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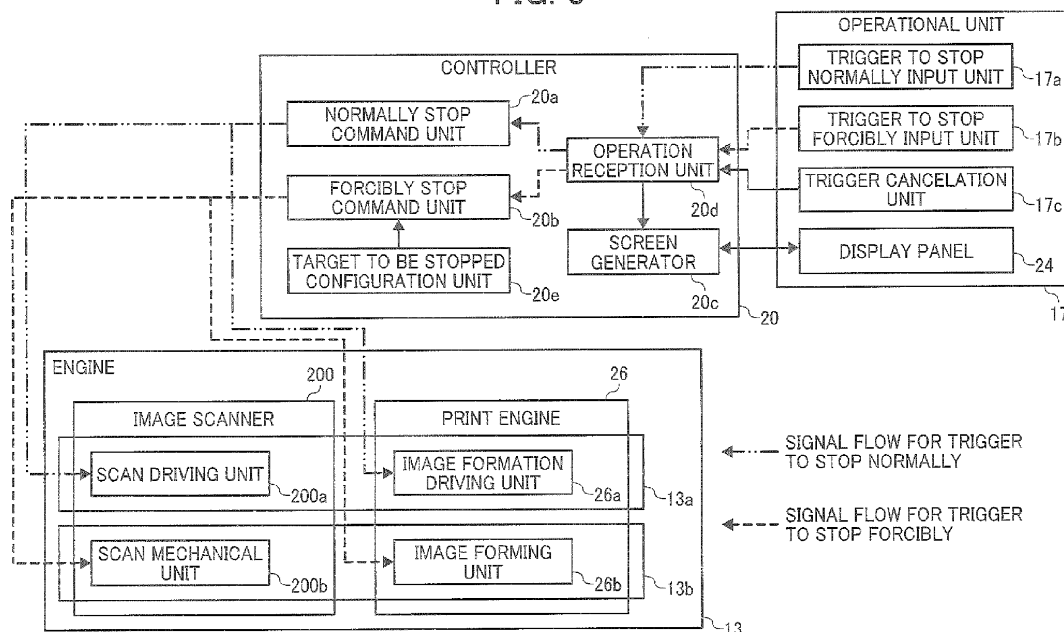
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(54) **Image forming apparatus, method of stopping operation, and recording medium storing a program for stopping operation**

(57) An image forming apparatus, a method of stopping operation, and a program stored on a recording medium are provided. An image forming apparatus (1) includes an image processing mechanical unit (26b, 200b) that realizes an image processing function, an image processing driver (26a, 200a) that drives the image processing mechanical unit (26b, 200b) in accordance with operating status of the image forming apparatus (1), an operation reception unit (20d) that acquires information in accordance with user operation on an operational

unit (17), a normally stop command unit (20a) that outputs a signal that commands to stop image processing operation to the image processing driver (26a, 200a) if the information acquired by the operation reception unit (20d) relates to normally stop operation, and a forcibly stop command unit (20b) that outputs a signal that commands to stop currently-executed image processing operation to the image processing mechanical unit (26b, 200b) if the information acquired by the operational reception unit (20d) relates to forcibly stop operation.

FIG. 3



Description

BACKGROUND

Technical Field

[0001] The present invention relates to an image forming apparatus, method of stopping operation, and recording medium storing a program for stopping operation.

Background Art

[0002] With increased computerization of information, image processing apparatuses such as printers and facsimiles used for outputting the computerized information and scanners used for computerizing documents have become indispensable. In most cases, these image processing apparatuses are configured as multifunctional peripherals (MFPs) that can be used as printers, facsimiles, scanners, or copiers by implementing an image pick-up function, image forming function, and communication function, etc.

[0003] Among these kinds of image processing apparatuses, in image forming apparatuses used for outputting computerized images, various configurations such as an image forming mechanism that performs forming and outputting images and a feeding mechanism that feeds paper as a medium on which images are output are operating mechanically. Therefore, regarding control of stopping operations of the apparatus, various processes are configured to prevent the apparatus from causing troubles.

[0004] For example, JP-2012-086450-A proposes an image forming apparatus in which a drawing process module and an image process module are connected serially. In case of receiving a forcibly stopping request during a print processing, a stopping output destination determining unit of the image forming apparatus determines whether or not the latter image process module is stoppable. If the image process module is unstoppable in case of receiving the forcibly stop request, the image process module finishes processing after performing image processing using pixel data of predetermined color value for the number of unprocessed pixels. By contrast, if the image process module is stoppable in case of receiving the forcibly stop request, the image process module is stopped immediately to fulfill an urgent stop request quickly.

[0005] In the image forming apparatus described in JP-2012-086450-A, in stopping a currently executed job forcibly, first, the former drawing module stops operating by a trigger of one stop request, and next, the latter image processing module stops operating by passing the trigger to the later image processing module. Consequently, a control of passing the trigger gets complicated since the trigger to stop the job currently executed by the latter image module is received via the former drawing module.

[0006] In the following description, an image forming

apparatus that simplifies a control process for stopping a currently executed job forcibly is provided.

SUMMARY

[0007] An example embodiment of the present invention provides an image forming apparatus that includes an image processing mechanical unit that realizes an image processing function, an image processing driver that drives the image processing mechanical unit in accordance with operating status of the image forming apparatus, an operation accepting unit that acquires information in accordance with user operation on an operational unit, a normally stop command unit that outputs a signal that commands to stop image processing operation to the image processing driver if the information acquired by the operation reception unit (20d) relates to normally stop operation, and a forcibly stop command unit that outputs a signal that commands to stop currently executed image processing operation to the image processing mechanical unit if the information acquired by the operational reception unit (20d) relates to forcibly stop operation.

[0008] An example embodiment of the present invention includes a method of stopping operation of the image forming apparatus, and a recording medium storing a program that causes the computer to implement the method of stopping operation of the image forming apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A more complete appreciation of the disclosure and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings.

FIG. 1 is a block diagram illustrating a hardware configuration of an image forming apparatus as an embodiment of the present invention.

FIG. 2 is a block diagram illustrating a functional configuration of the image forming apparatus as an embodiment of the present invention.

FIG. 3 is a block diagram illustrating a functional configuration for an operation stopping process as an embodiment of the present invention.

FIG. 4 is a perspective diagram illustrating an exterior configuration of an inkjet forming apparatus as an embodiment of the present invention.

FIG. 5 is a cross-sectional profile diagram illustrating the inkjet forming apparatus as an embodiment of the present invention

FIG 6 is a flowchart illustrating flow of a process performed by the image forming apparatus as an embodiment of the present invention.

FIG 7 is a flowchart illustrating a stoppmg operation

performed by the image forming apparatus as an embodiment of the present invention.

FIG. 8A is a diagram illustrating a forcibly stop selection screen, FIG 8B is a diagram illustrating a forcibly stop execution screen, FIG 8C is a diagram illustrating an uncharged forcibly stop notification screen, and FIG 8D is a diagram illustrating a charged forcibly stop notification screen as an embodiment of the present invention.

FIG. 9 is a flowchart illustrating a flow of stopping operation without a displaying process as an embodiment of the present invention.

DETAILED DESCRIPTION

[0010] In describing preferred embodiments illustrated in the drawings, specific terminology is employed for the sake of clarity. However, the disclosure of this patent specification is not intended to be limited to the specific terminology so selected, and it is to be understood that each specific element includes all technical equivalents that have the same function, operate in a similar manner, and achieve a similar result.

[0011] In the following embodiment, in an image forming apparatus as a MFP a control in the case of stopping operation of the apparatus forcibly is described in detail with reference to figures.

[0012] FIG. 1 is a block diagram illustrating a hardware configuration of the image forming apparatus. As shown in FIG 1, the information processing apparatus in this embodiment includes an engine that performs forming an image in addition to the same configuration as information processing apparatuses such as a general server or a personal computer (PC) etc

[0013] That is in the image forming apparatus 1 in this embodiment, a Central Processing Unit (CPU) 10, a Random Access Memory (RAM) 11, a Read Only Memory (ROM) 12, an engine 13, a hard disk drive (HDD) 14, and an interface (I/F) 15 are connected with each other via a bus 18. In addition, a Liquid Crystal Display(LCD) 16 and an operational unit 17 are connected to the I/F 15.

[0014] The CPU 10 is a processor and controls the whole operation of the information processing apparatus. The RAM 11 is a volatile storage device that can read/write information at high speed and is used as a work area when the CPU 10 processes information. The ROM 12 is a read-only nonvolatile storage device and stores programs such as firmware. The engine 13 performs forming and processing an image actually in the image forming apparatus 1.

[0015] The HDD 14 is a nonvolatile storage device that can read/write information and stores an operating system (OS), various control programs, and application programs etc. The I/F 15 connects the bus 18 with various hardware and network etc. and controls them. The LCD 16 is a visual user interface to check status of the image forming apparatus 1. The operational unit 17 is a user interface such as a keyboard, mouse, various hardware

buttons, and touch panel to input information to the image forming apparatus 1.

