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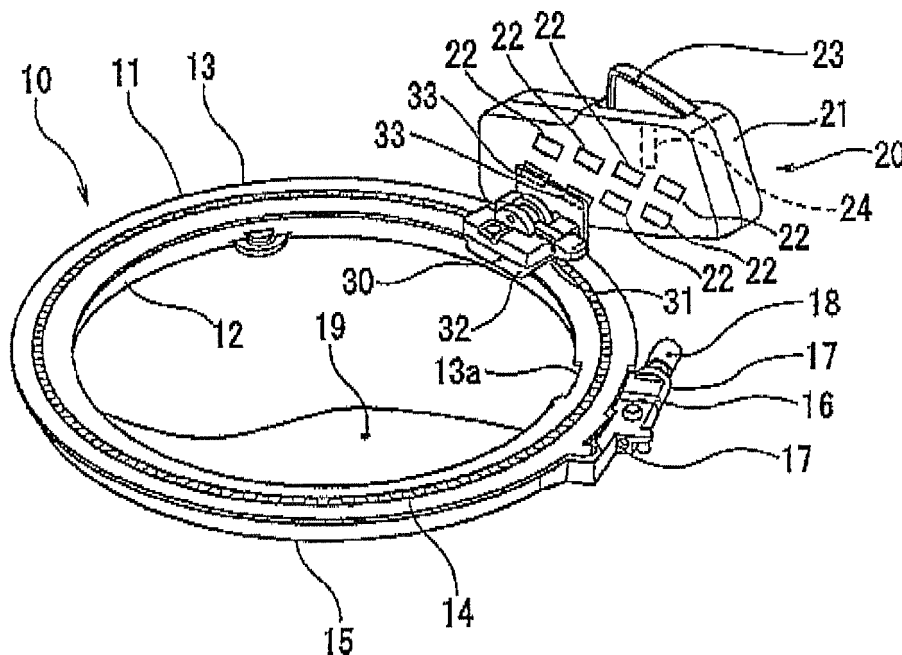
Hand controller unit, and sewing machine with embroidery function having hand controller unit

(57)

A hand controller unit (20) attached to an embroidery frame (11) and changing a stitch width or a sewing speed while a sewing machine (1) is being operated

includes a controller position setting unit (50) which is movable relative to the embroidery frame and is configured to be fixed at a desired position.

FIG. 2



EP 2 540 894 A1

Description

TECHNICAL FIELD

[0001] This disclosure generally relates to a hand controller unit, and a sewing machine with an embroidery function having the hand controller unit.

BACKGROUND DISCUSSION

[0002] A known operation switch for a sewing machine (a hand controller) is disclosed in JP2002-28390A (hereinafter referred to as Patent reference 1). The known operation switch for the sewing machine disposed in the Patent reference 1 is provided with a base portion including a switch portion (an operation switch) for operating an operation of a sewing machine (a sewing machine with an embroidery function) and is provided with a pair of arm portions. Base end portions of the pair of arm portions are connected to the base portion, and distal end portions of the pair of arm portions face each other while allowing a cut-out therebetween. Thus, the pair of arm portions define, at an inner surface side thereof, a finger insertion hole which is configured so that a finger of a person is inserted. The switch portion includes a transmission unit for transmitting radio waves to be received by the machine.

[0003] A known sewing machine (a sewing machine provided with an embroidery function) having an automatic operation function of a finger-type controller is disclosed in JPH06-292788A (hereinafter referred to as Patent reference 2). According to the known sewing machine disclosed in the Patent reference 2, a sewing machine frame is provided with the finger-type controller (a hand controller), a sewing machine motor, an identical-speed detecting means, a starting operation means, a speed memory means and an automatic operation command means, a releasing means and a central processing unit controlling the finger-type controller, the sewing machine motor, the identical-speed detecting means, the starting operation means, the speed memory means and the automatic operation command means, the releasing means. The starting operation means and the releasing means are operated via an operation of the finger-type controller,

[0004] According to the sewing machine disposed in the Patent reference 1 an operator of the sewing machine manipulates an embroidery frame in a state where the hand controller is fixedly fitted around the finger, and thus it may be difficult for the operator to manipulate the embroidery frame as the operator moves the finger on which the hand controller is fitted or a thumb used for operating the hand controller. Accordingly, it may be difficult for the operator to slightly and finely move an object on which embroidery is performed, and at the same time to operate the hand controller.

