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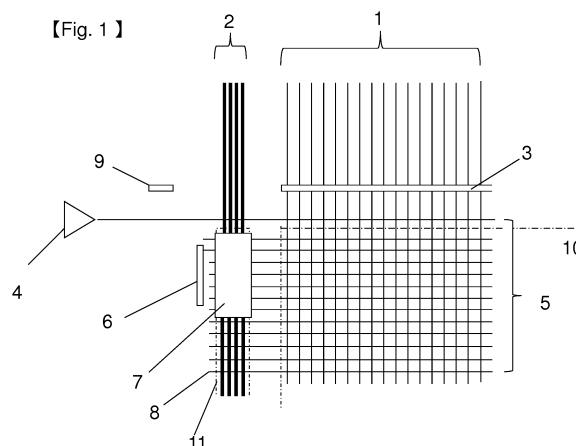
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(54) **SELVAGE HOLDING APPARATUS FOR LOOM, LOOM, AND METHOD FOR MANUFACTURING WOVEN FABRIC**

(57) An object of the present invention is to provide a device capable of reducing occurrence of cloth fell retreat at a selvage portion of a woven fabric and warp yarn looseness in a base cloth selvage portion when a high-density woven fabric is woven at a high speed, and a method for manufacturing the woven fabric. The present invention is: a selvage portion gripping device for a loom, having a space where a selvage portion can pass in which the selvage portion formed by weaving additional yarns and weft yarns can pass through in a woven fabric forwarding direction, a tiny space where the weft yarn can move in which the weft yarn can move in the woven fabric forwarding direction, and a means for maintaining a woven condition of the selvage portion even when the weft yarn is cut with a weft yarn cutter; and a method for weaving using a loom equipped with the device.



## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a selvage portion gripping device for a loom. More specifically, the present invention relates to a selvage portion gripping device for a loom for effectively suppressing occurrence of warp yarn looseness in a base cloth selvage portion that occurs near a selvage portion when a high-density woven fabric is woven, a loom equipped with the device, and a method for manufacturing the woven fabric using the device.

### BACKGROUND ART

**[0002]** Conventionally, there have been proposed a large number of high-density woven fabrics using a synthetic fiber multifilament including polyester and nylon. Due to diversification of uses, a woven fabric that is further made thin or is highly strengthened accompanying this diversification has been requested.

**[0003]** Generally, when the high-density woven fabric is woven, as a cover factor thereof becomes larger, an amount of movement of a cloth fell from a reed beating portion to a forwarding side of a warp yarn becomes larger. Because of this, the following inconveniences occur.

**[0004]** (It should be noted that the cover factor is a value expressed by  $(D1 \times 0.9)^{1/2} \times N1 + (D2 \times 0.9)^{1/2} \times N2$ , wherein total fineness of a warp yarn is  $D1$  (dtex), warp yarn density is  $N1$  (yarns/2.54 cm), total fineness of a weft yarn is  $D2$  (dtex), and weft yarn density is  $N2$  (yarns/2.54 cm).)

(a) The woven fabric near the reed beating portion undergoes a bumping phenomenon, and it becomes hard to obtain a woven fabric having desirable weft yarn density.

(b) The warp yarn induces fluff, and weaving cannot be stably performed.

(c) When a loom rotation speed is made high, a phenomenon in which the amount of movement of the cloth fell of the selvage portion from the reed beating portion to the forwarding side of the warp yarn becomes larger appears more conspicuously. Due to the warp yarn looseness at the selvage portion, a cloth length difference between the selvage portion and a central portion occurs, and a waving phenomenon, that is, a so-called warp yarn looseness in a base cloth selvage portion (also referred to as "Mimitarumi" or "Mimitaburi" in Japanese) appears. The woven fabric is formed into a desirable product by cutting and sewing. In order to effectively utilize the woven fabric to the maximum for a target use, the woven fabric is usually used up to near an end portion of the woven fabric. Ends of a cut part easily unravel. Accordingly, when the warp yarn looseness in the base cloth selvage portion occurs near the selvage

portion, poor cutting occurs, a shape as a product cannot be secured, or a function is not fulfilled. (d) The warp yarn looseness in the base cloth selvage portion in a gray fabric not only hinders each processing passing property of a roll winding process, a scouring process, and a heat set process, but also becomes a cause for creating wrinkles on the obtained woven fabric. As a technology to suppress occurrence of warp yarn looseness in the base cloth selvage portion, a method in which weaving density of a selvage portion is made higher than weaving density of a main body part of a woven fabric at the time of weaving (Patent Document 1), a method in which additional yarns are beaten up into a selvage portion formed of ground yarns and binding yarns (Patent Document 2), a method in which a binding yarn having a hetero-cross-section is used for a part of a plurality of additional yarns provided at an outside of the woven fabric (Patent Document 3), a method in which a section shape of a warp yarn at a selvage portion is made flat (Patent Document 4), and the like are known. However, it cannot be always said that these technologies are capable of sufficiently suppressing occurrence of the warp yarn looseness in the base cloth selvage portion.

**[0005]** Apart from the above-described technologies, a method in which, by an air jet loom or a water jet loom, a pair of grip rollers is provided at an arrival portion of a running weft yarn, tension for breaking the weft yarn running is applied to the weft yarn for a predetermined time until reed beating of a cloth fell is completed, and spring back of the warp yarn is held down (Patent Document 5), and a method in which a device which tightens a weft yarn similarly provided at an arrival portion of a weft yarn is driven and controlled (Patent Document 6) are known.

### PRIOR ART DOCUMENTS

#### PATENT DOCUMENTS

#### [0006]

Patent Document 1: Japanese Patent Laid-open Publication No. H09-302549

Patent Document 2: Japanese Patent Laid-open Publication No. H09-302550

Patent Document 3: Japanese Patent Laid-open Publication No. 2001-355143

Patent Document 4: Japanese Patent Laid-open Publication No. 2003-221749

Patent Document 5: Japanese Patent Laid-open Publication No. H10-46445

Patent Document 6: Japanese Patent Laid-open Publication No. H10-298850

## SUMMARY OF THE INVENTION

### PROBLEMS TO BE SOLVED BY THE INVENTION

**[0007]** However, any of the above-described conventional technologies has a problem in that complicated control is required to grip the running weft yarn, which thereby leads to an increase in cost for manufacturing the woven fabric.

**[0008]** In consideration of the drawbacks of the above-described conventional technologies, an object of the present invention is to provide a selvage portion gripping device for a loom capable of effectively suppressing occurrence of cloth fell retreat at a selvage portion or warp yarn looseness in a base cloth selvage portion when a high-density woven fabric is woven at a high speed, a loom, and a method for manufacturing the woven fabric.

### SOLUTIONS TO THE PROBLEMS

**[0009]** In order to solve the above-described problems, the present invention is configured by the following means.

An aspect of the present invention is:

(1) A selvage portion gripping device to be mounted on a loom, the selvage portion gripping device including: a space where a selvage portion can pass in which the selvage portion formed by weaving additional yarns and weft yarns can pass through in a woven fabric forwarding direction; a tiny space where the weft yarn can move in which the weft yarn can pass through; and a means for maintaining a woven condition of the selvage portion even when the weft yarn is cut with a weft yarn cutter of the loom.

A first embodiment is:

(2) The selvage portion gripping device for the loom, wherein the means for maintaining the woven condition of the selvage portion is an flexible part which catches the selvage portion allocated in the space where the selvage portion can pass. A second embodiment is:

(3) The selvage portion gripping device for the loom according to claim 2, wherein the flexible part which catches the selvage portion is a part formed of a plate spring or a flexible member and a plate material.

Another aspect of the present invention is:

(4) A loom having any of the selvage portion gripping devices for the loom, wherein the selvage portion gripping device exists at a selvage portion of a woven fabric and at a position where a weft yarn is cut with a weft yarn cutter.

Still another aspect of the present invention is:

(5) A method for manufacturing a woven fabric where a predetermined number of warp yarns are parallelized, additional yarns are parallelized at an outside of the parallelized warp yarns, and a weft yarn is

supplied to the warp yarns and the additional yarns, including: by using the loom, gripping a selvage portion by a selvage portion gripping device for a loom which exists on the loom at the time of cutting the weft yarn. Another embodiment thereof is:

(6) The method for manufacturing the woven fabric, includes: gradually separating the additional yarns from the selvage portion discharged from the selvage portion gripping device for the loom.

Still another method for manufacturing a woven fabric in one aspect of the present invention is:

(7) A method for manufacturing a woven fabric where a predetermined number of warp yarns are parallelized, additional yarns are parallelized at an outside of the parallelized warp yarns, and a weft yarn is supplied to the warp yarns and the additional yarns, including: after the weft yarn is supplied and the woven fabric is subjected to reed beating, gripping a selvage portion formed by weaving the additional yarns and the weft yarns at the time of cutting the weft yarn.

