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(54) **SHEET FEEDING APPARATUS AND IMAGE FORMING APPARATUS**

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(57) **ABSTRACT**

A sheet feeding apparatus includes a sheet supporting portion, a sheet feeding portion including a rotary feeding member and a driving portion, an air separating portion configured to perform a blowing operation that blows air on a side surface of the sheets supported by the sheet supporting portion, and a control portion. In a case where a job for feeding sheets is started, the control portion is configured to move the rotary feeding member from the separation position to the abutment position, causes the air separating portion to perform the blowing operation in a state where the rotary feeding member is positioned at the abutment position, and after the blowing operation, causes the sheet feeding portion to feed a plurality of sheets in a state where the control portion stops the blowing operation, by driving the driving portion.

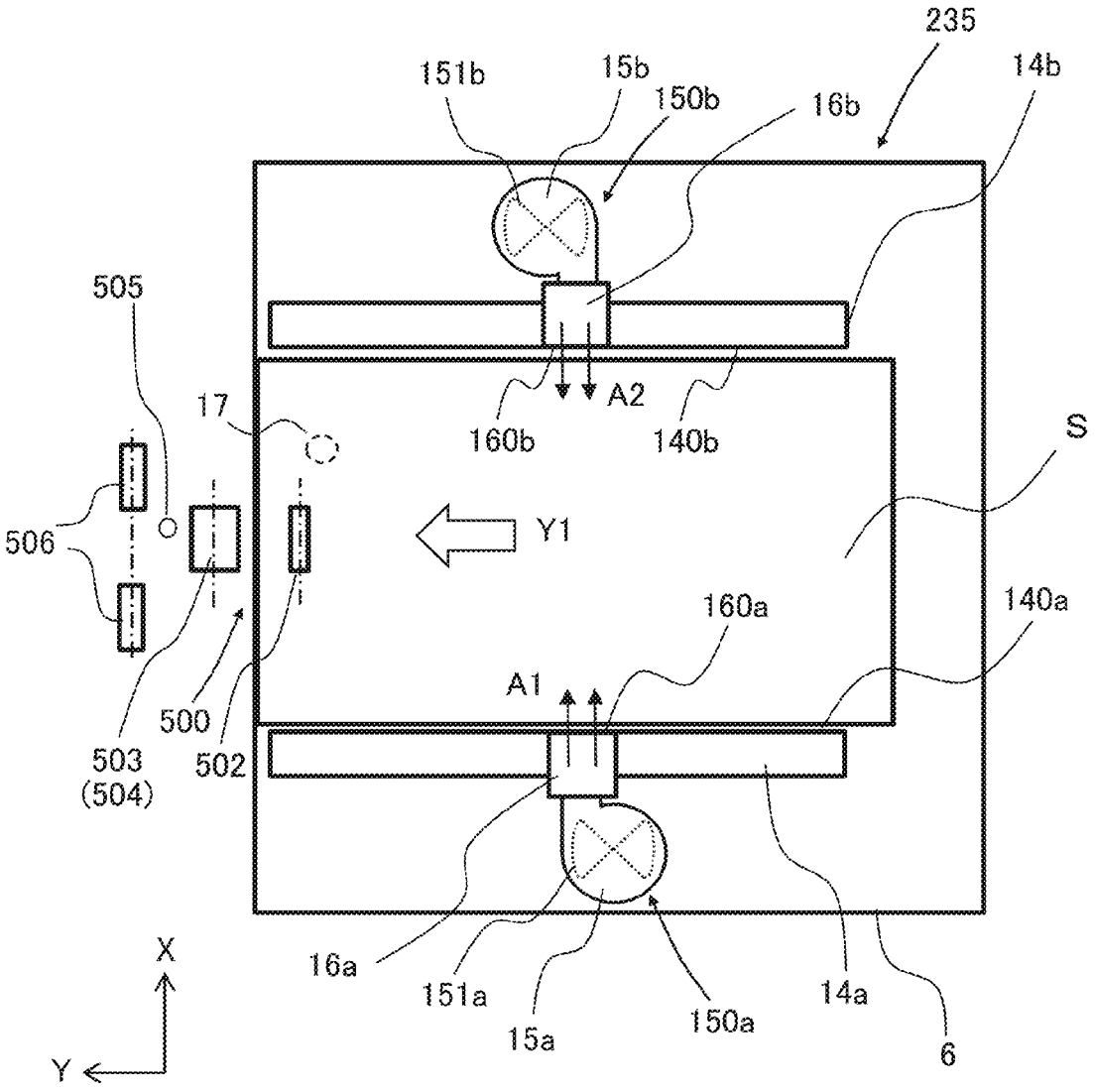


FIG.1

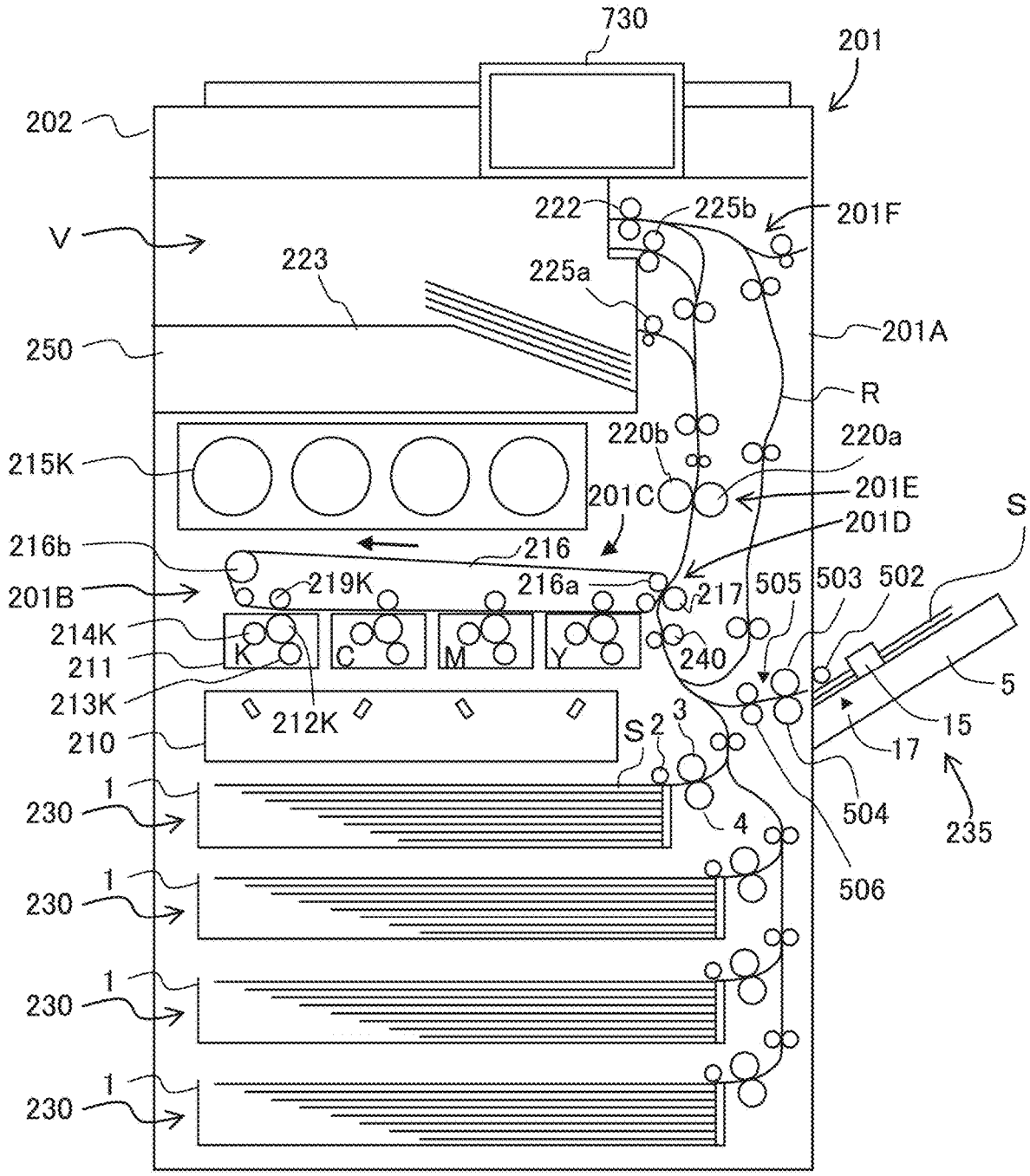

730
201
202
222
225b
201F
V
223
225a
250
201A
R
220b
220a
215K
201C
201E
S
201D
216b
216
201B
219K
216a
217
505
503
502
214K
K
C
M
Y
240
211
5
213K
212K
15
210
S
2
3
17
1
230
4
504
235
506

