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MUTO

(54) **IMAGE FORMING DEVICE, CONTROL METHOD OF IMAGE FORMING DEVICE, PROGRAM FOR ACHIEVING CONTROL METHOD, AND STORAGE MEDIUM FOR STORING PROGRAM**

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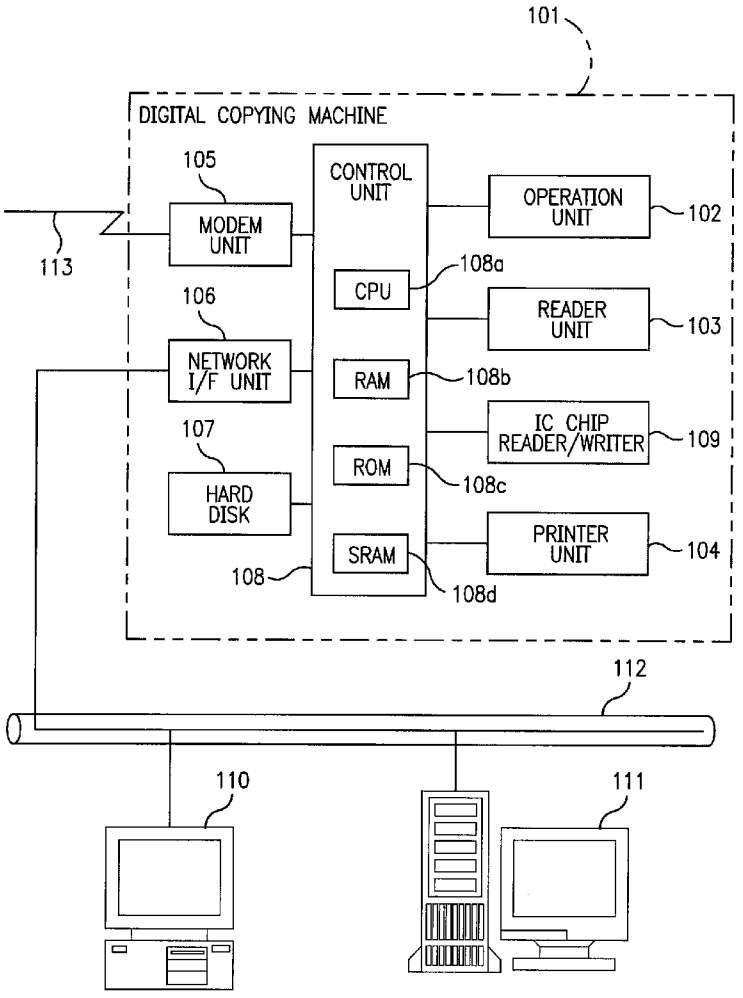
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(57) **ABSTRACT**

An image forming device comprises: an image forming unit adapted to execute image formation on a recording medium; and a writing unit adapted to be able to execute at least an information writing operation in a non-contact manner to a non-contact IC added to the recording medium. It is controlled whether or not the image forming unit should execute the image formation on the recording medium, according to a result of the information writing operation executed by the writing unit to the non-contact IC added to the recording medium.



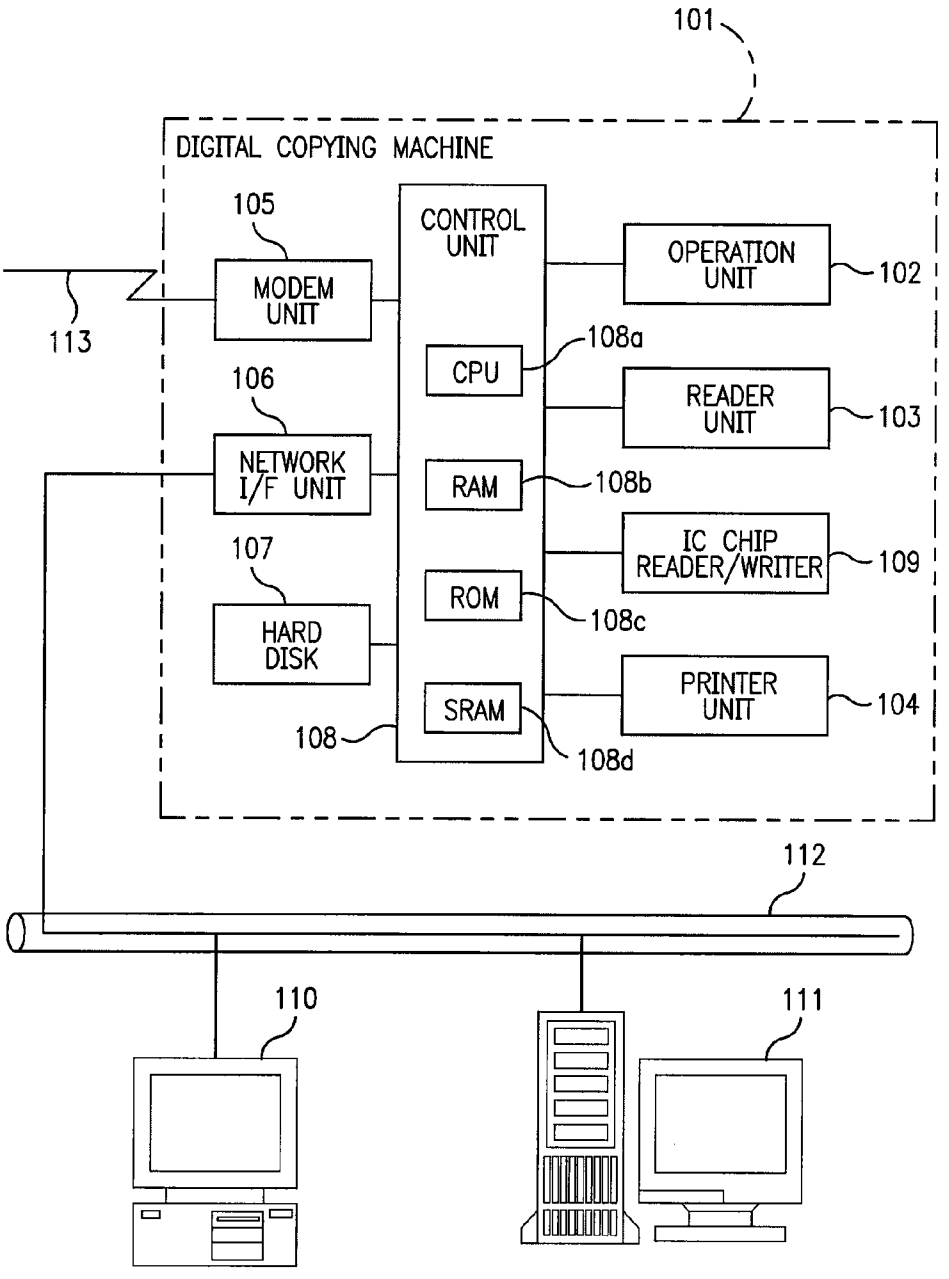

101
DIGITAL COPYING MACHINE
105
MODEM UNIT
113
106
NETWORK I/F UNIT
107
HARD DISK
108
CONTROL UNIT
CPU
108a
RAM
108b
ROM
108c
SRAM
108d
OPERATION UNIT
102
READER UNIT
103
IC CHIP READER/WRITER
109
PRINTER UNIT
104
112
110
111

FIG. 1

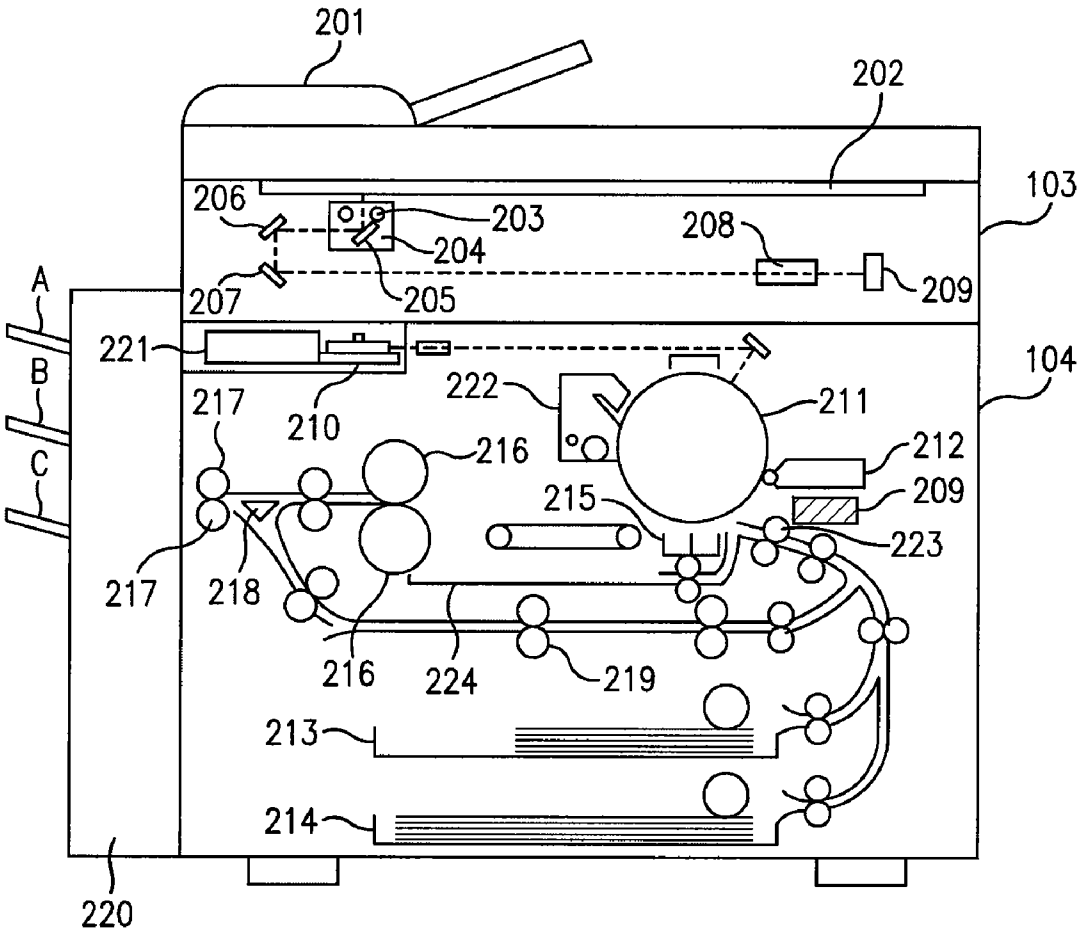

201
202
103
206
203
204
208
207
205
209
A
B
C
221
104
222
211
217
210
216
212
215
209
223
217
218
216
224
219
213
214
220

