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(54) **IMAGE FORMING APPARATUS**

(71) Applicant: **SHARP KABUSHIKI KAISHA**, Sakai-shi, Osaka (JP)

(72) Inventors: **Mayuko Yoshida**, Sakai (JP); **Shinsaku Tohki**, Sakai (JP)

(73) Assignee: **SHARP KABUSHIKI KAISHA**, Sakai (JP)

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(22) Filed: **Jul. 6, 2016**

Related U.S. Patent Documents

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(30) **Foreign Application Priority Data**

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Oct. 26, 2010 (JP) 2010-239319

(51) **Int. Cl.**
G06F 15/00 (2006.01)
H04N 1/00 (2006.01)

(52) **U.S. Cl.**
CPC ***H04N 1/00411*** (2013.01); ***H04N 1/00424*** (2013.01); ***H04N 1/00427*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 1/00411; H04N 1/00424; H04N 1/00427; H04N 1/00448; H04N 1/00458;
(Continued)

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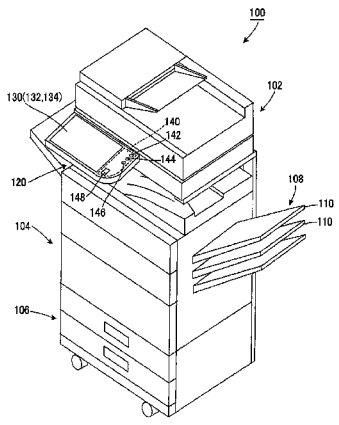
(Continued)

Primary Examiner — Joshua D Campbell
(74) *Attorney, Agent, or Firm* — Keating & Bennett, LLP

(57) **ABSTRACT**

An image forming apparatus includes a document reader, a storage for storing image data, an image output unit and a control unit. The control unit includes a display image generator for generating a display image, a display panel and a control unit-side controller having a function of presenting the display image based on the image data input in a preview representation and an output processing function of implementing an output process. As the output processing function, two schemes are provided: a first output scheme wherein, when image data has been input through the input unit, the images are output after displaying the images to be output in a preview representation on a display panel, and a second output scheme wherein, when image data has been input through the input unit, the image is directly output
(Continued)



without displaying the image to be output in a preview representation on the display panel.

11 Claims, 28 Drawing Sheets

(52) **U.S. Cl.**
CPC ***H04N 1/00448*** (2013.01); ***H04N 1/00458*** (2013.01); ***H04N 1/00469*** (2013.01); ***H04N 1/00474*** (2013.01); ***H04N 1/00482*** (2013.01); ***H04N 1/00503*** (2013.01); *H04N 2201/0094* (2013.01); *H04N 2201/3288* (2013.01)

(58) **Field of Classification Search**
CPC H04N 1/00469; H04N 1/00474; H04N 1/00482; H04N 1/00503; H04N 2201/0094; H04N 2201/3288
USPC 358/1.13
See application file for complete search history.

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JP	2006-127478	A	5/2006
JP	2006-171861	A	6/2006
JP	2008-205903	A	9/2008
JP	2009-088694	A	4/2009
JP	2009-175935	A	8/2009
JP	2009-260696	A	11/2009
JP	2010-034844	A	2/2010
JP	2010-074251	A	4/2010
JP	2010-134859	A	6/2010
JP	2010-142973	A	7/2010
JP	2010-147569	A	7/2010
JP	2010-147578	A	7/2010
JP	2010-151972	A	7/2010
JP	2010-204879	A	9/2010
JP	2011-114845	A	6/2011

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Yoshida et al., "Image Forming Apparatus", U.S. Appl. No. 15/202,837, filed Jul. 6, 2016.

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FIG. 1

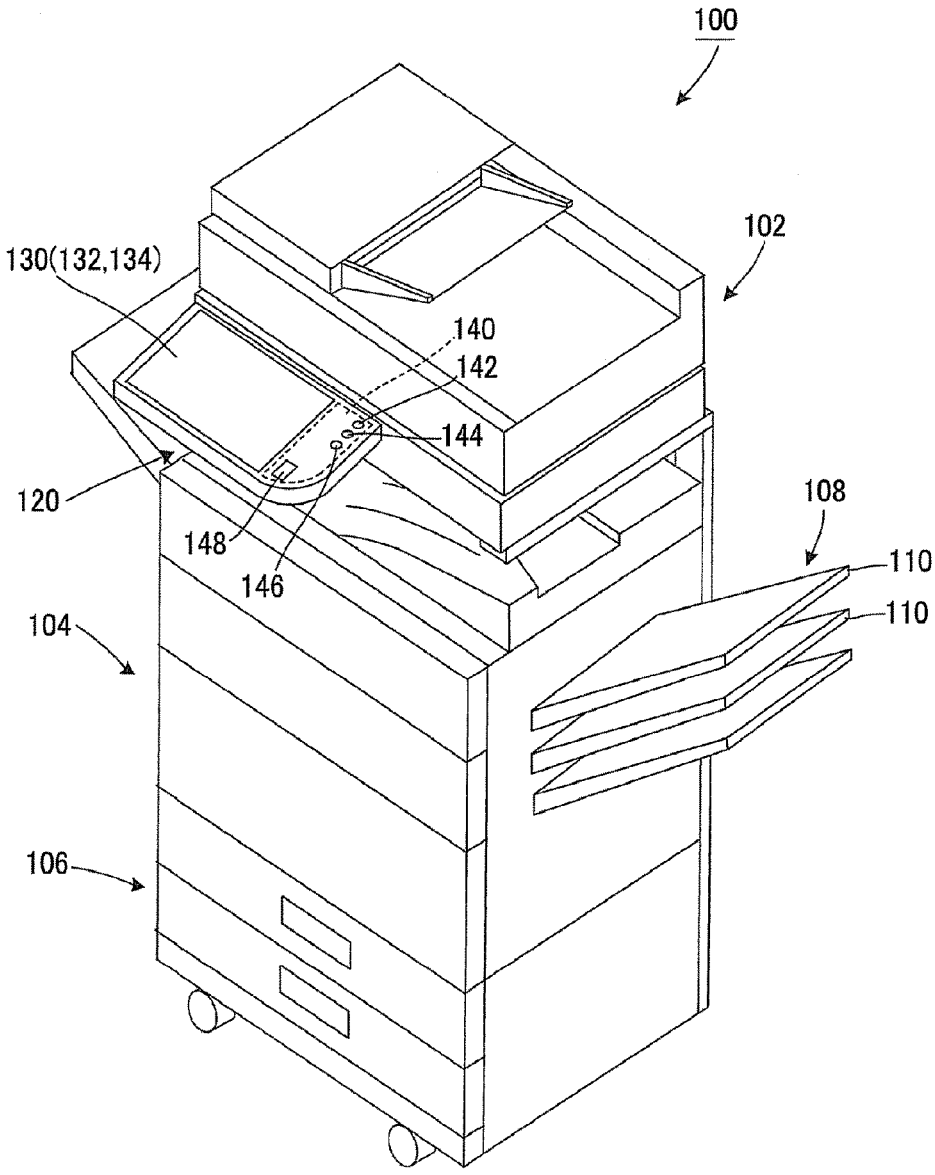

FIG. 2

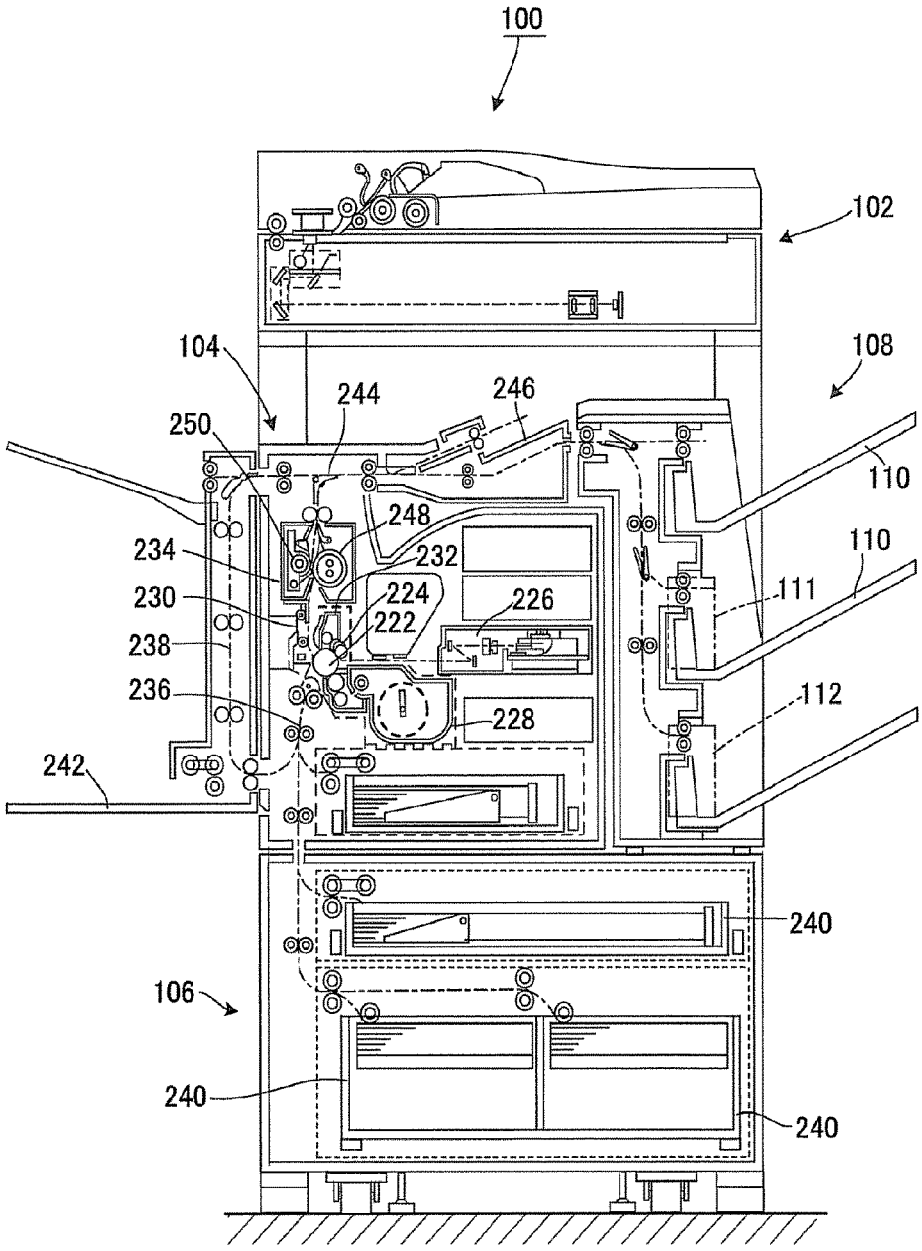
100
102
104
108
244
246
250
110
248
234
232
110
230
224
226
111
222
238
236
112
228
242
240
106
240
240

FIG. 3

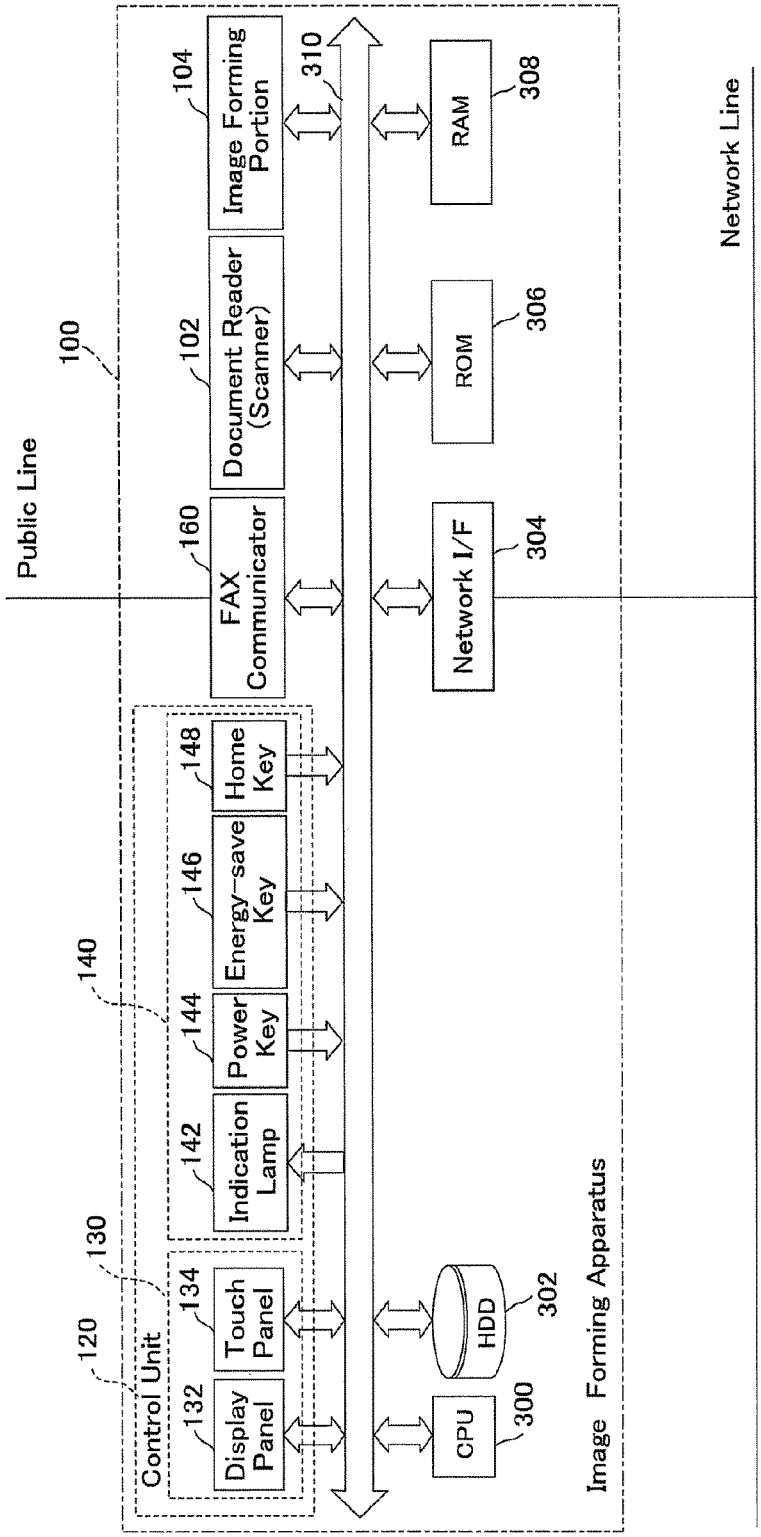
Public Line
100
102
Document Reader (Scanner)
104
Image Forming Portion
310
160
FAX Communicator
RAM
308
ROM
306
Network I/F
304
Network Line
140
148
Home Key
146
Energy-save Key
144
Power Key
142
Indication Lamp
130
134
Touch Panel
120
Control Unit
132
Display Panel
CPU
300
HDD
302
Image Forming Apparatus

FIG. 4

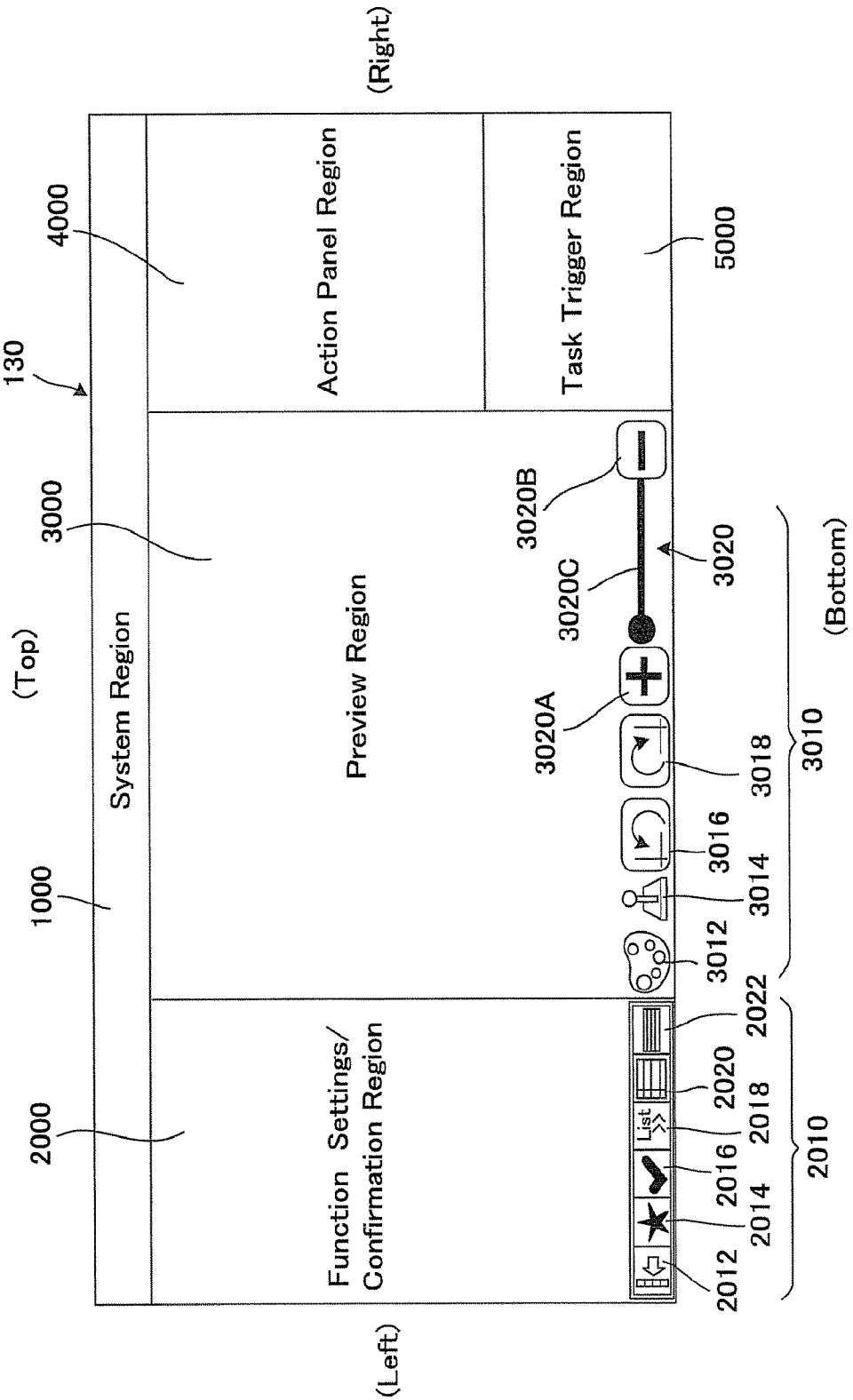
System Region
Preview Region
Action Panel Region
Task Trigger Region
Function Settings/
Confirmation Region
(Top)
(Left)
(Right)
(Bottom)
130
1000
2000
3000
4000
5000
2010
2012
2014
2016
2018
2020
2022
3010
3012
3014
3016
3018
3020
3020A
3020B
3020C
List

FIG. 5

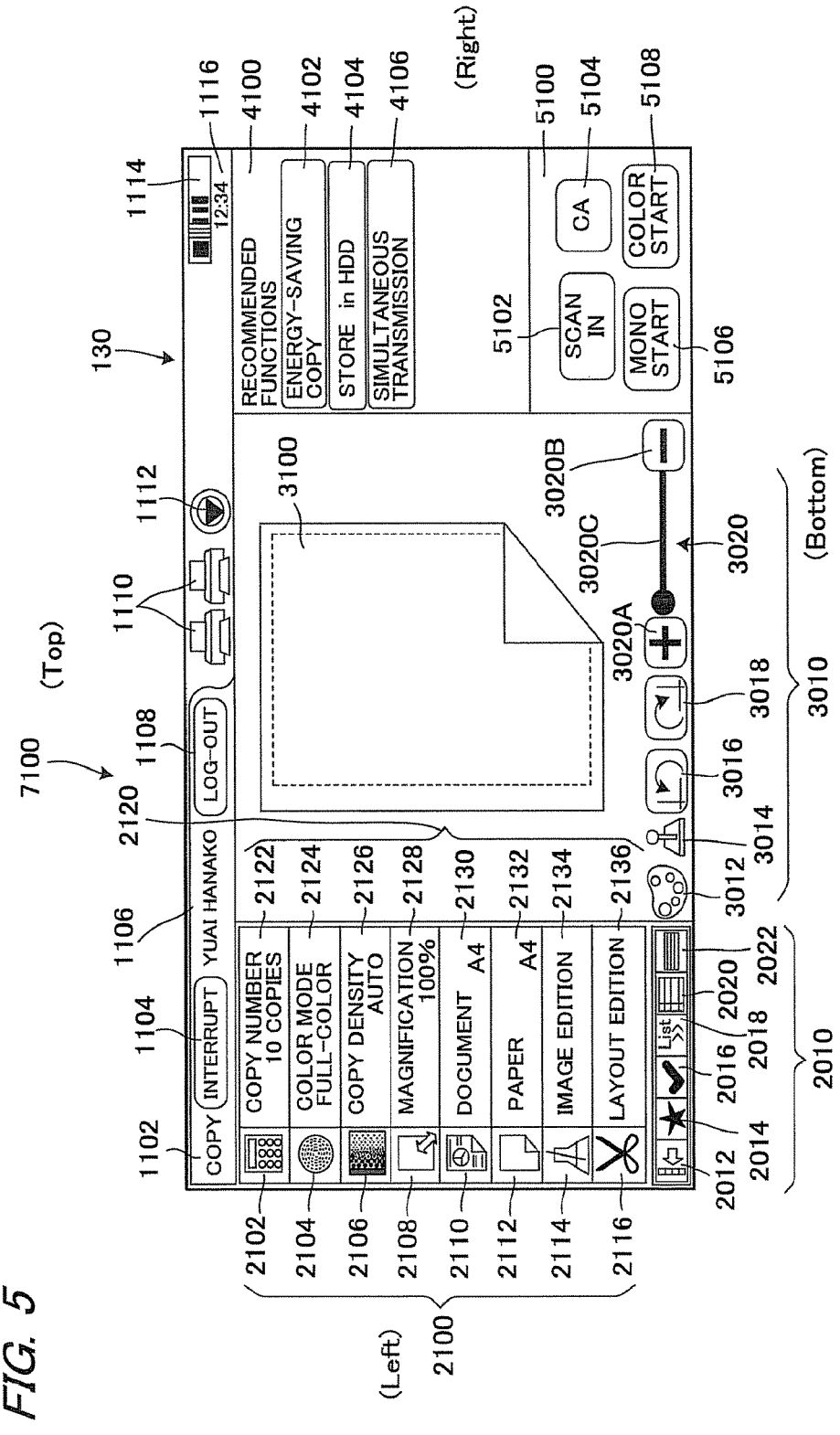
(Top)
(Left)
(Right)
(Bottom)
7100
130
2100
2010
COPY
INTERRUPT
YUAI HANAKO
LOG-OUT
12:34
COPY NUMBER 10 COPIES
COLOR MODE FULL-COLOR
COPY DENSITY AUTO
MAGNIFICATION 100%
DOCUMENT A4
PAPER A4
IMAGE EDITION
LAYOUT EDITION
RECOMMENDED FUNCTIONS
ENERGY-SAVING COPY
STORE in HDD
SIMULTANEOUS TRANSMISSION
SCAN IN
MONO START
CA
COLOR START
List
1102
1104
1106
1108
1110
1112
1114
1116
2102
2104
2106
2108
2110
2112
2114
2116
2120
2122
2124
2126
2128
2130
2132
2134
2136
2012
2014
2016
2018
2020
2022
3100
3010
3012
3014
3016
3018
3020
3020A
3020B
3020C
4100
4102
4104
4106
5100
5102
5104
5106
5108