[0016] In this hardware configuration described above, programs stored in storage devices such as the ROM 12, HDD 14, and optical discs (not shown in figures) are read to the RAM 11, and a software controlling unit is constructed by executing operation in accordance with the programs by the CPU 10. Functional blocks that implement functions of the image forming apparatus 1 of this embodiment are constructed by a combination of the software controlling units described above and hardware.

[0017] Next, functions of the image forming apparatus 1 in this embodiment are described below with reference to FIG. 2. FIG. 2 is a block diagram illustrating a functional configuration of the image forming apparatus 1. As shown in FIG. 2, the image forming apparatus 1 includes a controller 20, an Auto Document Feeder (ADF) 21, a scanner unit 22, a paper output tray 23, a display panel 24, a paper feeder 25, a print engine 26, a paper output tray 27, and a network I/F 28. The image forming apparatus 1 includes an inkjet forming unit that forms an image by an inkjet recording method that uses roll sheet as an image forming mechanism. In this case, the paper feeder 25 and the print engine 26 are included in an inkjet forming unit 100. Also, the ADF 21 and the scanner unit 22 are included in an image scanning unit 200.

[0018] The controller 20 includes a main controller 30, an engine controller 31, an input/output controller 32, an image processor 33, and an operational display controller 34. As shown in FIG. 2, the image forming apparatus 1 in this embodiment is constructed as the MFP that includes the scanner unit 22 and the print engine 26. In FIG. 2, solid arrows indicate electrical connections, and dashed arrows indicate flow of paper.

[0019] The display panel 24 is both an output interface that displays status of the image forming apparatus 1 visually and an input interface (operational unit) to operate the image forming apparatus 1 directly or input information to the image forming apparatus 1. The network I/F 28 is an interface that the image forming apparatus 1 communicates with other apparatuses via a network, and Ethernet and Universal Serial Bus (USB) interface are used for the network I/F 18.

[0020] The controller 20 combines software (including an operation stopping program that executes an operation stopping method for the image forming apparatus 1) and hardware. In particular, control programs such as firmware stored in nonvolatile storage devices such as the ROM 12, nonvolatile memory devices, the HDD 14, and optical disks are loaded into volatile memory device such as the RAM 11 (hereinafter referred to as "memory"), and the software controlling unit is implemented by executing operations by the CPU 10 in accordance with the programs. The controller 20 is constructed of the software controlling unit and hardware such as integrated circuits. The controller 20 functions as a controller that controls the whole part of the image forming apparatus 1.

[0021] The main controller 30 controls each unit included in the controller 20 and sends commands to each unit in the controller 20. The engine controller 31 controls and drives the print engine 26, the ADF 21, and the scanner unit 22 etc.

[0022] The input/output controller 32 inputs signals and commands input via the network I/F 28 to the main controller 30. In addition, the main controller 30 controls the input/output controller 32 and accesses other apparatuses via the network I/F 18.

[0023] The image processor 33 generates drawing information based on print information included in an input print job under the control of the main controller 30. The drawing information is information that the print engine 26 as an image forming unit draws as an image to be formed in an image forming operation. The print information included in the print job is image information converted by a printer driver installed in the image processing apparatus such as the PC to a format recognizable by the image forming apparatus 1. The operational display controller 34 displays information on the display panel 24 and reports information input via the display panel 24 to the main controller 30. That is, the main controller 30 and the operational display controller 34 consist of an operation acceptance unit.

[0024] If the image forming apparatus 1 functions as the printer, first, the input output controller 32 receives a print job via the network I/F 28. The input/output controller 32 transfers the received print job to the main controller 30. After receiving the print job, the main controller 30 generates the drawing information based on the document information and image information included in the print job by controlling the image generator 33.

[0025] After the image generator 33 generates the drawing information, the engine controller 31 executes forming an image on roll sheet carried from the paper feeder 25 in the inkjet forming unit 100 based on the generated drawing information. That is, the inkjet forming unit 100 functions as the print engine 26. After the print engine 26 forms the image on the roll sheet, the roll sheet is ejected on the paper output tray 27.

[0026] If the image forming apparatus 1 functions as a scanner, in response to a command to execute scanning input by operation on the display panel 24 or from an external apparatus such as the PC via the network I/F 28, the operational display controller 34 or the input/output controller 32 transfers a signal to execute scanning to the main controller 30. The main controller 30 controls the engine controller 31 based on the received signal to execute scanning.

[0027] The engine controller 31 drives the ADF 21 and carries a document to be scanned set on the ADF 21 to the scanner unit 22. In addition, the engine controller 31 drives the scanner unit 22 and scans the document carried from the ADF 21. If the document is not set on the ADF 21 and the document is set on the scanner unit 22 directly, the scanner unit 22 scans the set document under the control of the engine controller 31. That is, the

ADF 21 and the scanner unit 22 functions as an image pickup engine.

[0028] In scanning operation, an image pickup device such as CCD included in the scanner unit 22 scans the document optically, and image pickup information is generated based on the optical information. The engine controller 31 transfers the image pickup information generated by the scanner unit 22 to the image processor 33. The image processor 33 generates the image information based on the image pickup information received from the engine controller 31 under the control of the main controller 30.

[0029] The image information generated by the image processor 33 is either stored in the HDD 14 etc. as is or transferred to an external apparatus by the input/output controller 32 via the network I/F 18 depending on the user instruction.

[0030] If the image forming apparatus 1 functions as a copier, the image processor 33 generates the drawing information based on either the image pickup information received from the scanner unit 22 by the engine controller 31 or the image information generated by the image processor 33. Similarly as the printer operation, the engine controller 31 drives the print engine 26 based on the drawing information.

[0031] Next, configuration for a process of stopping operation of the image forming apparatus in this embodiment is described below with reference to FIG. 3. FIG. 3 is a block diagram illustrating a functional configuration for the operation stopping process.

[0032] There are two types of stopping operation of the image forming apparatus. One is "normal stopping operation" that cancels a job that waits for executing (also referred to as "following job"), and the other is "forcibly stopping operation" that stops a job executed currently. In this embodiment, it is assumed that, after canceling the following job by inputting the normal stopping operation, the job executed currently is stopped by inputting the forcibly stopping operation.

[0033] Instructions to execute the normal stopping operation and the forcibly stopping operation are input from the operational unit 17. As a configuration for that purpose, the operational unit 17 includes a trigger to stop normally input unit 17a for inputting an instruction to cancel a job that waits for executing, a trigger to stop forcibly input unit 17b for inputting an instruction to stop a job executed currently, and a trigger cancellation unit 17c for inputting an instruction to interrupt an operation to stop the job executed currently (shown as "trigger cancellation" in FIG. 3). The trigger to stop normally input unit 17a can be configured by using either a software button displayed on the display panel 24 or a hardware button mounted on a case surface of the image forming apparatus 1. In addition, if the image forming apparatus 1 is used as a network printer, the trigger to stop normally input unit 17a can be configured by selecting job cancellation on a confirmation screen of a print job. By contrast, the trigger to stop forcibly input unit 17b is configured by

using a software button in a screen displayed on the display panel 24 after the trigger to stop normally input unit 17a is operated. The trigger cancelation unit 17c is configured by using a software button in a screen displayed during forcibly stopping operation. If the trigger cancelation unit 17c is operated, the image processing operation stopped normally or forcibly can be resumed. Timing of the input operation on the trigger to stop forcibly input unit 17b and the trigger cancelation unit 17c is controlled by configuring the trigger to stop forcibly input unit 17b and the trigger cancelation unit 17c using the software button in a screen and controlling timing of displaying the screen.

[0034] In this embodiment, the engine 13 (shown in FIG. 1) is included as an image processing unit. The engine 13 includes an image processing mechanical unit 13b as a mechanical configuration that realizes the image processing function and an image processing drive unit 13a that drives the image processing mechanical unit 13b.

[0035] The image forming apparatus 1 in this embodiment includes a print engine 26 and an image scanning unit 200 as shown in FIG. 2. The print engine 26 realizes formation and output of an image, and the image scanning unit 200 realizes a document scanning function.

[0036] The print engine 26 includes an image formation driving unit 26a (also referred to as "plotter controller") and an image forming unit 26b (also referred to as "plotter") as an image processing mechanical unit.

[0037] The image formation driving unit 26a consists of combination of software and hardware that controls operation of the image forming unit 26b. The image formation driving unit 26a stores a job that waits for being executed by the image forming unit 26b.

[0038] The image forming unit 26b executes forming and outputting an image on a recording medium for images and includes paper carrying mechanism and printing mechanism.

[0039] The image scanning unit 200 includes a scanning driver 200a (also referred to as "scanning unit controller") and a scanning mechanism unit 200b.

[0040] The scanning mechanism unit 200b is a mechanical configuration that realizes a document scanning function and image pickup information generating function. For example, a document carrying mechanism in the ADF 21 and hardware that includes optical components such as an image sensor and light source in the scanning unit 22 correspond to the scanning mechanism unit 200b.

[0041] The scanning driver 200a acquires image pickup information by driving the scanning mechanism unit 200b and consists of the scanning driver. The scanning driver 200a consists of combination of software and hardware and controls each part in the scanning mechanism unit 200b. The scanning driver 200a stores a job that waits for being executed by the scanning mechanism unit 200b.