FIG.2

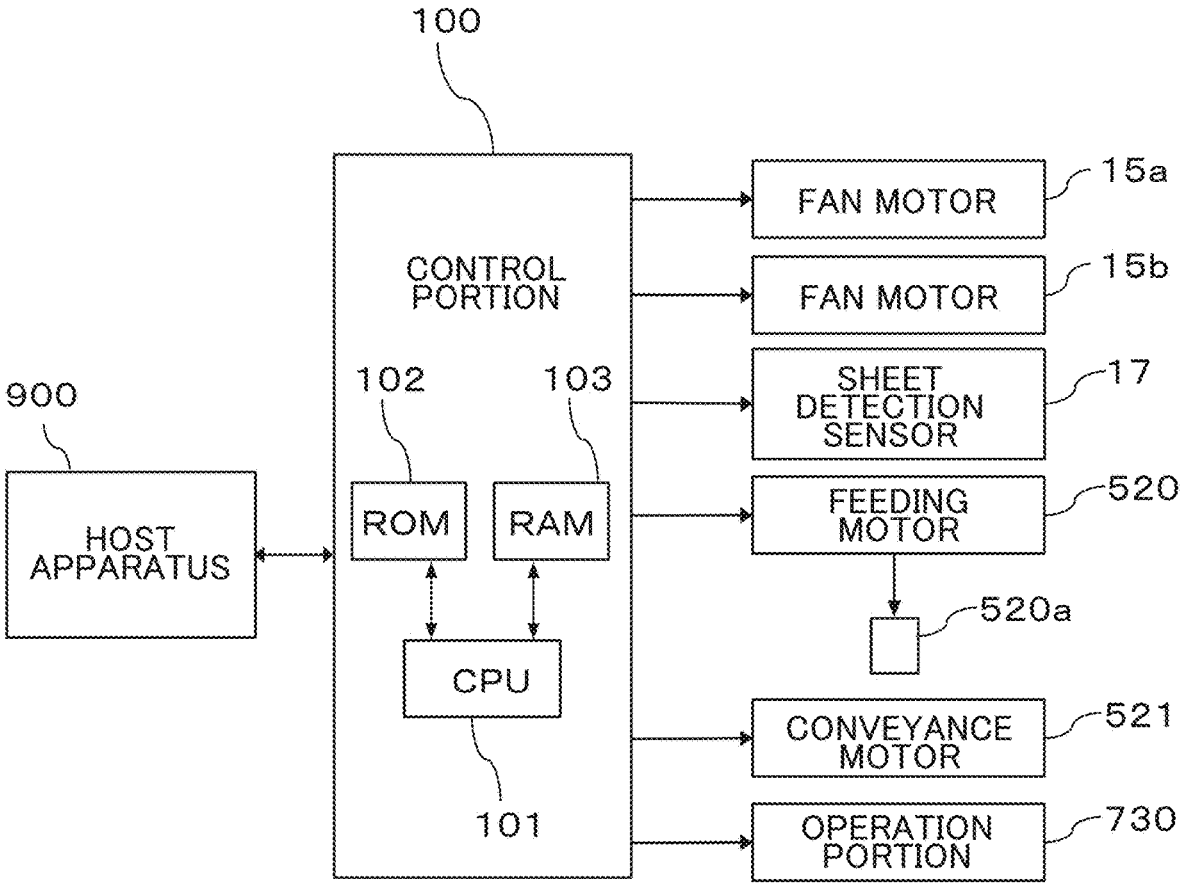

100
CONTROL PORTION
102
103
ROM
RAM
CPU
101
900
HOST APPARATUS
FAN MOTOR
15a
FAN MOTOR
15b
SHEET DETECTION SENSOR
17
FEEDING MOTOR
520
520a
CONVEYANCE MOTOR
521
OPERATION PORTION
730

FIG.3

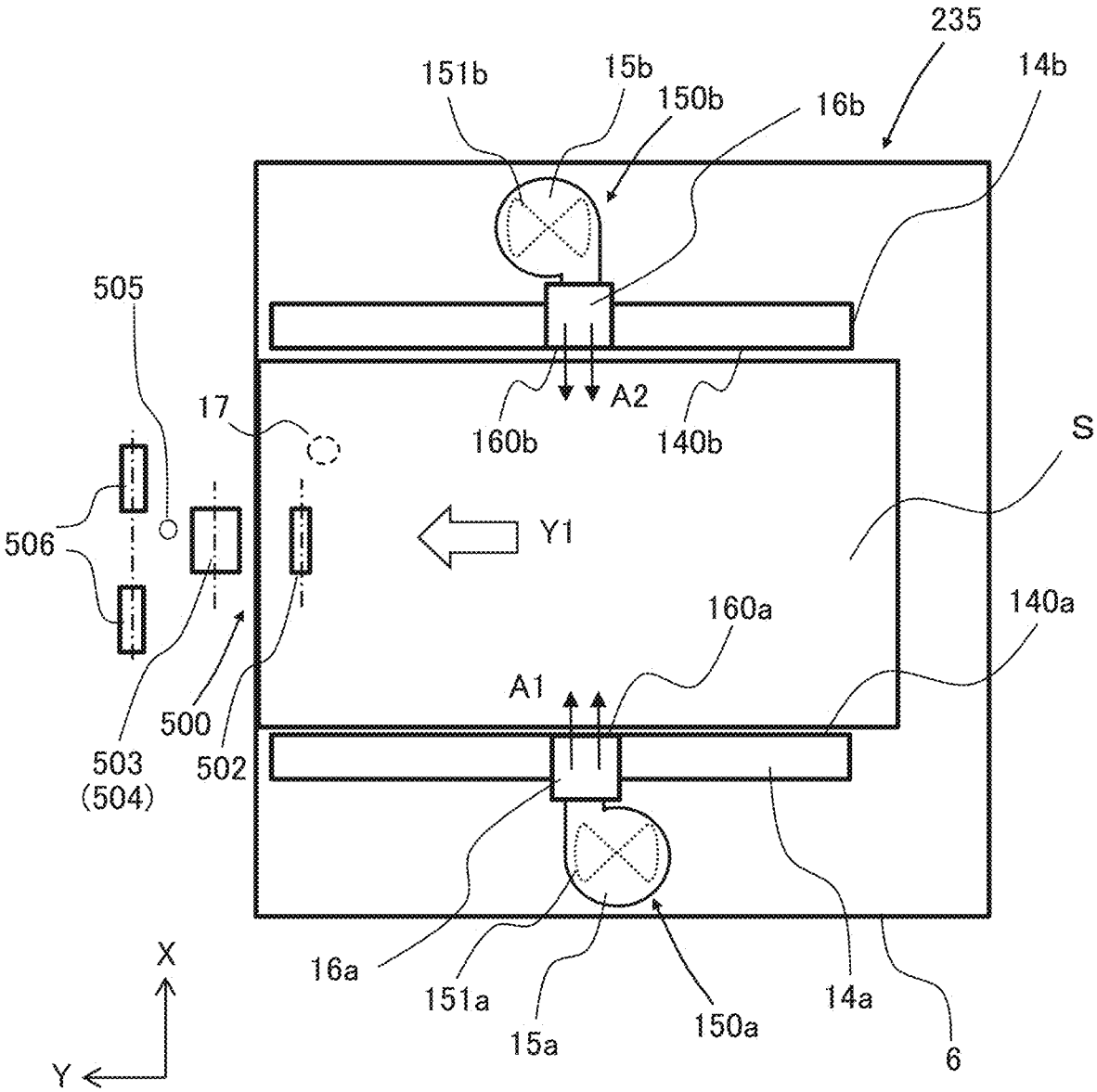

235
151b
15b
150b
16b
14b
505
17
160b
A2
140b
S
506
Y1
160a
140a
A1
500
503
(504)
502
16a
151a
15a
150a
14a
6
X
Y

