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(54) **ULTRASOUND DIAGNOSTIC DEVICE**

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G06F 3/14	(2006.01)

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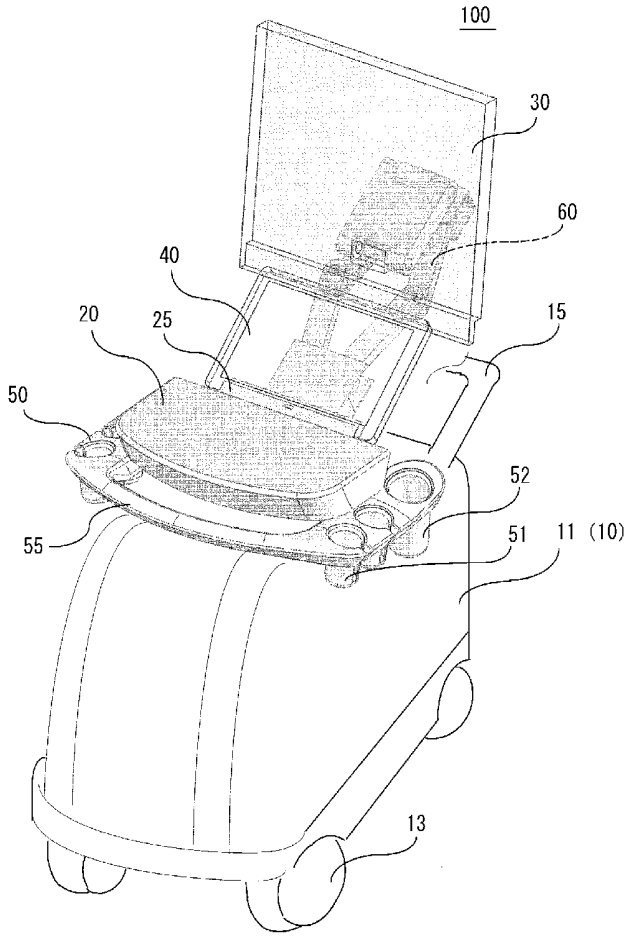
(57) **ABSTRACT**

Provided is a compact ultrasound diagnostic device having a high degree of freedom in a viewing position and a viewing angle of a display panel and having excellent operability. The ultrasonic diagnostic device includes a main body (**10**) that includes an operation panel (**20**); a first display (**30**) connected to the main body through a supporter (**60**); and a second display (**40**) detachably connected to the main body. The second display (**40**) includes a transmission/reception circuit that performs transmission or reception with the main body (**10**). When the sub display **40** is detached, a connection unit (**25**) on a side of the main body, to which the sub display **40** is connected, functions as a connection unit of the main display **30**.



