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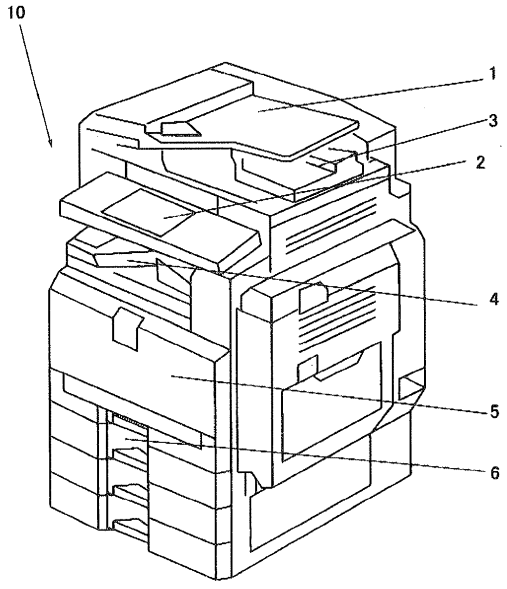
## (54) Image forming device and method

(57) An image forming device (10) includes a device body including a reader (3) to read a document and a printer (5) to print the read document, an operation panel (21) detachable from the device body, including an imaging element (216, 21c) to capture an image of a subject and a display unit (21a), a communication element (113, 213, 114, 214) to communicable connect the device body and the operation panel (21). The device (10) is adapted to synthesize document image data read by the reader (3) and subject image data captured by the imaging element (21b, 21c), display the synthesized image data on the display unit (21a), and print the synthesized image data with the printer (5), while the operation panel (21) is detached from the device body.

FIG.1

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## Description

**[0001]** The present invention relates to an image forming device incorporating an operation panel detachable from a device body and an image forming method.

**[0002]** Japanese Patent No. 4387961 discloses an image forming device incorporating an operation panel detachable from a device body in use for a remote controller.

**[0003]** This operation panel comprises operation blocks provided in the device body and having items to select in accordance with the functions of the device and a data output to output selection data indicating the selected items with the operation blocks to the device. The operation panel further includes a detachable display block having a display to display the items to select the device functions, a detector to detect an item selected, a controller to control the display to display the items to select together with the items of the other operation blocks when detached and a data acquiring element to acquire the selected item by the detector as the selection data from the detached display block. The data output is adapted to output the acquired selection data to the device.

**[0004]** By manipulation of this operation panel detached, the image forming device can be operated. However, only simple operations such as power-on/off, print start and stop are feasible.

**[0005]** The present invention aims to provide image forming device and method with a detachable operation panel including photographic and display functions to be able to smoothly complete printing by a simple operation after setting an image composition on a display.

**[0006]** An image forming device comprises a device body including a reader to read a document and a printer to print the read document, an operation panel detachable from the device body, including an imaging element to capture an image of a subject and a display unit, a communication element to communicably connect the device body and the operation panel, wherein the image forming device is adapted to synthesize document image data read by the reader and subject image data captured by the imaging element, display the synthesized image data on the display unit, and print the synthesized image data with the printer, while the operation panel is detached from the device body.

**[0007]** Features, embodiments, and advantages of the present invention will become apparent from the following detailed description with reference to the accompanying drawings:

FIG. 1 schematically shows the exterior of an image forming device according to one embodiment of the present invention;

FIGs. 2A to 2F show an operation panel divided and detached;

FIG. 3 is a block diagram of a device body and the operation panel by way of example;

FIG. 4A shows an operation panel in a standby mode mounted in the device body and FIG. 4B is a perspective view of the exterior of the image forming device;

FIG. 5A shows the operation panel in a standby mode detached from the device body and FIG. 5B is a perspective view of the image forming device in FIG. 4B with the operation panel detached;

FIG. 6A is a document preview on a full screen display of the operation panel detached from the device body, Fig. 6B an enlarged document preview on the operation panel, and FIG. 6C is a perspective view of the image forming device in FIG. 4B with the operation panel detached;

FIG. 7A shows a camera image preview on the operation panel detached from the device body and FIG. 7B is a perspective view of the image forming device with the operation panel detached to shoot a key on the table;

FIG. 8 shows the synthetic image of a document image and a camera image on a full screen display of the detached operation panel before the adjustment of a synthesis position;

FIG. 9 shows an enlarged synthetic image of a document image and a camera image on the detached operation panel before the adjustment of a synthesis position;

FIG. 10A shows editing an enlarged synthetic image of a document image and camera image on the detached operation panel after the adjustment of the synthesis position and FIG 10B shows a user's operating the operation panel;

FIG. 11A shows the document image preview on a full screen display of the detached operation panel while printed after completion of the synthesis and FIG. 11B is a perspective view of the exterior of the image forming device with the operation panel detached;

FIG. 12 is a flowchart for the operation of the image forming device in FIG. 1;

FIG. 13 is a flowchart for another operation of the image forming device in FIG. 1; and

FIGs. 14A to 14D show an example of read document image data, a synthesis area set indicated by the broken line, moving a block of the display 21a to adjust the position of a subject, and the image data set in a desired position and size, respectively.

**[0008]** The features of the present embodiment are in accurately deciding the position and size of image data of a subject relative to document image data at photographing, to thereby eliminate the necessity for post-image processing such as position adjustment or enlargement and reduction. The post-image processing is preferably performed at a later opportunity. It is able to facilitate alteration to image data by synthesizing camera image data and image data read from the image forming device for output.

**[0009]** Hereinafter, one embodiment of the present in-

vention will be described in detail with reference to FIG. 1 to FIG. 14. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

**[0010]** FIG. 1 shows the exterior of an image forming device according to one embodiment of the present invention. An image forming device 10 includes a scanner 3 to read documents, an ADF (automatic document feeder) 1 to send documents to the scanner 3, a printer 5 to output read images of documents, a paper tray 6, and a paper discharge tray 4.

**[0011]** From the bottom in the drawing, the device body is comprised of the four-stage paper tray 6, printer 5 as image forming unit, scanner 3, and paper discharge tray 4 by way of example.

**[0012]** FIGs. 2A to 2F show the division and detachment of the operation panel of the image forming device 10 in FIG. 1. A panel unit 2 is dividable and includes an operation element 2a as keywswitches to decide an application such as copier, scanner, printer, and an LED in FIG. 2A. The operation element 2a is assumed to be not detached since the keywswitches and LED are not necessary for remote control in FIG. 2B.

**[0013]** An operation panel 21 includes a display 21a as LCD, a touch panel for input to a display screen, and cameras 21b, 21c, an operation button 104 in FIG. 2C, 2D.

**[0014]** A sub panel 22 includes ten keywswitches to input the number of copies, a start and stop button 22b to start and cancel copying or printing, an LED, and a camera 22a.

**[0015]** The operation panel 21 and sub panel 22 are detachable from the device body and usable for a remote controller in FIGs. 2E, 2F.

**[0016]** Next, referring to FIG. 5, the structure of the essential parts of the device body and the operation panel is described by way of example. The operation panel 21 includes a controller 110 as CPU, a non-volatile second memory 112, a wired interface 113, a wireless interface 114, and a camera 21c. Likewise, a control unit 200 of the device body includes a controller 210, a first storage 212, a wired interface 213, and a wireless interface 214.

**[0017]** The control unit 200 and operation panel 21 when detached bidirectionally communicate with each other via the wired interfaces 113, 213 and wireless interfaces 114, 214. The first and second storages 112, 212 store image data to be displayed on the display 21a.

**[0018]** Referring to FIGs, 4 to 8, an example of the image synthesis and printout of the operation panel detached from the image forming device is described. FIG. 4A shows a normal screen on the display 21a in a standby mode when a user uses the image forming device 10 with the operation panel 21 mounted on the device body. While attached to the device body, the operation panel 21 does not display operation buttons since they are unnecessary.

**[0019]** FIG. 5A shows a normal screen on the display 21a of the operation panel 21 detached when a user uses the image forming device 10 in a standby mode in FIG. 5B. When detached from the device body, the operation panel 21 shows the operation buttons. By a manipulation of these buttons on the operation panel 21, all the operations of the image forming device 10 can be performed. The functions of the operation element 2a and sub panel 22 are also displayed on the display 21a.

**[0020]** FIG. 6A shows a document image preview on a full screen display of the display 21a of the operation panel 21, FIG. 6B shows an enlarged document image preview on the display 21a and FIG. 6C shows the operation panel 21 detached from the image forming device 10.

**[0021]** The screen is switched to that in FIG. 6A from a standby display when a user intends to add a synthetic image on a read document or check the details of the document, for instance.

**[0022]** FIG. 7A shows a camera image preview of a key 32 on a table 31 in FIG. 7B captured by a camera 21b of the operation panel 21. FIG. 7A omits showing a document image. In edit mode a user can shoot a subject to synthesize while viewing the preview image.

**[0023]** FIG. 8 shows a preview of a synthetic image of the camera image in FIG. 7A and a read document image on the display 21a of the operation panel 21. The preview image can be printed as it is or either or both of the camera image and document image can be modified as moved, enlarged, reduced, or partially extracted. FIGs. 9 to 10 show an example of moving image data from the camera. In FIG. 9 camera image data is being enlarged while in FIG. 10B a user is holding the operation panel 21 to manipulate the screen with her finger. FIG.10A shows that a user is operating the operation panel 21 in edit mode to move the key image rightward.

**[0024]** FIG. 11A shows a printout image after the image synthesis and editing on a full screen display of the display 21a of the operation panel 21 detached from the image forming device in FIG. 11B.

**[0025]** FIG. 12 is an exemplary flowchart for the operation of the image forming device in FIG. 1, using read document image data in FIGs. 14A to 14D. FIG. 14A shows read document data on the display 21a, FIG. 14 shows a set synthesis area at the center indicated by the broken line. The synthesis area can be set with a cursor or a touch panel. FIG. 14C shows adjusting the position of a subject by moving a block of the display 21a and FIG. 14D shows a captured image in a desired position and a size.

**[0026]** The controller 210 of the control unit 200 or that 110 of the operation panel 21 in FIG. 3 mainly performs the operation. In step S100 the image forming device 10 starts operating in standby mode in FIGs. 4A, 5A.

**[0027]** The controller 210 determines whether or not a reading operation has been instructed. The document reading is started by pressing a button 22a on the sub panel 22 in the standby mode in FIGs. 4A, 5B with the operation panel mounted on the device body while it is started by a button 21d on the display 21a of the operation

panel 21 in FIGs. 5A, 5B with the operation panel detached. When the operation panel 21 is detached, the operation is now taken over by the controller 110 in step S101. Upon determining that the instruction has not been issued yet (No in step S101), the controller 110 returns the standby display to the screen. Upon determining that the instruction has been issued (Yes in step S101), the controller 110 proceeds to step S102.

**[0028]** In step S102 a document is read by the image forming device according to an instruction from the operation panel 21 to acquire image data. The controller 110 proceeds to step S103.

**[0029]** In step S103 a document image preview is displayed as shown in FIG. 6A. In FIG. 14A the preview image includes a blank space at the center for photographic data to be added.

**[0030]** In step S104 the controller 110 determines whether or not a camera mode is set. Upon determining that the camera mode is set (Yes in step S104), the controller 110 proceeds to step S105. Upon determining that the camera mode is not set (No in step S104), the controller 110 proceeds to step S109.

**[0031]** The controller 110 determines whether or not the operation panel 21 is detached from the image forming device 10 in step S105. Upon determining that the operation panel 21 is attached to the image forming device 10 (No in step S105), the controller 110 returns to step S104. Upon determining that the operation panel 21 is detached (Yes in step S105), the controller 110 proceeds to step S106.

**[0032]** The controller 110 instructs the display 21a to display a synthetic image of the document image and camera image as shown in FIGs. 8, 9, 10A.

**[0033]** The controller 110 determines whether or not a subject has been shot by a user in step S107. When the user has captured a subject image, the controller 110 acquires image data therefrom (Yes in step S107) and proceeds to step S109. When the subject has not been shot (No in step S107), that is, the user is setting the composition of an image, the controller 110 proceeds to step S108.

