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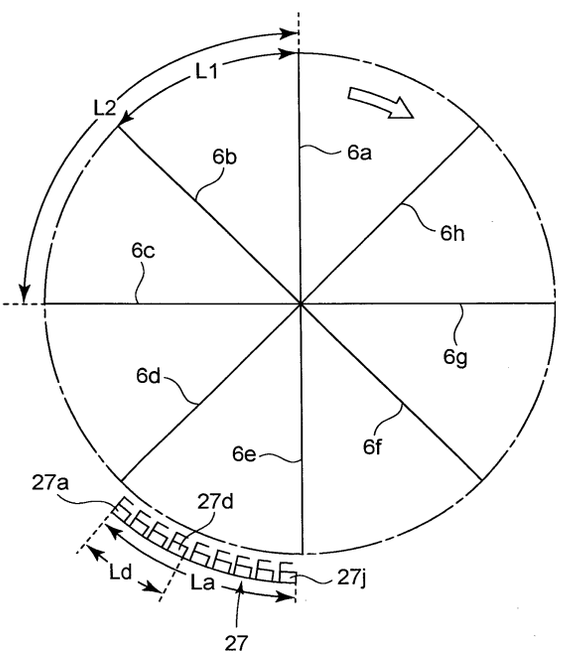
(54) Sample warper with idle running preventing mechanism of yarn guide

(57) There is provided a sample warper (200) with an idle running preventing mechanism of a yarn guide (6a-6h), wherein yarns (22) are automatically exchanged and successively wound on the warper drum (208) according to a preset yarn order by passing the yarns between the yarn guides (6a-6h) and the yarn selection guides (27a-27j), and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, after a yarn removing operation for removing the first yarn from the first yarn guide is finished, a yarn feeding operation for feeding the second yarn to a second yarn guide is performed while the empty first yarn guide makes one rotation. The sample warper can achieve such an advantage that an idle running time of a yarn guide when exchanging yarns can be reduced considerably and a speed of yarn exchanging is improved remarkably.

FIG.8



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a sample warper with an idle running preventing mechanism of a yarn guide which has a plurality of yarn guides for winding yarns on a warper drum and automatically exchanges yarns in a preset yarn order to wind the yarns on the warper drum, wherein yarns to be wound can be very effectively exchanged by utilizing the plural yarn guides, and a high speed warping method.

2. Description of the Related Art

[0002] As a sample warper used conventionally, for example, there has been known a structure disclosed in Japanese Patent No. 1529104, namely, a structure where using a fixed creel for supporting a plurality of bobbins on which different kinds (different colors or twisted differently) of yarns are to be wound, the yarns are successively wound on a warper drum by yarn guides while yarn exchanging is performed by yarn selection guides according to preset pattern data (a yarn order).

[0003] Further, there has been also known a sample warper for winding a plurality of yarns simultaneously, wherein by using a rotary creel and omitting a yarn exchanging step, it is possible to cancel loss of time for yarn exchanging, to wind simultaneously a plurality of yarns on a warper drum, and further to reduce a warping time (refer to Japanese Patent No. 1767706, US Patent 4,972,662 and EP375480).

[0004] The fixed creel has a plurality of bobbins on which the same kind and/or different kinds (mainly different kinds) of yarns are to be wound, wherein since yarns can be warped for each yarn while yarn exchanging is freely performed by the selection device, a warping operation for pattern warping can be advantageously performed, but since yarns are sequentially wound on the warper drum for each yarn, much time is disadvantageously required for a warping operation. On the other hand, the rotary creel has a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound, and it can be applied to repetition warping for an extremely limited number of patterns such as solid color warping (for example, one color of a red color yarn), one to one warping (for example, repetition of one red yarn and one white yarn, or repetition of one S-twisted yarn and one Z-twisted yarn), two to two warping (for example, repetition of two red yarns and two white yarns, or two S-twisted yarns and two Z-twisted yarns) and the like. In the rotary creel, a warping operation for pattern warping except for the extremely limited number of patterns can not be disadvantageously performed but a warping time can be advantageously reduced to a great extent because the plural yarns are wound on the warper drum simultaneously.

[0005] The present applicant has already proposed a sample warper provided with a plurality of yarn selection devices corresponding to a fixed creel and a rotary creel, which can perform jointly pattern warping and repetition warping and reduce a warping time of a warping operation requiring solid color warping and pattern warping to achieve an extremely high efficiency (refer to JP2000-136456A and EP933455A2).

[0006] Further, the present applicant has also proposed a novel yarn removing mechanism that can prevent a yarn from loosing in the above-described sample warper to perform yarn exchanging efficiently (refer to JP11-293536A, EP955399A2 and US Patent 5,970,591).

[0007] As described above, conventionally, research and improvement have been already conducted regarding the yarn loosening prevention when exchanging yarns in a sample warper. However, yarn exchanging using a fixed creel in a current sample warper (that is, feeding a yarn from a yarn selection guide to a yarn guide, or storing a yarn from the yarn guide to the yarn selection guide) has been performed by using one yarn guide in a sample warper having one yarn guide, or by selecting one yarn guide to be used in a sample warper having a plurality of yarn guides.

[0008] In such a sample warper, for example, when yarn exchanging is performed from a red yarn to a white yarn, a yarn guide must perform idle running of at least one rotation between storing of a yarn and feeding of another yarn in order that the red yarn is removed from the yarn guide to store the removed red yarn in a yarn selection guide for the red yarn and the white yarn is fed from a selection guide for the white yarn to the yarn guide.

[0009] In recent years, as fabric design becomes complicated, the number of yarn exchanging increases remarkably, so that a ratio of a total idle running time of the yarn guide during yarn exchanging increases to the warping operation time. Therefore, it has been required to provide a yarn exchanging mechanism where the idle running time of the yarn guide has been reduced to the least possible level.

SUMMARY OF THE INVENTION

[0010] The present inventors have solved the above-described problem and have reached to the present invention as a result of the repeated research about a mechanism for reducing the idle running time of the yarn guide during yarn exchanging to the least possible level.

[0011] A first object of the present invention is to provide a sample warper with an idle running preventing mechanism of a yarn guide which can reduce an idle running time during yarn exchanging to the least possible level so as to improve a speed of yarn exchanging remarkably and hence can shorten a warping time large-

ly as compared with a case of using a conventional yarn exchanging mechanism where an idle running is performed.

[0012] A second object of the present invention is to provide a high speed warping method which realizes a sharp increase in warping rate and can reduce an idle running time of a yarn guide to the least possible to perform yarn exchanging while maintaining a high warping rate, that is, without lowering the warping rate, thereby reducing the warping time considerably.

[0013] In order to solve the above problem, according to a first aspect of the present invention, there is provided a sample warper with an idle running preventing mechanism of a yarn guide comprising: a plurality of yarn guides each rotatably mounted on a side surface of a warper drum for winding yarns on the warper drum; a yarn selection device provided with a plurality of yarn selection guides which are in correspondence with the yarn guides, each of the yarn selection guides being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; a fixed creel for supporting a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound and which are in correspondence with the plural yarn selection guides; and yarn removing guides which are provided such that one of the yarn removing guides corresponds to each of the plural yarn selection guide, wherein yarns are automatically exchanged and successively wound on the warper drum according to a preset yarn order by passing the yarns between the yarn guides and the yarn selection guides, and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, after a yarn removing operation for removing the first yarn from the first yarn guide is finished, a yarn feeding operation for feeding the second yarn to a second yarn guide is performed while the empty first yarn guide makes one rotation.

[0014] When yarn exchanging is performed from a yarn of the yarn selection guide positioned downstream of the yarn selection device to a yarn of the yarn selection guide positioned upstream of the yarn selection device, the yarn guide positioned downstream of the first yarn guide is preferably used as the second yarn guide. After a yarn removing operation for removing the first yarn from the first yarn guide is finished, a yarn guide which has first reached the position of the yarn selection guide which supplies the second yarn is preferably used as the second yarn guide.

[0015] According to a second aspect of the present invention, there is provided a sample warper with an idle running preventing mechanism of a yarn guide comprising: a plurality of yarn guides each rotatably mounted on a side surface of a warper drum for winding yarns on the warper drum; a yarn selection device provided with a plurality of yarn selection guides which are in correspondence with the yarn guides, each of the yarn selection guides being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; a fixed creel for supporting a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound and which are associated with the plural yarn selection guides; and yarn removing guides which are provided such that one of the yarn removing guides corresponds to each of the plural yarn selection guide, wherein yarns are automatically exchanged and successively wound on the warper drum according to a preset yarn order by passing the yarns between the yarn guides and the yarn selection guides, and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, after a yarn feeding operation for feeding the second yarn to a second yarn guide is finished, a yarn removing operation for removing the first yarn from the first yarn guide is performed while the second yarn guide holding the second yarn makes one rotation.