### EFFECTS OF THE INVENTION

**[0010]** When weaving is performed by using the selvage portion gripping device for the loom according to the above-described aspect (1) of the present invention, the selvage portion is disposed inside the selvage portion gripping device and is configured so as to maintain the woven condition thereof. Accordingly, occurrence of crimp of the weft yarn can be prevented, looseness of the warp yarn can be prevented, and warp yarn looseness in a base cloth selvage portion can be effectively suppressed. Similarly, when weaving is performed by using the selvage portion gripping device for the loom according to the above-described embodiment (2), the selvage portion inside the selvage portion gripping device for the loom is flexibly caught by the flexible part which catches the selvage portion. Accordingly, forwarding of the selvage portion is performed more smoothly, and the woven condition between the additional yarns and the weft yarns are maintained more reliably. Consequently, occurrence of the crimp of the weft yarn can be prevented, the looseness of the warp yarn can be prevented, and the warp yarn looseness in the base cloth selvage portion can be effectively suppressed.

**[0011]** Further, when weaving is performed by using the selvage portion gripping device for the loom according to the above-described aspect (3) of the present invention, the flexible part which catches the selvage portion is a part formed of a plate spring or a flexible member and a plate material. Accordingly, a structure is simple and inexpensive, forwarding of the selvage portion is performed more smoothly, and the woven condition between the additional yarns and the weft yarns is maintained further reliably. Consequently, occurrence of cloth fell retreat at the selvage portion of the woven fabric and the warp yarn looseness in the base cloth selvage portion

can be suppressed more effectively and inexpensively.

**[0012]** When weaving is performed by using the loom according to the above-described aspect (4) of the present invention, weaving can be performed while occurrence of cloth fell retreat at the selvage portion of the woven fabric or the warp yarn looseness in the base cloth selvage portion is suppressed more effectively.

**[0013]** Further, according to the weaving method in the above-described aspect (5) of the present invention, the selvage portion is disposed inside the selvage portion gripping device and is configured so as to maintain the woven condition thereof. Accordingly, it is possible to obtain a woven fabric in which occurrence of the crimp of the weft yarn can be prevented, the looseness of the warp yarn is prevented, and warp yarn looseness in the base cloth selvage portion is effectively suppressed.

**[0014]** According to the above-described embodiment (6), the additional yarns are separated from the selvage portion discharged from the selvage portion gripping device together with the movement of the woven fabric. Accordingly, cutting work of the selvage portion is not required, and the selvage portion can be reused by winding the additional yarns separately.

**[0015]** Further, according to the weaving method in the above-described aspect (7) of the present invention, since the selvage portion is configured so as to maintain the woven condition thereof. Accordingly, it is possible to obtain a woven fabric in which occurrence of the crimp of the weft yarn can be prevented, the looseness of the warp yarn is prevented, and the warp yarn looseness in the base cloth selvage portion is effectively suppressed.

**[0016]** In the weaving method of the present invention, the weaving is performed by a loom which uses fluid to insert the weft yarn, such as a water jet loom, the selvage portion gripping device for the loom is installed at a side of a weft yarn nozzle which is a nozzle for beating the weft yarn, and even in a case where the weft yarn is cut between the weft yarn nozzle and the selvage portion gripping device for the loom with a weft yarn cutter, the selvage portion is disposed inside the selvage portion gripping device and is configured so as to maintain the woven condition thereof. Accordingly, occurrence of the crimp of the weft yarn can be prevented, the looseness of the warp yarn can be prevented, and the warp yarn looseness in the base cloth selvage portion can be effectively suppressed.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]**

Fig. 1 is a schematic plan view showing a main part of a loom which includes a selvage portion gripping device for a loom.

Fig. 2 is a schematic perspective view showing the selvage portion gripping device for the loom.

Fig. 3 is a schematic sectional view of the selvage portion gripping device for the loom which uses a

pair of plate springs as a flexible part which catches a selvage portion.

Fig. 4 is a schematic sectional view of the selvage portion gripping device for the loom which uses the pair of plate springs as the flexible part which catches the selvage portion.

Fig. 5 is a diagram showing an evaluation method of warp yarn looseness in a base cloth selvage portion.

#### EMBODIMENTS OF THE INVENTION

**[0018]** Hereinafter, the best mode for carrying out the present invention will be described by using drawings and the like.

**[0019]** A selvage portion gripping device for a loom of the present invention is a selvage portion gripping device for a loom which has a space where a selvage portion can pass in which the selvage portion formed by weaving an additional yarn and a weft yarn can pass through in a woven fabric forwarding direction and a tiny space where a weft yarn can move in which the weft yarn can move in the woven fabric forwarding direction. The selvage portion gripping device further has a means for maintaining a woven condition of the selvage portion even when the weft yarn is cut with a weft yarn cutter.

**[0020]** It should be noted that a fringe is a weft yarn supplied from a weft yarn nozzle, and then cut and protruded from the woven fabric. The additional yarn is a yarn inserted into an outside of the woven fabric in a warp direction in order to catch the fringe apart from a ground yarn of the woven fabric. Since the weft yarns are weft-inserted into the additional yarns as with the warp yarns, a condition in which the additional yarns and the weft yarns are intersected by vertically changing their positions, i.e., a woven condition, is formed. The selvage portion is a portion where the fringes and the additional yarns are woven.

**[0021]** Fig. 1 is a schematic plan view showing an outline of weaving in a case where the selvage portion gripping device for the loom of the present invention is installed at a weft yarn nozzle side. "1" indicates a warp yarn, "2" indicates an additional yarn, "3" indicates a reed, "4" indicates a weft yarn nozzle, "5" indicates a weft yarn, "6" indicates a weft yarn cutter, "7" indicates a selvage portion gripping device for a loom, "8" indicates a fringe, and "9" indicates an edge dent of the reed. It should be noted that, in the weaving, a plurality of warp yarns further exists and the weft yarn 5 and the reed 3 are further extended at a right side in Fig. 1. However, the illustration is omitted.

**[0022]** The weft yarn 5 supplied from the weft yarn nozzle 4 is weft-inserted into the additional yarns 2 supplied from a device which supplies the additional yarns (not shown) and into the warp yarns 1 supplied from a device which supplies the warp yarns (not shown). The weft yarn 5 weft-inserted into the warp yarns 1 is beaten up by the reed 3 and the edge dent of the reed 9, and a woven

fabric 10 and a selvage portion 11 are formed. It should be noted that a tip of the beaten weft yarn 5 is normally caught by catch-cords (not shown) or the like, and weft yarn tension is maintained for a predetermined time. After that, the tip of the weft yarn 5 is cut between the woven fabric 10 and the catch-cords with a cutter allocated at an opposite side of the weft yarn nozzle (not shown), and the catch-cords are collected.

**[0023]** The selvage portion 11 where the additional yarns 2 and the weft yarns 5 are woven is supplied to the selvage portion gripping device for the loom 7 without being reed-beaten, and is moved inside the selvage portion gripping device synchronously with movements of the woven fabric 10 and the fringes 8. At this time, the weft yarn 5 is cut with the weft yarn cutter 6 immediately after the reed beating. However, the selvage portion 11 after the weft yarn is cut is disposed inside the selvage portion gripping device, and the woven condition is maintained. Accordingly, occurrence of crimp of the weft yarn or occurrence of looseness of the warp yarn can be prevented.

**[0024]** The selvage portion 11 after the weft yarn have been cut is discharged from the selvage portion gripping device as it is, and is moved together with the woven fabric 10. However, since the selvage portion 11 is discharged from the selvage portion gripping device for the loom, the woven condition of the additional yarns 2 and the fringes 8 is not maintained. The fringes 8 are gradually separated from the additional yarns 2 and move. The additional yarns 2 move independently. Further, the woven fabric 10 and the fringes 8 move together. The additional yarns 2 are collected in the same route as that of the catch-cords allocated at the opposite side of the weft yarn nozzle through a guide (not shown) or by another winding device. With this mechanism, the crimp of the weft yarn after the weft yarn is cut and looseness of the warp yarn are not generated, and occurrence of cloth fell retreat at the selvage of the woven fabric or warp yarn looseness in the base cloth selvage portion is effectively suppressed.

**[0025]** In order to make it difficult to generate the crimp of the weft yarn and the looseness of the warp yarn, a length for gripping the selvage portion (i.e., a length in a longitudinal direction of the woven fabric where the selvage portion is held down by the means for maintaining the woven condition of the selvage portion of the woven fabric, and hereinafter referred to as "selvage portion gripping length") is preferably 2 to 15 mm, and more preferably 3 to 10 mm. By having this range, high tension can be maintained even when the weft yarn is cut after the reed beating, and a woven fabric structure can be stabilized.

