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(54) **Ultrasonic diagnostic apparatus**

Ultraschalldiagnosevorrichtung

Appareil de diagnostic ultrasonique

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Description

BACKGROUND

1. Field

[0001] Embodiments of the present invention relate to an ultrasonic diagnostic apparatus having a probe which transmits ultrasonic waves to an object to be diagnosed and receives the ultrasonic waves reflected from the object.

2. Description of the Related Art

[0002] In general, ultrasonic diagnostic apparatuses radiate ultrasonic waves from a body surface of an object to be diagnosed to a region to be diagnosed in the body and obtain a tomography image of soft tissue or a blood flow image through the ultrasonic waves reflected from the region.

[0003] The ultrasonic diagnostic apparatuses include a body, a probe configured to transmit ultrasonic waves to an object and receive the ultrasonic waves reflected from the object, a display unit disposed at an upper portion of the body to display a diagnostic result obtained through the received ultrasonic waves using an image, and a control panel disposed in the front of the display unit to allow a user to operate the ultrasonic diagnostic apparatus.

[0004] Among the above-mentioned construction elements, the probe includes a transducer configured to transmit and receive the ultrasonic waves. Recently, there are ultrasonic diagnostic apparatuses in which the transducer is rotated to obtain a three-dimensional image.

The EP 2 298 175 A1 discloses a three-dimensional probe apparatus. The probe apparatus includes a drive unit generating power in a forward or rearward direction, a power transmission unit transmitting the power in association with the drive unit, a transducer receiving the power from the power transmission unit to move towards a plurality of locations for operation, and a location detector detecting a moving location of the transducer to allow the transducer to move towards the plurality of locations for operation. The transducer may move towards a plurality of locations for operation and the location detector may detect a moving location of the transducer to define the location of the transducer so as to differently control the operation of the transducer in accordance with the moving location of the transducer, so that the probe apparatus can perform the probing operation in a plurality of directions at one position without changing the probing direction.

The DE 835 239 relates to the sealing between two bodies which execute a displacement movement relative to one another.

An ultrasonic probe disclosed in the EP 1 576 926 A1 includes an inserting portion to be inserted into a body cavity and a grip portion held by an operator outside of the body cavity. The inserting portion includes a transducer unit, a rotation axis provided in the transducer unit, and a swing meachanism for swinging the transducer unit around the rotation axis as a center, and the grip portion includes a motor for generating a driving force for driving the swing mechansim. The swing mechanism includes a shaft connected to the motor, a first pulley attached coaxially to the shaft, a second pulley attached coaxially to the rotation axis of the transducer unit, and a wire connecting the first pulley and the second pulley.

SUMMARY

[0005] Therefore, it is an object of the present invention to provide an ultrasonic diagnostic apparatus which may easily rotate a transducer of a probe. The above object is achieved by the probe according to claim 1. Additional aspects of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0006] In accordance with the present invention, a probe according to claim 1 including a transducer configured to transmit and receive ultrasonic waves and installed to be rotatable, a driving device configured to rotate the transducer, at least one wire configured to transmit power of the driving device to the transducer, a handle case configured to accommodate the driving device therein, a cap coupled to the handle case to accommodate the transducer therein, and filled with oil, and a diaphragm formed of a deformable material and disposed between the cap and the handle case, wherein the wire is installed to pass through the diaphragm, and fixed to the diaphragm so that the diaphragm is deformed according to movement of the wire.

[0007] The diaphragm may be formed of a stretchable material which is elastically deformed.

[0008] The probe may further include a partition member disposed between the cap and the handle case to partition an internal space of the cap and an internal space of the handle case, and the partition member may include a through-hole in which the diaphragm is installed.

[0009] The probe further includes a shaft connected to a rotational center of the transducer, and the wire includes a first wire connected to one side of the shaft so that the shaft is rotated in a first direction, and a second wire connected to the other side of the shaft so that the shaft is rotated in a second direction.

[0010] The diaphragm includes a first deforming portion through which the first wire passes to be fixedly installed therein and which is deformed according to movement of the first wire, and a second deforming portion through which the second wire passes to be fixedly installed therein and which is deformed according to movement of the second wire.

[0011] The probe may further include a first sealing

member through which the first wire passes to be fixedly installed therein, installed to pass through the first deforming portion, and configured to seal between the first deforming portion and the first wire, and a second sealing member through which the second wire passes to be fixedly installed therein, installed to pass through the second deforming portion, and configured to seal between the second deforming portion and the second wire.

[0012] Each of the first deforming portion and the second deforming portion may have a bellows shape.

[0013] The driving device may include a driving motor configured to generate a rotational force, a transfer screw configured to be rotated by the driving motor, and a moving member configured to be moved in an axial direction of the transfer screw according to rotation of the transfer screw, and the first wire and the second wire may be connected to the moving member so that the first wire and the second wire are moved according to movement of the moving member.

[0014] The driving device may include a changing pulley configured to change an extending direction of the second wire, the first wire may have one end which is connected to one side of the moving member, and the other end which is connected to one side of the shaft, and the second wire may have one end which is connected to the other side of the moving member, and the other end which is connected to the other side of the shaft, and the second wire may have a middle portion which is wound on the changing pulley so that a moving direction of the second wire is changed.

[0015] In accordance with another aspect of the present invention, an ultrasonic diagnostic apparatus includes a probe including a transducer installed to be rotatable, a driving device configured to rotate the transducer, a handle case configured to accommodate the driving device therein, a cap coupled to the handle case to accommodate the transducer therein, and filled with oil, and a diaphragm formed of a deformable material so that a volume of the diaphragm is changed, and disposed in the cap.

[0016] The diaphragm may be formed in one of a rectangular parallelepiped, a cylinder, a hemisphere and a triangular pyramid that are hollow.

[0017] The diaphragm may include at least one crease.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] These and/or other aspects of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a front view of an ultrasonic diagnostic apparatus according to one embodiment of the present invention;

FIG. 2 is a perspective view illustrating an internal configuration of a probe applied to the ultrasonic diagnostic apparatus according to one embodiment of the present invention;

FIG. 3 is an exploded perspective view illustrating the internal configuration of the probe applied to the ultrasonic diagnostic apparatus according to one embodiment of the present invention;

FIG. 4 is an exploded perspective view illustrating a driving device of the probe applied to the ultrasonic diagnostic apparatus according to one embodiment of the present invention;

FIG. 5 is a schematic view illustrating an operation of the probe applied to the ultrasonic diagnostic apparatus according to one embodiment of the present invention; and

FIGS. 6 to 15 are perspective views respectively illustrating a diaphragm applied to the probe according to another embodiments of the present invention.

DETAILED DESCRIPTION

[0019] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0020] Hereinafter, an ultrasonic diagnostic apparatus according to an embodiment of the present invention will be described in detail with reference to the drawings.

