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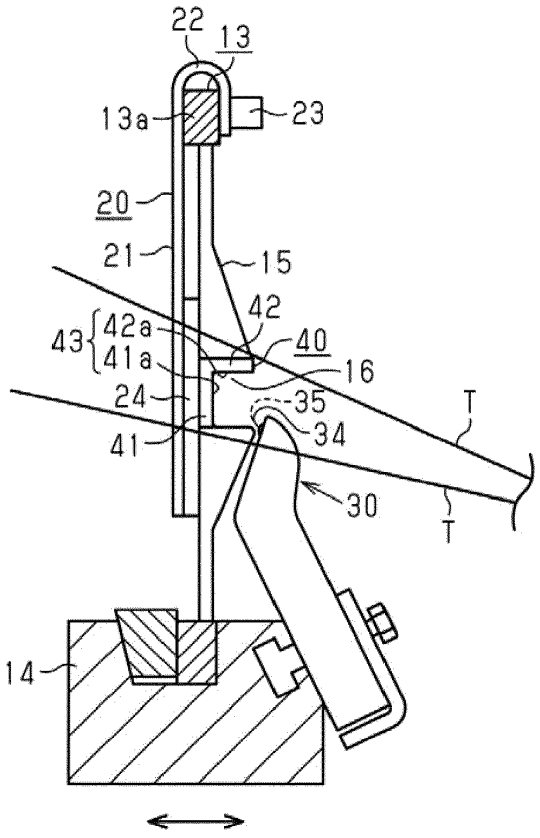
(54) WEFT YARN SENSING DEVICE OF AN AIR JET LOOM

(57) There is provided a weft yarn sensing device of an air jet loom (11) in which a weft yarn (Y) is inserted into a weft insertion passage (16) formed by recessed portions (15a) of reed wires (15) arranged in a weft insertion direction. The weft yarn sensing device includes a weft yarn sensor (30) including a light-emitting portion (34) that emits light into the weft insertion passage (16) and a light-receiving portion (35) located that faces toward the weft insertion passage (16). The device further includes at least one contrast adjuster (40) disposed between any two of the reed wires (15) that are adjacent to each other in the weft insertion direction. The contrast adjuster (40) has a width (D) in the weft insertion direction that is equal to or greater than a distance (K) between the two reed wires (15) adjacent to each other in the weft insertion direction.

FIG. 2



EP 3 382 076 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a weft yarn sensing device of an air jet loom in which weft yarns are inserted into a weft insertion passage that is formed by a plurality of reed wires of a reed of the air jet loom.

[0002] Generally, an air jet loom has an optical weft yarn sensing device for determining whether insertion of a weft yarn is successfully performed or not. The weft yarn sensing device is mounted on a slay of the air jet loom and has a light-emitting device and a light-receiving device. The light-emitting device emits light toward the inserted weft yarn traveling in the weft insertion passage. The light emitted by the light-emitting device strikes and is reflected from the weft yarn and then received by the light-receiving device. For example, when a weft yarn enters the light-emitting area of the light-emitting device, the light-receiving device converts the received light into an electric signal and the electric signal is sent to the controller of the air jet loom. When no such electric signal is sent to the controller, that is, when the weft yarn fails to reach the light-emitting area of the light-emitting device, the controller of the air jet loom determines a weft insertion failure and stops or suspends the operation of the air jet loom.

[0003] The optical weft yarn sensing devices such as the one described above have a problem of varied sensing accuracy that is attributable to the type of the weft yarn to be inserted. For example, there occurs a difference in the quantity of the reflected light between a thin black weft yarn and a thick white weft yarn. The quantity of the light reflected from the thin black weft yarn is small and hence hard to sense compared with the reflected light quantity from the thick white weft yarn. Such influence on the sensing accuracy caused by the difference in the received light quantity among the weft yarns of different types may be reduced, for example, by a mirror (or the contrast adjuster) located rearward of a weft yarn traveling in a weft insertion passage, as disclosed in Japanese Patent Application Publication No. H08-127945.

[0004] According to the Publication No. H08-127945, the mirror for enhancing the accuracy of sensing weft yarns is mounted to a mounting member which is inserted in a space created by removing some reed wires from the reed. In the weft yarn sensing device of such configuration, the mounting member and the mirror disposed between the reed wires are vibrated by the vibration of the reed caused during its beating operation. The vibration of the mirror may affect the sensing accuracy of the weft yarn sensing device and an erroneous sensing may result.

[0005] The present invention, which has been made in view of the circumstances above, is directed to providing a weft yarn sensing device of an air jet loom that senses weft yarns with high accuracy.