FIG.4A

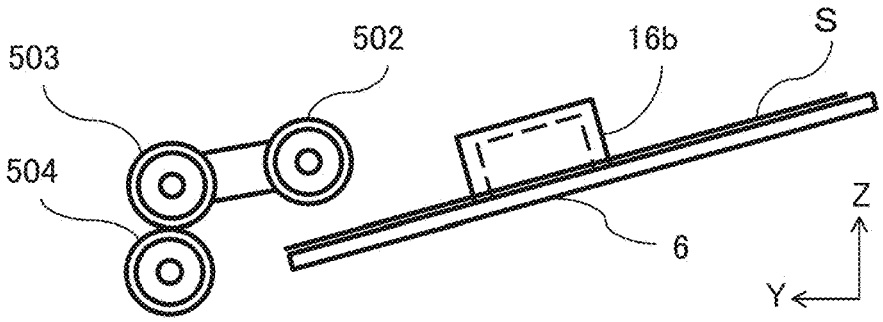



FIG.4B

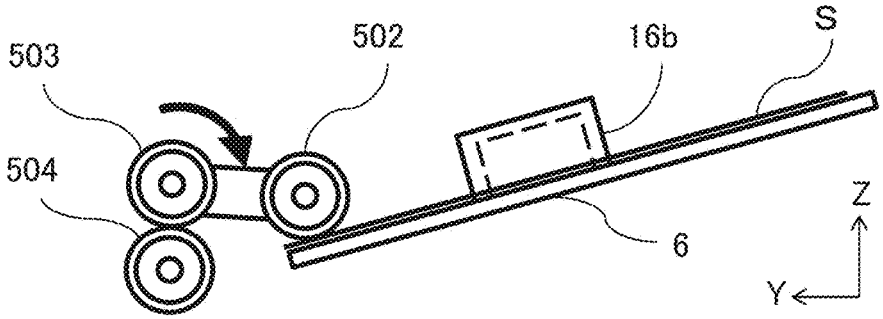



FIG.4C

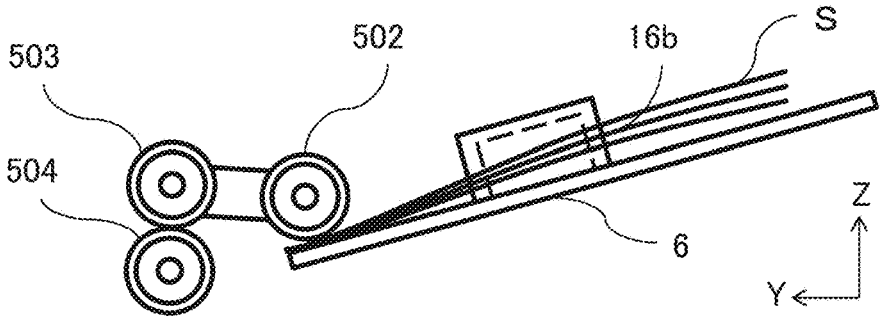



FIG.4D

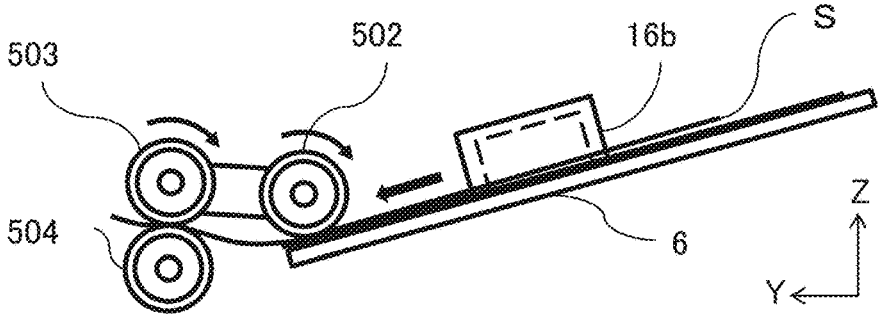


FIG.5

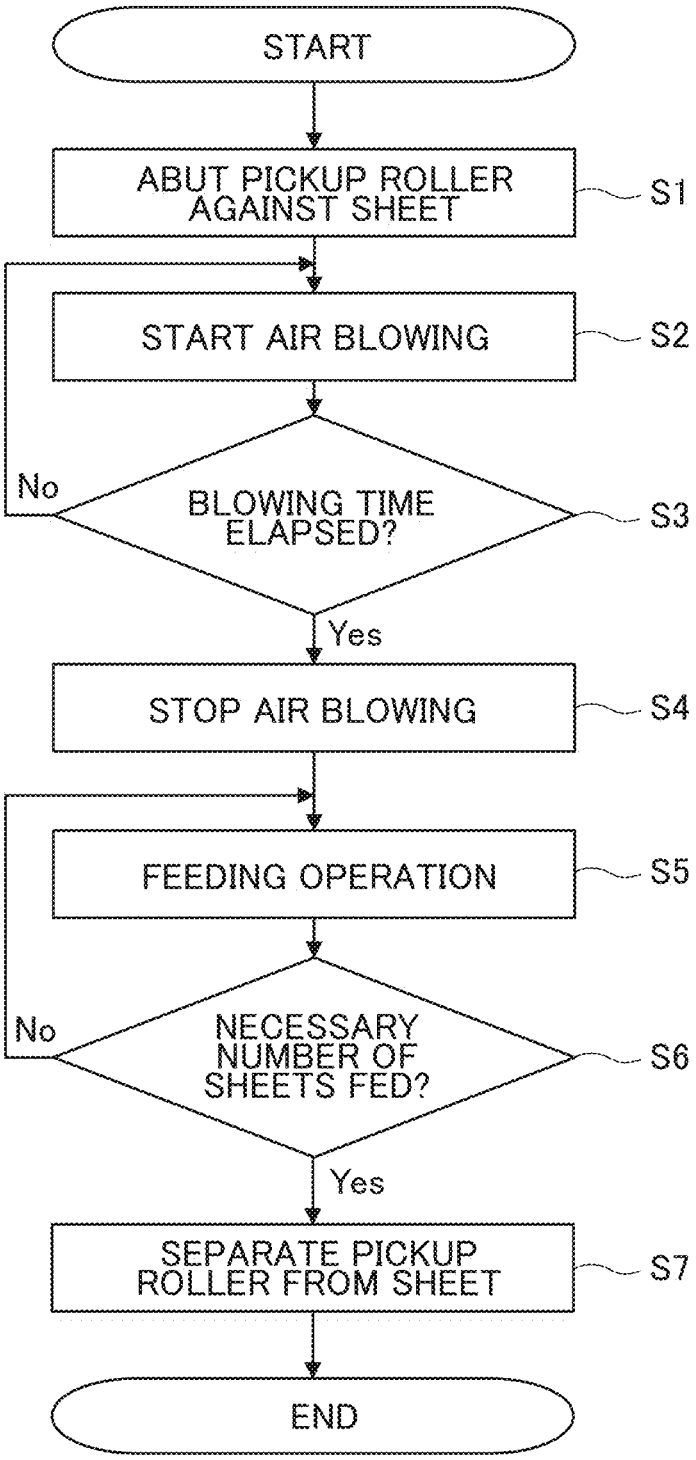

START
ABUT PICKUP ROLLER AGAINST SHEET
S1
START AIR BLOWING
S2
No
BLOWING TIME ELAPSED?
S3
Yes
STOP AIR BLOWING
S4
FEEDING OPERATION
S5
No
NECESSARY NUMBER OF SHEETS FED?
S6
Yes
SEPARATE PICKUP ROLLER FROM SHEET
S7
END

FIG.6

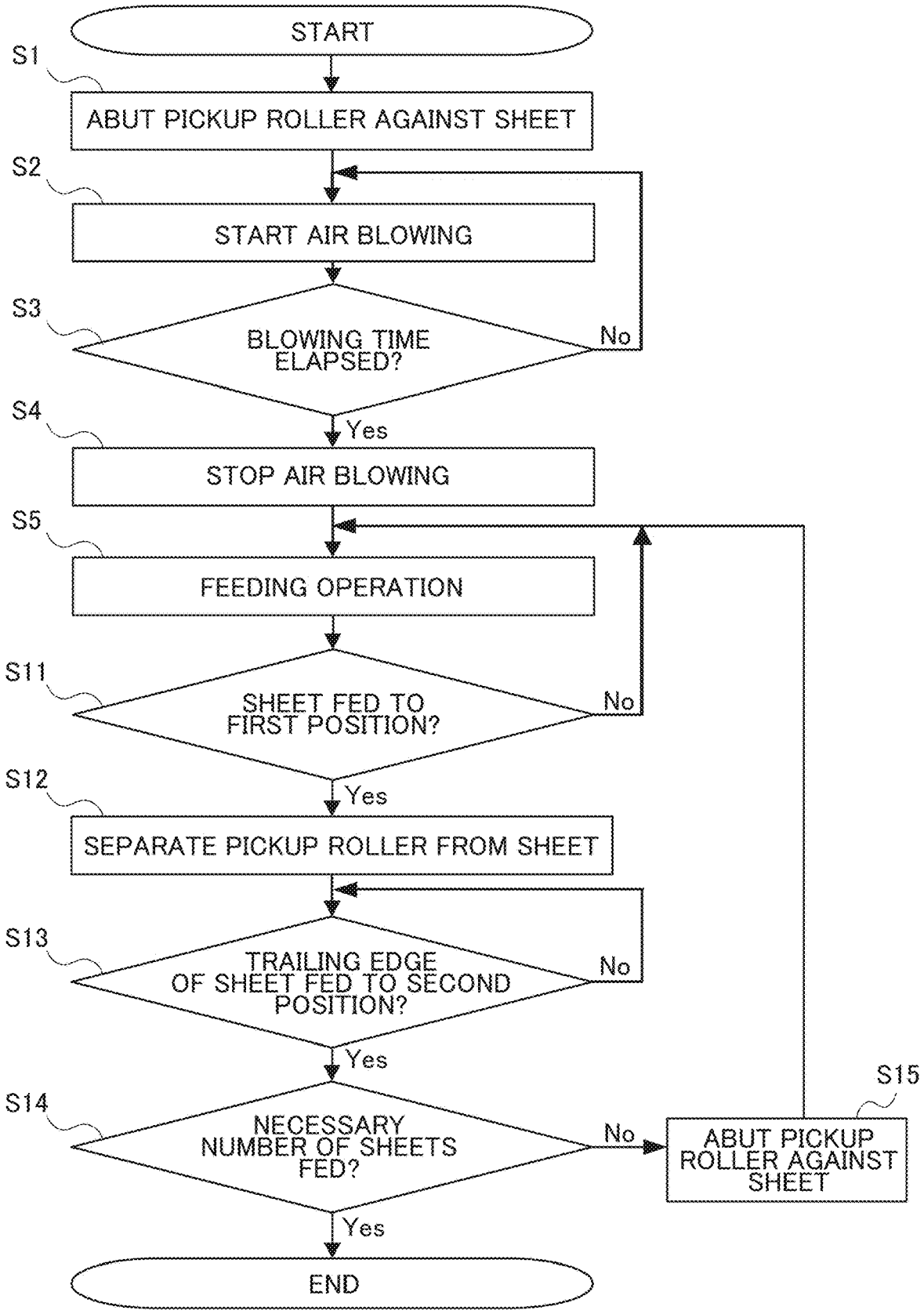
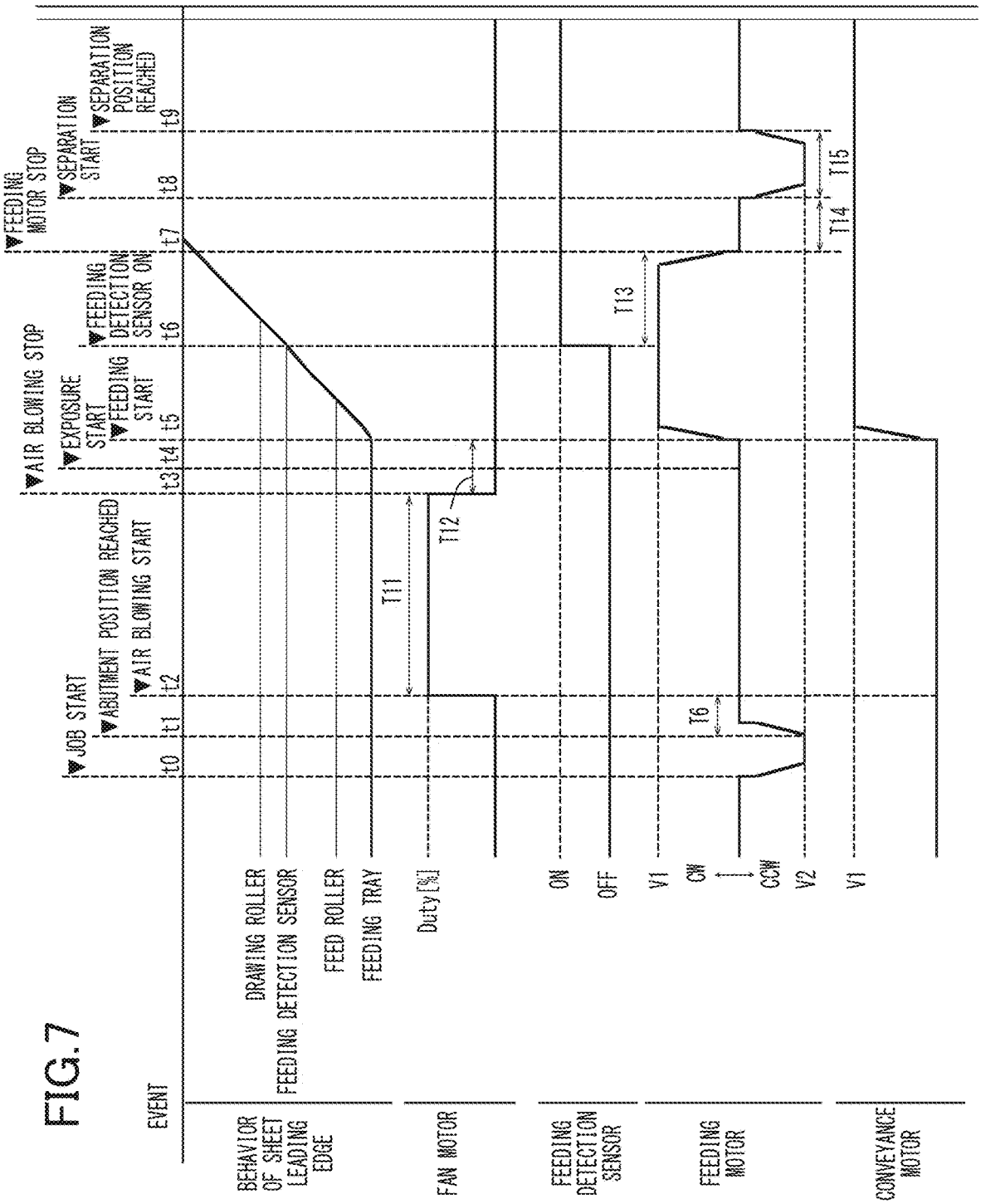

