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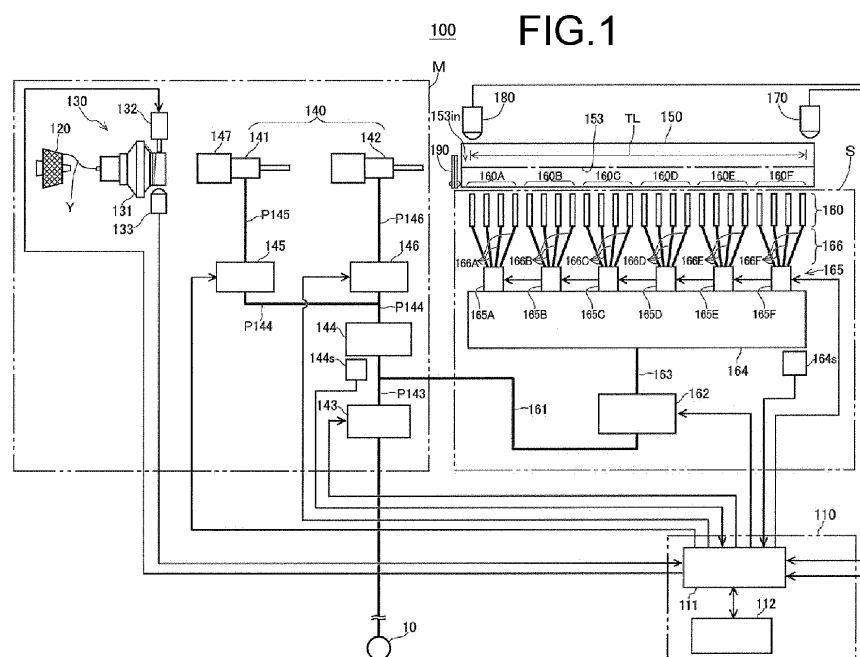
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(54) **AIR-JET LOOM WITH WEFT-INSERTION CONTROL APPARATUS**

(57) There is provided an air-jet loom with a weft-insertion control apparatus (110, 180). The air-jet loom is configured to insert a weft yarn (Y) through a weft yarn passage (153) by injecting air from a main nozzle (142) and a sub-nozzle (160, 160A to 160F). The weft-insertion control apparatus (110, 180) is configured to control weft insertion of the air-jet loom. The weft-insertion control apparatus (110, 180) includes an inlet sensor (180) con-

figured to detect inlet arrival timing (Tin) of a leading end of the weft yarn (Y) to arrive at an inlet (153in) of the weft yarn passage (153), and a control device (110) configured to control a weft-insertion condition for inserting the weft yarn (Y) based on the inlet arrival timing (Tin). A detection range (180d) of the inlet sensor (180) includes the inlet (153in) of the weft yarn passage (153).



Description

BACKGROUND ART

[0001] The present invention relates to an air-jet loom with a weft-insertion control apparatus, in particular, an air-jet loom with a weft-insertion control apparatus in which weft-insertion conditions are suitably controllable according to timing of a leading end of a weft yarn to arrive at an inlet of a weft yarn passage.

[0002] An air-jet loom weaves fabrics by injecting air from nozzles so as to pass each of weft yarns coming from a weft-yarn length-measuring and pooling device through warp yarns that are passed between a plurality of dents, in a direction perpendicularly to the warp yarns. One of important points to weave fabrics of high quality in this case is to cause each of the weft yarns to arrive at a predetermined weft-insertion position at predetermined timing.

[0003] The weft-yarn length-measuring and pooling device includes a weft-yarn unwinding pin that unwinds the weft yarn pooled around a weft-yarn pooling drum, and a weft-yarn unwinding detector that detects the weft yarn unwound from the weft-yarn pooling drum and sends a weft-yarn unwinding signal. Various controls for weft insertion conditions are performed according to weft-insertion start timing calculated based on the weft-yarn unwinding signal. The weft-insertion start timing is timing of the weft yarn to start traveling with air injected from a main nozzle. A weft-yarn controlling method using the weft-insertion start timing like the above case is disclosed in Japanese Patent Application Publication No. H05-59639.

[0004] In conventional arts, the weft-insertion start timing of the weft yarn to start traveling of the weft yarn is calculated from unwinding timing of the weft yarn to be unwound from the weft-yarn pooling drum. However, there is a difference in time between the unwinding timing of the weft yarn and timing of the leading end of the weft yarn to arrive at an inlet of a weft yarn passage after the weft yarn starts traveling by injecting air from the main nozzle. In addition, the difference in time between the unwinding timing of the weft yarn and the timing of the leading end of the weft yarn to arrive at the inlet varies. Therefore, in the method disclosed in the above Patent Application Publication, the various controls for the weft-insertion conditions are not suitably performed.