FIG. 6

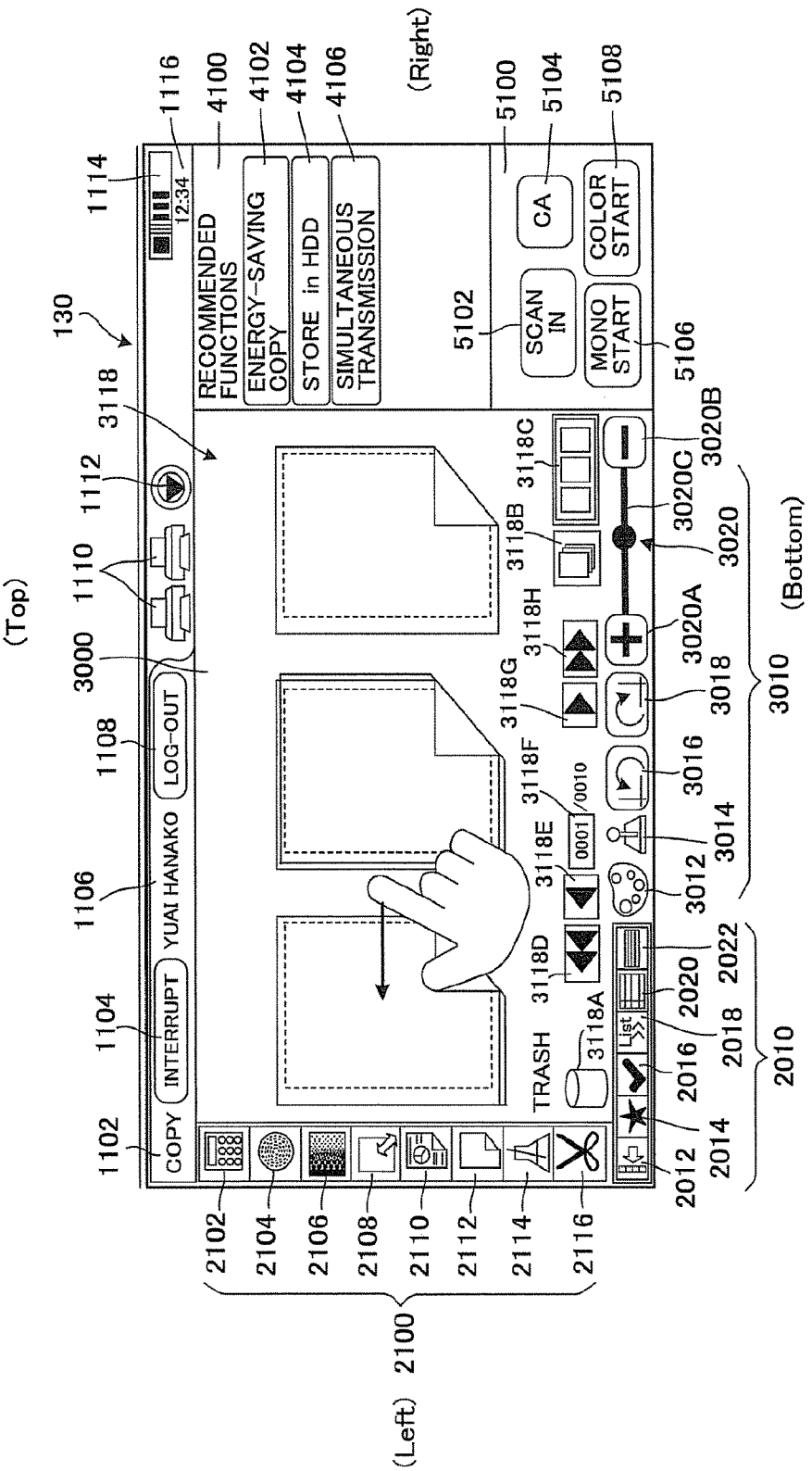
(Top)
(Left)
(Right)
(Bottom)
130
1102
COPY
1104
INTERRUPT
1106
YUAI HANAKO
1108
LOG-OUT
1110
1112
1114
12:34
1116
3000
3118
RECOMMENDED FUNCTIONS
4100
ENERGY-SAVING COPY
4102
STORE in HDD
4104
SIMULTANEOUS TRANSMISSION
4106
5100
5102
SCAN IN
5104
CA
5106
MONO START
5108
COLOR START
3118A
3118B
3118C
3118D
3118E
3118F
3118G
3118H
TRASH
0001
/0010
3010
3012
3014
3016
3018
3020
3020A
3020B
3020C
2010
2012
2014
2016
2018
2020
2022
2100
2102
2104
2106
2108
2110
2112
2114
2116

FIG. 7

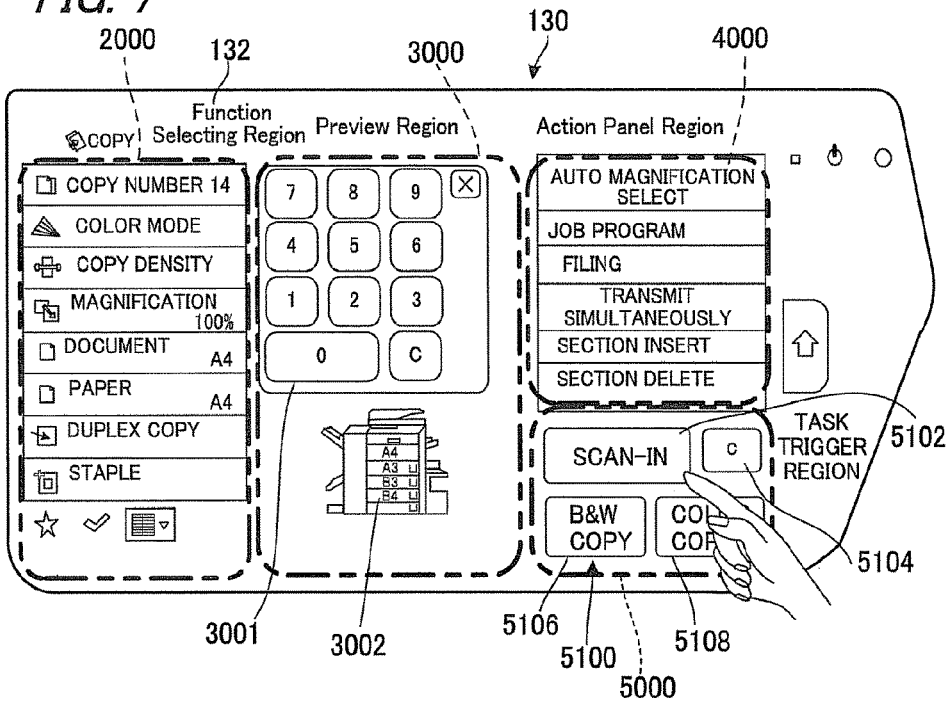
2000
132
3000
130
4000
COPY
Function Selecting Region
Preview Region
Action Panel Region
COPY NUMBER 14
COLOR MODE
COPY DENSITY
MAGNIFICATION 100%
DOCUMENT A4
PAPER A4
DUPLEX COPY
STAPLE
7 8 9
4 5 6
1 2 3
0 C
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
SCAN-IN
C
TASK TRIGGER REGION
5102
B&W COPY
5104
3001
3002
5106
5100
5000
5108

FIG. 8

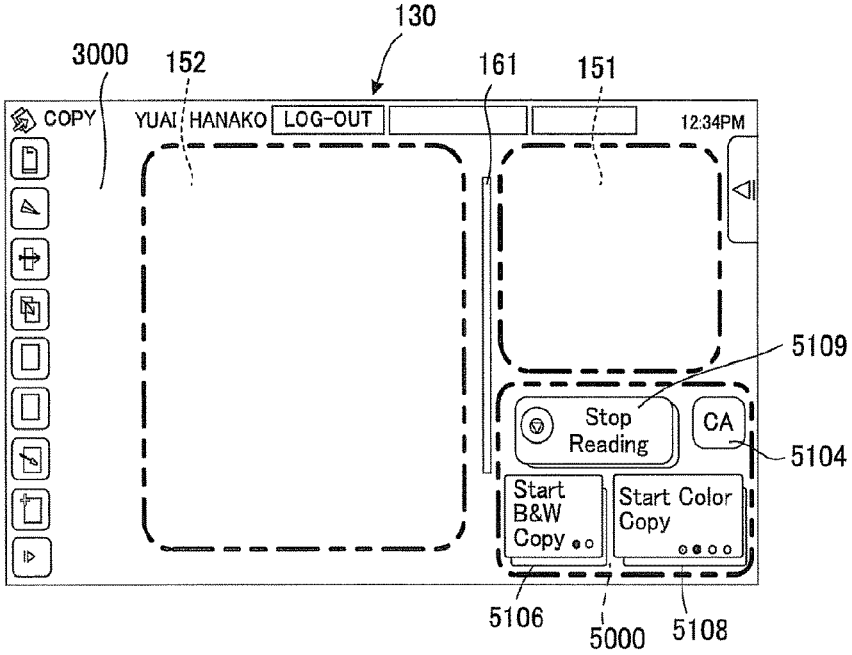
130
3000
152
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
5109
Stop Reading
CA
5104
Start B&W Copy
Start Color Copy
5106
5000
5108

FIG. 9

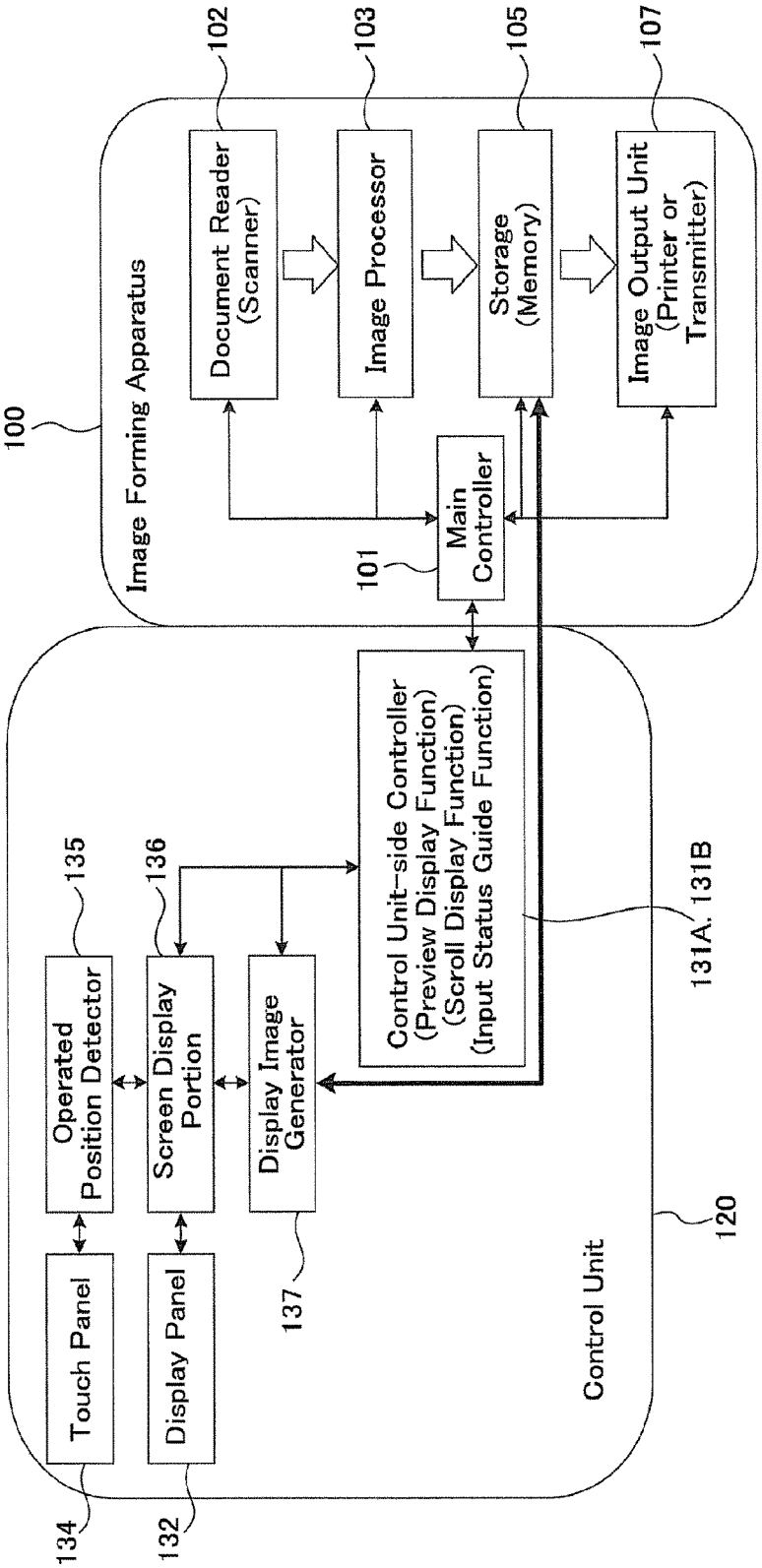
100
Image Forming Apparatus
102
Document Reader (Scanner)
103
Image Processor
105
Storage (Memory)
107
Image Output Unit (Printer or Transmitter)
101
Main Controller
Control Unit-side Controller (Preview Display Function) (Scroll Display Function) (Input Status Guide Function)
131A, 131B
135
Operated Position Detector
136
Screen Display Portion
Display Image Generator
137
Touch Panel
Display Panel
134
132
Control Unit
120

FIG. 10

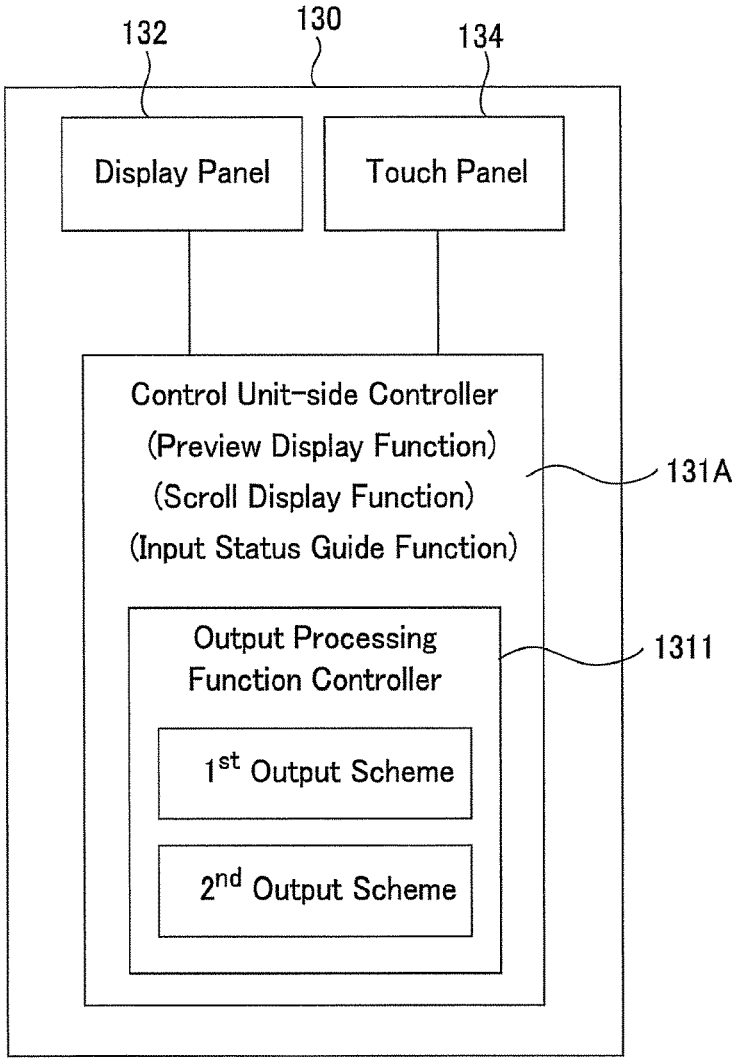
132
130
134
Display Panel
Touch Panel
Control Unit-side Controller
(Preview Display Function)
(Scroll Display Function)
(Input Status Guide Function)
131A
Output Processing
Function Controller
1311
1st Output Scheme
2nd Output Scheme

FIG. 11

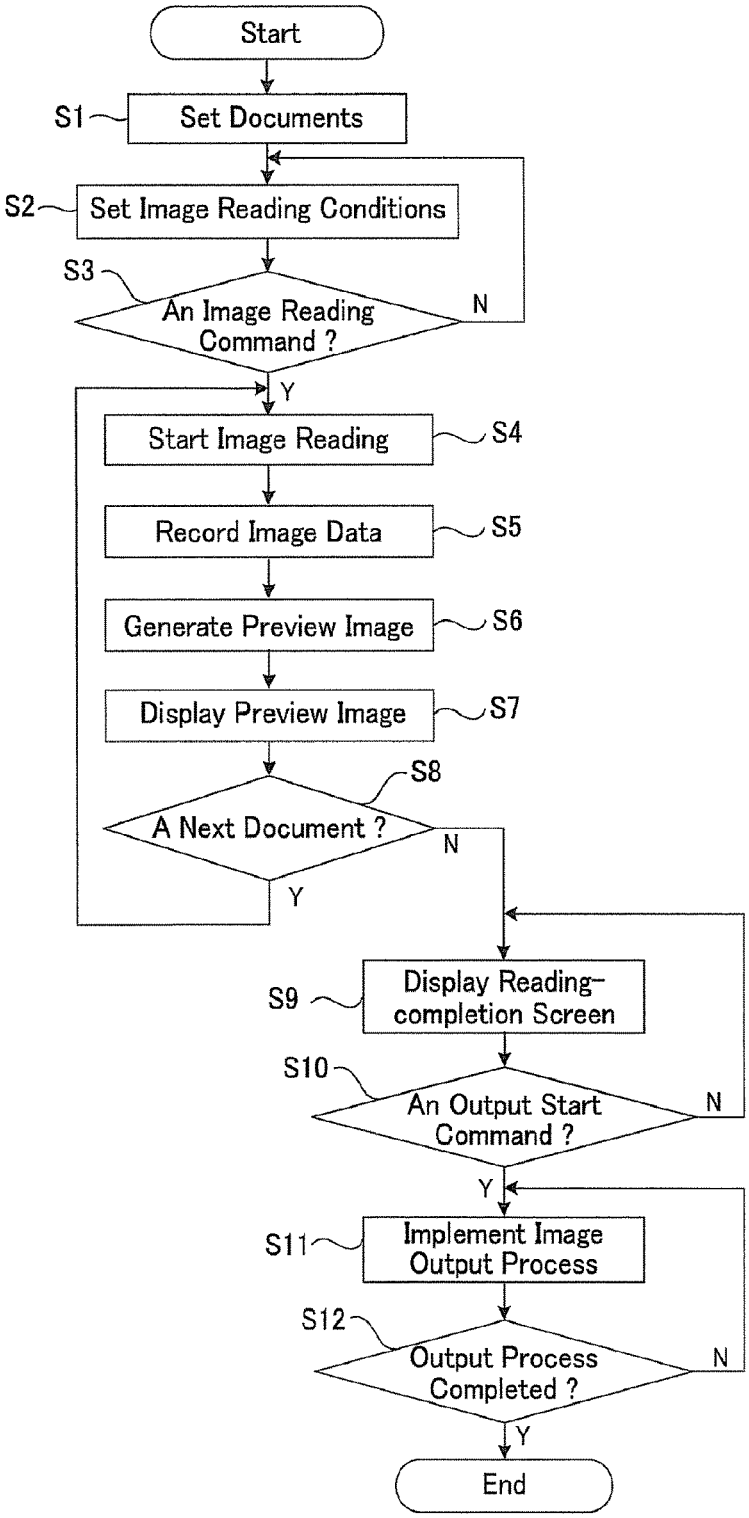
Start
S1
Set Documents
S2
Set Image Reading Conditions
S3
An Image Reading Command ?
N
Y
Start Image Reading
S4
Record Image Data
S5
Generate Preview Image
S6
Display Preview Image
S7
S8
A Next Document ?
N
Y
S9
Display Reading-completion Screen
S10
An Output Start Command ?
N
Y
S11
Implement Image Output Process
S12
Output Process Completed ?
N
Y
End

FIG. 12

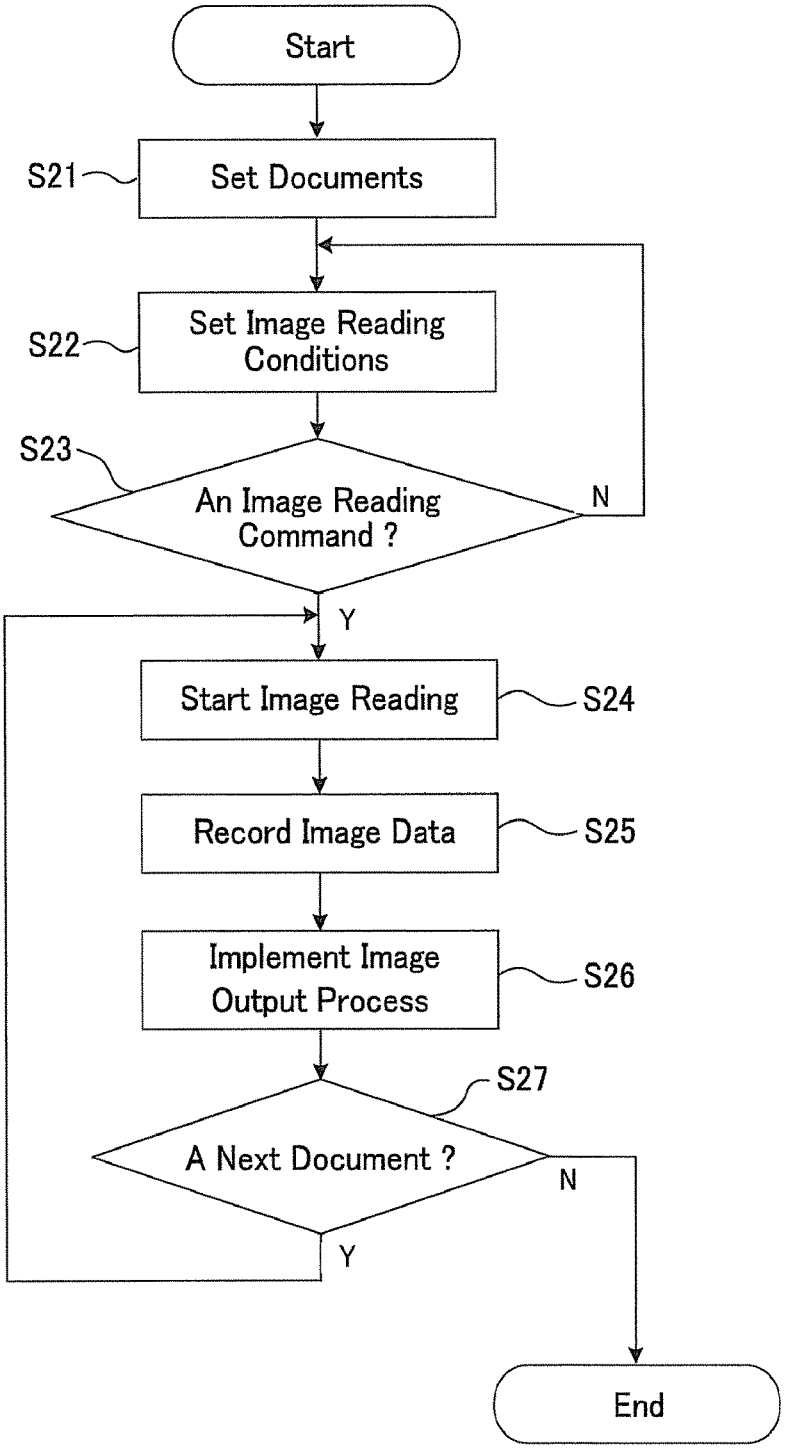
Start
S21
Set Documents
S22
Set Image Reading Conditions
S23
An Image Reading Command ?
N
Y
Start Image Reading
S24
Record Image Data
S25
Implement Image Output Process
S26
S27
A Next Document ?
N
Y
End