[0042] The image formation driving unit 26a and the

scanning driver 200a are included in the image processing drive unit 13a, and the image forming unit 26b and the scanning mechanism unit 200b are included in the image processing mechanical unit 13b.

[0043] The controller 20 includes a normal stop instruction unit 20a, a forcibly stop instruction unit 20b, a screen generator 20c, an operation acceptance unit 20d, and a stop target configuration unit 20e as a configuration for controlling normal stop operation and forcibly stop operation. The normal stop instruction unit 20a is electrically connected to units that store following job data (that is, each of the image formation driving unit 26a and the scanning mechanism unit 200b in FIG. 3). The screen generator 20c generates screens displayed on the display panel 24 in accordance with status executing normal stop operation and forcibly stop operation. Screens generated by the screen generator 20c will be described later in detail with the reference to FIG. 8.

[0044] The operation acceptance unit 20d acquires information in accordance with input operation on the trigger to stop normally input unit 17a and the trigger to stop forcibly input unit 17b (electric signal that indicates which one is operated, the trigger to stop normally input unit 17a or the trigger to stop forcibly input unit 17b) and generates and outputs a trigger signal in accordance with each input operation.

[0045] In case of including the print engine 26 and the image scanning unit 200 as the image processing mechanism (corresponding to the engine 13), the stop target configuration unit 20e configures that either or both of the print engine 26 or the image scanning unit 200 is stopped forcibly. The stop target configuration unit 20e is electrically connected to the forcibly stop instruction unit 20b, and the forcibly stop instruction unit 20b outputs an instruction necessary for stopping forcibly only to the unit configured by the stop target configuration unit 20e.

[0046] The combination of the main controller 30 and the engine controller 31 consists of the normal stop instruction unit 20a and the forcibly stop instruction unit 20b and the combination of the main controller 30 and the optional display controller 34 consists of the screen generator 20c, the operation acceptance unit 20d, and the stop target configuration unit 20e.

[0047] If the trigger to stop normally input unit 17a is operated (corresponding to input operation of the trigger to stop normally), the operation acceptance unit 20d acquires information in accordance with the input operation on the trigger to stop normally input unit 17a and generates the trigger to stop normally. The trigger to stop normally is output to the normal stop instruction unit 20a. After the normal stop instruction unit 20a outputs a signal to instruct the image formation driving unit 26a to cancel the waiting job (that is, a signal to instruct to discard image information already acquired), the image formation driving unit 26a cancels the stored following job. In particular, the image formation driving unit 26a cancels drawing information of the following job stored in a line memory included in the image formation driving unit 26a. Concur-

rently, the normal stop instruction unit 20a outputs a signal to instruct the scanning driver 200a to stop carrying a document that waits for being scanned mounted on a paper feed tray (not shown in figures) included in the ADF 21, and the scanning driver 200a stops scanning the following document

[0048] If the trigger to stop forcibly input unit 17b is operated (corresponding to input operation of the trigger to stop forcibly), the operation acceptance unit 20d acquires information in accordance with the input operation on the trigger to stop forcibly input unit 17b and generates the trigger to stop forcibly. The trigger to stop forcibly is output to the forcibly stop instruction unit 20b. After the forcibly stop instruction unit 20b outputs a signal to instruct the image forming unit 26b to stop executing the current job, the image forming unit 26b stops the current job (that is, the image forming unit 26b outputs a signal to execute operation in case of stopping supplying power). In particular, the image forming unit 26b includes a register to input an instruction to shut down (hereinafter referred to as "shutdown register"). The forcibly stop instruction unit 20b rewrites a value of the shutdown register as a value of instructing to shut down. Accordingly, the image forming unit 26b performs the forcibly stop operation. Here the forcibly stop operation means that apparatus status is transitioned from a job executing status to another different status such as a waiting status without waiting for finishing the job. For example, the roll sheet is ejected forcibly in case of a skew operation. In addition, in case of executing printing, printing is stopped at that point without waiting for finishing printing, and the image forming mechanism is transitioned to a standby status, and so on. Concurrently, the forcibly stop instruction unit 20b outputs a signal to instruct the scanning mechanism unit 200b to stop, and the scanning mechanism unit 200b ejects a document that the ADF 21 is carrying forcibly and stops optical scanning by the scanning unit 22. Subsequently, the forcibly stop instruction unit 20b transitions the scanning mechanism unit 200b that includes units described above to the standby status.

[0049] Accordingly, the job stored in the image formation driving unit 26a and the scanning drive unit 200a can be stopped by the trigger to stop normally. Furthermore, the job already passed to the image forming unit 20b and the scanning mechanism unit 200b can be stopped by the trigger to stop forcibly too. Consequently, the operation of the print engine 26 and the image scanner 200 can be stopped forcibly.

[0050] In the above description, the trigger to stop forcibly can finish all operation of the print engine 26 and the image scanner 200 by implementing the function to stop both the print engine 26 and the image scanner 200 forcibly. By contrast, the trigger to stop forcibly can implement a function to stop only the image scanner 200 or only the print engine 26. To accomplish that, the screen generator 20c can display a screen for configuring a target to stop forcibly on the display panel 24, and it can be configured that only the image scanner 200 is stopped,

the print engine 26 is stopped, or both the image scanner 200 and the print engine 26 is stopped. In that case, the screen generator 20c and the operational unit 17 consist of a stop target configuration unit.

[0051] Next, a configuration of the inkjet forming apparatus included in the image forming apparatus 1 in this embodiment is described below with reference to FIG 4 and FIG. 5. FIG. 4 is a perspective diagram illustrating an exterior configuration of the inkjet forming apparatus, and FIG. 5 is a cross-sectional profile diagram illustrating the inkjet forming apparatus. The inkjet forming apparatus shown in FIG. 4 and FIG. 5 includes spool roller bearing mountings 101a and 101b. The spool roller bearing mountings 101a and 101b function as sheet supporting units that support an upper roll sheet 104a and a lower roll sheet 104b that unreel a sheet 110.

[0052] In the anteroposterior direction X perpendicular to the vertical direction Z, the left side of the main unit of the apparatus 101 is the front side 101F, and the right side of the main unit of the apparatus 101 is the rear side in FIG. 4. The main scanning direction Y perpendicular both the vertical direction Z and the anteroposterior direction X in FIG. 4 penetrates the page of FIG. 5, and the main scanning direction Y corresponds to the sheet width direction.

[0053] A guide rod 118 and a guide rail 119 are spanned across side panels (not shown in figures) inside the main unit of the apparatus 101, and a carriage 120 is held on the guide rod 118 and the guide rail 119 movably in the main scanning direction Y.

[0054] The carriage 120 includes liquid recording heads (not shown in figures) that discharge ink droplets whose colors are black (K), yellow (Y), magenta (M), and cyan (C). In addition, the carriage 120 includes a sensor that detects a carried sheet. Each liquid recording head includes sub tanks (not shown in figures) that supply ink to each liquid recording head integrally.

[0055] A main scanning mechanism that moves and scans the carriage 120 in the main scanning direction Y includes a driving motor 121 mounted on one side of the main scanning direction Y (diagonally upward left in FIG 4), a driving pulley 122 connected to an output shaft of the driving motor 121 and driven by the driving motor 121, a driven pulley 123 mounted on the other side of the main scanning direction Y (diagonally downward right in FIG 4), and a belt member 124 that runs between the driving pulley 122 and the driven pulley 123. The driven pulley 123 is tensioned to the outside direction, that is, the direction getting away from the driving pulley 122 by a tension spring (not shown in figures).

[0056] The belt member 124 pulls the carriage 120 into the main scanning direction Y since a part of the belt member 124 is held by a belt holding unit mounted on the back side of the carriage 120. An encoder sheet (not shown in figures) that detects the main scanning position of the carriage 120 is mounted along with the main scanning direction Y, and the encoder sheet is read by an encoder sensor (not shown in figures) mounted on the

carriage 120

[0057] As shown in FIG. 5, among main scanning zones of the carriage 120, in a recording zone where the sheet is carried, the sheet 110 unreeled and carried from the upper roll sheet 104a or the lower roll sheet 104b (described in detail later) is carried by a carrying unit (a pair of rollers 109a and 109b, a resistance roller 134, and a resistance pressure roller 135. In recording zone, the sheet 110 is carried in the sub-scanning direction perpendicular to the main scanning direction Y where the carriage 120 moves, that is, the sheet 110 is carried in the forward direction Xa among anteroposterior direction X in FIG. 4 intermittently.

[0058] In addition, among main scanning zones, a maintenance recovery unit 125 that maintains and recovers each liquid recording head in the carriage 120 is mounted in the other side zone (diagonally downward right in FIG. 4). Furthermore, a main cartridge 126 that contains ink in each color to supply to the sub tank of each liquid recording head is amounted detachably to the main unit of the apparatus 101.

[0059] At the position after the recording zone in the carrying path of the sheet 110, a cutter 127 that cuts the sheet on which an image is recorded at a predetermined length is mounted. The cutter 127 is fixed on a wire and a timing belt that run between multiple pulleys. In addition, one of the multiple pulleys is connected to the driving motor, and the sheet is cut at the predetermined length by moving the wire and the timing belt by the driving motor via the pulley in the main scanning direction Y.

