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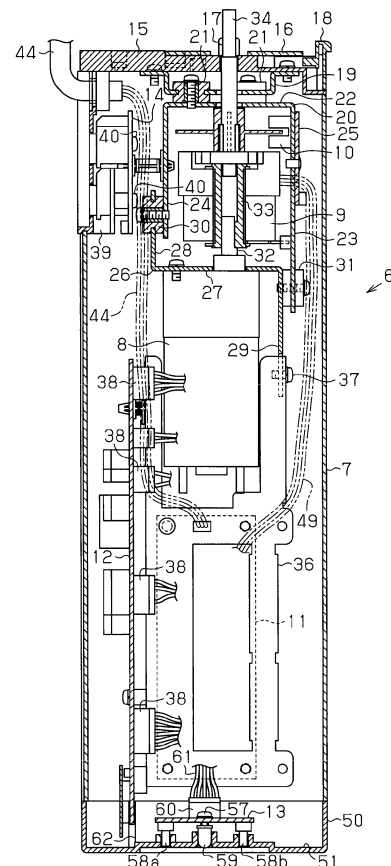
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(54) **MOTOR UNIT OF ELECTRIC SUN SHADING DEVICE AND METHOD FOR ASSEMBLING MOTOR UNIT OF ELECTRIC SUN SHADING DEVICE**

(57) In a motor unit of an electric sunlight shielding apparatus in which a base member of the motor unit containing a motor is attached to an end portion of a rail for transferring a sunlight shielding material, and the sunlight shielding material is transferred along the rail by the working of the motor unit, a motor assembly provided with the motor (8), a power source board (11) and a control board (12) are integrally fixable to the base member (15) via a fixing bracket (20, 26, 36), and the motor assembly, the power source board (11) and the control board (12) integrally fixed to the base member (15) are capable of being inserted together in a motor case (7).

Fig. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to an electric curtain in which a curtain fabric is transferred along a curtain rail by a driving force of a motor, particularly to a motor unit which is attached to the curtain rail.

BACKGROUND

[0002] In an electric curtain, a transfer belt movably supported within a curtain rail is transferred by a driving force of a motor, and a leading runner configured to suspend and support a front edge of a curtain fabric is transferred by the transfer belt so that the curtain fabric is transferred along the curtain rail.

[0003] In some such electric curtains, a motor unit is attached to one end of the curtain rail, and the transfer belt is transferred based on the working of the motor unit.

[0004] Within the motor unit, in addition to a motor, a control board for controlling the working of the motor, a power source board for supplying electric power to the motor and the control board, a modular board connected to an operation switch or the like arranged outside the motor unit and to the control board via a signal wire and a modular jack, and the like are arranged.

[0005] Patent Documents 1 and 2 disclose a motor unit where a motor as well as a controller and a power source or a modular power cable are provided in a case.

PRIOR ART DOCUMENTS

Patent Documents

[0006]

Patent Document 1: Japanese Unexamined Patent Application Publication No. 2010 - 167119

Patent Document 2: French Patent Application Publication No. 2938413

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

[0007] According to the motor unit disclosed in the Patent Document 1, a motor-fixing portion is formed separately from a control board and the power source. Thus, it is necessary to put the motor-fixing portion and the control board and the power source sequentially in the motor case, making the assembling work cumbersome.

[0008] Further, it is necessary to make signal wires connecting the motor to the controller and the power source sufficiently long not to hinder the assembling work, so that undesirable events sometimes occur, for example, the signal wire gets tangled within the motor case after assembly, external noises are caught by the

long signal wires causing malfunction, or a certain radiation noise is increased.

[0009] According to the motor unit disclosed in the Patent Document 2, it is necessary to arrange the modular power cable around in the case from a lower portion thereof to an upper portion for connection, and thus the connecting work of the cable is cumbersome.

[0010] The object of the present invention is to provide a motor unit of an electric sunlight shielding apparatus for which assembling work can be simplified.

Means to Solve the Problems

[0011] According to claim 1, a motor unit of an electric sunlight shielding apparatus is provided, in which a base member of the motor unit containing a motor is attached to an end portion of a rail for transferring a sunlight shielding material, and the sunlight shielding material is transferred along the rail by the working of the motor unit, wherein a motor assembly provided with the motor, a power source board and a control board are integrally fixable to the base member via a fixing bracket, and wherein the motor assembly, the power source board and the control board integrally fixed to the base member are capable of being inserted together in a motor case having a tube shape.

[0012] According to claim 2, the motor unit of an electric sunlight shielding apparatus of claim 1 is provided, wherein a modular base to which a modular board is attached is integrally attachable to the base member or the fixing bracket, wherein the motor case is provided with an opening to which the modular base is attachable, and wherein the modular base is provided with a locking groove into which an opening edge of the opening is capable of being inserted.

[0013] According to claim 3, the base member to which the motor assembly, the power source board, the control board and the modular base are integrally fixed is inserted into the motor case through one end thereof so that the base member is attachable to one end of the motor case, and a unit cap configured to close another end of the motor case is attached to the another end of the motor case.

[0014] According to claim 4, a switch board is connected to the control board, the switch board being attachable to an inner surface of the unit cap.

[0015] According to claim 5, the switch board is provided with a push button switch and a display lamp, and the unit cap is provided with an operation hole configured to expose the push button switch and a display hole configured to expose said display lamp.

[0016] According to claim 6, the unit cap is provided with a guiding piece configured to position the control board.

[0017] According to claim 7, the fixing bracket is provided with a clutch and a sensor portion.

[0018] According to claim 8, the control board is electrically connected to the clutch and the sensor portion,

and the control board, the clutch and the sensor portion are capable of being inserted into the motor case.

[0019] According to claim 9, the motor case has a tube shape with a horizontally long cross-section, and a power cable is introduced into the motor case through an upper end portion on a short side thereof and guided to the power source board located below by way of a side of the fixing bracket.

[0020] According to claim 10, a signal wire of the clutch is guided downward by way of a gap between an inner surface on a short side of the motor case and the fixing bracket, and guided along a board-fixing bracket to the control board and connected thereto.

[0021] According to claim 11, a signal wire of the sensor portion is guided downward by way of a gap between an inner surface on a short side of the motor case and the fixing bracket, and guided along a board-fixing bracket to the control board and connected thereto.

[0022] According to claim 12, a motor unit is assembled in the following steps: integrally fixing and electrically connecting a motor assembly provided with a motor, a power source board, a control board and a modular board to a base member via a fixing bracket; inserting the integrally fixed motor assembly, power source board, control board and modular board in a motor case; and fixing the base member to the motor case.

Advantageous Effect of the Invention

[0023] According to the present invention, a motor unit of an electric sunlight shielding apparatus for which assembling work is simplified can be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Fig. 1 is a front view showing an electric curtain.

Fig. 2 is a cross-sectional view showing a motor unit.

Fig. 3 is a bottom view showing the internal constitution of the motor unit.

Fig. 4 is an exploded side view showing a fixing bracket.

Fig. 5 is a bottom view showing a unit cap.

Fig. 6 is a front view showing a modular board.

Fig. 7 is a front view showing a motor assembly.

Fig. 8 is a side view showing the motor assembly.

Fig. 9 is a plan view showing an anti-vibration fixing bracket.

Fig. 10 is an exploded perspective view showing a motor case and a modular base.

Fig. 11 is a perspective view showing a base member.

Fig. 12 is a plan view showing the unit cap.

Fig. 13 is an explanatory drawing showing the noise attribute of the motor assembly.

