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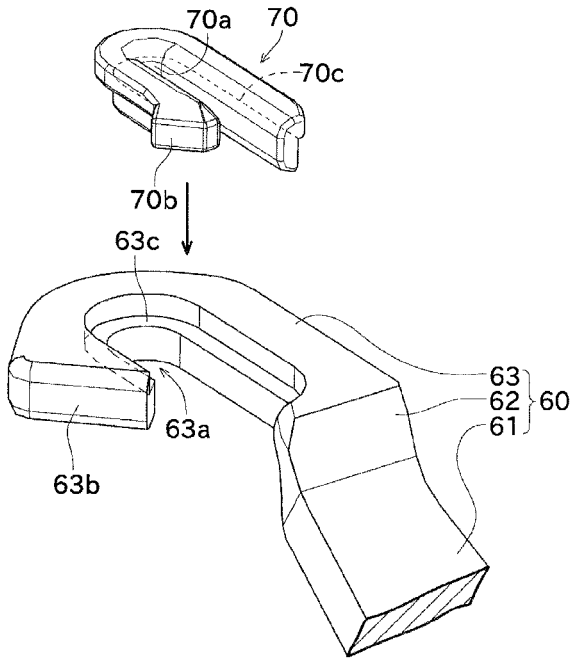
(54) Traverse guide, winding unit, and winding machine

(57) A traverse guide includes an arm body (60) and a yarn guiding piece (70) made of ceramics. A mounting groove (63a) is formed on the arm body (60), the mounting groove (63a) being a groove located at an end on one side in a longitudinal direction and having the other side in a longitudinal direction opened. A yarn hooking groove (70a) is formed in the yarn guiding piece (70). The yarn hooking groove (70a) is arranged on an inner side of the mounting groove (63a), and has the other side in the longitudinal direction opened. When the arm body (60) is reciprocated with a yarn hooked at the yarn hooking groove (70a), the yarn is traversed by the traverse guide.

FIG. 6



EP 2 570 377 A1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a traverse guide adapted to traverse a yarn.

2. Description of the Related Art

[0002] Conventionally, there is known a traverse guide including an arm section and a yarn hooking section. The arm section is an elongate member. The yarn hooking section is connected to a tip-end of the arm section. The yarn hooking section is provided with a groove or the like adapted to hook and hold the yarn. The traverse guide can traverse the yarn with respect to a package by reciprocating the arm section with a motor or the like with the yarn hooking section holding the yarn. Japanese Unexamined Patent Publication No. 2010-137944 discloses this type of traverse guide.

[0003] The traverse guide disclosed in Japanese Unexamined Patent Publication No. 2010-137944 includes an arm section configured by two plate materials, and a hook-like yarn hooking section. The two plate materials configuring the arm section are arranged to face each other with a gap. With this configuration, air resistance of the arm section involved in reciprocating movement can be reduced, and a load on the motor adapted to drive the arm section can be reduced.

[0004] Japanese Unexamined Patent Publication No. 2010-137944 discloses a CFRP (Carbon Fiber Reinforced Plastics), a complex material including inorganic fiber (glass fiber, ceramic fiber, or the like) and/or organic fiber (aramid fiber, PBO (Poly-p-phenylenebenzobisoxazole) fiber, ultrahigh molecular weight polyethylene, or the like), an alloy including a light weight metal (magnesium, berylium, aluminum, titanium, or the like), and the like for the material of the arm section.

[0005] WO 1999/047739 describes providing in a traverse arm including a fork-shaped yarn guide, an abrasion resistant member on both sides of a slit of the yarn guide. However, how the abrasion resistant member is attached to the yarn guide is not described.

BRIEF SUMMARY OF THE INVENTION

[0006] The yarn hooking section is abraded by making contact with the yarn. Therefore, the yarn hooking section is preferably configured by a member having abrasion resistance such as ceramics. The ceramics has a relatively heavy weight, and thus a load is applied on the motor adapted to drive the arm section. Since the yarn hooking section is connected to one end of the arm section, when reciprocatingly swinging the arm section with the other end of the arm section as a swing shaft, for example, inertia becomes large and the load applied on the motor increases.

[0007] A member having the abrasion resistance such as ceramics generally has high hardness, and thus has low toughness and tends to easily break. The traverse guide is provided to traverse the yarn continuously at high speed, and hence improvement in durability is demanded.

[0008] An object of the present invention is to provide a traverse guide in which durability of a yarn hooking section (yarn guiding section) is improved while a load on a motor adapted to drive the arm-like traverse guide is reduced.

[0009] According to a first aspect of the present invention, a traverse guide includes an arm body and a yarn guiding section. The arm body includes a frame body on which a mounting groove is formed. The mounting groove is arranged on a first end among ends in a longitudinal direction of the arm body and opened in a direction towards a second end, the second end being an opposite end with respect to the first end in the longitudinal direction. The yarn guiding section is made of ceramics. The yarn guiding section is arranged on a groove wall of the frame body. A yarn hooking groove is formed in the yarn guiding section and is opened in a direction towards the second end.

[0010] Since a contacting area of a yarn during traversing is made of ceramics, the traverse guide excels in abrasion resistance. Since the frame body of the arm body is arranged to cover the yarn guiding section, the yarn guiding section can be reliably held and durability is improved.

[0011] In the above traverse guide, the arm body and the yarn guiding section are preferably adhered by adhesive. Since a fixing hole and the like for fixing the yarn guiding section to the arm body is not required to be formed, a manufacturing cost of the traverse guide can be suppressed.

[0012] In the above traverse guide, the arm body and the yarn guiding section are preferably adhered by the adhesive such that the adhesive covers a boundary between the mounting groove and the yarn guiding section. Even if a step is formed at the boundary between the mounting groove and the yarn guiding section, the yarn can be prevented from getting caught at the step during catching of the yarn by the traverse guide and the like. Therefore, occurrence of yarn breakage and the like can be prevented.

[0013] In the above traverse guide, a positioning section adapted to position the yarn guiding section with respect to the arm body is preferably formed on the arm body. Accordingly, since position accuracy (mounting accuracy) of the yarn guiding section can be improved, the step formed at the boundary between the mounting groove and the yarn guiding section can be made small.

[0014] In the above traverse guide, the positioning section is preferably formed such that the yarn guiding section is inserted into the mounting groove from one side in a thickness direction of the arm body. Accordingly,

since a position of the yarn guiding section can be easily determined, an operator can promptly carry out a mounting operation.

[0015] In the above traverse guide, the yarn hooking groove is formed in an elongate shape with one end opened. A longitudinal direction of the elongate yarn hooking groove coincides with a longitudinal direction of the arm body. Since a length of the yarn hooking groove can be made relatively long, the yarn is less likely to be displaced from the yarn hooking groove while being traversed.

