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(71) Applicant: **AISIN SEIKI KABUSHIKI KAISHA**
Kariya-shi, Aichi 448-8650 (JP)

(72) Inventor: **Matsukawa, Yoko**
Aichi 448-8650 (JP)

(74) Representative: **Albutt, Anthony John**
D Young & Co LLP
120 Holborn
London EC1N 2DY (GB)

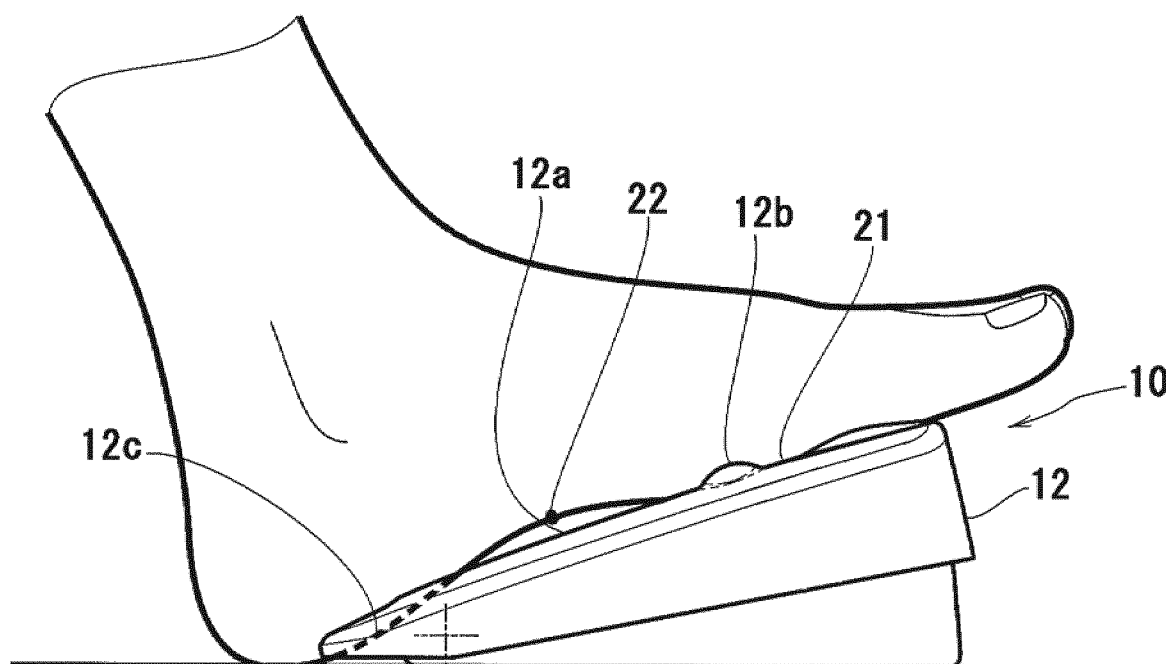
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(54) **Sewing machine**

(57) A sewing machine (1) includes a foot controller (10) including a casing (12) to be stepped on configured to receive an operator's foot for an operation and a positioning guide member (12b, 12c) provided on the casing (12) to guide the operator where to place a thenar eminence of the operator. The sewing machine (1) further

includes a motor (6) varying rotation speed thereof to control a moving distance of a sewing needle (4a) in a rightward-leftward direction or to control a speed of the sewing needle (4a) moving in an upward-downward direction in accordance with an operation amount of the casing (12).

FIG. 4



Description

TECHNICAL FIELD

[0001] This disclosure generally relates to a sewing machine.

BACKGROUND DISCUSSION

[0002] JPS55- 56603A, hereinafter referred to as Reference 1, discloses a sewing machine provided with a controller body formed in a circular form, which is a form that restrains the controller from limiting operational direction of the controller to a particular direction. Accordingly, the controller may be operated from every direction to change speed of operation of the sewing machine so that an operator may control the speed of operation of the sewing machine with ease and without complex operating procedures.

[0003] Nevertheless, the sewing machine according to Reference 1 does not clearly define where a sole of a foot should be positioned relative to the controller body that is a foot controller. Accordingly, the sewing machine according to Reference 1 results in difficulty of providing a subtle control of the sewing machine in a state where the sewing machine is operated by stepping on the foot controller, which is considered as a disadvantage.

[0004] A need thus exists for a sewing machine provided with a foot controller providing ease on controlling the sewing machine with subtlety in a state where the sewing machine is operated by stepping on the foot controller.

SUMMARY

[0005] A sewing machine includes a foot controller including a casing to be stepped on configured to receive an operator's foot for an operation and a positioning guide member provided on the casing to guide the operator where to place a thenar eminence of the operator. The sewing machine further includes a motor varying rotation speed thereof to control a moving distance of a sewing needle in a rightward-leftward direction or to control a speed of the sewing needle moving in an upward-downward direction in accordance with an operation amount of the casing.

[0006] Accordingly, a positional relationship between a sole of a foot and the foot controller becomes clear to the operator so that the operator controlling the sewing machine by stepping on the foot controller may be provided with ease on controlling the sewing machine with subtlety.

[0007] According to another aspect of this disclosure, the positioning guide member of the sewing machine provided on the casing to be stepped on is positioned at a position corresponding to a portion of a foot of the operator between vertex of the thenar eminence and most recessed point of a plantar arch of the foot in a state

where the operator steps on the casing.