EMBODIMENT

[0025] Hereafter one embodiment of an electric curtain (electric sunlight shielding apparatus) embodying the present invention will be described based on the drawings. In the electric curtain of a double-door type shown in Fig. 1, curtain fabrics (sunlight shielding materials) 2a, 2b are drawn out from both end portions of a curtain rail 1 toward a middle portion, or the curtain fabrics 2a, 2b are folded in from the middle portion of the curtain rail 1 toward the both end portions.

[0026] A pair of leading runners 3a, 3b are movably supported by the curtain rail 1, and a number of runners 4a are movably supported between the leading runner 3a and a right end of the curtain rail 1. Also, a number of runners 4b are movably supported between the leading runner 3b and a left end of the curtain rail 1.

[0027] Further, the curtain fabric 2a on one side is suspended from and supported by the leading runner 3a and the runners 4a, and the curtain fabric 2b on the other side is suspended from and supported by the leading runner 3b and the runners 4b.

[0028] To both right and left ends of the curtain rail 1, transfer apparatuses 5a, 5b are attached, and an endless transfer belt which moves in the curtain rail 1 is put around the transfer apparatuses 5a, 5b. Further, a motor unit 6 is suspended from and supported by the transfer apparatus 5a on the right end side of the curtain rail 1, and the transfer belt is moved within the curtain rail 1 by the driving force of a motor disposed in the motor unit 6.

[0029] Then, the leading runners 3a, 3b are transferred toward the middle portion of the curtain rail 1 or toward the both end portions of the curtain rail 1 according to the rotation of the motor in a forward or reverse direction.

[0030] Next the constitution of the motor unit 6 attached to the transfer apparatus 5a will be described.

[0031] As shown in Figs. 2 and 3, the motor unit 6 has a motor case 7 formed of a sectioned material having a roughly rectangular tube shape with a rounded horizontally long cross-section, in which a motor 8, a clutch 9, a sensor portion 10, a power source board 11 and a control board 12, a switch board 13 and a modular board 14, etc. are contained.

[0032] The working of the motor 8 is controlled by a control circuit mounted on the control board 12 based on operations of operation switches (not shown) connected to the modular board 14 via a cable.

[0033] A motor bracket 16 made of a metal plate is fixed on an upper surface of a base member 15 which is attached to an upper end of the motor case 7, and a pair of engagement pieces 17 are formed upwardly on the motor bracket 16. Further, a stopper device 18 is provided on one side of the upper surface of the base member 15.

[0034] To attach the motor unit 6 to the transfer apparatus 5a, the engagement pieces 17 are inserted into an attachment hole formed in a lower surface of the transfer apparatus 5a and, in this state, the motor unit 6 is rotated in a horizontal direction. Then the engagement pieces

17 are held in the attachment hole, and the stopper device 18 is activated to hold the motor unit 6 making it not rotatable so that the motor unit 6 is suspended from and supported by the transfer apparatus 5a.

[0035] An anti-vibration fixing bracket 19 is attached to a lower surface of the base member 15, and a unit-fixing bracket 20 is attached below the anti-vibration fixing bracket 19 via anti-vibration bushes 21. The anti-vibration fixing bracket 19 and the unit-fixing bracket 20 are, as shown in Fig. 9, linked to each other via three anti-vibration bushes 21 so arranged as to surround an insertion hole 67 for an output shaft.

[0036] As shown in Fig. 4, the unit-fixing bracket 20 is formed by bending a metal plate to have an upper part 22 and side parts 23, 24 on both sides thereof, and the clutch 9 and the sensor portion 10 are attached between the side edges 23, 24. Further, a sensor board 25 is attached to the side part 23.

[0037] A motor-fixing bracket 26 is attached to the unit-fixing bracket 20 via anti-vibration bushes 31, 32. The motor-fixing bracket 26 is formed by bending a metal plate into a crank shape to have a horizontal part 27 at a middle portion, an upper part 28 extending upward from one side of the horizontal part 27, and a lower part 29 extending downward from the other side of the horizontal part 27.

[0038] The upper part 28 is attached to the side part 24 of the unit-fixing bracket 20 via the anti-vibration bush 30, and the lower part 29 is attached to the side part 23 of the unit-fixing bracket 20 via two anti-vibration bushes 31 as shown in Fig. 8.

[0039] The motor 8 is attached to the horizontal part 27 of the motor-fixing bracket 26. An output shaft 32 of the motor 8 is linked to an input shaft 33 of the clutch 9 such that relative rotation thereof is not possible. Further, an output shaft 34 extending from the clutch 9 protrudes upward, as an output shaft of the motor unit 6, by way of the unit-fixing bracket 20, the anti-vibration fixing bracket 19, the base member 15 and the motor bracket 16. Thus the motor assembly 35 shown in Fig. 7 is constituted.

[0040] An end portion of a board-fixing bracket 36 is attached to the lower part 29 of the motor-fixing bracket 26 with a screw 37. The power source board 11 and the control board 12 are attached to the board-fixing bracket 36. The board thickness of the board-fixing bracket 36 is set at 75 % of the board thickness of the motor-fixing bracket 26.

[0041] As shown in Fig. 2, plural sets of signal wires are connected to the control board 12 via respective sockets 38, and the control board 12 is connected to the clutch 9 via signal wires 49 and to the motor 8, the switch board 13 and the modular board 14 via other signal wires.

[0042] The modular board 14 is fixed to a modular base 39 with a screw 40, and the modular base 39 in turn is attached to the base member 15.

[0043] As shown in Figs. 6 and 10, the modular base 39 is provided with square holes 42 at two locations in the vertical direction between a pair of side parts 41, and

above the square holes 42 a holding portion 43 is formed as a dent of a square shape. Through the square holes 42 modular cables can be inserted in and connected to modular jacks provided on the modular board 14, and a locking portion 45 of a cube shape provided in a middle portion of a power cable 44 is fitted in the holding portion 43. On outer peripheral surfaces of the locking portion 45 locking grooves 46 are formed, which can fit with opening edges of the holding portion 43.

[0044] At an upper edge on one side of the motor case 7 an opening 47 is formed, which is so configured that the modular base 39 can be insert therein and fitted therewith, and in the side parts 41 of the modular base 39 locking grooves 48 are formed, which are configured to fit with opening edges of the opening 47. The modular base 39 can be inserted in the opening 47 from above the motor case 7.

[0045] Further, at an upper edge on the other side of the motor case 7 a cutout 68 is formed, which is so configured that the stopper device 18 can be inserted therein.

[0046] The power cable 44 being held by the holding portion 43 is kept unmovable in the longitudinal direction of the power cable 44. As shown in Fig. 2, the power cable 44 within the motor case 7 is arranged from the modular base 39 to the power source board 11 by way of the vicinities of the clutch 9 and motor 8, and connected to the power source board 11.

[0047] As shown in Fig. 11, on one side of a lower surface of the base member 15 an elongated protrusion 70 is formed, which is so configured that the locking groove 46 of the locking portion 45 of the power cable 44 can be fitted therewith. Attachment holes 63 are formed in four corners of the base member 15, at locations corresponding to ribs 53 formed in four corners of the inner surface of the motor case 7. Further, in the lower surface of the base member 15, in the vicinities of peripheries on longer edge sides guiding pieces 64 are formed, which is configured to guide the inner surface of the motor case 7 so as to position the base member 15 relative to the motor case 7.

[0048] When the guiding pieces 64 are fitted to the inner surface of the motor case 7 while the modular base 39 which has been positioned relative to the base member 15 via the locking portion 45 of the power cable 44 and attached to the unit-fixing bracket 20 is inserted into the opening 47 of the motor case 7, a state is reached where centers of the attachment holes 63 and the ribs 53 are roughly aligned, and thus the base member 15 and the motor case 7 are positioned relative to each other. When screws are threaded into the ribs 53 from above the attachment holes 63 in this state, the base member 15 is fixed to the motor case 7. At this time the modular base 39 engages with the base member 15 and the opening 47 of the motor case 7, and is held thereby.

