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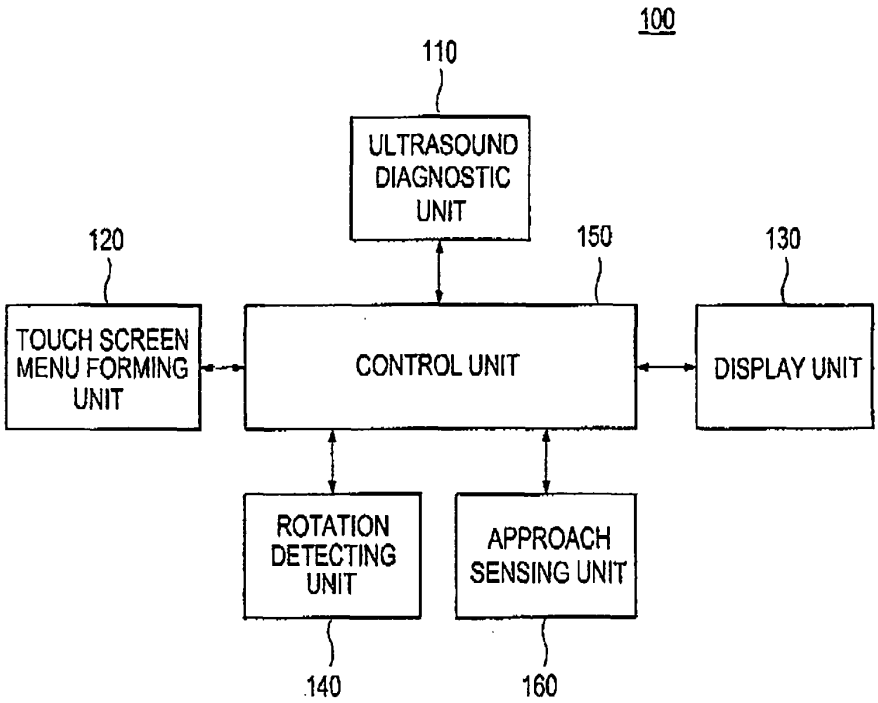
(54) User interface in an ultrasound system

(57) A ultrasound system comprises a display unit for prompting a user to touch a desired one of hierarchically arranged soft buttons for triggering an execution of the function of the ultrasound system associated with the touched button. The display unit includes a display having a display with touch panel mounted. The display unit is configured to display a touch screen menu together with the ultrasound image on the display. The system comprises a rotation detection unit for detecting rotation of the display and optionally an approach sensing unit mounted on the display.

FIG. 1



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Description

USER TNTERFACE IN AN ULTRASOUND SYSTEM

[0001] The present application claims priority from Korean Patent Application No. 10-2008-0028801 filed on March 28, 2008, the entire subject matter of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure generally relates to user interfaces, and more particularly to a user interface adapted to utilize a touch screen in an ultrasound system.

BACKGROUND

[0003] Recently, an ultrasound system has been extensively used in the medical field due to its non-invasive and nondestructive nature. Modern high-performance ultrasound imaging systems and techniques are commonly used to produce two dimensional ultrasound images, three-dimensional ultrasound images and color flow images of internal features of patients. Further, such ultrasound systems provide various functions such as image recording, image annotation, zooming, archiving, panning and the like.

[0004] As the number of functions performed by the ultrasound system is increased, the size of a user interface such as a control panel, on which a keyboard, a track ball and slide bars are installed, is also inevitably increased. However, it is difficult to expand the area of the user interface due to the limited space of the ultrasound system. To resolve this problem, the ultrasound system may provide a touch screen as the user interface. The touch screen may be mounted on a control panel in the conventional ultrasound system. In order to install the touch screen on the ultrasound system, a touch panel liquid crystal display and an additional graphic card should be additionally provided. Thus, installing the touch screen on the control panel significantly increases the manufacturing costs.

[0005] Further, the ultrasound system may use a display, the horizontal size of which is relatively lager than the vertical size (e.g., the aspect ratio is 4:3 or 16:9). However, there is a problem since a display area of the display is not efficiently used due to the characteristics of the ultrasound image.

SUMMARY

[0006] Embodiments of a user interface, which utilizes a touch screen in an ultrasound system, are disclosed herein. In one embodiment, by way of non-limiting example, an ultrasound system comprises: an ultrasound diagnostic unit for forming an ultrasound image based on echoes reflected from a target object; a touch screen menu forming unit for forming a touch screen menu having graphics and text, the touch screen menu including hierarchically arranged soft buttons associated with functions of the ultrasound system; and a display unit including a display with a touch panel mounted, the display unit being configured to display the touch screen menu together with the ultrasound image on the display to prompt a user to touch a desired one of the soft buttons for triggering an execution of the associated function therewith, the display unit further including a support to rotatable support the display; a rotation detection unit configured to detect rotation of the display to output a rotation detection signal; and a control unit configured to determine a display mode of the ultrasound image and the touch screen menu in response to the rotation detection signal.

[0007] The Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used in determining the scope of the claimed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is a block diagram showing an illustrative embodiment of an ultrasound system.

FIG. 2 is a schematic diagram showing an example of rotation of a display.

FIGS. 3-8 are schematic diagrams showing examples of displaying an ultrasound image and a touch screen menu.

DETAILED DESCRIPTION

[0009] A detailed description may be provided with reference to the accompanying drawings. One of ordinary skill in the art may realize that the following description is illustrative only and is not in any way limiting. Other embodiments of the present invention may readily suggest themselves to such skilled persons having the benefit of this disclosure.

