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(54) **IMAGE FORMING APPARATUS THAT FORMS IMAGE FOR HALF-CUTTING, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM**

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(57) **ABSTRACT**

An image forming apparatus capable of leaving necessary images formed on seal paper, even when a removal operation is performed on an image forming paper, which includes the seal paper and release paper, after half-cutting processing. The image forming apparatus has an image forming part for forming a first image and a second image indicating additional information related to the first image, on the seal paper. The image forming apparatus makes setting related to the additional information, acquires information related to first half-cutting for leaving a portion of the first image in the seal paper on the release paper after the half-cutting processing and information related to second half-cutting for leaving, based on the setting, a portion of the second image in the seal paper on the release paper after the half-cutting, and forms the first and second images on the seal paper.

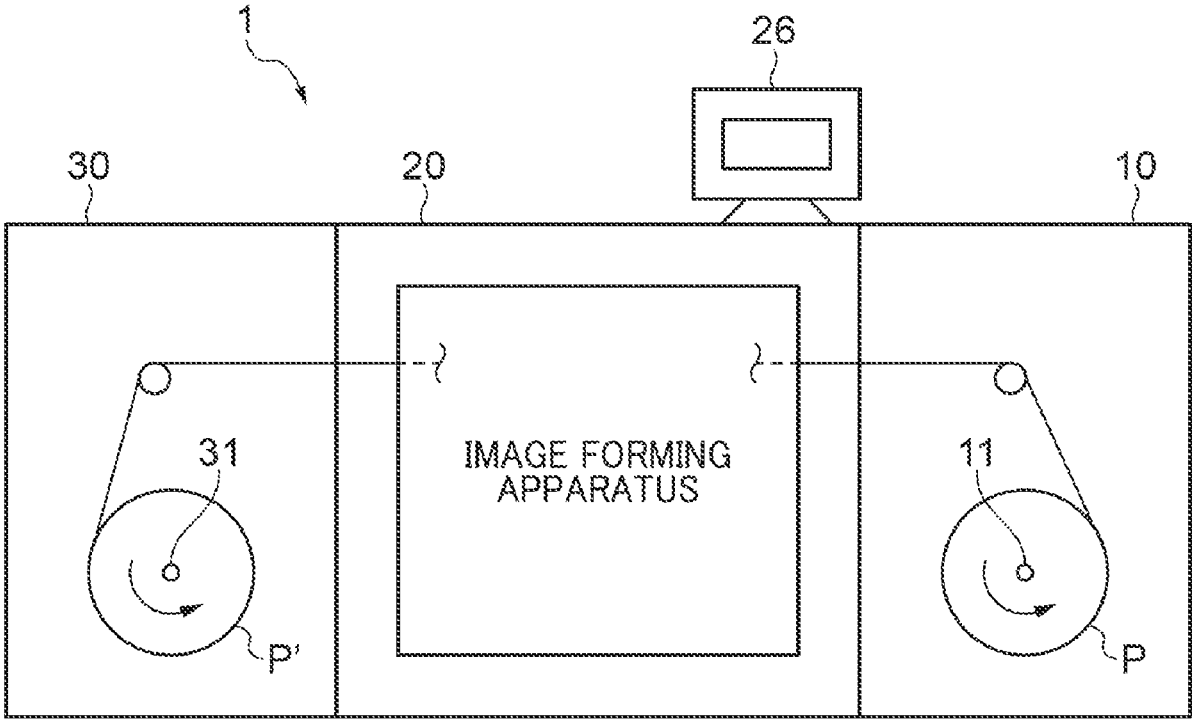


FIG. 1

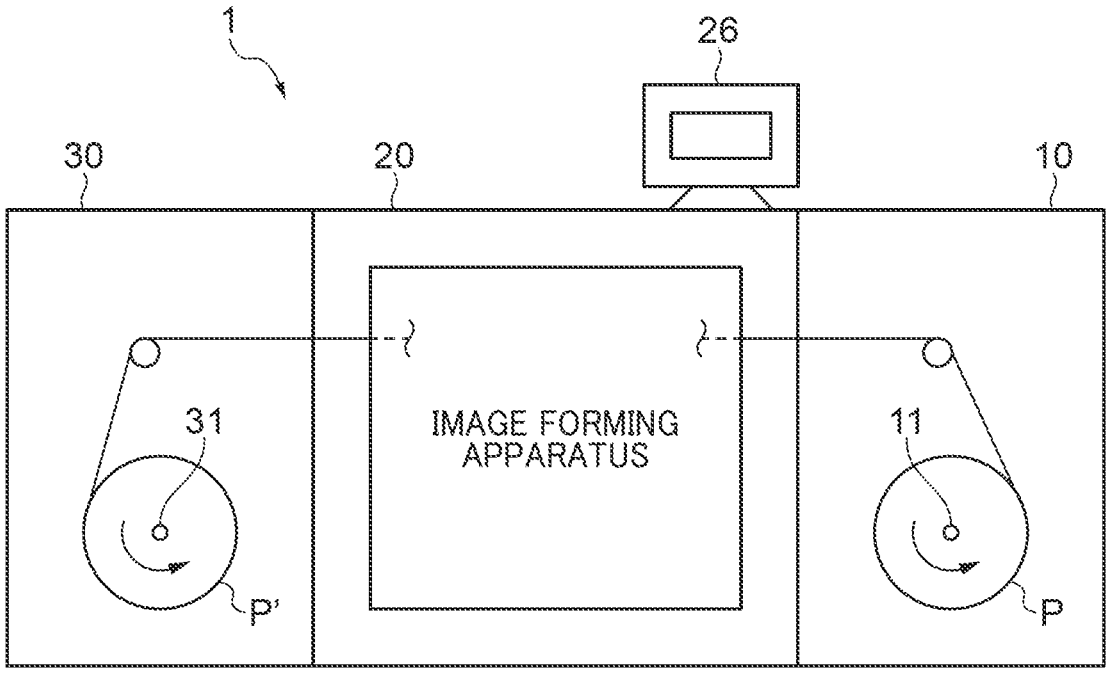


FIG. 2

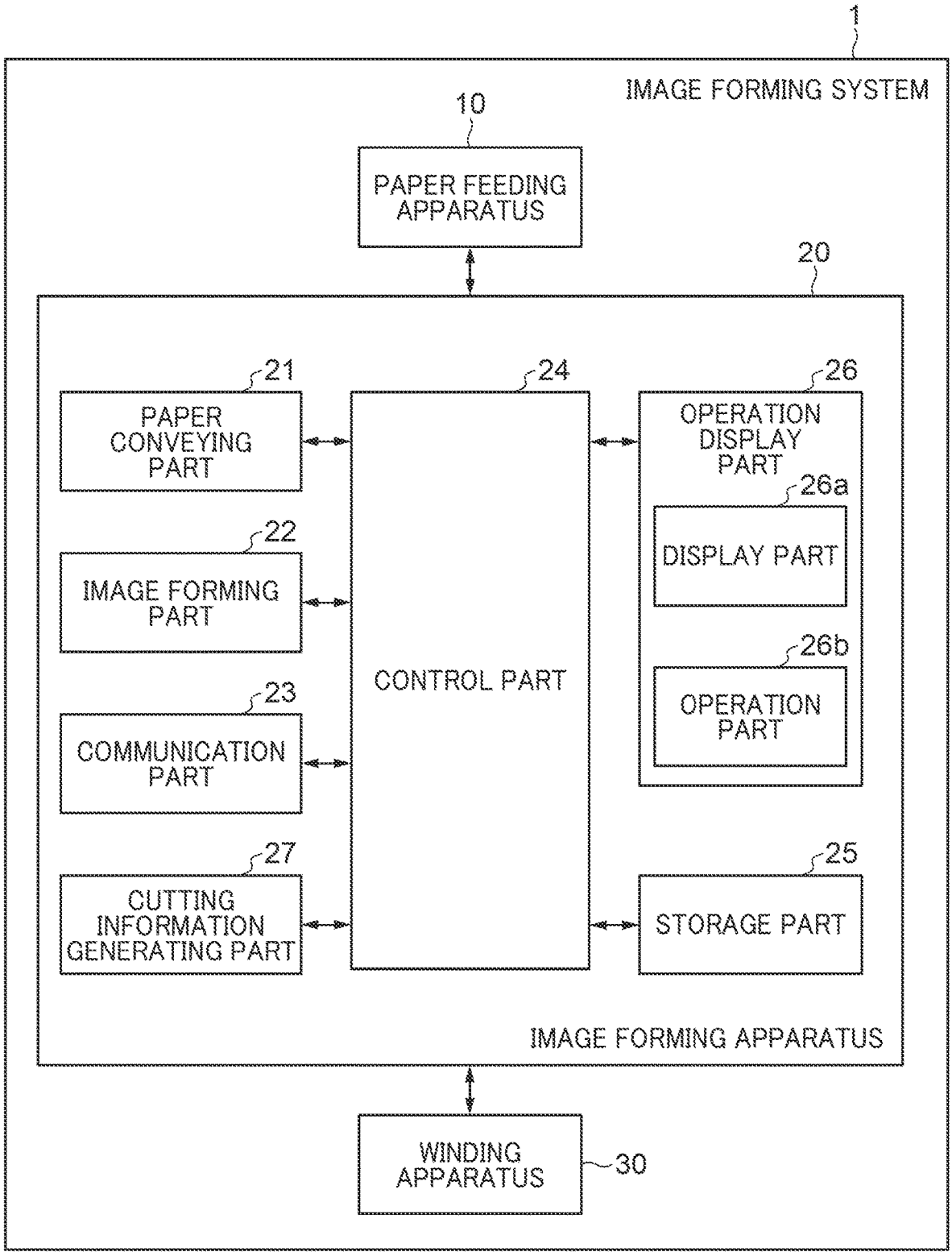

1
IMAGE FORMING SYSTEM
10
PAPER FEEDING APPARATUS
20
21
PAPER CONVEYING PART
22
IMAGE FORMING PART
23
COMMUNICATION PART
27
CUTTING INFORMATION GENERATING PART
24
CONTROL PART
26
OPERATION DISPLAY PART
26a
DISPLAY PART
26b
OPERATION PART
25
STORAGE PART
IMAGE FORMING APPARATUS
WINDING APPARATUS
30