[0005] The present invention has been made in view of the above circumstances, and is directed to providing an air-jet loom with a weft-insertion control apparatus, wherein the air-jet loom accurately detects timing of a leading end of a weft yarn to arrive at an inlet of a weft yarn passage and suitably controls weft-insertion conditions.

SUMMARY

[0006] In accordance with an aspect of the present in-

vention, there is provided an air-jet loom with a weft-insertion control apparatus. The air-jet loom is configured to insert a weft yarn through a weft yarn passage by injecting air from a main nozzle and a sub-nozzle. The weft-insertion control apparatus is configured to control weft insertion of the air-jet loom. The weft-insertion control apparatus includes an inlet sensor and a control device. The inlet sensor is configured to detect inlet arrival timing of a leading end of the weft yarn to arrive at an inlet of the weft yarn passage. A detection range of the inlet sensor includes the inlet of the weft yarn passage. The control device is configured to control a weft-insertion condition for inserting the weft yarn based on the inlet arrival timing.

[0007] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the embodiments together with the accompanying drawings in which:

FIG. 1 is a block diagram illustrating a weft-insertion apparatus of an air-jet loom including a weft-insertion control apparatus, according to a first embodiment of the present invention;

FIG. 2 is a perspective view illustrating a relation between dents and an inlet sensor in the weft-insertion apparatus of the air-jet loom according to the first embodiment; and

FIG. 3 is a characteristic graph illustrating various timing of a weft yarn in the air-jet loom according to the first embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0009] The following will describe a weft-insertion control apparatus of an air-jet loom according to an embodiment of the present invention in detail with reference to the accompanying drawings. In the drawings, identical reference numerals are provided to identical components.

First embodiment

[0010] The following will describe a configuration of a weft-insertion apparatus 100 of an air-jet loom including a weft-insertion control apparatus, according to the first embodiment, with reference to FIGS. 1 to 3.

[0011] FIG. 1 is a block diagram illustrating the weft-insertion apparatus 100 of the air-jet loom including the weft-insertion control apparatus, according to the first

embodiment. FIG. 2 is a perspective view illustrating a relation between a reed 150 and an inlet sensor 180 in the weft-insertion apparatus 100 of the air-jet loom according to the first embodiment. FIG. 3 is a characteristic graph illustrating various timing of a weft yarn Y in the air-jet loom according to the first embodiment.

[0012] In the description, regarding a weft-insertion direction in which a weft yarn is inserted through a shed of warp yarns and directed, a side from which the weft yarn is inserted is referred to as an upstream side whereas a side to which the weft yarn is directed is referred to as a downstream side. Regarding a direction in which compressed air flows, a side from which the compressed air flows is referred to as an upstream side whereas a side to which the compressed airflows is referred to as a downstream side.

[Configuration of weft-insertion apparatus 100]

[0013] The weft-insertion apparatus 100 illustrated in FIG. 1 mainly includes a control device 110, a main system M, a sub-system S, the reed 150, an end sensor 170, the inlet sensor 180, and a cutter 190. The weft-insertion apparatus 100 illustrated in FIG. 1 includes a single main system M as an example, but may include two or more main systems M, instead.

[0014] The control device 110 includes a CPU 111 and a function panel 112. The CPU 111 performs various control over the weft-insertion apparatus 100. The function panel 112 serves as an informing device that gives various information. The function panel 112 includes a display function and an input function. The display function displays various information based on instructions from the CPU 111, and the input function transmits the input information to the CPU 111. The control device 110 serves as a weft-insertion control apparatus together with the inlet sensor 180 that will be described later.

[0015] The main system M includes a yarn supply portion 120, a weft-yarn length-measuring and pooling device 130, and a weft insertion nozzle 140.

[0016] The yarn supply portion 120 is disposed upstream of the weft-yarn length-measuring and pooling device 130 and holds a weft yarn Y. The weft yarn Y held by the yarn supply portion 120 is drawn by the weft-yarn length-measuring and pooling device 130.

[0017] The weft-yarn length-measuring and pooling device 130 includes a weft-yarn pooling drum 131, a weft-yarn unwinding pin 132, and a balloon sensor 133. The weft-yarn pooling drum 131 draws the weft yarn Y held by the yarn supply portion 120, and winds and pools the weft yarn Y therearound. The weft-yarn unwinding pin 132 and the balloon sensor 133 are disposed in the periphery of the weft-yarn pooling drum 131. The balloon sensor 133 is disposed in line with the weft-yarn unwinding pin 132 on a side of the weft-yarn pooling drum 131 on which the weft yarn Y is unwound.

[0018] The weft-yarn unwinding pin 132 unwinds the weft yarn Y pooled around the weft-yarn pooling drum

131, at a loom rotational angle that is preset in the control device 110. Conventionally, weft-insertion start timing has been calculated based on a weft-yarn unwinding signal detected by the balloon sensor 133. On the other hand, the weft-insertion start timing according to the first embodiment is timing of a leading end of the weft yarn Y to arrive at an inlet 153in of a weft yarn passage 153 (see FIGS. 1 and 2), i.e., an inlet arrival timing T_{in} (see FIG. 3). Timing of the weft yarn Y to be unwound by the weft-yarn unwinding pin 132 is controlled according to the inlet arrival timing T_{in} .

