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(54) IMAGE FORMING APPARATUS AND METHOD FOR CONTROLLING THE SAME

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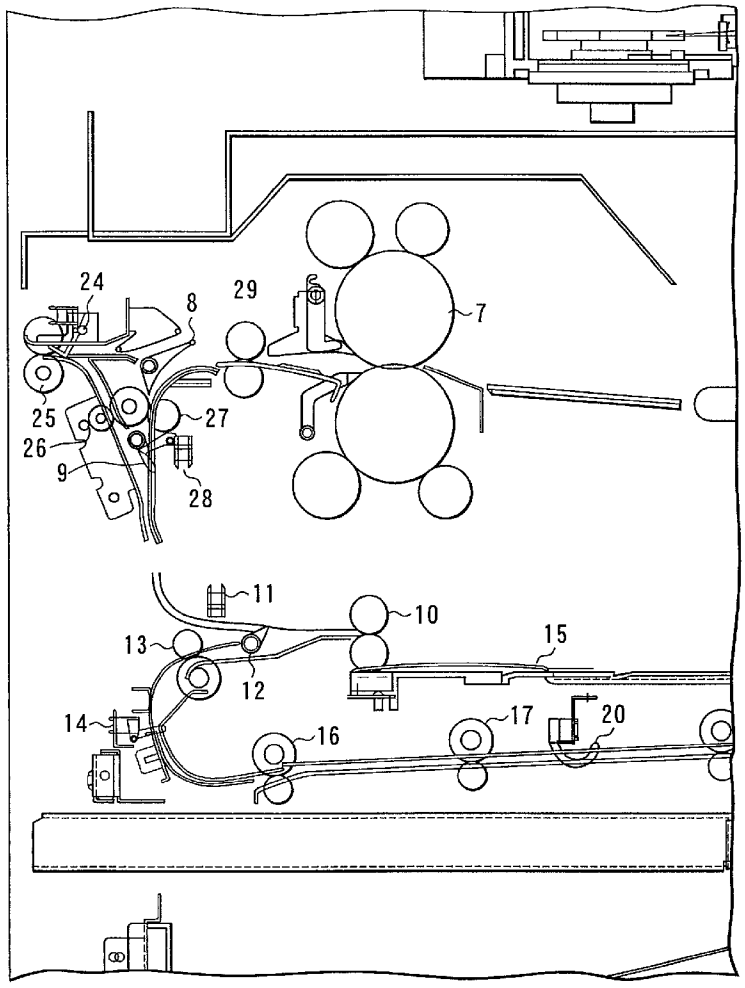
(57) **ABSTRACT**

There is disclosed an image forming apparatus and a method for controlling the apparatus, comprising a roller for conveying a sheet, and a sensor for detecting a time for conveying the sheet by the roller, the conveyance time of the sheet by the roller actually measured by the sensor is compared with an average conveyance time of the sheet corresponding to a sheet size, and a conveyance speed of the sheet by the roller is corrected so as to set the conveyance speed of the roller to be constant based on a comparison result.