[0016] In the above traverse guide, a material of the arm body preferably includes at least one of magnesium alloy, aluminum alloy, and resin. Since the magnesium alloy, the aluminum alloy, and the resin are generally lighter than the ceramics, as compared to a case where the entire traverse guide (or the entire frame body) is made of ceramics, the traverse guide can be made lightweight. Therefore, the load of the motor adapted to drive the traverse guide, for example, can be suppressed.

[0017] In the above traverse guide, a guide surface adapted to guide the yarn to the yarn hooking groove is preferably formed on each of the arm body and the yarn guiding section. Since the guide surface is formed on both the arm body and the yarn guiding section, the yarn can be guided to proximity of the yarn hooking groove during the catching of the yarn by the traverse guide. Therefore, the traverse guide can reliably catch the yarn.

[0018] According to a second aspect of the present invention, a winding unit includes the traverse guide, a traverse guide driving section, and a cradle. The traverse guide is adapted to traverse the yarn while hooking the yarn with the yarn hooking groove. The traverse guide driving section is adapted to drive the traverse guide. The cradle is adapted to hold a package formed by the yarn being traversed by the traverse guide.

[0019] Since the load applied on the traverse guide driving section can be reduced, the winding unit can traverse the yarn at high speed by the traverse guide. As a result, production efficiency of the winding unit can be improved.

[0020] According to a third aspect of the present invention, a yarn winding machine includes a plurality of winding units. The package can be efficiently formed by the plurality of winding units .

DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 is a front view of an automatic winder according to one embodiment of the present invention;

FIG. 2 is a front view and a block diagram of a winder unit;

FIG. 3 is a schematic side view of a traverse device;

FIG. 4 is a perspective view showing a configuration of an arm body and a yarn guiding piece;

FIG. 5A is a view showing a step formed between the arm body and the yarn guiding piece;

FIG. 5B is a view showing a state in which the step is covered by an adhesive; and

FIG. 6 is a perspective view describing a mounting method of the arm body and the yarn guiding piece.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0022] Embodiments of the invention will be hereinafter described. First, an overall configuration of an automatic winder 1 according to an embodiment will be described with reference to FIG. 1. "Upstream" and "downstream" respectively refer to upstream and downstream in a travelling direction of a yarn at the time of yarn winding. As illustrated in FIG. 2 and the like, in the present embodiment, since a yarn 20 unwound from a yarn supplying bobbin 21 in a yarn supplying section 16 is wound by a winding section 17, the yarn supplying section 16 side is the upstream and the winding section 17 side is the downstream.

[0023] As illustrated in FIG. 1, the automatic winder (yarn winding machine) 1 includes a plurality of winder units (winding units) 10 arranged in line, an automatic doffing device 8, and a machine control device 90.

[0024] Each winder unit 10 is configured to wind the yarn 20 unwound from the yarn supplying bobbin 21 around a winding bobbin 22 while traversing the yarn 20 to form a package 30.

[0025] When the package 30 is fully wound in one of the winder units 10, the automatic doffing device 8 travels to a position of the relevant winder unit 10 to collect the fully-wound package 30 and supply a winding bobbin (empty winding bobbin) 22 around which the yarn 20 is not wound. The automatic doffing device 8 may only collect the fully-wound package 30 and may not supply the empty winding bobbin 22. The automatic doffing device 8 may not collect the fully-wound package 30 and may only supply the empty winding bobbin 22.

[0026] The machine control device 90 includes an operation section 91 and a display section 92. An operator may input a predetermined set value or select an appropriate control method by operating the operation section 91. The setting is thereby made on each winder unit 10. The display section 92 may display winding status of the yarn 20 in each winder unit 10, content of trouble that occurred, and the like.

[0027] Next, a description will be made on a detailed configuration of the winder unit 10 with reference to FIG. 2 and FIG. 3. Each winder unit 10 includes a winding unit main body 11 and a unit control section 50.

[0028] The unit control section 50 includes, for example, a Central Processing Unit (CPU), and a Read Only Memory (ROM). The ROM stores a program for controlling each component of the winding unit main body 11. The CPU executes the program stored in the ROM.

[0029] The winding unit main body 11 includes a yarn supplying section 16, a yarn-unwinding assisting device

12, a tension applying device 13, a splicer device 14, a clearer (yarn quality measuring device) 15, and the winding section 17 arranged in this order from the yarn supplying bobbin 21 along a yarn travelling path between the yarn supplying bobbin 21 and the winding bobbin (winding tube, paper tube, core tube) 22.

[0030] The yarn supplying section 16 is arranged at a lower part of the winding unit main body 11. The yarn supplying section 16 can hold the yarn supplying bobbin 21 supplied by a bobbin transportation system or a magazine type bobbin supplying device (not illustrated) at a prescribed position.

[0031] The yarn-unwinding assisting device 12 causes a regulation member 40 to make contact with a balloon formed at an upper part of the yarn supplying bobbin 21 when the yarn 20 unwound from the yarn supplying bobbin 21 is swung around, and controls the balloon to an appropriate size to assist the unwinding of the yarn 20.

[0032] The tension applying device 13 applies a predetermined tension on the travelling yarn 20. The tension applying device 13 may be a gate-type in which movable comb teeth 37 are arranged with respect to fixed comb teeth 36. The movable comb teeth 37 are swung by a rotary solenoid 38 or the like, so as to be in a meshed state or a released state with respect to the fixed comb teeth 36. A disc-type tension applying device, for example, may be adopted instead of the gate-type tension applying device 13 described above.

[0033] The splicer device 14 joins a lower yarn from the yarn supplying bobbin 21 and an upper yarn from the package 30 after a yarn cut when the clearer 15 detects a yarn defect and cuts the yarn 20 with a cutter 39, or after a yarn breakage while unwinding the yarn 20 from the yarn supplying bobbin 21. Such a yarn joining device adapted to join the upper yarn and the lower yarn may be a mechanical type or a type that uses fluid such as compressed air.

[0034] The clearer 15 includes a clearer head 49 provided with a sensor (not illustrated) for detecting a thickness of the yarn 20, and an analyzer 53 for processing a yarn thickness signal from the sensor. The clearer 15 detects a yarn defect such as slub by monitoring the yarn thickness signal from the sensor. The cutter 39 is provided in proximity to the clearer head 49, and immediately cuts the yarn 20 when the clearer 15 detects the yarn defect. The analyzer 53 may be arranged in the unit control section 50. The clearer 15 may be adapted to detect foreign substances contained in the yarn 20 as the yarn defect.

[0035] A lower yarn guiding pipe 25 for catching the lower yarn from the yarn supplying bobbin 21 and guiding the lower yarn to the splicer device 14 is arranged below the splicer device 14. An upper yarn guiding pipe 26 for catching the upper yarn from the package 30 and guiding the upper yarn to the splicer device 14 is arranged above the splicer device 14. The lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 can respectively swing with shafts 33 and 35 as a center. A suction port 32 is formed at a tip-end of the lower yarn guiding pipe 25. A suction mouth 34 is arranged at a tip-end of the upper yarn guiding pipe 26. An appropriate negative pressure source (not illustrated) is connected to the lower yarn guiding pipe 25 and the upper yarn guiding pipe 26. The lower yarn guiding pipe 25 and the upper yarn guiding pipe 26 can generate a suction flow at the suction port 32 and the suction mouth 34 to suck and catch yarn ends of the upper yarn and the lower yarn.