**[0026]** It is preferable that a width for gripping the selvage portion (i.e., a length in a direction vertical to the longitudinal direction of the woven fabric where the selvage portion gripping device for the loom grips the selvage portion (a direction where the additional yarns which form the selvage portion are arranged), and hereinafter

referred to as "selvage portion gripping width") be a width capable of gripping the entire selvage portion. However, the width is not limited to the above-described width as long as the high tension can be maintained even when the weft yarn is cut after the reed beating so as to stabilize the woven fabric structure.

**[0027]** It should be noted that the selvage portion gripping device for the loom is only disposed at the weft yarn nozzle side of the woven fabric 10. However, the device may be disposed at the opposite side of the weft yarn nozzle. In a case where the selvage portion gripping device for the loom is disposed at the opposite side of the weft yarn nozzle, it is preferable that the device be provided between the woven fabric and the weft yarn cutter allocated at the opposite side of the weft yarn nozzle. At that time, similarly to the weft yarn nozzle side, it is preferable that the additional yarns be parallelized at the opposite side of the weft yarn nozzle of the woven fabric, that the selvage portion woven with the beaten weft yarns be formed, and that the selvage portion gripping device for the loom be disposed near a reed beating portion of the selvage portion. It is more preferable that the selvage portion gripping device for the loom allocated at the side of the weft yarn nozzle and the selvage portion gripping device for the loom allocated at the opposite side of the weft yarn nozzle be disposed opposite to each other via the warp yarns of the woven fabric so as to maintain weft yarn tension.

**[0028]** Fig. 2 is an enlarged schematic perspective view of a case where the selvage portion gripping device for the loom 7 according to the present invention is installed at the weft yarn nozzle 4 side. "1" indicates the warp yarn, "2" indicates the additional yarn, "4" indicates the weft yarn nozzle, "5" indicates the weft yarn, "8" indicates the fringe, "10" indicates the woven fabric, and "11" indicates the selvage portion. The woven fabric 10 is forwarded from a right upper side in the drawing to a left lower side in the drawing. Further, the plurality of warp yarns further exists and the weft yarn 5 is further extended at a right upper portion in the drawing. However, the illustration is omitted.

**[0029]** It is desirable that the selvage portion gripping device for the loom 7 be provided at least at the weft yarn nozzle side of the woven fabric 10. In addition, it is preferable that the device 7 be further provided at the opposite side of the weft yarn nozzle.

**[0030]** The selvage portion gripping device for the loom 7 according to the present invention includes an outlet 71B of the selvage portion of a space where the selvage portion can pass in which the selvage portion 11 formed by weaving the additional yarns 2 and the weft yarns 5 can pass through in the woven fabric forwarding direction and an inlet 71A (not shown) of the selvage portion of the space where the selvage portion can pass formed at upper reaches of the additional yarns 2 of the selvage portion gripping device for the loom 7. An outlet 72B of the selvage portion is a tiny space portion where the weft yarn can move and which is at the woven fabric side for

which the fringes 8 move parallel to the forwarding direction of the woven fabric 10. A tiny space where the weft yarn can move and which is allocated at the weft yarn nozzle side 72A (not shown) is formed at the weft yarn nozzle side of the selvage portion gripping device for the loom 7.

**[0031]** The selvage portion 11 enters the space portion where the selvage portion can pass from the inlet 71A of the space where the selvage portion can pass along the forwarding direction of the woven fabric 10. The fringes 8 are gripped by a gripping means provided between the tiny space where the weft yarn can move and which is allocated at the weft yarn nozzle side 72A and the tiny space where the selvage portion can move and which is allocated at the woven fabric side 72B. The fringes 8 move inside the space where the selvage portion can pass parallel to the forwarding direction of the woven fabric 10. Even in a case where the weft yarn 5 is cut with the weft yarn cutter between the weft yarn nozzle 4 and the selvage portion gripping device for the loom 7, the woven condition of the selvage portion is maintained.

**[0032]** As the means for maintaining the woven condition of the selvage portion 11 within the selvage portion gripping device for the loom, a sliding member which does not prevent movement of the selvage portion in the space where the selvage portion can pass can be cited. A method in which a dimension of the space where the selvage portion can pass is appropriately set according to a dimension of the selvage portion so as to be capable of gripping the selvage portion 11 can be employed. However, a method in which a flexible part which catches a selvage portion which flexibly catches the selvage portion is arranged in the space where selvage portion can pass of the selvage portion gripping device for the loom is simpler and more reliable.

**[0033]** In this case, the flexible part which catches the selvage portion is provided inside the space where selvage portion can pass. As the flexible part which catches the selvage portion, a rubber plate or a resin plate can be used, or a member formed of a flexible member, such as a coil spring or a rubber, and a plate material made of a metal or the like can be used. Further, it is advantageous to use a fixed plate spring in the space where the selvage portion can pass in terms of a structure and simplicity, i.e., cost. Also, it is preferable that a portion of the flexible part which catches the selvage portion which is in contact with the selvage portion have a surface having a low abrasion property.

**[0034]** Fig. 3 is a schematic sectional view of the selvage portion gripping device for the loom which uses a pair of plate springs 74A, 74B as the flexible part which catches the selvage portion. Fig. 3 corresponds to a case where the device is taken along a surface orthogonal to the weft yarns 5 in Fig. 2.

**[0035]** The woven fabric is forcibly taken off by a winding roll in the weaving. Accordingly, in a condition where the additional yarns 2 and the weft yarns 5 are woven, the selvage portion 11 is moved from a right side to a left

side in the drawing, i.e., from the inlet 71A of the space where the selvage portion can pass to the outlet 71B of the space where the selvage portion can pass. "74A" and "74B" indicate a pair of carbon steel catching parts, such as plate springs, provided inside the space portion where the selvage portion can pass, and are respectively fixed to upper and lower wall surfaces of the space portion where the selvage portion can pass by two bolts 73. There, the selvage portion 11 provided in the space portion where the selvage portion can pass is caught by the plate springs 74A, 74B serving as the flexible selvage portion parts from the upper and lower surfaces. Even in a case where the weft yarn 5 is cut between the weft yarn nozzle 4 and the selvage portion gripping device for the loom 7, the cut weft yarn 5 is prevented from slipping out from the selvage portion 11 or from loosening, and the woven condition of the selvage portion 11 is maintained inside the selvage portion gripping device for the loom 7. The selvage portion 11 is moved inside the space portion where the selvage portion can pass and discharged from the selvage portion gripping device for the loom 7. The woven fabric 10 is moved together with the fringes 8. At this time, as described above, the woven condition between the additional yarns 2 and the cut fringes 8 are loosened, the cut fringes 8 are gradually separated from the additional yarns 2, and the additional yarns 2 move independently and are separated from the woven fabric 10 and the fringes 8.

**[0036]** It is not always necessary that the flexible part which catches the selvage portion is formed in a pair. One plate spring disposed on the upper (or the lower) wall surface and a lower side (or an upper side) thereof inside the selvage portion passage section may be provided. The plate spring can employ various shapes. However, in order to catch the selvage portion by uniform stress over a constant length, as in Fig. 3, it is preferable to use the pair of plate springs 74A, 74B which respectively has a planar shape and two arc shapes at both ends thereof. By considering the number of the additional yarns which configures the selvage portion and a thickness of each additional yarn, a thickness of the selvage portion, and the like, a length or a width of a portion having the planar shape, a thickness of the plate spring, and the like may be appropriately set. Accordingly, the woven condition of the selvage portion can be maintained in a degree that the crimp of the weft yarn after the weft yarn is cut or the looseness of the warp yarn is not generated at the selvage portion discharged from the selvage portion gripping device 7. Further, as the material, stainless steel, phosphor bronze, beryllium copper, resin, or the like can be employed as well as the carbon steel.

**[0037]** Fig. 4 is a schematic sectional view of the selvage portion gripping device for the loom 7 shown in Fig. 3 which is taken along a surface orthogonal to a forwarding direction of the additional yarns 2. In this drawing, "72A" indicates the tiny space where the weft yarn can move for the weft yarn at the weft yarn nozzle side (before cutting and after cutting) to move together with the sel-

vage portion, and "72B" indicates the tiny space where the weft yarn can move for the weft-inserted weft yarn 5 to move in the forwarding direction of the woven fabric 10. These tiny space where the weft yarn can move 72A, 72B can adjust a clearance so that the weft yarn can pass through and a woven portion between the additional yarns and the weft yarns in the woven condition (i.e., the selvage portion) cannot pass through. Accordingly, even in a case where the weft yarn is cut at the weft yarn nozzle side, the woven condition is maintained, and there is no occurrence of a crimp of the weft yarn caused by slipping-out or looseness of the cut weft yarn or no occurrence of a loosen fringe caused by the looseness of the warp yarn. Therefore, it is preferable that a height of the tiny space where the weft yarn can move be smaller than heights of the inlet and the outlet of the space portion where the selvage portion can pass.

