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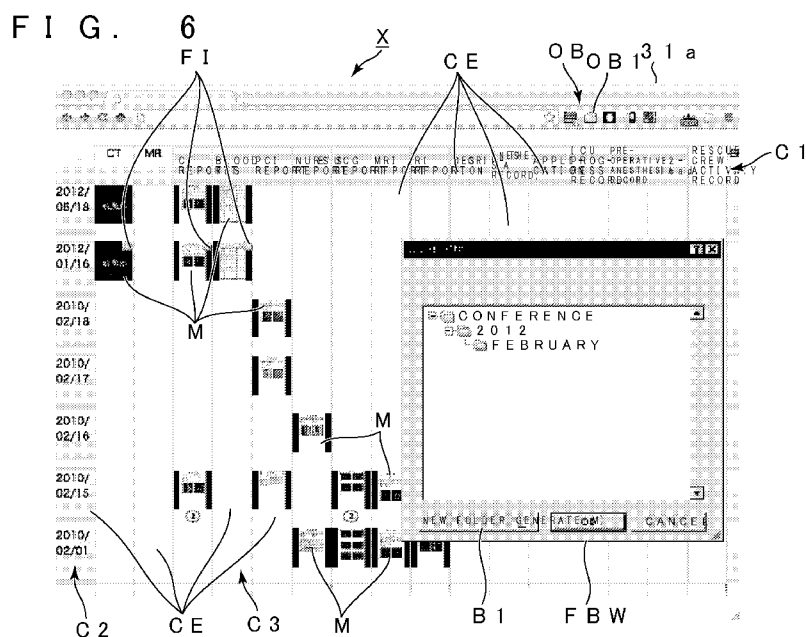
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- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
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[Continued on next page]

- (54) Title: **DISPLAY DEVICE AND IMAGE DISPLAY SYSTEM**



- (57) Abstract: To provide a display device and an image display system capable of arranging data in terms of an operator's intention while securing the viewing property of the data. The display device is provided with a display screen 31a on which a view X in which simple images M based on medical data are arranged in a matrix form, is displayed. Folder icons FI each indicating an image based on the data put in a folder, of the medical data are displayed on the display screen 31a. A folder browser window FBW is displayed on the display screen 31a with the view X being displayed thereon. Each simple image M can be put in the corresponding folder by its dragging and dropping.

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DISPLAY DEVICE AND IMAGE DISPLAY SYSTEM**BACKGROUND TO THE INVENTION**

[Technical Field]

[001] The present invention relates to a display device and an image display system which display a view of simple images of patients.

[Background Art]

[002] A display device, which is connected to a server via Network and displays images based on medical data stored in the server, has been described in, for example, a Patent Document 1.

[003] The medical data stored in the server are data of medical images such as X-ray CT images captured by an X-ray CT (Computed Tomography) apparatus, MRI images captured by an MRI (Magnetic Resonance Imaging) system, etc. for example. In addition to the above, the medical data also include those or the like in which documents of paper used in hospitals, such as a patient referral document, etc. are scanned and brought into data form.

Summary of the Invention

[004] Meanwhile, there is a case where quite a number of medical images and documents have been created with respect to patients that call a hospital and their data have been stored. When a diagnosis or the like is carried out, an operator needs to find out related medical images and documents out of them depending on the purpose. There is also a case where it is desired to know histories such as the frequency of generation of medical data with respect to a given patient. Therefore, in order to satisfy these requests, the inventors of the present application have proposed a display device that displays a view in which medical images and documents have been arranged in a matrix form. In this view, for example, thumbnails of medical images and documents of the same date are arranged in a row direction (transverse direction), and thumbnails of the same document class are arranged in a column direction (longitudinal direction).

[005] The above-described view of simple images is excellent in viewing property but is hard to manage medical data in terms of an operator's intention. Thus, if it is possible to classify and arrange the simple images out of the view depending on the purpose, the operator is able to easily find out a desired image and becomes convenient. With this situation, there has been a demand for a display device and an image display system capable of arranging data in terms of an operator's intention while securing the viewing property of the data.

[006] The invention of one aspect made to solve the above problems provides a display device including a display unit which displays a view in which images based on medical data are arranged in a matrix form and which is adapted to display indicators therein, each indicating an image based on the data put in a folder, of the medical data.

[007] Further, the invention of another aspect provides a display device including a display unit which displays a view of images based on data having accompanying information of a plurality of attributes as metadata, the view being a matrix-like view in which the images are arranged for every accompanying information of one attribute in a row direction and arranged for every accompanying information of other attributes in a column direction, and which is adapted to display indicators therein, each indicating an image based on the data put in a folder, of the data.

[008] According to the invention of the above aspects, since the data of the images that configure the view are put in each folder, the data can be arranged in terms of an operator's intention, and the viewing property of the data can be ensured by displaying the view. Since each indicator is displayed, it is possible to grasp that it indicates the image based on the data put in the folder.

Brief Description of the Drawings

[009] FIG. 1 is a block diagram of an image display system according to an embodiment.

[0010] FIG. 2 is a diagram showing a display screen of a display unit on which a view is displayed.

[0011] FIG. 3 is a flowchart for describing the storage of each simple image into a folder.

[0012] FIG. 4 is a flowchart showing the details of a process at Step S1 shown in FIG. 3.

[0013] FIG. 5 is a diagram showing a display screen being in a state in which a first operation button is clicked.

[0014] FIG. 6 is a diagram showing a display screen on which a folder browser window is displayed.

[0015] FIG. 7 is a diagram illustrating one example of a table.

[0016] FIG. 8 is a diagram depicting a display screen on which a folder browser window with a "June" folder being generated newly is displayed.

[0017] FIG. 9 is a diagram showing a table after the "June" folder has been added thereto.

[0018] FIG. 10 is a diagram illustrating a display screen on which a sub window is displayed.

[0019] FIG. 11 is a diagram for describing the operation of putting each simple image used in a conference of June in the "June" folder.

[0020] FIG. 12 is a diagram showing a table being in a state in which UID is written into each UID

column of the “June” folder.

[0021] FIG. 13 is a diagram illustrating a folder viewer.

[0022] FIG. 14 is a diagram showing a display screen on which a folder browser window is displayed.

[0023] FIG. 15 is a diagram depicting a display screen on which the folder browser window after an “August” folder has been generated is displayed.

[0024] FIG. 16 is a diagram showing the table after the “August” folder has been added thereto.

[0025] FIG. 17 is a diagram depicting the display screen on which a sub window of the “June” folder is displayed.

[0026] FIG. 18 is a diagram for describing the operation of putting each simple image used in a conference of August in the “August” folder.

[0027] FIG. 19 is a diagram showing a table being in a state in which UID is written into each UID column of the “August” folder.

[0028] FIG. 20 is a diagram illustrating a folder viewer.

[0029] FIG. 21 is a diagram showing a state in which a patient name is clicked in the folder viewer shown in FIG. 20

[0030] FIG. 22 is a block diagram showing another example of an image display system according to an embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0031] An embodiment of the present invention will hereinafter be described in detail based on the accompanying drawings. An image display system 1 shown in FIG. 1 is equipped with a server 2 and a display terminal 3 connected via a network N. The image display system 1 is a system which displays images about medical care. A plurality of department systems 4 are connected to the server 2 via the network N. The image display system 1 is one example illustrative of an embodiment of an image display system according to the present invention. The display terminal 3 is one example illustrative of an embodiment of a display device according to the present invention.

[0032] The server 2 has a storage unit 21, a display data generating unit 22 and a data output unit 23. The storage unit 21 is, for example, an HDD (Hard Disk Drive) or the like. Medical data or the like inputted from each department system 4 to the server 2 via the network N have been stored in the storage unit 21. The server 2 is one example illustrative of an embodiment of a server in the present invention. The storage unit 21 is one example illustrative of an embodiment of a storage unit in the

present invention.

[0033] Each of the medical data stored in the storage unit 21 is data related to each patient, which is generated in a medical provision facility, an inspection facility for performing the inspection of a specimen, or the like. The data include medical image data, document data, numeric data, etc. The medical data is one example illustrative of an embodiment of medical data in the present invention.

[0034] The medical image data is data acquired by the modality or the like of the department system 4, e.g., image data such as an X-ray CT image, an MRI image, an ultrasound image or the like. The document data is data about, for example, a radiographic interpretation report, a patient referral document, informed consent forms such as a surgery consent form, an inspection consent form or the like, a medical questionnaire, an application blank, a result of inspection, or the like. The document data also includes PDF (Portable Document Format) data set in the form of data by scanning each paper document, or the like. The numeric data is data of numeric values related to each patient, for example, numeric data indicative of inspection results.

[0035] The medical data also includes data or the like about a progress record of patient's biological information such as an electrocardiogram, etc., and other records related to patients in addition to the medical image data, the document data and the numeric data listed above.

[0036] The medical data includes metadata in addition to the body of data. The metadata is comprised of accompanying information of a plurality of attributes such as the name of a patient, a patient ID, a date, a document class, a type code, a practice setting, etc. Here, the term of "accompanying information" means a specific name, a date, a document class, a type code and a practice setting. The attributes means the attributes associated with these accompanying information. For example, the accompanying information about the attribute of "document class" is "CT", "MRI" or the like. The accompanying information about the attribute of "practice setting" is "department of radiology", "department of circulatory organ" or the like. The metadata is a concept that includes information (e.g., information referred to as "document class") about an attribute, and specific information (i.e., accompanying information, e.g., information referred to as "CT") about the attribute.

[0037] The metadata includes Unique ID (hereinafter called "UID"). The UID is information for identifying medical data.

[0038] The metadata includes one automatically applied at each of the department systems 4, and one applied by performing an input from an operator, such as a modality of an X-ray CT apparatus or the

like, etc, for example.

[0039] The date for the metadata corresponds to the generation date of medical data, for example. The date for the metadata may include the year, the time and so on as well as the day. If medical image data is used, then the date of image shooting or capturing may be set as a generation date. If document data is used, then the generated date of a document may be a generation date. Alternatively, the date when a document was scanned and brought into data form may be a generation date.

[0040] The document class for the metadata is of information indicative of the type of medical data, e.g., information indicative of the type of medical images of MRI (Magnetic Resonance Imaging), US (Ultrasound) and the like, and the type of documents such as a hospitalization consent form, an application blank for hospitalization, a medical questionnaire for hospitalization, an inspection consent form, a surgery consent form, etc. The type code for the metadata is information indicative of a superordinate concept of a document class, for example, a consent form or the like.

[0041] The practice setting for the metadata is information indicative of a department to which a request to generate medical data is made, such as the department of radiology, the department of circulatory organ or the like.

[0042] The attributes for the metadata may be determined in advance. Even when they are determined in advance, the attributes may be arranged to be capable of performing their addition and deletion.

[0043] As will be described later, a table TA in which UID of medical data of a simple image M held in each folder and a folder name are associated with each other is stored in the storage unit 21.

[0044] The display data generating unit 22 generates data of an image displayed in the display terminal 3. For example, the display data generating unit 22 generates data of a view X of simple images M of the same patient based on the medical data stored in the storage unit 21. As will be described later, the view X is displayed in the display terminal 3 (refer to FIG. 2, for example). The display data generating unit 22 is one example illustrative of an embodiment of a view generating unit in the present invention.