[0008] Accordingly, the positional relationship between the sole of the foot and the foot controller becomes more clear to the operator so that the operator controlling the sewing machine by stepping on the foot controller may be provided with furthermore ease on controlling the sewing machine with subtlety.

[0009] According to further aspect of this disclosure, the positioning guide member of the sewing machine provided on the casing to be stepped on is positioned at a position that comes to contact with a sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, in a state where the operator steps on the casing.

[0010] Accordingly, the positional relationship between the sole of the foot and the foot controller becomes more clear to the operator so that the operator controlling the sewing machine by stepping on the foot controller may be provided with furthermore ease on controlling the sewing machine with subtlety.

[0011] According to another aspect of this disclosure, the positioning guide member of the sewing machine includes a recessed area provided on the casing to be stepped on at a position for receiving a heel of the operator when the operator steps on the casing so that the portion of the foot of the operator between the vertex of the thenar eminence and the most recessed point of the plantar arch of the foot is positioned at a position where the positioning guide member is provided.

[0012] Accordingly, the positional relationship between the sole of the foot and the foot controller becomes even more clear to the operator so that the operator controlling the sewing machine by stepping on the foot controller may be provided with even more ease on controlling the sewing machine with subtlety.

[0013] According to further aspect of this disclosure, the positioning guide member of the sewing machine includes a recessed area provided on the casing to be stepped on at a position for receiving a heel of the operator when the operator steps on the casing so that the sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, is positioned at a position where the positioning guide member is provided.

[0014] Accordingly, a positional relationship between the sole of the foot and the foot controller becomes even more clear to the operator so that the operator controlling the sewing machine by stepping on the foot controller may be provided with even more ease on controlling the sewing machine with subtlety.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The foregoing and additional features and characteristics of this disclosure will become more apparent from the following detailed description considered with the reference to the accompanying drawings, wherein:

[0016] Fig. 1 is a perspective view of a sewing machine

according to an embodiment;

[0017] Fig. 2 is a perspective view drawing illustrating an exterior of a foot controller of the sewing machine according to the embodiment viewed from a direction that shows a top side of the foot controller;

[0018] Fig. 3 is a top view drawing illustrating the foot controller of the sewing machine according to the embodiment at a time of use; and

[0019] Fig. 4 is a side view drawing illustrating the foot controller of the sewing machine according to the embodiment at the time of use.

DETAILED DESCRIPTION

[0020] An embodiment of a sewing machine 1 according to this disclosure is described in detail referring to drawings.

[0021] Fig. 1 is a perspective view of the sewing machine 1 according to the embodiment. A main body 4 of the sewing machine 1 is placed on a table 8. A foot controller 10 is placed on a floor surface 9. A harness 2 electrically connects the main body 4 of the sewing machine 1 and the foot controller 10. The main body 4 of the sewing machine 1 includes a sewing needle 4a. Furthermore, the sewing machine 1 internally includes a motor 6 and a circuit board 5 in the main body 4. The circuit board 5 and the harness 2 are electrically connected via a connector 3, which is illustrated in Fig. 2. The circuit board 5 and the motor 6 are electrically connected via an internal electrical line 7.

[0022] Fig. 2 is a perspective view drawing illustrating an exterior of the foot controller 10 viewed from a direction that shows a top side of the foot controller 10. The foot controller 10 includes a base casing 11, a casing 12 to be stepped on, and the harness 2. The base casing 11 makes contact with the floor surface 9. The casing 12 to be stepped on is force fitted to and engages with the base casing 11 so that the casing 12 is rotationally supported to the base casing 11 at a rotational axis 11a, which is at a portion integrally formed with the base casing 11. The harness 2 penetrates a through hole 11b for the harness 2 to go through, which is integrally formed on a frontward surface of the base casing 11. The harness 2 electrically transmits a signal generated in the foot controller 10 to the main body 4 of the sewing machine 1. The harness 2 is provided with the connector 3 at one end. The connector 3 electrically connects the main body 4 of the sewing machine 1 and the harness 2. The casing 12 to be stepped on is provided with a recess 11c configured to make the casing 12 avoid making contact with the harness 2. The recess 11c is provided with a size of an opening that equals to or slightly larger than the through hole 11b for the harness 2 to go through. The recess 11c is provided on the casing 12 to be stepped on at a portion that overlaps with the through hole 11b for the harness 2 to go through in a state where an operator steps on the casing 12.

[0023] Fig. 3 is a top view drawing illustrating the foot

controller 10 of the sewing machine 1 according to the embodiment at a time of use. Fig. 4 is a side view drawing illustrating the foot controller 10 of the sewing machine 1 according to the embodiment at the time of use. A positioning guide member 12b is provided on a surface 12a to be stepped on of the casing 12 at a position where a sloped surface portion of a thenar eminence of an operator, the sloped surface portion at a position closer to a plantar arch of a foot, makes contact with the positioning guide member 12b in a state where the operator steps on the casing 12. Note that an operator refers to a user or a sales person of the sewing machine 1. The positioning guide member 12b, which is in a substantially oval shape viewed from a direction of applying pressure by foot on the casing 12 to be stepped on, forms a gently sloped convex form protruding from the surface 12a to be stepped on where a sole of the foot makes contact. A recessed area 12c of the casing 12 to be stepped on, the recessed area 12c that serves as a positioning guide member, is provided on the surface 12a to be stepped on of the casing 12 at a position where a heel of the operator makes contact in a state where the operator steps on the casing 12. The recessed area 12c of the casing 12 to be stepped on, which is in a substantially circular arc shape viewed from a direction of applying pressure by foot on the casing 12, forms a gently sloped concave area recessing from the surface 12a where a sole of the foot makes contact. The positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on are provided so that the positioning guide member 12b makes contact with the sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, in a state where the operator places the heel on the recessed area 12c of the casing 12.