FIG. 3

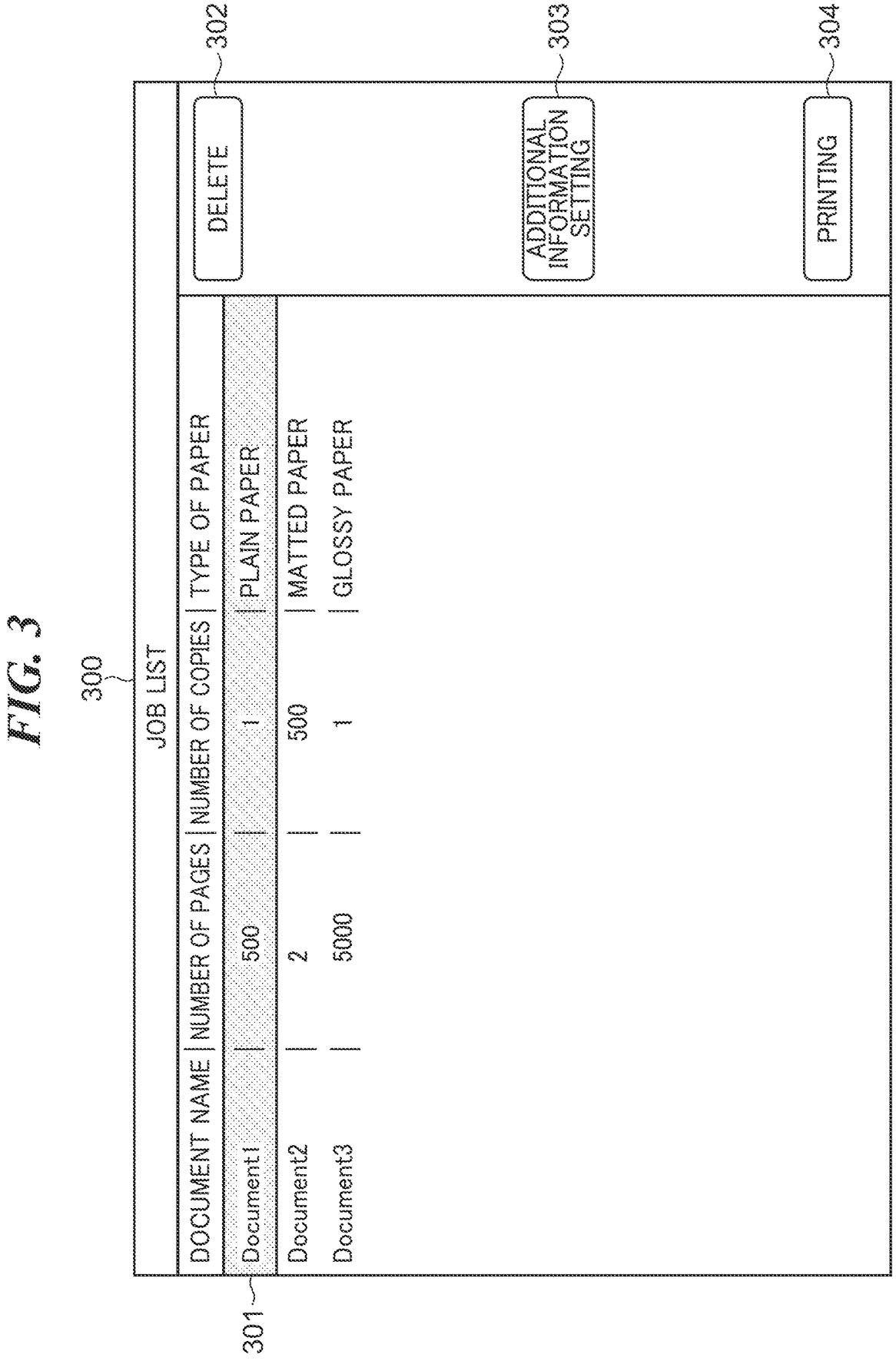

300
JOB LIST
302
DELETE
303
ADDITIONAL INFORMATION SETTING
304
PRINTING
301
DOCUMENT NAME
NUMBER OF PAGES
NUMBER OF COPIES
TYPE OF PAPER
Document1
500
1
PLAIN PAPER
Document2
2
500
MATTED PAPER
Document3
5000
1
GLOSSY PAPER

FIG. 4

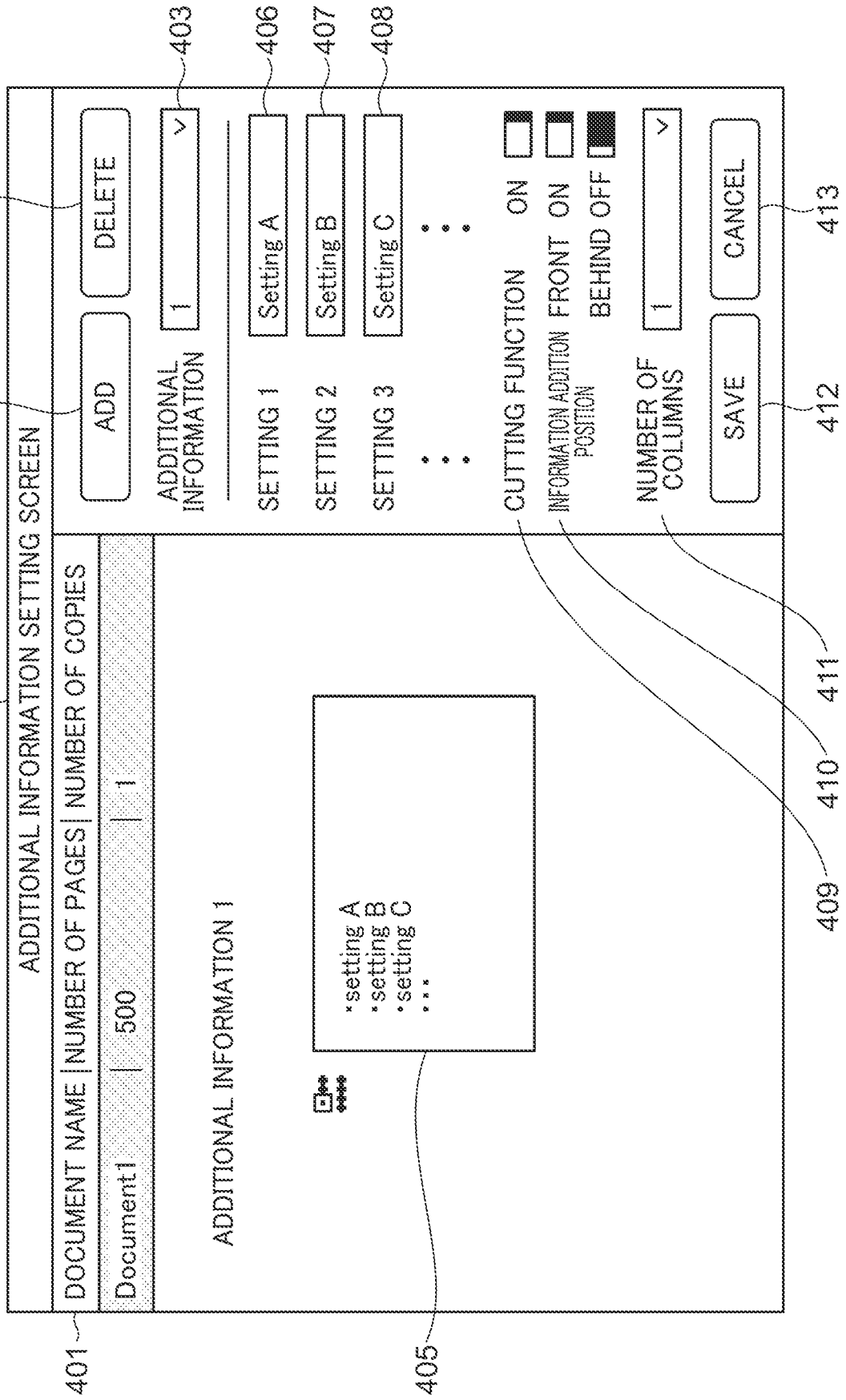
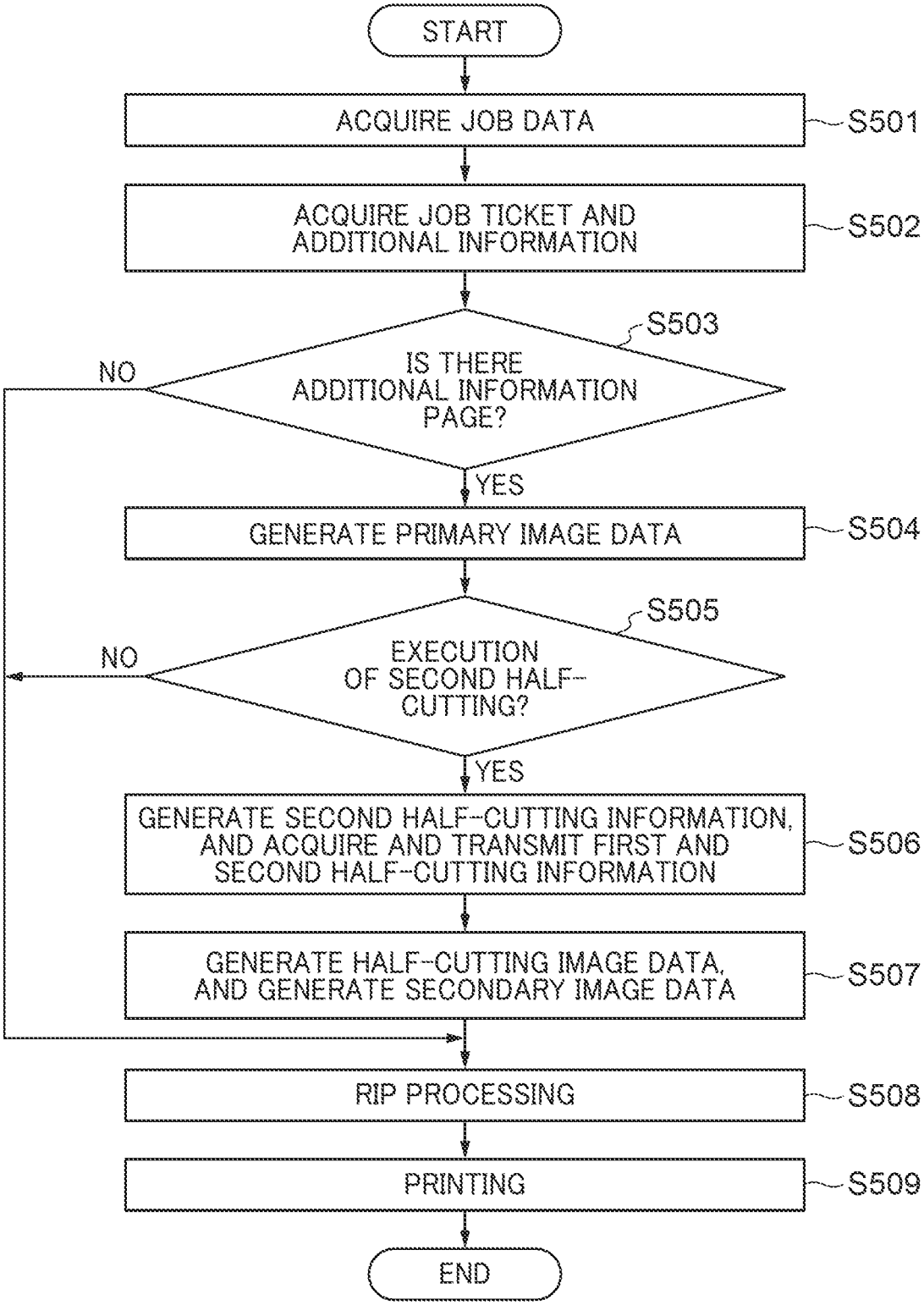