[0005] According to the sewing machine disclosed in the Patent reference 2, an operator operates the hand

controller with one hand, and thus it may be difficult for the operator to hold an object on which embroidery is performed with both hands. Accordingly, it may be difficult for the operator to slightly and finely move the object on which embroidery is performed.

[0006] A need thus exists for a hand controller unit allowing an object on which embroidery is performed to be held with both hands of an operator and to be moved slightly and finely while the hand controller is operated manually at hand during operation of a sewing machine, and for a sewing machine with an embroidery function having the hand controller unit, which allows the object on which embroidery is performed to be held with both hands and to be moved slightly and finely while the hand controller is operated.

SUMMARY

[0007] According to an aspect of this disclosure, a hand controller unit attached to an embroidery frame and changing a stitch width or a sewing speed while a sewing machine is being operated includes a controller position setting unit which is movable relative to the embroidery frame and is configured to be fixed at a desired position.

[0008] According to another aspect of this disclosure, a sewing machine with an embroidery function includes an embroidery frame unit including an embroidery frame manipulated on a table on which an embroidery work is performed and a hand controller unit manually operable by an operator of the sewing machine at hand, wherein the hand controller unit includes a controller position setting unit which is movable on the embroidery frame and is configured to be fixed at a desired position.

[0009] According to the above described structure, the operator may hold the hand controller unit together with the embroidery frame with a palm and/or fingers of the operator, which makes operation of the hand controller unit easier.

[0010] Further, the operator may hold the embroidery frame with both hands while performing embroidery work, which makes it easy for the operator to move the embroidery frame slightly and finely.

[0011] Further, due to the controller position setting unit, the hand controller unit is movable on the embroidery frame and is configured to be fixed at a desired position. Accordingly, when the operator changes a portion and/or an orientation of the embroidery in the embroidery frame, the operator may slide and move the hand controller unit to a desired position that facilitates the operation of the hand controller unit, and may fix the hand controller unit again at the desired position.

[0012] According to a further aspect of this disclosure, the hand controller unit includes a ball bearing being in contact with an upper surface of the embroidery frame.

[0013] According to the above described structure, the hand controller unit includes the ball bearings, and thus the hand controller unit moves smoothly on the embroidery frame.

[0014] According to a further aspect of this disclosure, the controller position setting unit includes a cam configured to fix the hand controller unit on the embroidery frame and an operation lever for causing the cam to engage with and disengage from the embroidery frame.

[0015] According to the above described structure, the controller position setting unit includes the operation lever and the cam. Accordingly, operability for attaching and removing the hand controller unit to and from the embroidery frame is more improved.

[0016] According to a further aspect of this disclosure, the hand controller unit includes a hand controller provided with an operation switch that is manually operable by the operator at hand and includes an attachment member provided with the controller position setting unit.

[0017] According to a further aspect of this disclosure, the hand controller unit includes a switch position selection unit for changing an attachment posture of the hand controller to the attachment member.

[0018] According to the above described structure, the hand controller unit includes the switch position selection unit for changing the attachment posture of the hand controller to the attachment member. Accordingly, an attachment posture of the operation switch on the attachment member may be adjusted depending on a length of the finger and/or a range of movement of the finger of the operator so that a position, a height and/or an angle of the operation switch facilitates the operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] 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:

[0020] Fig. 1 is a perspective view explaining a state where an embroidery frame and a hand controller unit of an embodiment disclosed here are attached to a sewing machine with an embroidery function;

[0021] Fig. 2 is a perspective view explaining an embroidery frame unit of the embodiment, which is illustrated in Fig. 1;

[0022] Fig. 3A is an explanatory exploded view illustrating an entire attachment member of a hand controller unit of the embodiment;

[0023] Fig. 3B is a cross sectional-view explaining an accommodation portion of the embodiment;

[0024] Fig. 4A is a view explaining a selection lever of the embodiment, which is illustrated in Fig. 3A, in a slidable position; and

[0025] Fig. 4B is a view explaining the selection lever in a fixed position.