[0036] The winding section 17 includes a cradle 23, a traverse device 27, and a contact roller 29.

[0037] The cradle 23 removably holds the winding bobbin 22. The cradle 23 can swing towards a front side and a back side of the winder unit 10, and can absorb an increase in a yarn layer diameter of the package 30 accompanying the winding of the yarn 20 around the winding bobbin 22. In other words, even if the yarn layer diameter of the package 30 changes accompanying the winding of the yarn 20, a surface of the package 30 can be appropriately made in contact with a surface of the contact roller 29. By winding the yarn 20 around the conical winding bobbin 22, the cradle 23 and the traverse device 27 can form the conical package 30 as illustrated in FIG. 2.

[0038] A package driving motor (winding tube driving section) 41 such as a servo motor is provided on the cradle 23. The winding section 17 rotatably drives the winding bobbin 22 with the package driving motor 41 to wind the yarn 20 around the surface of the winding bobbin 22 (or the surface of package 30). An operation of the package driving motor 41 is controlled by the unit control section 50. A package-driving-motor control section may be provided independently from the unit control section 50, and the operation of the package driving motor 41 may be controlled by the package-driving-motor control section.

[0039] The contact roller 29 is arranged to make contact with a peripheral surface of the winding bobbin 22 or a peripheral surface of the package 30. The contact roller 29 is rotated accompanying the rotation of the winding bobbin 22 or the package 30.

[0040] The traverse device 27 is an arm-type traverse device, and traverses the yarn 20 with respect to the surface of the package 30. The winding section 17 is adapted to wind the yarn 20 into the package 30 while traversing the yarn 20 by the traverse device 27.

[0041] As illustrated in FIG. 3, the traverse device 27 includes a traverse guide 28, a traverse guide driving motor (traverse guide driving section) 45, and a guide plate 52.

[0042] The traverse guide 28 is an elongate member adapted to swing about a supporting axis. A yarn hooking groove 70a (see FIG. 5A and the like, to be described later) is formed at a first end (side close to the yarn 20, tip-end side) of the traverse guide 28 so that the yarn 20 can be hooked. A second end (basal end side) of the traverse guide 28 is fixed to a drive shaft 45a of the traverse guide drive motor 45 while being reinforced by

a boss portion 46.

[0043] The traverse guide driving motor 45 is configured by a servo motor, for example, and is provided to drive the traverse guide 28. The traverse guide driving motor 45 may be configured by other appropriate motors such as a brushless DC motor, a stepping motor, a voice coil motor, or the like. The detailed shape and the structure of the traverse guide 28 will be described later.

[0044] The traverse device 27 drives the traverse guide driving motor 45 to reciprocate the traverse guide 28 with the yarn 20 hooked at the first end (the yarn hooking groove 70a) of the traverse guide 28. The traverse device 27 thus reciprocates the first end of the traverse guide 28 in a winding width direction of the package 30 to traverse the yarn 20 with respect to the surface of the package 30. The winder unit 10 thus winds the yarn 20 around the winding bobbin 22 while traversing the yarn 20 at a predetermined speed to a prescribed winding width, and forms a yarn layer formed on an outer peripheral surface of the winding bobbin 22 at a desired density.

[0045] An operation of the traverse guide driving motor 45 is controlled by the unit control section 50. However, instead of being controlled by the unit control section 50, a dedicated traverse control section may be provided, and the traverse guide driving motor 45 may be controlled by this traverse control section. The guide plate 52 is arranged upstream of the traverse guide 28. The guide plate 52 bends a yarn path of the yarn 20 located upstream of the guide plate 52 towards the contact roller 29 to guide the yarn 20 such that the yarn 20 can be caught by the traverse guide 28.

[0046] Next, the shape and the structure of the traverse guide 28 will be described in detail with reference to FIG. 4 to FIG. 6.

[0047] The traverse guide 28 includes an arm body 60, and a yarn guiding piece (yarn guiding section) 70. The arm body 60 is an elongate plate-like member made with a light weight metal such as magnesium alloy or aluminum alloy, or a high strength resin. The arm body 60 includes an arm section 61, a bent section 62, and a hooking section (frame body) 63.

[0048] The arm section 61 occupies a majority of the arm body 60. The arm section 61 has a plurality of holes formed at a central part, and a shaft hole 61a, a key groove 61b, and fixing holes 61c formed at the second end. The hole formed in the arm section 61 may be one or may be omitted.

[0049] The shaft hole 61a is formed as a circular hole. The drive shaft 45a of the traverse guide driving motor 45 is inserted to the shaft hole 61a. The key groove 61b is formed as a groove having a rectangular cross-sectional contour, and is a groove adapted to couple with the drive shaft 45a. Three fixing holes 61c are formed to surround the shaft hole 61a. The fixing holes 61c are holes for fixing the boss portion 46. Screw holes are formed on the boss portion 46 so as to correspond with a position of the fixing holes 61c. The boss portion 46 can be fixed to the traverse guide 28 by aligning the screw holes and the fixing holes 61c and tightening with bolts or the like. The number of fixing holes 61c is not particularly limited.

[0050] The bent section 62 is formed between the arm section 61 and the hooking section 63. The bent section 62 is bent in a direction in which the hooking section 63 approaches the contact roller 29. Since a free length (length of the yarn 20 from the traverse guide 28 until making contact with the contact roller 29) can be reduced, a behavior of the yarn 20 can be stabilized. Therefore, the winder unit 10 can form a high quality package 30.

[0051] The hooking section 63 is a section constituting the first end of the arm body 60, and is formed in a frame shape and a hook shape. The hooking section 63 is formed with a mounting groove 63a, a guide surface 63b, and a positioning section 63c.

[0052] The mounting groove 63a is formed to be elongate in a longitudinal direction of the arm body 60 when seen in the thickness direction of the arm body 60 (see FIG. 5A). The mounting groove 63a is formed to open the end on one side of the long hole (direction towards the second end of the arm body 60). The yarn guiding piece 70 is attached to an inner side of the mounting groove 63a. The hooking section 63 holds the yarn guiding piece 70 so as to surround the yarn guiding piece 70.

[0053] The guide surface 63b is a surface formed diagonally from an outer side to an inner side of the hooking section 63 (opening section of the mounting groove 63a). The guide surface 63b guides the yarn 20 to the yarn hooking groove 70a during the catching of the yarn 20 by the traverse guide 28.

[0054] The positioning section 63c is used to determine the position when mounting the yarn guiding piece 70 to the arm body 60. The positioning section 63c is the step-like section formed on a wall surface constituting the mounting groove 63a.

