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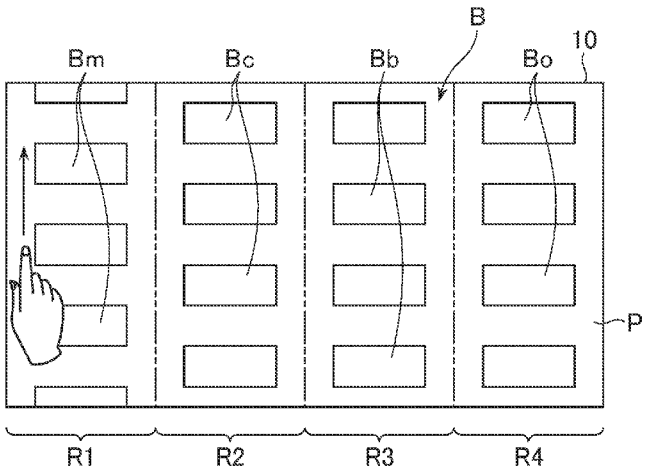
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[Continued on next page]

(54) Title: DISPLAY APPARATUS, AND PROGRAM THEREFOR

FIG.13



(57) Abstract: To provide a display apparatus allowing an operator to easily find a desired icon. A display apparatus comprises a processor for executing a program of an operation button display control function. When an input is made for selecting one of a plurality of categories and scrolling a window P in a vertical direction, the operation button display control function scrolls only part of the window P representing the selected category in the vertical direction so that operation buttons B that belong to the selected category and are not displayed in the window P become displayed in the window P. When an input is made for scrolling the window P in a horizontal direction, the icon display control function scrolls the window P as a whole in the horizontal direction so that operation buttons B in a category that is not displayed in the window P become displayed in the window P.

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DISPLAY APPARATUS, AND PROGRAM THEREFOR

FIELD OF THE INVENTION

[0001] The present invention relates to a display apparatus and a program therefor for displaying icons in a window.

BACKGROUND OF THE INVENTION

[0002] In some cases icons are displayed in a window of a device and the icons are used by an operator to conduct operations, etc. of the device. For example, in some ultrasonic diagnostic apparatuses for capturing an ultrasonic image of a subject, an auxiliary display section using a touch screen is provided in addition to a display section in which the ultrasonic image is displayed (see Patent Document 1, for example), and operation buttons to be selected by the operator for him/herself to input a command are displayed as icons in the auxiliary display section.

[0003] The operation buttons displayed in the auxiliary display section include various categories of operation button. For example, they include measurement buttons for displaying in the display section a measurement marker for measuring a length or an area in an ultrasonic image, body pattern buttons for displaying body patterns in the display section in which the ultrasonic image is displayed, and comment buttons for displaying a comment in the display section in which the ultrasonic image is displayed. These measurement buttons, body pattern buttons, and comment buttons include various kinds of button, respectively.

[0004] Japanese Patent Application KOKAI No. 2013-27497

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0005] As described above, operation buttons belonging to one category include a variety of buttons, and categories also have varieties. Thus, it is desirable to have a display apparatus allowing an operator to easily find a desired icon even in case that icons displayed in a window belong to various categories and icons belonging to one category include a variety of icons.

MEANS FOR SOLVING THE PROBLEM

[0006] The invention in one aspect made for solving the aforementioned problem is a

display apparatus characterized in comprising: an icon display section in which icons are displayed; a processor for executing a program of an icon display control function of displaying a plurality of said icons each belonging to one of a plurality of categories, in one window in said icon display section separately on a category-by-category basis, said function displaying said icons belonging to the same category arranged in a first direction, and displaying said icons in different categories in a second direction orthogonal to said first direction; and an input section for allowing an operator to make an input for scrolling said window, wherein when the operator makes an input at said input section for selecting one of said plurality of categories and scrolling said window in said first direction in which icons belonging to said category are arranged, said icon display control function scrolls, based on the input, only part of said window representing said selected category in said first direction so that icons that belong to said selected category and are not displayed in said window become displayed in said window, and when the operator makes an input at said input section for scrolling said window in said second direction, said icon display control function scrolls, based on the input, said window as a whole in said second direction so that icons in a category that is not displayed in said window become displayed in said window.

EFFECT OF THE INVENTION

[0007] According to the invention in the aspect described above, since a plurality of icons each belonging to one of a plurality of categories are displayed in one window separately on a category-by-category basis, a desired icon may be easily found from among the displayed ones. Moreover, by scrolling only part of the window representing the selected category in the first direction, icons in the category that are not displayed in the window can become displayed, and by scrolling the window in the second direction, icons in a category that is not displayed in the window can become displayed. Thus, a desired operation button that is not displayed in the window may be easily found.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] [FIG. 1] A block diagram showing a schematic configuration of an ultrasonic diagnostic apparatus, which is an exemplary embodiment of the present invention.

[0009] [FIG. 2] A block diagram showing a configuration of the display processing section.

[0010] [FIG. 3] A schematic representation showing an appearance of the

ultrasonic diagnostic apparatus.

[0011] [FIG. 4] A block diagram showing part of functions of the control section.

[0012] [FIG. 5] A flow chart showing an operation of the ultrasonic diagnostic apparatus in the embodiment.

[0013] [FIG. 6] A diagram showing an auxiliary display section in which operation buttons for selecting a region to be examined are displayed.

[0014] [FIG. 7] A diagram showing the auxiliary display section in which a plurality of operation buttons belonging to different categories are displayed on a category-by-category basis.

[0015] [FIG. 8] A flow chart showing processing of creation of preset information.

[0016] [FIG. 9] A diagram showing the auxiliary display section in which category selection buttons are displayed.

[0017] [FIG. 10] A diagram showing the display section in which a selection image for selecting a comment button(s) is displayed.

[0018] [FIG. 11] A diagram showing the display section in which a measurement marker, a comment, and a body pattern are displayed.

[0019] [FIG. 12] A diagram for explaining that the window of the auxiliary display section is divided into four regions.

[0020] [FIG. 13] A diagram showing the auxiliary display section in a condition that scrolling in a vertical direction is made.

[0021] [FIG. 14] A diagram for explaining an input by a hard key for selecting one of first through fourth regions.

[0022] [FIG. 15] A diagram showing the auxiliary display section in a condition that scrolling in a horizontal direction is made.

MODES FOR CARRYING OUT THE INVENTION

[0023] Now several embodiments of the present invention will be described below with reference to the accompanying drawings. In FIG. 1, there is shown an ultrasonic diagnostic apparatus 1 for capturing an ultrasonic image of a subject. The ultrasonic diagnostic apparatus 1 comprises a display apparatus in accordance with the present invention. A

particular description will be provided below.

[0024] The ultrasonic diagnostic apparatus 1 comprises an ultrasonic probe 2, a transmission/reception (T/R) beamformer 3, an echo data processing section 4, a display processing section 5, a display section 6, an operating section 7, a control section 8, and a storage section 9. The ultrasonic probe 2 is configured to have a plurality of ultrasonic vibrators arranged in an array, and ultrasound is transmitted to a subject and echo signals therefrom are received by these ultrasonic vibrators.

[0025] The T/R beamformer 3 drives the ultrasonic probe 2 to transmit ultrasound having predefined transmission parameters based on control signals from the control section 8. The T/R beamformer 3 also applies signal processing such as phased-addition processing to ultrasonic echo signals.

[0026] The echo data processing section 4 applies B-mode processing including, for example, logarithmic compression processing and envelope detection processing, to echo data output from the T/R beamformer 3 to create B-mode data. The echo data processing section 4 may apply other processing such as Doppler processing.

[0027] The display processing section 5 has an image display control section 51 and an operation button display control section 52, as shown in FIG. 2. The image display control section 51 scan-converts raw data obtained at the echo data processing section 4 by a scan converter to create ultrasonic image data, and displays an ultrasonic image in the display section 6 based on the ultrasonic image data. For example, the image display control section 51 scan-converts the aforementioned B-mode data by the scan converter to create B-mode image data, and displays a B-mode image in the display section 6 based on the B-mode image data. The B-mode image represents an example of the medical image.

[0028] The image display control section 51 also displays images other than the ultrasonic image, such as, for example, characters and graphic symbols, in the display section 6.