**[0034]** In step S108 the controller 110 determines whether or not the camera mode is cancelled. That is, when the camera mode is cancelled before photographing (Yes in step S108), it proceeds to step S109. When the camera mode is continued (No in step S108), it returns to step S106.

**[0035]** In step S109 the controller 110 determines whether or not the edit mode is set. Upon determining that the edit mode is set (Yes in step S109), the controller 110 proceeds to step S110. Upon determining that the edit mode is not set (No in step S109), it proceeds to step S112.

**[0036]** In step S110 the controller 110 modifies image data according to a user's manipulation in FIG. 10B, displays the read document previews on the display 21a in FIGs. 10A, 11A, and proceeds to step S111.

**[0037]** In step S111 the controller 110 determines whether or not the editing has been completed. Upon determining the completion of editing (Yes in step S111), it proceeds to step S112 (No in step S111). Upon determining that editing is in progress, it returns to step S110.

**[0038]** In step S112 the controller 110 determines whether or not printing is instructed. With the printing instructed (Yes in step S112), the controller 110 gives a printing instruction to the controller 210 of the device body, and the controller 210 prints the image data in step S113. With no printing instructed (No in step S112), it cancels printing and returns to step S100.

**[0039]** The synthesis area indicated by the broken line in FIG. 14B can be set in any stage after step S103 to photographing.

**[0040]** FIG. 13 is a flowchart for another operation of the image forming device in FIG. 1 as an example of using pre-stored document image data. The steps S200 to S213 are the same as steps S100 to S113 except for step S201 so that a description thereof is omitted.

**[0041]** In step S201 the controller 110 determines whether or not a reading operation has been instructed. Upon determining that the reading operation has not been instructed (No in step S201), it determines whether or not stored document image data is selected in step S214. Upon determining that stored image data is not selected (No in step S214), it returns to step S200. Meanwhile, upon determining that stored image data is selected (Yes in step S214), it sets the selected image data in step S215 and proceeds to step S203.

**[0042]** It is preferable that the image data shown in FIG. 14A or other similar image data be pre-stored and selected in step S214. In addition, the setting of the synthesis area in FIG. 14 can be registered in advance, which makes it possible to easily acquire the finished image data in FIG. 14D by only determining the image composition of the camera in FIG. 14C.

**[0043]** Thus, a user can determine the position and size of a subject while viewing the display 21a and print out the image data without post-image processing. In FIG. 14C the subject is set not to be displayed outside the synthesis area during preview. Instead, it can be displayed outside the area during the preview but set not to be displayed after photographing. In either case the subject image data outside the synthesis area is not printed.

**[0044]** As described above, the present embodiment allows a user to be able to freely move the position of a subject vertically, horizontally, and back and forth while viewing the preview display, to set subject image data in an arbitrary position and a desired size relative to document image data. This eliminates the necessity for post-image processing using image processing software with a mouse and a keyboard. A user can smoothly capture an image of a subject, create a synthetic image as shown in FIG. 11A and print it out at once.

**[0045]** According to the present embodiment, it is made possible to change the data size of a subject relative to that of a read document in accordance with a ratio of document data, a full screen data or a partially

enlarged data in FIGs. 8, 9, on the display. Subject image data can be enlarged at the same ratio along with the enlargement of the document data during preview or in post-photographing adjustment.

**[0046]** Further, a plurality of synthesis areas can be set in different colors or with different brightness.

**[0047]** The cameras as imaging element can comprise a moving image shooting function in addition to a still image shooting function. The image forming device can select optimal subject image data relative to document image data in a certain shooting time. Further, it can comprise an image data corrector to correct synthesized image data by adjusting at least one of the position, size, rotation, color, and brightness of the subject image data relative to the document image data.

**[0048]** Further, the communication element can be a wireless communication and it can be configured that synthetic image data can be printed from the printer without the operation panel mounted on the device body.

**[0049]** Further, the operation panel can be configured to operate all or a part of the functions of the image forming device.

**[0050]** Although the present invention has been described in terms of exemplary embodiments, it is not limited thereto. It should be appreciated that variations or modifications may be made in the embodiments described by persons skilled in the art without departing from the scope of the present invention as defined by the following claims. The above embodiment describes a certificate of gratitude by way of example, however, it can be applied in various occasions as ceremonies, parties.

## Claims

**1.** An image forming device (10) comprising:

a device body including a reader (3) to read a document and a printer (5) to print the read document;
an operation panel (21) detachable from the device body, including an imaging element (21b, 21c) to capture an image of a subject and a display unit (21a);
a communication element (113, 213, 114, 214) to communicably connect the device body and the operation panel (21), wherein
the image forming device (10) is adapted to synthesize document image data read by the reader (3) and subject image data captured by the imaging element (21b, 21c), display the synthesized image data on the display unit (21a), and print the synthesized image data with the printer (5), while the operation panel (21) is detached from the device body.

**2.** An image forming device according to claim 1, wherein
the display unit (21a) is adapted to display a preview image of the imaging element together with the read document image data while the operation panel (21) is detached from the device body.

**3.** An image forming device (10) according to either claim 1 or 2, wherein
the synthesize image data is reduced or enlarged in size on the display unit at a same ratio of the subject image data and document image data and printed at the same ratio from the printer.

**4.** An image forming device (10) according to any one of claims 1 to 3, further comprising:

a synthesis area setter to set, on the display unit (21a), an area in which the document image data is synthesized with the subject image data, while the document image data is being displayed on the display unit and while the operation panel is detached from the device body.

**5.** An image forming device (10) according to claim 4, wherein:

the synthesis area setter is adapted to set a plurality of areas; and
the image forming device (10) is adapted to display the areas on the display unit and acquire subject image data of the areas individually while the operation panel is detached from the device body.

**6.** An image forming device (10) according to any one of claims 1 to 5, further comprising
an image data corrector to correct the synthesized image data after the subject image data is acquired, by adjusting at least one of a position, a size, a rotation, a color, and brightness of the subject image data relative to the document image data.

**7.** An image forming device (10) according to any one of claims 1 to 6, wherein:

the imaging element (21b, 21 c) comprises still image and moving image shooting functions and a moving image selecting function to select subject image data in a certain shooting time when moving image data is acquired by the moving image shooting; and
the image forming device is adapted to synthesize the selected moving image data of the subject with the document image data and print the synthesized image data with the printer.

**8.** An image forming device (10) according to any one of claims 1 to 7, wherein

the communication element (113, 213, 114, 214) is a wireless communication, to allow the printer (5) to print the synthesized image data without the operation panel attached to the device body.

**9.** An image forming device (10) according to any one of claims 1 to 8, wherein
the operation panel is configured to operate at least a part of the functions of the device body.

**10.** An image forming method by use of a detachable operation panel (21), comprising the steps of:

reading image data of a document;
displaying a camera preview image together with read document image data on the operation panel detached;
synthesizing image data of a subject and the document image data; and
printing the synthesized image data.