FIG. 2

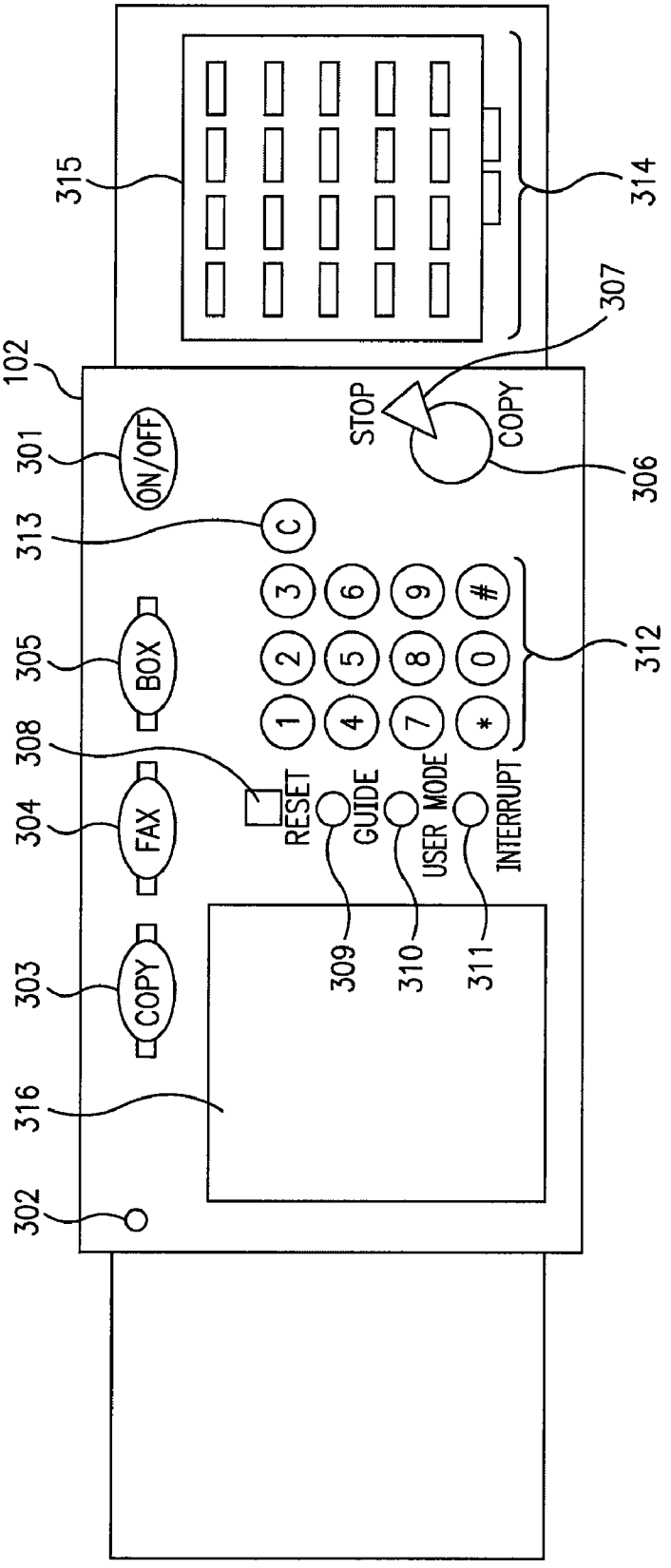

315
314
307
102
STOP
COPY
301
ON/OFF
306
313
C
3
6
9
#
312
305
BOX
2
5
8
0
308
1
4
7
*
RESET
GUIDE
USER MODE
INTERRUPT
304
FAX
309
310
311
303
COPY
316
302

FIG. 3

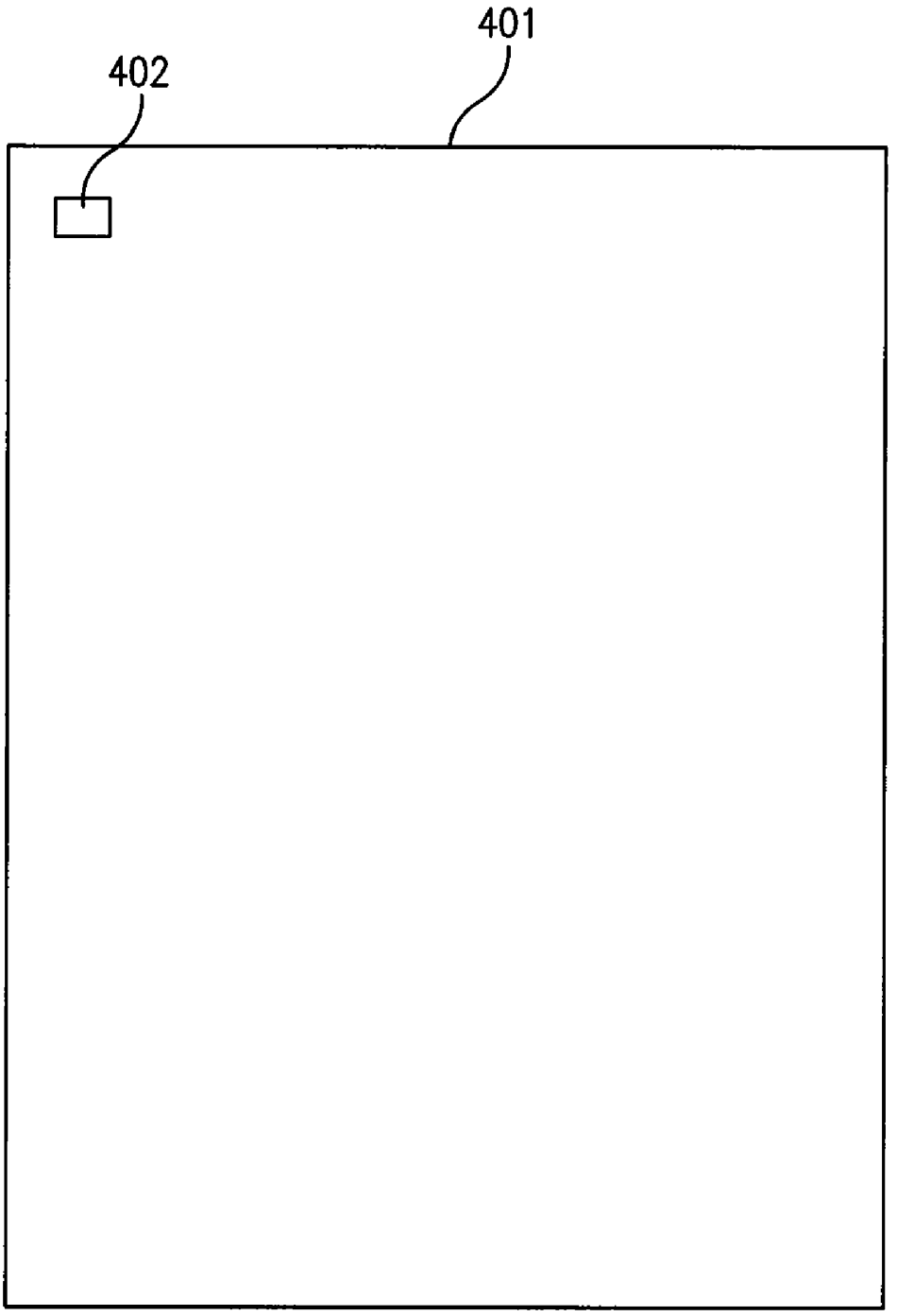


FIG. 4

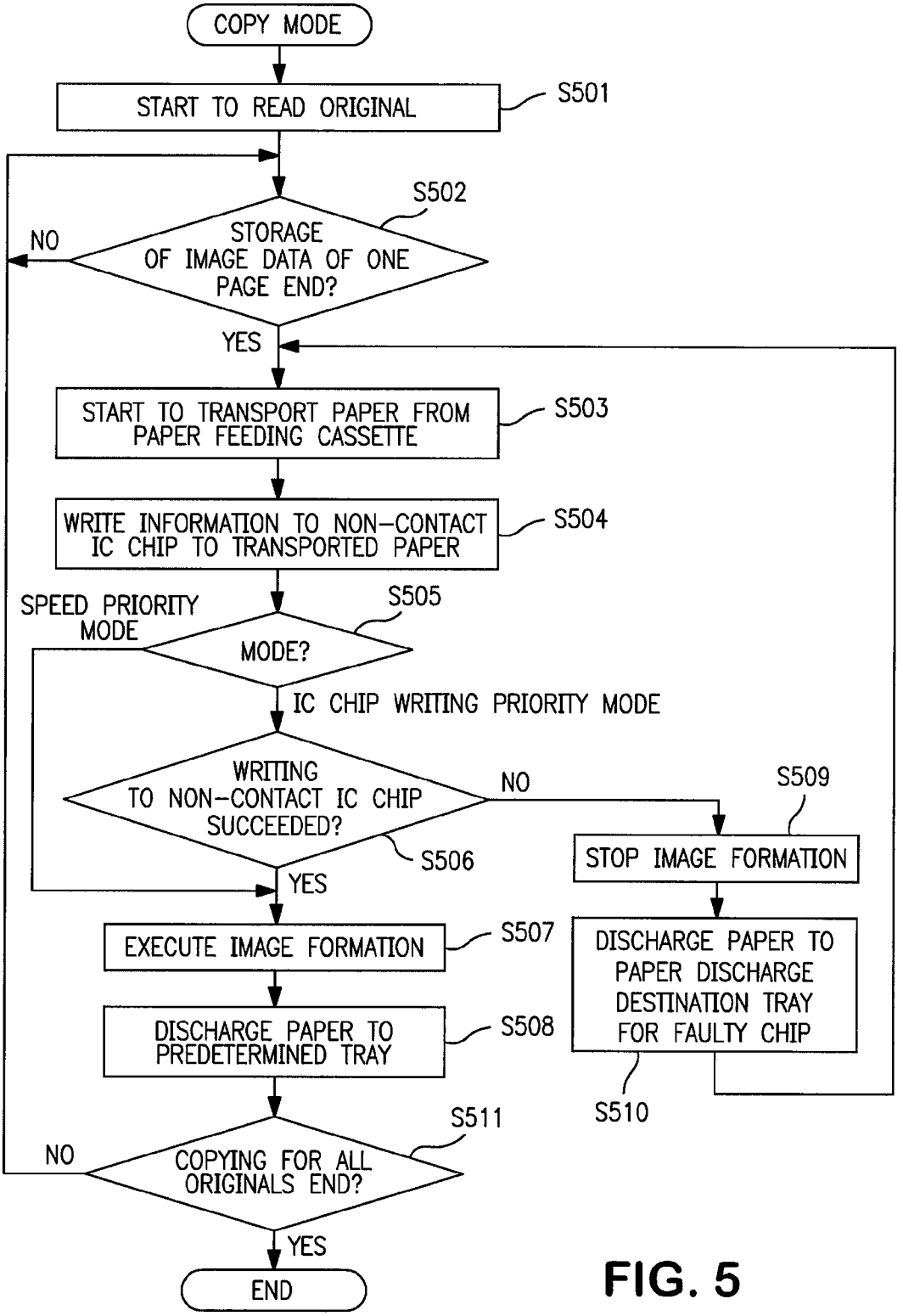

COPY MODE
START TO READ ORIGINAL
S501
S502
STORAGE OF IMAGE DATA OF ONE PAGE END?
NO
YES
START TO TRANSPORT PAPER FROM PAPER FEEDING CASSETTE
S503
WRITE INFORMATION TO NON-CONTACT IC CHIP TO TRANSPORTED PAPER
S504
SPEED PRIORITY MODE
S505
MODE?
IC CHIP WRITING PRIORITY MODE
WRITING TO NON-CONTACT IC CHIP SUCCEEDED?
NO
S509
S506
STOP IMAGE FORMATION
YES
EXECUTE IMAGE FORMATION
S507
DISCHARGE PAPER TO PAPER DISCHARGE DESTINATION TRAY FOR FAULTY CHIP
DISCHARGE PAPER TO PREDETERMINED TRAY
S508
S510
S511
NO
COPYING FOR ALL ORIGINALS END?
YES
END