[0019] The balloon sensor 133 detects the weft yarn Y to be unwound from the weft-yarn pooling drum 131 during weft insertion and sends the weft-yarn unwinding signal to the control device 110. When the control device 110 receives the weft-yarn unwinding signal a predetermined number of times, the control device 110 controls the weft-yarn unwinding pin 132 so that the weft-yarn unwinding pin 132 is locked. The locked weft-yarn unwinding pin 132 locks the weft yarn Y unwound from the weft-yarn pooling drum 131, which ends the weft insertion of the weft yarn Y.

[0020] Operation timing of the weft-yarn unwinding pin 132 to lock the weft yarn Y is set according to a number of windings of the weft yarn Y of a length corresponding to a weaving width TL to be pooled around the weft-yarn pooling drum 131.

[0021] The first embodiment illustrates a case where the length of the weft yarn Y wound around the weft-yarn pooling drum 131 three times corresponds to the weaving width TL. The control device 110 is set to send an operational signal to lock the weft yarn Y to the weft-yarn unwinding pin 132 when the control device 110 receives the weft-yarn unwinding signals from the balloon sensor 133 three times. A weft-yarn detection signal from the balloon sensor 133 corresponds to an unwinding signal to unwind the weft yarn Y from the weft-yarn pooling drum 131, which is recognized by the control device 110 as unwinding timing or releasing timing of the weft yarn based on a loom rotational angle signal obtained from an encoder.

[0022] The weft insertion nozzle 140 includes a tandem nozzle 141 and a main nozzle 142. The tandem nozzle 141 draws the weft yarn Y from the weft-yarn pooling drum 131 by injecting the compressed air. A brake 147 is disposed upstream of the tandem nozzle 141, and applies a brake on the traveling weft yarn Y before the weft insertion ends. The main nozzle 142 inserts the weft yarn Y through the weft yarn passage 153 of the reed 150 by injecting the compressed air.

[0023] The main nozzle 142 is connected to a main valve 146 through a pipe P146. The main valve 146 is connected to a main tank 144 through a pipe P144. The tandem nozzle 141 is connected to a tandem valve 145 through a pipe P145. The tandem valve 145 is connected to the main tank 144 through the pipe P144. The main tank 144 is common to the tandem valve 145 and the main valve 146.

[0024] The compressed air supplied from an air compressor 10 installed at a fabric weaving factory is controlled at a set pressure by a main regulator 143 and is supplied to the main tank 144 through a pipe P143. A pressure sensor 144s detects a pressure of the compressed air stored in the main tank 144, and a detection result is transmitted to the control device 110.

[0025] The reed 150 is disposed downstream of the weft insertion nozzle 140 of the main system M. The reed 150 includes a plurality of dents 150a to 150n as illustrated in FIG. 2. The plurality of dents 150a to 150n is configured so that each of the warp yarns passes through a space between any two of the dents 150a to 150n adjacent to each other. The weft yarn passage 153 is formed by recessed portions of the dents 150a to 150n at near centers of the dents 150a to 150n in an up-down direction. The weft yarn passage 153 allows the weft yarn Y to travel therethrough. A plurality of nozzles serving as sub-nozzles 160 (hereinafter referred to as a plurality of groups of sub-nozzles 160), the end sensor 170, and the inlet sensor 180 are disposed along the weft yarn passage 153 of the reed 150. The cutter 190 is disposed near the inlet 153in of the weft yarn passage 153 of the reed 150. After the weft yarn Y is beaten, the cutter 190 cuts off the weft yarn Y to separate the weft yarn Y from the woven fabric. The inlet 153in of the weft yarn passage 153 refers to a portion including and around the recessed portion formed at about a center of the dent 150a that is the closest dent to the main nozzle 142.

[0026] The sub-system S includes the plurality of groups of sub-nozzles 160 disposed along the weft yarn passage 153 of the reed 150 through which the weft yarn Y travels by injecting air. The plurality of groups of sub-nozzles 160 is divided into, for example, six groups of sub-nozzles 160A to 160F each of which includes four sub-nozzles.

[0027] The plurality of groups of sub-nozzles 160A to 160F is connected to a plurality of sub-valves 165 via a plurality of groups of pipes 166, respectively. The plurality of groups of pipes 166 includes six groups of pipes 166A to 166F, corresponding to the six groups of sub-nozzles 160A to 160F, respectively, and each group of pipes 166A to 166F includes four pipes. The plurality of sub-valves 165 includes sub-valves 165A to 165F so as to correspond to the plurality of groups of pipes 166A to 166F, respectively, and is connected to a common sub-tank 164.