[0024] In the sewing machine 1 according to the embodiment, the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on are integrally formed with the casing 12. Nevertheless, the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on may be substituted with separate parts that are fitted to the casing 12.

[0025] Operations of the sewing machine 1 according to the embodiment are described next.

[0026] As Fig. 3 illustrates, in a state where an operator steps on the casing 12 to be stepped on from a substantially upward direction while the heel of the operator is placed on the recessed area 12c of the casing 12 to be stepped on, the sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, makes contact with the positioning guide member 12b. In a state where the operator further steps on the casing 12 to be stepped on by the thenar eminence from the aforementioned state, the casing 12 to be stepped on is pushed downward so that the motor 6 changes a rotational speed directly proportional to the amount of the casing 12 pushed downward. Accordingly, a distance to move a

sewing needle 4a in a rightward-leftward direction or a speed of the sewing needle 4a moving in an upward-downward direction is changed.

[0027] In a state where the operator steps on the casing 12 to be stepped on, the heel of the operator is retained at the recessed area 12c of the casing 12 where the recessed area 12c is at a position substantially right above the rotational axis 11a of the base casing 11. Accordingly, the heel does not move significantly in an upward direction and a downward direction while the heel pivots at an ankle in a frontward direction and a rearward direction. The heel receives a load from a foot. Accordingly, in a state where a position of a knee changes from a position directly above the heel in a gravitational vertical direction and a load is applied on the casing 12 to be stepped on from a direction different from the gravitational vertical direction, the position of the casing 12 may slide to a position corresponding to the load applied from the aforementioned direction different from the gravitational vertical direction. In a state where the position of the casing 12 to be stepped on has slid to a position in a frontward direction accordingly, the operator makes the sloped surface portion of the thenar eminence contact with the positioning guide member 12b to pull the casing 12 in a rearward direction. In a state where the position of the casing 12 to be stepped on has slid to a position in the rearward direction accordingly, the operator makes the sloped surface portion of the heel contact with the recessed area 12c of the casing 12 to be stepped on to push the casing 12 in the frontward direction. In a state where the position of the casing 12 to be stepped on has slid to a position in a sideways direction, which is to a position either in a rightward direction or in a leftward direction, the operator makes the sloped surface portion of the thenar eminence contact with the positioning guide member 12b and/or makes the sloped surface portion of the heel contact with the recessed area 12c to bring the casing 12 back to an original position.

[0028] Advantages of the sewing machine 1 according to the embodiment are described next.

[0029] First, the sewing machine 1 according to the embodiment is provided with the foot controller 10 including the positioning guide member 12b, 12c to guide the operator where to place the thenar eminence of the operator. Accordingly, a positional relationship between the sole of the foot and the foot controller 10 becomes clear to the operator so that the operator controlling the sewing machine 1 by stepping on the foot controller 10 may be provided with ease on controlling the sewing machine 1 with subtlety.

[0030] Second, the sewing machine 1 according to the embodiment includes the positioning guide member 12b provided on the casing 12 to be stepped on at a position corresponding to a portion of the foot of the operator between vertex 21 of the thenar eminence and most recessed point 22 of the plantar arch of the foot. Accordingly, a positional relationship between the sole of the foot and the foot controller 10 becomes more clear to the

operator so that the operator controlling the sewing machine 1 by stepping on the foot controller 10 may be provided with furthermore ease on controlling the sewing machine 1 with subtlety. Additionally, in a state where the position of the casing 12 to be stepped on has slid to a position in the sideways direction or to a position in the frontward direction, the operator may make the sloped surface portion of the foot between the vertex 21 of the thenar eminence of the operator and the most recessed point 22 of the plantar arch of the foot contact with the positioning guide member 12b to bring the casing 12 back to an original position. Accordingly, the operator is restrained from an operation by hand to bring the casing 12 to be stepped on back to the original position each time the position of the casing 12 slides to a position in the sideways direction or to a position in the frontward direction. As a result, an efficiency of operation of the sewing machine 1 furthermore increases.