[0016] When yarn exchanging is performed from a yarn of the yarn selection guide positioned upstream of the yarn selection device to a yarn of the yarn selection guide positioned downstream of the yarn selection device, the yarn guide positioned upstream of the first yarn guide is preferably used as the second yarn guide. A yarn guide positioned upstream in a rotational direction of and adjacent to the first yarn guide is preferably used as the second yarn guide.

[0017] According to a third aspect of the present invention, there is a sample warper with an idle running preventing mechanism of a yarn guide comprising: a plurality of yarn guides each rotatably mounted on a side surface of a warper drum for winding yarns on the warper drum; a yarn selection device provided with a plurality of yarn selection guides which are in correspondence with the yarn guides, each of the yarn selection guides being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; a fixed creel for supporting a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound and which are associated with the plural yarn selection guides; and yarn removing guides which are provided such that one of the yarn removing guides corresponds to each of the plural yarn selection guide, wherein yarns are automatically exchanged and successively wound on the warper drum according to a preset yarn order by passing the yarns between the yarn guides and the yarn selection guides, and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, a yarn removing operation for removing the first yarn from the first yarn guide and a yarn feeding operation for feeding the second yarn to a second yarn guide are performed simultaneously.

[0018] The yarn selection guides may be grouped into a plurality of groups and arranged. By arranging the grouped yarn selection guides according to spaces among the plural yarn guides and assigning arrange-

ment of the plural yarn guides to the grouped yarn selection guides, the sample warper of the third aspect according to the present invention can be implemented

[0019] A warping method of the present invention uses each of the above-described sample warpers and reduces a time period required for the yarn exchanging is reduced to the least possible level.

[0020] According to the sample warper with an idle running preventing mechanism of a yarn guide of the present invention, such an advantage can be achieved that an idle running time of a yarn guide when exchanging yarns can be reduced considerably and a speed of yarn exchanging is improved remarkably, and the warping time can be reduced largely as compared with a case of using the conventional yarn exchanging mechanism where an idle running of the yarn guide is performed.

[0021] According to the high speed warping method of the present invention, such an advantage can be achieved that much increase in warping speed is realized and yarn exchanging can be performed while maintaining a high warping speed, namely without lowering the warping speed, and the warping time can be reduced largely.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Fig. 1 is a schematic explanatory side view showing a structural example of a sample warper of the present invention;
Fig. 2 is a schematic explanatory plan view of Fig. 1;
Fig. 3 is a schematic explanatory front view of Fig. 1;
Fig. 4 is a schematic explanatory view of an essential portion showing an example of a yarn selection device;
Fig. 5 is a schematic explanatory view showing an action of the yarn selection device, wherein a yarn selection guide holding a yarn has been pivotally moved to a yarn exchanging position;
Fig. 6 is a perspective view of an essential portion showing an example of a moving type yarn guide;
Fig. 7 is a bottom view of Fig. 6;
Fig. 8 is an explanatory view showing a relationship among intervals L_1 and L_2 between respective yarn guides in a plurality of yarn guides, a width L_a of a yarn selection device and a width L_d between respective yarn selection guides; and
Fig. 9 is a schematic explanatory front view showing another structural example of a sample warper of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Embodiments of the present invention will be explained below with reference to the attached drawings. It is apparent that the present invention will be modified variously from the illustrated embodiments without departing from the technical idea of the present invention.

[0024] In Figs. 1 to 3, reference numeral 200 denotes a sample warper according to the present invention that has a basic structure and function in common with the conventional sample warper except for a characteristic structure and function according to the present invention, which will be described later.

[0025] As illustrated, like the above-described conventional sample warper, the sample warper 200 of the present invention comprises a plurality of yarn guides 6a to 6h (the number of the yarn guides is not limited to a specific number, but eight of the yarn guides are shown in the illustrated embodiment), each of which is rotatably mounted on a side surface of a warper drum 208 for winding yarns 22 on the warper drum 208, and a yarn selection device 27 provided with a plurality of yarn selection guides 27a to 27j which are mounted in correspondence with the yarn guides 6a to 6h on an end portion of a base 210 supporting the warper drum 208, each of the yarn selection guides 27a to 27j being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns, wherein yarns 22 are automatically exchanged and successively wound on the warper drum 208 according to a preset yarn order by passing the yarns 22 between the yarn guides 6a to 6h and the yarn selection guides 27a to 27j. In this case, reference numerals 7a to 7h denote guide pieces which are provided at distal ends of the yarn guides 6a to 6h for performing yarn catching and yarn holding.

[0026] In Fig. 1, reference numeral 79 denotes a controller; 212, a yarn change portion; 214, a side cover; 216, a view window, and 218, a driving portion.

[0027] As illustrated in Fig. 1 and Fig. 2, in the sample warper 200 of the present invention, a fixed creel 202 for supporting a plurality of bobbins 110 which are associated with the plural yarn selection guides 27a to 27j and on which yarns of different yarns (yarns with different colors or yarns twisted differently) have been wound.

[0028] The yarns 22 of the fixed creel 202 are respectively stored in the plural yarn selection guides 27a to 27j and can be sequentially wound on the warper drum 208.

[0029] The fixed creel 202 comprises a bobbin stand 102 and a creel stand 104. The bobbin stand 102 has a bobbin frame 108 provided with casters 106 on a lower surface thereof. A suitable number of the bobbins 110 are mounted on a back end side of the bobbin frame 108. Guide plates 112 are provided ahead of the bobbins 110, respectively.

[0030] As illustrated in Fig. 1, since a leading end of a yarn 22m being warped is wound on the warper drum 208 via the yarn guide 6, the tension of the yarn 22m fluctuates and a drop ring 124 moves up and down according to the fluctuation. On the other hand, a yarn 22n being suspended (a yarn stored in the yarn selection device 27) is stored inside the yarn selection device 27 in

a state that a drop ring 124 has fallen into the lowest position.

[0031] Reference numeral 17 denotes a plurality of conveyor belts movably mounted on a circumferential surface of the warper drum 208, and a feed rate of the conveyor belt 17 is controlled by a conveyor belt feed means according to warping conditions (the number of yarns to be warped, the width to be warped, the winding number of yarns to be warped and the like). The movement of the conveyor belts is synchronous with rotation of the yarn guides. Reference numerals 33, 34, 38a and 38b denote shedding bars, and 35 and 37 denote cut shedding bars. Shedding means (not shown) are provided on distal end portions of the shedding bars 33 to 35, 37, 38a and 38b on the side of the yarn guides, and a shed of a yarn can be formed by the shedding means. Incidentally, the basic structure and function of the sample warper 200 are well known from the above-described patent publications and the others, and hence the detailed explanation thereof will be omitted.

[0032] As the above-described yarn selection device 27, one described in JP11-293536A, for example, shown in Fig. 4 and Fig. 5 can be used. In Fig. 4 and Fig. 5, the yarn selection device 27 has a plurality of yarn selection guides 27a to 27h (the yarn selection guides 27d to 27f are shown in Fig. 4, and the yarn selection guide 27a is shown in Fig. 5), and each of the yarn selection guides 27a to 27h is pivotally moved to an operation position (a yarn exchanging position) or a suspended position (a standby position) by a corresponding selection solenoid 29 of a rotary solenoid so as to put the yarn 22 in and out.

[0033] Yarn removing guides 136a to 136h (in the illustrated embodiment, the yarn removing guides 136e to 136g are shown in Fig. 4 and the yarn removing guide 136a is shown in Fig. 5) are provided such that each of the yarn removing guides 136a to 136h forms a pair with corresponding one of the yarn selection guides 27a to 27h. Each of the yarn removing guides 136a to 136h is pivotally moved to an operation position (a yarn removing position) or a suspended position (a standby position) by a yarn removing solenoid 138 provided in proximity to the selection solenoid 29 to perform a yarn removing operation. In Fig. 4 and Fig. 5, reference numeral 16 denotes a drum spoke; 59, a front cover; 59a, a front guide rod; and 212, a yarn change portion.