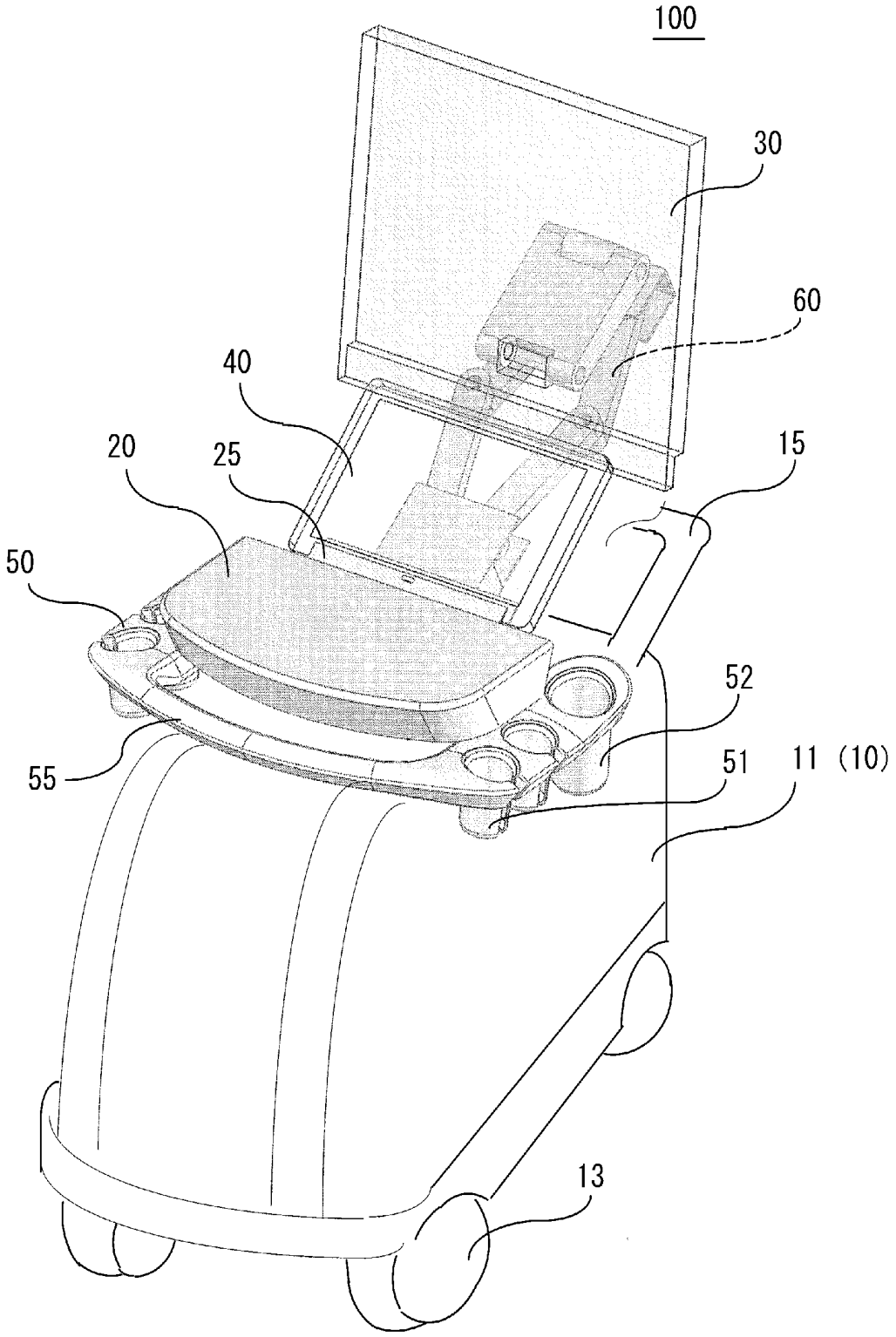


Fig. 1

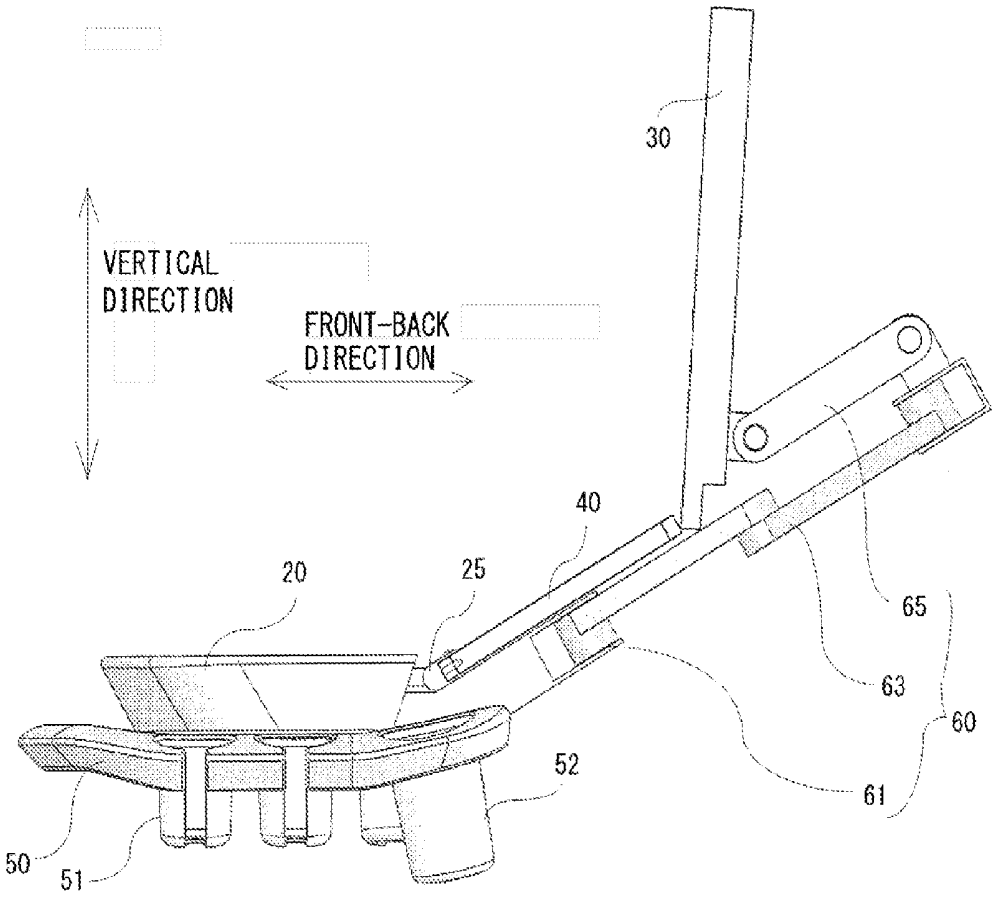

VERTICAL
DIRECTION
FRONT-BACK
DIRECTION
30
40
20
25
65
63
60
52
61
50
51

Fig. 2

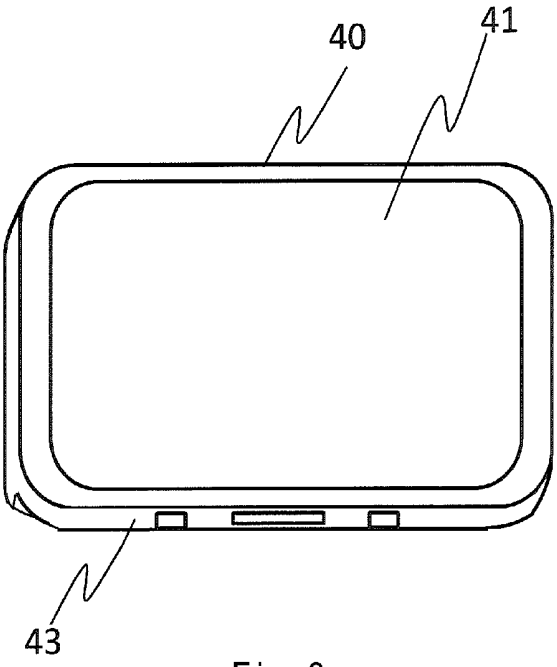


Fig. 3

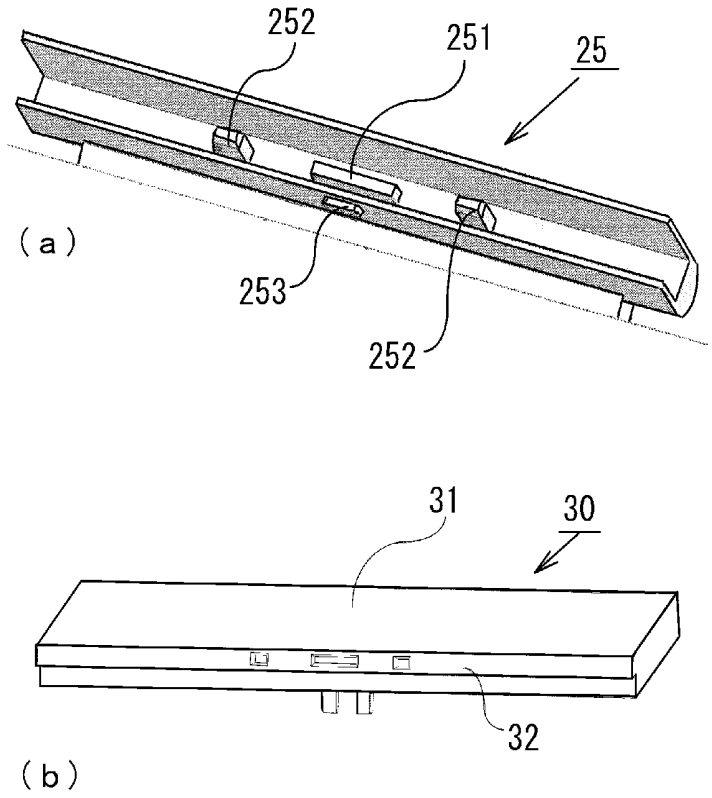


Fig. 4

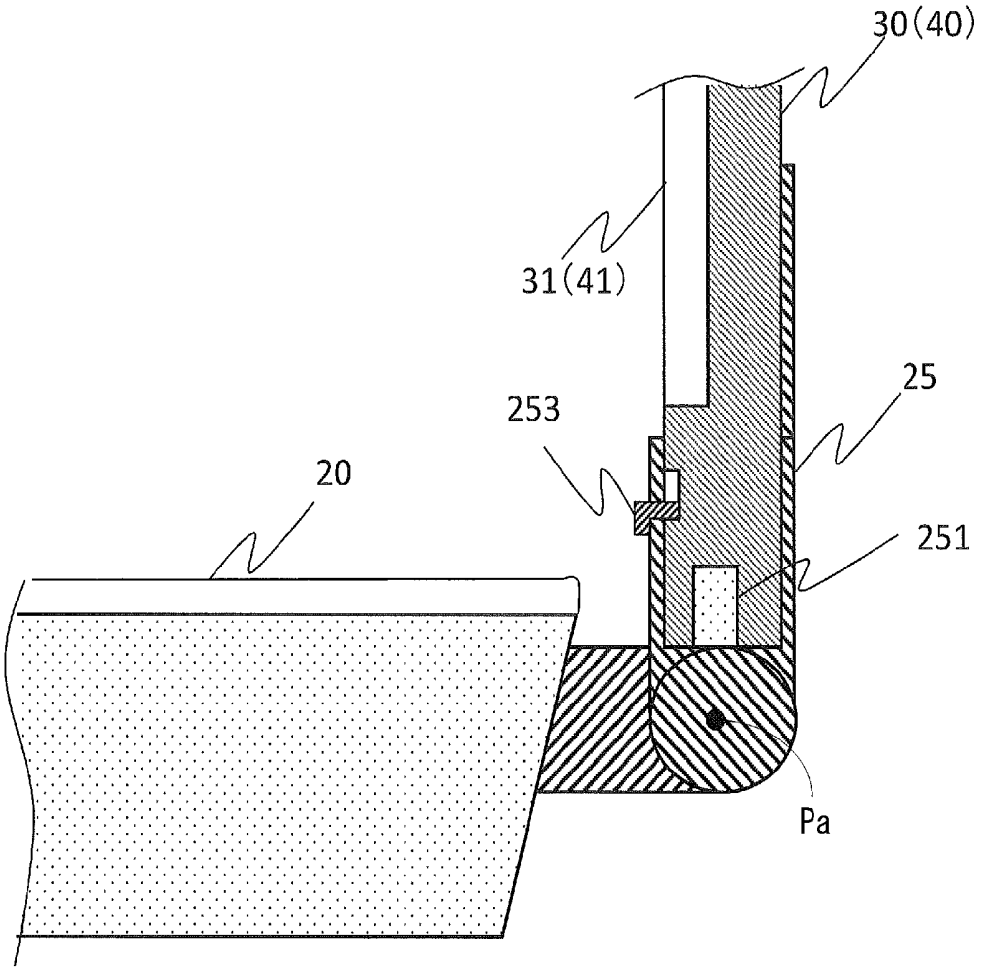


Fig. 5

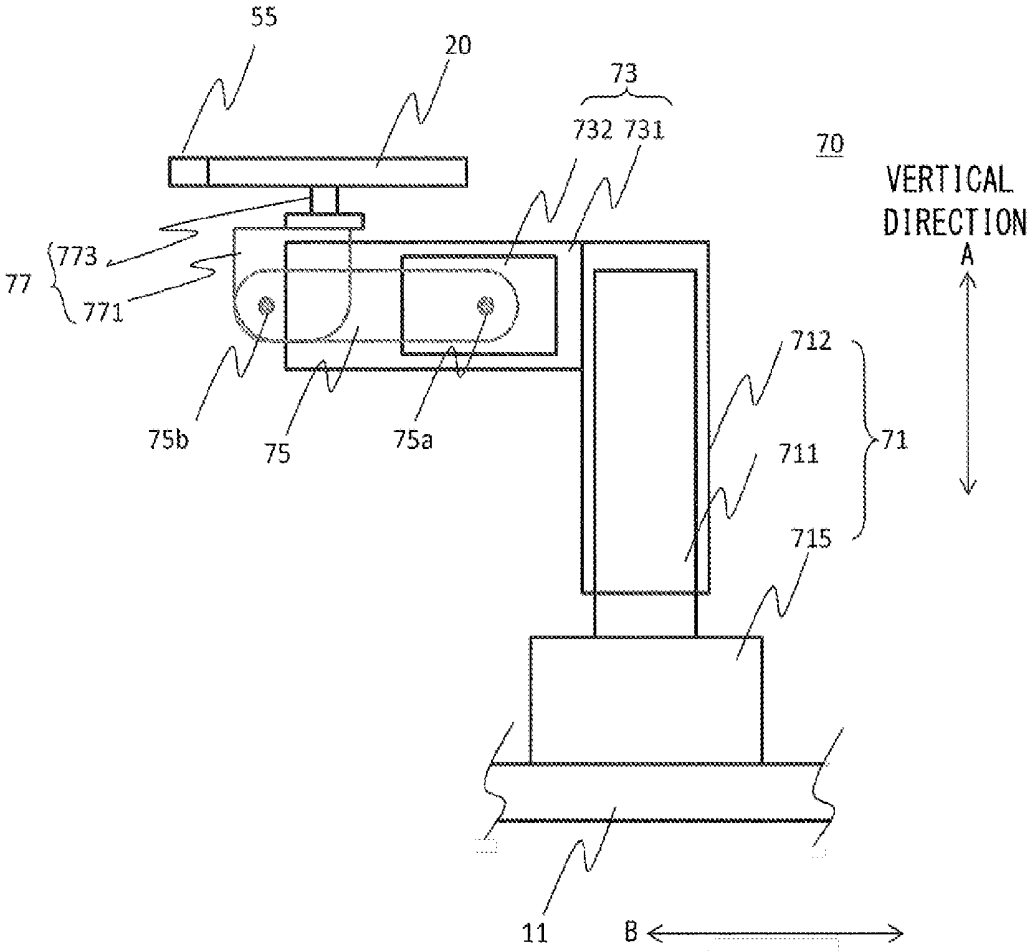

55
20
73
732 731
70
VERTICAL DIRECTION
A
773
77
771
712
711
71
715
75b
75
75a
11
B
FRONT-BACK DIRECTION

Fig. 6

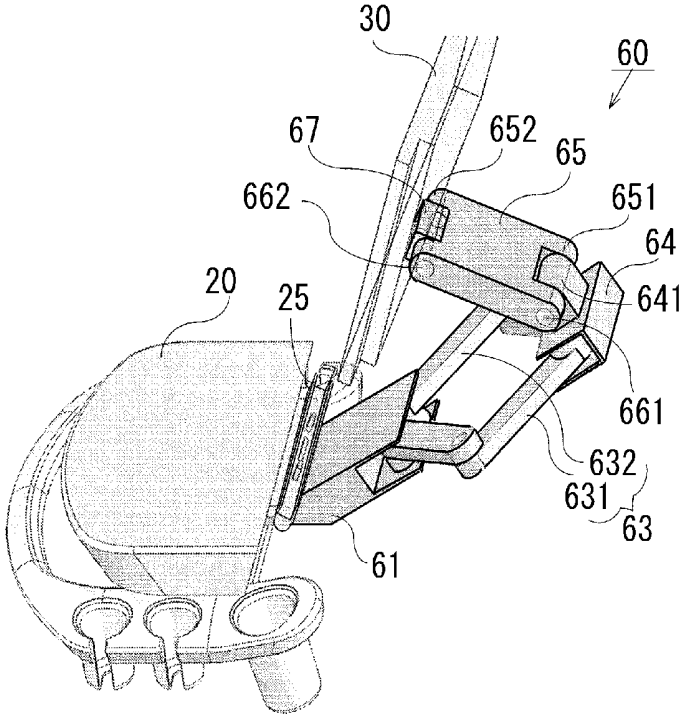


Fig. 7

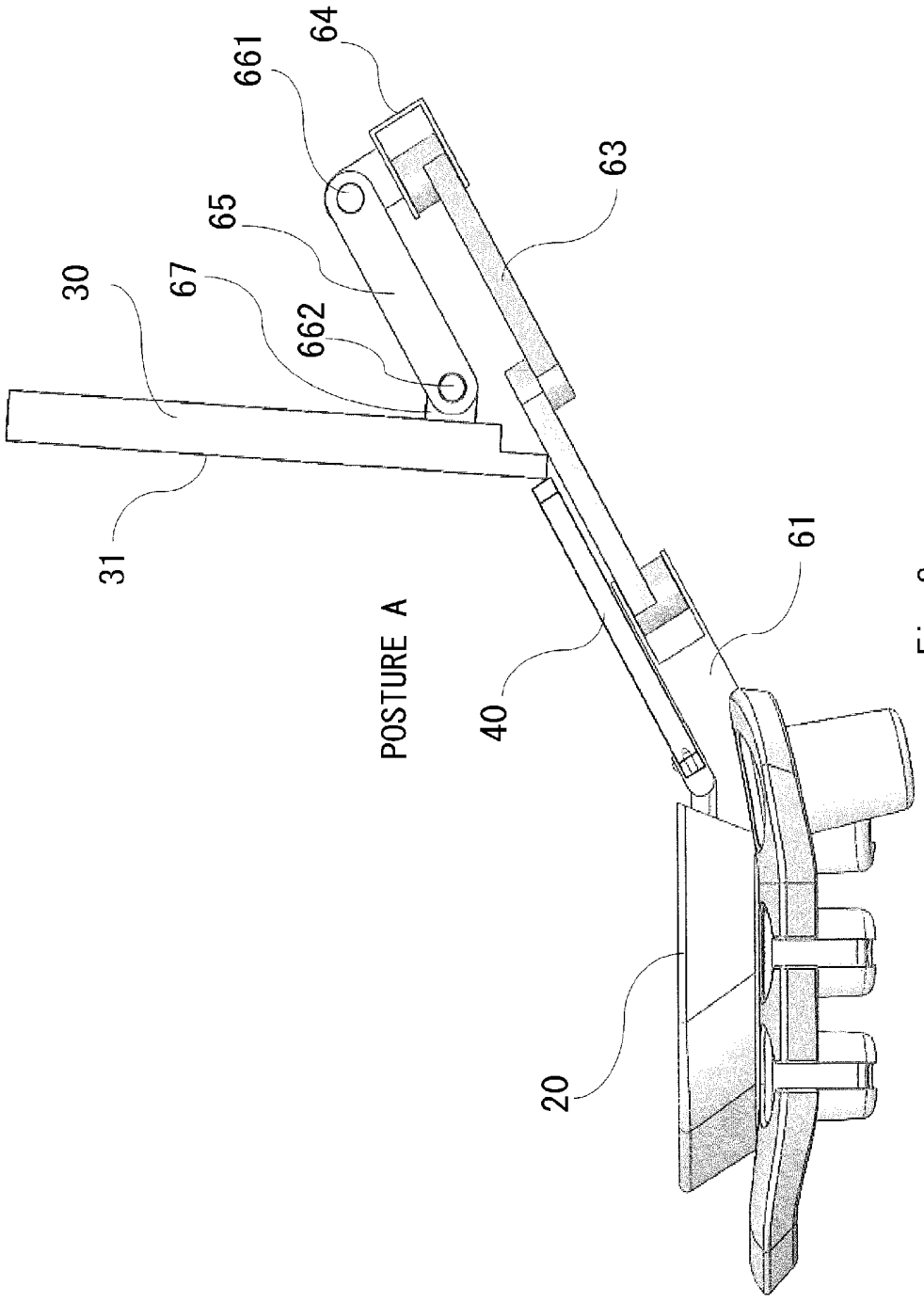


Fig. 8

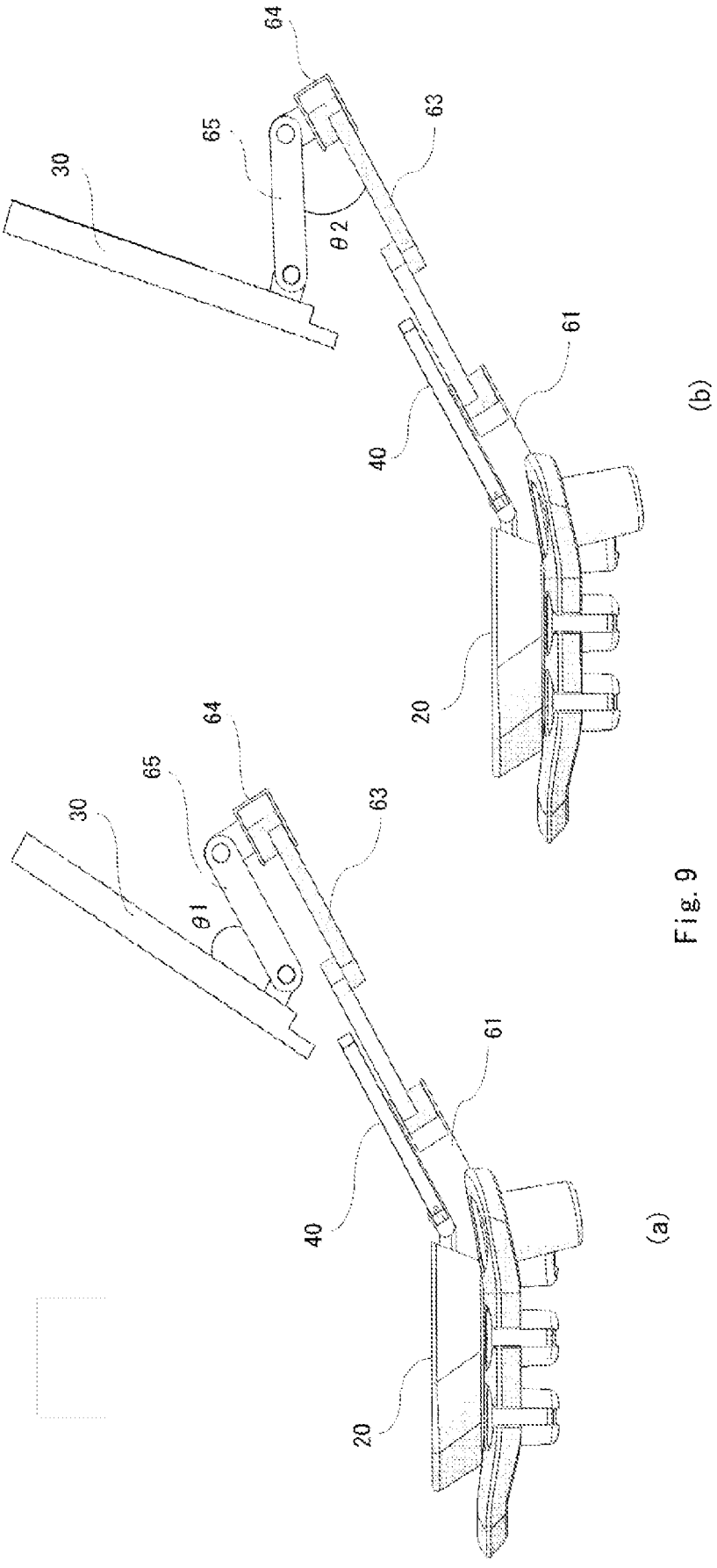


Fig. 9

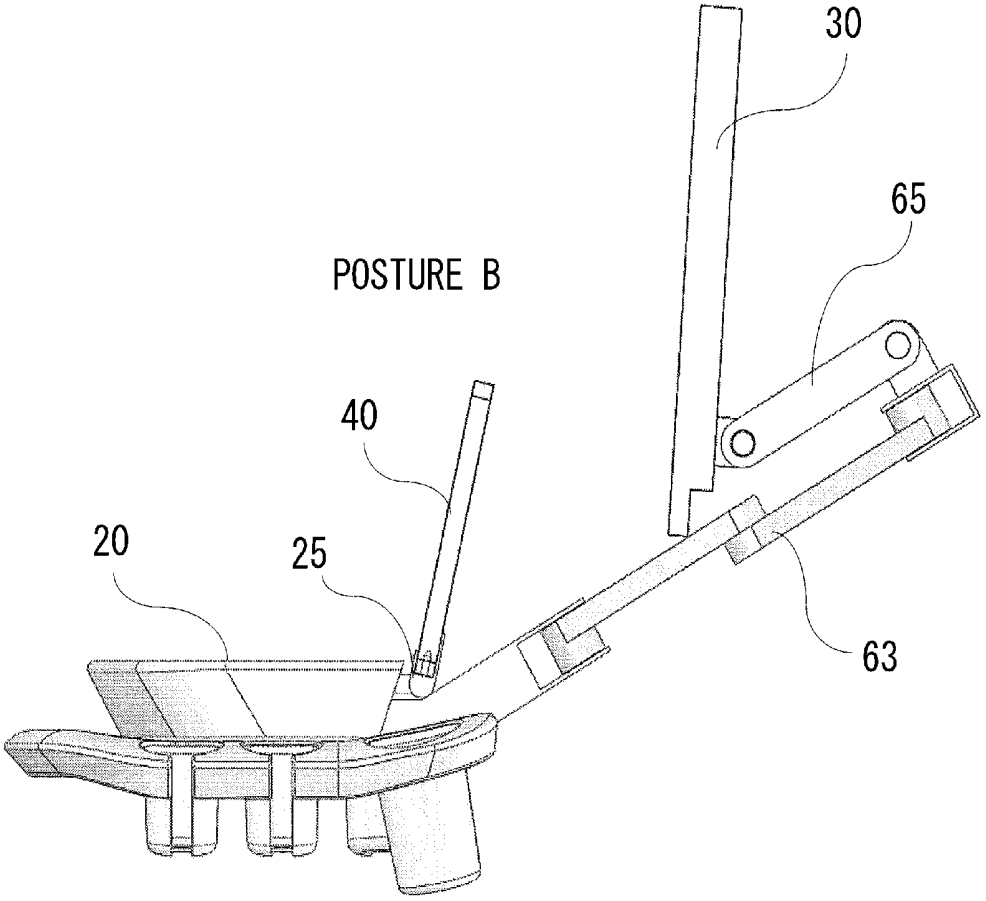


Fig. 10

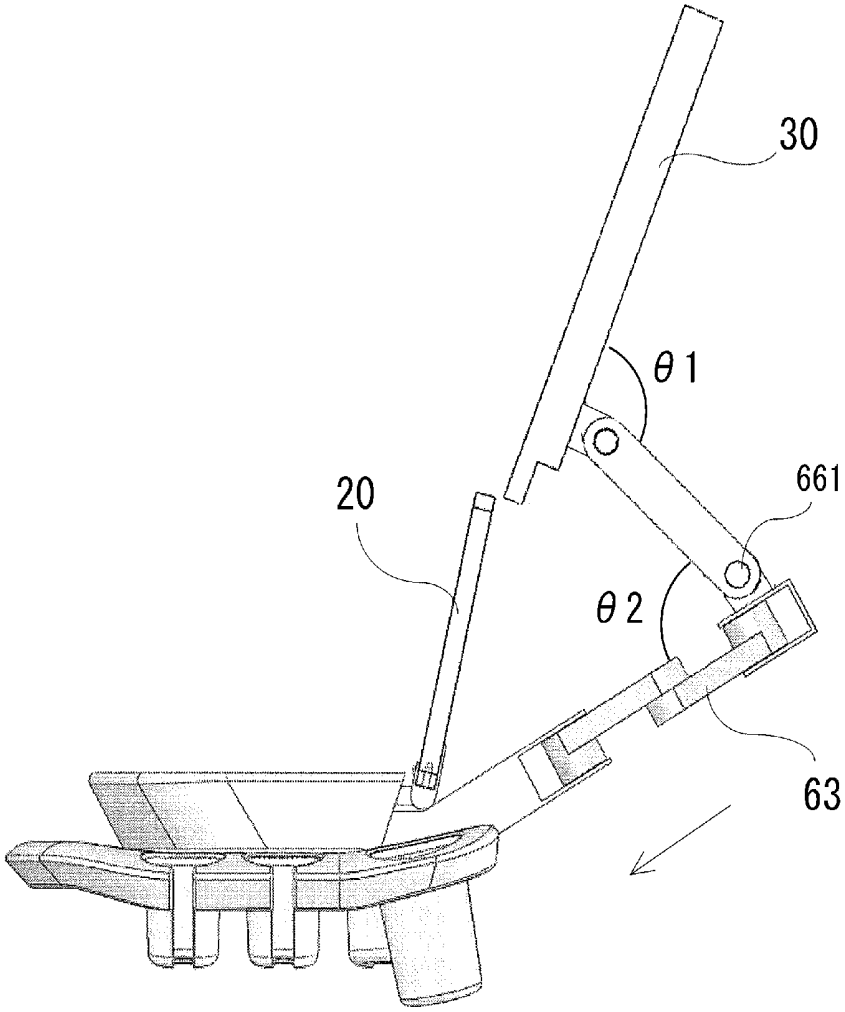


Fig. 11

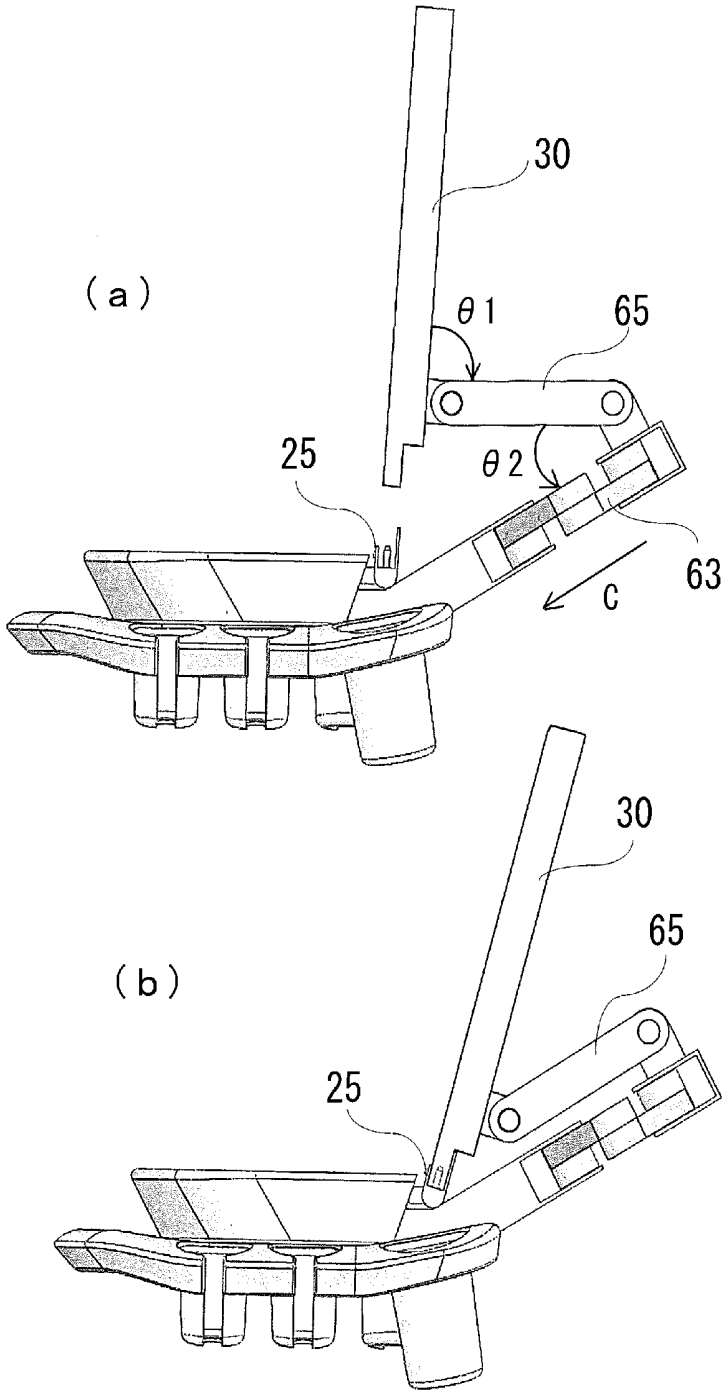


Fig. 12

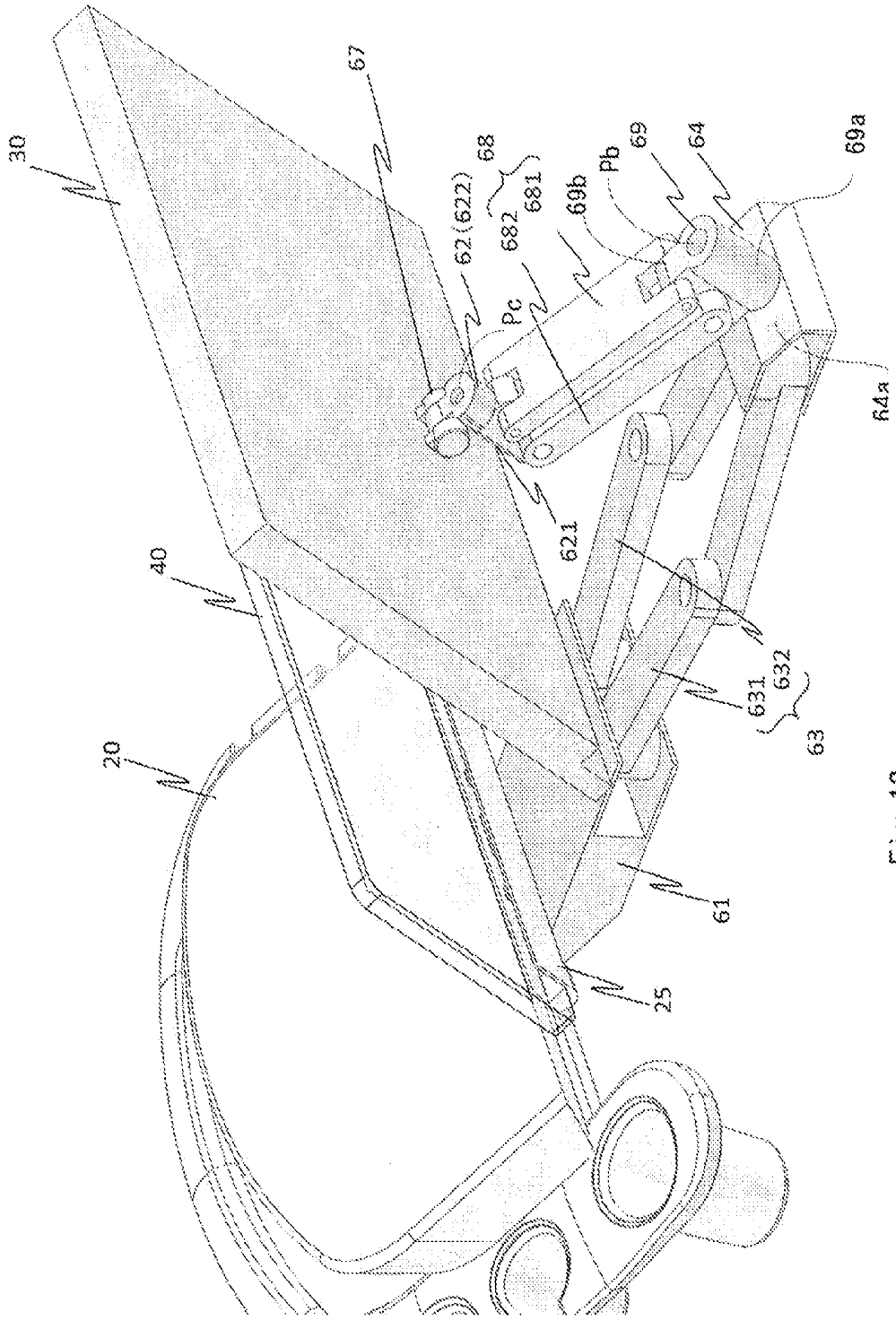

30
67
68
681
682
62(622)
Pc
621
69b
Pb
69
64
69a
64a
40
631
632
63
20
61
25

Fig. 13

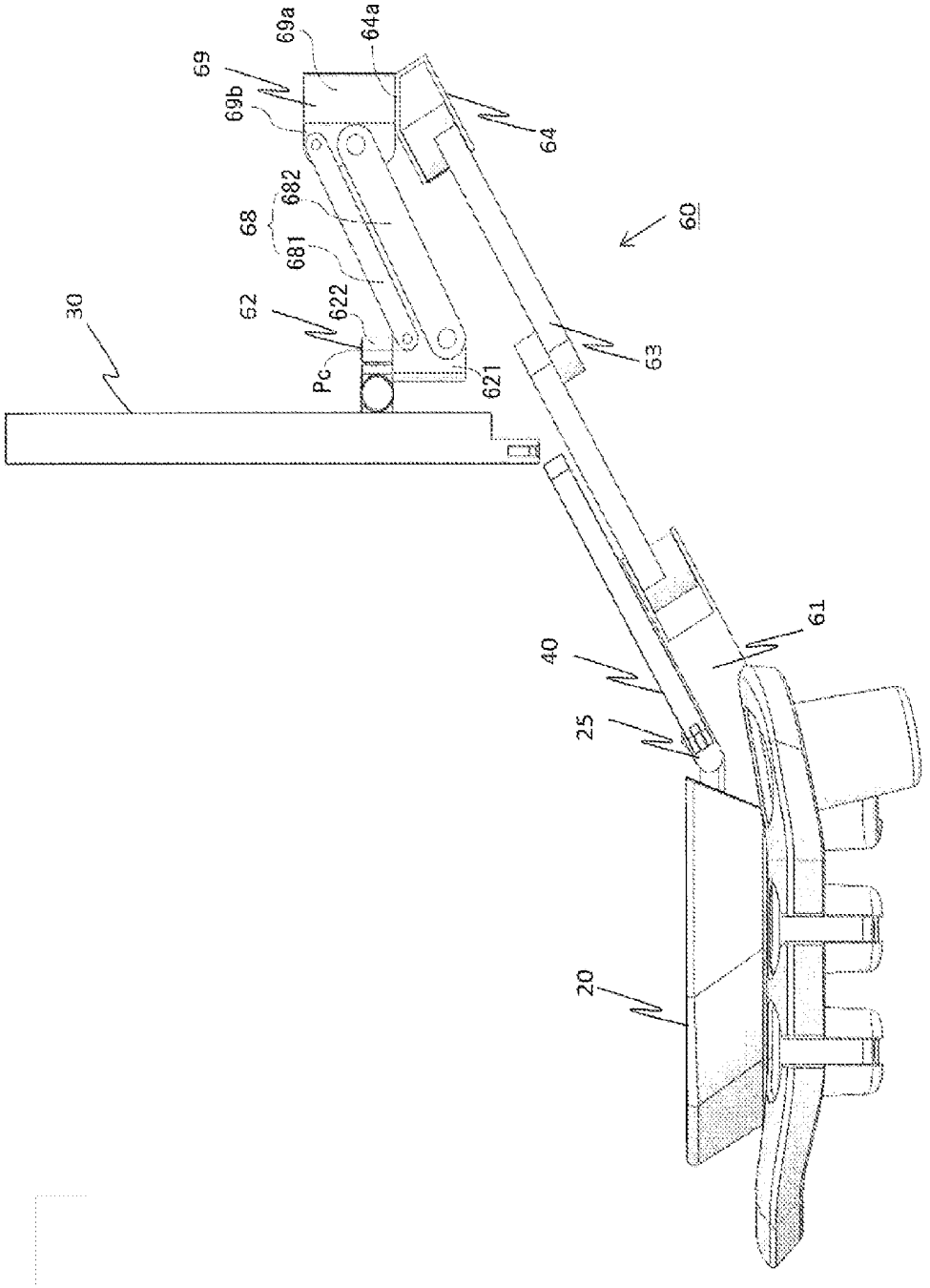


Fig. 14

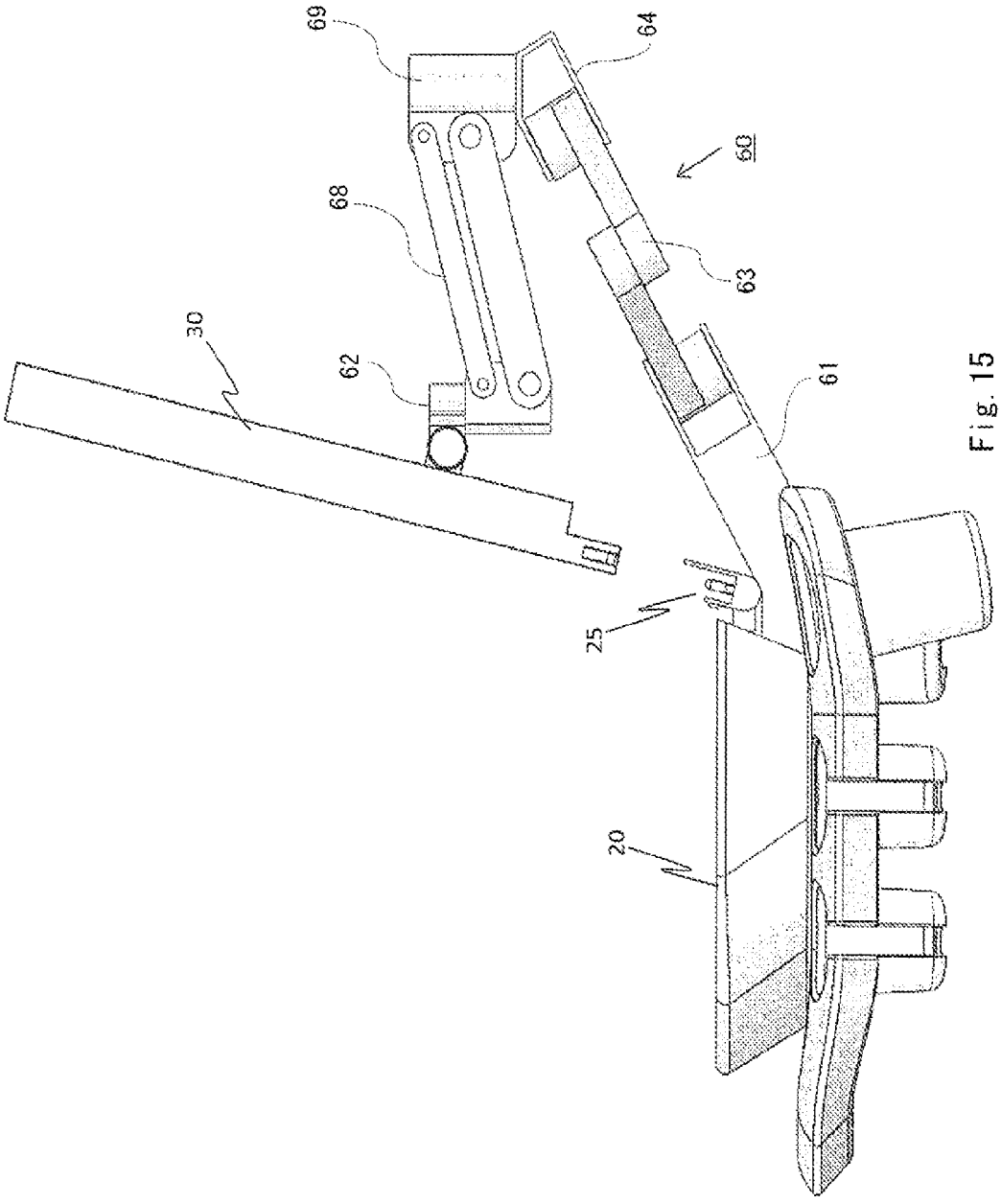


Fig. 15

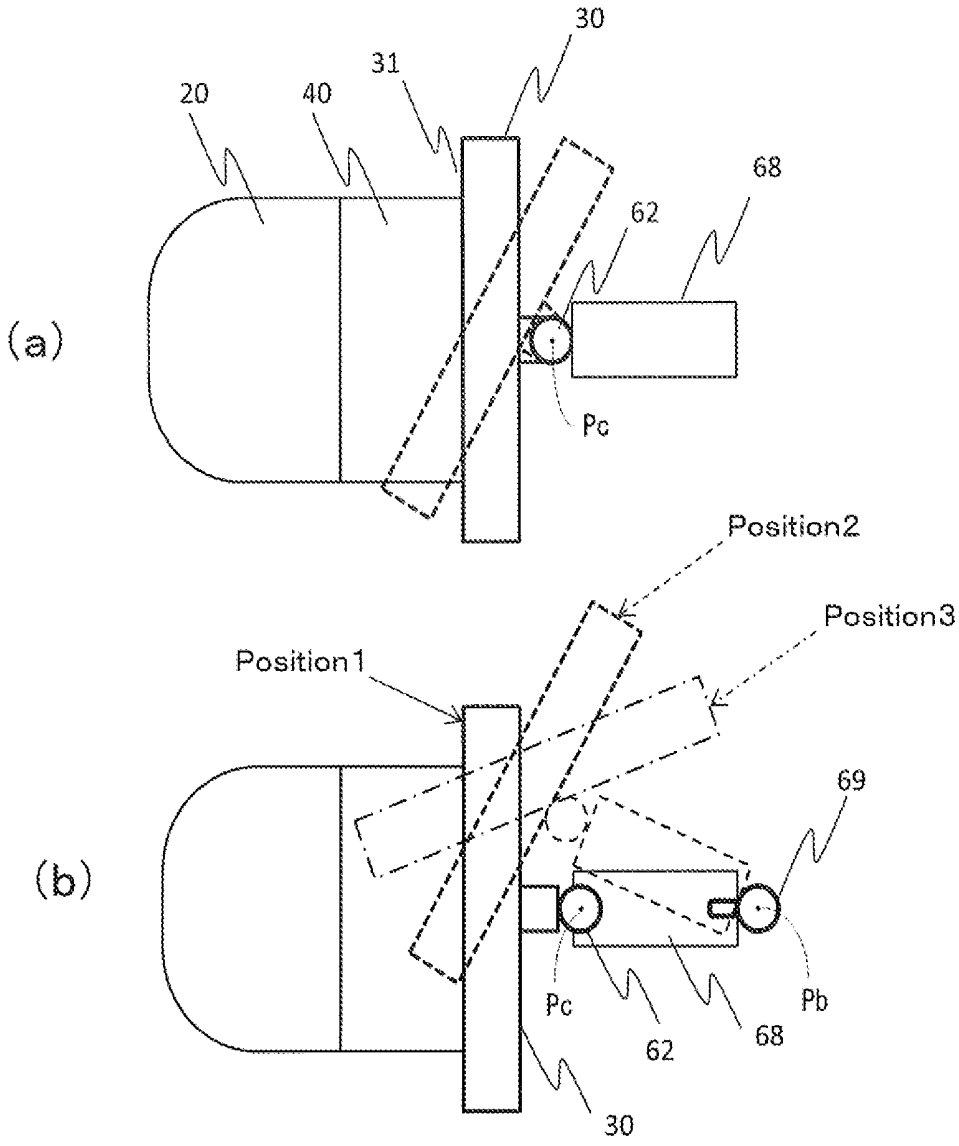

(a)
20
40
31
30
68