[0029] The operation button display control section 52 displays operation buttons B in an auxiliary display section 10, which will be described later, provided in the operating section 7 (an operation button display control function). The operation buttons B are for an operator to input a command to the ultrasonic diagnostic apparatus 1. The operator selects from the operation buttons B for inputting a command.

[0030] The operation button display control section 52 displays a plurality of the operation buttons B each belonging to one of a plurality of categories in one window separately on a category-by-category basis. Details thereof will be discussed later. The operation button display control function represents an exemplary embodiment of the icon display control function in the present invention. The operation button display control section 52 represents an exemplary embodiment of the icon display control section in the present invention.

[0031] The display section 6 is an LCD (Liquid Crystal Display), an organic EL (Electro-Luminescence) display, or the like.

[0032] The operating section 7 is configured to comprise a keyboard, operation buttons and/or a pointing device such as a trackball, and the like, although not particularly shown, for allowing an operator to input a command and/or information.

[0033] The operation buttons are soft keys and hard keys. The operating section 7 is provided with the auxiliary display section 10, as shown in FIG. 3, and the operation buttons B are displayed in the auxiliary display section 10 as the soft keys (see FIG. 7, etc.). The auxiliary display section 10 is constructed from a touch screen in the present embodiment. The operation buttons B as the soft keys represent an exemplary embodiment of the icons in the present invention. The auxiliary display section 10 represents an exemplary embodiment of the icon display section in the present invention, and a window P (see FIG. 7) in the auxiliary display section 10 in which the operation buttons B are displayed represents an exemplary embodiment of the input section in the present invention.

[0034] Operation buttons as the hard keys are omitted in the drawings.

[0035] The control section 8 is a processor such as a CPU (Central Processing Unit). The control section 8 loads thereon a program stored in the storage section 9 and controls several sections in the ultrasonic diagnostic apparatus 1. For example, the control section 8 loads thereon a program stored in the storage section 9 and executes functions of the T/R beamformer 3, echo data processing section 4, and display processing section 5 by the loaded program. The processor constituting the control section 8 represents an exemplary embodiment of the processor in the present invention.

[0036] The control section 8 may execute all of the functions of the T/R beamformer 3, all of the functions of the echo data processing section 4, and all of the functions of the

display processing section 5 by the program, or execute only part of the functions by the program. In case that the control section 8 executes only part of the functions, the remaining functions may be executed by hardware such as circuitry.

[0037] It should be noted that the functions of the T/R beamformer 3, echo data processing section 4, and display processing section 5 may be implemented by hardware such as circuitry.

[0038] The control section 8 also loads thereon a program stored in the storage section 9 and executes a function of an information creating section 81 shown in FIG. 4 by the program. The information creating section 81 creates preset information including information on operation buttons B to be displayed in the auxiliary display section 10 by the operation button display control section 81 and information on categories to which the operation buttons belong (information creating function). Details thereof will be discussed later. The information creating function represents an exemplary embodiment of the information creating function in the present invention.

[0039] The storage section 9 is an HDD (Hard Disk Drive), and/or a semiconductor memory such as a RAM (Random Access Memory) and/or a ROM (Read-Only Memory). The storage section 9 represents an exemplary embodiment of the storage section in the present invention.

[0040] Next, an operation of the ultrasonic diagnostic apparatus 1 in the present embodiment will be described based on the flow chart in FIG. 5. The flow chart in FIG. 5 shows a processing flow in an examination using the ultrasonic diagnostic apparatus 1.

[0041] First, at Step S1, the operation button display control section 52 displays operation buttons B for selecting a type of examination in the auxiliary display section 10, as shown in FIG. 6. The operation button display control section 52 displays the operation buttons B based on an input by the operator at the operating section 7. The operator then selects a type of examination by the operation buttons B displayed in the auxiliary display section 10.

[0042] The type of examination herein is a region to be examined. The operation buttons B are operation buttons Br for selecting a region to be examined. Although not particularly shown here, in each of the operation buttons Br, there are displayed characters representing a region to be examined. When the operator selects an operation button Br corresponding to a desired region to be examined, the selected operation button Br is

displayed in a color different from that of other operation buttons B (as indicated by dots in FIG. 6). Here, a kidney is selected as the region to be examined.

[0043] Selection from the operation buttons B displayed in the auxiliary display section 10 may be made by the operator touching an operation button B displayed in the auxiliary display section 10 by his/her finger or the like, or using a pointing device in the operating section 7. This similarly applies to selection from the operation buttons B displayed in the auxiliary display section 10 in the following description. That is, an input at the auxiliary display section 10 in the operating section 7 may be an input by the operator touching the auxiliary display section 10 by his/her finger or the like, or an input using a pointing device.

[0044] Once a region to be examined has been selected at Step S1, the operation button display control section 52 displays a plurality of operation buttons B specified beforehand by the operator, in the auxiliary display section 10 at Step S2, as shown in FIG. 7. More particularly, the operation button display control section 52 displays a plurality of operation buttons B each belonging to one of a plurality of categories in one window P separately on a category-by-category basis.

[0045] In the present embodiment, a plurality of operation buttons B each belonging to one of four categories are displayed. A first category is for measurement buttons Bm for displaying in the display section 6 a measurement marker MK (see FIG. 11) for measuring a length or a volume in an ultrasonic image displayed in the display section 6, and a second category is for comment buttons Bc for displaying a comment CM (see FIG. 11) in the display section 6. A third category is for body pattern buttons Bb for displaying a body pattern BP (see FIG. 11) in the display section 6, and a fourth category is for buttons Bo for inputting other commands. It should be noted that a long dashed double dotted line surrounding each of the categories in FIG. 7 is drawn for convenience of explanation.

[0046] While the shape of the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo is rectangular in FIG. 7, it is not limited thereto. For example, the body pattern button Bb may have a shape of a body pattern BP.

[0047] The operation buttons B belonging to the same category (the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo) are arranged in a vertical direction in the auxiliary display section 10. The vertical direction represents an exemplary embodiment of the first direction in the present invention. Different categories are arranged

in a horizontal direction orthogonal to the direction of arrangement of the operation buttons B belonging to the same category. The horizontal direction represents an exemplary embodiment of the second direction in the present invention.

[0048] The operation buttons B displayed at Step S2 are buttons to be selected by the operator for him/herself to input a command during capture of an ultrasonic image such as a B-mode image. In the present embodiment, the operation buttons B are buttons for displaying graphic symbols such as the measurement marker MK and/or body pattern BP, characters such as the comment CM, and the like, in a B-mode image displayed in the display section 6 during capture of the B-mode image.

[0049] At Step S2, the operation button display control section 52 displays the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo based on preset information stored in the storage section 9. The preset information includes information on operation buttons B and information on categories to which the operation buttons B belong.

[0050] The number of operation buttons B belonging to one category in the preset information is greater than the number of operation buttons B that can be displayed in one window P in the auxiliary display section 10. The number of categories in the preset information is also greater than the number of categories that can be displayed in one window P in the auxiliary display section 10. Therefore, the operation button display control section 52 selects predetermined operation buttons B in predetermined categories from among categories and operation buttons B included in the preset information, and displays them as an initial display. The "initial display" as used herein refers to a condition before the window P is scrolled, which will be discussed later.

[0051] For example, the operation button display control section 52 may always display predetermined categories and operation buttons B as initial display, or display categories and operation buttons B that were last displayed in a previous examination of the same type as initial display. The number of categories displayed in the window P and the number of operation buttons B displayed in one category are such numbers that the operation buttons B may be displayed in a size sufficient to ensure usability.

[0052] The operation buttons B and the categories to which the operation buttons B belong in the preset information are operation buttons and categories specified by the

operator. The preset information is created by the information creating section 81 for each type of examination conducted in the ultrasonic diagnostic apparatus 1, and stored in the storage section 9. Once information for specifying a type of examination, operation buttons B, and categories has been input by the operator at the operating section 7, the information creating section 81 creates the preset information based on the input. The type of examination refers to a region to be examined and/or a purpose of the examination.

[0053] The preset information here is information created and stored regarding a renal examination, and is information on the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo specified by the operator.

[0054] Now creation of the preset information will be described below. Creation of the preset information is conducted before an examination (before the processing at Steps S1 through S4 in FIG. 5 is conducted). The preset information is created according to an input by the operator. The operator who makes an input for creating the preset information may be an examiner who conducts an examination using the ultrasonic diagnostic apparatus 1. Alternatively, the operator who makes an input for creating the preset information may be a person other than the examiner. The person other than the examiner may be, for example, a person who installs the ultrasonic diagnostic apparatus 1 in an institution such as a hospital or a person who makes an input when the apparatus is shipped from the factory.