400
ADDITIONAL INFORMATION SETTING SCREEN
402
ADD
404
DELETE
403
ADDITIONAL INFORMATION
1
406
SETTING 1
Setting A
407
SETTING 2
Setting B
408
SETTING 3
Setting C
CUTTING FUNCTION ON
INFORMATION ADDITION POSITION FRONT ON
BEHIND OFF
NUMBER OF COLUMNS
1
SAVE
412
CANCEL
413
401
DOCUMENT NAME
NUMBER OF PAGES
NUMBER OF COPIES
Document1
500
1
ADDITIONAL INFORMATION 1
405
•setting A
•setting B
•setting C
•••
409
410
411

FIG. 5


START
ACQUIRE JOB DATA
S501
ACQUIRE JOB TICKET AND ADDITIONAL INFORMATION
S502
S503
IS THERE ADDITIONAL INFORMATION PAGE?
NO
YES
GENERATE PRIMARY IMAGE DATA
S504
S505
EXECUTION OF SECOND HALF-CUTTING?
NO
YES
GENERATE SECOND HALF-CUTTING INFORMATION, AND ACQUIRE AND TRANSMIT FIRST AND SECOND HALF-CUTTING INFORMATION
S506
GENERATE HALF-CUTTING IMAGE DATA, AND GENERATE SECONDARY IMAGE DATA
S507
RIP PROCESSING
S508
PRINTING
S509
END

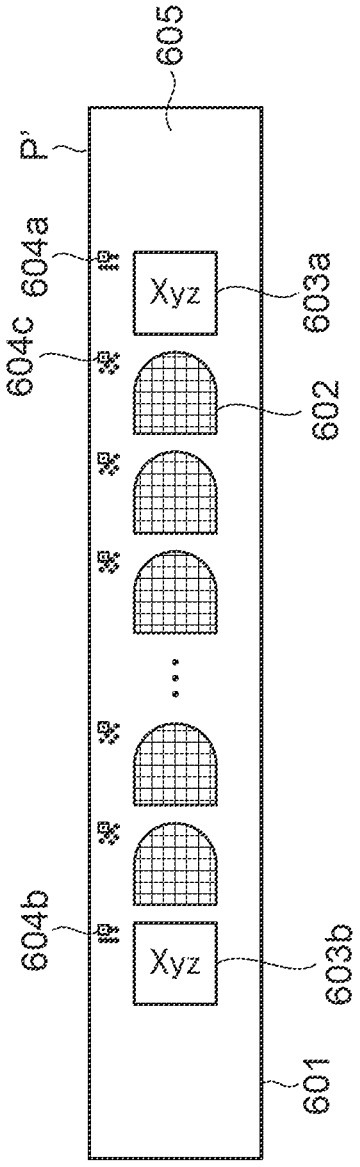


FIG. 6

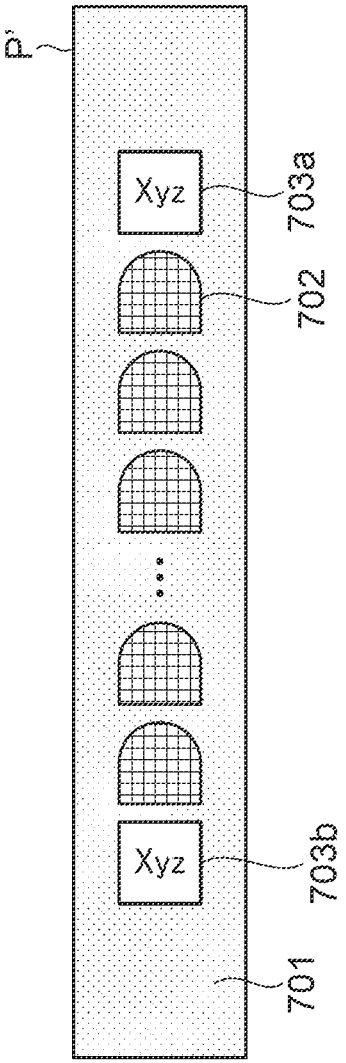


FIG. 7

FIG. 8

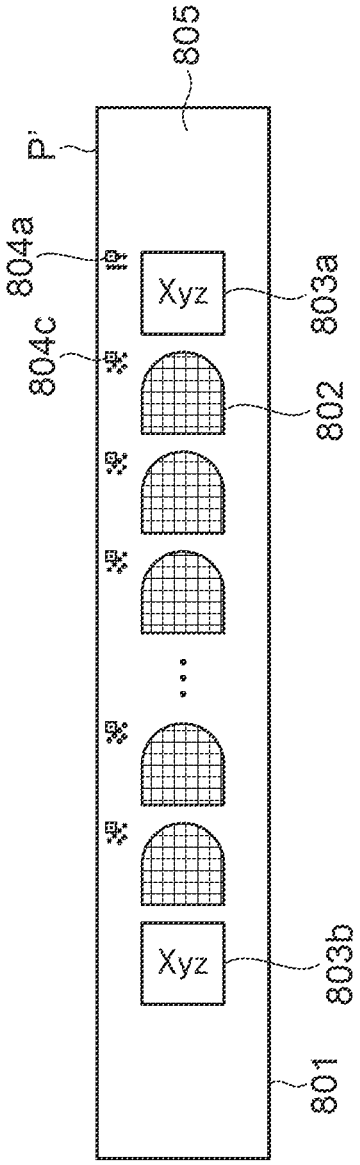


FIG. 9

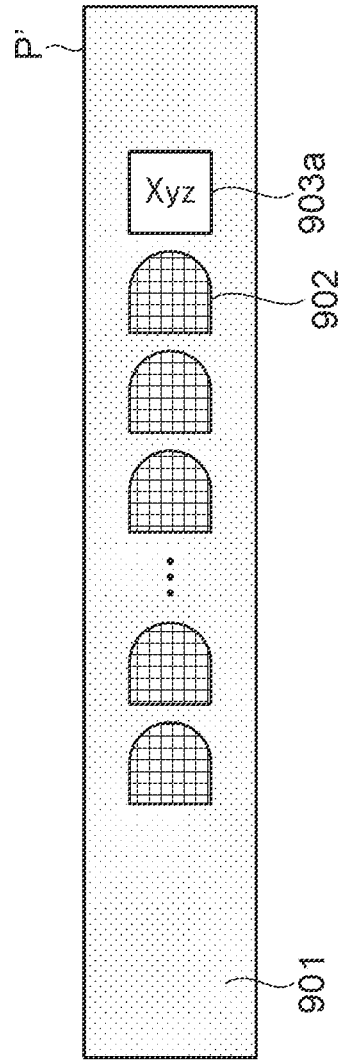
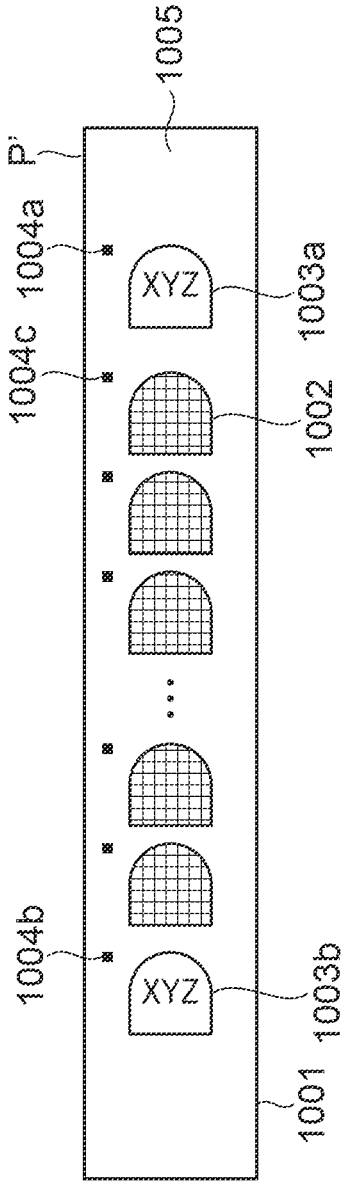