[0010] Referring more particularly to FIG. 1, an illustrative embodiment of an ultrasound system 100 is shown. As depicted, the ultrasound system 100 may include an ultrasound diagnostic unit 110 configured to form ultrasound images based on ultrasound echoes reflected from a target object. The ultrasound diagnostic unit 110 may include a probe (not shown) for transmitting and receiving ultrasound signals, a beam former (not shown) for forming a receive beam based on the ultrasound echoes, and an image processing unit (not shown) for processing the receive beam to form the ultrasound image of the target object.

[0011] The ultrasound system 100 may further include a touch screen menu forming unit 120 that may be operable to form a touch screen menu having graphics and text. The touch screen menu may include hierarchically

arranged soft buttons associated with functions of the ultrasound system. For example, the touch screen menu may be classified into a main menu and a sub menu. The main menu may include image mode buttons for selecting the ultrasound image modes such as a 2-dimensional (2D) mode, a color mode, a. Power Doppler mode and a pulsed wave mode, and a utility mode for setup of the ultrasound system 100. The sub menu may include a plurality of image adjusting buttons and a plurality of setup buttons associated with the respective soft buttons contained in the main menu. The instructions may include requests for display mode selection, patient information display, rotation of an ultrasound image, enlargement and reduction, gain adjustment, measurement, movement of a cursor and the like.

[0012] The ultrasound system may further include a display unit 130 that may display an ultrasound image formed in the ultrasound diagnosing unit 110. Also, the display unit 130 may further display the touch screen menu formed in the touch screen menu forming unit 120. In one embodiment, the display unit 130 may include a display with a touch panel mounted, such as a touch panel liquid crystal display (LCD). The touch panel may be configured to detect a user touch to thereby output a touch signal corresponding to a touch location of the user on the display. That is, the display is configured to display the touch screen menu together with the ultrasound image on the display panel to prompt a user to touch a desired one of the hierarchically arranged soft buttons for triggering an execution of the associated function therewith. The display unit 130 may further include a support to rotatable support the display in a predetermined direction within a predetermined angle by the user.

[0013] The ultrasound system 100 may additionally include a rotation detecting unit 140. The rotation detecting unit 140 may be configured to detect a rotation of the display in the display unit 130 to thereby output a detection signal ("rotation detection signal"). Referring now to FIG. 2, if the display 210 is rotated to be within a first angle range P1 of about 0 to 45 degrees with respect to a reference angle (e.g., 0 degree), then the rotation detecting unit 140 may output a first rotation detection signal. Also, if the display 210 is rotated to be within a second angle range P2 of about 45 to 90 degrees, then the detecting unit 140 may output a second rotation detection signal. In one embodiment, when the display 210 is rotated to be positioned at an angle of 45 degrees, the detecting unit 140 may output the second rotation detection signal.

[0014] The ultrasound system may further include a control unit 150. The control unit 150 may be configured to control transmission/reception of the ultrasound signals. Further, the control unit 150 may be operable to control formation of the ultrasound image and the touch screen menu. The control unit 150 may also be configured to determine a display mode of the ultrasound image and the touch screen menu on the display in response to the rotation detection signals.

[0015] In one embodiment, if the first rotation detection signal is outputted from the detecting unit 140, then the control unit 150 may be operable to control the display unit 130 such that a first display area 320 and a second display area 330 are displayed on left and right sides of the screen, respectively, as illustrated in FIG. 3. In such a case, the ultrasound image UI may be displayed on the first display area 320 and the touch screen menu may be displayed on the second display area 330. As described above, the touch screen menu may include the main menu 332 and the sub menu 334. In one embodiment, a ratio of the horizontal dimensions of the first display area 320 and the second display area 340 may be set to 3:1. However, the ratio is certainly not limited thereto. The size ratio may be adjusted according to the image mode.

[0016] In one embodiment, it has been described that the ultrasound image UI may be displayed on the first display area 320 and the touch screen menu may be displayed on the second display area 340. However, displaying the ultrasound image UI and the touch screen menu is certainly not limited thereto. In another embodiment, the touch screen menu may be displayed on the first display area 320 and the ultrasound image UI may be displayed on the second display area 330. In such a case, the ratio of the horizontal dimensions of the first display area 320 and the second display area 330 may be set to 1:3, although it is certainly not limited thereto.

[0017] If the second rotation detection signal is outputted from the detecting unit 140, then the control unit 150 may be operable to control the display 310 such that a third display area 340 and a fourth display area 350 are displayed on upper and lower sides of the screen of the display 310, respectively, as illustrated in FIG. 4. In such a case, the ultrasound image UI may be displayed on the third display area 340 and the touch screen menu may be displayed on the fourth display area 350. The touch screen menu may include the main menu 352 and the sub menu 354. A ratio of the vertical dimensions of the third display area 340 and the fourth display area 350 may be set to 7:1. However, the ratio is certainly not limited thereto.

[0018] If the touch signal is inputted from the display unit 130, then the control unit 150 may be configured to control the ultrasound system 100 such that the function corresponding to the soft button located at the user touch is performed.

[0019] The ultrasound system 100 may further include an approach sensing unit 160. In one embodiment, the approach sensing unit 160 may be installed on a front side of the display unit 130. However, the location of the approach sensing unit 160 is not limited thereto. The approach sensing unit 160 may be operable to sense whether any object such as a user's hand, a stylus, etc. approaches the approach sensing unit 160 within a predetermined distance. If the object approaches within the predetermined distance, then the approach sensing unit 160 may output an approach sensing signal. Any device

capable of sensing the approach of the object may be used as the approach sensing unit 160.