62
Pc
(b)
Position1
Position2
Position3
69
Pc
62
68
Pb
30

Fig. 16

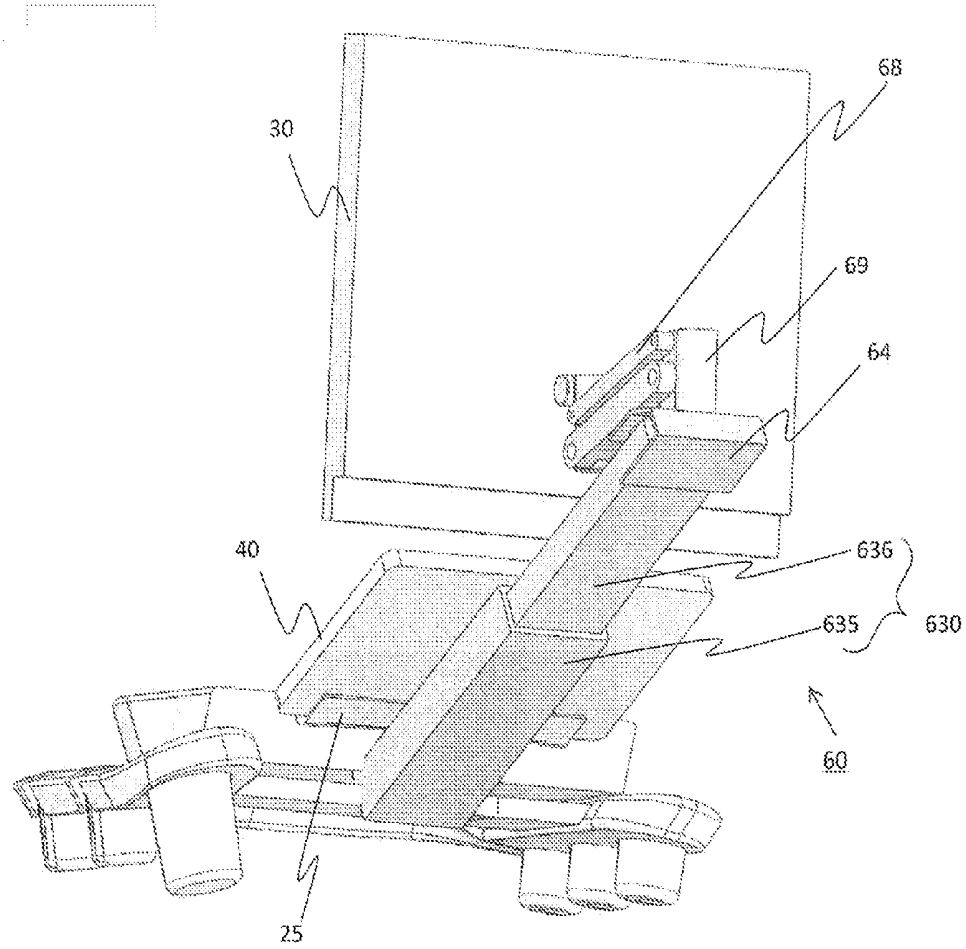


Fig. 17

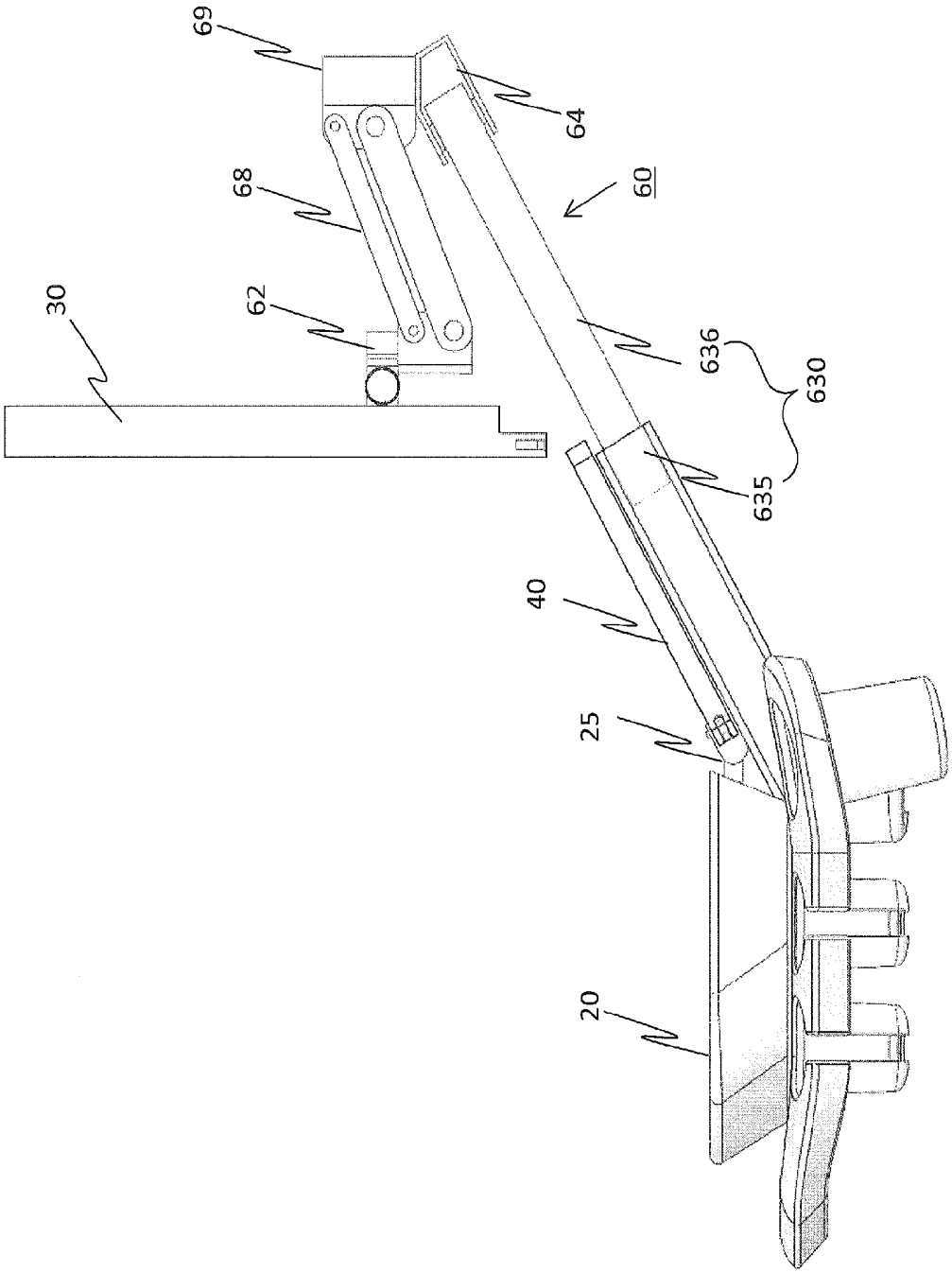


Fig. 18

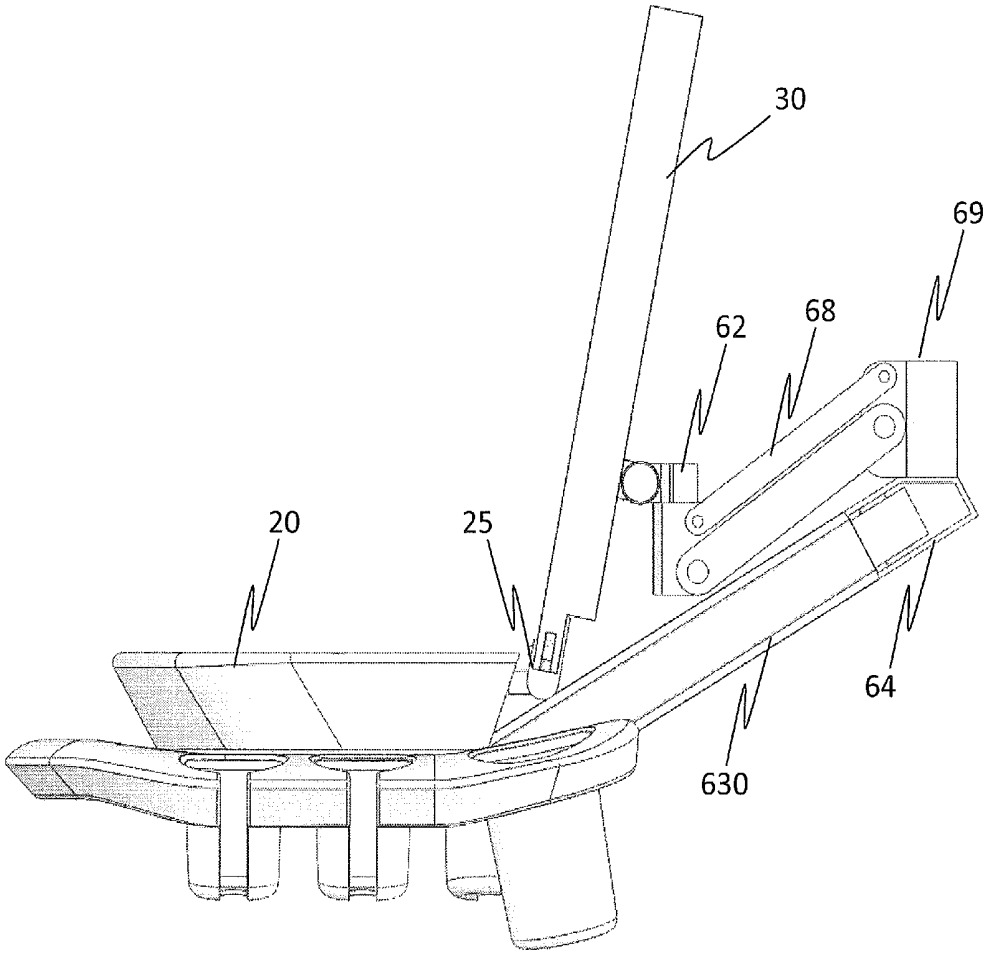


Fig. 19

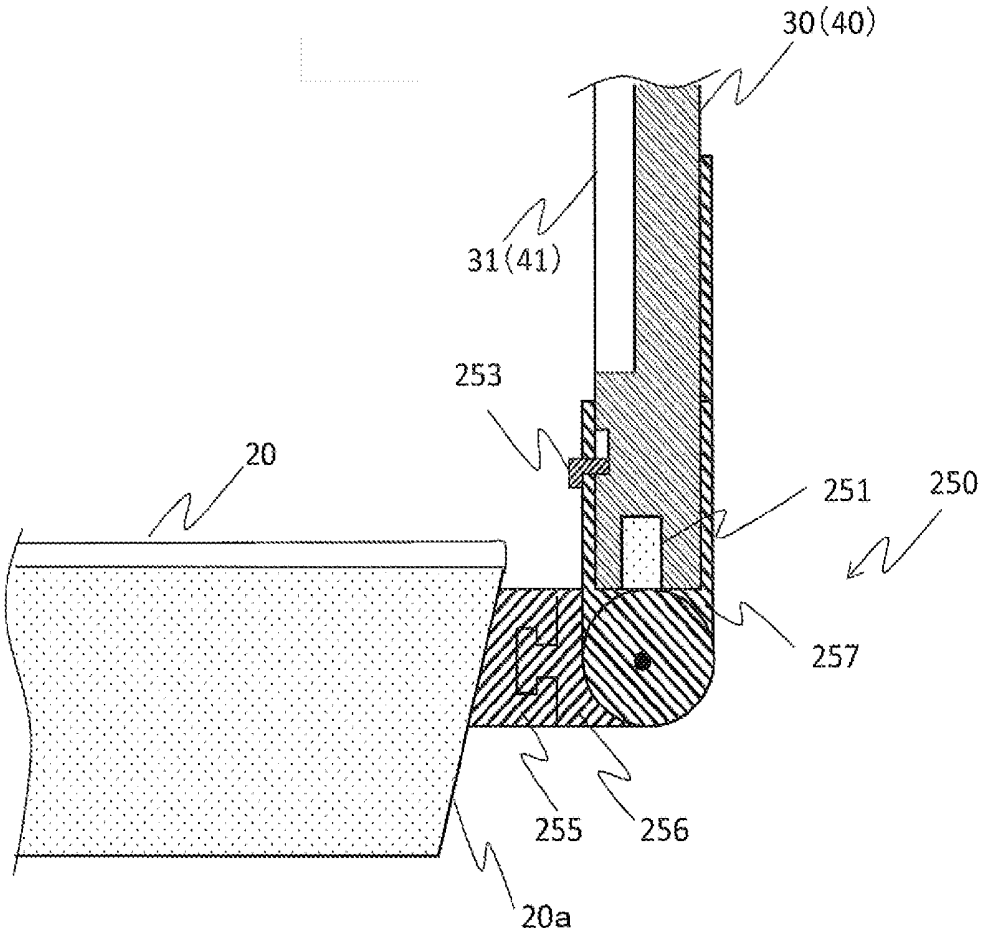


Fig. 20

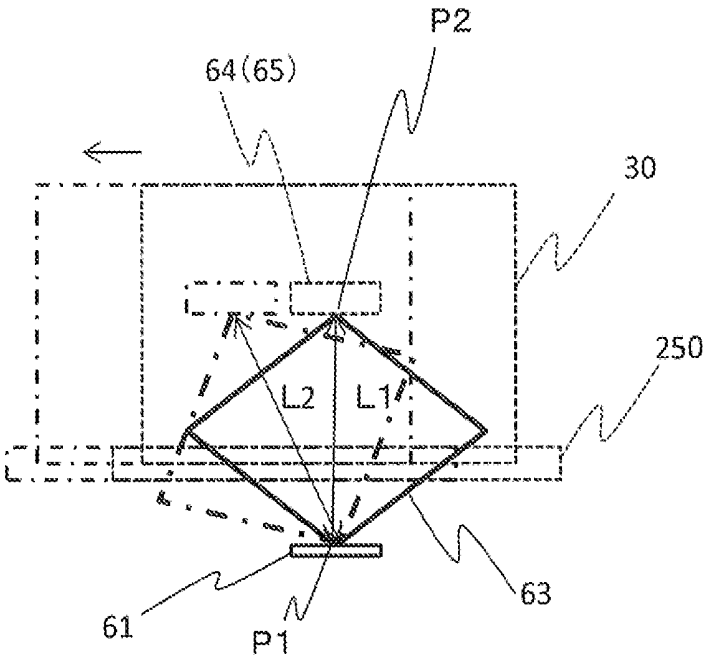


Fig. 21

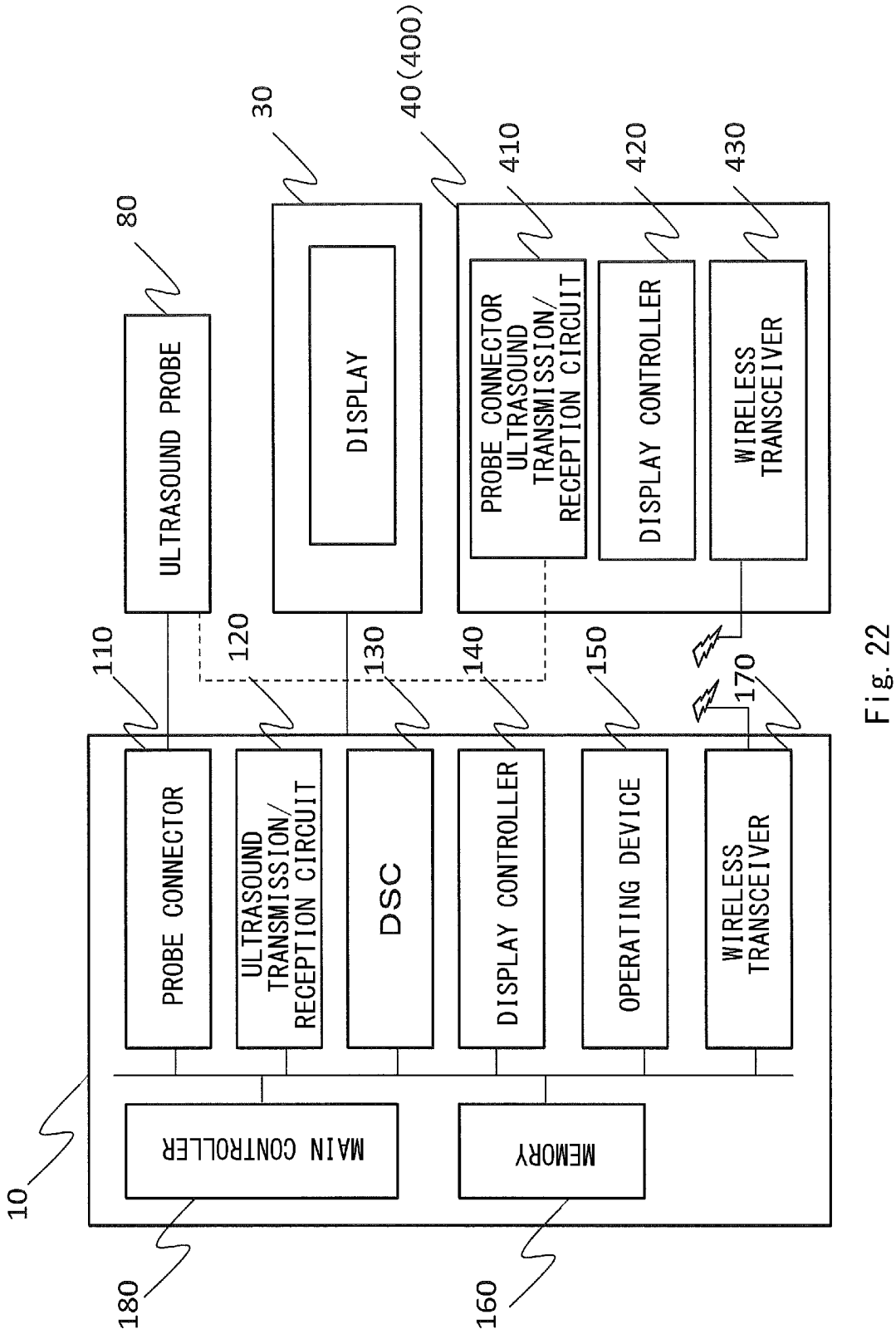

10
MAIN CONTROLLER
MEMORY
PROBE CONNECTOR
ULTRASOUND TRANSMISSION/ RECEPTION CIRCUIT
DSC
DISPLAY CONTROLLER
OPERATING DEVICE
WIRELESS TRANSCEIVER
110
120
130
140
150
170
180
160
ULTRASOUND PROBE
80
DISPLAY
30
40(400)
PROBE CONNECTOR ULTRASOUND TRANSMISSION/ RECEPTION CIRCUIT
DISPLAY CONTROLLER
WIRELESS TRANSCEIVER
410
420
430

Fig. 22

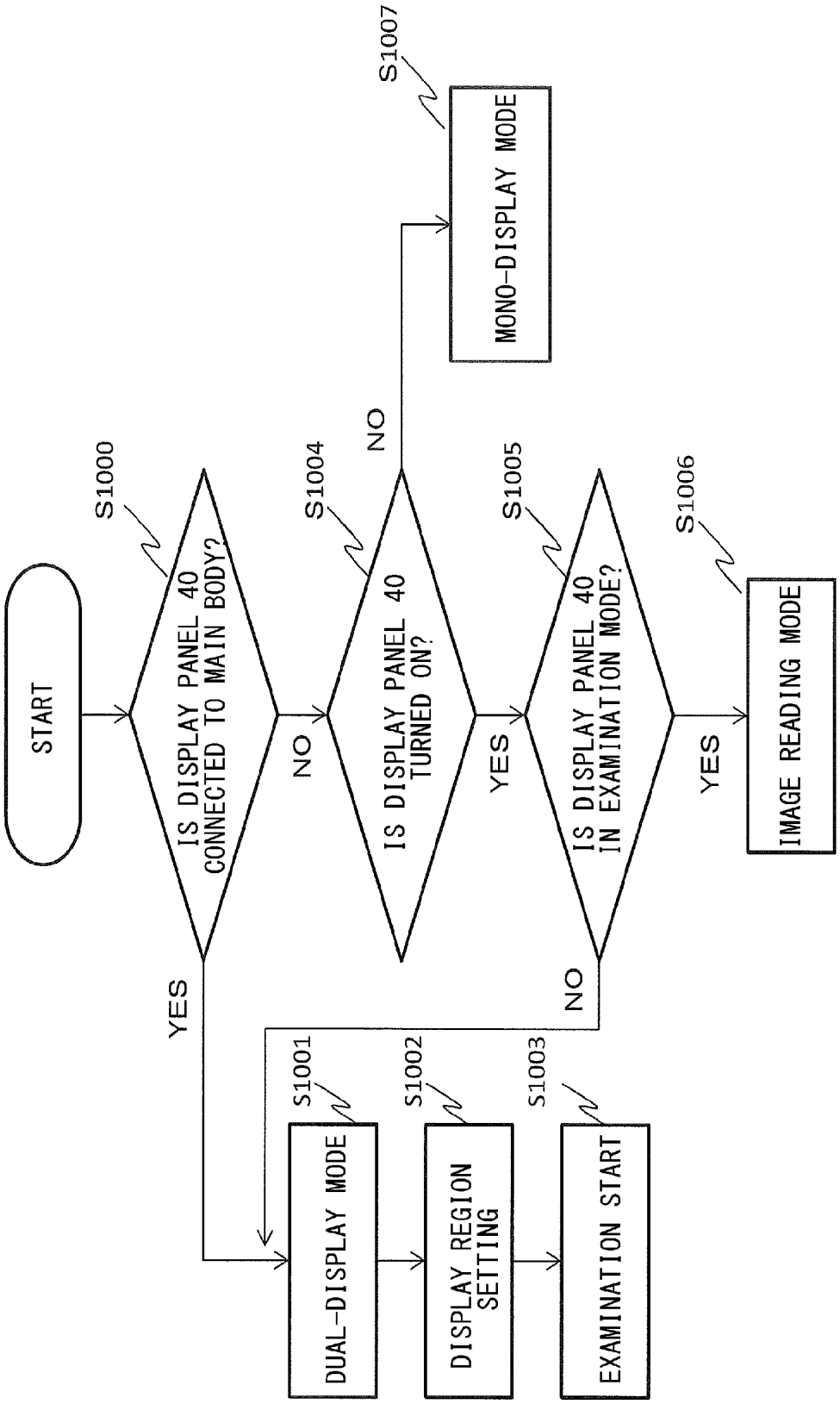

START
S1000
IS DISPLAY PANEL 40 CONNECTED TO MAIN BODY?
YES
NO
S1004
IS DISPLAY PANEL 40 TURNED ON?
NO
S1007
MONO-DISPLAY MODE
YES
S1005
IS DISPLAY PANEL 40 IN EXAMINATION MODE?
NO
YES
S1006
IMAGE READING MODE
S1001
DUAL-DISPLAY MODE
S1002
DISPLAY REGION SETTING
S1003
EXAMINATION START

Fig. 23

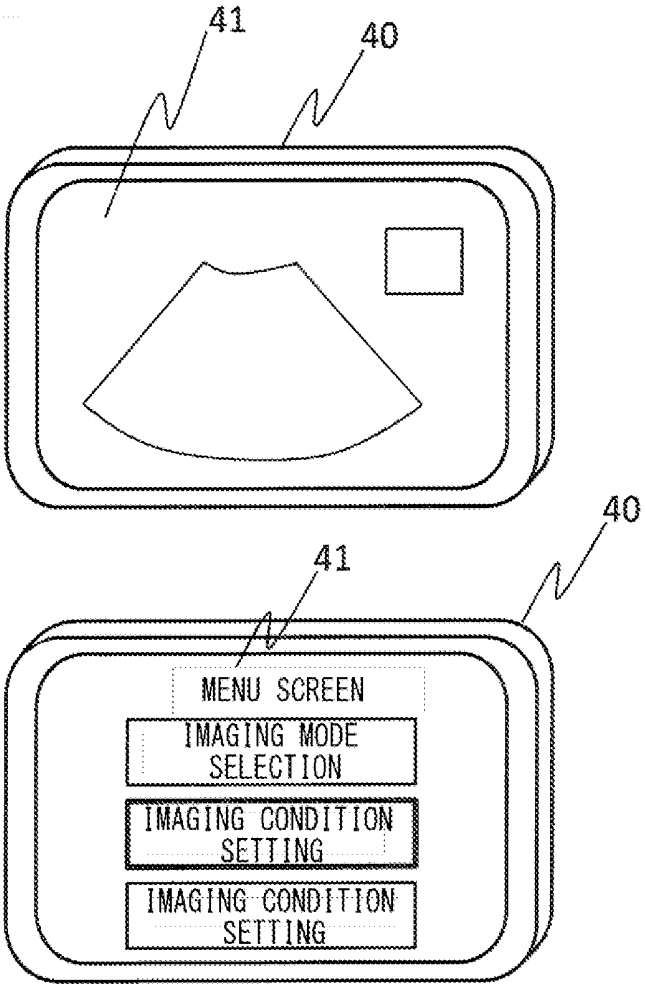

