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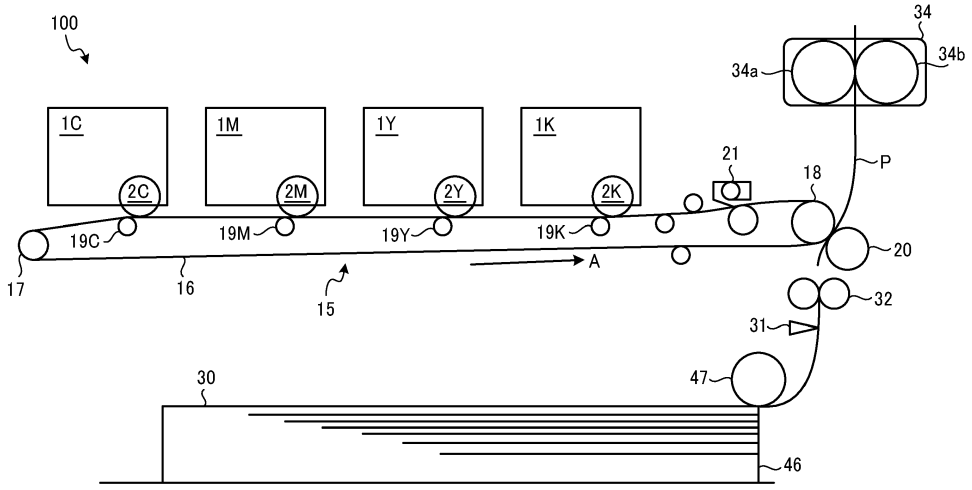
(54) IMAGE FORMING APPARATUS, CONTROL METHOD OF IMAGE FORMING APPARATUS, AND CARRIER MEANS

(57) An image forming apparatus (100) includes a feed unit (102) configured to continuously feed a plurality of sheets with a given sheet-to-sheet interval from a sheet storing unit (30) storing the plurality of sheets; a detection unit (103) configured to detect presence or absence of a sheet fed on a feed path of sheet; and an image forming unit (104) configured to form an image on an image bearing member (2) and to transfer the image formed on the image bearing member (2) onto the sheet. When the detection unit (103) does not detect a first sheet fed within a given time after the image is formed on the image bearing member (2), the feed unit (102) continues feeding of the first sheet and stops feeding of a second sheet succeeding the first sheet. When the detection unit (103) detects the first sheet after the feeding of the second sheet is stopped, the image forming unit (104) re-forms an image, to be formed on the first sheet, on the image bearing member (2), and the feed unit (102) resumes the feeding of the second sheet.

FIG. 1



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Description

BACKGROUND

Technical Field

[0001] This disclosure relates to an image forming apparatus, a method of controlling an image forming apparatus, and carrier means.

Background Art

[0002] In conventional image forming apparatuses, a control unit of image forming apparatus stops an operation of feeding a sheet at a position between a sheet feed unit and an image transfer unit. In these image forming apparatuses, even if the control unit determines that a sheet cannot be fed to a position used for transferring a formed image (e.g., toner image) in time, the control unit determines that a sheet jamming does not occur, but feeds the concerned sheet to a registration position and stops the feeding of the concerned sheet, and thereafter resumes the feeding of concerned sheet to resume the image forming operation on the concerned sheet, which is known as a retry function (hereinafter referred to as "function of re-trying of image forming operation").

[0003] In one technology disclosed in JP-2003-306254-A, when a sheet is abutted against a registration roller and the sheet feeding is stopped temporarily and then the sheet feeding is to be resumed, the control unit detects a sheet-to-sheet interval based on signals output from a sensor and delays a start of feeding of succeeding sheet based on the detected sheet-to-sheet interval to prevent the sheet from being jammed due to the narrow sheet-to-sheet interval between the sheets.

[0004] However, if the interval between the preceding sheet and the succeeding sheet becomes too narrow or the preceding sheet and the succeeding sheet overlap at least partially when the sheet feeding is stopped temporarily, such as when the delay of sheet feeding occurs, since the sensor output signals do not change, the control unit cannot detect the sheet-to-sheet interval correctly.

SUMMARY

[0005] In one aspect of the present invention, an image forming apparatus is devised. The image forming apparatus includes a feed unit configured to continuously feed a plurality of sheets with a given sheet-to-sheet interval from a sheet storing unit storing the plurality of sheets; a detection unit configured to detect presence or absence of a sheet fed on a feed path of sheet; and an image forming unit configured to form an image on an image bearing member and to transfer the image formed on the image bearing member onto the sheet. When the detection unit does not detect a first sheet fed within a given time after the image is formed on the image bearing member, the feed unit continues feeding of the first sheet and stops feeding of a second sheet succeeding the first sheet. When the detection unit detects the first sheet after the feeding of the second sheet is stopped, the image forming unit re-forms an image, to be formed on the first sheet, on the image bearing member, and the feed unit resumes the feeding of the second sheet.

[0006] In another aspect of the present invention, a method of controlling an image forming apparatus is devised. The method includes continuously feeding a plurality of sheets with a given sheet-to-sheet interval from a sheet storing unit storing the plurality of sheets; detecting presence or absence of a sheet fed on a feed path of sheet; forming an image on an image bearing member; and transferring the image formed on the image bearing member onto the sheet. When the detecting does not detect a first sheet fed within a given time after the image is formed on the image bearing member, the feeding continues feeding of the first sheet while stopping feeding of a second sheet succeeding the first sheet. When the detecting detects the first sheet after the feeding of the second sheet is stopped, the forming re-forms an image, to be formed on the first sheet, on the image bearing member, and the feeding resumes the feeding of the second sheet.

[0007] As to the above embodiment of this disclosure, when the sheet feeding is resumed after the sheet feeding is stopped temporarily, the sheet-to-sheet interval can be ensured sufficiently.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] A more complete appreciation of the description and many of the attendant advantages and features thereof can be readily acquired and understood from the following detailed description with reference to the accompanying drawings, wherein:

FIG. 1 is an example of configuration of image forming apparatus, such as printer, according to an embodiment of this disclosure;

FIG. 2 is an example of configuration of hardware block diagram of a control system of a printer of FIG. 1;

FIG. 3 is an example of configuration of functional block diagram of a printer of FIG. 1;

FIG. 4 is an example of a flowchart illustrating an image forming operation performed at a printer according to an embodiment of this disclosure;

FIG. 5 is an example of a flowchart illustrating image formation processing on a succeeding sheet with respect to a re-trying of image forming operation occurring sheet when a re-trying of image forming operation has occurred in the sequence of FIG. 4;

FIG. 6 is a diagram describing a case where a re-trying of image forming operation occurring sheet overlaps with a succeeding sheet when the feeding of the re-trying of image forming operation occurring

sheet is delayed when the re-trying of image forming operation has occurred in the sequence of FIG. 4; and

FIG. 7 is a diagram describing a sheet feed interval after a re-trying of image forming operation has occurred in the re-trying of image forming operation in the sequence of FIG. 4.

[0009] The accompanying drawings are intended to depict embodiments of the this disclosure and should not be interpreted to limit the scope thereof. The accompanying drawings are not to be considered as drawn to scale unless explicitly noted.

DETAILED DESCRIPTION

[0010] A description is now given of exemplary embodiments of the present inventions. It should be noted that although such terms as first, second, etc. may be used herein to describe various elements, components, regions, layers and/or units, it should be understood that such elements, components, regions, layers and/or units are not limited thereby because such terms are relative, that is, used only to distinguish one element, component, region, layer or unit from another region, layer or unit. Thus, for example, a first element, component, region, layer or unit discussed below could be termed a second element, component, region, layer or unit without departing from the teachings of the present inventions.

[0011] Further, it should be noted that the terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present inventions. Thus, for example, as used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. Moreover, the terms "includes" and/or "including," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0012] Hereinafter, a description is given of an embodiment of an image forming apparatus, a control method of image forming apparatus, and program with reference to the accompanying drawings.

[0013] As to be described in this disclosure, a technology according to the embodiment includes a feed unit configured to feed continuously each of a plurality of sheets with a given sheet-to-sheet interval from a sheet storing unit storing the plurality of sheets; a detection unit configured to detect presence or absence of a sheet fed on a feed path of sheet; and an image forming unit configured to form an image on an image bearing member and to transfer the image formed on the image bearing member onto the sheet. When the detection unit does not detect a first sheet fed within a given time after the image is formed on the image bearing member, the feed unit continues feeding of the first sheet and stops feeding of a second sheet, succeeding the first sheet. When the detection unit detects the first sheet after the feeding of the second sheet is stopped, the image forming unit reforms an image, to be formed on the first sheet, on the image bearing member, and the feed unit resumes the feeding of the second sheet. With this configuration, when the sheet feeding is resumed after the sheet feeding is stopped temporarily, the sheet-to-sheet interval can be ensured sufficiently.