[0028] The sub tank 164 is connected, via a pipe 163, to a sub regulator 162. The sub regulator 162 is connected, via a pipe 161, to the pipe P143 interposed between the main regulator 143 and the main tank 144. Therefore, the sub tank 164 stores the compressed air of a set pressure controlled by the sub regulator 162, via the main regulator 143. A pressure sensor 164s detects a pressure of the compressed air stored in the sub tank 164, and a detection result is transmitted to the control device 110.

[0029] The end sensor 170 is disposed on a downstream side of the weft yarn passage 153, at a downward

selvage that is located more downward than a downward end of the weaving width TL. The end sensor 170 optically detects the weft yarn Y that arrives in a detection range 170d (see FIG. 2). In order to detect the weft yarn Y that arrives in the detection range 170d, the end sensor 170 may include a light-emitting device, a light-receiving device, and a light-guiding device. When the end sensor 170 detects the weft yarn Y, the end sensor 170 generates a weft-yarn detection signal and transmits the weft-yarn detection signal to the control device 110. The weft-yarn detection signal from the end sensor 170 corresponds to an end arrival signal of the weft yarn Y, which is recognized by the control device 110 as an end arrival timing Tend (see FIG. 3).

[0030] A detection range 180d of the inlet sensor 180 includes the inlet 153in of the weft yarn passage 153 as illustrated in FIG. 2 so as to optically detect the weft yarn Y that arrives at the inlet 153in of the weft yarn passage 153. In order to detect the weft yarn Y that arrives in the detection range 180d, the inlet sensor 180 may include a light-emitting device, a light-receiving device, and a light-guiding device. When inlet sensor 180 detects the leading end of the weft yarn Y, the inlet sensor 180 generates a weft-yarn detection signal, and transmits the weft-yarn detection signal to the control device 110. The weft-yarn detection signal from the inlet sensor 180 corresponds to an inlet arrival signal of the weft yarn Y, which is recognized by the control device 110 as the inlet arrival timing Tin of the leading end of the weft yarn Y. A sensor disposed in a range of the weaving width may be used as the inlet sensor 180, i.e., the inlet sensor 180 may be disposed in a range of the weaving width TL.

[Weft-insertion control]

[0031] The following will describe a weft-insertion control performed by the weft-insertion control apparatus of the air-jet loom. The weft-insertion control apparatus of the air-jet loom includes the inlet sensor 180 configured to detect the inlet arrival timing Tin of the leading end of the weft yarn Y to arrive at the inlet 153in of the weft yarn passage 153, and the control device 110 configured to control the weft-insertion conditions for inserting the weft yarn Y based on the inlet arrival timing Tin.

[0032] The weft yarn Y pooled around the weft-yarn pooling drum 131 is unwound by the weft-yarn unwinding pin 132, and is drawn from the weft-yarn pooling drum 131 by injecting air from the tandem nozzle 141. The weft yarn Y drawn from the weft-yarn pooling drum 131 is inserted into the weft yarn passage 153 by injecting the air from the main nozzle 142. The weft yarn Y inserted in the weft yarn passage 153 travels through the weft yarn passage 153 by injecting the air from the plurality of groups of sub-nozzles 160.

[0033] The inlet sensor 180 optically detects the weft yarn Y that arrives at the inlet 153in of the weft yarn passage 153, and generates the weft-yarn detection signal to transmit the weft-yarn detection signal to the control

device 110. The control device 110 receives the weft-yarn detection signal generated by the inlet sensor 180 and recognizes the signal as the inlet arrival timing T_{in} that is the timing of the leading end of the weft yarn Y to arrive at the inlet 153in of the weft yarn passage 153. Then, the control device 110 controls the weft-insertion conditions for inserting the weft yarn Y based on the inlet arrival timing T_{in} , as described below.

[0034] As a way of controlling the weft-insertion conditions, the control device 110 controls the releasing timing of the weft-yarn unwinding pin 132 to release the weft yarn Y pooled by the weft-yarn length-measuring and pooling device 130. For example, when the inlet arrival timing T_{in} is earlier than a predetermined target value T_{ref} , the control device 110 controls the weft-yarn unwinding pin 132 so that the releasing timing of the weft yarn Y is delayed. As a result, the inlet arrival timing T_{in} is delayed to approach the target value T_{ref} , which reduces a likelihood of a failure in the weft insertion caused by the weft yarn Y being caught by some of the warp yarns that have not been fully raised yet. In this way, the weft yarn Y is suitably inserted.

[0035] When the inlet arrival timing T_{in} is later than the predetermined target value T_{ref} , the control device 110 controls the weft-yarn unwinding pin 132 so that the releasing timing of the weft yarn Y is advanced. As a result, the inlet arrival timing T_{in} is advanced to approach the target value T_{ref} , which gives sufficient time for the weft insertion performed by the weft insertion nozzle 140 and the groups of sub-nozzles 160. In this way, the weft yarn Y is suitably inserted.

