US 20110208050A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0208050 A1

(43) Pub. Date: Aug. 25, 2011

KIM

(54) ULTRASONIC DIAGNOSTIC APPARATUS

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(21) Appl. No.: **12/971,728**

(22) Filed: **Dec. 17, 2010**

(30) **Foreign Application Priority Data**

Feb. 24, 2010 (KR) 10-2010-0016820

Publication Classification

(51) **Int. Cl.**
A61B 8/00 (2006.01)

(52) **U.S. Cl.** **600/437**

(57) **ABSTRACT**

An ultrasonic diagnostic apparatus is disclosed. The ultrasonic diagnostic apparatus includes a display unit displaying an ultrasound image, and an object checking unit checking a state or probing portion of an object.

According to the ultrasonic diagnostic apparatus, the display unit for displaying an ultrasound image and the object checking unit for checking a state or probing portion of an object are located in the same direction, so that an examiner views the ultrasound image and the state of the object without alternately turning the head to view the monitor and the object.

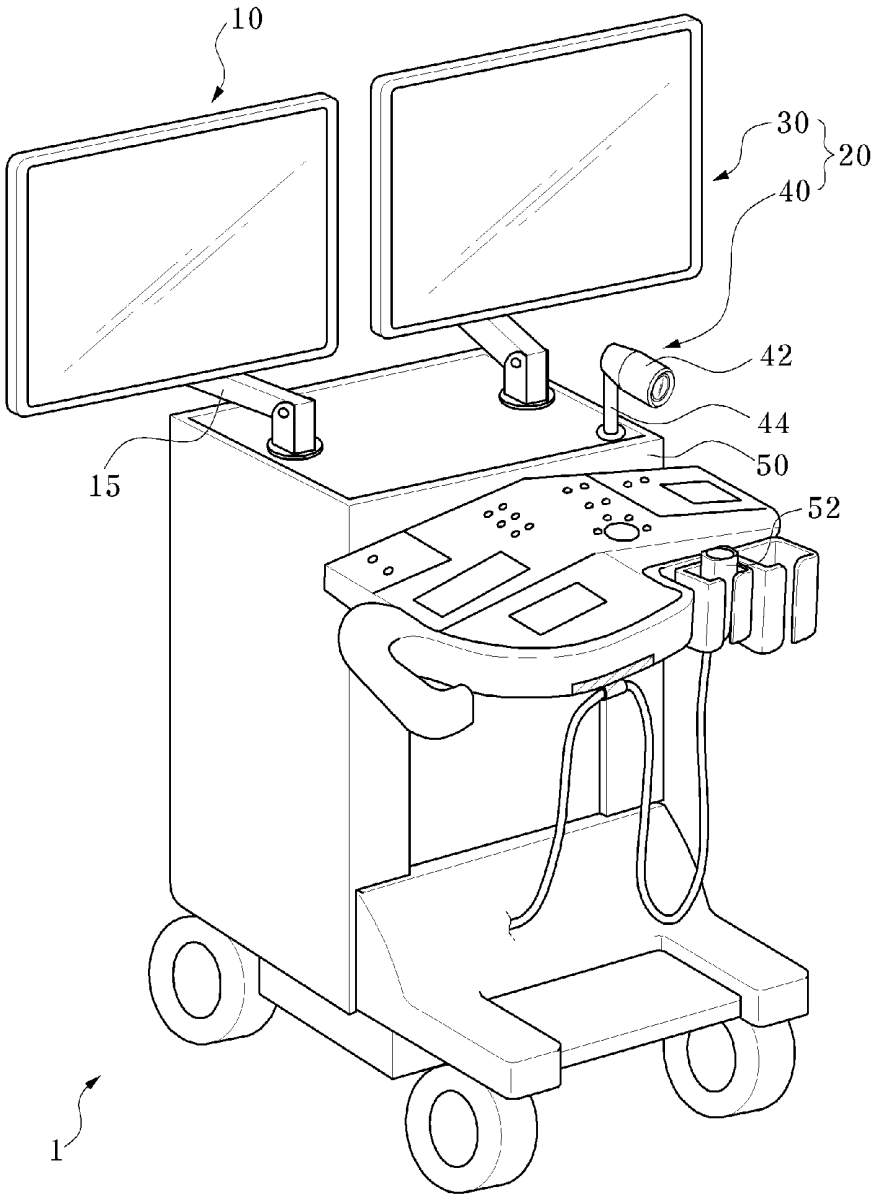


Fig. 1

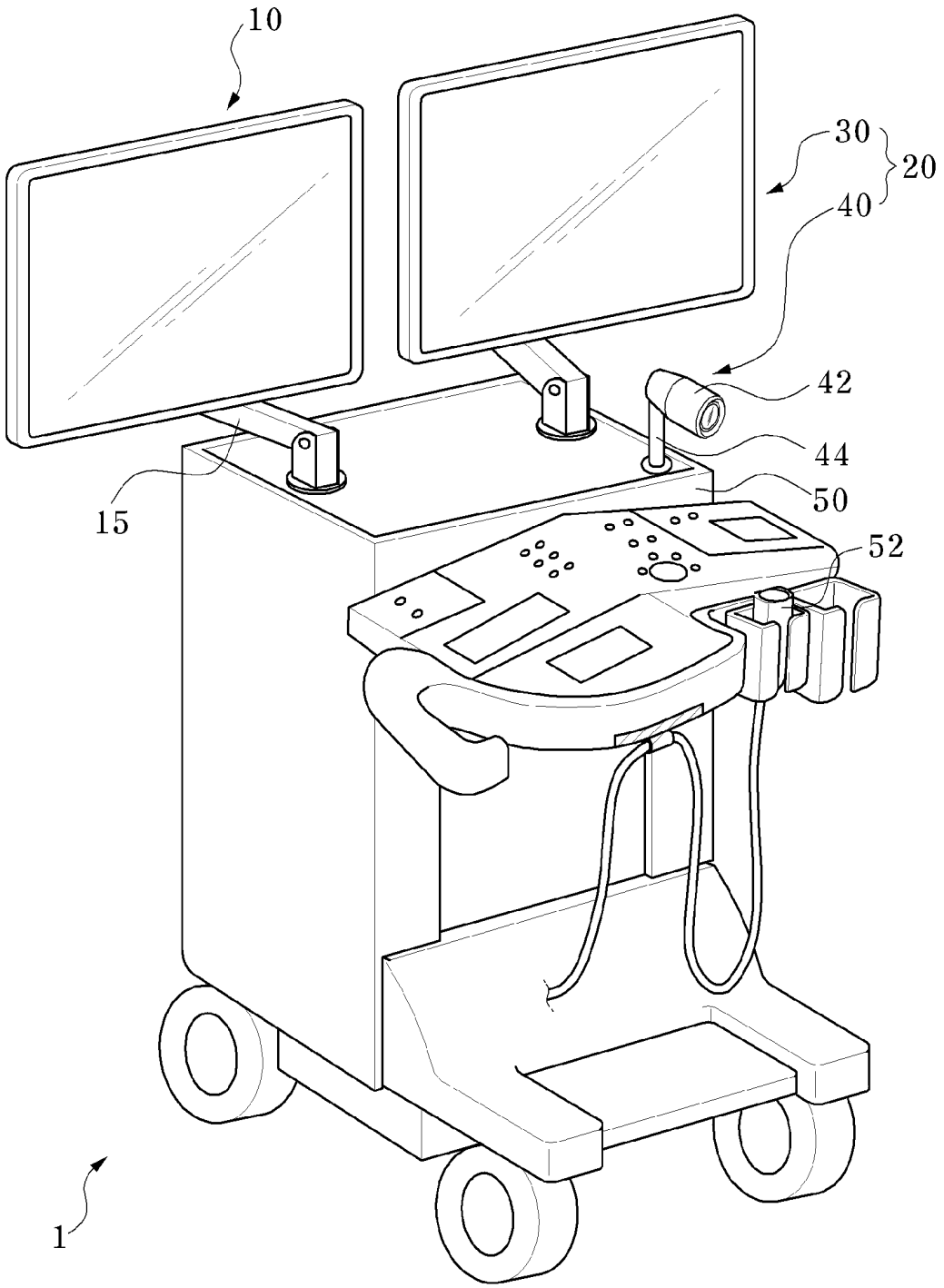


Fig. 2