[0014] In this disclosure, the image forming apparatus is an apparatus that performs an image forming operation on media, such as paper, overhead projector (OHP) sheet, thread, fiber, cloth, leather, metal, plastic, glass, wood, and ceramics as "recording media" by attaching developer or ink on to the recording media. In the following description, the term of "image formation" applies not only to forming an image having the meaning of character or figure on the recording media, but also forming an image having no meaning, such as pattern, onto the recording media. The term of "sheet" is not limited to paper (paper sheet), but also includes OHP sheets, cloth, etc., and means media to which developer or ink can be attached, and the "sheet" be also referred to as recorded medium, recorded media, recording paper, and recording sheet. Hereinafter, the sheet is described as "sheet P." The sheet P may mean one or more sheet, or a particular sheet. Further, the dimensions, materials, shapes, and their relative arrangements described in the description of each component are just examples, and the scope of this disclosure is not limited to the dimensions, materials, shapes, and their relative arrangements described in the description of each component unless specifically stated.

[0015] Hereinafter, with reference to FIG. 1, a description is given of an image forming apparatus according to an embodiment, in which a tandem color laser printer including a plurality of image bearing members arranged in parallel is described as an example of the image forming apparatus.

[0016] FIG. 1 is an example of configuration of a printer 100, which is an example of image forming apparatus, according to the embodiment. As illustrated in FIG. 1, the printer 100 includes, for example, four process units 1C, 1M, 1Y, and 1K for respectively forming images of cyan (C), magenta (M), yellow (Y), and black (K) arranged in parallel, each of which is used as an image forming unit (image forming device). Each of the four process units 1C, 1M, 1Y, and 1K employs almost the same configuration except that the color of used toner is different.

[0017] For the convenience of the description, hereinafter, C (cyan), M (magenta), Y (yellow), and K (black), corresponding to the toner color used for the image forming, are attached after the numbers indicating the component members. In a case of general description, these attached letters of C, M, Y, and K may be omitted appropriately. For example, the four process units 1C, 1M, 1Y, and 1K may be simply referred to as the four process

units 1 (C, M, Y, K). Further, for example, when not distinguishing each process unit among the four process units 1 (C, M, Y, K), the term of the process unit 1 may be used.

[0018] The process units 1 (C, M, Y, K) respectively include, for example, four image bearing members 2 (2C, 2M, 2Y, 2K) having a drum-like shape. The image bearing members 2 are arranged in parallel along a moving direction of an intermediate transfer belt 16 in the printer 100 while spaced apart in parallel. During an operation of the printer 100, each of the image bearing members 2 is driven by a drive force transmitted from a drive source, and a peripheral surface of each of the image bearing members 2 rotates along the moving direction of the intermediate transfer belt 16.

[0019] The image bearing member 2 forms a toner image thereon when an image forming operation using a laser light beam is performed inside the process unit 1. A transfer device 15 is disposed at a lower side of the image bearing member 2. The transfer device 15 includes an endless intermediate transfer belt 16. One end of the intermediate transfer belt 16 is wound around a driven roller 17, and the other end of the intermediate transfer belt 16 is wound around a transfer drive roller 18.

[0020] When the transfer drive roller 18 is driven by a driving source and rotated, the intermediate transfer belt 16 moves in a direction indicated by an arrow A, and a surface of the image bearing member 2 contacts an external surface of the intermediate transfer belt 16. The inner portion of the intermediate transfer belt 16 is provided with four primary transfer rollers 19 (Y, C, M, K) facing each of the image bearing members 2.

[0021] A belt cleaning device 21 configuring an image removing unit is provided at a position facing the external surface of the intermediate transfer belt 16, such as at a position near the right end of the intermediate transfer belt 16. With respect to the intermediate transfer belt 16 traveling in the direction of arrow A, the right end of the intermediate transfer belt 16 is a position of downstream of a secondary transfer unit, to be described later, and the upstream side of the process unit 1. The belt cleaning device 21 is a device for wiping out extraneous materials, such as unnecessary toner and sheet powder remaining on the surface of the intermediate transfer belt 16.

[0022] Further, a secondary transfer roller 20 configuring a transfer unit is provided at a position opposite to the transfer drive roller 18 by sandwiching the intermediate transfer belt 16 therebetween, and the secondary transfer roller 20 faces the external surface of the intermediate transfer belt 16. The secondary transfer roller 20, used as the secondary transfer unit, contacts the intermediate transfer belt 16 at the position opposing the transfer drive roller 18 to form a second transfer nip. At the second transfer nip, the toner image formed on the intermediate transfer belt 16 is electrostatically transferred onto the sheet P by applying a bias voltage while passing the sheet P (an example of recording medium) through the second transfer nip set between the intermediate transfer belt 16 and the secondary transfer roller 20.

[0023] The sheet feed tray 30 stacks and stores a plurality of sheets, such as the sheet P, in its inner tray space. A bottom plate 46 for placing the sheet P in a stacking state is disposed on the internal bottom surface of the sheet feed tray 30. As to the bottom plate 46, one end of the bottom plate 46 in the longitudinal direction thereof is rotatably supported by a support axis, and the other end of the bottom plate 46 is swingable along the vertical direction. The bottom plate 46 is constantly biased upward by a biasing member, such as a spring. The sheet feed tray 30 is an example of sheet feeding unit. Further, a plurality of sheets, such as the sheet P, is one example of a plurality of sheets. In this description, the term of "sheet P" may mean a sheet, a plurality of sheets, or one or more particular sheets.

[0024] A feed roller 47 serving as a rotating member is disposed at the end portion of the sheet feed tray 30 where the bottom plate 46 swings. The sheet feed roller 47 abuts the top of a bundle of sheet P placed in the sheet feed tray 30 in a stacked state, and the uppermost sheet P can be fed by the sheet feed roller 47. Since the sheet feed roller 47 is used to feed the sheet P in a given direction, it is not necessary to use a roller as the sheet feeder. For example, an endless rotation belt, which is extended between two rollers, can be used instead of the sheet feed roller 47.

[0025] A registration sensor 31 capable of detecting an end of the sheet P is disposed in the downstream direction of the sheet feed roller 47. In this description, the end of the sheet P includes the front end of the sheet P and/or the rear end of the sheet P. For example, the registration sensor 31 is configured to output ON-signal when the sheet P is detected, and output OFF-signal when the sheet P is not detected. That is, the registration sensor 31 is configured to detect the presence or non-presence (absence) of the sheet P fed on a feed path of the sheet P used for the sheet feeding.

[0026] Further, a paired registration rollers 32, which is a media standby unit that stops the sheet P temporarily, is disposed in a downstream direction of the feed direction when viewed from the registration sensor 31. The paired registration rollers 32, disposed at a position close to the upstream side of the intermediate transfer belt 16, temporarily stops and temporarily loosen the sheet P so that the toner image on the intermediate transfer belt 16 and the front end of the sheet P are accurately aligned at the second transfer nip. The paired registration rollers 32 feeds the sheet P, which is temporarily stopped, at a given timing to the second transfer nip just before the toner image formed on the intermediate transfer belt 16 is transferred onto the sheet P at the second transfer nip.

[0027] A fixing device 34 is disposed downstream of the second transfer nip set by the secondary transfer roller 20 and the transfer drive roller 18 in the downstream direction of the sheet feed direction. The fixing device 34 includes, for example, a fixing roller 34a and a pressure roller 34b. The fixing roller 34a includes, for example, a

heat source such as a halogen lamp, and the pressure roller 34b rotates while contacting the fixing roller 34a with a given pressure. Further, the fixing device 34 may adopt an endless rotation belt or other configuration such as an induced heating (IH) method.

[0028] FIG. 2 is an example of configuration of hardware block diagram of a control system of the printer 100 (image forming apparatus) of FIG. 1. As illustrated in FIG. 2, the printer 100 includes, for example, universal asynchronous receiver transmitter (UART) 57, central processing unit (CPU) 58, read only memory (ROM) 59, random access memory (RAM) 60, non-volatile random access memory (NVRAM) 61, operation panel interface (I/F) 62, input/output (I/O) 65, and image processing integrated circuit (IC) 66. The UART 57, CPU 58, ROM 59, RAM 60, NVRAM 61, operation panel I/F 62, I/O 65, and image processing IC 66 are connected with each other via system bus 64. The ROM 59, RAM 60, and NVRAM 61 configure a storage unit of the printer 100.

[0029] The UART 57 is an integrated circuit for converting serial signals and parallel signals. Instead of the UART 57, universal synchronous asynchronous receiver transmitter (USART) capable of synchronous serial communication may be used.

[0030] The CPU 58 is connected to the operation panel 63 via the operation panel I/F 62. The operation panel 63, provided with a display unit and an input unit that function as a user interface, is used for setting a printer mode or the like. The operation panel I/F 62 performs data exchange between the CPU 58 and the operation panel 63, for example, via the UART 57.

[0031] Further, a controller 67 is connected to the CPU 58 via the image processing IC 66. The CPU 58 obtains or acquires given printing conditions, such as thickness of sheet used for printing, from the controller 67 via, for example, the UART 57.

[0032] The CPU 58 is a control unit that controls the printer 100 (image forming apparatus) entirely. The CPU 58 comprehensively controls the access to various devices connected to the system bus 64 based on the control program or the like stored in the ROM 59. The CPU 58 controls the input and output of the registration sensor 31, a feed motor 69, a transfer motor 70, a photosensitive member motor 71, and a temperature humidity sensor 72, which are connected via, for example, the UART 57 and the I/O 65. In other words, the CPU 58 executes the control program of the printer 100 stored in the ROM 59.

[0033] The ROM 59 is a read-only nonvolatile memory, and stores one or more control programs and data used for controlling, used by the CPU 58.