[0034] As the yarn selection device 27, besides the device shown in Fig. 4 and Fig. 5, there may be also used a yarn selection device having a structure provided with conventionally known yarn removing members as separate members.

[0035] As the plural yarn guides 6a to 6h, fixed type yarn guides can be used, but it is preferable to use movable type yarn guides. As the movable type yarn guides, those described in JP2002-30536A, for example, shown in Fig. 6 and Fig. 7 may be used. The movable type yarn guides 6a to 6h are provided with arm portions 308 and guide pieces 7a to 7h which are rotatably provided at distal end portions of the arm portions 308 and can hold yarns, as illustrated in Fig. 6 and Fig. 7 (only the movable yarn guide 6a is shown).

[0036] A holder portion 312 is provided at a distal end portion of the arm portion 308, and a cylinder base 314 is continuously attached to the holder portion 312. The cylinder base 314 is provided with a rotary air cylinder 316 having a swinging shaft 316a, and a guide piece 7a is fixed to the swinging shaft 316a and is rotatable together with the swinging shaft 316a. Reference numerals 318a and 318b denote air tubes mounted so as to communicate with the rotary air cylinder 316, and compressed air is supplied from an unillustrated solenoid valve into the rotary air cylinder 316.

[0037] For example, when compressed air is supplied from the air tube 318a into the rotary air cylinder 316, the guide piece 7a is rotated in one direction, for example, to a position indicated by a solid line in Fig. 7, that is to say, projected to the yarn holding position to serve as the yarn guide. On the other hand, when compressed air is supplied from the air tube 318b into the rotary air cylinder 316, the guide piece 7a is rotated in the other direction, for example, to a position indicated by an imaginary line in Fig. 7, that is to say, retracted to a position where the guide piece 7a does not hold a yarn, so that the guide piece 7a does not serve as the yarn guide. In Fig. 7, reference numerals 320 and 320 indicated by an imaginary line denote stoppers which serve to limit a rotation range of the guide piece 7a.

[0038] The sample warper of the present invention comprises: the plural yarn guides 6a to 6h which wind the yarns 22 on the warper drum 208; the plural yarn selection guides 27a to 27j which are mounted on an end portion of the base 210 supporting the warper drum 208 in correspondence with the yarn guides 6a to 6h and each of which is pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; the fixed creel 202 provided in correspondence with the plural yarn selection guides 27a to 27j and for supporting the plural bobbins 110 on which yarns of the same kind and/or different kinds have been wound; the yarn removing guides 136a to 136j each provided in correspondence with each of the plural yarn selection guides 136a to 136j, wherein the yarns 22 are automatically exchanged and successively wound on the warper drum 208 according to a preset yarn order by passing the yarns between the yarn guides 6a to 6h and the yarn selection guides 27a to 27j, wherein, when yarn exchanging is performed, a yarn removing operation for removing the first yarn (red), for example, the yarn 22a from the first yarn guide, for example, the yarn guide 6a winding the first yarn 22a on the warper drum 208 and a yarn feeding operation for feeding the second yarn (white), for example, the yarn 22b to the second yarn guide 6b are performed while a reference yarn guide first subjected to the yarn removing operation or the yarn feeding operation and selected from either of the two yarn guides 6a,

6b makes one rotation.

[0039] Modes of yarn exchanging in the present invention are as follows: (1) after the yarn removing operation is finished, the yarn feeding operation can be performed; (2) after the yarn feeding operation is finished, the yarn removing operation can be performed, and (3) the yarn removing operation and the yarn feeding operation can be performed simultaneously.

(1) The mode where after the yarn removing operation is finished, the yarn feeding operation is performed, for example, the first yarn 22a is removed from the first yarn guide 6a winding the first yarn 22a and the second yarn guide 6b catches the second yarn 22d is performed in the following manner. The first yarn 22a is first removed from the first yarn guide 6a winding the first yarn 22a on the warper drum 208 by having the first yarn 22a caught on the yarn removing guide, for example, the yarn removing guide 136a, and the caught first yarn 22a is passed to the corresponding yarn selection guide 27a to be stored. Next, while the empty first yarn guide 6a (in this case, the first yarn guide 6a which is first subjected to the yarn removing operation, and the first yarn guide 6a serves as the reference yarn guide) makes one rotation, the second yarn 22d is fed from the yarn selection guide 27d storing the second yarn 22d to the second yarn guide 6b, and the second yarn 22d is wound on the warper drum 208 in a state that the second yarn 22d has been held by the second yarn guide 6b. By performing such yarn exchanging, a time period from removing the first yarn 22a from the first yarn guide 6a to holding the second yarn 22d by the second yarn guide 6a is considerably short, so that an idle running state of the yarn guide (in a state that none of the yarn guides 6a to 6h holds the yarns 22) can be avoided to the utmost.

In the mode (1) described above, by utilizing as the second yarn guide a yarn guide which first passes through after the state that the yarn selection guide 27d feeds the second yarn 22d has been realized, an idle running time of the empty first yarn guide 6a may be reduced to the minimum. It is most preferable that a yarn guide provided adjacent to and downstream of the first yarn guide 6a, for example, the yarn guide 6b in Fig. 3 is used as the second yarn guide because the idle running time may be reduced to the minimum. However, in order to allow utilization of the yarn guide 6b as the second yarn guide, as illustrated in Fig. 8, it is required that a length L_1 of an arc formed by the yarn guide 6a and the yarn guide 6b is larger than an installation width L_a of the yarn selection device 27 (that is, a total installation width L_a of all the yarn selection guides 27a to 27j), namely, $L_1 > L_a$. If $L_1 < L_a$, the yarn guide 6b can not be used as the second yarn guide; a length L_2 of an arc formed by the yarn guide 6a and the yarn guide 6c is further compared with the installation width L_a of the yarn selection device 27, and if $L_2 > L_a$, the yarn guide 6c can be used as the second yarn guide. If $L_2 < L_a$, a yarn guide forming a further larger arc is selected to be used similarly. In fact, when a relationship between an installation width between one of the yarn selection guides 27a to 27j first used and one of the yarn selection guides 27a to 27j next used, for example, L_d (the installation width between the yarn selection guides 27a and 27d in the example shown in Fig. 8) and the above-described L_1, L_2 meets L_1, $L_2 > L_d$, it is possible to implement the yarn exchanging mode (1) in the present invention. If L_1 or $L_2 > L_a$, all the yarn selection guides 27a to 27j can be advantageously utilized.

Regarding the mode (1), more specifically speaking, for example, when a yarn being warped by the first yarn guide 6a is a yarn of the yarn selection guide 27a (the yarn 22m in the example shown in Fig. 2), any one of the yarn guides 6b to 6h can be used as the second yarn guide, but the yarn guide 6b is the most preferable second yarn guide. As a yarn to be fed to the second yarn guide of the yarn guides 6b to 6h, any one of the yarns stored in the yarn selection guides 27b to 27h (the yarns 22n in the example shown in Fig. 2) may be used. In the mode (1) where the yarn exchanging is performed from the yarn guide 6a to the yarn guide 6b, it is sufficient for the yarn guide 6a to make 1/8 rotation of idle running as compared with the conventional mode where after the yarn guide 6a has made one rotation of idle running, the yarn exchanging is performed.

(2) The mode where after the yarn feeding operation is finished, the yarn removing operation is performed, for example, the empty second yarn guide 6a catches the second yarn 22a and the yarn 22d is removed from the first yarn guide 6b winding the first yarn 22d is performed in the following manner. First, the second yarn 22a is fed to the second yarn guide 6a, and the second yarn 22a is held by the second yarn guide 6a and wound on the warper drum 208. Next, while the second yarn guide 6a (in this case, a yarn guide which is first subjected to yarn feeding is the second yarn guide 6a, and the second yarn guide 6a serves as the reference yarn guide) makes one rotation, the first yarn 22d is removed from the first yarn guide 6b winding the first yarn 22d on the warper drum 208 by having the first yarn 22d caught on the yarn removing guide, for example, 136d, and the first yarn 22d is passed and stored to a corresponding yarn selection guide 27d. Even when such yarn exchanging is performed, a time period from the second yarn 22a being fed and held to the second yarn guide 6a to the first yarn 22d being removed from the first yarn guide 6b is

considerably short, so that an idle running state of the yarn guide can be avoided to the utmost. In the mode (2), the yarn selection guide storing a yarn to be first fed is preferably positioned on an upstream side of the yarn guide in a rotational direction thereof. In such a constitution, it is required that the second yarn guide 6a is positioned on the upstream side of the first yarn guide 6b in the rotational direction thereof, but a relationship in size between the width L_a of the selection device 27 and the widths L_1, L_2 of arcs among the yarn guides 6a to 6h causes no problem. Incidentally, even in the mode (2), such a constitution can be employed that the yarn selection guide storing a yarn to be first fed is positioned on a downstream side in the rotational direction of the yarn guide. In case of this constitution, the above-described relationship of L_1 or $L_2 > L_d$ may be enough in order to remove the second yarn 22d from the first yarn guide 6b, but if L_1 or $L_2 > L_a$ is met, all of the yarn selection guides 27a to 27j can be advantageously utilized like the mode (1).