SUMMARY OF THE INVENTION

[0006] In accordance with an aspect of the present invention, a weft yarn sensing device of an air jet loom is provided. The air jet loom has a reed including a plurality of reed wires arranged side by side in a weft insertion direction. Each reed wire has a recessed portion so that a weft insertion passage is formed by the recessed portions of the reed wires and a weft yarn is inserted into the weft insertion passage by air jets. The weft yarn sensing device includes a weft yarn sensor including a light-emitting portion that emits light into the weft insertion passage and a light-receiving portion that is located so as to face toward the weft insertion passage. The weft yarn sensing device comprises at least one contrast adjuster that is disposed between any two of the reed wires that are adjacent to each other in the weft insertion direction. The contrast adjuster has a dimension in the weft insertion direction that is equal to or greater than a distance between the two reed wires that are adjacent to each other in the weft insertion direction.

[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. 1A is a fragmentary schematic perspective view of an air jet loom according to an embodiment of the present invention as viewed from the front side of the air jet loom, showing a positional relationship between a reed and a weft yarn sensor of the air jet loom;

FIG. 1B is an enlarged perspective view of a part of the air jet loom of FIG. 1 at which a contrast adjuster is mounted;

FIG. 2 is a partially sectional side view showing a positional relationship between reed wires and the weft yarn sensor;

FIG. 3 is a perspective view showing an anti-vibration member and the contrast adjuster;

FIG. 4 is an enlarged front view illustrating reed wires and the contrast adjuster;

FIG. 5 is an enlarged side view showing a positional relationship between the contrast adjuster and the weft yarn sensor; and

FIG. 6 is an enlarged perspective view showing another embodiment of the present invention which includes a plurality of contrast adjusters.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0009] The following will describe a weft yarn sensing device of an air jet loom according to an embodiment of the present invention with reference to FIGS. 1 to 5.

[0010] Referring to FIG. 1A schematically showing an air jet loom 11 as viewed from the front side thereof, a main nozzle that injects air for weft insertion (not shown), a plurality of sub-nozzles 12 that injects air for weft insertion (only one sub-nozzle 12 is shown in the drawing), and a reed 13 are fixed to a slay 14 of the air jet loom 11. Each sub-nozzle 12 is fixed to the slay 14 via a support block 17 in such a manner that the sub-nozzle 12 is re-locatable on the slay 14 via the support block 17 which is re-locatable along the slay 14. The sub-nozzles 12 are adapted to move into and out of a shed of warp yarns T through the rows of the warp yarns T with the swinging motion of the slay 14.

[0011] The reed 13 includes a plurality of reed wires 15 that is held by a holding member 13a extending in a direction in which weft yarns are inserted. The reed wires 15 are arranged side by side in the weft yarn insertion direction along the holding member 13a. Each reed wire 15 has a recessed portion 15a that is recessed from the front face of the reed wire 15.

[0012] Referring to FIG. 1B, each reed wire 15 has surfaces that form the recessed portion 15a. Specifically, each recessed portion 15a is formed by a first passage-forming surface 15b, a second passage-forming surface 15c, and a third passage-forming surface 15d. The first passage-forming surface 15b corresponds to the bottom surface of the recessed portion 15a as viewed in the weft insertion direction. The second passage-forming surface 15c and the third passage-forming surface 15d continue from the upper and lower ends of the first passage-forming surface 15b, respectively, and extend toward the front of the air jet loom 11. The recessed portions 15a of the reed wires 15 cooperate to form a weft insertion passage 16 through which an inserted weft yarn Y travels.

[0013] The air jet loom 11 further includes a vibration suppressing unit 20 that suppresses or mitigates vibration of the reed wires 15.

[0014] As shown in FIGS. 2 and 3, the vibration suppressing unit 20 includes a mount portion 21 of a rectangular plate shape. The mount portion 21 of the vibration suppressing unit 20 is bent at one longitudinal or lengthwise end portion (the upper end portion) thereof to form a hook portion 22. The hook portion 22 is adapted to be hooked onto the holding member 13a of the reed 13 from above. Bolts 23 are threaded into the hook portion 22.

[0015] The vibration suppressing unit 20 further includes an anti-vibration member 24 that is fixed to the other longitudinal or lengthwise end portion (the lower end portion) of the mount portion 21. The anti-vibration member 24 is an elastic member made of a rubber or the like. The vibration suppressing unit 20 is mounted to the reed 13 by hooking the hook portion 22 of the vibration suppressing unit 20 onto the holding member 13a of the reed 13 so that the anti-vibration member 24 contacts from behind with the reed 13 or the rear surfaces of the reed wires 15 that are located at positions corresponding to the mount position of the vibration suppressing unit 20. Then, the anti-vibration member 24 is pressed against the rear surfaces of the reed wires 15 by tightening the bolts 23. That is, the vibration suppressing unit 20 is disposed in contact with the rear surfaces of the reed wires 15. Accordingly, the anti-vibration member 24 absorbs the vibration of the reed wires 15 of the reed 13 at the time of beating, thereby suppressing the vibration of the reed wires 15.