[0020] If the approach sensing signal is not outputted from the approach sensing unit 160, then the control unit 150 may be operable to control the display 310 such that the main menu is only displayed on the display unit 130, as illustrated in FIG. 5. In such a case, the display area 330 displaying the touch screen menu may be reduced depending on the size of the main menu 332. That is, the control unit 150 may control the display unit 130 such that the display area 320 for displaying the ultrasound image UI may be widened and the display area 330 for displaying the touch screen may be reduced. In another embodiment, if the approach sensing signal is not outputted, then the control unit 150 may be operable to control the display 310 such that the ultrasound image UI is only displayed.

[0021] However, if the approach sensing signal is outputted from the approach sensing unit 160, then the control unit 150 may be operable to control the main menu 332 and the sub menu 334 to be displayed at the same time, as illustrated in FIG. 6. In such a case, the size of the display area 330 for displaying the touch screen menu may be adjusted according to the size of the main menu 332 and sub menu 334.

[0022] FIGS. 7 and 8 show examples of displaying the ultrasound image and the touch screen menu, while the display of the display unit 130 is rotated to be at an angle of 90 degrees. If the approach sensing signal is outputted from the approach sensing unit 160, then the control unit 150 may be operable to control the display 310 such that the main menu is only displayed on the display unit 130, as illustrated in FIG. 7. In such a case, the display area 350 displaying the touch screen menu may be reduced depending on the size of the main menu 352. That is, the control unit 150 may control the display unit 130 such that the display area 340 for displaying the ultrasound image may be widened and the display area 350 for displaying the touch screen may be reduced. Also, the control unit may be operable to control the display unit 130 such that the ultrasound image is only displayed while the approach sensing signal is not outputted in another embodiment.

[0023] However, if the second signal is outputted from the approach sensing unit 160, then the control unit 150 may be operable to control the main menu 352 and the sub menu 354 to be displayed at the same time, as illustrated in FIG. 8. In such a case, the size of the display area 350 for displaying the touch screen menu may be adjusted according to the size of the main menu 352 and sub menu 354.

[0024] In one embodiment, since the display unit and the user interface are embodied in a single device, costs may be reduced. Also, the touch screen menu is provided on the display together with the ultrasound image so that the user may easily select a desirable function of the ultrasound system without changing the user's sight. Further, since the touch screen menu is provided on a residual display area while the ultrasound image is displayed, the display area of the display unit 130 may be efficiently utilized.

[0025] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, numerous variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. An ultrasound system, comprising:

   an ultrasound diagnostic unit for forming an ultrasound image based on echoes reflected from a target object;
   a touch screen menu forming unit for forming a touch screen menu having graphics and text, the touch screen menu including hierarchically arranged soft buttons associated with functions of the ultrasound system;
   a display unit including a display with a touch panel mounted, the display unit being configured to display the touch screen menu together with the ultrasound image on the display to prompt a user to touch a desired one of the soft buttons for triggering an execution of the associated function therewith, the display unit further including a support to rotatable support the display;
   a rotation detection unit configured to detect rotation of the display to output a rotation detection signal; and
   a control unit configured to determine a display mode of the ultrasound image and the touch screen menu in response to the rotation detection signal.

2. The ultrasound system of Claim 1, wherein the rotation detection unit is configured to output a first rotation detection signal when the display is rotated within a range of 0 to 45 degrees, and wherein the rotation detection unit is further configured to output a second rotation detection signal when the display is rotated within a range of 45 to 90 degrees.

3. The ultrasound system of Claim 2, wherein the control unit is configured to control the display such that a first display area and a second display area are

set on left and right sides on a screen of the display in response to the first detection signal, and wherein the ultrasound image is displayed on the first display area and the touch screen menu is displayed on the second display area.

4. The ultrasound system of Claim 3, wherein the control unit is configured to control the display such that a third display area and a fourth display area are set on upper and lower sides on a screen of the display in response to the second detection signal, and wherein the ultrasound image is displayed on the third display area and the touch screen menu is displayed on the fourth display area.

5. The ultrasound system of Claim 1, further comprising an approach sensing unit mounted on the display unit, the approach sensing unit being configured to sense an approach of an object to output an approach sensing signal while the object is within a predetermined distance from the display.

6. The ultrasound system of Claim 5, wherein the control unit is configured to control the display such that only the ultrasound image is displayed while the approach sensing signal is not outputted, and wherein the ultrasound image and the touch screen menu are displayed on the second display area while the approach sensing signal is outputted from the approach sensing unit.