FIG.1

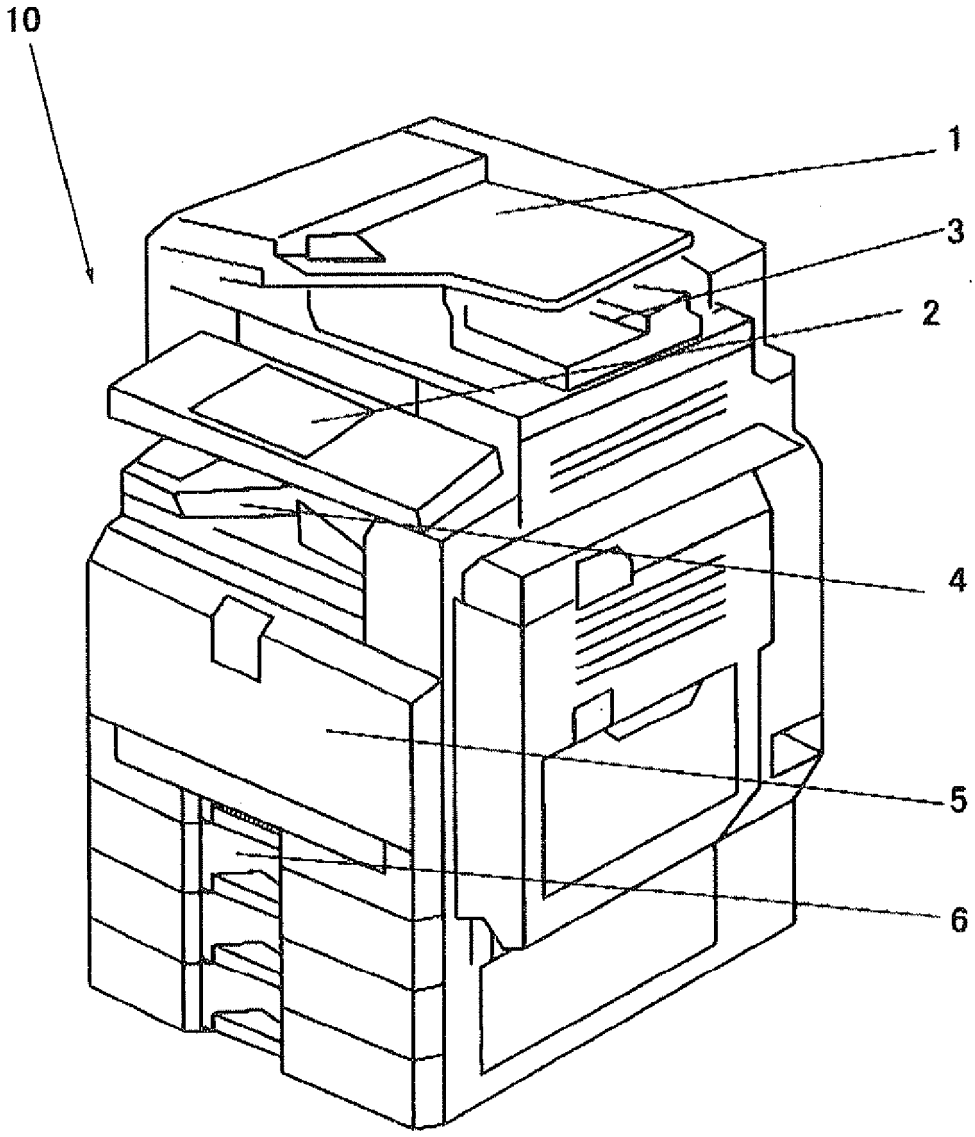


FIG.2A

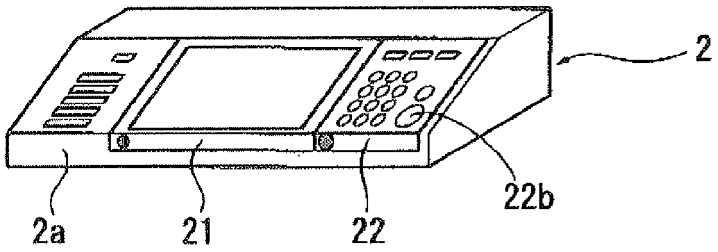



FIG.2B

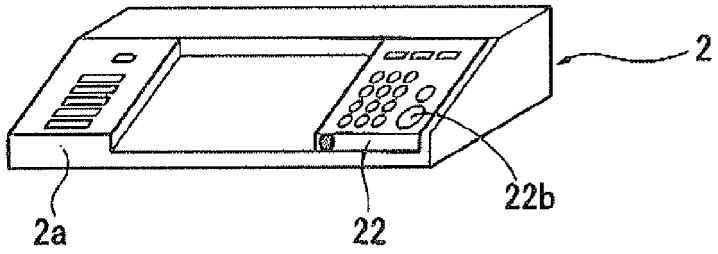



FIG.2C

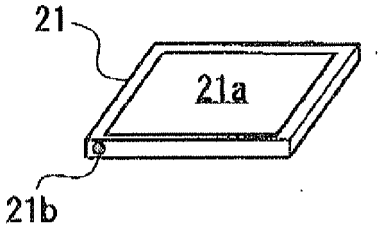



FIG.2D

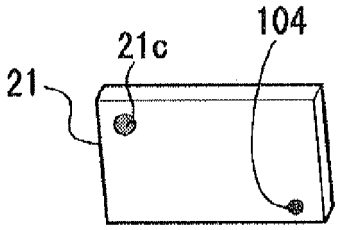



FIG.2E

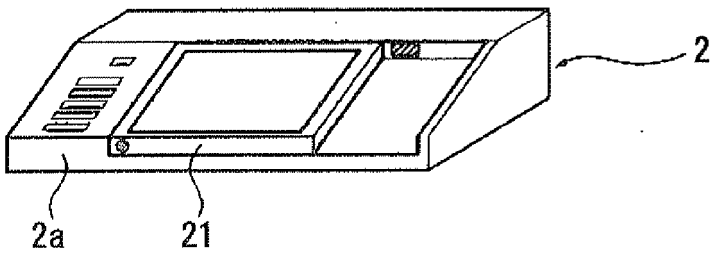



FIG.2F

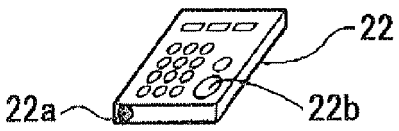


FIG.3

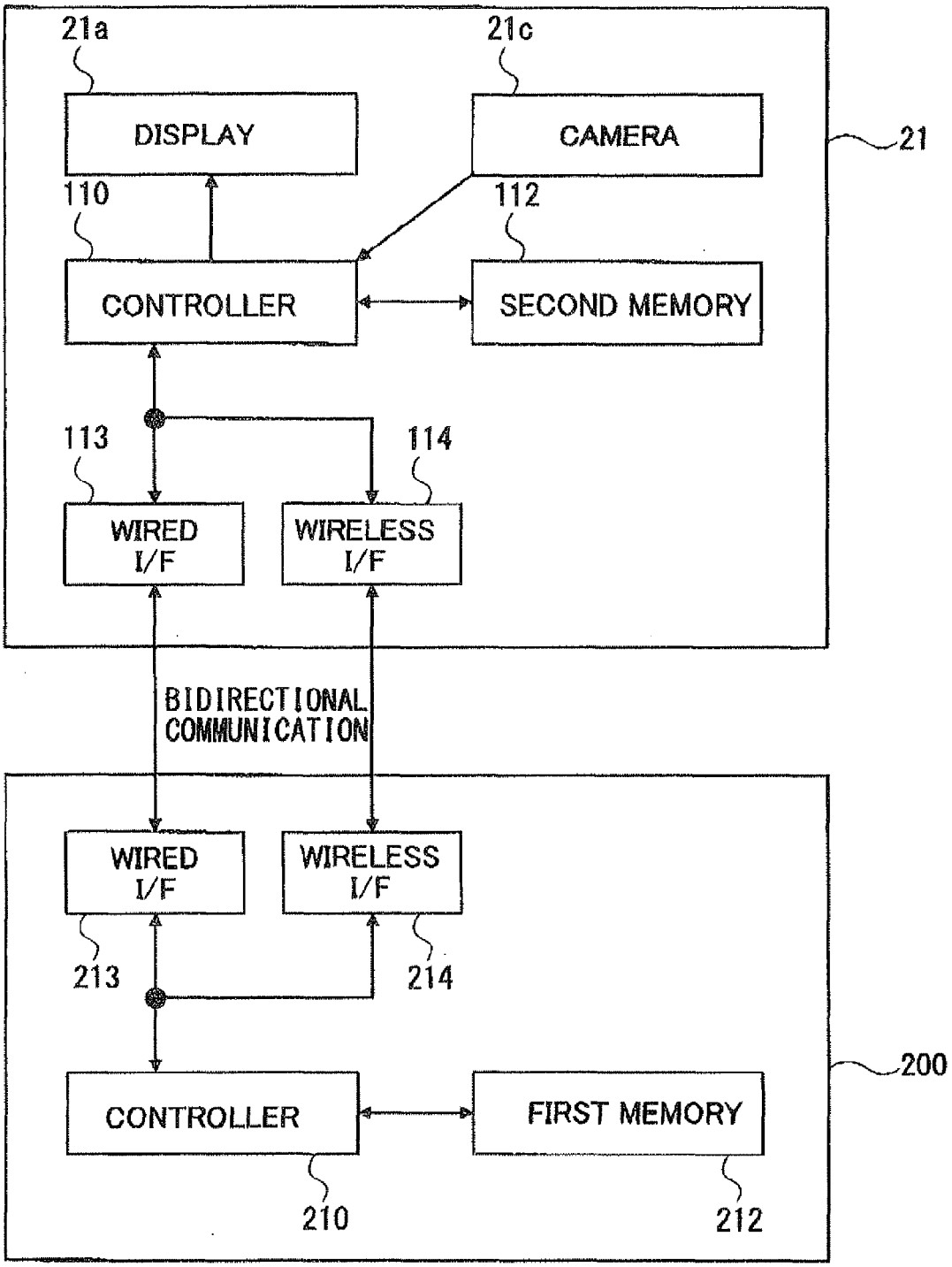

21a
21c
DISPLAY
CAMERA
21
110
112
CONTROLLER
SECOND MEMORY
113
114
WIRED I/F
WIRELESS I/F
BIDIRECTIONAL COMMUNICATION
WIRED I/F
WIRELESS I/F
213
214
200
CONTROLLER
FIRST MEMORY
210
212