[0045] The display data generating unit 22 generates data of a folder viewer FV displayed in the display terminal 3 (refer to FIG. 6, for example). The folder viewer FV will be described later.

[0046] The data output unit 23 outputs data from the server 2 to the display terminal 3 in response to a request from the display terminal 3.

[0047] In FIG. 1, the display data generating unit 22 and the data output unit 23 are provided in the

same server as the storage unit 21 having stored the medical data therein, but may be provided in a server different from that for the storage unit 21.

[0048] The display terminal 3 is a general-purpose personal computer, for example. The display terminal 3 may be a tablet type computer. The display terminal 3 has a display unit 31, a controller 32, an input unit 33, and a storage unit 34.

[0049] The display unit 31 is an LCD (Liquid Crystal Display), a CRT (Cathode Ray Tube) or the like. The display unit 31 is one example illustrative of an embodiment of a display unit in the present invention.

[0050] The controller 32 has a data request unit 321, a display control unit 322 and a table generating unit 323. The data request unit 321 outputs a signal for requesting the data of the view X or the like to the server 2, based on an operator's input in the input unit 33.

[0051] The display control unit 322 causes a display screen 31a of the display unit 31 to display an image. For example, the display control unit 322 causes the display screen 31a of the display unit 31 to display the view X as shown in FIG. 2, based on the data of the view X input from the server 2. In FIG. 2, the view X displayed in the display unit 31 is a part of the view X generated by the display data generating unit 22.

[0052] The view X includes display columns C1 and C2 for accompanying information and a display column C3 for each simple image. These display columns C1 and C2 and C3 are made up of a plurality of cells CE respectively. The display column C1 for the accompanying information is comprised of cells CE that configure the top row arranged in a row direction (lateral direction) in the view X. The display column C2 for the accompanying information is comprised of cells CE that configure the leftmost column arranged in a column direction (lengthwise direction) in the view X.

[0053] The display control unit 322 causes the display column C1 for the accompanying information to display accompanying information of the same attribute. Also the display control unit 322 causes even the display column C2 for the accompanying information to display accompanying information of the same attribute. Accompanying information of different attributes are displayed in the display columns C1 and C2. In FIG. 2, a document class is displayed in the display column C1 for the accompanying information, and the date (year, month and day) is displayed in the display column C2 for the accompanying information. The accompanying information displayed in the display column C1 for the accompanying information is one example illustrative of an embodiment of accompanying

information of one attribute in the present invention. Also the accompanying information displayed in the display column C2 for the accompanying information is one example illustrative of an embodiment of accompanying information of other attributes in the present invention.

[0054] The attributes of the display columns C1 and C2 for the accompanying information may be adapted to be able to change by performing the input operation using the input unit 33 by the operator.

[0055] Simple images M based on the medical data stored in the storage unit 21 are displayed in the display column C3 for the simple images. Each of the simple images M is a thumbnail image or the like. Data about the simple image M is generated by the display data generating unit 22 of the server 2. The simple image M is one example illustrative of an embodiment of an image based on data in the present invention.

[0056] A description will be made of the generation of the simple images M by the display data generating unit 22. When each simple image M displayed in the display column C3 is of a medical image based on the medical image data, a sheet of medical image data selected out of a plurality of sheets of medical image data generated at one inspection is chosen. Of the plurality of sheets of medical image data generated at one inspection, the first data or intermediate data may automatically be selected. Then, the selected one sheet of medical image data is converted to a suitable size to display it in the view X. This size is a size of such an extent that it can be arranged on the display screen 31a in a state in which a viewing property has been maintained (e.g., 64×64 pixels, 96×96 pixels, etc.). The simple images M based on the so-converted medical image data are displayed in the cells CE that configure the display column C3.

[0057] When the simple images M are images based on document data, e.g., data about a sheet of document is selected if the document data is data about a plurality of sheets of documents. The selected data is converted to a suitable size as with the above. Then, each simple image M based on the converted data is displayed in the display column C3.

[0058] When the medical data displayed as the simple image M is numeric data, an image indicative of the contents of the numeric data is generated and displayed as a simple image M. For example, the image indicative of the contents of the numeric data is an image comprised of characters indicative of the contents of the numeric data. The characters indicative of the contents of the numeric data are characters indicative of an inspection name, and the like.

[0059] By causing the operator to click each simple image M displayed in the display column C3 using

the input unit 33, the display control unit 322 causes an image (original image) based on the original medical data by which the clicked simple image M has been generated, to be displayed. This medical data is obtained from the server 2. Specifically, the data request unit 321 first requests the original medical data of the clicked simple image M to the server 2. This request contains UID of the original medical data. In the server 2, the requested medical data is read from the storage unit 21, based on the UID inputted from the display terminal 3 and outputted to the display terminal 3 by the data output unit 23.

[0060] Accompanying information in the lengthwise direction (column direction) of the display column C3 are displayed in their corresponding cells CE that configure the display column C1. Also accompanying information in the lateral direction (row direction) of the display column C3 are displayed in their corresponding cells CE that configure the display column C2. Simple images M are arranged in matrix form in the display column C3. Simple images M having the accompanying information displayed in the cells CE that configure the display column C1 are arranged in the display column C3 as viewed in the column direction. Simple images M having the accompanying information displayed in the cells CE that configure the display column C2 are arranged in the display column C3 as viewed in the row direction. In the view X, the corresponding simple image M is placed in a position specified from the two accompanying information of the display columns C1 and C2.

[0061] Specifically, in FIG. 2, there is shown a view X in which simple images M of respective document classes are arranged in the column direction, and simple images M of respective dates are arranged in the row direction. Described to take an example, the display control unit 322 causes simple images M (thumbnail images each indicative of CT image) each based on medical data having information indicative of a CT image as accompanying information to be displayed in a column of cells CE displayed as “CT” of the display column C1 in the display column C3. Also the display control unit 322 causes simple images M based on medical data having date information of 2012 May 18 as accompanying information to be displayed in a row of cells CE displayed as for “2012/5/18” of the display column C2 for the accompanying information, for example, in the display column C3. Thus, the display control unit 322 causes the view X in which the simple images M are arranged in the row direction for every accompanying information of one attribute and arranged in the column direction for every accompanying information of other attributes, to be displayed.

[0062] Incidentally, when the attributes of the display columns C1 and C2 for the accompanying

information are altered, the display data generating unit 22 generates data of a view X in which accompanying information of the altered attributes are displayed in the display columns C1 and C2 and the simple images M are relocated in accordance with their alterations.

[0063] The view X can be scrolled by performing a drag operation by the input unit 33. When the display unit 31 is a touch panel type display, the operator is able to scroll the view X by performing a drag or flick operation with his/her fingers.

[0064] With the view X being displayed, the operator can grasp a generation history of medical data about a given patient one look at it. Thus, since the view X is excellent in the viewing property of the medial data, the operator is able to easily grasp the frequency of patient's hospital visits and the like.

[0065] The simple image M based on the medical data held in the folder by the input of the input unit 33 by the operator is contained in the simple images M that configure the view X. The details thereof will be described later.

[0066] The table generating unit 323 generates a table TA in which each folder name and UID of medical data are associated with each other, as will be described later.

[0067] The input unit 33 is made up of a keyboard, a mouse or the like. The input unit 33 is one example illustrative of an embodiment of an input unit in the present invention.

[0068] The storage unit 34 is, for example, a semiconductor memory such as an HDD (Hard Disk Drive), or a RAM (Random Access Memory), a ROM (Read Only Memory) or the like.

[0069] The department system 4 is a department system in a hospital, such as an Radiology Information System(RIS) including modalities of an X-ray CT apparatus, an MRI apparatus and the like, a clinical examination system or the like.

[0070] The operation of the image display system 1 of the present embodiment will next be described. According to the image display system 1 of the present embodiment, the operator is able to arrange the simple images M that configure the view X about the given patient, using the folder. Here, a description will be made of an example in which simple images M used in a conference in a hospital by the operator are arranged using a folder. The simple images M are assumed to be images about a patient P.

[0071] The operator puts in a folder, data about a simple image M used in a conference, of simple images M that configure a view X. Described specifically, this will be explained based on the flowchart of FIG. 3. First, at Step S1, the operator causes the display screen 31a to display the view X.

The detailed process of this Step S1 will be explained based on the flowchart of FIG. 4.

[0072] In FIG. 4, at Step S11, the operator first performs the input of indicating the display of a view X and the input of specific information of the patient P such as his/her name, ID, etc. at the input unit 33 of the display terminal 3. Next, at Step S12, the data request unit 321 requests data of the view X related to the patient P inputted with the specific information to the server 2. The specific information of the patient P is included in this request.

[0073] When the data of the view X is requested at Step S12, the display data generating unit 22 of the server 2 generates data of a view X. Described in detail, the display data generating unit 22 first specifies all medical data of the patient P stored in the storage unit 21, based on the specific information of the patient P inputted from the data request unit 321. The medical data are to be created in plural form when different for the patient P. And the display data generating unit 22 generates data of a view X comprised of simple images M about the patient P, based on the specified medical data of patient P.

[0074] Next, at Step S14, the data output unit 23 outputs the data of the view X generated at Step S13 to the display terminal 3. Next, at Step S15, the display control unit 322 causes the display screen 31a to display the view X, based on the data of the view X inputted to the display terminal 3 at Step S14 described above (refer to FIG. 2). The display control unit 322 causes the display screen 31a to display even various operation buttons OB or the like along with the view X.

[0075] Next, at Step S2, the operator causes the display unit 31 to display a folder browser window FBW to create a new folder. Its details will be described. First, the operator clicks the first operation button OB1 of the operation buttons OB through a cursor CU as shown in FIG. 5, using the input unit 33. When the first operation button OB1 is clicked, the display control unit 322 causes the display screen 31a to display a folder browser window FBW as shown in FIG. 6. The folder browser window FBW with a “conference – 2012 – February” folder displayed thereon has been displayed in FIG. 6. The folder browser window FBW is one example illustrative of an embodiment of an input screen to perform the input of putting data into a folder.

[0076] The display of the folder browser window FBW will be described. When the first operation button OB1 is clicked, the data request unit 321 first requests data of the folder browser window FBW to the server 2. Next, the display data generating unit 22 of the server 2 generates the data of the folder browser window FBW with reference to the table TA stored in the storage unit 21. Then, when the data of the folder browser window FBW is outputted from the data output unit 23 to the display terminal

3, the display control unit 322 causes the folder browser window FBW to be displayed based on the data.

[0077] The table TA will now be described. Here, a “conference” folder exists and a “February” folder exists within a “2012” folder in this “conference” folder. Thus, the folder takes a hierarchical structure in the present embodiment. Each simple image M used in the conference of February, 2012 has been put in the “February” folder. Accordingly, as shown in FIG. 7, a table TA, in which a folder name of “conference – 2012 – February” and UID of medical data put in this folder are associated with each other, is stored in the storage unit 21. The UID (indicated by crosses “×” in FIG. 7) of the medical data for each simple image M put in the “February” folder is shown in each UID column C_{UID} of the table TA shown in FIG. 7. The UID is one example illustrative of an embodiment of specific information for reading data from the server in the present invention. The table TA is one example illustrative of an embodiment of a table in the present invention.