[0034] The RAM 60, which is a volatile memory capable of reading and writing information, is used as a work frame memory used for loading recorded data and storing environmental data.

[0035] The NVRAM 61, which is a nonvolatile memory capable of reading and writing information, stores information on the printer 100 that is used by the control program.

[0036] The operation panel 63, operated by a user, is connected to the operation panel I/F 62. The controller 67 is connected to the image processing IC 66.

[0037] The I/O 65 is connected to the registration sensor 31 used for detecting that the sheet P is fed, the feed motor 69 used for rotationally driving the sheet feed roller 47, the transfer motor 70 used for rotationally driving the transfer drive roller 18, the photosensitive member motor 71 used for rotationally driving the image bearing member 2, and the temperature humidity sensor 72 used for detecting the temperature and humidity of the sheet P.

[0038] FIG. 3 is an example of configuration of functional block diagram of the printer 100 (image forming apparatus) of FIG. 1. The CPU 58 implements functions related to image forming operation, such as measurement of time of feeding the sheet P, detection of delay of the feed time, resuming of image forming, and resuming of registration (resuming of sheet feed), based on instructions generated from the control program and the control data stored in the ROM 59. As illustrated in FIG. 3, the printer 100 includes functions, such as acquisition unit 101, feed unit 102, detection unit 103, image forming unit 104, and notification unit 105.

[0039] Further, FIG. 3 illustrates examples of functions related to the embodiment for the simplicity of the description, but the function of the printer 100 is not limited thereto.

[0040] The acquisition unit 101 acquires control signals and measurement values from the registration sensor 31, the operation panel 63, the controller 67, and the temperature humidity sensor 72. The acquisition unit 101 includes, for example, a function of acquiring print request and image data from a terminal device that issues a print request to the printer 100.

[0041] The feed unit 102 has a function of continuously feeding each of a plurality of sheets P from the sheet feed tray 30 (sheet storing unit) storing the plurality of sheets P (a plurality of paper sheets) with a given sheet feed interval (sheet-to-sheet interval). More specifically, the feed unit 102 controls the feeding of the sheet P by controlling the driving of the paired registration rollers 32 and the sheet feed roller 47.

[0042] The detection unit 103 has a function of detecting the presence or non-presence (absence) of the sheet P on the feed path of the sheet P that is fed under the control of the feed unit 102. More specifically, the detection unit 103 has a function of detecting the end of the sheet P (front end or rear end of the sheet P) based on the ON-OFF switching of the registration sensor 31. In other words, the detection unit 103 has a function of monitoring the state of the registration sensor 31 and determining the image formation timing. Further, the detection unit 103 obtains or acquires a slide amount of the sheet P based on the arrival time of the sheet P to the registration sensor 31.

[0043] The image forming unit 104 has a function of forming an image on the image bearing member 2 and transferring the image formed on the image bearing

member 2 onto the sheet P. More specifically, the image forming unit 104 includes functions, such as converting the image data supplied from the acquisition unit 101 into control signals of the process unit 1 corresponding to each color, controlling the writing of the latent image onto the image bearing member 2, creating a toner image from the image data supplied from the acquisition unit 101, transferring the toner image onto the sheet P, and fixing the toner image transferred onto the sheet P by applying heat and pressure to the sheet P.

[0044] Further, the image forming unit 104 includes, for example, a function for correcting the position deviation when the position deviation is detected when performing the printing. Further, the image forming unit 104 includes, for example, a function for performing a retry processing of image forming operation by controlling the image forming timing.

[0045] The notification unit 105 has a function of generating display information used for notifying a user of occurrence of sheet jamming not feeding the sheet. The notification unit 105 further includes, for example, a function of notifying a user that the re-trying of image forming operation has occurred after the sheet feed interval is changed due to the occurring of the re-trying of image forming operation.

[0046] Hereinafter, with reference to FIG. 1, a description is given of operation of the printer 100 according to the embodiment.

[0047] At first, with reference to FIG. 1, a description is given of basic operation of the printer 100.

(Sheet Feed Operation)

[0048] When the sheet feed roller 47 of the sheet feed tray 30 rotates by receiving the feed start signal from the printer control unit, among the sheet P loaded or stacked on the bottom plate 46 of the sheet feed tray 30, the uppermost sheet P is separated from the lower sheet P and fed out.

[0049] When the front end of the sheet P is detected by the registration sensor 31, the sheet P is fed using the detection at the registration sensor 31 as a trigger until a slack is formed at the nip portion of the paired registration rollers 32 to correct a skew of the front end of the sheet P.

(Image Forming Operation)

[0050] When a visible toner image is developed on the image bearing member 2K, the developed toner image is transferred onto the surface of the intermediate transfer belt 16 moving in synchronization with the image bearing member 2K by receiving a transfer effect caused by the primary transfer roller 19K, which is positively charged. The formation of latent image, development of latent image, and primary transfer of toner image are sequentially performed at given timing at the process unit 1 (C, M, Y, K) based on the image data, and then toner images of cyan C, magenta M, yellow Y and black K are overlaid sequentially on the surface of the intermediate transfer belt 16 to form toner images of four colors. The four-color toner image is conveyed along with the intermediate transfer belt 16 that moves in the direction of arrow A.

[0051] When the color toner images are transferred onto the intermediate transfer belt 16, the paired registration rollers 32 and the sheet feed roller 47 start the driving, and then the sheet P is fed to the secondary transfer roller 20, which is the transfer position, so that the timing of sheet feed matches the timing of toner images transferred onto the intermediate transfer belt 16. Further, the driving start of the paired registration rollers 32 and the sheet feed roller 47 are not necessarily have to be simultaneously. Further, another feed roller for feeding the sheet P may be provided in addition to the paired registration rollers 32 and the sheet feed roller 47.

[0052] Since the secondary transfer roller 20 is positively charged, the toner image on the intermediate transfer belt 16 is transferred onto the sheet P being fed at the second transfer nip set by the secondary transfer roller 20.

[0053] Then, the residual toner and foreign matter remaining on the surface of the intermediate transfer belt 16 are removed by the belt cleaning device 21 to prepare for performing the next-time image formation and transfer process.

[0054] The sheet P transferred with the toner image is fed to the fixing device 34. The sheet P fed to the fixing device 34 is sandwiched between the fixing roller 34a and the pressure roller 34b, and then the unfixed toner image is heated and pressurized to fix the toner image on the sheet P.

[0055] FIG. 4 is an example of a flowchart illustrating an image forming operation performed at the printer 100 according to the embodiment. The print processing (image forming operation) of FIG. 4 is started in response to an acquisition of a print request by the acquisition unit 101 from, for example, a terminal device. When the print processing is to be started, the acquisition unit 101 transmits the print request and image data received from the terminal device to the image forming unit 104.

[0056] In step S101, the image forming unit 104 starts the image forming operation. More specifically, the image forming unit 104 converts the image data received from the acquisition unit 101 into control signals for controlling a process to be performed at the process unit 1 corresponding to each color. Then, the image forming unit 104 supplies the control signals to the process unit 1. Then, the image forming unit 104 activates each motor and starts the image forming operation at the process unit 1.

[0057] In step S102, the detection unit 103 starts to measure a registration resuming time.

[0058] In step S103, the feed unit 102 starts a process of feeding the sheet. More specifically, the feed unit 102 drives the feed motor 69 to rotate the sheet feed roller 47 linked to the feed motor 69 via an electromagnetic clutch to start the sheet feed processing that feeds the

sheet P stacked on the sheet feed tray 30 with a given sheet-to-sheet interval.

[0059] In step S104, the detection unit 103 start to measure a jamming detection time.

[0060] In step S105, the detection unit 103 determines whether or not the registration sensor 31 becomes ON. In this configuration, it is assumed that the registration sensor 31 becomes ON in response to detecting the sheet P. In other words, as to the sheet feed processing started in step S103, the detection unit 103 determines whether the front end of the sheet P, fed from the sheet feed tray 30, arrives or reaches the registration sensor 31.

[0061] As to the sequence of FIG. 4, if the detection unit 103 determines that the front end of the sheet P arrives or reaches the registration sensor 31 (S105: YES), the sequence proceeds to step S107, and if the detection unit 103 determines that the front end of the sheet P does not arrive or reach the registration sensor 31 (S105: NO), the sequence proceeds to step S106.

[0062] Further, as to the embodiment, the detection unit 103 determines whether the front end of the sheet P, fed from the sheet feed tray 30, arrives or reaches the registration sensor 31 based on the signals output of the registration sensor 31, but is not limited to thereto. For example, the sensor output signals used for the determination by the detection unit 103 can be signals output from any sensor capable of checking the normal feeding of the sheet, and the sensor position can be at any position.

[0063] In step S106, the detection unit 103 determines whether or not the given registration resuming time has elapsed. In this configuration, it is assumed that the given registration resuming time is, for example, set and stored in the storage unit in advance. In other words, in step S106, the detection unit 103 determines whether or not the given registration resuming time has elapsed in a state that the front end of the sheet P does not arriver or reach the registration sensor 31.

[0064] As to the sequence of FIG. 4, if the detection unit 103 determines that the given registration resuming time has elapsed (S106: YES), the sequence proceeds to step Sill, and if the detection unit 103 determines that the given registration resuming time has not yet elapsed (S106: NO), the sequence returns to step S105.