FIG.4A

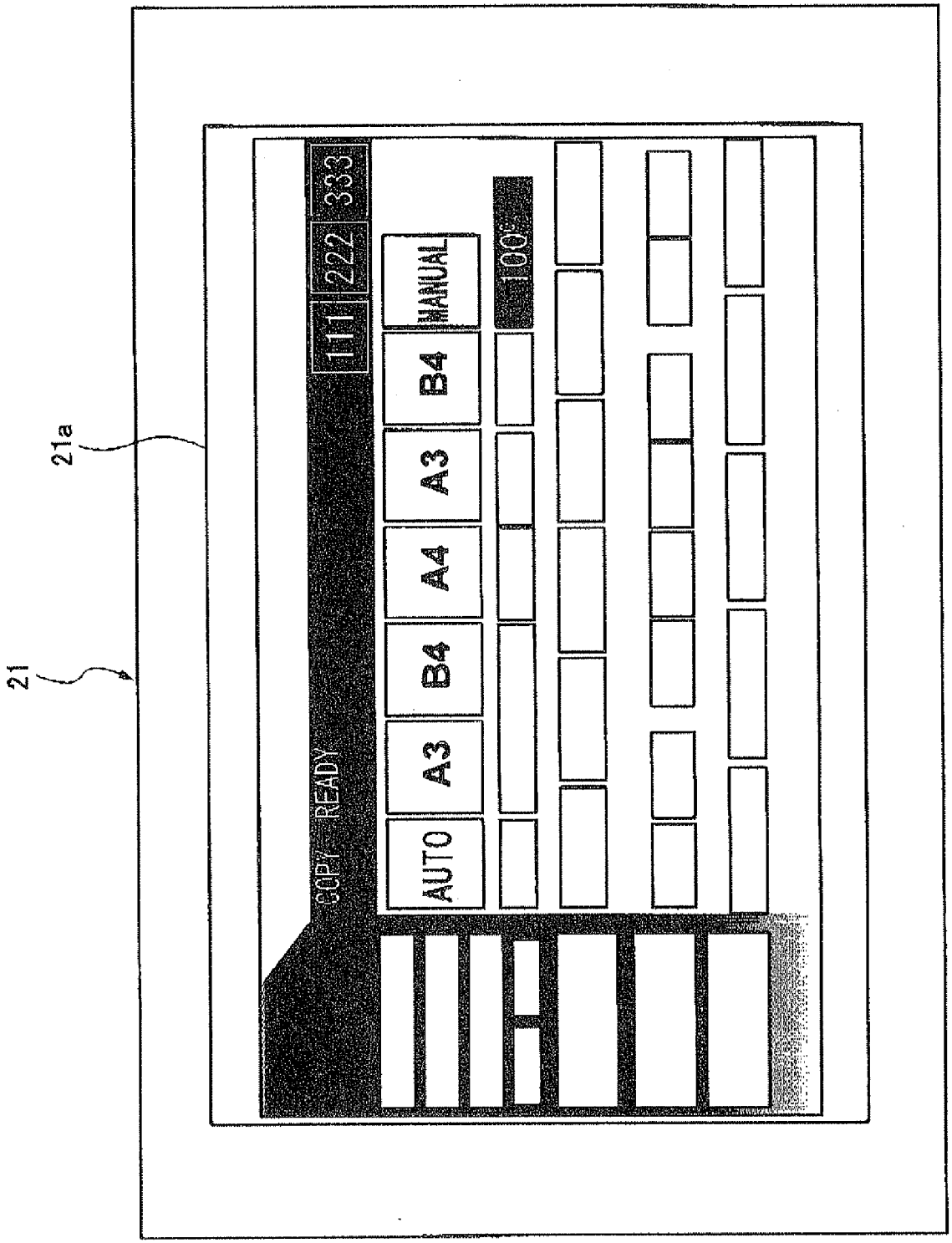


FIG.4B

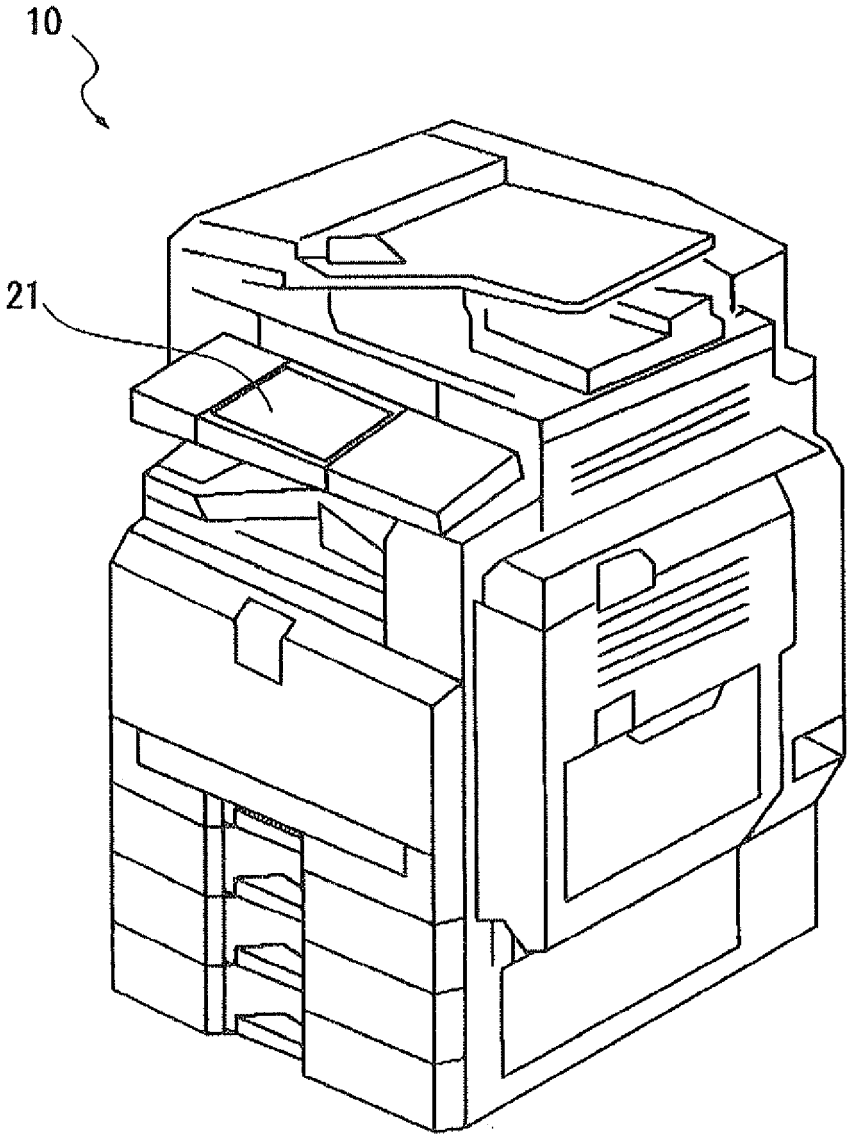


FIG.5A

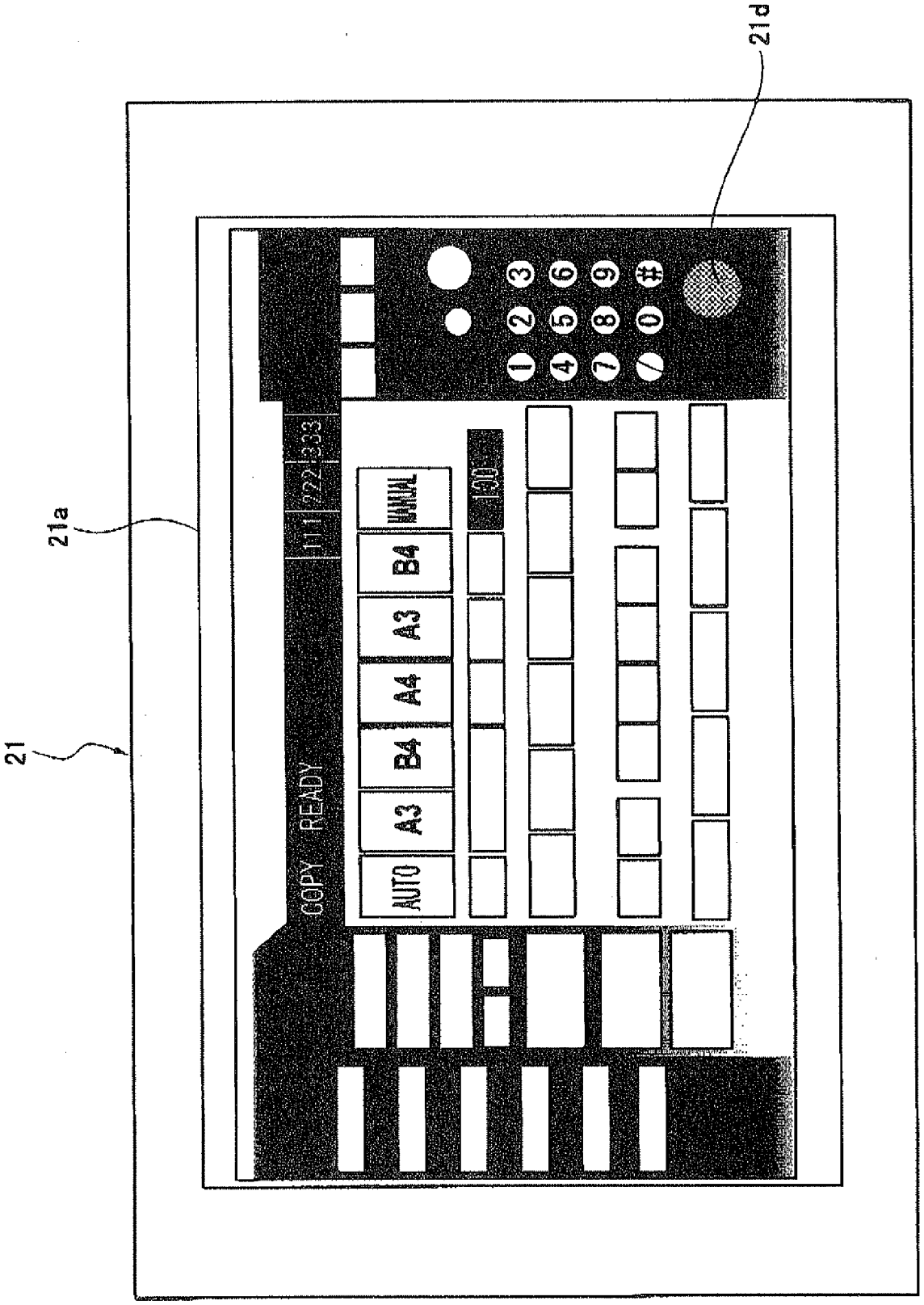

21d
21a
21
COPY READY
AUTO
A3
B4
A4
A3
B4
MANUAL
100
111 122 133
1 2 3
4 5 6
7 8 9
* 0 #

FIG.5B

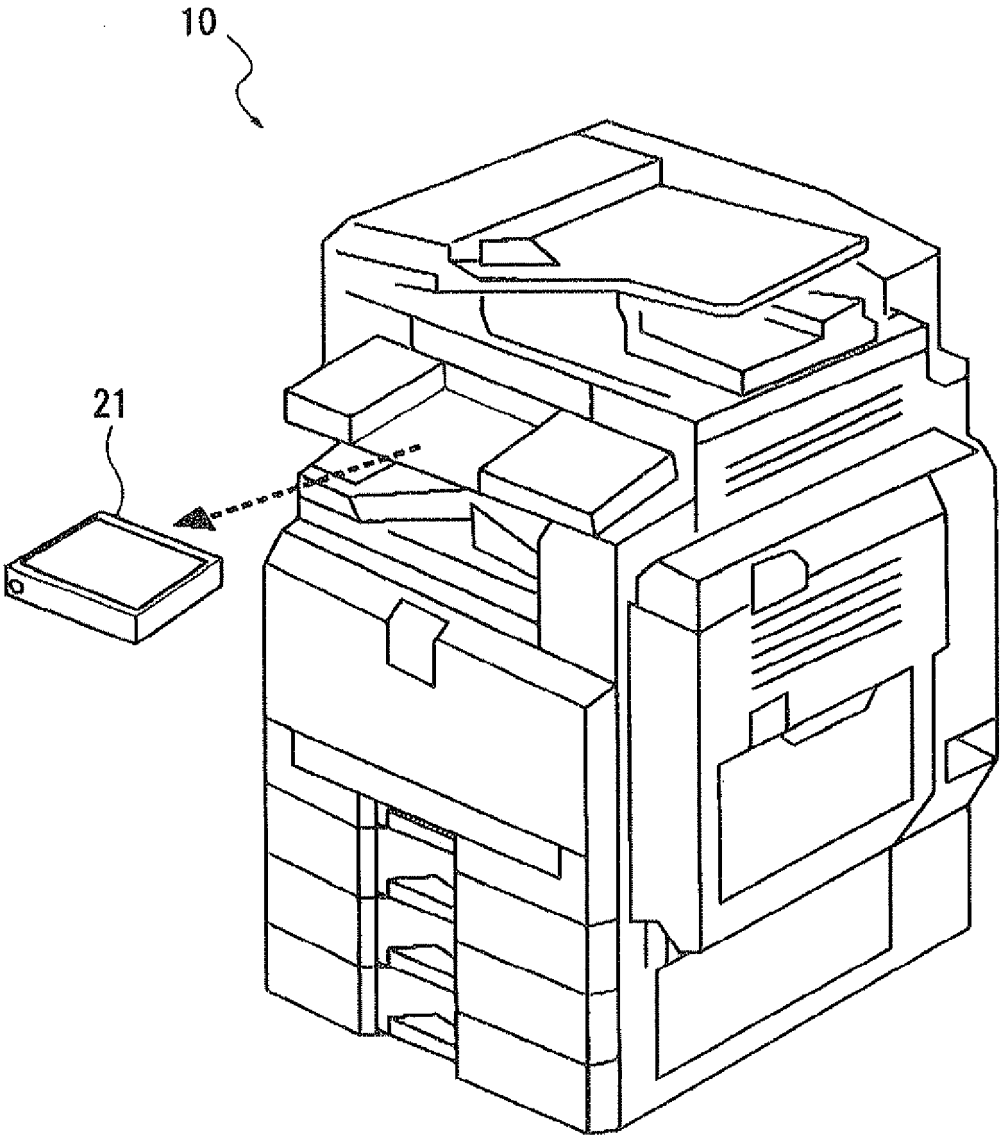


FIG.6A

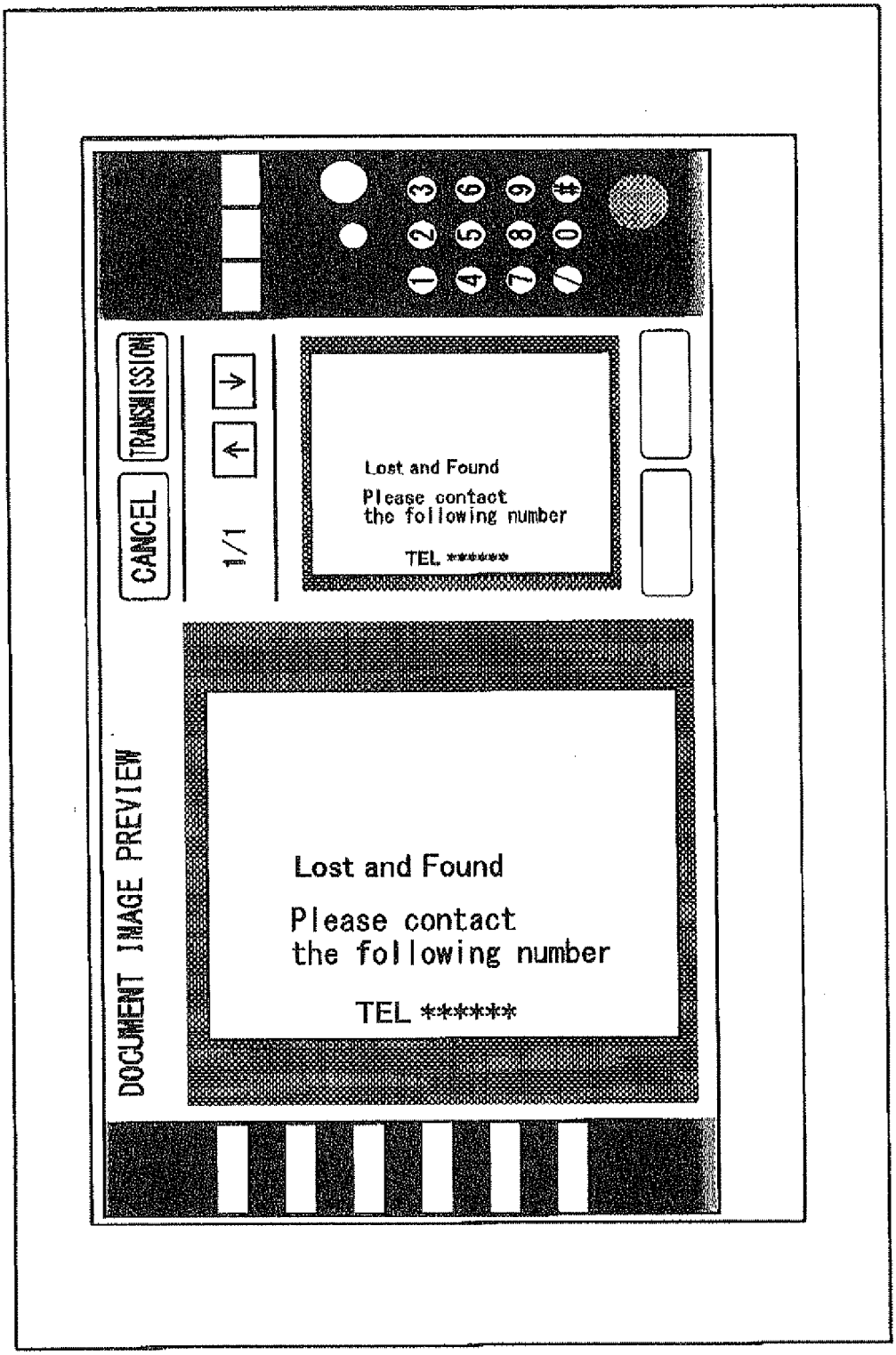

TRANSMISSION
CANCEL
1/1
Lost and Found
Please contact
the following number
TEL *****
DOCUMENT IMAGE PREVIEW
Lost and Found
Please contact
the following number
TEL *****