[0078] The table TA is limited to a specific patient. Accordingly, simple images of different patients other than the patient P also exist within the folder.

[0079] When the folder browser window FBW is displayed, the operator clicks a “new folder generation” button B1 by a cursor (not shown in FIG. 6) using the input unit 33 to generate a new folder. Here, the operator is intended to put a simple image M used in the conference of “June” in its corresponding folder. The operator creates a “June” folder as a new folder as shown in FIG. 8.

[0080] When the “June” folder is generated, the table generating unit 323 adds “June” to a table TA in which a folder name and UID of each medical data are associated with each other as shown in FIG. 9. The table TA with “June” added thereto is stored in the storage unit 34.

[0081] Next, at Step S3, the operator puts each simple image M used in the conference of “June” in the “June” folder in the folder browser window FBW. Now consider that the operator desires to put even the CT image used in the conference of February in the “June” folder. When the operator desires to confirm each simple image M used in the conference of February before a desired simple image M is put in the “June” folder, the operator causes a sub window SW to be displayed as shown in FIG. 10. Each simple image M put in the “conference – 2012 – February” folder is displayed in the sub window SW. It is thus possible for the operator to easily confirm each simple image M used in the conference of February. With the simple image M being clicked, an image based on the original medical data by which the simple image M has been generated may be displayed.

[0082] The folder name “conference – 2012 – February” of the folder in which the simple image M

used in the conference of February has been put, is displayed in the sub window SW. Thus, the operator is able to easily recognize that the sub window SW is a window indicative of the contents of the “conference – 2012 – February” folder. The sub window SW is one example illustrative of an embodiment of a window including each image based on data put in the same folder in the present invention.

[0083] The display of the sub window SW will be described. A folder icon FI is displayed in each simple image M which has been put in the folder and arranged. When the folder icon FI is clicked, the sub window SW is displayed. The folder icon FI is an indicator which indicates that medical data of the simple image M with the folder icon FI displayed therein has been put in the folder. In other words, the folder icon FI is an indicator capable of identifying the simple image M based on the medical data put in the folder, of the simple images M of the view X as a simple image M that is not put in the folder. The folder icon FI is one example illustrative of an embodiment of an indicator in the present invention.

[0084] The folder icon FI is placed upon generating the data of the view X at Step S13 described above. Specifically, the display data generating unit 22 adds the folder icon FI to the corresponding simple image M with reference to UID included in the table TA. In this case, at Step S14 described above, the data of the view X with the folder icon FI applied thereto is outputted to the display terminal 3.

[0085] When the folder icon FI is clicked, a sub window SW including each simple image M of data put in a folder corresponding to the folder icon FI is displayed in the display screen 31a. Assume that, for example, a folder icon FI displayed in a simple image M for a CT image of 2012, January 16 is clicked. Data of the CT image of 2012, January 16 has been put in the “February” folder. The operator is able to confirm by the sub window SW that the CT image used in the conference of February is the image of 2012, January 16.

[0086] The folder icon FI and the simple images M have been linked to folder specific information for specifying a folder (folder name). When the folder icon FI is clicked, the data request unit 321 outputs the folder specific information to the server 2. The display data generating unit 22 of the server 2 generates data of the sub window SW by reference to the folder specific information inputted from the display terminal 3. Described in more detail, the display data generating unit 22 specifies UID of a simple image M put in a folder specified by the folder specific information by reference to the table TA and generates data of a sub window SW including the corresponding simple image M. The data of the sub window SW is outputted to the display terminal 3 by the data output unit 23. The display control

unit 322 causes the sub window SW to be displayed based on the data inputted from the server 2.

[0087] After the confirmation of each simple image M used in the conference of February, the operator puts a simple image M used in the conference of June in the “June” folder along with the simple image M for the CT image which has been used in the conference of February. Described specifically, as shown in FIG. 11, the operator drag and drops each simple image M to be put in the “June” folder to the “June” folder of the folder browser window FBW. Here, the simple image M for the CT image of 2012, January 16, and the CT image, CT report and simple image M for blood test of 2012, May 18 are put in the “June” folder by a drag and drop operation using the input unit 33. The drag and drop operation is one example illustrative of an embodiment of the input of putting data in a folder.

[0088] Thus, the operator is able to easily put a desired simple image M in its corresponding folder just by dragging and dropping to the folder browser window FBW displayed on the view X.

[0089] When the simple image M is dragged and dropped in the folder, the table generating unit 323 generates a table in which a folder name and UID of medical data are associated with each other. Here, as shown in FIG. 12, the table generating unit 323 writes UID of medical data of each simple image M which has been put in the “June” folder into the corresponding UID column C_{UID} of the “June” folder of the table TA. Thus, the table TA in which the “June” folder and the UID of the medical data of each simple image M put in the “June” folder are associated with each other is completed (construction of hierarchical structure). The table TA is stored in the storage unit 34. Also the table TA is outputted to the server 2 and hence the table TA about the patient P stored in the storage unit 21 is updated.

[0090] Incidentally, the data of each simple image M is to be put in the folder by writing UID into each UID column C_{UID} of the table TA.

[0091] As described above, the preparation for the conference is completed. The operator opens the “June” folder at the conference of June and displays the image, based on each simple image M in the “June” folder to perform the description of a case. To open the “June” folder, the operator performs the input of causing the display screen 31a to display a folder viewer FV as shown in FIG. 13 using the input unit 33. A display column FC for a folder and a display column MC for simple images M are contained in the folder viewer FV. The folder viewer FV is one example illustrative of images that include images based on data put in folders, and the folders.

[0092] The display of the folder viewer FV will be described. When the input of causing the input unit 33 to display the folder viewer FV is made, the data request unit 321 requests data of the folder

viewer FV to the server 2. The display data generating unit 22 generates data of a folder viewer FV including simple images M put in each folder by referring to the table TA stored in the storage unit 21. The display data generating unit 22 generates data of simple images M contained in the folder viewer FV, based on the medical data having UID included in the table TA.

[0093] Also the display data generating unit 22 generates data of a folder viewer FV in which simple images M are classified every patient. The display data generating unit 22 specifies the name of a patient and a patient ID thereof, based on metadata having UID contained in the table TA and classifies the simple images M for each patient. In FIG. 13, simple images M of patients P, Q and R are classified and displayed in the display column MC for the simple images.

[0094] The operator selects the “June” folder of the folder’s display column FC and thereby causes the simple images M put in the “June” folder to be displayed in the display column MC for the simple images. Then, the operator clicks the corresponding simple image M displayed in the display column MC and thereby causes the display screen 31a to display an image (original image) based on the medical data (original data by which each clicked simple image M has been generated) stored in the storage unit 21 of the server 2 although not illustrated in particular, thereby making it possible to perform the description of a case. At this time, the operator is capable of describing the CT image used in the conference of February and a CT image of 2012, May 18 newly obtained this time by comparison.

[0095] Incidentally, when the corresponding simple image M is clicked, the UID of the simple image M is outputted to the server 2. The data output unit 23 of the sever 2 outputs the medical data of UID inputted from the display terminal 3 to the display terminal 3. Thus, the original data based on the medical data is displayed in the display unit 31.

[0096] Next, a description will be made of a preparation for a conference of August to be performed after the conference of June. As with the preparation for the above-mentioned conference of June, the preparation for the conference of August is also performed by basically the same process as the flowcharts of FIGS. 3 and 4. At Step S2 of FIG. 3, however, a folder browser window FBW having a “February” folder and a “June” folder is displayed as shown in FIG. 14. Then, the operator clicks a “new folder generation” button B1 in the folder browser window FBW to generate an “August” folder newly as shown in FIG. 15.

[0097] When the “August” folder is generated, the table generating unit 323 adds “August” to the table TA as shown in FIG. 16. The table TA with “August” added thereto is stored in the storage unit 34.

[0098] Now consider where the operator desires to include even the CR images used in the conferences of February and June in the simple images M used in the conference of August. At Step S3 described above, before each simple image M used in the conference of August is put in the “August” folder, the operator clicks the folder icon FI to display the sub window SW. The operator clicks the folder icon FI displayed in the simple image M put in the “February” folder to thereby display a sub window SW in which each simple image M put in the “February” folder has been displayed. Also the operator clicks the folder icon FI displayed in the simple image M put in the “June” folder to thereby display a sub window SW in which each simple image M put in the “June” folder has been displayed. Thus, the operator is able to confirm the simple image M of each folder. The sub window SW in which each simple image M put in the “June” folder has been displayed is displayed in FIG. 17.

[0099] Incidentally, when the folder icons displayed in the simple images M placed in both of the “February” folder and the “June” folder are clicked, both of the sub window SW in which the simple images M put in the “February” folder have been displayed, and the sub window SW in which the simple images M put in the “June” folder have been displayed, may be displayed.

[00100] By the way, in the view X shown in each of FIGS. 14, 15 and 17, the folder icon FI has been displayed in each of the simple images M put in the “February” folder and the “June” folder.

[00101] After the confirmation of each simple image M by the sub window SW, the operator drags and drops the simple images M used in the conference of August to put the same in the “August” folder as shown in FIG. 18. When the simple images M are dragged and dropped in the “August” folder, the table generating unit 323 writes UID of medical data for the dragged and dropped simple images M into UID columns C_{UID} of the “August” folder in the table TA as shown in FIG. 19.

[00102] In the conference of August, the operator causes a folder viewer FV to be displayed as shown in FIG. 20 and selects the “August” folder. Thus, the simple images M put in the “August” folder are displayed in a display column MC for simple images. Although not illustrated in particular, the operator clicks a desired simple image M to display an image and performs the description of a case.

[00103] If there is any question about the data existing only in the “February” folder at the conference of August, the operator selects a “February” folder in a folder’s display column FC and causes each simple image M put in the “February” folder to be displayed in the display column MC. The operator clicks the corresponding simple image M in the display column MC to display an image, followed by execution of its description.

[00104] Further, if there is any question about each simple image M not put in the folder at the conference, the operator causes the display terminal 3 to display the view X. Specifically, the operator clicks a desired patient name (patient P herein) by a cursor CU as shown in FIG. 21 in the simple-image display column MC of the folder viewer FV to thereby make it possible to display a view X of that patient. With the name of a patient being clicked, the data request unit 321 outputs information about patient ID of the patient to be clicked to the server 2. Then, the view X is displayed on the display screen 31a in accordance with the processes of Steps S12 through S15 described above.

[00105] Since the folder icon FI is not displayed in each simple image M not put in the folder within the view X, a simple image M for answering a question is searched out of the simple images M with no folder icon FI being displayed. With the folder icons FI being displayed in the view X, the operator is able to easily distinguish between the simple images M put in each folder and the simple images M other than those. It is thus possible to easily find a desired simple image M in the view X.

[00106] According to the image display system 1 and display terminal 3 of the present embodiment, since medical data can be arranged by folders in terms of an operator's intention while confirming a viewing property of a great deal of medical data about a given patient, a desired image can easily be found out.