[0049] A unit cap 50 is attached to a lower end of the motor case 7. The unit cap 50 is fixed, as shown in Fig. 5, by treading screws into the ribs 53 in the motor case 7 through attachment holes 52 each provided in one of

four corners of a horizontal part 51 which is a bottom part of the motor case.

[0050] Further, in a middle portion of the horizontal part 51 a pair of operation holes 54 and a display hole 55 between the operation holes 54 are arranged linearly in the longitudinal direction of the horizontal part 51.

[0051] Inside of the horizontal part 51 the switch board 13 is attached. The switch board 13 is attached with a screw 57 to an attachment hole 56 (see Fig. 12) provided in the vicinity of the display hole 55. The switch board 13 is provided with button switches 58a, 58b, which are each exposed in the operation hole 54 in a state where the switch board 13 is attached to the attachment hole 56 with the screw 57, and a display lamp 59 which is exposed in the display hole 55 in that state. The push button switches 58a, 58b and the display lamp 59 are connected to the control board 12 via a socket 60 attached to the switch board 13 and signal wires 61.

[0052] The switch board 13 is provided for setting operation modes of the motor 8; the operation modes can be changed through a depressing operation of the button switch 58a disposed in the operation hole 54, and the operation modes can be set through a depressing operation of the button switch 58b. The display lamp 59 displays the content set when setting operation of the mode is made.

[0053] In the unit cap 50 guiding grooves 62 for guiding both side edges of a lower end of the control board 12 are provided at locations below the control board 12. In attaching the unit cap 50 to the motor case 7, inserting the both edges of the lower end of the control board 12 into the guide grooves 62 will facilitate positioning of the attachment holes 52 of the unit cap 50 and the ribs 53 of the motor case 7. Note that once the unit cap 50 is fixed to the motor case 7, in a state where the motor case 7 is placed vertically, a gap is formed between the control board 12 and the guide grooves 62 so that vibration of the control board 12 does not propagate to the unit cap 50. In a state where the motor case 7 is held horizontally, the side edges of the control board 12 are held by the guiding grooves 62.

[0054] The power cable 44 is introduced through an upper end portion on a short edge side of the motor case 7 having the tube shape with the horizontally long cross-section, and guided by way of sides of the fixing brackets 19, 20, 26 to the power source board 11 located below.

[0055] Further, a signal wire of the clutch 9 is guided downward by way of a gap between the inner surface on the short edge side of the motor case 7 and the fixing brackets 20, 26, and guided along the board-fixing bracket 36 to the control board 12 and connected thereto.

[0056] Also, a signal wire of the sensor portion 10 is guided downward by way of the gap between the inner surface on the short side of the motor case 7 and the fixing brackets 20, 26, and guided along the board-fixing bracket 36 to the control board 12 and connected thereto.

[0057] Now an assembling process of the motor unit 6 as explained above will be described. First, the motor

bracket 16 is attached to the base member 15, and the clutch 9 and the sensor portion 10 are attached to the unit-fixing bracket 20. Then, the anti-vibration fixing bracket 19 is attached to the unit-fixing bracket 20 via the anti-vibration bushes 21, and thereafter the anti-vibration fixing bracket 19 is attached to the base member 15.

[0058] Next, the motor-fixing bracket 26 attached with the motor 8 is attached to the unit-fixing bracket via the anti-vibration bushes 30, 31, so that the motor assembly 35 is formed.

[0059] Subsequently the modular base 39 to which the modular board 14 and the power cable 44 have been attached is attached to the base member 15. At this time the locking groove 46 of the locking portion 45 of the power cable 44 engages with the elongated protrusion 70 of the base member 15.

[0060] Next, the power source board 11 and the control board 12 are attached to the board-fixing bracket 36, the power cable 44 is connected to the power source board 11, and each of the signal wires is connected to the control board 12. Then the board-fixing bracket 36 is attached to the motor-fixing bracket 26 with the screw 37. Further, the switch board 13 is put in a state where it is connected to the control board 12 via the signal wire 61.

[0061] Thereafter, the motor assembly 35 to which the board-fixing bracket 36 and the modular base 39 have been attached is inserted in the motor case 7 from above it. At this time, the side near the control board 12 is inserted first in the motor case 7.

[0062] Then the modular base 39 is engaged with the opening of the motor case 7 and the base member 15 is fixed to the motor case 7, so that the motor assembly 35 and the board-fixing bracket 36 are held in the motor case 7. At this time, the power source board 11 and the control board 12 which are attached to the motor assembly 35 and the board-fixing bracket 36 do not get in contact with the inner surface of the motor case 7.

[0063] In this state, if electric power is supplied via the power cable 44 and the modular board 14 is connected to the operation switch, the motor is activated.

[0064] Next, a cap assembly having the switch board 13 attached to the unit cap 50 is connected to the control board 12 with a signal wire, and the unit cap 50 is attached to the lower end of the motor case 7, resulting in completion of the assembling of the motor unit 6. Further, when the motor unit 6 is attached to the transfer apparatus 5a, an electric curtain is constituted in which the curtain fabrics 2a, 2b are transferred by the driving force of the motor 8.

[0065] In the motor unit 6 constituted as explained above, the unit-fixing bracket 20 is attached via the anti-vibration bushes 21 to the anti-vibration fixing bracket 19 fixed to the base member 15, and the motor-fixing bracket 26 attached with the motor 8 is attached via the anti-vibration bushes 30, 31 to the unit-fixing bracket 20.

[0066] Therefore, vibrations generated when the motor 8 operates propagate to the unit-fixing bracket 20 and

the anti-vibration fixing bracket 19 after being attenuated sufficiently.

[0067] Further, the power source board 11 and the control board 12 which are attached to the motor assembly 35 and the board-fixing bracket 36 are not in contact with the inner surface of the motor case 7.

[0068] Accordingly, vibrations propagating from the motor 8 to the motor case 7 is suppressed, so that generation of noises is suppressed.

[0069] Moreover, since the board-fixing bracket 36 on which the power source board 11 and the control board 12 are mounted is attached to the motor-fixing bracket 26, mass of the motor-fixing bracket 26 is virtually increased, causing a resonance frequency of the motor-fixing bracket 26 itself or the motor assembly 35 itself to shift to the low frequency side.

[0070] Fig. 13 shows a noise N1 generated from the motor assembly 35 when the motor 8 is activated in a state where the board-fixing bracket 36 is not attached to the motor assembly 35, a noise N2 generated from the motor assembly 35 when the motor 8 is activated in a state where the board-fixing bracket 36 is attached to the motor assembly 35, and a background noise N3 at the time of measurement.

[0071] As shown in this figure, it was found that the noise level in the wavelength range of 1 kHz to 2 kHz, which sounds as a most abrasive noise, was lowered when the board-fixing bracket 36 was attached to the motor-fixing bracket 26.

[0072] According to the motor unit 6 of the electric curtain having the constitution explained above, the following advantageous effects can be obtained.

[0073]

(1) Assembling work is easy, since the motor assembly 35, power source board 11, the control board 12 and the modular board 14 are assembled first with the base member 15 integrally, and thereafter inserted in the motor case 7.

(2) It is possible to connect the motor assembly 35 to the power source board 11, the control board 12 and the modular board 14 with the power cable 44, the signal wires 49 and the other signal wires beforehand, and subsequently insert them in the motor case. Therefore, it is not necessary to make the power cable 44, the signal wires 49 and the other signal wires long, allowing the connection with substantially shortest cables or wires.