**[0038]** Typically, the woven fabric woven by using the selvage portion gripping device for the loom according to the present invention is particularly useful when weaving a high-density woven fabric used for sportswear, industrial materials, or the like. However, the present invention is not limited to this.

**[0039]** The yarn for the warp yarn or the weft yarn used for weaving is not particularly limited, and a chemical fiber, a natural fiber, or the like can be used. As the chemical fiber, for example, a polyamide-based fiber, a polyester-based fiber, an aramid-based fiber, a rayon-based fiber, a polysulfone-based fiber, a super high molecular weight polyethylene-based fiber, or the like can be used. As the natural fiber, cotton, hemp, silk, wool, or the like can be used. In a case of weaving the high-density woven fabric, the chemical fiber is preferable. Among these, the polyamide-based fiber and the polyester-based fiber which are excellent in mass productivity and economy are preferable. The polyamide-based fiber is further preferable from a viewpoint of heat resistance and less fluff of the fiber.

**[0040]** As the polyamide-based fiber, for example, fibers made of Nylon 6, Nylon 66, Nylon 12, Nylon 46, a copolymerized polyamide of the Nylon 6 and the Nylon 66, copolymerized polyamides formed by copolymerizing the Nylon 6 with polyalkylene glycol, dicarboxylic acid, amine, and the like can be cited. Further, as the polyester-based fiber, for example, fibers made of polyethylene terephthalate, polybutylene terephthalate, polytrimethylene terephthalate, and the like can be cited. A fiber formed by copolymerizing the polyethylene terephthalate or the polybutylene terephthalate with isophthalic acid, or 5-sodium sulfoisophthalic acid as an aromatic dicarboxylic acid component, or a fiber formed by copolymerizing the polyethylene terephthalate or the polybutylene terephthalate with aliphatic dicarboxylic acid, such as adipic acid, may be used as well.

**[0041]** Further, in order to improve productivity in a spinning and stretching process and a processing process or to improve characteristics, these synthetic fibers may contain an additive, such as a heat stabilizer, an

antioxidant, a light stabilizer, a smoothing agent, an anti-static agent, a plasticizer, a thickener, a pigment, a flame retardant, and the like.

**[0042]** Further, as a form of the fiber, a multifilament yarn is preferably used from a point of significantly achieving the effects of the present invention.

**[0043]** Further, a sectional shape of a single yarn is not limited to a round shape and may be formed in any shape. For example, needless to say, the sectional shape may be a laterally symmetrical shape, such as a flat shape, a rectangular shape, a rhomboid, or a cocoon shape, or a laterally asymmetrical shape. Alternatively, the sectional shape may be a shape combining any of these. Further, the sectional shape may have a protrusion or unevenness. The yarn may be a hollow yarn.

**[0044]** A plain weave, a twill weave, a satin weave, a variation of these weaves, and the like can be used for the woven fabric manufactured by using the selvage portion gripping device for the loom according to the present invention. However, the present invention is not particularly limited to these weaves.

**[0045]** The woven fabric manufactured by using the selvage portion gripping device for the loom according to the present invention is woven using the warp yarn, the weft yarn, and the additional yarn as basic yarns. The additional yarn catches the weft yarn by utilizing its rigidity and prevents looseness of the weft yarn. The additional yarn forms the selvage portion by weaving with the weft yarn.

**[0046]** A predetermined number of the warp yarns are parallelized, and the additional yarns are further parallelized at the outside of the parallelized warp yarns. The weft yarn is supplied and beaten up, and the woven fabric is manufactured. As described above, after the woven condition between the supplied weft yarns and the additional yarns is maintained near the reed beating portion of the selvage portion by the selvage portion gripping device for the loom, the selvage portion is discharged from the selvage portion gripping device for the loom of the woven fabric. In other words, near the reed beating portion of the selvage portion, the selvage portion gripped by the selvage portion gripping device for the loom is moved synchronously with the movement of the woven fabric inside the selvage portion gripping device for the loom, and discharged thereafter.

**[0047]** The discharged selvage portion is moved together with the movement of the woven fabric. As mentioned above, since the additional yarns are gradually separated from the portion of the selvage portion where the weft yarn is cut, the finished woven fabric does not include the additional yarns. In other words, the additional yarn is supplied from a supply device different from the warp yarn. While the warp yarns are passed through healds and reeds, the additional yarns are not passed through the reeds. The additional yarns form the selvage portion together with the weft yarns woven by opening movements similar to the warp yarns, and are passed through the selvage portion gripping device for the loom.

The additional yarns are supplied from the vicinity of a warp yarn beam, a load is applied to the additional yarns by a spring type tensioner, and the additional yarns are passed through the opened healds. After the weft yarn is run by high-pressure water or pressured air and the warp yarn and the weft yarn are beaten up by the reed, the weft yarn is cut with the weft yarn cutter. Here, since the selvage portion gripping device for the loom grips the selvage portion so as to maintain the woven condition of the selvage portion, slipping-out of the cut weft yarn from the selvage portion or looseness thereof is suppressed. With this configuration, compared with a case where the selvage portion gripping device for the loom is not installed, the crimp of the weft yarn of the selvage portion becomes small, and the crimp of the warp yarn becomes large. Due to this, warp yarn tension becomes high, gripping force for the weft yarn increases, and the cloth fell retreat at the selvage portion becomes small. Hence, since a cloth length difference between the selvage portion and a central portion of the woven fabric becomes small, an amount of a bow becomes small, and the warp yarn looseness in the base cloth selvage portion can improve.

**[0048]** In a case where weaving is performed according to the conventional method, the cloth fell is expressed by a distance from a top of a temple to the cloth fell. When the weft yarn is run by the high-pressure water or the pressured air, high tension acts on the weft yarn. When the weft yarn is cut with the cutter after the weft yarn is beaten up by the reed, the free end portion of the weft yarn returns to a ground side of the woven fabric. Due to the decline in the weft yarn tension at the selvage portion of the woven fabric, the crimp of the weft yarn increases, and conversely the crimp of the warp yarn at the selvage portion decreases. Accordingly, the warp yarn tension at the selvage portion becomes low. As a result, the gripping force exerted on the weft yarn by the warp yarns disappears, and the cloth fell retreat becomes large. Also, the amount of a bow of the woven fabric increases, which thereby leads to occurrence of the warp yarn looseness in the base cloth selvage portion or deterioration of physical properties of the woven fabric. However, by performing weaving by using the selvage portion gripping device for the loom according to the present invention, the above-described problems are solved.

**[0049]** When weaving is performed by using the selvage portion gripping device for the loom according to the present invention, the additional yarns are normally supplied from a cone or a paper tube without using a leno yarn device or a bobbin. Particularly, it is preferable to use a spring washer to manage the tension when the additional yarns are supplied.

**[0050]** Since moderate crimping lessens fluctuations in tension of the additional yarns during weaving, it is preferable that the additional yarn be a multifilament and a crimped yarn. A material of the additional yarn is not particularly limited. However, polyester or nylon is easily available in general. It is preferable to select the material

of the additional yarn similar in yarn characteristics to the warp yarn.

**[0051]** It is preferable that total fineness of the additional yarns be larger than total fineness of the weft yarns. By keeping woven strength between the additional yarns and the weft yarns at the selvage portion larger than woven strength between the warp yarns and the weft yarns, slipping-out of the cut weft yarn from the selvage portion or loosening thereof is prevented.

**[0052]** From a viewpoint of exhibiting the effects of the present invention to the maximum, it is preferable that the number of additional yarns be four to eight yarns.

**[0053]** Since the woven fabric using the selvage portion gripping device for the loom according to the present invention can be subjected to high-speed operation, it is preferable that the woven fabric be woven by a jet loom. Particularly, a water jet loom is preferable from a point of conspicuously exhibiting the effects of the present invention. The water jet loom runs the weft yarns by the high-pressure water, beats up the weft yarns, and then cuts the weft yarns at the weft yarn nozzle side. Because of this, compared with an air jet loom or a rapier loom, the water jet loom tends to have high running tension of the weft yarns, and further improvement of gripping force of the weft yarn at the selvage portion is requested. Accordingly, at the time of high-speed operation or a wide woven fabric in particular, the effect obtained by use of the added yarns (additional yarns) and by the selvage portion gripping device for the loom according to the present invention becomes more conspicuous.

**[0054]** In a case where the high-density woven fabric is woven by using the selvage portion gripping device for the loom according to the present invention, it is preferable that, after the weaving by the water jet loom, scouring/heat set processing be performed to dry and/or remove an oil agent adhered to original yarns and remove wrinkles.