[0060] Next, operational flow of the image forming apparatus 1 in this embodiment is described below with reference to FIG. 6. FIG. 6 is a flowchart illustrating flow of a process performed by the image forming apparatus.

[0061] In printing by the image forming apparatus 1, first, a roll sheet or a cut sheet is prepared in S601. Subsequently, print settings are configured in S602. Instructing to start printing, e.g., pressing a hardware button to input starting printing, is included in configuring the print settings. In addition, if the image forming apparatus 1 functions as the copier, scanning a document is also included in configuring the print settings. Subsequently, printing is executed in S603, and the printing finishes in S604. If it is necessary to wait for drying the printed surface (NO in S605), the sheet is dried in S606. After finishing drying the sheet, or if it is not necessary to wait for drying the printed surface (YES in S605), the sheet is cut and ejected in S607. If there is a following job (NO in S608), the process goes back to S603, and the next printing process is executed. If there is no following jobs (YES in S608), the process ends.

[0062] Next, flow of stopping operation of the image forming apparatus 1 in this embodiment is described below with reference to FIG. 7 and FIG. 8. FIG. 7 is a flowchart illustrating a stopping operation performed by the image forming apparatus as an embodiment of the present invention. FIG. 8A is a diagram illustrating a forcibly stop selection screen, FIG. 8B is a diagram illus-

trating a forcibly stop execution screen, FIG. 8C is a diagram illustrating an uncharged forcibly stop notification screen, and FIG. 8D is a diagram illustrating a charged forcibly stop notification screen.

[0063] After the image forming apparatus 1 starts printing, the printing process finishes if the printing operation is performed normally (YES in S701). During the printing operation (NO in S701), the image forming apparatus 1 waits for the trigger to stop normally and keeps performing the printing operation until the trigger to stop normally is performed (NO in S702).

[0064] If the trigger to stop normally input unit 17a is operated (YES in S702), the normally stop command unit outputs a signal to command to cancel jobs that wait for being executed to the image formation driving unit 26a and the scan driving unit 200a. After receiving the signal, the image formation driving unit 26a and the scan driving unit 200a cancel jobs that wait for being executed in S703. After the normally stop command unit 20a outputs the signal to cancel to the image formation driving unit 26a, the screen generator 20c displays a screen to select whether or not it is necessary to execute stopping forcibly (hereinafter referred to as "a forcibly stop selection screen") on the display panel 24 in S704.

[0065] FIG. 8A is a diagram illustrating the forcibly stop selection screen. The forcibly stop selection screen includes a software button 801 that accepts inputting a command to execute stopping forcibly and a software button 802 that accepts inputting a command not to execute stopping forcibly. The software button 801 is the trigger to stop forcibly input unit 17b. In case of stopping a job currently executed, the software button 801 is operated, and the trigger to stop forcibly is executed (YES in S705). Subsequently, the forcibly stop command unit 20b starts an operation to stop the job currently executed with the image forming unit 26b and the scan mechanical unit 200b in S706. The screen generator 20c displays a screen to report that the operation to stop forcibly is currently executed (hereinafter referred to as "a forcibly stop execution screen") on the display panel 24 in S707.

[0066] FIG. 8B is a diagram illustrating the forcibly stop execution screen. The forcibly stop execution screen includes a software button 803 that accepts inputting a command to interrupt the operation to stop forcibly. After a resuming operation is executed by pressing the software button 803 (YES in S708), the normally stop command unit 20a outputs a signal to command to resume the stopped image processing operation to the image formation driving unit 26a and the scan driving unit 200a, and the forcibly stop command unit 20b outputs a signal to command to resume the stopped image processing operation to the image forming unit 26b and the scan mechanical unit 200b. Accordingly, the stopped units resume the job currently executed in S711, and the process ends after the job is finished. If the software button 803 is not operated (NO in S708), the job data currently executed is deleted in S710.

[0067] The screen generator 20c displays a screen to

report that the operation to stop forcibly finishes (hereinafter referred to as "a forcibly stop notification screen") on the display pane 24 in S708. FIG. 8C is a diagram illustrating an uncharged forcibly stop notification screen, and FIG. 8D is a diagram illustrating a charged forcibly stop notification screen. The screen shown in FIG. 8C is displayed if the job currently executed is finished on the way after the operation to stop forcibly. In this case, since the job is not charged if the image forming apparatus 1 functions as the copier, it is reported that the job currently executed is finished on the way and the job is not charged. Alternatively, if the job currently executed finishes regardless of performing the operation to stop forcibly, it is considered as a successful completion and charged. Therefore, as shown in FIG. 8D, it is reported that the job currently executed finishes normally and is charged.

[0068] Either after displaying the forcibly stop notification screen in S711 or the trigger to stop forcibly is not input (NO in S705), the process ends.

[0069] While it is considered that it is possible to cancel the trigger in the above description, it is not required to cancel the trigger. In this case, the software button 803 to command to resume printing in the forcibly stop execution screen (shown in FIG. 8B) is not necessary, and the stop in S707 is omitted.

[0070] In addition, the trigger to stop normally input unit 17a and the trigger to stop forcibly input unit 17b are set separately in the above description. However, it is possible that an operational unit (a hardware button or a software button) does double duty as the trigger to stop normally input unit 17a and the trigger to stop forcibly input unit 17b. Consequently, the trigger to stop normally and the trigger to stop forcibly can be input by one operation. In this case, timing of outputting the signal to command to stop forcibly by the forcibly stop command unit 20h can be delayed than timing of outputting the signal to command to stop normally by the normally stop command unit 20a to prevent inconvenience that a subsequent job is sent to the stopped image forming unit 26b because the subsequent job is stopped after the job currently executed is stopped.

[0071] Next, a case in which the trigger to stop forcibly shown in FIG. 7 is executed while the series of printing operation shown in FIG. 6 is performed is described below.

[0072] If the trigger to stop forcibly is input while the printing operation is executed in S603, the image forming unit 26b aborts printing, stops waiting for drying sheet forcibly, cuts the sheet, and ejects the sheet. In addition, a cap is put on a liquid recording head (not shown in figures) in the carriage 120. If the trigger to stop forcibly is input while the sheet is drying in S606, the image forming unit 26b stops waiting for drying sheet forcibly, cut the sheet, and ejects the sheet.

[0073] By contrast, at the timing of not printing in the series of the printing operation, the job currently executed is stopped and the cap is put on the liquid recording head. For example, in an operation to prepare roll sheet in

S601, in case of accepting the operation on the trigger to stop forcibly input unit 17b while the roll sheet is prepared to transition to the state that the image forming and outputting operation can be executed, the roll forming operation as the job currently executed is stopped, and the sheet is ejected out of the apparatus.

[0074] Furthermore, while printing is configured in S602, the scanning operation as the job currently executed is stopped. In these cases, the cap is put on the liquid recording head too. For example, in case of accepting the operation on the trigger to stop forcibly input unit 17b while the carriage is performing decapping or moving the head up and down as the operation before printing, if it is not executed to carry sheet, the process currently executed and the subsequent process are aborted forcibly, it is executed to cap and transition to the state in which image forming and outputting operation can be executed.

[0075] If the trigger to stop normally or the trigger to stop forcibly is input while the print engine 26 or the image scanner 200 is on standby, in maintenance, or shutdown, any trigger becomes invalid.

[0076] In the above description, while screens that correspond with process status (shown in

[0077] FIGS. 8A, 8B, 8C, and 8D on the display unit while the operation to stop is executed, it is not required to display those screens in some cases. Another example embodiment without displaying screens is described below with reference to FIG. 9. FIG. 9 is a flowchart illustrating a flow of stopping operation without a displaying process.

[0078] In this example embodiment, by including an input device (e.g., a hardware button) to accept the trigger to stop forcibly on the case of the image forming apparatus 1 instead of the forcibly stop selection screen shown in FIG. 8A, the screen to input the trigger to stop forcibly becomes unnecessary. Similarly, an input device to accept the trigger to stop normally is included on the case of the image forming apparatus 1 too. Under this assumption, the process shown in FIG. 9 is described below.

[0079] After the image forming apparatus 1 starts printing, the printing process is finished if the printing process was executed normally (YES in S901). The image forming apparatus 1 is in the status of waiting for the trigger to stop normally during the printing operation (NO in S901), and the image forming apparatus continues the printing operation until the trigger to stop normally is executed (NO in S902).

[0080] After operating the trigger to stop normally input unit 17a (YES in S902), jobs that wait for being executed are canceled in S903. Subsequently, the trigger to stop forcibly is executed by operating the input unit for the trigger to stop forcibly (YES in S904). Accordingly, the forcibly stop command unit 20b instructs the image forming unit 26b and the scan mechanical unit 200b to stop the job currently executed in S905. Subsequently, the job data currently executed is canceled in S906, and the process ends.

[0081] In the example embodiment described above, it is possible to execute the stop processing operation using the trigger to stop normally and the trigger to stop forcibly only without displaying on the display.