(Normal Print Processing)

[0065] Hereinafter, with reference to FIG. 4, a description is given of a flow in a case when the front end of the sheet P arrives or reaches the registration sensor 31 before the given jamming detection time and the registration resuming time have elapsed. That is, steps S107 to S110, which follow step S105, is a flow when the feeding of the sheet P is in time for the image forming operation.

[0066] In step S107, the feed unit 102 resumes the registration, for example, when the given registration resuming time has elapsed. More specifically, the feed unit 102 drives the paired registration rollers 32 to feed the sheet P (i.e., preceding sheet) to the secondary transfer roller 20. Further, the feed unit 102 resumes the driving of the sheet feed roller 47 and starts the feeding process of the sheet P (i.e., succeeding sheet).

[0067] Further, before step S107, the sheet P is fed in a time period from a linking of a sheet feed clutch until the given registration resuming time elapses by setting a given slack for the front end of the sheet P at the paired registration rollers 32. That is, it is assumed that step S107 is started when the linked driving of the sheet feed clutch is canceled to stop the rotation of the sheet feed roller 47, and the sheet P is in a standby state.

[0068] In step S108, at a time when a position of the toner image being formed on the intermediate transfer belt 16 and a position of the sheet P that is waiting at the paired registration rollers 32 are aligned at the secondary transfer roller 20, the feed unit 102 drives the feed motor 69 by linking the feed motor 69 to the paired registration rollers 32 via a registration clutch to feed the sheet P to the secondary transfer nip set by the secondary transfer roller 20. Then, the image forming unit 104 transfers the toner image onto the sheet P at the secondary transfer roller 20.

[0069] Further, until step S108, the toner image is transferred onto the intermediate transfer belt 16 by the primary transfer roller 19 and is then fed to the secondary transfer roller 20 by the intermediate transfer belt 16 for the image forming operation that has started in step S101.

[0070] In step S109, the feed unit 102 feeds the sheet P transferred with the toner image to the fixing device 34. Then, the image forming unit 104 performs the fixing process using the fixing device 34.

[0071] In step S110, the feed unit 102 ejects or discharges the sheet P fixed with the toner image at the fixing device 34 from the printer 100. Then, the print processing is completed or terminated.

(Print Processing when Re-Trying of Image Forming Operation Occurs)

[0072] Hereinafter, with reference to FIG. 4, a description is given of a flow in a case when the given registration resuming time has elapsed in a state that the front end of the sheet P does not arrive or reach the registration sensor 31 (when step S106 is YES).

[0073] In step S111, the image forming unit 104 stops the image forming operation. The feed unit 102 continues to feed the sheet P (i.e., preceding sheet). On the other hand, the feed unit 102 stops or interrupts the feeding of the sheet P (i.e., succeeding sheet).

[0074] In step S112, the detection unit 103 determines whether the front end of the fed sheet P (i.e., preceding sheet) arrives or reaches the registration sensor 31 as similar to step S105.

[0075] As to the sequence of FIG. 4, if the detection unit 103 determines that the front end of the sheet P (i.e., preceding sheet) arrives or reaches the registration sen-

sor 31 (S112: YES), the sequence proceeds to step S114, and if the detection unit 103 determines that the front end of the sheet P (i.e., preceding sheet) does not arrive or reach the registration sensor 31 (S112: NO), the sequence proceeds to step S113.

[0076] In step S113, the detection unit 103 determines whether or not the given jamming detection time has elapsed. In this configuration, it is assumed that the given jamming detection time is, for example, set and stored in the storage unit in advance. In other words, in step S113, the detection unit 103 determines whether or not the given jamming detection time has elapsed in a state that the front end of the sheet P (i.e., preceding sheet) does not arrive or reach the registration sensor 31.

[0077] As to the sequence of FIG. 4, if the detection unit 103 determines that the given jamming detection time has elapsed (S113: YES), the sequence proceeds to step S116, and if the detection unit 103 determines that the given jamming detection time has not yet elapsed (S113: NO), the sequence returns to step S112.

[0078] In step S 114, the image forming unit 104 resumes the image forming operation. More specifically, the image forming unit 104 resumes the image forming operation as similar to step S101. Further, the detection unit 103 starts to measure the registration resuming time.

[0079] In step S115, the feed unit 102 resumes the registration as similar to step S107. However, different from step S107, the feed unit 102 does not start the feed processing for the sheet P (i.e., succeeding sheet) in step S115. Then, the sequence of FIG. 4 proceeds to step S108, and the second transfer, fixing, and discharging are performed for the sheet P (i.e., preceding sheet) to which the feeding process is resumed.

[0080] After the detection unit 103 determines that the given registration resuming time has elapsed in step S106 (S106: YES), the resuming of image forming operation on sheet (re-formation of image) and the discharging of sheet that are performed in steps S111, S114, S115, S108, S109, and S110, which is referred to as re-trying of image forming operation.

(Printing Operation when Jamming Occurs)

[0081] Hereinafter, with reference to FIG. 4, a description is given of a flow in a case when the given jamming detection time has elapsed in a state that the front end of the sheet P does not arrive or reach the registration sensor 31 (when step S113 is YES).

[0082] In step S116, the detection unit 103 determines that the sheet jamming has occurred. In other words, in step S116, the detection unit 103 determines that the jamming not feeding the sheet occurs. If the detection unit 103 determines that the jamming not feeding the sheet occurs in step S116, the notification unit 105 generates display information used for notifying a user an occurrence of the jamming not feeding the sheet. Then, the notification unit 105 transmits the generated display information to the operation panel 63. Then, the operation panel 63 displays a message indicating the occurrence of the jamming not feeding the sheet based on the display information received from the notification unit 105. The display information includes, for example, a character or text string such as error code, a pre-set shape, or the like. Further, the occurrence of the jamming not feeding the sheet may be notified to the user by flashing the display screen or changing a color of the display screen.

[0083] In step S117, the printing is interrupted. Then, the sequence of FIG. 4 ends or terminates.

[0084] Hereinafter, with reference to FIG. 5, a description is given of a an example of a flow of image forming on the sheet P (hereinafter, referred to as the succeeding sheet), in which the sheet P (succeeding sheet) is a sheet that is fed after the sheet P (preceding sheet) that the re-trying of image forming operation has occurred (hereinafter, referred to as re-trying of image forming operation occurring sheet).

[0085] FIG. 5 is an example of a flowchart illustrating an image forming on the succeeding sheet with respect to the preceding sheet (re-trying of image forming operation occurring sheet) when the re-trying of image forming operation has occurred in the sequence of FIG. 4.

[0086] In step S201, the feed unit 102 stops the feeding of the succeeding sheet. The processing in step S201 corresponds to the processing in step S111 of FIG. 4. In other words, when the feeding of the succeeding sheet is stopped in step S201, the feeding of the re-trying of image forming operation occurring sheet is not stopped.

[0087] In step S202, the detection unit 103 starts to measure a time using a sheet-to-sheet interval securing timer. In this configuration, the sheet-to-sheet interval securing timer is set with a time, for example, based on a specific time period that is required to feed the maximum sheet length that can be fed.

[0088] In step S203, the detection unit 103 determines whether or not a time-out of the sheet-to-sheet security timer has occurred. That is, in step S203, the detection unit 103 determines whether the sheet-to-sheet interval between the sheet P (preceding sheet) on which the re-trying of image forming operation has occurred (re-trying of image forming operation occurring sheet) and the sheet P (succeeding sheet) is sufficient or not. As to the sequence of FIG. 5, step S203 is repeated until the detection unit 103 determines that the time-out of the sheet-to-sheet security timer has occurred. If the detection unit 103 determines that the time-out of the sheet-to-sheet security timer has occurred (S203: YES), the sequence proceeds to step S204.

[0089] In step S204, the feed unit 102 resumes the feeding of the succeeding sheet.

[0090] As in the same manner in steps S108 to S110 of FIG. 4, the processing in steps S205 to S207 is performed to perform the secondary transfer, fixing, and discharging on the succeeding sheet to which the feeding is resumed. After the discharge or ejection operation of the sheet is performed in step S207, the sequence of FIG. 5 ends or terminates.

[0091] FIG. 6 is a diagram describing a case where the re-trying of image forming operation occurring sheet overlaps with the succeeding sheet when the feeding of the re-trying of image forming operation occurring sheet is delayed when the re-trying of image forming operation has occurred in the sequence of FIG. 4.

[0092] As above described with reference to FIG. 4, the print processing in the case when the re-trying of image forming operation occurs is a print processing in which the given registration resuming time has elapsed in the state that the front end of the sheet P does not arrive or reach the registration sensor 31. If the feeding of the re-trying of image forming operation occurring sheet is delayed, as illustrated in the upper part of FIG. 6, the re-trying of image forming operation occurring sheet (i.e., preceding sheet) overlaps at least partially with the succeeding sheet. If the re-trying of image forming operation occurring sheet (i.e., preceding sheet) and the succeeding sheet are fed in a state of overlapping the preceding sheet and the succeeding sheet, the registration sensor 31 does not become OFF for a longer period of time, with which it is determined that the sheet jamming occurs.