Further, regarding the mode (2), more specifically speaking, for example, when a yarn being warped by the first yarn guide 6b is a yarn of the yarn selection guide 27h, it is preferable to use the yarn guide 6a as the second yarn guide. As the yarn fed to the second yarn guide 6a, any one of yarns stored in the yarn selection guides 27a to 27j except for the yarn selection guide 27h can be used. In the case (2) where the yarn exchanging is performed from the yarn guide 6b to the yarn guide 6a, idle running of the yarn guide 6b is completely prevented as compared with the conventional mode where after the yarn guide 6a has made one rotation of idle running, the yarn exchanging is performed, so that a state that both the yarn guides 6a and 6b are winding the yarns (so-called double winding) occurs during making final 1/8 rotation. However, the double winding in such an extent does not cause any problem.

(3) The mode where the yarn removing operation and the yarn feeding operation are simultaneously performed, for example, the first yarn 22a is removed from the first yarn guide 6a winding the first yarn 22a and the second yarn guide 6b catches the second yarn 22d is performed in the following manner. The first yarn 22a is removed from the first yarn guide 6a winding the first yarn guide 22a on the warper drum 208 by having the first yarn22a caught on a yarn removing guide, for example, the yarn removing guide 136a, and the first yarn 22a is passed and stored to a corresponding yarn selection guide 27a. Simultaneously therewith, the second yarn 22d is fed from the yarn selection guide 27d storing the second yarn 22d to the second yarn guide 6b and the second yarn 22d is wound on the warper drum 208 in a state that the second yarn 22d has been held by the second yarn guide 6b. In this case, it is required that the width L_1 of the arc formed by the first yarn guide 6a and the second yarn guide 6b and the installation width L_d between the yarn selection guides 27a and 27d are approximately equal to each other, namely, $L_1 = L_d$ such that the yarn 22a can be removed from the first yarn guide 6a and the yarn 22d can be fed to the second yarn guide 6b.

[0040] In the above-described mode (3), besides the arrangement of the yarn selection device 27 illustrated in Fig. 3 and Fig. 8, it is preferable to employ arrangement where the yarn selection device 27 are grouped to a plurality of groups (the device is grouped into a first yarn selection group 27A and a second yarn selection group 27b), as illustrated in Fig. 9. The first yarn selection device 27A is provided with the yarn selection guides 27a to 27e and the second yarn selection device 27B is provided with the yarn selection guides 27f to 27j. When an installation angle (45° in Fig. 9) between the two yarn selection devices 27A and 27B is set to be equal to an angle formed by adjacent yarn guides of the yarn guides 6a to 6h (in case of eight yarn guides, an angle formed by adjacent yarn guides, for example, by the yarn guides 6a and 6b, is 45°), the space between the yarn guides 6a and 6b can be coincident with the space between the yarn selection devices 27A and 27B. With such a constitution, it is easy to perform the yarn removing operation from the yarn guide 6a and the yarn feeding operation to the yarn guide 6b like the mode (3). In case that the yarn removing operation and the yarn feeding operation are simultaneously performed in this manner, idle running of the yarn guide 6a is completely prevented, so that ideal yarn exchanging is performed. Incidentally, even if the constitution shown in Fig. 9 where the yarn selection device 27 has been grouped into groups is employed, of course, such a constitution can be applied to the case that the yarn removing operation and the yarn feeding operation are sequentially performed like the modes (1) and (2).

Claims

1. A sample warper with an idle running preventing mechanism of a yarn guide comprising: a plurality of yarn guides each rotatably mounted on a side surface of a warper drum for winding yarns on the warper drum; a yarn selection device provided with a plurality of yarn selection guides which are in correspondence with the yarn guides, each of the yarn selection guides being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; a fixed creel for supporting a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound and which are associated

with the plural yarn selection guides; and yarn removing guides which are provided such that one of the yarn removing guides corresponds to each of the plural yarn selection guide, wherein yarns are automatically exchanged and successively wound on the warper drum according to a preset yarn order by passing the yarns between the yarn guides and the yarn selection guides, and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, after a yarn removing operation for removing the first yarn from the first yarn guide is finished, a yarn feeding operation for feeding the second yarn to a second yarn guide is performed while the empty first yarn guide makes one rotation.

2. The sample warper according to claim 1, wherein, when yarn exchanging is performed from a yarn of the yarn selection guide positioned downstream of the yarn selection device to a yarn of the yarn selection guide positioned upstream of the yarn selection device, the yarn guide positioned downstream of the first yarn guide is used as the second yarn guide.

3. The sample warper according to claim 1 or 2, wherein, after a yarn removing operation for removing the first yarn from the first yarn guide is finished, a yarn guide which has first reached the position of the yarn selection guide which supplies the second yarn is used as the second yarn guide.

4. A sample warper with an idle running preventing mechanism of a yarn guide comprising: a plurality of yarn guides each rotatably mounted on a side surface of a warper drum for winding yarns on the warper drum; a yarn selection device provided with a plurality of yarn selection guides which are in correspondence with the yarn guides, each of the yarn selection guides being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; a fixed creel for supporting a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound and which are associated with the plural yarn selection guides; and yarn removing guides which are provided such that one of the yarn removing guides corresponds to each of the plural yarn selection guide,
wherein yarns are automatically exchanged and successively wound on the warper drum according to a preset yarn order by passing the yarns between the yarn guides and the yarn selection guides, and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, after a yarn feeding operation for feeding the second yarn to a second yarn guide is finished, a yarn removing operation for removing the first yarn from the first yarn guide is performed while the second yarn guide holding the second yarn makes one rotation.

5. The sample warper according to claim 4, wherein, when yarn exchanging is performed from a yarn of the yarn selection guide positioned upstream of the yarn selection device to a yarn of the yarn selection guide positioned downstream of the yarn selection device, the yarn guide positioned upstream of the first yarn guide is used as the second yarn guide.

6. The sample warper according to claim 4, wherein a yarn guide positioned upstream in a rotational direction of and adjacent to the first yarn guide is used as the second yarn guide.

7. A sample warper with an idle running preventing mechanism of a yarn guide comprising: a plurality of yarn guides each rotatably mounted on a side surface of a warper drum for winding yarns on the warper drum; a yarn selection device provided with a plurality of yarn selection guides which are in correspondence with the yarn guides, each of the yarn selection guides being pivotally moved to project to a yarn exchanging position when exchanging yarns and retract to a standby position when storing yarns; a fixed creel for supporting a plurality of bobbins on which the same kind and/or different kinds of yarns are to be wound and which are associated with the plural yarn selection guides; and yarn removing guides which are provided such that one of the yarn removing guides corresponds to each of the plural yarn selection guide, wherein yarns are automatically exchanged and successively wound on the warper drum according to a preset yarn order by passing the yarns between the yarn guides and the yarn selection guides, and wherein, when a first yarn being wound on the warper drum by a first yarn guide is exchanged to a second yarn, a yarn removing operation for removing the first yarn from the first yarn guide and a yarn feeding operation for feeding the second yarn to a second yarn guide are performed simultaneously.

8. The sample warper according to any one of claims 1 to 7, wherein the yarn selection guides are grouped into a plurality of groups and arranged.

9. The sample warper according to claim 8, wherein the grouped yarn selection guides are arranged according to spaces among the plural yarn guides.

10. A high speed warping method using the sample warper according to any one of claims 1 to 9, wherein a time period required for the yarn exchanging is reduced to the minimum.