DETAILED DESCRIPTION

[0026] An embodiment of this disclosure will be explained hereunder with reference to Figs. 1 to 4B.

[0027] As illustrated in Fig. 1, a sewing machine 1 with

an embroidery function (hereinafter also referred to as the sewing machine 1) is provided with an extension table 3 (i.e., a table) positioned at a lower left portion of the sewing machine 1 when viewed in Fig. 1 and is provided with an embroidery frame unit 10 arranged on the extension table 3. The embroidery frame unit 10 is arranged to be movable on the extension table 3 by an operator of the sewing machine 1 while embroidery work is performed, and to be removable from the extension table 3 after completion of the embroidery work. A harness 5, which is disposed between a hand controller unit 20 and the sewing machine 1 and which transmits operation signals from the hand controller unit 20 to the sewing machine 1, is connected to the hand controller unit 20 via a connector 7 and to the sewing machine 1 via another connector 7. In Fig. 1, a hand controller 21 is arranged in a lateral orientation so that a direction in which an operation switch 23 is operated corresponds to a horizontal direction, however, the hand controller 21 may be arranged in a vertical orientation so that the direction in which the operation switch 23 is operated corresponds to a vertical direction. Further, in Fig. 1, the harness 5 is routed to be arranged in front of the sewing machine 1 and is connected to the sewing machine 1, that is, the harness 5 is arranged between the sewing machine 1 and the operator, and is connected to the sewing machine 1. However, the harness 5 may be routed to be arranged behind the sewing machine 1 in a manner that the harness 5 is held by an under surface of the extension table 3 and may be connected to the sewing machine 1. Further, in Fig. 1, the harness 5 is connected via the corresponding connector 7 to the hand controller 21 and to the sewing machine 1, however, the harness 5 may be directly connected to the hand controller 21 and to the sewing machine 1 without using the connectors 7. Further, the extension table 3 is employed in Fig. 1, however, a normal table may be employed instead of the extension table 3. In the embodiment, the terms "upper", "under", "front" and "rear", and derivatives thereof are used based on the sewing machine 1, unless otherwise specified.

[0028] As illustrated in Fig. 2, an embroidery frame unit 10 includes the hand controller unit 20 which is slidably (movably) provided at a rail 13 provided on an embroidery frame 11. The hand controller unit 20 is made of resin having a high slidability, including, for example, polyacetal, and the embroidery frame 11 is made of resin having a high slidability, including, for example, polyphenylene ether. The embroidery frame 11 includes an inner frame 12 and an outer frame 15. The rail 13 is provided on an upper portion of the inner frame 12. The outer frame 15 and the inner frame 12 are configured to clamp therebetween a fabric 19. The outer frame 15 includes a screw hole 17 provided at an outer periphery of the outer frame 15 at two positions at both circumferential sides relative to a joint portion 16 of the outer frame 15. A fixing finger screw 18 for opening/closing the joint portion 16 of the outer frame 15, is configured to be screwed into each screw hole 17. The hand controller unit 20 includes

an attachment member 30 made of resin having a high slidability, including, for example, polyacetal. The attachment member 30 is slidable on the rail 13 and is configured to be fixed at a desired position on the rail 13. The hand controller unit 20 further includes the hand controller 21 for operating the sewing machine 1 to start/stop sewing, and for adjusting a stitch width, that is, an amount of a lateral movement of a needle, of the sewing machine 1.