FIG. 1

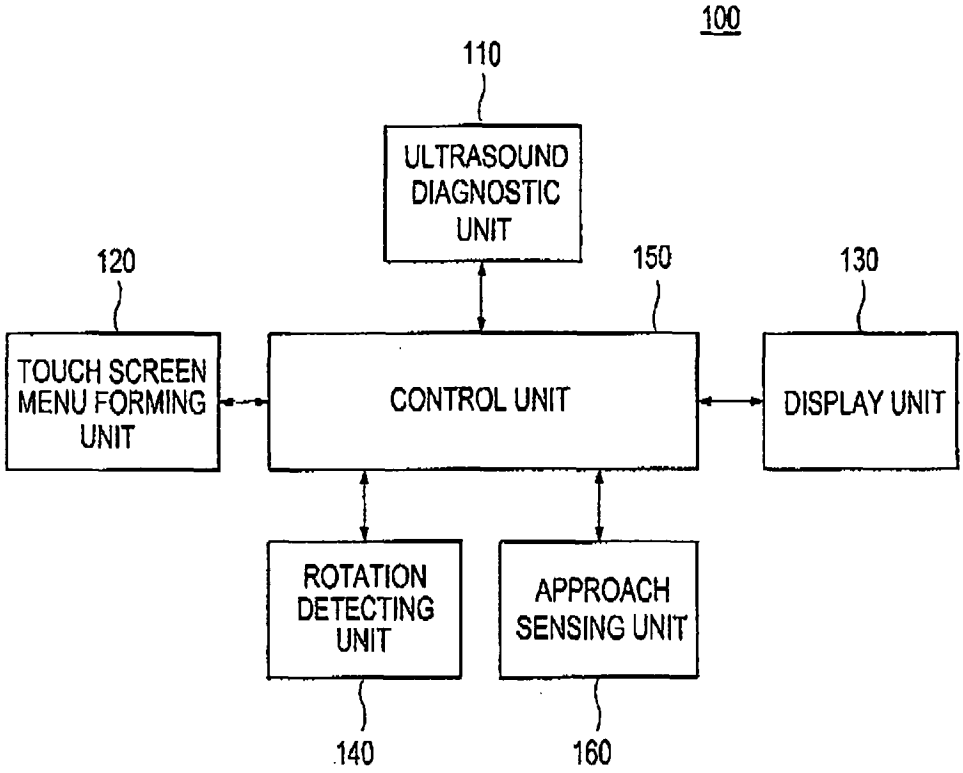

100
110
ULTRASOUND DIAGNOSTIC UNIT
120
150
130
TOUCH SCREEN MENU FORMING UNIT
CONTROL UNIT
DISPLAY UNIT
ROTATION DETECTING UNIT
APPROACH SENSING UNIT
140
160