41
40
40
41
MENU SCREEN
IMAGING MODE SELECTION
IMAGING CONDITION SETTING
IMAGING CONDITION SETTING

Fig. 24

ULTRASOUND DIAGNOSTIC DEVICE

TECHNICAL FIELD

[0001] The present invention relates to an ultrasound diagnostic device, and more particularly, to an ultrasound diagnostic device including two displays.

BACKGROUND ART

[0002] In an ultrasound diagnostic device, in order to allow a patient and other persons in addition to an examiner to easily view a display panel that displays an ultrasound image, various types of mechanisms that support the display panel to a device main body to rotate (turn) or move up and down the display panel with respect to the device main body have been proposed (PTL 1). Further, most of the ultrasound diagnostic devices in the related art include a mechanism that folds the display panel from a standing posture to a horizontal posture when the device is not used, for example.

[0003] Further, in order to increase the degree of freedom in viewing the display panel, a device in which a display unit provided with a display panel is provided independently of a main body of an ultrasound diagnostic device and a cart portion of the display unit is connectable to a cart portion of the main body has been proposed (PTL 2).

CITATION LIST

Patent Literature

[0004] PTL 1: JP-A-2011-147786

[0005] PTL 2: JP-A-2010-46374

SUMMARY OF INVENTION

[0006] In an ultrasound diagnostic device in the related art in which a display panel is fixed to a device main body, a rotating mechanism or a vertical movement mechanism is provided as a support mechanism, but there is a restriction in a movement range of the display panel. On the other hand, when a display panel is mounted as a display unit structure provided separately from a main body, the entire device including the main body and the display unit becomes bulky, and a wide space is necessary for transportation or accommodation.

[0007] An object of the invention is to provide an ultrasound diagnostic device which is generally compact, having a high degree of freedom in a viewing position and a viewing angle of a display panel and having excellent operability.