FIG. 13

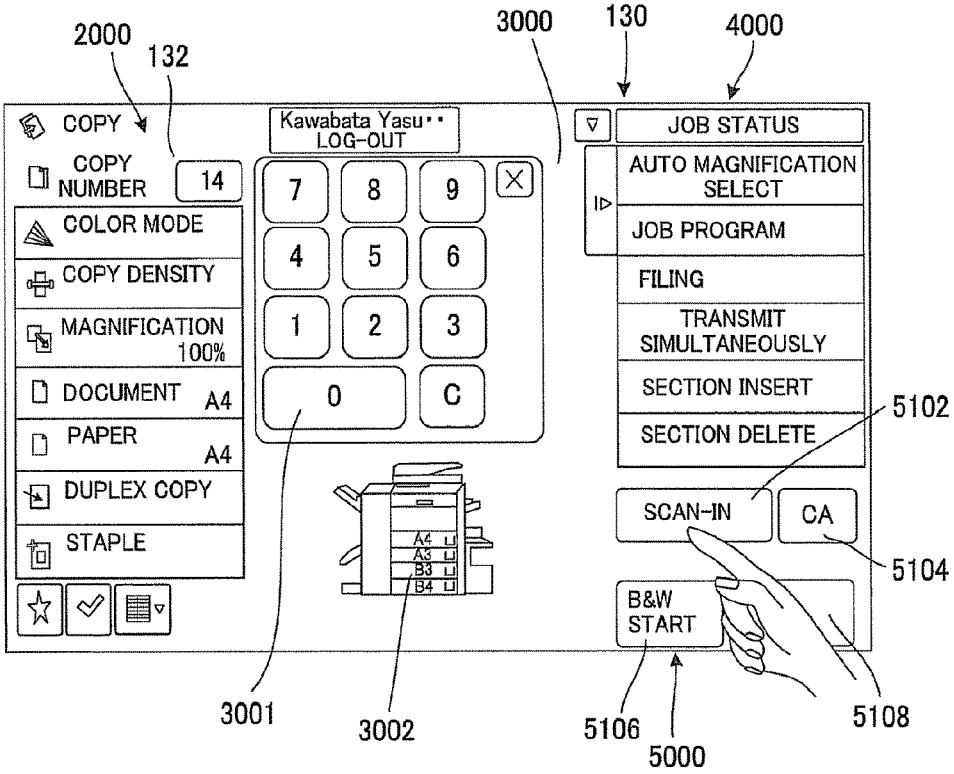
2000
132
3000
130
4000
COPY
Kawabata Yasu••
LOG-OUT
JOB STATUS
COPY NUMBER
14
AUTO MAGNIFICATION SELECT
JOB PROGRAM
COLOR MODE
COPY DENSITY
MAGNIFICATION 100%
DOCUMENT A4
PAPER A4
DUPLEX COPY
STAPLE
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
7
8
9
4
5
6
1
2
3
0
C
5102
SCAN-IN
CA
5104
B&W START
3001
3002
5106
5000
5108

FIG. 14

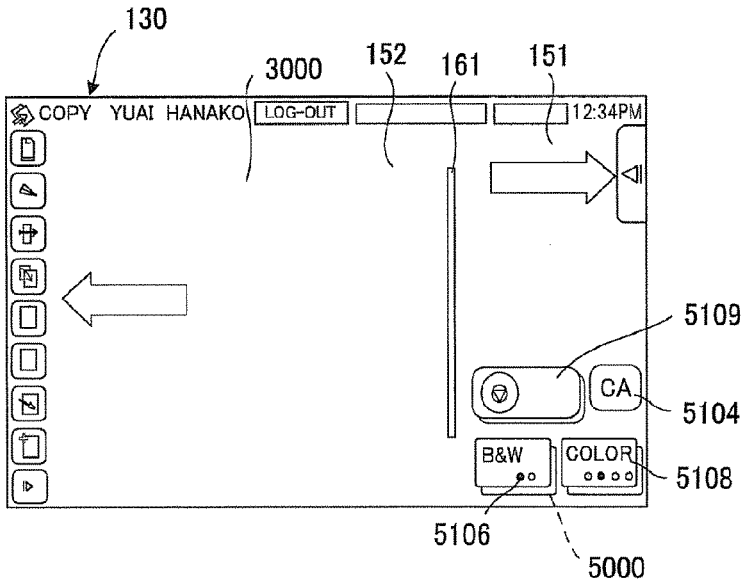
130
3000
152
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.15

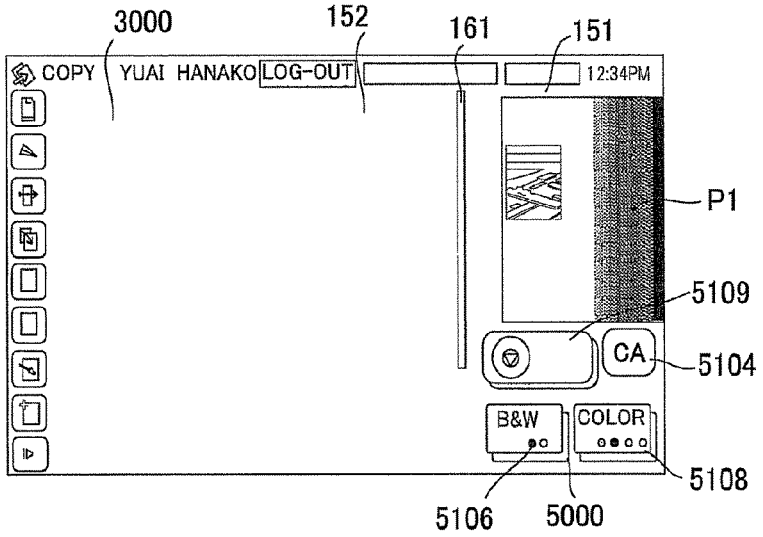
3000
152
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
P1
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.16

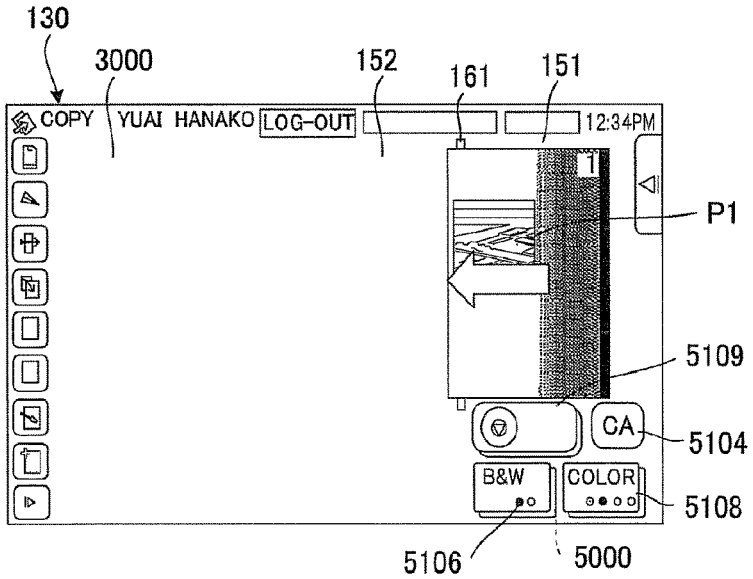
130
3000
152
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
1
P1
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.17

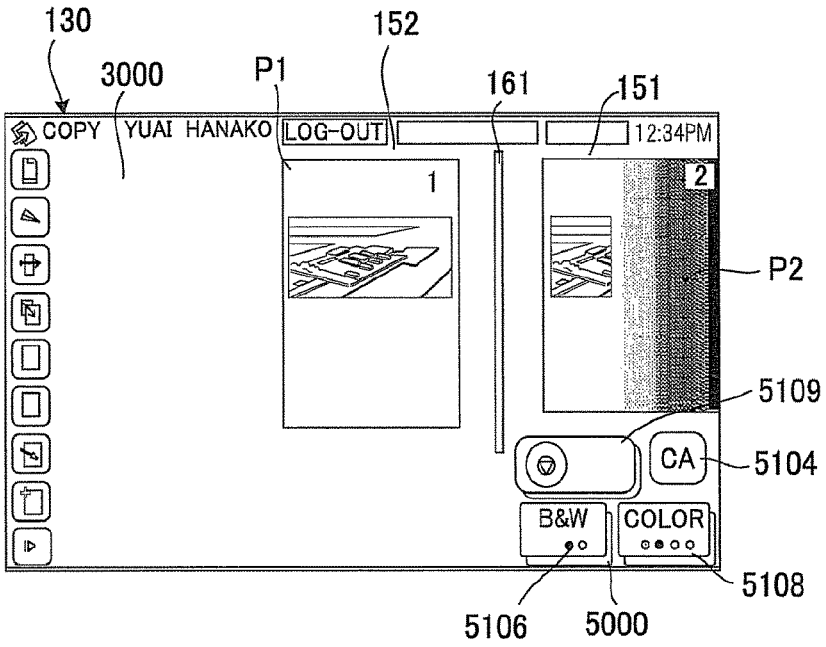
130
3000
P1
152
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
1
2
P2
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.18

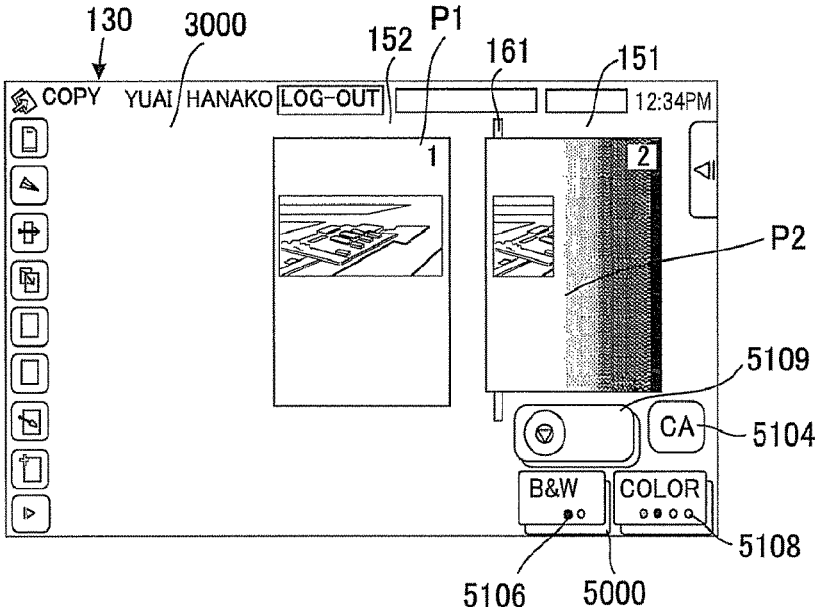
130
3000
152
P1
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
1
2
P2
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.19

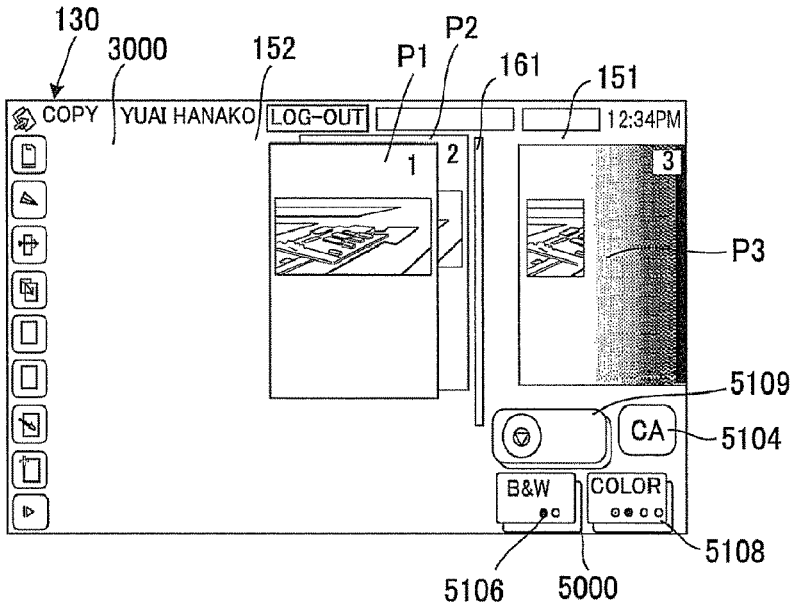
130
3000
152
P1
P2
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
1
2
3
P3
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.20

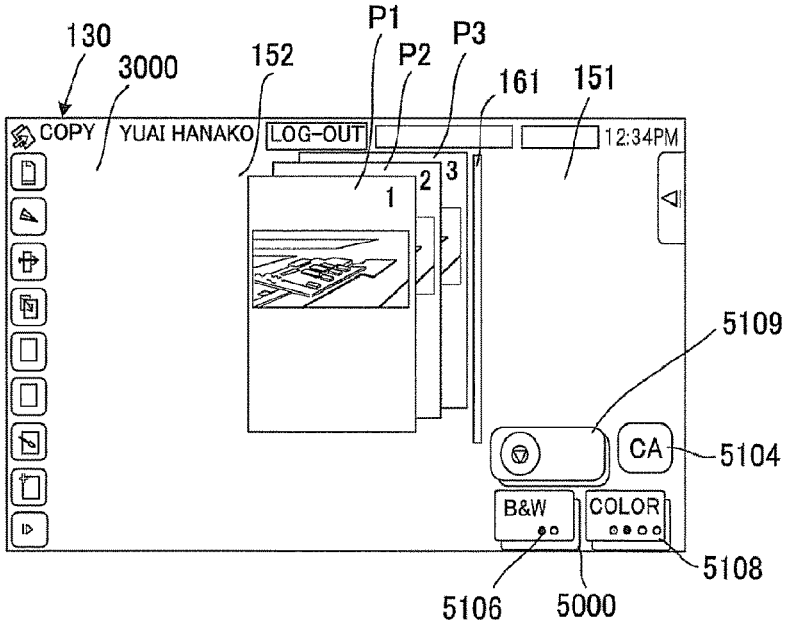
130
3000
152
P1
P2
P3
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
1
2
3
5109
CA
5104
B&W
COLOR
5108
5106
5000

FIG.21

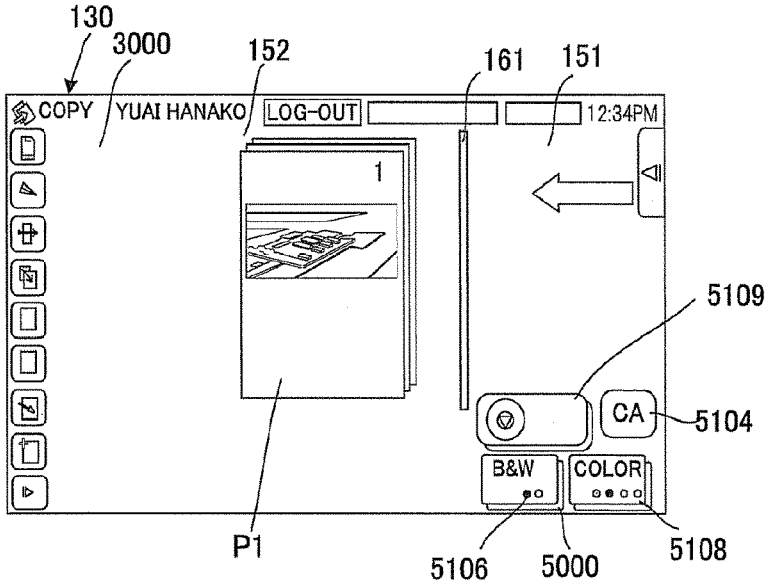
130
3000
152
161
151
COPY
YUAI HANAKO
LOG-OUT
12:34PM
1
5109
CA
5104
B&W
COLOR
P1
5106
5000
5108

FIG.22

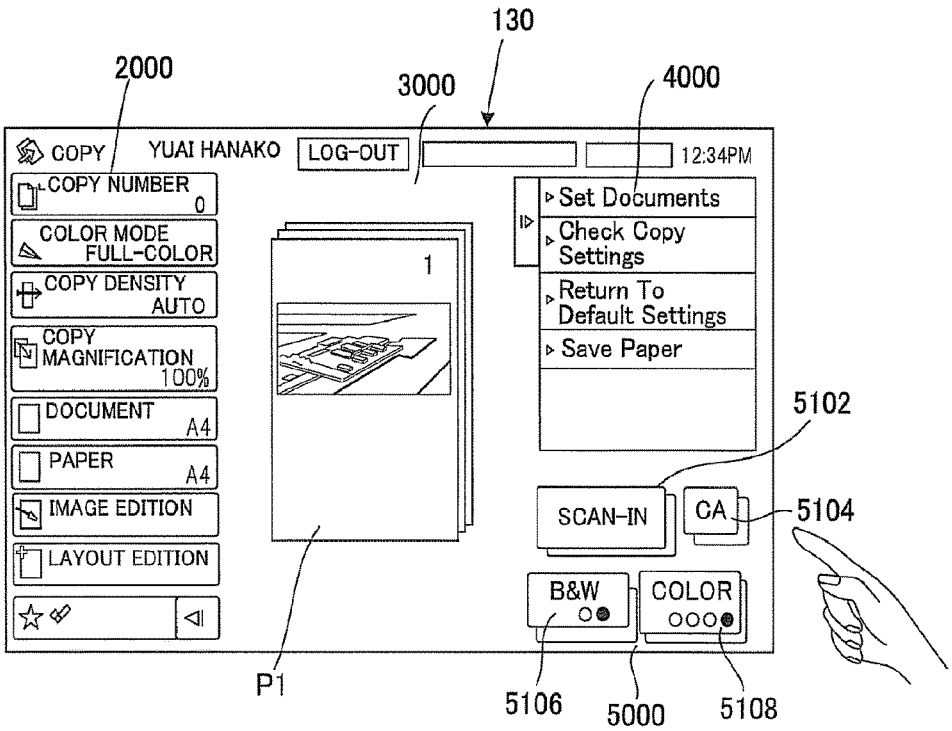
130
2000
3000
4000
COPY
YUAI HANAKO
LOG-OUT
12:34PM
COPY NUMBER
0
COLOR MODE
FULL-COLOR
COPY DENSITY
AUTO
COPY
MAGNIFICATION
100%
DOCUMENT
A4
PAPER
A4
IMAGE EDITION
LAYOUT EDITION
1
Set Documents
Check Copy
Settings
Return To
Default Settings
Save Paper
5102
SCAN-IN
CA
5104
B&W
COLOR
P1
5106
5000
5108

FIG. 23

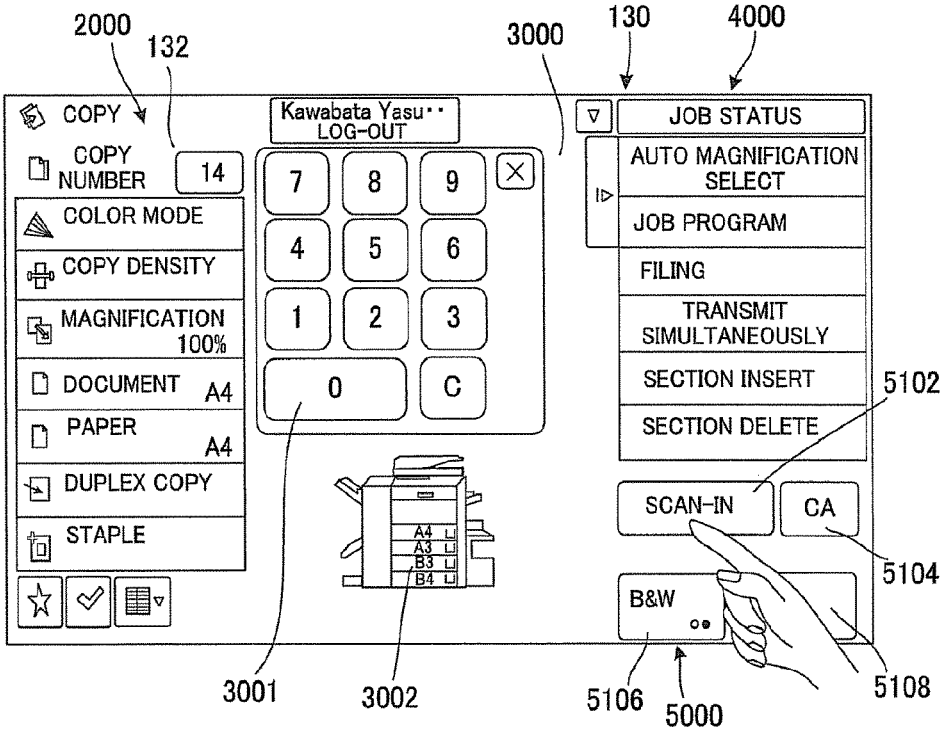
2000
132
3000
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COPY NUMBER
14
AUTO MAGNIFICATION SELECT
JOB PROGRAM
COLOR MODE
COPY DENSITY
FILING
MAGNIFICATION 100%
TRANSMIT SIMULTANEOUSLY
DOCUMENT A4
SECTION INSERT
5102
PAPER A4
SECTION DELETE
DUPLEX COPY
SCAN-IN
CA
STAPLE
5104
B&W
7 8 9
4 5 6
1 2 3
0 C
A4
A3
B3
B4
3001
3002
5106
5000
5108

FIG.24

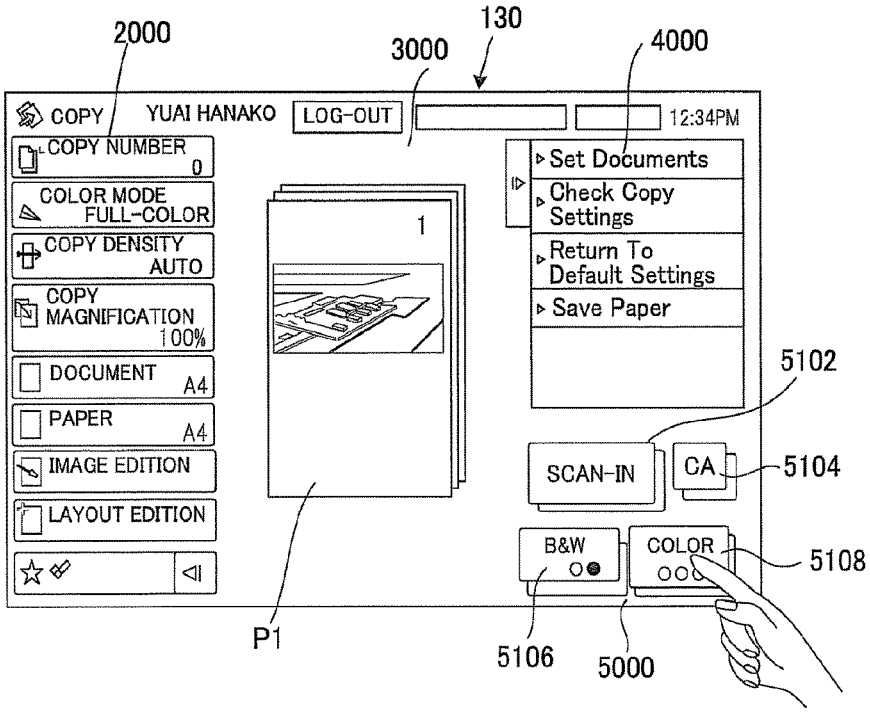
2000
3000
130
4000
COPY
YUAI HANAKO
LOG-OUT
12:34PM
COPY NUMBER 0
Set Documents
COLOR MODE FULL-COLOR
Check Copy Settings
COPY DENSITY AUTO
Return To Default Settings
COPY MAGNIFICATION 100%
Save Paper
1
5102
DOCUMENT A4
PAPER A4
SCAN-IN
CA
5104
IMAGE EDITION
LAYOUT EDITION
B&W
COLOR
5108
P1
5106
5000