FIG. 2

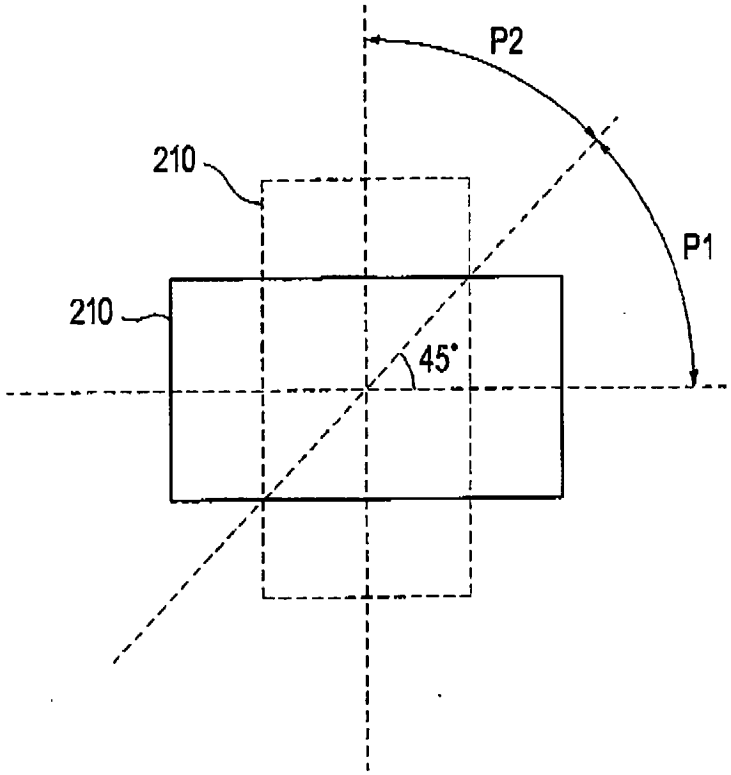


FIG. 3

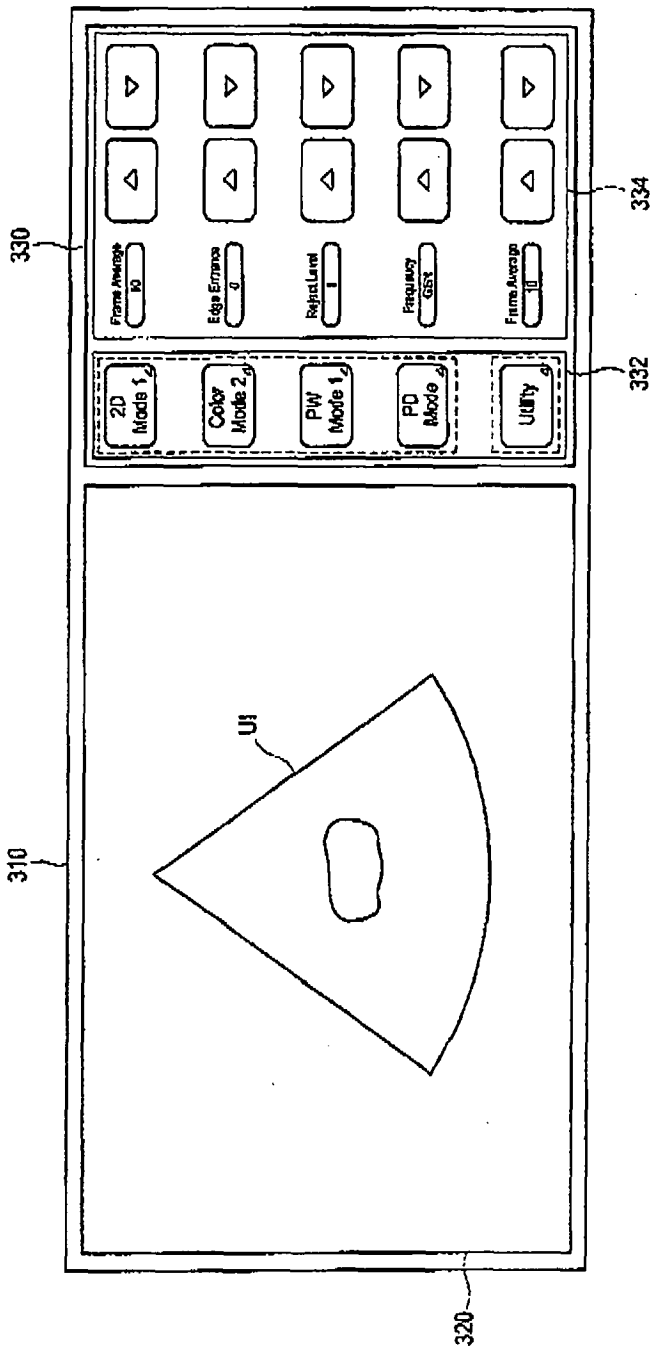

330
334
332
310
320
UI
2D Mode 1
Color Mode 2
PW Mode 1
PD Mode
Utility

FIG. 4