START
S1
ABUT PICKUP ROLLER AGAINST SHEET
S2
START AIR BLOWING
S3
BLOWING TIME ELAPSED?
No
Yes
S4
STOP AIR BLOWING
S5
FEEDING OPERATION
S11
SHEET FED TO FIRST POSITION?
No
Yes
S12
SEPARATE PICKUP ROLLER FROM SHEET
S13
TRAILING EDGE OF SHEET FED TO SECOND POSITION?
No
Yes
S14
NECESSARY NUMBER OF SHEETS FED?
No
S15
ABUT PICKUP ROLLER AGAINST SHEET
Yes
END

FIG. 7


EVENT
BEHAVIOR OF SHEET LEADING EDGE
DRAWING ROLLER
FEEDING DETECTION SENSOR
FEED ROLLER
FEEDING TRAY
FAN MOTOR
Duty[%]
FEEDING DETECTION SENSOR
ON
OFF
FEEDING MOTOR
V1
CW
CCW
V2
V1
CONVEYANCE MOTOR
t0
t1
t2
t3
t4
t5
t6
t7
t8
t9
JOB START
ABUTMENT POSITION REACHED
AIR BLOWING START
AIR BLOWING STOP
EXPOSURE START
FEEDING START
FEEDING DETECTION SENSOR ON
FEEDING MOTOR STOP
SEPARATION START
SEPARATION POSITION REACHED
T11
T12
T13
T14
T15
T6

# SHEET FEEDING APPARATUS AND IMAGE FORMING APPARATUS

## BACKGROUND OF THE INVENTION

### Field of the Invention

**[0001]** The present invention relates to a sheet feeding apparatus that performs a blowing operation for separating sheets from each other by blowing air on the sheets, and to an image forming apparatus.

### Description of the Related Art

**[0002]** An image forming apparatus, such as a copying machine, a facsimile, or a printer, includes a sheet feeding apparatus, such as a feeding cassette or a feeding deck, that sets a bundle of sheets to be supplied to an image forming portion that forms images. In recent years, it has been desired to form images on a variety of types of sheets, and there is a case in which sheets, such as coated paper sheets, that have a smooth surface property are used as a recording material. However, if a bundle of such sheets having smooth surfaces is set in a sheet feeding apparatus, the feeding of the sheets may become difficult because the close contact force between the sheets has a higher value. As countermeasures, Japanese Patent Application Publication No. 2006-256819 proposes a configuration in which sheets are lifted and floated by blowing air on the sheet bundle for separating the sheets from each other.

**[0003]** In the configuration of the image forming apparatus as described in Japanese Patent Application Publication No. 2006-256819 and having the mechanism for blowing air on the sheet bundle, the sheets are generally fed from the sheet feeding apparatus during the air blowing operation. However, if the sheets are fed while the air is blown on the sheets, an edge portion of each sheet bends easily because the sheets are floated. Thus, even if the position of the sheets in the sheet width direction is regulated by regulation plates or the like, an edge portion of each sheet bends if the force that pivots the sheet is applied to the sheet, so that the sheet skews easily.

## SUMMARY OF THE INVENTION

**[0004]** According to one aspect of the present invention, a sheet feeding apparatus includes a sheet supporting portion configured to support sheets, a sheet feeding portion including a rotary feeding member and a driving portion configured to drive the rotary feeding member and configured to perform a feeding operation that feeds the sheets supported by the sheet supporting portion, by driving the driving portion, the rotary feeding member being configured to move between an abutment position and a separation position, the abutment position being a position at which the rotary feeding member abuts against the sheets supported by the sheet supporting portion, the separation position being a position at which the rotary feeding member is separated from the sheets supported by the sheet supporting portion, an air separating portion configured to perform a blowing operation that blows air on a side surface of the sheets supported by the sheet supporting portion, and a control portion configured to control movement of the rotary feeding member between the abutment position and the separation position, the feeding operation by the sheet feeding portion, and the blowing operation by the air separating portion. In a case where a job for feeding sheets is started, the control portion is configured to move the rotary feeding member from the separation position to the abutment position, causes the air separating portion to perform the blowing operation in a state where the rotary feeding member is positioned at the abutment position, and after the blowing operation, causes the sheet feeding portion to feed a plurality of sheets in a state where the control portion stops the blowing operation, by driving the driving portion.

**[0005]** Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0006]** FIG. **1** is a diagram illustrating a schematic configuration of an image forming apparatus of a first embodiment.

**[0007]** FIG. **2** is a block diagram illustrating a control system of the image forming apparatus of the first embodiment.

**[0008]** FIG. **3** is a schematic diagram illustrating a configuration of a manual feeding portion of the first embodiment.

**[0009]** FIG. **4**A is a schematic side view illustrating a position of a pickup roller that is not conveying sheets placed on a feeding tray of the manual feeding portion of the first embodiment.

**[0010]** FIG. **4**B is a schematic side view illustrating a state where the pickup roller is abutted against the sheets because the feeding of the sheets placed on the feeding tray is started.

**[0011]** FIG. **4**C is a schematic side view illustrating a state where an air blowing portion is driven and air is blown on the sheet bundle in a state where the pickup roller is abutted against the sheets.

**[0012]** FIG. **4**D is a schematic side view illustrating a state where the pickup roller and a feed roller are rotated and the feeding of the sheets is started.

**[0013]** FIG. **5** is a flowchart illustrating sheet feeding control of the first embodiment.

**[0014]** FIG. **6** is a flowchart illustrating sheet feeding control of a second embodiment.

**[0015]** FIG. **7** is a diagram illustrating a part of control sequence of an image forming apparatus of the second embodiment.

## DESCRIPTION OF THE EMBODIMENTS

### First Embodiment

**[0016]** Hereinafter, a first embodiment of the present invention will be described in detail with reference to the accompanying drawings. First, an image forming apparatus **201** of the present embodiment will be described with reference to FIG. **1**. FIG. **1** is a cross-sectional view illustrating a schematic configuration of the image forming apparatus **201** of the first embodiment. Schematic Configuration of Image Forming Apparatus

**[0017]** As illustrated in FIG. **1**, the image forming apparatus **201** of the first embodiment is a tandem-system intermediate-transfer laser beam printer that uses the electrophotographic process. In FIG. **1**, the image forming apparatus **201**, an image forming apparatus body **201**A, and an image forming portion **201**B that forms an image on a sheet are illustrated. In addition, an image reading apparatus

202 is disposed substantially horizontally above the image forming apparatus body 201A, and a discharging space V for discharging sheets is formed between the image reading apparatus 202 and the image forming apparatus body 201A. Note that an operation portion 730 is disposed above the image forming apparatus body 201A. The operation portion 730 includes a component, such as a touch panel, that can display an image on a screen.

[0018] The image forming portion 201B that serves as an image forming portion has a four-drum full-color system. The image forming portion 201B includes a laser scanner 210 that serves as an exposure portion, and four process cartridges 211Y, 211M, 211C, and 211K which form four-color toner images of yellow (Y), magenta (M), cyan (C), and black (K). Each of the process cartridges 211 includes a photosensitive drum 212 that serves as an image bearing member, a charger 213 that serves as a charging portion, and a development unit 214 that serves as a developing portion. In addition, the image forming portion 201B includes an intermediate transfer unit 201C and a fixing portion 201E, which are disposed above the process cartridges 211. Note that toner cartridges 215 supply toner to the development units 214.

[0019] The intermediate transfer unit 201C includes an intermediate transfer belt 216 wound around a driving roller 216*a* and a tension roller 216*b*. Note that inside the intermediate transfer belt 216, primary transfer rollers 219 are each disposed in contact with the intermediate transfer belt 216 at a position facing a corresponding photosensitive drum 212. The intermediate transfer belt 216 is rotated by the driving roller 216*a*, which is driven by a driving portion (not illustrated), in a direction indicated by an arrow.

[0020] In addition, toner images formed on the photosensitive drums and having respective colors and negative polarity are multiple-transferred sequentially onto the intermediate transfer belt 216 by the primary transfer rollers 219. At a position facing the driving roller 216*a* of the intermediate transfer unit 201C, a secondary transfer roller 217 is disposed for transferring a color image formed on the intermediate transfer belt 216, onto the sheet S. A secondary transfer portion 201D is formed between the intermediate transfer belt 216 and the secondary transfer roller 217. In addition, the fixing portion 201E is disposed above the secondary transfer roller 217, and includes a pressing roller 220*a* and a heating roller 220*b*. In the upper left with respect to the fixing portion 201E, a first discharging roller pair 225*a*, a second discharging roller pair 225*b*, and a both-sides reversing portion 201F are disposed. The both-sides reversing portion 201F includes a reversing roller pair 222 that can rotate in a forward or reverse direction, and a re-conveyance path R. The re-conveyance path R is used to re-convey a sheet having an image formed on one side of the sheet, to the image forming portion 201B.

[0021] In a lower portion of the image forming apparatus body 201A, a sheet feeding unit 230 is disposed for feeding sheets S, which are set in the sheet feeding unit 230, to the image forming portion 201B. The sheet feeding unit 230 includes a feeding cassette 1 that stores sheets, and a sheet feeding portion 5 that feeds the sheets S stored in the feeding cassette 1. The sheet feeding portion 5 includes a pickup roller 2, a feed roller 3, and a retard roller 4. The feed roller 3 and the retard roller 4 serve as a separation portion that separates a multi-fed sheet S, sent from the pickup roller 2, from the other.

[0022] In addition, in a side face of the image forming apparatus body 201A on the right side in FIG. 1, a manual feeding portion 235 is disposed for sending the sheets S, which are set in the manual feeding portion 235, to the image forming portion 201B. The manual feeding portion 235 includes a feeding tray 6 that supports the sheets S. Similar to the sheet feeding unit 230, the manual feeding portion 235 includes a pickup roller 502 that serves as a sheet feeding portion. In addition, the manual feeding portion 235 includes a feed roller 503 and a retard roller 504 that serve as a separation portion that separates a sheet S, sent from the pickup roller 502, from the other.