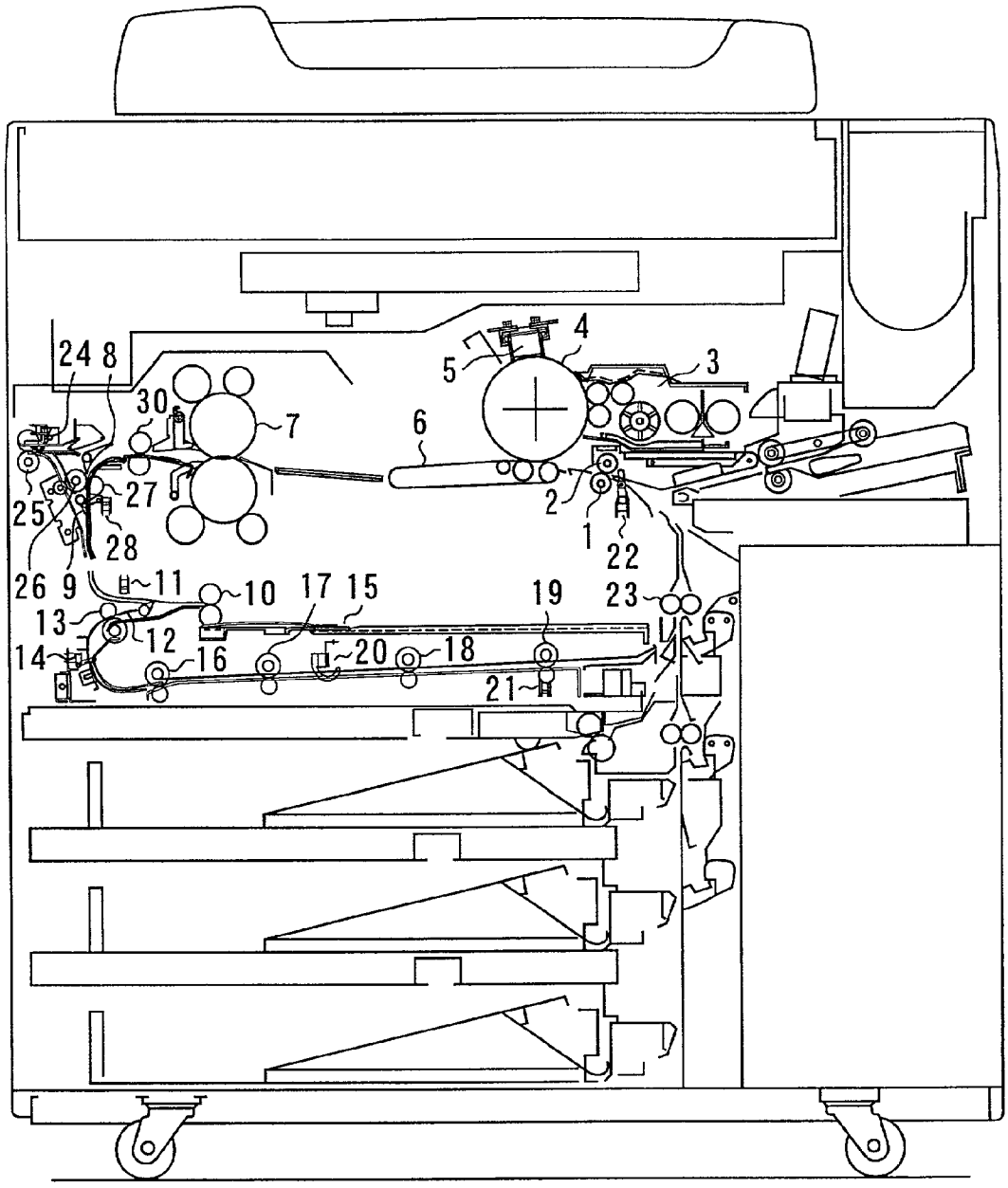


FIG. 1

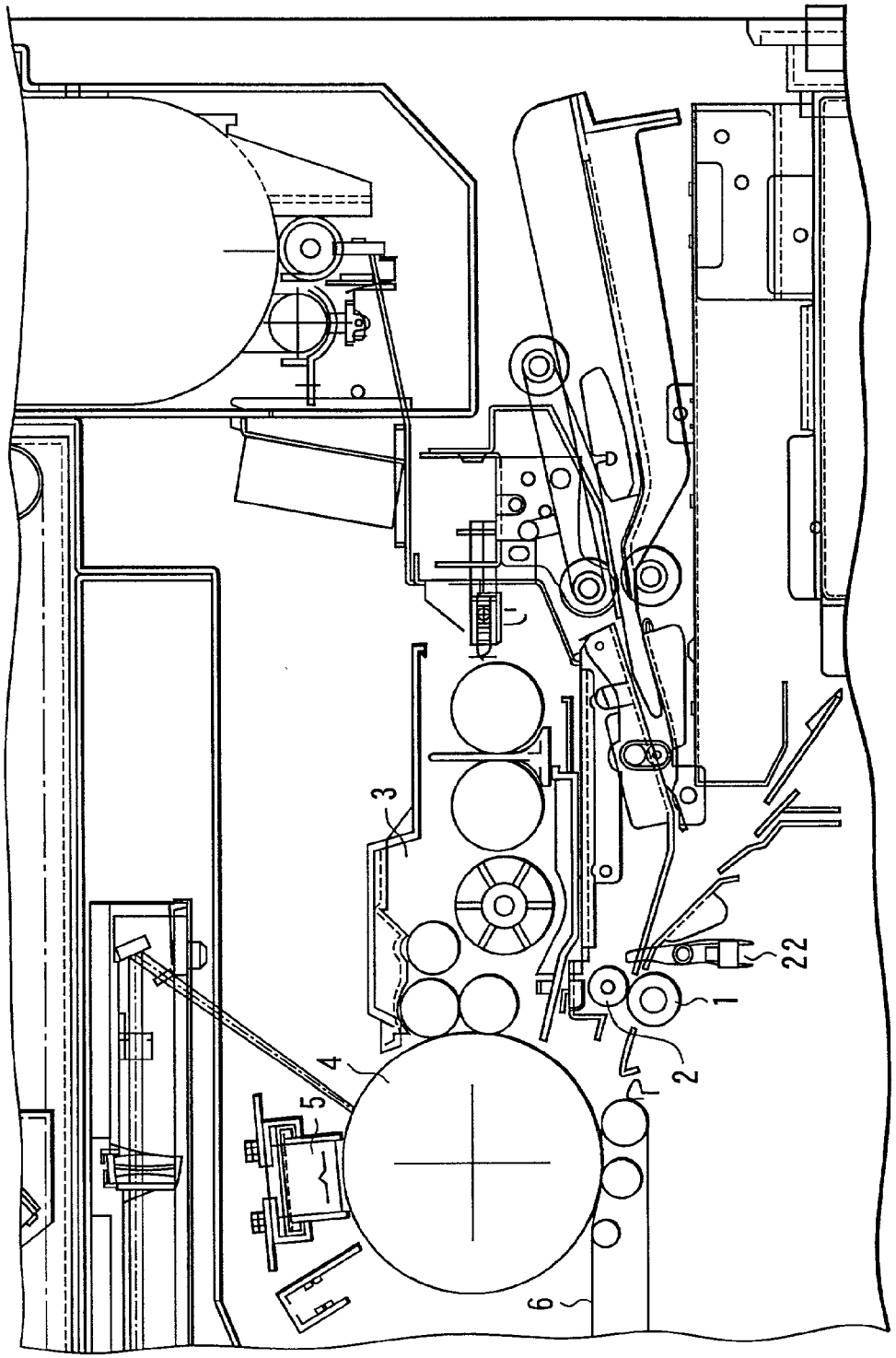


FIG. 2

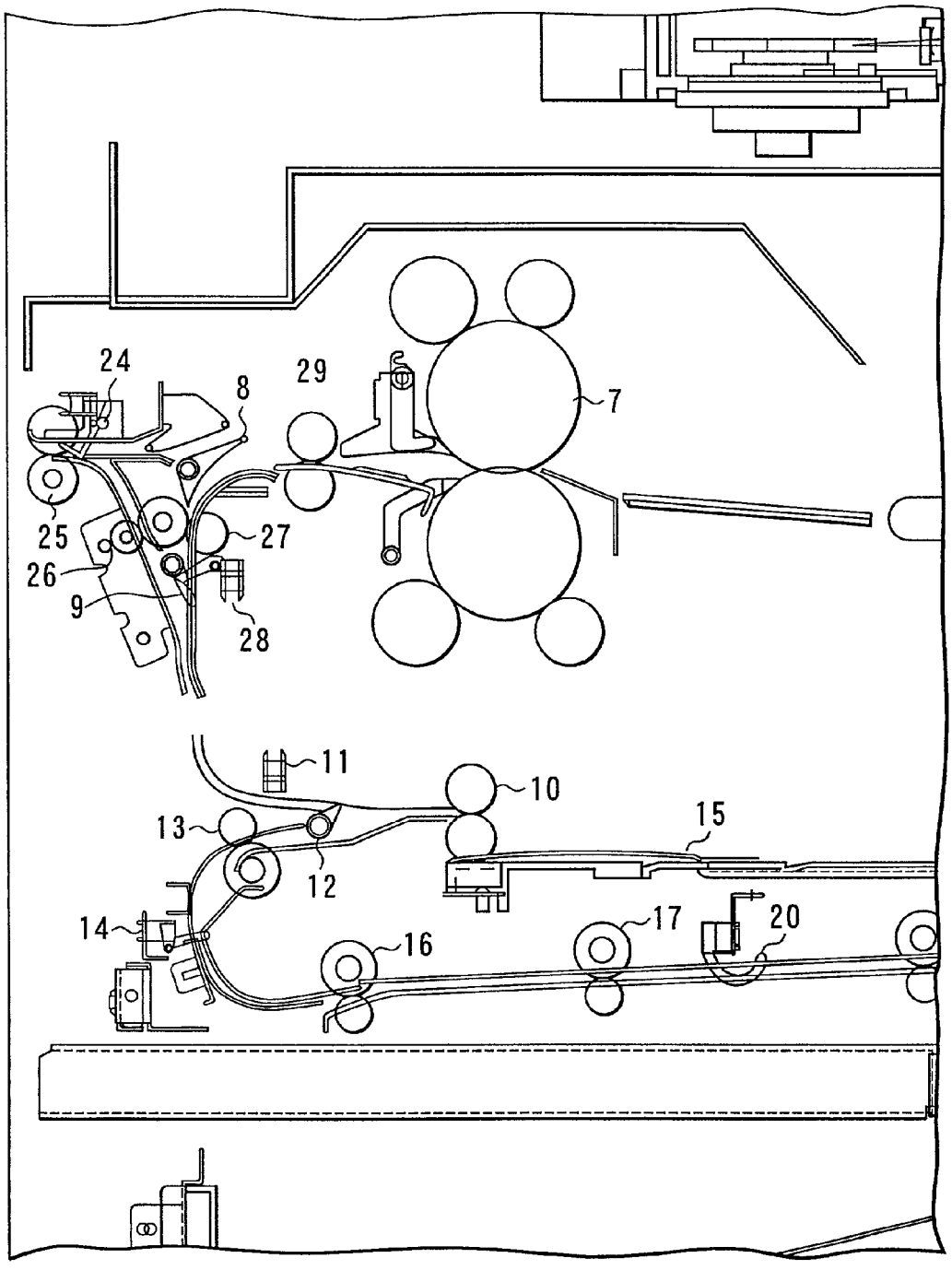