[0055] The yarn guiding piece 70 is mounted on a groove wall of the hooking section 63 (inner side of the mounting groove 63a). The yarn guiding piece 70 is made with ceramics. The yarn hooking groove 70a, a guide surface 70b, and a step-like section 70c are formed in the yarn guiding piece 70.

[0056] The yarn hooking groove 70a has a same shape as the mounting groove 63a. The yarn hooking groove 70a is a groove formed to open an end on one side (direction towards the second end of the arm body 60) of the long hole (elongate shape). The yarn hooking groove 70a is formed such that a longitudinal direction of the yarn hooking groove 70a coincides with the longitudinal direction of the arm body 60. After the yarn 20 is caught by the traverse guide 28, the yarn 20 is located inside the yarn hooking groove 70a. When the wall surface of the yarn hooking groove 70a pushes the yarn 20 accompanying the reciprocating movement of the traverse guide 28, the yarn 20 is traversed with respect to the package 30. The yarn hooking groove 70a of the present embodiment is formed to be closed in a direction towards the first end of the arm body 60 and opened in a direction

towards the second end. Even if a force in the direction towards the first end acts on the yarn 20, the yarn 20 is not displaced from the yarn hooking groove 70a.

[0057] The guide surface 70b is formed to linearly continue to the guide surface 63b of the arm body 60. When catching the yarn 20 by the traverse guide 28, the yarn 20 is guided to the yarn hooking groove 70a via the guide surface 63b and the guide surface 70b. Since the yarn 20 can be guided to the proximity of the yarn hooking groove 70a by forming the guide surface 70b, the traverse guide 28 can reliably catch the yarn 20.

[0058] The step-like section 70c is used for positioning when mounting the yarn guiding piece 70 to the arm body 60. The step-like section 70c is formed on an outer peripheral surface of the yarn guiding piece 70. The step-like section 70c is formed in a shape that corresponds with the positioning section 63c. The position of the yarn guiding piece 70 can be determined by aligning the step-like section 70c and the positioning section 63c.

[0059] Substantially the entire outer peripheral surface of the yarn guiding piece 70 is covered by the hooking section 63 of the arm body 60. Thus, the arm body 60 can reliably hold the yarn guiding piece 70.

[0060] Next, processes of mounting the yarn guiding piece 70 to the arm body 60 will be described with reference to FIG. 5A, FIG. 5B, and FIG. 6.

[0061] In the present embodiment, the yarn guiding piece 70 is mounted on the arm body 60 by an adhesive. Specifically, the operator applies the adhesive on at least one of the wall surface constituting the mounting groove 63a and the outer peripheral surface of the yarn guiding piece 70. In this case, the operator adjusts an application amount of the adhesive so that the adhesive is slightly squeezed out from the boundary between the arm body 60 and the yarn guiding piece 70 when adhering.

[0062] The operator then inserts the yarn guiding piece 70 to the mounting groove 63a from one side in the thickness direction of the arm body 60 (see FIG. 6). Accordingly, the position of the yarn guiding piece 70 is determined at an area where the positioning section 63c and the step-like section 70c make contact, and the arm body 60 and the yarn guiding piece 70 can be adhered to one another.

[0063] A step may be formed at the boundary between the arm body 60 and the yarn guiding piece 70. The yarn 20 may get caught at such a step and a yarn breakage may occur. The step that becomes a cause of yarn breakage may be a step formed at a boundary between the guide surface 63b and the guide surface 70b (see reference symbol A in FIG. 5A), or may be a step formed at a boundary between a basal end of the yarn guiding piece 70 and the arm body 60 (see reference symbol B in FIG. 5A).

[0064] In the present embodiment, the adhesive is applied to a degree in which the adhesive is slightly squeezed out from the boundary between the arm body 60 and the yarn guiding piece 70. By intentionally making the adhesive to be squeezed out at the portion of the step, the step may be made smooth, or a gradual protrusion that covers the step can be formed (see FIG. 5B). In FIG. 5B, the adhesive is illustrated to be protruding at two specific areas, but the adhesive may be applied to cover other boundary.

[0065] The traverse guide 28 of the present embodiment includes the arm body 60 and the yarn guiding piece 70. The arm body 60 includes the hooking section 63 on which the mounting groove 63a is formed. The mounting groove 63a is located at the first end of the arm body 60 and is opened in the direction towards the second end. The yarn guiding piece 70 is made of ceramics and is arranged on the groove wall of the hooking section 63. The yarn guiding piece 70 is formed with the yarn hooking groove 70a opened in the direction towards the second end of the arm body 60.

[0066] The traverse guide 28 excels in abrasion resistance since the portion that makes contact with the yarn 20 is made of ceramics. Since the hooking section 63 is arranged to cover the yarn guiding piece 70, the yarn guiding piece 70 can be reliably held and durability is improved.

[0067] In the traverse guide 28 of the present embodiment, the arm body 60 and the yarn guiding piece 70 are adhered by the adhesive. Since a fixing hole or the like for fixing the yarn guiding piece 70 to the arm body 60 is not required to be formed, a manufacturing cost of the traverse guide 28 can be suppressed.

[0068] In the traverse guide 28 of the present embodiment, the arm body 60 and the yarn guiding piece 70 are adhered by the adhesive such that the adhesive covers the boundary between the mounting groove 63a and the yarn guiding piece 70. Even if a step is formed at the boundary between the mounting groove 63a and the yarn guiding piece 70, the yarn 20 can be prevented from getting caught at the step during the catching of the yarn 20 by the traverse guide 28 and the like. Therefore, occurrence of yarn breakage and the like can be prevented.

[0069] In the traverse guide 28 of the present embodiment, the positioning section 63c adapted to position the yarn guiding piece 70 with respect to the arm body 60 is formed on the arm body 60. Since the positioning accuracy of the yarn guiding piece 70 can be improved, the step formed at the boundary between the mounting groove 63a and the yarn guiding piece 70 can be reduced.

[0070] In the traverse guide 28 of the present embodiment, the positioning section 63c is formed so that the yarn guiding piece 70 can be inserted to the mounting groove 63a from one side in the thickness direction of the arm body 60. Since the position of the yarn guiding piece 70 can be easily determined, the operator can promptly carry out a mounting operation.

[0071] In the traverse guide 28 of the present embodiment, the yarn hooking groove 70a is formed in a long hole shape (elongate shape) with a basal end side opened. A longitudinal direction of the long hole coincides with a longitudinal direction of the arm body 60. Since

the length of the yarn hooking groove 70a thus can be made relatively long, the yarn 20 is less likely to be displaced from the yarn hooking groove 70a while being traversed.

[0072] In the traverse guide 28 of the present embodiment, the arm body 60 and the yarn guiding piece 70 respectively includes the guide surfaces 63b and 70b adapted to guide the yarn 20 to the yarn hooking groove 70a. Since the guide surface is formed on both the arm body 60 and the yarn guiding piece 70, the yarn 20 can be guided to the proximity of the yarn hooking groove 70a during the catching of the yarn 20 by the traverse guide 28. Therefore, the traverse guide 28 can reliably catch the yarn 20.