FIG. 5

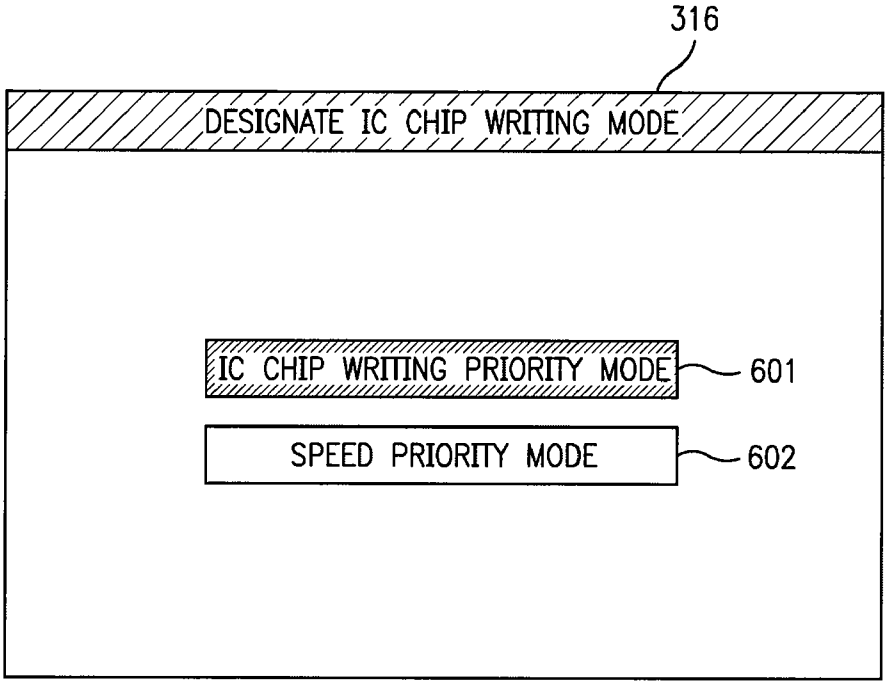

316
DESIGNATE IC CHIP WRITING MODE
IC CHIP WRITING PRIORITY MODE
601
SPEED PRIORITY MODE
602

FIG. 6

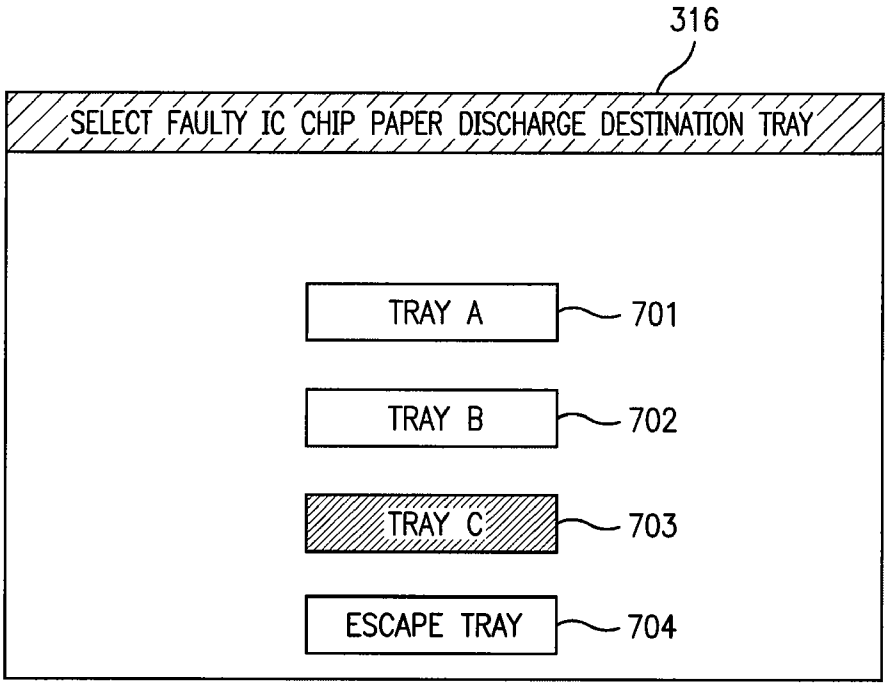

316
SELECT FAULTY IC CHIP PAPER DISCHARGE DESTINATION TRAY
TRAY A
701
TRAY B
702
TRAY C
703
ESCAPE TRAY
704

FIG. 7

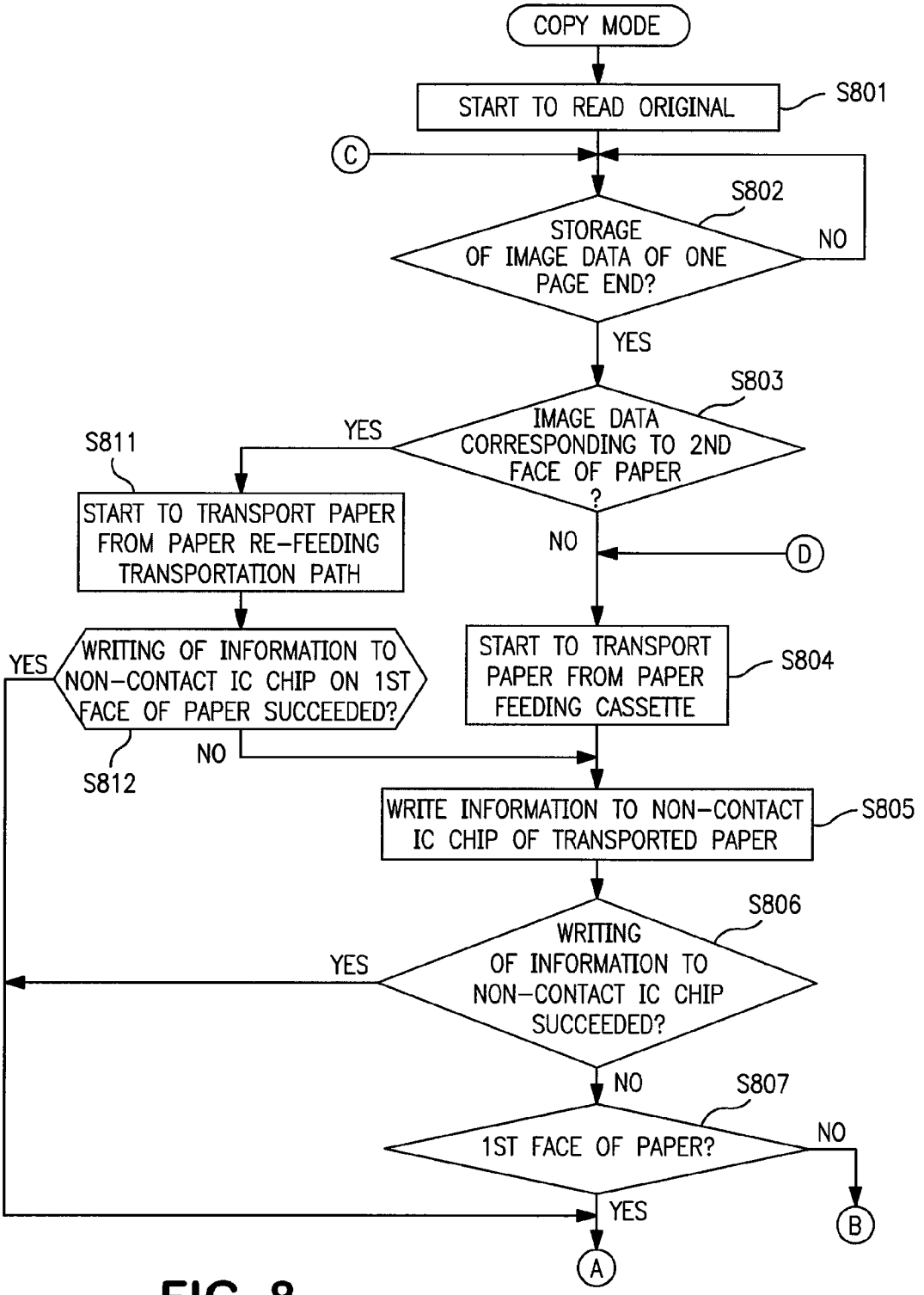

COPY MODE
START TO READ ORIGINAL
S801
C
S802
STORAGE OF IMAGE DATA OF ONE PAGE END?
NO
YES
S803
IMAGE DATA CORRESPONDING TO 2ND FACE OF PAPER ?
YES
S811
START TO TRANSPORT PAPER FROM PAPER RE-FEEDING TRANSPORTATION PATH
NO
D
WRITING OF INFORMATION TO NON-CONTACT IC CHIP ON 1ST FACE OF PAPER SUCCEEDED?
YES
S812
NO
START TO TRANSPORT PAPER FROM PAPER FEEDING CASSETTE
S804
WRITE INFORMATION TO NON-CONTACT IC CHIP OF TRANSPORTED PAPER
S805
S806
WRITING OF INFORMATION TO NON-CONTACT IC CHIP SUCCEEDED?
YES
NO
S807
1ST FACE OF PAPER?
NO
YES
B
A

FIG. 8

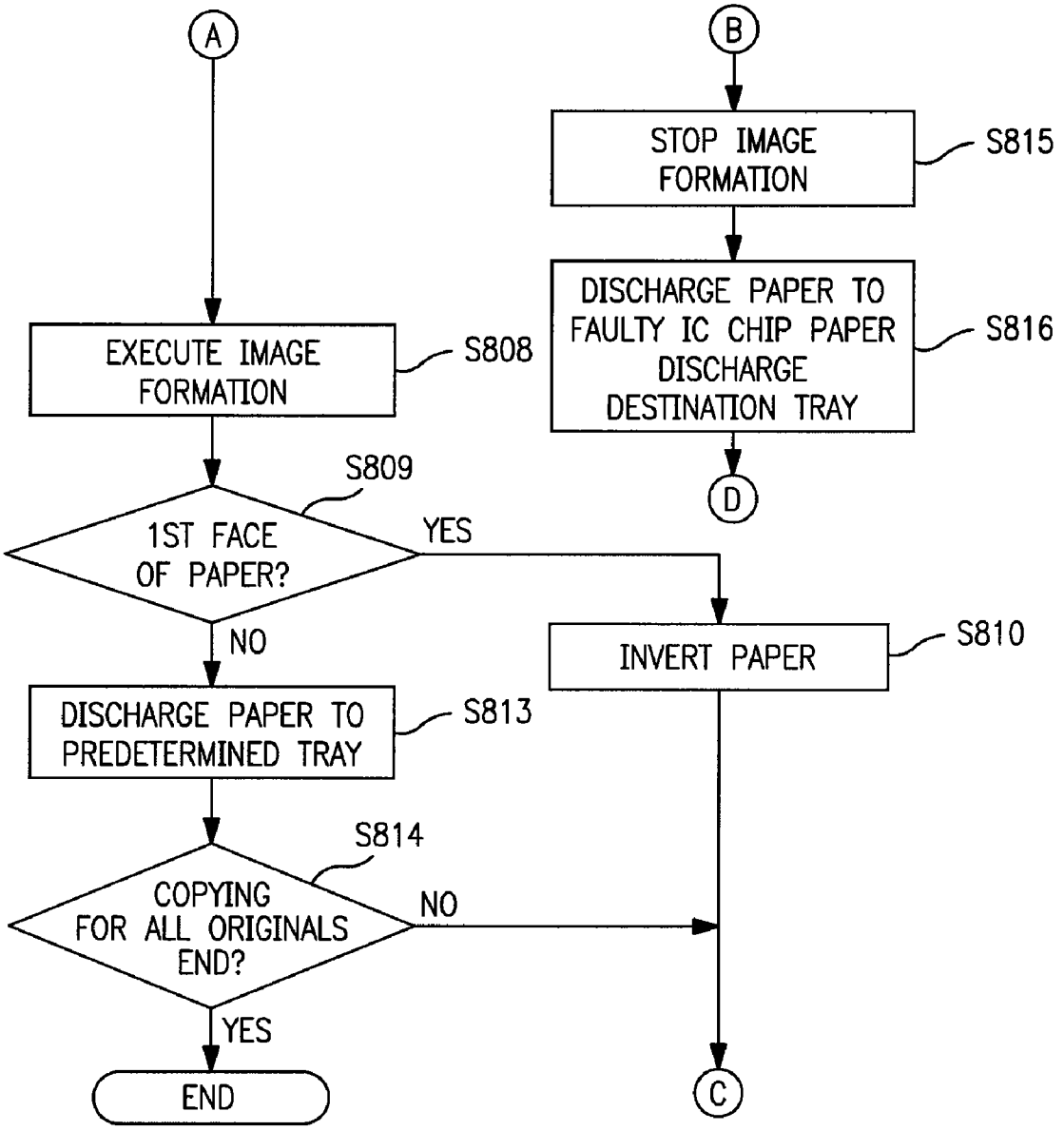

A
B
STOP IMAGE FORMATION
S815
DISCHARGE PAPER TO FAULTY IC CHIP PAPER DISCHARGE DESTINATION TRAY
S816
D
EXECUTE IMAGE FORMATION
S808
S809
1ST FACE OF PAPER?
YES
NO
INVERT PAPER
S810
DISCHARGE PAPER TO PREDETERMINED TRAY
S813
S814
COPYING FOR ALL ORIGINALS END?
NO
YES
END
C