[0082] In the embodiments described above, the trigger to stop normally and the trigger to stop forcibly are input by the user operation. However, instead of the user operation, after detecting an irregular status of the image forming apparatus 1 (e.g., irregular tension is generated due to paper jam of the roll sheet), it is possible to input the trigger to stop normally and the trigger to stop forcibly in accordance with the detection result. Accordingly, the image forming apparatus 1 can perform a stop operation autonomously without user operation in accordance with the status of the image forming apparatus 1 itself out of user recognition.

[0083] In the embodiments described above, in case of stopping the image forming apparatus 1 forcibly by user operation, it is possible to instruct the engine to be stopped forcibly to stop directly by inputting the trigger to stop forcibly separately from the trigger to stop normally. Consequently, since it is possible to stop the engine without inputting/outputting the trigger between blocks connected serially to the engine to be stopped, control of the trigger regarding forcibly stop can be simplified.

[0084] In the example embodiments described above, inkjet method is used as the image forming mechanism. However, the key point in the example embodiments described above is the control of the forcibly stop operation during the printing job, and the type of the image forming mechanism is not limited to a specific method. That is, that can be applied to the image forming apparatus with various image forming mechanisms such as electrophotography method and thermal method, and similar effects can be achieved with them.

[0085] Numerous additional modifications and variations are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the disclosure of this patent specification may be practiced otherwise than as specifically described herein.

[0086] As can be appreciated by those skilled in the computer arts, this invention may be implemented as convenient using a conventional general-purpose digital computer programmed according to the teachings of the present specification. Appropriate software coding can readily be prepared by skilled programmers based on the teachings of the present disclosure, as will be apparent to those skilled in the software arts. The present invention may also be implemented by the preparation of application-specific integrated circuits or by interconnecting an appropriate network of conventional component circuits, as will be readily apparent to those skilled in the relevant art.

[0087] Each of the functions of the described embodiments may be implemented by one or more processing circuits. A processing circuit includes a programmed

processor, as a processor includes circuitry. A processing circuit also includes devices such as an application specific integrated circuit (ASIC) and conventional circuit components arranged to perform the recited functions.

Claims

1. An image forming apparatus (1), comprising:

an image processing mechanical unit (26b, 200b) to realize an image processing function; an image processing driver (26a, 200a) to drive the image processing mechanical unit (26b, 200b) in accordance with operating status of the image forming apparatus (1); an operation reception unit (20d) to acquire information in accordance with user operation on an operational unit (17); a normally stop command unit (20a) to output a signal that commands to stop image processing operation to the image processing driver (26a, 200a) if the information acquired by the operation reception unit (20d) relates to normally stop operation; and a forcibly stop command unit (20b) to output a signal that commands to stop currently-executed image processing operation to the image processing mechanical unit (26b, 200b) if the information acquired by the operational reception unit (20d) relates to forcibly stop operation.

2. The image forming apparatus (1) according to claim 1, wherein the image processing mechanical unit (26b, 200b) is an image forming unit (26b) that forms an image on a recording medium, the image processing driver (26a, 200a) is an image forming driving unit (26a) that acquires information of the image to be formed and drives the image forming unit (26b) according to the acquired image information, the normally stop command unit (20a) outputs a signal that commands the image forming driving unit (26a) to discard the acquired image information if the operational reception unit (20d) acquires information related to normal stop operation, and the forcibly stop command unit (20b) outputs a signal that commands the image forming unit (26b) to execute operation to stop a power supply if the operational reception unit (20d) acquires information related to forcibly stop operation.

3. The image forming apparatus (1) according to any one of claims 1 to 2, wherein the time when the forcibly stop command unit (20b) outputs the signal that commands the image processing mechanical unit (26b, 200b) to stop image processing operation is after the time when the normally stop command unit (20a) outputs the signal that commands the image

processing driver (26a, 200a) to stop image processing operation.

4. The image forming apparatus (1) according to claim 3, wherein the operation reception unit (20d) displays a forcibly stop selection screen that includes a trigger to stop forcibly input unit (17b) for allowing a user to input the forcibly stop operation, after the normally stop command unit (20a) outputs a signal that commands the image processing driver (26a, 200a) to stop the image processing operation. 5
5. The image forming apparatus (1) according to claim 3, wherein the operation reception unit (20d) acquires information related to the normally stop operation and information related to the forcibly stop operation in accordance with a series of operation on the operational unit (17). 10
6. The image forming apparatus (1) according to any one of claims 1 to 5, wherein the operation reception unit (20d) outputs a signal to instruct the image processing driver (26a, 200a) to resume the image processing operation and a signal to instruct the image processing mechanical unit (26b, 200b) to resume the image processing operation if the operation reception unit (20d) acquires information related to operation to resume the image processing operation that is instructed to stop. 15
7. The image forming apparatus (1) according to any one of claims 1 to 6, wherein the image processing mechanical unit (26b, 200b) is a scan mechanical unit (200b) that scans a document to generate image information, the image processing driver (26a, 200a) is a scan driving unit (200a) that drives the scan mechanical unit (200b) and acquires the image information, the normally stop command unit (20a) outputs a signal that instructs the scan driving unit (200a) to stop carrying a document to be scanned if the operation reception unit (20d) acquires information related to the normal stop operation, and the forcibly stop command unit (20b) outputs a signal that instructs the scan mechanical unit (200b) to execute operation to stop supplying power if the operation reception unit (20d) acquires information related to the forcibly stop operation. 20
8. The image forming apparatus (1) according to claim 7, further comprising: 25
- a target to be stopped configuration unit (20e) to configure the image processing mechanical unit (26b, 200b) to be stopped forcibly, wherein the target to be stopped configuration unit (20e) configures either one of the image forming unit (26b) and the scan mechanical unit (200b) or 30

both of the image forming unit (26b) and the scan mechanical unit (200b) as the target to be stopped forcibly if the image forming unit (26b) and the scan mechanical unit (200b) are included in the image processing mechanical unit (26b, 200b).

9. A method of stopping operation of an image forming apparatus (1) that comprises an image processing mechanical unit (26b, 200b) to realize an image processing function, an image processing driver (26a, 200a) to drive the image processing mechanical unit (26b, 200b) in accordance with operating status of the image forming apparatus (1), and an operation reception unit (20d) to acquire information in accordance with user operation on an operational unit (17), comprising the steps of: 35

outputting a signal that commands to stop image processing operation to the image processing driver (26a, 200a), if the information acquired by the operation reception unit (20d) relates to normally stop operation; and

outputting a signal that commands to stop currently-executed image processing operation to the image processing mechanical unit (26b, 200b) if the information acquired by the operational reception unit (20d) relates to forcibly stop operation. 40

10. A computer-readable recording medium storing a program that, when executed by a computer, causes a processor to perform the method of claim 9. 45