[0031] Third, the sewing machine 1 according to the embodiment includes the positioning guide member 12b provided on the casing 12 to be stepped on at a position that comes to contact with the sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot. Accordingly, a positional relationship between the sole of the foot and the foot controller 10 becomes more clear to the operator so that the operator controlling the sewing machine 1 by stepping on the foot controller 10 may be provided with furthermore ease on controlling the sewing machine 1 with subtlety. Additionally, in the sewing machine 1, the operator may control an operation amount of the foot controller 10 by pressing the positioning guide member 12b with the thenar eminence having a hard bone underneath. Accordingly, the operator is provided with furthermore ease on controlling the sewing machine 1 with subtlety in a state where the sewing machine 1 is operated by stepping on the foot controller 10. Additionally, the operator may control the operation amount of the foot controller 10 while pulling the positioning guide member 12b in a direction closer to the operator with the sloped surface portion of the thenar eminence. Accordingly, the foot controller 10 is restrained from being pushed away from the operator in the frontward direction. As a result, a number of times that the operator adjusting the positional relationship between the foot controller 10 and the sole of the foot may be decreased so that an efficiency of operation of the sewing machine 1 increases even more. Moreover, in a state where the position of the casing 12 to be stepped on has slid to a position in the sideways direction or to a position in the frontward direction, the operator may make the sloped surface portion of the thenar eminence contact with the positioning guide member 12b to bring the casing 12 back to an original position. Accordingly, the operator is restrained from an operation by hand to bring the casing 12 to be stepped on back to the original position each time the casing 12 slides to a position in the sideways direction or to a position in the frontward direction. As a result, an

efficiency of operation of the sewing machine 1 further-more increases.

[0032] Fourth, the sewing machine 1 according to the embodiment includes the foot controller 10 provided with the positioning guide member 12b including the recessed area 12c provided on the casing 12 to be stepped on. The recessed area 12c is provided at the position for receiving the heel of the operator when the operator steps on the casing 12 so that the portion of the foot of the operator between the vertex 21 of the thenar eminence and the most recessed point 22 of the plantar arch of the foot is positioned at a position where the positioning guide member 12b is provided. Accordingly, the positional relationship between the sole of the foot and the foot controller 10 becomes even more clear to the operator so that the operator controlling the sewing machine 1 by stepping on the foot controller 10 may be provided with even more ease on controlling the sewing machine 1 with subtlety. Additionally, in a state where the position of the casing 12 to be stepped on has slid to a position in the sideways direction or to a position in the rearward direction, the operator may make the sloped surface portion of the heel contact with the recessed area 12c to bring the casing 12 back to the original position. Accordingly, the operator is restrained from an operation by hand to bring the casing 12 to be stepped on back to the original position each time the position of the casing 12 slides to a position in the sideways direction or to a position in the rearward direction. As a result, an efficiency of operation of the sewing machine 1 increases even further. Moreover, the operator may operate the sewing machine 1 while the heel is resting on the recessed area 12c of the casing 12 to be stepped on to control the operation amount of the foot controller 10. Accordingly, the operator is restrained from retaining the foot in a suspended position by using a muscle in a thigh to hold a weight of the foot. As a result, the operator may be restrained from tiring the foot and may sustain a physical strength at the foot for a longer time.

[0033] Fifth, the sewing machine 1 according to the embodiment includes the foot controller 10 provided with the positioning guide member 12b including the recessed area 12c provided on the casing 12 to be stepped on. The recessed area 12c is provided at the position for receiving the heel of the operator when the operator steps on the casing 12 to be stepped on so that the sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, is positioned at a position where the positioning guide member 12b is provided. Accordingly, the positional relationship between the sole of the foot and the foot controller 10 becomes even more clear to the operator so that the operator controlling the sewing machine 1 by stepping on the foot controller 10 may be provided with even more ease on controlling the sewing machine 1 with subtlety. Additionally, in a state where the position of the casing 12 to be stepped on has slid to a position in the rearward direction, the operator may

control an operation amount of the foot controller 10 while pushing the recessed area 12c of the casing 12 in the frontward direction by making the sloped surface portion of the heel contact with the recessed area 12c to bring the foot controller 10 back to the original position. Accordingly, the foot controller 10 at the foot of the operator is restrained from being continuously pulled closer to the operator in the rearward direction. As a result, a number of times that the operator adjusting a positional relationship between the foot controller 10 and the sole of the foot may be decreased so that an efficiency of operation of the sewing machine 1 increases even more. Furthermore, in a state where the position of the casing 12 to be stepped on has slid to a position in the sideways direction or to a position in the rearward direction, the operator may make the sloped surface portion of the heel contact with the recessed area 12c to bring the casing 12 back to the original position. Accordingly, the operator is restrained from an operation by hand to bring the casing 12 to be stepped on back to the original position each time the position of the casing 12 slides to a position in the sideways direction or to a position in the rearward direction. As a result, an efficiency of operation of the sewing machine 1 increases. Moreover, the operator may operate the sewing machine 1 while the heel is resting on the recessed area 12c of the casing 12 to be stepped on to control the operation amount of the foot controller 10. Accordingly, the operator is restrained from retaining the foot in a suspended position by using a muscle in a thigh to hold a weight of the foot. As a result, the operator may be restrained from tiring the foot and may sustain a physical strength at the foot for a longer time.

[0034] A result of tests to monitor differences of operational performances between five inexperienced operators and five experienced operators is described below as an example that indicates an advantage of the sewing machine 1 according to the embodiment. In each test, each of the operators has performed an operation to fill in a diamond shape having internal diagonal dimensions of 40 millimeters in a longitudinal direction and 5 millimeters in a lateral direction. The diamond shape is filled in with a continuous embroidery operation. The test is performed ten times on each operator. Each result of the tests is considered as a pass in a case where the result has neither a stitch that begins or ends outside the outline of the diamond shape at a distance that is equal to or more than 1 millimeter from the outline nor a stitch that begins or ends within the outline of the diamond shape at a distance that is equal to or more than 1 millimeter from the outline and leaves a space between the stitch and the outline. The diamond shape is divided into a first half triangle area and a second half triangle area and pass/fail results are monitored at each area.