FIG. 9

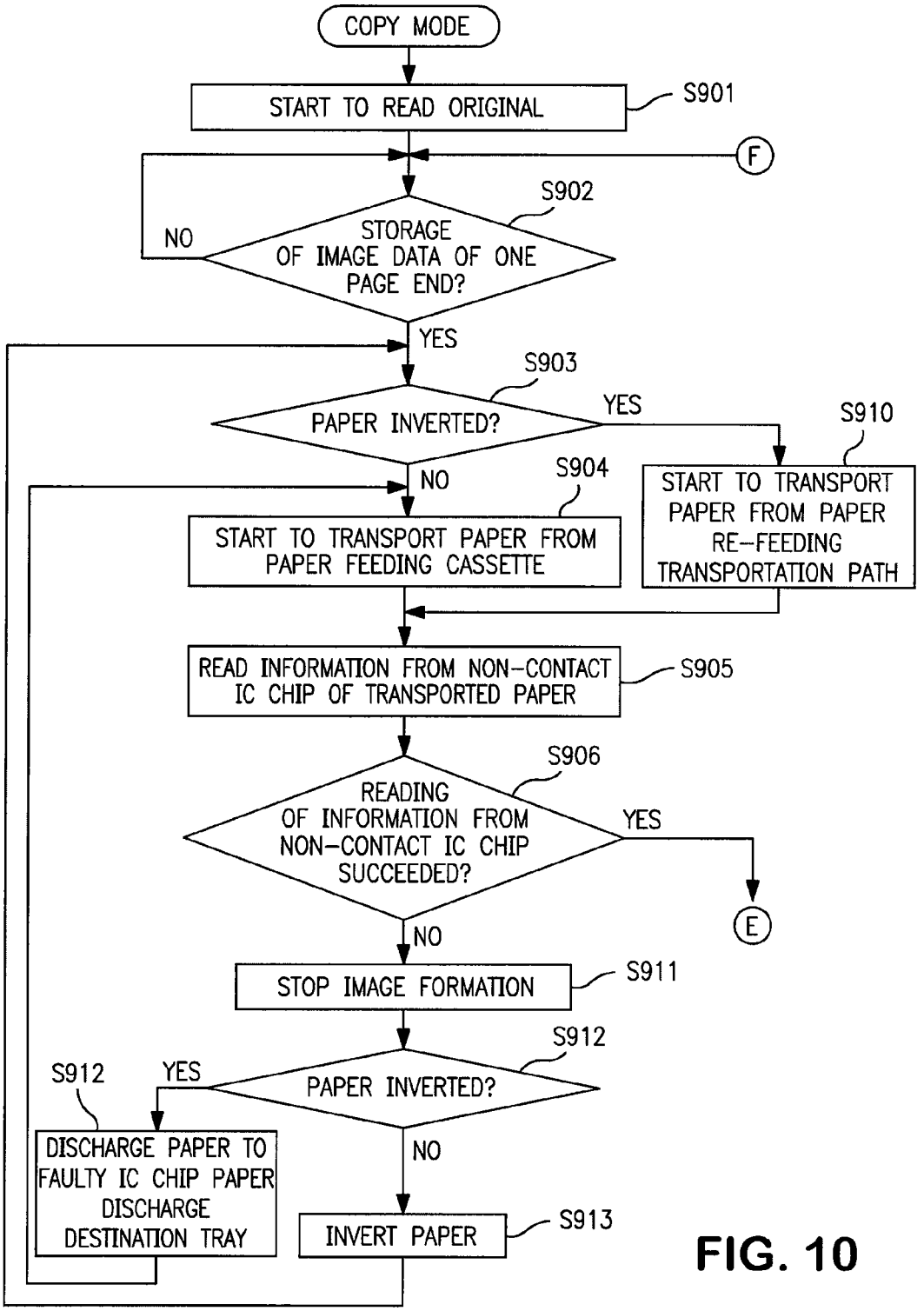

COPY MODE
START TO READ ORIGINAL
S901
F
S902
NO
STORAGE OF IMAGE DATA OF ONE PAGE END?
YES
S903
PAPER INVERTED?
YES
S910
NO
S904
START TO TRANSPORT PAPER FROM PAPER FEEDING CASSETTE
START TO TRANSPORT PAPER FROM PAPER RE-FEEDING TRANSPORTATION PATH
READ INFORMATION FROM NON-CONTACT IC CHIP OF TRANSPORTED PAPER
S905
S906
READING OF INFORMATION FROM NON-CONTACT IC CHIP SUCCEEDED?
YES
E
NO
STOP IMAGE FORMATION
S911
S912
S912
YES
PAPER INVERTED?
DISCHARGE PAPER TO FAULTY IC CHIP PAPER DISCHARGE DESTINATION TRAY
NO
INVERT PAPER
S913

FIG. 10

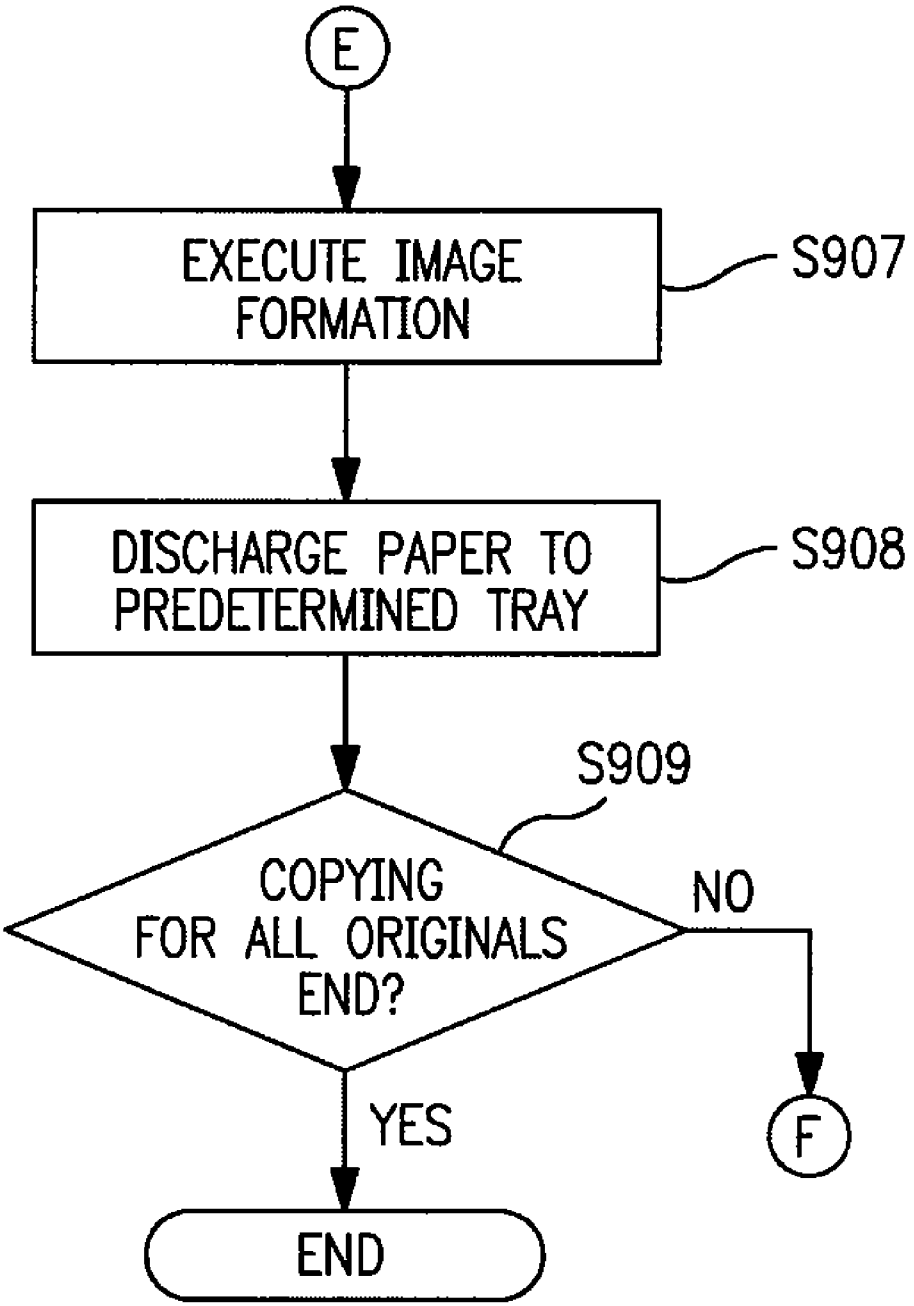

E
EXECUTE IMAGE FORMATION
S907
DISCHARGE PAPER TO PREDETERMINED TRAY
S908
S909
COPYING FOR ALL ORIGINALS END?
NO
YES
F
END

FIG. 11

IMAGE FORMING DEVICE, CONTROL METHOD OF IMAGE FORMING DEVICE, PROGRAM FOR ACHIEVING CONTROL METHOD, AND STORAGE MEDIUM FOR STORING PROGRAM

TECHNICAL FIELD

[0001] The present invention relates to an image forming device for forming an image on a recording medium, a control method of the image forming device, a program for achieving the control program, and a storage medium for storing the program.

BACKGROUND ART

[0002] In recent years, the printer which executes printing on a paper with non-contact IC (integrated circuit) chip (that is, the paper on which the non-contact IC chip is embedded) is proposed in, for example, Japanese Patent Application Laid-Open No. 2000-337426. Here, it should be noted that "IC chip" can be also called "IC" simply. More specifically, in a case where the printing on the paper with non-contact IC chip is executed, the printer writes information to a non-contact IC chip which has been embedded on the paper with non-contact IC chip. Besides, the printer executes the printing on the basis of the information held in the non-contact IC chip embedded in the paper with non-contact IC chip. Incidentally, it should be noted that the non-contact IC chip is also called a non-contact IC tag or a non-contact IC and is used in the RFID (Radio Frequency Identification) technology.

[0003] In the printer which writes the information to the non-contact IC chip in case of the printing to the paper with non-contact IC chip, if the image data input to the printer includes the information to be written to the non-contact IC chip, the relevant information is written to the non-contact IC chip and also the printing based on the input image data is executed on the paper with non-contact IC chip.

[0004] In Japanese Patent Application Laid-Open No. 2000-337426, if the paper with non-contact IC chip to be fed to the printer runs out, the information to be written to the non-contact IC chip on the paper with non-contact IC chip is transformed into a QR (quick response) code, and the acquired QR code as well as the input image data is printed on an ordinary paper (that is, the paper on which there is no non-contact IC chip) instead of the paper with non-contact IC chip.

[0005] In addition, the technology that, if the information was not able to be written to the non-contact IC chip on the paper with non-contact IC chip, the previous content is printed on a next paper with non-contact IC chip and also the relevant information is written to the non-contact IC chip on the next paper with non-contact IC chip is proposed in, for example, Japanese Patent Application Laid-Open No. 2003-288557.

[0006] As described above, in the case where the QR code is printed on the ordinary paper together with the input image data if the paper with non-contact IC chip runs out, it is possible to compensate a lack of the information by printing the QR code on the ordinary paper. However, in that case, for example, there is a possibility that the paper with non-contact IC chip on which the writing of the information to the non-contact IC chip was failed is output. As a result, the output paper with non-contact IC chip is short of the information to be written to the non-contact IC chip under normal conditions.

[0007] Moreover, in a case where the information was not able to be written in the non-contact IC chip on the paper with non-contact IC chip, if the technology of printing the previous content on the next paper with non-contact IC chip and also writing the previous information to the non-contact IC chip on the next paper with non-contact IC chip is used, it is possible to acquire the predetermined number of papers with non-contact IC chip on which the writing of the information to the non-contact IC chip succeeded. However, in that case, the sheaf of the papers with non-contact IC chip mixedly includes the papers with non-contact IC chip on which the writing of the information to the non-contact IC chip succeeded and the papers with non-contact IC chip on which the writing of the information to the non-contact IC chip did not succeed (or the writing of the information to the non-contact IC chip failed). For this reason, the user has to appropriately sort in the relevant sheaf the papers with non-contact IC chip on which the writing of the information to the non-contact IC chip succeeded from the papers with non-contact IC chip on which the writing of the information to the non-contact IC chip failed.

[0008] Moreover, it is generally needless or useless to execute the image formation to the papers with non-contact IC chip on which the writing/reading to/from the non-contact IC chip failed. For this reason, it is necessary not to execute such needless image formation.