FIG.6B

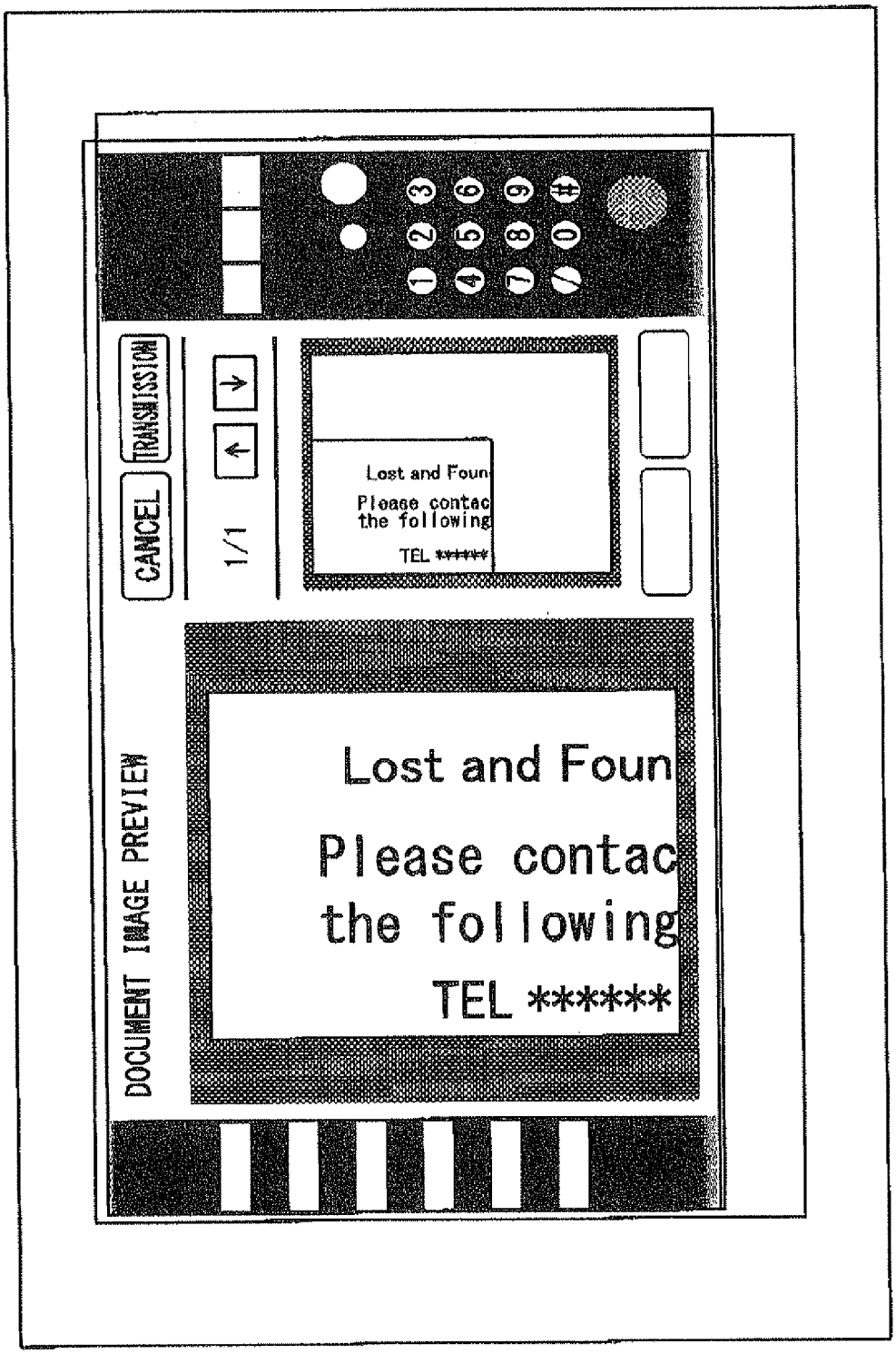

TRANSMISSION
CANCEL
1/1
Lost and Foun
Please contac
the following
TEL ******
DOCUMENT IMAGE PREVIEW
Lost and Foun
Please contac
the following
TEL ******