[0073] The preferred embodiments of the present invention have been described above, but the structures described above may be modified as below.

[0074] The material of the arm body 60 is preferably a light weight metal or a resin, as described in the above embodiment, but may be other materials such as the material disclosed in Japanese Unexamined Patent Publication No. 2010-137944. The other materials of the arm body 60 include, for example, a carbon composite material, specifically, fiber-reinforced plastic including carbon fiber, boron fiber, and aramid fiber or the like.

[0075] The first end of the arm body 60 may not be formed in a hook shape as long as the first end has a frame shape and is provided with the mounting groove.

[0076] The yarn guiding piece 70 is not limited to the shape described in the above embodiment. For example, the guide surface 70b may not be provided.

[0077] In the embodiment described above, the positioning section 63c and the step-like section 70c are formed in a step-form, but may have a configuration other than the step-form. For example, the projection projecting to an inner side from the mounting groove 63a may be formed, and a recess having a shape corresponding to such a projection may be formed on the outer peripheral surface of the yarn guiding piece 70.

[0078] A mounting method of the yarn guiding piece 70 with respect to the arm body 60 is not limited to the adhesive, and for example, a bolt or the like may be used.

[0079] An example of a general cone winding package has been described in the above embodiment by way of example, but the package formed by the winder unit 10 may be a winding package of which an end surface is tapered or a cheese-shaped package.

[0080] As described above, the traverse device 27 is not limited to a configuration of reciprocating the traverse guide 28 within a substantially horizontal plane with respect to an installation surface of the winder unit 10. For example, as in Japanese Unexamined Patent Publication No. 2010-137944, a configuration may be adopted in which the longitudinal direction of the traverse arm is substantially perpendicular to the installation surface of the winder unit.

[0081] The package driving motor 41 is not limited to a servo motor, and may be various types of motors such as a step motor or an induction motor. The contact roller 29 may be driven with an appropriate driving device and the package 30 may be rotated accompanying the rotation of the contact roller 29.

[0082] The yarn winding machine is not limited to the automatic winder, and can be applied to other yarn winding machines such as a re-winding machine, a fine spinning machine (e.g., an air-jet spinning machine, an open-end spinning machine), and the like.

Claims

1. A traverse guide comprising:

an arm body (60) including a frame body (63) on which a mounting groove (63a) is formed, the mounting groove (63a) being arranged on a first end among ends in a longitudinal direction of the arm body (60) and opened in a direction towards a second end, the second end being an opposite end with respect to the first end in the longitudinal direction, and

a yarn guiding section (70) made of ceramics arranged on a groove wall of the frame body (63) and on which a yarn hooking groove (70a) is formed to be opened in a direction towards the second end.

2. The traverse guide according to claim 1, wherein the arm body (60) and the yarn guiding section (70) are adhered by adhesive.

3. The traverse guide according to claim 2, wherein the arm body (60) and the yarn guiding section (70) are adhered by the adhesive such that the adhesive covers a boundary between the mounting groove (63a) and the yarn guiding section (70).

4. The traverse guide according to any one of claim 1 through claim 3, wherein a positioning section (63c) adapted to position the yarn guiding section (70) with respect to the arm body (60) is formed on the arm body (60).

5. The traverse guide according to claim 4, wherein the positioning section (63c) is formed such that the yarn guiding section (70) is inserted into the mounting groove (63a) from one side in a thickness direction of the arm body (60).

6. The traverse guide according to any one of claim 1 through claim 5, wherein the yarn hooking groove (70a) is formed in an elongate shape with one end opened, and a longitudinal direction of the elongate yarn hooking groove (70a) coincides with a longitudinal direction of the arm body (60).

7. The traverse guide according to any one of claim 1 through claim 6, wherein material of the arm body (60) includes at least one of magnesium alloy, aluminum alloy, and resin.

8. The traverse guide according to any one of claim 1 through claim 7, wherein a guide surface (63b, 70b) adapted to guide a yarn (20) to the yarn hooking groove (70a) is formed on each of the arm body (60) and the yarn guiding section (70).

9. A winding unit comprising:

the traverse guide (28) according to any one of claim 1 through claim 8, the traverse guide being adapted to traverse a yarn (20) while hooking the yarn (20) with the yarn hooking groove (70a),
a traverse guide driving section (45) adapted to drive the traverse guide (28), and
a cradle (23) adapted to hold a package (30) formed by the yarn (20) being traversed by the traverse guide (28).