[0029] The attachment member 30 includes an under surface 31 for sliding on the rail 13 that has an approximate width of 23 millimeter, and a rail-holding hook 32, for example, plural rail-holding hooks 32, holding an under surface of the rail 13 in a manner that a minor clearance which is sufficient to restricts each rail-holding hook 32 from coming off the rail 13 is provided between the rail-holding hook 32 and the under surface of the rail 13. Each rail-holding hook 32 slides on the under surface of the rail 13 while being in contact with the under surface of the rail 13. Each rail-holding hook 32 has an approximate width of 5 millimeters in a radial direction of the embroidery frame 11, an approximate length of 5 millimeters in a circumferential direction of the embroidery frame 11 and an approximate pitch of 19 millimeters between the adjacent rail-holding hooks 32 facing each other in the radial direction of the embroidery frame 11. The attachment member 30 further includes a hand controller-fixing tab 33, for example, plural hand controller-fixing tabs 33, provided on a side surface of the attachment member 30. Each hand controller-fixing tab 33 is configured to be inserted into and fixed at an attachment hole 22 provided at the hand controller 21, and to come off the attachment hole 22. The hand controller 21 includes the operation switch 23 and the attachment hole 22, for example, plural attachment holes 22, into which the hand controller-fixing tab 33 is configured to be inserted and fixed thereat. The hand controller-fixing tabs 33 and the attachment holes 22 constitute a switch position selection unit where combinations of the hand controller-fixing tabs 33 and the attachment holes 22 into which the hand controller-fixing tabs 33 are inserted are selectively changeable, and thus an attachment posture of the hand controller 21 to the attachment member 30 is changeable. The operation switch 23 is provided with a variable resistance 24, including, for example, a potentiometer which transmits an amount of operation to the sewing machine 1. In this embodiment, the hand controller 21 is configured to adjust the stitch width, however, the hand controller 21 may be configured to adjust a sewing speed of the sewing machine 1. Further, a rack 14, which is for positioning the hand controller 21, may be provided at a center portion of the rail 13 in the radial direction of the embroidery frame 11. Further, the attachment member 30 may include a fastening mechanism other than the hand controller-fixing tab 33, including, for example, a screw or a pin. Further, the attachment member 30 and the hand controller 21 may be integrally formed with each other.

[0030] As illustrated in Figs. 3A and 3B, the attachment member 30 accommodates a ball bearing 39, for example, four ball bearings 39, each made of metal. More specifically, each ball bearing 39 is accommodated in an accommodation portion 35 formed at a base 34 which holds the rail 13 in an up/down direction, that is, the base 34 holds the rail 13 at upper and lower portions of the rail 13, in a manner that the ball bearing 39 rolls inside the corresponding accommodation portion 35. The base 34 is made of resin having a high slidability, including, for example, polyacetal. The four ball bearings 39 are covered with a cover 40 in a manner that the four ball bearings 39 are sandwiched between the base 34 and the cover 40, and the base 34 and the cover 40 are fastened to each other by means of a screw 43, for example, two screws 43. Further, a rotation axis hole 52 of a selection lever 51 (i.e., operation lever) is fitted in a recessed portion 41 of the cover 40, and the selection lever 51 is rotatably mounted on the cover 40 by means of a lever pin 53.

[0031] An under surface of each accommodation portion 35 includes an opening portion 36, for example, four opening portions 36. Each opening portions 36 is formed in a manner that the corresponding ball bearing 39 rolls while part of each ball bearing 39 is in contact with the rail 13 (that is, an upper surface of the embroidery frame 11) and in a manner that the ball bearing 39 does not come off the attachment member 30 in a state where the hand controller unit 20 is attached to the rail 13. The opening portions 36 are provided with a pitch, in the radial direction of the embroidery frame 11, which restricts the ball bearings 39 from being in contact with the rack 14 provided at the center portion of the rail 13 and with a pitch, in the circumferential direction of the embroidery frame 11, which allows each ball bearing 39 to move on the rail 13 smoothly without rattling. Further, a bearing-retaining boss 42, for example, four bearing-retaining bosses 42, are provided at an under surface of the cover 40 so that each ball bearing 39 is in contact with the rail 13 and with the under surface of the cover 40 (that is, an upper surface of the accommodation portion 35) when the ball bearing 39 rolls while the part of the ball bearing 39 is in contact with the rail 13. On the other hand, a slide-side locking tab 37 and a fix-side locking tab 38 both of which include flexibility are provided at an upper surface of the base 34. The selection lever 51 is engageable at the slide-side locking tab 37 when the selection lever 51 is at a slidable position after rotation, and the selection lever 51 is disengageable from the slide-side locking tab 37 before rotating toward the fixed position. The selection lever 51 is engageable at the fix-side locking tab 38 when being at a fixed position after rotation, and the selection lever 51 is disengageable from the fix-side locking tab 38 before rotating toward the slidable position. Each ball bearing 39 may be made of resin having a high slidability, including, for example, polyamide.