FIG. 3

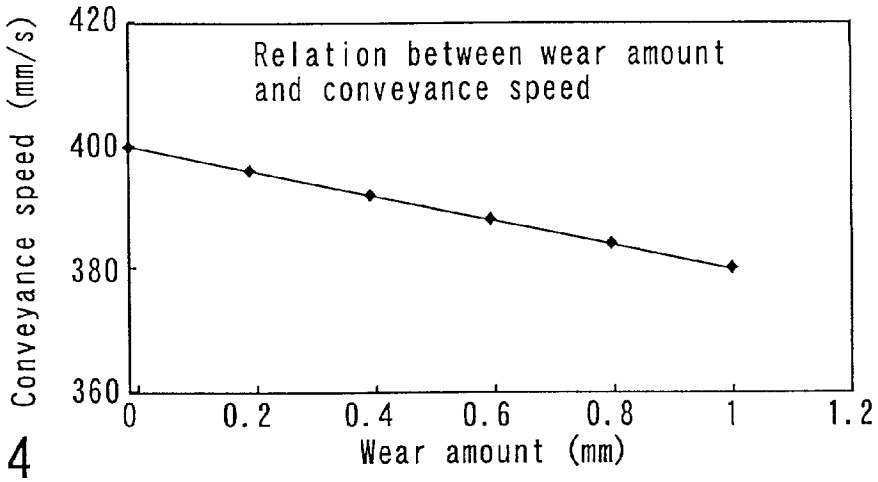


FIG. 4

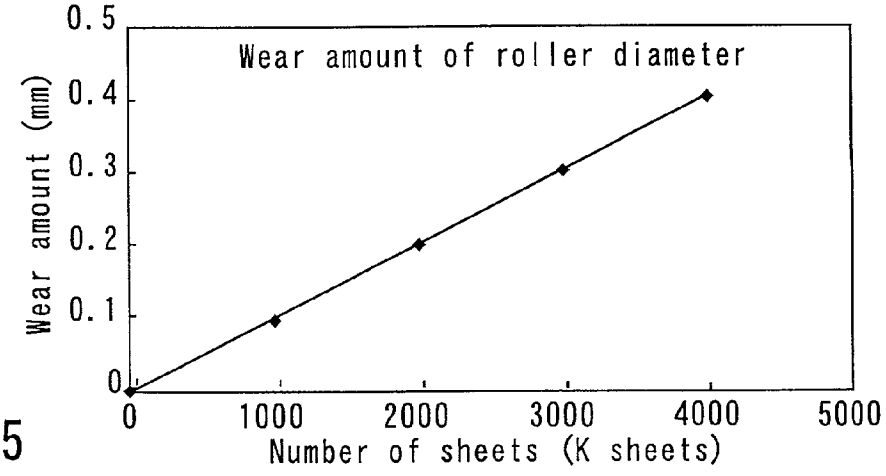


FIG. 5

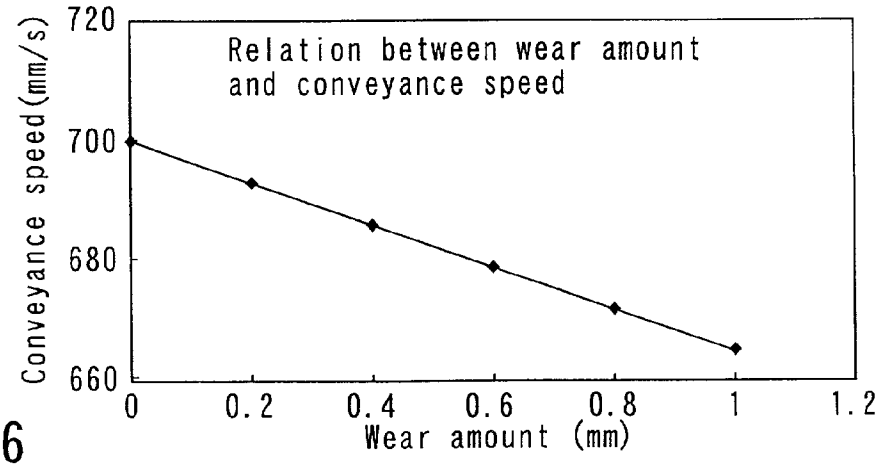