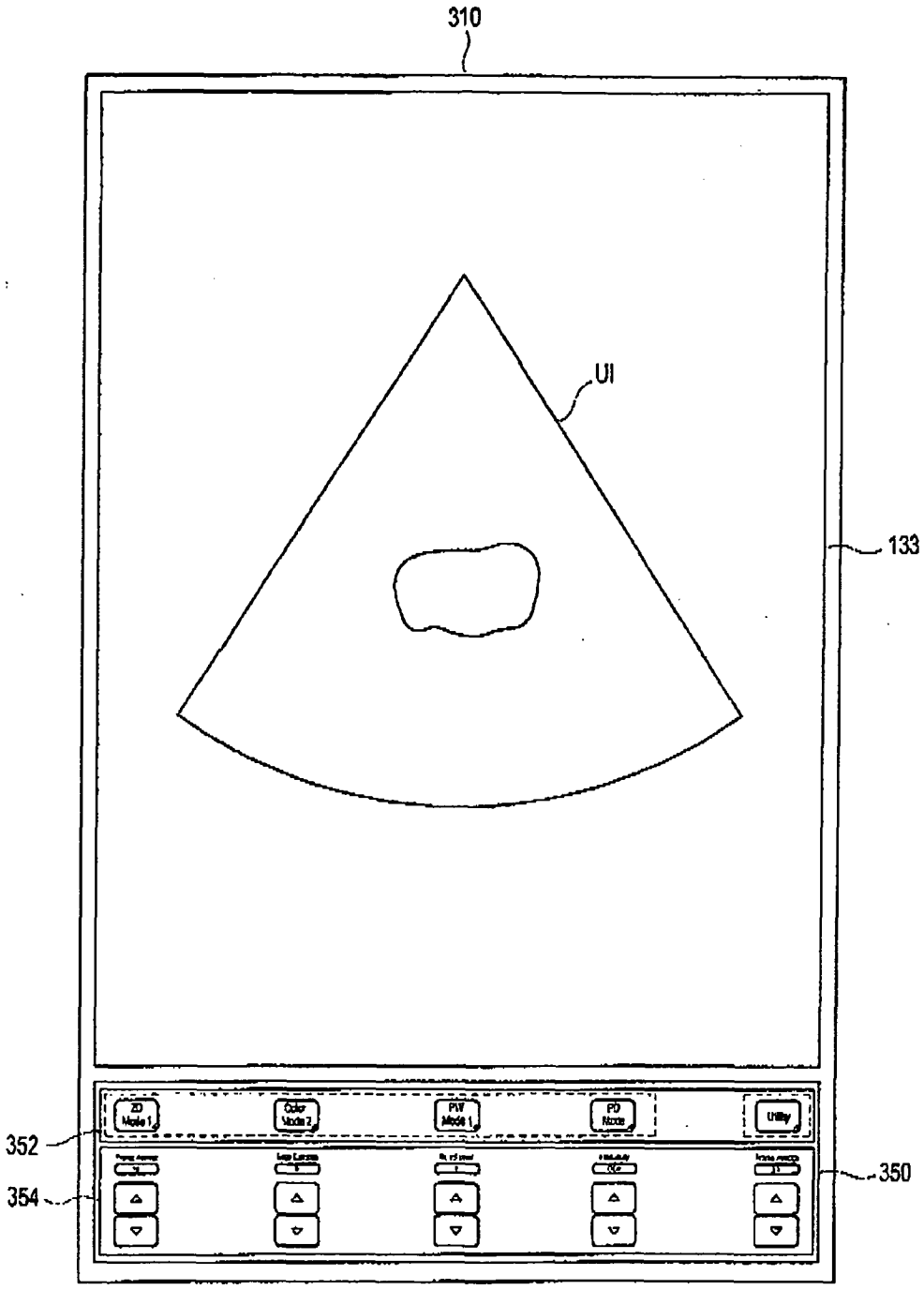


FIG. 5

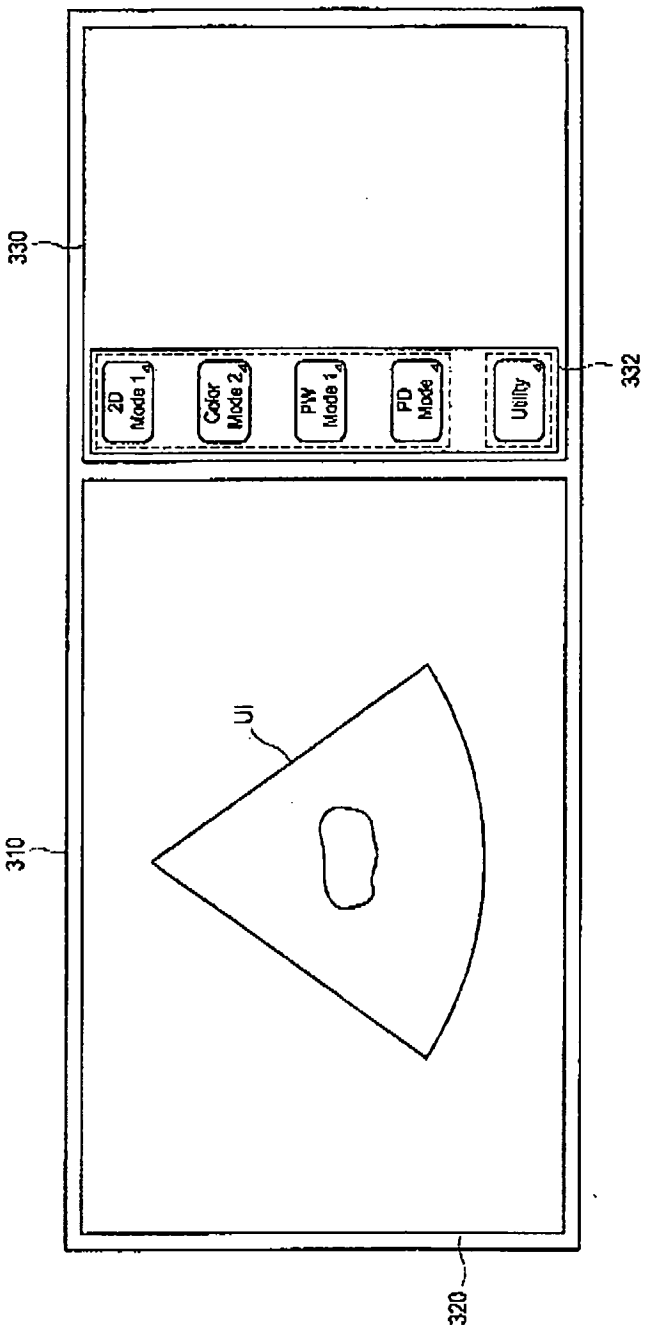

330
2D Mode 1
Color Mode 2
PW Mode 1
PD Mode
Utility
332
UI
310
320

FIG. 6