DISCLOSURE OF THE INVENTION

[0009] Accordingly, the present invention is conceived in response to the above disadvantages of the conventional art.

[0010] For example, by the image forming device and the control method thereof according to the present invention, it is possible to discriminatingly output a recording medium with non-contact IC chip on which the writing or the reading of information to or from a non-contact IC chip succeeded and a recording medium with non-contact IC chip on which the writing or the reading of information to or from a non-contact IC chip failed.

[0011] Moreover, for example, by the image forming device and the control method thereof according to the present invention, it is possible not to execute image formation to the recording medium with non-contact IC chip on which the writing or the reading of the information to or from the non-contact IC chip failed.

[0012] An object of the present invention is to provide an image forming device comprising:

[0013] an image forming unit adapted to execute image formation on a recording medium;

[0014] a writing unit adapted to be able to execute at least an information writing operation in a non-contact manner to a non-contact IC added to the recording medium; and

[0015] a control unit adapted to control whether or not the image forming unit should execute the image formation on the recording medium, according to a result of the information writing operation executed by the writing unit to the non-contact IC added to the recording medium.

[0016] Another object of the present invention is to provide an image forming device comprising:

[0017] an image forming unit adapted to execute image formation on a recording medium;

[0018] a writing unit adapted to execute an information writing operation in a non-contact manner with respect to a non-contact IC added to the recording medium; and

[0019] a control unit adapted to control to change the image formation by said image forming unit according to whether or not said writing unit correctly executed the information writing operation with respect to the non-contact IC added to the recording medium.

[0020] Still another object of the present invention is to provide an image forming device comprising:

[0021] an image forming unit adapted to execute image formation on a recording medium;

[0022] a reading unit adapted to execute an information reading operation in a non-contact manner with respect to a non-contact IC added to the recording medium; and

[0023] a control unit adapted to control to change the image formation by said image forming unit according to whether or not said reading unit correctly executed the information reading operation from the non-contact IC added to the recording medium.

[0024] Still another object of the present invention is to provide a control method for an image forming device which comprises a writing unit adapted to execute an information writing operation in a non-contact manner with respect to a recording medium to which a non-contact IC has been added, and executes image formation on the recording medium, said method comprising:

[0025] a writing step of causing the writing unit to execute the information writing operation with respect to the non-contact IC added to the recording medium; and

[0026] a control step of controlling to change the image formation according to whether or not the information writing operation was correctly executed with respect to the non-contact IC in said writing step.

[0027] Still another object of the present invention is to provide a control method for an image forming device which comprises a reading unit adapted to execute at least an information reading operation in a non-contact manner with respect to a recording medium to which a non-contact IC has been added, and executes image formation on the recording medium, said method comprising:

[0028] a reading step of causing the reading unit to execute the information reading operation from the non-contact IC added to the recording medium; and

[0029] a control step of controlling to change the image formation according to whether or not the information reading operation was correctly executed from the non-contact IC in said reading step.

[0030] Moreover, a computer program which is used to cause a computer to execute the control method of the image forming device and a computer-readable storage medium which stores therein the computer program for causing the computer to execute the control method of the image forming device are provided.

[0031] According to the present invention, it is possible to discriminatingly output the recording medium with non-contact IC chip on which the writing or the reading of the information to or from the non-contact IC chip succeeded and the recording medium with non-contact IC chip on which the writing or the reading of the information to or from the non-contact IC chip failed.

[0032] Moreover, by not executing the image formation to the recording medium with non-contact IC chip on which the writing or the reading of the information to or from the non-contact IC chip failed, it is possible to prevent from executing the needless or useless image formation.

[0033] The above and other objects and characteristics of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] FIG. **1** is a block diagram showing the constitution of the image forming device according to the first embodiment of the present invention;

[0035] FIG. **2** is a longitudinal sectional view showing the constitutions of a reader unit **103** and a printer unit **104** both shown in FIG. **1**;

[0036] FIG. **3** is a plan view showing the key configuration of an operation unit **102** shown in FIG. **1**;

[0037] FIG. **4** is a plan view showing the constitution of the paper with non-contact IC chip;

[0038] FIG. **5** is a flow chart showing the control procedure of the copy mode in which the IC chip writing mode of a digital copying machine **101** shown in FIG. **1** is designated;

[0039] FIG. **6** is a diagram showing an example of the IC chip writing priority mode selection screen to be displayed on a touch panel **316** of the operation unit **102** shown in FIG. **1**;

[0040] FIG. **7** is a diagram showing an example of the faulty IC chip paper discharge destination tray selection screen to be displayed when the IC chip writing priority mode is selected on the IC chip writing priority mode selection screen shown in FIG. **6**;

[0041] FIG. **8** is a flow chart showing the control procedure of the double-sided copy mode in which the IC chip writing mode in the image forming device according to the second embodiment of the present invention is designated;

[0042] FIG. **9** is a flow chart showing the control procedure of the double-sided copy mode in which the IC chip writing mode in the image forming device according to the second embodiment of the present invention is designated;

[0043] FIG. **10** is a flow chart showing the control procedure of the copy mode in which the IC chip reading mode in the image forming device according to the third embodiment of the present invention is designated; and

[0044] FIG. **11** is a flow chart showing the control procedure of the copy mode in which the IC chip reading mode in the image forming device according to the third embodiment of the present invention is designated.

BEST MODE FOR CARRYING OUT THE INVENTION

[0045] Hereinafter, the embodiments of the present invention will be explained with reference to the attached drawings.

First Embodiment

[0046] FIG. **1** is a block diagram showing the constitution of the image forming device according to the first embodiment of the present invention. In the present embodiment, the digital copying machine **101** will be explained as the image forming device.

[0047] That is, as shown in FIG. **1**, the digital copying machine **101** is equipped with the operation unit **102**, the reader unit **103**, the printer unit **104**, a modem unit **105**, a network I/F (interface) unit **106**, a hard disk **107**, a control unit **108** and an IC chip reader/writer **109**.

[0048] The operation unit **102** is used to operate and handle the digital copying machine **101**, the reader unit **103** reads an original on an original and outputs the thus acquired image data to the control unit **108**, and the printer unit **104** prints on a paper the image based on the image data transferred from the control unit **108**. Here, it should be noted that, as the paper to which the image is printed, it is possible to use either the paper with non-contact IC chip on which the non-contact IC chip from/to which the information can be read/written has been embedded and the ordinary paper on which the non-contact IC chip is not embedded.

[0049] The modem unit **105** expands the facsimile data received through a telephone circuit **113** and transfers the expanded data to the control unit **108**. Also, the modem unit **105** compresses the image data transferred from the control unit **108** and transmits the compressed data as the facsimile data through the telephone circuit **113**. Here, the facsimile data received by the modem unit **105** can be temporarily stored in the hard disk **107**.

[0050] The network I/F unit **106** which interfaces with a LAN (local area network) **112** controls the communication with the devices such as a PC (personal computer) **110**, a server **111** and the like. Moreover, the network I/F unit **106** outputs the image data transferred from the PC **110** or the server **111** through the LAN **112** to the control unit **108**. Besides, the network I/F unit **106** transfers the image data and the control code to the PC **110** or the server **111** in response to the indication issued from the control unit **108**.

[0051] The hard disk **107** is the storage device which stores the image data. Here, if the order of reading of the image data from the hard disk **107** is changed, it is possible to change the print output order. Moreover, if the plural copies of the same image are output, the same image data is read from the hard disk **107** plural times. Besides, if it takes a long time for the transfer of the data as in the facsimile transmission or the facsimile reception, it is possible to temporarily store in the hard disk **107** the PDL (page description language) extraction data and the image data acquired by the reader unit **103**.

[0052] The control unit **108** is equipped with a CPU (central processing unit) **108***a*, a RAM (random access memory) **108***b*, a ROM (read only memory) **108***c* and an SRAM (static random access memory) **108***d*. Here, the CPU **108***a* totally controls the digital copying machine **101** by executing the programs stored in the ROM **108***c*. Moreover, the CPU **108***a* controls the data flows among the reader unit **103**, the printer unit **104**, the modem unit **105**, the network I/F unit **106** and the hard disk **107**.

[0053] The IC chip reader/writer **109** which is originally provided in the printer unit **104** reads in a non-contact manner the information stored in the non-contact IC chip on the paper with non-contact IC chip, and then transfers the read information to the control unit **108**. Also, the IC chip reader/writer **109** can write in a non-contact manner the information transferred from the control unit **108** to the non-contact IC chip on the paper with non-contact IC chip.

[0054] Next, the constitutions of the reader unit **103** and the printer unit **104** will be explained with reference to FIG. **2**. More specifically, FIG. **2** is the longitudinal sectional view showing the constitutions of the reader unit **103** and the printer unit **104** both shown in FIG. **1**.

[0055] As shown in FIG. **2**, the reader unit **103** and the printer unit **104** are integrally constituted. More specifically, in FIG. **2**, a document feeder **201** which is mounted on the reader unit **103** feeds one by one the originals (documents) from the last page thereof onto a platen glass **202**. Then, if the reading operation to the fed original put on the platen glass **202** ends, the document feeder **201** discharges the relevant original from the platen glass **202**.

[0056] In any case, if the original is fed and put on the platen glass **202**, a lamp **203** lights, and a scanner unit **204** starts to move, whereby the original is exposed and scanned. At that time, the reflection light acquired from the original is guided to a CCD (charge coupled device) image sensor **209** (simply called CCD **209** hereinafter) by mirrors **205**, **206** and **207** and a lens **208**.

[0057] Subsequently, the image on the thus scanned original is read by the CCD **209**, the image data output from the CCD **209** is subjected to the predetermined process, and the processed image data is then transferred to the printer unit **104** or the network I/F unit **106** through the control unit **108**.

[0058] The printer unit **104** comprises a laser beam generation unit **210** and a laser driver **221**. Here, the laser driver **221** drives the laser beam generation unit **210** to generate a laser beam according to the image data output from the reader unit **103**. Then, the generated laser beam is irradiated to a photosensitive drum **211**, whereby the latent image according to the irradiated laser beam is formed on the photosensitive drum **211**. Incidentally, a developing unit **212**, a transfer unit **215** and a cleaner **222** are arranged in the vicinity of the photosensitive drum **211**. Here, the developing unit **212** supplies the toner to the latent image formed on the photosensitive drum **211** so as to visualize the latent image as the toner image, the transfer unit **215** transfers the toner image on the photosensitive drum **211** to a fed paper, and the cleaner **222** collects the residual toner on the photosensitive drum **211**. Moreover, an escape tray **224** to which the paper to which image formation is not yet executed is discharged is provided in the printer unit **104**.

[0059] Here, it should be noted that the paper with non-contact IC chip (that is, the paper to which the non-contact IC chip has been added or adhered) or the ordinary paper (that is, the paper on which there is no non-contact IC chip) is used as the paper, and the papers are supplied from either one of a paper feeding cassette **213** and a paper feeding cassette **214**. In the present embodiment, it is assumed that the papers with non-contact IC chip are fed from each of the paper feeding cassettes **213** and **214**, and it is also assumed that "paper" implies "paper with non-contact IC chip" as long as there is no specific note.

[0060] The leading edge of the paper fed from the paper feeding cassette **213** or **214** is first bumped against registration rollers **223** and thus stopped. Then, the once-stopped paper is transported to the location between the photosensitive drum **211** and the transfer unit **215** at predetermined timing. Incidentally, an IC chip reader/writer **109** which executes information writing/reading to/from the non-contact IC chip on the paper in a non-contact manner is provided before the registration rollers **223**. Here, it should be noted that the IC chip reader/writer **109** is disposed to be able to execute wireless communication with the non-contact IC chip on the paper once stopped at the registration rollers **223**, whereby the IC chip reader/writer **109** executes the information writing or reading operation with respect to the non-contact IC chip on the paper at the timing when the paper is once stopped at the registration rollers **223**.

[0061] Then, the toner image on the photosensitive drum **211** is transferred by the transfer unit **215** to the paper transported to the location between the photosensitive drum **211**

and the transfer unit **215**, and the paper on which the toner image has been transferred is further transported to a fixing unit **216**. Thus, in the fixing unit **216**, the toner image on the paper is hot-pressed, whereby the toner image is fixed onto the paper.