FIG. 10



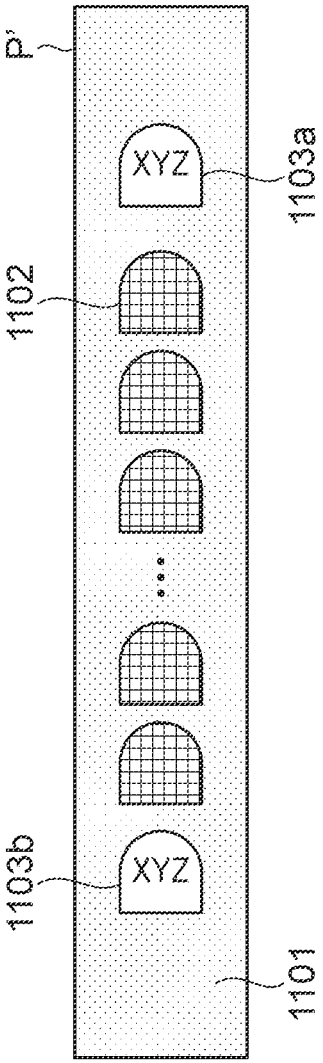


FIG. 11

FIG. 12

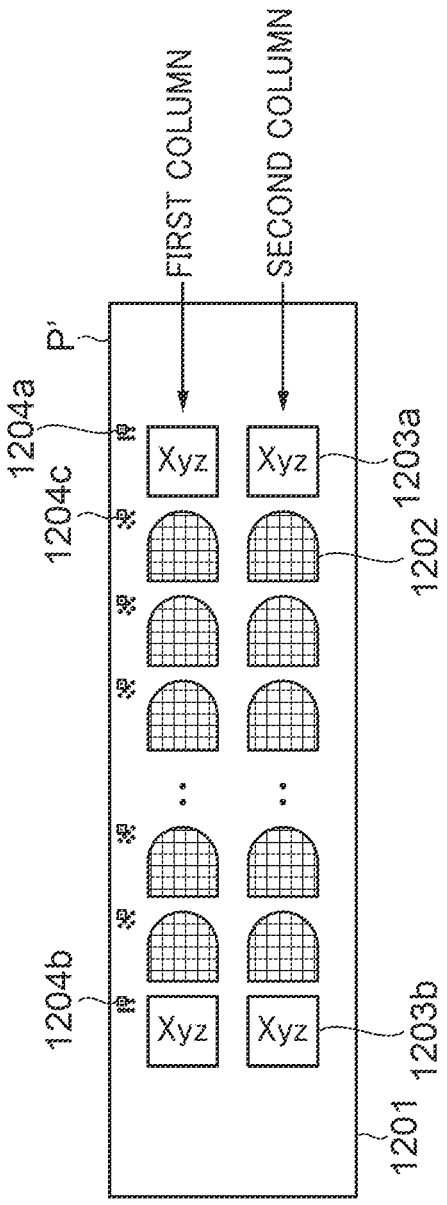

FIRST COLUMN
SECOND COLUMN
P'
1204a
1204c
1204b
Xyz
Xyz
Xyz
Xyz
1203a
1202
1203b
1201

FIG. 13

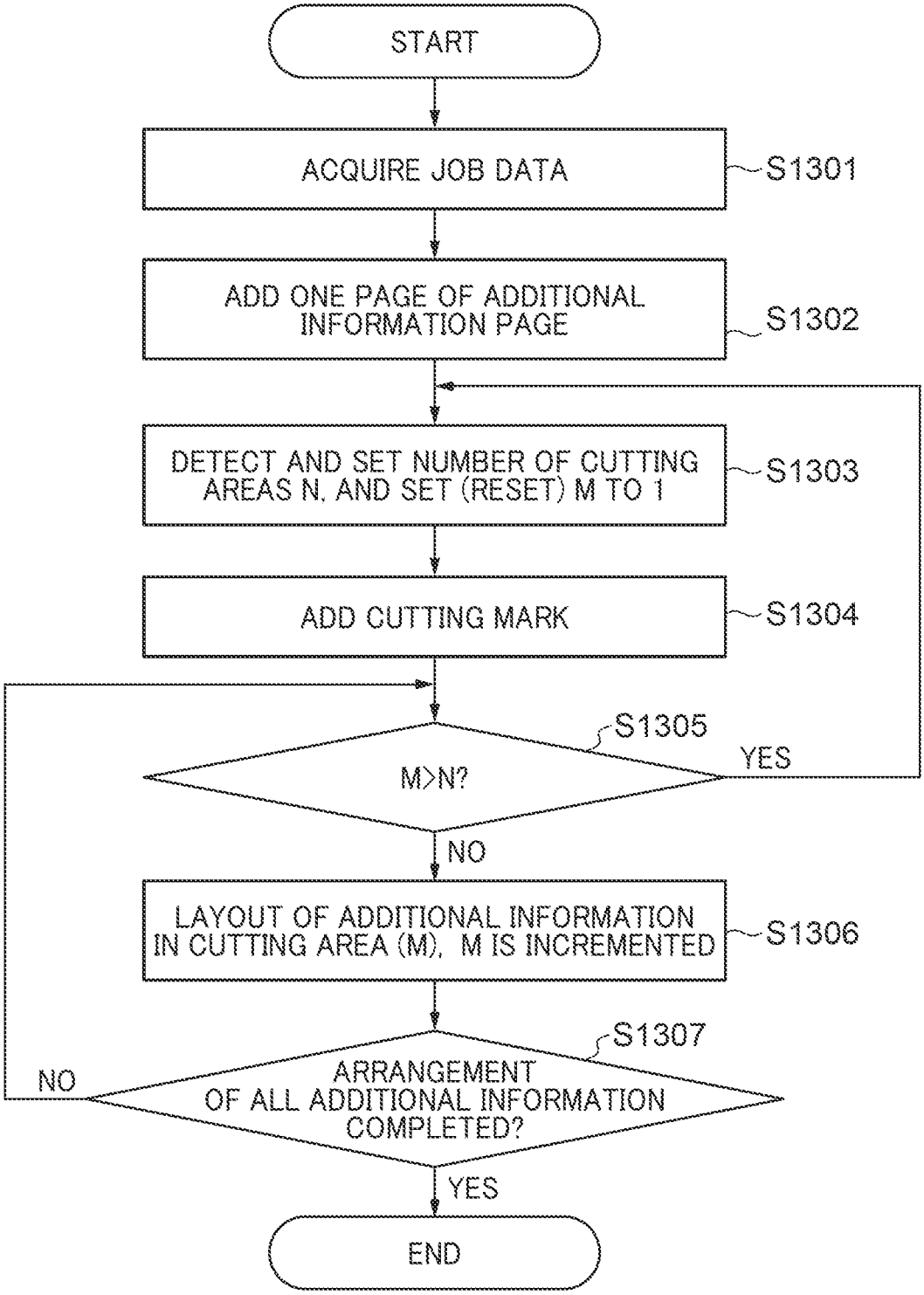

START
ACQUIRE JOB DATA
S1301
ADD ONE PAGE OF ADDITIONAL INFORMATION PAGE
S1302
DETECT AND SET NUMBER OF CUTTING AREAS N, AND SET (RESET) M TO 1
S1303
ADD CUTTING MARK
S1304
S1305
M>N?
YES
NO
LAYOUT OF ADDITIONAL INFORMATION IN CUTTING AREA (M), M IS INCREMENTED
S1306
S1307
ARRANGEMENT OF ALL ADDITIONAL INFORMATION COMPLETED?
NO
YES
END

FIG. 14

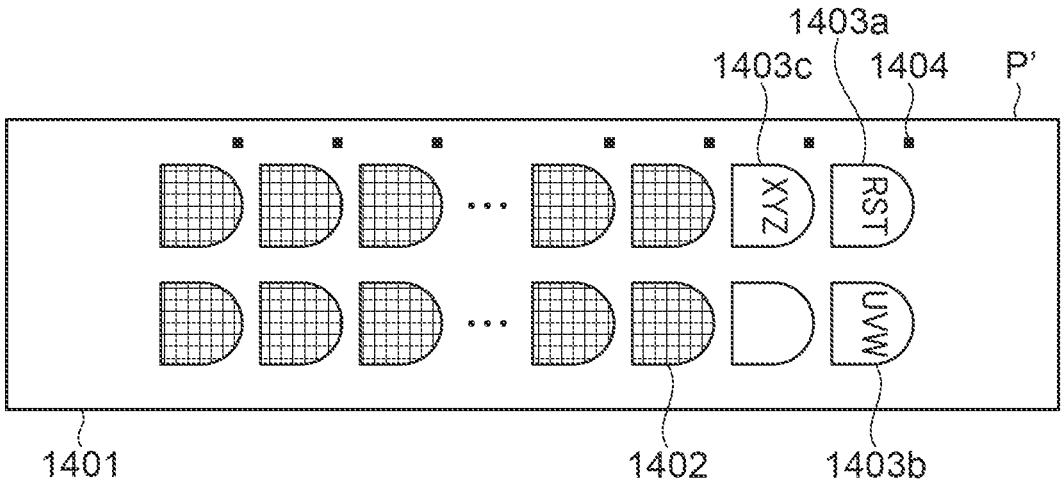


IMAGE FORMING APPARATUS THAT FORMS IMAGE FOR HALF-CUTTING, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an image forming apparatus that forms an image for half-cutting, a control method therefor, and a storage medium.

Description of the Related Art

[0002] Conventionally, regarding a technique of label printing on roll paper, there is a technique of adding, to a margin area excluding a label, additional information such as information on label manufacturing (for example, a manufacturer, a manufacturing date, and the like), information on a delivery form of roll paper, and the like. Then, by allowing a user to confirm this additional information, for example, it is possible to reduce an error in management work and to improve work efficiency. As a technique of adding additional information, for example, there is known an image forming apparatus described in Japanese Laid-Open Patent Publication (kokai) No. 2019-151028. The image forming apparatus performs setting related to the additional information, and adds the additional information based on the setting to roll paper. Generally, when the roll paper formed of seal paper and release paper is used, a label is printed on the seal paper, and then a post-process is performed. In the post-process, half-cut is performed on the periphery of the label and a removal operation is performed so as to remove a margin portion excluding the label. In the case of using a label generated by a method in which such a post-process is introduced, it is easy to attach the label to a commodity or the like using an automatic labeling machine.