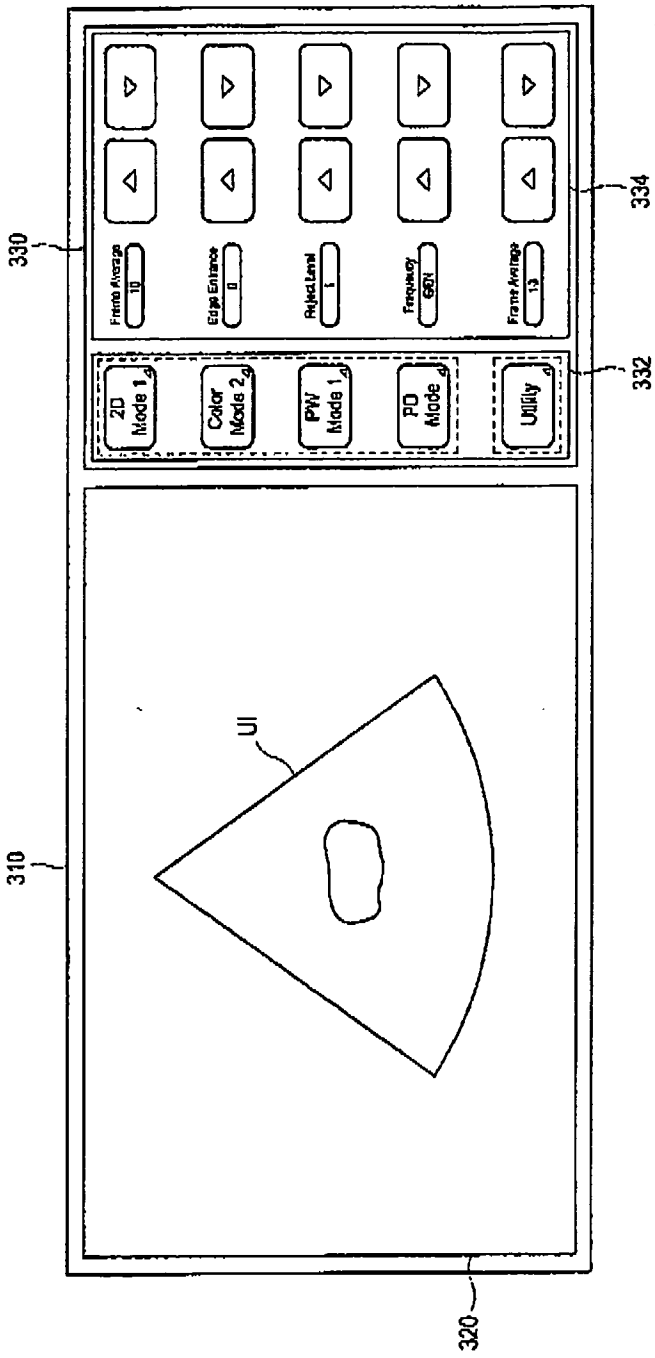

330
334
332
310
320
UI
2D Mode 1
Color Mode 2
PW Mode 1
PD Mode
Utility

FIG. 7

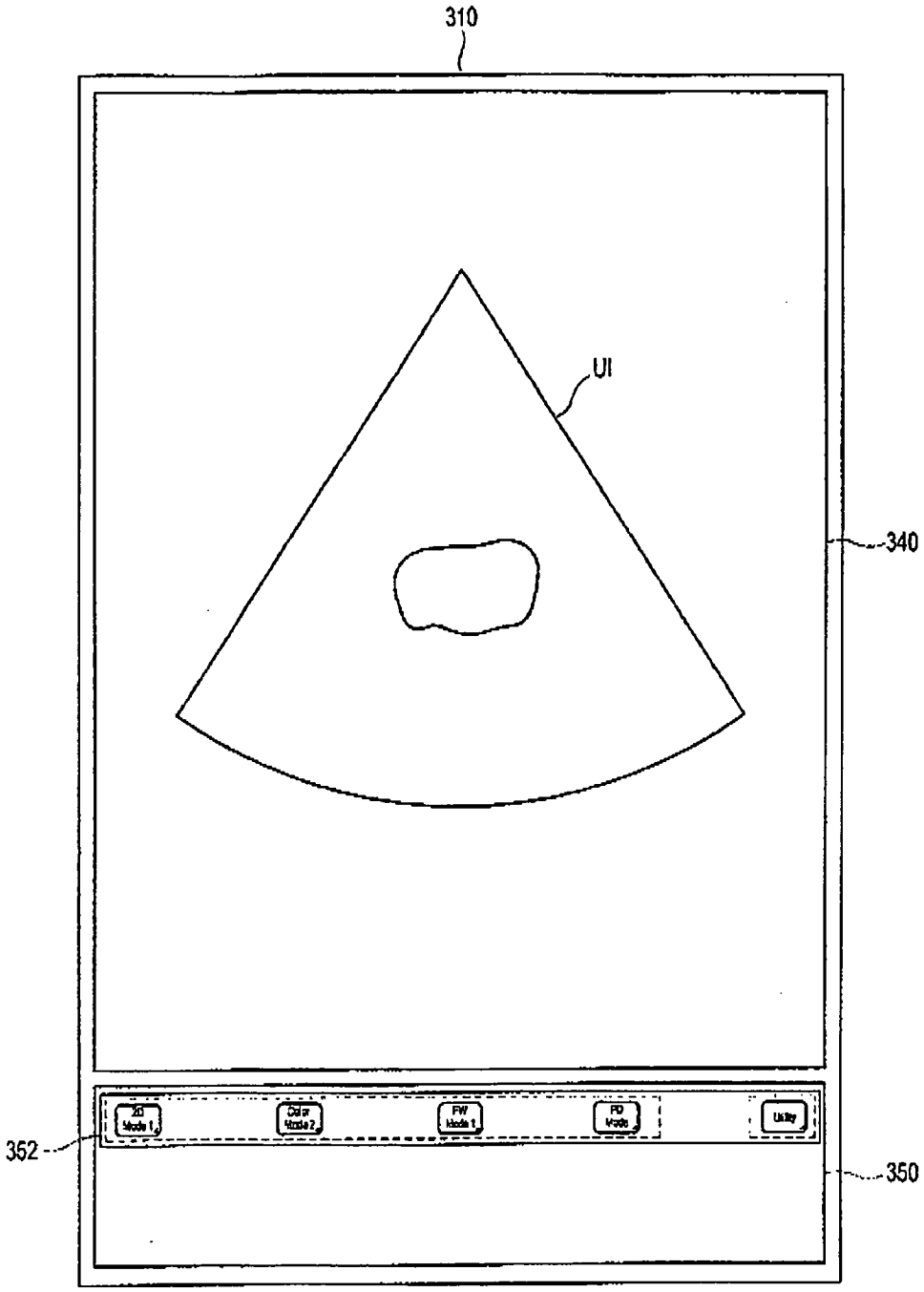
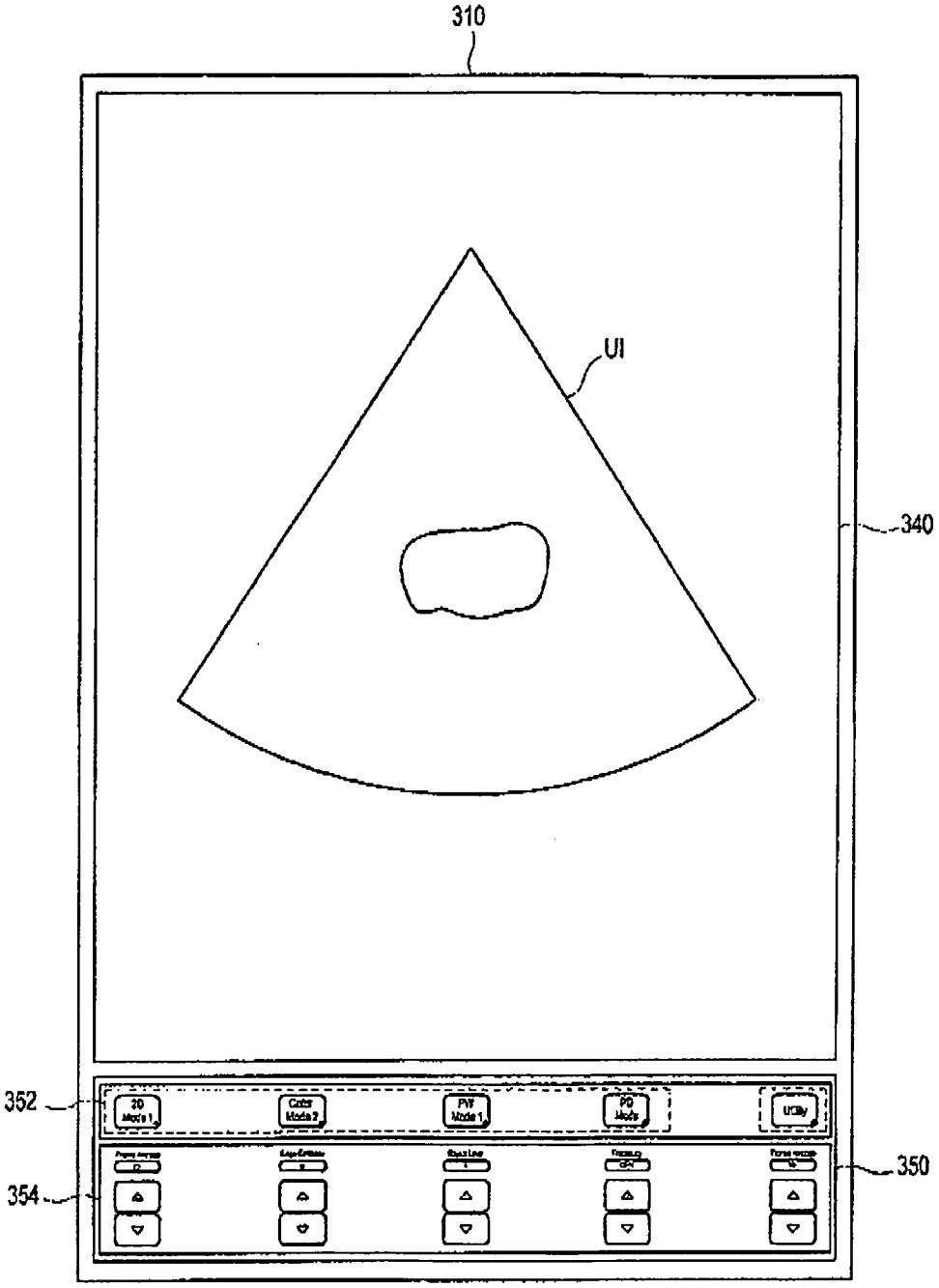