(3) Adverse effects due to noises can be reduced, since the power cable 44, the signal wires 49 and the other signal wires can be made shortest.

(4) It is possible to position the motor case 7 relative to the base member 15 easily by means of the guide pieces 64 provided to the based member 15 and then fit them.

(5) It is possible to attach the modular base 39 after positioning it relative to the motor case 7 easily by inserting the opening edge of the opening 47 of the

motor case 7 in the locking grooves 48 of the modular base 39.

(6) It is possible to attach the switch board 13 to the unit cap 50, and subsequently attach the unit cap 50 to the lower end of the motor case 7. Therefore, it is possible to certainly position the push button switches 58a, 58b and the display lamp 59 of the switch board 13 relative to the operation holes 54 and the display hole 55 and then fix them.

(7) In attaching the unit cap 50 to the lower end of the motor case, it is possible to easily position the unit cap 50 and the motor case by inserting the end portion of the control board 12 in the guide pieces 64 of the unit cap 50.

[0074] The above embodiment may be implemented in the following manner.

The motor assembly 35 may be only the motor 8.

DESCRIPTION OF THE REFERENCE SYMBOLS

[0075] 1: rail (curtain rail); 2a, 2b: curtain fabric; 6: motor unit; 7: motor case; 8: motor; 11: power source board; 12: control board; 15: base member; 19: anti-vibration fixing bracket; 20: fixing bracket (unit-fixing bracket); 21, 30, 31: anti-vibration material (anti-vibration bush); 35: motor assembly; 36: fixing bracket (board-fixing bracket)

Claims

1. A motor unit of an electric sunlight shielding apparatus in which a base member of the motor unit containing a motor is attached to an end portion of a rail for transferring a sunlight shielding material, and the sunlight shielding material is transferred along the rail by the working of the motor unit, wherein a motor assembly provided with the motor, a power source board and a control board are integrally fixable to the base member via a fixing bracket, and the motor assembly, the power source board and the control board integrally fixed to the base member are capable of being inserted together in a motor case having a tube shape.
2. A motor unit of an electric sunlight shielding apparatus of claim 1, wherein a modular base to which a modular board is attached is integrally attachable to the base member or the fixing bracket, the motor case is provided with an opening to which the modular base is attachable, and the modular base is provided with a locking groove into which an opening edge of the opening is capable of being inserted.
3. A motor unit of an electric sunlight shielding appa-

ratus of claim 2,
 wherein the base member to which the motor assembly, the power source board, the control board and the modular base are integrally fixed is inserted into the motor case through one end thereof so that the base member is attachable to one end of the motor case, and
 a unit cap configured to close another end of the motor case is attached to the another end of the motor case.

4. A motor unit of an electric sunlight shielding apparatus of claim 3,
 wherein a switch board is connected to the control board, the switch board being attachable to an inner surface of the unit cap. 15
5. A motor unit of an electric sunlight shielding apparatus of claim 4,
 wherein the switch board is provided with a push button switch and a display lamp, and
 the unit cap is provided with an operation hole configured to expose the push button switch and a display hole configured to expose sad display lamp. 20
 25
6. A motor unit of an electric sunlight shielding apparatus of any one of claims 3 to 5,
 wherein the unit cap is provided with a guiding piece configured to position the control board. 30
7. A motor unit of an electric sunlight shielding apparatus of any one of claims 1 to 6,
 wherein the fixing bracket is provided with a clutch and a sensor portion. 35
8. A motor unit of an electric sunlight shielding apparatus of claim 7,
 wherein the control board is electrically connected to the clutch and the sensor portion, and the control board, the clutch and the sensor portion are capable of being inserted into the motor case. 40
9. A motor unit of an electric sunlight shielding apparatus of any one of claims 1 to 8,
 wherein the motor case has a tube shape with a horizontally long cross-section, and
 a power cable is introduced into the motor case through an upper end portion on a short side thereof and lead to the power source board located below by way of a side of the fixing bracket. 45
 50
10. A motor unit of an electric sunlight shielding apparatus of any one of claims 7 to 9,
 wherein a signal wire of the clutch is guided downward by way of a gap between an inner surface on a short side of the motor case and the fixing bracket, and guided along a board-fixing bracket to the control board and connected thereto. 55

11. A motor unit of an electric sunlight shielding apparatus of any one of claims 7 to 10,
 wherein a signal wire of the sensor portion is guided downward by way of a gap between an inner surface on a short side of the motor case and the fixing bracket, and guided along a board-fixing bracket to the control board and connected thereto.

12. A method of assembling a motor unit of an electric sunlight shielding apparatus, comprising the steps of:

integrally fixing and electrically connecting a motor assembly provided with a motor, a power source board, a control board and a modular board to a base member via a fixing bracket;
 inserting the integrally fixed motor assembly, power source board, control board and modular board in a motor case; and
 fixing the base member to the motor case.