FIG.6C

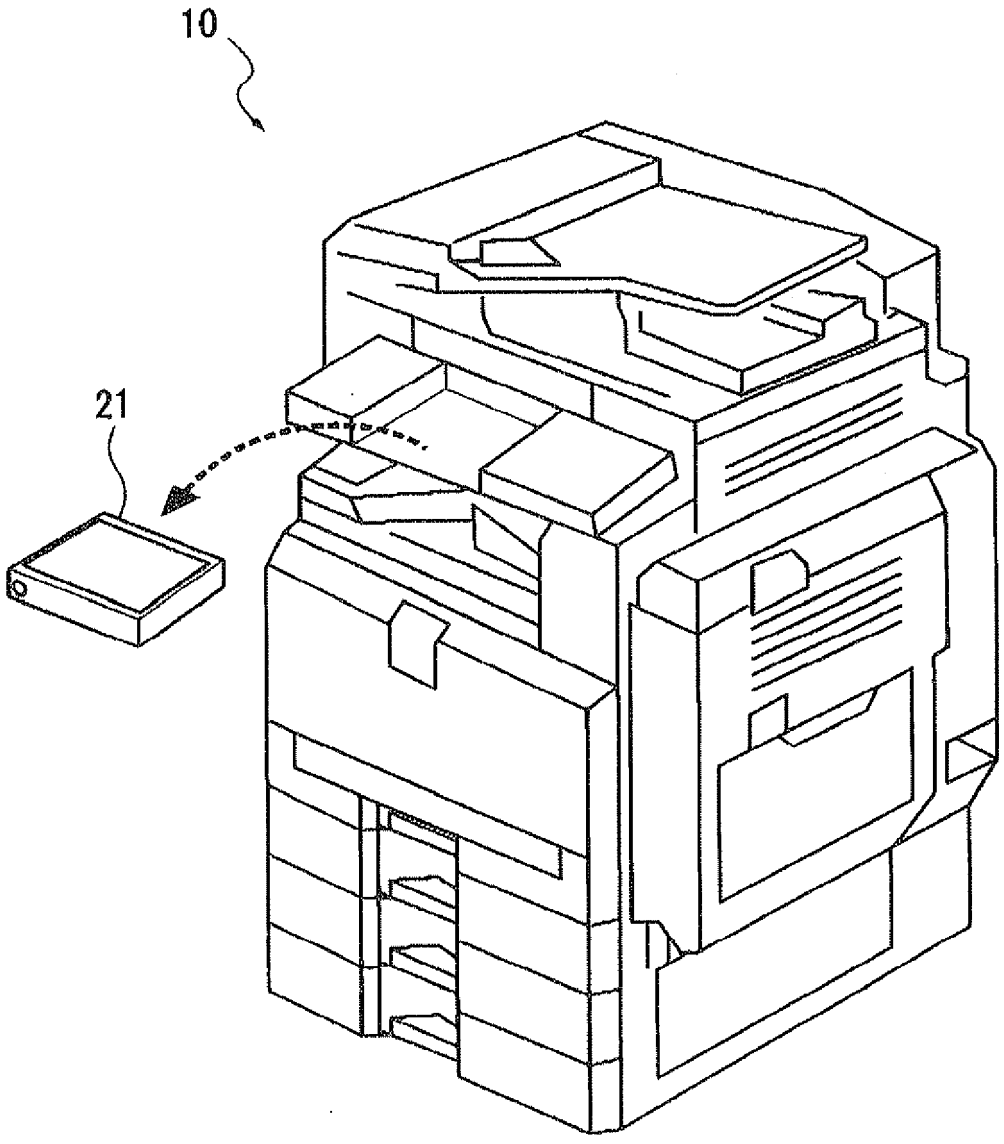


FIG.7A

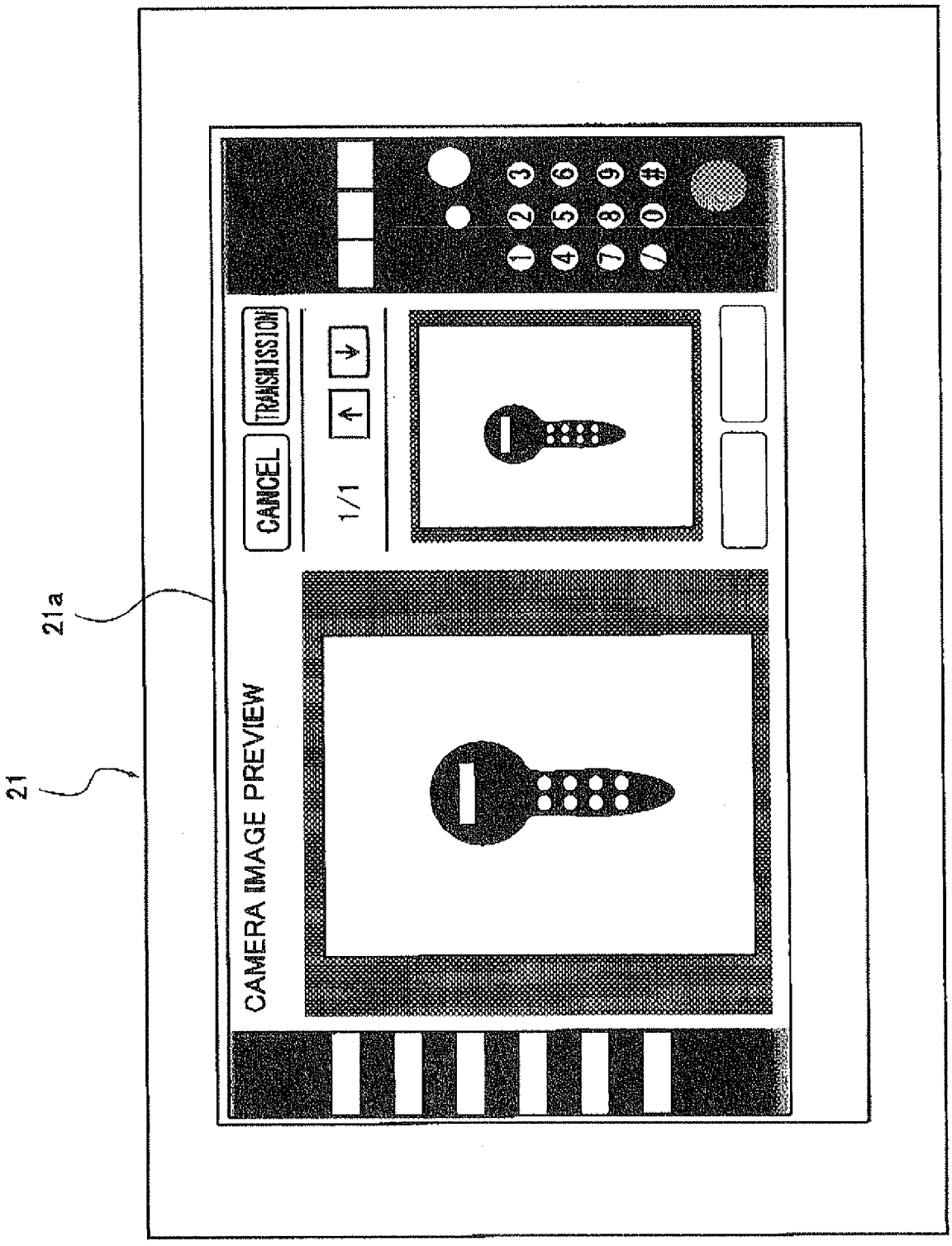


FIG.7B

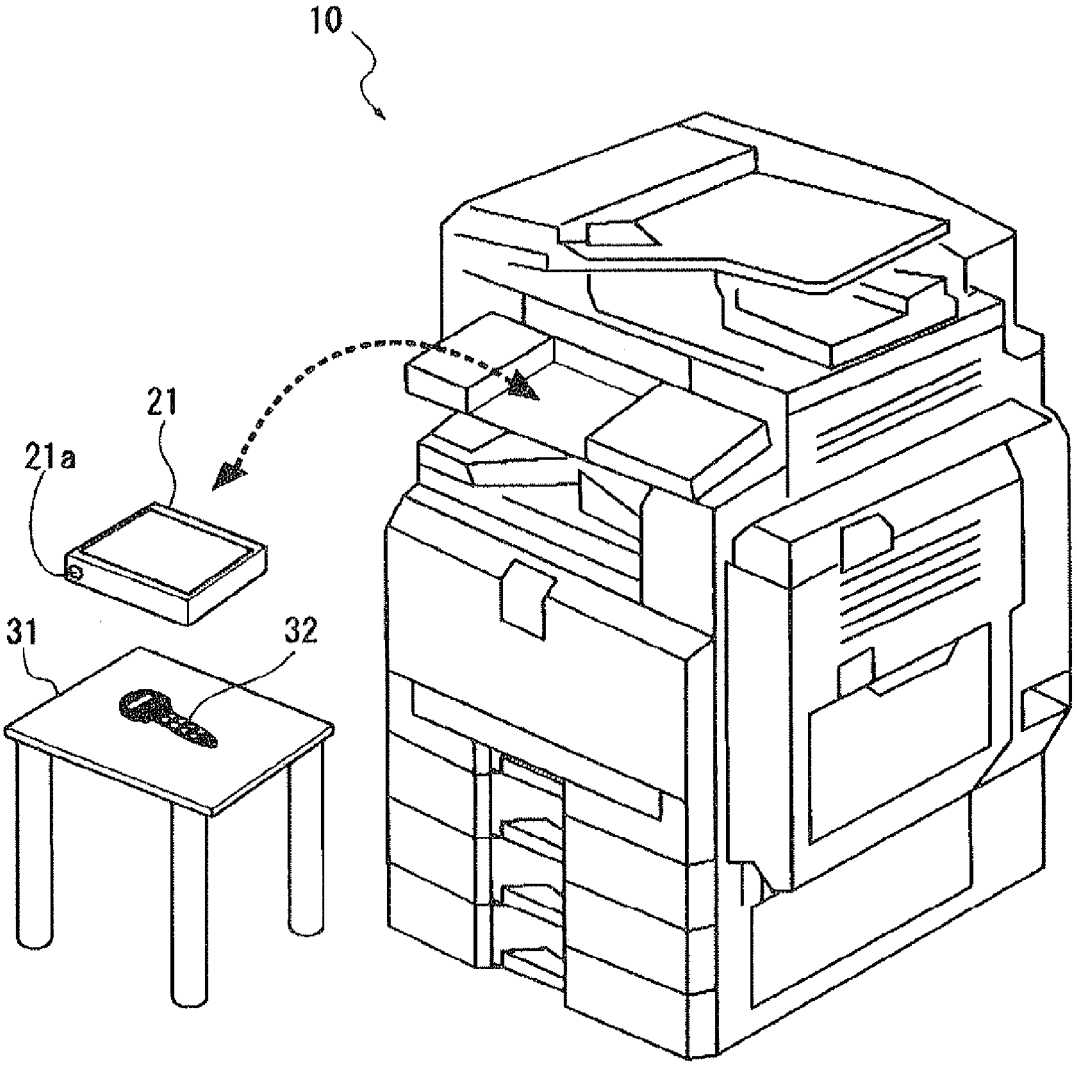


FIG.8

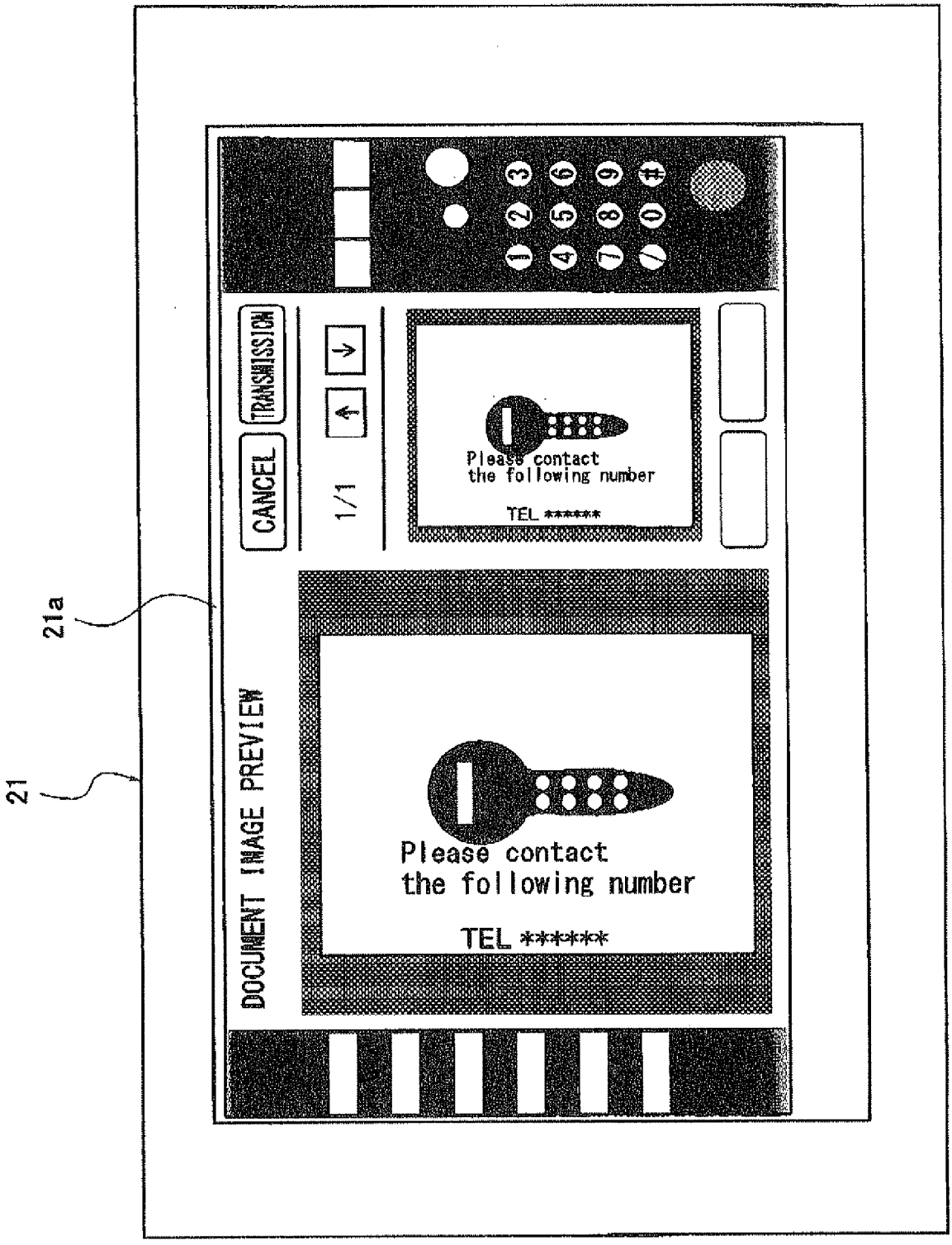
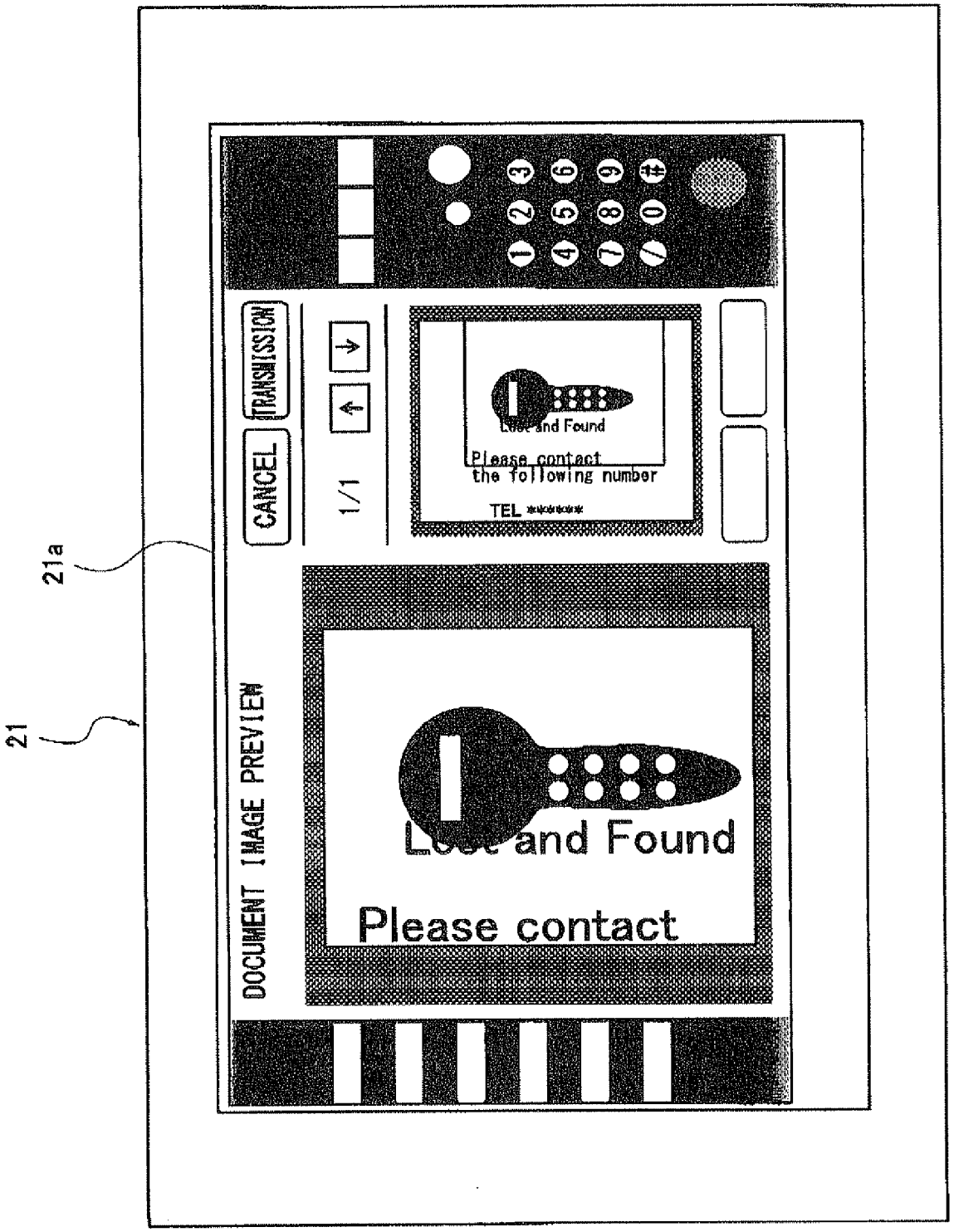

21a
21
DOCUMENT IMAGE PREVIEW
CANCEL
TRANSMISSION
1/1
Please contact
the following number
TEL ******
Please contact
the following number
TEL ******