[0003] However, in a case where additional information is described in the margin portion, there is a problem in that the additional information is removed along with margin portion when the removal operation is performed, and even if a user desires to confirm the additional information thereafter, the user cannot confirm the additional information.

SUMMARY OF THE INVENTION

[0004] The present invention provides an image forming apparatus capable of leaving a first image and a second image formed on seal paper as they are on release paper even when "a removal operation" of removing a margin portion of the seal paper is performed on an image forming paper, a control method therefor, and a storage medium.

[0005] Accordingly, the present invention provides an image forming apparatus that is configured to form an image related to half-cutting processing, in which only a periphery of the image on seal paper of image forming paper is cut without cutting release paper, the image forming paper including the seal paper having an adhesive surface and release paper capable of being peeled off from the adhesive surface, the image forming apparatus comprising an image forming part configured to form a first image and a second image indicating additional information related to the first image, on the seal paper of the image forming paper, one or more controllers configured to function as a setting unit configured to make setting related to the additional information, an acquisition unit configured to acquire first half-cutting information related to first half-cutting for leaving a portion of the first image in the seal paper on the release paper after the half-cutting processing is performed, and to acquire, second half-cutting information related to second half-cutting for leaving, based on the setting made, a portion of the second image in the seal paper on the release paper after the half-cutting processing is performed, and a control unit configured to control the image forming part to form, on the seal paper, the first image and the second image based on the setting.

[0006] According to the present invention, even when image forming paper is subjected to a removal operation of removing a margin portion of seal paper, a second image can be left on release paper as it is together with a first image formed on the seal paper.

[0007] Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** is a diagram showing an example of a schematic configuration of an image forming system according to a first embodiment.

[0009] FIG. **2** is a block diagram showing a hardware configuration of the image forming system shown in FIG. **1**.

[0010] FIG. **3** is a diagram showing an example of a job list (a print setting screen) displayed on an operation display part of an image forming apparatus.

[0011] FIG. **4** is a diagram showing an example of an additional information setting screen.

[0012] FIG. **5** is a flowchart showing an example of image forming processing.

[0013] FIG. **6** is a plan view showing an example of a product obtained by the image forming system according to the first embodiment.

[0014] FIG. **7** is a plan view showing a state after the product shown in FIG. **6** is processed by a half-cutting apparatus.

[0015] FIG. **8** is a plan view showing a first variation of the product obtained by the image forming system according to the first embodiment.

[0016] FIG. **9** is a plan view showing a state after the product shown in FIG. **8** is processed by the half-cutting apparatus.

[0017] FIG. **10** is a plan view showing a second variation of the product obtained by the image forming system according to the first embodiment.

[0018] FIG. **11** is a plan view showing a state after the product shown in FIG. **10** is processed by the half-cutting apparatus.

[0019] FIG. **12** is a plan view showing a third variation of the product obtained by the image forming system according to the first embodiment.

[0020] FIG. **13** is a flowchart showing an example of image forming processing according to a second embodiment.

[0021] FIG. **14** is a plan view showing an example of a product obtained by the image forming processing according to the second embodiment.

DESCRIPTION OF THE EMBODIMENTS

[0022] The present invention will now be described in detail below with reference to the accompanying drawings showing embodiments thereof. However, the configurations described in the following embodiments are merely examples, and the scope of the present invention is not limited by the configurations described in the respective embodiments. For example, each part constituting the present invention can be replaced with a part having any configuration capable of implementing a similar function. In addition, any component may be added. Any two or more configurations (features) of the respective embodiments can be combined.

[0023] A first embodiment will be described with reference to FIGS. **1** to **7**. FIG. **1** is a diagram showing an example of a schematic configuration of an image forming system **1** according to the first embodiment. The image forming system **1** shown in FIG. **1** is a system that forms an image on roll paper (continuous paper) P as image forming paper. The image forming system **1** includes a paper feeding apparatus **10**, an image forming apparatus **20**, and a winding apparatus **30** which are sequentially arranged in this order from the upstream side to the downstream side in the conveyance direction of the roll paper P. The paper feeding apparatus **10** and the image forming apparatus **20** are connected to each other, and the image forming apparatus **20** and the winding apparatus **30** are connected to each other. The roll paper P is wound around a paper tube in a roll shape. The roll paper P includes seal paper **601** having an adhesive surface, and release paper **701** that can be peeled off from the adhesive surface (refer to FIGS. **6** and **7**).

[0024] The paper feeding apparatus **10** is an apparatus that supplies the roll paper P to the image forming apparatus **20**. In the present embodiment, the paper feeding apparatus **10** includes a rotatable rotation shaft **11** disposed in parallel with the horizontal direction. The rotation shaft **11** supports the paper tube of the roll paper P and rotates together with the paper tube. Then, the roll paper P is conveyed toward the image forming apparatus **20** at a constant speed while being stretched via a plurality of rollers such as a conveyance roller(s) and a paper feeding roller(s).

[0025] The image forming apparatus **20** forms an image on the roll paper P supplied from the paper feeding apparatus **10**. Further, the image forming apparatus **20** conveys the roll paper P having the image formed thereon toward the winding apparatus **30**. The winding apparatus **30** is an apparatus that winds the roll paper P conveyed from the image forming apparatus **20** into a roll shape. In the present embodiment, the winding apparatus **30** includes a rotatable rotation shaft **31** disposed parallel with the horizontal direction. The rotation shaft **11** supports the paper tube used to wind the roll paper P and rotates together with the paper tube. The roll paper P supplied from the image forming apparatus **20** passes through a plurality of rollers such as a conveyance roller(s) and a paper discharging roller(s), and thereafter the roll paper P is wound in a roll shape at a constant speed around the paper tube supported by the rotation shaft **31**. As a result, a product P' obtained by forming an image on the roll paper P is held by the paper tube supported by the rotation shaft **31**.

[0026] FIG. **2** is a block diagram showing a hardware configuration of the image forming system **1** shown in FIG. **1**. In the present embodiment, the paper feeding apparatus **10** and the winding apparatus **30** are external apparatuses of the image forming apparatus **20**. As shown in FIG. **2**, the image forming apparatus **20** includes a paper conveying part **21**, an image forming part **22**, a communication part **23**, a control part (a control unit) **24**, a storage part **25**, an operation display part **26**, and a cutting information generating part **27**.

[0027] The paper conveying part **21** is a conveyance mechanism built in the image forming apparatus **20** and configured to convey the roll paper P. The paper conveying part **21** includes a plurality of rollers. These rollers rotate in the paper conveying part **21**, and whereby the roll paper P conveyed from the paper feeding apparatus **10** can be conveyed to the image forming part **22**, and the roll paper P having passed through the image forming part **22** can be conveyed to the winding apparatus **30**. The image forming part **22** executes an image forming job (hereinafter, may be simply referred to as a "job") to form an image based on image data on the seal paper **601** of the roll paper P supplied from the paper feeding apparatus **10**.

[0028] The image to be formed includes a first image and a second image. The "first image" is, for example, an image indicating a "recommended product", a "price label", or the like to be attached as a sticker (a label) to a commodity of a supermarket. In the example shown in FIG. **6**, a job image **602** corresponds to the first image. The "second image" is an image indicating information (additional information) related to the first image. The second image can be, for example, an image indicating the name of the first image (delivery form information), the date and time when the first image should be attached as a sticker, and the like. In the example shown in FIG. **6**, an additional image **603***a* and an additional image **603***b* correspond to the second image. It should be noted that each of the first image and the second image can be an image including a picture, a character, a symbol, or the like singly or in combination thereof.

[0029] The communication part **23** includes, for example, a communication control card such as a local area network (LAN) card. The communication part **23** transmits and receives various types of data to and from an external apparatus such as a personal computer (PC) or a half-cutting apparatus (post-processing machine) connected to a communication network such as a LAN or a wide area network (WAN).

[0030] The control part **24** includes, for example, a central processing unit (CPU), a random access memory (RAM), and the like. The CPU of the control part **24** reads various programs stored in the storage part **25**, loads the programs in the RAM, and executes various types of processing according to the loaded programs. Examples of the various programs include a system program and a program for causing the CPU (computer) to execute each means (unit) of the image forming apparatus **20** (a control method for the image forming apparatus). The storage part **25** includes, for example, a nonvolatile semiconductor memory (a so-called flash memory), a hard disk drive (HDD), or the like. In addition to the above-described various programs, the storage part **25** also stores various types of data and the like necessary for execution of each program.

[0031] The operation display part **26** includes, for example, a liquid crystal display (LCD) with a touch panel, and has a function as a display part **26***a* and a function as an operation part **26***b*. The display part **26***a* displays various types of information based on a display control signal input from the control part **24**. The operation part **26***b* includes

various operation keys such as a numeric keypad, receives various types of input operations by a user, and outputs an operation signal corresponding to the input operation to the control part **24**. The operation display part **26** also functions as a setting means (unit) (a setting process) configured to perform, for example, when a job is executed, setting related to additional information to be described later, that is, to perform a setting operation based on the additional information. The cutting information generating part **27** functions as a generation means (unit) configured to generate second half-cutting information to be described later based on the setting operation received on the operation display part **26**.

[0032] Next, image forming processing of forming an image on the roll paper P will be described. The image forming processing is performed in the image forming apparatus **20**. First, a user generates job data with, for example, a PC, which is an external apparatus, and performs print setting and delivery winding number setting for the job. The PC transmits the job data and a job ticket including information such as print setting and delivery winding number setting to the image forming apparatus **20** via the communication network. The control part **24** of the image forming apparatus **20** receives, via the communication part **23**, the job data and the job ticket including the information such as the print setting and the delivery winding number setting transmitted from the PC. Thereafter, the control part **24** displays a job list **300** shown in FIG. **3** on the operation display part **26**.