FIG. 25

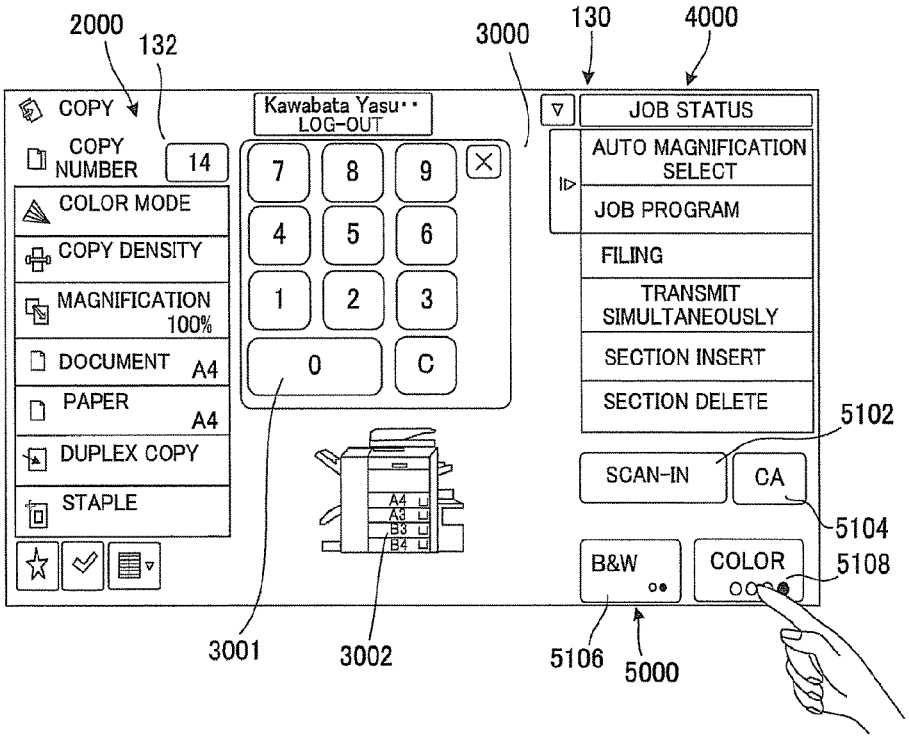
2000
132
3000
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COPY NUMBER
14
AUTO MAGNIFICATION SELECT
JOB PROGRAM
COLOR MODE
COPY DENSITY
MAGNIFICATION 100%
DOCUMENT A4
PAPER A4
DUPLEX COPY
STAPLE
7
8
9
4
5
6
1
2
3
0
C
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
5102
SCAN-IN
CA
5104
5108
B&W
COLOR
3001
3002
5106
5000

FIG. 26

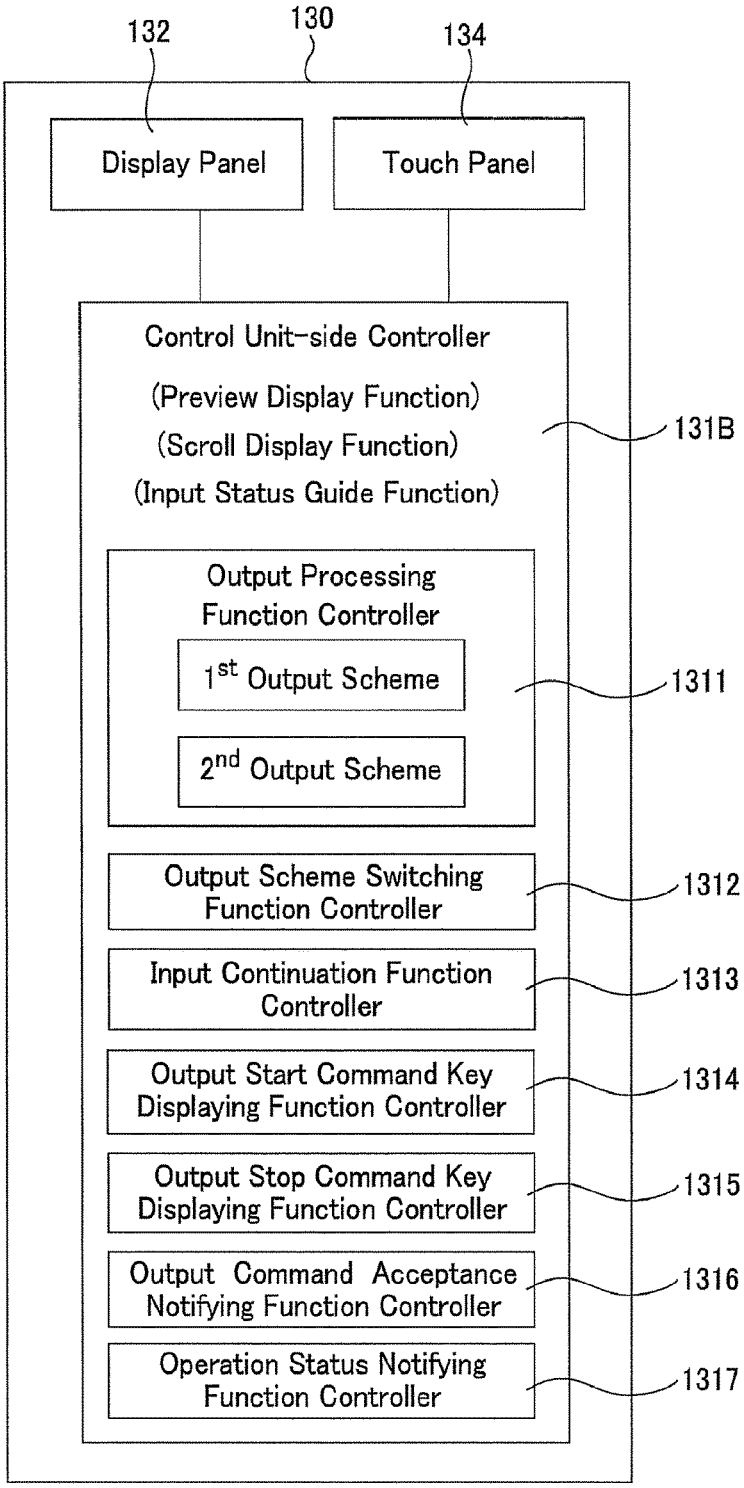
132
130
134
Display Panel
Touch Panel
Control Unit-side Controller
(Preview Display Function)
(Scroll Display Function)
(Input Status Guide Function)
131B
Output Processing Function Controller
1st Output Scheme
2nd Output Scheme
1311
Output Scheme Switching Function Controller
1312
Input Continuation Function Controller
1313
Output Start Command Key Displaying Function Controller
1314
Output Stop Command Key Displaying Function Controller
1315
Output Command Acceptance Notifying Function Controller
1316
Operation Status Notifying Function Controller
1317

FIG. 27

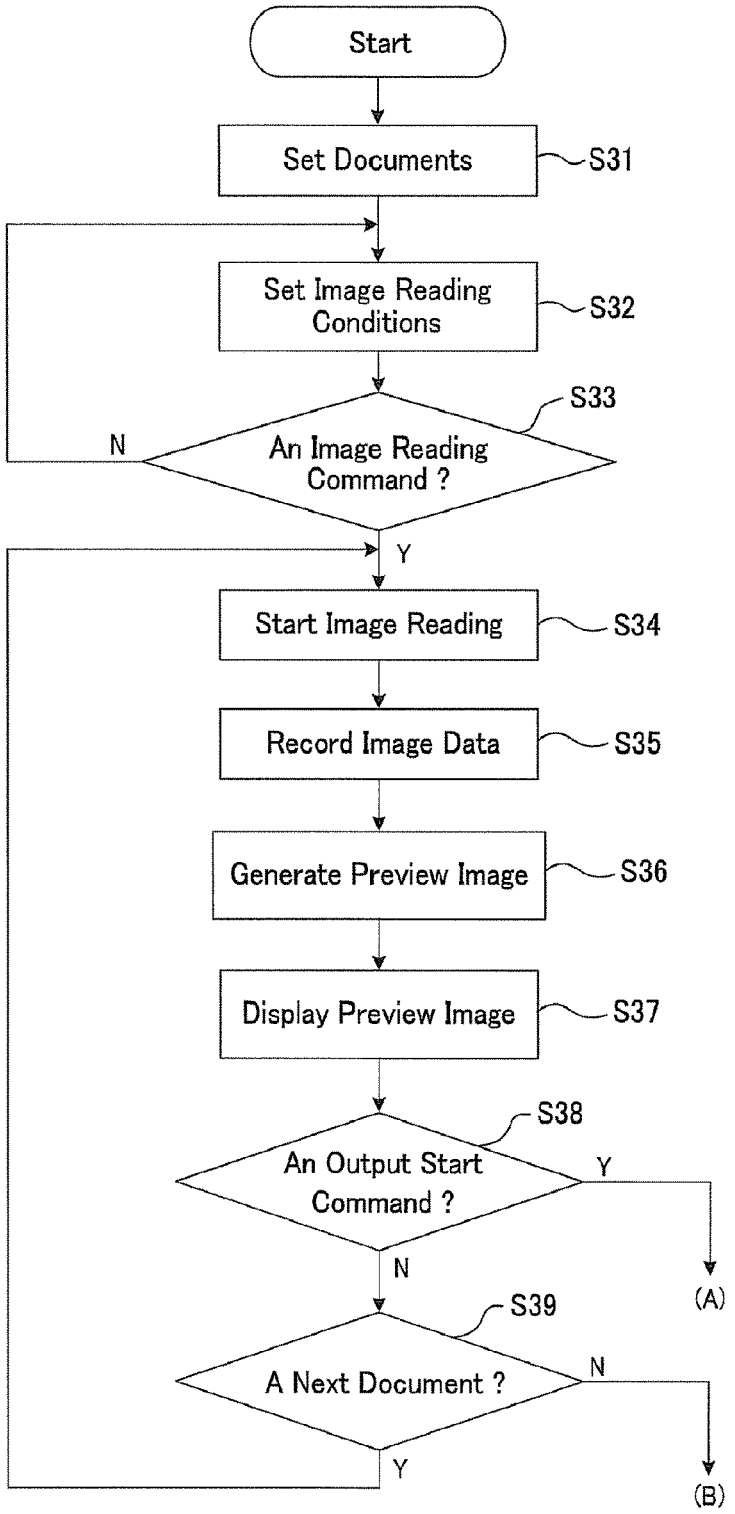
Start
Set Documents
S31
Set Image Reading Conditions
S32
S33
An Image Reading Command ?
N
Y
Start Image Reading
S34
Record Image Data
S35
Generate Preview Image
S36
Display Preview Image
S37
S38
An Output Start Command ?
Y
N
(A)
S39
A Next Document ?
N
Y
(B)

FIG. 28

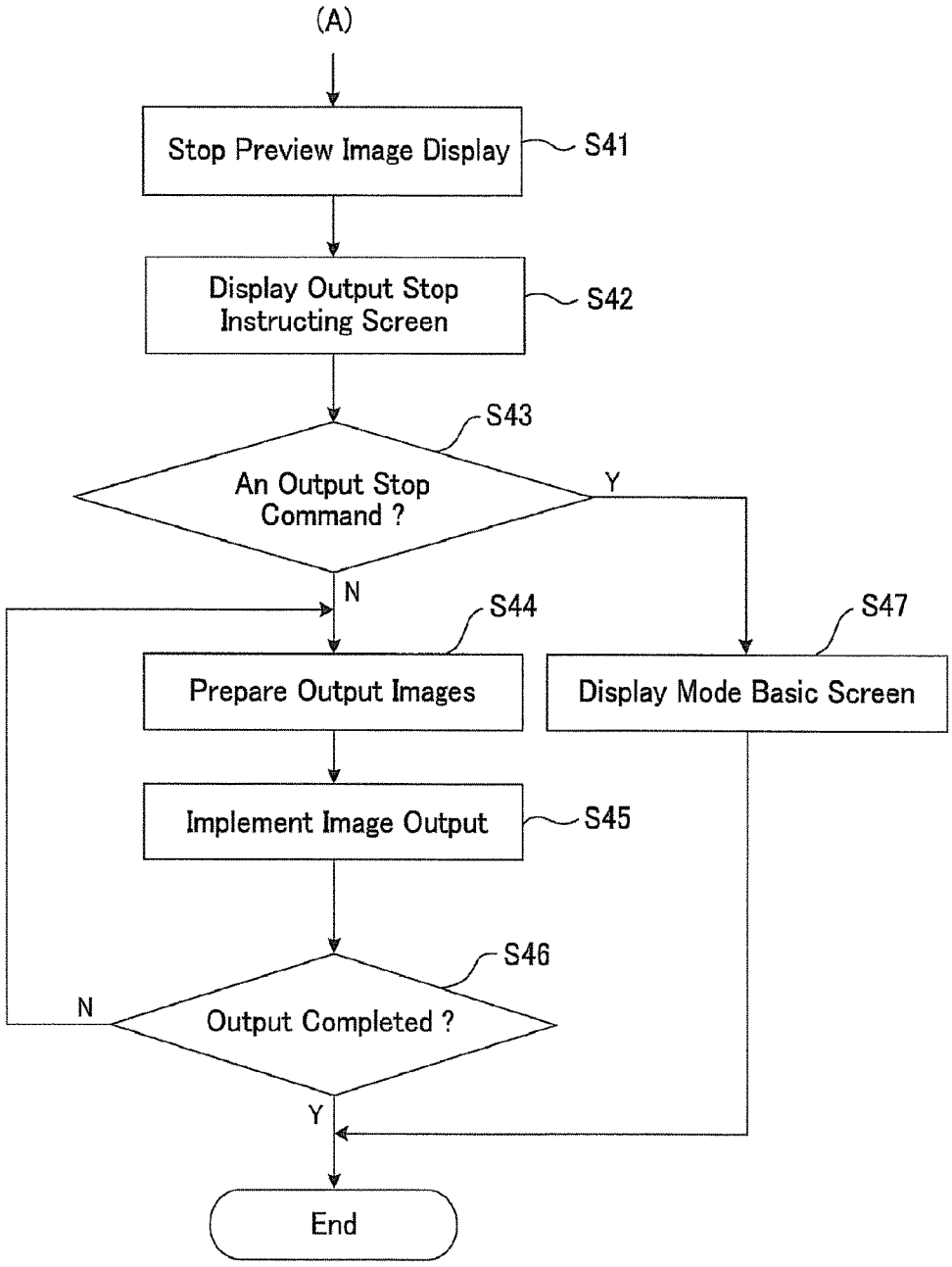
(A)
Stop Preview Image Display
S41
Display Output Stop Instructing Screen
S42
S43
An Output Stop Command ?
Y
N
S44
Prepare Output Images
S47
Display Mode Basic Screen
Implement Image Output
S45
S46
N
Output Completed ?
Y
End

FIG. 29

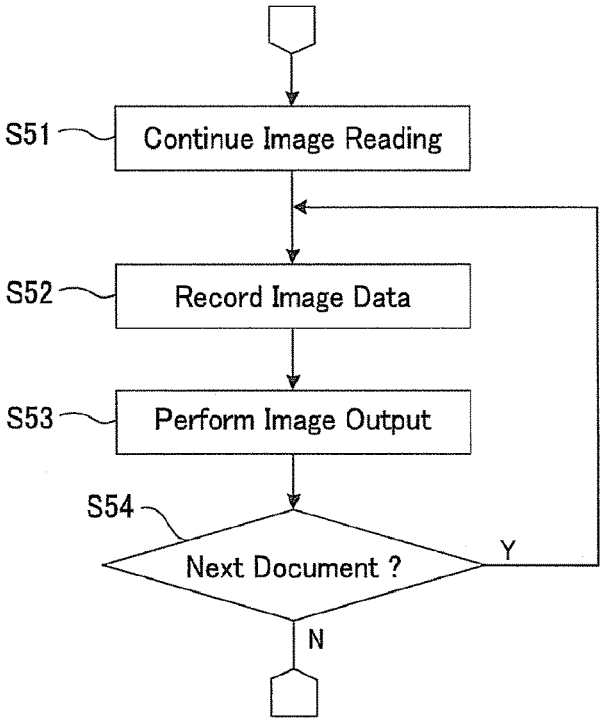
S51
Continue Image Reading
S52
Record Image Data
S53
Perform Image Output
S54
Next Document ?
Y
N

FIG. 30

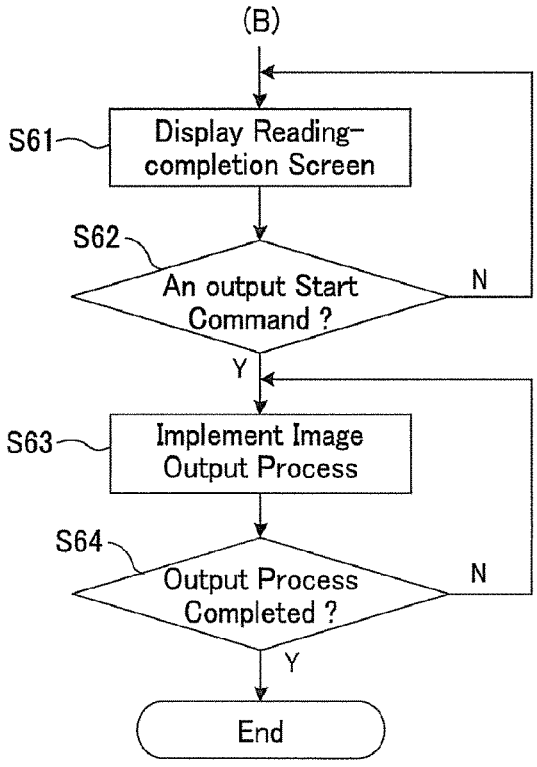
(B)
S61
Display Reading-completion Screen
S62
An output Start Command ?
N
Y
S63
Implement Image Output Process
S64
Output Process Completed ?
N
Y
End

FIG. 31

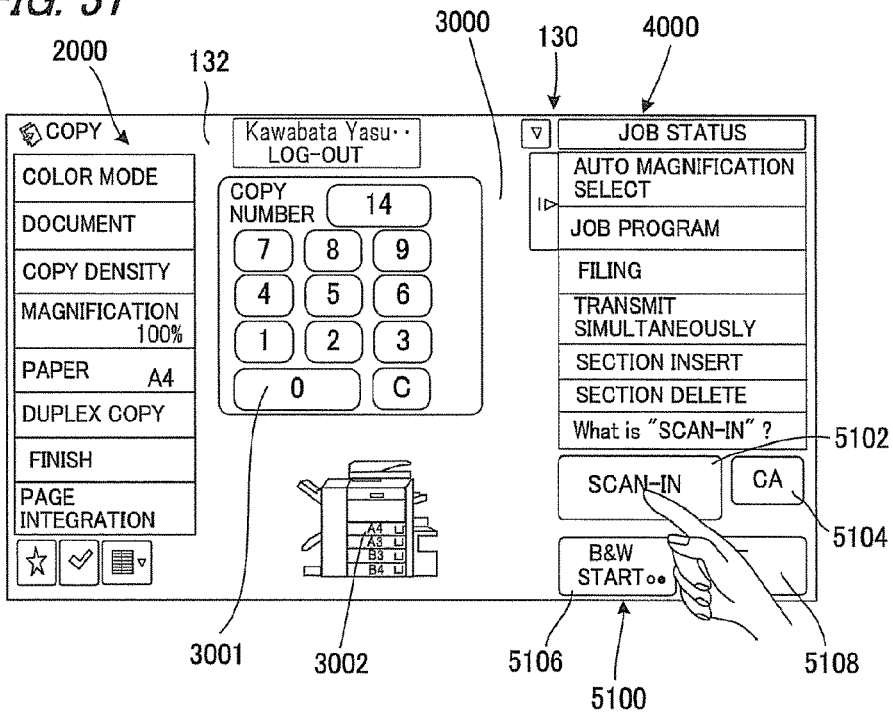
2000
132
3000
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
COPY NUMBER 14
7 8 9
4 5 6
1 2 3
0 C
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
SCAN-IN
CA
B&W START
5102
5104
3001
3002
5106
5100
5108

FIG. 32

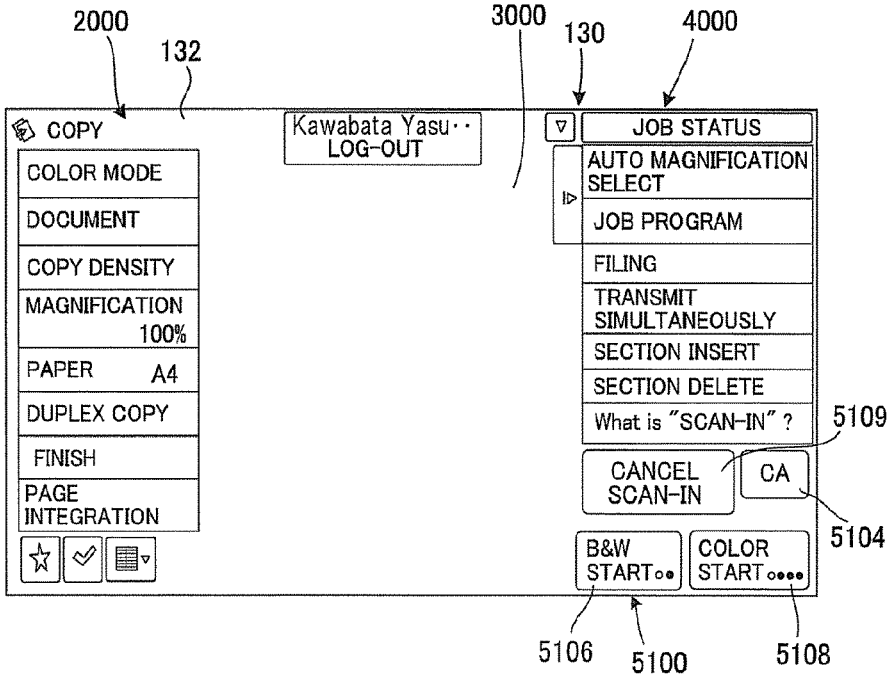
2000
132
3000
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5106
5100
5108

FIG. 33

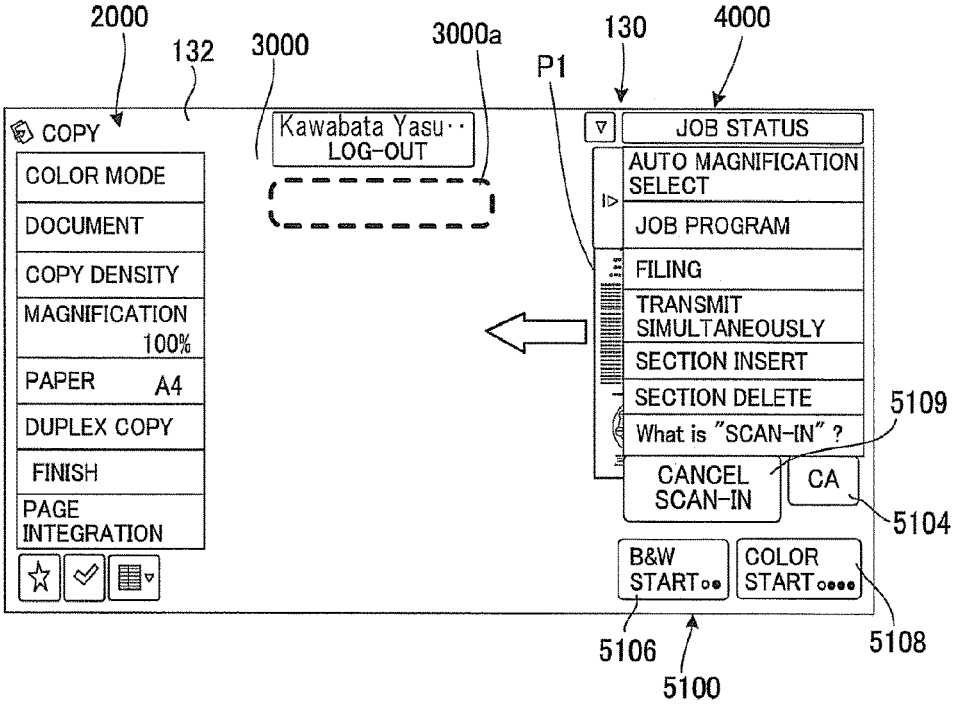
2000
132
3000
3000a
130
4000
P1
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5106
5108
5100