10. A yarn winding machine comprising a plurality of winding units (10) according to claim 9.

FIG. 1

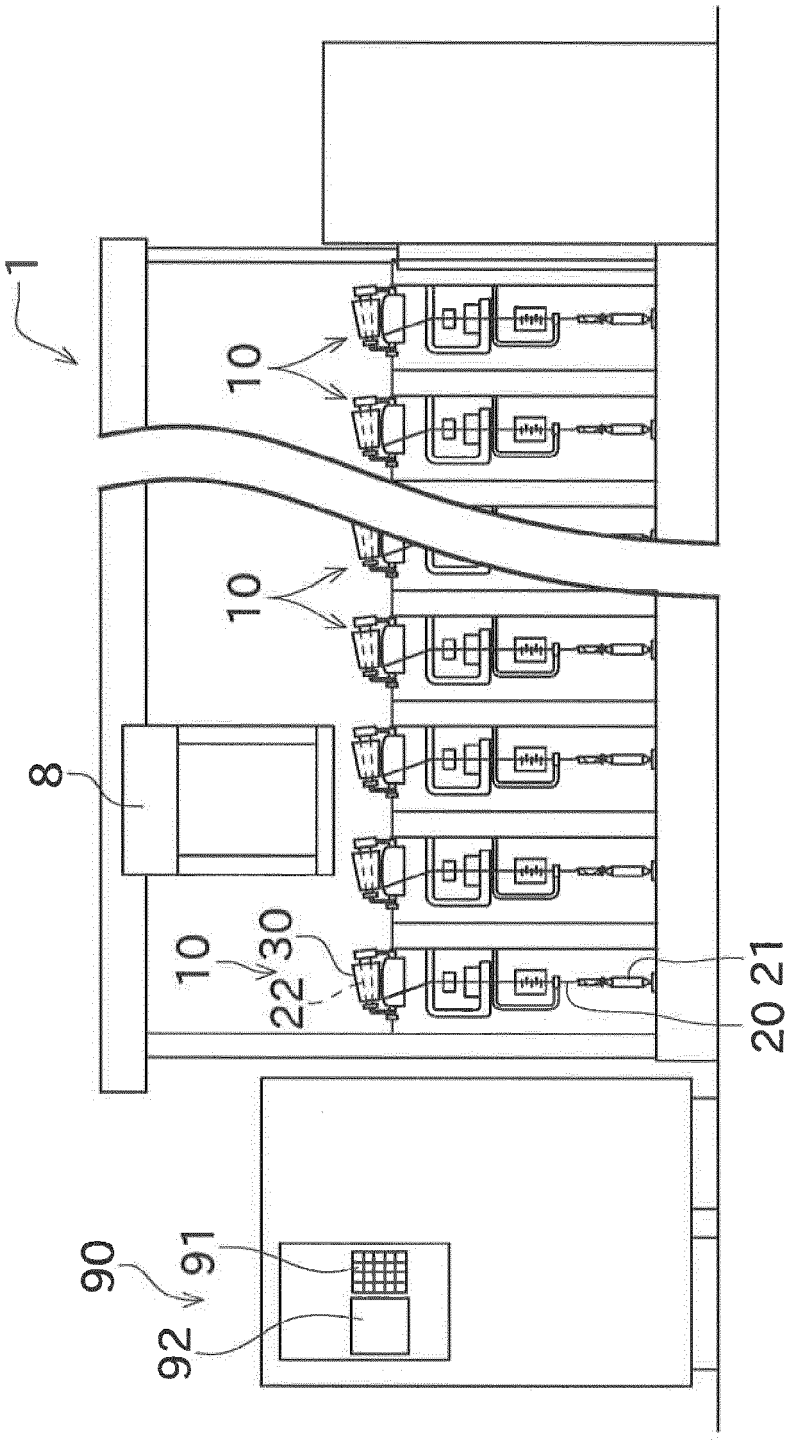


FIG. 2

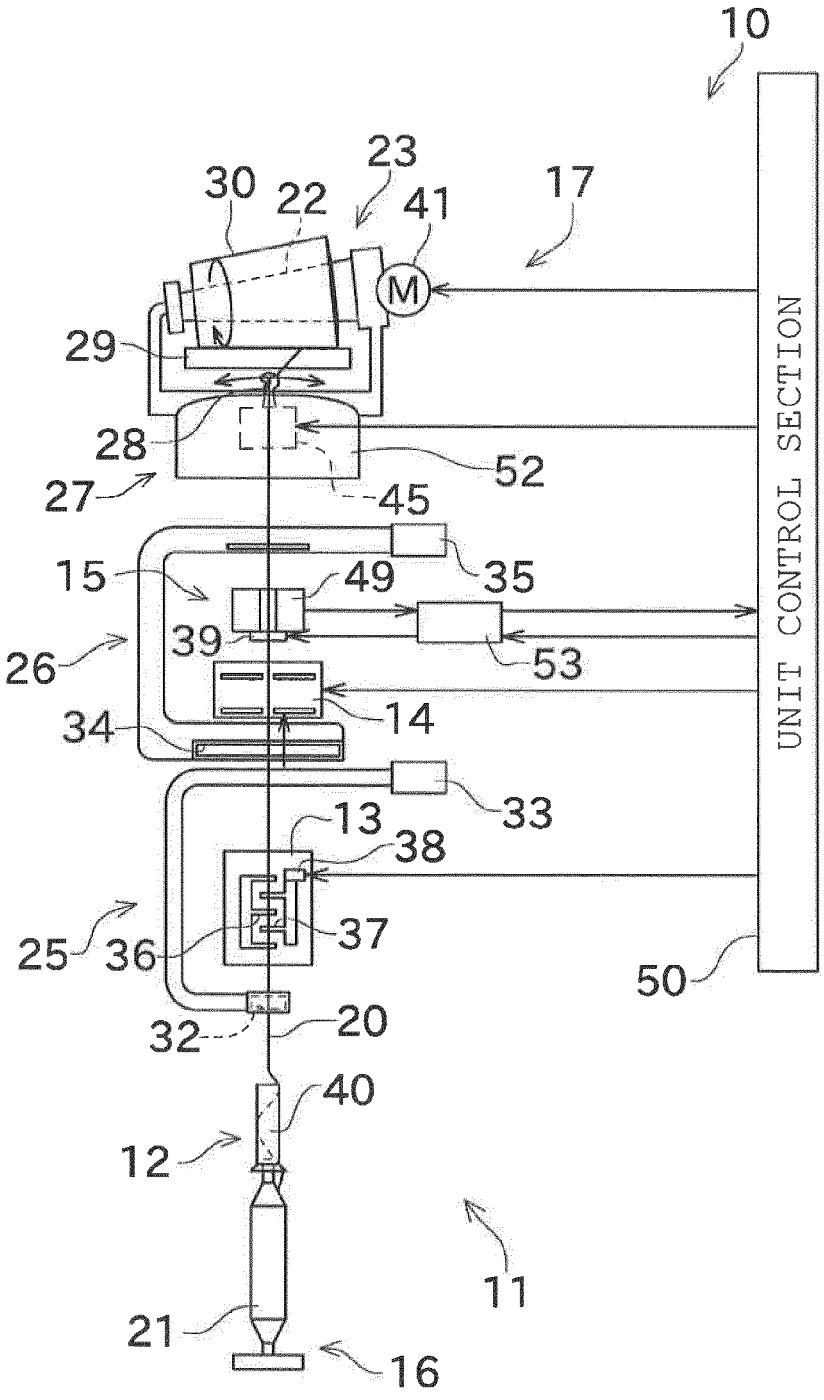

10
UNIT CONTROL SECTION
23
30
22
41
17
M
29
28
52
27
45
15
49
35
39
53
26
14
34
33
13
38
25
36
37
50
32
20
40
12
11
21
16