[0023] Next, an image forming operation of the image forming apparatus 201 will be described. First, the image forming apparatus 201 obtains the image information of a document. The image information of the document is obtained by the image reading apparatus 202 reading the image information. In another case, the image information of the document is obtained by receiving print image data outputted from a host apparatus 900 (see FIG. 2) connected to a control portion 100 (see FIG. 2) of the image forming apparatus 201.

[0024] The image information obtained by the image forming apparatus 201 is subjected to image processing, then converted to an electrical signal, and then transmitted to the laser scanner 210 of the image forming portion 201B. In the image forming portion 201B, the surface of the photosensitive drum 212, uniformly charged by the charger 213 so as to have a predetermined polarity and electric potential, is sequentially exposed by a laser beam. With this operation, electrostatic latent images of yellow, magenta, cyan, and black are sequentially formed on the photosensitive drums of the process cartridges 211.

[0025] After that, the electrostatic latent images are visualized by developing the electrostatic latent images by using toners of respective colors, and the toner images having respective colors and formed on the photosensitive drums are transferred onto the intermediate transfer belt 216 by a primary transfer bias applied to the primary transfer rollers 219 such that one toner image is superposed on another. With this operation, the toner images are formed on the intermediate transfer belt 216.

[0026] On the other hand, the sheet S fed by the feed roller 3 of the sheet feeding unit 230 is conveyed to a registration roller pair 240 (which is hereinafter referred to as a registration roller pair) constituted by a driving roller and a driven roller. When the sheet S is conveyed to the registration roller pair 240, the registration roller pair 240 is in a stop state, and the leading edge of the sheet S is abutted against the registration roller pair 240 that is in the stop state. With this operation, the leading edge of the sheet S is aligned with the registration roller pair 240. After that, since the conveyance of the sheet S is continued by the feed roller 3, a bending (loop) is formed in the sheet S. When the amount of loop of the sheet S reaches a predetermined amount, the registration roller pair 240 is driven. With this operation, the skew of the sheet S is corrected by the registration roller pair 240, and the sheet S whose skew has been corrected is conveyed to the secondary transfer portion 201D by the registration roller pair 240. In the secondary transfer portion 201D, the toner images are collectively transferred onto the sheet S by a secondary transfer bias applied to the secondary transfer roller 217. The sheet S onto which the toner images have been transferred is conveyed to the fixing portion 201E. In

the fixing portion **201**E, the sheet S is heated and pressed, so that the toners having respective colors are melted and mixed with each other and the toner images are fixed to the sheet S as a color image.

**[0027]** After that, the sheet S, to which the images are fixed, is discharged to the discharging space V by the first discharging roller pair **225***a* and the second discharging roller pair **225***b* disposed downstream of the fixing portion **201**E, and is stacked on a stacking portion **223** formed in the bottom surface of the discharging space V. In a case where images are formed on both sides of the sheet S, after an image is fixed to the sheet S, the sheet S is conveyed to the re-conveyance path R by the reversing roller pair **222**, and conveyed to the image forming portion **201**B again.

Configuration of Control System of Image Forming Apparatus

**[0028]** Next, a configuration of a control system of the image forming apparatus **201** will be described with reference to FIG. **2**. FIG. **2** is a block diagram illustrating the control system of the image forming apparatus **201** of the first embodiment.

**[0029]** For example, the control portion **100** of the first embodiment is included in the image forming apparatus **201**, and includes a CPU **101**, a ROM **102**, and a RAM **103**. The control portion **100** is a control portion that controls the image forming apparatus **201**. The control portion **100** is connected to the host apparatus **900** and the operation portion **730**, and sends/receives information to/from the host apparatus **900** and the operation portion **730**. In addition, the control portion **100** processes signals to be sent to various types of process apparatuses, and performs sequence control. Note that the host apparatus **900** is an external apparatus, such as a personal computer, an image scanner, or a facsimile.

**[0030]** The control portion **100** is connected to below-described fan motors **15***a* and **15***b*, a sheet detection sensor **17**, and a sheet feeding motor **520**. The sheet feeding motor **520** serves as a driving portion, a motor, or a first motor that drives the pickup roller **502** and the feed roller **503**. In addition, the control portion **100** is connected to a conveyance motor **521** that serves as a second motor that drives a drawing roller **506**.

**[0031]** The sheet feeding motor **520** rotates the pickup roller **502** and the feed roller **503** by rotating in a CW direction (i.e., a first direction). In addition, the sheet feeding motor **520** moves the pickup roller **502** between two positions: an abutment position and a separation position, by rotating in a CCW direction (i.e., a second direction) opposite to the CW direction. The abutment position is a position at which the pickup roller **502** is abutted against the sheet S, and the separation position is a position at which the pickup roller **502** is not abutted against the sheet S.

**[0032]** The sheet feeding motor **520** is linked to the pickup roller **502** and the feed roller **503**, via a driving mechanism **520***a*. The driving mechanism **520***a* includes a driving gear that transmits the driving force to the pickup roller **502** and the feed roller **503**. The driving force causes the pickup roller **502** and the feed roller **503** to rotate in a direction in which the sheet is fed. In addition, the driving mechanism **520***a* includes a moving mechanism that moves (lifts and lowers) the pickup roller **502** between the two positions: the abutment position and the separation position. In addition, the driving mechanism **520***a* includes one-way clutches. When the sheet feeding motor **520** rotates in the CW direction (i.e., a forward direction), the one-way clutch transmits the driving force to the driving gear, and does not transmit the power to the moving mechanism. When the sheet feeding motor **520** rotates in the CCW direction (i.e., a reverse direction), the one-way clutch transmits the driving force to the moving mechanism, and does not transmit the power to the driving gear.

**[0033]** In the manual feeding portion **235**, if the sheet feeding motor **520** is rotated in the CW direction (i.e., a forward direction), the driving force is transmitted to the pickup roller **502** and the feed roller **503**. The driving force causes the pickup roller **502** and the feed roller **503** to rotate in a direction in which the sheet is fed. In addition, in the manual feeding portion **235**, if the sheet feeding motor **520** is rotated in the CCW direction (i.e., a reverse direction), the pickup roller **502** is moved between the two positions: the abutment position and the separation position.

**[0034]** The CPU **101** of the control portion **100** detects the pickup roller **502** located at the abutment position, depending on a signal outputted when the state of a home-position detection sensor, disposed in the moving mechanism, becomes an ON state. In addition, the CPU **101** moves the pickup roller **502** to the separation position by rotating the sheet feeding motor **520** in a reverse direction until a time sufficient to move the pickup roller **502** to the separation position has elapsed since the state of the home-position detection sensor was in the ON state. The detailed description thereof will be made below.

Configuration of Manual Feeding Portion

**[0035]** Next, the detailed description of the manual feeding portion **235**, which serves as a sheet feeding apparatus, will be made with reference to FIGS. **1**, **3**, and **4**A to **4**D. FIG. **3** is a schematic top view of the manual feeding portion **235** of the first embodiment.

**[0036]** As illustrated in FIG. **3**, the manual feeding portion **235** includes the feeding tray **6** that serves as a sheet supporting portion and a manual feeding tray, and a first sheet-feeding portion **500** that performs the feeding operation. The first sheet-feeding portion **500** includes the pickup roller **502**, the feed roller **503**, and the retard roller **504**. The pickup roller **502** serves as a rotary feeding member. The feed roller **503** and the retard roller **504** serve as a separation portion that separates a sheet S, sent from the pickup roller **502**, from the other.

**[0037]** In addition, in the manual feeding portion **235**, the drawing roller **506** that serves as a second sheet-feeding portion is disposed at a position positioned downstream of the feed roller **503** and the retard roller **504** in a conveyance direction Y**1** of the sheet S.

**[0038]** In addition, the manual feeding portion **235** includes the sheet detection sensor **17** that is disposed in the feeding tray **6**, and that detects the sheet S placed on the feeding tray **6**. In addition, the manual feeding portion **235** includes a feeding detection sensor **505** that is disposed between the rollers (i.e., the feed roller **503** and the retard roller **504**) and the drawing roller **506** in the conveyance direction Y**1** of the sheet S, and that detects the passage of the sheet S.

**[0039]** The feeding tray **6** includes side-edge regulation plates, **14***a* and **14***b*, that serve as a regulation portion for regulating the position of the sheet S in a direction (i.e., a sheet width direction) orthogonal to the conveyance direc-

tion Y1 of the sheet S. The side-edge regulation plates **14***a* and **14***b* respectively include air blowing portions **150***a* and **150***b* that serve as an air separating portion.

**[0040]** The air blowing portion **150***a* of the side-edge regulation plate **14***a* includes a fan **151***a* that is driven by the fan motor **15***a* (see FIG. **2**), and a blowing nozzle **16***a* that guides air sent from the fan **151***a* and blows the air from a side-surface side of the sheet bundle. The blowing nozzle **16***a* includes a blowing opening **160***a* disposed in an abutment surface **140***a* of the side-edge regulation plate **14***a* that is in contact with the sheet bundle. The air sent from the fan **151***a* blows from the blowing opening **160***a*.

**[0041]** Similarly, the air blowing portion **150***b* of the side-edge regulation plate **14***b* includes a fan **151***b* that is driven by the fan motor **15***b* (see FIG. **2**), and a blowing nozzle **16***b* that guides air sent from the fan **151***b* and blows the air from a side-surface side of the sheet bundle. The blowing nozzle **16***b* includes a blowing opening **160***b* disposed in an abutment surface **140***b* of the side-edge regulation plate **14***b* that is in contact with the sheet bundle. The air sent from the fan **151***b* blows from the blowing opening **160***b*.

**[0042]** In the first embodiment, each of the fan motors **15***a* and **15***b* is PWM-controlled, and each of the fans **151***a* and **151***b* is a blower fan having a diameter φ of 97 mm. In the manual feeding portion **235**, in the air blowing operation, each of the fan motors **15***a* and **15***b* is PWM-controlled at a predetermined duty ratio (e.g., 40%), as the PWM duty ratio, for blowing the air.