[0036] As a way of controlling the weft-insertion conditions, the control device 110 controls air-injection start timing of at least one of the main nozzle 142 and the plurality of groups of sub-nozzles 160.

[0037] For example, when the inlet arrival timing T_{in} is earlier than the predetermined target value T_{ref} , the control device 110 controls the air-injection start timing of the main nozzle 142 so that the air-injection start timing is delayed. As a result, the inlet arrival timing T_{in} is delayed to approach the target value T_{ref} . In this way, the weft yarn Y is suitably inserted. On the other hand, the control device 110 controls the air-injection start timing of the plurality of groups of sub-nozzles 160 so that the air-injection start timing is advanced in response to the inlet arrival timing T_{in} earlier than the target value T_{ref} . This reduces a difference in timing between the timing of the leading end of the weft yarn Y to arrive at the groups of sub-nozzles 160 and the timing of the groups of sub-nozzles 160 to start injection.

[0038] When the inlet arrival timing T_{in} is later than the predetermined target value T_{ref} , the control device 110 controls the air-injection start timing of the main nozzle 142 so that the air-injection start timing is advanced. As a result, the inlet arrival timing T_{in} is advanced to approach the target value T_{ref} . In this way, the weft yarn Y is suitably inserted. On the other hand, the control device 110 controls the air-injection start timing of the plurality

of groups of sub-nozzles 160 so that the air-injection start timing is delayed in response to the inlet arrival timing T_{in} later than the target value T_{ref} . This reduces a difference in timing between the timing of the leading end of the weft yarn Y to arrive at the groups of sub-nozzles 160 and the timing of the groups of sub-nozzles 160 to start injection.

[0039] Controlling the weft-insertion conditions as described above reduces excessive air injection, which also reduces power consumption.

[0040] The weft yarn Y is inserted by passing through an area of the shed of the warp yarns (not illustrated) in the weft yarn passage 153. As a way of controlling the weft-insertion conditions, the control device 110 may detect an opening amount of the shed of the warp yarns to determine the target value T_{ref} of the inlet arrival timing based on the detected opening amount of the shed. The control device 110 determines the target value T_{ref} of the inlet arrival timing so that a relation between the detected opening amount of the shed of the warp yarns and the inlet arrival timing of the weft yarn Y are suitably maintained.

[0041] For example, the control device 110 may determine the target value T_{ref} of the inlet arrival timing of the weft yarn Y so that the opening amount of the shed of the warp yarns is aimed to a smallest possible value that allows the weft yarn Y to pass without failure, before the opening amount of the shed of the warp yarns reaches a maximum value. In this way, the weft yarn Y is suitably, efficiently, and stably inserted. A dedicated warp-yarn sensor may be prepared separately from the inlet sensor 180. However, the inlet sensor 180 is capable of detecting the opening amount of the shed of the warp yarns, in addition to detecting the weft yarn Y. For example, when a shedding motion causes the warp yarn to be out of the detection range of the inlet sensor 180, a light reflected against the warp yarn reduces and thus the detection signal fluctuates. Based on the above fluctuated timing of the detection signal, timing of the opening amount of the shed of the warp yarns suitable for the weft insertion may be calculated.

[Advantageous effects obtained by embodiment]

[0042] The above-described embodiment of the present invention offers the following advantageous effects.

[0043] The air-jet loom with the weft-insertion control apparatus according to the present invention is configured to insert the weft yarn Y through the weft yarn passage 153 by injecting the air from the main nozzle 142 and the groups of sub-nozzles 160. The weft-insertion control apparatus is configured to control weft insertion of the air-jet loom. The weft-insertion control apparatus includes the inlet sensor 180 configured to detect the inlet arrival timing of the leading end of the weft yarn Y to arrive at the inlet of the weft yarn passage 153 where the detection range 180d includes the inlet 153in of the

weft yarn passage 153, and the control device 110 configured to control the weft-insertion conditions for inserting the weft yarn Y based on the inlet arrival timing T_{in} . With the above-described weft-insertion control apparatus, the inlet arrival timing T_{in} of the leading end of the weft yarn Y to arrive at the inlet of the weft yarn passage 153 is accurately detected and the weft-insertion conditions are suitably controlled.

[0044] In the above-described weft-insertion control apparatus, the control device 110 controls the releasing timing of the weft yarn Y pooled by the weft-yarn length-measuring and pooling device 130 to be released, as a way of controlling the weft-insertion conditions. Controlling the weft-insertion conditions as described above allows the inlet arrival timing T_{in} of the weft yarn Y to approach the target value T_{ref} , by which the weft yarn Y is suitably inserted.

[0045] In the above-described weft-insertion control apparatus, the control device 110 controls air-injection start timing of at least one of the main nozzle 142 and the groups of sub-nozzles 160, as a way of controlling the weft-insertion conditions. Controlling the weft-insertion conditions as described above allows the inlet arrival timing T_{in} of the weft yarn Y to approach the target value T_{ref} , by which the weft yarn Y is suitably inserted. Controlling the weft-insertion conditions as described above allows an appropriate control of air-injection timing and reduces excessive air injection, which also reduces energy consumption.