[0021] As illustrated in FIG. 1, an ultrasonic diagnostic apparatus according to an embodiment of the present invention includes a body 10, a probe 20 configured to transmit ultrasonic waves to an object to be diagnosed and receive the ultrasonic waves reflected from the object, a display unit 30 disposed at an upper portion of the body 10 to display a diagnostic result obtained through the received ultrasonic waves using an image, and a control panel 40 configured to allow a user to operate the ultrasonic diagnostic apparatus.

[0022] As illustrated in FIGS. 2 and 3, the probe 20 includes a transducer 21 installed to be rotatable, a driving device 22 configured to generate power to rotate the transducer 21, a handle case 23 configured to accommodate the driving device 22 therein and to allow the user to grasp the handle case 23 and use the probe 20, and a cap 24 configured to accommodate the transducer 21 therein and disposed at a distal end of the handle case 23 to be in contact with the object to be diagnosed.

[0023] The transducer 21 includes an ultrasonic vibrator configured to transmit and receive the ultrasonic waves and, as described above, may be rotatably installed in the cap 24 to read a three-dimensional image of the object to be diagnosed. The transducer 21 includes a shaft 21a configured to form a rotational center thereof, and both ends of the shaft 21a are rotatably installed at two hinge portions 25a of a partition member 25, which

will be described later, to be rotated around the shaft 21a.

[0024] A portion of the cap 24 corresponding to the rotating transducer 21 has an arc shape in section so that an interval between an inner surface of the cap 24 and an outer surface of the transducer 21 can be maintained constantly even when the transducer 21 installed in the cap 24 rotates.

[0025] An inner space of the cap 24 is filled with oil serving as a medium for transmitting the ultrasonic waves generated from the transducer 21, and the partition member 25 configured to partition the inner space of the cap 24 and an inner space of the handle case 23 is disposed between the cap 24 and the handle case 23, such that the space filled with the oil is defined by the cap 24 and the partition member 25.

[0026] As described above, the partition member 25 is installed at the distal end of the handle case 23, and the driving device 22 is fixed in the handel case 23.

[0027] As illustrated in FIGS. 4 and 5, the driving device 22 includes a driving motor 221 configured to generate a rotational force, a driving pulley 222 configured to be rotated by the driving motor 221, a driven pulley 223 configured to receive power from the driving pulley 222 through a timing belt 224, a transfer screw 225 connected to the driven pulley 223 to be rotated together with the driven pulley 223, a moving member 226 configured to be moved according to movement of the transfer screw 225, a pair of guide rods 227 configured to guide movement of the moving member 226, and wires 228A and 228B configured to connect the moving member 226 and the transducer 21 so that the transducer 21 is rotated according to the movement of the moving member 226.

[0028] The moving member 226 includes a coupling hole 226a through which the transfer screw 225 passes to be coupled therein, and a pair of guide grooves 226b provided at both sides thereof and installed at the guide rods 227 so that the movement of the moving member 226 is guided by the guide rods 227. Therefore, the moving member 226 is moved in one direction or an opposite direction according to a rotational direction of the transfer screw 225.

[0029] The wires 228A are 228B are configured to pass through the partition member 25 and to be connected to the shaft 21a of the transducer 21 to rotate the transducer 21, and the partition member 25 has a through-hole 25b through which the wires 228A and 228B passes through to be installed therein.

[0030] The wires 228A and 228B include a first wire 228A of which one end is connected to one side of the moving member 226 and the other end is connected to one side of the shaft 21a so that the shaft 21a is rotated in a first direction, and a second wire 228B of which one end is connected to the other side of the moving member 226 and the other end is connected to the other side of the shaft 21a so that the shaft 21a is rotated in a second direction opposite to the first direction.

[0031] Further, the driving device 22 includes a changing pulley 229 which changes a moving direction of the second wire 228B in an opposite direction so that the second wire 228B is moved in a direction opposite to that of the first wire 228A and applies a force to the shaft 21a. Therefore, the second wire 228B has a middle portion which is wound on the changing pulley 229 so that the moving direction thereof is changed reversely.

[0032] The partition member 25 includes the pair of hinge portions 25a to which the both ends of the shaft 21a are rotatably installed, and the through-hole 25b through which the wires 228A and 228B pass to be installed therein. A diaphragm 26 which is formed of a deformable material, to which the wires 228A and 228B are fixed, and which is deformed according to movement of the wires 228A and 228B is installed at the through-hole 25b.

[0033] The diaphragm 26 is formed of a stretchable material which is elastically deformed like rubber, and includes a first deforming portion 26a through which the first wire 228A passes to be fixedly installed therein and which is deformed according to movement of the first wire 228A, and a second deforming portion 26b through which the second wire 228B passes to be fixedly installed therein and which is deformed according to movement of the second wire 228B. In the embodiment, each of the first and second deforming portions 26a and 26b has a bellows shape to be easily deformed.

[0034] Further, sealing members 27A and 27B are installed between the wires 228A and 228B and the deforming portions 26a and 26b to seal between the wires 228A and 228B and the deforming portions 26a and 26b. The sealing members 27A and 28B include a first sealing member 27A through which the first wire 228A passes through to be fixedly installed therein and which is installed to pass through the first deforming portion 26a and to seal between the first wire 228A and the first deforming portion 26a, and a second sealing member 27B through which the second wire 228B passes through to be fixedly installed therein and which is installed to pass through the second deforming portion 26b and to seal between the second wire 228B and the second deforming portion 26b.

[0035] Therefore, the first wire 228A and the second wire 228B are moved in opposite directions to each other according to the movement of the moving member 226, and the first deforming portion 26a and the second deforming portion 26b are deformed to correspond to the movements of the first and second wires 228A and 228B, and thus the oil filled in the cap 24 is prevent from leaking.

[0036] In the embodiment, the diaphragm 26 is configured so that the deforming portions 26a and 26b are fixed to the wires 228A and 228B and deformed according to the movement of the wires 228A and 228B. However, the present invention is not limited thereto, and the diaphragm may be separately installed from the wires and may correspond to a change of an oil volume in the cap 24 according to a temperature thereof.

[0037] That is, as described above, the diaphragm is formed of the deformable material to be deformable, and

thus a volume of the diaphragm may be changed. Therefore, in the case in which the temperature of the oil in the cap 24 becomes lower than a reference temperature and the oil volume is reduced, the diaphragm is deformed so that the volume thereof is increased to correspond to the reduced oil volume. In the case in which the temperature of the oil in the cap 24 becomes higher than the reference temperature and the oil volume is increased, the diaphragm is deformed so that the volume thereof is reduced to correspond to the increased oil volume. Therefore, an oil pressure in the cap 24 may be maintained constantly.