**[0043]** In the feeding tray **6**, the air is blown from the fan motors **15***a* **15***b* toward the edge portions of the sheet S as indicated by arrows A**1** and A**2**, so that upper sheets of the sheet bundle are lifted and floated and the close contact force between sheets is reduced.

**[0044]** FIG. **4**A is a schematic side view illustrating a position of the pickup roller **502** that is not conveying sheets S placed on the feeding tray **6** of the manual feeding portion **235**. As illustrated in FIG. **4**A, in the manual feeding portion **235**, when the sheet S is not conveyed, the pickup roller **502** is separated from the feeding tray **6**, and the pickup roller **502** and the sheet S are not in contact with each other. Thus, in the manual feeding portion **235**, the sheet bundle can be smoothly stacked on the feeding tray **6**.

**[0045]** FIG. **4**B is a schematic side view illustrating a state where the pickup roller **502** is abutted against the sheet S because the feeding of the sheet S placed on the feeding tray **6** is started. As illustrated in FIG. **4**B, in the manual feeding portion **235**, the pickup roller **502** is pivoted around the shaft of the feed roller **503**, and is abutted against the sheet S placed on the feeding tray **6**.

**[0046]** As described above, the operation for moving the pickup roller **502** to the abutment position, at which the pickup roller **502** is abutted against the sheet S, is performed by using the driving force of the sheet feeding motor **520** (see FIG. **2**). In the manual feeding portion **235**, if the sheet feeding motor **520** is rotated in the CW direction (i.e., a forward direction that is a first direction), the pickup roller **502** and the feed roller **503** are rotated via the driving mechanism **520***a* in a direction in which the pickup roller **502** and the feed roller **503** can convey the sheet S in the conveyance direction Y**1**. In addition, in the manual feeding portion **235**, if the sheet feeding motor **520** is rotated in the CCW direction (i.e., a reverse direction that is a second direction), the pickup roller **502** is lifted and lowered in a Z direction, via the driving mechanism **520***a*. In a case where the sheet feeding motor **520** is rotated in the reverse direction, the pickup roller **502** is lifted and lowered in the Z direction, between the two positions: the abutment position at which the pickup roller **502** is abutted against the sheet S, and the separation position at which the pickup roller **502** is not abutted against the sheet S.

**[0047]** FIG. **4**C is a schematic side view illustrating a state where the fan motors **15***a* and **15***b* are driven and the air is blown on the sheet bundle in a state where the pickup roller **502** is abutted against the sheet S. As illustrated in FIG. **4**C, in the manual feeding portion **235**, the air is blown by the air blowing portions **150***a* and **150***b* in a state where edge portions of the sheets S are nipped by the pickup roller **502** and the feeding tray **6**.

**[0048]** Thus, in the manual feeding portion **235**, since the air is blown, the close contact force between sheets can be reduced while variations in position of the sheets is kept to a minimum.

**[0049]** FIG. **4**D is a schematic side view illustrating a state where the pickup roller **502** and the feed roller **503** are rotated and the conveyance of the sheet S is started. As illustrated in FIG. **4**D, in the manual feeding portion **235**, the conveyance of the sheet S is started by the rotation of the pickup roller **502** after the blowing of air by the air blowing portions **150***a* and **150***b* is stopped. In the manual feeding portion **235**, the feed roller **503** and the retard roller **504** nip and convey the sheet S sent from the pickup roller **502**, so that the sheet S is conveyed, separated from the sheet bundle.

**[0050]** If the sheet S is bent by the air blown by the air blowing portions **150***a* and **150***b*, the sheet S will pivot and skew when conveyed. However, the pivot and skew of the sheet S can be suppressed by the manual feeding portion **235** in the above-described manner.

## Control Flow of Manual Feeding Portion

**[0051]** FIG. **5** is a flowchart illustrating a control process executed by the CPU **101** of the control portion **100** when the sheet S is fed from the manual feeding portion **235** in the image forming apparatus **201** of the first embodiment. The control process illustrated in FIG. **5** is started when the CPU **101** issues a start command of a job for feeding a necessary (predetermined) number of sheets S from a sheet bundle supported by the feeding tray **6**.

**[0052]** First, the CPU **101** lowers the pickup roller **502** to the abutment position, and causes the pickup roller **502** to abut against the sheet S (S**1**). In this process, the CPU **101** rotates the sheet feeding motor **520** in a reverse direction until the state of the home-position detection sensor, disposed in the moving mechanism of the driving mechanism **520***a*, becomes an ON state; and thereby lowers the pickup roller **502** from the separation position to the abutment position, at which the pickup roller **502** abuts against the sheet S. By executing Step S**1**, the state illustrated in FIG. **4**A is changed to the state illustrated in FIG. **4**B in the manual feeding portion **235**.

**[0053]** Then the CPU **101** causes the air blowing portions **150***a* and **150***b* to blow air (S**2**). In this process, the CPU **101** causes the air blowing portions **150***a* and **150***b* to blow air by driving the fan motors **15***a* and **15***b*. Since the air is blown by the air blowing portions **150***a* and **150***b* in a state where the pickup roller **502** is positioned at the abutment position,

the state illustrated in FIG. **4**B is changed to the state illustrated in FIG. **4**C in the manual feeding portion **235**.

**[0054]** Then the CPU **101** determines whether a blowing time has elapsed since the air blowing portions **150***a* and **150***b* started to blow the air (S**3**). In this process, if the CPU **101** determines that the blowing time has not elapsed (No), then the CPU **101** returns to Step S**2**, and repeats the process of the steps S**2** and S**3** until the blowing time has elapsed.

**[0055]** The blowing time is set in advance by the CPU **101**, so as to have an appropriate value, based on a media property such as the grammage or surface property of the sheet S to be fed, and the environment information, such as room temperature and humidity, on the environment in which the image forming apparatus **201** is operated.

**[0056]** If the CPU **101** determines in the process of Step S**3** that the blowing time has elapsed (Yes), then the CPU **101** causes the air blowing portions **150***a* and **150***b* to stop blowing the air (S**4**). Then the CPU **101** executes the feeding operation for the Sheet S by rotating the pickup roller **502** and the feed roller **503** in a direction in which the pickup roller **502** and the feed roller **503** can convey the sheet S in the conveyance direction Y**1**, by rotating the sheet feeding motor **520** in a forward direction (S**5**). By executing the feeding operation for the sheet S after the air blowing portions **150***a* and **150***b* stop blowing the air, the state illustrated in FIG. **4**C is changed to the state illustrated in FIG. **4**D in the manual feeding portion **235**.

**[0057]** In the manual feeding portion **235**, after the stop of blowing the air, the state of the sheet S that was floated is returned to the state of the sheet S that is of the bundle (the state is a state before the sheet is lifted and floated) by executing the processes of the steps S**4** and S**5** (the state of the sheet S that was floated is returned to the state of the sheet S that is of the bundle while the air between sheets is removed from between the sheets). When the state of the sheet S that was floated is returned to the state of the sheet S that is of the bundle, the close contact force between sheets remains to have a smaller value, to which the close contact force was decreased by the air blowing operation. Thus, in the manual feeding portion **235**, the pickup roller **502** can be prevented from slipping on a sheet and becoming unable to convey the sheet, for example. That is, even if the sheets have strong close-contact force, the manual feeding portion **235** can feed the sheets. The processes of the steps SI to S**5** serve as the feeding process of the first embodiment.

**[0058]** Then the CPU **101** determines whether the feeding of the necessary number of sheets has been completed (S**6**). In this process, the CPU **101** determines whether the feeding of the necessary number of sheets has been completed, based on the number of sheets whose passage was detected by the feeding detection sensor **505**. If the CPU **101** determines in the process of Step S**6** that the feeding of the necessary number of sheets has not been completed (No), then the CPU **101** returns to Step S**5**, and repeats the processes of the steps S**5** and S**6** until the feeding of the necessary number of sheets is completed.

**[0059]** If the CPU **101** determines in the process of Step S**6** that the feeding of the necessary number of sheets S has been completed (Yes), then the CPU **101** determines that the job for feeding the necessary number of sheets has been completed, and that the CPU **101** is in a state where the CPU **101** is not executing the job (non-operation state). Then the CPU **101** lifts the pickup roller **502** from the abutment position, at which the pickup roller **502** is abutted against the sheet S, to the separation position, at which the pickup roller **502** is not abutted against the sheet S, by rotating the sheet feeding motor **520** in a reverse direction (S**7**). Then the CPU **101** causes the manual feeding portion **235** to end the feeding operation for the sheet S.

**[0060]** Thus, in the manual feeding portion **235** of the first embodiment, the pickup roller **502** is kept at the abutment position while a job is executed. With this operation, the manual feeding portion **235** can feed sheets sequentially from a sheet bundle, until a necessary number of sheets is fed and the job is completed, by keeping the pickup roller **502** at the abutment position and rotating the pickup roller **502**.

**[0061]** In addition, since the pickup roller **502** is positioned at the separation position in the non-operation state where the job is not executed, the manual feeding portion **235** can prevent the pickup roller **502** from interfering with sheets when the sheets are placed on the feeding tray **6**.

**[0062]** As described above, even if sheets, such as coated paper sheets, have a smooth surface property, the manual feeding portion **235** of the first embodiment can feed the sheets by reducing the close contact force of the sheets, by separating a few to dozens of upper sheets of the sheet bundle from each other by performing the air blowing operation. In addition, when the manual feeding portion **235** performs the air blowing operation, the manual feeding portion **235** causes the pickup roller **502** to abut against the leading edge of the sheets.

**[0063]** If the sheet S is bent by the air blown by the air blowing portions **150***a* and **150***b*, the sheet S will pivot and skew when conveyed. However, the pivot and skew of the sheet S can be suppressed by the manual feeding portion **235** in the above-described manner.

**[0064]** In addition, the feeding operation for the sheets is performed after the air blowing operation is stopped. Thus, the amount of skew of sheets fed from the manual feeding portion **235** can be improved, compared with the amount of skew of sheets in a configuration in which the feeding operation is performed while the air blowing operation is performed. Thus, the amount of skew correction required for the registration roller pair **240** to perform can be made smaller. As a result, the variations in position of sheets conveyed to the secondary transfer portion **201**D can be deceased, so that the print precision (quality) can be improved.