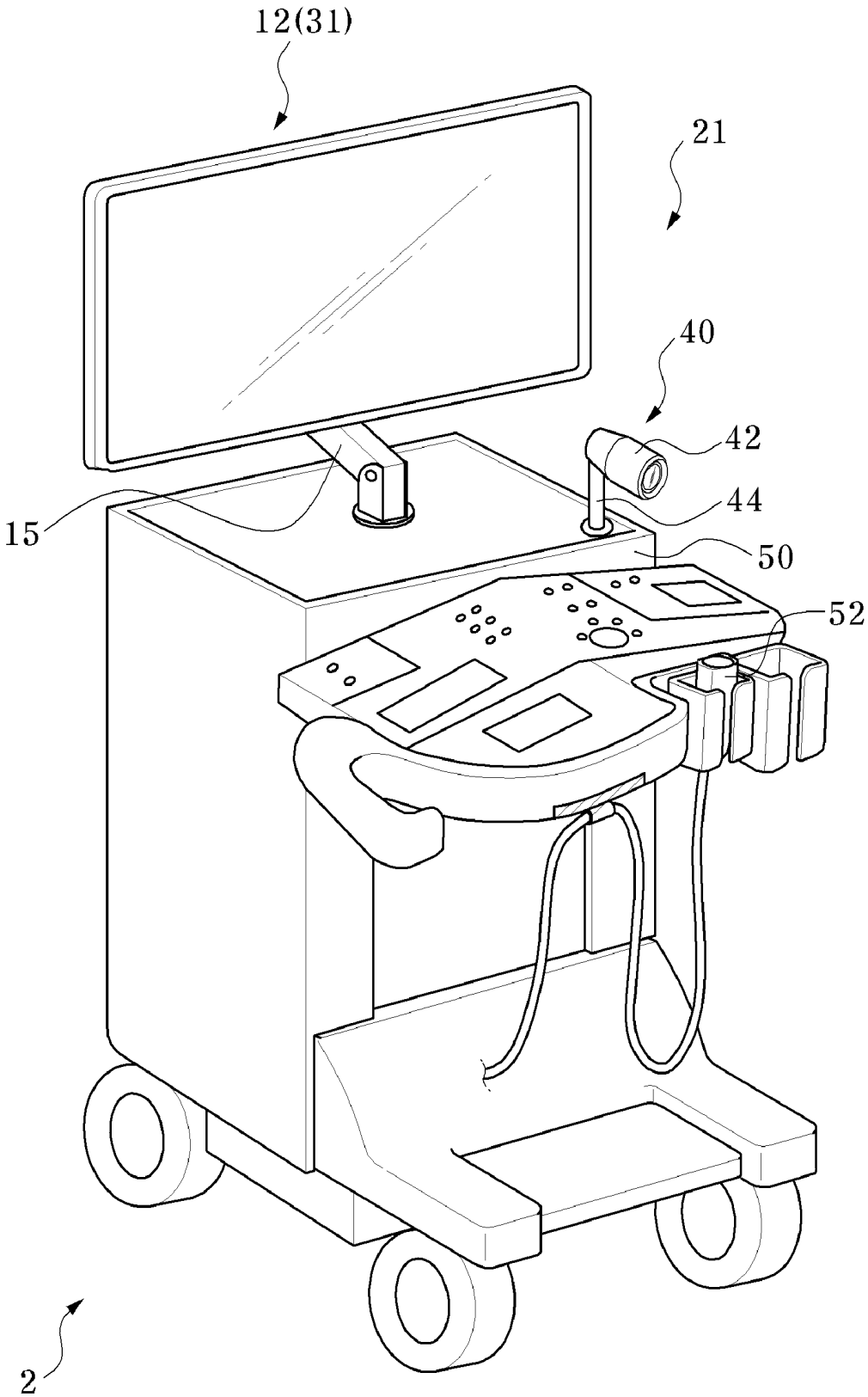
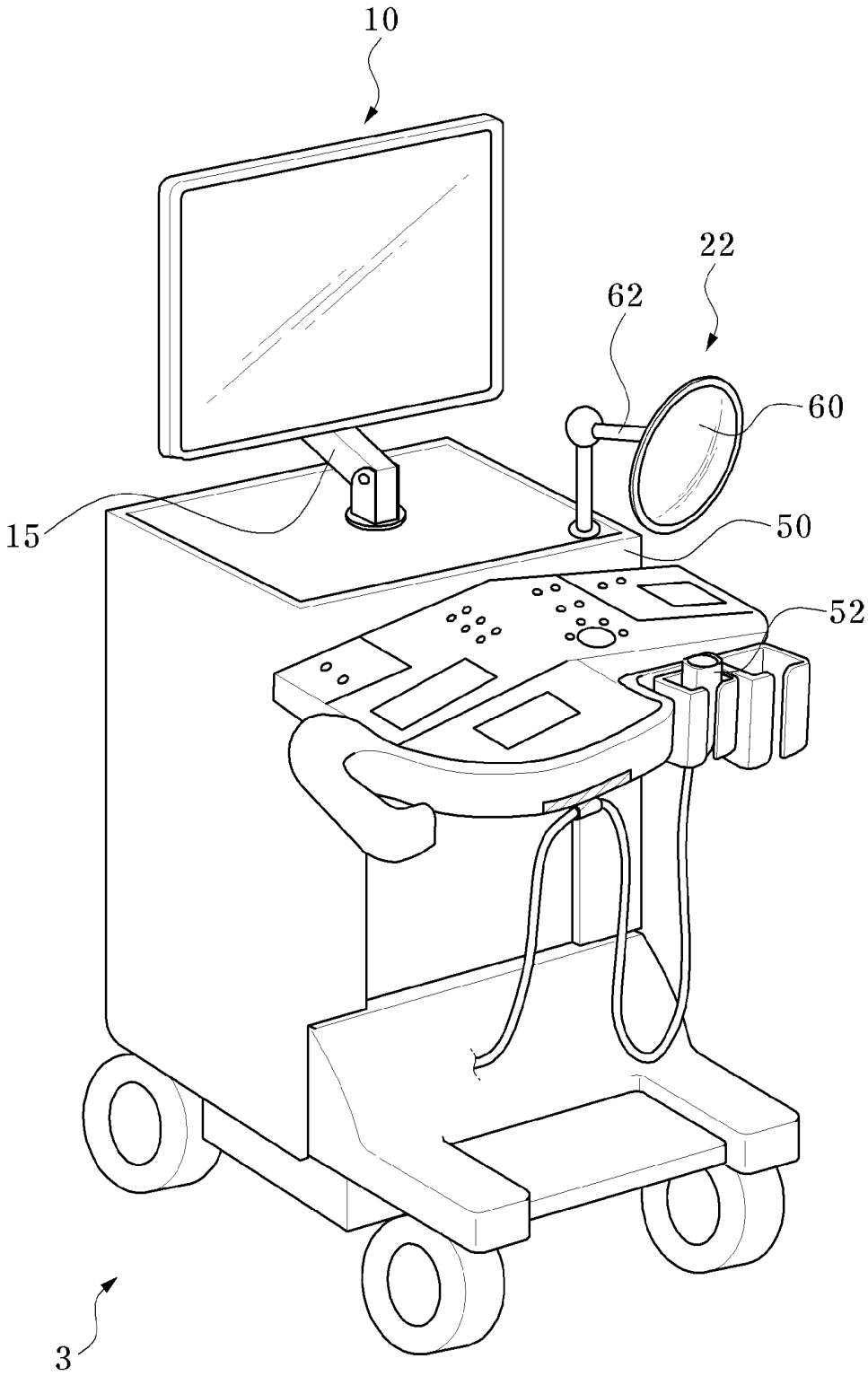


Fig. 3



ULTRASONIC DIAGNOSTIC APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an ultrasonic diagnostic apparatus and, more particularly, to an ultrasonic diagnostic apparatus that may monitor an ultrasound image of an object and a state or probing portion of the object in one direction.