[0055] Now creation of the preset information will be particularly described based on the flow chart in FIG. 8. First, at Step S11, the operator makes an input for selecting a renal examination as a type of examination (see FIG. 6). Next, at Step S12, the operation button display control section 52 displays category selection buttons Bs for selecting a category in the auxiliary display section 10, as shown in FIG. 9. The operation button display control section 52 displays the category selection buttons Bs based on an input by the operator at the operating section 7. Once the category selection buttons Bs have been displayed, the operator makes an input for selecting a category selection button Bs of a desired category at the operating section 7. In FIG. 9, a category selection button Bsc for selecting a category of comment button Bc is selected. The selected category selection button Bsc is displayed in a color different from that of other category selection buttons Bs (dots are drawn in FIG. 9).

[0056] Categories corresponding to the category selection buttons Bs are stored in the storage section 9. The storage section 9 stores therein categories of operation button B likely to be used in the ultrasonic diagnostic apparatus 1 corresponding to various

examinations.

[0057] Next, at Step S13, the operator selects kinds of operation button B in the category selected at Step S12. Here, kinds of comment button Bc are selected. In particular, when a category of comment button Bc is selected at Step S12, the image display control section 51 displays a selection window Ps for selecting kinds of comment button Bc in the display section 6 at Step S13, as shown in FIG. 10. The selection window Ps has a comment list V in which kinds of comment button Bc are listed. The operator makes an input for selecting a desired kind of comment button Bc in the comment list V using the operating section 7. The selected kinds of comment button Bc are displayed in a selected button display field C. The operator selects comment buttons Bc likely to be used by an operator of the ultrasonic diagnostic apparatus 1 in the renal examination.

[0058] Kinds of operation button B such as the comment buttons Bc described above are stored in the storage section 9. The storage section 9 stores therein operation buttons B likely to be used in the ultrasonic diagnostic apparatus 1 corresponding to various examinations.

[0059] Once kinds of comment button Bc have been selected at Step S13, the preset information creating section 81 creates preset information containing the category of comment button Bc selected at Step S12 and the kinds of comment button Bc selected at Step S13 as preset information for the renal examination at Step S14. The created preset information is stored in the storage section 9.

[0060] Similarly to the above, the preset information is created and stored for the category of measurement button Bm, category of body pattern button Bb, and category of button Bo for inputting other commands.

[0061] Kinds and categories of operation button in the preset information stored in the storage section 9 may be added and deleted. In particular, the operator can add a kind and a category of operation button by making an input for selecting a type of examination, selecting a category, and selecting a kind of operation button B at the operating section 7, similarly to Steps S11 through S13 described above. The operator can also make an input for deleting a category and a kind of operation button B in the preset information at the operating section 7, although not particularly shown. Once a kind and/or category of operation button B has been added or deleted by an input at the operating section 7, the information creating section

81 updates items in the preset information. The updated preset information is stored in the storage section 9.

[0062] For types of examination other than that for a kidney, preset information including information on operation buttons B to be displayed in one window P and categories to which the operation buttons B belong is created and stored in the storage section 9 in a similar way to that for the preset information for the renal examination. Therefore, the preset information stored in the storage section 9 includes information for identifying a type of examination so as to distinguish which type of examination the preset information is related to.

[0063] Now return to the description of the flow chart in FIG. 5. When the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo are displayed at Step S2 described above, the operator initiates ultrasound transmission/reception by the ultrasonic probe 2 at Step S3. Thus, a B-mode image is displayed in the display section 6.

[0064] Next, at Step S4, the operator conducting ultrasound transmission/reception by the ultrasonic probe 2 makes an input at the operating section 7 for selecting required operation buttons B from among the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo displayed in the auxiliary display section 10 at Step S2. For example, by the operator making an input for selecting one of the measurement buttons Bm at the operating section 7, the image display control section 51 displays a measurement marker MK for measuring a distance between two points over a B-mode image BI displayed in the display section 6, as shown in FIG. 11. Moreover, by the operator making an input for selecting one of the comment buttons Bc at the operating section 7, the image display control section 51 displays a comment CM comprised of characters "Lt Kidney" in the display section 6. Further, by the operator making an input for selecting one of the body pattern buttons Bb at the operating section 7, the image display control section 51 displays a selected body pattern BP in the display section 6.

[0065] At Step S4 described above, in case that the operation button the operator desires to select is not found among the operation buttons B displayed in the auxiliary display section 10, the operator searches for the desired operation button B by scrolling the window P in the auxiliary display section 10. Once the desired operation button B has been displayed, he/she selects it.

[0066] Now scrolling of the window P will be particularly described. As shown in FIG. 12, the window P is divided in a horizontal direction into four regions: a first region R1, a second region R2, a third region R3, and a fourth region R4. In FIG. 12, a long dashed double dotted line indicates each border between adjacent pairs of the first through fourth regions R1 through R4. It should be noted that the long dashed double dotted lines are imaginary lines and are not displayed in the auxiliary display section 10.

[0067] In the first region R1, the measurement buttons Bm are arranged, and in the second region R2, the comment buttons Bc are arranged. In the third region R3, the body pattern buttons Bb are arranged, and in the fourth region R4, the buttons Bo are arranged. The operator can scroll each of the first through fourth regions R1 through R4 independently in the window P. Specifically, as shown in FIG. 13, when the operator makes an input (flick input) by touching any one of the first through fourth regions R1 through R4 in the window P and sliding it in a vertical direction, the operation button display control section 52 scrolls a region of the part of the first through fourth regions R1 through R4 that is slid by the finger in the vertical direction. The operation button display control section 52 achieves scrolling so that operation buttons B that belong to a category corresponding to the region of the part slid by the finger and are not displayed in the window P become displayed. In FIG. 13, the first region R1 is scrolled. By this scrolling, measurement buttons Bm that are not displayed in the window P can be displayed.

[0068] The input by a touch and slide by a finger as described above represents an exemplary embodiment of the input for selecting a category and scrolling the window in a first direction in which icons belonging to the category are arranged.

[0069] It should be noted that the input for selecting any one of the first through fourth regions R1 through R4 and making scrolling is not limited to the input by a touch and slide by a finger, and it may be an input by hard keys and a pointing device in the operating section 7. In this case, the hard keys and pointing device in the operating section 7 represent an embodiment of the input section in the present invention.

[0070] In particular, the operator first makes an input for selecting one of the first through fourth regions R1 through R4 by a hard key. The selected region is displayed in a color different from that of other regions, as exemplarily shown in FIG. 14 (as indicated by dots in FIG. 14). In FIG. 14, the first region R1 is selected. Next, the operator uses a trackball to scroll the selected region. It should be noted that the input method described herein is an

example.

[0071] Moreover, the operator can display operation buttons B in a category that is not displayed in the window P by scrolling the window P in a horizontal direction. In particular, when the operator makes an input by touching the window P and sliding it in the horizontal direction by his/her finger, as shown in FIG. 15, the operation button display control section 52 scrolls the window P as a whole in the horizontal direction. The operation button display control section 52 achieves scrolling so that operation buttons Bx in a category that is not displayed in the window P become displayed in the window P. By this scrolling, operation buttons Bx in a category other than those of the measurement buttons Bm, comment buttons Bc, body pattern buttons Bb, and buttons Bo that are displayed in the window P can become displayed.

[0072] According to the present embodiment, operation buttons B likely to be used by an operator in a certain examination at the ultrasonic diagnostic apparatus 1 are specified by the operator, and are stored as the preset information. The operation buttons B stored as the preset information are displayed in one window separately on a category-by-category basis, so that the operator can immediately find a required operation button B during an examination. Therefore, an operator's workflow can be improved.

[0073] Especially in the ultrasonic diagnostic apparatus 1, the operator conducts ultrasound transmission/reception while holding the ultrasonic probe 2 in his/her hand during capture of a B-mode image. According to the present embodiment, since operation buttons B to be selected by the operator during image capture are displayed as described above, operation buttons B can be easily selected even during image capture.

[0074] Moreover, since not all operation buttons B are displayed in the window P, the operation buttons B can be displayed in a size sufficient to ensure usability. Although not all operation buttons B are thus displayed, the window P can be scrolled in a vertical direction on a category-by-category basis, and the whole window P can be scrolled in a horizontal direction as well, so that a desired operation button B that is not displayed in the window P may be easily found.