[00107] Although the present invention has been explained by the embodiments as described above, it is needless to say that the present invention can be changed in various ways within the scope that does not change the gist of the invention. For example, although each of the above embodiments has explained the example in which the view of the simple images based on the medical data is displayed, the present invention is not limited to the medical data. The present invention can be applied to a display device and an image display system, which display a view of simple images based on data having accompanying information of a plurality of attributes as metadata. The view however needs to be a view in which simple images are arranged for every accompanying information of one attribute in a column direction and arranged for every accompanying information of other attributes in a row direction.

[00108] Instead of the table generating unit 323 provided in the display terminal 3, a table generating unit 24 may be provided in the server 2 as shown in FIG. 22. In this case, when each simple image M is dragged and dropped in a folder, UID of the simple image M is outputted to the server 2 and written into its corresponding UID column C_{UID} of a table TA.

Claims

1. A display device comprising:

a display unit which displays a view in which images based on medical data are arranged in a matrix form,

wherein the medical data include data put in folders, and

wherein the display unit is adapted to display indicators therein, the each indicator being capable of identifying the image based on the data put in the folder, of the images of the view as an image that is not put in the folder.

2. A display device comprising:

a display unit which displays a view of images based on data having accompanying information of a plurality of attributes as metadata, the view being a matrix-like view in which the images are arranged for every accompanying information of one attribute in a row direction and arranged for every accompanying information of other attributes in a column direction,

wherein the data for medical use include data put in each folder, and

wherein the display unit is adapted to display indicators therein, the each indicator being capable of identifying the image based on the data put in the folder, of the images of the view as an image that is not put in the folder.

3. The display device according to claim 1 or 2, including an input unit which performs the input of putting the data in the folder to specify the image in the view displayed in the display unit.

4. The display device according to claim 3, wherein an input screen for performing the input of putting the data in the folder by the input unit is displayed in the display unit with the view being displayed.

5. The display device according to claim 4, wherein the input screen is a window including a view of the folders with the data put therein.

6. The display device according to claim 5, wherein the input of putting the data in each of the folders is to drag and drop the images of the view into the folders by an operator using the input unit.

7. The display device according to claim 6, wherein a table in which specific information for reading the data of the images dragged and dropped in the folders from a server, and folder names

are associated with each other is generated by dragging and dropping in the folders.

8. The display device according to any one of claims 1 through 7, wherein the names of the folders are displayed in the display unit with the view being displayed.

9. The display device according to claim 8, wherein when the input of indicating the indicator is performed by the operator, the name of the folder corresponding to the indicator is displayed in the display unit.

10. The display device according to any one of claims 1 through 9, wherein a window including images based on data put in the same folder is displayed in the display unit with the view being displayed.

11. The display device according to claim 10, wherein when the input of indicating the indicator is performed by the operator, a window including images put in the same folder corresponding to the indicator is displayed in the display unit.

12. The display device according to any one of claims 1 through 9, wherein the folder takes a hierarchical structure.

13. The display device according to any one of claims 1 through 12, including a storage unit which stores therein a table in which specific information for reading the data put in each of the folders from the server, and a folder name are associated with each other.

14. The display device according to any one of claims 1 through 13, wherein images each including an image based on the data put in the folder and the folder are displayed in the display unit.

15. The display device according to claim 14, wherein an original image based on original data by which the image specified by the operator within the images each including the image based on the data put in the folder and the folder is generated, is displayed in the display unit.

16. The display device according to claim 14 or 15, wherein the images are classified every patient.

17. The display device according to claim 16, wherein the view of patients each specified by the operator in the images each including the image based on the data put in the folder and the folder is displayed in the display unit.

18. An image display system comprising:

a server connected to the display device according to any one of claims 1 through 17.

19. The image display system according to claim 18, wherein the server includes a storage

unit which stores the data therein.

20. The image display system according to claim 18 or 19, wherein the server includes a storage unit which stores therein a table in which specific information for reading the data put in each of the folders from the server and a folder name are associated with each other.

21. The image display system according to any one of claims 18 through 20, wherein the server is provided with a view generating unit which generates the view.

FIG. 1

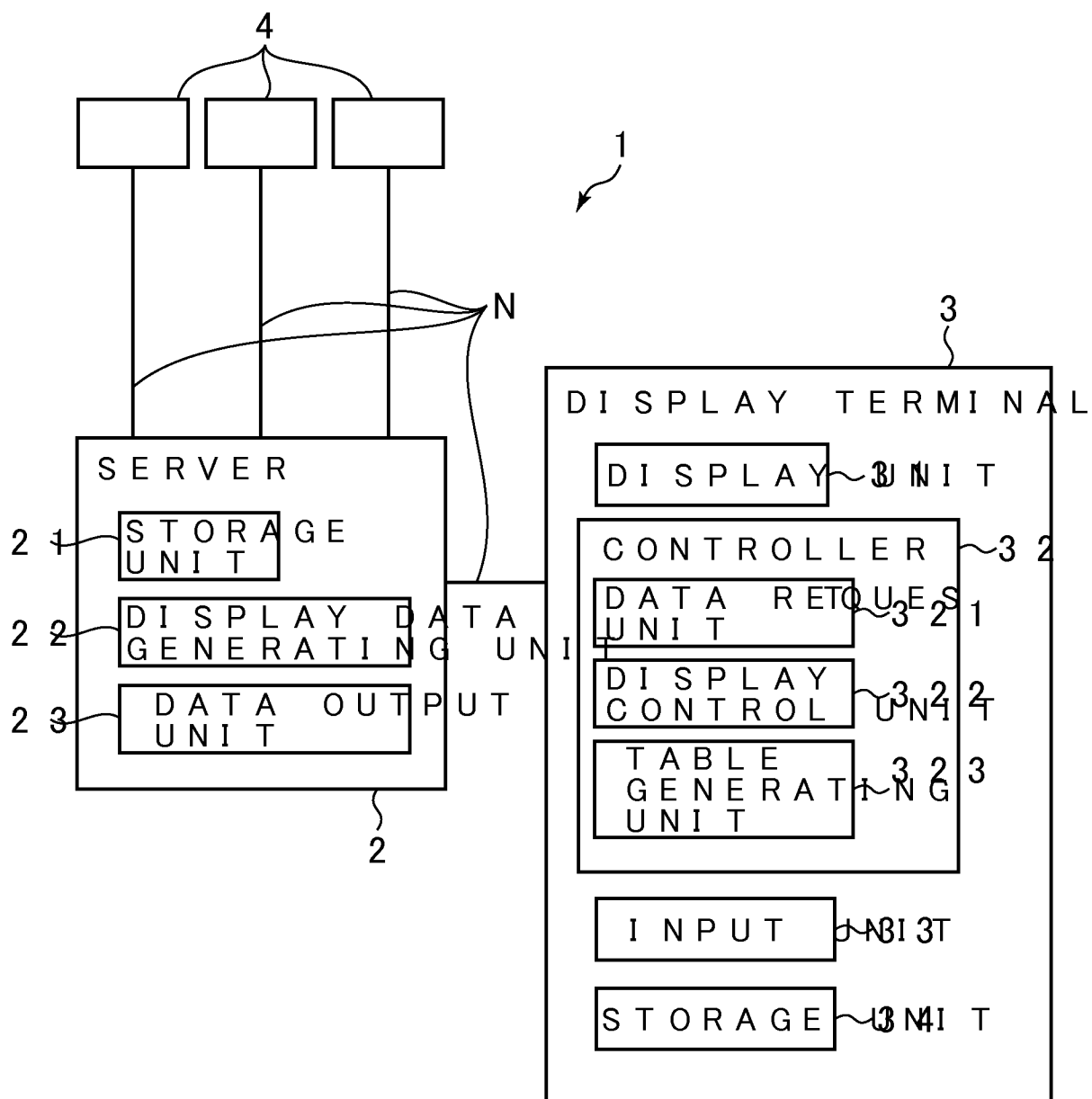
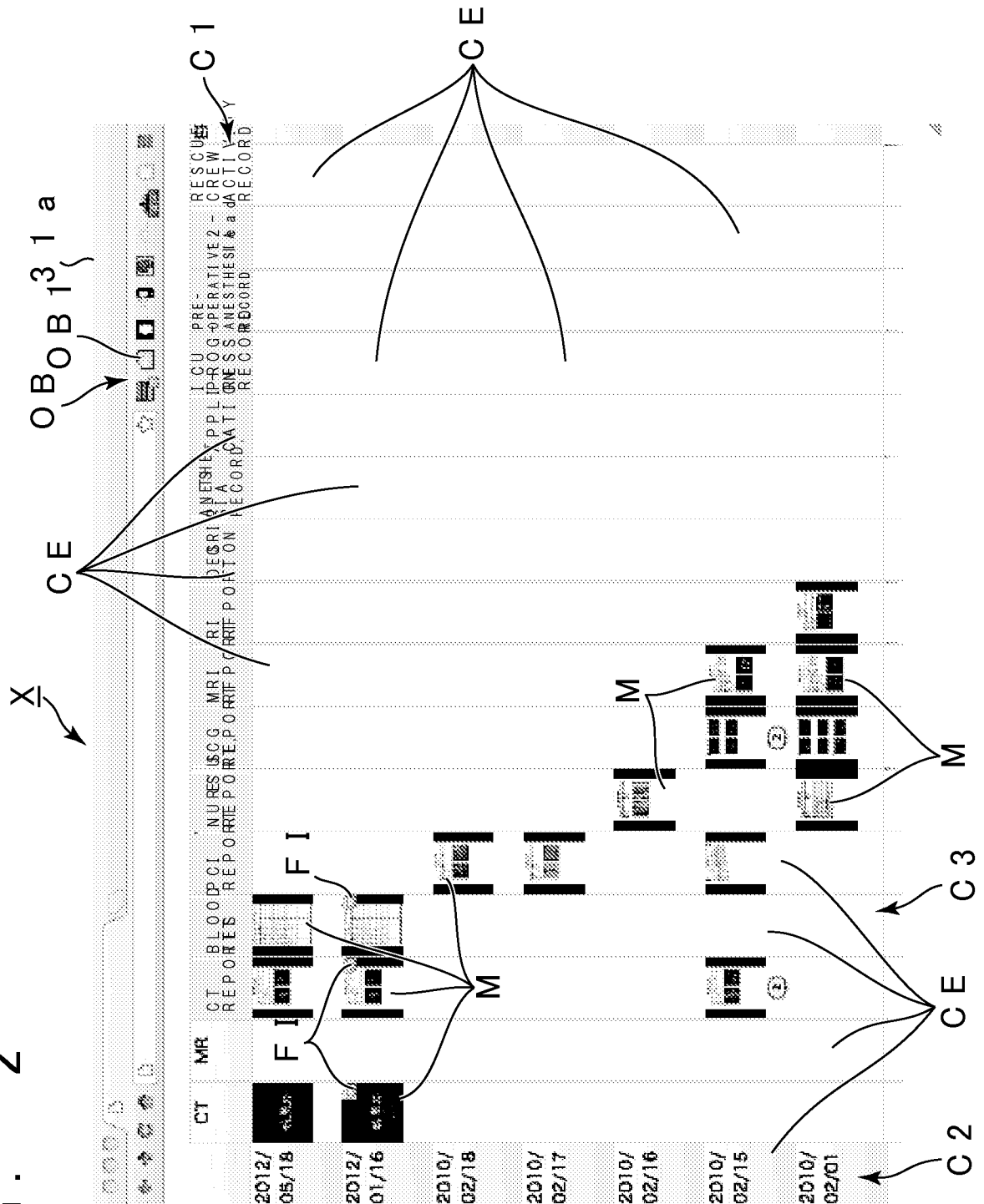
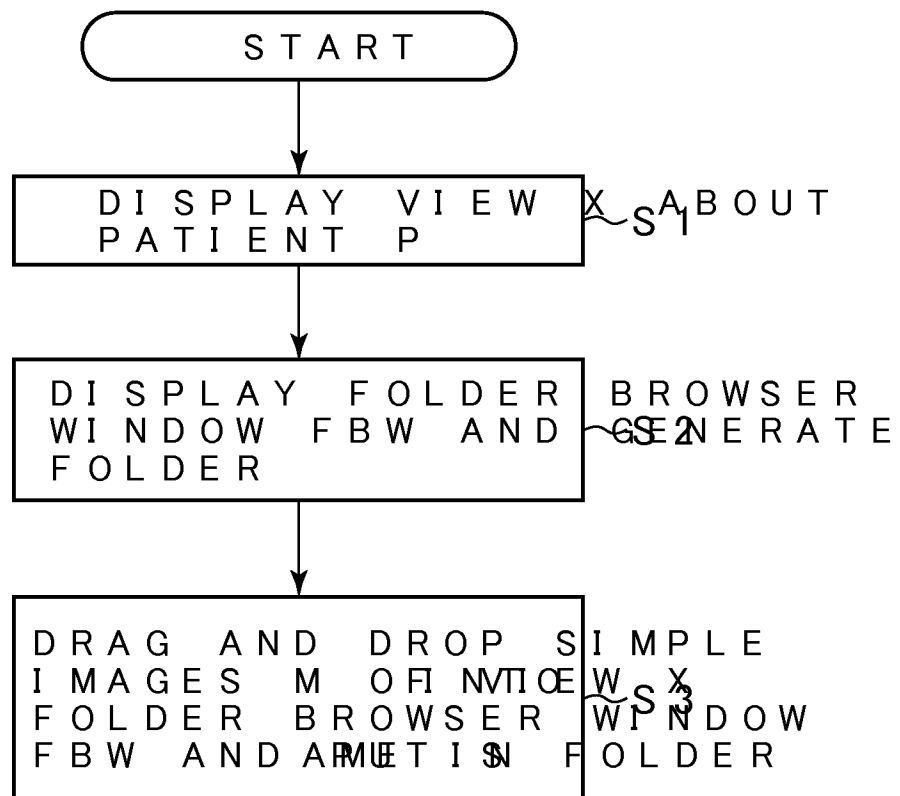