[0046] The above-described weft-insertion control apparatus includes the warp-yarn sensor configured to detect the opening amount of the shed of the warp yarns at the inlet 153in of the weft yarn passage 153 where the weft yarn Y is inserted through the weft yarn passage 153 via the shed of the warp yarns. The control device 110 determines the target value T_{ref} of the inlet arrival timing based on the opening amount of the shed of the warp yarns detected by the warp-yarn sensor.

[0047] The control device 110 determines the target value T_{ref} of the inlet arrival timing based on the opening amount of the shed of the warp yarns so that the relation between the opening amount of the shed of the warp yarns and the inlet arrival timing T_{in} of the weft yarn Y are suitably maintained.

[0048] By determining the target value T_{ref} of the inlet arrival timing of the weft yarn Y in this way, the weft yarn Y is suitably, efficiently, and stably inserted. This also increases time for opening the shed of the warp yarns suitably for the weft insertion, which may improve productivity.

[0049] In the above-described weft-insertion control apparatus, the inlet sensor 180 serves as the warp-yarn sensor, which allows the opening amount of the shed of the warp yarns to be calculated. As a result, a dedicated warp-yarn sensor does not need to be prepared, by which the target value T_{ref} of the inlet arrival timing of the weft yarn Y is determined without changing equipment such as adding a sensor.

[0050] There is provided an air-jet loom with a weft-insertion control apparatus (110, 180). The air-jet loom is configured to insert a weft yarn (Y) through a weft yarn passage (153) by injecting air from a main nozzle (142) and a sub-nozzle (160, 160A to 160F). The weft-insertion control apparatus (110, 180) is configured to control weft insertion of the air-jet loom. The weft-insertion control apparatus (110, 180) includes an inlet sensor (180) configured to detect inlet arrival timing (T_{in}) of a leading end of the weft yarn (Y) to arrive at an inlet (153in) of the weft yarn passage (153), and a control device (110) configured to control a weft-insertion condition for inserting the weft yarn (Y) based on the inlet arrival timing (T_{in}). A detection range (180d) of the inlet sensor (180) includes the inlet (153in) of the weft yarn passage (153).

Claims

1. An air-jet loom with a weft-insertion control apparatus (110, 180), wherein the air-jet loom is configured to insert a weft yarn (Y) through a weft yarn passage (153) by injecting air from a main nozzle (142) and a sub-nozzle (160, 160A to 160F), wherein the weft-insertion control apparatus (110, 180) is configured to control weft insertion of the air-jet loom, **characterized in that** the weft-insertion control apparatus (110, 180) includes:

an inlet sensor (180) configured to detect inlet arrival timing (T_{in}) of a leading end of the weft yarn (Y) to arrive at an inlet (153in) of the weft yarn passage (153), wherein a detection range (180d) of the inlet sensor (180) includes the inlet (153in) of the weft yarn passage (153); and
a control device (110) configured to control a weft-insertion condition for inserting the weft yarn (Y) based on the inlet arrival timing (T_{in}).

2. The air-jet loom according to claim 1, **characterized in that** the control device (110) controls releasing timing of the weft yarn (Y) pooled by a weft-yarn length-measuring and pooling device (130) to be released, as a way of controlling the weft-insertion condition.

3. The air-jet loom according to claim 1 or 2, **characterized in that** the control device (110) controls air-injection start timing of at least one of the main nozzle (142) and the sub-nozzle (160, 160A to 160F) to start air injection, as a way of controlling the weft-insertion condition.

4. The air-jet loom according to any one of claims 1 to 3, **characterized in that**

the weft-insertion control apparatus (110, 180)

includes a warp-yarn sensor configured to detect an opening amount of a shed of warp yarns at the inlet (153in) of the weft yarn passage (153), and
the control device (110) determines a target value (Tref) of the inlet arrival timing (Tin) based on the opening amount of the shed of the warp yarns detected by the warp-yarn sensor.

5. The air-jet loom according to claim 4, **characterized in that** 10
the inlet sensor (180) also serves as the warp-yarn sensor.