[0093] Further, if the paired registration rollers 32 and the sheet feed roller 47 are driven in the state where the re-trying of image forming operation occurring sheet (i.e., preceding sheet) and the succeeding sheet are overlapped at least partially with each other, the sheet jamming may occur.

[0094] As described above, even if such situation occurs, the printer 100 can stop the feeding of the succeeding sheet alone when the re-trying of image forming operation occurs. In other words, as to the above described embodiment, as illustrated in the lower part of FIG. 6, an interval between the re-trying of image forming operation occurring sheet (i.e., preceding sheet) and the succeeding sheet can be secured sufficiently. Further, as to the above described controlling of the sheet-to-sheet interval, the overlapping of sheets can be prevented. This means that the sheet can be discharged without causing the jamming.

[0095] FIG. 7 is a diagram describing a sheet feed interval (sheet-to-sheet interval) after the re-trying of image forming operation has occurred for the re-trying of image forming operation in the sequence of FIG. 4. In an example case of FIG. 7, the re-trying of image forming operation has occurred at sheet 2.

[0096] Since the re-trying of image forming operation has not occurred at sheet 1, the feeding of the succeeding sheet 2 is started during the normal print processing of the sheet 1. In this situation, the sheet-to-sheet interval between sheet 1 and sheet 2 is an interval A as illustrated in FIG. 7.

[0097] Then, since the re-trying of image forming operation has occurred at sheet 2, the feeding of sheet 3 is stopped or interrupted temporarily. As described above, the feeding of sheet 3 is resumed after the time-out of the sheet-to-sheet interval securing timer has occurred. When the feeding of the sheet 3 is resumed, the sheet-to-sheet interval between sheet 2 and sheet 3 is an interval B as illustrated in FIG. 7.

[0098] As above described, when the re-trying of image forming operation occurs at sheet 2, the feed unit 102 sets the interval B as the sheet-to-sheet interval between sheet 3 and sheet 4. That is, when the re-trying of image forming operation occurs, the feed unit 102 sets the given sheet-to-sheet interval (i.e., interval B) between the re-trying of image forming operation occurring sheet (i.e., preceding sheet) and the succeeding sheet as the sheet-to-sheet interval.

[0099] Further, if a slippery sheet is set, the feeding of the succeeding sheet may also be delayed. However, as to the configuration of the above described embodiment, the sheet feed interval in accordance with the degree of slippery of sheet can be ensured sufficiently for the succeeding sheet. In other words, as to the configuration of the above described embodiment, when the re-trying of image forming operation occurs, the sheet jamming caused by interference of between the sheets, such as the too-close sheet interval between the sheets can be prevented.

[0100] Further, if the sheet-to-sheet interval has been changed (e.g., enlarged) due to the occurrence of re-trying of image forming operation, another re-trying of image forming operation may occur subsequently. In this case, as similar to step S117, for example, the notification unit 105 generates the display information used for notifying the user that the re-trying of image forming operation has occurred due to the delay of feeding of sheet in a state in which the sheet-to-sheet interval between the sheets becomes longer. With this configuration, the user can be notified that slippage occurs frequently, so that the user can be given an opportunity for checking the sheet type.

[0101] Further, in the above described embodiment, the case where the sheet feeding of the succeeding sheet is resumed when the time out of the sheet-to-sheet interval securing timer has occurred is described, but is not limited thereto.

[0102] For example, the resuming of feeding the succeeding sheet may be at a timing at which the rear end of the re-trying of image forming operation occurring sheet (i.e., preceding sheet) passes through the registration sensor 31, which is disposed downstream from the front end of the succeeding sheet in the feed path. The timing at which the rear end of the re-trying of image forming operation occurring sheet (i.e., preceding sheet) passes through the registration sensor 31 is a timing when the registration sensor 31 becomes OFF after the registration sensor 31 becomes ON when the front end of re-trying of image forming operation occurring sheet (i.e., preceding sheet) reaches the registration sensor 31.

[0103] As to the above described embodiment, when the re-trying of image forming operation occurs, the feeding of the re-trying of image forming operation occurring sheet (i.e., preceding sheet) is continued while the feed-

ing of the succeeding sheet is stopped or interrupted, with which the feeding of the re-trying of image forming operation occurring sheet (i.e., preceding sheet) and the succeeding sheet in the overlapped state can be prevented.

[0104] That is, as to the above described embodiment, since a situation that the registration sensor 31 does not become OFF for a longer period of time can be prevented, the timing of the feeding of the succeeding sheet can be determined based on the ON-OFF state of the registration sensor 31. By resuming the feeding of the succeeding sheet in response to detecting the OFF state of the registration sensor 31 disposed on the feed path, the decrease in productivity can be reduced while preventing the occurrence of sheet jamming.

[0105] As to the above described embodiment, the case where a sheet-shape object, such as paper, is fed and conveyed in the printer 100 (image forming apparatus), but is not limited thereto. The above described embodiment can be also applied to another object not having the sheet-shape, and any apparatus that performs other image formation operation. For example, the above described embodiment can be applied to an apparatus that attach labels on objects not having the sheet-shape, being conveyed on a conveyer belt, such as corrugated cardboard boxes, by securing a conveying interval between the objects being conveyed on the conveyer belt.

[0106] As to the above embodiment of this disclosure, when the sheet feeding is resumed after the sheet feeding is stopped temporarily, the sheet-to-sheet interval can be ensured sufficiently.

[0107] Further, as to the above described embodiment, the image forming program that is executed by the printer 100 (image forming apparatus) according to the embodiment is provided in ROM or the like in advance.

[0108] Further, as to the above described embodiment, the image forming program executed by the printer 100 (image forming apparatus) may be configured to be recorded on a computer-readable recording medium, such as compact disk ROM (CD-ROM), flexible disc (FD), compact disk recordable (CD-R), digital versatile disk (DVD), or the like using installable format or executable format.

[0109] Further, as to the above described embodiment, the image forming program executed by the printer 100 (image forming apparatus) may be configured to be stored in one or more computers connected to a network, such as the Internet, and to be provided by downloading via the network. Further, the image forming program executed by the printer 100 (image forming apparatus) may be configured to be provided or distributed via the network, such as the Internet.

[0110] Further, as to the above described embodiment, the image forming program executed by the printer 100 (image forming apparatus) employs a module configuration including the above described units (acquisition unit 101, feed unit 102, detection unit 103, image forming unit 104, notification unit 105), and in an actual hardware, when the CPU (processor) reads out the image forming program from the ROM and executes the image forming program, the acquisition unit 101, the feed unit 102, the detection unit 103, the image forming unit 104, and the notification unit 105 are implemented on a main storage unit.

[0111] In the above described embodiment, the image forming apparatus is applied to a multifunctional apparatus having at least two functions, selected from a copy function, a printer function, a scanner function, a facsimile function, but the above described image forming apparatus can be applied to any image forming apparatus, such as copier, printer, scanner, facsimile machine, or the like.

[0112] The present invention can be implemented in any convenient form, for example using dedicated hardware, or a mixture of dedicated hardware and software. The present invention may be implemented as computer software implemented by one or more networked processing apparatuses. The network can comprise any conventional terrestrial or wireless communications network, such as the Internet. The processing apparatuses can compromise any suitably programmed apparatuses such as a general purpose computer, personal digital assistant, mobile telephone (such as a WAP or 3G-compliant phone) and so on. Since the present invention can be implemented as software, each and every aspect of the present invention thus encompasses computer software implementable on a programmable device. The computer software can be provided to the programmable device using any conventional carrier medium. The carrier medium can compromise a transient carrier medium such as an electrical, optical, microwave, acoustic or radio frequency signal carrying the computer code. An example of such a transient medium is a TCP/IP signal carrying computer code over an IP network, such as the Internet. The carrier medium can also comprise a storage medium for storing processor readable code such as a floppy disk, hard disk, CD ROM, magnetic tape device or solid state memory device. The hardware platform includes any desired kind of hardware resources including, for example, a central processing unit (CPU), a random access memory (RAM), and a hard disk drive (HDD). The CPU may be implemented by any desired kind of any desired number of processor. The RAM may be implemented by any desired kind of volatile or non-volatile memory. The HDD may be implemented by any desired kind of non-volatile memory capable of storing a large amount of data. The hardware resources may additionally include an input device, an output device, or a network device, depending on the type of the apparatus. Alternatively, the HDD may be provided outside the apparatus as long as the HDD is accessible. In this example, the CPU, such as a cashe memory of the CPU, and the RAM may function as a physical memory or a primary memory of the apparatus, while the HDD may function as a secondary memory of the apparatus.

[0113] Numerous additional modifications and varia-

tions 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 specification can be practiced otherwise than as specifically described herein. Any one of the above-described operations may be performed in various other ways, for example, in an order different from the one described above.

Claims

1. An image forming apparatus (100) comprising:

a feed unit (102) configured to continuously feed a plurality of sheets with a given sheet-to-sheet interval from a sheet storing unit (30) storing the plurality of sheets;
a detection unit (103) configured to detect presence or absence of a sheet fed on a feed path of sheet; and
an image forming unit (104) configured to form an image on an image bearing member (2) and to transfer the image formed on the image bearing member (2) onto the sheet;
wherein when the detection unit (103) does not detect a first sheet fed within a given time after the image is formed on the image bearing member (2), the feed unit (102) continues feeding of the first sheet and stops feeding of a second sheet succeeding the first sheet,
wherein when the detection unit (103) detects the first sheet after the feeding of the second sheet is stopped, the image forming unit (104) re-forms an image, to be formed on the first sheet, on the image bearing member (2), and the feed unit (102) resumes the feeding of the second sheet.