FIG. 2



3/22

FIG. 3



4/22

FIG. 4

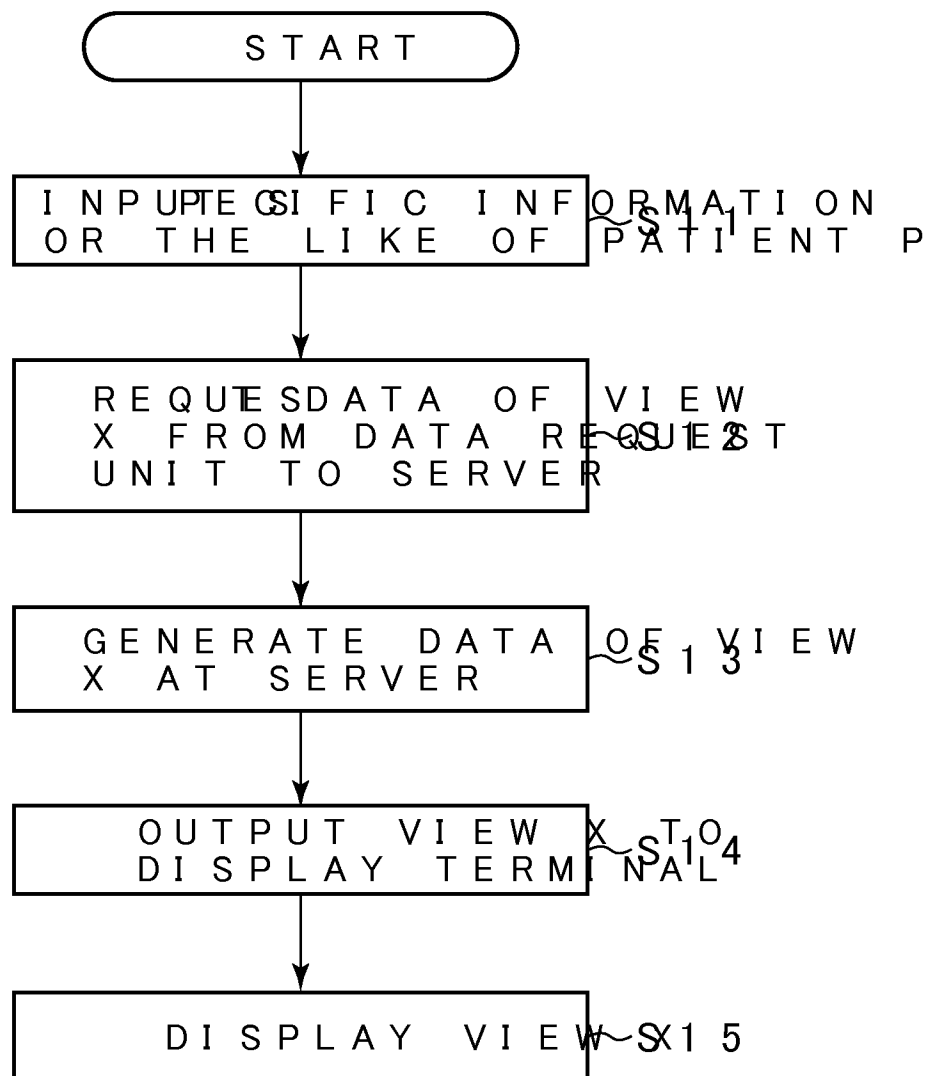


FIG. 6

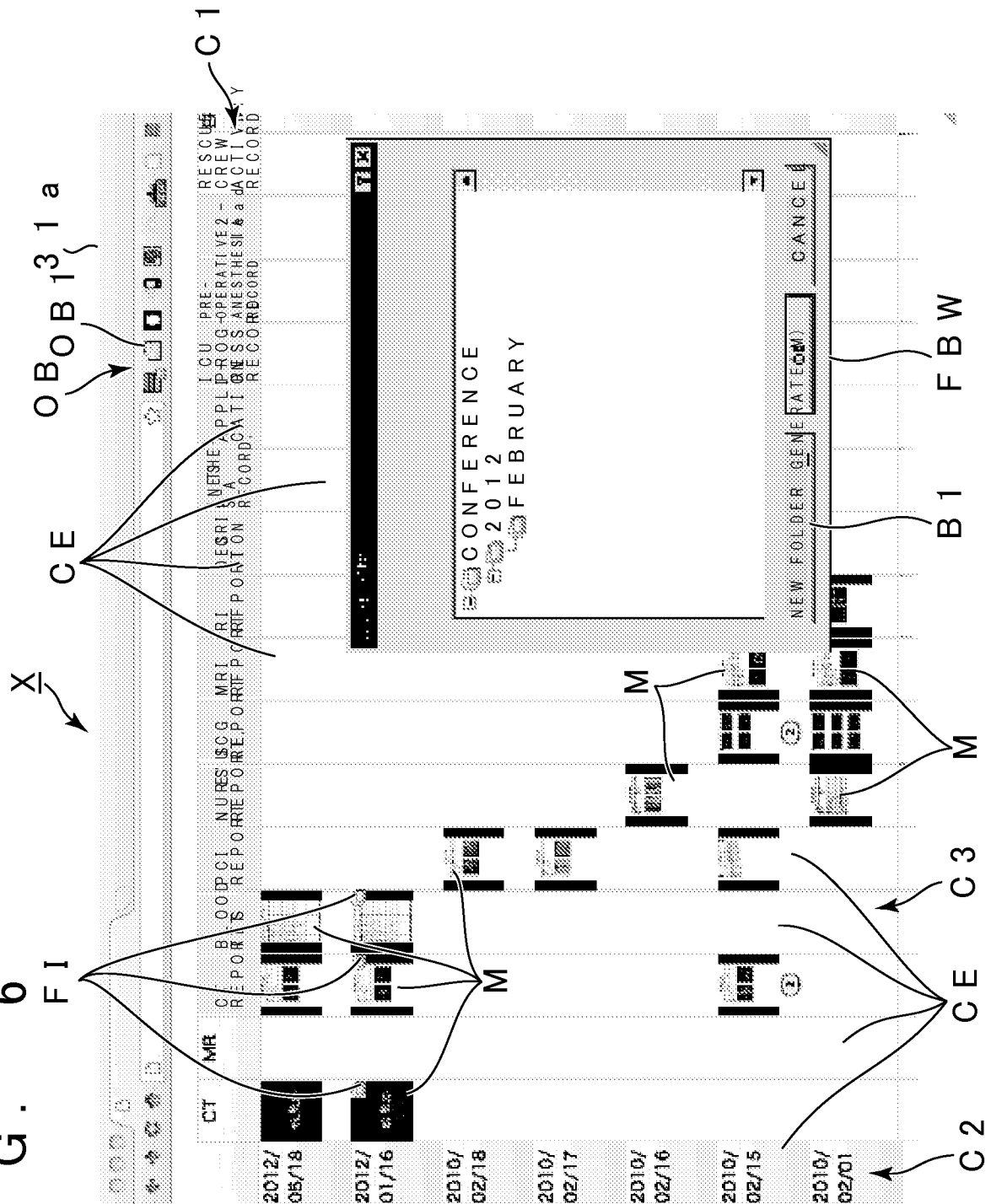


FIG. 7

TA
↓

C O N F E R E N C E	E N C R Y P T I O N	F E B R U A R Y	x x x x x x x	C U I D
			x x x x x x x	C U I D
			x x x x x x x	C U I D