FIG.1

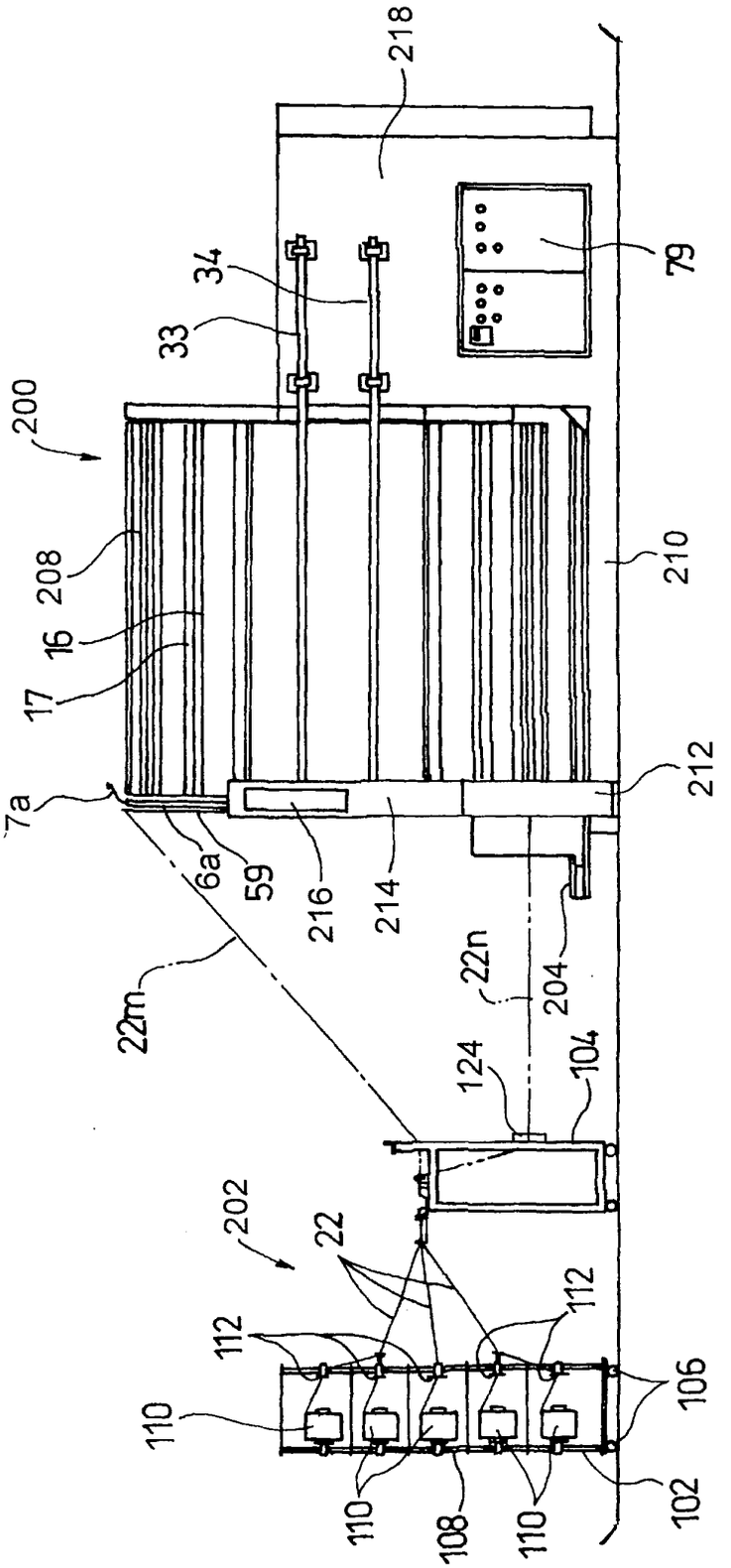

218
79
34
33
200
208
16
17
210
7a
212
6a
59
216
214
22n
204
22m
124
104
202
22
112
112
106
110
110
108
110
102