[0038] Various shapes of the diaphragm performing such operations are illustrated in FIGS. 6 to 15.

[0039] As illustrated in FIGS. 6 to 10, the diaphragms 28a to 28e may have various shapes, such as a rectangular parallelepiped, a cylinder, a hemisphere, a triangular pyramid and another deformed shape thereof that are hollow. And as illustrated in FIGS. 11 to 15, the diaphragms 28f to 28j may have one or more creases to be more easily deformable.

[0040] As described above, since the diaphragm is deformed according to the movement of the wire configured to rotate the transducer, and corresponds to the movement of the wire, the oil in the cap can be prevented from leaking to the handle case.

[0041] Further, as described above, since the diaphragm is deformed to correspond to the change of the oil volume in the cap according to a temperature thereof, the oil pressure in the cap can be maintained constantly.

Claims

1. A probe (20) comprising:

a transducer (21) configured to transmit and receive ultrasonic waves and installed to be rotatable;
a driving device (22) configured to rotate the transducer (21);
a plurality of wires (228A, 228B) configured to transmit power of the driving device (22) to the transducer (21);a handle case (23) configured to accommodate the driving device (22) therein;
a cap (24) coupled to the handle case (23) to accommodate the transducer (21) therein, and filled with oil; and
a diaphragm (26) formed of a deformable material and disposed between the cap (24) and the handle case (23),
wherein the diaphragm (26) is fixedly installed by allowing the plurality of wires (228A, 228B) to pass there through;
characterized by
a shaft (21a) connected to a rotational center of the transducer (21), wherein the plurality of wires include a first wire (228A) connected to one side of the shaft (21a) so that the shaft (21a) is configured to rotate in a first direction and a second wire (228B) connected to the other side of the shaft (21a) so that the shaft (21a) is configured to rotate in a second direction;
the plurality of wires (228A, 228B) are fixed to the diaphragm (26) and are configured to move while wound around the shaft (21a) to rotate the transducer (21);
the diaphragm (26) comprises a first deforming portion (26a) through which the first wire (228A) passes to be fixedly installed therein and which is deformed according to movement of the first wire (228A), and a second deforming portion (26b) through which the second wire (228B) passes to be fixedly installed therein and which is deformed according to movement of the second wire (228B).

2. The probe (20) according to claim 1, wherein the diaphragm (26) is formed of a stretchable material which is elastically deformed.

3. The probe (20) according to claim 1, further comprising a partition member (25) disposed between the cap (24) and the handle case (23) to partition an internal space of the cap (24) and an internal space of the handle case (23),
wherein the partition member (25) comprises a through-hole (25b) in which the diaphragm (26) is installed.

4. The probe (20) according to claim 1, further comprising:

a first sealing member (27A) through which the first wire (228A) passes to be fixedly installed therein, installed to pass through the first deforming portion (26a), and configured to seal between the first deforming portion (26a) and the first wire (228A); and
a second sealing member (27B) through which the second wire (228B) passes to be fixedly installed therein, installed to pass through the second deforming portion (26b), and configured to seal between the second deforming portion (26b) and the second wire (228B).

5. The probe (20) according to claim 1, wherein each of the first deforming portion (26a) and the second deforming portion (26b) has a bellows shape.

6. The probe (20) according to claim 2, wherein the driving device (22) comprises a driving motor (21) configured to generate a rotational force, a transfer screw (225) configured to be rotated by the driving motor (221), and a moving member (226) configured to be moved in an axial direction of the transfer screw (225) according to rotation of the transfer screw

(225), and the first wire (228A) and the second wire (228B) are connected to the moving member (226) so that the first wire (228A) and the second wire (228B) are moved according to movement of the moving member (226).

7. The probe (20) according to claim 5, wherein the driving device (22) comprises a changing pulley (229) configured to change an extending direction of the second wire (228B),
the first wire (228A) has one end which is connected to one side of the moving member (226), and the other end which is connected to one side of the shaft (21a),
the second wire (228B) has one end which is connected to the other side of the moving member (226), and the other end which is connected to the other side of the shaft (21a), and
the second wire (228B) has a middle portion which is wound on the changing pulley (229) so that a moving direction of the second wire (228B) is changed.

8. An ultrasonic diagnostic apparatus comprising the probe (20) according to any one of claims 1 to 7.

Patentansprüche

1. Prüfkopf (20), der Folgendes aufweist:

einen Transducer (21), der dafür vorgesehen ist, Ultraschallwellen zu übertragen und zu empfangen, und der so installiert ist, dass er drehbar ist;
eine Antriebseinrichtung (22), die dafür vorgesehen ist, den Transducer (21) zu rotieren;
eine Vielzahl von Leitungen (228A, 228B), die dafür vorgesehen sind, die Leistung der Antriebseinrichtung (22) an den Transducer (21) zu übertragen;
ein Traggehäuse (23), das dafür vorgesehen ist, die Antriebseinrichtung (22) darin aufzunehmen;
eine Kappe (24), die mit dem Traggehäuse (23) verbunden ist, um den Transducer (21) darin aufzunehmen, und die mit Öl gefüllt ist; und
eine Membran (26), die aus einem deformierbaren Material gebildet und zwischen der Kappe (24) und dem Traggehäuse (23) angeordnet ist, wobei die Membran (26) fest installiert ist, wobei es der Vielzahl von Leitungen (228A, 228B) möglich ist, durch dieselbe zu verlaufen;
gekennzeichnet durch
eine Welle (21a), die mit einem Rotationsmittelpunkt des Transducers (21) verbunden ist, wobei die Vielzahl von Leitungen eine erste Leitung (228A), die mit einer Seite der Welle (21a) derart verbunden ist, dass die Welle (21a) in einer ersten Richtung rotierbar ist, und eine zweite Leitung (228B) aufweist, die mit der anderen Seite der Welle (21a) derart verbunden ist, dass die Welle (21a) in einer zweiten Richtung rotierbar ist;
die Vielzahl von Leitungen (228A, 228B) sind an der Membran (26) befestigt und sind dafür vorgesehen, sich zu bewegen, während sie um die Welle (21a) gewickelt sind, um den Transducer (21) zu rotieren;
die Membran (26) weist einen ersten Deformierabschnitt (26a), durch welchen die erste Leitung (228A) verläuft, um darin fest installiert zu sein, und welcher gemäß einer Bewegung der ersten Leitung (228A) deformiert wird, und einen zweiten Deformierabschnitt (26b) auf, durch welchen die zweite Leitung (228B) verläuft, um fest darin installiert zu sein, und welcher gemäß einer Bewegung der zweiten Leitung (228B) deformiert wird.

2. Prüfkopf (20) nach Anspruch 1, wobei die Membran (26) aus einem dehnbaren Material gebildet ist, das elastisch deformiert wird.