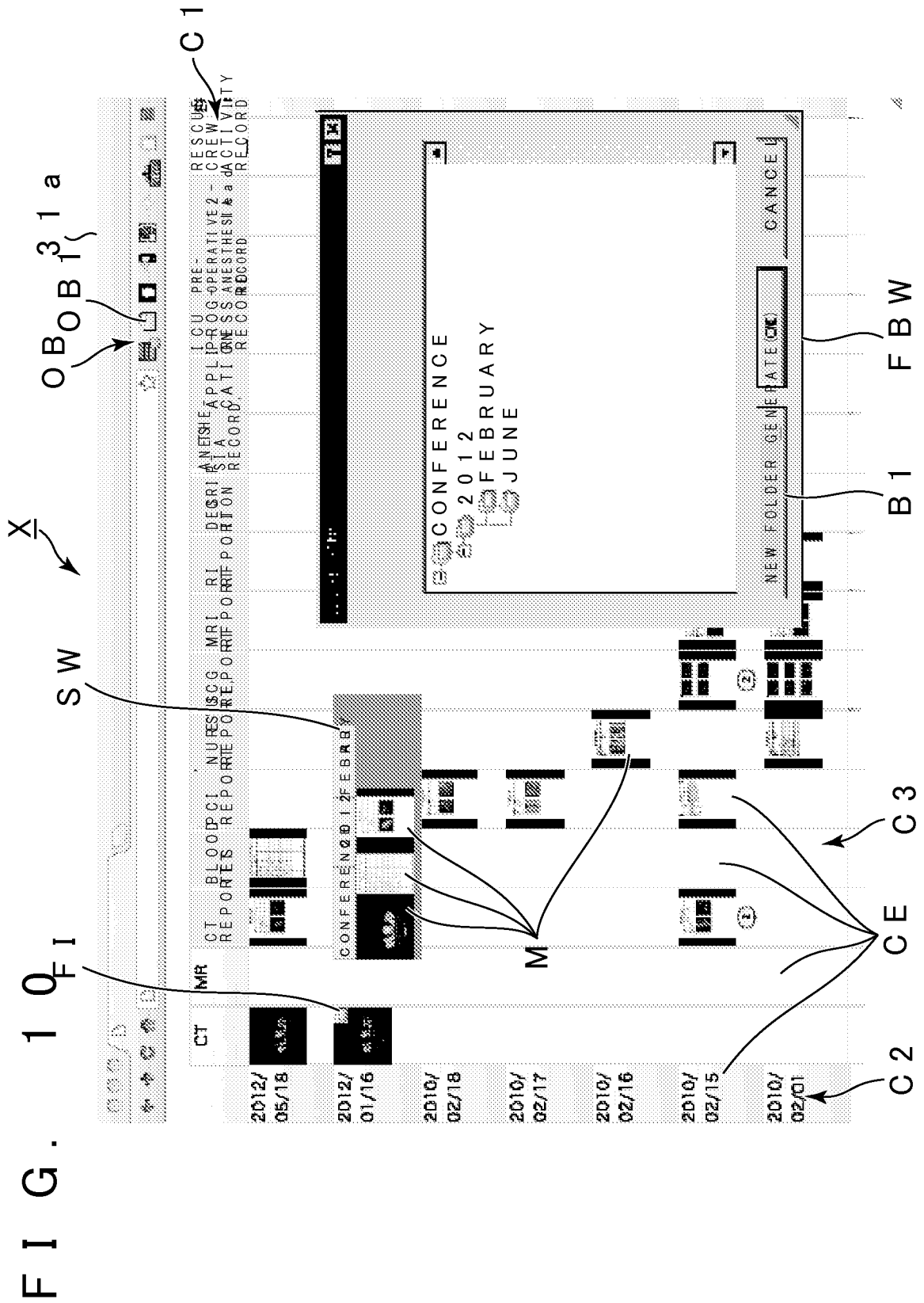
9/22

F I G . 9

T A
↓

C O N F E R E N C E	E N C 2 E 0 1 2	F E B R U A R Y	× × × × × × ×	C U I D
			× × × × × × ×	C U I D
			× × × × × × ×	C U I D
		J U N E		

10/22



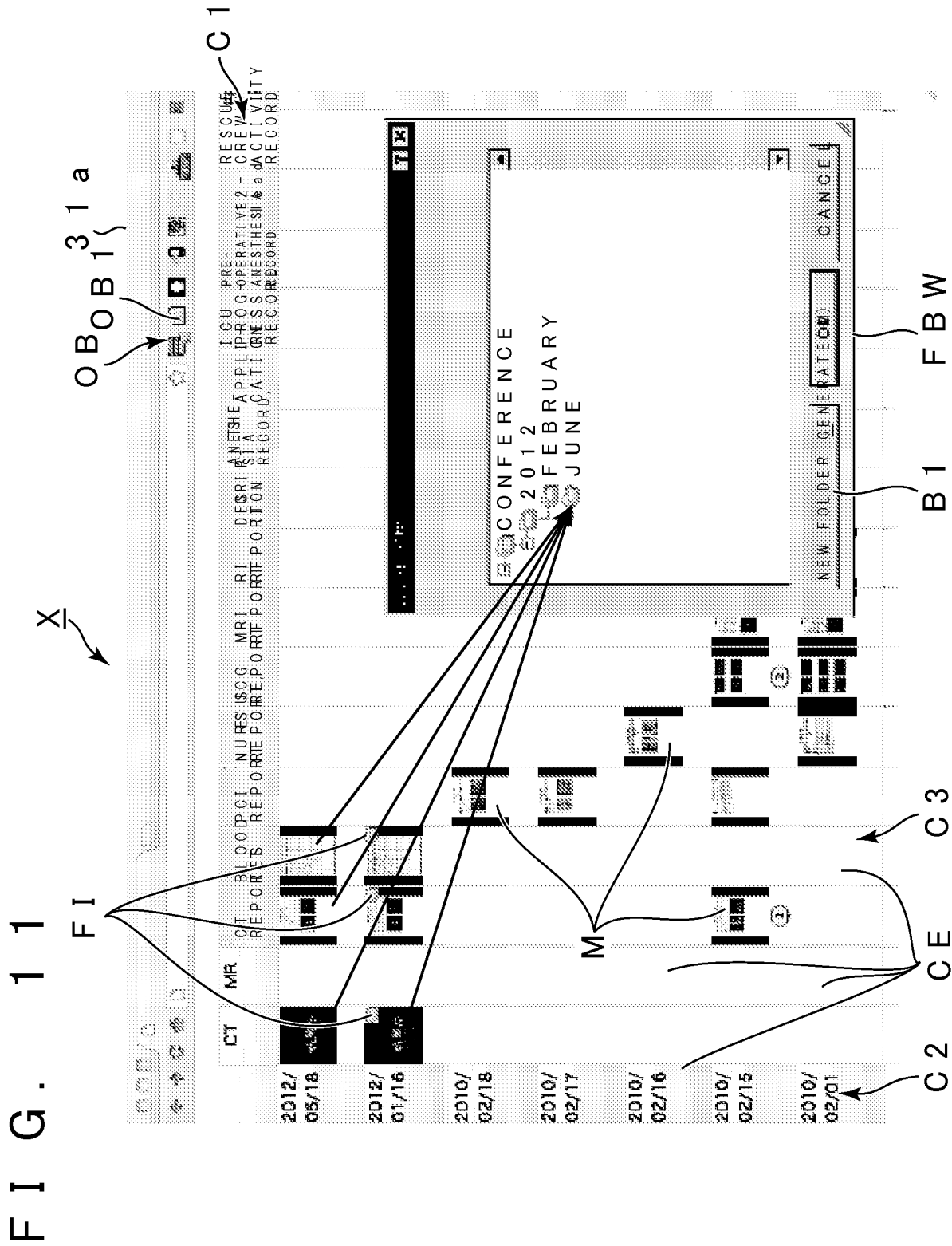
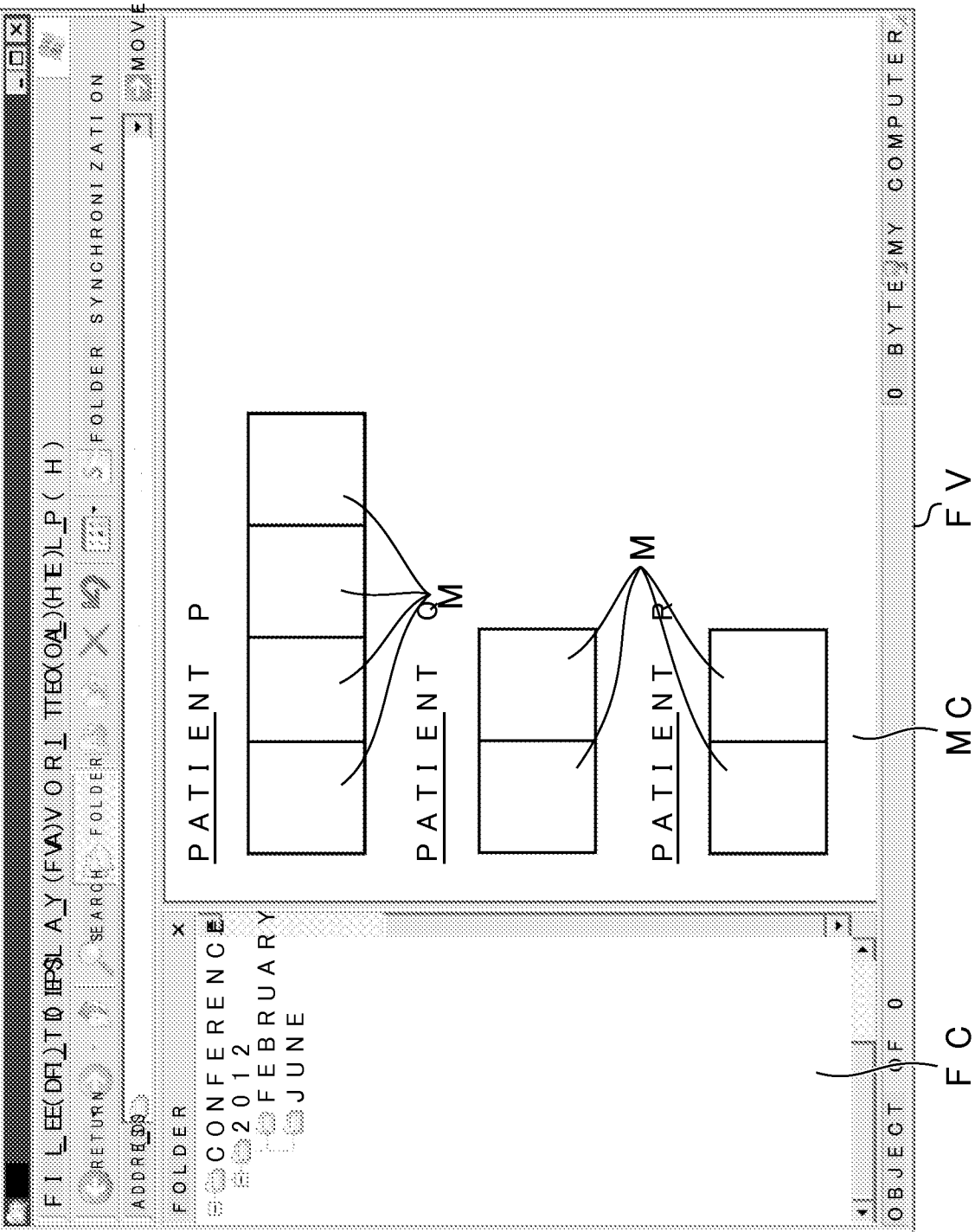