FIG. 6

FIG. 7

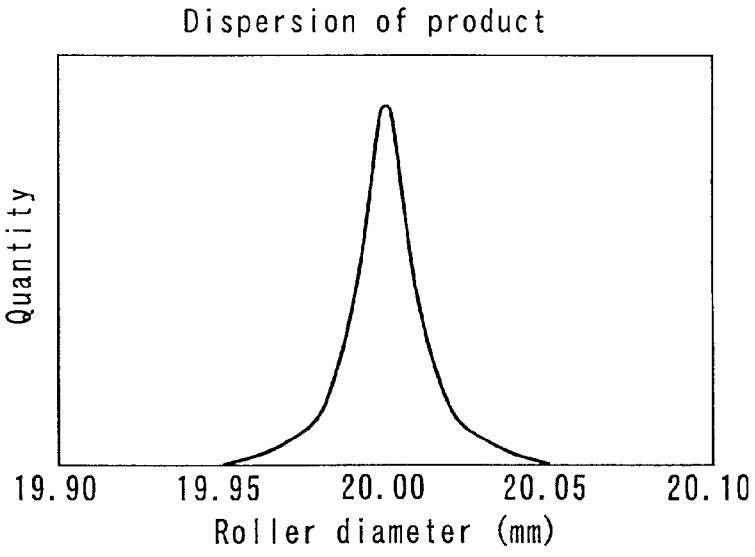
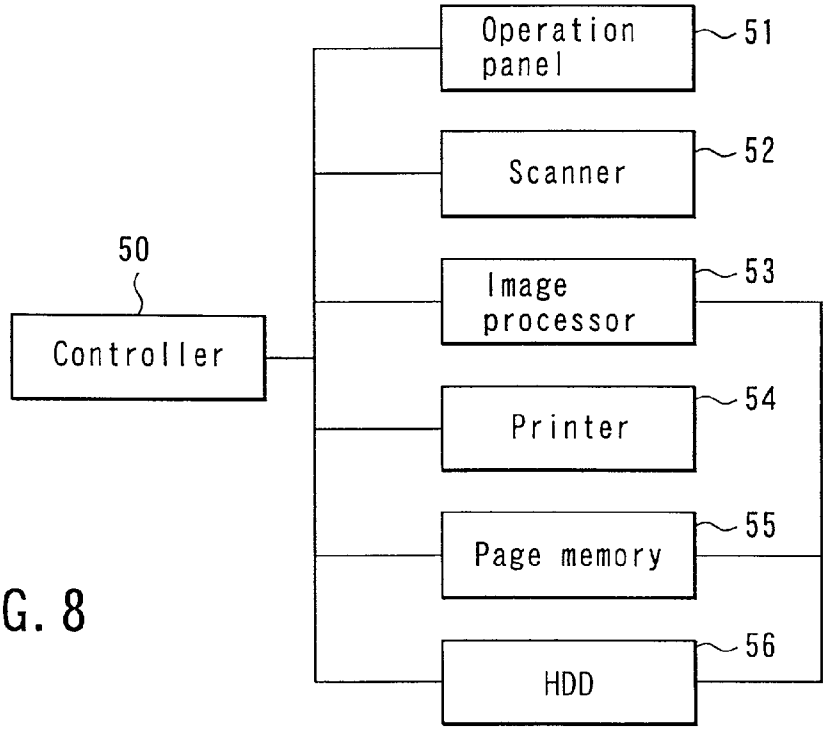

Dispersion of product
Quantity
19.90
19.95
20.00
20.05
20.10
Roller diameter (mm)

FIG. 8


Operation panel
51
Scanner
52
50
Image processor
53
Controller
Printer
54
Page memory
55
HDD
56