FIG. 34

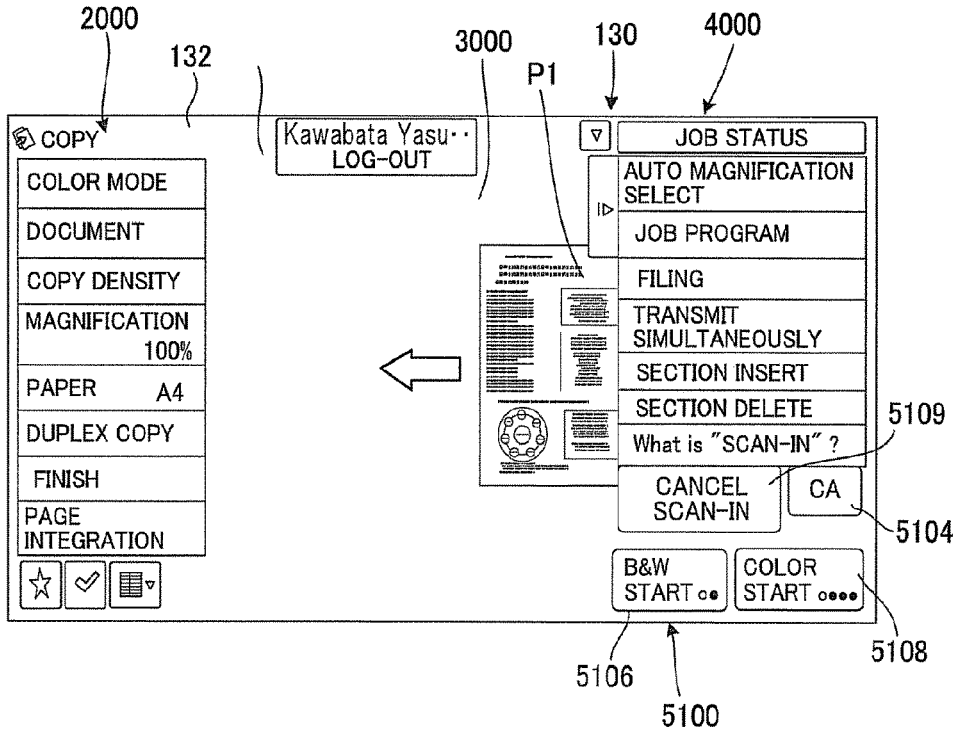
2000
132
3000
P1
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5106
5108
5100

FIG. 35

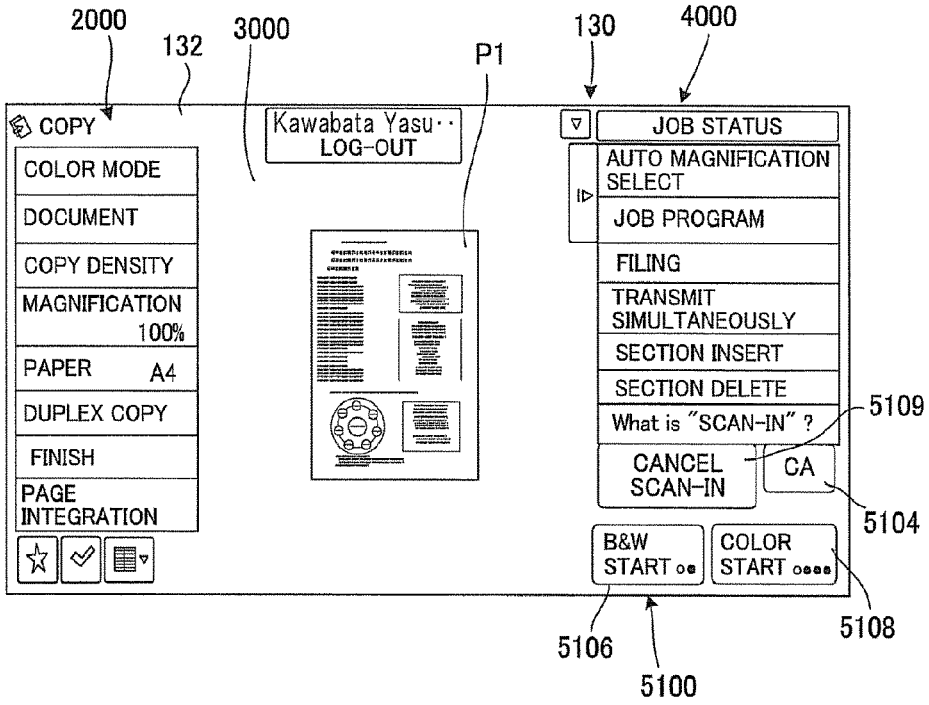
2000
132
3000
P1
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5108
5106
5100

FIG. 36

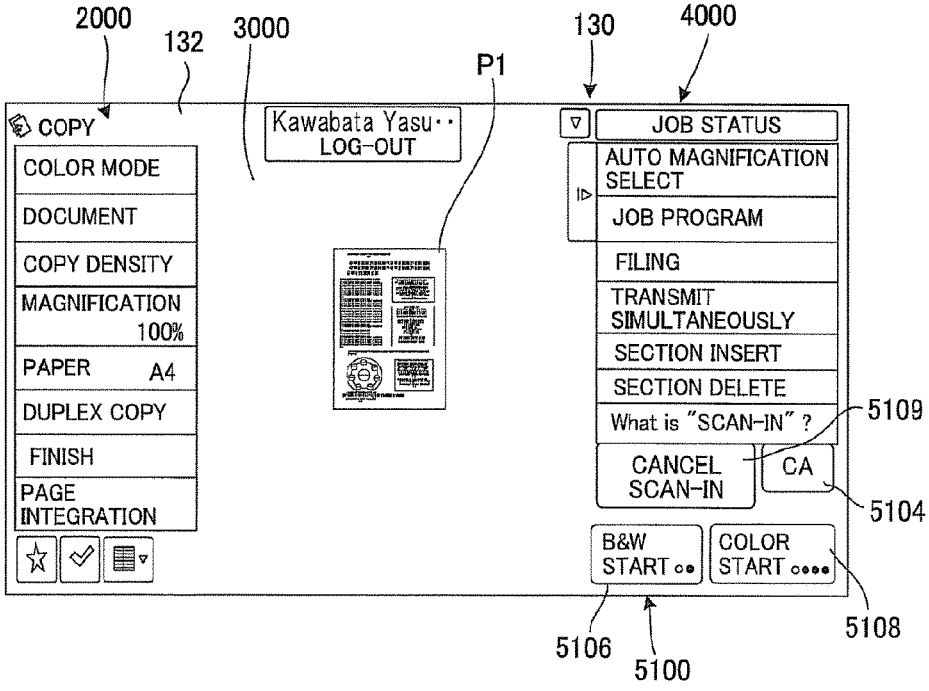
2000
132
3000
P1
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5108
5106
5100

FIG. 37

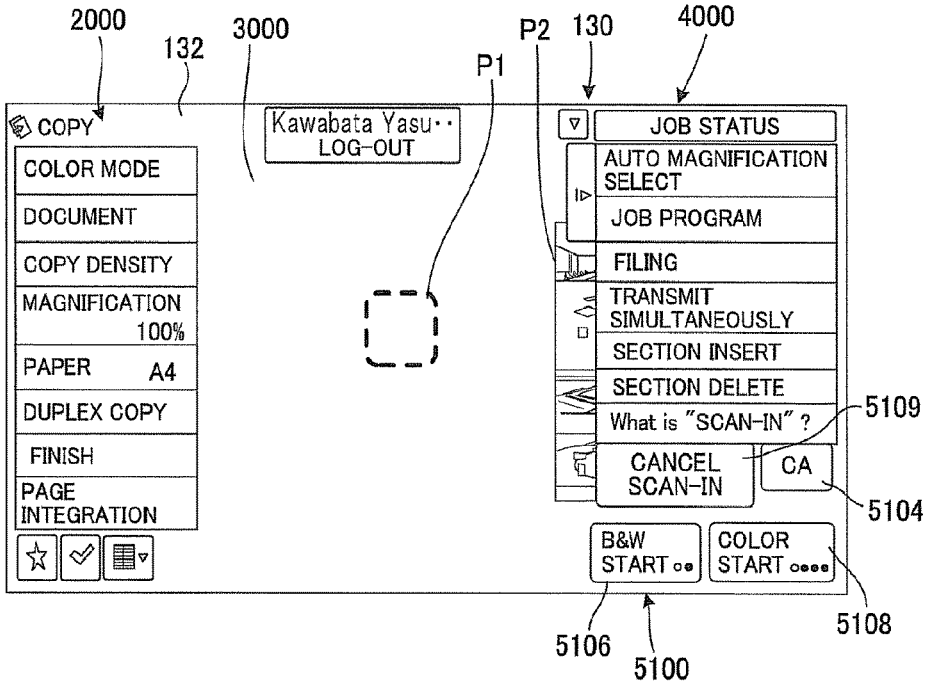
2000
132
3000
P1
P2
130
4000
COPY
Kawabata Yasu··
LOG-OUT
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
JOB STATUS
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5108
5106
5100

FIG. 38

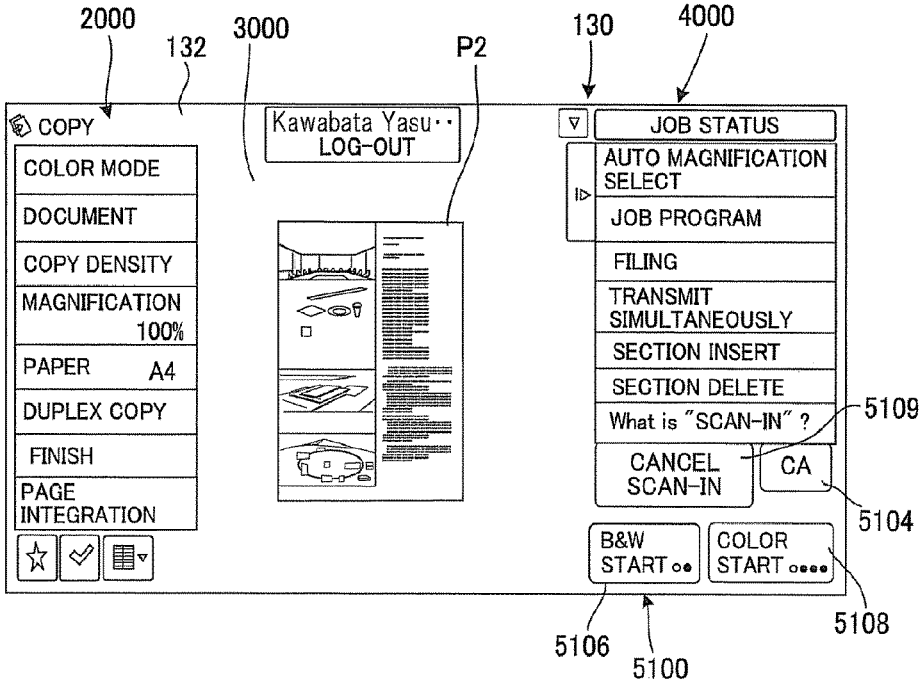
2000
132
3000
P2
130
4000
COPY
Kawabata Yasu··
LOG-OUT
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
JOB STATUS
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
CANCEL SCAN-IN
CA
B&W START
COLOR START
5109
5104
5108
5106
5100

FIG. 39

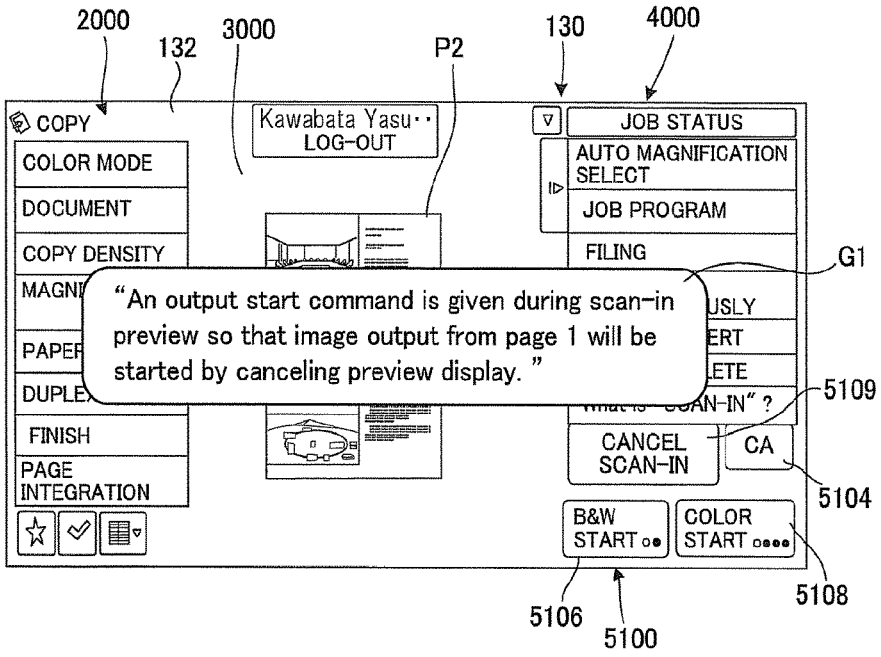
2000
132
3000
P2
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNI
PAPER
DUPLEX
FINISH
PAGE INTEGRATION
"An output start command is given during scan-in preview so that image output from page 1 will be started by canceling preview display."
G1
5109
CANCEL SCAN-IN
CA
5104
B&W START
COLOR START
5106
5100
5108

FIG. 40

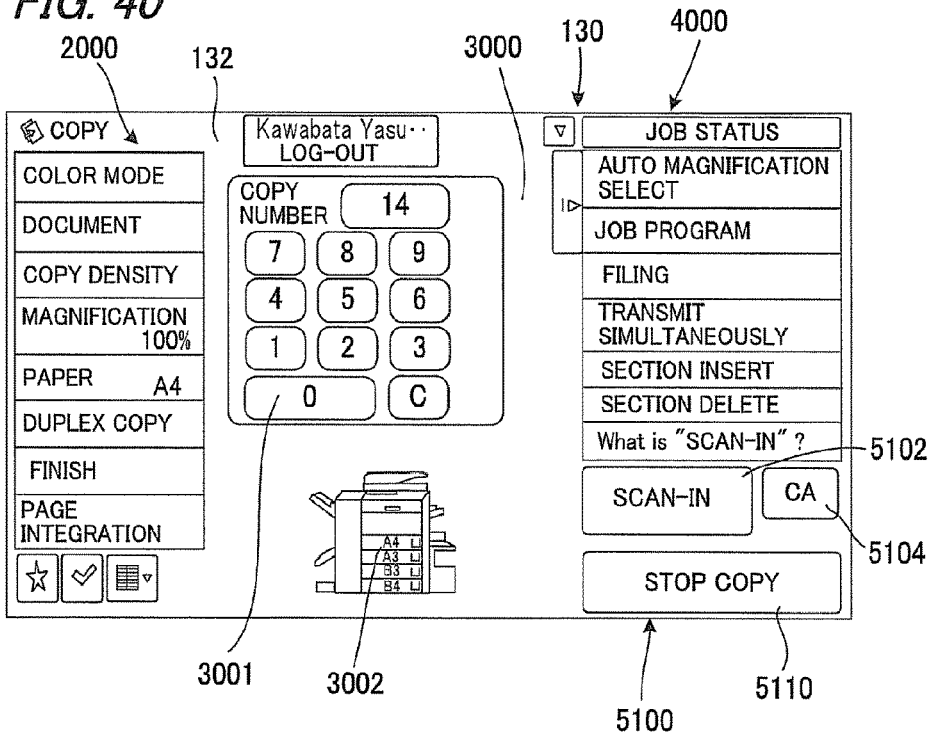
2000
132
3000
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
COPY NUMBER 14
7 8 9
4 5 6
1 2 3
0 C
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
SCAN-IN
CA
STOP COPY
5102
5104
3001
3002
5100
5110

FIG. 41

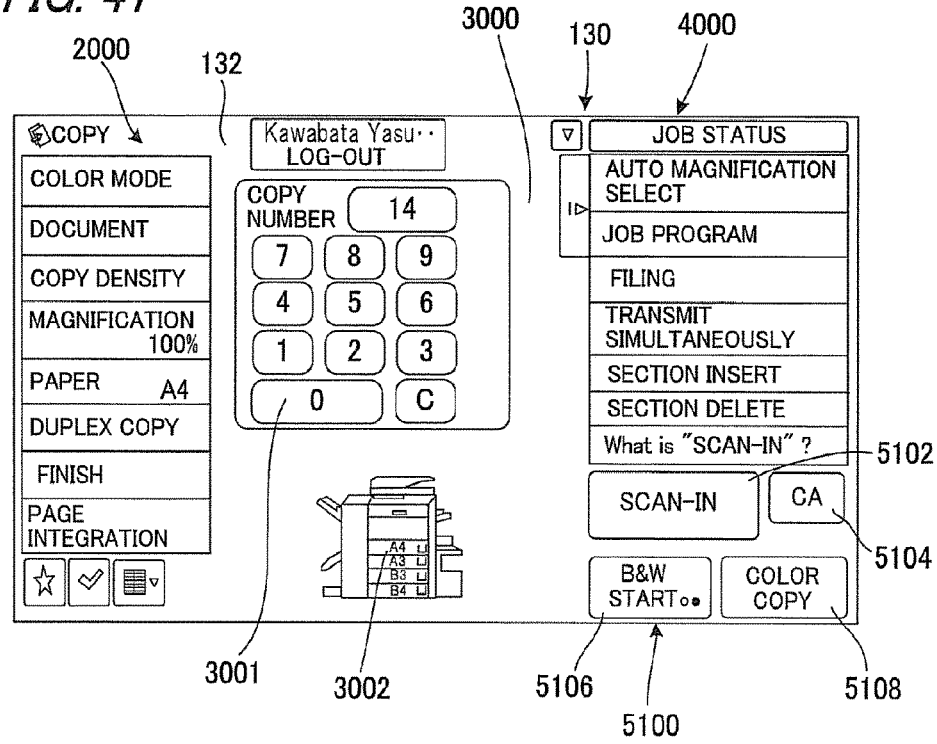
2000
132
3000
130
4000
COPY
Kawabata Yasu··
LOG-OUT
JOB STATUS
COLOR MODE
DOCUMENT
COPY DENSITY
MAGNIFICATION 100%
PAPER A4
DUPLEX COPY
FINISH
PAGE INTEGRATION
COPY NUMBER 14
7 8 9
4 5 6
1 2 3
0 C
AUTO MAGNIFICATION SELECT
JOB PROGRAM
FILING
TRANSMIT SIMULTANEOUSLY
SECTION INSERT
SECTION DELETE
What is "SCAN-IN" ?
SCAN-IN
CA
B&W START
COLOR COPY
5102
5104
3001
3002
5106
5100
5108

IMAGE FORMING APPARATUS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

Notice: More than one reissue application has been filed for the reissue of U.S. Pat. No. 8,582,131. The reissue applications are application Ser. Nos. 15/202,768 (the present application) and 15/202,837, both of which are reissue applications of U.S. Pat. No. 8,582,131. Application Ser. No. 15/202,837 is a continuation reissue application of application Ser. No. 15/202,768 (the present application).

This Nonprovisional application claims priority under 35 U.S.C. §119 (a) on Patent Application No. 2010-238890 filed in Japan on 25 Oct. 2010 and Patent Application No. 2010-239319 filed in Japan on 26 Oct. 2010, the entire contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates to an image forming apparatus such as a copier, printer, facsimile machine or the like, in particular, relating to an image forming apparatus equipped with an image display control device capable of displaying plural pages of document images in preview representation.

(2) Description of the Prior Art

Recently, there have been known image forming apparatus that include an image display control device capable of multiple pages of document images in a preview representation. In such image forming apparatus, it is possible to confirm the documents that have been scanned before printout by displaying the processed result of the scanned (prescanned) documents before execution of a job.

As a prior art example, there has been disclosed a configuration of an image forming apparatus which scans documents and then performs image processes on the scanned document images to thereby output printed material (see Patent Document 1).

According to the above image forming apparatus, in the image processor, a finish information generator generates expected finish information based on the image data captured by the scanner and an input pane information generator generates an input pane to display it on the display. When the operator, whilst viewing the displayed, expected finish screen, inputs settings through the input pane, the setter receives the settings and the finish information generator generates a finish information screen based on the received settings, the input pane information generator generates input pane information, and the display unit displays the expected finish and the input pane.

The control display unit includes a microphone, an input unit, a display unit and a speaker, and may input settings by voice through the microphone, may input settings using the input unit such as a keyboard, touch panel or the like, and may display menu items of settings on the display unit. The display unit adds voice output using the speaker other than visual display.

In this way, by reading documents before setting operations for several kinds of functions by users to display the expected finish condition, it is possible to provide an image forming apparatus that is highly efficient in setting operations with improved convenience.

[Prior Art Documents]

Patent Document 1

Japanese Patent Application Laid-open 2006-3568

However, as in the technology disclosed in Patent Document 1, in the image forming apparatus having a function of displaying a preview of the images to be output to enable the user to check, it is only possible to start an output process after user's confirmation of finished images before output. That is, there has been the problem that it is impossible to achieve an output process in conformity with the intention of the user who wants to omit checking work before output (the user who puts weight on quickness), hence it is impossible to meet user needs.

SUMMARY OF THE INVENTION

The present invention has been devised in view of the above prior art problems, it is therefore an object of the present invention to provide an image forming apparatus with improved convenience in which an image output process can be implemented in conformity with user's intention.

It is another object of the present invention to provide an image forming apparatus that is improved in convenience so that preview checking work can be cancelled whenever the user wants and that makes it possible to achieve an image output process in conformity with user's intention.

The first aspect of the invention resides in an image forming apparatus comprising:

an input unit receiving image data;

an output unit outputting an image formed based on the image data;

a storing unit storing the image data input from the input unit; and,

an image display control unit, and is characterized in that the image display control unit includes:

a display image generator generating a display image based on the image data stored in the storing unit;

a display unit displaying the display image generated by the display image generator; and,

a display controller including a function of presenting the display image based on the image data input from the input unit, in a preview representation and an output processing function of implementing an output process by means of the output unit, and

the display controller controls

a first output scheme in which, when image data has been input through the input unit, the images to be output are displayed in a preview representation on the display unit, and then are output by means of the output unit, and

a second output scheme in which, when image data has been input through the input unit, the image to be output are not directly displayed in a preview representation on the display unit, but are directly output by means of the output unit.

The second aspect of the present invention resides in that in the output process by means of the output unit, an identical display is used as the standby screens to be displayed on the display unit for starting the output process, for both the first output scheme and the second output scheme.

The third aspect of the present invention resides in that in the output process by means of the output unit, the opera-

tions after an output start command is given are different between the first output scheme and the second output scheme.

For example, since, in the first output scheme, image data has been scanned before an output start command is given, an output process may be performed based on the image data that has been already scanned when an output start command is given. In the second output scheme, an output start command is given first, then image data is scanned so as to perform an output process based on the scanned image data.

The fourth aspect of the present invention resides in the display controller includes an output scheme switching function controller which, when a command for starting image output by means of the output unit is given during an output process based on the first output scheme, stops the preview display and switches the operation to that based on the second output scheme to perform image output.

The fifth aspect of the present invention resides in that the display controller includes an input continuation function controller which, when a command for starting image output by means of the output unit is given during an output process based on the first output scheme, starts image output of the image data that has been already input and continues input of image data that has not yet been input.

The sixth aspect of the present invention resides in that the display controller includes an output start command key displaying function controller which displays an output start command key for instructing the start of image output by means of the image output unit, on the display unit during the output process of the first output scheme.

The seventh aspect of the present invention resides in that the display controller includes an output stop command key displaying function controller which displays an output stop command key for instructing the stoppage of output until image data that has not been yet input ends when the start of image output by the means of image output unit is directed during the output process of the first output scheme.

The eighth aspect of the present invention resides in that the display controller includes an output command acceptance notifying function controller which notifies that the start of image output by means of the image output unit can be directed during the output process of the first output scheme.

The ninth aspect of the present invention resides in that the display controller includes an operation status notifying function controller which notifies the operation status of the apparatus when the start of image output by means of the image output unit is directed during the output process of the first output scheme.

According to the first aspect of the present invention, two types of output schemes are made possible so as to implement an output process in conformity with user's intention, whereby it is possible to meet user needs. For example, when the user puts weight on the finished condition, it is possible for the user to check the output content by preview images in advance before performing an output process. When the user puts weight on quickness of output processing, it is possible to implement a direct output process for the input data.

According to the second aspect of the present invention, no matter it is the case where an output process is performed after preview confirmation by scan-in operation, or no matter it is the case where an output process is performed instantly, it is possible to promote the user to start operating smoothly without being puzzled due to difference in input control depending on the output scheme that user wants to select.

According to the third aspect of the present invention, it is possible to implement an output process efficiently by the image forming apparatus that operates in conformity with the output process to be done.

According to the fourth aspect of the present invention, it is possible to give an output command in the middle of input (scan-in) of image data, hence it is possible for the user to start output at any time the user wants without waiting for completion of the scan-in operation when a large amount of documents need to be scanned in, or when a scan-in operation is started by mistake.

As a result, it is possible to provide an image forming apparatus that is improved in convenience and can implement an image output process in conformity with user's intention.