[0016] A weft yarn sensor 30 that senses an inserted weft yarn Y traveling in the weft insertion passage 16 is fixed to the slay 14. The weft yarn sensor 30 is positioned so that upper warp yarns and lower warp yarns that form a warp shed therebetween are located outside the sensing area of the weft yarn sensor 30. Herein, the warp yarns T that are raised above the recessed portions 15a of the reed wires 15 correspond to the upper warp yarns, while the warp yarns T lowered below the recessed portions 15a of the reed wires 15 correspond to the lower warp yarns.

[0017] As shown in FIGS. 2 and 5, the weft yarn sensor 30 has at the tip thereof a light-emitting portion 34 that includes a light-emitting diode, and a light-receiving portion 35 that includes a photo transistor and is located so as to face toward the weft insertion passage 16. The light-emitting portion 34 and the light-receiving portion 35 are electrically connected to a controller (not shown). The controller senses or determines the traveling condition of a weft yarn Y based on light-receiving signal sent from the light-receiving portion 35. Accordingly, the weft yarn sensor 30 constitutes the weft yarn sensing device of the present invention that determines whether the weft yarn Y is inserted successfully through the weft insertion passage 16 or not.

[0018] As shown in FIG. 1B, the weft yarn sensing device includes a contrast adjuster 40 that reduces the influence on the sensing of the weft yarns Y resulting from the color and thickness (or the yarn count) of a weft yarn Y to be inserted. The contrast adjuster 40 is integrated with the vibration suppressing unit 20 and disposed so that the contrast adjuster 40 (or the first passage-forming surface 15b of the contrast adjuster 40) is located rearward of the weft yarn Y traveling in the weft insertion passage 16. As shown in FIGS. 1B and 4, the contrast adjuster 40 is disposed between two of the reed wires 15 that are adjacent to each other in the weft insertion direction. The contrast adjuster 40 is of a white color.

[0019] As shown in FIGS. 3 and 4, the contrast adjuster 40 includes a main body portion 41 and a projecting portion 42. The main body portion 41 extends along the longitudinal or lengthwise direction of the reed wires 15. The

projecting portion 42 extends frontward of the reed wires 15 (or the air jet loom 11) from one longitudinal or lengthwise end (the upper end) of the main body portion 41. The contrast adjuster 40 is formed in an inverted L-shape as viewed in the weft insertion direction.

[0020] The main body portion 41 has a front surface 41a that faces frontward of the air jet loom 11 and is exposed to the weft insertion passage 16. The projecting portion 42 of the contrast adjuster 40 is formed so as to extend frontward of the reed wires 15 (or the air jet loom 11) from the upper end of the main body portion 41. The projecting portion 42 has a bottom surface 42a that extends frontward from the front surface 41a of the main body portion 41 and is also exposed to the weft insertion passage 16.

[0021] The contrast adjuster 40 has a reflecting portion 43 that reflects light emitted from the light-emitting portion 34 of the weft yarn sensor 30. The reflecting portion 43 consists of the front surface 41a of the main body portion 41 and the bottom surface 42a of the projecting portion 42 of the contrast adjuster 40. That is, the reflecting portion 43 is exposed to the weft insertion passage 16. The reflecting portion 43 is located above and rearward of the weft yarn sensor 30.

[0022] As shown in FIGS. 4 and 5, the reflecting portion 43 is formed so that the front surface 41a of the main body portion 41 is flush with the first passage-forming surface 15b of the recessed portion 15a, and the bottom surface 42a of the projecting portion 42 is flush with the second passage-forming surface 15c of the recessed portion 15a. Accordingly, the reflecting portion 43 is exposed to the weft insertion passage 16.

[0023] The contrast adjuster 40 has two side surfaces 40a having an inverted L-shape as viewed in the weft insertion direction. As show in in FIG. 5, the side surfaces 40a of the contrast adjuster 40 have depths F that are dimensions of the main body portion 41 and the projecting portion 42 measured in the longitudinal or the front-rear direction of the air jet loom 11. The contrast adjuster 40 also has a width D, which is the smallest dimension of the main body portion 41 as measured between the opposite side surfaces 40a. The width D of the contrast adjuster 40 is constant as a whole in the direction of the depth F.