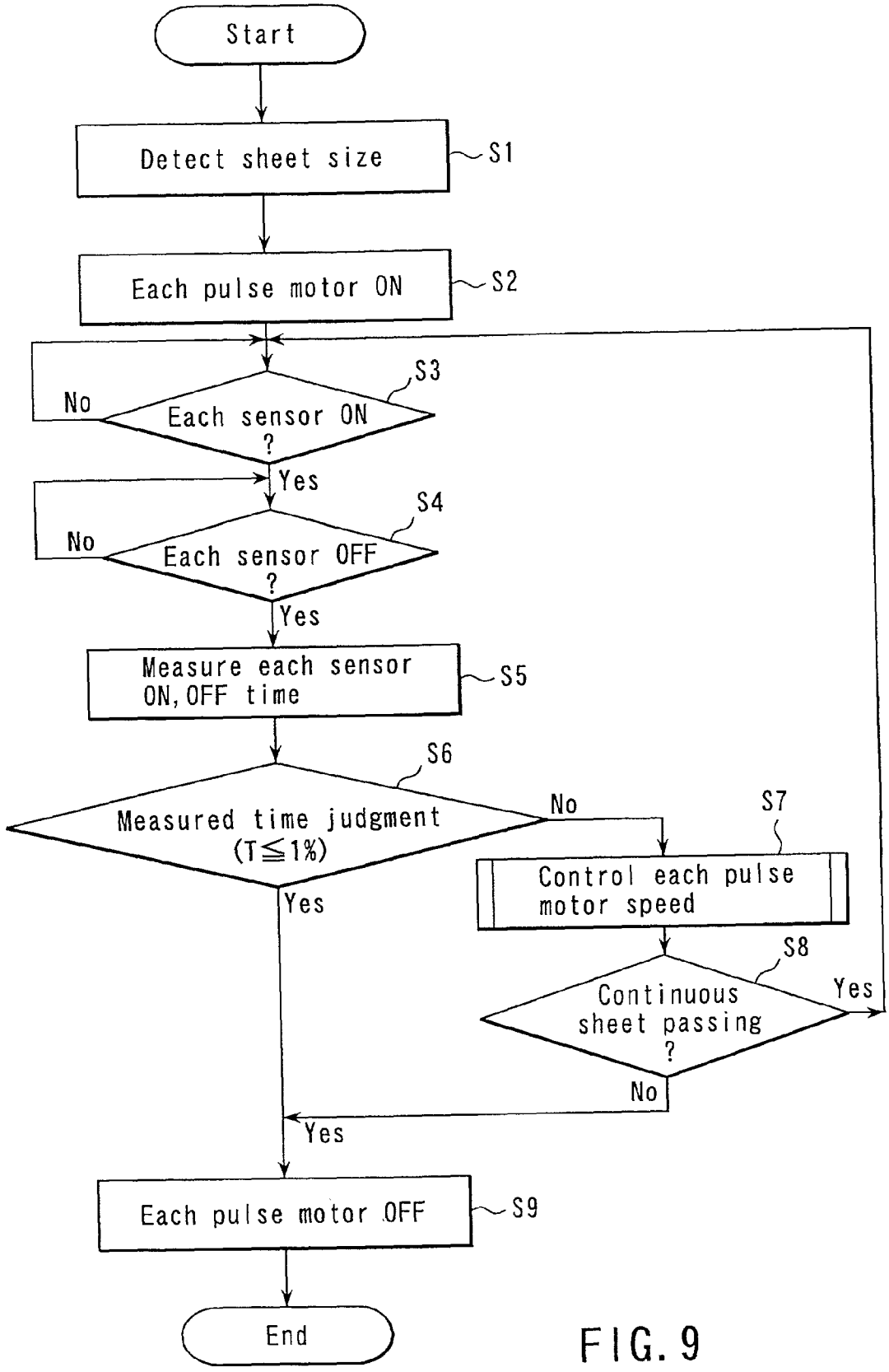

Start
Detect sheet size
S1
Each pulse motor ON
S2
S3
No
Each sensor ON ?
Yes
S4
No
Each sensor OFF ?
Yes
Measure each sensor ON, OFF time
S5
S6
Measured time judgment (T≦1%)
No
S7
Control each pulse motor speed
S8
Continuous sheet passing ?
Yes
No
Yes
Each pulse motor OFF
S9
End