[0032] As illustrated in Figs. 4A and 4B, the selection lever 51 includes a handle 54 and a cam 55. The handle

54 is for the operator to rotate the selection lever 51 so that the hand controller unit 20 is slidable on the rail 13 or is fixed at the rail 13. When the operator fixes the hand controller unit 20 at the rail 13, the cam 55 causes the hand controller unit 20 to be floated off the rail 13. That is, an under surface of the base 34 is floated off an upper surface of the rail 13. The cam 55 is formed with a protruding portion that performs spring properties by being flexed by approximately 1 millimeter in a height direction of the cam 55 when viewed in Figs. 4A and 4B in a case where the hand controller unit 20 floats off the rail 13. The selection lever 51 is made of resin including, for example, polyacetal that is hard to crack even under repeated stress that is generated when the cam 55 performs the spring properties. The handle 54 and the cam 55 are integrally formed with each other. The selection lever 51 and the cam 55 constitute the controller position setting unit 50.

[0033] An operation of the sewing machine 1 with the embroidery function, according to the embodiment will be explained hereunder.

[0034] In the state illustrated in Fig. 1, the operator is positioned in front of the sewing machine 1. In order to perform the embroidery work, in the state illustrated in Fig. 1, the selection lever 51 is rotated to the slidable position and is engaged or locked at the slide-side locking tab 37 as illustrated in Fig. 4A. In this state, at a neck portion 13a provided at a predetermined position of the rail 13 of the inner frame 12 and having an approximate width of 17 millimeters in the circumferential direction of the embroidery frame 11, the rail 13 is brought to engage at the rail-holding hooks 32 so that the hand controller unit 20 is arranged at the rail 13. In Fig. 2, the neck portion 13a is provided at one position, however, the number of the neck portion 13a is not limited thereto. After the hand controller unit 20 is slid on the rail 13 to a desired position, the selection lever 51 is rotated to the fixed position and is engaged or locked at the fix-side locking tab 38 as illustrated in Fig. 4B, and thus the hand controller unit 20 is fixed at the rail 13. At this time, the hand controller unit 20 is lifted up by means of the cam 55 formed at the selection lever 51, and thus the rail 13 is sandwiched between each rail-holding hook 32 formed at a lower portion of the hand controller unit 20 and the cam 55. Accordingly, the hand controller unit 20 is fixed at the rail 13 by a sliding resistance generated while the rail 13 is sandwiched between the rail-holding hooks 32 and the cam 55 in the up/down direction. Next, the hand controller 21 is arranged in the vertical orientation as illustrated in Fig. 2.

[0035] Next, the fabric 19 on which the embroidery work is to be performed is clamped between the inner frame 12 of the embroidery frame 11 and the outer frame 15 of the embroidery frame 11. After that, the fixing finger screw 18 is screwed into the screw holes 17 provided at two positions at the outer frame 15 and the joint portion 16 of the outer frame 15 is tightened so that the outer frame 15 is tightened around the inner frame 12 while

the fabric 19 on which the embroidery work is to be performed is stretched. The embroidery frame unit 10, which is set and assembled in the above-described manner, is placed on the extension table 3 in a manner that the hand controller unit 20 is positioned at a side that corresponds to the operator's left hand. The operator holds the embroidery frame 11 with the operator's both hands while holding the hand controller unit 20, together with the embroidery frame 11, with the left hand. In addition, the operator places the thumb of the left hand on the operation switch 23 and manipulates an amount of pressing the operation switch 23 so as to adjust the stitch width of the sewing machine 1, and at the same time the operator finely adjusts a stitching position, that is, a portion of the fabric at which the embroidery is provided, with both hands. In order to change the posture, a position and/or an angle of the hand controller 21 to the attachment member 30, the combinations of the hand controller-fixing tabs 33 and the attachment holes 22 into which the hand controller-fixing tabs 33 are inserted are changed according to the necessity including, for example, a length of the thumb and/or a range of movement of the thumb of the operator. Further, in a case where the operator grips the embroidery frame 11 firmly by using the thumb while operating the operation switch 23 with a finger other than the thumb, the hand controller 21 may be attached to the attachment member 30 in the lateral orientation instead of the vertical orientation.