According to the fifth aspect of the present invention, since it is possible to continue scanning of image data that has not yet been input and output the image data that has been already input, simultaneously, it is possible to shorten the processing time.

According to the sixth aspect of the present invention, an output start command key is displayed during a scan-in operation of the first output scheme. It is hence possible for the user to give an output start command at any timing the user wants even in the middle of the scan-in operation.

According to the seventh aspect of the present invention, since it is possible to give a command of stopping output during input of image data that has not been yet input, it is possible to stop image output (or stop scanning) to make the apparatus ready for a next job. With this arrangement, it is possible to shorten the loss time up to execution of the next operation and hence improve operativity.

According to the eighth aspect of the present invention, it is possible to notify (make) the user (recognize) that an output command is acceptable in the middle of a scan-in operation.

According to the ninth aspect of the present invention, even a user who is unfamiliar with the apparatus can grasp the operation status of the apparatus when an output command is given in the middle of a scan-in operation, hence can use the apparatus without confusion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustrative view showing an overall configuration of an image forming apparatus according to the first and second embodiments of the present invention;

FIG. **2** is an illustrative view schematically showing the internal mechanisms of the image forming apparatus;

FIG. **3** is a functional block diagram showing a hardware configuration of the image forming apparatus;

FIG. **4** is an illustrative view showing display regions on a touch panel display of the image forming apparatus;

FIG. **5** is an illustrative view showing a screen example displayed on the touch panel display;

FIG. **6** is an illustrative view showing a state where the preview region being displayed on the touch panel display is changed;

FIG. **7** is an illustrative view showing a display mode of a display panel of the touch panel display;

FIG. **8** is an illustrative view showing one example of a display mode of a preview display region in the touch panel display;

FIG. **9** is a block diagram showing an electric configuration of a control unit in the image forming apparatus;

FIG. **10** is a block diagram showing a configuration of a touch panel display of a control unit according to the first embodiment of the present invention;

FIG. **11** is a flow chart showing the processing sequence of the first output scheme implemented by an image output unit of the image forming apparatus;

FIG. **12** is a flow chart showing the processing sequence of the second output scheme implemented by the image output unit;

FIG. **13** is an illustrative view showing a display mode of the touch panel display at the time of document reading;

FIG. **14** is an illustrative view showing a displayed state on the touch panel display at the start of document reading;

FIG. **15** is an illustrative view showing a state where the image of the first document is displayed in the first display area on the touch panel display;

FIG. **16** is an illustrative view showing a state where the first sheet image is moving from the first display area to the second display area on the touch panel display;

FIG. **17** is an illustrative view showing a state where the second sheet image is displayed in the first display area after the first sheet image has been moved from the first display area to the second display area on the touch panel display;

FIG. **18** is an illustrative view showing a state where the second sheet image is moving from the first display area to the second display area on the touch panel display;

FIG. **19** is an illustrative view showing a state where the second sheet image has moved to and behind the first sheet image in the second display area on the touch panel display;

FIG. **20** is an illustrative view showing a state where the third sheet image has moved to and behind the second sheet image that moved and is displayed in the second display area on the touch panel display;

FIG. **21** is an illustrative view showing a displayed state of the touch panel display immediately after all the documents have been pre-scanned by scan-in in the image forming apparatus;

FIG. **22** is an illustrative view showing a displayed state of the touch panel display in command waiting mode after all the documents were pre-scanned by scan-in in the image forming apparatus;

FIG. **23** is an illustrative view showing a display screen for directing the start of image reading by the first output scheme in the image output unit of the image forming apparatus;

FIG. **24** is an illustrative view showing a display screen for directing the start of image output by the first output scheme in the image output unit;

FIG. **25** is an illustrative view showing a display screen for directing the start of image output by the second output scheme in the image output unit;

FIG. **26** is a block diagram showing a configuration of a touch panel display of a control unit according to the second embodiment of the present invention;

FIG. **27** is a flow chart showing the processing sequence of performing image output when input of image data is implemented by the first output scheme in the image forming apparatus;

FIG. **28** is a flow chart showing the processing sequence of an output process when an output start command is given in the middle of capturing image data in the first output scheme in the image forming apparatus;

FIG. **29** is a flow chart showing the processing sequence of an input process of image data that is continued in parallel with the output process when an output start command is given in the middle of capturing image data in the first output scheme in the image forming apparatus;

FIG. **30** is a flow chart showing the processing sequence of an output process when no output start command is given in the middle of capturing image data in the first output scheme in the image forming apparatus;

FIG. **31** is an illustrative view showing a display screen on the touch panel display for reading documents;

FIG. **32** is an illustrative view showing a displayed state of a preview region on the touch panel display at the time of starting document reading;

FIG. **33** is an illustrative view showing a displayed state of the first sheet image in the preview region when the document reader of the image forming apparatus starts reading the first document;

FIG. **34** is an illustrative view showing a displayed state of the first sheet image in the preview region when the document reader is reading the first document;

FIG. **35** is an illustrative view showing a displayed state of the first sheet image in the preview region when the document reader has completed the reading of the first document;

FIG. **36** is an illustrative view showing a state where the first sheet image displayed in the preview region is gradually eliminated;

FIG. **37** is an illustrative view showing a displayed state of the second sheet image in the preview region when the document reader starts reading the second document;

FIG. **38** is an illustrative view showing a displayed state of the second sheet image in the preview region when the document reader has completed the reading of the second document;

FIG. **39** is an illustrative view showing a display screen presented when an output start command is given in the middle of an input process by the document reader;

FIG. **40** is an illustrative view showing a display screen presented when an output process is being implemented in the middle of the input process by the document reader; and,

FIG. **41** is an illustrative view showing a display screen presented when an output process has been completed in the image forming apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

(The First Embodiment)

The embodiment of the present invention will hereinafter be described with reference to the accompanying drawings.

FIG. **1** is an illustrative view of one example mode of carrying out the present invention, showing an overall configuration of an image forming apparatus according to the embodiment of the present invention. FIG. **2** is an illustrative view schematically showing the internal mechanisms of the image forming apparatus. FIG. **3** is a functional block diagram showing a hardware configuration of the image forming apparatus. FIG. **4** is an illustrative view showing a preview display region on a touch panel display of the image forming apparatus. FIG. **5** is an illustrative view showing a screen example displayed on the touch panel display. FIG. **6** is an illustrative view showing a state where the preview region being displayed on the touch panel display is modified.

An image forming apparatus **100** according to the embodiment of the present invention includes: as shown in FIG. **1**, a document reader (input unit) **102** for capturing image data; an image forming portion **104** for forming an image on a recording medium based on the image data input through document reader **102**; an image output unit (output unit) **107** (see FIG. **9**) for outputting the image formed based

on the image data; and a control unit (image display control device) **120** having a display panel (display portion) **132** for displaying preview images based on image data and a control unit-side controller (display controller) **131** (see FIG. **9**) having a function of giving a display image based on the image data input through the document reader **102**, in a preview representation on display panel **132**.

Control unit-side controller **131** includes an output processing function controller **1311** (see FIG. **10**), which effects two kinds of processing, that is, the first output scheme in which, when image data has been input through document reader **102**, the images are output after displaying the images to be output in a preview representation on display panel **132** and the second output scheme in which, when image data has been input through document reader **102**, the image is directly output without displaying the image to be output in a preview representation on display panel **132**.

The multiple document images displayed on display panel **132** may include preview display images of document images captured by the document reader etc., of image forming apparatus **100** and preview images of finished images to be formed on recording paper by the image forming portion.

Image forming apparatus **100** is a kind of an image processing apparatus. The image display control device according to the present invention is also applicable to image processing apparatus and electronic appliances other than the image forming apparatus of this kind.

Further, image forming apparatus **100** includes a plurality of operational modes, and is equipped with a display device for displaying information for each operational mode. The display device is preferably constructed so as to be able to display information the user wants in a user friendly manner even if the user does not remember the screen configuration when the operational mode is changed over.

Here, image forming apparatus **100** includes a touch panel display (control screen) that can be controlled by both gesture control and touch control other than gesture control, but the image forming apparatus may use a touch panel display that can be controlled by touch control only. Alternatively, the image forming apparatus may include a display panel that cannot be touch-controlled but can display only, with keys for control.

Here, gesture control means controls that are related to various kinds of movements of fingers in combination with GUI (Graphic User Interface), such as responses in accordance with the distance moved and speed of the fingers, double-tapping, the moving fingers trace and the like that are given with meanings.

This image forming apparatus **100** forms images on recording paper based on electrophotography.

Image forming apparatus **100** includes, as its operation modes, copy mode, facsimile mode (FAX mode), document filing mode (a mode in which scanned images are stored in a storage inside the image forming apparatus) and mail mode (a mode in which scanned images are transmitted in the form of an attachment file to an e-mail). This image forming apparatus **100** may further have a network printer mode.

The image forming apparatus **100** changes the display content on the screen for every operation mode. Further, the printing mechanism is not limited to electrophotography.

To begin with, image forming apparatus **100** will be described.

Image forming apparatus **100** of the present embodiment includes document reader **102**, image forming portion **104**, a paper feed portion **106**, a paper output processor **108** and a control unit **120**, as shown in FIG. **1**.

Control unit **120** is formed of a touch panel display **130** and a display control portion **140**.

Touch panel display **130** is comprised of a display panel **132** of a liquid crystal panel or the like and a touch panel (touch control detecting means) **134** that is laid over display panel **132** to detect the positions the user presses with fingers.

Display control portion **140** includes an indication lamp **142**, a power key **144**, an energy-save key **146** and a home key **148** that resets the display content of touch panel display **130** to the home screen for operational mode selection.

In this way, image forming apparatus **100** has touch panel display **130** as a main control device and also has a display control portion **140** that includes the hardware keys and indication lamps. The keys (power key **144**, energy-save key **146** and home key **148**) on display control portion **140** are given as hardware buttons, in contrast to software buttons formed by touch panel display **130**.

Note that image forming apparatus **100** should not be limited to that including display control portion **140** of this kind, but may be provided with touch panel display **130** only. That is, it will work as long as the initial screen of the selected operational mode can be actuated when the user selects an operational mode on the home screen displayed on touch panel display **130**. Next, the operational modes of this image forming apparatus **100** will be described.

(Copy Mode)

The operation of the copy mode of image forming apparatus **100** will be described.

In this copy mode, image reader (which will be referred to hereinbelow as "scanner") **102** and image forming portion **104** operate mainly.

A document placed on a document placement table is read as image data by scanner **102** and the read image data is input to a CPU **300** of a microcomputer etc. shown in FIG. **3**, where the image data undergoes various kinds of image processing, and the processed image data is output to image forming portion **104**.

As shown in FIG. **2**, image forming portion **104** is a mechanism that prints images of documents given as image data onto recording mediums (recording paper in most cases), including a photoreceptor drum **222**, a charging device **224**, a laser scan unit (which will be referred to hereinbelow as "LSU") **226**, a developing device **228**, a transfer device **230**, a cleaning unit **232**, a fixing unit **234**, an unillustrated charge eraser and other devices.

Also, image forming portion **104** is provided with a main feed path **236** and a reverse feed path **238**. The recording paper fed from paper feed portion **106** is conveyed along main feed path **236**. Paper feed portion **106** draws recording paper, one sheet at a time, from a stack of recording paper, held in a paper feed cassette **240** or set on a manual feed tray **242** and delivers the recoding paper to main feed path **236** of image forming portion **104**.

In the course of the recording paper being conveyed along main feed path **236** of image forming portion **104**, the recording paper passes through and between photoreceptor drum **222** and transfer device **230** and then passes through fixing device **234** to perform printing for the recording paper.

While photoreceptor drum **222** rotates in one direction, its surface is cleaned by cleaning device **232** and the charge erasing device, then uniformly electrified by charging device **224**.

LSU **226** modulates the laser beam based on the image data to be printed and repeatedly scans the laser beam over the photoreceptor drum **222** surface in the main scan direction, to form an electrostatic latent image on the photoreceptor drum **222** surface.

Developing unit **228** supplies toner to the photoreceptor drum **222** surface and develops the electrostatic latent image to form a toner image on the photoreceptor drum **222** surface.

Transfer device **230** transfers the toner image on the photoreceptor drum **222** surface to the recording paper which passes through the nip between the transfer device **230** and photoreceptor drum **222**.

Fixing device **234** includes a heat roller **248** for heating recording paper and a pressing roller **250** for pressing recording paper. The recording paper is heated by heat roller **248** and pressed by pressing roller **250** so that the toner image transferred to the recording paper is fixed to the recording paper. A heater in the heat roller is heated by the power supplied to this fixing unit **234** so as to control and keep heat roller **248** at a temperature suitable for fixing. When the apparatus enters the energy saving mode, for instance the power supplied to this heater is stopped or cut down.

Arranged at the junction between main feed path **236** and reverse feed path **238** is a branch claw **244**. When printing is performed on one side of recording paper only, branch claw **244** is positioned so as to lead the recording paper from fixing device **234** toward a paper output tray **246** or paper output processor **108**.

When printing is performed on both sides of recording paper, branch claw **244** is rotated in the predetermined direction so that the recording paper is once conveyed toward the paper output tray **246** side. Then, the paper is switched back and conveyed toward reverse feed path **238**. The recording paper then passes through reverse feed path **238** and is inverted upside down and fed to main feed path **236** again. The recording paper is once again printed on its rear side in the course of main feed path **236** and lead to paper output tray **246** or paper output processor **108**.

The recording paper thus printed is lead to paper output tray **246** or paper output processor **108** and discharged to either paper output tray **246** or each of paper output trays **110** of paper output processor **108**.

In paper output processor **108**, a plurality of recording sheets are sorted and discharged to individual paper output trays **110**, and/or each set of recording sheets is punched or stapled. For example, when multiple copies of printed documents are prepared, the printed recording sheets are sorted and discharged to paper output trays **110** so that one copy of the printed documents is allotted to individual paper output tray **110**, and the printed documents on each paper output tray **110** are punched by a punching unit **111** or stapled by a stapling unit **112** to prepare individual printed material.

(Facsimile Mode)

Next, the operation in facsimile mode will be described.

In this facsimile mode, the transmitting operation is mainly effected by document reader (scanner) **102** and a FAX communicator **160**, as shown in FIG. **3**. The receiving operation is mainly effected by FAX communicator **160** and image forming portion **104**.

(Transmitting Operation)

The transmitting operation is performed by the steps of: selecting the facsimile mode, reading image data from a document placed on the document placement table by means of document reader **102**, supplying the read image data to CPU **300** made up of a microcomputer etc. shown in FIG. **3** where the image data is subjected to various kinds of image processes, and outputting the thus obtained image data to the FAX communicator (FAX communicator **160** in FIG. **3**).

As shown in FIG. **3**, FAX communicator **160** of the transmission side image forming apparatus **100** connects the selected transmitter side line to the designated destination, converts the image data into communication data conforming to the facsimile communication standard and transmits the communication data to the receiver side facsimile machine (e.g., image forming apparatus **100** having a facsimile function).

(Communication Operation)

When connection of the line is established, FAX communicator **160** of image forming apparatus **100** on the receiver side detects a communication request signal from FAX communicator **160** of image forming apparatus **100** on the transmitter side and sends a response signal. Then, for example, FAX communicators **160** on both the transmitter and receiver sides exchange facsimile performance information of their own with each other and determine the communication rate and coding and code correction scheme of the image data within the available maximum capacity to set up a modem communication scheme. The data is transmitted based on an image signal format conforming to this communication scheme, from FAX communicator **160** of image forming apparatus **100** on the transmitter side to FAX communicator **160** of image forming apparatus **100** on the receiver side. When data transmission is ended, the line is cut off.

(Receiving Operation)

The FAX communicator **160** of image forming apparatus **100** on the receiver side converts the received data into image data and sends the data to image forming portion **104**. Here, the received data may be converted into image data by image forming portion **104**. Image forming portion **104** prints images of documents represented by the image data converted from the received data, onto recording paper, in the same manner as the above-described operation in copy mode.

Next, the control block configuration of image forming apparatus **100** will be described with reference to the drawings.

As shown in FIG. **3**, image forming apparatus **100** includes: control unit **120** that allows the user to set copy mode and facsimile mode; a ROM **306** for storing programs etc.; a hard disk **302** serving as a non-volatile storage area that can hold programs, data and the like even if the power is cut off; and a RAM (Random Access Memory) **308** that offers a storing area when a program is executed.

Image forming apparatus **100** further includes: a bus **310** connected to image reader **102**, image forming portion **104**, FAX communicator **160**, control unit **120**, ROM **306**, hard disk **302** and RAM **308**; and CPU **300** that is connected to bus **310** to realize general functions as an image forming apparatus.

Hard disk **302** records (stores) files of image data of documents scanned by the image forming apparatus **100**. Hard disk **302** also stores initial screen data for each operational mode. The files and data stored in hard disk **302** can also be recorded in ROM **306**.

Stored in ROM **306** are programs, data and the like necessary for controlling the operation of image forming apparatus **100**. As the data stored in ROM **306** with the programs, the initial screen data for each operational mode may be stored. CPU **300** controls image forming apparatus **100** in accordance with the programs and data stored in

ROM **306** and performs control associated with each function of image forming apparatus **100**.

As shown in FIG. **3**, a public line for exchange of image data is connected to FAX communicator **160** of this image forming apparatus **100** while a network line is connected to a network interface **304**. This network line may be connected to a computers etc. that use this image forming portion **100** as a network printer or may be connected via the internet to a computer etc. that is identified by a designated URL (Uniform Resource Locator). When connected to the Internet in this way, the image forming apparatus **100** can obtain the necessary information via the Internet.

RAM **308** offers a function as a working memory for temporarily recording the result of the operation and processing by CPU **300** and a function as a frame memory for recording image data.

Control of image reader **102**, image forming portion **104**, touch panel display **130** and display control portion **140** forming control unit **120**, ROM **306**, hard disk **302** and RAM **308** is performed by CPU **300** executing predetermined programs. Here, control unit **120** communicates with CPU **300** by way of an input/output interface.

Control unit **120** is given as a board-like panel that is tilted so as to allow the user ease of view. Control unit **120** includes touch panel display **130** in the left area and display control portion **140** (including indication lamp **142** and hardware buttons, namely, power key **144**, energy-save key **146** and home key **148**) in the right area on the top thereof. Touch panel display **130** and display control portion **140** are integrally provided in control unit **120**.

As described above, this touch panel display **130** is formed of display panel **132** and touch panel **134** that is laid over display panel **132**.

Displayed on display panel **132** of touch panel display **130** are the home screen for selection of the operational mode of image forming apparatus **100**, the current status of this image forming apparatus **100**, the status of destination selection, job processing status and the like. Displayed in the preview display region of display panel **132** are selection buttons as software keys. When the displayed area of a selection button is pushed by a finger, touch panel **134** detects the pushed position. Then, the position on which touch panel **134** is pressed is compared with the positions of selection buttons so as to perform selection of an operational mode of image forming apparatus **100**, functional setting, operational instructions, and the like. In addition to this touch control (command input control based on the position of the user's pressing), this image forming apparatus **100** also supports the above-mentioned gesture control (command input control based on the trace of user's control motion).

Further, indication lamp **142** of display control portion **140** is made up of a LED (Light Emitting Diode) for instance and is controlled by CPU **300** so as to turn on/off (/flash on and off). When the user presses down power key **144** that is provided separately in addition to the main power switch, this image forming apparatus **100** comes out of standby mode (in which, for example, only fax reception is permitted with the main power turned on) to active mode so that the whole operational modes of this image forming apparatus **100** can be used. Indication lamp **142** comes on in link with this status. Further, when a predetermined period has elapsed without receiving any user input, or when the user presses energy-save key **146**, this image forming apparatus **100** comes out of active mode into energy save mode so that only part of the operational modes of image forming apparatus **100** are operational. Indication lamp **142** flashes on and off in link with this status. Further, when the user presses energy-save key **146** in this energy save mode, the image forming apparatus **100** comes out of energy save mode into active mode. Home key **148** is a hardware key for retuning the display of touch panel display **130** into the initial condition (home screen). It is noted that the operations when power key **144**, energy-save key **146** and home key **148** are pressed should not be limited to these.

The hardware keys on display control portion **140** (power key **144**, energy-save key **146** and home key **148**) may be embedded with a key lamp controlled by CPU **300** so as to turn on/off (/flash). For example, this key lamp may be a round type key ring-like lighting or center lighting. This key lamp turns on at the timing that the hardware key is permitted to use as a control device (at the timing that operation is performed when the hardware key is used)

Image forming apparatus **100** has the aforementioned two operational modes (copy mode and facsimile mode). Software buttons for function settings in each operational mode are displayed on touch panel display **130**, and also the preview as the on-screen form of forming images, keys for destination setting and the like are displayed as necessary.

When the operational mode is different from that which the user wants, touch panel display **130** displays another screen. Even in such a case, in order for the user to easily find the information the user requests, touch panel display **130** is divided into multiple regions (which also are given in a size variable manner) so as to display necessary information in each region.

In particular, in this image forming apparatus **100**, when one operational mode is selected on the home screen of touch panel display **130** provided as the main display control device, the initial screen of the operational mode is displayed.

In this initial screen, (1) the basic layout is formed of five areas, namely "system region", "function selecting region", "preview region", "action panel region" and "task trigger region", which are appropriately arranged, so that the user is able to easily perform input of settings from top left to bottom right (in the same manner as the user moves their gaze and fingers in the conventional machine which is not provided with a large scale touch panel display **130**). Further, (2) the concept of the displays of the five regions is consistent in all operational modes, so that the user is able to operate without confusion when another operational mode is used.

The following description will be given on the configuration of this basic layout.

The basic layout in touch panel display **130** will be described with reference to the drawings.

As shown in FIG. **4**, the basic layout of touch panel display **130** is designed in the laterally long touch panel display **130** such that a system region **1000** is arranged at the topmost part, a preview region (preview display region) **3000** in the center of the screen, a function settings/confirmation region **2000** on the left side of preview region **3000**, an action panel region **4000** on the upper right part of preview region **3000**, and a task trigger region **5000** on the lower right of preview region **3000**. Here, the laterally long touch panel display **130** is formed of, for example, 1024 pixels wide×600 pixels high. Further, function settings/confirmation region **2000** will be written hereinbelow as function selecting region **2000**.

It is noted that the number of regions in touch panel display **130** should not be limited to five. Also, the horizontal arrangement should not be limited so that the horizontal arrangement may be reversed right side left, for example,

depending on the user's dominant hand. Further, the position of system region **1000** may be disposed at the lowermost part. Alternatively, the system region **1000** may be undisplayed depending on the status or settings.

System region **1000** displays the current status of this image forming apparatus **100**, e.g., the title of the operational mode in control and the status and conditions of image forming apparatus **100**. For example, displayed in system region **1000** are the name of operational mode, the cut-in key, the log-in user name, the job status in progress, the usage status of built-in memory, time and the like.

In function selecting region **2000**, settings in each function, display switching, function selecting menu (icons, buttons, etc.) operated by user to confirm settings are variably displayed in a selected display style, i.e., in icon mode, regular mode or express mode. In icon mode, only icons for function setting are displayed in function selecting region **2000** so as to maximize the size of preview region **3000**. In express mode, the display of function selecting region **2000** is enlarged so as to allow the user to set the function all at once though the size of preview region **3000** is minimized. In regular mode, preview region **3000** is sized between that in the icon mode and that in the express mode while in function selecting region **2000** the text of function titles are displayed together with functional setting icons.

These icon mode, regular mode and express mode are switched from one to another based on user control. That is, the size of preview region **3000** is modified and displayed in accordance with user control. In this way, since icons are able to give information to the user by using limited area, it is preferable that every function is given with an icon so as to be able to enlarge the display of preview region **3000**.

This function selecting region **2000** includes at its bottom a group of select buttons **2010** for switching the display style in function selecting region **2000**. Arranged in the group of select buttons **2010** are an icon mode entering button **2012** for displaying function selecting region **2000** in icon mode, a favorite button **2014** for displaying the functions registered as "favorites", a check button **2016** for displaying the functions whose settings have been modified, a list button **2018** for displaying a list of all the functions that can be designated in the selected operation mode, a regular mode entering button **2020** for displaying function selecting region **2000** in regular mode, and an express mode entering button **2022** for displaying function selecting region **2000** in express mode.