[0075] While the present invention has been described with reference to the embodiments, it will be easily recognized that the present invention may be practiced with several modifications without departing from the spirit and scope thereof. For example, the

preset information may be created for each operator. The preset information may also be created for each imaging mode in ultrasonic imaging. The imaging mode refers to a B-mode, a Doppler mode, and the like. Moreover, the preset information may be created for each type of ultrasonic probe 2.

[0076] Further, the preset information may be created for each combination of two or more of the type of examination, operator, imaging mode, and type of ultrasonic probe 2. For example, the preset information may be created for each type of examination, and for each operator as well.

[0077] Moreover, the ultrasonic diagnostic apparatus 1 described above is an example of the display apparatus in accordance with the present invention, i.e., display apparatus for displaying operation buttons for an operator to input a command. The present invention is not limited to ultrasonic diagnostic apparatuses. For example, the present invention may be likewise applied to any medical image capture apparatus for capturing a medical image of a subject, such as X-ray CT (Computed Tomography) apparatuses, and MRI (Magnetic Resonance Imaging) apparatuses. Besides, the present invention may be any display apparatus that displays operation buttons for an operator to input a command. Furthermore, the icon in the present invention is not limited to the operation button for an operator to input a command. The present invention may be any display apparatus for displaying icons.

DESCRIPTION OF REFERENCE SYMBOLS

[0078]

1	Ultrasonic diagnostic apparatus
8	Control section (processor)
9	Storage section
10	Auxiliary display section (icon display section)
52	Operation button display control section (icon display control section)
81	Information creating section
B	Operation button (icon)
P	Window

CLAIMS

What we claim is:

1. A display apparatus characterized in comprising:

an icon display section in which a plurality of icons are displayed;

a processor for executing a program of an icon display control function of displaying said icons each belonging to one of a plurality of categories, in one window in said icon display section separately on a category-by-category basis, said function displaying said icons belonging to the same category arranged in a first direction, and displaying said icons in different categories in a second direction orthogonal to said first direction; and

an input section for allowing an operator to make an input for scrolling said window,

wherein when the operator makes an input at said input section for selecting one of said plurality of categories and scrolling said window in said first direction in which icons belonging to said category are arranged, said icon display control function scrolls, based on said input, only part of said window representing said selected category in said first direction so that icons that belong to said selected category and are not displayed in said window become displayed in said window, and when the operator makes an input at said input section for scrolling said window in said second direction, said icon display control function scrolls, based on said input, said window as a whole in said second direction so that icons in a category that is not displayed in said window become displayed in said window.

2. The display apparatus as recited in claim 1, characterized in that: said icon display section is a touch screen, and said icons are displayed in said window in said touch screen.

3. The display apparatus as recited in claim 2, characterized in that: said window in said touch screen also serves as said input section.

4. The display apparatus as recited in any one of claims 1 through 3, characterized in that: said input section comprises hard keys and a pointing device.

5. The display apparatus as recited in any one of claims 1 through 4, characterized in that:

said processor executes a program of an information creating function of creating

preset information including information on said icons and information on categories to which said icons belong, said function creating said preset information based on an input by the operator specifying said icons and categories to which said icons belong, and

said icon display control function displays said icons based on said preset information.

6. The display apparatus as recited in claim 5, characterized in that:

said preset information is stored in a storage section, and

said information creating function updates said preset information based on an input by the operator adding or deleting said category or said icon in said preset information stored in said storage section.

7. The display apparatus as recited in any one of claims 1 through 6, characterized in that: said icons are soft keys displayed in a touch screen, and are operation buttons to be selected by the operator.

8. The display apparatus as recited in any one of claims 1 through 7, characterized in that: said icon display section, said processor, and said input section are an icon display section, a processor, and an input section in a medical image capture apparatus for capturing a medical image.

9. The display apparatus as recited in claim 8, characterized in that: said icons are operation buttons to be selected by the operator during capture of a medical image.

10. A display apparatus characterized in comprising:

an icon display section in which a plurality of icons are displayed;

an icon display control section for displaying said icons each belonging to one of a plurality of categories, in one window in said icon display section separately on a category-by-category basis, said control section displaying said icons belonging to the same category arranged in a first direction, and displaying said icons in different categories in a second direction orthogonal to said first direction; and

an input section for allowing an operator to make an input for scrolling said window,

wherein when the operator makes an input at said input section for selecting one of said plurality of categories and scrolling said window in said first direction in which icons

belonging to said category are arranged, said icon display control section scrolls, based on said input, only part of said window representing said selected category in said first direction so that icons that belong to said selected category and are not displayed in said window become displayed in said window, and when the operator makes an input at said input section for scrolling said window in said second direction, said icon display control section scrolls, based on said input, said window as a whole in said second direction so that icons in a category that is not displayed in said window become displayed in said window.

11. A program for a display apparatus, said program causing a processing to execute: an icon display control function of displaying a plurality of icons each belonging to one of a plurality of categories, in one window in an icon display section separately on a category-by-category basis, said function displaying said icons belonging to the same category arranged in a first direction, and displaying said icons in different categories in a second direction orthogonal to said first direction, said program being characterized in that:

when an operator makes an input at an input section for selecting one of said plurality of categories and scrolling said window in said first direction in which icons belonging to said category are arranged, said icon display control function scrolls, based on said input, only part of said window representing said selected category in said first direction so that icons that belong to said selected category and are not displayed in said window become displayed in said window, and when the operator makes an input at said input section for scrolling said window in said second direction, said icon display control function scrolls, based on said input, said window as a whole in said second direction so that icons in a category that is not displayed in said window become displayed in said window.

FIG.1

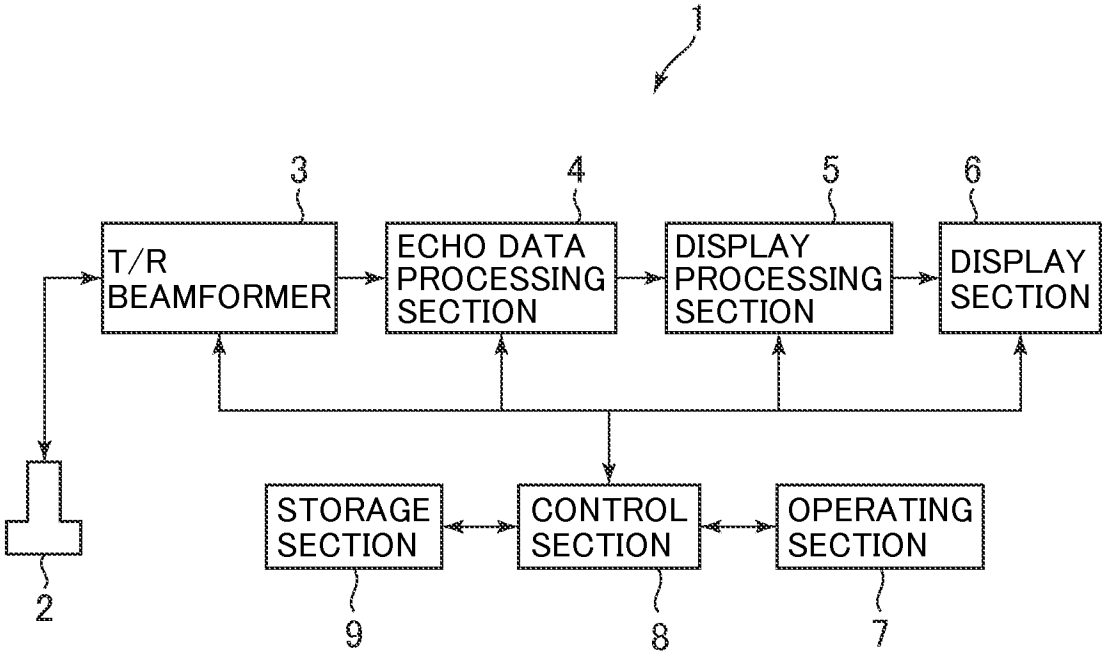

1
3
4
5
6
T/R BEAMFORMER
ECHO DATA PROCESSING SECTION
DISPLAY PROCESSING SECTION
DISPLAY SECTION
2
STORAGE SECTION
CONTROL SECTION
OPERATING SECTION
9
8
7