**[0055]** A width of the woven fabric is not particularly limited. However, since the warp yarn looseness in the base cloth selvage portion easily occurs as the woven fabric is wider, the device is particularly useful for the woven fabric having a region where only the warp yarns exist of 140 cm or more, and particularly of 180 cm or more. It is preferable that an upper limit of the width be 280 cm or less in manufacturing.

**[0056]** Next, a method for weaving using the selvage portion gripping device for the loom according to the present invention will be described.

**[0057]** The above-described yarns are used for the warp yarns, the additional yarns, and the weft yarns. The warp yarns and the additional yarns whose fineness is in proportion to woven fabric design are arranged for the warp and set in the loom. The weft yarns are prepared in the same manner. The additional yarn to be used is normally thicker than the warp yarn. As for the loom, it is preferable to use the water jet loom from a point of reducing occurrence of warp yarn fluff or improving productivity.



**[0058]** The tension of the warp yarn and the additional yarn is preferably 10 to 250 cN/yarn, and more preferably 20 to 200 cN/yarn. By setting the tension in such a range, a tiny space between single fibers in a yarn bundle of the yarns that configures the woven fabric can be reduced, and a dense woven fabric can be obtained. Further, after the weft yarn is inserted, the warp yarns tensioned as described above force the weft yarn to bend so that structure-restraining force of the woven fabric in the weft yarn direction is enhanced, an anti-yarn slippage property of the woven fabric improves, and a seam portion of a sewn product can be strengthened. If the warp yarn tension is small, a contact area between the warp yarns and the weft yarns in the woven fabric cannot be increased, and edge comb resistance cannot be obtained to a desirable extent. Further, an effect of reducing the tiny space between the single fibers is small. If the warp yarn tension is excessively great, the warp yarns tend to produce fluff due to abrasion at heald mails.

**[0059]** As a concrete method for adjusting the warp yarn tension within the above-described range, a method in which an inserting speed of the weft yarn is adjusted besides adjusting a forwarding speed of the warp yarn of the loom can be cited. Whether the warp yarn tension is actually within the above-described range during weaving can be checked by, for example, measuring the tension that acts per warp yarn at an intermediate point between the warp yarn beam and a back roller during operation of the loom. Further, it is preferable to provide a difference between tension of an upper sheet of the warp yarn and tension of a lower sheet of the warp yarn at the warp yarn opening.

**[0060]** As an adjustment method, there is, for example, a method in which a difference in a running line length between the upper yarns and the lower yarns is provided by installing a back roller level to, for example, about 10 to 30 mm higher than a horizontal position and the like. Further, as another method of providing a difference between the tension of the upper yarns and the tension of the lower yarns, there is, for example, a method in which a cam drive system is adopted in an opening device, and a dwell angle for the other side of the upper yarns/the lower yarns is made 100 degrees greater than that of the other. The tension of the warp yarn with the increased dwell angle is higher.

**[0061]** Next, if necessary, processing such as scouring, heat set, or the like is performed after the weaving process.

**[0062]** In the woven fabric woven by using the selvage portion gripping device for the loom according to the present invention, occurrence of cloth fell retreat at the selvage portion or occurrence of the warp yarn looseness in the base cloth selvage portion can be effectively prevented even in the high-speed weaving. For example, even when the loom is operated at high-speed rotation of about 400 to 900 rpm, occurrence of the warp yarn looseness in the base cloth selvage portion is extremely suppressed. Accordingly, the woven fabric can be cut

into a shape as designed and also easy to sew. Further, since occurrence of the warp yarn looseness in the base cloth selvage portion is suppressed, waste of the woven fabric is small, and the woven fabric is advantageous in terms of cost.

#### EXAMPLE

**[0063]** Hereinafter, a configuration and an effect of the present invention will be described in detail by using the following examples.

#### [Measurement Method]

##### (1) Total Fineness

**[0064]** Total fineness was obtained by measuring fineness based on corrected mass with a predetermined load of 0.045 cN/dtex according to a JIS L 1013:2010 8.3.1 A method.

##### (2) Number of Single Fibers

**[0065]** Calculation was performed according to a method of JIS L 1013:2010 8.4.

##### (3) Fineness of Single Fiber

**[0066]** Calculation was performed by dividing the total fineness by the number of single fibers.

##### (4) Weaving Density of Warp Yarns/Weft Yarns

**[0067]** Measurement was performed based on JIS L 1096:2010 8.6.1. Each sample was placed on a flat table, and unnatural wrinkles and tension were removed. Then, at five different locations, the numbers of warp yarns and weft yarns in sections of 2.54 cm were counted, and average values for the warp yarn and the weft yarn were calculated.

##### (5) Strength/Elongation

**[0068]** Measurement was performed under a constant speed elongation condition shown in a JIS L 1013:2010 8.5.1 standard time test. Using "TENSILON" UCT-100 made by ORIENTEC Co., LTD, each sample was performed at a grip interval of 25 cm and a pulling speed of 30 cm/min. It should be noted that elongation was obtained from elongation of a point showing the ultimate strength in an S-S curve.

##### (6) Warp Yarn Tension during Weaving

**[0069]** Using a "Check Master" (registered trademark) (type: CM-200FR) made by Kanai Kouki K.K., tension acting per warp yarn in an intermediate portion between the warp yarn beam and the back roller during operation

of the loom was measured.

#### (7) Evaluation of Warp Yarn Looseness in Base Cloth Selvage Portion

**[0070]** As shown in Fig. 5, two marks (102A, 102B) are put on a central portion in a width direction of the woven fabric 10 at an interval of 500 mm. Two lines (103A, 103B) are drawn along the weft yarns from the marks 102A, 102B at the respective central portions of the woven fabric in a direction of an end portion 101A at the weft yarn nozzle side of the woven fabric and in a direction of an end portion 102B at the opposite side of the weft yarn nozzle of the woven fabric. The end portions 101A, 102B are width direction both ends. In this case, the woven condition of the woven fabric 10 tends to be loose at both the sides as compared with the central portion. Accordingly, as shown in Fig. 5, the two lines bend toward the cloth fell on both the sides, and an interval between the two lines, i.e., the lines 103A, 103B in the direction of the weft yarn, tends to be wider at peripheral portions than the central portion. Therefore, while a distance between the two lines 103A, 103B in the weft yarn direction at the central portion of the woven fabric is 500 mm, when the warp yarn looseness in the base cloth selvage portion becomes large, an interval between the two lines 103A and 103B in the direction of the weft yarn becomes wider at the end portion 101A allocated at the weft yarn nozzle side of the woven fabric and the end portion 101B allocated at a side which is not the weft yarn nozzle side of the woven fabric. The end portions 101A, 101B are the both sides.

**[0071]** Next, lines, i.e., lines 104A, 104B in the warp yarn direction, are drawn between the two lines 103A, 103B in the direction of the weft yarn at an interval of 20 mm from the end portion 101A allocated at the weft yarn nozzle side of the woven fabric and from the end portion 101B allocated at the opposite side of the weft yarn nozzle of the woven fabric. The end portions are the both sides of the woven fabric. The woven fabric is cut along the lines 103A, 103B in the direction of the weft yarn and the lines 104A, 104B in the direction of the warp yarn, thereby obtaining two strip-shaped bodies generated at the end portions of the woven fabric and having shapes close to rectangles. Lengths in the warp direction, (i.e., a length direction) of the strip-shaped bodies were measured, and the warp yarn looseness in the base cloth selvage portion was evaluated.

[Example]

(Warp Yarns/Weft Yarns)

**[0072]** Multifilament yarns formed of polyester and having a circular sectional shape, with single fiber fineness of 2.33 dtex, the number of filaments being 36, total fineness of 84 dtex, no twist provided, strength of 4.21 cN/dtex, and elongation of 40% were prepared.

(Weaving)

**[0073]** Employing the above-described yarns for warp yarns and weft yarns and by a water jet loom equipped with a selvage portion gripping device for a loom, which will be described below, a plain weave fabric was woven with warp yarn tension during weaving being 20 cN/yarn, loom rotation speed being 500 rpm, warp yarn density being 133 yarns/2.54 cm, weft yarn density being 133 yarns/2.54 cm, and a width (a width of a portion where the warp yarns exist) being 200 cm.

**[0074]** It should be noted that, as for additional yarns, 3 ply textured yarns formed of polyester and having a circular sectional shape, with single fiber fineness of 3.44 dtex, the number of filaments being 96 f, and total fineness of 330 dtex were used. Four additional yarns were supplied and parallelized to each of the two outsides of the warp yarns where a predetermined number of yarns were parallelized, and were supplied by setting additional yarn tension to 130 cN/yarn. A clearance of 5 mm was provided between the warp yarn and the additional yarn as a fringe. The fringes of the discharged selvage portion were gradually separated from the additional yarns, and the additional yarns were collected in the same route as the catch-cords at the opposite side of the weft yarn nozzle through a guide.