[0035] In a case where each of the five inexperienced operators uses a foot controller without the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on to fill in the first half triangle area, a pass rate for each of the five inexperienced op-

erators was 70%, 60%, 50%, 90% and 30%. As an average, the pass rate to fill in the first half triangle area using the foot controller without the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 60% for the five inexperienced operators. The pass rate for each of the same five inexperienced operators to fill in the second half triangle area was 40%, 20%, 10%, 10%, and 20%, respectively. As an average, the pass rate to fill in the second half triangle area using the foot controller without the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 38% for the five inexperienced operators. In a case where the same five inexperienced operator uses a foot controller provided with the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on to fill in the first half triangle area, the pass rate for each of the five inexperienced operators was 80%, 60%, 70%, 90% and 80%, respectively. As an average, the pass rate to fill in the first half triangle area using the foot controller provided with the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 76% for the five inexperienced operators. The pass rate for each of the same five inexperienced operators to fill in the second half triangle area was 70%, 60%, 10%, 100%, and 70%, respectively. As an average, the pass rate to fill in the second half triangle area using the foot controller provided with the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 62% for the five inexperienced operators.

[0036] In a case where each of the five experienced operators uses a foot controller without the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on to fill in the first half triangle area, the pass rate for each of the five experienced operators was 70%, 60%, 80%, 60% and 90%. As an average, the pass rate to fill in the first half triangle area using the foot controller without the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 72% for the five experienced operators. The pass rate for each of the same five experienced operators to fill in the second half triangle area was 90%, 20%, 70%, 30%, and 80%, respectively. As an average, the pass rate to fill in the second half triangle area using the foot controller without the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 58% for the five experienced operators. In a case where the same five experienced operators use a foot controller provided with the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on to fill in the first half triangle area, the pass rate for each of the same five experienced operators was 70%, 70%, 70%, 80% and 100%, respectively. As an average, the pass rate to fill in the first half triangle area using the foot controller provided with the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 78% for the five experienced operators. The pass rate

for each of the same five experienced operators to fill in the second half triangle area was 90%, 20%, 70%, 30%, and 80%, respectively. As an average, the pass rate to fill in the second half triangle area using the foot controller provided with the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on was 58% for the five experienced operators.

[0037] From the above results, providing the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on to the foot controller 10 is recognized as effective on increasing the pass rate especially for inexperienced operators.

[0038] In addition, the sewing machine 1 according to this disclosure may be a sewing machine provided with a foot controller 10 provided with a recessed portion 12d on a surface of the positioning guide member 12b where the thenar eminence of the operator makes contact. The recessed portion 12d is a curved surface portion having arcs corresponding to cross sectional shapes of the thenar eminence taken in height directions taken at a portion of the thenar eminence, the portion in the direction of the most recessed point 22 of the plantar arch of the foot where the direction is the direction viewed from the direction of applying pressure by foot on the casing 12 to be stepped on. Accordingly, a positional relationship between the sole of the foot and the foot controller 10 becomes clear to the operator in the sewing machine 1 so that the operator controlling the sewing machine 1 by stepping on the foot controller 10 may be provided with an ease on controlling the sewing machine 1 with a furthermore subtlety. Furthermore, the recessed portion 12d restrains the thenar eminence from sliding off from a desired position on the foot controller 10 even after the operator changes an amount of stepping on the foot controller 10 many times.

[0039] In addition, the sewing machine 1 according to this disclosure may be either a sewing machine provided with a foot controller 10 where a distance between the positioning guide member 12b and the recessed area 12c of the casing 12 to be stepped on is adjustable or a sewing machine provided with two or more foot controllers 10 where each of the foot controllers 10 is provided with a different distance between the positioning guide member 12b and the recessed area 12c of the casing 12. Accordingly, operation of the sewing machine 1 may become comfortable for a wide range of operators from the operator having a small foot size to the operator having a large foot size.

[0040] In addition, the sewing machine 1 according to this disclosure may be a sewing machine provided with a foot controller 10 including a positioning guide member 12b having a substantially oval shape viewed from the direction of applying pressure by foot on the casing 12 to be stepped on and formed in a recessed form 12e, which is a form smoothly recessing from the surface of the foot controller 10 where the sole of the operator makes contact. The recessed form 12e is furthermore recessed at a portion 12f where the vertex 21 of the thenar

eminence would make contact with the recessed form 12e. Accordingly, an operator having a corn or other types of injury at the thenar eminence may operate the sewing machine 1 with comfort.

[0041] In addition, the sewing machine 1 according to this disclosure may be a sewing machine including a foot controller 10 covered by a soft material for example a silicone rubber at a positioning guide member 12b, at a recessed area 12c of a casing 12 to be stepped on, or at an entire surface of the foot controller 10 where the operator steps on. Accordingly, an operator having a corn or other types of injury at the thenar eminence may operate the sewing machine 1 with comfort. Furthermore, a contact state between the sole of the operator and the surface of the foot controller 10 where the operator steps on is enhanced so that the heel and the thenar eminence of the operator are further restrained from sliding off from a desired position on the foot controller 10. Accordingly, the operator is provided with furthermore ease on controlling the sewing machine 1 with subtlety.