[0062] Subsequently, the paper passed the fixing unit **216** is transported to a finisher **220** by discharge rollers **217**. Here, it should be noted that the finisher **220** sorts the transported papers, executes the sheet (paper) processes such as the stapling of the sorted papers and the like, and then discharges the processed papers to trays A, B and C respectively.

[0063] Incidentally, in a case where the double-sided printing is set, after the paper was once transported to the discharge rollers **217**, each of the discharge rollers **217** is reversed, whereby the paper is guided to a paper re-feeding transportation path **219** by the operation of a flapper **218**.

[0064] Moreover, in a case where the multiple printing is set, the paper passed the fixing unit **216** is not transported up to the discharge rollers **217** but is guided to the paper re-feeding transportation path **219** by the operation of the flapper **218**.

[0065] Then, as well as the above, the paper guided to the paper re-feeding transportation path **219** is once stopped at the registration rollers **223**, and the once-stopped paper is then transported to the location between the photosensitive drum **211** and the transfer unit **215**.

[0066] Subsequently, the operation unit **102** will be explained with reference to FIG. **3**. That is, FIG. **3** is the plan view showing the key configuration of the operation unit **102** shown in FIG. **1**.

[0067] As shown in FIG. **3**, a main power source lamp **301**, a preheating key **302**, a copy mode key **303**, a facsimile mode key **304**, a box key **305**, a copy start key **306**, a stop key **307**, a reset key **308**, a guide key **309**, a user mode key **310**, an interruption key **311**, numerical keys **312**, a clear key **313**, plural one-touch dialing keys **314**, two sets of tabs **315**, and a touch panel **316** are provided on the operation unit **102**. More specifically, the main power source lamp **301** lights up in the case where the power is being supplied to the main body of the digital copying machine **101**, and the preheating key **302** is depressed to turn on and off the preheating mode. Further, the copy mode key **303** is depressed to select the copy mode, the facsimile mode key **304** is depressed to select the facsimile mode, and the box key **305** is depressed to select the box mode. Moreover, the copy start key **306** is depressed to indicate the copy start, and the stop key **307** is depressed to interrupt or stop the copy operation. The user mode key **310** is depressed when the user intends to change the basic setting of the system. Besides, the two sets of tabs **315** function to allocate the operations respectively corresponding to the one-touch dialing keys **314** in accordance with the combinations of the opened and closed states of the tabs, and the touch panel **316** is composed of the combination of the liquid crystal display and the touch sensor. Incidentally, on the touch panel **316**, the individual setting screen is displayed with respect to each mode. Moreover, the various software keys for executing various detailed settings are also displayed on the touch panel **316**.

[0068] Subsequently, the paper with non-contact IC chip will be explained with reference to FIG. **4**. That is, FIG. **4** is the plan view showing the constitution of the paper with non-contact IC chip.

[0069] As shown in FIG. **4**, the paper with non-contact IC chip is composed of a paper **401** such as a plain paper or the like, and a non-contact IC chip **402** which has been embedded in the paper **401**. More specifically, the non-contact IC chip **402** comprises an antenna portion (not shown) and a memory portion (not shown). Thus, when the radio wave (or electric wave) of the predetermined frequency is received from the IC chip reader/writer **109**, the antenna portion of the non-contact IC chip **402** produces the induced electromotive force. By using such produced power, the non-contact IC chip **402** transmits/receives the data to/from the IC chip reader/writer **109**, and also reads/writes the data from/to the memory portion. Incidentally, it is also possible to use, as the paper with non-contact IC chip, the paper **401** to which the non-contact IC chip **402** has been adhered.

[0070] Subsequently, the operation in the copy mode in which the IC chip writing mode of the digital copying machine **101** is designated will be explained with reference to FIGS. **5**, **6** and **7**. More specifically, FIG. **5** is the flow chart showing the control procedure of the copy mode in which the IC chip writing mode of the digital copying machine **101** shown in FIG. **1** is designated, FIG. **6** is the diagram showing an example of the IC chip writing priority mode selection screen (also called the IC chip writing mode designation screen hereinafter) to be displayed on the touch panel **316** of the operation unit **102** shown in FIG. **1**, and FIG. **7** is the diagram showing an example of the faulty IC chip paper discharge destination tray selection screen to be displayed when the IC chip writing priority mode is selected on the IC chip writing priority mode selection screen shown in FIG. **6**. Here, it should be noted that the control procedure shown in the flow chart of FIG. **5** is executed by the CPU **108***a* of the control unit **108**.

[0071] In the copy mode, the digital copying machine **101** according to the present embodiment can designate the IC chip writing mode. More specifically, if the IC chip writing mode is designated, the information is written to the non-contact IC chip on the fed paper by the IC chip reader/writer **109**, and, after then, either the IC chip writing priority mode or the speed priority mode is executed according to the setting by the user.

[0072] In the case where the IC chip writing priority mode is being set, the image formation is controlled according to whether or not the information writing to the non-contact IC chip succeeded. More specifically, if the information writing to the non-contact IC chip succeeded, the image is formed on the fed paper, and the paper on which the image has been formed is transported to the designated paper discharge tray. On the contrary, if the information writing to the non-contact IC chip did not succeed, any image is not formed on the fed paper, and the paper on which the image is not formed is transported to the discharge destination tray different from the paper discharge tray with respect to which the information writing to the non-contact IC chip succeeded is discharged.

[0073] In the meanwhile, in the case where the speed priority mode is being set, the image is formed on the fed paper irrespective of whether or not the information writing to the non-contact IC chip succeeded. Then, the paper on which the image has been formed is discharged to the designated paper discharge tray.

[0074] Incidentally, if the IC chip writing mode is designated, the paper with non-contact IC chip is used as the paper under normal conditions. However, for example, if the non-contact IC chip which has been embedded in (or adhered to) the paper is faulty or defective, if the non-contact IC chip is damaged while the paper is transported up to the registration

rollers **223**, or the like, the information writing to the non-contact IC chip did not succeed. For this reason, the fed paper on which the image is not formed is discharged. Moreover, if the ordinary paper (that is, the paper on which there is no non-contact IC chip) is erroneously fed, the information writing to the non-contact IC chip did not succeed with respect to the ordinary paper. Thus, also in that case, the fed ordinary paper on which the image is not formed is discharged.

[0075] On the other hand, if the IC chip writing mode is not designated, the normal copy mode is executed. In the normal copy mode, the image formation is executed to the fed paper irrespective of whether the fed paper is the paper with non-contact IC chip or the ordinary paper (that is, the paper on which there is no non-contact IC chip), whereby the information writing to the non-contact IC chip is not executed to the paper. In any case, since the operation in the normal copy mode is well known, the explanation thereof will be omitted.

[0076] In the case where the IC chip writing mode is designated by the user through the operation unit **102**, for example, the IC chip writing mode designation screen as shown in FIG. **6** is displayed on the touch panel **316**. More specifically, on the IC chip writing mode designation screen, a button **601** which is depressed to select and designate the IC chip writing priority mode and a button **602** which is depressed to select and designate the speed priority mode are displayed. Here, it should be noted that such mode selection by the buttons **601** and **602** is executed exclusively. More specifically, the IC chip writing priority mode is selected and set if the button **601** is depressed, while the speed priority mode is selected and set if the button **602** is depressed. Then, the set mode is stored in the SRAM **108***d* of the control unit **108**.

[0077] If the IC chip writing priority mode is selected on the IC chip writing mode designation screen, for example, the faulty IC chip paper discharge destination tray selection screen as shown in FIG. **7** is displayed on the touch panel **316**. Here, it should be noted that the faulty IC chip paper discharge destination tray selection screen is the screen which is used to select the tray (also called the faulty IC chip paper discharge destination tray) to which the paper on which the information writing to the non-contact IC chip did not succeed should be discharged. On the faulty IC chip paper discharge destination tray selection screen, plural buttons **701**, **702**, **703** and **704** which are used to respectively designate the faulty IC chip paper discharge destination trays are displayed. For example, if the button **703** is depressed, the tray C is selected and set as the faulty IC chip paper discharge destination tray, and the set tray C is stored in the SRAM **108***d* as the selected faulty IC chip paper discharge destination tray. Here, it should be noted that it is impossible to set the faulty IC chip paper discharge destination tray shown in FIG. **7** to be the same as the paper discharge destination used in the copy job.

[0078] In any case, the user designates the IC chip writing mode, executes the various settings necessary in the copy mode, sets the originals to the document feeder **201**, and then depresses the copy start key **306**. Thus, the operation in the copy mode starts.

[0079] In the copy mode, as shown in FIG. **5**, it is controlled by the control unit **108** to start to read the original (step S**501**). Then, if the reading of the original starts, the set originals are sequentially fed one by one from the document feeder **201** onto the platen glass **202**, and the image on the fed original is read by the reader unit **103**. The image data is then stored in the hard disk **107** in due order every time the original is read.

[0080] Subsequently, the control unit **108** waits for until the image data of one page to be next output is stored in the hard disk **107** (step S**502**). At first, the image data of the first page is stored. Then, if the image data of the one page to be next output is stored in the hard disk **107**, the image data is output from the hard disk **107** to the printer unit **104** through the control unit **108**. In the printer unit **104**, the latent image based on the relevant image data is formed on the photosensitive drum **211**, and the formed latent image is visualized as the toner image through the developing process.

[0081] Moreover, if the image data of the one page to be next output is stored in the hard disk **107**, it is controlled by the control unit **108** to feed the paper from either the paper feeding cassette **213** or **214** and start to transport the fed paper (step S**503**). The paper fed from either the paper feeding cassette **213** or **214** is transported toward the registration rollers **223**, and the transported paper is once stopped in the state that the leading edge of the paper is bumped against registration rollers **223**. Then, the control unit **108** controls the IC chip reader/writer **109** to write the information concerning the contents (e.g., magnification, layout, original size, paper size, paper type, number of colors, etc.) set by the user to the non-contact IC chip on the paper stopped at the registration rollers **223** (step S**504**).

[0082] Subsequently, the control unit **108** refers to the information in the SRAM **108***d* and thus judges whether the mode set through the IC chip writing mode designation screen as shown in FIG. **6** is the IC chip writing priority mode or the speed priority mode (step S**505**). Then, if the IC chip writing priority mode is set, the control unit **108** controls the IC chip reader/writer **109** to read the information from the non-contact IC chip on the paper. Further, the control unit **108** judges whether or not the information writing to the non-contact IC chip succeeded, according to whether or not the read information conforms to the information indicated to be written to the non-contact IC chip in the step S**504** (step S**506**). Here, if the read information conforms to the information indicated to be written to the non-contact IC chip, the control unit **108** judges that the information writing to the non-contact IC chip succeeded. On the contrary, if the read information does not conform to the information indicated to be written to the non-contact IC chip, the control unit **108** judges that the information writing to the non-contact IC chip did not succeed.

[0083] If it is judged that the information writing to the non-contact IC chip succeeded, the control unit **108** controls to execute the image formation (step S**507**). In the control of the image formation, the control unit **108** respectively controls the operation that the paper is transported to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**, the operation that the toner image on the photosensitive drum **211** is transferred onto the paper by the transfer unit **215**, and the operation that the toner image transferred onto the paper is fixed thereto by the fixing unit **216**. Here, the formation of the latent image to the photosensitive drum **211** based on the image data, the development of the formed latent image, and the like were already started in the predetermined timing after the time when the storage of the image data to be output in the hard disk **107** ends in the step S**502**, so as to be in time for the start timing of the process in the step S**507**. Then, the control unit **108**

discharges the paper to the designated tray (for example, the uppermost tray A in the finisher **220** shown in FIG. **2**) (step S**508**).

[0084] Subsequently, the control unit **108** judges whether or not the copying of all the originals from the document feeder **201** ends (step S**511**). If the copying of all the originals does not end, the flow returns to the step S**502**. On the contrary, if the copying of all the originals ends, the process in the copy mode ends.