FIG.2

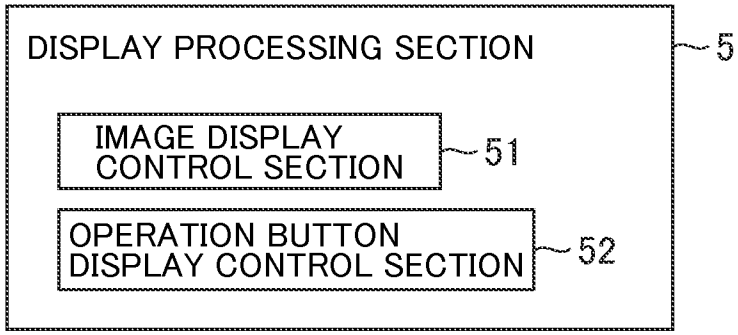

DISPLAY PROCESSING SECTION
5
IMAGE DISPLAY CONTROL SECTION
51
OPERATION BUTTON DISPLAY CONTROL SECTION
52

FIG.3

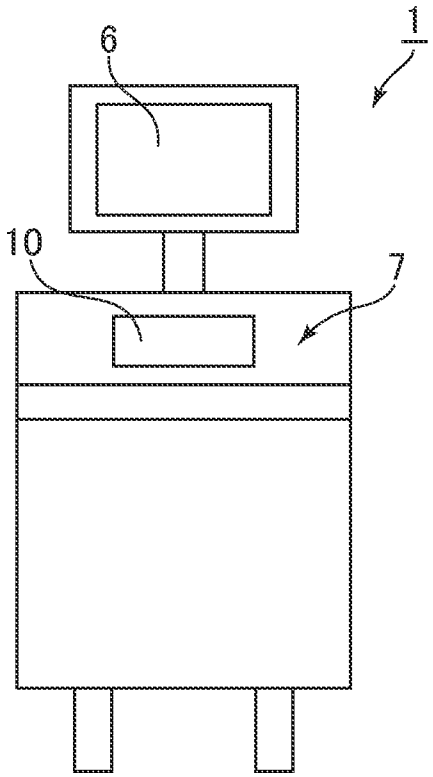


FIG.4

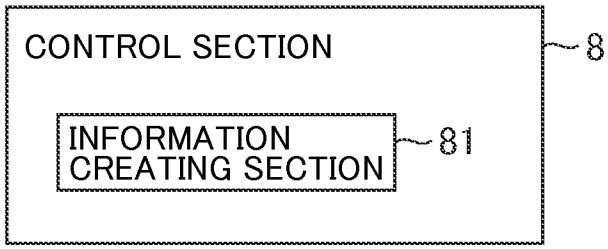


FIG.5

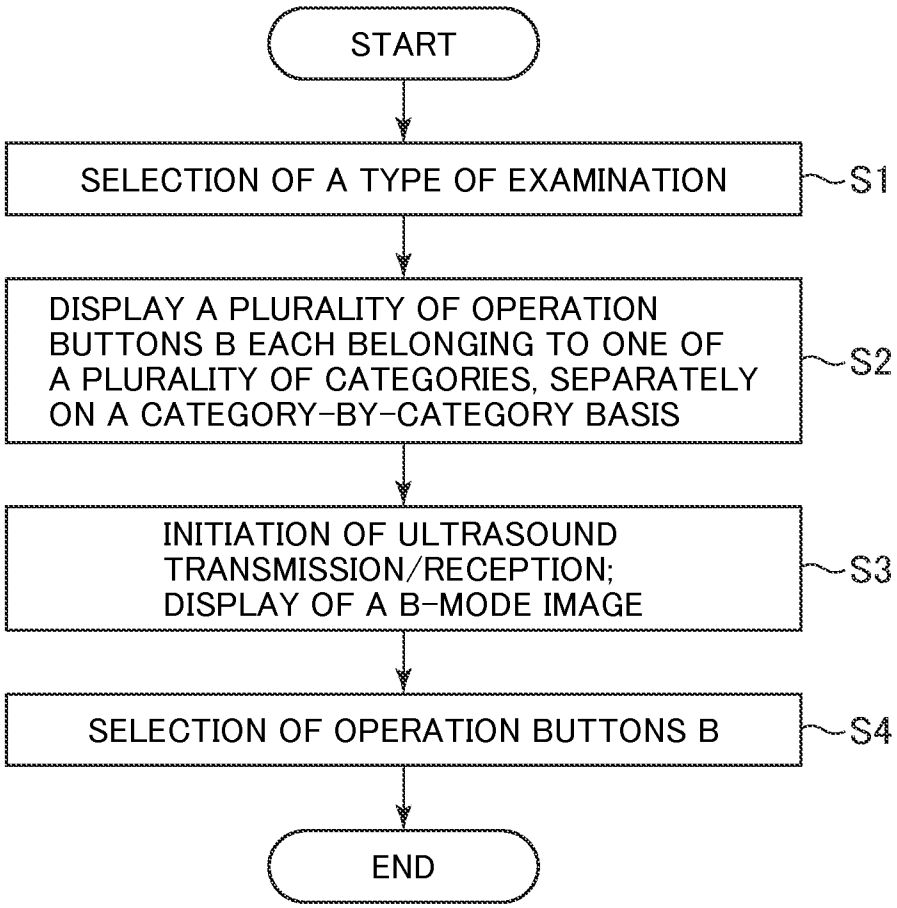

START
SELECTION OF A TYPE OF EXAMINATION
S1
DISPLAY A PLURALITY OF OPERATION BUTTONS B EACH BELONGING TO ONE OF A PLURALITY OF CATEGORIES, SEPARATELY ON A CATEGORY-BY-CATEGORY BASIS
S2
INITIATION OF ULTRASOUND TRANSMISSION/RECEPTION; DISPLAY OF A B-MODE IMAGE
S3
SELECTION OF OPERATION BUTTONS B
S4
END