Here, when there are many pieces of information to be displayed in function selecting region **2000**, the information is displayed in this function selecting region **2000**, in a vertically movable manner. In this case, this group of select buttons **2010** is not moved but constantly displayed in the bottom-most portion of function selecting region **2000**.

Preview region **3000** displays the image of the output pages of the (finished) document. The image is displayed using dummy data or scanned data, and the displayed image in preview region **3000** is revised every time the user changes the finish. There are two modes of displaying the finish in this preview region **3000**: the display of the final preview with a dummy image in virtual mode before scanning and the display of the final preview with actual images in scan-in mode after scanning. The virtual mode further has two types, before setting documents and after setting documents.

At the bottom of this preview region **3000** there is a group of preview select buttons **3010** for changing the display style in preview region **3000**. The group of preview select buttons **3010** includes a rotate-left button **3016** for rotating the image left 90 degrees and a rotate-right button **3018** for rotating the image right 90 degrees and a zoom bar **3020**. Other than these, for example a change color button **3012** and preview control button **3014** are arranged.

With this, when rotate-left button **3016** is touched once, the preview rotates 90 degrees left. When the button is touched twice, the preview is rotated 180 degrees left (inverted upside down). Alternatively, when the image of the finished document displayed in the preview region is gesture-controlled (by rotating the document image 180 degrees counterclockwise with the fingertip), the preview is rotated 180 degrees left or inverted upside down.

When rotate-right button **3018** is touched once, the preview rotates 90 degrees right. When the button is touched twice, the preview is rotated 180 degrees right (inverted upside down). Alternatively, when the image of the finished document displayed in the preview region is gesture-controlled (by rotating the document image 180 degrees clockwise with the fingertip), the preview is rotated 180 degrees right or inverted upside down.

When the (+) button **3020**A of zoom bar **3020** is touched, or when bar **3020**C is gesture-controlled (by dragging or sliding) toward the (+) button **3020**A, the preview image is enlarged. Alternatively, when the image of the finished document displayed in the preview region is gesture-controlled (on the document image by the "pinch out/pinch open" gesture with fingertips), the preview image is enlarged. Here, the "drag" gesture is an action of moving the finger. The "pinch out/pinch open" is an action of spreading the two fingertips apart.

When the (−) button **3020**B of zoom bar **3020** is touched, or when bar **3020**C is gesture-controlled (by dragging or sliding) toward the (−) button **3020**B, the preview image is reduced. Alternatively, when the image of the finished document displayed in the preview region is gesture-controlled (on the document image by the "pinch in/pinch close" gesture with fingertips), the preview image is reduced. Here, the "pinch in/pinch close" is an action of bringing the two fingertips together.

When there are many pages of document images to be displayed in preview region **3000**, touchable displayed page select buttons (page number input buttons, page up and down buttons, single page display button and multiple page display button, etc.) may be displayed. In this case, it is also possible to turn over or return the page of the document to be previewed by a sliding touch (flicking) of the document image. Further, when the document image to be displayed in preview region **3000** is large, scroll bars that can be touched or gesture-controlled may be displayed. The "flick" gesture is a soft sweeping action with the finger.

Action panel region **4000** displays information such as hint, advice and suggestion for operation and control. Display in this action panel region **4000** is given such that when a particular function is selected by a certain user, the functions associated with the subject function may be displayed, another function as to the subject function may be displayed in a purpose-oriented manner, or the function that was selected in the past in combination with the subject function by the same user or a user of the group to which this user belongs may be displayed as a "recommended function".

Task trigger region **5000** displays trigger items that the user operates in order to actually cause the image forming apparatus **100** to operate after all the settings in the operational mode have been completed. An example is the start button (software button) for starting the operation. Here, since information on a lack of a consumable supply is also

related to the unfeasibility of the task in the operational modes needing a printing process (other than fax transmission), this should be also displayed in this "task trigger region".

In this case, it is also preferable that the start button is displayed only when the start button can be pressed down. The condition in which the start button can be pressed down, means a state where all settings have been completed and none of consumable supplies (recording paper and toner) will run short in the case of an operational mode needing a printing operation or a state where all the transmission parameters including destination have been set in the case of a fax mode (transmission) operation as the operational mode needing no printing.

The layout of these five regions is not changed even if the operational mode is switched from one to another (in the initial screen of any operational mode). Further, each region may change in size, expanding or contracting in the horizontal (longitudinal) direction of the screen of touch panel display **130** as in the case where the display of function selecting region **2000** (and preview region **3000**) is switched between icon mode, regular mode and express mode.

The layout of the five regions is designed in light of the user interfaces in conventional machines, by directing attention to user's path of gaze and control. This arrangement leads the user to perform settings by moving their gaze from top left to bottom right and moving their input action (fingers of the dominant hand) from top left to bottom right.

In this arrangement, for switching the operational mode from one to another, the user presses down home key **148** (FIG. **3**) and selects another operational mode on the home screen. In this way, it is possible to change operational mode by way of the home screen.

(Initial Screen Display Operation in Copy Mode)

When copy mode is selected, the initial screen for copy mode is displayed on touch panel display **130** using copy mode initial screen data loaded from hard disk **302** (FIG. **3**) or the like.

In this occasion, a copy mode initial screen **7100** is displayed for example, on touch panel display **130**, as shown in FIG. **5**. Copy mode initial screen **7100** displays information using the five divided regions laid out as described above.

In system region **1000** (FIG. **4**) of copy mode initial screen **7100**, areas **1102**, **1104**, **1106**, **1108**, **1110**, **1112**, **1114** and **1116** are laid out as shown in FIG. **5**.

Area **1102** denotes the operational mode being selected (copy mode in this case). Displayed in area **1102** is the name and/or icon of the operational mode.

It is also preferred that a pulldown menu showing operational modes is displayed so as to allow for switching of operational mode when this area **1102** is touch-controlled, tapped or double-tapped (the same in other operational modes).

Area **1104** displays sub information entailing the selected operational mode.

In area **1104** a cut-in key (software button) is displayed as sub information. When this cut-in key is touch-controlled, tapped or double-tapped, a cut-in process can be actuated in copy mode.

Area **1106** displays the log-in user name.

In area **1108** a log-out button (software button) is displayed.

Area **1110** displays the status of the job in progress.

Area **1112** displays buttons (software buttons) related to job status.

That is, area **1112** displays the status of the job in progress with an icon. This job status is touch-controlled, tapped or double-tapped, the job status information is displayed in detail. It is further preferable that a button for suspending the selected job and the like is displayed in area **1112**.

Area **1114** displays the communication status and area **1116** displays the current time.

Displayed in function selecting region **2000** (FIG. **4**) on copy mode initial screen **7100** are a function selecting menu **2100** that allows the user to select in copy mode and a group of select buttons **2010** described above. In the screen shown in FIG. **5**, the function select menu is displayed in regular mode.

As shown in FIG. **5**, the function select menu displayed in regular mode is composed of a group of icons **2100** and a group of texts **2120**. As the function select menu displayed in function selecting region **2000**, texts **2122**, **2124**, **2126**, **2128**, **2130**, **2132**, **2134** and **2136** are displayed.

Text **2122** shows an icon **2102** for setting the number of copies and its set content.

Text **2124** shows an icon **2104** for setting color mode and its set content.

Text **2126** shows an icon **2106** for setting copy density and its set content.

Text **2128** shows an icon **2108** for setting copy magnification and its set content.

Text **2130** shows an icon **2110** for setting the document type and its set content.

Text **2132** shows an icon **2112** for setting the paper type and its set content.

Text **2134** shows an icon **2114** for image edition and its set content.

Text **2136** shows an icon **2116** for layout edition and its set content.

Here, it should be noted that a greater number of items can be also displayed in the function setting menu, in a vertically scrolling manner with the position of select buttons **2010** fixed. In this case, the displayed items inclusive of hidden items above and below, can be changed from one to another by any of touch control (scroll control) and gesture control (flick control in the vertical direction).

Here, the image edition is edition for one page document, and includes, as a lower-layered menu, frame deletion, printing menu, watermark, user stamp and the like. The layout edition is edition for multiple pages of documents, and includes, as a lower-layered menu, page integration, binding margins, page change, centering and the like. Subordinates menus under these will be displayed on touch panel display **130** by touching, taping or double-tapping icons **2102** to **2116** or texts **2112** to **2136**.

Arranged in preview region **3000** (FIG. **4**) on copy mode initial screen **7100** are a document output (finish) image **3100** and a group of preview select buttons **3010** stated above. In this arrangement, dummy data or scanned data is used to display image **3100**, and the image **3100** is changed and displayed in preview region **3000** every time the function setting menu in function selecting region **2000** is changed (the preview display is changed).

Displayed in action panel region **4000** (FIG. **4**) on copy mode initial screen **7100** is information such as hint, advice and suggestion for copying operation. Here, recommended functions in the copy mode that the user selects are displayed as shown in FIG. **5**. In this case, action panel region **4000** includes an area **4100** for displaying the content of displayed information and areas **4102** to **4106** that serve in themselves as software buttons and display text indicating recommended functions.

When area **4102** is touch-controlled, tapped or double-tapped, a pulldown menu of further detailed information for energy-saving in copying is displayed. In this case, for example a software button for entering the function setting screen for duplex copying is displayed with text "Duplex printing will save paper", a software button for entering the function setting screen for page integration with text "Printing multiple documents integrally will save paper", and a software button for entering the function setting screen for saddle stitch binding with text "Printing can be done so as to bind the paper as a booklet".

Displayed in task trigger region **5000** (FIG. **4**) on copy mode initial screen **7100** is a group of command buttons **5100**. These command buttons **5100** include a scan-in key (software button) **5102**, a clear-all key(software button) **5104**, a monochrome start key(software button) **5106** and a color start key(software button) **5108**.

Scan-in key **5102** is a key for causing image forming apparatus **100** to scan a document to obtain image data.

Clear-all key **5104** is a key for clearing the set functions.

Monochrome start key **5106** is a key for causing image forming apparatus **100** to scan a document and perform monochrome copying.

Color start key **5108** is a key for causing image forming apparatus **100** to scan a document and perform color copying.

In this way, when the user inputs a request in copy mode initial screen **7100** displayed with information in five-divided region s, a copying process is effected in accordance with the request.

Next, description will be made on the switching operation of preview pages when preview region **3000** is enlarged with function selecting region **2000** displayed in icon mode.

When the user flicks left the preview display screen in which a preview image **3118** is displayed as shown in FIG. **6**, the input trace is analyzed. In this case, the gesture control by this user is analyzed as a request for turning over the page, and a revised preview image including another page that has not been displayed and corresponds to the direction of the flick is displayed.

It is also possible to change the pages in preview image representation by touching a page forward button **3118**G, page fast forward button **3118**H, page reverse button **3118**E or page fast reverse button **3118**D. It is also possible to change the pages in preview image representation by touching a direct pagination button **3118**F to directly input the page number the user wants to jump.

In this way, when function selecting region **2000** (FIG. **4**) is displayed in icon mode, preview region **3000** is enlarged so that it is possible to display the preview image so as to improve user' visual recognition and user controllability, as shown in FIG. **6**. In particular, it is possible to scroll the preview display up to a preview image the user wants by touch control or gesture control, and display the desired preview image.

Here, designated at **3118**A in FIG. **6** is a trash icon. When a selected page is dragged to this trash icon **3118**A, the page can be deleted.

When a single page display icon **3118**B is pressed down, the preview image with, for example three pages displayed, is changed to one page representation (in this case one page is displayed in a large scale). When a multiple page display icon **3118**C is pressed down, the preview image with, for example, one page displayed, is changed to three page representation.

Next, the display modes of touch panel display **130** of image forming apparatus **100** will be described with reference to the drawings.

FIG. **7** is an illustrative view showing a display mode of the display panel of the touch panel display of the image forming apparatus. FIG. **8** is an illustrative view showing one example of a display mode of the preview display region in the touch panel display.

As shown in FIG. **7**, touch panel display **130** in image forming apparatus **100**, preview region **3000** is arranged in the center of the screen and function selecting region **2000** is arranged on the left side of preview region **3000**. Action panel region **4000** is laid out on the upper right of preview region **3000**, and task trigger region **5000** is arranged under the action panel region **4000**.

Displayed in preview region **3000** of the initial screen are a virtual ten-key pad **3001** and a mimic display **3002** that gives an image of the whole apparatus.

Task trigger region **5000** is constantly displayed in the lower right of preview region **3000** without reduction in size when preview region **3000** is displayed in a large size.

Displayed in task trigger region **5000** is a group of command buttons **5100**.

As the group of command buttons **5100**, scan-in key **5102**, clear-all key **5104**, monochrome start key **5106** and color start key **5108** are laid out.

When this scan-in key **5102** is operated to scan documents and start acquisition of image data, the scan-in key may be replaced by an interrupt key for interrupting the operation of apparatus (interrupting scanning).

Further, as, shown in FIG. **8**, in touch panel display **130**, preview region **3000** is enlarged so that a first display area **151** is formed at the position corresponding to action panel region **4000** and a second display area **152** greater than first display area **151** is formed in the approximate center in preview region **3000**.

In first display area **151**, a display image generated based on the input image data is displayed.

The display image that has been displayed in first display area **151** is then displayed in second display area **152**.

First display area **151** and second display area **152** are arranged side by side.

A border line **161** that shows the boundary is displayed between first display area **151** and second display area **152**.

Border line **161** shows a reading line in the operation of documents being scanned when "screen display guidance" is given at the time of document reading. That is, border line **161** schematically represents the status of the documents being scanned by document reader **102**, on touch panel display **130**. In the present embodiment, border line **161** is displayed as a linear green line extending in the vertical direction of touch panel display **130**.

Task trigger region **5000** is constantly displayed near border line **161** in the lower right of preview region **3000** without reduction in size even when preview region **3000** is enlarged.

Displayed in task trigger region **5000** is a group of command buttons **5100**.

As the group of command buttons **5100**, scan-in key **5102**, clear-all key **5104**, monochrome start key **5106** and color start key **5108** are laid out.

Monochrome start key **5106** and color start key **5108** are keys that trigger an image output process for forming (printing images) on recording paper in aftermentioned first and second output schemes.

Scan-in key **5102** is a key that triggers an aftermentioned first output scheme (a process in which, when image data has

been input through document reader **102** the images are output after displaying the images to be output in a preview representation on display panel **132**).

When scan-in key **5102** is operated to scan documents by scan-in direction and start acquisition of image data, the scan-in key is replaced by an interrupt key (control key) **5109** for interrupting the operation (interrupting scanning) of the apparatus, as shown in FIG. **8**.

Next, the electric configuration of the control unit in the image forming apparatus will be described with reference to the drawings.

FIG. **9** is a block diagram showing an electric configuration of a control unit in the image forming apparatus. FIG. **10** is a block diagram showing a configuration of a touch panel display of the control unit.

As shown in FIG. **9**, control unit **120** includes, in addition to display panel **132** and touch panel **134**, an operated position detector **135**, a screen display unit **136**, a display image generator **137** and control unit-side controller (display controller) **131**A for controlling the processing and operation in control unit **120**.

Image forming apparatus **100** includes document reader **102** for capturing image data, an image processor **103**, a storage **105** for storing image data input through document reader **102** and an image output unit **107** such as a printer, transmitter or the like for outputting images, all being operated and controlled by a main controller **101**.

Operated position detector **135** detects the operated position on touch panel **134**.

Screen display unit **136** displays an image formed by display image generator **137** on display panel **132**.

Display image generator **137** prepares a predetermined image based on image data input to the main body of image forming apparatus **100**, following instructions from control unit-side controller **131**A.

Control unit-side controller **131**A is connected to main controller **101** of the main body of image forming apparatus **100** and functions as a controller in touch panel display **130**.

As shown in FIG. **10**, control unit-side controller **131**A has a preview display function for displaying multiple pages of document images in a preview representation on display panel **132**, a movable display function (scroll display function) of displaying a preview of multiple page document images in a movable manner, and an input status guiding function for displaying the input status of image data input through document reader **102** on display panel **132** to guide the user.

Control unit-side controller **131**A further includes an output processing function controller **1311** for controlling image output by means of image output unit **107**.

Output processing function controller **1311** can control the first output scheme and the second output scheme.

The first output scheme is a process in which, when image data has been input through document reader **102**, the images are output after displaying the images to be output in a preview representation on display panel **132**.

The second output scheme is a process in which, when image data has been input through document reader **102**, the image is directly output without displaying the image to be output in a preview representation on display panel **132**.

The user is allowed to select either the first output scheme or the second output scheme.

In the output processing by image output unit **107**, an identical display is displayed as the standby screens to be displayed on display panel **132** to direct the start of an output process, for both the first output scheme and the second output scheme.

In the output processing by image output unit **107**, the operations after an output start command is given are different between the first output scheme and second output scheme.

Next, the image output processing by image output unit **107** (the first output scheme and the second output scheme) will be described with reference to flow charts.

FIG. **11** is a flow chart showing the processing sequence of the first output scheme. FIG. **12** is a flow chart showing the processing sequence of the second output scheme.

Image output by means of image output unit **107** can be carried out by two ways, i.e., based on the first output scheme and the second output scheme, one of which is selected by the user.

(The First Output Scheme)

The first output scheme in image forming apparatus **100** is a process in which, when image data has been input through document reader **102** the images are output after displaying the images to be output in a preview representation on display panel **132**.

In image forming apparatus **100**, when the first output scheme is selected to make image output unit **107** perform image output, the output process shown in FIG. **11** is effected.

First, documents are set on document reader **102** (Step S**1**) and the conditions for image reading are set on touch panel display **130** (Step S**2**). After completion of setting the conditions for image reading, it is determined whether the start of document reading is directed by touching scan-in key **5102** (Step S**3**).

When it is determined at Step S**3** that the start of document reading has been directed, document reading by document reader **102** is started (Step S**4**).

On the other hand, when it is determined at Step S**3** that the start of document reading has not been directed, the control returns to Step S**2**, and the conditions for image reading are set once again.

As document reading is performed at Step S**4**, the image data of the read document is recorded into storage **105** (Step S**5**).

Then, a display image to be given in a preview representation is generated based on the recorded image data by display image generator **137** (Step S**6**), and the display image is given in a preview representation on display panel **132** (Step S**7**).

Thereafter, it is determined whether there is a next document (Step S**8**).

When it is determined at Step S**8** that there is a next document, the control returns to Step S**4** so that document reading is carried out. On the other hand, when it is determined at Step S**8** that there is no more document, a display image for notifying a completed state of document reading is given (Step S**9**).

Then, the control enters a mode for waiting for an image output command, in which it is checked whether the start of image output is directed by touching monochrome start key **5106** or color start key **5108** (Step S**10**).

When it is determined at Step S**10** that an image output start command has been given, an image output process is implemented (Step S**11**).

On the other hand, when it is determined at Step S**10** that no command for starting image output has been given, the control goes back to Step S**9**, and the display image indicating a completed state of document reading is displayed to wait for an image output command.

When an image output process is implemented at Step S**11**, then it is determined whether the image output process

is completed (Step S12). When it is determined at Step S12 that the image output process has been completed, the image output process is ended. On the other hand, when it is not determined at Step S12 that the image output process has been completed, the control returns to Step S11, so that the image output process is continued.

In this way, the first output scheme is implemented.

In the above way, according to the first output scheme, image data of each document scanned by image reader **102** is recorded into storage **105** first so that display images based on the image data is presented in a preview representation, thereafter, image output is carried out. Accordingly, it is possible to implement image output without making mistakes.

(The Second Output Scheme)

The second output scheme in image forming apparatus **100** is a process in which, when image data has been input through document reader **102** the image is directly output without displaying the image to be output in a preview representation on display panel **132**.

In image forming apparatus **100**, when the second output scheme is selected to make image output unit **107** perform image output, the output process shown in FIG. **12** is effected.

First, documents are set on document reader **102** (Step S21) and the conditions for image reading are set on touch panel display **130** (Step S22). After completion of setting the conditions for image reading, it is determined whether the start of document reading by touching either monochrome start key **5106** or color start key **5108** is directed (Step S23).

When it is determined at Step S23 that the start of document reading has been directed, document reading by document reader **102** is started (Step S24).

On the other hand, when it is determined at Step S23 that the start of document reading has not been directed, the control returns to Step S22, and the conditions for image reading are set once again.

As document reading is performed at Step S24, the image data of the read document is recorded into storage **105** (Step S25). Then, an image output process is implemented based on the recorded image data (Step S26).

Thereafter, it is determined whether there is a next document (Step S27).

When it is determined at Step S27 that there is another document, the control returns to Step S24 so that document reading is carried out. On the other hand, when it is determined at Step S27 that there is no more document, the image output process is ended.

In this way, the second output scheme is implemented.

In the above way, according to the second output scheme, image data of each document scanned by image reader **102** is recorded into storage **105** first, then the image is directly output without presenting any preview display. Accordingly, it is possible to perform image output quickly as compared to the first output scheme.

That is, in the first output scheme, image output is effected at the eleventh step in the processing sequence shown in FIG. **11**, whereas in the second output scheme, image output is implemented at the sixth step in the processing sequence shown in FIG. **12**. Accordingly, when the user wants to have an output process finished in a hurry, it is possible to effect an image output process quickly by selecting the second output scheme which does not produce preview display.

Referring next to the drawings, the preview display given to guide the document reading status by document reader **102** on touch panel display **130** will be described.

FIGS. **13** to **22** are illustrative views showing the progress of preview images displayed on the touch panel display at the time of document reading in the image forming apparatus of the present embodiment.

In image forming apparatus **100**, when documents to be copied are read, the user selects the copy mode in the home screen displayed on touch panel display **130**, and a screen shown in FIG. **13** is displayed on touch panel display **130**. Under this condition, in order to perform preview display (the first output scheme), the user touches scan-in key **5102** as shown in FIG. **13** to start document reading.

The set documents are assumed to be A4 size documents in long-edge-feed orientation, for example.

When document reading is directed through scan-in key **5102**, the displayed information in function selecting region **2000** and action panel region **4000** on touch panel display **130** is pulled in to both the left and right sides indicated by the arrows in FIG. **14** while preview region **3000** is expanded and border line **161** indicating the boundary between first display area **151** and second display area **152** formed in preview region **3000** is displayed.

This border line **161** is to schematically represent the status of documents being scanned by document reader **102**, on touch panel display **130**, and will be referred to as "reading line".

When documents are read by document reader **102**, a preview image reduced in size by display image generator **137** is formed from the image data of the first scanned document, and the first sheet image P**1** is displayed in first display area **151** on the right side of reading line **161**, as shown in FIG. **15**.

The first sheet image P**1** is displayed so as to gradually become clearer toward second display area **152** or reading line **161** (from right to left).

The first sheet image P**1** displayed in first display area **151** moves toward reading line **161** as shown in FIG. **16** and passes over reading line **161** to second display area **152** on the left side of reading line **161** as shown in FIG. **17**.

At this point of time, the second sheet image P**2** which display image generator **137** formed based on the image data of the second sheet document scanned by document reader **102** is reduced in size and displayed in first display area **151**.

The second sheet image P**2** displayed in first display area **151** is displayed so that the image becomes gradually clearer toward second display area **152** or reading line **161** (from right to left).

Then, the second sheet image P**2** displayed in first display area **151** moves toward reading line **161** as shown in FIG. **18** and passes over reading line **161** to second display area **152** on the left side of reading line **161**, where the image is displayed as shown in FIG. **19**.

At this point, the second sheet image P**2** is laid behind first sheet image P**1** with part of it exposed from the first sheet image P**1** so as to have the existence of second sheet image P**2** recognized.

Then, at this point of time, the third sheet image P**3** which display image generator **137** formed based on the image data of the third sheet document scanned by document reader **102**, is reduced in size and displayed.

That is, the third sheet image P**3** displayed in first display area **151** is displayed so that the image becomes gradually clearer toward second display area **152** or reading line **161** (from right to left).

Then, third sheet image P**3** displayed in first display area **151** moves toward reading line **161** as shown in FIG. **20** and

passes over reading line **161** to second display area **152** on the left side of reading line **161**, where the image is displayed.

At this point, the third sheet image P**3** is further laid behind second sheet image P**2** with part of it exposed from the second sheet image P**2** so as to have the existence of third sheet image P**3** recognized.