FIG.2

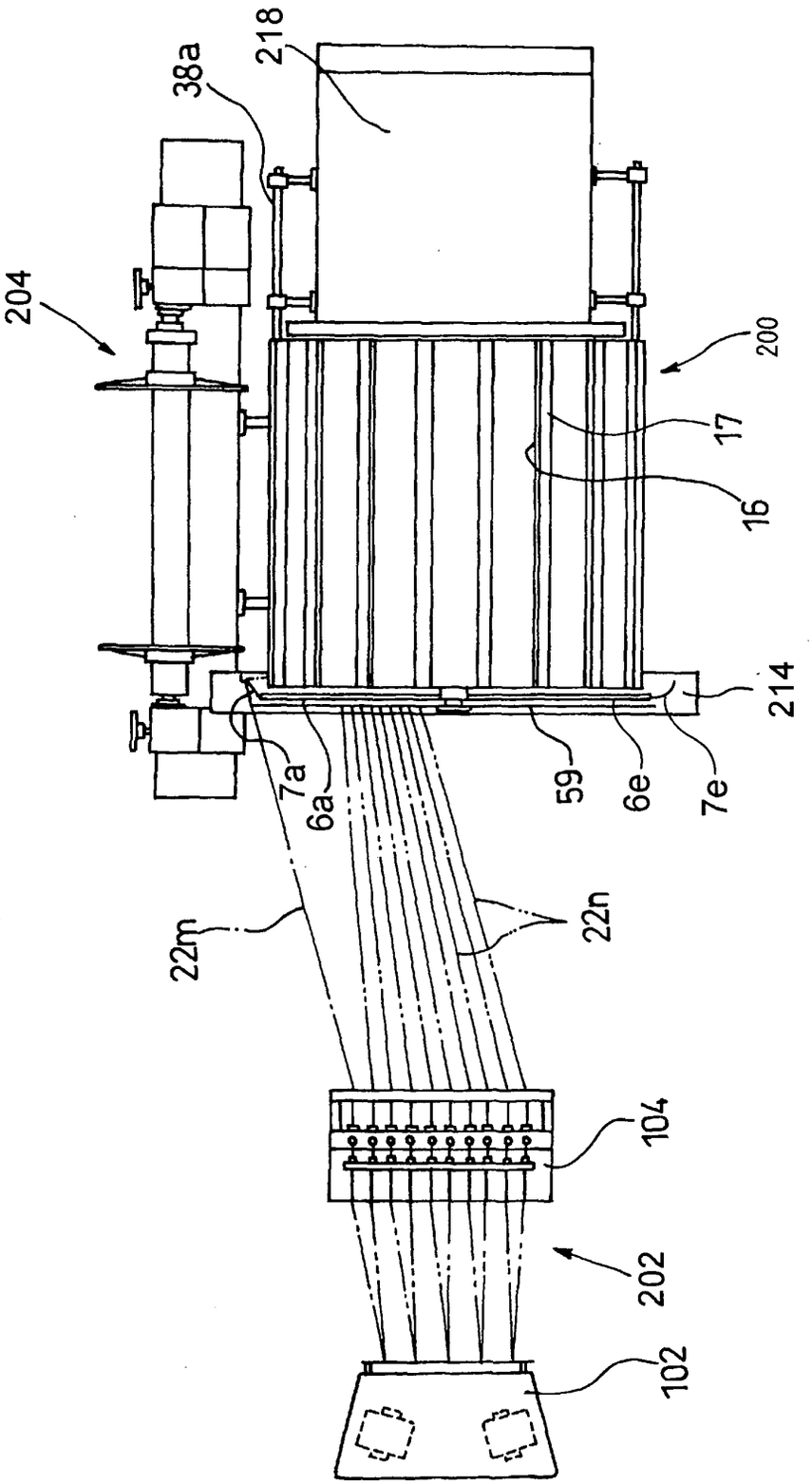


FIG.3

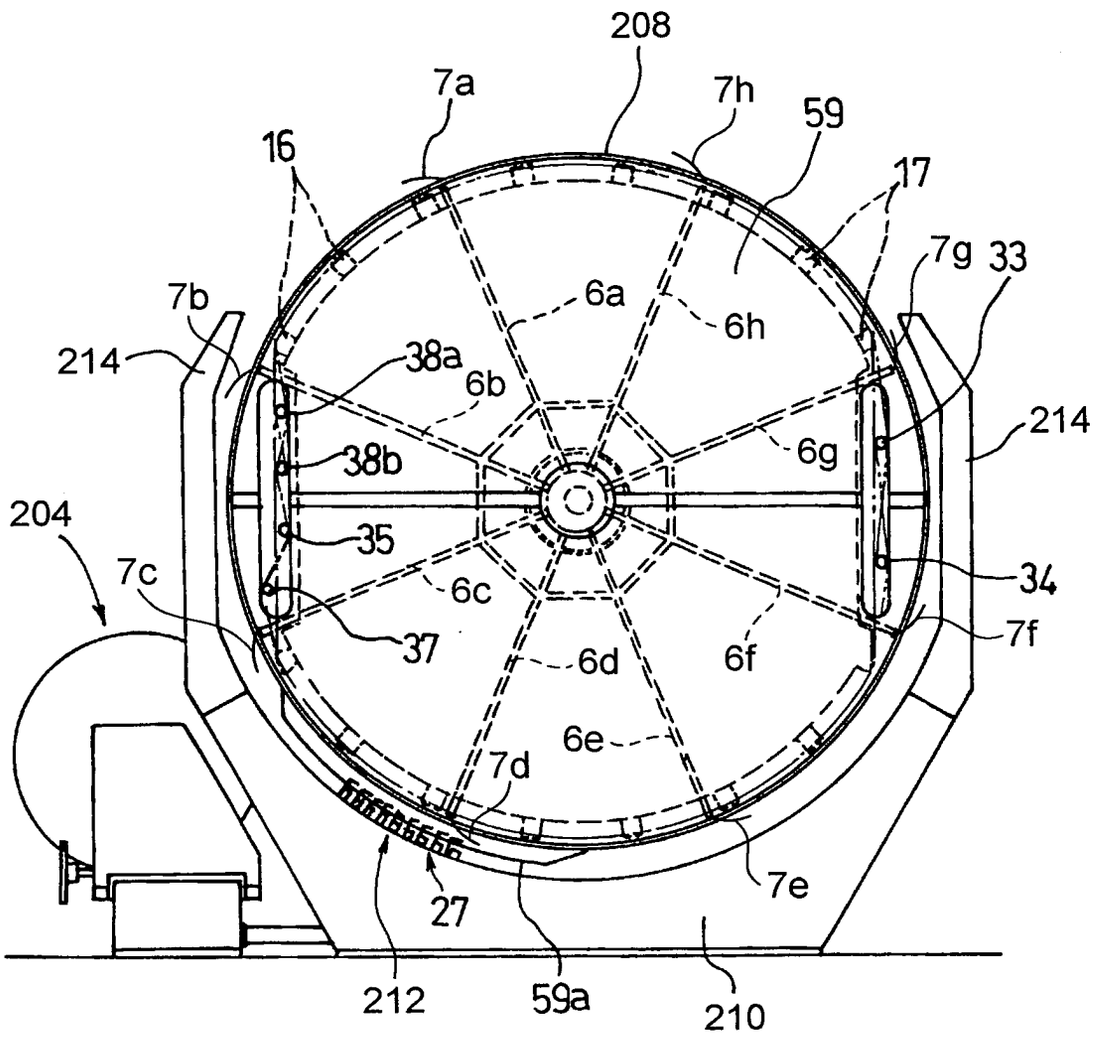

208
7a
7h
59
16
17
7g
33
7b
6a
6h
214
38a
6b
214
38b
6g
204
35
34
7c
6c
37
7f
6d
6f
6e
7d
7e
27
212
59a
210