FIG.6

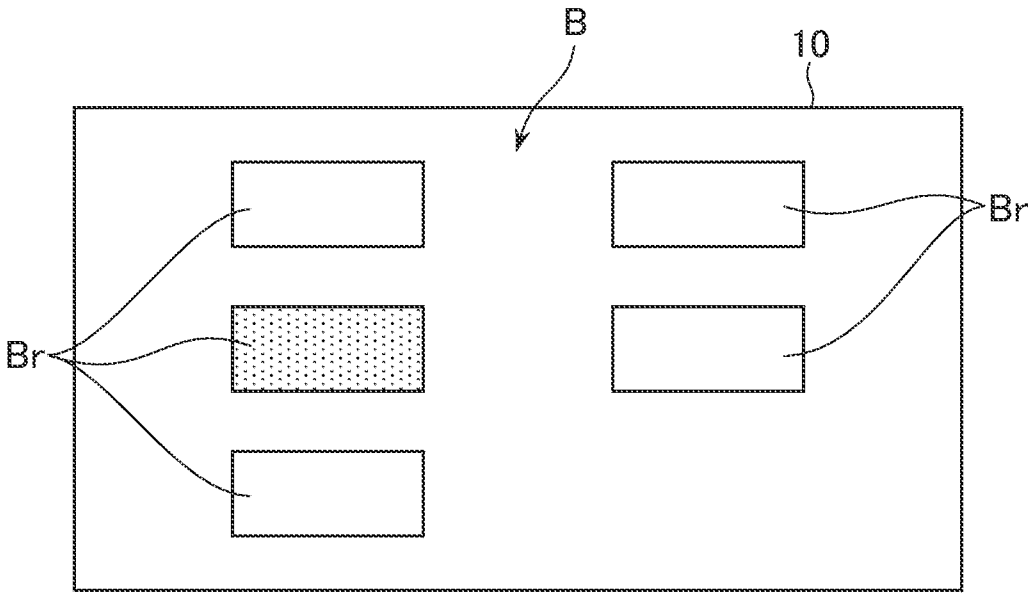


FIG.7

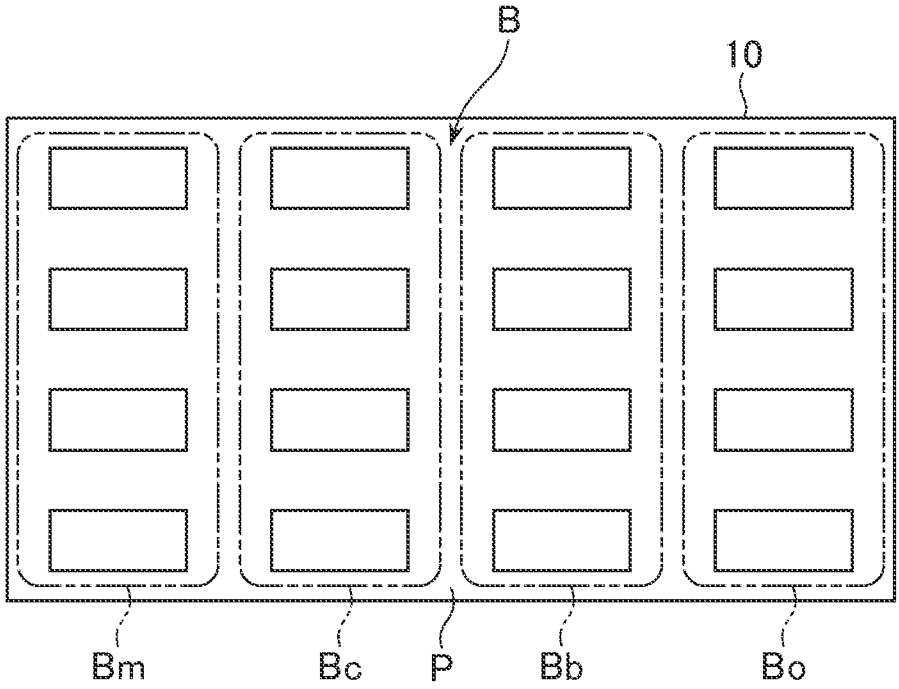


FIG.8

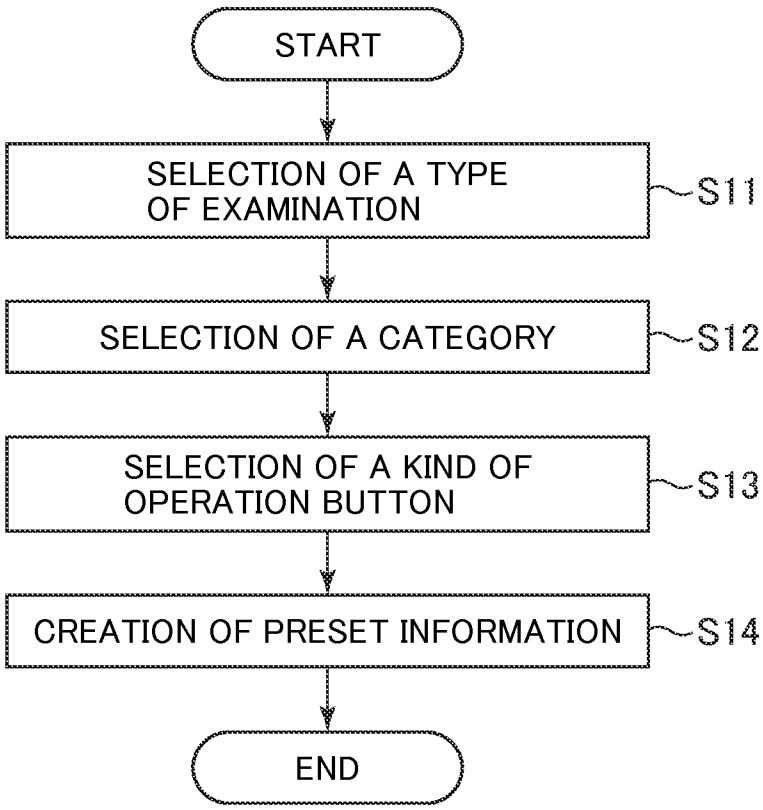
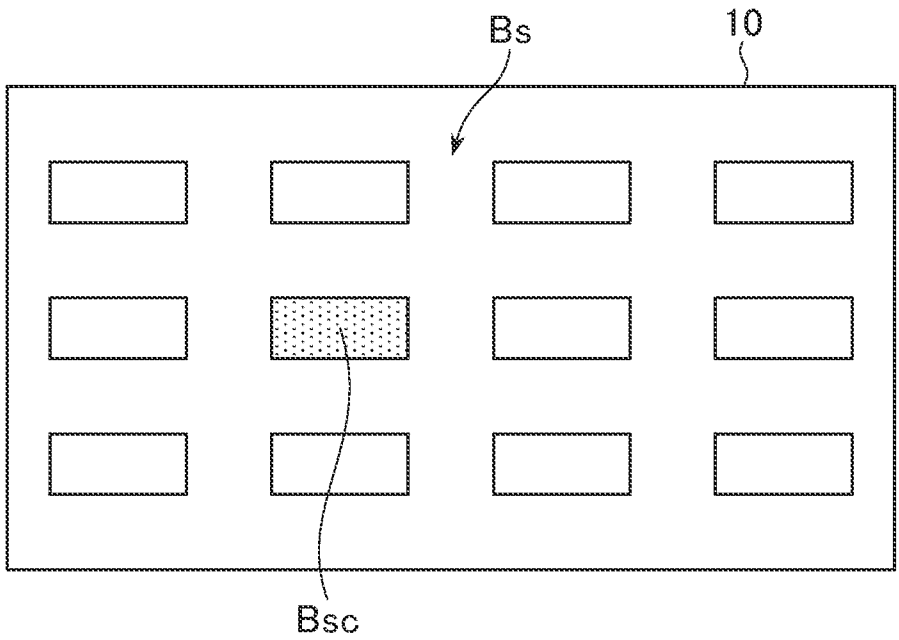

START
SELECTION OF A TYPE OF EXAMINATION
S11
SELECTION OF A CATEGORY
S12
SELECTION OF A KIND OF OPERATION BUTTON
S13
CREATION OF PRESET INFORMATION
S14
END