## Second Embodiment

**[0065]** Next, an image forming apparatus **201** of a second embodiment will be described. The image forming apparatus **201** of the second embodiment can move the pickup roller **502** to the separation position during a job for feeding a necessary number of sheets S from a sheet bundle supported by the feeding tray **6**. In this point, the image forming apparatus **201** of the second embodiment differs from the above-described first embodiment. Since the other configuration of the second embodiment is the same as that of the first embodiment, a component identical to that of the first embodiment is given an identical symbol, a control process identical to that of the first embodiment is given an identical step number, and the description thereof will be omitted.

### Control Flow of Manual Feeding Portion

**[0066]** FIG. **6** is a flowchart illustrating a control process executed by the CPU **101** of the control portion **100** when

the sheet S is fed from the manual feeding portion **235** in the image forming apparatus **201** of the second embodiment. The control process illustrated in FIG. **6** is started when the CPU **101** issues a start command of a job for feeding a necessary number of sheets S from a sheet bundle supported by the feeding tray **6**.

**[0067]** After executing the process of Step S**5**, the CPU **101** determines whether the CPU **101** has fed the leading edge of the sheet S to a first position (S**11**). In the second embodiment, the first position is a position separated from the drawing roller **506**, which is positioned downstream of the feed roller **503** in the conveyance direction of the sheet S, by a first distance (e.g., 10 mm) in the conveyance direction of the sheet S and positioned downstream of the drawing roller **506**. The CPU **101** determines whether the leading edge of the sheet S has reached the first position, by performing computation by using the speed at which the sheet S is fed and the time which has elapsed since the feeding detection sensor **505**, positioned between the feed roller **503** and the drawing roller **506**, detected the leading edge of the sheet S.

**[0068]** If the CPU **101** determines in the process of Step S**11** that the CPU **101** has not fed the leading edge of the sheet S to the first position (No), then the CPU **101** returns to Step S**5**. On the other hand, if the CPU **101** determines in the process of Step S**11** that the CPU **101** has fed the leading edge of the sheet S to the first position (Yes), then the CPU **101** proceeds to Step S**12**.

**[0069]** In the process of Step S**12**, the CPU **101** lifts the pickup roller **502** from the abutment position, at which the pickup roller **502** is abutted against the sheet S, to the separation position, at which the pickup roller **502** is not abutted against the sheet S, by rotating the sheet feeding motor **520** in a reverse direction (S**12**). As described above, in the manual feeding portion **235**, if the sheet feeding motor **520** is rotated in the reverse direction, the pickup roller **502** is moved between the abutment position and the separation position, via a drive train portion. In addition, if the sheet feeding motor **520** is rotated in a forward direction, the pickup roller **502** and the feed roller **503** are rotated in a direction in which the pickup roller **502** and the feed roller **503** can convey the sheet S in the conveyance direction Y**1**.

**[0070]** Thus, in the manual feeding portion **235**, the process of Step S**12** is executed and the sheet feeding motor **520** is rotated in the reverse direction, so that the pickup roller **502** is moved to the separation position and separated from the sheet S. In addition, in the manual feeding portion **235**, when the sheet feeding motor **520** is rotated in the reverse direction, the feed roller **503** is also not rotated in the direction in which the feed roller **503** can convey the sheet S in the conveyance direction Y**1**.

**[0071]** In the manual feeding portion **235**, however, the sheet S has already reached the drawing roller **506**, and the drawing roller **506** is being rotated by the conveyance motor **521** that is different from the sheet feeding motor **520**. Thus, in the manual feeding portion **235**, even in a case where the process of Step S**12** is executed and the sheet feeding motor **520** is being rotated in the reverse direction, the conveyance of the sheet S can be continued by the drawing roller **506**.

**[0072]** Then the CPU **101** determines whether the CPU **101** has fed the trailing edge of the sheet S to a second position (S**13**). In the second embodiment, the second position is a position separated from the feed roller **503** by a second distance (e.g., 10 mm) in the conveyance direction of the sheet S and positioned downstream of the feed roller **503**. The CPU **101** determines whether the trailing edge of the sheet S has reached the second position, based on the time which has elapsed since the feeding of the sheet S was started, and the length of the sheet S in the conveyance direction Y**1**.

**[0073]** If the CPU **101** determines in the process of Step S**13** that the CPU **101** has not fed the trailing edge of the sheet S to the second position (No), then the CPU **101** repeats the process of Step S**13**, while continuing the feeding operation, until the trailing edge of the sheet S reaches the second position. On the other hand, if the CPU **101** determines in the process of Step S**13** that the CPU **101** has fed the trailing edge of the sheet S to the second position (Yes), then the CPU **101** proceeds to Step S**14**.

**[0074]** In the process of Step S**14**, the CPU **101** determines whether the feeding of the necessary number of sheets has been completed (S**14**). In this process, the CPU **101** determines whether the feeding of the necessary number of sheets has been completed, based on the number of sheets whose passage was detected by the feeding detection sensor **505**.

**[0075]** If the CPU **101** determines in the process of Step S**14** that the CPU **101** has completed the feeding of the necessary number of sheets S (Yes), then the CPU **101** determines that the job for feeding the necessary number of sheets has been completed, and causes the manual feeding portion **235** to end the feeding operation of the sheet S. In the manual feeding portion **235**, at a point of time at which the job is completed, the pickup roller **502** is in a state where the pickup roller **502** is positioned at the separation position by executing the process of Step S**12**. In other words, in the manual feeding portion **235** of the second embodiment, in a state (i.e., a non-operation state) where the job is not being executed, the pickup roller **502** is positioned at the separation position.

**[0076]** On the other hand, if the CPU **101** determines in the process of Step S**14** that the CPU **101** has not completed the feeding of the necessary number of sheets (No), then the CPU **101** lowers the pickup roller **502** to the abutment position, and causes the pickup roller **502** to abut against the uppermost sheet of the sheet bundle (S**15**). Then the CPU **101** returns to Step S**5**.

**[0077]** Since the CPU **101** returns to Step S**5** after executing the process of Step S**15**, the processes of the steps S**5** to S**15** are repeated in the manual feeding portion **235** until the necessary number (which is set in the job) of sheets S are fed. That is, the manual feeding portion **235** moves the pickup roller **502** from the abutment position to the separation position every time the drawing roller **506** is allowed to feed a sheet, until a necessary number of sheets S is fed from a sheet bundle supported by the feeding tray **6**. In addition, the manual feeding portion **235** moves the pickup roller **502** positioned at the separation position, to the abutment position before the feeding of a new sheet from the sheet bundle is started.

**[0078]** If the pickup roller **502** is continuously in contact with the sheet bundle (supported by the feeding tray **6**) until the necessary number (which is specified in the job) of sheets is fed, a mark of the pickup roller **502** will be left on sheets. In the present embodiment, however, the manual feeding portion **235** can suppress the mark from being left on the sheets.

Control Sequence

**[0079]** FIG. **7** is a diagram illustrating a part of control sequence of the image forming apparatus **201** of the second embodiment.

**[0080]** As illustrated in FIG. **7**, in the manual feeding portion **235**, at a time to at which a job is started, the rotation of the sheet feeding motor **520** in a reverse direction is started by a voltage V**2**, so that the pickup roller **502** starts to move from the separation position toward the abutment position. In the manual feeding portion **235**, the pickup roller **502** reaches the abutment position at a time t**1**. The CPU **101** determines that the pickup roller **502** has abutted against the abutment position, by using a signal outputted from the home-position detection sensor disposed in the moving mechanism of the driving mechanism **520***a*. If the CPU **101** determines that the pickup roller **502** has abutted against the abutment position, the CPU **101** stops the rotation of the sheet feeding motor **520** in the reverse direction.

**[0081]** In the manual feeding portion **235**, at a time t**2** at which a time T**6** has elapsed since the time t**1** at which the pickup roller **502** abutted against the abutment position, the air blowing operation by the air blowing portions **150***a* and **150***b* is started by driving the fan motors **15***a* and **15***b*. In the manual feeding portion **235**, in the air blowing operation, each of the fan motors **15***a* and **15***b* is PWM-controlled at a predetermined ratio (e.g., 40%), as the PWM duty ratio, for blowing the air. The air blowing operation is performed until a time T**11** (e.g., **10** seconds), as a blowing time, elapses.

**[0082]** In the manual feeding portion **235**, the air blowing operation by the air blowing portions **150***a* and **150***b* is started at the time t**2**, and is ended at a time t**3** at which the time T**11** has elapsed since the time t**2**. In the manual feeding portion **235**, at a time t**5** at which a time T**12** has elapsed since the time t**3** at which the air blowing operation was ended, the feeding of the uppermost sheet S of the sheet bundle supported by the feeding tray **6** is started. In the manual feeding portion **235**, at the time t**5**, the rotation of the sheet feeding motor **520** in a forward direction is started by a voltage V**1**, and the conveyance motor **521** is also rotated by the voltage V**1**. With this operation, in the manual feeding portion **235**, the feeding of the uppermost sheet S of the sheet bundle supported by the feeding tray **6** is started by the pickup roller **502** of the first sheet-feeding portion **500**.

**[0083]** In the image forming apparatus **201**, at a time t**4** in a period of time from the time t**3** at which the air blowing operation is ended, to the time t**5** at which the feeding operation by the first sheet-feeding portion **500** is started, the exposure of the surface of the photosensitive drum **212** by the laser scanner **210** is started. In other words, the image forming apparatus **201** causes the air blowing portions **150***a* and **150***b* to perform the air blowing operation before the image forming portion **201**B starts the image formation by using the image information obtained by the image forming portion **201**B by performing the exposure of the surface of the photosensitive drum **212** by the laser scanner **210**.

**[0084]** The air blowing operation by the air blowing portions **150***a* and **150***b* causes the feeding tray **6** to vibrate, which causes the failure in image formation performed by the image forming portion **201**B. In the above-described configuration, however, the manual feeding portion **235** of the second embodiment can prevent the failure in image formation, which is caused by the vibration of the feeding tray **6**.

**[0085]** In the manual feeding portion **235**, at a time t**7** at which a time T**13** has elapsed since a time t**6** at which the feeding detection sensor **505** detected the leading edge of the sheet S, the leading edge of the sheet S reaches the first position positioned downstream of the drawing roller **506** in the conveyance direction. In the manual feeding portion **235**, the rotation of the sheet feeding motor **520** in the forward direction, made by the voltage V**1**, is stopped; and at a time t**8** at which a time T**14** has elapsed since the time t**7**, the rotation of the sheet feeding motor **520** in the reverse direction is started by the voltage V**2**, and the movement of the pickup roller **502** from the abutment position toward the separation position is started. In the manual feeding portion **235**, at a time t**9** at which a time T**15** has elapsed since the time t**8**, the CPU **101** determines, based on the elapsed time, that the pickup roller **502** has reached the separation position, and stops the rotation of the sheet feeding motor **520** in the reverse direction.