[0036] In the embodiment, the operation switch 23 is operated with the left hand of the operator, however, the hand controller 21 may be attached to the attachment member 30 so that the operation switch 23 is operated with the right hand. Further, in the embodiment, the hand controller unit 20 is configured to be fixed at the rail 13 by using the sliding resistance, however, the configuration is not limited thereto. An end portion of the cam 55 may be configured to fit in the rack 14 provided at the center portion of the rail 13, so that the operator obtains a click feeding during movement of the hand controller unit 20 and so that the hand controller unit 20 returns to an original position more precisely in a case where the operator moves the hand controller unit 20 back to the original position.

[0037] In order to change the portion of the fabric at which the embroidery is provided and/or an orientation of the fabric, in a state illustrated in Fig. 2, the selection lever 51 is rotated to the slidable position and is engaged or locked at the slide-side locking tab 37 as illustrated in Fig. 4A. In this state, the hand controller unit 20 which is slidable on the rail 13 is moved to a desired position. After the hand controller unit 20 is slid on the rail 13 to the desired position, the selection lever 51 is rotated to the fixed position and is engaged or locked at the fix-side locking tab 38 as illustrated in Fig. 4B. Thus, the hand controller unit 20 is fixed at the rail 13 and the operator may restart the embroidery work.

[0038] Effects and advantages obtained according to the embodiment will be explained hereunder.

[0039] According to the sewing machine 1 with the embroidery function of the aforementioned embodiment, the embroidery frame unit 10 includes the hand controller unit 20 configured to adjust the stitch width. Accordingly, the operator may hold the hand controller unit 20 together with the embroidery frame 11 with the palm and/or fingers of the operator, which makes the operation of the hand controller unit 20 easier. At the same time, the operator may hold the embroidery frame 11 with both hands while performing the embroidery work, which makes it easy for the operator to move the embroidery frame 11 slightly and finely. Further, due to the controller position setting unit 50 provided at the attachment member 30, the hand controller unit 20 is movable on the embroidery frame 11 and is configured to be fixed at a desired position. Accordingly, when the operator changes the portion of the fabric at which the embroidery is provided and/or the orientation of the fabric in the embroidery frame unit 10, the operator may slide and move the hand controller unit 20 to a desired position that facilitates the operation of the hand controller unit 20, and may fix the hand controller unit 20 again at the desired position.

[0040] According to the sewing machine 1 with the embroidery function of the aforementioned embodiment, the hand controller unit 20 includes the ball bearings 39. Accordingly, the hand controller unit 20 moves smoothly on the embroidery frame unit 10.

[0041] According to the sewing machine 1 with the embroidery function of the aforementioned embodiment, the controller position setting unit 50 includes the selection lever 51 and the cam 55. Accordingly, operability for engaging and disengaging the hand controller unit 20 at and from the rail 13 is more improved. For example, the cam 55 comes to be engaged at and disengaged from the rail 13 by rotating the selection lever 51.

[0042] The sewing machine 1 with the embroidery function of the aforementioned embodiment includes the attachment hole 22 (i.e., the switch position selection unit) and the hand controller-fixing tab 33 (i.e., the switch position selection unit) both of which are for changing the attachment posture of the hand controller 21 to the attachment member 30. Accordingly, the attachment posture of the operation switch 23 on the attachment member 30 may be adjusted depending on the length of the finger and/or the range of the movement of the finger of the operator so that the position, a height and/or the angle of the operation switch 23 facilitate the operation.

2. A sewing machine (1) with an embroidery function, comprising:

an embroidery frame unit (10) including an embroidery frame (11) manipulated on a table (3) on which an embroidery work is performed and a hand controller unit (20) manually operable by an operator of the sewing machine (1) at hand, wherein

the hand controller unit (20) includes a controller position setting unit (50) which is movable on the embroidery frame (11) and is configured to be fixed at a desired position.

3. The sewing machine (1) with the embroidery function according to claim 2, wherein the hand controller unit (20) includes a ball bearing (39) being in contact with an upper surface of the embroidery frame (11).