FIG.9


21
21a
DOCUMENT IMAGE PREVIEW
CANCEL
TRANSMISSION
1/1
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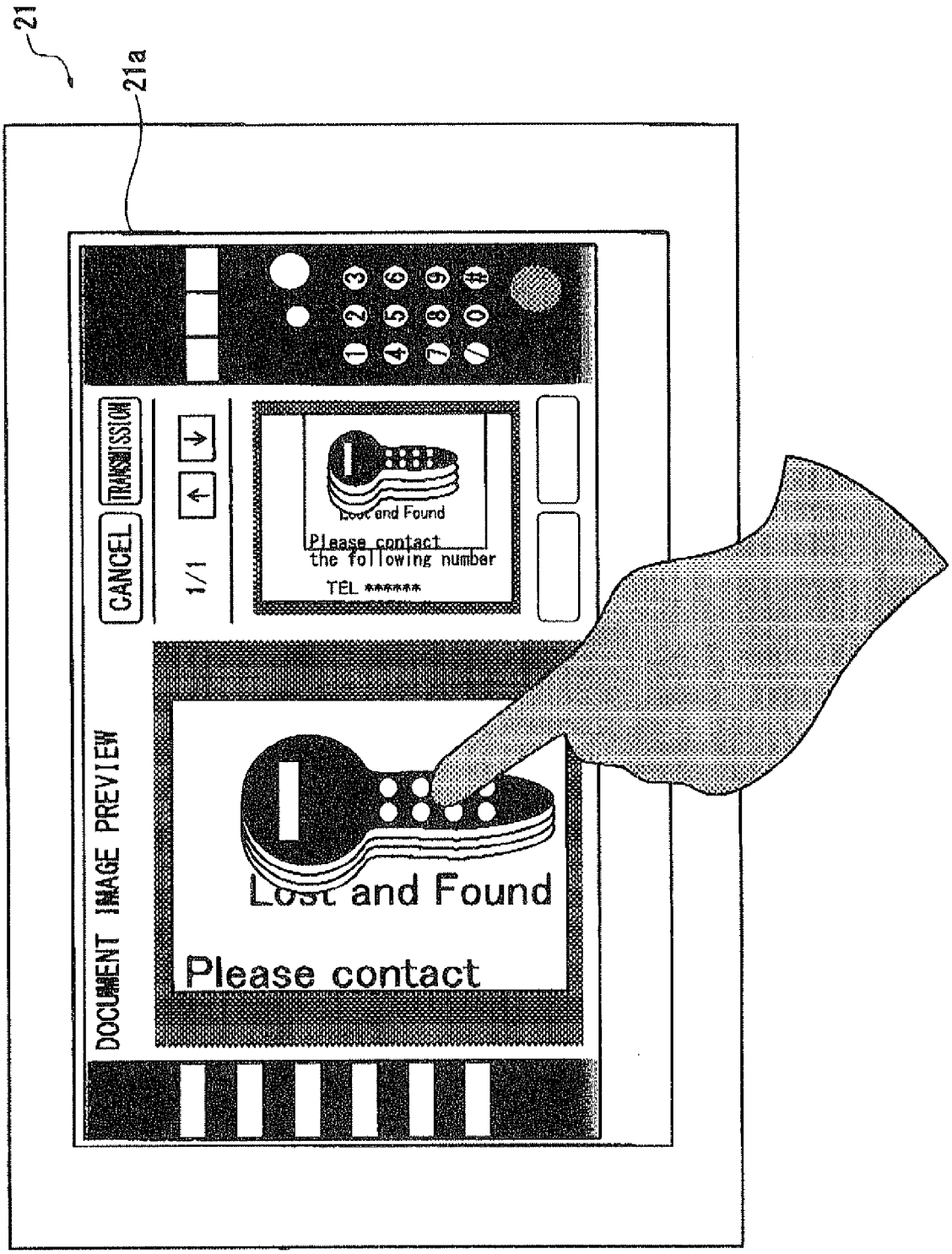
the following number
TEL ******
Lost and Found
Please contact

FIG.10A


21
21a
TRANSMISSION
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TEL *****
DOCUMENT IMAGE PREVIEW
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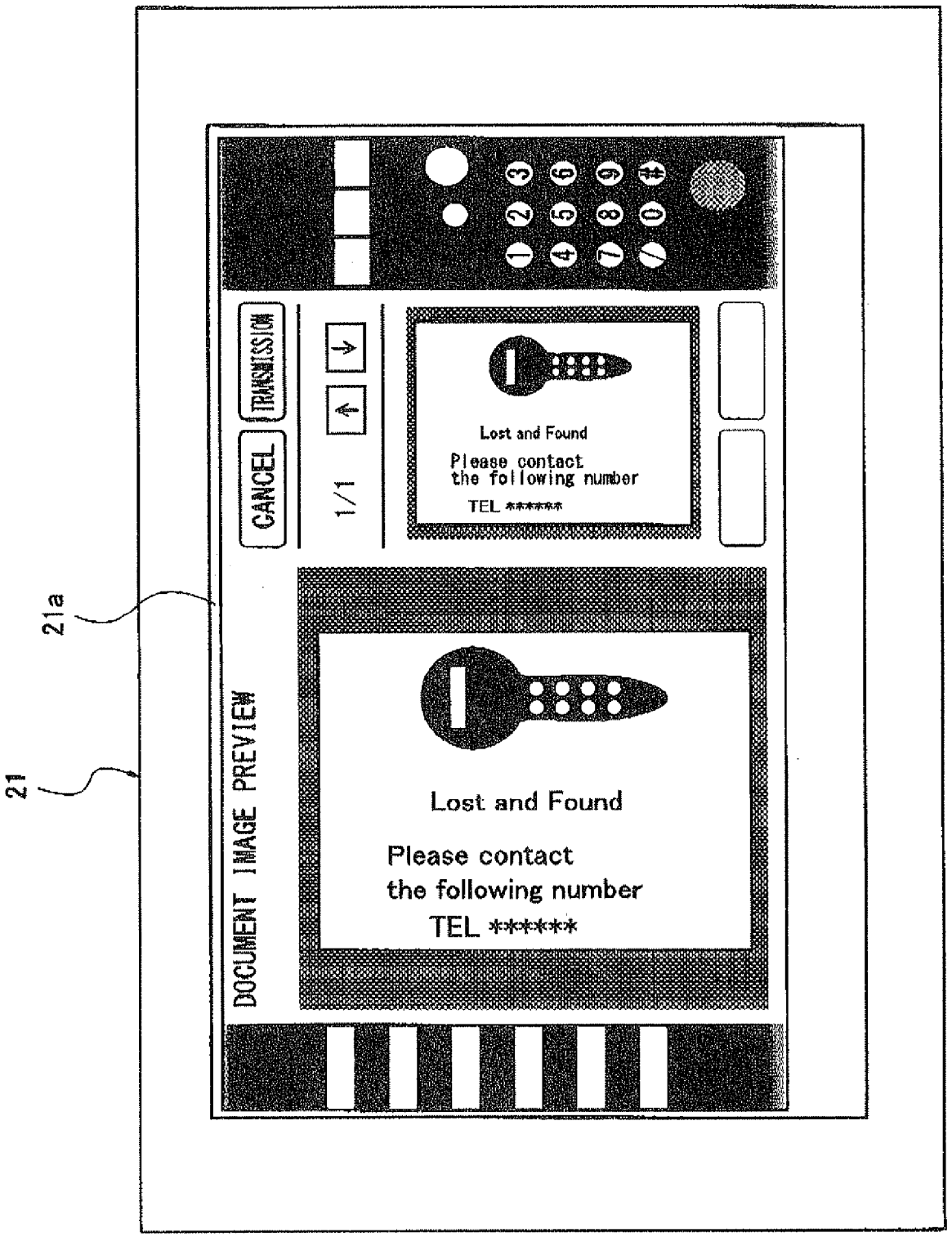
Please contact

FIG.10B

FIG.11A


21a
21
DOCUMENT IMAGE PREVIEW
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the following number
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Please contact
the following number
TEL ******