3. Prüfkopf (20) nach Anspruch 1, welcher des Weiteren ein Aufteilelement (25) aufweist, das zwischen der Kappe (24) und dem Traggehäuse (23) angeordnet ist, um einen inneren Raum der Kappe (24) und einen inneren Raum des Traggehäuses (23) zu teilen,
wobei das Aufteilelement (25) eine Durchgangsbohrung (25b) aufweist, in der die Membran (26) installiert ist.

4. Prüfkopf (20) nach Anspruch 1, welcher des Weiteren Folgendes aufweist:

ein erstes Dichtelement (27A), durch welches die erste Leitung (228A) verläuft, um fest darin installiert zu sein, welches so installiert ist, dass es durch den ersten Deformierabschnitt (26a) verläuft, und welches dafür vorgesehen ist, zwischen dem ersten Deformierabschnitt (26a) und der ersten Leitung (228A) abzudichten; und
ein zweites Dichtelement (27B), durch welches die zweite Leitung (228B) verläuft, um fest darin installiert zu sein, welches so installiert ist, dass es durch den zweiten Deformierabschnitt (26b) verläuft, und welches dafür vorgesehen ist, zwischen dem zweiten Deformierabschnitt (26b) und der zweiten Leitung (228B) abzudichten

5. Prüfkopf (20) nach Anspruch 1, wobei sowohl der erste Deformierabschnitt (26a) als auch der zweite Deformierabschnitt (26b) eine Balgform aufweist.

6. Prüfkopf (20) nach Anspruch 2, wobei die Antriebseinrichtung (22) einen Antriebsmotor (221), der dafür

vorgesehen ist, eine Rotationskraft zu erzeugen, eine Übertragungsschraube (225), die dafür vorgesehen ist, von dem Antriebsmotor (221) rotiert zu werden, und ein Bewegungselement (226) aufweist, das dafür vorgesehen ist, in einer axialen Richtung der Übertragungsschraube (225) gemäß der Rotation der Übertragungsschraube (225) bewegt zu werden, und wobei die erste Leitung (228A) und die zweite Leitung (228B) mit dem Bewegungselement (226) verbunden sind, so dass die erste Leitung (228A) und die zweite Leitung (228B) gemäß der Bewegung des Bewegungselements (226) bewegt werden.

7. Prüfkopf (20) nach Anspruch 5, wobei die Antriebseinrichtung (22) eine Wechselriemenscheibe (229) aufweist, die dafür vorgesehen ist, eine Erstreckungsrichtung der zweiten Leitung (228B) zu ändern,
die erste Leitung (228A) ein Ende aufweist, das mit einer Seite des Bewegungselements (226) verbunden ist, wobei das andere Ende mit einer Seite der Welle (21a) verbunden ist,
die zweite Leitung (228B) ein Ende aufweist, das mit der anderen Seite des Bewegungselements (226) verbunden ist, wobei das andere Ende mit der anderen Seite der Welle (21a) verbunden ist, und
die zweite Leitung (228B) einen mittleren Abschnitt aufweist, der auf der Wechselriemenscheibe (229) aufgewickelt ist, so dass eine Bewegungsrichtung der zweiten Leitung (228B) geändert wird.

8. Ultraschalldiagnosevorrichtung, welche den Prüfkopf (20) nach einem der Ansprüche 1 bis 7 aufweist.

Revendications

1. Sonde (20) comportant :

un transducteur (21) configuré pour transmettre et recevoir des ondes ultrasoniques et installé pour être rotatif;
un dispositif d'entraînement (22) configuré pour entraîner le transducteur (21) en rotation ;
une pluralité de câbles (228A, 228B) configurés pour transmettre de la puissance du dispositif d'entraînement (22) au transducteur (21); un boîtier de commande (23) configuré pour contenir le dispositif d'entraînement (22), dans lequel se trouve ;
un couvercle (24) couplé au boîtier de commande (23) pour loger le transducteur (21) et rempli d'huile ; et
un diaphragme (26) réalisé en un matériau déformable et disposé entre le couvercle (24) et le boîtier de commande (23),
dans lequel le diaphragme (26) est installé de manière fixe en permettant à la pluralité de câbles (228A, 228B) de passer à travers ;
caractérisée par
un arbre (21a) connecté à un centre rotatif du transducteur (21), dans lequel la pluralité de fils conducteurs comprend un premier câble (228A) connecté à un côté de l'arbre (21a) de telle sorte que l'arbre (21a) est configuré pour tourner dans une première direction et un second câble (228B) connecté de l'autre côté de l'arbre (21a) de sorte que l'arbre (21a) est configuré pour tourner dans une seconde direction ;
la pluralité de câbles (228A, 228B) est fixée au diaphragme (26) et est configurée pour se déplacer tout en étant enroulée autour de l'arbre (21a) pour assurer l'entraînement du transducteur (21) ;
le diaphragme (26) comprend une première portion déformable (26a) à travers laquelle le premier câble (228A) passe pour être installé de manière fixe et qui est déformé selon le mouvement du premier câble (228A), et une seconde portion déformable (26b) à travers laquelle le second câble (228B) passe pour être installé de manière fixe et qui est déformé en fonction du mouvement du second câble (228B).

2. Sonde (20) selon la revendication 1, dans laquelle le diaphragme (26) est réalisé en un matériau étirable qui est déformé élastiquement.

3. Sonde (20) selon la revendication 1, comprenant en outre un élément de séparation (25) disposé entre le couvercle (24) et le boîtier de commande (23) pour séparer un espace intérieur du couvercle (24) et un espace intérieur du boîtier de commande (23),
dans laquelle l'organe de séparation (25) comporte un élément de passage (25b) dans une ouverture, dans laquelle est installé le diaphragme (26).

4. Sonde (20) selon la revendication 1, comprenant en outre :

un premier élément de scellement (27A) à travers lequel passe le premier câble (228A) pour être installé de manière fixe à l'intérieur, installé pour passer à travers la première portion déformable (26a), et configuré pour assurer l'étanchéité entre la première portion déformable (26a) et le premier câble (228A) ; et
un second élément de scellement (27B) à travers lequel passe le second câble (228B) pour être installé de manière fixe à l'intérieur, installé pour passer à travers la seconde portion déformable (26b), et configuré pour assurer l'étanchéité entre la seconde portion déformable (26b) et le second câble (228B).

5. Sonde (20) selon la revendication 1, dans laquelle

chacune des première portion déformable (26a) et seconde portion déformable (26b) a une forme de soufflet.