2. The image forming apparatus (100) according to claim 1,
wherein when the feeding of the second sheet is resumed, the feed unit (102) changes the given sheet-to-sheet interval between sheets to be fed after the second sheet to a specific sheet-to-sheet interval set between the first sheet and the second sheet.

3. The image forming apparatus (100) according to claim 1 or claim 2,
wherein when the detection unit (103) detects a front end of the first sheet after the feeding of the second sheet is stopped, the image forming unit (104) re-forms an image, to be formed on the first sheet, on the image bearing member (2),
wherein when the detection unit (103) detects a rear end of the first sheet after the feeding of the second sheet is stopped, the feed unit (102) resumes the feeding of the second sheet.

4. The image forming apparatus (100) according to claim 3,
wherein when the detection unit (103) starts to measure a time period elapsing from a stop of feeding of the second sheet, and then the detection unit (103) detects the rear end of the first sheet, the detection unit (103) detects that the time period elapsing from the stop of feeding of the second sheet exceeds a time required to feed a sheet having the maximum sheet length that can be fed in the image forming apparatus (100).

5. The image forming apparatus (100) according to any of claims 1 to 4, further comprising:

a notification unit (105),
wherein when the detection unit (103) does not detect a third sheet, which is fed after resuming the feeding of the second sheet, within a given time after an image is formed on the image bearing member (2), the notification unit (105) is configured to generate display information presenting to a user that a re-trying of image forming operation has occurred in a state of enlarging the given sheet-to-sheet interval.

6. A method of controlling an image forming apparatus (100), comprising:

continuously feeding a plurality of sheets with a given sheet-to-sheet interval from a sheet storing unit (30) storing the plurality of sheets;
detecting presence or absence of a sheet fed on a feed path of sheet;
forming an image on an image bearing member (2); and
transferring the image formed on the image bearing member (2) onto the sheet;
wherein when the detecting does not detect a first sheet fed within a given time after the image is formed on the image bearing member (2), the feeding continues feeding of the first sheet while stopping feeding of a second sheet succeeding the first sheet;
wherein when the detecting detects the first sheet after the feeding of the second sheet is stopped, the forming re-forms an image, to be formed on the first sheet, on the image bearing member (2), and the feeding resumes the feeding of the second sheet.

7. A carrier means carrying computer readable code for controlling one or more processors to execute the method of claim 6.