FIG. 9

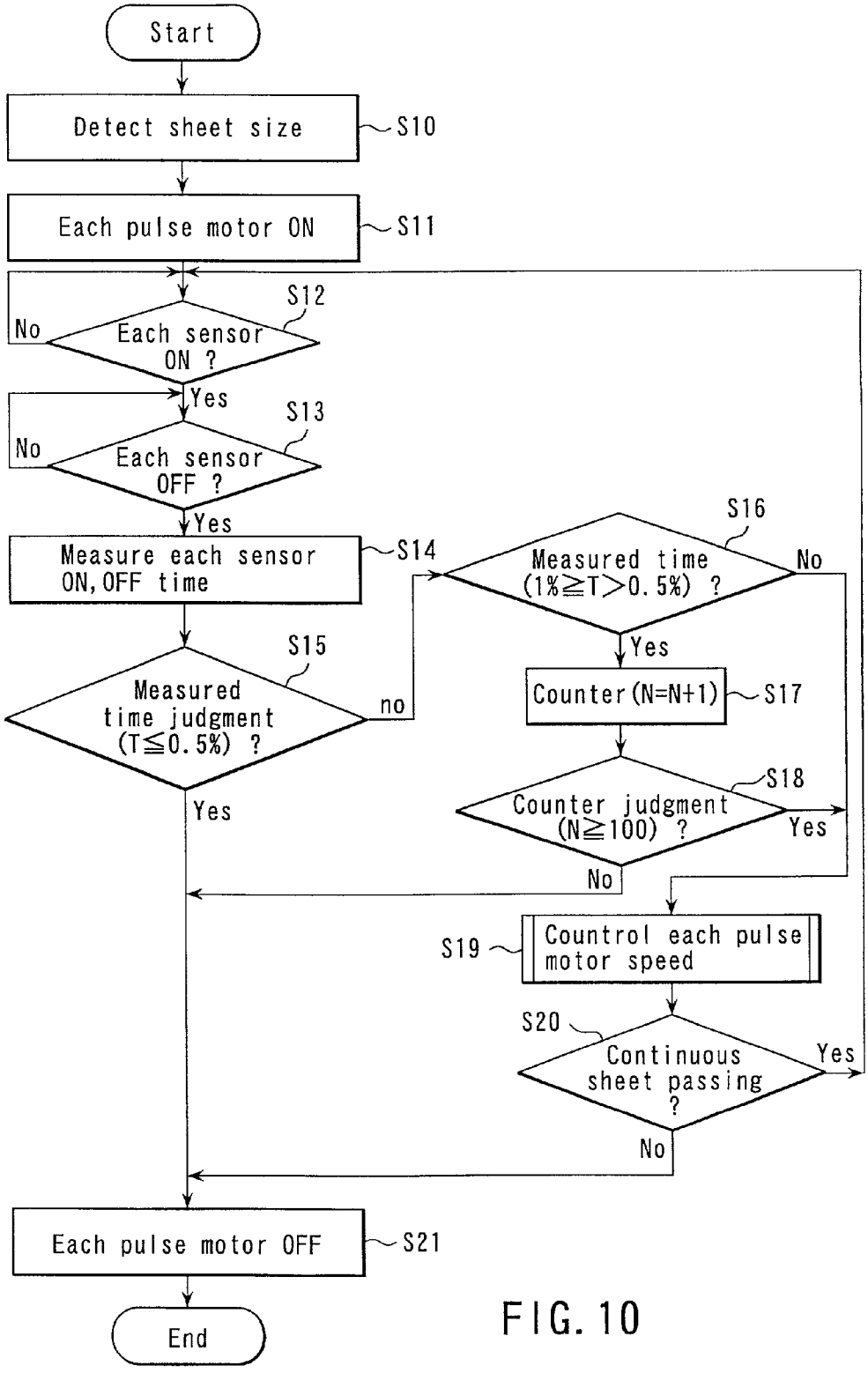

Start
Detect sheet size
S10
Each pulse motor ON
S11
S12
No
Each sensor ON ?
Yes
S13
No
Each sensor OFF ?
Yes
Measure each sensor ON, OFF time
S14
S15
Measured time judgment (T≦0.5%) ?
no
Yes
S16
Measured time (1%≧T>0.5%) ?
No
Yes
Counter (N=N+1)
S17
S18
Counter judgment (N≧100) ?
Yes
No
S19
Countrol each pulse motor speed
S20
Continuous sheet passing ?
Yes
No
Each pulse motor OFF
S21
End

FIG. 10

IMAGE FORMING APPARATUS AND METHOD FOR CONTROLLING THE SAME

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an image forming apparatus and a controlling method of the apparatus.

[0002] In a conventional image forming apparatus, a speed is controlled based on an output of a pre-registration sensor, or a sheet size is detected based on the output of the pre-registration sensor in order to align a tip-end position of a conveyed sheet.

[0003] Since a roller for use in this image forming apparatus is not a frequently changed component, the roller is worn by friction, and it becomes difficult to obtain an initially set speed just before an end of life of an apparatus body. Therefore, a friction of a roller diameter, a margin for a precision of the roller diameter, or the precision is strictly preset.

[0004] In this case, a necessary or more margin has to be set. That is, a speed is set to be lower than an actual copy speed by about 1 to 2 CPM, or the CPM is reduced in duration of life in many cases.

[0005] Here, for example, in Jpn. Pat. Appln. KOKAI Publication No. 2000-191182, a technique for controlling an ON timing of rotation start of a registration roller and aligning a tip end of an image of the sheet in accordance with a detection point with a correction value added to a reflective sheet sensor by a type of a sheet by a sheet detection sensor is disclosed.

[0006] However, the following problem occurs in the aforementioned prior art.

[0007] That is, it is also seen from the aforementioned document (Jpn. Pat. Appln. KOKAI Publication No. 2000-191182, and the like) that the output of the reflective sheet sensor differs in a detection position.