[0024] Referring to FIG. 4, the width D of the contrast adjuster 40 is smaller than the depths F of the main body portion 41 and the projecting portion 42 of the contrast adjuster 40 and equal to or slightly greater than the distance K between any two of the reed wires 15 that are arranged adjacent to each other in the weft insertion direction, i.e., the distance K between the surfaces of the two adjacent reed wires 15 (or the side surfaces 40a) facing each other. With this configuration, when the contrast adjuster 40 is inserted between the two adjacent reed wires 15, the contrast adjuster 40 pushes the reed wires 15 away from each other, so that the side surfaces 40a of the contrast adjuster 40 are in pressure contact with the surfaces of the two adjacent reed wires 15 on the opposite sides of the contrast adjuster 40. Thus, the contrast adjuster 40 is held between the two reed wires 15.

[0025] The following will describe the operation of the weft yarn sensing device.

[0026] The weft yarn sensing device according to the present embodiment is configured such that the vibration of the reed 13 caused by the beating operation of the air jet loom 11 is prevented from being transmitted to the contrast adjuster 40 mounted on the reed 13. As illustrated in FIG. 5, the light-emitting portion 34 of the weft yarn sensor 30 emits a light into the weft insertion passage 16 and part of the light reflected by the inserted weft yarn Y or the recessed portion 15a of the reed wire 15 is received by the light-receiving portion 35 of the weft yarn sensor 30. In this way the weft yarn Y is sensed by the weft yarn sensor 30. Then, a detection signal is generated and output by the light-receiving portion 35. Based on the detection signal, the traveling condition of the weft yarn Y traveling in the weft insertion passage 16 is determined.

[0027] In the case of inserting a weft yarn Y of a black color, which has a low light reflectance value, the quantity of light reflected by the black weft yarn Y is small. Meanwhile, the quantity of the light reflected by the reflecting portion 43 of the contrast adjuster 40 is greater than that of the black weft yarn Y. Therefore, there exists a large relative difference in the quantity of the reflected light between the black weft yarn Y and the contrast adjuster 40. In this case, Y the weft yarn Y is sensed when the relative difference exceeds a specified threshold. In contrast, in the case of inserting a weft yarn Y of a white color having a high light reflectance value, the white weft yarn Y is sensed based on the quantity of the light reflected by the white weft yarn Y alone.

[0028] According to the above embodiment, the following effects are obtained.

(1) The width D of the contrast adjuster 40 is equal to or greater than the distance K between any two of the reed wires 15 that are adjacent to each other in the weft insertion direction, so that the contrast adjuster 40 is firmly held between the two reed wires 15. With this configuration, the contrast adjuster 40 is prevented from being vibrated during the beating operation of the air jet loom 11. As a result, sensing failure which may be caused by the vibrated contrast adjuster 40 is prevented and the weft yarn Y is sensed with high accuracy.

(2) The contrast adjuster 40 is not required depending on the color or the yarn count of the weft yarn Y. In that case, the contrast adjuster 40 is removed from the reed 13. That is, the contrast adjuster 40 is mounted to and dismounted from the reed 13 repeatedly as required. As described above, because the contrast adjuster 40 is adapted to be held between two reed wires 15 that are adjacent to each other in

the weft insertion direction, the surfaces of the reed wires 15 on the front side thereof, specifically, the first to third passage-forming surfaces 15b, 15c, 15d defining the recessed portions 15a will not get worn by the repeated mounting and dismounting of the contrast adjuster 40. As a result, the weft yarn Y traveling in the weft insertion passage 16 is protected against damage due to any wear of the reed wires 15.

(3) The contrast adjuster 40 is disposed so that the reflecting portion 43 (or the front surface 41a of the main body portion 41 and the bottom surface 42a of the projecting portion 42) is in flush with the first passage-forming surfaces 15b and the second passage-forming surfaces 15c of the recessed portions 15a of the reed wires 15. Therefore, the reflecting portion 43 and hence the contrast adjuster 40 itself does not hinder the traveling of the weft yarn Y through the weft insertion passage 16, and the reflecting portion 43 effectively reflects the emitted light. Furthermore, the arrangement of the contrast adjuster 40 and the reed wires 15 does not create any irregularities, such as a hollow, in the weft insertion passage 16. Therefore, the flow of air accompanying the insertion of the weft yarn Y is not hindered in the weft insertion passage 16.

(4) The contrast adjuster 40 is integrated with the vibration suppressing unit 20 that is mounted to the reed 13 for suppressing the vibration of the reed wires 15. In other words, the contrast adjuster 40 is held between any two adjacent reed wires 15 and also supported by the vibration suppressing unit 20. With this configuration, the contrast adjuster 40 is further prevented from being vibrated and, at the same time, the contrast adjuster 40 is prevented from coming off from the reed wires 15.