FIG.11B

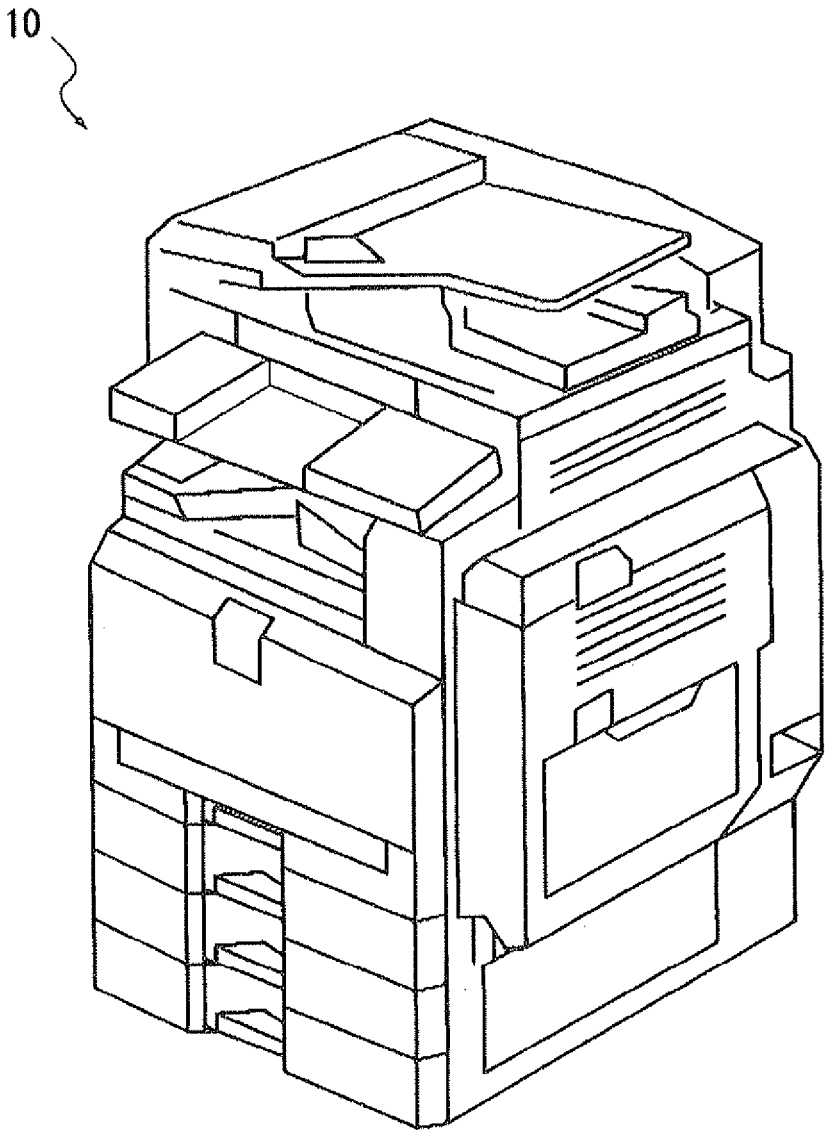


FIG.12

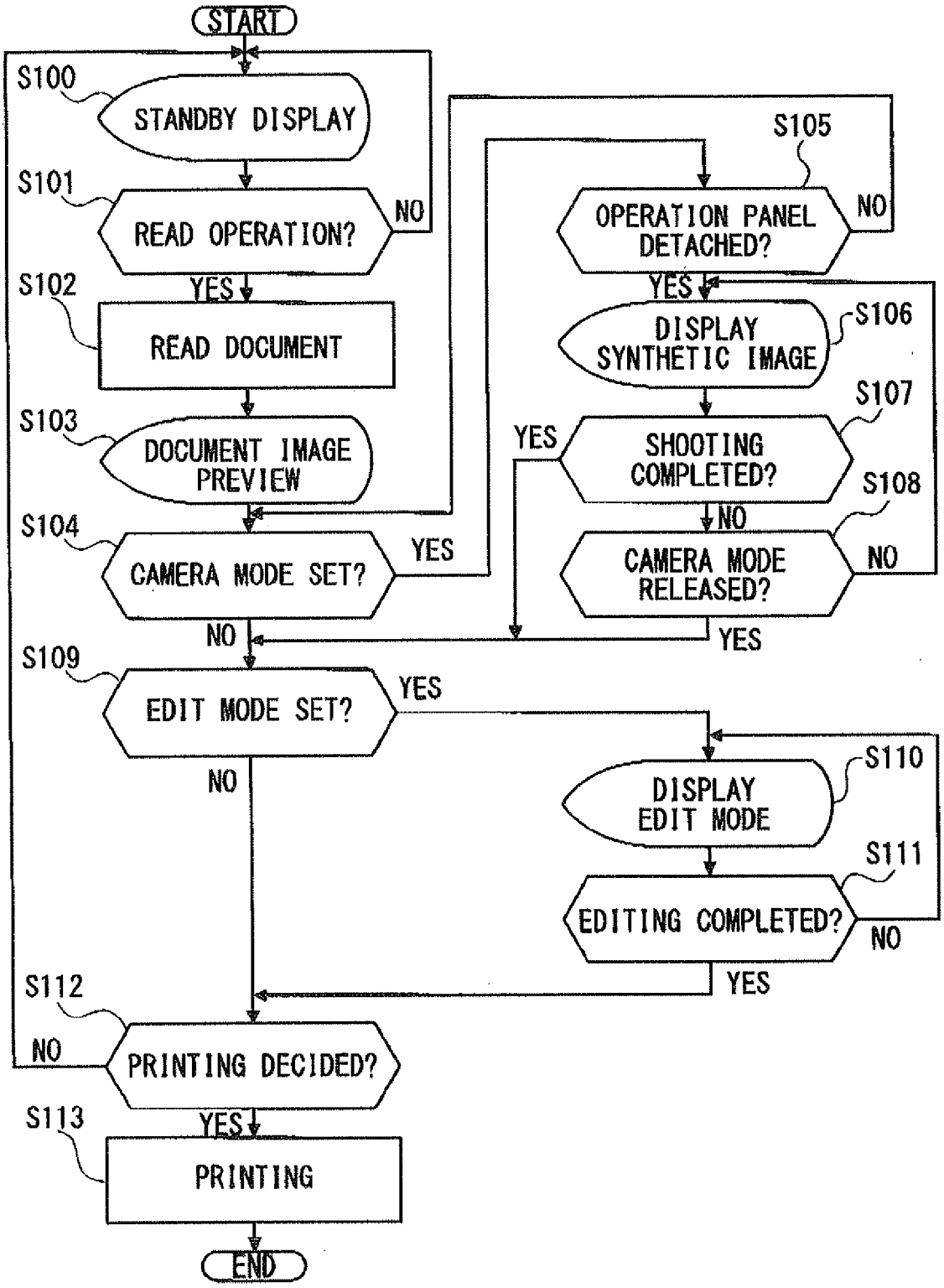

START
S100
STANDBY DISPLAY
S101
READ OPERATION?
NO
YES
S102
READ DOCUMENT
S103
DOCUMENT IMAGE PREVIEW
S104
CAMERA MODE SET?
YES
NO
S105
OPERATION PANEL DETACHED?
NO
YES
S106
DISPLAY SYNTHETIC IMAGE
S107
SHOOTING COMPLETED?
YES
NO
S108
CAMERA MODE RELEASED?
NO
YES
S109
EDIT MODE SET?
YES
NO
S110
DISPLAY EDIT MODE
S111
EDITING COMPLETED?
NO
YES
S112
PRINTING DECIDED?
NO
YES
S113
PRINTING
END

FIG.13

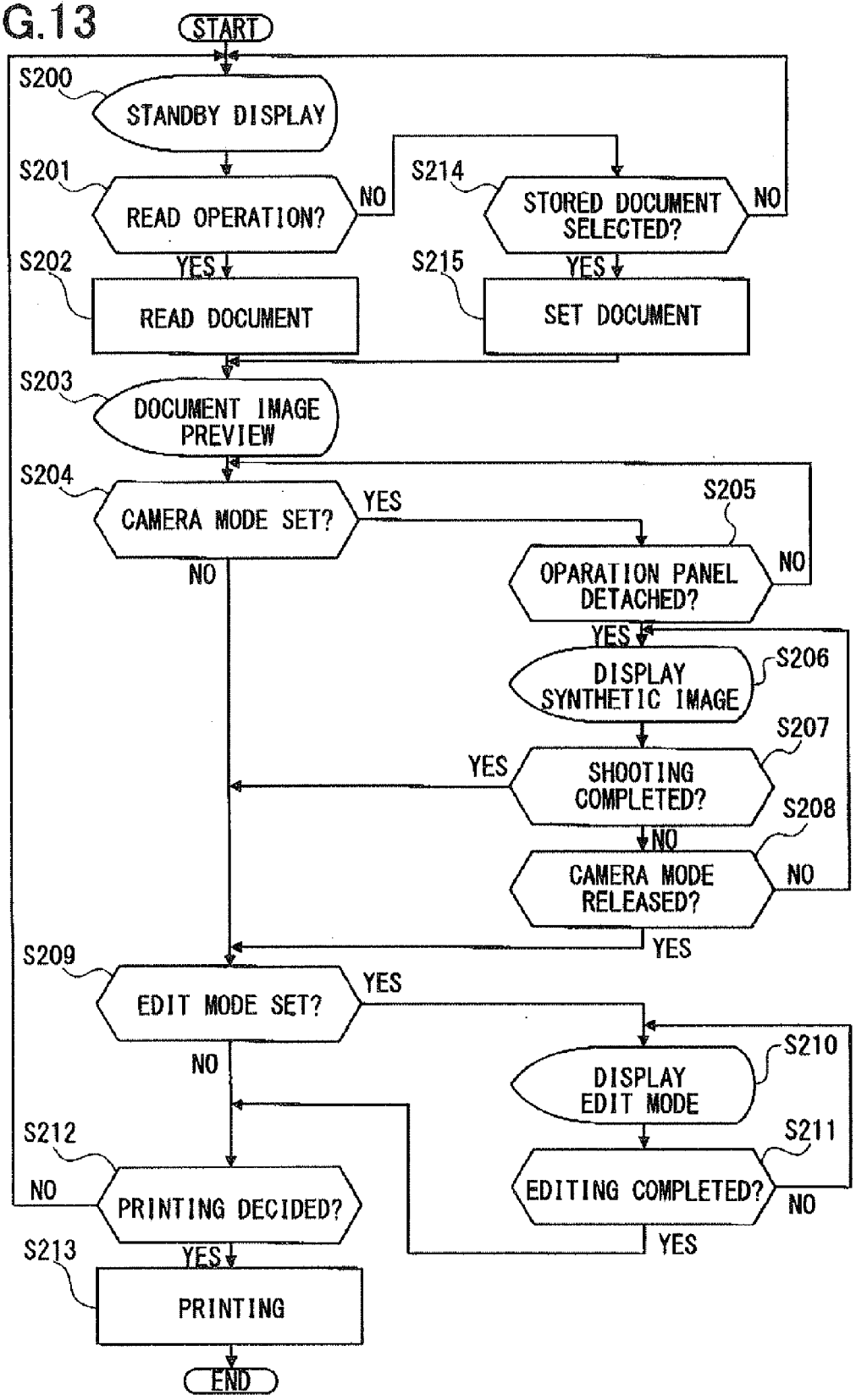

START
S200
STANDBY DISPLAY
S201
READ OPERATION?
NO
YES
S202
READ DOCUMENT
S214
STORED DOCUMENT SELECTED?
NO
YES
S215
SET DOCUMENT
S203
DOCUMENT IMAGE PREVIEW
S204
CAMERA MODE SET?
YES
NO
S205
OPARATION PANEL DETACHED?
NO
YES
S206
DISPLAY SYNTHETIC IMAGE
S207
SHOOTING COMPLETED?
YES
NO
S208
CAMERA MODE RELEASED?
NO
YES
S209
EDIT MODE SET?
YES
NO
S210
DISPLAY EDIT MODE
S211
EDITING COMPLETED?
NO
YES
S212
PRINTING DECIDED?
NO
YES
S213
PRINTING
END

FIG.14A

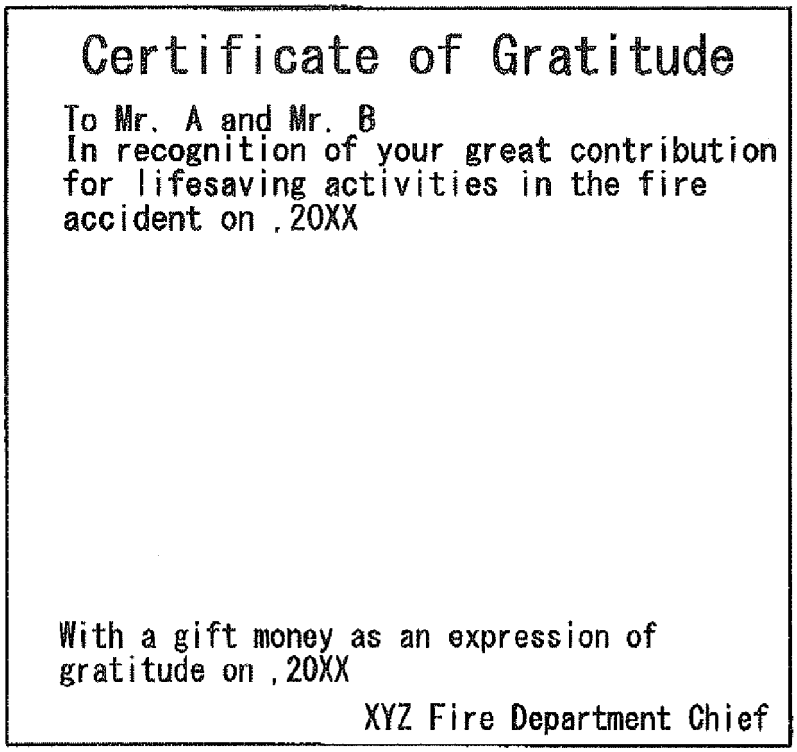



FIG.14B

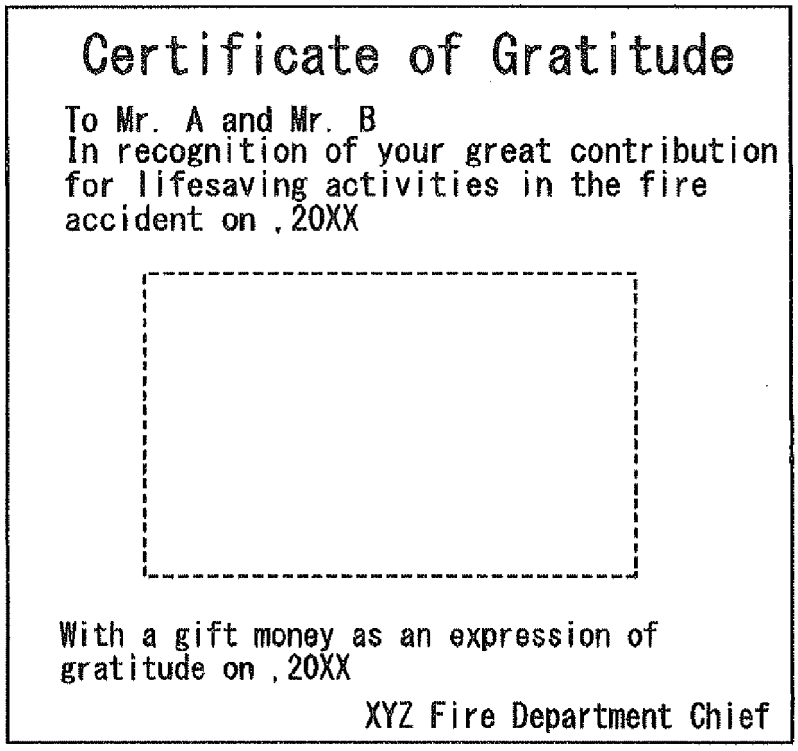


FIG.14C

Certificate of Gratitude

In recognition of your great contribution for lifesaving activities in the fire accident on , 20XX

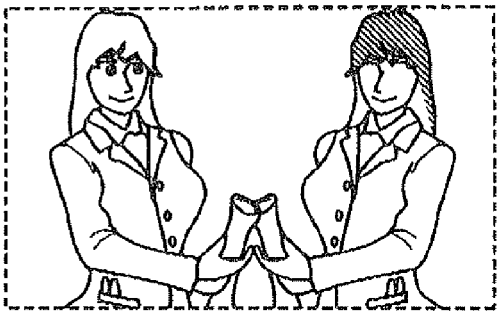
With a gift money as an expression of gratitude on , 20XX

XYZ Fire Department Chief

FIG.14D

Certificate of Gratitude

In recognition of your great contribution for lifesaving activities in the fire accident on , 20XX



With a gift money as an expression of gratitude on , 20XX

XYZ Fire Department Chief

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- JP 4387961 B **[0002]**