[0008] In order to achieve the above object, an ultrasound diagnostic device of the invention includes two displays. One display (first display) is fixed to a device main body through a support mechanism, and the other display (second display) is detachably mounted to the main body. Here, the "main body" of the invention represents a device main body including an operation panel, and "detachably mounted to the main body", "connected to the main body", or the like includes a case of "detachably mounted to the operation panel" or "connected to the operation panel".

[0009] A display connection unit for connection of at least one of two displays is provided in the main body (operation panel). The ultrasound diagnostic device is operated in a dual-display mode where two displays are operated when the detachable second display is connected to the display connection unit. The first display is supported to the main body to be movable from a rear position of the second display to an upper or front position thereof, and can move without collision with the second display connected to the main body.

[0010] When the detachable second display is detached from the display connection unit, the first display is connected to the display connection unit, and the ultrasound diagnostic device is operated in a mono-display mode where an ultrasound image or the like is displayed on one display. Here, the first display is connected to the display connection unit. Further, the second display detached from the display connection unit performs transmission or reception with the main body in a wireless manner to function as a display panel.

[0011] According to the invention, since the second display which is detachably mounted to the main body, in addition to the first display fixed to the main body, is provided, it is possible to view an ultrasound image at a free posture by the second display detached from the main body. Further, providing a connector for the first display and a connector for the second display in the main body as a common one connection unit, and connecting the second display to the main body, it is possible to increase the degree of freedom in display such as a large screen display or a division display using the two display panels.

[0012] Further, by providing a mechanism that allows an operation of jumping over the second display in a support mechanism of the first display, even in a state where the second display is connected to the main body, it is possible to smoothly perform the operation of the first display.

BRIEF DESCRIPTION OF DRAWINGS

[0013] FIG. **1** is a perspective view illustrating an overall outline of an ultrasound diagnostic device according to a first embodiment.

[0014] FIG. **2** is a side view illustrating main parts of the ultrasound diagnostic device shown in FIG. **1**.

[0015] FIG. **3** is a diagram illustrating a second display (sub display) in a state of being detached from a main body.

[0016] FIG. **4**(*a*) is a perspective view illustrating a display connection unit of the main body, and FIG. **4** (*b*) is a perspective view illustrating an end portion of the display connected to the connection unit.

[0017] FIG. **5** is a side sectional view illustrating the connection unit to which a display is connected.

[0018] FIG. **6** is a diagram schematically illustrating a support mechanism for an operation panel.

[0019] FIG. **7** is a diagram illustrating a supporter of a first display (main display) supported by the main body.

[0020] FIG. **8** is a diagram illustrating a posture example (posture A) of the second display connected to the connection unit.

[0021] FIGS. **9**(*a*) and **9**(*b*) are diagrams illustrating a positional change of the first display at the posture A of the second display shown in FIG. **8**.

[0022] FIG. **10** is a diagram illustrating another posture example (posture B) of the second display connected to the connection unit.

[0023] FIG. **11** is a diagram illustrating a positional change of the first display at the posture B of the second display shown in FIG. **10**.

[0024] FIGS. **12**(*a*) and **12**(*b*) are diagrams illustrating an operation when the first display supported by the main body is connected to the connection unit.

[0025] FIG. **13** is a perspective view illustrating a display supporter of an ultrasound diagnostic device according to a second embodiment.

[0026] FIG. **14** is a side view illustrating a dual-display state in the second embodiment.

[0027] FIG. **15** is a side view illustrating a mono-display state in the second embodiment.

[0028] FIGS. **16**(*a*) and **16**(*b*) are diagrams illustrating a motion of a first display in the ultrasound diagnostic device of the second embodiment.

[0029] FIG. **17** is a perspective view illustrating a modification example of the display supporter of the second embodiment.

[0030] FIG. **18** is a side view illustrating a dual-display state in the modification example shown in FIG. **17**.

[0031] FIG. **19** is a side view illustrating a mono-display state in the modification example shown in FIG. **17**.

[0032] FIG. **20** is a sectional view illustrating main parts of an ultrasound diagnostic device according to a third embodiment.

[0033] FIG. **21** is a diagram illustrating a transverse movement of a display of an ultrasound diagnostic device of the third embodiment.

[0034] FIG. **22** is a functional block diagram illustrating an ultrasound diagnostic device according to a fourth embodiment.

[0035] FIG. **23** is a flowchart illustrating an operation of the ultrasound diagnostic device of the fourth embodiment.

[0036] FIG. **24** is a diagram illustrating a display screen example of a second display.

DESCRIPTION OF EMBODIMENTS

[0037] An ultrasound diagnostic device of embodiments of the invention includes a main body that includes an operation panel, a first display that is connected to the main body through a supporter, and a second display that is detachably connected to the main body. The second display that is detachably connected to the main body includes a transmission/reception circuit that performs transmission or reception of a signal with the main body. Further, the main body includes a display connection unit that is detachably connected to the second display, and the first display and the second display include an end portion that is engaged with the display connection unit. The ultrasound diagnostic device of the embodiments may be operated in an operating mode (dual-display mode) where the second display is connected to the display connection unit and the first display and the second display function as displays connected to the main body, and in an operating mode (mono-display mode) where the second display is detached from the main body and the first display is connected to the display connection unit.

[0038] Hereinafter, the embodiments of the ultrasound diagnostic device of the invention will be described with reference to the accompanying drawings.

First Embodiment

[0039] FIG. **1** is a perspective view illustrating an overall outline of an ultrasound diagnostic device **100** of a first embodiment, and FIG. **2** is a side view illustrating main parts of the ultrasound diagnostic device shown in FIG. **1**. In the figures, a left side is a front side of the device, and a side opposite thereto is a rear side. As shown in the figures, the ultrasound diagnostic device **100** includes a main body **10**, an operation panel **20** fixed to the main body **10** through a support mechanism, two displays **30** and **40**, and a probe housing **50** for storing an ultrasound probe (not shown), as main components. The displays **30** and **40** have respectively independent functions and thus are not in a main-sub relationship, but hereinafter, for ease of description, the display (first display) **30** is referred to as a main display **30**, the display (second display) **40** is referred to as a sub display **40**. Further, when it is not necessary that the displays **30** and **40** are distinguished from each other, the displays **30** and **40** are simply referred to as displays.

[0040] The main body **10** includes a housing **11** that accommodates therein an electronic circuit and the like which are main components of the ultrasound diagnostic device. Further, a cart **13** is provided in a lower portion of the housing **11**, and a handle **15** used when an operator moves the device is provided in an upper portion of the housing **11**.

[0041] The operation panel **20** is a component that performs an input operation for operating the main body **10**. Although not shown, input devices (not shown) such as buttons, keys, or a pointing device for receiving an input are provided on an upper surface of the operation panel **20** at a predetermined arrangement. The operation panel **20** is supported by the support mechanism fixed to the housing **11** and is disposed in an upper portion of the housing **11**. The support mechanism for the operation panel **20** includes a mechanism capable of rotating the operation panel **20** around a vertical axis, moving the operation panel **20** in the horizontal direction (front-back direction/lateral direction), swing, and moving the operation panel **20** in the vertical direction. Further, on the rear side of the operation panel **20**, a display connection unit (hereinafter, simply referred to as a connection unit) **25** for connection of the main display **30** and the sub display **40** is provided. Details of the structure of the connection unit **25** will be described later.

[0042] The main display **30** is supported by a supporter fixed to an upper portion of the housing **11** or the rear surface of the operation panel **20**, and is electrically connected to the main body **10** through a cable (not shown). In this embodiment, although its configuration is not particularly limited, the main display **30** has a display surface of a screen larger than that of the sub display **40**, and shares display content with the sub display **40** according to characteristics such as the number of pixels or definition in a state where the sub display **40** is connected to the main body **10**.

[0043] The supporter of the main display **30** includes a connecting mechanism **60** which is a combination of plural mechanisms capable of rotating the main display **30** around a vertical axis, moving the main display **30** in the horizontal direction, and moving the main display **30** in the vertical direction. Although details of the connecting mechanism **60** will be described, the main display **30** can move from a rear surface (rear side) position to a front surface position with reference to the sub display **40** connected to the connection unit **25** by the connecting mechanism **60**. Further, a structure connected to the connection unit **25** provided in the operation panel **20** is provided at a lower end of the main display **30**, and in a state where the sub display **40** is detached from the connection unit **25**, the main display **30** may be connected to the connection unit **25** through the structure.

[0044] As shown in FIG. **3**, the sub display **40** is a tablet-type display device, and includes a display surface **41** of a touch panel type. A drive circuit and a transmission/reception circuit for performing transmission or reception of a signal with the main body **10**, or the like are stored in the sub display **40**. Further, a structure connected to the connection unit **25** provided in the operation panel **20** is provided on one surface

43 orthogonal to the display surface 41. The sub display 40 is detachably mounted to the connection unit 25, and is electrically connected to the main body 10 through a terminal provided in the connection unit 25 in a state of being connected to the connection unit 25, so that transmission or reception of a signal or data can be performed with the main body 10. In a state where the sub display 40 is detached from the connection unit 25, the sub display 40 functions as an independent tablet-type display device. In addition, the sub display 40 may perform the transmission or reception of the signal or data with the main body 10 in a wireless manner, and in this case, the sub display 40 functions as a simple ultrasound diagnostic device. The function of the sub display 40 that functions as the simple ultrasound diagnostic device will be described in other embodiments.

[0045] The probe housing 50 is a member including a probe holder 51 and a jelly holder 52 for accommodating an ultrasound probe or jelly. The probe housing 50 is fixed to an upper end of the support mechanism of the operation panel 20 so that the probe holder and the jelly holder are disposed on opposite sides of the operation panel 20, and may move integrally together with the operation panel 20. A portion that connects right and left portions of the probe housing 50 on the front side of the operation panel 20 also serves as an operation handle 55 of the operation panel 20. By operating the operation handle 55, the operation panel 20 can rotate or slide, for example.

[0046] Next, the structure of the connection unit 25 of the operation panel 20 and the structure of the end portion of the display 30 (40) connected thereto will be described with reference to FIGS. 4 and 5. FIG. 4(*a*) is a top view of the connection unit, FIG. 4(*b*) is a diagram illustrating an end portion of a display connected to the connection unit, and FIG. 5 is partial sectional view illustrating a state where the display is connected to the connection unit.

[0047] The connection unit 25 is provided to be rotatable around an axis Pa along one surface of a housing that forms the operation panel 20, and thus, an angle of the display panel connected to the connection unit 25 with respect to the operation panel 20 can be changed. As shown in FIGS. 4(*a*) and 5, the connection unit 25 is an elongated member formed by a concave portion having a U-shaped (channel shape) section, and is mounted to the rear surface of the operation panel 20 so that its length direction is parallel to the rear surface of the operation panel 20. The concave portion serves as an accommodating part that accommodates an end portion of the display 30 or 40, and there are provided on the bottom thereof, a connector 251 for electrically connecting the display 30 or 40 to the main body 10 and a protrusion 252 which serves as a guide when the display panel is inserted into the accommodating part. Further, a locking mechanism 253 that fixes the display at a position where the display panel is inserted into the concave portion is provided. As the locking mechanism 253, a known mechanism in which a key-shaped member slides or rotates to be engaged with a hole of an opponent to be locked is used.

[0048] On the other hand, as shown in FIG. 4(*b*), in one end surface of the display 30 or 40, a portion having approximately the same width as an inner width of the concave portion of the connection unit 25 is formed. Further, in an end surface of this portion, holes with which two protrusions 252 of the connection unit 25 are engaged are formed at the same interval as that of the protrusions 252. A concave terminal to be connected to the connector 251 is formed at an intermediate position between the two holes. With such an end structure, when the end portion of the display 30 or 40 is inserted into the concave portion of the connection unit 25, the display 30 or 40 is mechanically and electrically connected to the main body. Since the main display 30 is connected to the main body through the cable, a concave portion that accommodates the connector 251 may simply function as a mechanical connector. In this case, the main body may recognize whether the display connected to the connection unit 25 is the main display 30 or the sub display 40 based on the connection of the sub display 40 to the connector 251.

[0049] The main body of the ultrasound diagnostic device in the invention refers to an entire device including the main body 10 and the operation panel 20 excluding the displays 30 and 40.

[0050] Next, details and operations of the respective support mechanisms of the operation panel 20 and the main display 30 in the ultrasound diagnostic device 100 of this embodiment will be described.

[0051] First, the support mechanism of the operation panel 20 will be described with reference to FIG. 6. FIG. 6 is a schematic side view illustrating the mechanism when seen on a lateral side of the ultrasound diagnostic device 100. In the figure, arrow A represents a vertical direction of the device, and arrow B represents a front-back direction of the device. As shown in the figure, the support mechanism 70 includes a vertical moving part 71 that is mounted to a bottom surface of the housing 11 to be slidable in the front-back direction, a horizontal moving part 73 that is mounted to an upper end of the vertical moving part 71 to be movable in the front-back direction, a swing part 75 that is mounted to the horizontal moving part 73 at one end thereof to be rotatable around a shaft 75*a*, and a rotating part 77 that is mounted to the other end of the swing part 75 to be rotatable around a shaft 75*b*. The rotating part 77 includes a rotating shaft supporter 771 that is rotatably mounted to the swing part 75 and a rotating shaft 773, and the operation panel 20 is fixed to a plate member (not shown) fixed to the rotating shaft 773 of the rotating part 77 by a fastening screw or the like.

[0052] The vertical moving part 71 includes a fixing member 715 that slides on a front-back rail (not shown) fixed to the bottom surface of the housing 11, a support column 711 fixed to the fixing member 715, and a cylinder 712 that is fitted to the support column 711 and moves in the vertical direction along the support column 711. The horizontal moving part 73 is fixed to an upper end of the cylinder 712. The support column 711 and the cylinder 712 may be configured by a known drive mechanism such as a hydraulic cylinder or an air cylinder, and may be operated by an operating pedal or a handle (not shown).

[0053] The horizontal moving part 73 includes a guide 731 fixed to the upper portion of the cylinder 712, and a slider 732 that is slidably engaged with the guide 731. An end of a swing arm which forms the swing part 75 is fixed to one end of the slider 732. The rotating shaft supporter 771 of the rotating part 77 is fixed to the other end of the swing arm 75.

[0054] Due to the support mechanism 70, the operation panel 20 fixed to the rotating part 77 can perform rotation around the shaft 773, a front-back movement, and a vertical movement, and can perform a vertical movement with a front-back movement according to change in an angle of the swing arm 75 with respect to the horizontal direction. By combining the operations of these mechanisms, it is possible to achieve various movements of the operation panel 20.

[0055] Next, details of the supporter (connecting mechanism **60**) of the main display **30** will be described with reference to FIGS. **7** to **12**.

[0056] As shown in FIGS. **7** and **8**, the connecting mechanism **60** includes a fixing part **61** fixed to the upper surface of the housing **11** of the main body **10**, a pantograph-shaped link part **63** that is connected to the fixing part **61** at one end thereof, and a rotating part **65** that connects the other end of the link part **63** to the rear surface of the main display **30**, as main components.

[0057] The fixing part **61** is a member having a structure in which two plate portions (upper plate and lower plate) are connected to each other at a predetermined interval. One end of the link part **63** is fixed between the two plate portions to be rotatable around an axis that extends in a direction orthogonal to a plate surface of the plate portions. The fixing part **61** is fixed to the upper surface of the housing **11** of the main body **10** by a fastening screw or the like so that the plate portions are inclined with respect to the panel surface **21** of the operation panel **20**.