FIG.4

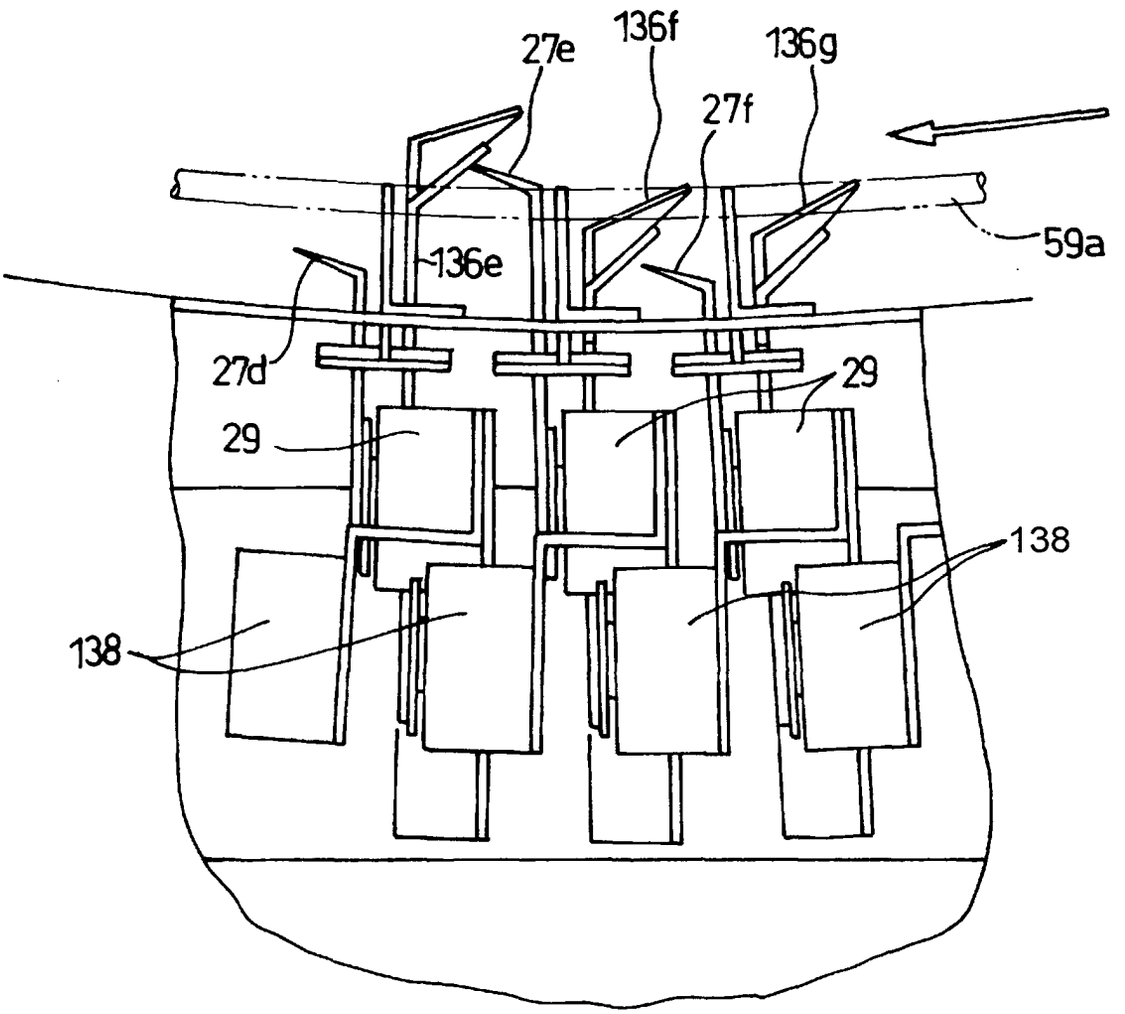


FIG.5

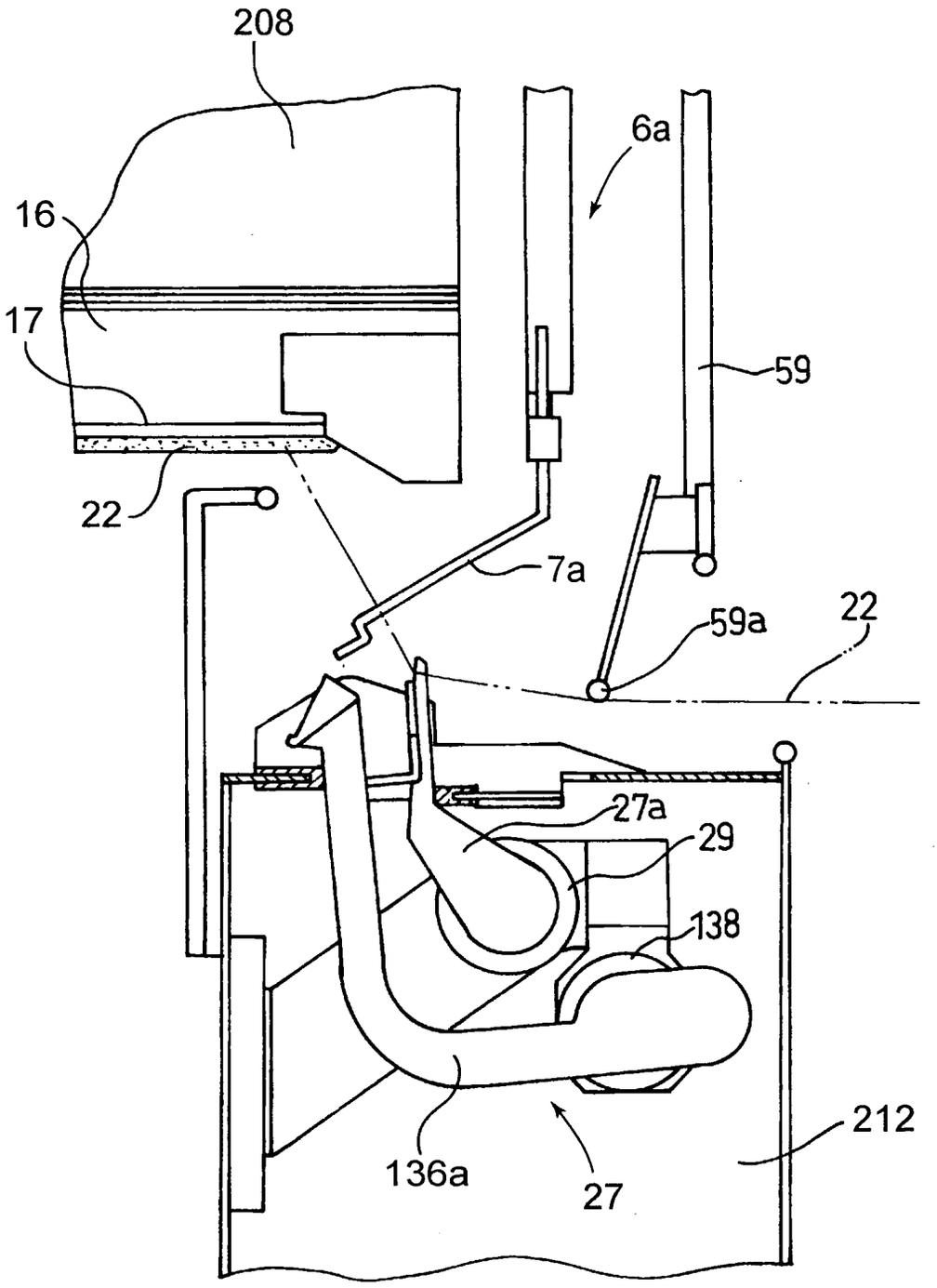


FIG.6

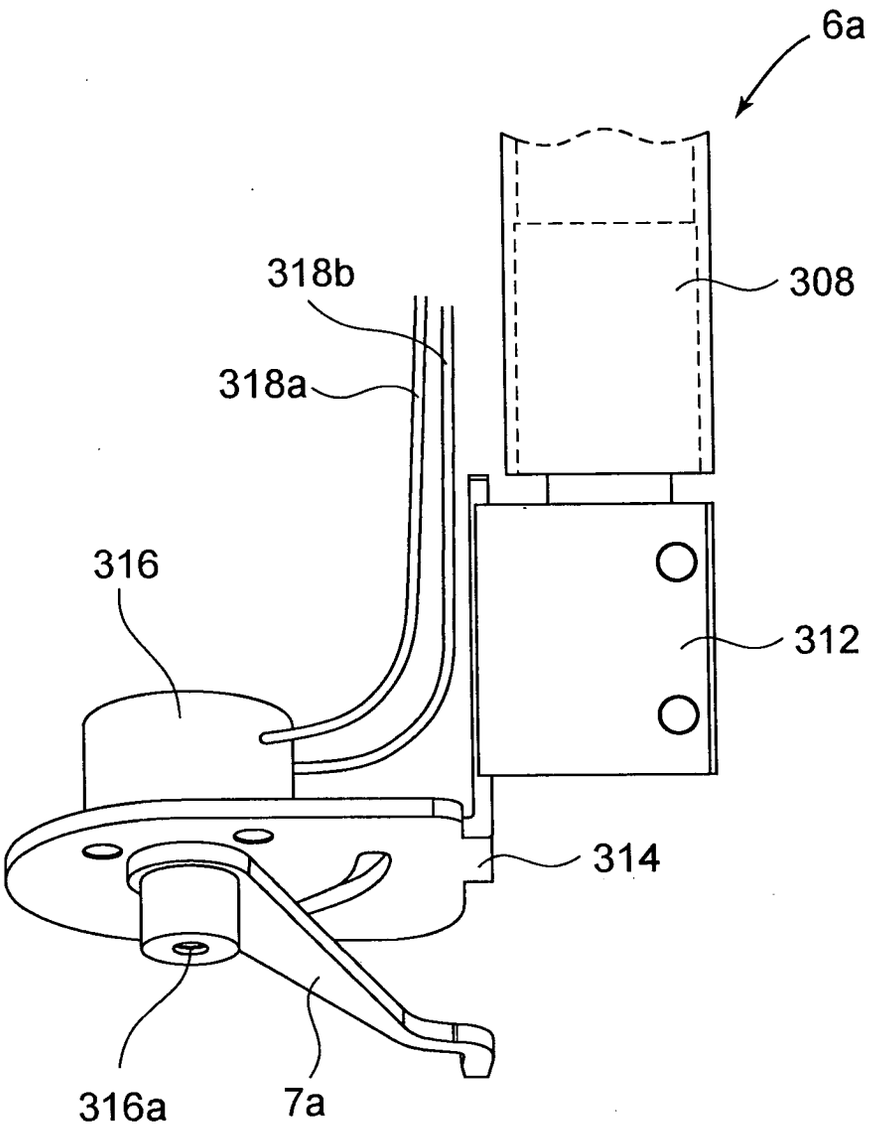


FIG.7

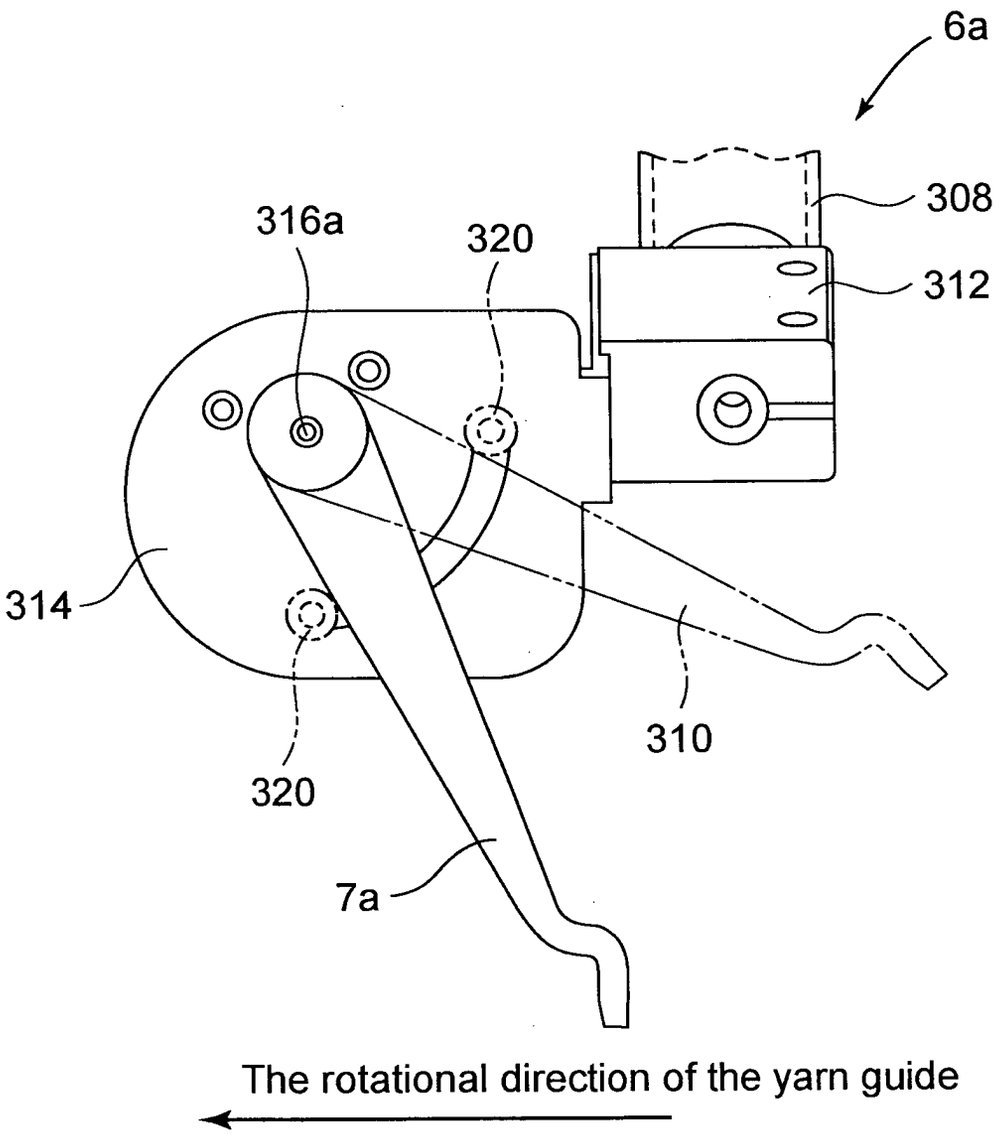

6a
308
316a
320
312
314
310
320
7a
The rotational direction of the yarn guide

FIG.8