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FIG.1

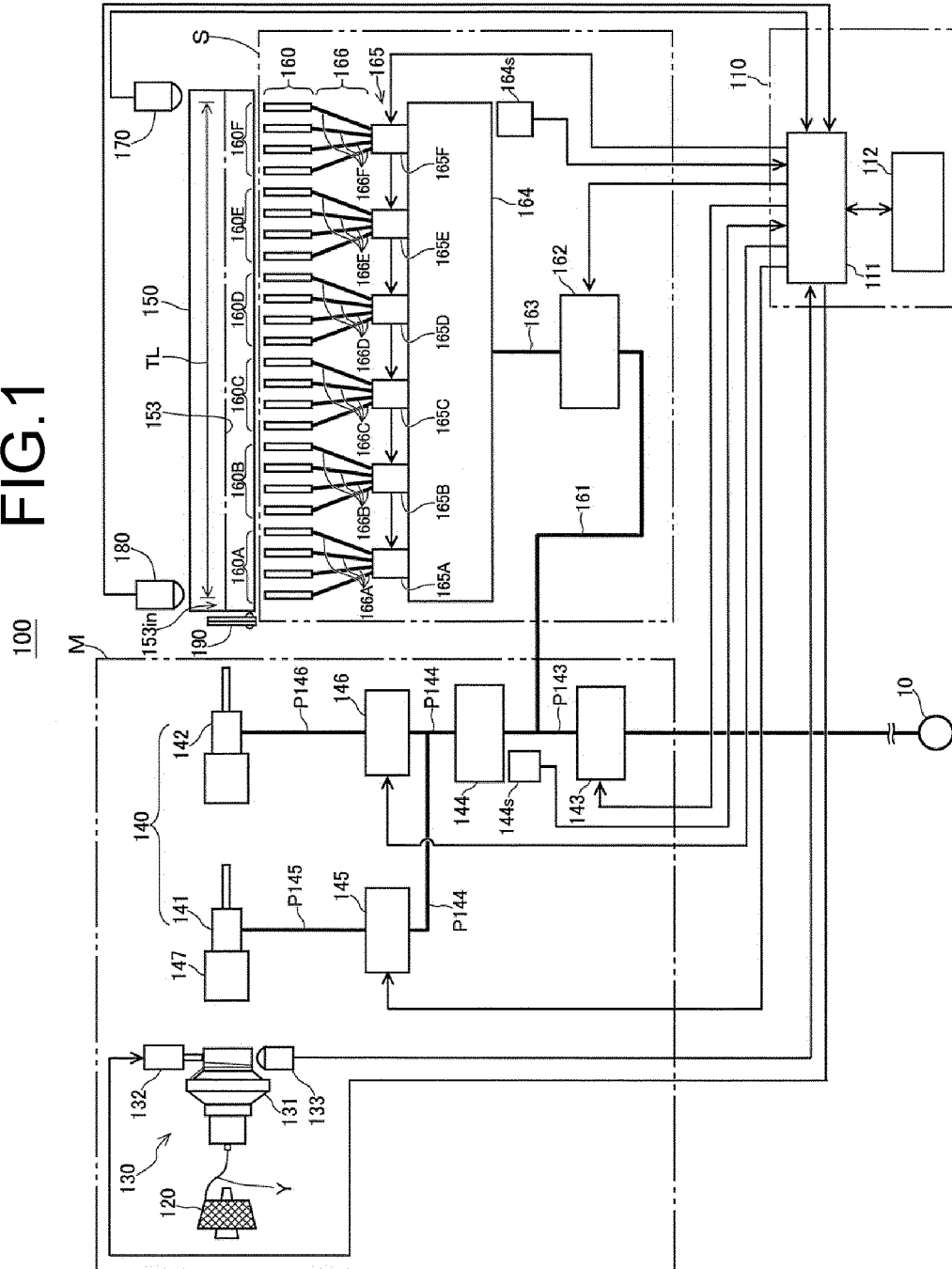


FIG. 2

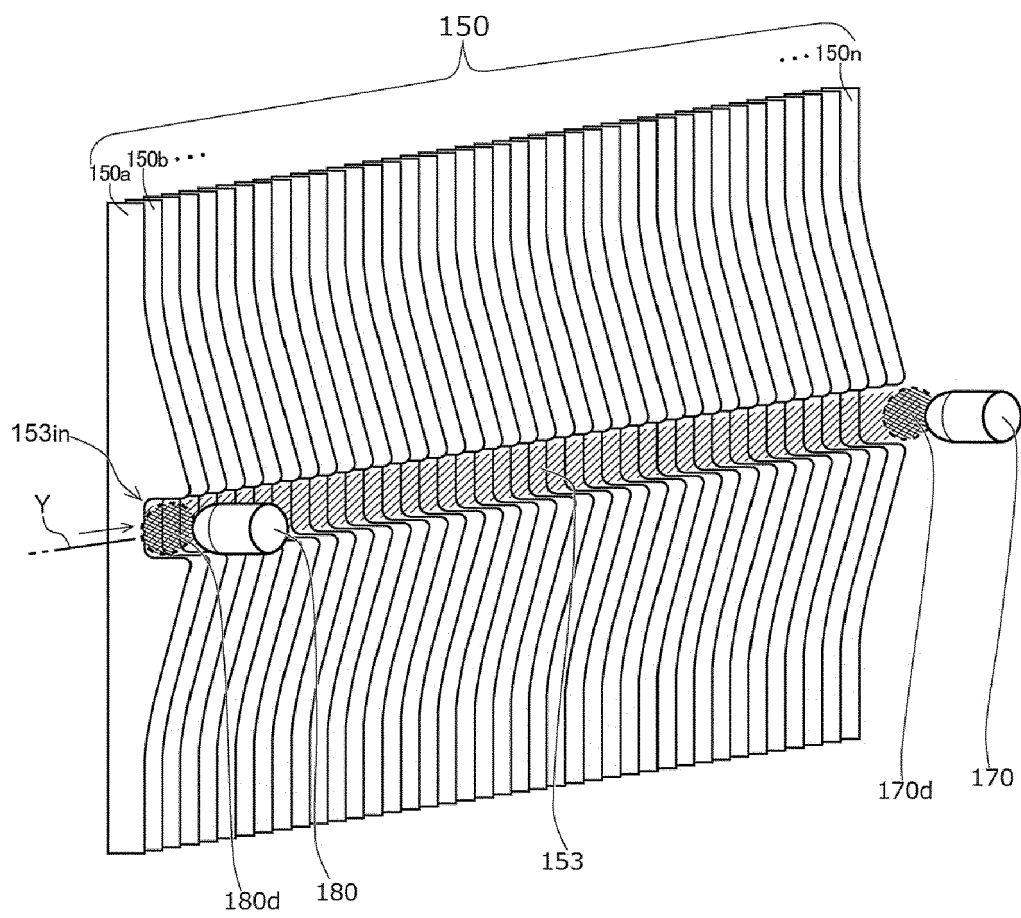
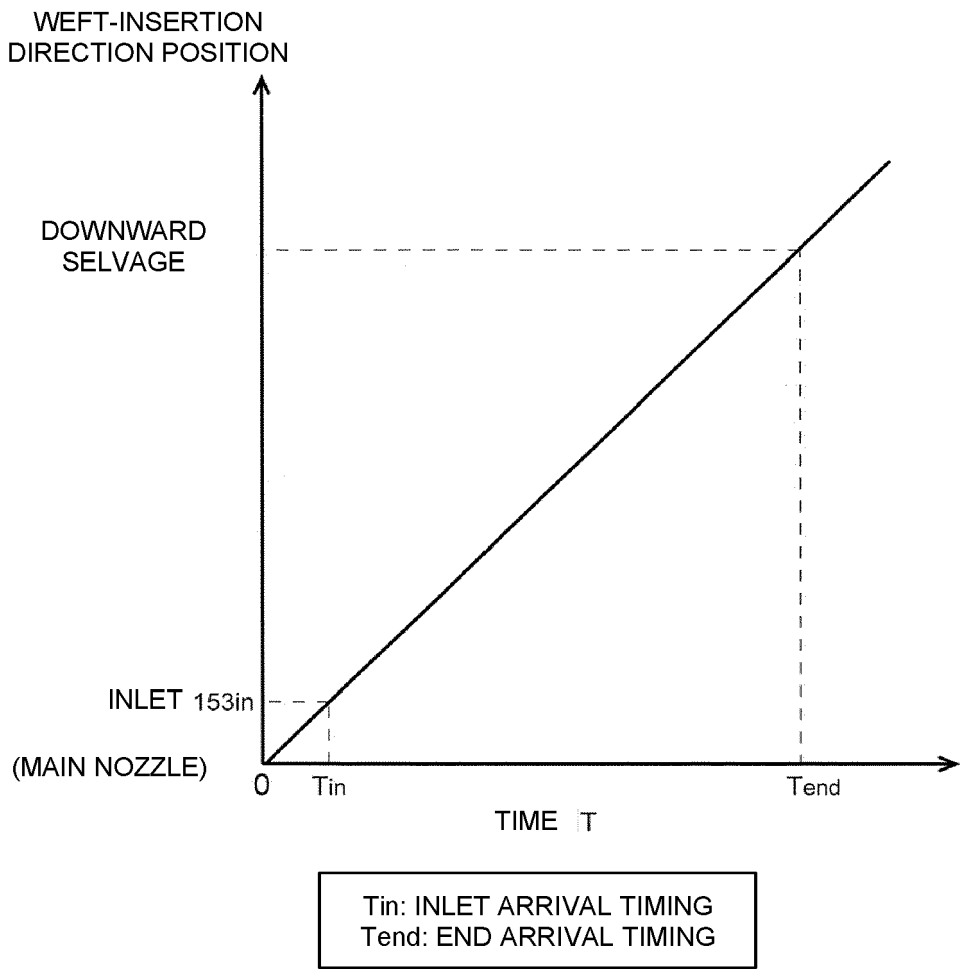


FIG. 3





EUROPEAN SEARCH REPORT

Application Number

EP 21 20 6611

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 144 422 A2 (TOYOTA JIDOSHOKKI KK [JP]) 22 March 2017 (2017-03-22) * paragraph [0013] - paragraph [0020] * * paragraph [0049] * * figures 1-6 *	1-5	INV. D03D47/36 D03D47/30
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Place of search Munich		Date of completion of the search 7 April 2022	Examiner Hausding, Jan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
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