[0003] 2. Description of the Related Art

[0004] Generally, an ultrasonic diagnostic apparatus refers to a non-invasive apparatus that irradiates an ultrasound signal from a surface of a patient body towards a target internal organ beneath the body surface and obtains an image of a monolayer or blood flow in soft tissue from information in the reflected ultrasound signal (ultrasound echo-signal).

[0005] The ultrasonic diagnostic apparatus has been widely used for diagnosis of the heart, the abdomen, the urinary organs, and in obstetrics and gynecology due to various merits such as small size, low price, real-time image display, and high stability through elimination of radiation exposure, as compared with other image diagnostic apparatus, such as X-ray diagnostic apparatus, computerized tomography scanners (CT scanners), magnetic resonance imagers (MRIs), nuclear medicine diagnostic apparatuses, and the like.

[0006] The ultrasonic diagnostic apparatus includes a probe that transmits an ultrasound signal to an object and receives the ultrasound echo-signal reflected therefrom to obtain an ultrasound image of the object.

[0007] The signal received by the probe is output to a monitor of the apparatus through a controller and an operator examines the object while alternately viewing the monitor and the object.

[0008] Here, it should be noted that the above description is provided for understanding of the background of the invention and is not a description of a well-known conventional technique in the art to which the present invention pertains.

[0009] As such, since the examiner examines the object while alternately viewing the monitor and the object on which the probe is positioned, the examiner is likely to become tired and suffers low operation efficiency. Therefore, there is a need for an improved ultrasonic diagnostic apparatus that overcomes such a problem.

SUMMARY OF THE INVENTION

[0010] The present invention is conceived to solve the problem of the related art, and an aspect of the invention is to provide an ultrasonic diagnostic apparatus that allows an examiner to view an ultrasound image and a state of an object without alternately turning the head to view a monitor and the object.

[0011] In accordance with an aspect of the invention, an ultrasonic diagnostic apparatus includes: a display unit displaying an ultrasound image; and an object checking unit checking a state or probing portion of an object.

[0012] The object checking unit may include a photographing unit capturing an image of the object and an object display unit displaying the image of the object captured by the photographing unit.

[0013] The object display unit may be separated from the display unit.

[0014] The object display unit may be located at a lateral side of the display unit.

[0015] The object display unit may be the display unit.

[0016] The object checking unit may include a mirror at a lateral side of the display unit.

[0017] The mirror may include a convex mirror.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The above and other aspects, features and advantages of the invention will become apparent from the following description of embodiments given in conjunction with the accompanying drawings, in which:

[0019] FIG. **1** is a schematic perspective view of an ultrasonic diagnostic apparatus according to one embodiment of the present invention;

[0020] FIG. **2** is a schematic perspective view of an ultrasonic diagnostic apparatus according to another embodiment of the present invention; and

[0021] FIG. **3** is a schematic perspective view of an ultrasonic diagnostic apparatus according to a further embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENT

[0022] Exemplary embodiments of the invention will now be described in detail with reference to the accompanying drawings. For convenience of description, an ultrasonic diagnostic apparatus including a probe will be described herein. It should be noted that the drawings are not to precise scale and may be exaggerated in thickness of lines or size of components for descriptive convenience and clarity only. Furthermore, terms used herein are defined by taking functions of the invention into account and can be changed according to the custom or intention of users or operators. Therefore, definition of the terms should be made according to overall disclosures set forth herein.

[0023] FIG. **1** is a schematic perspective view of an ultrasonic diagnostic apparatus according to one embodiment of the present invention.