[0085] Incidentally, if it is judged in the step S**506** that the information writing to the non-contact IC chip failed, the control unit **108** stops the image formation (step S**509**). Here, the toner image (that is, the toner itself) formed on the photosensitive drum **211** is collected by the cleaner **222**, and the paper is then transported to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**. Thus, any toner image is not transferred to the paper, and the relevant paper is transported to the finisher through the fixing unit **216**. Then, the control unit **108** controls the finisher **220** so as to discharge the paper to the tray (for example, the lowermost tray C in the finisher **220** shown in FIG. **2**) designated as the faulty IC chip paper discharge destination tray by using the faulty IC chip paper discharge destination tray selection screen shown in FIG. **7** (step S**510**). Here, it should be noted that the paper on which the information writing to the non-contact IC chip failed might include the ordinary paper.

[0086] Subsequently, the flow returns to the step S**503** to feed a new paper. Then, the control unit **108** controls to repeat the processes in the step S**503**, S**506**, S**509** and S**510** until the information writing to the non-contact IC chip on the newly fed paper succeeds. That is, the formation of the same toner image to the photosensitive drum **211** and the collection of the toner of the toner image are repeated until the information writing to the non-contact IC chip on the newly fed paper succeeds.

[0087] As described above, according to the present embodiment, the papers on which the writing of the information to the non-contact IC chip succeeded and the papers on which the writing of the information to the non-contact IC chip failed are independently output respectively to the corresponding trays, whereby the user can easily acquire only the papers on which the writing of the information to the non-contact IC chip succeeded without sorting the output papers. As a result, the convenience to the user improves.

[0088] Incidentally, in the present embodiment, to avoid that the image is unnecessarily formed on the paper, both the writing of the information to the non-contact IC chip **402** and the confirmation of the written information are executed before the image formation is executed. However, it is also possible to execute the writing of the information to the non-contact IC chip and the confirmation of the written information after the image formation on the paper. Besides, it is further possible to execute the writing of the information to the non-contact IC chip before the image formation on the paper and execute the confirmation of the written information after the image formation on the paper. In that case, a further IC chip reader/writer is added and provided at an appropriate location on the paper transportation path between the transfer unit **215** and the discharge rollers **217** of the image forming device (that is, the downstream side of the IC chip reader/writer **109** on the paper transportation path), the information writing is executed by the IC chip reader/writer **109**, and the information reading is executed by the further added IC chip reader/writer.

[0089] Moreover, in the present embodiment, the faulty IC chip paper discharge destination tray is selected by using the faulty IC chip paper discharge destination tray selection screen. However, the control unit **108** may automatically select the free (vacant) tray as the faulty IC chip paper discharge destination tray. In that case, it is possible to prevent that the paper on which the writing of the information to the non-contact IC chip failed mixes with the papers output in another job or the like.

[0090] In addition, the escape tray **224** may be selected as the faulty IC chip paper discharge destination tray. In the case where the escape tray **224** is selected, the paper on which the writing of the information to the non-contact IC chip failed is transported to the escape tray **224** by controlling a not-shown flapper provided between the registration roller and the transfer unit. Thus, it is possible to discharge the paper without passing it through the fixing unit, whereby the transported paper is not damaged. Consequently, the paper discharged to the escape tray can be again used for, for example, the image formation in which the IC chip writing mode is not designated, as maintaining the same degree of quality as unused.

Second Embodiment

[0091] Subsequently, the second embodiment of the present invention will be explained with reference to FIGS. **8** and **9**. FIGS. **8** and **9** are the flow charts showing the control procedure of the double-sided copy mode in which the IC chip writing mode in the image forming device according to the second embodiment of the present invention is designated.

[0092] In the above first embodiment, the control to be executed in the information writing to the non-contact IC chip on the paper in the single-sided copy mode is explained. Meanwhile, in the present embodiment, the control to be executed in the information writing to the non-contact IC chip on the paper in the double-sided copy mode will be explained. Here, it should be noted that the configuration described in the present embodiment is the same as that described in the first embodiment, whereby the explanation thereof will be omitted.

[0093] In the double-sided copy mode according to the present embodiment, unlike the first embodiment, it is impossible to select either one of the IC chip writing priority mode and the speed priority mode, that is, the IC chip writing priority mode is automatically set.

[0094] In the double-sided copy mode according to the present embodiment, as shown in FIG. **8**, it is controlled by the control unit **108** to start to read the original (step S**801**). Then, the control unit **108** waits for until the image data of one page to be next output is stored in the hard disk **107** (step S**802**). If the image data of the one page to be next output is stored in the hard disk **107**, it is judged by the control unit **108** whether or not the image data is the image data corresponding to the second face of the paper (step S**803**). If it is judged that the image data is not the image data corresponding to the second face of the paper, it is controlled by the control unit **108** to feed the paper from either the paper feeding cassette **213** or **214** and start to transport the fed paper (step S**804**). The paper fed from either the paper feeding cassette **213** or **214** is transported and once stopped at the registration rollers **223**. Then, the control unit **108** controls the IC chip reader/writer

109 to write the designated information to the non-contact IC chip on the paper stopped at the registration rollers **223** (step S**805**).

[0095] Subsequently, the control unit **108** controls the IC chip reader/writer **109** to read the information from the non-contact IC chip on the paper. Further, the control unit **108** judges whether or not the information writing to the non-contact IC chip succeeded, according to whether or not the read information conforms to the information indicated to be written to the non-contact IC chip in the step S**805** (step S**806**). Here, if it is judged that the information writing to the non-contact IC chip did not succeed, the control unit **108** further judges whether or not to execute the image formation on the first face of the paper (step S**807**). In that case, the image formation is executed to the first face of the paper, the control unit **108** controls to execute the image formation (step S**808**). On the contrary, if it is judged that the information writing to the non-contact IC chip succeeded, as well as above, the control unit **108** controls to execute the image formation (step S**808**). That is, in the case where the image formation on the first face of the paper is executed, the image formation is executed irrespective of whether the information writing to the non-contact IC chip succeeded or failed.

[0096] In the above image formation, the operation of transporting the paper to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**, the operation of transferring the toner image on the photosensitive drum **211** onto the paper by the transfer unit **215**, and the operation of fixing the transferred toner image onto the paper by the fixing unit **216** are executed.

[0097] Subsequently, the control unit **108** judges whether or not the above image formation is the image formation on the first face of the paper (step S**809**). If it is judged that the above image formation is the image formation on the first face of the paper, the control unit **108** controls to guide the paper to the paper re-feeding transportation path **219** and invert the image formation face of the guided paper (step S**810**). Then, the flow returns to the step S**802** to execute the same procedure as that for the image formation on the first face of the paper so as to execute the image formation on the second face of the paper. Here, since it is judged that the image data to be next output is the image data formed on the second face of the paper (step S**803**), the control unit **108** controls to start to transport the paper on the paper re-feeding transportation path **219** (step S**811**). That is, the paper is transported from the paper re-feeding transportation path **219** to the registration rollers **223**, and the transported paper is once stopped at the registration rollers **223**.

[0098] Next, the control unit **108** judges whether or not the information writing to the non-contact IC chip succeeded at the time of the image formation to the first face of the paper (step S**812**). If it is judged that the information writing to the non-contact IC chip succeeded at the time of the image formation to the first face of the paper, the control unit **108** controls to feed the paper from the registration rollers **223** and execute the image formation (that is, the transfer of the toner image) to the second face of the fed paper (step S**808**). Then, the control unit **108** judges that the above image formation is not the image formation on the first face of the paper, that is, the control unit **108** judges that the above image formation is the image formation on the second face of the paper (step S**809**). Subsequently, the control unit **108** controls to discharge the paper of which both the faces have been subjected to the image formation to the designated tray (for example, the uppermost tray A in the finisher **220** shown in FIG. **2**)(step S**813**).

[0099] Next, the control unit **108** judges whether or not the double-sided copying of all the originals from the document feeder **201** ends (step S**814**). If the double-sided copying of all the originals does not end, the flow returns to the step S**802**. On the contrary, if the double-sided copying of all the originals ends, the process in the copy mode ends.

[0100] Meanwhile, if it is judged in the step S**812** that the information writing to the non-contact IC chip did not succeed at the time of the image formation to the first face of the paper, the control unit **108** controls the IC chip reader/writer **109** to write the information to the non-contact IC chip on the paper transported from the paper re-feeding transportation path **219** (step S**805**). Then, if it is judged that the information writing to the non-contact IC chip on the paper transported from the paper re-feeding transportation path **219** succeeded (step S**807**), the control unit **108** controls to execute the image formation on the second face of the paper (step S**808**). Moreover, the control unit **108** controls to discharge the paper of which both the faces have been subjected to the image formation to the designated tray (for example, the uppermost tray A in the finisher **220** shown in FIG. **2**) (step S**813**).

[0101] Incidentally, if it is judged in the step S**807** that the information writing to the non-contact IC chip on the paper transported from the paper re-feeding transportation path **219** failed, the control unit **108** stops the image formation on the second face of the paper as shown in FIG. **9** (step S**815**). Here, the toner image (that is, the toner itself) formed on the photosensitive drum **211** is collected by the cleaner **222**, and the paper is then transported to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**. Thus, any toner image is not transferred to the paper, and the relevant paper is transported to the finisher **220** through the fixing unit **216**. Then, the control unit **108** controls the finisher **220** so as to discharge the paper to the tray (for example, the lowermost tray C in the finisher **220** shown in FIG. **2**) designated as the faulty IC chip paper discharge destination tray by using the faulty IC chip paper discharge destination tray selection screen shown in FIG. **7** (step S**816**). Here, it should be noted that the paper on which the information writing to the non-contact IC chip failed might include the ordinary paper.

[0102] Subsequently, the flow returns to the step S**804** to feed a new paper. Then, the control unit **108** controls to again start the image formation from the first face of the paper. This is repeated until the information writing to the non-contact IC chip on the paper succeeds.

[0103] As described above, according to the present embodiment, in the case where the double-sided copying is executed, with respect to the paper on which the information writing to the non-contact IC chip failed at the time of the copying on the first face thereof (including the paper from which the non-contact IC chip cannot be detected), the information writing to the non-contact IC chip is executed at the time of the copying on the second face thereof. Therefore, it is possible to reduce the occurrence of the papers on which the information writing to the non-contact IC chip failed, and it is also possible to improve the throughput of the double-sided copying.

Third Embodiment

[0104] Subsequently, the third embodiment of the present invention will be explained with reference to FIGS. **10** and **11**. FIGS. **10** and **11** are the flow charts showing the control procedure of the copy mode in which the IC chip reading mode in the image forming device according to the third embodiment of the present invention is designated.

[0105] In the above first and second embodiments, the information writing to the non-contact IC chip is executed with respect to the paper, and, based on the result of the information writing, the image formation is executed with respect to the paper (that is, the paper with non-contact IC chip) in which the normal non-contact IC chip has been embedded. Meanwhile, in the present embodiment, the information has been previously stored in the non-contact IC chip embedded in the paper, and the relevant paper is held or set in the paper feeding cassette **213** or **214**. Then, the information is read from the non-contact IC chip with respect to the paper fed from the paper feeding cassette **213** or **214**, and, based on the result of the information reading, the image formation is executed with respect to the paper (that is, the paper with non-contact IC chip) in which the normal non-contact IC chip has been embedded. Here, it should be noted that the configuration described in the present embodiment is the same as that described in the first embodiment, whereby the explanation thereof will be omitted.

[0106] In the present embodiment, in the case where the copying is executed, the user first designates the IC chip reading mode and executes various settings in the copy mode. After then, the user actually sets the original to the document feeder **201** and depresses the copy start key **306**, whereby the operation in the copy mode starts.

[0107] In the copy mode, as shown in FIG. **10**, it is first controlled by the control unit **108** to start to read the original (step S**901**). Then, the control unit **108** waits for until the image data of one page to be next output is stored in the hard disk **107** (step S**902**). If the image data of the one page to be next output is stored in the hard disk **107**, the control unit **108** judges whether or not the paper has been already inverted (step S**903**). If it is judged that the paper is not inverted yet, it is controlled by the control unit **108** to feed the paper from either the paper feeding cassette **213** or **214** and start to transport the fed paper (step S**904**). The paper fed from either the paper feeding cassette **213** or **214** is transported up to the registration rollers **223**, and the transported paper is once stopped in the state that the leading edge of the paper is bumped against registration rollers **223**. Then, the control unit **108** controls the IC chip reader/writer **109** to read the information from the non-contact IC chip on the paper stopped at the registration rollers **223** (step S**905**).