FIG. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 4161

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 2006 0106054 A (MEDISON CO LTD [KR]) 12 October 2006 (2006-10-12) * the whole document *	1-4	INV. G06F19/00
X	US 6 891 920 B1 (MINYARD THOMAS J [US] ET AL) 10 May 2005 (2005-05-10) * column 5, line 10 - column 11, line 13 * * figures 2-4B *	1-4	
Y	US 2006/116578 A1 (GRUNWALD SORIN [US] ET AL) 1 June 2006 (2006-06-01) * paragraph [0069] - paragraph [0077] * * paragraph [0202] - paragraph [0270] * * figures 1-3,19-26C *	1-4	
Y	US 6 516 215 B1 (ROUNDHILL DAVID N [US]) 4 February 2003 (2003-02-04) * the whole document *	1-4	
A	US 6 063 030 A (VARA ALBERT [US] ET AL) 16 May 2000 (2000-05-16) * the whole document *	1-4	TECHNICAL FIELDS SEARCHED (IPC) G06F A61B

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	17 June 2009	Sanandrés Ledesma, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

1 EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 09 00 4161

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-4

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 09 00 4161

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4

   Ultrasound system with rotatable display and rotation detection unit

   ---

2. claims: 5-6

   Ultrasound system with approach sensing unit mounted on the display

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 4161

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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17-06-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 20060106054 A	12-10-2006	NONE	
US 6891920 B1	10-05-2005	NONE	
US 2006116578 A1	01-06-2006	DE 10306924 A1	04-09-2003
		JP 2003299652 A	21-10-2003
		US 2002173721 A1	21-11-2002
		US 2004138569 A1	15-07-2004
US 6516215 B1	04-02-2003	NONE	
US 6063030 A	16-05-2000	AU 1294995 A	19-06-1995
		WO 9515521 A2	08-06-1995

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 1020080028801 **[0001]**

专利名称(译)	超声系统中的用户界面		
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申请号	EP2009004161	申请日	2009-03-24
申请(专利权)人(译)	MEDISON CO.，LTD.		
当前申请(专利权)人(译)	MEDISON CO.，LTD.		
[标]发明人	KIM JIN HYOUNG		
发明人	KIM, JIN HYOUNG		
IPC分类号	G06F19/00 A61B8/00 G06F3/048		
CPC分类号	A61B8/465 A61B8/00 A61B8/462 G16H40/63		
代理机构(译)	SCHMID，WOLFGANG		
优先权	1020080028801 2008-03-28 KR		
外部链接	Espacenet		

摘要(译)

超声系统包括显示单元，用于提示用户触摸分层排列的软按钮中的所需一个，以触发与所触摸的按钮相关联的超声系统的功能的执行。显示单元包括显示器，该显示器具有安装有触摸板的显示器。显示单元被配置为在显示器上与超声图像一起显示触摸屏菜单。该系统包括用于检测显示器的旋转的旋转检测单元以及可选地安装在显示器上的接近感测单元。

FIG. 1