(5) The mounting work of the contrast adjuster 40 is facilitated because the vibration suppressing unit 20 and the contrast adjuster 40 that is integrated with the vibration suppressing unit 20 are mounted to the reed 13 at once.

(6) The contrast adjuster 40 is integrated with the vibration suppressing unit 20, which is an existing device provided in an air jet loom for preventing vibration of the reed wires 15. Therefore, no new components are required for mounting the contrast adjuster 40, and the presence of the newly added contrast adjuster 40 hardly affects the beating motion of the reed 13.

(7) The contrast adjuster 40 includes the main body portion 41 and the projecting portion 42 and has an inverted L-shape as viewed in the weft insertion direction. The reflecting portion 43 of the contrast adjuster 40 includes the front surface 41a of the main body portion 41 and the bottom surface 42a of the projecting portion 42 and is located above and rearward of the weft yarn sensor 30. Specifically, the front surface 41a and the bottom surface 42a are located at the destination of the emitted light. Therefore, light emitted from the light-emitting portion 34 of the weft yarn sensor 30 located below and frontward of the reflecting portion 43 is efficiently reflected by the reflecting portion 43, especially by the bottom surface 42a of the projecting portion 42.

(8) The weft yarn sensing device includes only a single contrast adjuster 40. Therefore, when the contrast adjuster 40 becomes necessary or unnecessary as a result of a change of the color or the yarn count of the weft yarn Y to be used, the mounting or dismounting work of the contrast adjuster 40 is completed at one time, which results in an easy mounting and dismounting work of the contrast adjuster 40.

(9) The weft yarn sensing device has only a single contrast adjuster 40. Therefore, the increase in the weight of the air jet loom 11 caused by adding the contrast adjuster 40 is kept minimum.

[0029] It is to be noted that the above embodiment may be modified as exemplified below.

[0030] A plurality of contrast adjusters 40 may be provided in the reed 13, as shown in FIG. 6. In this case, the contrast adjusters 40 are integrated with the anti-vibration member 24 of the vibration suppressing unit 20 so that the vibration suppressing unit 20 and the contrast adjusters 40 can be mounted to the reed 13 at one time. With the provision of the plural contrast adjusters 40, the reflection of the light emitted from the light-emitting portion 34 is reinforced.

[0031] The contrast adjuster 40 need not necessarily be integrated with the vibration suppressing unit 20. Alternatively, the contrast adjuster 40 may be mounted to the reed 13 by being held between two reed wires 15 adjacent to each other in the weft insertion direction. Furthermore, the holding of the contrast adjuster 40 by the reed wires 15 may be reinforced by providing an adhesive tape between the side surfaces 40a of the contrast adjuster 40 and the side surfaces of the reed wires 15 facing the side surfaces 40a.

[0032] The shape of the contrast adjuster 40 need not necessarily be an inverted L-shape as viewed in the weft insertion direction. For example, the contrast adjuster 40 may be provided by a rectangular main body portion such as 41 which has no projecting portion 42. Alternatively, the contrast adjuster 40 may have a U-shape as viewed in the weft insertion direction that conforms to the recessed portions 15a of the reed wires 15.

[0033] The width D of the contrast adjuster 40 may be the same as the distance K between any two of the reed wires 15 adjacent to each other in the weft insertion direction or otherwise may be greater than the width D

according to the above embodiment.

[0034] The color of the contrast adjuster 40 is not limited to white and may be changed in accordance with the color of the weft yarn Y to be inserted.

[0035] The reflecting portion 43 of the contrast adjuster 40 may be coated with an infrared reflective paint.

[0036] The reflecting portion 43 of the contrast adjuster 40 need not necessarily be in flush with the first passage-forming surfaces 15b and the second passage-forming surfaces 15c of the recessed portions 15a of the reed wires 15. The reflecting portion 43 may alternatively be located rearward of the first passage-forming surfaces 15b and the second passage-forming surfaces 15c.

[0037] There is provided a weft yarn sensing device of an air jet loom (11) in which a weft yarn (Y) is inserted into a weft insertion passage (16) formed by recessed portions (15a) of reed wires (15) arranged in a weft insertion direction. The weft yarn sensing device includes a weft yarn sensor (30) including a light-emitting portion (34) that emits light into the weft insertion passage (16) and a light-receiving portion (35) located that faces toward the weft insertion passage (16). The device further includes at least one contrast adjuster (40) disposed between any two of the reed wires (15) that are adjacent to each other in the weft insertion direction. The contrast adjuster (40) has a width (D) in the weft insertion direction that is equal to or greater than a distance (K) between the two reed wires (15) adjacent to each other in the weft insertion direction.