FIG. 3

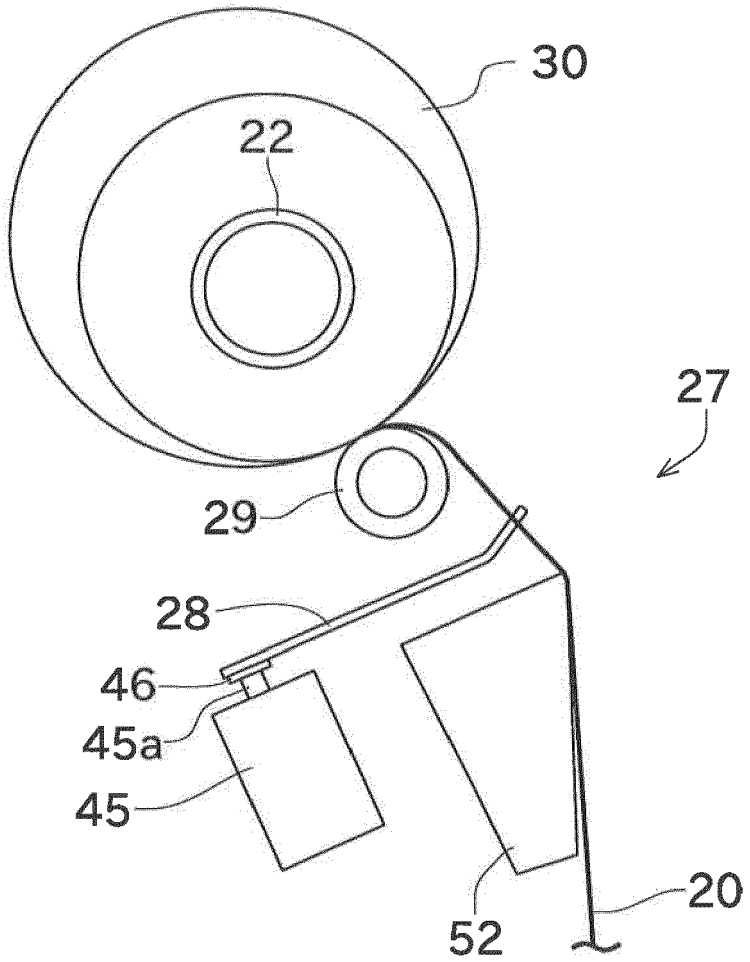


FIG. 4

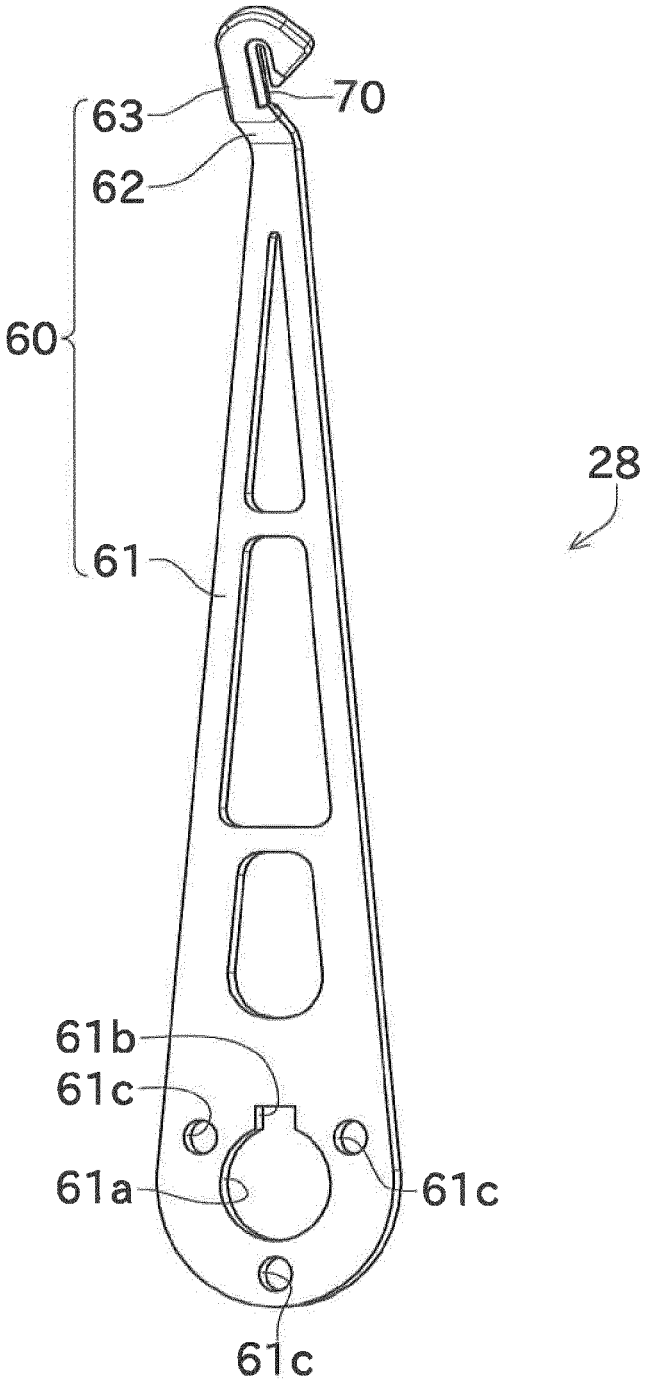


FIG. 5A

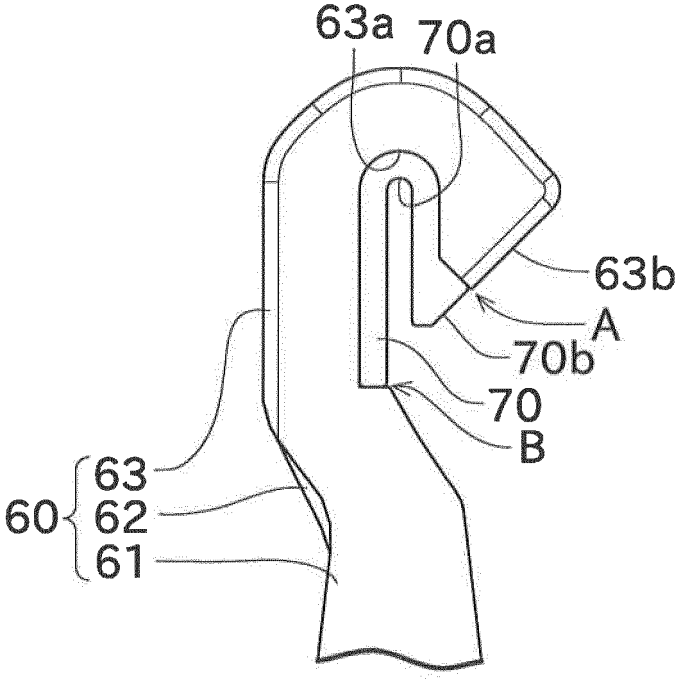

63a
70a
63b
A
70b
70
B
60
63
62
61

FIG. 5B

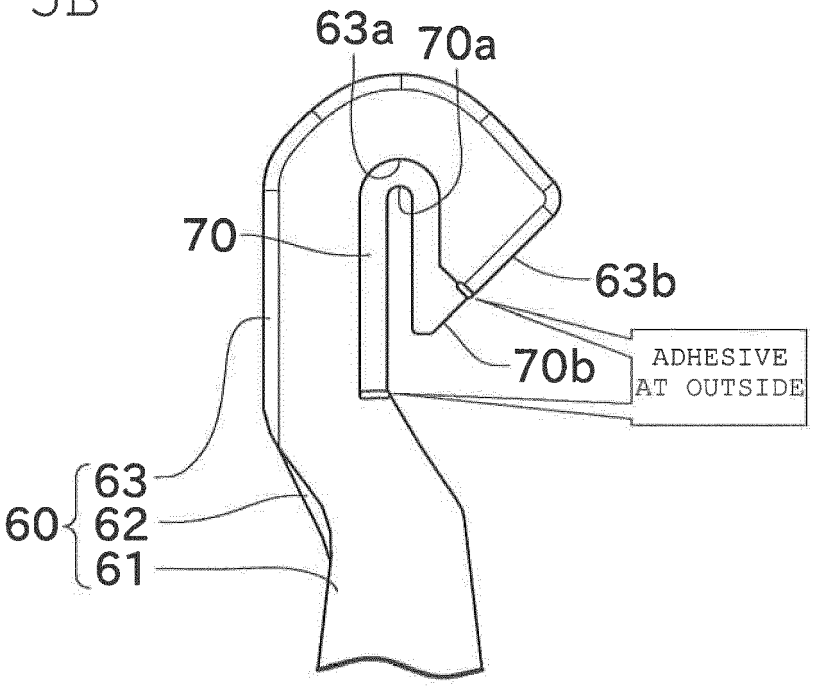
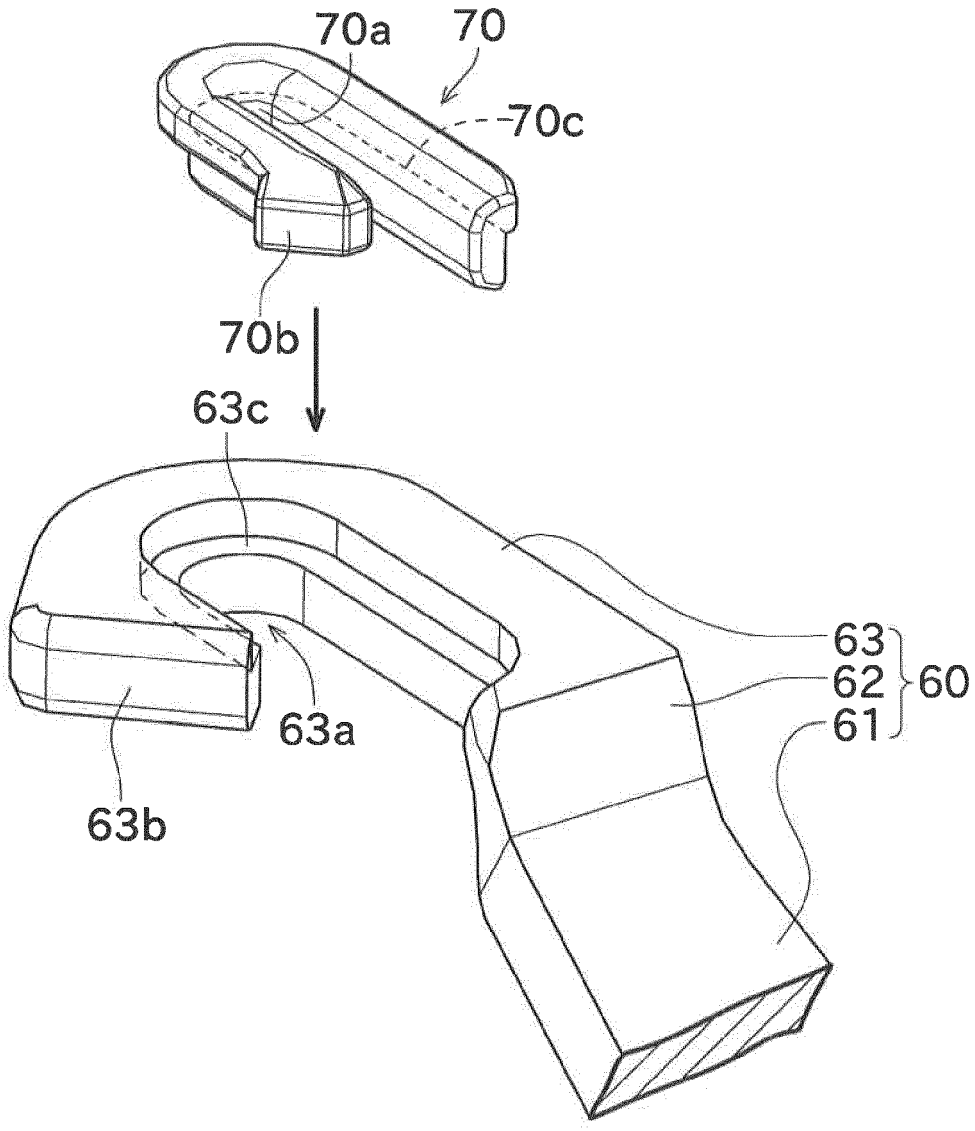

63a
70a
70
63b
70b
ADHESIVE AT OUTSIDE
60
63
62
61

FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 7185

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	JP 2010 137944 A (MURATA MACHINERY LTD) 24 June 2010 (2010-06-24) * abstract; figures *	1,4,7,9, 10	INV. B65H57/24 B65H54/28 B65H57/00
Y	EP 1 712 505 A2 (MURATA MACHINERY LTD [JP]) 18 October 2006 (2006-10-18) * paragraph [0019]; figures *	1-10	
Y	US 3 502 282 A (GRAF FELIX) 24 March 1970 (1970-03-24) * column 2, lines 37-39; claim 4; figures *	1,4-10	
Y	FR 2 888 226 A1 (RIETER TEXTILE MACHINERY FR [FR]) 12 January 2007 (2007-01-12) * page 18, lines 1,2; figures *	2,3	
A	WO 2009/031163 A1 (LOHIA STARLINGER LTD [IN]; LOHIA AMIT KUMAR [IN]) 12 March 2009 (2009-03-12) * page 5, lines 15-17; figures *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
A	US 3 130 938 A (DYSART ROGER A) 28 April 1964 (1964-04-28) * column 2, line 62 - column 3, line 2; figures *	1	B65H