6. Sonde (20) selon la revendication 2, dans laquelle le dispositif d'entraînement (22) comporte un moteur d'entraînement (221) configuré pour générer une force de rotation, une vis de transfert (225) configurée pour être entraînée par le moteur d'entraînement (221), et un organe mobile (226) configuré pour être déplacé dans une direction axiale de la vis de transfert (225) selon la rotation de la vis de transfert (225), et le premier câble (228A) et le second câble (228B) sont connectés à l'organe mobile (226) de sorte que le premier câble (228A) et le second câble (228B) sont déplacés selon le mouvement de l'organe mobile (226).

7. Sonde (20) selon la revendication 5, dans laquelle le dispositif d'entraînement (22) comporte une poulie de changement (229) configurée pour changer une direction d'extension du second câble (228B),
le premier câble (228A) comporte une extrémité qui est connectée à l'un des côtés de l'organe mobile (226), et l'autre extrémité qui est connectée à l'un des côtés de l'arbre (21a),
le second câble (228B) comporte une extrémité qui est connectée à l'autre côté de l'organe mobile (226), et l'autre extrémité qui est connectée à l'autre côté de l'arbre (21a), et
le second câble (228B) comporte une portion centrale qui est enroulée sur la poulie de changement (229) de sorte que la direction de déplacement du second câble (228B) est modifiée.