[0058] The link part **63** is a link having a pantograph structure in which a pair of right and left link arms **631** and **632**, each of which has two arms connected to each other, are combined. One end of each of the link arms **631** and **632** is pivotally supported to the fixing part **61**, and the other end thereof disposed at a diagonal position with respect to the one end is fixed to an intermediate member **64** having the same structure as that of the fixing part **61**. A distance between the fixing part **61** and the intermediate member **64** is changed according to an opening and closing operation of the pair of link arms **631** and **632** which are disposed between the fixing part **61** and the intermediate member **64**, and thus, a distance between the main display **30** and the operation panel **20** that are connected to the intermediate member **64** through the rotating part **65** may be changed. That is, the link part **63** functions as an expansion/contraction mechanism.

[0059] The intermediate member **64** is formed by a plate member having a channel-shaped (U-shaped) section, and the rotating part **65** is rotatably fixed to an upper plate portion thereof.

[0060] The rotating part **65** is a rectangular parallelepiped member having a small thickness with respect to sizes of a length and a width thereof, and on two opposite side surfaces thereof, shaft supporters **651** and **652** that fixes shafts which are parallel to the side surfaces are formed. A shaft **661** supported by one shaft supporter **651** passes through a shaft supporter **641** fixed to the intermediate member **64**, and thus, the rotating part **65** is rotatable around the shaft **661** with respect to the intermediate member **64**. A shaft **662** supported by the other shaft supporter **652** passes through a shaft supporter **67** fixed to the rear surface (surface opposite to the display surface **31**) of the main display **30**, and thus, the main display **30** is rotatable around the shaft **662** with respect to the rotating part **65**.

[0061] The main display **30** is disposed at a rear and upper position with reference to the sub display **40** connected to the operation panel **20** at a posture A of the sub display **40** shown in FIG. **8**, by the connecting mechanism **60** with such a configuration. As shown in FIG. **9**(*a*), by changing an angle θ1 of the main display **30** with respect to the rotating part **65** from the above position, it is possible to change the angle of the display surface **31** into an angle for easy viewing of an operator. Further, as shown in FIG. **9**(*b*), by changing an angle θ2 of the rotating part **65** with respect to the link part **63**, it is possible to change a vertical position of the main display **30**.

[0062] Further, as shown in FIG. **10**, by changing the angle of the connection unit **25** with respect to the operation panel **20**, when the sub display **40** is disposed at an angle (posture B) close to a vertical posture compared with the posture shown in FIG. **8**, for example, as shown in FIG. **11**, by increasing the angle θ1 of the main display **30** with respect to the rotating part **65** or the angle θ2 of the rotating part **65** with respect to the link part **63** and changing a distance between one pair of link arms of the link part **63**, it is possible to move the main display **30** to be close to the sub display **40** as indicated by an arrow, and thus, it is possible to position the main display **30** on an upper side of the sub display **40**.

[0063] Here, when the main display **30** moves to be close to the sub display **40** and then rotates, the main display **30** collides with the sub display **40**. This collision can be prevented if the operator surely performs the change of the angle of the main display **30** prior to the operation of the link part **63**, but the operation of the link part **63** may be mechanically restricted in association with the position of the main display **30**. Such a mechanism may employ various locking mechanisms.

[0064] For example, when a locking mechanism of the link part **63** that interlocks with the operation of the rotating part **65** is provided, and when the angle θ2 with respect to the link part **63** is small, that is, in a state where the rotating part **65** is folded with respect to the link part **63**, the locking mechanism locks the operation of the link part **63** to prevent the main display **30** from moving to the sub display **40**. Further, the rotating part **65** rotates to reach a predetermined angle, the locking may be released. In this way, by restricting an expansion/contraction range of the link part **63** in association with the rotation angle of the rotating part **65**, it is possible to avoid collision of the main display **30** and the sub display **40** regardless of the opening angle of the sub display **40**, and to achieve various postures of the sub display **40**.

[0065] As another method, a locking mechanism may be provided in the connection unit **25** of the sub display **40**. Specifically, a configuration in which a wire wound by rotation (rotation in a clockwise direction shown in FIG. **9**) around the shaft **661** of the rotating part **65** is connected between the shaft **661** and the main body side to which the link part **63** is fixed and locking and releasing between the wire and the main body side are performed by the locking mechanism of the connection unit **25** may be used. When the sub display **40** is connected to the connection unit **25**, the wire is connected to the main body side, and when the rotating part **65** rotates to lift the main display **30** upward, the link part **63** is operated to be pulled by the wire, so that the main display **30** moves close to the main body side. That is, the main display **30** moves forwardly at a high position such that the main display **30** does not collide with the sub display **40** connected to the connection unit **25**. Further, when the sub display **40** is detached from the connection unit **25**, the locking mechanism provided in the connection unit **25** is released, and the connection between the wire and the main body side is released. Thus, it is possible to independently perform movement of the main display **30** by means of the link part **63** and movement of the main display **30** by means of the rotating part **65**, respectively.

[0066] Further, in a state where the sub display **40** is detached from the connection unit **25** of the operation panel **20**, as shown in FIGS. **12**(*a*) and **12**(*b*), the main display **30**

moves forwardly by the link part **63** (arrow C), and the angle θ2 of the rotating part **65** with respect to the link part **63** and the angle θ1 of the main display **30** with respect to the rotating part **65** are changed, and thus, it is possible to connect the main display **30** to the connection unit **25**.

[0067] As described above, by operating the link part **63** and the rotating part **65**, the main display **30** can move from the rear position of the sub display **40** to the upper or front position thereof without collision even in a state where the sub display **40** is connected to the connection unit **25**, and can be connected to the connection unit **25** fixed to the operation panel **20**.

[0068] In the embodiment shown in FIG. **12**, the connecting mechanism **60** is provided so that the main display **30** is connected to the connection unit **25** at a position where the link part **63** is contracted (position where a distance between the link arm **631** and the link arm **632** is maximum) and at a position where the angle θ2 of the rotating part **65** with respect to the link part **63** is minimum, but the sizes of the respective members that form the connecting mechanism **60** are not limited to the embodiment shown in the figures. The sizes may be changed so that the operation range of the main display **30** is enlarged.

[0069] For example, when the size of the link part **63** is designed so that the distance between the link arms can be increased from the state where the main display **30** is connected to the connection unit **25**, even in a state where the main display **30** is connected to the connection unit, it is possible to change the angle of the main display **30** with respect to the operation panel **20** so that the main display **30** is forwardly inclined compared with the position shown in FIG. **12**. Further, the size of the rotating part **65** and the connecting position thereof with the main display **30** may be designed so that the main display **30** is connected to the connection unit **25** at a position where the angle θ2 of the rotating part **65** is larger than 0°, and thus, it is possible to change the angle of the main display **30** so that the main display **30** is backwardly inclined compared with the position shown in FIG. **12**.

[0070] Hereinbefore, the mechanism of the supporter (connecting mechanism **60**) of the main display **30** is described with reference to FIGS. **7** to **12**, but one characteristic of the ultrasound diagnostic device of this embodiment is in that the main display **30** which is connected to the main body **10** and the detachable sub display **40** can be connected to the common connection unit **25**. Accordingly, the supporter of the main display **30** (connecting mechanism **60**) is not limited to the above-described supporter, and any mechanism may be employed as long as the mechanism is capable of moving the end portion of the main display **30** to a position where the end portion is connected to the connection unit **25** provided in the main body **10**. For example, instead of the pantograph-shaped link part **63** which is a mechanism capable of expanding or contracting the distance between the connection unit **25** and the main display **30**, a link mechanism formed by only one link arm, a slide mechanism formed by a cylinder and a slider, or the like may be employed.

[0071] According to the ultrasound diagnostic device of this embodiment, since the detachable sub display **40** is provided separately from the main display **30** supported by the main body, when the sub display **40** is connected to the main body, it is possible to enlarge an effective display area of the display panel. Further, it is possible to realize various display forms, for example, to display plural images having different times and modes to be easily viewed, or to use one display for image display and the other display for a GUI, for example. Further, when the sub display **40** is detached from the main body, it is possible to move the sub display **40** to a free position, and thus, it is possible to allow a patient who lies on a bed or other persons to also view an image at an easy viewing position.

[0072] Further, according to the ultrasound diagnostic device of this embodiment, since the connection unit on the main body side to which the detachable sub display **40** is connected also functions as the connection unit for the main display **30**, when the sub display **40** is detached from the main body, it is possible to connect the main display **30** to the connection unit, and to perform display at a stable posture.

Second Embodiment

[0073] An ultrasound diagnostic device of a second embodiment is characterized in that a turning function of a display panel supported by a main body is additionally provided.

[0074] That is, in the ultrasound diagnostic device of this embodiment, the supporter of the first display includes the rotating part fixed to the rear surface of the display panel, the expansion/contraction mechanism part that is fixed to the main body side at one end thereof and has the variable distance between the main body and the other end thereof, and the intermediate member that connects the rotating part to the expansion/contraction mechanism part. Here, the rotating part is fixed to the rear surface of the display surface through a pivot part fixed to the rear surface, and the display panel is supported to the rotating part in a turnable manner (Aspect **1**.

[0075] Alternatively, the ultrasound diagnostic device of this embodiment has a characteristic that the supporter of the first display supported by the main body has a function of turning the first display. That is, the ultrasound diagnostic device of this embodiment has a configuration in which the supporter of the first display includes the rotating part that is rotatably fixed to the rear surface of the display surface, the expansion/contraction mechanism part that is fixed to the main body side at one end thereof and has the variable distance between the main body and the other end thereof, and the intermediate member that connects the rotating part to the expansion/contraction mechanism part. The rotating part is connected to the intermediate member in a turnable manner (Aspect **2**).

[0076] Anyone of the mechanism (pivot) (Aspect **1**) that connects the display to the rotating part in a turnable manner and the mechanism (Aspect **2**) that connects the rotating part to the intermediate member in a turnable manner may be provided, or both of them may be provided.

[0077] In the ultrasound diagnostic device of this embodiment, since configurations other than the supporter of the first display are the same as in the first embodiment, description thereof will not be repeated, and hereinafter, different mechanisms will be described with reference to FIGS. **13** to **15**. FIG. **13** is a perspective view illustrating a support mechanism seen on a rear side of the device, FIGS. **14** and **15** are side views thereof. In FIGS. **13** to **15**, the same reference numerals are given to the same components as in the first embodiment, and description thereof will not be repeated.

[0078] A supporter **60** of a first display of this embodiment includes a link part **63**, an intermediate member **64**, a second

link part **68**, a shaft member **69** fixed to an intermediate member **64**, and a pivot part **62** fixed to a rear surface **30***b* of a main display **30**.

[0079] The link part **63** includes a pair of link arms, similar to the first embodiment shown in FIG. **1**. One end of each link arm is rotatably shaft-supported to a fixing part **61** fixed to a main body **10**, and the other end thereof is rotatably shaft-supported to the intermediate member **64**. The intermediate member **64** is a member having a structure in which shafts of the link arms are inserted between two parallel plates similar to the first embodiment, in which an upper plate portion has an inclined surface **64***a* formed on a rear side with reference to a portion thereof where the shafts of the link arms are supported between the upper plate portion and a lower plate portion. The shaft member **69** is fixed to the inclined surface **64***a*. That is, as shown in the side view of FIG. **14**, the plate portions of the intermediate member **64** that shaft-supports the link part **63** are disposed on a flat plane parallel to the link part **63** fixed at an angle with respect to an operating surface of an operation panel **20**, but the inclined surface **64***a* that is inclined with respect to the plate portions is disposed on an approximately horizontal plane, and thus, vertically supports the shaft member **69**.

[0080] The shaft member **69** is a member including a cylindrical member **69***a* and a plate-shaped member **69***b* that extends in a radius direction of the cylindrical member, in which the cylindrical member **69***a* is fitted to a shaft Pb provided on the upper plate portion of the intermediate member **64**, and the plate-shaped member **69***b* shaft-supports an end portion of the second link part **68**. Thus, the shaft member **69** can rotate around the shaft Pb provided in the intermediate member **64**, so that the second link part **68** connected to the plate-shaped member **69***b* of the shaft member **69** and the main display **30** can be turned around the shaft. Here, a configuration in which the shaft member **69** is rotatably supported to the intermediate member **64** is described, but a configuration in which the shaft member **69** is fixed to the intermediate member **64** and does not turn is included in this embodiment.

[0081] The second link part **68** includes a pair of arms **681** and **682** which are vertically disposed, and a concave portion for being engaged with the shaft member **69** and the pivot part **62** is formed on opposite end portions of each of the arms **681** and **682**. At the end portion connected to the shaft member **69**, the plate-shaped member **69***b* of the shaft member **69** is fitted to the concave portions of the upper and lower arms **681** and **682**, so that the upper and lower arms can rotate with respect to the shaft member **69**.

[0082] The pivot part **62** has a structure in which two members of a supporter **621** having a structure similar to that of the shaft member **69** and a turning part **622** that is rotatably connected to the supporter **621** are combined. The supporter **621** and the turning part **622** are members having a cylindrical portion and a plate-shaped portion that extends in a radius direction of the cylindrical portion. Concave portions formed in end portions of the upper and lower arms **681** and **682** are fitted to the plate-shaped portion of the supporter **621** to support the arms **681** and **682** to be rotatable. Further, a pivot Pc is fixed to the cylindrical portion of the supporter **621** along its central axis, the cylindrical portion of the turning part **622** is fitted to the pivot Pc, so that the turning part **622** can rotate around the pivot Pc. The plate-shaped portion of the turning part **622** is shaft-supported to the shaft supporter **67** fixed to the rear surface of the main display **30**, so that the main display **30** can rotate with respect to the supporter **621**.

[0083] In such a configuration of the supporter **60**, a configuration in which the distance between the main display **30** and the operation panel **20** is expanded or contracted using the link part **63**, and a configuration in which an angle of the second link part **68** with respect to the link part **63** or an angle of the main display **30** with respect to the second link part **68** is changed to change an angle of the display panel with respect to the vertical direction or a position thereof in the vertical direction are the same as in the first embodiment. Further, as shown in FIG. **15**, a configuration in which the main display **30** can be connected to the connection unit **25** by combining respective rotations of the link part **63** and the second link part **68**, in a state where the detachable sub display **40** is not connected to the display connection unit **25** provided in the operation panel **20**, is also the same as in the first embodiment.

[0084] In addition to these operations, in the support mechanism of this embodiment, the main display **30** may turn around the shaft member **69** and/or the pivot part **62** (Pc). For example, as shown in FIG. **16**(*a*), the main display **30** may turn around the pivot part **62** to change the direction of the display surface **31**. Further, as shown in FIG. **16**(*b*), the second link part **68** and the main display **30** may turn around the shaft member **69** to move the main display **30** from an initial position (Position **1**) to a turning position (Position **2**), and to further turn the main display **30** from the position (Position **2**) around the pivot part **62** (turning to Position **3**).

[0085] In a state where the main display **30** is disposed on a rear side of the sub display **40** as shown in FIG. **14**, since a turning range of the main display **30** does not overlap a movement range where the sub display **40** is opened or closed with respect to the operation panel **20**, it is possible to reliably prevent collision between them. Further, as described in the first embodiment, by providing a restriction based on the angle of the second link part **68** to the movement of the main display **30** produced by the link part **63**, or by providing a locking mechanism that is operated according to the presence or absence of connection of the sub display **40** to the connection unit **25**, it is possible to perform a turning operation of the main display **30** while preventing collision with the sub display **40** not only at the position shown in FIG. **14** but also in various opening or closing angles of the sub display **40**.

[0086] As described above, according to the ultrasound diagnostic device of this embodiment, it is possible to provide various movements including turning of the main display **30**, in addition to the effects of the first embodiment.

[0087] In this embodiment, similar to the first embodiment, instead of the pantograph-shaped link part **63**, as a mechanism capable of expanding or contracting the distance between the main display **30** and the connector **25**, a link mechanism configured by only one link arm, a slide mechanism configured by a cylinder and a slider, or the like may be employed.