FIG. 1

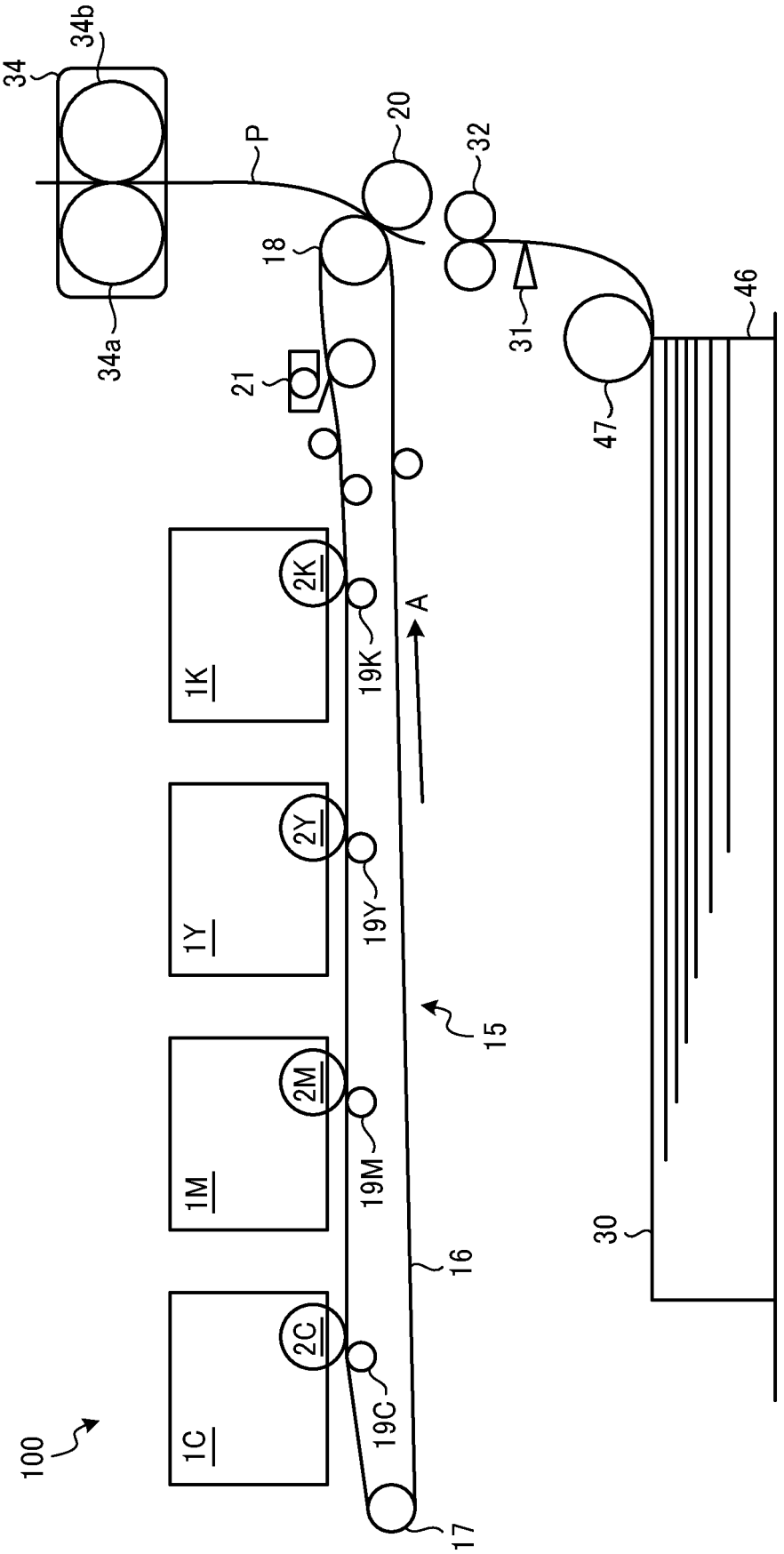

34
34b
34a
P
20
32
18
21
31
46
47
1K
2K
19K
A
1Y
2Y
19Y
15
1M
2M
19M
16
30
1C
2C
19C
17
100

FIG. 2

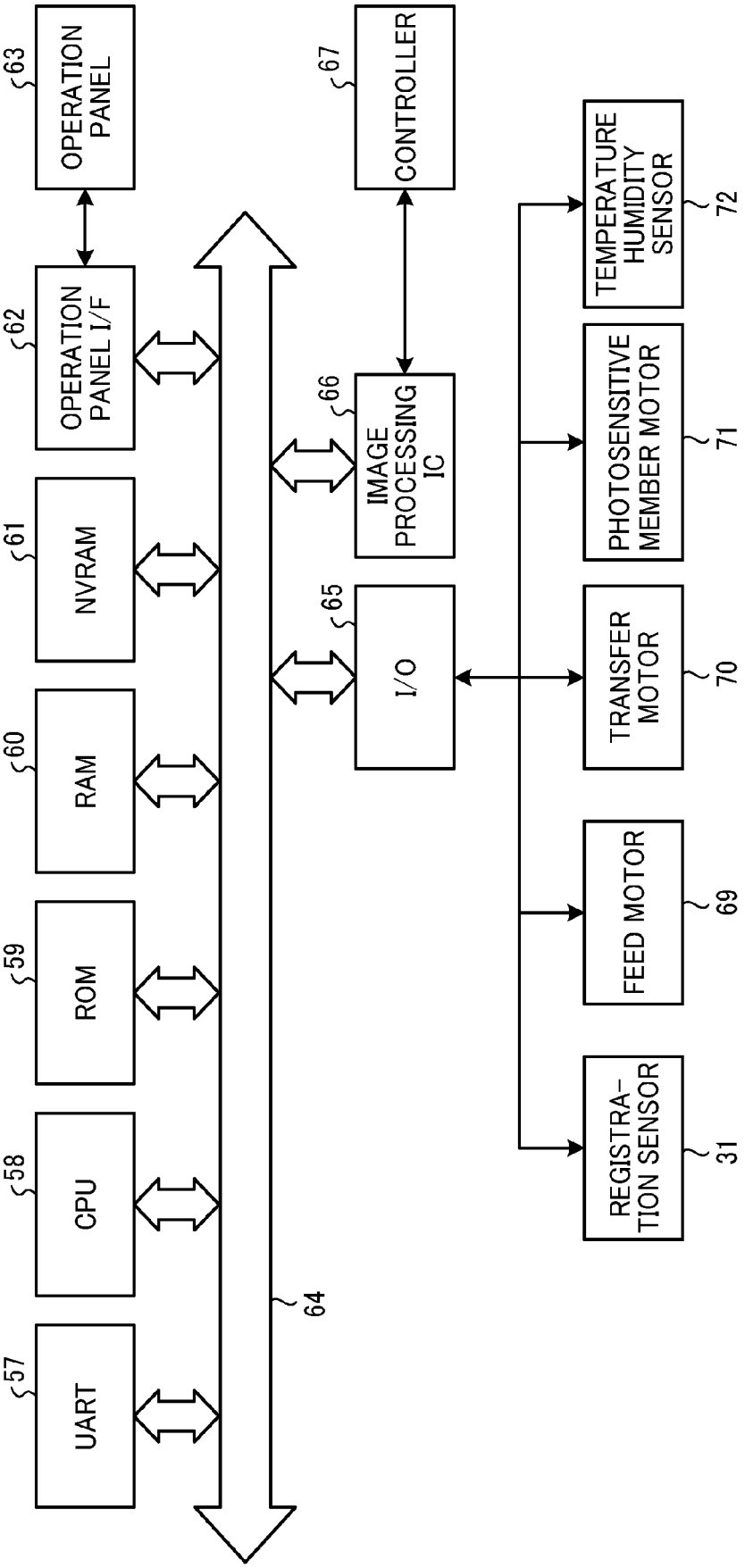

OPERATION PANEL
63
OPERATION PANEL I/F
62
NVRAM
61
RAM
60
ROM
59
CPU
58
UART
57
64
CONTROLLER
67
IMAGE PROCESSING IC
66
I/O
65
TEMPERATURE HUMIDITY SENSOR
72
PHOTOSENSITIVE MEMBER MOTOR
71
TRANSFER MOTOR
70
FEED MOTOR
69
REGISTRA-TION SENSOR
31

FIG. 3

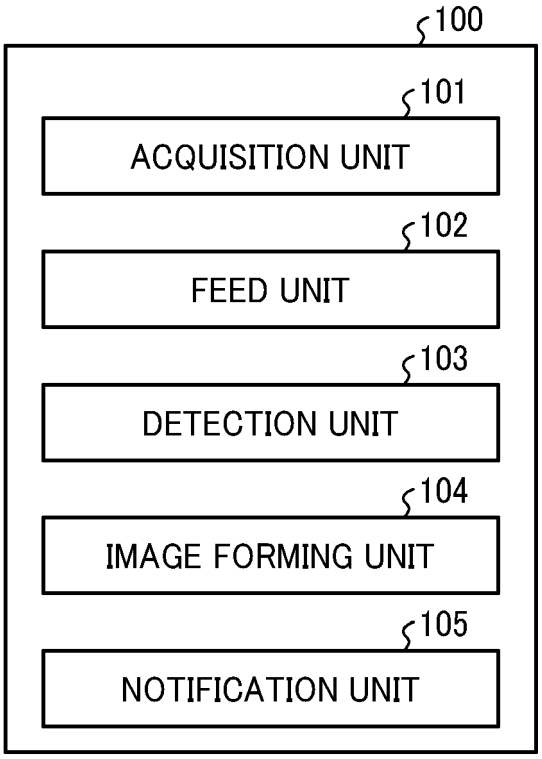

100
101
ACQUISITION UNIT
102
FEED UNIT
103
DETECTION UNIT
104
IMAGE FORMING UNIT
105
NOTIFICATION UNIT

FIG. 4

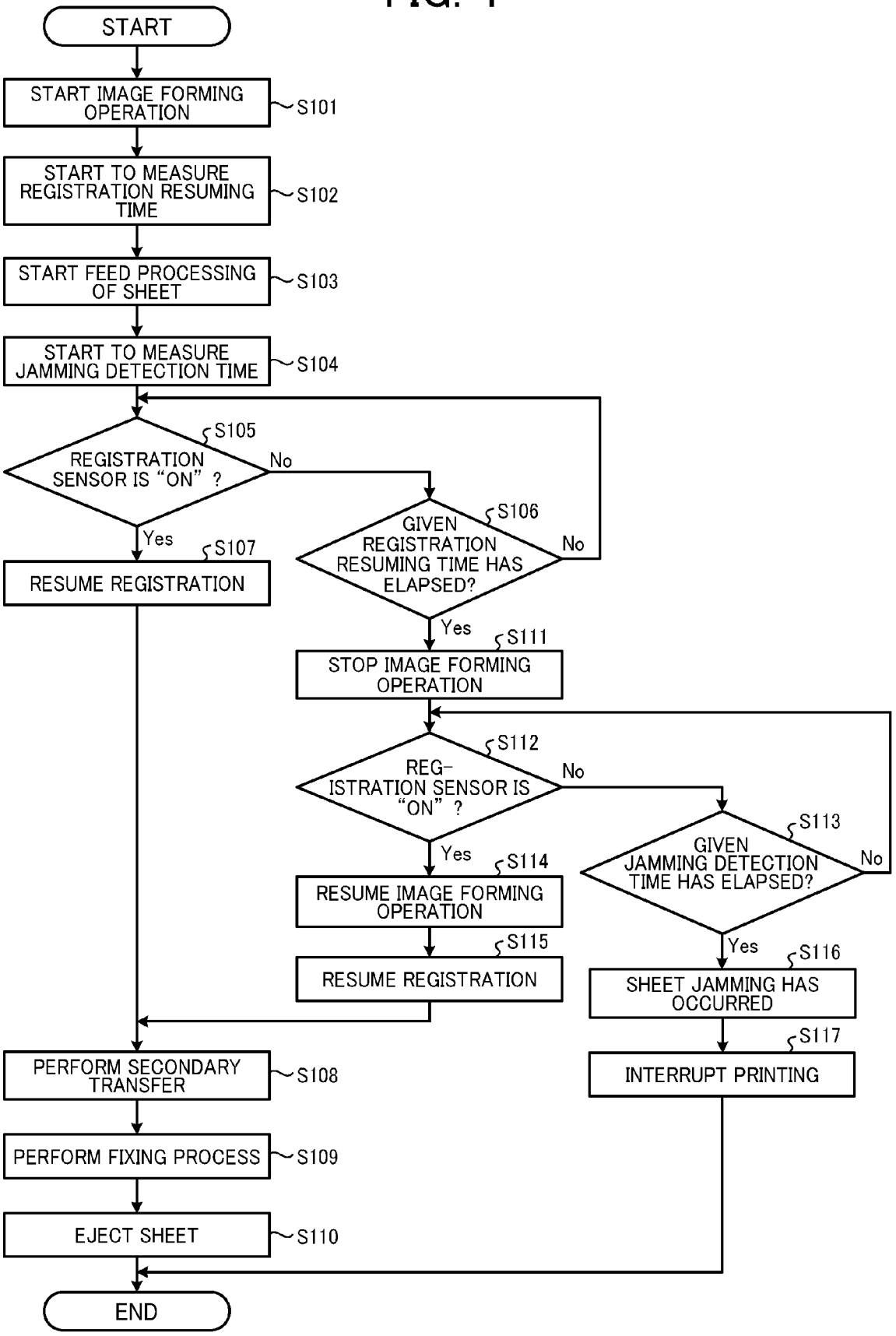

START
START IMAGE FORMING OPERATION
S101
START TO MEASURE REGISTRATION RESUMING TIME
S102
START FEED PROCESSING OF SHEET
S103
START TO MEASURE JAMMING DETECTION TIME
S104
S105
REGISTRATION SENSOR IS "ON" ?
No
Yes
S107
RESUME REGISTRATION
S106
GIVEN REGISTRATION RESUMING TIME HAS ELAPSED?
No
Yes
S111
STOP IMAGE FORMING OPERATION
S112
REG-ISTRATION SENSOR IS "ON" ?
No
Yes
S114
RESUME IMAGE FORMING OPERATION
S115
RESUME REGISTRATION
S113
GIVEN JAMMING DETECTION TIME HAS ELAPSED?
No
Yes
S116
SHEET JAMMING HAS OCCURRED
S117
INTERRUPT PRINTING
PERFORM SECONDARY TRANSFER
S108
PERFORM FIXING PROCESS
S109
EJECT SHEET
S110
END