[0033] FIG. **3** is a diagram showing an example of a job list (a print setting screen) displayed on the operation display part of the image forming apparatus **20**. As shown in FIG. **3**, the job list **300** includes display items **301** to **304**. The display item **301** is a display area that displays a list of jobs has been submitted (input) to the image forming apparatus **204**. In the display item **301**, a list of jobs is displayed in order of submitted. Job information included in this job includes a document name, the number of pages, the number of copies, a paper type, and the like. A user can select a job included in the list in the display item **301** by operating an operation key of the operation part **26***b*.

[0034] Further, the job information is stored in the storage part **25**. The display item **302** is a button for deleting, from the storage part **25**, the job information and the like stored in the storage part **25**, when operated (pressed). The display item **303** is a button for performing setting related to additional information. When the display item **303** is operated (pressed), an additional information setting screen **400** shown in FIG. **4** is displayed on the operation display part **26**. On the additional information setting screen **400**, setting related to additional information of a job selected in the display item **301** can be made. The display item **304** is a button for starting image formation (printing) based on the job selected in the display item **301** when operated (pressed). As a result, image formation based on the additional information is performed.

[0035] FIG. **4** is a diagram showing an example of the additional information setting screen **400**. The additional information setting screen **400** is displayed on the operation display part **26** of the image forming apparatus **20** when the display item **303** in the job list **300** shown in FIG. **3** is pressed. The additional information setting screen **400** includes display items **401** to **413**. The display item **401** is a display area for displaying job information related to the job selected in the display item **301** of the job list **300**. The display item **402** is a button for adding one page of additional information when operated (pressed). That is, a unit of one addition of the additional information by operation of the display item **402** is expressed by "page" (an "additional information page"). It should be noted that the additional information for one page is printed as at least one second image (in the present embodiment, as one second image).

[0036] By operating the display item **403**, one additional information page to be set can be selected from one or more additional information pages including the additional information page added by the operation of the display item **402**. For example, one additional information page can be selected from a plurality of additional information pages by a pull-down operation of the display item **403**. The display item **404** is a button for deleting the additional information page selected by the display item **403**, when being operated (pressed). In the display item **405**, a preview of the additional information page (the additional information) selected by the display item **403** is displayed. As a result, a user can confirm the additional information page (the second image). Contents of the additional information included in the additional information page displayed on the preview in the display item **405** are individually designated (set) in the display item **406**, the display item **407**, and the display item **408**. The contents of the additional information to be set may be, for example, job information such as a document name or the number of pages, and/or may be any character string indicating delivery form information of the product P' or the name of the product P'.

[0037] The display item **409** is an item for selecting ON/OFF of a cutting function. A user can select ON/OFF of the cutting function by operating the display item **409**, that is, the user can select (set) whether or not to execute half-cutting using a half-cutting apparatus (not shown) (execution/non-execution of half-cutting). When the cutting function is turned ON, a half-cutting function is enabled. Here, the "half-cutting" (half-cutting processing) refers to processing of cutting, by using the half-cutting apparatus, only the periphery of an image on the seal paper **601** out of the seal paper **601** and the release paper **701** forming the roll paper P without cutting the release paper **701**. An image portion and a remaining surplus portion (a margin portion) are divided by performing the half-cutting, in the seal paper **601**. After the first image and the second image are formed, the roll paper P is conveyed to the half-cutting apparatus as the product P'.

[0038] The half-cutting apparatus can perform first half-cutting and second half-cutting. The "first half-cutting" is processing of leaving a portion of the first image on the seal paper **601** on the release paper **701**, after the above-mentioned half-cutting is performed. The first half-cutting is performed regardless of the selection in the display item **409** (that is, regardless of selection of "ON/OFF of the cutting function", that is, "execution/non-execution of the half-cutting"). The "second half-cutting" is processing of leaving a portion of the second image on the seal paper **601** on the release paper **701**, after the above-mentioned half-cutting is performed. The second half-cutting is performed in a case where ON of the cutting function is selected in the display item **409**.

[0039] Examples of the half-cutting apparatus include an apparatus that performs half-cutting using laser light, an apparatus that performs half-cutting using die cutting, and the like. The apparatus that performs half-cutting using laser

light can freely change a half-cutting shape surrounding an image. The apparatus that performs half-cutting using die cutting is effective in a case where a half-cutting shape surrounding an image is fixed. Then, in the product P' obtained by performing the first half-cutting and/or the second half-cutting on the roll paper P, a remaining surplus portion other than the first image and/or the second image in the seal paper **601** is removed, that is, processing called a "removal operation" is performed.

[0040] The display item **410** is an item for setting the position of the second image (the additional information) on the roll paper P. In the example shown in FIG. **4**, with respect to the first image (the job image), it is selectable any one of the arrangement of the second image on a part in front of the first image (hereinafter, also simply referred to as "in front of") in the conveyance direction of the roll paper P (hereinafter, also simply referred to as "conveyance direction"), the arrangement of the second image on a part behind the first image (hereinafter, also simply referred to as "behind") in the conveyance direction, and the arrangement of the second images on both in front of and behind the first image in the conveyance direction. The display item **411** is an item for setting the number of columns in the width direction of the roll paper P, each of the columns including pieces of additional information arranged. The display item **412** is a button for storing the contents set on the additional information setting screen **400** in the storage part **25** when being operated (pressed). The display item **413** is a button for canceling the contents set on the additional information setting screen **400** when being operated (pressed).

[0041] FIG. **5** is a flowchart showing an example of image forming processing. The image forming processing is executed by the control part **24** when printing is performed on the roll paper P. Namely, the image forming processing is a program stored in the storage part **25** and executed by the CPU of the control part **24**, and is started when a user selects one job in the display item **301** of the job list **300** and presses the display item **304**.

[0042] First, in step S**501**, the control part **24** acquires data of a job (job data) selected in the display item **301**. In step S**502**, the control part **24** acquires a job ticket of the job selected in the display item **301** and additional information set by a user on the additional information setting screen **400**.

[0043] In step S**503**, the control part **24** determines whether to add a second image (an image of an additional information page) to a first image (a job) (a delivery information image), based on information indicating whether or not there is the additional information (the additional information page) in the information acquired in step S**502**. In a case where it is determined in step S**503** that there is the additional information, that is, in a case where it is determined to add the second image, the processing proceeds to step S**504**. In a case where it is determined in step S**503** that there is no additional information, that is, in a case where it is determined not to add the second image, the processing proceeds to step S**508**.

[0044] In step S**504**, the control part **24** generates image data (primary image data) including the first image and the second image, based on the additional information acquired in step S**502**. The second image is to be arranged in front of the first image in the conveyance direction, to be arranged behind the first image in the conveyance direction, or to be arranged both in front of and behind the first image in the conveyance direction, according to selection (setting) on the display item **410** on the additional information setting screen **400**.

[0045] In step S**505**, the control part **24** determines whether to execute or not execute second half-cutting based on the information of ON/OFF of a cutting function in the additional information acquired in step S**502**. In a case where it is determined in step S**505** that the second half-cutting is to be executed, the processing proceeds to step S**506**. In a case where it is determined in step S**505** that the second half-cutting is not to be executed, the processing proceeds to step S**508**.

[0046] In step S**506**, the control part **24** controls the cutting information generating part **27** to generate second half-cutting information related to the second half-cutting. Then, the control part **24** acquires first half-cutting information related to first half-cutting, and acquires the second half-cutting information related to the second half-cutting from the cutting information generating part **27** (an acquisition process). The first half-cutting information is information indicating what shape should surround the first image in half-cutting. The second half-cutting information is information indicating what shape should surround the second image in the half-cutting.

[0047] The first half-cutting information is included in the job information in advance, for example, and is acquired from an external apparatus such as a PC. Further, the second half-cutting information is not limited to one acquired from the cutting information generating part **27**, and may be acquired from an external apparatus such as a PC. As described above, in the present embodiment, the control part **24** also functions as an acquisition means (unit) configured to acquire the first half-cutting information and the second half-cutting information. Further in step S**506**, the control part **24** transmits the first half-cutting information and the second half-cutting information to the half-cutting apparatus via the communication part (a transmission means (unit)) **23**.

[0048] In step S**507**, the control part **24** generates half-cutting image data including a first half-cutting image indicating the first half-cutting information and a second half-cutting image indicating the second half-cutting information. Then, the control part **24** generates secondary image data obtained by adding the half-cutting image data to the image data (the primary image data) generated in step S**504**. The first half-cutting image and the second half-cutting image are not particularly limited. For example, in a case where the half-cutting apparatus to be used is configured to be able to read an image, each half-cutting image indicating each half-cutting information can be an identification code such as a QR code (registered trademark).

[0049] In step S**508**, the control part **24** performs raster image processor (RIP) processing on the secondary image data generated in step S**507** to generate image data (image data for printing) of an image to be printed on the roll paper P.

[0050] In step S**509**, the control part **24** controls the image forming part **22** to print the image data generated in step S**508** on the roll paper P, and ends the processing (a control process). As a result, the roll paper P becomes the product P' on which the first image, the second image, the first half-cutting image, and the second half-cutting image are formed.

[0051] As described above, in a case where it is determined (selected) in step **S505** that the second half-cutting is not executed, the processing proceeds to step **S508**. In this case, the formation of the second half-cutting image is omitted. This omission is effective in a case where the second image may be removed together with the surplus portion at the time of the removal operation.

[0052] FIG. **6** is a plan view showing an example of the product P' obtained by the image forming system according to the first embodiment. As shown FIG. **6**, on the seal paper **601**, a plurality of job images **602** as a plurality of first images are arranged in a row in the longitudinal direction (the conveyance direction) of the seal paper **601**. In the seal paper **601**, an additional image **603***a* as a second image is arranged in front of the plurality of job images **602** in the conveyance direction, and an additional image **603***b* as a second image is arranged behind the plurality of job images **602** in the conveyance direction. The additional image **603***a* and the additional image **603***b* are the same image in the configuration shown in FIG. **6**, but are not limited thereto, and may be different from each other.