Claims

1. A foot controller for a sewing machine (1), comprising:

a foot controller (10) including a casing (12) to be stepped on configured to receive an operator's foot for an operation and a positioning guide member (12b, 12c) provided on the casing (12) to guide the operator where to place a thenar eminence of the operator; and
a motor (6) varying rotation speed thereof to control a moving distance of a sewing needle (4a) in a rightward-leftward direction or to control a speed of the sewing needle (4a) moving in an upward-downward direction in accordance with an operation amount of the casing (12).

2. The foot controller for a sewing machine (1) according to Claim 1, wherein the positioning guide member (12b) provided on the casing (12) to be stepped on is positioned at a position corresponding to a portion of a foot of the operator between vertex (21) of the thenar eminence and most recessed point (22) of a plantar arch of the foot in a state where the operator steps on the casing (12).

3. The foot controller for a sewing machine (1) according to Claim 1, wherein the positioning guide member (12b) provided on the casing (12) to be stepped on is positioned at a position that comes to contact with a sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, in a state where the operator steps on the casing (12).

4. The foot controller for a sewing machine (1) according to Claim 1 or 2, wherein the positioning guide member (12b) includes a recessed area (12c) provided on the casing (12) to be stepped on at a position for receiving a heel of the operator when the operator steps on the casing (12) so that the portion of the foot of the operator between the vertex (21) of the thenar eminence and the most recessed point (22) of the plantar arch of the foot is positioned at a position where the positioning guide member (12b) is provided.

5. The foot controller for a sewing machine (1) according to Claim 1 or 3, wherein the positioning guide member (12b) includes a recessed area (12c) provided on the casing (12) to be stepped on at a position for receiving a heel of the operator when the operator steps on the casing (12) so that the sloped surface portion of the thenar eminence of the operator, the sloped surface portion at a position closer to the plantar arch of the foot, is positioned at a position where the positioning guide member (12b) is provided.