(Selvage Portion Gripping Device for Loom)

**[0075]** The selvage portion gripping device for the loom in Fig. 3 includes the space portion where the selvage portion can pass in which the selvage portion formed by weaving the additional yarns and the weft yarns can pass through in the woven fabric forwarding direction and the tiny space portion where the weft yarn can move in which the weft yarn can move in the woven fabric forwarding direction, and further includes a pair of plate springs arranged at the space portion where the selvage portion can pass. The two selvage portion gripping devices for the loom were respectively installed at the end allocated at the weft yarn nozzle side and at the end allocated at the opposite side of the weft yarn nozzle near the reed beating portion of the loom.

**[0076]** A main body of the selvage portion gripping device for the loom 7 is made of stainless steel and has a rectangular parallelepiped shape (6 mm in width, 30 mm in height, 25 mm in length). As shown in Fig. 3, the selvage portion gripping device for the loom 7 includes the inlet 71A of the space where the selvage portion can pass which has a width of 4 mm and a height of 10 mm and the outlet 72A of the space where the selvage portion can pass. Also, the two flexible parts which catch the selvage portion are vertically provided in the space where the selvage portion can pass. The two flexible parts which catch the selvage portion are respectively configured by the plate springs 74A, 74B and plate spring supporting bodies 75A, 75B. The plate springs 74A, 74B are respectively made of stainless steel having a thickness of 0.3

mm, have the arc-shaped portions at both ends of the flat plate portion having a length of 20 mm, and are fixed to the plate spring supporting bodies 75A, 75B by bolts. As a result, a selvage portion gripping length was set to 20 mm, and a selvage portion gripping width was set to 4 mm. The selvage portion was configured to be caught so that the selvage portion passes between the flat plate portions of the pair of plate springs synchronizing with a flow of the woven fabric. Further, as shown in Fig. 4, the tiny space where the weft yarn can move and which is allocated at the weft yarn nozzle side 72A and the tiny space portion where the selvage portion can move and which is allocated at the woven fabric side 72B are formed on both the side surfaces of the selvage portion gripping device for the loom 7. A widths of these tiny spaces are formed slightly larger than a diameter of the weft yarn and smaller than a thickness of the selvage portion where the weft yarns and the additional yarns are woven. As a result, the weft yarn moves parallel along the flow of the woven fabric, and the selvage portion is not slipped out from the tiny space where the weft yarn can move to the woven fabric side even after the weft yarn is cut with the weft yarn cutter.

[Comparative Example]

**[0077]** Except that the selvage portion gripping device for the loom and the additional yarns are not used, the weaving was performed according to a method similar to the method in Example.

[Evaluation of Warp Yarn Looseness in Base Cloth Selvage Portion]

**[0078]** Hereinafter, the woven fabrics obtained in Example and Comparative Example were evaluated according to the above-described evaluation method of the warp yarn looseness in the base cloth selvage portion. Lengths of the strip-shaped bodies are shown. As is evident from this, occurrence of cloth fell retreat at the selvage portion of the woven fabric and the warp yarn looseness in the base cloth selvage portion were decreased in the woven fabric woven by using the selvage portion gripping device for the loom according to the present invention.

[Warp Yarn Looseness at Base Cloth Selvage Portion in Example]

**[0079]**

L side: 510.5 mm  
R side: 512.5 mm

[Warp Yarn Looseness at Base Cloth Selvage Portion in Comparative Example]

**[0080]**

L side: 518.0 mm  
R side: 520.0 mm

## DESCRIPTION OF REFERENCE SIGNS

**[0081]**

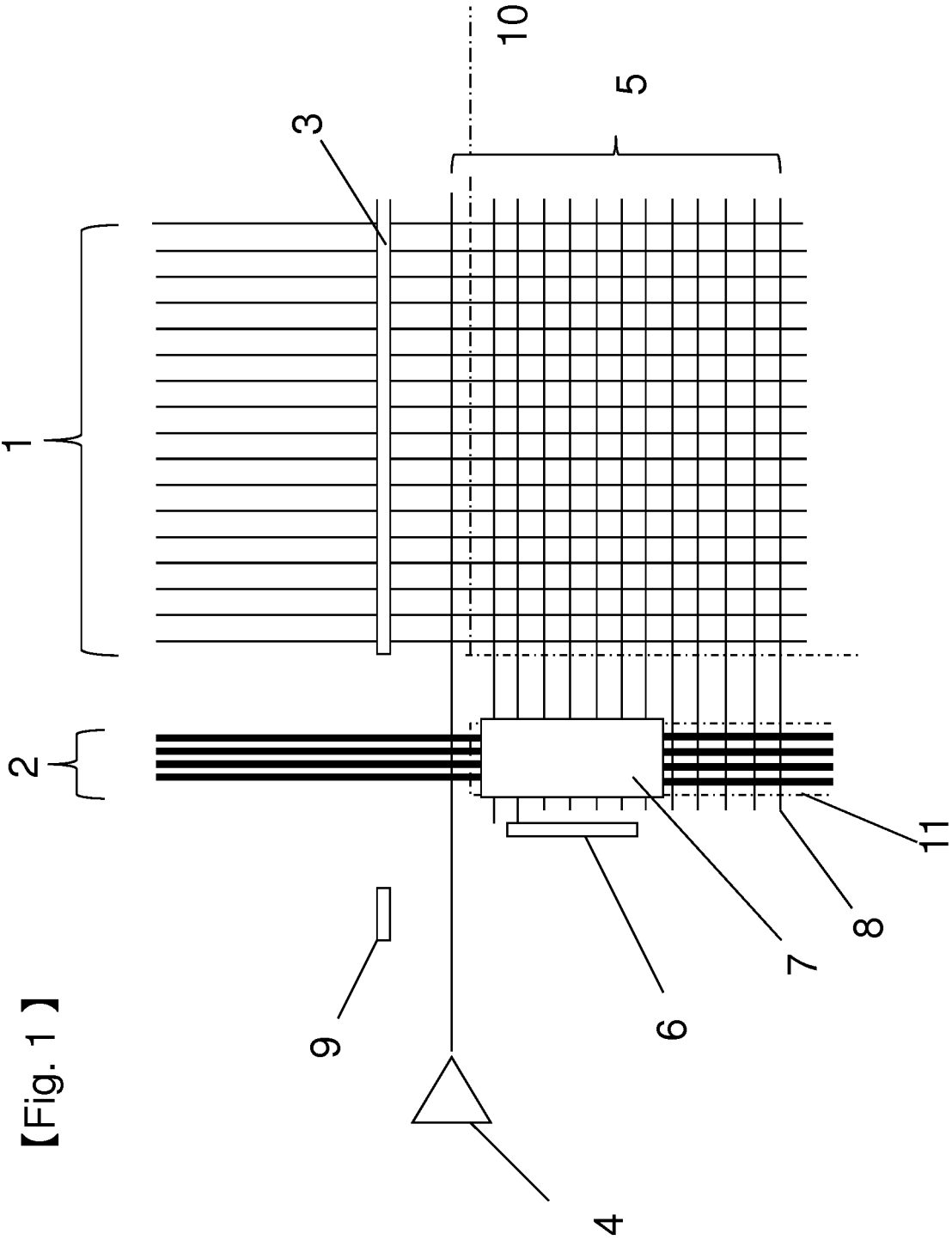
1: Warp yarn  
2: Additional yarn  
3: Reed  
4: Weft yarn nozzle  
5: Weft yarn  
6: Weft yarn cutter  
7: Selvage portion gripping device for loom  
8: Fringe  
9: Edge dent of reed  
10: Woven fabric  
11: Selvage portion  
71A: Inlet of space where selvage portion can pass  
71B: Outlet of space where selvage portion can pass  
72A: Tiny space where weft yarn can move and which is allocated at weft yarn nozzle side  
72B: Tiny space where weft yarn can move and which is allocated at woven fabric side  
73: Bolt  
74A, 74B: Plate springs  
75A, 75B: Plate spring supporting bodies  
101A: End portion allocated at weft yarn nozzle side of woven fabric  
101B: End portion allocated at side which is not weft yarn nozzle side of woven fabric  
102A, 102B: Marks at central portions of woven fabric  
103A, 103B: Lines along weft yarn  
104A, 104B: Lines along warp yarn  
L, R: Strips  
X: Direction of weft yarn  
Y: Direction of warp yarn

## Claims

1. A selvage portion gripping device to be mounted on a loom,  
the selvage portion gripping device comprising: a space where a selvage portion can pass in which the selvage portion formed by weaving additional yarns and weft yarns can pass through in a woven fabric forwarding direction; a tiny space where the weft yarn can move in which the weft yarn can pass through; and a means for maintaining a woven condition of the selvage portion even when the weft yarn is cut with a weft yarn cutter of the loom.
2. The selvage portion gripping device for the loom according to claim 1, wherein the means for maintaining the woven condition of the selvage portion is a flexible part which catches the selvage portion allo-