FIG. 1

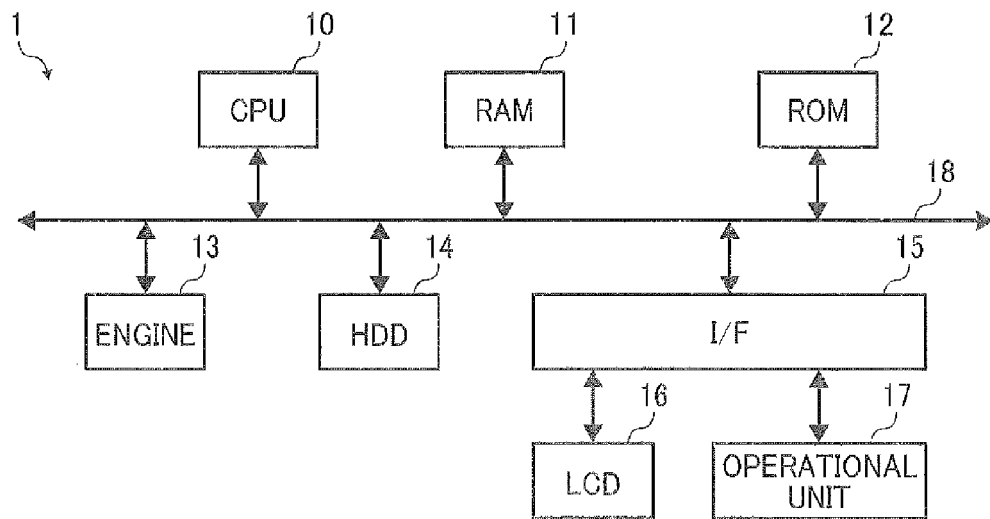


FIG. 2

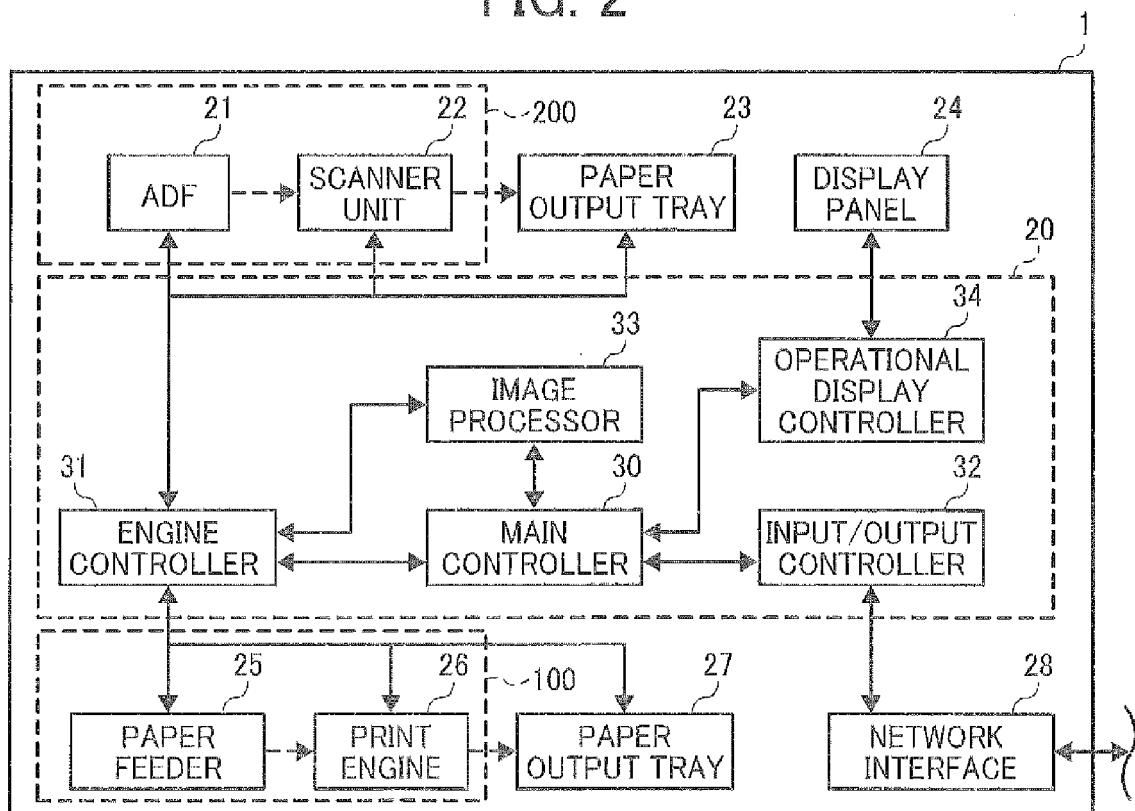
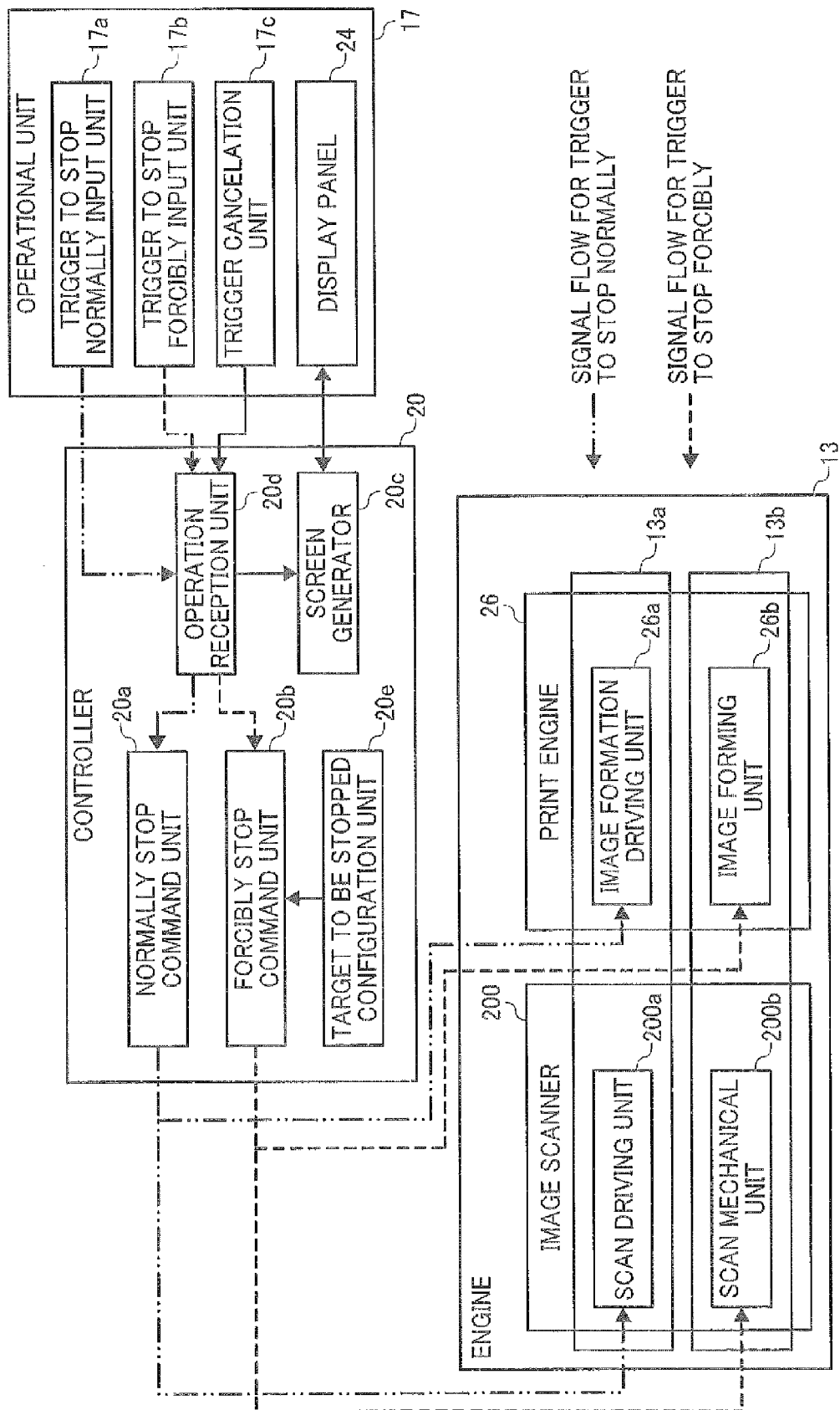