6. A sewing machine comprising a foot controller as claimed in any preceding claim.

FIG. 1

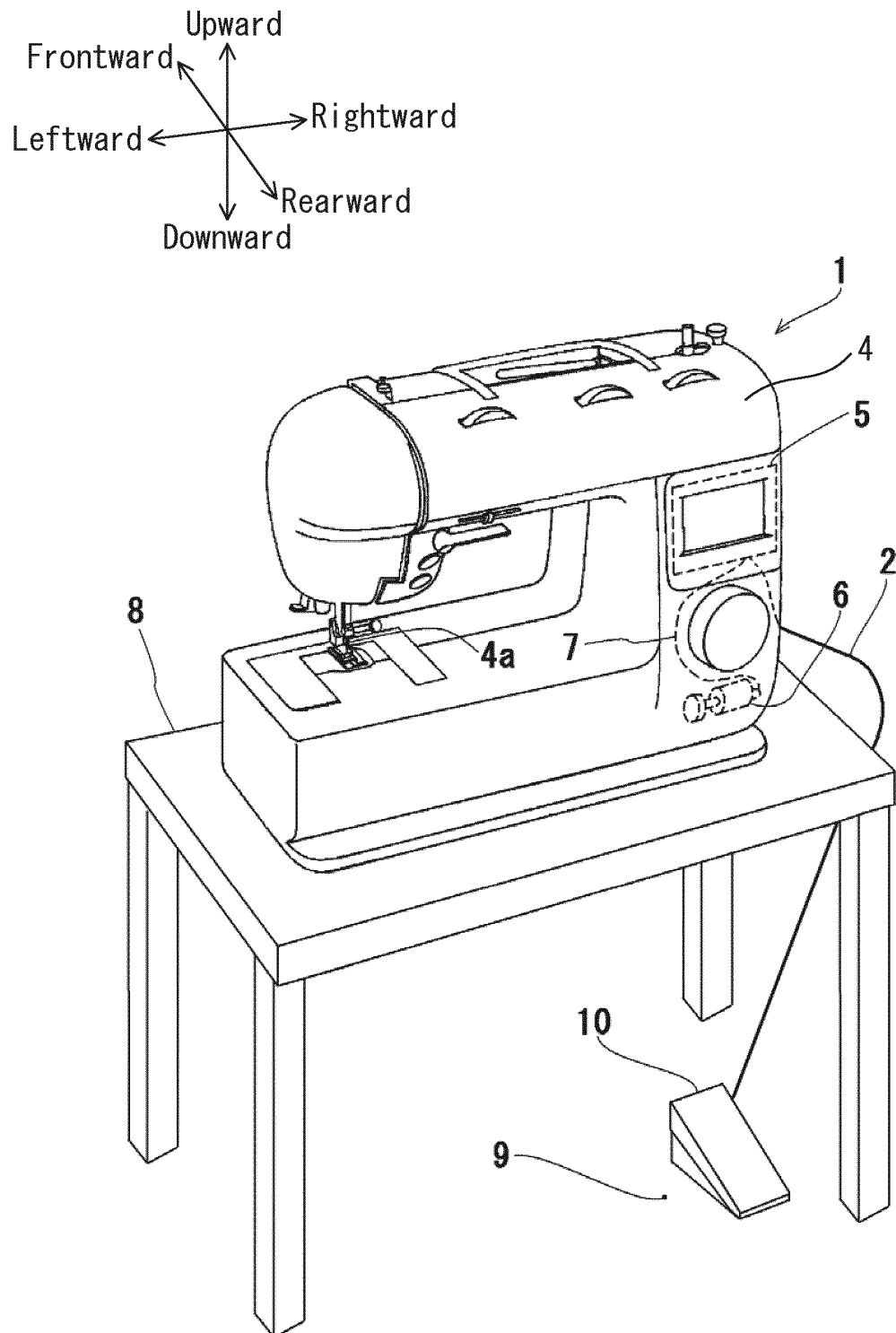


FIG. 2

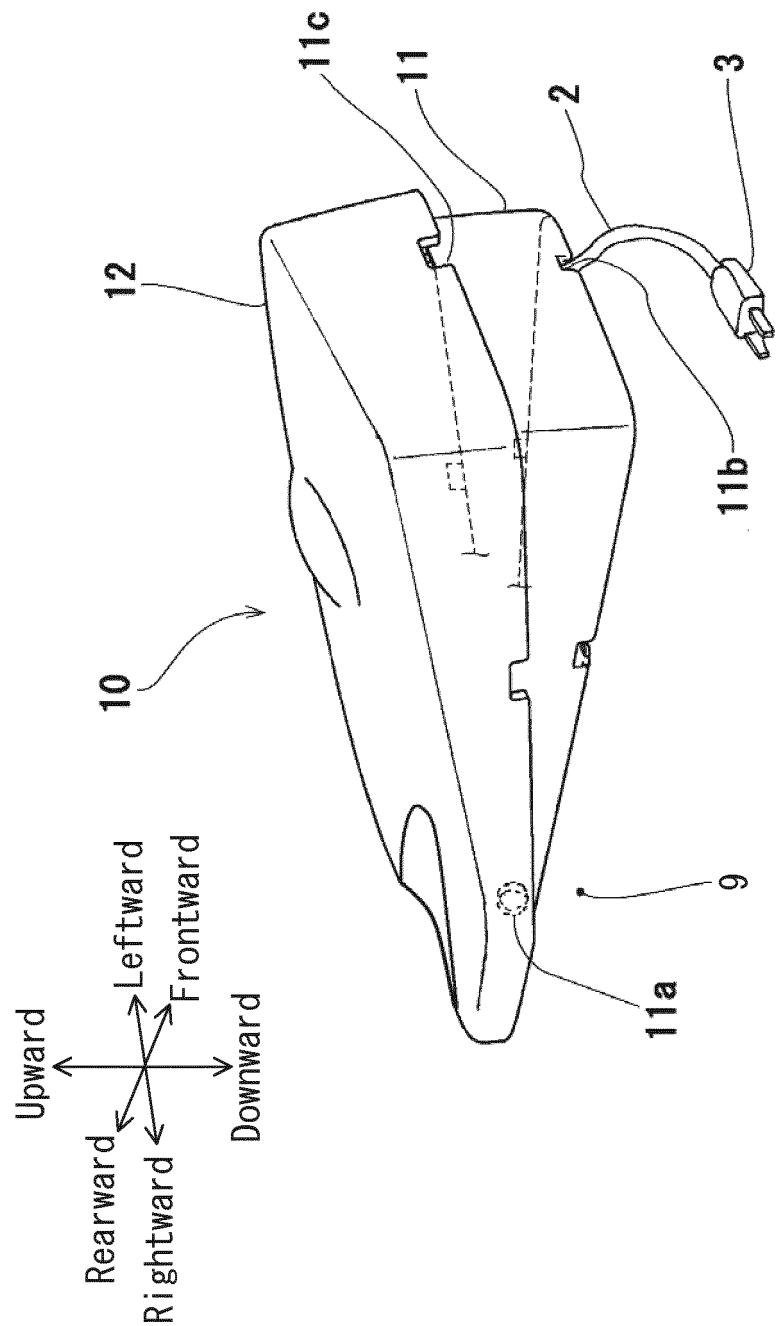


FIG. 3

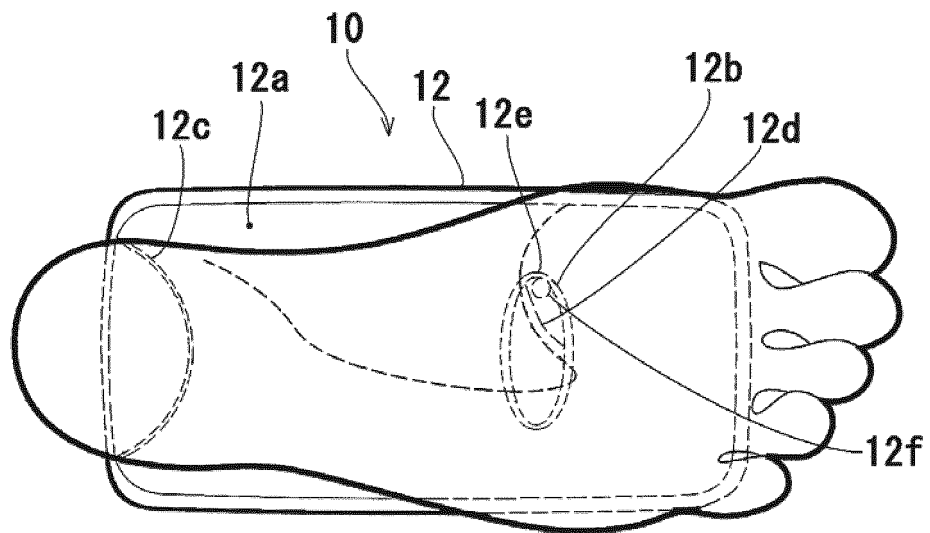
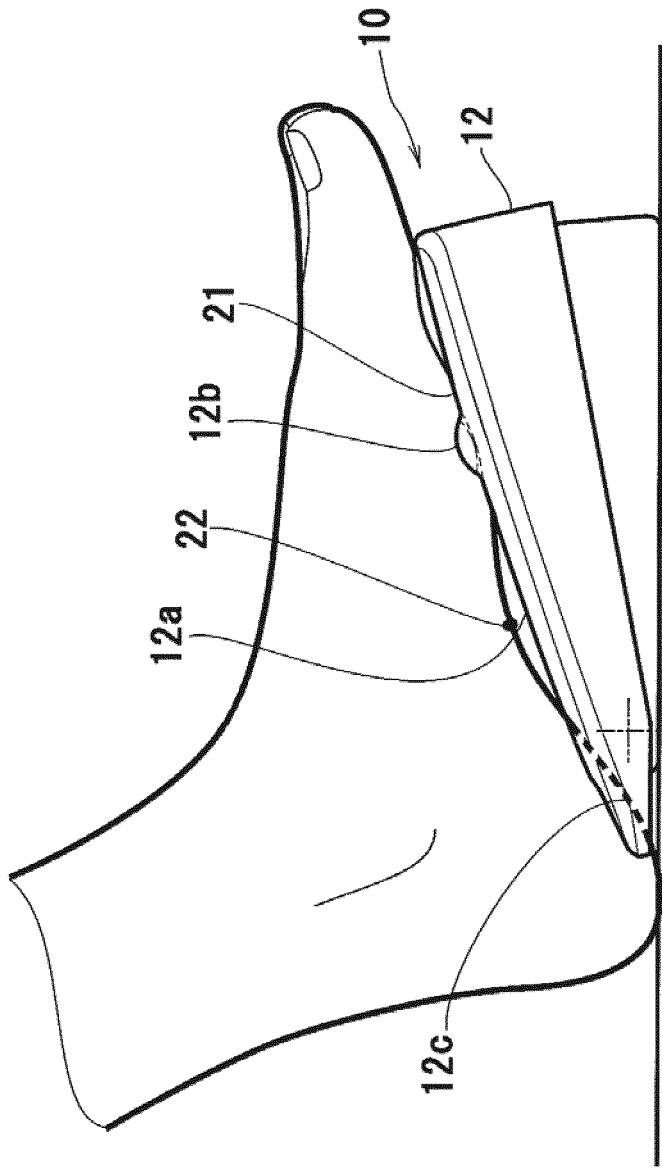


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 13 16 3329

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2009 089729 A (JUKI KK) 30 April 2009 (2009-04-30)	1,6	INV. D05B69/18
A	* abstract; figures 1-9 *	2-5	
A	----- US 2012/060734 A1 (YAMANASHI YOKO [JP] ET AL) 15 March 2012 (2012-03-15) * paragraph [0024] - paragraph [0070]; figures 1-12 *	1-6	
A	----- TW I 269 139 B (ALCON INC [CH]) 21 December 2006 (2006-12-21) * figures 1-15 *	1-6	
A	----- US 2002/183662 A1 (LU SHUN-TSUNG [TW] ET AL) 5 December 2002 (2002-12-05) * paragraph [0019] - paragraph [0026]; figures 1-8 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			D05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 July 2013	Examiner Herry-Martin, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 16 3329

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-07-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2009089729 A	30-04-2009	NONE	
US 2012060734 A1	15-03-2012	JP 2012061042 A US 2012060734 A1	29-03-2012 15-03-2012
TW I269139 B	21-12-2006	AR 041081 A1 AU 2003244532 A1 BR 0303428 A CA 2437328 A1 IL 157547 A IL 171886 A IL 171887 A IL 171888 A IL 171889 A IL 171890 A IL 171891 A JP 4283619 B2 JP 5107944 B2 JP 2004097816 A JP 2009105064 A JP 2011206596 A KR 20040021558 A KR 20070090867 A KR 20070090868 A KR 20070090869 A KR 20070090870 A KR 20070098771 A TW I269139 B	27-04-2005 25-03-2004 10-05-2005 04-03-2004 05-07-2006 31-05-2010 31-05-2010 31-05-2010 31-05-2010 31-05-2010 31-05-2010 24-06-2009 26-12-2012 02-04-2004 14-05-2009 20-10-2011 10-03-2004 06-09-2007 06-09-2007 06-09-2007 06-09-2007 05-10-2007 21-12-2006
US 2002183662 A1	05-12-2002	NONE	