FIG.9



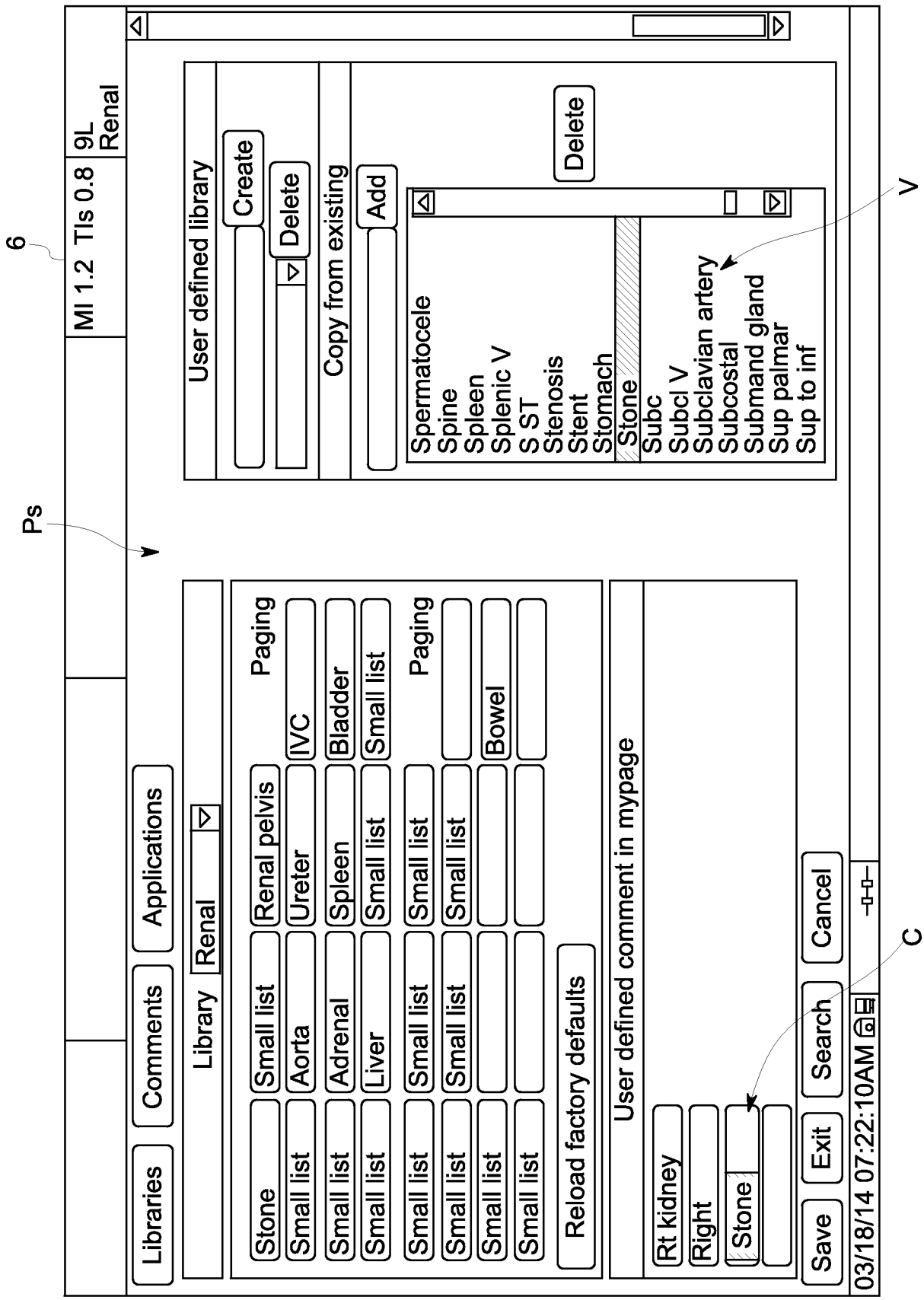

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Comments
Applications
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Renal
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Paging
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Ureter
Aorta
Adrenal
Liver
Paging
Spleen
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Small list
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Small list
IVC
Bladder
Small list
Bowel
Reload factory defaults
User defined comment in mypage
Rt kidney
Right
Stone
Save
Exit
Search
Cancel
03/18/14 07:22:10AM
C
User defined library
Create
Delete
Copy from existing
Add
Spermatocele
Spine
Spleen
Splenic V
S ST
Stenosis
Stent
Stomach
Stone
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Subc
Subcl V
Subclavian artery
Subcostal
Submand gland
Sup palmar
Sup to inf
V

FIG. 10

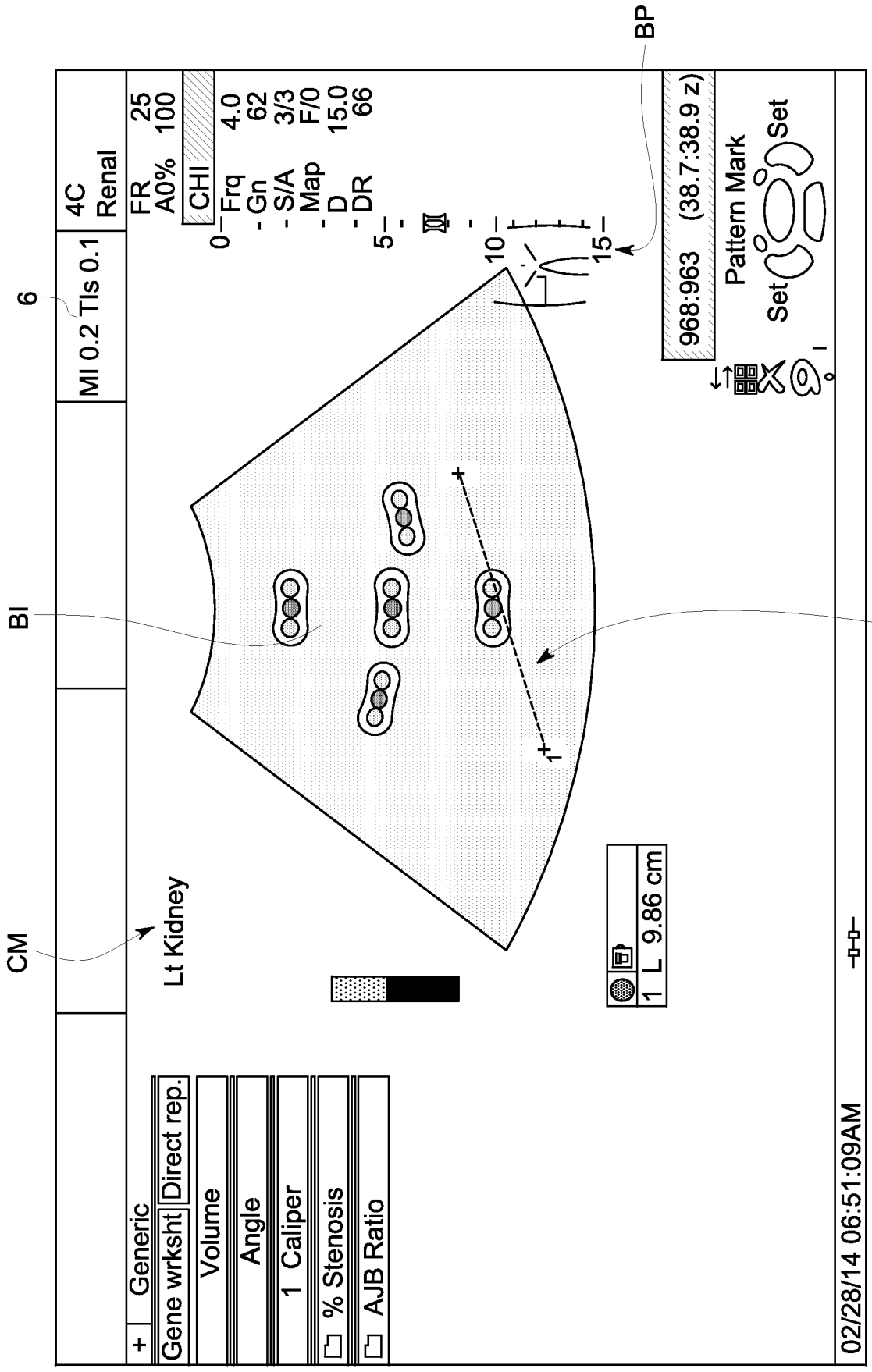

6
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4C
Renal
FR 25
A0% 100
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Frq 4.0
Gn 62
S/A 3/3
Map F/0
D 15.0
DR 66
0
5
10
15
BP
968:963 (38.7:38.9 z)
Pattern Mark
Set
Set
BI
MK
CM
Lt Kidney
1 L 9.86 cm
+ Generic
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Volume
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% Stenosis
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02/28/14 06:51:09AM