When display and motion of the display image of each document scanned by document reader **102** is repeatedly performed as described above so that pre-scanning of all the documents by scan-in is completed as shown in FIG. **21**, display of function selecting region **2000** and action panel region **4000** is restored to the original state while reading line **161** is deleted as shown in FIG. **22**. The display image in this state after scanning of the documents is completed, forms the standby screen for starting an output process.

Next, the control of executing image output through touch panel display **130** will be described with reference to the drawings.

FIG. **23** is an illustrative view showing a display screen for directing the start of image reading by the first output scheme in the image output unit of the image forming apparatus. FIG. **24** is an illustrative view showing a display screen for directing the start of image output by the first output scheme in the image output unit. FIG. **25** is an illustrative view showing a display screen for directing the start of image output by the second output scheme in the image output unit.

When image output is carried out by image output unit **107**, either the first output scheme or the second output scheme is selected by the user and effected.

(The First Output Scheme)

When image output is performed based on the first output scheme in image forming apparatus **100**, the first output scheme is selected for the output process by touching scan-in key **5102** in the copy mode initial screen as shown in FIG. **23** to thereby start document reading.

When document reading is started in the first output scheme, preview images shown in FIGS. **14** to **22** are displayed based on the image data of the scanned documents. Then when all the documents have been scanned, the standby screen with the images to be output displayed in a preview representation is presented as shown in FIG. **24** and the control enters the command waiting mode for starting an image output process.

Then, to start image output, monochrome start key **5106** or color start key **5108** on the standby screen shown in FIG. **24** is touched to direct the start of image output.

As described above, according to the first output scheme, since the display images based on the scanned image data are preview-displayed and then the output process is implemented by giving an image output start command, it is possible to perform an output process by confirming the output content in advance based on preview images when the user puts weight on the finished condition and hence perform image output without making mistakes.

In the display image displayed on display panel **132** in the first output scheme, either the copy mode initial screen shown in FIG. **23** or the standby screen for starting an image output process shown in FIG. **24**, function selecting region **2000**, action panel region **4000** and task trigger region **5000** are displayed. Further, in task trigger region **5000**, scan-in key **5102** and color start key **5108** are displayed in the same manner for both of the display screens. With this arrangement, the user can start a document reading operation or an image output operation without confusion when image output is performed by the first output scheme.

(The Second Output Scheme)

When image output is performed by the second output scheme in image forming apparatus **100**, the second output scheme is selected as an output process by touching monochrome start key **5106** or color start key **5108** in the copy mode initial screen as shown in FIG. **25** so as to start document reading.

When document reading is started in the second output scheme, the image data of the scanned document is recorded into storage **105**, then images are directly output based on the image data without presenting any preview display.

As described above, since the second output scheme includes no processing steps for presenting preview display, it is possible to perform image output quickly.

Further, similarly to the display screen in the first output scheme, the display image displayed on display panel **132** in the second output scheme includes function selecting region **2000**, action panel region **4000** and task trigger region **5000** as shown in FIG. **25**. Further, in task trigger region **5000**, monochrome start key **5106** and color start key **5108** are displayed in the same manner as the standby screen for starting an image output process in the first output scheme shown in FIG. **24**. With this arrangement, the user can start an image output operation without confusion when image output is performed by the second output scheme.

As described above, according to the present embodiment, in image forming apparatus **100**, control unit-side controller **131**A includes output processing function controller **1311** which effects the first output scheme in which, when image data has been input through document reader **102**, the images are output after displaying the images to be output in a preview representation on display panel **132** and the second output scheme in which, when image data has been input through document reader **102**, the image is directly output without displaying the image to be output in a preview representation on display panel **132**. Accordingly, two types of output schemes are made possible so as to implement an output process in conformity with user's intention, whereby it is possible to meet user needs.

For example, when the user puts weight on the finished condition, use of the first output scheme enables the user to check the output content by preview images in advance before performing an output process, it is hence possible to perform image output without making mistakes.

On the other hand, when the user puts weight on quickness of output processing, use of the second output scheme enables a direct output process for the input data without presenting any preview display, it is hence possible to produce quick image output.

In the present invention, it is possible to switch the processing mode from the first output scheme to the second output scheme in the middle of presenting preview display (the first output scheme) Next, description will be made on the second embodiment in which the processing mode can be switched from the first output scheme to the second output scheme in the middle of the former.

(The Second Embodiment)

The second embodiment of the present invention will be described with reference to FIGS. **26** to **41**. Since the second embodiment is different from the first embodiment in the configuration of the control unit-side controller only, description will be made focusing on the different points of the control unit-side controller. Further, in the following description, the same components as those in the first embodiment are allotted with the same reference numerals without description.

As shown in FIG. **26**, control unit-side controller **131**B of the present embodiment has a preview display function for displaying multiple pages of document images in a preview representation on display panel **132**, a movable display function of displaying a preview of multiple page document images in a movable manner, and an input status guiding function for displaying the input status of image data input through document reader **102** on display panel **132** to guide the user.

Control unit-side controller **131**B further includes an output processing function controller **1311** for controlling image output by means of image output unit **107**.

Output processing function controller **1311** is able to control the first output scheme in which, when image data has been input through document reader **102**, the images are output after displaying the images to be output in a preview representation on display panel **132** and the second output scheme in which, when image data has been input through document reader **102**, the image is directly output without displaying the image to be output in a preview representation on display panel **132**.

The user is allowed to select either the first output scheme or the second output scheme.

Control unit-side controller **131**B further includes an output scheme switching function controller **1312**, an input continuation function controller **1313**, an output start command key displaying function controller **1314**, an output stop command key displaying function controller **1315**, an output command acceptance notifying function controller **1316**, and an operation status notifying function controller **1317**.

Output scheme switching function controller **1312** performs such control as to stop preview display and actuate the second output scheme to start image output when the start of image output by means of image output unit **107** is directed (by a touching operation of monochrome start key **5106** or color start key **5108**) during the output process of the first output scheme.

Input continuation function controller **1313** performs such control as to start image output of the image data that has been already input and continue input of image data that has not yet been input when the start of image output by means of image output unit **107** is directed (by a touching operation of monochrome start key **5106** or color start key **5108**) during the output operation of the first output scheme.

Output start command key displaying function controller **1314** performs such control as to display the output start command keys (monochrome start key **5106** and color start key **5108**) for instructing the start of image output by means of image output unit **107**, on touch panel display **130** during the output operation of the first output scheme.

Output stop command key displaying function controller **1315** performs such control as to display the output stop command keys for instructing the stoppage of image output until image data that has not been yet input ends when the start of image output by means of image output unit **107** is directed (by a touching operation of monochrome start key **5106** or color start key **5108**) during the output operation of the first output scheme.

Output command acceptance notifying function controller **1316** performs such control as to notify that the start of image output by means of image output unit **107** can be directed during the output operation of the first output scheme.

Operation status notifying function controller **1317** performs such control as to notify the operation status of the apparatus during the output operation of the first output scheme when the start of image output by means of image output unit **107** is directed (by a touching operation of monochrome start key **5106** or color start key **5108**).

The components of control unit-side controller **131**B, specifically, output processing function controller **1311**, output scheme switching function controller **1312**, input continuation function controller **1313**, output start command key displaying function controller **1314**, output stop command key displaying function controller **1315**, output command acceptance notifying function controller **1316** and operation status notifying function controller **1317**, may be provided separately so that each controller performs its function (control), may be provided as an integrated structure that can perform the functions (control) of all the controllers, or may be provided as multiple structures each of which includes two or more controllers in combination.

Next, the output process by means of image output unit **107** in image forming apparatus **100** will be described with reference to flow charts.

FIG. **27** is a flow chart showing the processing sequence of performing image output when input of image data is implemented by the first output scheme in the image forming apparatus. FIG. **28** is a flow chart showing the processing sequence of an output process when an output start command is given in the middle of capturing image data in the first output scheme. FIG. **29** is a flowchart showing the processing sequence of an input process of image data that is continued in parallel with the output process when an output start command is given in the middle of capturing image data in the first output scheme. FIG. **30** is a flowchart showing the processing sequence of an output process when no output start command is given in the middle of capturing image data in the first output scheme.

Image output by means of image output unit **107** can be performed by two ways, i.e., based on the first and second output schemes, one of which is selected by the user.

In the output processing in the image forming apparatus, when the so-called scan-in preview, which presents input image data on touch panel display **130** in a preview representation before output, is used, the output process is implemented by selecting the first output scheme.

In image forming apparatus **100**, when the first output scheme is selected to output the images of the input image data by means of image output unit **107**, the output process shown in FIG. **27** is implemented.

First, documents are set on document reader **102** (Step S**31**) and the conditions for image reading are set on touch panel display **130** (Step S**32**). After completion of setting the conditions for image reading, it is determined whether the start of document reading is directed by touching scan-in key **5102** (Step S**33**).

When it is determined at Step S**33** that the start of document reading has been directed, document reading by document reader **102** is started (Step S**34**). At this point, output start command keys (monochrome start key **5106** and color start key **5108**) for directing the start of image output are displayed on touch panel display **130** by output start command key displaying function controller **1314**.

On the other hand, when it is determined at Step S**33** that the start of document reading has not been directed, the control returns to Step S**32**, and the conditions for image reading are set once again.

As document reading is performed at Step S**34**, the image data of the read document is recorded into storage **105** (Step S**35**).

Then, a display image to be given in a preview representation is generated based on the recorded image data by

display image generator **137** (Step S**36**), and the display image is given in a preview representation on display panel **132** (Step S**37**).

Thereafter, it is determined whether an output start command has been given in the middle of scan-in preview (Step S**38**). When it is determined at Step S**38** that an output start command has been given, the control goes to (A).

On the other hand, when it is determined at Step S**38** that no output start command has been given, the control goes to Step S**39**, where it is determined whether there is a next document.

When it is determined at Step S**39** that there is another document, the control returns to Step S**34** so that document reading is carried out. On the other hand, when it is determined at Step S**39** that there is no more document, the control goes to (B).

The processing sequence after (A) is a process when an output start command is given in the middle of a scan-in operation, in which image output is performed based on the second output scheme for performing image output without presenting preview display, by switching the operation mode to the second output scheme.

Specifically, as shown in FIG. **28**, when it is determined at Step S**38** (FIG. **27**) that an output start command has been given, the operation mode is switched to that of the second output scheme by output scheme switching function controller **1312** so that preview images are stopped from being displayed (Step S**41**). Then, an output stop instructing screen (FIG. **40**) is displayed on touch panel display **130** by output stop command key displaying function controller **1315** (Step S**42**).

Further, it is determined whether an output stop command is given (Step S**43**). If it is determined at Step S**43** that no output stop command has been given, output images are prepared (Step **44**) so that image output is implemented (Step S**45**).

Then, it is determined whether the output process is completed (Step S**46**). If it is determined that the image output has not been completed, the control returns to Step S**44**, and the image output process is repeated. When it is determined that the image output has been completed, the image output process is ended.

On the other hand, when it is determined at Step S**43** that an output stop command has been given, a mode basic screen (FIG. **41**) is displayed on touch panel display **130** (Step S**47**), and the image output process is ended.

Here, when, in image forming apparatus **100**, a command for starting image output by means of image output unit **107** is given during the output operation based on the first output scheme, image output for the image data that has already been input is implemented by the processing sequence after (A) while image data that has not yet been input is continuously captured by the sub-flow executed by input continuation function controller **1313**.

Specifically, as shown in FIG. **29**, input continuation function controller **1313** continues controlling such that document reader **102** reads documents (Step S**51**), the read document image data is recorded into storage **105** (Step S**52**) and image output is performed (Step S**53**).

Then, it is determined whether there is another document (Step S**54**), so that the image data input process as well as the image output process is repeated until there is no more document to be read.

On the other hand, the processing sequence after (B) is the process after completion of scan-in preview. That is, this sequence is implemented when an image output start command is given after input of image data has been completed.

Specifically, as shown in FIG. **30**, when document reading by document reader **102** is completed, a display image showing a completed state of document reading is displayed (Step S**61**). At this time, preview images based on the input image data are displayed sequentially from the front page. Then, the control enters a mode for waiting for an image output command, in which it is checked whether the start of image output is directed by touching monochrome start key **5106** or color start key **5108** (Step S**62**).

It is determined at Step S**62** that an image output start command has been given, an image output process is implemented (Step S**63**). On the other hand, when it is determined at Step S**62** that no command for starting image output has been given, the control goes back to Step S**61**, and the display image indicating a completed state of document reading is displayed to wait for an image output command.

When an image output process is implemented at Step S**63**, then it is determined whether the image output process is completed (Step S**64**). When it is determined at Step S**64** that the image output process has been completed, the image output process is ended. On the other hand, when it is not determined at Step S**64** that the image output process has been completed, the control returns to Step S**63**, so that the image output process is continued.

In this way, the output process in image forming apparatus **100** is implemented.

In the above way, in image forming apparatus **100**, when an output start command is given in the middle of the scan-in operation while scan-in preview output based on the first output scheme is being implemented, the operation mode is switched to the second output scheme in which image output is performed without presenting preview display. As a result, images are directly output based on image data without producing any preview display, hence the user can start image output at any tine when the user wanted to start without the need of waiting for completion of the scan-in operation.

Referring next to the drawings, description will be made on the display guidance in touch panel display **130** that is presented when an output start command is given to actuate an image output operation during an input operation of image data.

FIGS. **31** to **41** are illustrative views showing displayed States of preview images on the touch panel display for reading documents.

In image forming apparatus **100**, when documents to be copied are read by document reader **102**, the user selects the copy mode in the home screen displayed on touch panel display **130** and touches scan-in key **5102** as shown in FIG. **31** to start document reading.

In this case, A4-sized documents are used and set in long-edge-feed orientation, for example.

When document reading is directed by scan-in key **5102**, virtual ten key pad **3001** and mimic display **3002** for presenting the image of the whole apparatus are erased from the screen on display panel **132** as shown in FIG. **31** so that a blank display area is formed in preview region **3000**.

Function selecting region **2000**, action panel region **4000** and task trigger region **5000** are displayed.

Monochrome start key **5106** and color start key **5108** functioning as the output start command keys are displayed in task trigger region **5000** by output start command key displaying function controller **1314**.

Further, instead of scan-in key **5102**, scan-in stop key **5109** is displayed.

When documents are read by document reader **102**, a display image reduced in size is generated from the image data of the scanned first sheet document by display image generator **137**, and the first sheet image P**1** appears from the left side edge of action panel region **4000** and is displayed moving leftwards to the approximate center of preview region **3000**, as shown in FIG. **33**.

At this timing, a comment such as "scanning in progress" or the like may be displayed near an upper area **3000**a of preview region **3000**.

Also, a comment indicating that a command for stating image output by image output unit **107** can be accepted during the output operation of the first output scheme may be displayed near, for example upper area **3000**a or the like, by output command acceptance notifying function controller **1316**.

Further, when the first sheet image P**1** appears in preview region **3000**, the image may be displayed so as to appear from behind action panel region **4000**. At this time, action panel region **4000** may be made see-through to such an extent that the existence of the first sheet image P**1** can be known over action panel region **4000**.

As shown in FIG. **34**, first sheet image P**1** as is moves leftwards during scanning by document reader **102**. When the reading of the document is completed, the image is stopped and displayed in the approximate center of preview region **3000**, as shown in FIG. **35**.

Next, when reading of the second document is started, the first sheet image P**1** is gradually reduced in size as shown in FIG. **36**, faded out and then erased completely (FIG. **37**).

In the process of scanning the second document, the second sheet image P**2** appears in preview region **3000** from the left side edge of action panel region **4000** while the first sheet image P**1** is becoming smaller and going out, as shown in FIG. **37**. Then, the first sheet image P**1** has gone out completely, the second sheet image P**2** is moved leftwards to the approximate center of preview region **3000** and displayed. Then, the second sheet image P**2** is stopped and displayed in the approximate center of preview region **3000**.

Now, when, in the middle of the input operation being implemented, the user touches monochrome start key **5106** or color start key **5108** after checking the preview of the second document to instruct a start of output, the preview display for guiding the input status of image data is stopped by output scheme switching function controller **1312**.

Then, a comment G**1** notifying the stoppage of preview display and the start of image output is displayed on the display screen, as shown in FIG. **39**, by the function of operation status notifying function controller **1317**.

As an example of comment G**1**, "An output start command is given during scan-in preview so that image output from page 1 will be started by canceling preview display." is displayed in the present embodiment.

Then, image output for the image data that has already been input is started while image data that has not yet been input is continuously captured by input continuation function controller **1313**.

In touch panel display **130**, output stop command key displaying function controller **1315** displays an output stop instructing screen including a copy interrupt key (output stop command key) **5110** in place of monochrome start key **5106** or color start key **5108** on the copy mode initial screen, as shown FIG. **40** until the image data that has not yet been input ends, or in other words, until the condition that a next job is acceptable.

When the output of all the image data is completed, the copy mode initial screen is displayed on touch panel display **130** in place of the output stop instructing screen so as to be ready for acceptance of a next job. At this time, monochrome start key **5106** and color start key **5108** are displayed instead of copy interrupt key **5110**.

In this way, when a command for starting image output is given during document reading in an output operation, images can be output by canceling preview display so as not to produce preview display of the image data that is input after the output start command while image data that has not yet been input can be continuously captured, whereby it is possible to implement speedy image output.

The above control, that is, the control that enables the user to give an output start command in the middle of document reading as above, is quite effective when, for example, the user wants to start output after review of the preview of the document the user wants, when the user was going to start a direct copying operation but started a scan-in operation by mistake, or when the user has started an image output operation in scan-in preview mode but wants to change the operation mode because the scan-in preview operation takes time longer than expected, into direct copy mode in which the user does not need to wait for completion of all the documents to be scanned.

As described above, control unit-side controller **131**B of touch panel display **130** in control unit **120** includes output processing function controller **1311** that is able to control the first output scheme in which, when image data has been input through document reader **102**, the images are output after displaying the images to be output in a preview representation on display panel **132** and the second output scheme in which, when image data has been input through document reader **102**, the image is directly output without displaying the image to be output in a preview representation on display panel **132**.

Further, control unit-side controller **131**B includes output scheme switching function controller **1312** that, by stopping preview display, actuates the second output scheme and starts image output when a start command of image output by means of image output unit **107** is given during the output operation of the first output scheme. Accordingly, it is possible to give an output start command in the middle of an scan-in operation, hence it is possible for the user to start output at any time the user wants without waiting for completion of the scan-in operation when a large amount of documents need to be scanned in, or when a scan-in operation is started by mistake. As a result, it is possible to implement a process in conformity with user's intention and hence meet user needs.

Further, since control unit-side controller **131**B includes input continuation function controller **1313**, it is possible to continue scanning of image data that has not yet been input and output the image data that has been already input, simultaneously. It is hence possible to shorten the processing time.

Since control unit-side controller **131**B further includes output start command key displaying function controller **1314**, the output start command keys (monochrome start key **5106** and color start key **5108**) are displayed during a scan-in operation based on the first output scheme. Accordingly, it is possible to give an output start command at any timing the user wants even in the middle of the scan-in operation.

Since control unit-side controller **131**B further includes output stop command key displaying function controller **1315**, it is possible to give a command of stopping output during input of image data that has not been yet input.

Accordingly, it is possible to stop image output (or stop scanning) at any time so as to make the apparatus ready for a next job.

Since control unit-side controller **131**B further includes output command acceptance notifying function controller **1316**, it is possible to notify the user that an output command is acceptable in the middle of a scan-in operation.

Since control unit-side controller **131**B further includes operation status notifying function controller **1317**, even a user who is unfamiliar with the apparatus can grasp the operation status of the apparatus when an output command is given in the middle of a scan-in operation, hence can use the apparatus without confusion.

The above first and second embodiments were described taking examples in which control unit **120** of the present invention is applied to image forming apparatus **100** shown in FIG. **1**. However, as long as it is an image forming apparatus that includes a control unit capable of presenting document images in preview representation on the display panel or the like before printing, the invention can be developed to any other image forming apparatus and the like, not limited to the image forming apparatus and copier having the configuration described above.

Further, the first embodiment was described taking display examples of preview images shown in FIGS. **14** to **22** while the second embodiment was described taking display examples of preview images shown in FIGS. **32** to **38**. However, it is also possible to use the method shown in FIGS. **32** to **38** as the display method of preview images in the first embodiment and use the method shown in FIGS. **14** to **22** as the display method of preview images in the second embodiment.

Having described heretofore, the present invention is not limited to the above embodiments, various changes can be made within the scope of the appended claims. That is, it is apparent that various kinds of variations and modified examples will occur to those skilled in the art within the scope of the appended claims. That is, any embodied mode obtained by combination of technical means modified as appropriate without departing from the spirit and scope of the present invention should be included in the technical art of the present invention.

What is claimed is:

1. An image forming apparatus comprising:

an input unit receiving image data;

an output unit outputting an image formed based on the image data;

a storing unit storing the image data input from the input unit; and,

an image display control unit, characterized in that the image display control unit includes:

a display image generator generating a display image based on the image data stored in the storing unit;

a display unit displaying the display image generated by the display image generator; and,

a display controller including a function of **[**presenting**]** *displaying* the display image based on the image data input from the input unit, in a preview representation and an output processing function of implementing an output process by means of the output unit, and

the display controller controls

a first output scheme in which, when *the* image data has been input through the input unit, the images to be output are **[**displayed**]** *output by means of the output unit after having displayed the images to be output* in **[**a**]** *the* preview representation on the display unit**[**, and then are output by means of the output unit**]**, and

a second output scheme in which, when *the* image data has been input through the input unit, the images to be output are **[**not**]** directly **[**displayed**]** *output by means of the output unit without displaying the images to be output* in **[**a**]** *the* preview representation on the display unit**[**, but are directly output by means of the output unit**]**, and

wherein the display controller includes a function of displaying an output start command key for instructing a start of image output by means of the **[**image**]** output unit, on the display unit prior to the output of the images based on the first output scheme, and an output process switching function such that, when the start of the output of the images is instructed by the output start command key prior to the output of the **[**image**]** *images* based on the first output scheme, the preview representation is stopped, and the output process is switched to the second output scheme to output the **[**image**]** *images*.

2. The image forming apparatus according to claim **1**,

wherein in the output process by means of the output unit, an identical display is used as a standby screen to be displayed on the display unit for starting the output process, for both the first output scheme and the second output scheme.

3. The image forming apparatus according to claim **1**,

wherein in the output process by means of the output unit, operations after an output start command is given are different between the first output scheme and the second output scheme.

4. The image forming apparatus according to claim **1**,

wherein the display controller includes an output scheme switching function controller which, when a command for starting image output by means of the output unit is given during an output process based on the first output scheme, stops the preview representation and switches the operation to that based on the second output scheme to perform image output.

5. The image forming apparatus according to claim **4**,

wherein the display controller includes an input continuation function controller which, when **[**a**]** *the* command for starting *the* image output by means of the output unit is given during **[**an**]** *the* output process based on the first output scheme, starts image output of the image data that has been already input and continues input of image data that has not yet been input.

6. The image forming apparatus according to claim **4**,

wherein the display controller includes an output start command key displaying function controller which displays an output start command key for instructing the start of *the* image output by means of the **[**image**]** output unit, on the display unit during the output process **[**of**]** *based on* the first output scheme.

7. The image forming apparatus according to claim **6**,

wherein the display controller includes an output stop command key displaying function controller which displays an output stop command key for instructing **[**the**]** *a* stoppage of output until *input of* image data that has not been yet input ends when the start of *the* image output by **[**the**]** means of **[**image**]** *the* output unit is directed during the output process **[**of**]** *based on* the first output scheme.

8. The image forming apparatus according to claim 4, wherein the display controller includes an output command acceptance notifying function controller which notifies that the start of *the* image output by means of the [image] output unit can be directed during the output process [of] *based on* the first output scheme.

9. The image forming apparatus according to claim 4, wherein the display controller includes an operation status notifying function controller which notifies the operation status of the apparatus when the start of *the* image output by means of the [image] output unit is directed during the output process [of] *based on* the first output scheme.

10. The image forming apparatus according to claim 1, wherein the function of displaying the output start command key for instructing the start of image output by means of the output unit on the display unit is after input of the image data has been started.

11. The image forming apparatus according to claim 1, wherein for the output process switching function, when the start of the output of the images is instructed by the output start command key in a middle of the input of the image data, the preview representation is stopped, and the output process is switched to the second output scheme to output the images.

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