Claims

1. A weft yarn sensing device of an air jet loom (11), the air jet loom (11) having a reed (13) including a plurality of reed wires (15) arranged side by side in a weft insertion direction and each having a recessed portion (15a) so that a weft insertion passage (16) is formed by the recessed portions (15a) of the reed wires (15) and a weft yarn (Y) is inserted into the weft insertion passage (16) by air jets, the weft yarn sensing device comprising a weft yarn sensor (30) including a light-emitting portion (34) that emits light into the weft insertion passage (16) and a light-receiving portion (35) that is located so as to face toward the weft insertion passage (16), **characterized in that**
   the weft yarn sensing device comprises at least one contrast adjuster (40) disposed between any two of the reed wires (15) that are adjacent to each other in the weft insertion direction, and
   the contrast adjuster (40) has a width (D) in the weft insertion direction that is equal to or greater than a distance (K) between the two reed wires (15) that are adjacent to each other in the weft insertion direction.

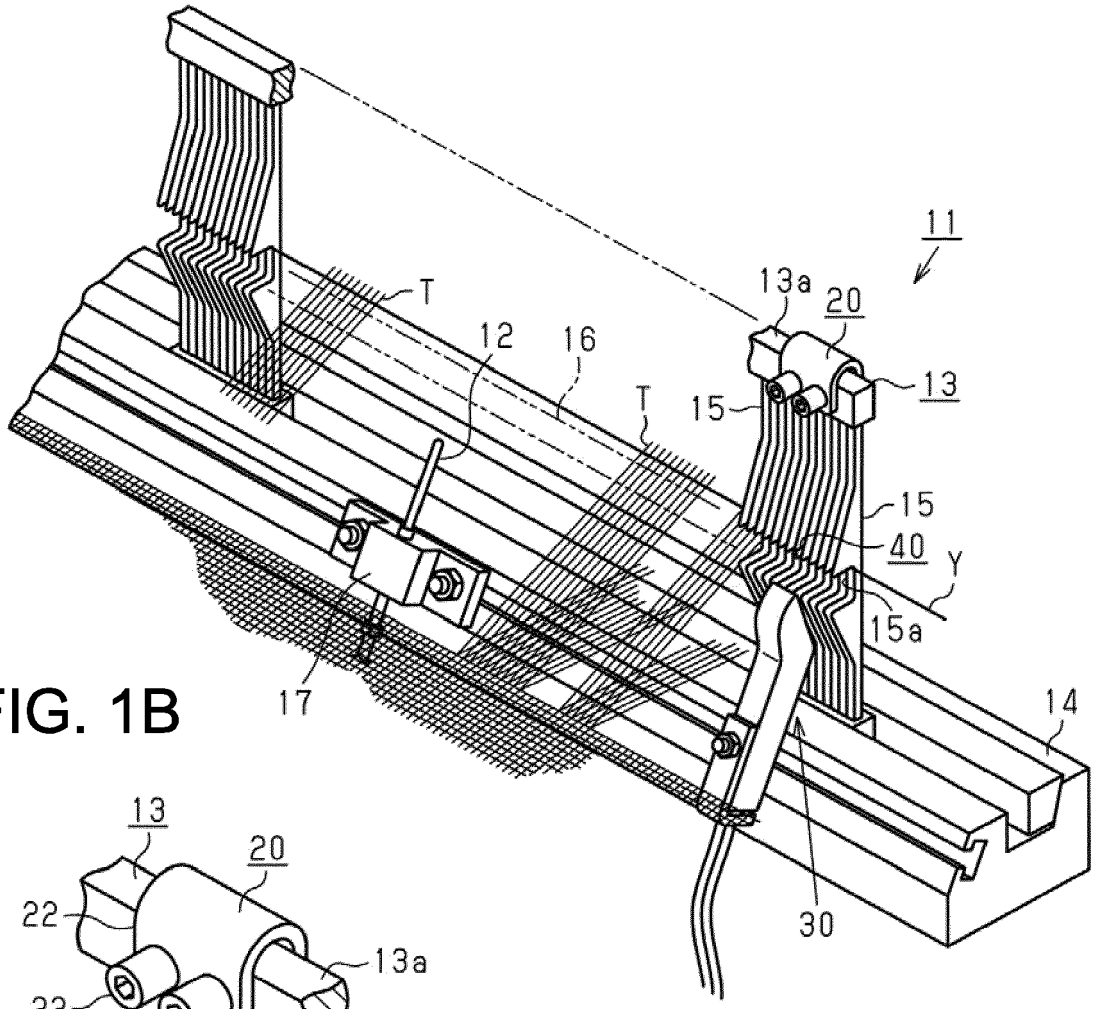
2. The weft yarn sensing device of the air jet loom (11) according to claim 1, **characterized in that**
   the weft yarn sensing device includes a vibration suppressing unit (20) that is mounted to the reed (13) in such a manner that the vibration suppressing unit (20) contacts with the reed wires (15) from behind thereof, and
   the contrast adjuster (40) is integrated with the vibration suppressing unit (20).