Modification Example

[0088] Instead of the link part **63** of the second embodiment, a modification example of the supporter (connecting mechanism) **60** that employs a slide mechanism are shown in FIGS. **17** to **19**. FIG. **17** is a perspective view illustrating the supporter **60** when seen on a rear side of the device, FIG. **18** is a side view illustrating a state where the sub display **40** is connected to the display connection unit **25**, and FIG. **19** is a

side view illustrating a state where the sub display **40** is detached from the display connection unit **25**. In the figures, the same reference numerals are given to the same components as in the first and second embodiments.

[0089] As shown in the figures, the supporter **60** of a display employed in an ultrasound diagnostic device of this modification example employs a slide mechanism **630** as a mechanism that moves the main display **30** in a front-back direction. The slide mechanism **630** includes a hollow cylindrical body **635** and a slider **636** that slides inside the cylindrical body, in which the cylindrical body is fixed to a main body side at a predetermined angle, and the slider is fixed to the intermediate member **64** at an end portion thereof disposed outside the cylindrical body. A support structure from the intermediate member **64** to the main display **30** is the same as in the second embodiment.

[0090] In this modification example, the slider **636** slides so that the main display **30** can move in the front-back direction, from a position in back of the sub display **40** as shown in FIG. **18** to a front position where the main display **30** is connected to the connection unit **25** as shown in FIG. **19**. In this movement, a configuration in which the main display **30** moves in the vertical direction using rotation produced by the second link part **68** and a configuration in which the main display **30** is turned using rotation produced by the shaft member **69** or the pivot part **62** are the same as in the second embodiment.

Third Embodiment

[0091] An ultrasound diagnostic device of a third embodiment is characterized in that a slide mechanism is additionally provided to a connector of a display. Since other configurations are the same as in the first and second embodiments, different points will be mainly described hereinbefore.

[0092] FIG. **20** is a sectional view illustrating a connection unit **250** fixed to the operation panel **20**. The connection unit **250** includes a fixing part **255** fixed along an end surface **20***a* of the operation panel **20**, a sliding part **256** that is connected to the fixing part **255** and is movable along the end surface **20***a* of the operation panel **20**, and a display accommodating part **257** that is rotatably mounted to the sliding part **256**.

[0093] Similar to the connection unit **25** of the first embodiment shown in FIGS. **4** and **5**, the display panel accommodating part **257** is an elongated member formed by a concave portion having a U-shaped section, and is mounted to the sliding part **256** so that its length direction is parallel to the rear surface of the operation panel **20**. Thus, angles of the displays **30** and **40** connected to the display panel accommodating part **257** with respect to the operation panel **20** can be changed. A configuration in which a connector **251** for electrically connecting the display **30** or **40** to the main body **10** and a protrusion **252** which serves as a guide when the display is inserted into the accommodating part are provided in the concave portion of the display accommodating part **257**, and a configuration in which a locking mechanism **253** that fixes the display is provided, are the same as in the first embodiment.

[0094] An end surface of the fixing part **255** to which the sliding part **256** is connected is formed in a rail shape, and a key-shaped end surface of the sliding part **256** is engaged with the rail-shaped end surface so that both of the end surfaces are connected to each other, and thus, the sliding part **256** can slide.

[0095] In this way, since the connection unit **250** has the slide mechanism, movement of the display in the lateral direction, in addition to the opening or closing operation of the display with respect to the operation panel **20**, can be performed, and thus, it is possible to move the display panel connected to the connection unit **250** to a position for easy viewing. Further, when the sub display **40** is connected to the connection unit **250**, the sub display **40** is at a position parallel to the main display **30** which is the other display, and the main display **30** and the sub display **40** do not collide with each other due to the movement of the connection unit **250** in the lateral direction.

[0096] When the main display **30** is connected to the connection unit **250**, the end portion of the main display **30** connected to the connection unit **250** and the end portion (fixing part **61**) of the supporter **60** fixed to the main body **10** cause lateral deviation when the connection unit **250** slides, but it is possible to absorb the deviation by expansion/contraction and rotation of the link part **63** of the supporter **60**. This state is shown in FIG. **21**.

[0097] In FIG. **21**, a point P**1** represents a position where one end of the link part **63** is shaft-supported by the fixing part **61** fixed to the main body side. A point P**2** represents a position where the other end of the link part **63** is shaft-supported by the intermediate member **64** fixed to the main display **30** through the shaft supporter **67** and the rotating part **65**. When the main display **30** moves from a position (position A) indicated by a dashed line to a position (position B) indicated by a single dot chain line as the connection unit **250** moves in a direction indicated by an arrow in the figure, the point P**1** of the link part **63** is stationary, but the point P**2** linearly moves in the horizontal direction according to the movement of the main display **30**. Here, as the link part **63***a* rotates around the point P**1** while making a distance L**1** between the point P**1** and the point P**2** lengthened (represented as L**2**, in which L**2**>L**1**) compared with a distance in a case where the display **30** is disposed at the position A, the link part **63** thus follows the horizontal movement of the intermediate member **64** and the rotating part **65**, that is, the horizontal movement of the main display **30**. In this way, even when the lateral deviation is present between the position where the main display **30** is fixed to the main body side through the supporter **60** and the position where the main display **30** is fixed to the main body side through the connection unit **250**, the supporter **60** can ensure a smooth operation of the main display **30** by its connecting mechanism.

[0098] According to this embodiment, since it is possible to cause the display connected to the connection unit **250** to slide in the lateral direction of the device, for example, it is possible to move an image on the display to be close to a person who wants to the image, and also to secure a wide space beside the display when moving an ultrasound probe connected to the ultrasound diagnostic device.

Fourth Embodiment

[0099] Next, an embodiment of an operation of the ultrasound diagnostic device of the invention will be described.

[0100] As described above, a main characteristic of the ultrasound diagnostic device of the invention is in that the sub display **40** is detachably mounted to the main body **10**. This embodiment is characterized in that a simple ultrasound examination function is provided to the detachable display panel so that functions of the ultrasound diagnostic device are enlarged.

[0101] A functional block diagram of the sub display **40** capable of functioning as a simple ultrasound diagnostic device and a functional block diagram of the main body **10** are shown in FIG. **22**.

[0102] As shown in the figure, the main body **10** includes a probe connector **110** to which an ultrasound probe **80** is connected; a transmission/reception circuit **120** that transmits an ultrasound signal to the ultrasound probe **80** through the probe connector **110** and receives an echo signal (signal obtained by converting ultrasound into an electric signal using a transducer) received by the ultrasound probe **80**; a digital scan converter (DSC) **130**; a display controller **140** that displays an ultrasound image such as an M mode or a B mode, processed and imaged by the digital scanning converter **130** on the main display **30** and the sub display **40**; an operating device **150** (including the operation panel **20**) for inputting a condition or a command necessary for examination to the main body **10**; a memory **160** that stores parameters or data necessary for examination, an ultrasound image, and the like; a wireless transceiver **170** that performs wireless communication with the sub display **40** detached from the main body **10**; and a main controller **180** that controls overall operations of the respective components. A program or data for operating various functions provided in the ultrasound diagnostic device is provided in the main controller **180** and the memory **160**. Further, a display (main display **30**) is connected to the main body **10**.

[0103] Although not shown in FIG. **22**, an auxiliary device, a power supply, or the like provided in a normal ultrasound diagnostic device may be further provided.

[0104] Since the functions of the main body **10** other than the display controller **140** are the same as in a conventional ultrasound diagnostic device, detailed description about respective components will be omitted. The display controller **140** switches a display mode between a state where the sub display **40** is connected to the main body **10** and a state where the sub display **40** is detached from the main body **10**. Detailed operation thereof will be described later.

[0105] In order to realize a limited ultrasound examination function, the sub display **40** includes a probe connector or an ultrasound transmission/reception circuit **410**, a display controller **420**, and a wireless transceiver **430**. In addition, although not shown, the sub display **40** may further include a controller and a memory. The limited ultrasound examination function refers to a function for performing limited examination with respect to a limited portion necessary for a round visit in a hospital, or the like, and may be provided in the controller or the memory provided in the sub display **40** as a package. Alternatively, the sub display **40** may be connected to the main body **10** to read the necessary function from the main controller **180** or the memory **160** in the main body **10**. A mechanism of a connection unit that connects the sub display **40** to the main body **10** may employ the mechanism described in the first to third embodiments.

[0106] The ultrasound diagnostic device **100** having such a configuration may be operated in an operating mode (dual-display mode) where the sub display **40** is connected to the main body **10** and an operating mode (mono-display mode) where the sub display **40** is not connected to the main body **10**. Further, the ultrasound diagnostic device **100** may be operated in an operating mode (image reading mode) where the sub display **40** that is not connected to the main body **10** is operated as a simple ultrasound diagnostic device **400** and performs transmission or reception with the main body **10** in a wireless manner, and an ultrasound image obtained by the simple ultrasound diagnostic device **400** is displayed on the main display **30** of the ultrasound diagnostic device **100**.

[0107] An example of an operation in the ultrasound diagnostic device **100** is shown in FIG. **23**.

[0108] If the ultrasound diagnostic device **100** starts its operation as power is supplied thereto, first, it is determined whether the sub display **40** is electrically connected (S**1000**). When the sub display **40** is connected, the ultrasound diagnostic device **100** is operated in the dual-display mode where both of the main display **30** that is already connected and the sub display **40** are used as displays (S**1001**). In this mode, a region for display content of the main display **30** and a region for display content of the sub display **40** are appropriately divided (S**1002**), and then, examination is started (S**1003**). The region division is arbitrary, but for example, when the ultrasound diagnostic device having the structure shown in FIG. **1** is used, the sub display **40** that is close to the operation panel **20** may be used as a display for a GUI or the like, and the main display **30** having a large screen may be used as a display for an ultrasound image. Further, images for different sections or images obtained at different times may be displayed on the two display panels, so that an examiner may compare the images. FIG. **24** shows a display example of the display surface **41** of the sub display **40**. In FIG. **24**, an upper diagram shows a state where an image is displayed, and a lower diagram shows a state where a UI is displayed.

[0109] When the sub display **40** is not connected to the ultrasound diagnostic device **100** or when the sub display **40** is detached from the main body from the dual mode state (NO in S**1000**), it is determined whether the sub display **40** is supplied with power to be operable (S**1004**), and when the sub display **40** is in the operable state, it is determined whether the operating mode of the sub display **40** is an examination mode or a display mode (S**1005**).

[0110] When the operating mode of the sub display **40** is the examination mode, an echo signal received by the ultrasound transmission/reception circuit **410** of the display panel through the ultrasound probe **80** connected to the sub display **40** is transmitted to the ultrasound diagnostic device **100** by the wireless transceivers **430** and **170**. The ultrasound diagnostic device **100** processes the signal in the same way as in a signal received by the ultrasound transceiver **120**, and displays the result on the main display **30** by the DSC **130**. That is, the ultrasound diagnostic device **100** is operated in the image reading mode where an ultrasound image received by the sub display **40** that functions as the simple ultrasound diagnostic device **400** is displayed on the main display **30** (S**1006**).

[0111] When the sub display **40** is operated in the display mode (NO in S**1005**), the sub display **40** may be used as an auxiliary display device in the dual-display mode (S**1001**), or may be used as a touch panel that displays an ultrasound image or receives an input of an examiner.

[0112] When power is not supplied to the sub display **40** (NO in S**1004**), the ultrasound diagnostic device **100** may be operated, in a similar way to a conventional mono-display device (S**1007**).

[0113] According to the ultrasound diagnostic device of this embodiment, it is possible to variously use the sub display **40** according to the mounted or detached state of the sub display **40** which is detachably mounted to the ultrasound diagnostic device **100**, and to realize various display modes.

[0114] The operation shown in FIG. **23** is an example of an operation of the ultrasound diagnostic device of this embodiment, and the invention is not limited to the shown flow, and modifications may be made. For example, it is preferable that the sub display **40** has a simple examination function in addition to the function of the display panel, but this configuration is not essential, and the sub display **40** may be used as a device only for display. In this case, steps **S1005** and **S1006** in FIG. **23** are not necessary.

INDUSTRIAL APPLICABILITY

[0115] According to the invention, it is possible to greatly increase the degree of freedom in examination and the degree of freedom in image display, in ultrasound diagnosis.

REFERENCE SIGNS LIST

[0116] **10** main body
[0117] **20** operation panel
[0118] **25** display connection unit
[0119] **30** main display (first display)
[0120] **40** sub display (second display)
[0121] **50** probe housing
[0122] **60** supporter (connecting mechanism)
[0123] **63** link part (expansion/contraction mechanism)
[0124] **65** rotating part
[0125] **67** shaft supporter
[0126] **68** second link part (rotating part)
[0127] **69** shaft member
[0128] **70** operation panel support mechanism
[0129] **80** probe
[0130] **100** ultrasound diagnostic device
[0131] **110** probe connector
[0132] **120** ultrasound transmission/reception circuit
[0133] **140** display controller
[0134] **150** operating device
[0135] **170** wireless transceiver
[0136] **400** simple ultrasound diagnostic device
[0137] **420** display controller
[0138] **430** wireless transceiver

1. An ultrasound diagnostic device comprising:
a main body that includes an operation panel;
a first display that is connected to the main body through a supporter; and
a second display that is detachably connected to the main body,
wherein the second display includes a transmission/reception circuit that performs transmission or reception with the main body.

2. The ultrasound diagnostic device according to claim **1**,
wherein the main body includes a display connection unit that is detachably connected to the second display, and the first display and the second display include an end portion that is engaged with the display connection unit.

3. The ultrasound diagnostic device according to claim **1**,
wherein the supporter includes a connection mechanism that moves the first display between a first position where the first display is disposed on a rear side of the second display connected to the main body and a second position where the first display is disposed on an upper or front side of the second display.

4. The ultrasound diagnostic device according to claim **3**,
wherein the connection mechanism includes an expansion/contraction mechanism part that is fixed to the main body at one end thereof and a rotating part that is connected between the other end of the expansion/contraction mechanism part and the first display, and the rotating part is rotatably connected to each of the expansion/contraction mechanism part and the first display.

5. The ultrasound diagnostic device according to claim **4**, further comprising:
a pivot part between the expansion/contraction mechanism part and the rotation part and/or between the rotation part and the first display.

6. The ultrasound diagnostic device according to claim **4**,
wherein the expansion/contraction mechanism part includes a link mechanism.

7. The ultrasound diagnostic device according to claim **1**,
wherein the second display is a tablet-type display panel including a wireless transmission/reception circuit.

8. The ultrasound diagnostic device according to claim **2**,
wherein the display connection unit is provided to be rotatable with respect to the operation panel fixed to the main body.

9. The ultrasound diagnostic device according to claim **2**,
wherein the display connection unit is provided to be slidable with respect to the operation panel fixed to the main body.

10. The ultrasound diagnostic device according to claim **1**, further comprising:
a controller that operates the ultrasound diagnostic device in any one mode among a dual-display mode where the first display and the second display connected to the main body function together as display panels and a mono-display mode where display content of the second display detached from the main body is displayed on the first display.

11. An ultrasound diagnostic device comprising:
a main body that includes an operation panel;
a first display that is connected to the main body through a supporter; and
a second display that is detachably connected to the main body,
wherein the supporter includes a connection mechanism that moves the first display between a first position where the first display is disposed on a rear side of the second display connected to the main body and a second position where the first display is disposed on an upper or front side of the second display.

* * * * *

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摘要(译)

本发明提供一种小型超声波诊断装置，其在观察位置和显示面板的视角方面具有高自由度，并且具有优异的可操作性。超声波诊断装置包括主体（ 10 ），其包括操作面板（ 20 ）;第一个显示器（ 30 ）通过支架连接到主体（ 60 ）;第二显示器（ 40 ）可拆卸地连接到主体。第二显示器（ 40 ）包括与主体进行发送或接收的发送/接收电路（ 10 ）。分离子显示器 40 时，主体一侧的连接单元（ 25 ），子显示器 40 是连接，用作主显示器的连接单元 30。