[0024] Referring to FIG. **1**, the ultrasonic diagnostic apparatus **1** according to the embodiment includes a display unit **10** that displays an ultrasound image, and an object checking unit **20** that checks a state or probing portion of the object.

[0025] As for the display unit **10**, any kind of imaging apparatus such as a CRT (cathode ray tube) imaging apparatus or an LCD (liquid crystal display) imaging apparatus may be used so long as the imaging apparatus can display an ultrasound image.

[0026] The display unit **10** is supported by a support member **15** and may be rotated or moved to a desired location, as needed.

[0027] The object checking unit **20** for checking a state or probing portion of the object includes a photographing unit **40** that captures an image of the object, and an object display unit **30** that displays the image of the object captured by the photographing unit **40**.

[0028] As for the photographing unit **40**, any kind of imaging apparatus may be used so long as the imaging apparatus can capture an image of an object. In one embodiment, the photographing unit **40** includes a body member **42** that receives an image from an outside, and a connector **44** that connects the body member **42** to a main body **50** of the diagnostic apparatus.

[0029] The photographing unit **40** may be automatically or manually moved according to movement of an object or probing portion of the object.

[0030] When the photographing unit **40** is configured to move automatically, a probe **52** is provided with a signal transmitter for position recognition, the main body **50** is provided with a signal receiver for receiving a signal sent from the signal transmitter, and the photographing unit **40** is rotated towards the probe **52**.

[0031] Alternatively, the photographing unit **40** may be rotated by operating a separate remote controller or an operation button to photograph a state or probing portion of an object. Obviously, other various modifications of the photographing unit may also be embodied.

[0032] When the photographing unit **40** is configured to be moved manually, a position of the photographing unit **40** is adjusted by directly rotating the body member **42** or the connector **44** by an operator to confirm the state or probing portion of the object.

[0033] As for the object display unit **30**, any kind of imaging apparatus such as a CRT imaging apparatus or an LCD imaging apparatus may be used so long as the imaging apparatus can output an image captured by the photographing unit **40**.

[0034] The object display unit **30** is also supported by the support member **15** and may be rotated or moved to a desired location, as needed.

[0035] The object display unit **30** is separated from the display unit **10**. The object display unit **30** may be located at a lateral side of the display unit **10**, so that the state or probing portion of the object and an ultrasound image of the object may be confirmed at the same time in one direction by an operator.

[0036] The display unit **10** and the object display unit **30** may be provided to the main body **50** of the diagnostic apparatus **50**, to which the probe **52** is connected to send a scanned image to the main body **50**.

[0037] Next, operation of the ultrasonic diagnostic apparatus according to the embodiment will be described with reference to the drawings.

[0038] An ultrasound image of an object scanned by the probe **52** is output on the display unit **10** and an image of a state or probing portion of the object captured by the photographing unit **40** is output on the object display unit **30**.

[0039] Since the display unit **10** and the object display unit **30** are parallel to each other while being separated from each other, an examiner may perform examination of the object on the display unit **10** and object display unit **30** without separately viewing the object, so that operation efficiency is improved.

[0040] In the ultrasonic diagnostic apparatus **1** of the embodiment described above, the display unit **10** for outputting an ultrasound image of an object and the object display unit **20** for checking a state or probing portion of the object are disposed in the same direction to allow an examiner to check the ultrasound image and the state of the object at the same time without turning the head, so that the examiner experiences less fatigue and can perform examination of the object with high operation efficiency.

[0041] Next, an ultrasonic diagnostic apparatus according to another embodiment will be described.

[0042] For convenience of description, the same elements as those of the above embodiment will be indicated by the same reference numerals and a detailed description thereof will be omitted herein.

[0043] FIG. **2** is a schematic perspective view of an ultrasonic diagnostic apparatus according to another embodiment of the present invention.

[0044] Referring to FIG. **2**, an ultrasonic diagnostic apparatus **2** of this embodiment includes a display unit **12** and an object checking unit **31**, which are integrally formed with each other.