FIG. 11

FIG.12

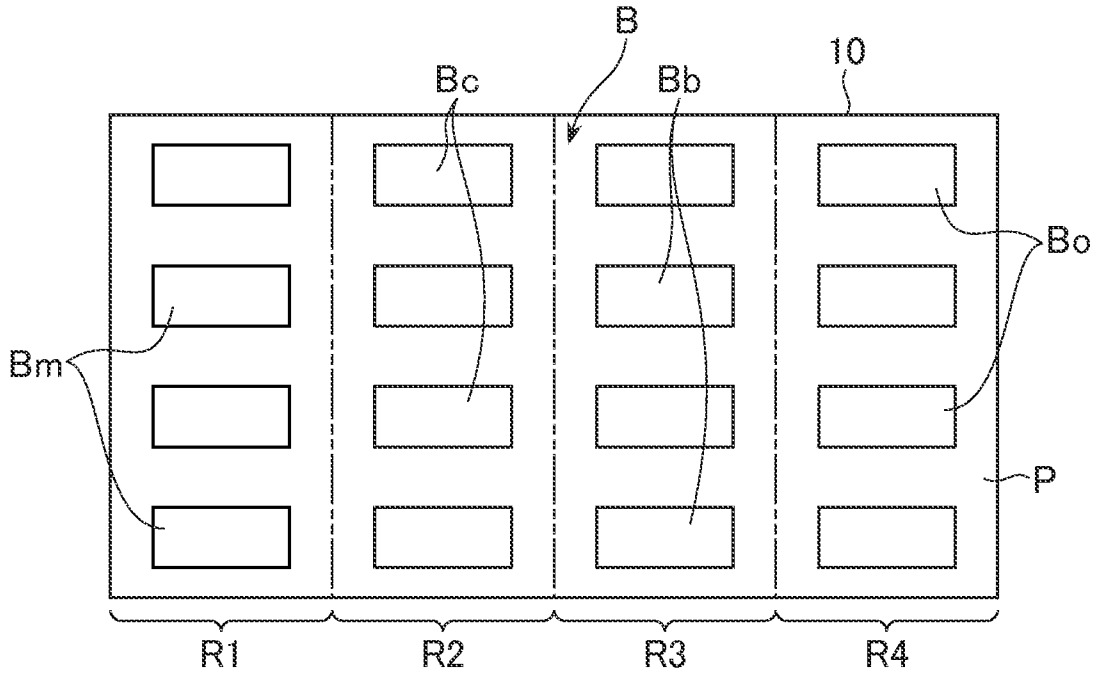


FIG.13

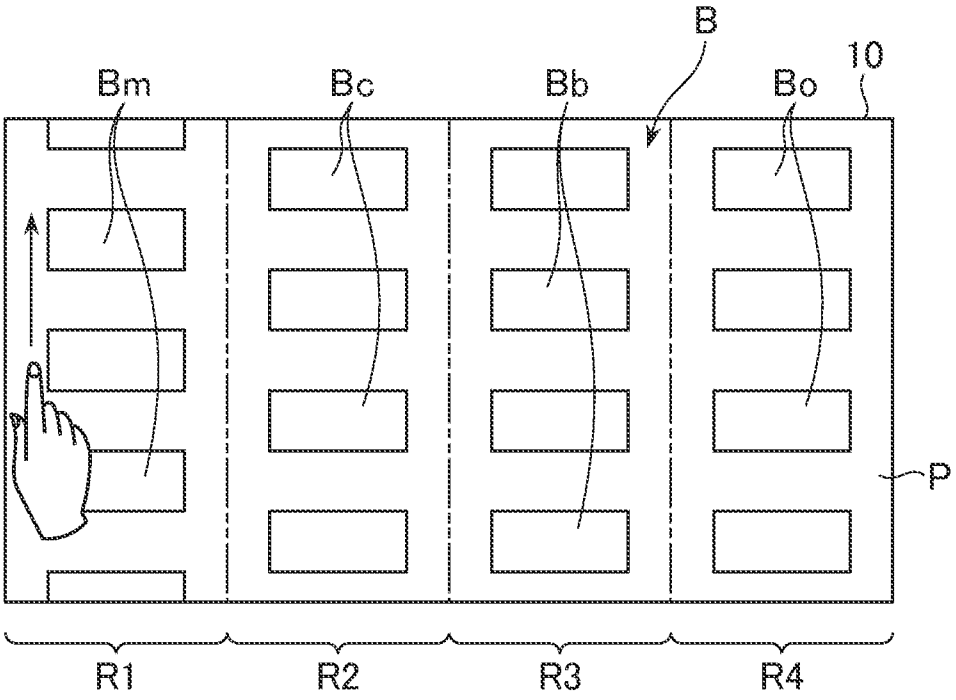


FIG.14

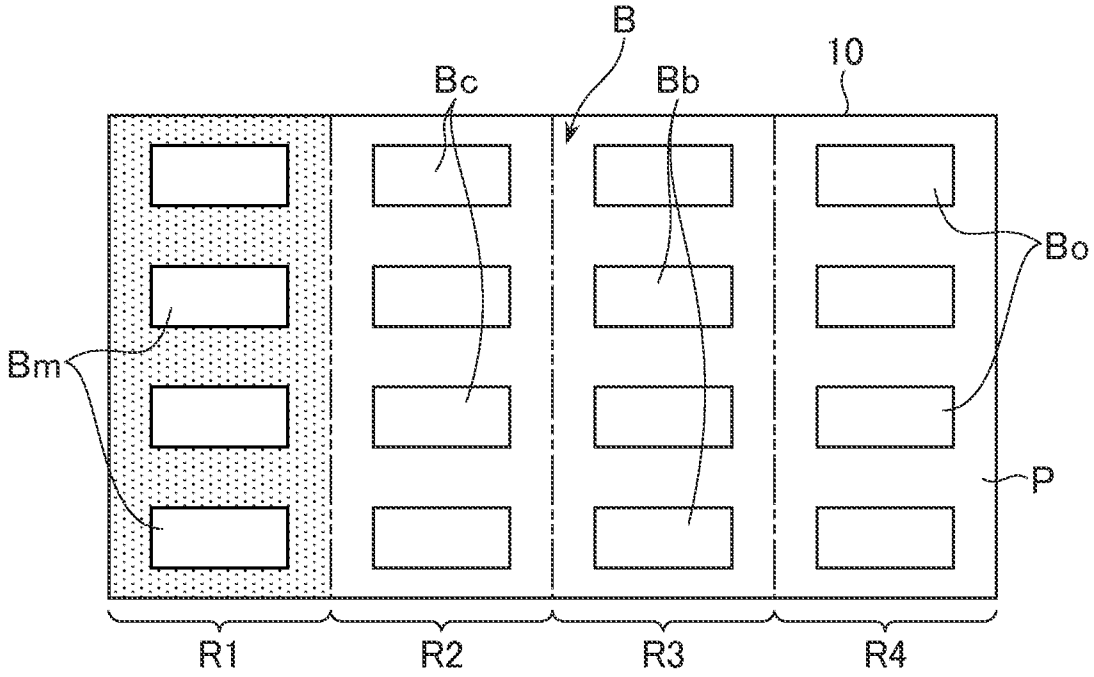
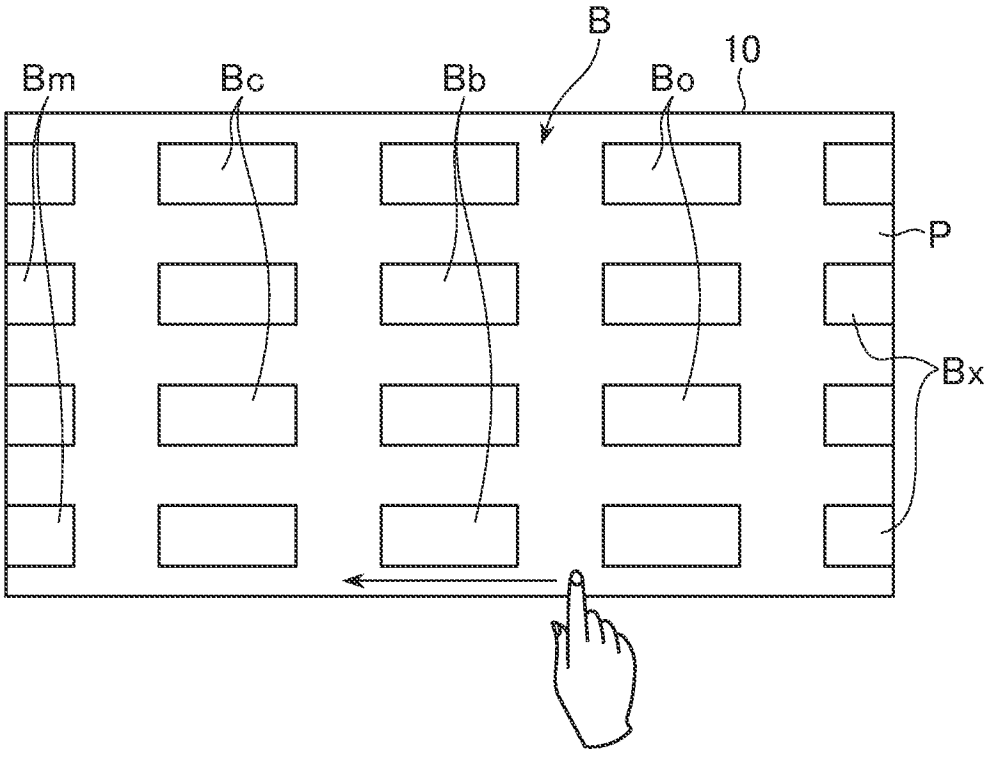


FIG.15



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2015/026417

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/0485
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/061266 A1 (CHAI CRX K [US] ET AL) 7 March 2013 (2013-03-07) paragraphs [0021], [0037] - [0041], [0057]; figures 1, 3, 9	1-11
A	US 2008/155462 A1 (NILAKANTAN NIKHIL [US] ET AL) 26 June 2008 (2008-06-26) abstract paragraph [0038]	1-11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 August 2015	18/08/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Cohen, Benjamin

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2015/026417

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013061266 A1	07-03-2013	AU 2012304456 A1	20-03-2014
		CN 103930849 A	16-07-2014
		EP 2592828 A1	15-05-2013
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		US 2013061266 A1	07-03-2013
		US 2015195623 A1	09-07-2015
		WO 2013036792 A1	14-03-2013
US 2008155462 A1	26-06-2008	NONE	