FIG. 3



451

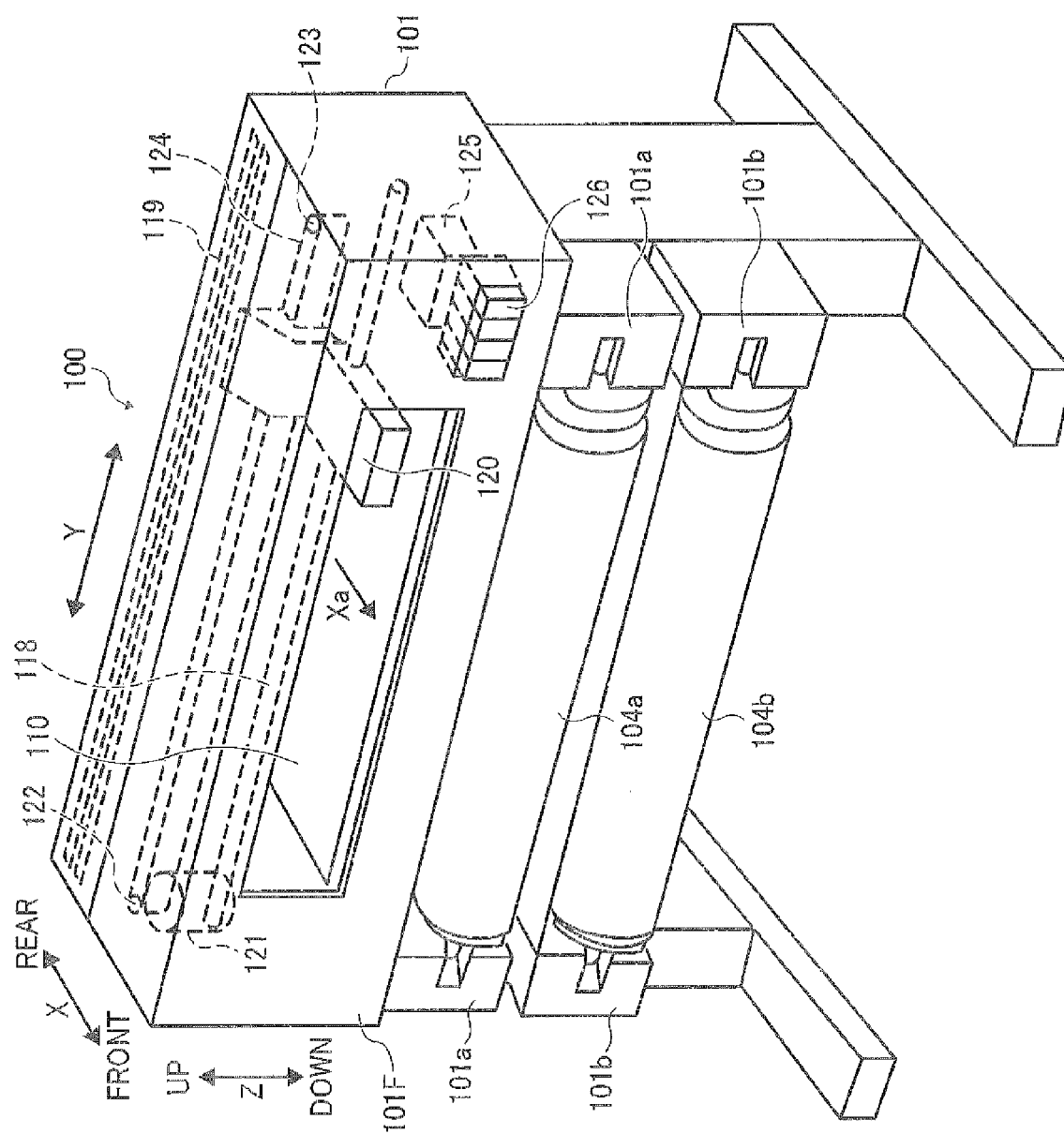


FIG. 5

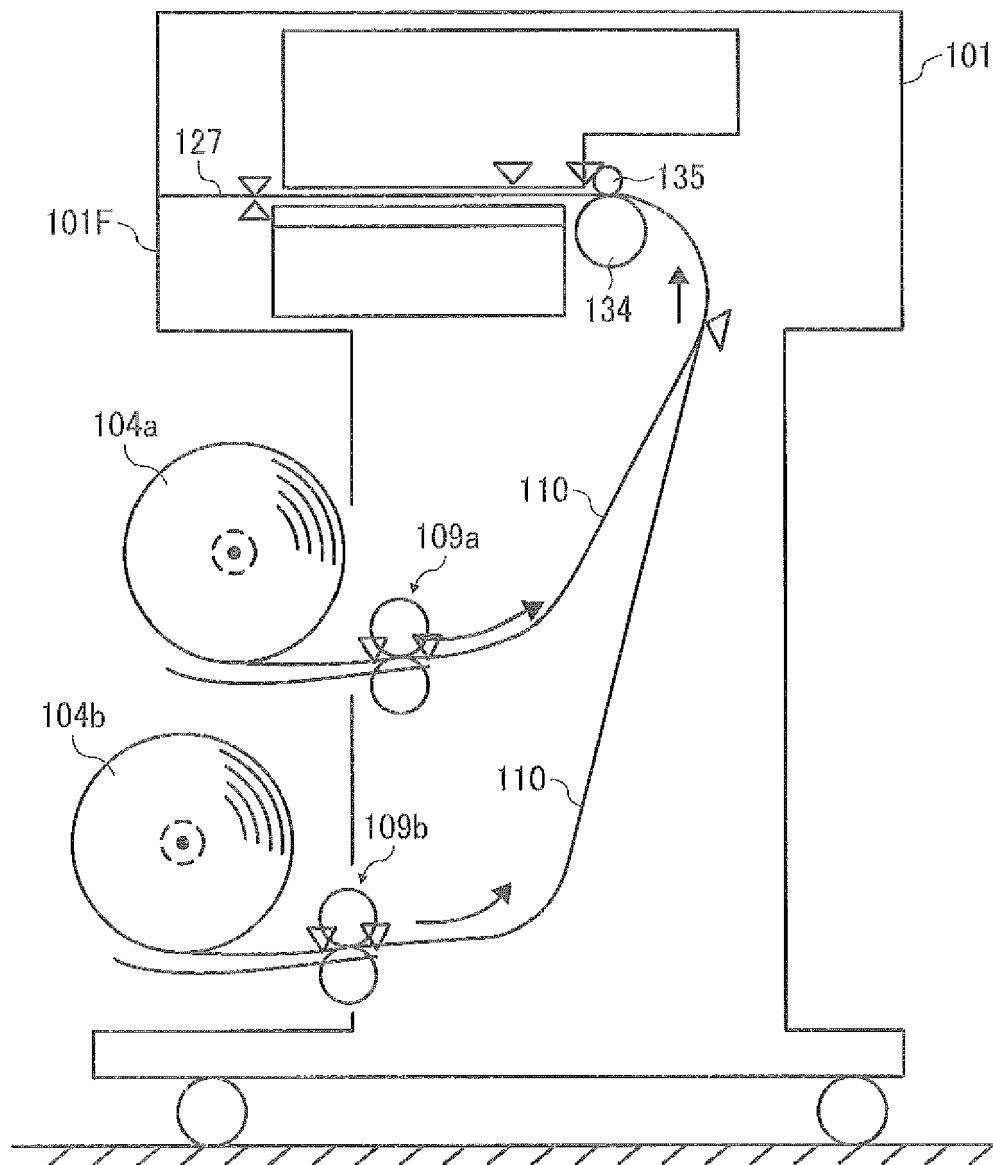


FIG. 6

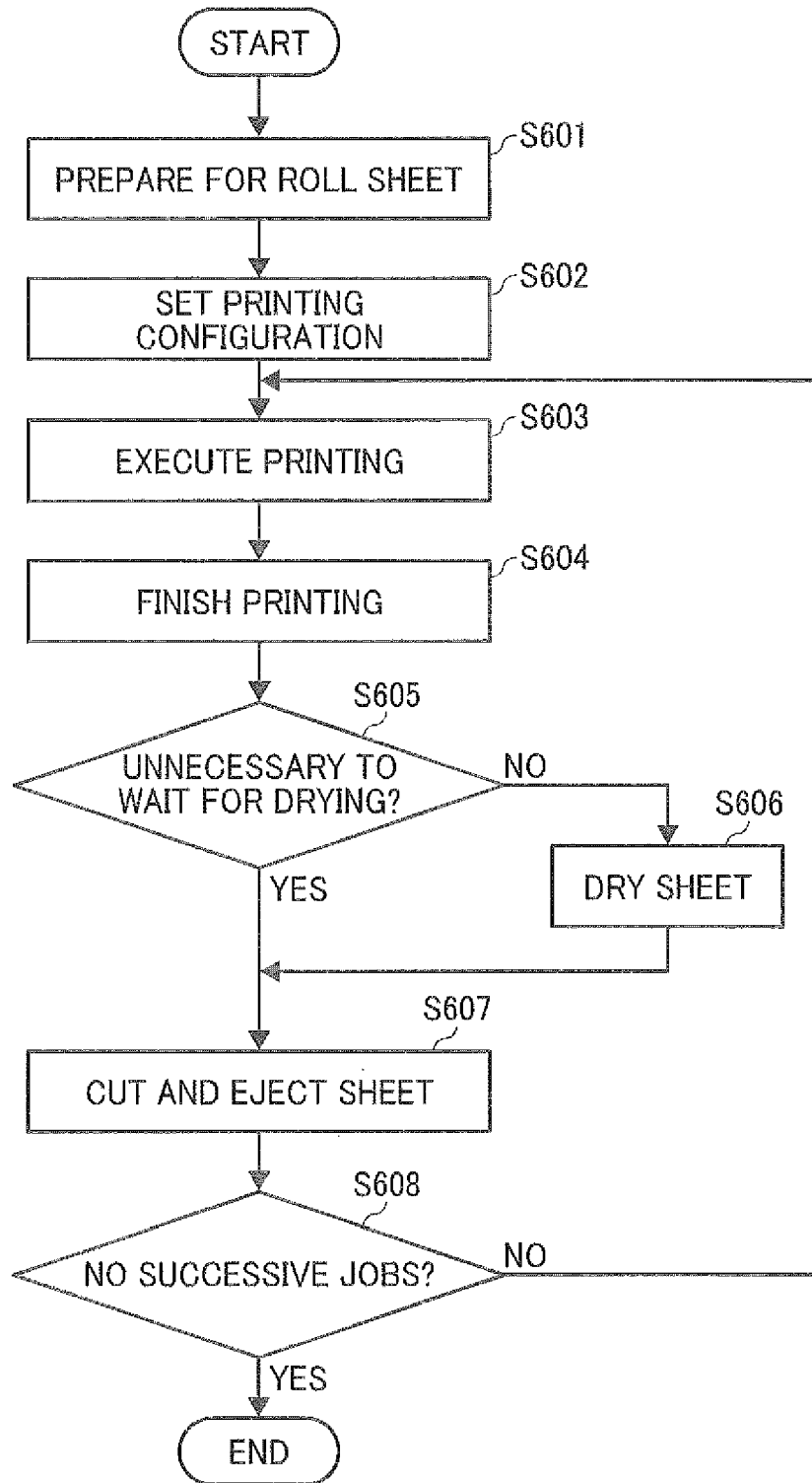


FIG. 7

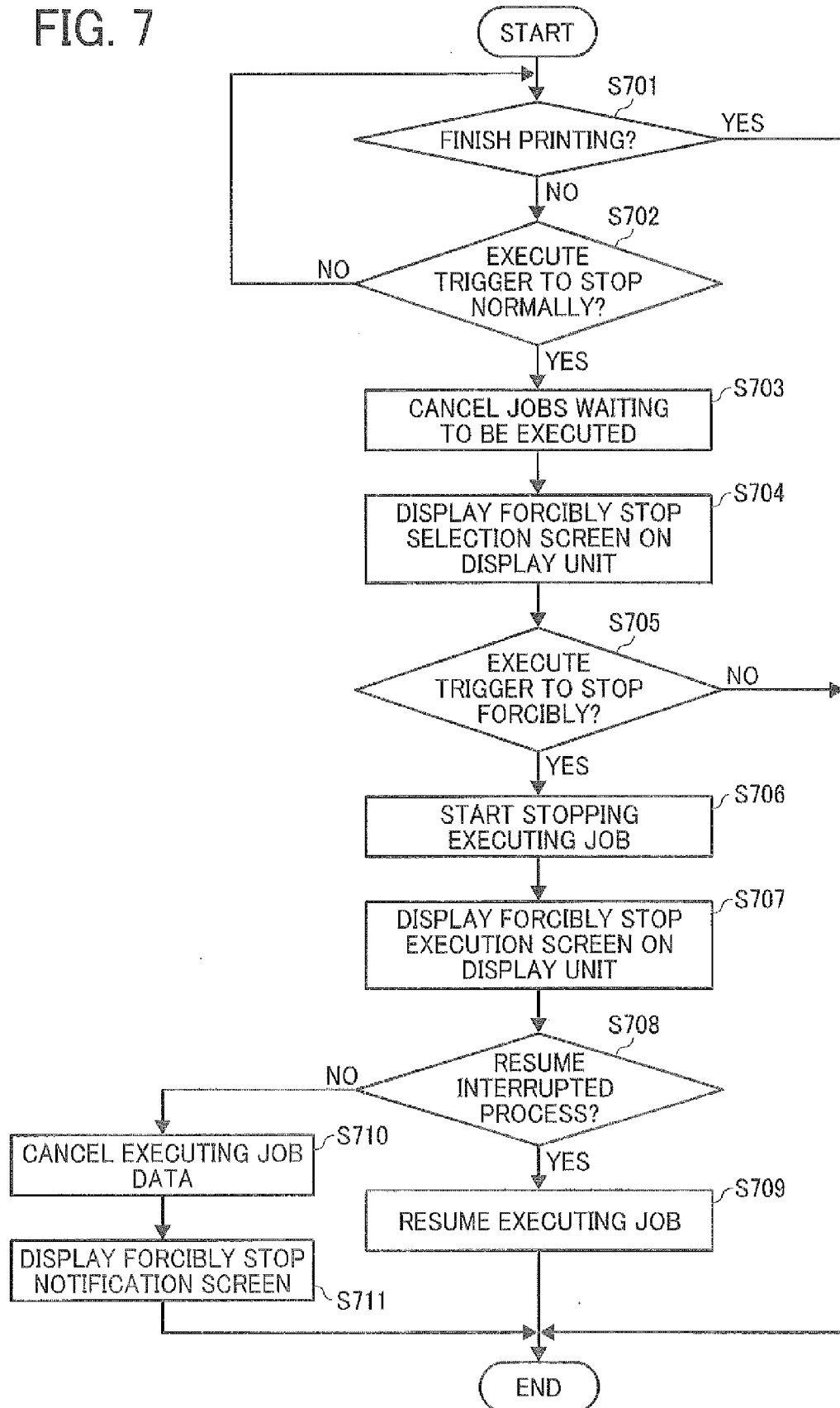


FIG. 8A

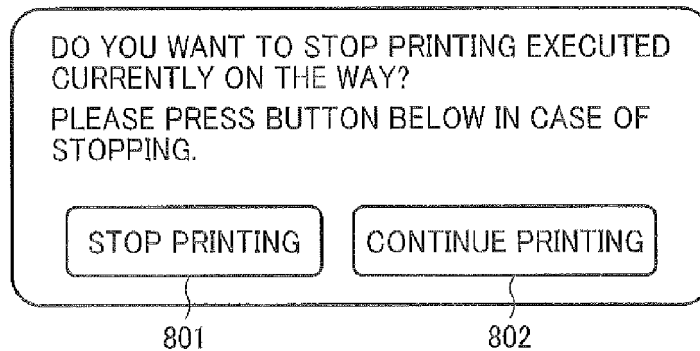


FIG. 8B