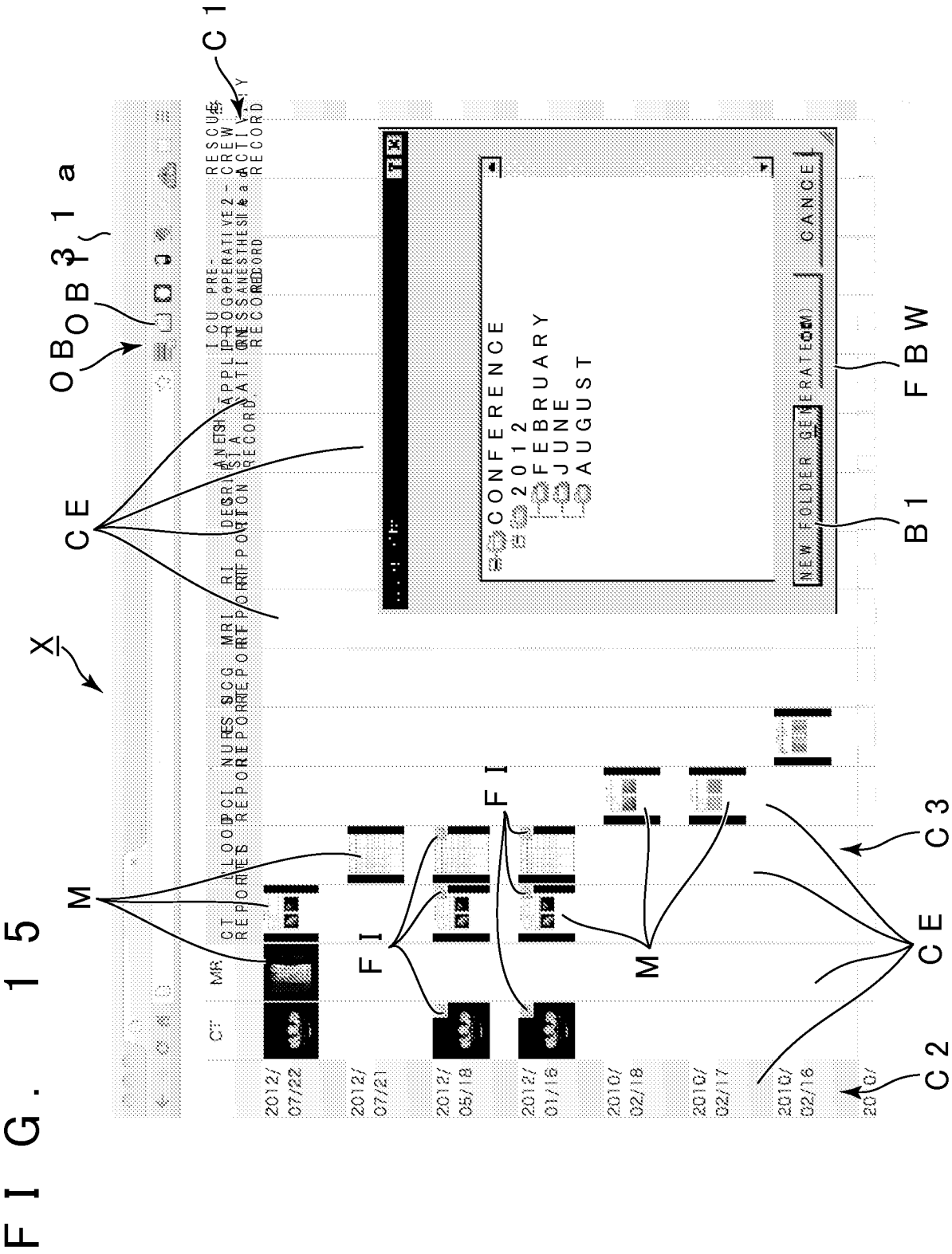
FIG. 12

TA
↓

C O N F E R E N C E 0 1 2	F E B R U A R Y	× × × × × × ×	C U I D
		× × × × × × ×	C U I D
		× × × × × × ×	C U I D
	J U N E	× × × × × × ×	C U I D
		× × × × × × ×	C U I D
		× × × × × × ×	C U I D
		× × × × × × ×	C U I D

FIG. 13



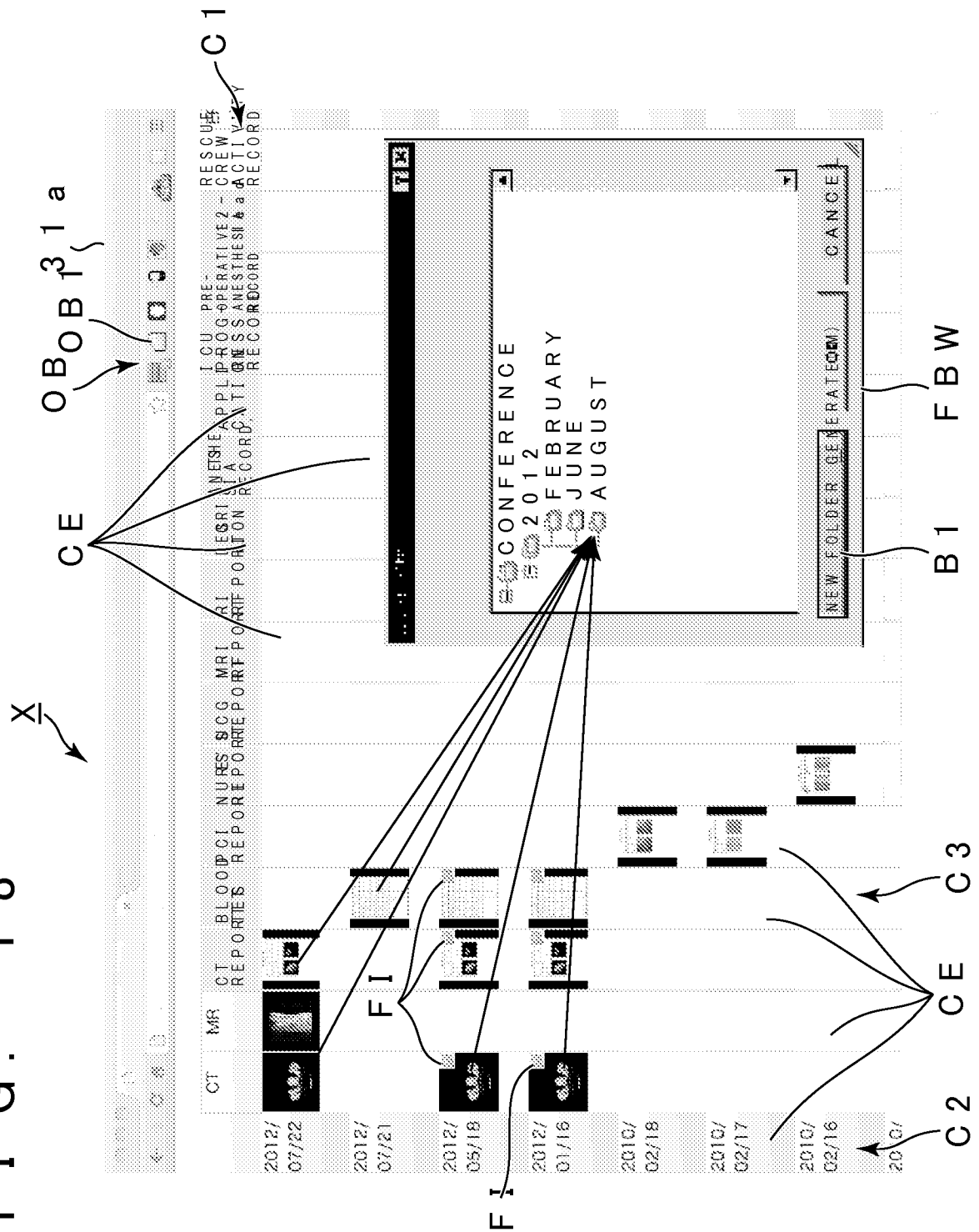


F I G . 1 6

TA
↓

C O N F E R E N C E 0 1 2		F E B R U A R Y	x x x x x x	C U I D
			x x x x x x	C U I D
			x x x x x x	C U I D
		J U N E	x x x x x x	C U I D
			x x x x x x	C U I D
			x x x x x x	C U I D
			x x x x x x	C U I D
		A U G U S T		

FIG. 18



F I G . 1 9

TA
↓

C O N F E R E N C E 0 1 2		F E B R U A R Y	x x x x x x x	C U I D
			x x x x x x x	C U I D
			x x x x x x x	C U I D
		J U N E	x x x x x x x	C U I D
			x x x x x x x	C U I D
			x x x x x x x	C U I D
			x x x x x x x	C U I D
		A U G U S T	x x x x x x x	C U I D
			x x x x x x x	C U I D
			T x x x x x x	C U I D
			x x x x x x x	C U I D
			x x x x x x x	C U I D

