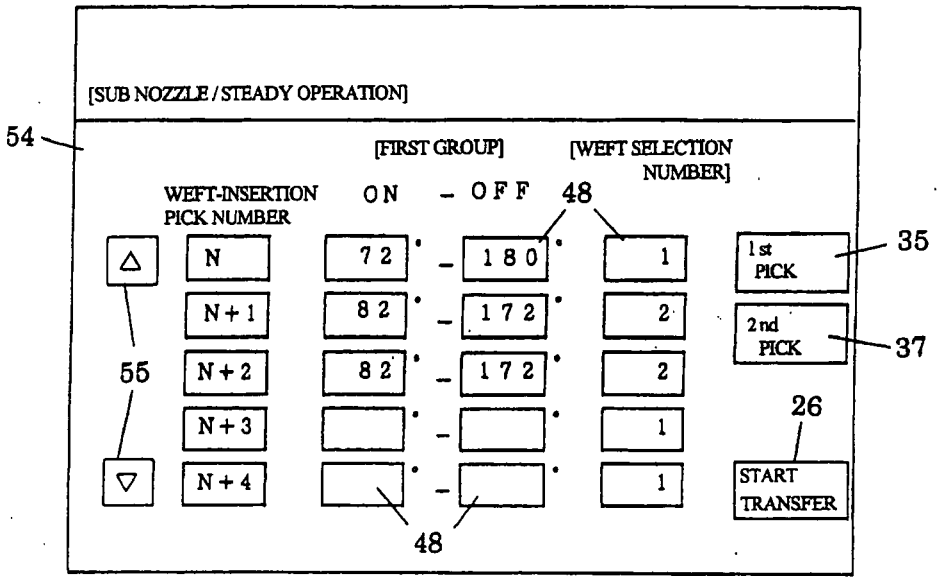
[SUB NOZZLE / STEADY OPERATION]
54
[FIRST GROUP]
[WEFT SELECTION NUMBER]
WEFT-INSERTION PICK NUMBER
ON - OFF
48
N
N+1
N+2
N+3
N+4
72 - 180
82 - 172
82 - 172
1
2
2
1
1
1st PICK
35
2nd PICK
37
55
26
START TRANSFER
48

FIG. 8