4. The sewing machine (1) with the embroidery function according to either claim 2 or 3, wherein the controller position setting unit (50) includes a cam (55) configured to fix the hand controller unit (20) on the embroidery frame (11) and an operation lever (51) for causing the cam (55) to engage with and disengage from the embroidery frame (11),

5. The sewing machine (1) with the embroidery function according to any one of claims 2 through 4, wherein the hand controller unit (20) includes a hand controller (21) provided with an operation switch (23) that is manually operable by the operator at hand and includes an attachment member (30) provided with the controller position setting unit (50),

6. The sewing machine (1) with the embroidery function according to any one of claims 2 through 5, wherein the hand controller unit (20) includes a switch position selection unit (22, 33) for changing an attachment posture of the hand controller (21) to the attachment member (30).

Claims

1. A hand controller unit (20) attached to an embroidery frame (11) and changing a stitch width or a sewing speed while a sewing machine (1) is being operated, comprising;
a controller position setting unit (50) which is movable relative to the embroidery frame (11) and is configured to be fixed at a desired position.

FIG. 1

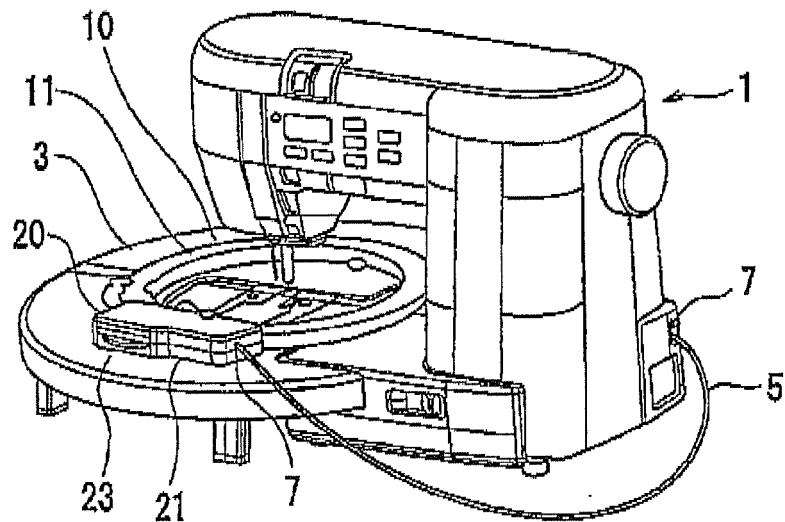


FIG. 2

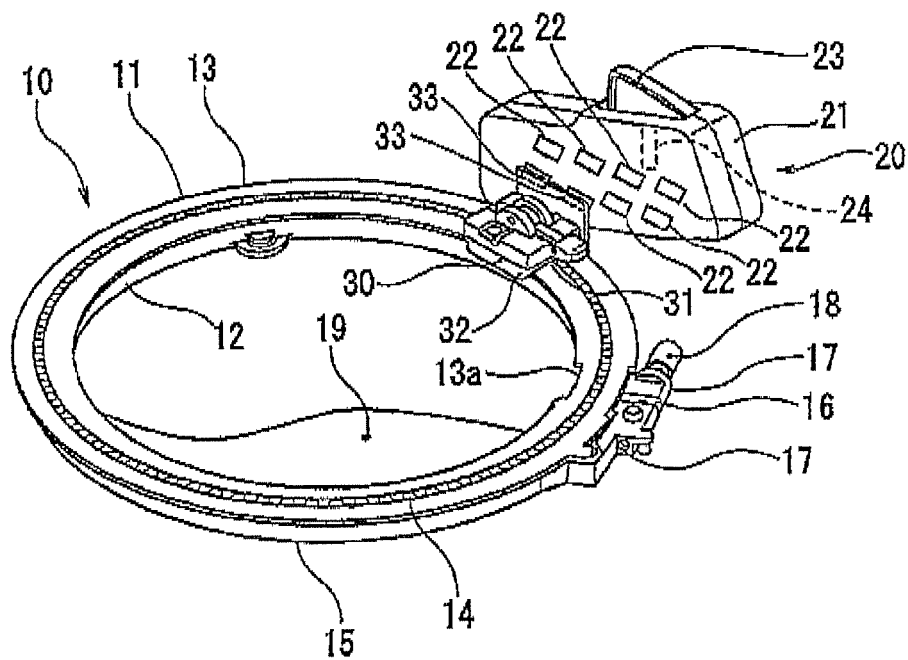


FIG. 3A

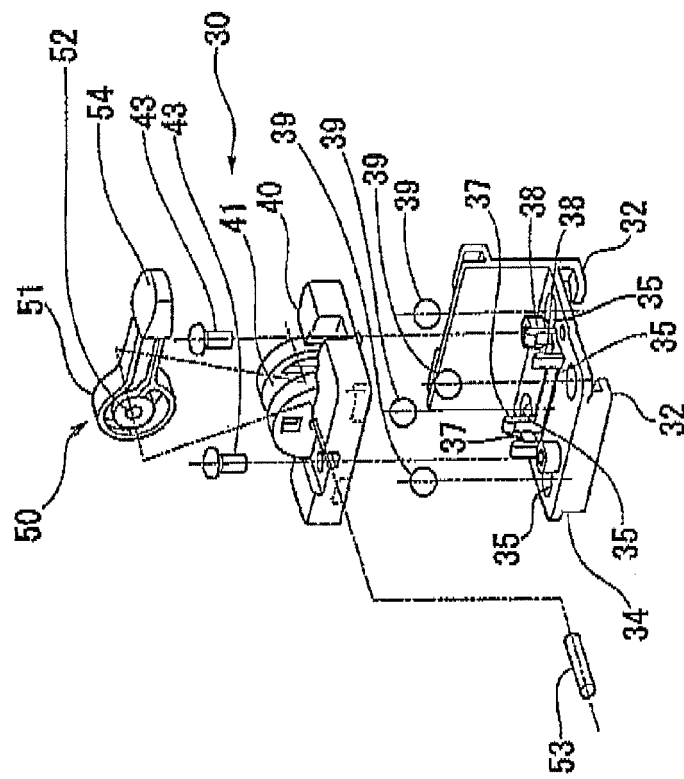


FIG. 3B

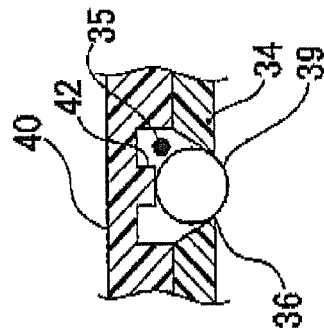


FIG. 4 A

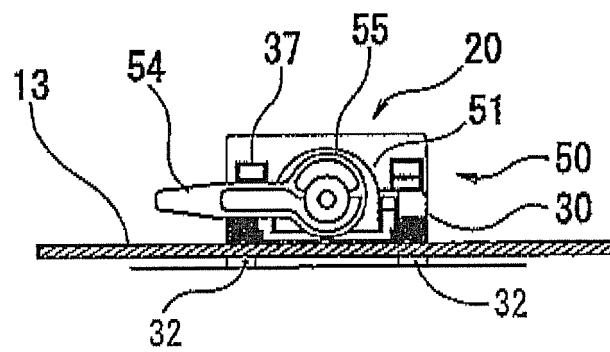
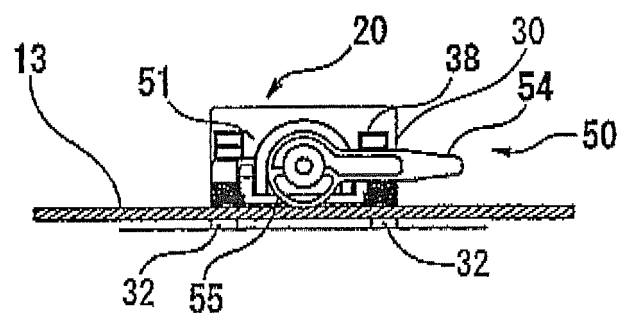


FIG. 4 B





EUROPEAN SEARCH REPORT

Application Number
EP 12 17 3678

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 October 2012	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
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EP 12 17 3678

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
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REFERENCES CITED IN THE DESCRIPTION

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