Fig. 1

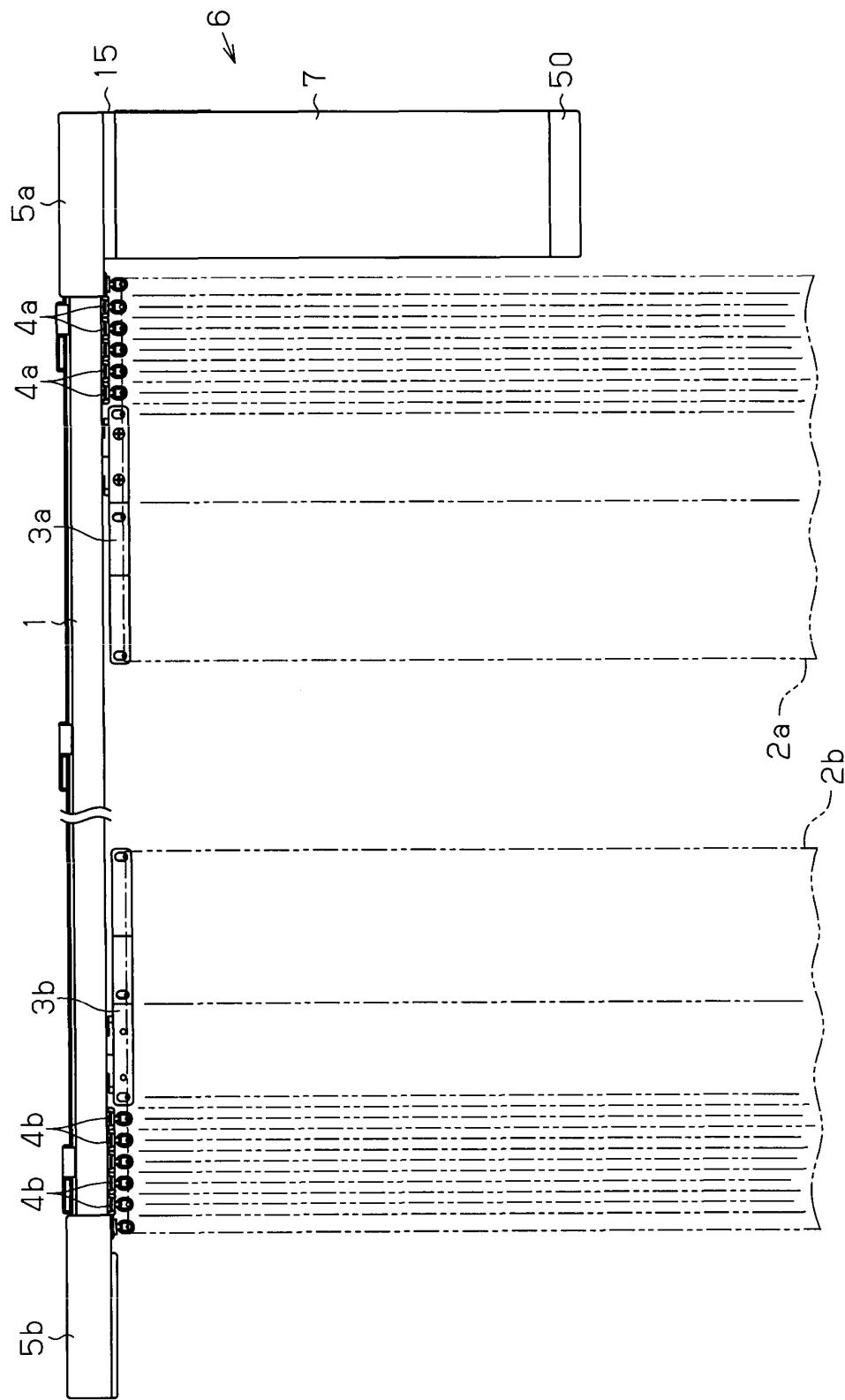


Fig. 2

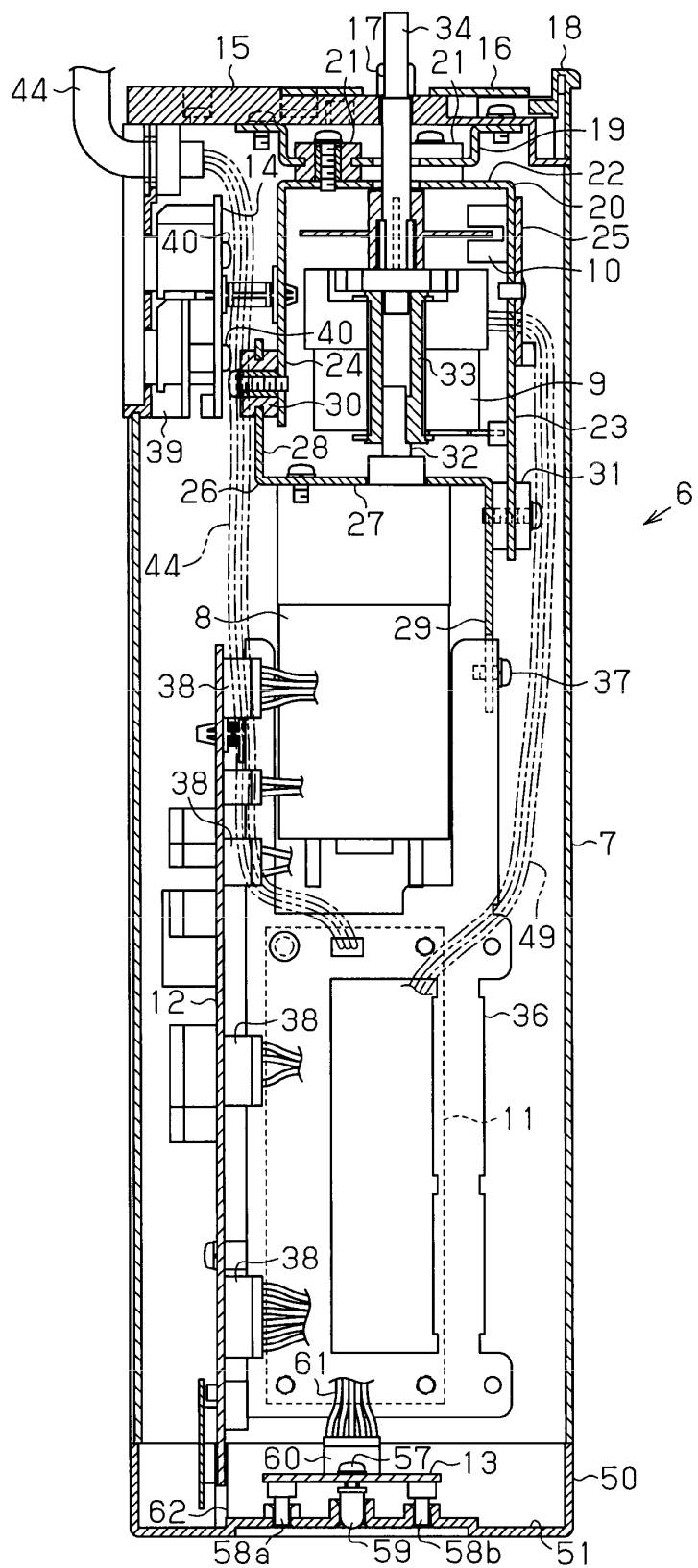


Fig. 3

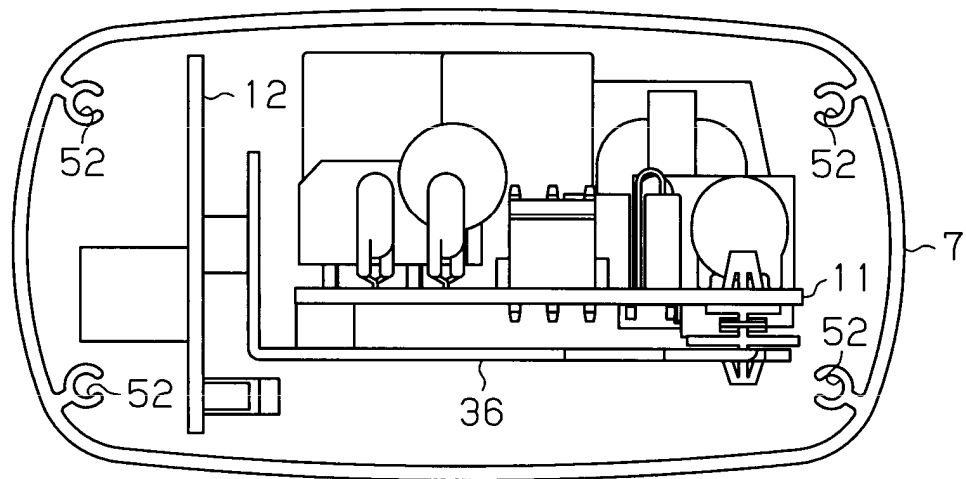


Fig. 4

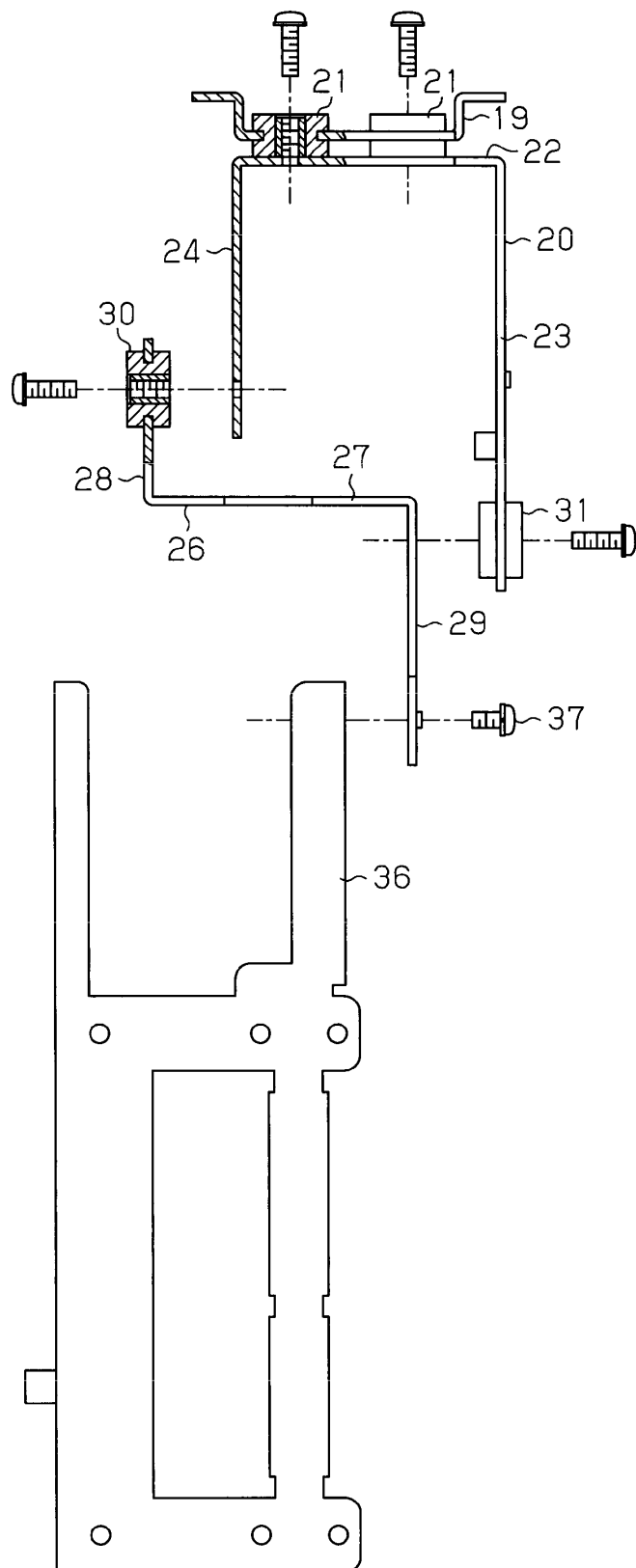


Fig. 5

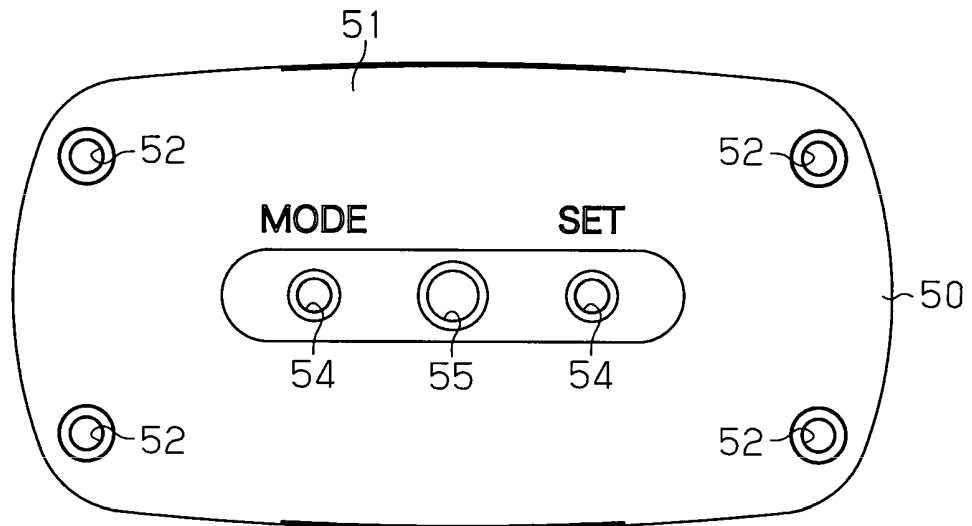


Fig. 6

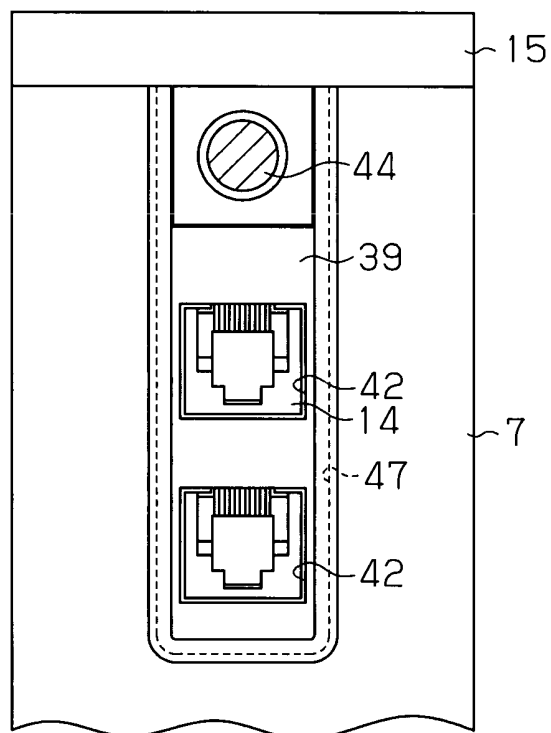


Fig. 7

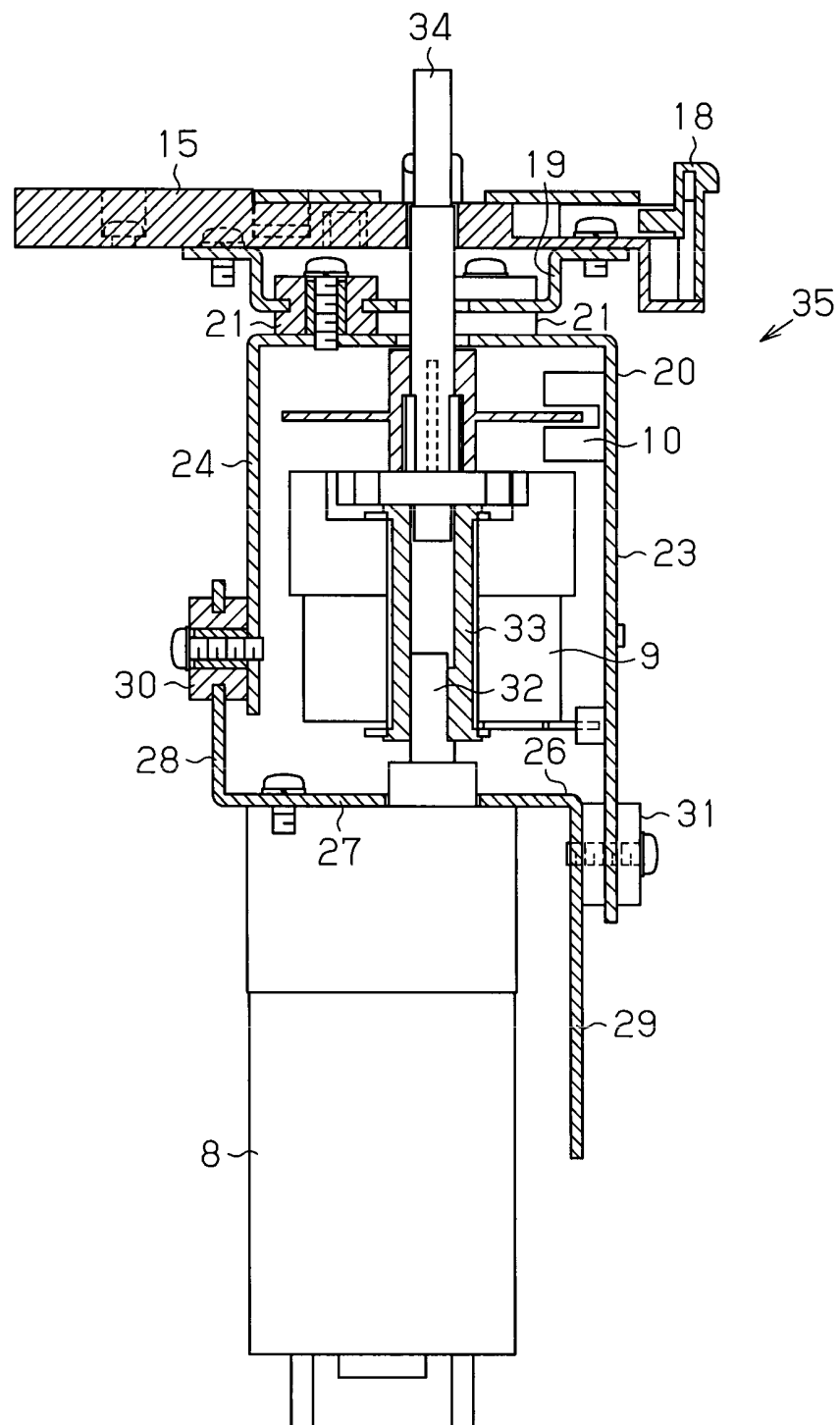


Fig. 8

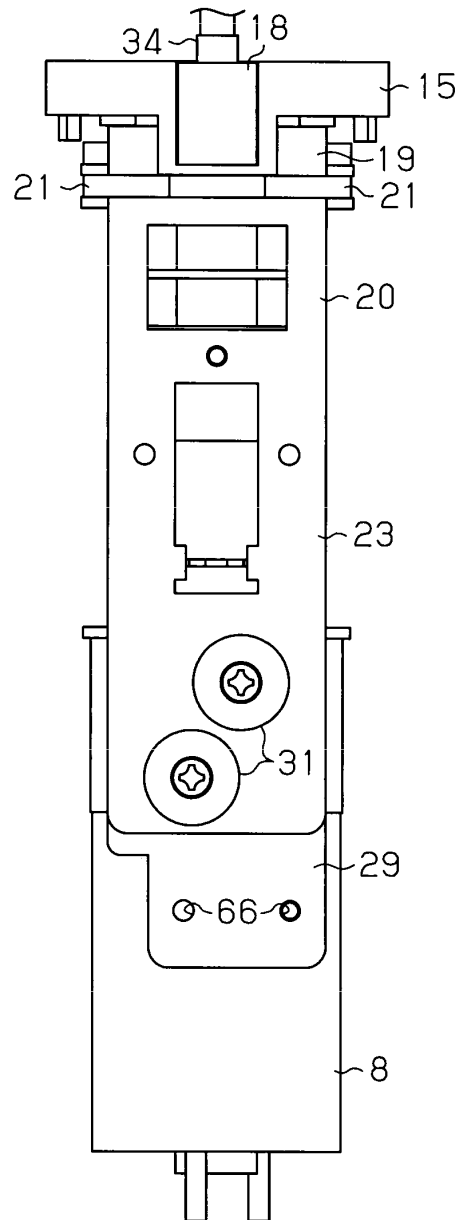


Fig. 9