8. Appareil de diagnostic ultrasonique comportant une sonde (20) selon l'une quelconque des revendications 1 à 7.

FIG. 1

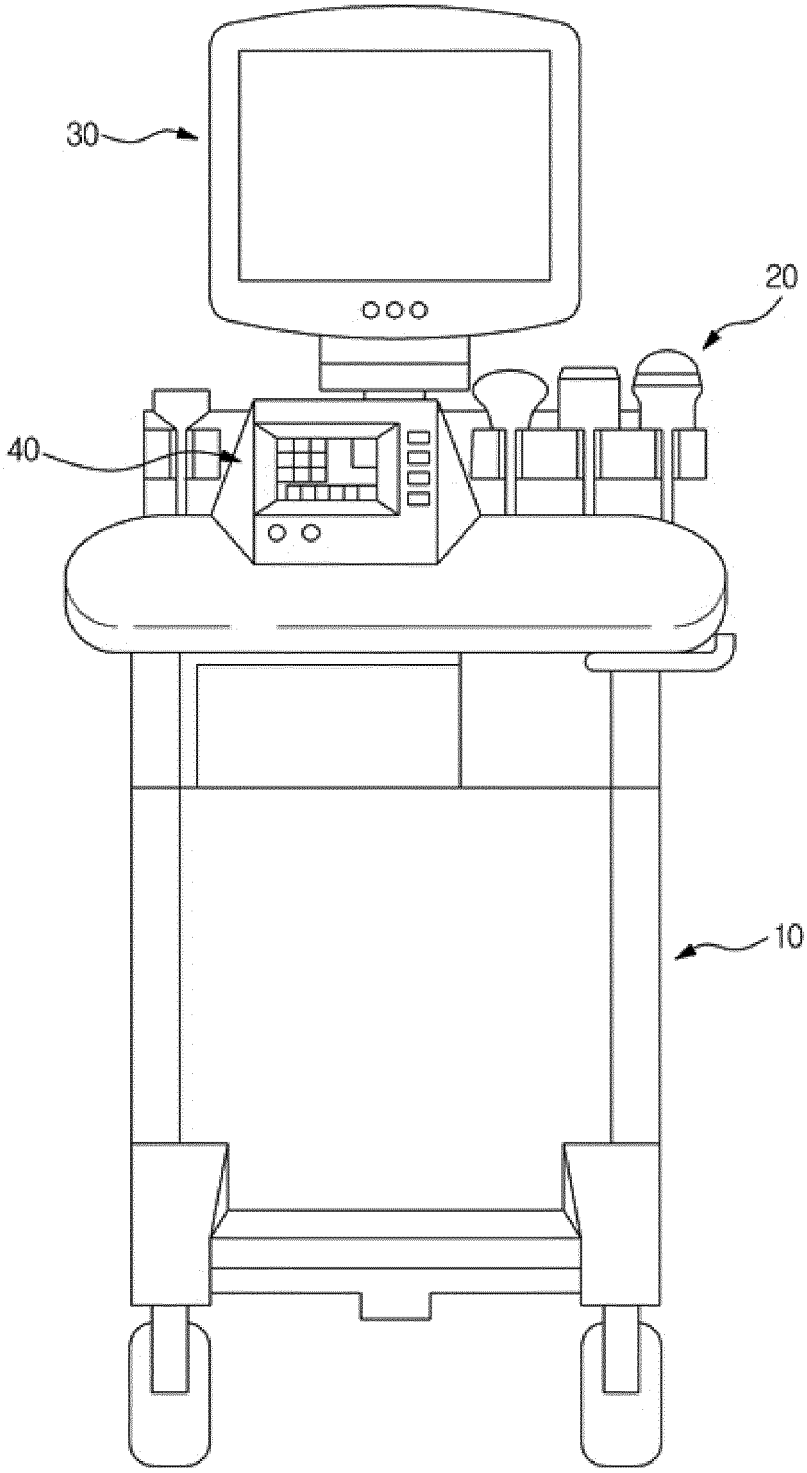


FIG. 2

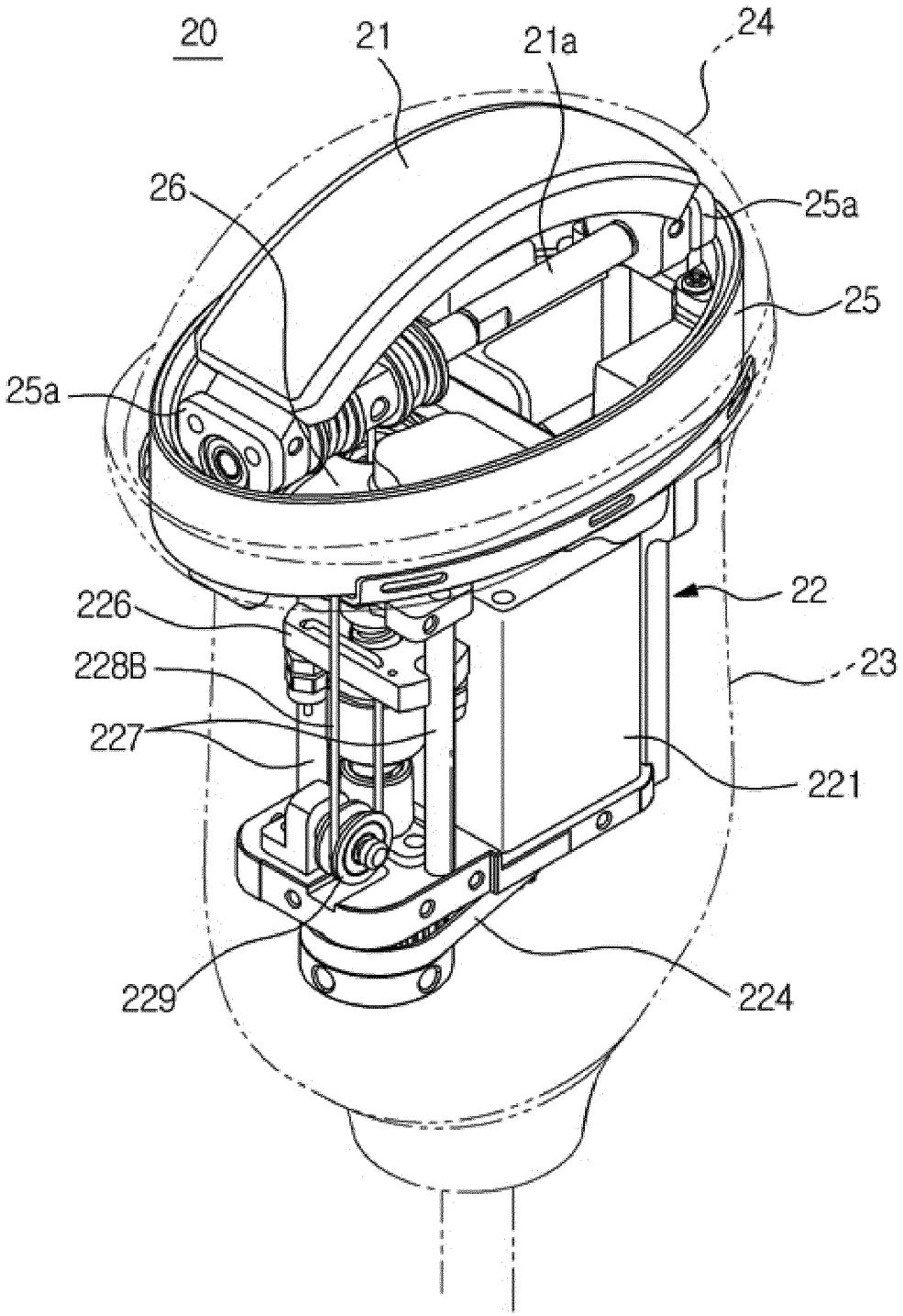


FIG. 3

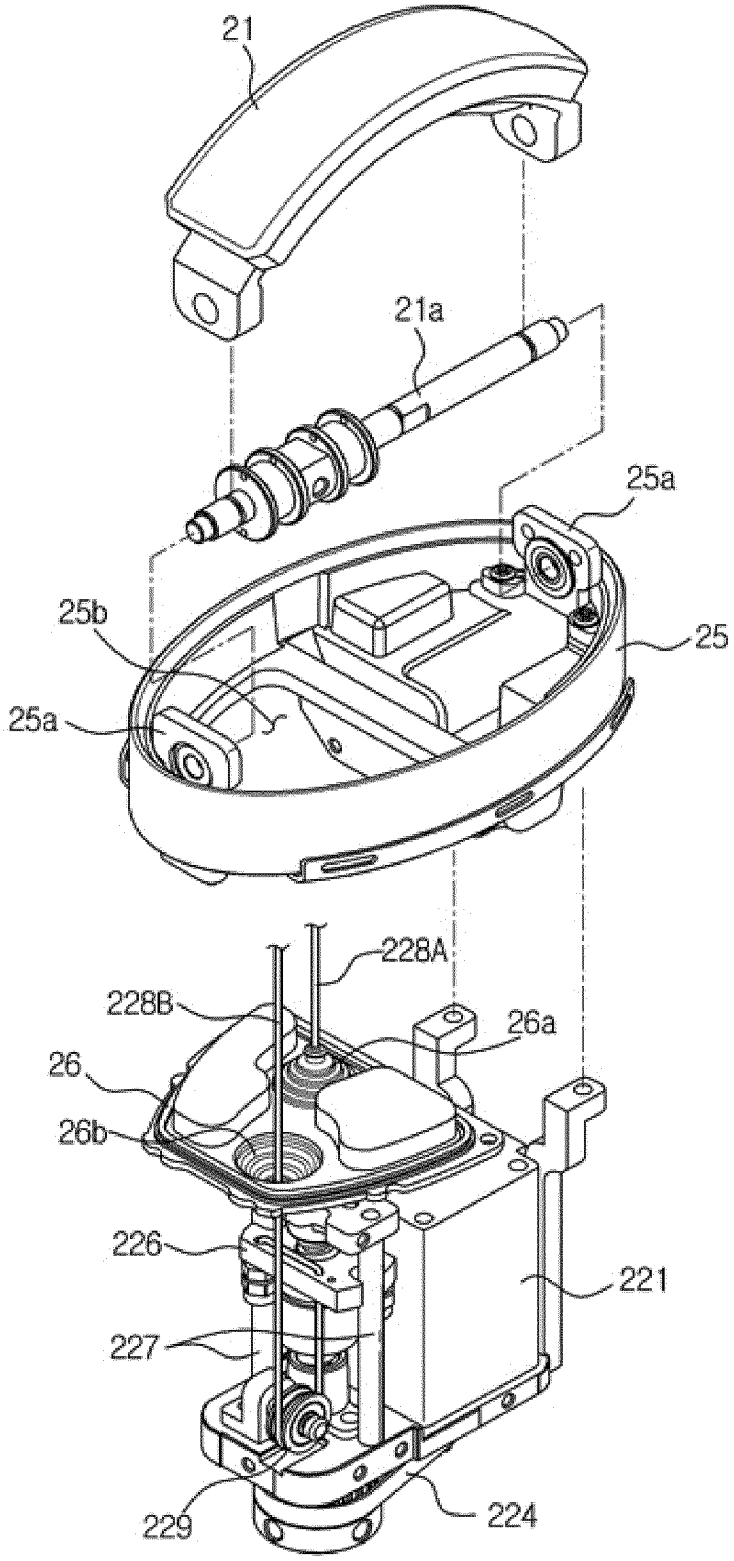


FIG. 4

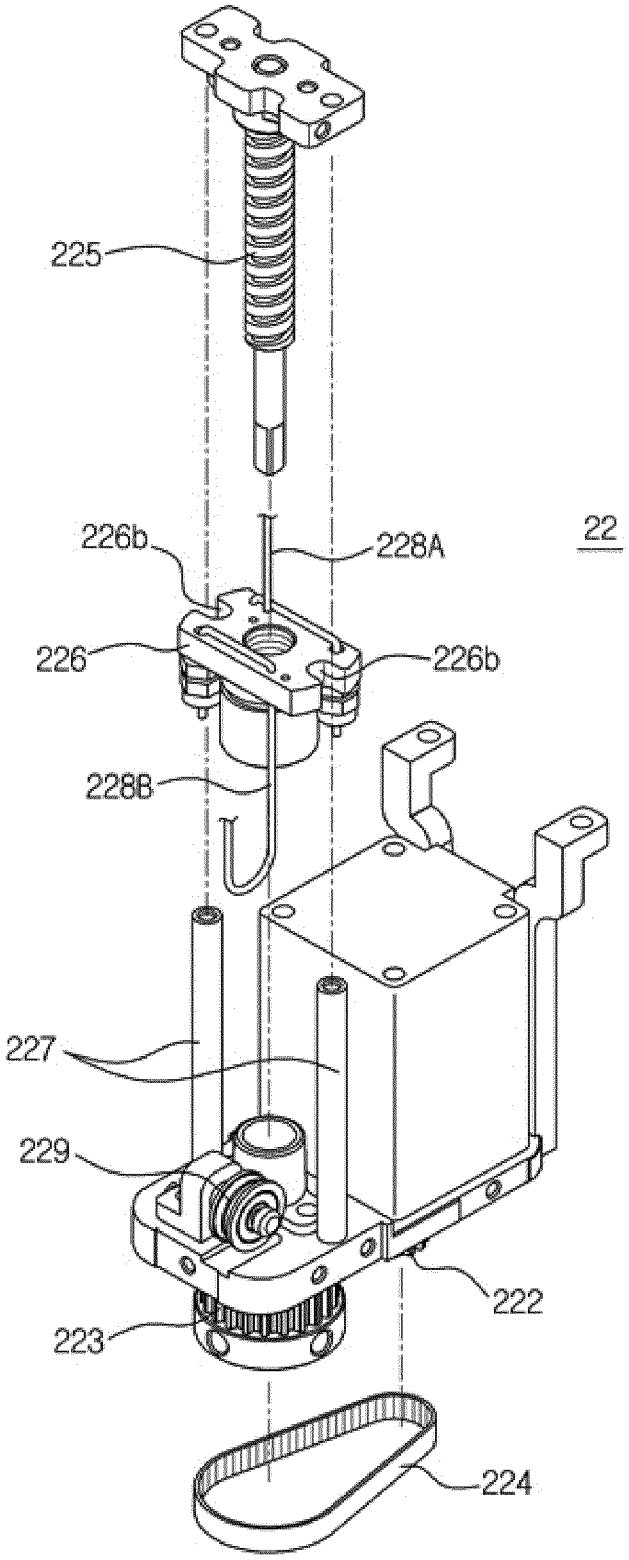


FIG. 5

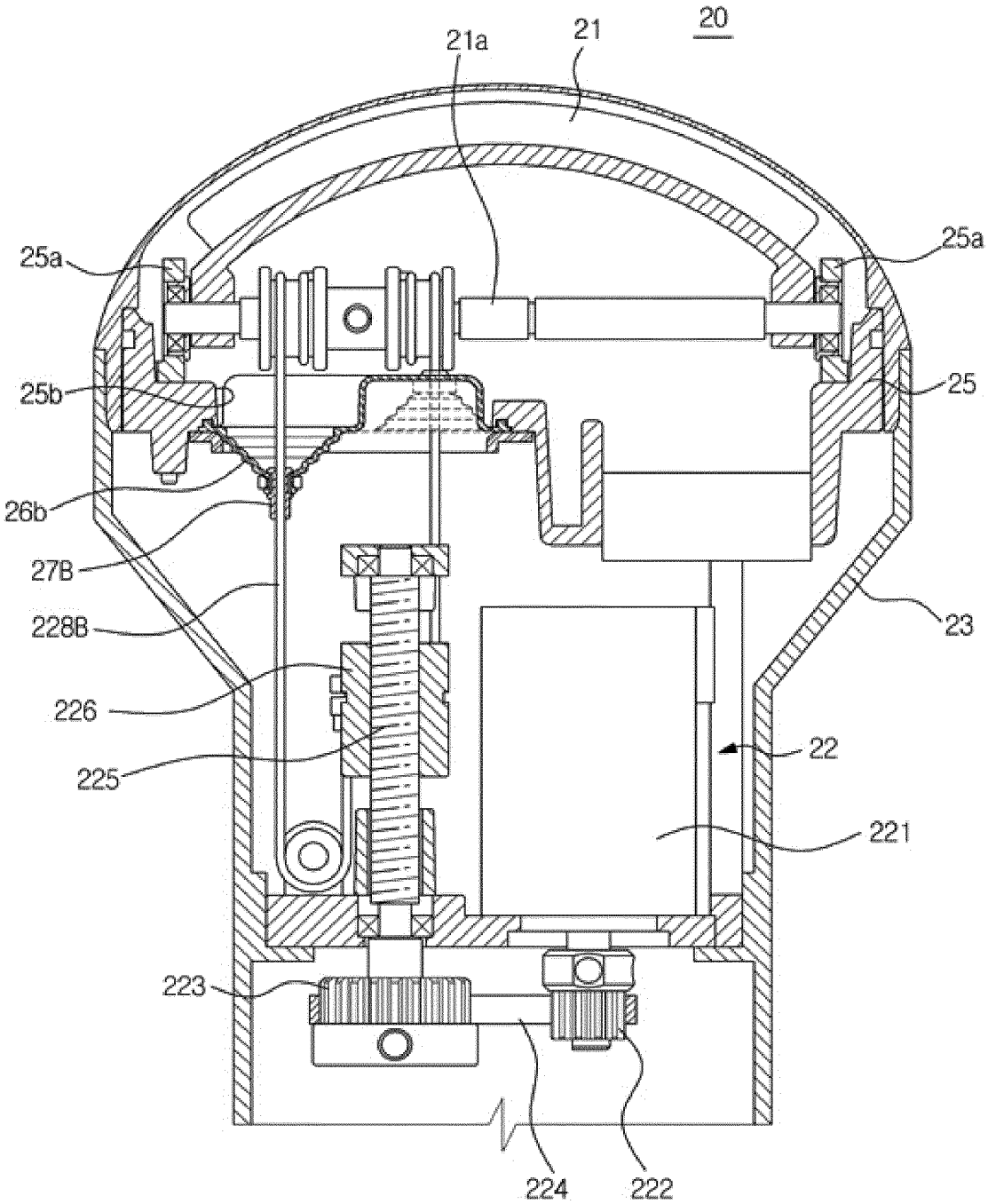

20
21
21a
25a
25a
25b
25
26b
27B
228B
23
226
22
225
221
223
224
222

FIG. 6

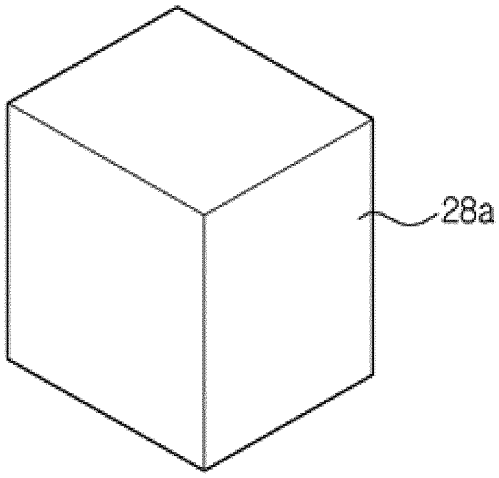