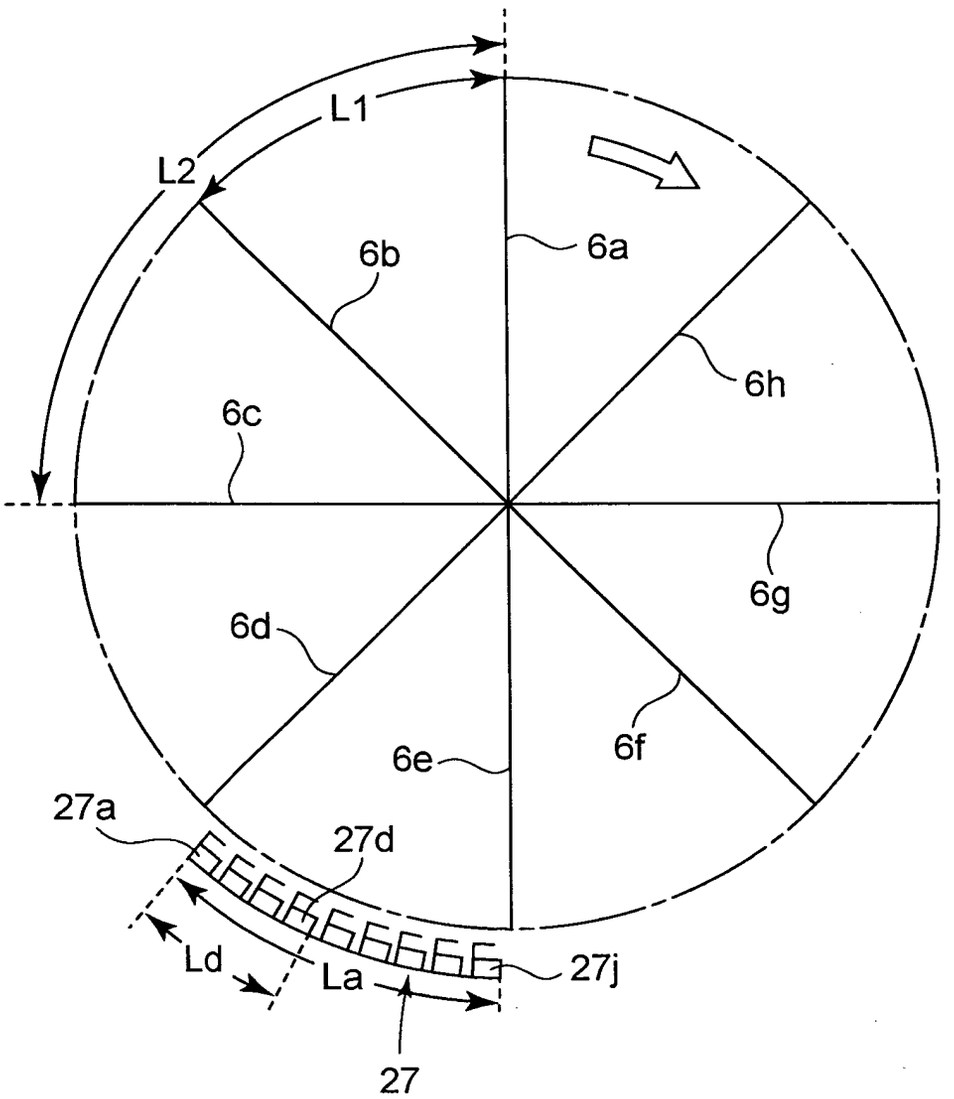
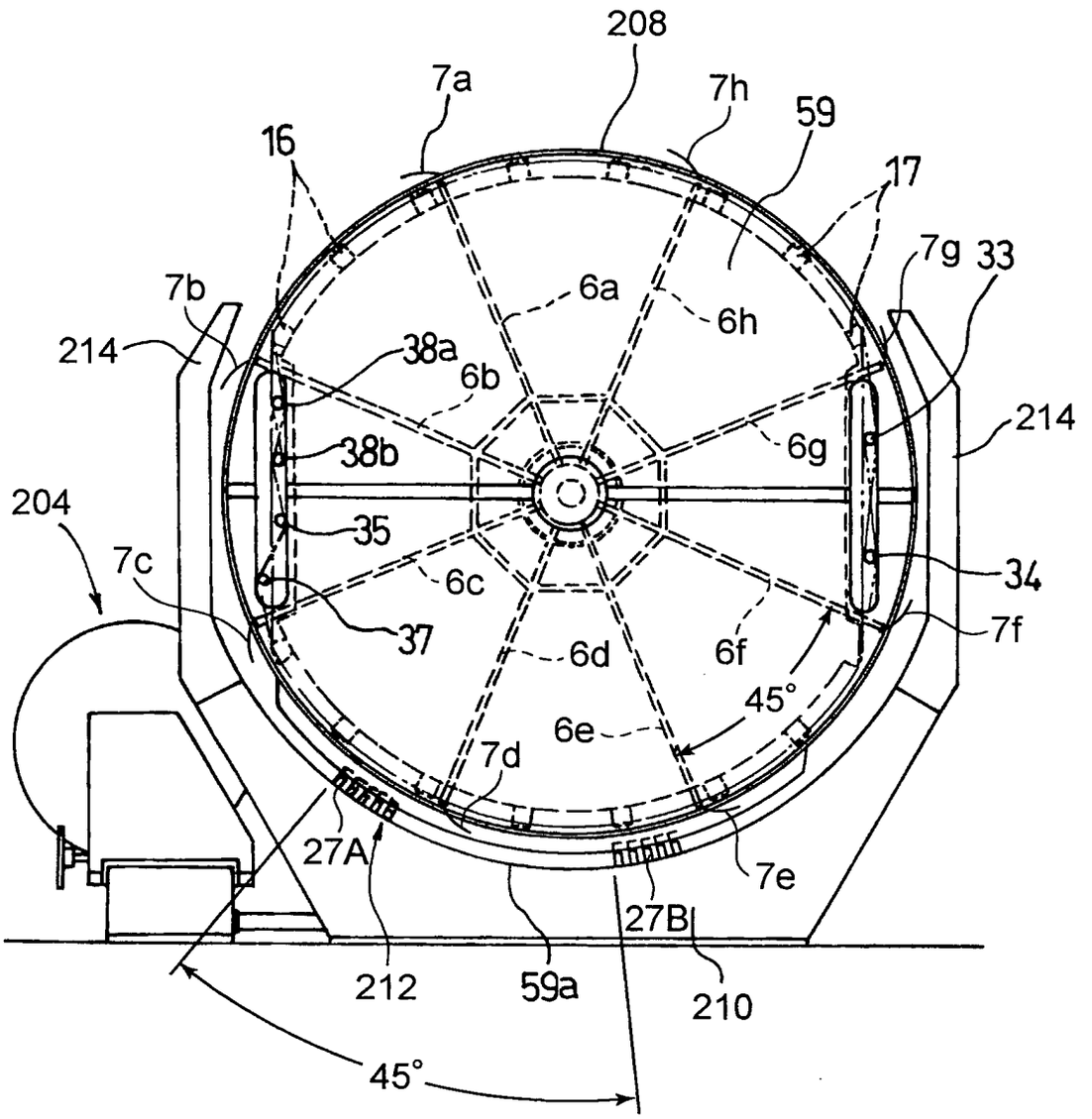


FIG.9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7b
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38a
6b
214
38b
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35
34
7c
6c
37
7f
6d
6f
45°
6e
7d
27A
7e
27B
212
59a
210
45°