FIG. 5

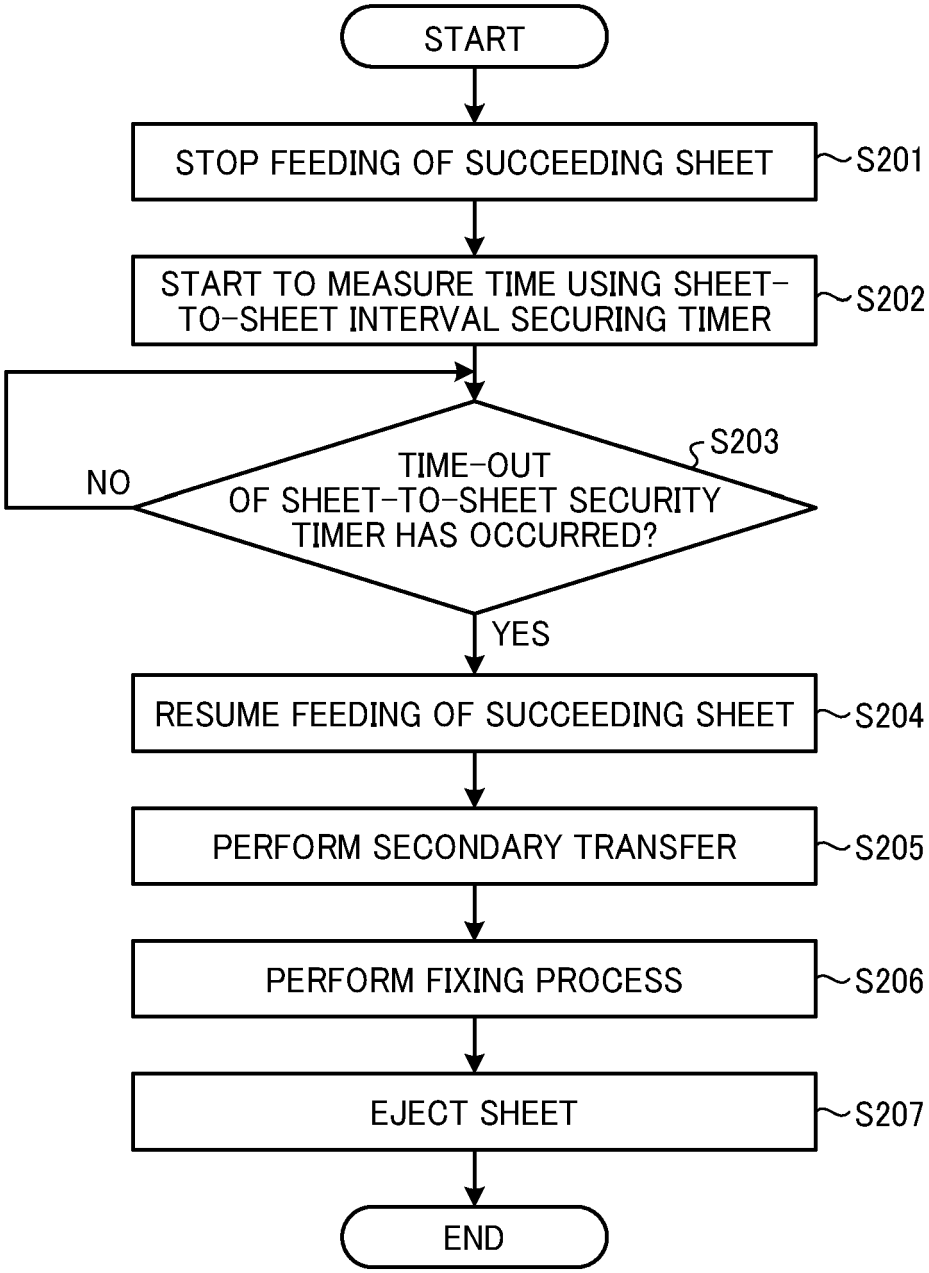

START
STOP FEEDING OF SUCCEEDING SHEET
S201
START TO MEASURE TIME USING SHEET-TO-SHEET INTERVAL SECURING TIMER
S202
S203
TIME-OUT OF SHEET-TO-SHEET SECURITY TIMER HAS OCCURRED?
NO
YES
RESUME FEEDING OF SUCCEEDING SHEET
S204
PERFORM SECONDARY TRANSFER
S205
PERFORM FIXING PROCESS
S206
EJECT SHEET
S207
END

FIG. 6

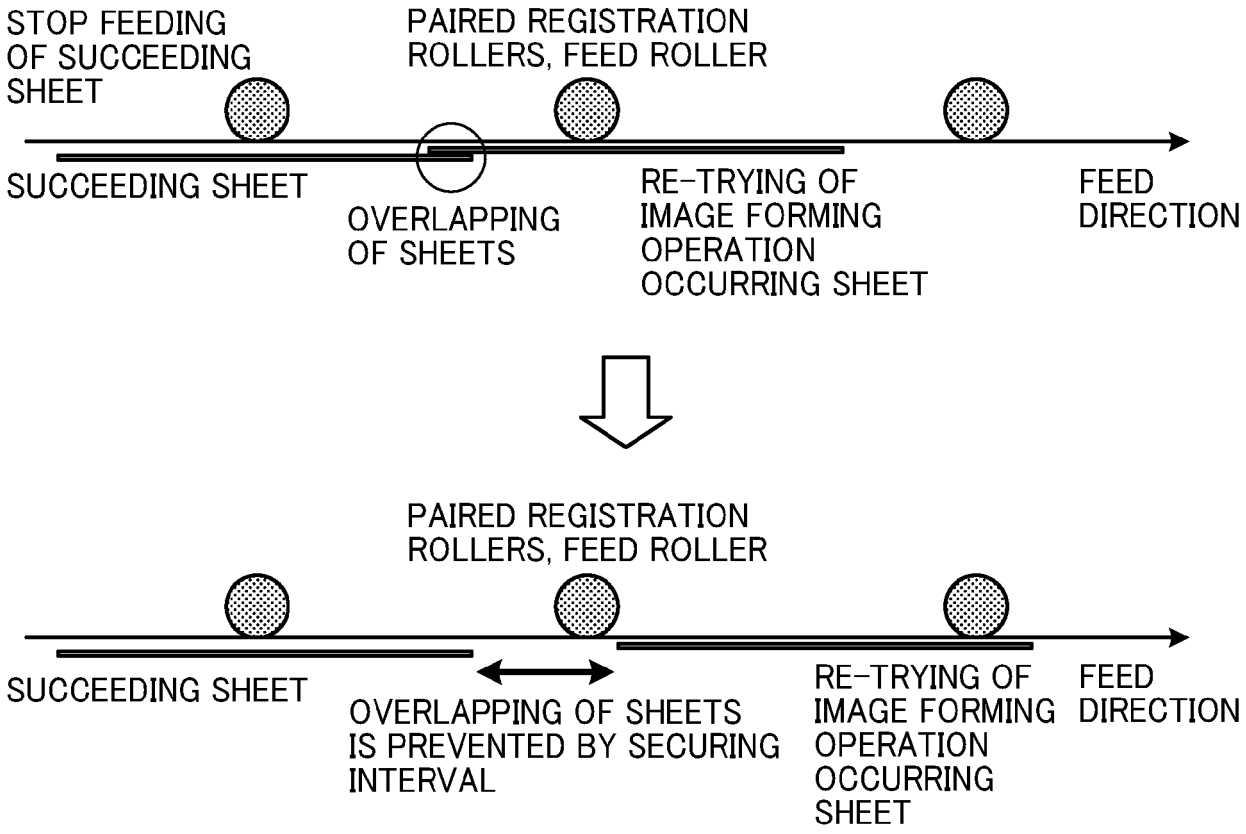
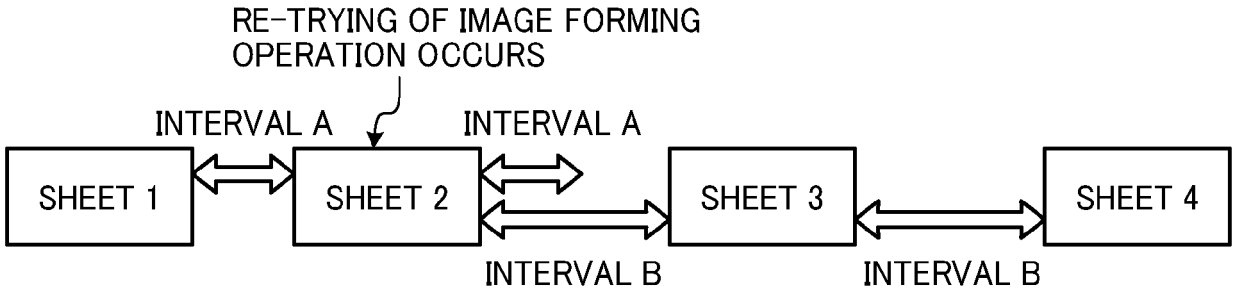

STOP FEEDING OF SUCCEEDING SHEET
PAIRED REGISTRATION ROLLERS, FEED ROLLER
SUCCEEDING SHEET
OVERLAPPING OF SHEETS
RE-TRYING OF IMAGE FORMING OPERATION OCCURRING SHEET
FEED DIRECTION
PAIRED REGISTRATION ROLLERS, FEED ROLLER
SUCCEEDING SHEET
OVERLAPPING OF SHEETS IS PREVENTED BY SECURING INTERVAL
RE-TRYING OF IMAGE FORMING OPERATION OCCURRING SHEET
FEED DIRECTION

FIG. 7


RE-TRYING OF IMAGE FORMING OPERATION OCCURS
INTERVAL A
INTERVAL A
SHEET 1
SHEET 2
SHEET 3
SHEET 4
INTERVAL B
INTERVAL B

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 20 19 4222

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2008/025737 A1 (MATSUI NORIAKI [JP] ET AL) 31 January 2008 (2008-01-31) * paragraph [0036] - paragraph [0095]; figures 1-7B * -----	1-7	INV. G03G15/00 B65H9/00
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A	JP 2018 116195 A (RICOH CO LTD) 26 July 2018 (2018-07-26) * abstract * * paragraph [[0073]] * * paragraph [[0090]] - paragraph [[0093]] * -----	5	

TECHNICAL FIELDS SEARCHED (IPC)

G03G
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 January 2021	Rubio Sierra, F

CATEGORY OF CITED DOCUMENTS

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29-01-2021

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		US 2008025737 A1	31-01-2008
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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