FIG. 7

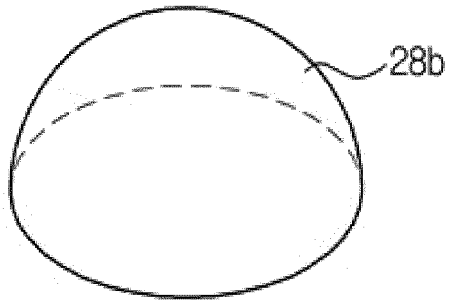


FIG. 8

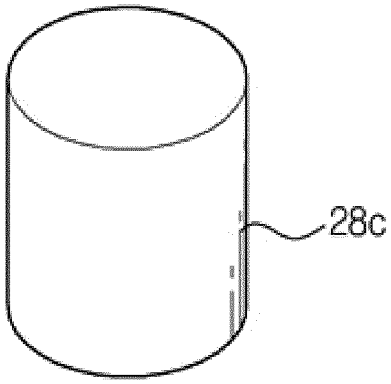


FIG. 9

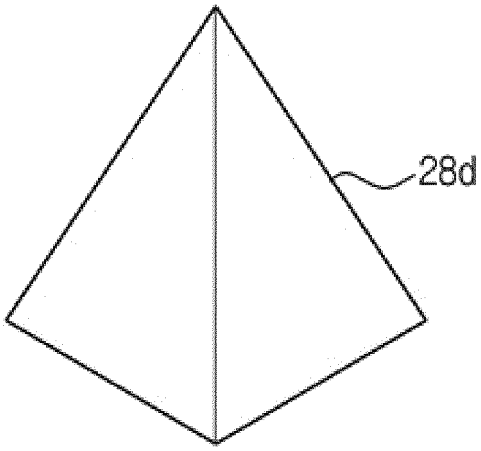


FIG. 10

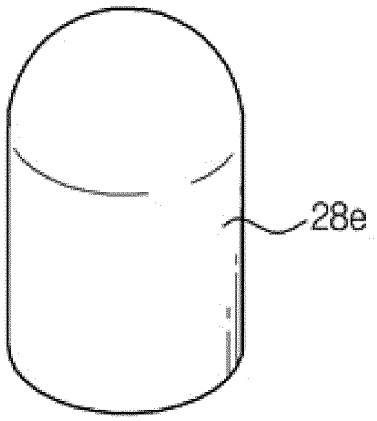


FIG. 11

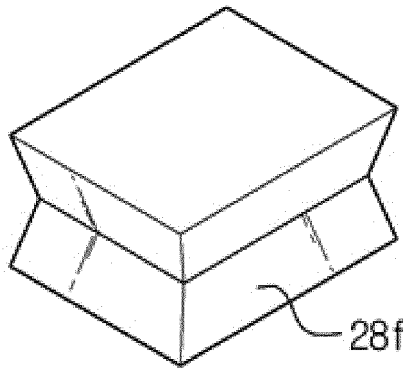


FIG. 12

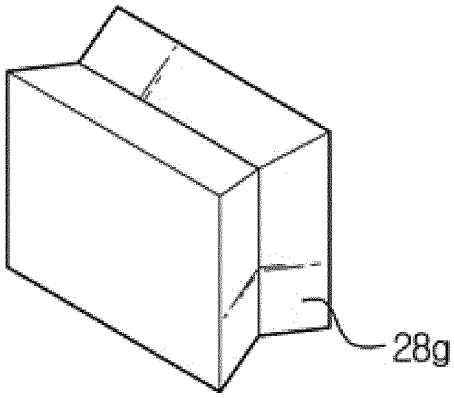


FIG. 13

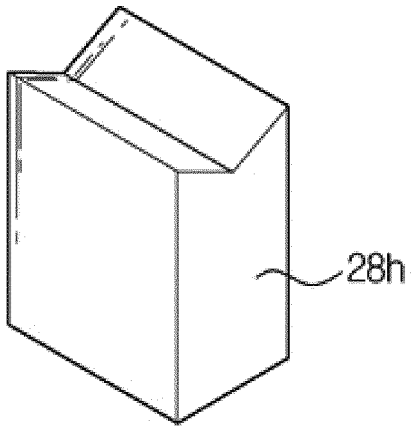


FIG. 14

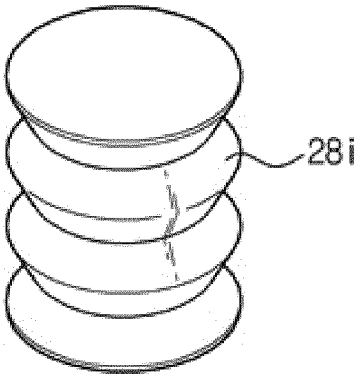
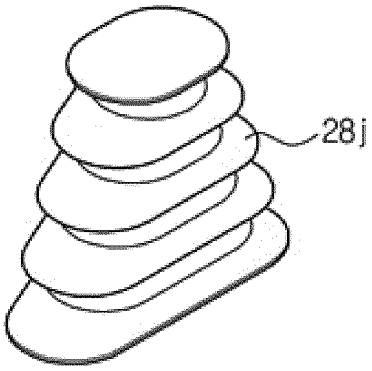


FIG. 15



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2298175 A1 **[0004]**
- DE 835239 **[0004]**
- EP 1576926 A1 **[0004]**

专利名称(译)	超声诊断设备		
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其他公开文献	EP2837334A1		
外部链接	Espacenet		

摘要(译)

本发明公开了一种超声诊断设备，其包括探头（20），其包括安装成可旋转的换能器（21），配置成旋转换能器的驱动装置（22），配置成传输功率的至少一根导线（228A，228B）传感器的驱动装置，装配在其中的驱动装置的手柄壳体，连接到手柄壳体（23）以在其中容纳换能器并填充油的盖子（24）和由可变形的膜片形成的膜片材料设置在盖子和手柄壳体之间，其中导线安装成穿过隔膜，并固定到隔膜上，使得隔膜根据导线的移动而变形。由于导线固定安装以穿过隔膜并随着导线的移动而变形，因此防止了盖子中的油泄漏到手柄壳体中。