[0053] On the seal paper **601**, a QR code **604***c* as a first half-cutting image is arranged adjacently to each job image **602**. Further, on the seal paper **601**, a QR code **604***a* as a second half-cutting image is arranged adjacently to the additional image **603***a*, and a QR code **604***b* as a second half-cutting image is arranged adjacently to the additional image **603***b*. The QR codes **604***a* to **604***c* are arranged in a surplus portion (a margin portion) **605** of the seal paper **601**. The QR code **604***a* and the QR code **604***b* are the same QR code in a case where the additional image **603***a* and the additional image **603***b* are the same image, and are different QR codes in a case where the additional image **603***a* and the additional image **603***b* are different images.

[0054] FIG. **7** is a plan view showing a state after the product P' shown in FIG. **6** is processed by the half-cutting apparatus. The product P' shown in FIG. **7** is obtained by the product P' in FIG. **6** being subjected to a removal operation after the half-cutting. It should be noted that the half-cutting by the half-cutting apparatus is performed based on the QR codes **604***a* to **604***c*. On the release paper **701** of the product P' obtained by being subjected to the removal operation, job images **702** which are small pieces of the job images **602** formed by the removal operation, additional information **703***a* which is a small piece of the additional image **603***a* formed by the removal operation, and additional information **703***b* which is a small piece of the additional image **603***b* formed by the removal operation, remain.

[0055] As described above, even after the removal operation, in the product P', the additional image **603***a* and the additional image **603***b* remain on the release paper **701** as they are, together with the job image **602** formed on the seal paper **601**. As a result, it is possible for a user to manage, for example, the name (delivery form information) of the job image **702**, the date and time when the job image **702** to be attached as a sticker (a label), and the like by seeing the additional image **603***a* and the additional image **603***b*. It should be noted that the half-cutting shape of the job image **702** and the half-cutting shape of the additional information **703***a* and the additional information **703***b* are different from each other in the configuration shown in FIG. **7**, which does however not limit the present invention, and these half-cutting shapes may have the same shape. Further, in any case, an apparatus that performs half-cutting using a laser light can be used as the half-cutting apparatus.

[0056] A first variation of the first embodiment will be described with reference to FIGS. **8** and **9**. In the description of the first variation, differences from the above-described embodiment will be mainly described, and description of similar matters will be omitted.

[0057] FIG. **8** is a plan view showing a first variation of the product P' obtained by the image forming system **1** according to the first embodiment. As shown in FIG. **8**, on seal paper **801**, a plurality of job images **802** each as a plurality of first images, are arranged in a row in the longitudinal direction (the conveyance direction) of the seal paper **801**. Further, on the seal paper **801**, an additional image **803***a* is arranged in front of the plurality of job images **802** in the conveyance direction, and an additional image **803***b* is arranged behind the job images **802** in the conveyance direction. The additional image **803***a* is a second image. The additional image **803***b* is a third image that indicates additional information related to the first image and is handled differently from the second image. The third image is formed by the image forming part **22**. The additional image **803***a* and the additional image **803***b* are the same image in the configuration shown in FIG. **8**, which does however not limit the present invention, and the additional image **803***a* and the additional image **803***b* may be different from each other.

[0058] On the seal paper **801**, a QR code **804***c* as a first half-cutting image is arranged adjacently to each job image **802**. Further, on the seal paper **801**, a QR code **804***a* as a second half-cutting image is arranged adjacently to the additional image **803***a*. The QR code **804***a* and the QR codes **804***c* are arranged on a surplus portion (a margin portion) **805** of the seal paper **801**. In addition, the additional image **803***b* is also arranged on the surplus portion **805**. As a result, the additional image **803***b* is removed together with the QR code **804***a* and the QR codes **804***c* at the time of the removal operation.

[0059] FIG. **9** is a plan view showing a state after the product P' shown in FIG. **8** is processed by the half-cutting apparatus. The product P' shown in FIG. **9** is obtained by the product P' in FIG. **8** being subjected to a removal operation after the half-cutting. It should be noted that the half-cutting by the half-cutting apparatus is performed based on the QR code **804***a* and the QR codes **804***c*. On release paper **901** of the product P' obtained by being subjected to the removal operation, job images **902** which are small pieces of the job images **802** formed by the removal operation and additional information **903***a* which is a small piece of the additional image **803***a* formed by the removal operation, remain. It should be noted that the additional image **803***b* formed in the surplus portion **805** is removed by the removal operation. Such a first variation is effective in the case where "the additional image **803***b* is useful for a worker who handles the product P' in the state shown in FIG. **8**, whereas the additional image **803***b* is unnecessary or confusing for a worker who handles the product P' in the state shown in FIG. **9**".

[0060] A second variation of the first embodiment will be described with reference to FIGS. **10** and **11**. In the description of the second variation, differences from the above-described embodiment and the first variation will be mainly described, and description of similar matters will be omitted.

[0061] FIG. **10** is a plan view showing a second variation of the product P' obtained by the image forming system **1** according to the first embodiment. As shown in FIG. **10**, on seal paper **1001**, a plurality of job images **1002** as a plurality of first images are arranged in a row in the longitudinal direction (the conveyance direction) of the seal paper **1001**. Further, in the seal paper **1001**, an additional image **1003***a* as a second image is arranged in front of the plurality of job images **1002** in the conveyance direction, and an additional image **1003***b* as a second image is arranged behind the plurality of job images **1002** in the conveyance direction.

[0062] Further, on the seal paper **1001**, a cutting mark **1004***c* as a first half-cutting image is arranged adjacently to each job image **1002**. Further, on the seal paper **1001**, a cutting mark **1004***a* as a second half-cutting image is arranged adjacently to the additional image **1003***a*, and a cutting mark **1004***b* as a second half-cutting image is arranged adjacently to the additional image **1003***b*. The cutting marks **1004***a* to **1004***c* are arranged on a surplus portion (a margin portion) **1005** of the seal paper **1001**. The cutting marks **1004***a* to **1004***c* have the same shape (for example, a quadrangle).

[0063] FIG. **11** is a plan view showing a state after the product P' shown in FIG. is processed by the half-cutting apparatus. The product P' shown in FIG. **11** is obtained by the product P' in FIG. **10** being subjected to a removal operation after the half-cutting. It should be noted that the half-cutting by the half-cutting apparatus is performed based on any of the cutting marks **1004***a* to **1004***c*. On the release paper **1101** of the product P' obtained by being subjected to the removal operation, job images **1102** which are small pieces of the job images **1002** formed by the removal operation, additional information **1103***a* which is a small piece of the additional image **1003***a* formed by the removal operation, and additional information **1103***b* which is a small piece of the additional image **1003***b* formed by the removal operation, remain. It should be noted that, the cutting marks **1004***a* to **1004***c* have the same shape, and the half-cutting shape of the job image **1102** is therefore the same as the half-cutting shape of the additional information **1103***a* and the additional information **1103***b*. In this case, as the half-cutting apparatus, an apparatus that performs half-cutting by die cutting can be used.

[0064] A third variation of the first embodiment will be described with reference to FIG. **12**. In the description of the third variation, differences from the above-described embodiment and the first and second variations will be mainly described, and description of similar matters will be omitted.

[0065] FIG. **12** is a plan view showing a third variation of the product P' obtained by the image forming system **1** according to the first embodiment. As shown in FIG. **12**, a plurality of job images **1202** as a plurality of first images are formed on seal paper **1201** of the product P' in the longitudinal direction (the conveyance direction) of the seal paper **1201**, and the plurality of job images **1202** are arranged in two columns in the width direction of the seal paper **1201**. This arrangement in two columns is achieved by setting the number of columns to "2" in the display item **411** on the additional information setting screen **400** shown in FIG. **4**. Hereinafter, the upper column in FIG. **12** will be referred to as a "first column", and the lower column will be referred to as a "second column".

[0066] In each of the first column and the second column, an additional image **1203***a* as a second image is arranged in front of the plurality of job images **1202** in the conveyance direction, and an additional image **1203***b* as a second image is arranged behind the plurality of job images **1202** in the conveyance direction. Further, on the seal paper **1201**, a QR code **1204***c* as a first half-cutting image is arranged adjacently to each job image **1202** in the first column. Further, on the seal paper **1201**, a QR code **1204***a* as a second half-cutting image is arranged adjacently to the additional image **1203***a* in the first column, and a QR code **1204***b* as a second half-cutting image is arranged adjacently to the additional image **1203***b* in the first column. It should be noted that the QR codes **1204***a* to **1204***c* may be arranged also in the second column similarly to the first column.

[0067] As described above, in the third variation, the first image and the second image are treated as one set, and the set is arranged in a plurality of columns in the product P'. That is, the product P' of the third variation has a plurality of sets. Then, the product P' is cut between the first column and the second column (between adjacent sets), after the removal operation. Even after cutting, each column includes not only the job images **1202** as first images but also the additional image **1203***a* and the additional image **1203***b* each as a second image. As a result, it is possible for a user to perform the above-described management by confirming the additional image **1203***a* and the additional image **1203***b*.

[0068] A second embodiment will be described with reference to FIGS. **13** and **14**. In the description of the second embodiment, differences from the first embodiment described above will be mainly described, and description of similar matters will be omitted. In a case where additional information is character information, there is a possibility that it may be difficult to include all the character information in one second image depending on, for example, various conditions such as the size of the roll paper P, the size of the second image that can be formed on the roll paper P, the number of characters and/or the size of characters. In the present embodiment, a configuration and an operation of reducing such a difficulty will be described. That is, a description will be given of a configuration in which one piece of additional information is divided into a plurality of cutting areas and the plurality of cutting areas are arranged as a plurality of second images on the page 1 of the product P'.

[0069] FIG. **13** is a flowchart showing an example of image forming processing according to the second embodiment. The image forming processing is executed by the control part **24** when printing is performed on the roll paper P. Here, it is assumed that there is additional information. Here, it is assumed that a predetermined font size "X" is set for example. FIG. **14** is a plan view showing an example of the product P' obtained by the image forming processing according to the second embodiment. Here, as an example, it is assumed that the product P' (FIG. **14**) including a character string "RSTUVWXYZ" as one piece of additional information is obtained by the image forming processing according to the second embodiment.

[0070] First, in step S**1301**, the control part **24** acquires job data selected on the display item **301** of the job list **300**.