[0045] In this embodiment, the display unit **12** has a multi-divisional screen and allows an ultrasound image of an object sent from a probe **52** and an image relating to a state or probing portion of the object sent from a photographing unit **40** to be displayed on divided screens of the display unit **12**.

[0046] In this embodiment, the display unit **12** uses a wide screen, which permits easy division of the screen.

[0047] Next, an ultrasonic diagnostic apparatus according to a further embodiment will be described.

[0048] For convenience of description, the same elements as those of the above embodiments will be indicated by the same reference numerals and a detailed description thereof will be omitted herein.

[0049] FIG. **3** is a schematic perspective view of an ultrasonic diagnostic apparatus according to a further embodiment of the present invention.

[0050] Referring to FIG. **3**, an ultrasonic diagnostic apparatus **3** of this embodiment includes an object checking unit **22**, which includes a mirror **60** at a lateral side of the display unit **10**.

[0051] The mirror **60** is supported by a mirror support **62** and is connected to the main body **50** of the diagnostic apparatus. The mirror **60** is manually or automatically rotatable.

[0052] A configuration of allowing automatic rotation of the object checking unit **22** is apparent to those skilled in the art, and a detailed description thereof will be omitted herein.

[0053] As for the mirror **60**, any kind of mirror may be used so long as it can be used to check a state or probing portion of an object. In another embodiment, the object checking unit **22** includes a convex mirror to secure a wide viewing angle.

[0054] As such, in the ultrasonic diagnostic apparatus according to the embodiments, a display unit for displaying an ultrasound image and an object checking unit for checking a state or probing portion of an object are located in the same direction, so that an examiner views the ultrasound image and the state of the object without alternately turning the head to view the monitor and the object. Thus, the ultrasonic diagnostic apparatus of the embodiments may improve operation efficiency of the examiner by lowering fatigue of the examiner.

[0055] Although some embodiments have been provided to illustrate the invention in conjunction with the drawings, it will be apparent to those skilled in the art that the embodiments are given by way of illustration only, and that various modifications and equivalent embodiments can be made without departing from the spirit and scope of the invention.

[0056] Further, although the ultrasonic diagnostic apparatus using the probe is provided in description of the embodiments, it is obvious that it is given by way of illustration only and the present invention may also be applied to various kinds of diagnostic apparatus.

[0057] Therefore, the scope of the invention should be limited only by the accompanying claims and equivalents thereof.

What is claimed is:

1. An ultrasonic diagnostic apparatus comprising:

a display unit displaying an ultrasound image; and

an object checking unit checking a state or probing portion of an object.

2. The ultrasonic diagnostic apparatus of claim **1**, wherein the object checking unit comprises:

a photographing unit capturing an image of the object; and

an object display unit displaying the image of the object captured by the photographing unit.

3. The ultrasonic diagnostic apparatus of claim **2**, wherein the object display unit is separated from the display unit.

4. The ultrasonic diagnostic apparatus of claim **3**, wherein the object display unit is located at a lateral side of the display unit.

5. The ultrasonic diagnostic apparatus of claim **2**, wherein the object display unit is the display unit.

6. The ultrasonic diagnostic apparatus of claim **1**, wherein the object checking unit comprises a mirror at a lateral side of the display unit.

7. The ultrasonic diagnostic apparatus of claim **6**, wherein the mirror is a convex mirror.

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专利名称(译)	超声诊断设备		
公开(公告)号	US20110208050A1	公开(公告)日	2011-08-25
申请号	US12/971728	申请日	2010-12-17
申请(专利权)人(译)	MEDISON CO.，LTD.		
当前申请(专利权)人(译)	三星MEDISON CO.，LTD.		
[标]发明人	KIM SUK WON		
发明人	KIM, SUK WON		
IPC分类号	A61B8/00		
CPC分类号	A61B8/00 A61B8/462 A61B8/4405 A61B8/42 A61B5/0079		
优先权	1020100016820 2010-02-24 KR		
外部链接	Espacenet USPTO		

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