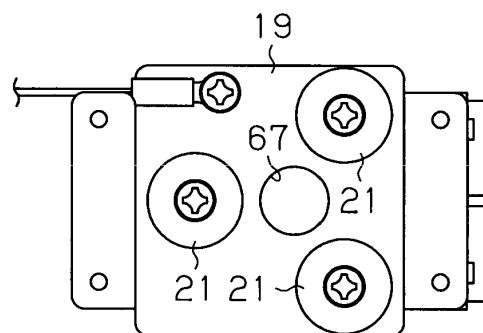


Fig. 10

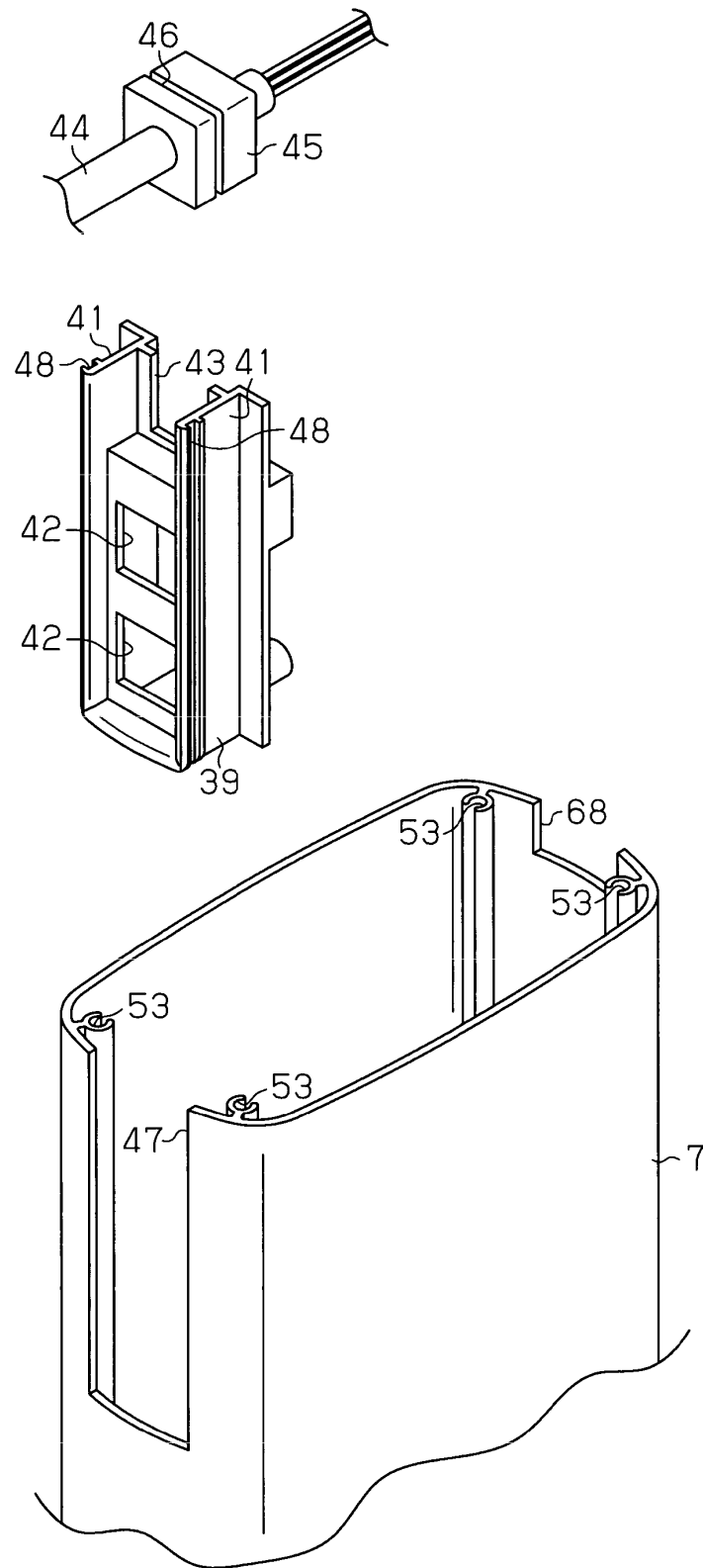


Fig. 11

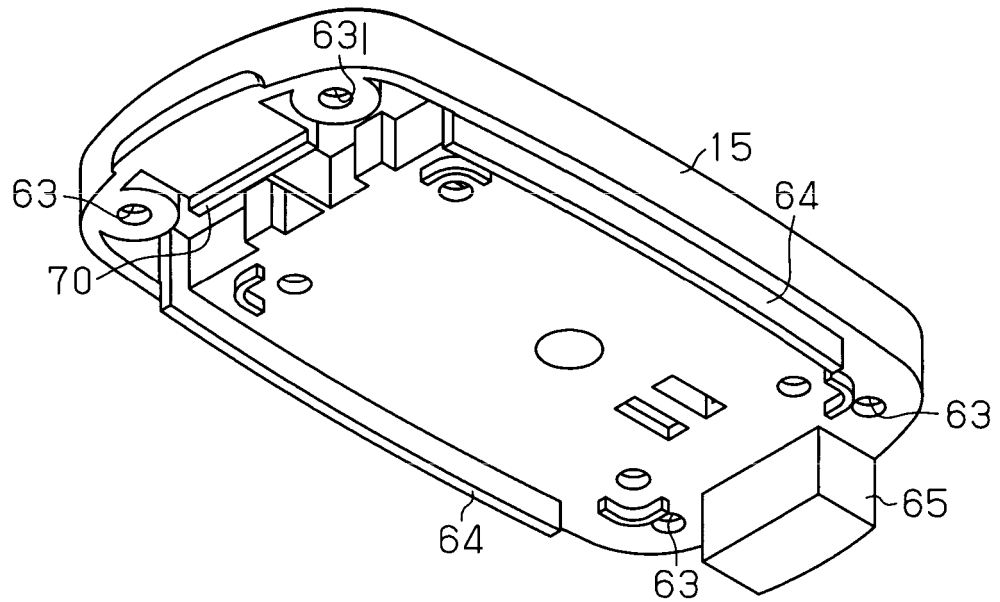


Fig. 12

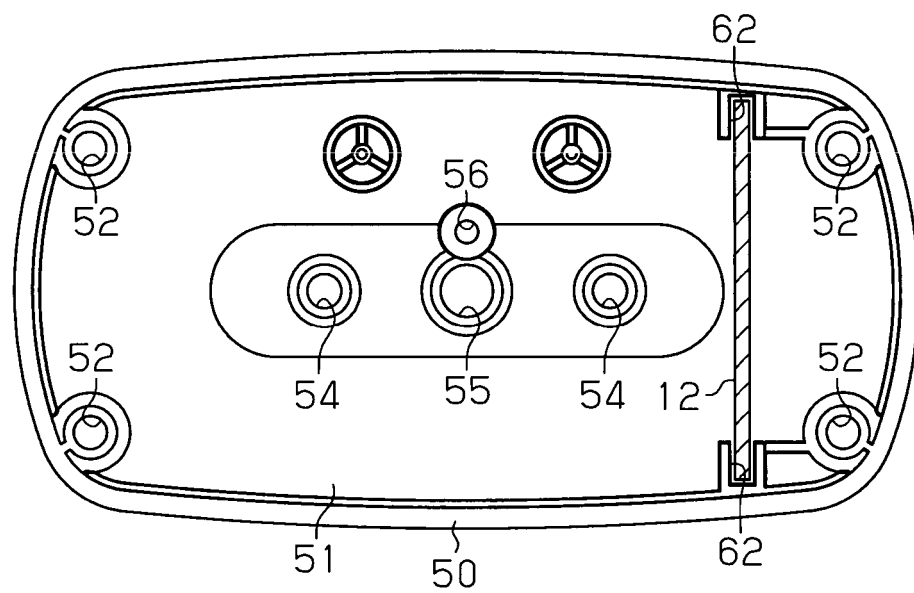
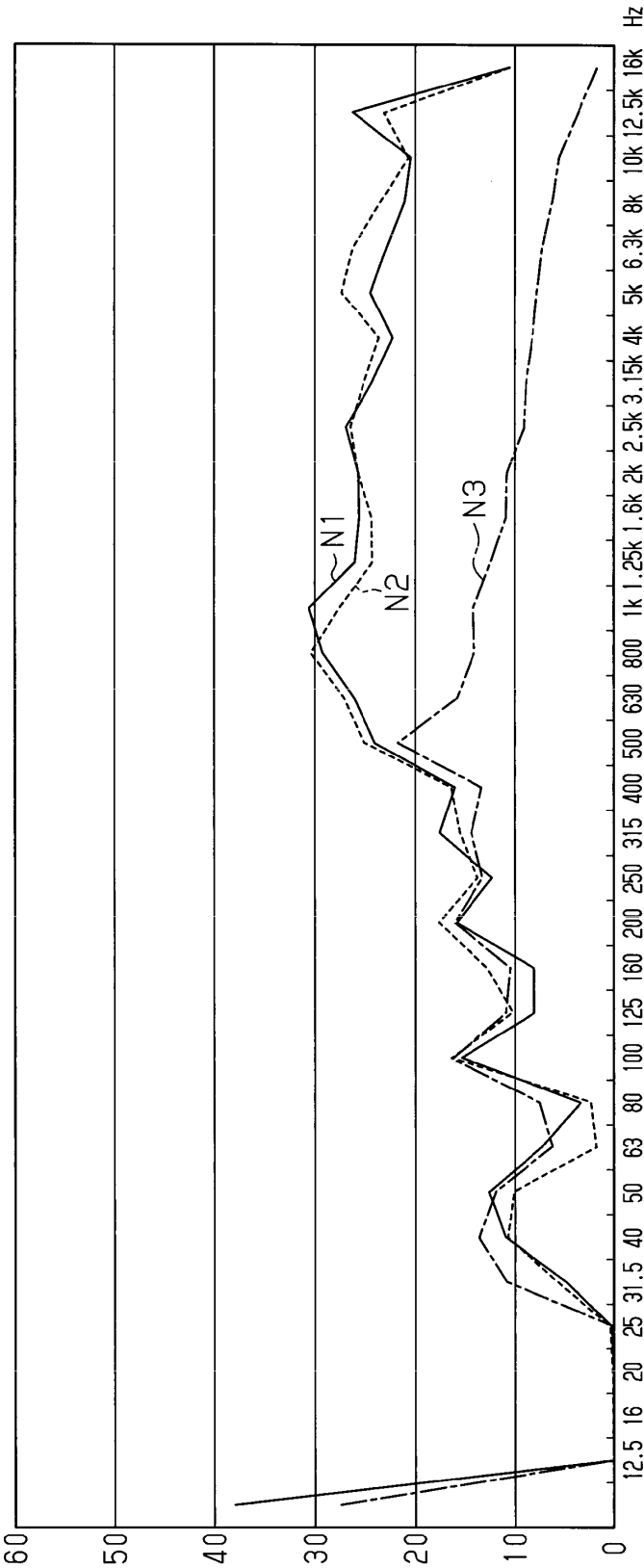


Fig. 13



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/054800

A. CLASSIFICATION OF SUBJECT MATTER

A47H5/02(2006.01) i, E05F15/10(2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47H5/02, E05F15/10

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013
 Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 175658/1983 (Laid-open No. 83392/1985) (SM Kogyo Kabushiki Kaisha), 08 June 1985 (08.06.1985), entire text; fig. 1 to 2 (Family: none)	1-12
A	JP 5-13266 Y2 (Makita Corp.), 07 April 1993 (07.04.1993), entire text; fig. 1 to 2 (Family: none)	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

16 April, 2013 (16.04.13)

Date of mailing of the international search report

07 May, 2013 (07.05.13)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/054800

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 3141000 B2 (Matsushita Electric Works, Ltd.), 05 March 2001 (05.03.2001), entire text; fig. 1 to 6 (Family: none)	1-12

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2010167119 A [0006]
- FR 2938413 [0006]