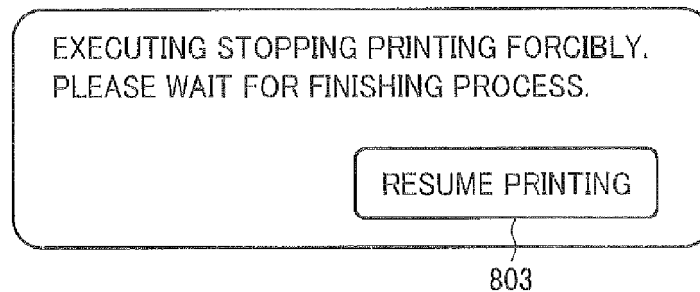


FIG. 8C

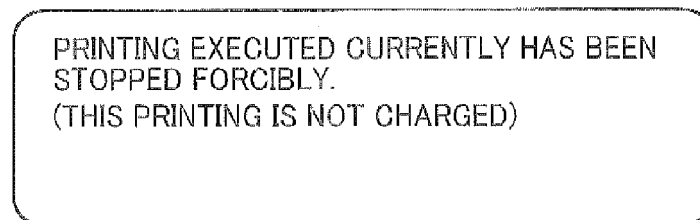


FIG. 8D

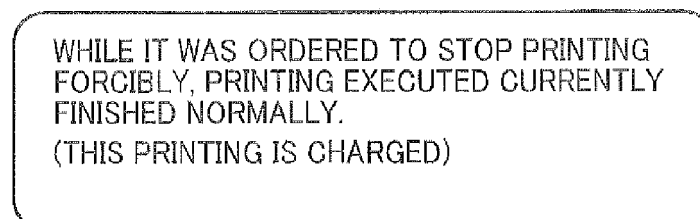
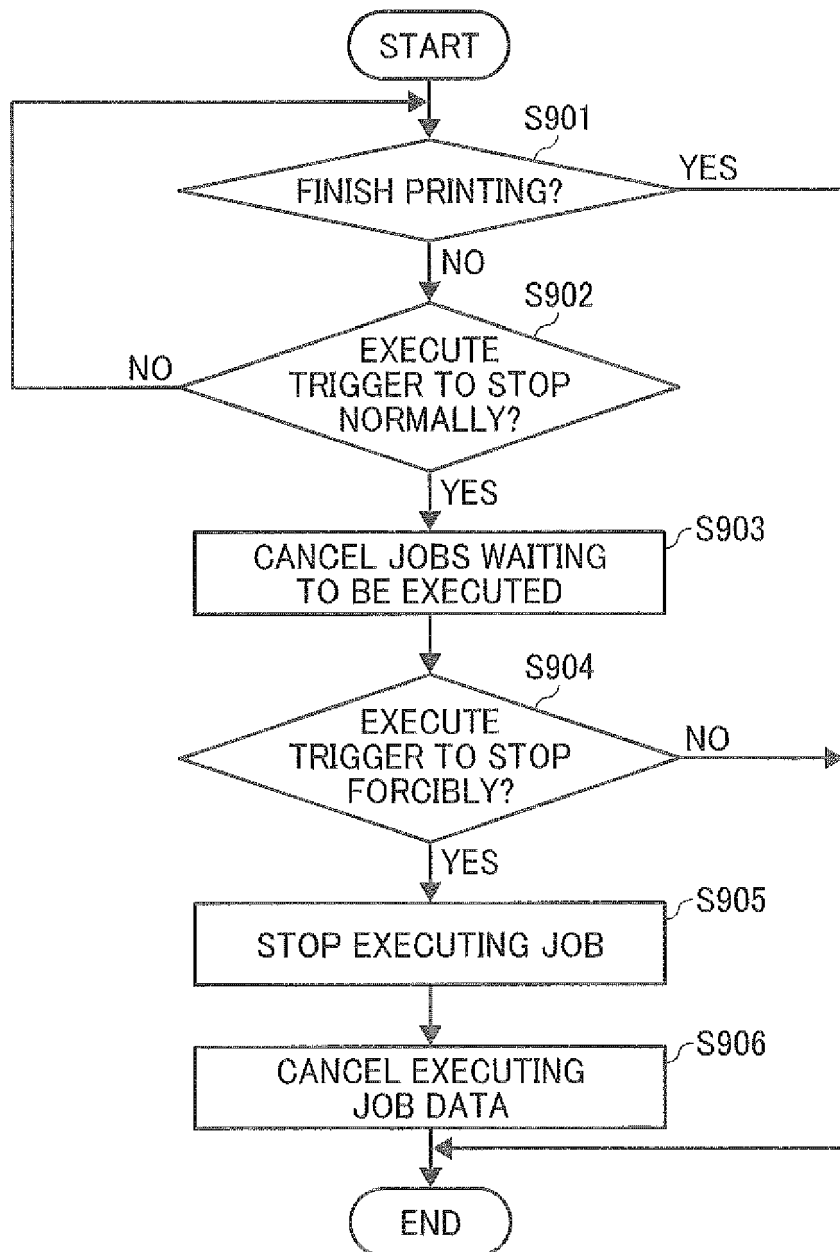


FIG. 9



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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