[0108] Next, the control unit **108** judges whether or not the information reading from the non-contact IC chip succeeded in the step S**905** (step S**906**). If it is judged that the information reading from the non-contact IC chip succeeded, the control unit **108** judges that the fed paper is the normal paper with non-contact IC chip, and thus controls to execute the image formation on the relevant paper (step S**907**). In the control of the image formation, the operation of transporting the paper to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**, the operation of transferring the toner image on the photosensitive drum **211** onto the paper by the transfer unit **215**, the operation of fixing the transferred toner image onto the paper by the fixing unit **216**, and the operation of transporting the paper subjected to the fixing to the finisher **220** are respectively controlled. Then, the control unit **108** controls the finisher **220** to discharge the paper to the predetermined tray (for example, the uppermost tray A in the finisher **220**) (step S**908**).

[0109] Subsequently, the control unit **108** judges whether or not the copying of all the originals fed from the document feeder **201** ends (step S**909**). If the copying of all the originals does not end, the flow returns to the step S**902**. On the contrary, if the copying of all the originals ends, the process in the copy mode ends.

[0110] Meanwhile, if it is judged in the step S**906** that the information reading from the non-contact IC chip did not succeed, that is, if it is judged that the information reading failed, the control unit **108** stops the image formation on the paper (step S**911**). Here, the toner image (that is, the toner itself) formed on the photosensitive drum **211** is collected by the cleaner **222**, and the paper is then transported to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**. Thus, the paper passes the fixing unit **216** in the state that any toner image is not transferred to the relevant paper. Then, the control unit **108** judges whether or not the paper has been already inverted (step S**912**). If it is judged that the paper is not inverted yet, it is controlled by the control unit **108** to guide the paper passed the fixing unit **216** to the paper re-feeding transportation path **219** so as to invert it (step S**913**).

[0111] Subsequently, the flow returns to the step S**903**, and the control unit **108** judges whether or not the paper has been already inverted. In that case, since the paper has been already inverted, it is controlled by the control unit **108** to start to transport the paper guided to the paper re-feeding transportation path **219** (step S**910**). Thus, the paper guided to the paper re-feeding transportation path **219** is transported toward the registration rollers **223**, and the transported paper is once stopped at the location of the registration rollers **223**. Then, the control unit **108** controls the IC chip reader/writer **109** to again read the information from the non-contact IC chip on the paper (step S**905**). Subsequently, the control unit **108** judges whether or not the information reading from the non-contact IC chip succeeded (step S**906**). If it is judged that the information reading from the non-contact IC chip succeeded, as described above, the control unit **108** controls to execute the image formation on the relevant paper (step S**907**). Then, the image-formed paper is discharged to the predetermined tray (step S**908**).

[0112] Meanwhile, if the information reading failed, the control unit **108** stops the image formation on the paper (step S**911**). That is, the toner image (that is, the toner itself) formed on the photosensitive drum **211** is collected by the cleaner **222**, and the paper is then transported to the location between the photosensitive drum **211** and the transfer unit **215** by the registration rollers **223**. Thus, the paper passes the fixing unit **216** in the state that any toner image is not transferred to the relevant paper. Here, since the paper has been already inverted (step S**912**), it is controlled by the control unit **108** to transport the paper to the finisher **220**. Then, for example, the control unit **108** controls the finisher **220** so as to discharge the paper to the tray designated as the faulty IC chip paper discharge destination tray by using the faulty IC chip paper discharge destination tray selection screen as shown in FIG. **7** (step S**914**). Here, it should be noted that the paper on which the information writing to the non-contact IC chip failed might include the ordinary paper.

[0113] Subsequently, the flow returns to the step **S903** to feed a new paper. Then, the control unit **108** controls to again form the same image on the newly fed paper, and this is repeated until the information reading from the non-contact IC chip on the paper succeeds.

[0114] As above, according to the present embodiment, if the information reading from the non-contact IC chip fails with respect to the one face of the paper, the relevant paper is inverted, and the information reading from the non-contact IC chip is again executed with respect to the other face of the relevant paper. Therefore, it is possible to reduce the occurrence of the papers on which the information reading from the non-contact IC chip failed. In particular, if the directional non-contact IC chips are added to both the faces of the paper, the present embodiment is effective for the relevant paper.

[0115] In the present embodiment, the principle of the present invention is applied to the double-sided copying. However, the principle of the present invention can be also applied to the single-sided copying as in the first embodiment. In any case, when the principle of the present invention is applied to the single-sided copying, if the information reading from the non-contact IC chip cannot be executed, the image formation is not executed, and the relevant paper is discharged to the faulty IC chip paper discharge destination tray set through the screen shown in FIG. **7**.

[0116] In the present embodiment, the information reading from the non-contact IC chip is explained. However, even in the case where the information is written to the non-contact IC chip, if the information writing fails, it is possible to invert the paper and again execute the information writing to the non-contact IC chip on the inverted paper. In that case, if the information writing fails after the image formation in the single-sided copying, the information writing to the non-contact IC chip is executed without executing the image formation after the inversion of the paper. Moreover, in the case where the information writing succeeded on the back face of the paper succeeded, if the paper is discharged as it is, the relevant paper is discharged in the inversion state that the front and back faces of the relevant paper are opposed to those of other image-formed papers. For this reason, the paper on which the image formation was executed to its back face is inverted and then discharged.

[0117] In the above first, second and third embodiments, it is controlled whether or not to execute the image formation according to whether or not the information writing or reading with respect to the non-contact IC chip succeeded. However, instead, it is also possible to adopt the constitution of changing the destination to which the image-formed paper (that is, the paper on which the image formation has ended) should be discharged, according to whether or not the information writing or reading with respect to the non-contact IC chip succeeded. That is, in such a case, the image formation is executed to the fed paper irrespective of whether or not the information writing or reading with respect to the non-contact IC chip succeeded. Then, the paper discharge destination tray is changed or switched so that, from among the image-formed papers, the papers on which the information writing or reading with respect to the non-contact IC chip succeeded and the papers on which the information writing or reading with respect to the non-contact IC chip failed are discharged respectively to the different trays. Moreover, in that case, if the information writing with respect to the non-contact IC chip failed, the message indicating such a fact may be synthesized as an additional image to the image to be essentially formed. For example, as such messages, "THERE IS A POSSIBILITY THAT NON-CONTACT IC ADDED TO THIS PAPER HAS BEEN DAMAGED", "WRITING OF INFORMATION TO NON-CONTACT IC ADDED TO THIS PAPER FAILED", and the like can be supposed. Incidentally, it should be noted that the above additional image is previously stored in the ROM **108***c* or the hard disk **107** in the digital copying machine **101**.

[0118] Further, in the above first, second and third embodiments, the case where the principle of the present invention is applied to the operation in the copy mode is explained. However, it is also possible to apply the principle of the present invention to the case where the image received through the facsimile, the image received through the network I/F unit **106**, the image stored in the hard disk **107** and the like are output by the printer unit **104**.

[0119] Furthermore, in the above first, second and third embodiments, the reader unit **103** and the printer unit **104** are controlled by the control unit **108**. Instead, the reader unit **103** and the printer unit **104** may be controlled respectively from the PC **110** through the LAN **112**.

[0120] Moreover, in the above first, second and third embodiments, the operations are indicated from the touch panel **316** of the operation unit **102**. However, it is also possible to indicate the operations by the access from the PC **110**.

[0121] Moreover, in each of the above embodiments, the laser beam printer is explained as the printer unit (or the printer engine) by way of example. Instead, it is also possible to use the printer having the print system other than the laser beam system. More specifically, it is possible to use the printers of an electrophotographic system (for example, an LED system), a liquid crystal shutter system, an inkjet system, a thermal transfer system, a sublimation system, and the like.

[0122] Moreover, the principle of the present invention is likewise applicable to a facsimile machine, a printer device and the like.

[0123] Incidentally, it is needless to say that the object of the present invention is achieved in a case where the storage medium (or the recording medium) storing (or recording) therein the program codes of software to realize the functions of the above embodiments is supplied to a system or an apparatus, and thus the computer (or CPU, MPU) in the system or the apparatus reads and executes the program codes stored in the storage medium. In that case, the program codes themselves read out of the storage medium realize the functions of the above embodiments, whereby the storage medium storing these program codes constitutes the present invention.

[0124] As the storage medium from which the program codes are supplied, for example, a Floppy™ disk, a hard disk, a magnetooptical disk, a CD-ROM, a CD-R, a CD-RW, a DVD-ROM, a DVD-RAM, a DVD-RW, a DVD+RW, a magnetic tape, a nonvolatile memory card, a ROM, or the like can be used. In addition, the program codes may be downloaded through the network.

[0125] Further, the present invention includes not only a case where the functions of the above embodiments are realized by executing the program codes read by the computer, but also a case where the OS (operating system) or the like running on the computer executes a part or all of the actual processes based on the indications of the program codes and thus the functions of the above embodiments are realized by the relevant processes.

[0126] Furthermore, the present invention also includes the case where, after the program codes read out of the storage medium are written into the memory provided on function expansion board inserted in the computer or in the function expansion unit connected to the computer, the CPU or the like provided on the function expansion board or in the function expansion unit executes a part or all of the actual processes on the basis of the instructions of the program codes, and thus the functions of the above embodiments are realized by the relevant processes.

[0127] As described above, while the present invention has been described with reference to what is presently considered to be the preferred embodiment, it is to be understood that the present invention is not limited to the disclosed embodiment. On the contrary, the present invention is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

[0128] This application claims priority from Japanese Patent Application No. 2004-299074 filed on Oct. 13, 2004, which is hereby incorporated by reference herein.

1-20. (canceled)

21. An image forming device comprising:

an image forming unit adapted to execute image formation on a recording medium;

a reading unit adapted to be able to execute information reading in a non-contact manner from a non-contact IC chip added to the recording medium; and

a control unit adapted to selectively execute either one of a first mode of executing control so as to change an operation of the image formation by the image forming unit based on whether or not the information reading from the non-contact IC chip by the reading unit was correctly executed, and a second mode of executing control so as to cause the image forming unit to execute the image formation to the recording medium to which the non-contact IC chip has been added, irrespective of whether or not the information reading from the non-contact IC chip by the reading unit was correctly executed.

22. An image forming device according to claim **21**, wherein, in the first mode, the control unit executes the control so as to change the operation of the image formation by causing to execute the image formation to the recording medium to which the non-contact IC chip has been added in the case where the information reading from the non-contact IC chip by the reading unit was correctly executed, and by causing not to execute the image formation to the recording medium to which the non-contact IC chip has been added in the case where the information reading from the non-contact IC chip by the reading unit was not correctly executed.

23. An image forming device according to claim **21**, wherein, in the first mode, the control unit executes the control so as to change the operation of the image formation by changing a discharge destination of the recording medium.

24. An image forming device according to claim **21**, further comprising a selection unit adapted to select either one of the first mode and the second mode based on a user's instruction,

wherein the control unit controls the image forming device in the mode selected by the selection unit.

25. A control method for an image forming device which comprises an image forming unit to execute image formation on a recording medium, the method comprising:

a reading step of executing information reading in a non-contact manner from a non-contact IC chip added to the recording medium; and

a control step of selectively executing either one of a first mode of executing control so as to change an operation of the image formation by the image forming unit based on whether or not the information reading from the non-contact IC chip was correctly executed in the reading step, and a second mode of executing control so as to cause the image forming unit to execute the image formation to the recording medium to which the non-contact IC chip has been added, irrespective of whether or not the information reading from the non-contact IC chip was correctly executed in the reading step.

26. A computer-readable storage medium which stores therein a control program for causing an image forming device to execute a control method for the image forming device which comprises an image forming unit to execute image formation on a recording medium, the control method comprising:

a reading step of executing information reading in a non-contact manner from a non-contact IC chip added to the recording medium; and

a control step of selectively executing either one of a first mode of executing control so as to change an operation of the image formation by the image forming unit based on whether or not the information reading from the non-contact IC chip was correctly executed in the reading step, and a second mode of executing control so as to cause the image forming unit to execute the image formation to the recording medium to which the non-contact IC chip has been added, irrespective of whether or not the information reading from the non-contact IC chip was correctly executed in the reading step.

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