[0071] In step S**1302**, the control part **24** adds a job ticket of a job selected in the display item **301**, and one page of the additional information page set by a user on the display item **403** of the additional information setting screen **400**.

[0072] In step S**1303**, the control part **24** detects and sets the number (variable) of cutting areas N in the job image page, and sets a variable M to M=1 (start of "first loop" based on the processing in S**1305** (described later)). It should be noted that the variable M is "reset" to 1 for convenience in second and subsequent steps S**1303** to which the process returns from step S**1305** to be described later (second and subsequent loops based on the processing in S**1305** (described later)). Here, the number of cutting areas N is the number of label images (the number of columns) in one page. The variable M represents that "attention is being paid to a cutting area (M), which is a "M-th" cutting area, among the plurality of cutting areas obtained by dividing one piece of additional information". That is, "M=n" is satisfied when attention is being paid to the n-th cutting area among the plurality of cutting areas during the processing. In the product P' shown in FIG. **14**, job images **1402** as first images are arranged on seal paper **1401**. Here, the number of label images (the number of columns) in one page is two, that is, "the number of cutting areas N=2".

[0073] In step S**1304**, the control part **24** adds a cutting mark **1404** as a second half-cutting image adjacently to an additional information page as a second image.

[0074] In step S**1305**, the control part **24** determines whether or not "M>N" is satisfied. In a case where it is determined in step S**1305** that "M>N" is satisfied, the processing returns to step S**1303** (second and subsequent loops), and processes of step S**1303** and the subsequent steps are sequentially executed. On the other hand, in a case where it is determined in step S**1305** that "M>N" is not satisfied, the processing proceeds to step S**1306**. Here (in the first loop), attention is being paid to the first cutting area (M=1), and N is N=2, and it is therefore determined that "M>N" is not satisfied, and the processing proceeds to step S**1306**.

[0075] In step S**1306**, the control part **24** performs a layout of characters in the cutting area (M), which is the M-th cutting area in one page of the additional information page, by an amount of characters that are allowed to be included in the cutting area (M) with a predetermined font size X, and increments the variable M. In a case where the processing up to S**1305** is performed while attention is paid to a cutting area (1), the variable M is incremented in step S**1306**, and M=2 is obtained. That is, a cutting area (2) is a cutting area to which attention is paid from now on. It should be noted that, in the product P' shown in FIG. **14**, a cutting area **1403***a* is the first cutting area (1) (M=1) of the first page.

[0076] In step S**1307**, the control part **24** determines whether or not the arrangement of all the additional information is completed. In a case where it is determined in step S**1307** that the arrangement of all the additional information is completed, the processing ends. In a case where it is determined in step S**1307** that the arrangement of all the additional information is not completed, the processing returns to step S**1305**, and processes in step S**1305** and the subsequent steps are sequentially executed.

[0077] Here, it is assumed that all the additional information cannot be arranged yet (refer to FIG. **14**). In step S**1307**, it is determined that the arrangement of all the additional information is not completed, the processing returns to step S**1305**, and again, it is determined in step S**1305** whether or not "M>N" is satisfied. Then, according to M=2 and N=2, it is determined in step S**1305** that "M>N" is not satisfied, and the processing proceeds to step S**1306**. Then, in S**1306**, the variable M is incremented to M=3. That is, a cutting area (3) is a cutting area to which attention is paid from now on. It should be noted that, in the product P' shown in FIG. **14**, a cutting area **1403***b* is the second (M=2) cutting area (2) of the first page. Thereafter, it is determined that, even if the additional information is laid out in two (N=2) cutting areas in one page, not all the additional information has been arranged yet (NO in S**1307**), and the processing returns to step S**1305** again. Here, according to M=3 and N=2, it is determined in step S**1305** that "M>N" is satisfied, and the processing returns to step S**1303** (the end of the "first loop" based on the processing in S**1305**). Next, in S**1303** (in the second loop), M is reset to 1 (M=1). Thereafter, the processing in step S**1304** is executed again, and then, in step S**1305**, it is determined that "M>N" is not satisfied based on M=1 and N=2, and the processing proceeds to step S**1306**. Then, the additional information is laid out in the cutting area (3), that is, in the cutting area (1) of the second loop, and the variable M is incremented to be M=2 of the second loop. It should be noted that, in the product P' shown in FIG. **14**, a cutting area **1403***c* is the cutting area (3) (the cutting area (1) in the second loop). Then, the processing proceeds to step S**1307**, and it is determined that the arrangement of all the additional information is completed (that is, there is no cutting area (4) (M=2 is not satisfied in the second loop)), and the present processing ends.

[0078] As described above, one piece of additional information is divided into the plurality of (three in the present embodiment) cutting areas and arranged as the plurality of second images (the cutting areas **1403***a* to **1403***c*), whereby all the contents of the additional information can be arranged in the product P' with the predetermined font size X. In this way, in the present embodiment, the plurality of second images can be arranged, which makes it possible that, in a case where all the additional information cannot be included in one second image due to various conditions, one piece of additional information can be distributed, allocated and displayed (formed) on the plurality of second images. As a result, a user can confirm the additional information without excess or deficiency.

[0079] Although the preferred embodiments of the present invention have been described above, the present invention is not limited to the above-described embodiments. For example, although roll paper is used as image forming paper in each of the embodiments, the image forming paper is not limited thereto, and for example, image forming paper having various sizes such as an A size and a B size can also be used.

Other Embodiments

[0080] Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) recorded on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more

circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)™), a flash memory device, a memory card, and the like.

[0081] While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

[0082] This application claims the benefit of Japanese Patent Application No. 2022-169288, filed Oct. 21, 2022, which is hereby incorporated by reference wherein in its entirety.

What is claimed is:

1. An image forming apparatus that is configured to form an image related to half-cutting processing, in which a periphery of the image on seal paper of image forming paper is cut without cutting release paper, the image forming paper including the seal paper having an adhesive surface and the release paper capable of being peeled off from the adhesive surface,

the image forming apparatus comprising:

an image forming part configured to form a first image and a second image indicating additional information related to the first image, on the seal paper of the image forming paper;

one or more controllers configured to function as:

a setting unit configured to make setting related to the additional information;

an acquisition unit configured to acquire first half-cutting information related to first half-cutting for leaving a portion of the first image in the seal paper on the release paper after the half-cutting processing is performed, and to acquire, second half-cutting information related to second half-cutting for leaving, based on the setting made, a portion of the second image in the seal paper on the release paper after the half-cutting processing is performed; and

a control unit configured to control the image forming part to form, on the seal paper, the first image and the second image based on the setting.

2. The image forming apparatus according to claim **1**, wherein the one or more controllers further function as

a generation unit configured to generate, based on the setting, the second half-cutting information,

wherein the acquisition unit acquires the second half-cutting information from the generation unit.

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

the control unit controls the image forming part to form, on the seal paper, a first half-cutting image indicating the first half-cutting information and a second half-cutting image indicating the second half-cutting information.

4. The image forming apparatus according to claim **3**, wherein

the first half-cutting image and the second half-cutting image are read by a half-cutting apparatus that performs the first half-cutting and the second half-cutting.

5. The image forming apparatus according to claim **3**, wherein

the setting unit is further configured to select, as the setting, execution of the second half-cutting or non-execution of the second half-cutting, and

in a case where the non-execution of the second half-cutting is selected, the control unit omits formation of the second half-cutting image.

6. The image forming apparatus according to claim **1**, wherein the one or more controllers further function as

a transmission unit configured to transmit the first half-cutting information and the second half-cutting information, to a half-cutting apparatus that performs the first half-cutting and the second half-cutting.

7. The image forming apparatus according to claim **1**, wherein

the image forming part is further configured to form a third image indicating the additional information related to the first image and being handled differently from the second image, and

the control unit forms the third image on a surplus portion of the seal paper, which is peelable from the release paper when the first half-cutting and the second half-cutting are performed.

8. The image forming apparatus according to claim **1**, wherein

the control unit handles, as one set, the first image and the second image, and arranges a plurality of the sets and form the plurality of the sets on the seal paper, and

the image forming paper having the first image and the second image formed thereon is cut between adjacent sets.

9. The image forming apparatus according to claim **1**, wherein

the control unit is configured to arrange and form a plurality of the second images on the seal paper, wherein the control unit distributes and allocates one piece of the additional information on the plurality of second images.

10. The image forming apparatus according to claim **1**, wherein

roll paper is used as the image forming paper.

11. A control method for an image forming apparatus that is configured to form an image related to half-cutting processing and includes an image forming part configured to form a first image and a second image indicating additional information related to the first image, on seal paper of image forming paper, the image forming paper including the seal paper having an adhesive surface and release paper capable of being peeled off from the adhesive surface, wherein the half-cutting processing cuts a periphery of the image on the seal paper of the image forming paper without cutting the release paper,

the control method comprising:

making setting related to the additional information;

acquiring first half-cutting information related to first half-cutting for leaving a portion of the first image in the seal paper on the release paper after the half-cutting processing is performed, and acquiring second half-cutting information related to second half-cutting for leaving, based on the setting made, a portion of the second image in the seal paper on the release paper after the half-cutting processing is performed; and

controlling the image forming part to form, on the seal paper, the first image and the second image based on the setting.

12. A non-transitory storage medium storing a program for causing a computer to execute a control method for an image forming apparatus that is configured to form an image related to half-cutting processing and includes an image forming part configured to form a first image and a second image indicating additional information related to the first image, on seal paper of image forming paper, the image forming paper including the seal paper having an adhesive surface and release paper capable of being peeled off from the adhesive surface, wherein the half-cutting processing cuts a periphery of the image on the seal paper of the image forming paper without cutting the release paper,

the control method comprising:

making setting related to the additional information;

acquiring first half-cutting information related to first half-cutting for leaving a portion of the first image in the seal paper on the release paper after the half-cutting processing is performed, and acquiring second half-cutting information related to second half-cutting for leaving, based on the setting made, a portion of the second image in the seal paper on the release paper after the half-cutting processing is performed; and

controlling the image forming part to form, on the seal paper, the first image and the second image based on the setting.

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