3. The weft yarn sensing device of the air jet loom (11) according to claim 1 or 2, **characterized in that**
   the contrast adjuster (40) includes a main body portion (41) and a projecting portion (42),
   the main body portion (41) extends along a lengthwise direction of the reed wires (15) and has a front surface (41a) that is exposed to the weft insertion passage (16), and
   the projecting portion (42) extends frontward of the reed wires (15) from an upper end of the main body portion (41) and has a bottom surface (42a) that extends from the front surface (41a) of the main body portion (41) and is exposed to the weft insertion passage (16).

4. The weft yarn sensing device of the air jet loom (11) according to any one of claims 1 to 3, **characterized in that** the weft yarn sensing device includes one contrast adjuster (40).

5. The weft yarn sensing device of the air jet loom (11) according to any one of claims 1 to 3, **characterized in that** the weft yarn sensing device includes a plurality of contrast adjusters (40).

FIG. 1A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13a
20
T
12
16
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15
13
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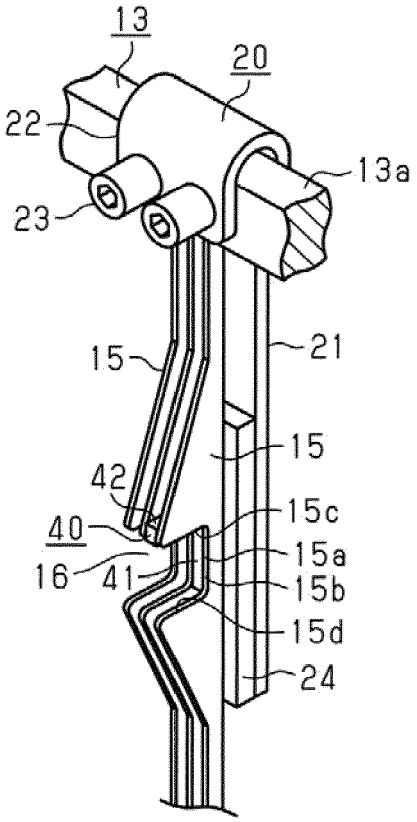
40
Y
15a
17
14
30

FIG. 1B


13
20
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15
21
15
42
15c
40
15a
16
41
15b
15d
24

FIG. 2

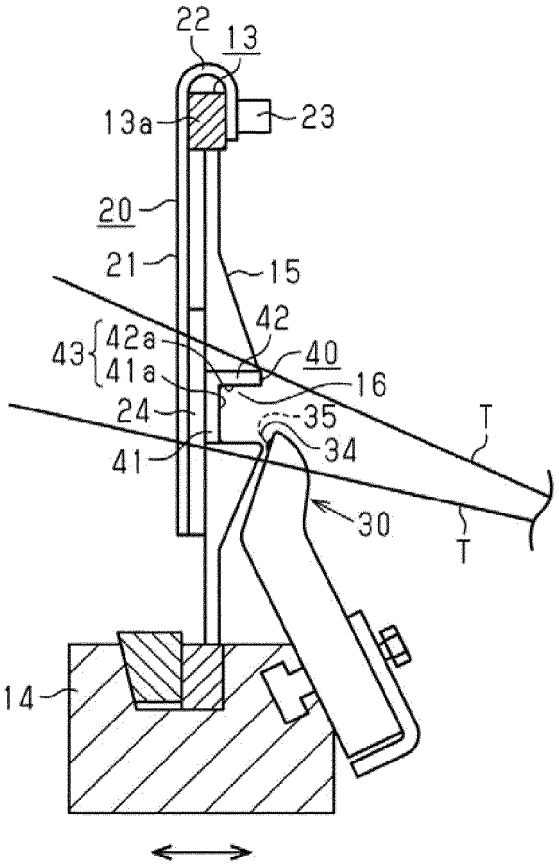
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FIG. 3