FIG. 20

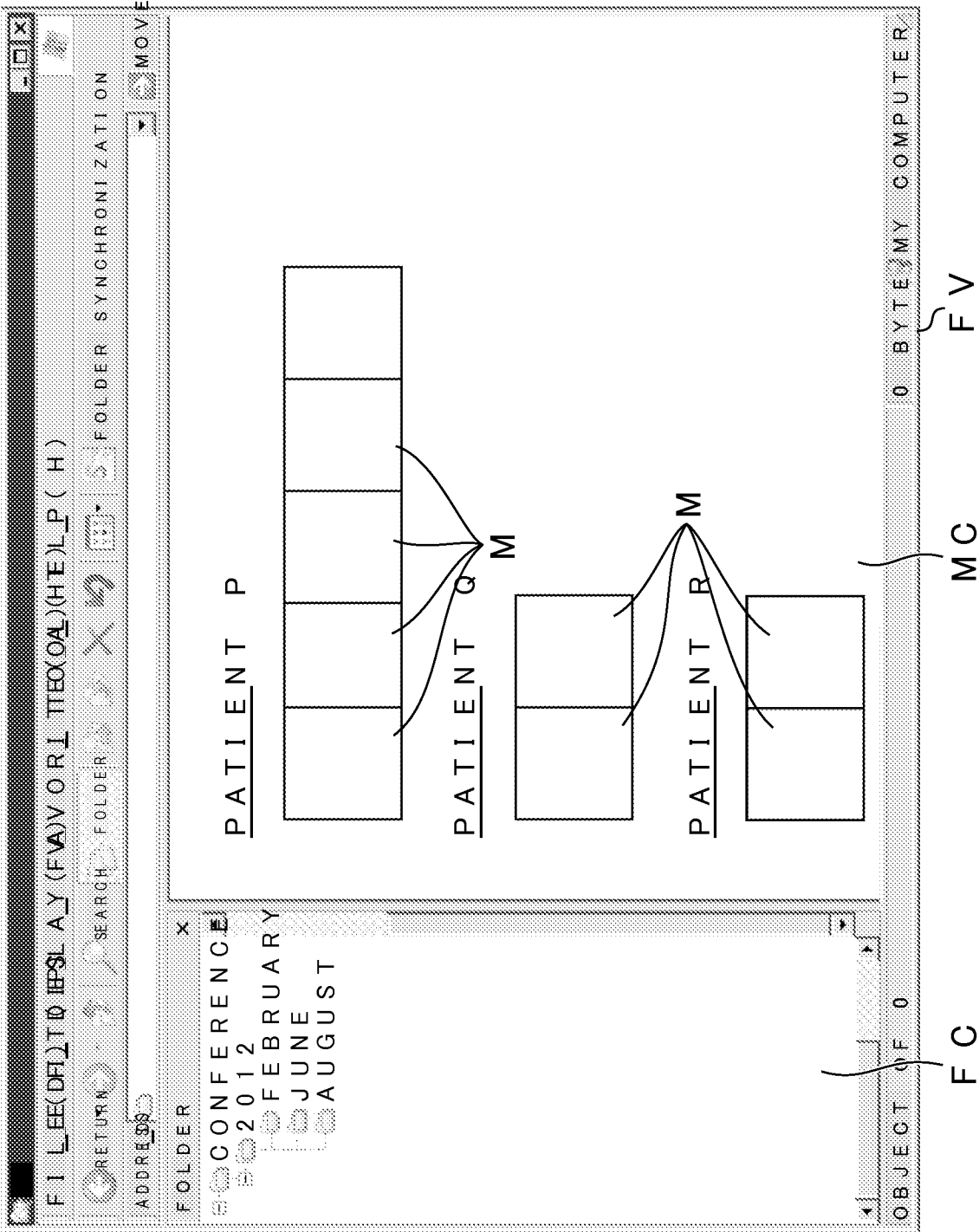
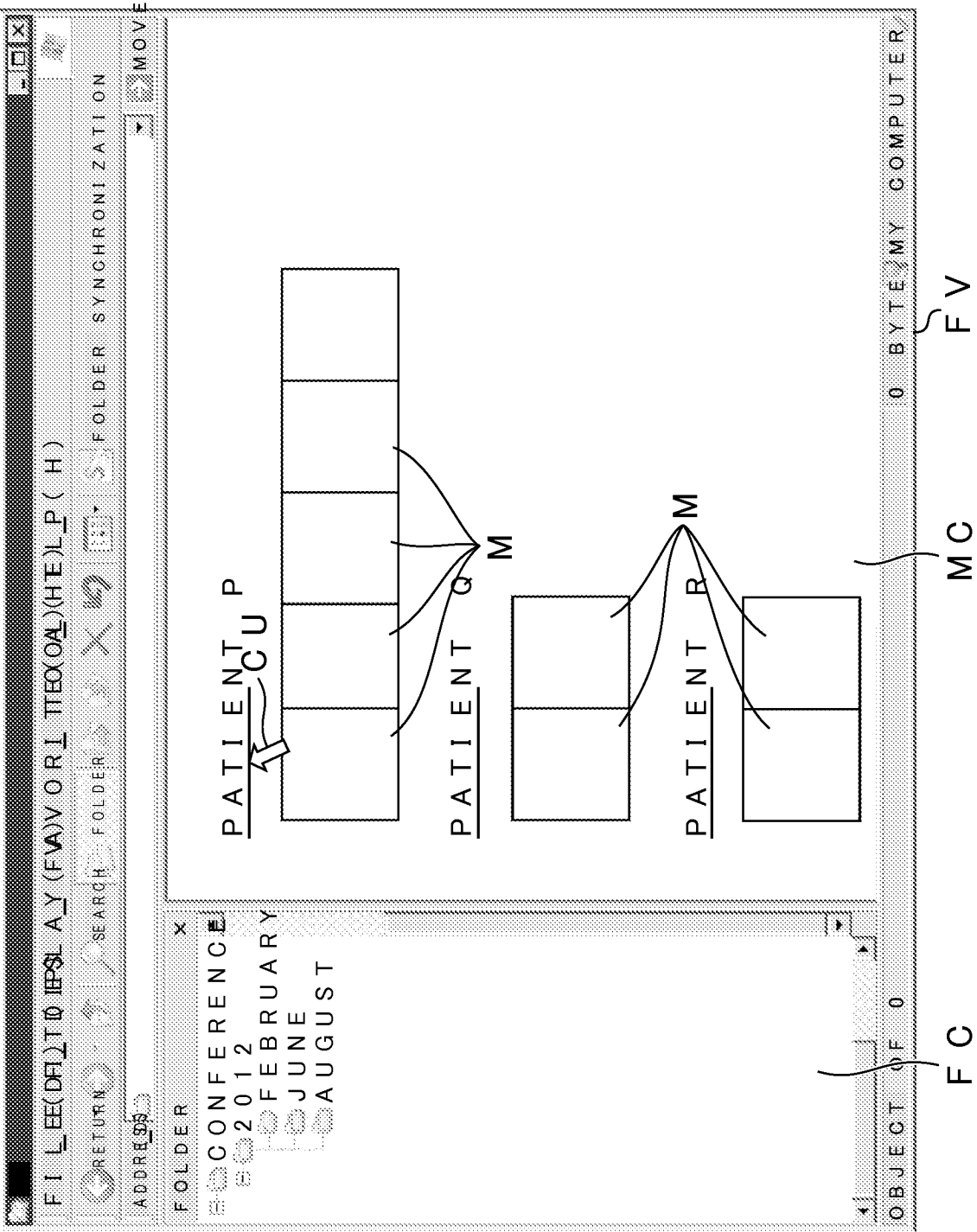
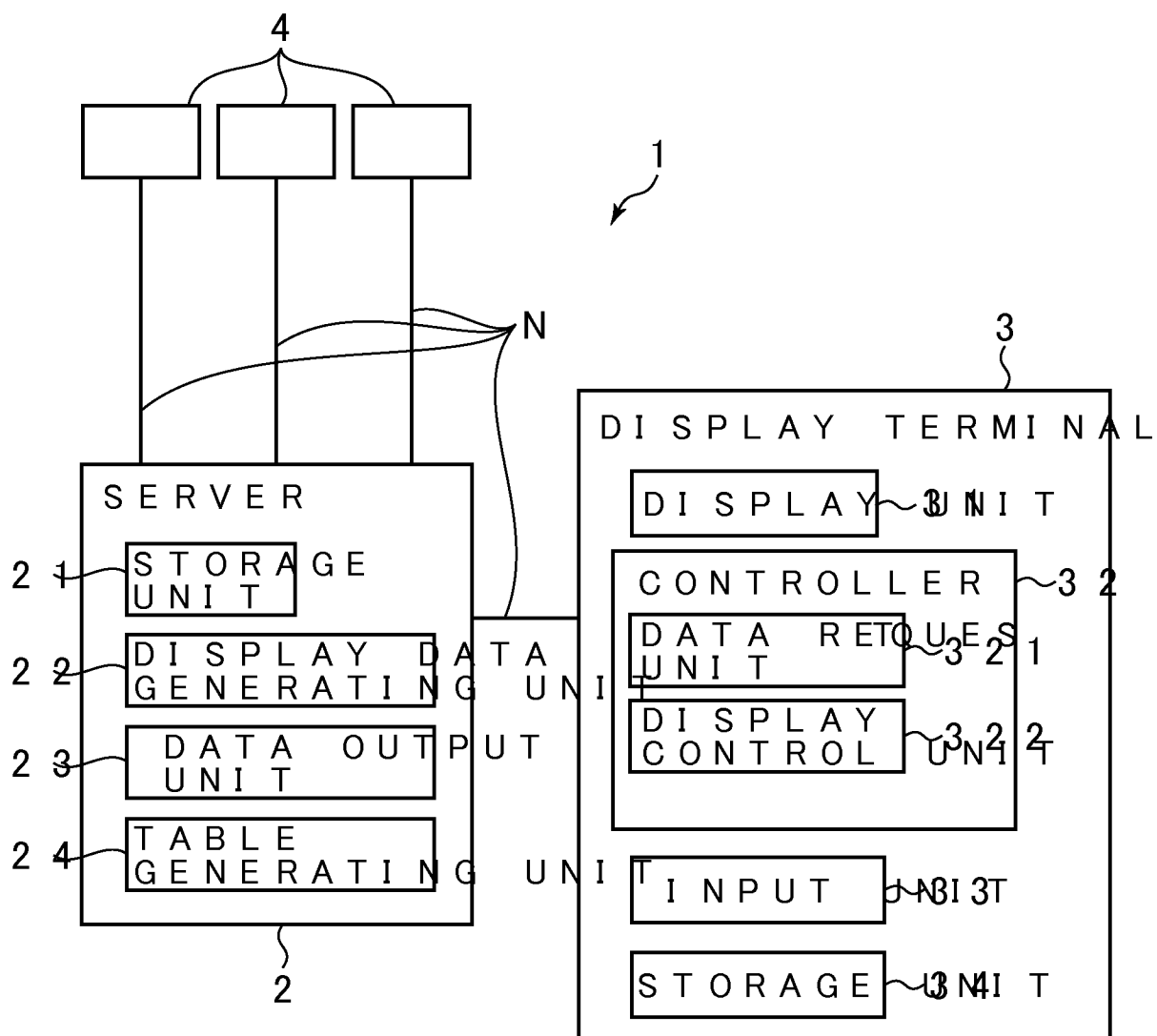


FIG. 21



22/22

F I G . 2 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/072736

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F19/00
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.
Y	US 2004/068423 A1 (SHAW GRANT D [GB]) 8 April 2004 (2004-04-08) abstract figures 3-6,14-16,21,22 paragraph [0012] - paragraph [0035] paragraph [0083] - paragraph [0112] -----	1-21
Y	US 2007/269140 A1 (NAGASAKA FUMIO [JP]) 22 November 2007 (2007-11-22) figures 7-10 paragraph [0007] - paragraph [0010] paragraph [0031] - paragraph [0044] -----	1-21
A	US 2011/134276 A1 (CHOI JAE-JOON [KR]) 9 June 2011 (2011-06-09) the whole document ----- -/--	1-21



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/072736

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2006/047218 A2 (CREATETHE LLC [US]; KUNG ALLEN [US]; KING TONY [US]; KANG ALBERT [US];) 4 May 2006 (2006-05-04) abstract page 2, line 11 - page 3, line 32 page 11, line 14 - page 11, line 23 page 15, line 13 - page 15, line 26 figures 6-14,19-26 -----	1-21
A	US 2004/201752 A1 (PARULSKI KENNETH A [US] ET AL) 14 October 2004 (2004-10-14) the whole document -----	1-21
A	US 7 058 901 B1 (HAFEY CHRISTOPHER [US] ET AL) 6 June 2006 (2006-06-06) abstract figure 2 column 1, line 59 - column 2, line 14 column 2, line 34 - column 8, line 40 -----	1-21

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/072736

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004068423	A1	08-04-2004	NONE
US 2007269140	A1	22-11-2007	JP 5028858 B2 19-09-2012 JP 2007304704 A 22-11-2007 US 2007269140 A1 22-11-2007
US 2011134276	A1	09-06-2011	KR 20110062383 A 10-06-2011 US 2011134276 A1 09-06-2011
WO 2006047218	A2	04-05-2006	US 2006184540 A1 17-08-2006 WO 2006047218 A2 04-05-2006
US 2004201752	A1	14-10-2004	NONE
US 7058901	B1	06-06-2006	US 7058901 B1 06-06-2006 US 2006181548 A1 17-08-2006