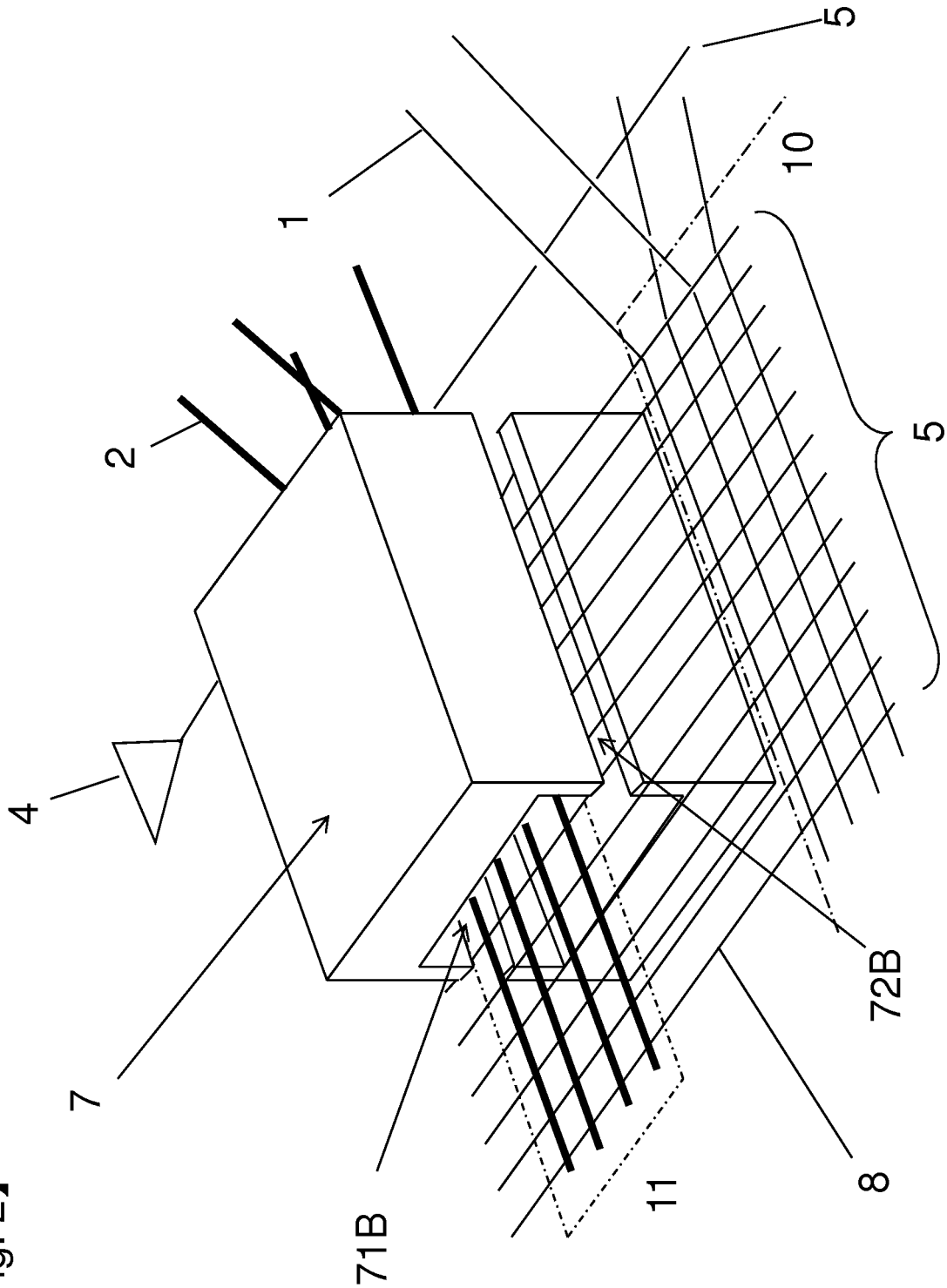
cated in the space where the selvage portion can pass.

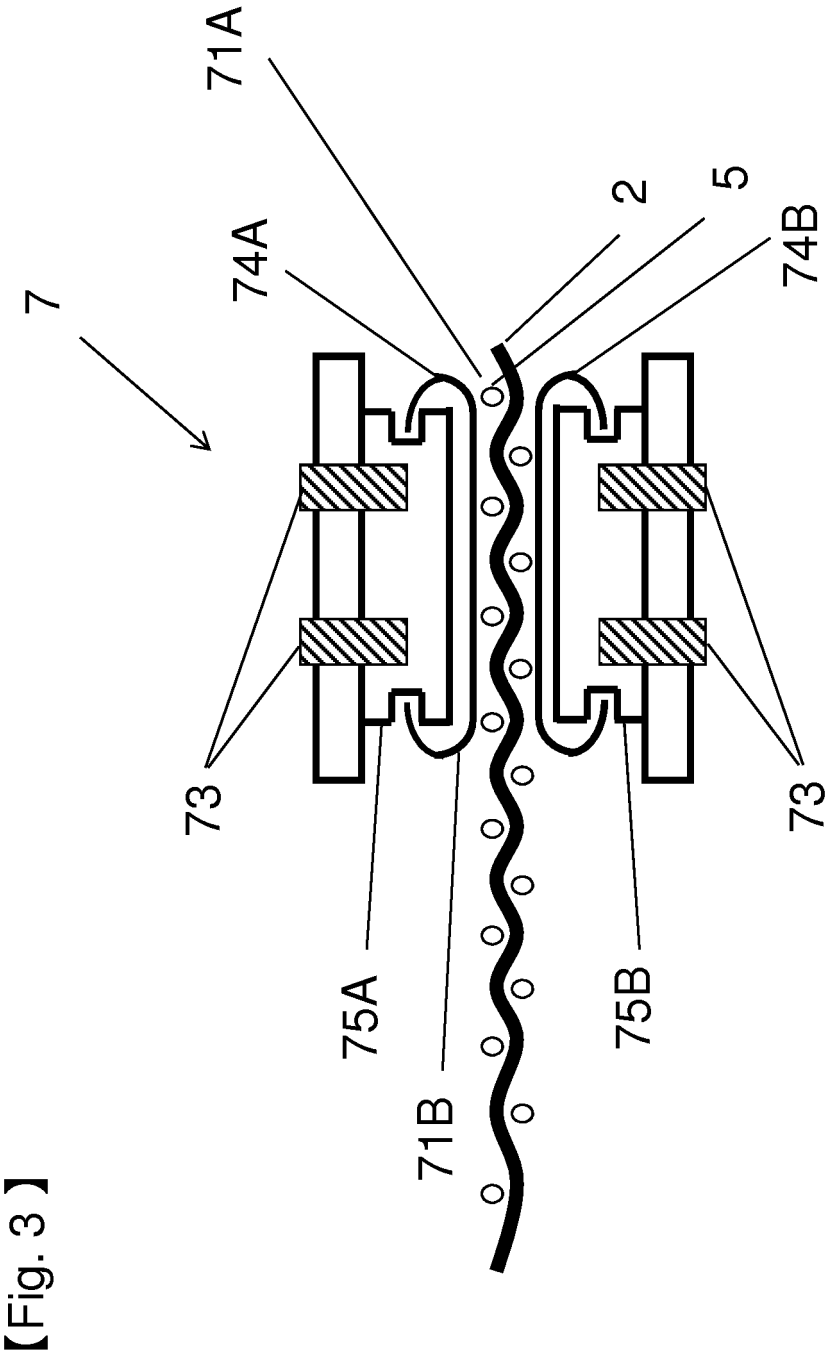
3. The selvage portion gripping device for the loom according to claim 2, wherein the flexible part which catches the selvage portion is a part formed of a plate spring or a flexible member and a plate material. 5
  
4. A loom having the selvage portion gripping device for the loom according to any of claims 1 to 3, wherein the selvage portion gripping device exists at a selvage portion of a woven fabric and at a position where a weft yarn is cut with a weft yarn cutter. 10  
15
  
5. A method for manufacturing a woven fabric where a predetermined number of warp yarns are parallelized, additional yarns are parallelized at an outside of the parallelized warp yarns, and a weft yarn is supplied to the warp yarns and the additional yarns, comprising: by using the loom according to claim 4, gripping a selvage portion by a selvage portion gripping device for a loom which exists on the loom at the time of cutting the weft yarn. 20  
25
  
6. The method for manufacturing the woven fabric according to claim 5, comprising: gradually separating the additional yarns from the selvage portion discharged from the selvage portion gripping device for the loom. 30
  