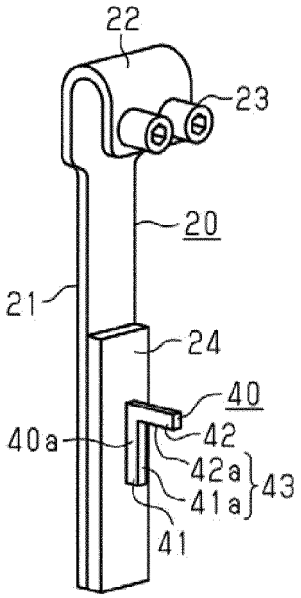
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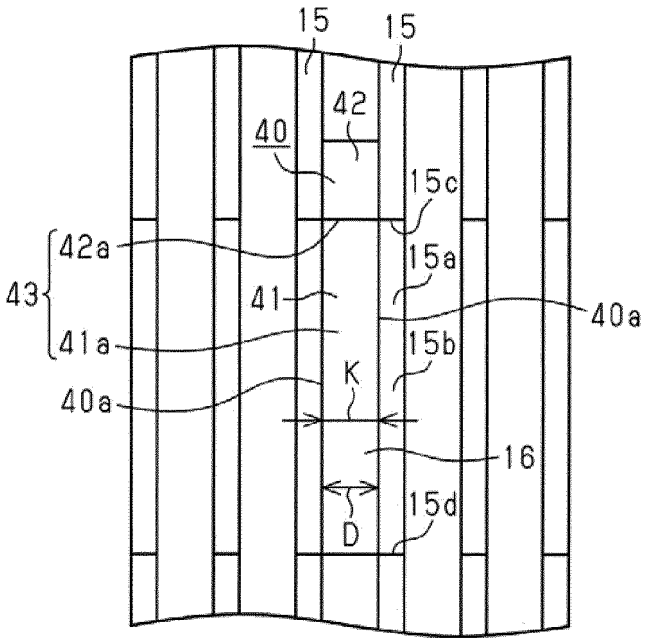
FIG. 4


15
15
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15c
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15a
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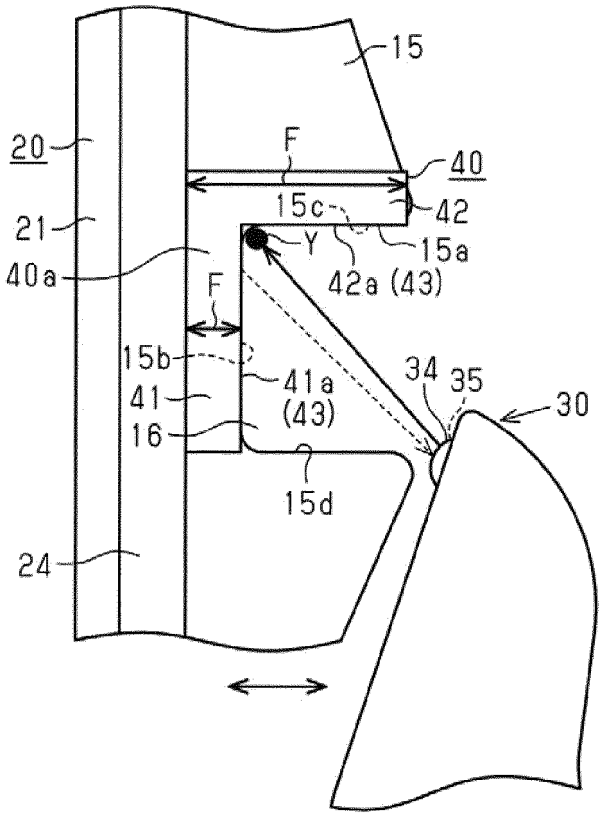
15b
K
40a
16
D
15d

FIG. 5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F
40
15c
42
21
Y
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F
15b
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35
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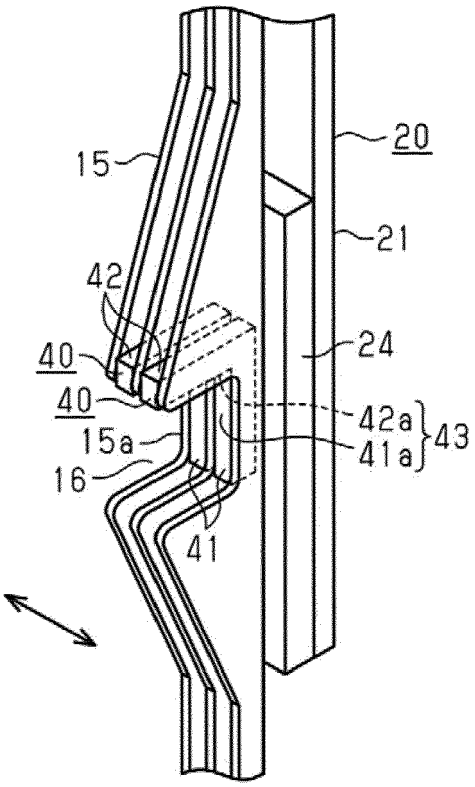
41a
(43)
41
16
15d
24

FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 1513

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 May 2018	Heinzelmann, Eric

CATEGORY OF CITED DOCUMENTS

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

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