A	US 4 033 520 A (MIMS HERMAN D ET AL) 5 July 1977 (1977-07-05) * column 3, lines 20-27; figures *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 October 2012	Lemmen, René

CATEGORY OF CITED DOCUMENTS

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& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-10-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2010137944 A	24-06-2010	CN 101746643 A	23-06-2010
		EP 2196423 A2	16-06-2010
		JP 2010137944 A	24-06-2010
EP 1712505 A2	18-10-2006	CN 1847127 A	18-10-2006
		EP 1712505 A2	18-10-2006
		JP 2006298499 A	02-11-2006
US 3502282 A	24-03-1970	CH 446849 A	15-11-1967
		DE 1710105 A1	16-09-1971
		GB 1187400 A	08-04-1970
		US 3502282 A	24-03-1970
FR 2888226 A1	12-01-2007	AT 506312 T	15-05-2011
		EP 1901985 A2	26-03-2008
		FR 2888226 A1	12-01-2007
		WO 2007007004 A2	18-01-2007
WO 2009031163 A1	12-03-2009	AT 508974 T	15-05-2011
		CN 101641273 A	03-02-2010
		EP 2185454 A1	19-05-2010
		ES 2366008 T3	14-10-2011
		PT 2185454 E	11-07-2011
		US 2010264247 A1	21-10-2010
		WO 2009031163 A1	12-03-2009
US 3130938 A	28-04-1964	NONE	
US 4033520 A	05-07-1977	BR 7604866 A	09-08-1977
		CA 1057266 A1	26-06-1979
		MX 143163 A	27-03-1981
		US 4033520 A	05-07-1977

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2010137944 A **[0002] [0003] [0004] [0074] [0080]**
- WO 1999047739 A **[0005]**