**[0086]** In the manual feeding portion **235**, in the period of time from the time t**7** to the time t**9**, the rotation of the conveyance motor **521** by the voltage VI is continued. Thus, in the manual feeding portion **235**, even after the time t**7** at which the rotation of the sheet feeding motor **520** in the forward direction is stopped, the feeding of the sheet S is continued by the drawing roller **506** rotated by the conveyance motor **521**.

**[0087]** As described above, even if sheets, such as coated paper sheets, have a smooth surface property, the manual feeding portion **235** of the second embodiment can feed the sheets by reducing the close contact force of the sheets, by separating a few to dozens of upper sheets of the sheet bundle from each other by performing the air blowing operation. In addition, when the manual feeding portion **235** performs the air blowing operation, the manual feeding portion **235** causes the pickup roller **502** to abut against the leading edge of the sheets.

**[0088]** If the sheet S is bent by the air blown by the air blowing portions **150***a* and **150***b*, the sheet S will pivot and skew when conveyed. However, the pivot and skew of the sheet S can be suppressed by the manual feeding portion **235** in the above-described manner.

**[0089]** In addition, the feeding operation for the sheets is performed after the air blowing operation is stopped. Thus, the amount of skew of sheets fed from the manual feeding portion **235** can be improved, compared with the amount of skew of sheets in a configuration in which the feeding operation is performed while the air blowing operation is performed. Thus, the amount of skew correction required for the registration roller pair **240** to perform can be made smaller. As a result, the variations in position of sheets conveyed to the secondary transfer portion **201**D can be deceased, so that the print precision (quality) can be improved.

**[0090]** In addition, when the fed sheet S reaches the drawing roller **506** positioned downstream of the first sheet-feeding portion **500** in the conveyance direction, the manual feeding portion **235** of the second embodiment moves the pickup roller **502** from the abutment position to the separation position. If the pickup roller **502** is continuously in contact with the sheet bundle (supported by the feeding tray **6**) until the necessary number (which is specified in the job) of sheets are fed, a mark of the pickup roller **502** will be left

on sheets. In the present embodiment, however, the manual feeding portion **235** can suppress the mark from being left on the sheets.

## Other Embodiments

**[0091]** In the above-described first and second embodiments, the description has been made for the sheet feeding control performed by the manual feeding portion **235** that includes the air blowing portions **150***a* and **150***b*. However, the present disclosure is not limited to this. For example, the sheet feeding control in the first and the second embodiments may be performed by the sheet feeding unit **230** that includes the feeding cassette **1**, or by a feeding deck that can be connected to the image forming apparatus **201** and that includes an air blowing portion. In a case where the sheet feeding control in the first and the second embodiments is performed by the sheet feeding unit **230**, any one of the sheet feeding units **230** in the up-down direction may perform the sheet feeding control. That is, the sheet supporting portion that supports the sheet bundle may have any configuration.

**[0092]** In the first and the second embodiments, the first sheet-feeding portion **500** lifts and lowers the pickup roller **502** by rotating the sheet feeding motor **520**, which rotates the pickup roller **502** and the feed roller **503**, in a reverse direction. However, the present disclosure is not limited to this. For example, the first sheet-feeding portion **500** may move the pickup roller **502** between the abutment position and the separation position by using a different actuator, such as a motor or a solenoid, that is a driving portion different from the sheet feeding motor **520**.

**[0093]** The manual feeding portion **235** of the first and the second embodiments moves the pickup roller **502** to the abutment position if a start command of a job is issued from the CPU **101** for feeding a necessary number of sheets from a sheet bundle supported by the feeding tray **6**. However, the present disclosure is not limited to this. For example, the manual feeding portion **235** may move the pickup roller **502** to the abutment position when the sheet detection sensor **17** for detecting a sheet S placed on the feeding tray **6** detects the sheet S.

**[0094]** In this case, it is preferable that the manual feeding portion **235** move the pickup roller **502** from the abutment position to the separation position if the job was not started and the feeding operation was not executed by the time when a predetermined time has elapsed. With this operation, in a case where sheets are placed on the feeding tray **6** and the feeding operation is not executed, the manual feeding portion **235** can suppress the pickup roller **502** from being continuously in contact with the sheets, and the mark of the pickup roller **502** from being left on the sheets.

**[0095]** In the first and the second embodiments, the description has been made for the case where the control portion **100** is included in the image forming apparatus **201**. However, the present disclosure is not limited to this. For example, the control portion **100** may be included in a feeding deck connected to the image forming apparatus **201**. That is, the control portion **100** may be disposed in any apparatus as long as the control portion that can control the sheet feeding portion and the air blowing portion is electrically connected to the sheet feeding portion and the air blowing portion.

**[0096]** Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) recorded on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)™), a flash memory device, a memory card, and the like.

**[0097]** While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

**[0098]** This application claims the benefit of Japanese Patent Application No. 2023-103757, filed Jun. 23, 2023, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

**1**. A sheet feeding apparatus comprising:

a sheet supporting portion configured to support sheets;

a sheet feeding portion including a rotary feeding member and a driving portion configured to drive the rotary feeding member and configured to perform a feeding operation that feeds the sheets supported by the sheet supporting portion, by driving the driving portion, the rotary feeding member being configured to move between an abutment position and a separation position, the abutment position being a position at which the rotary feeding member abuts against the sheets supported by the sheet supporting portion, the separation position being a position at which the rotary feeding member is separated from the sheets supported by the sheet supporting portion;

an air separating portion configured to perform a blowing operation that blows air on a side surface of the sheets supported by the sheet supporting portion; and

a control portion configured to control movement of the rotary feeding member between the abutment position and the separation position, the feeding operation by the sheet feeding portion, and the blowing operation by the air separating portion,

wherein in a case where a job for feeding sheets is started, the control portion is configured to move the rotary feeding member from the separation position to the

abutment position, causes the air separating portion to perform the blowing operation in a state where the rotary feeding member is positioned at the abutment position, and after the blowing operation, causes the sheet feeding portion to feed a plurality of sheets in a state where the control portion stops the blowing operation, by driving the driving portion.

**2**. The sheet feeding apparatus according to claim **1**, wherein the control portion is configured to position the rotary feeding member at the separation position in a non-operation state of the job.

**3**. The sheet feeding apparatus according to claim **2**, wherein the driving portion is a motor configured to cause the rotary feeding member to rotate and move between the abutment position and the separation position by rotation of the motor.

**4**. The sheet feeding apparatus according to claim **3**, wherein the motor is configured to rotate in a first direction and a second direction opposite to the first direction, and

wherein the sheet feeding portion includes a driving mechanism configured to rotate the rotary feeding member in a case where the motor is rotated in the first direction, and move the rotary feeding member between the abutment position and the separation position in a case where the motor is rotated in the second direction.

**5**. A sheet feeding apparatus comprising:

a sheet supporting portion configured to support sheets;

a first sheet-feeding portion including a rotary feeding member and a driving portion configured to drive the rotary feeding member and configured to perform a feeding operation that feeds the sheets supported by the sheet supporting portion, by driving the driving portion, the rotary feeding member being configured to move between an abutment position and a separation position, the abutment position being a position at which the rotary feeding member abuts against the sheets supported by the sheet supporting portion, the separation position being a position at which the rotary feeding member is separated from the sheets supported by the sheet supporting portion;

a second sheet-feeding portion disposed downstream of the first sheet-feeding portion in a conveyance direction of sheets;

an air separating portion configured to perform a blowing operation that blows air on a side surface of the sheets supported by the sheet supporting portion; and

a control portion configured to control movement of the rotary feeding member between the abutment position and the separation position, the feeding operation by the first sheet feeding portion and the second sheet feeding portion, and the blowing operation by the air separating portion,

wherein in execution of a job for feeding sheets, the control portion is configured to move the rotary feeding member to the abutment position in a case where the control portion causes the first sheet-feeding portion to start to feed a sheet, and moves the rotary feeding member to the separation position in a case where the sheet fed by the first sheet-feeding portion reaches the second sheet-feeding portion.

**6**. The sheet feeding apparatus according to claim **5**, wherein the driving portion is a first motor configured to rotate in a first direction and a second direction opposite to the first direction,

wherein the first sheet-feeding portion includes a driving mechanism configured to rotate the rotary feeding member in a case where the first motor is rotated in the first direction, and move the rotary feeding member between the abutment position and the separation position in a case where the first motor is rotated in the second direction, and

wherein the second sheet-feeding portion includes a second motor configured to feed a sheet by rotation of the second motor.

**7**. The sheet feeding apparatus according to claim **1**, further comprising:

a detection portion configured to detect sheets supported by the sheet supporting portion,

wherein the control portion is configured to move the rotary feeding member to the abutment position, based on the detection portion detecting the sheets supported by the sheet supporting portion.

**8**. The sheet feeding apparatus according to claim **7**, wherein the control portion is configured to move the rotary feeding member from the abutment position to the separation position if the job was not started by a time when a predetermined time has elapsed since the control portion moved the rotary feeding member to the abutment position.

**9**. The sheet feeding apparatus according to claim **1**, wherein the sheet supporting portion is a manual feeding tray for feeding sheets manually,

wherein the sheet feeding apparatus includes a regulation portion configured to regulate a position of sheets in a width direction orthogonal to a conveyance direction of the sheets, the sheets being supported by the manual feeding tray, and

wherein the regulation portion includes a blowing opening disposed in an abutment surface of the regulation portion, the abutment surface being a surface in contact with the sheets, the blowing opening being an opening from which air from the air separating portion is blown.

**10**. An image forming apparatus comprising:

the sheet feeding apparatus according to claim **1**; and

an image forming portion configured to form an image on a sheet fed from the sheet feeding apparatus.

**11**. The image forming apparatus according to claim **10**, wherein the image forming portion includes an image bearing member configured to rotate while bearing a toner image, and an exposure portion configured to expose the image bearing member, and

wherein in a case where the control portion executes the job, the control portion is configured to cause the air separating portion to perform the blowing operation before the control portion causes the exposure portion to expose the image bearing member.

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