7. A method for manufacturing a woven fabric where a predetermined number of warp yarns are parallelized, additional yarns are parallelized at an outside of the parallelized warp yarns, and a weft yarn is supplied to the warp yarns and the additional yarns, comprising: after the weft yarn is supplied and the woven fabric is subjected to reed beating, gripping a selvage portion formed by weaving the additional yarns and the weft yarns at the time of cutting the weft yarn. 35  
40  
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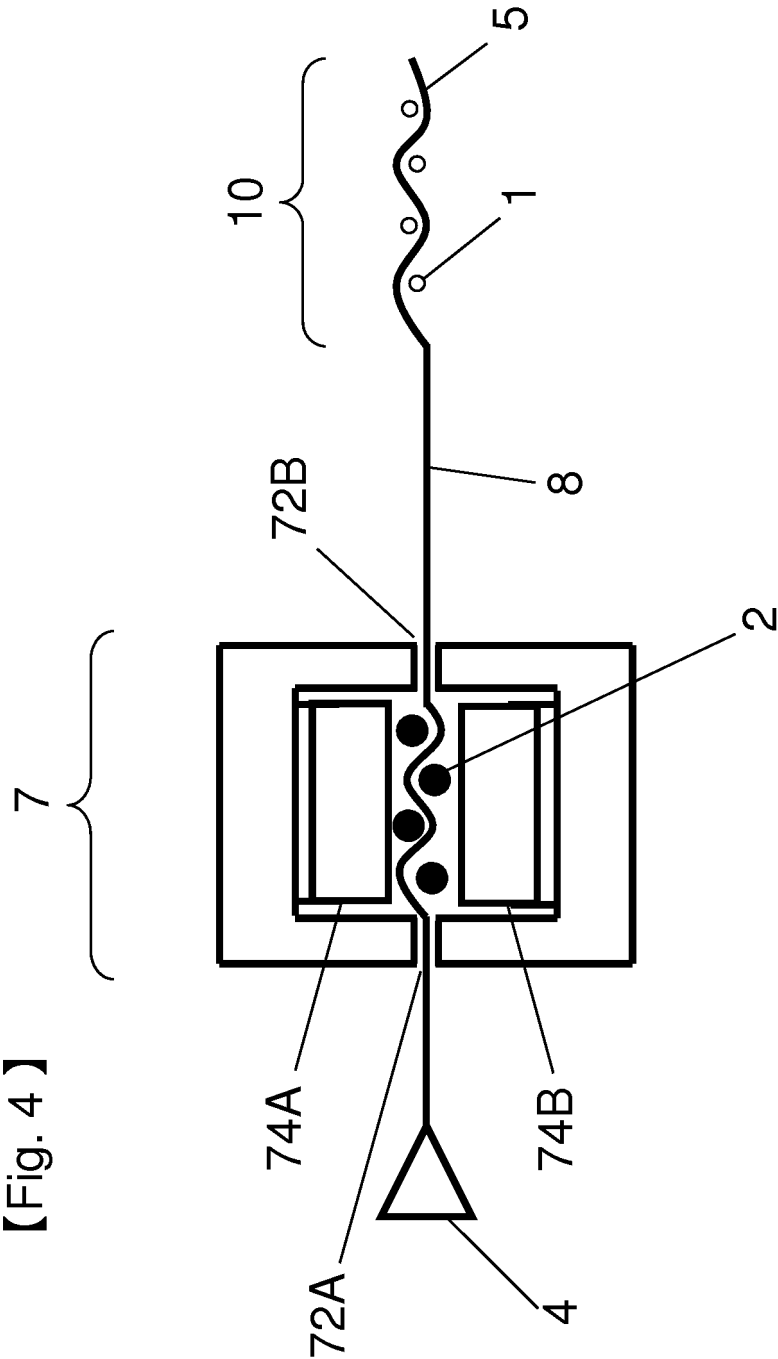


【Fig. 1】

【Fig. 2】

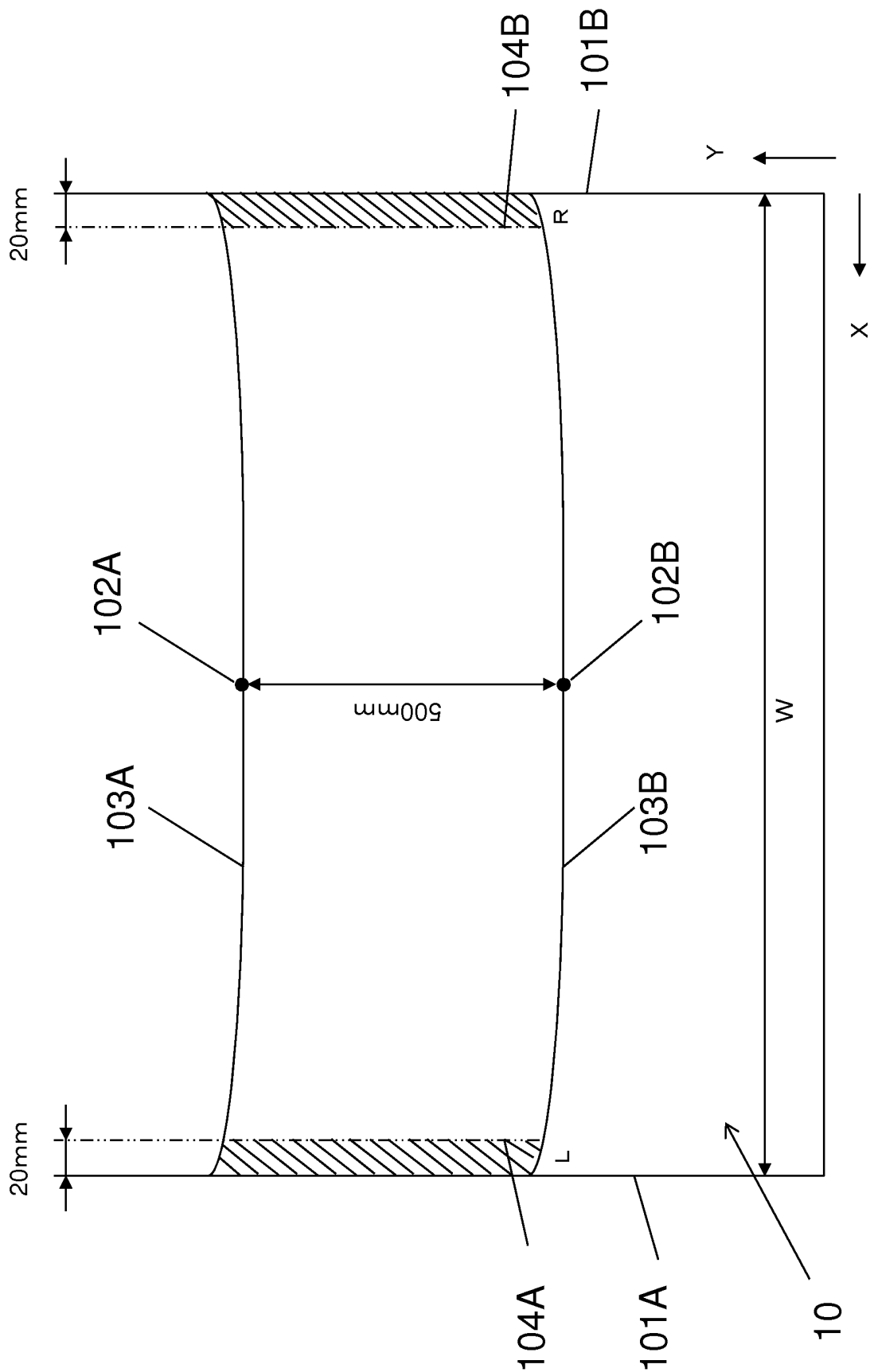








【Fig. 5】



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/074267

## A. CLASSIFICATION OF SUBJECT MATTER

D03D47/44(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D03D47/44, D03D49/70

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014  
 Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 50-136463 A (Enshu Ltd.), 29 October 1975 (29.10.1975), entire text; all drawings (Family: none)	1, 2, 4, 5, 7 3, 6
Y	JP 54-077764 A (Nissan Motor Co., Ltd.), 21 June 1979 (21.06.1979), page 2, upper right column, line 2 to page 3, upper right column, line 8; fig. 1 to 4 & US 4296783 A & GB 2009798 A & DE 2851693 A1 & FR 2410691 A1	3
Y	JP 04-316644 A (Kanebo, Ltd.), 09 November 1992 (09.11.1992), entire text; all drawings (Family: none)	6

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

\* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
19 November, 2014 (19.11.14)Date of mailing of the international search report  
02 December, 2014 (02.12.14)Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/074267

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 034190/1988 (Laid-open No. 141785/1989) (Sankyo Orimono Kabushiki Kaisha), 28 September 1989 (28.09.1989), entire text; all drawings (Family: none)	1-7

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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