[0008] Moreover, the reflective sheet sensor is used to change the speed timing of the registration roller and a constant control is carried out. However, in a future high-speed apparatus, a long-life rubber conveyance roller is required for the registration roller or a reverse roller and further a conveyance roller. Therefore, in order to obtain the long-life roller, it is essential to develop a roller superior in resistance to friction for enhancement of durability, and cost increases as compared with the existing rubber roller.

[0009] Moreover, in the reverse roller or the registration roller, the roller diameter needs to be precise in order to constantly convey the sheet. Therefore, the precision is required to be ±0.03 or less, and becomes comparatively high considering from a yield, manufacturing cost, and the like.

[0010] Furthermore, the reverse roller is commercialized by setting the copy speed with an excessively sufficient margin, so that the speed is reduced as compared with an actually possible copy speed in actual circumstances. Moreover, when the speed is not set with the sufficient margin, during reversing, the next sheet enters the reverse roller before completion of reversing of the previous sheet, and therefore jam occurs. Furthermore, in order to avoid the aforementioned phenomenon, a conventional type of apparatus is controlled so that the next sheet is inserted into a reverse path after checking of end of reversing. That is, the control is performed in such a manner that the copy speed is reduced in the duration of life.

[0011] Moreover, when the speed of the roller is slowed down in the reverse roller, overlapping of sheets increasingly occurs. With the increased overlapping of sheets, sheet tailings are generated, a friction coefficient of the roller is lowered, and a conveyance property is also deteriorated. Therefore, the speed is slowed down, and a frequency of occurrence of jam increases. Furthermore, with the much overlapping of sheets, when a toner is recycled, the sheet tailings are also conveyed into a cleaner, image deterioration, or the like is generated, and a photosensitive body is possibly influenced.

BRIEF SUMMARY OF THE INVENTION

[0012] The present invention has been developed in consideration of the problem, and an object thereof lies in the following respect. That is, a conveyance speed of each roller is detected based on outputs of various sensors disposed in the vicinity of a registration roller or a reverse roller, and a conveyance roller, and the conveyance speed of each roller is controlled by a pulse motor based on a detection result. Therefore, the object is to realize an optimum setting of the conveyance speed, and prevent a deviation of an image, conveyance dispersion, and occurrence of jam. Moreover, a further object is to moderate a precision of each single roller unit, so that a yield is enhanced, and further cost down is realized.

[0013] In order to achieve the aforementioned objects, according to the present invention, there is provided an image forming apparatus comprising: a roller for conveying a sheet; a sensor for detecting a time for conveying the sheet by the roller; and a correction controller for comparing the conveyance time of the sheet by the roller actually measured by the sensor with an average conveyance time of the sheet corresponding to a sheet size, and correcting a conveyance speed of the sheet by the roller so as to set the conveyance speed of the roller to be constant based on a comparison result.

[0014] Furthermore, according to the present invention, there is provided a method for controlling an image forming apparatus, comprising: a first step of conveying a sheet by a roller; a second step of detecting a time for conveying the sheet by the roller by a sensor; and a third step of comparing the conveyance time of the sheet by the roller actually measured by the sensor with an average conveyance time of the sheet corresponding to a sheet size, and correcting a conveyance speed of the sheet by the roller so as to set the conveyance speed of the roller to be constant based on a comparison result by a correction controller.

[0015] Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0016] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate

presently preferred embodiments of the invention, and together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

[0017] **FIG. 1** is a diagram showing a constitution of an image forming apparatus according to one embodiment of the present invention,

[0018] **FIG. 2** is a partially enlarged view of **FIG. 1**,

[0019] **FIG. 3** is a partially enlarged view of **FIG. 1**,

[0020] **FIG. 4** is a diagram showing a relation between a friction amount and a conveyance speed when a registration roller (ϕ**20**) is used,

[0021] **FIG. 5** is a diagram showing a relation between the number of passed sheets and the friction amount of a rubber roller in a case in which a sheet size is A**4** and rubber rollers are employed in registration rollers **1**, **2**,

[0022] **FIG. 6** is a diagram showing a relation between the conveyance speed and the friction amount of an ADU/reverse roller **10**,

[0023] **FIG. 7** is a diagram showing a statistical result of a component dispersion,

[0024] **FIG. 8** is a diagram showing a constitution of a control system of the image forming apparatus according to the embodiment,

[0025] **FIG. 9** is a flowchart showing a correction control of a conveyance roller by the image forming apparatus according to the embodiment in detail, and

[0026] **FIG. 10** is a flowchart showing the correction control of the conveyance roller by the image forming apparatus according to the embodiment in detail.

DETAILED DESCRIPTION OF THE INVENTION

[0027] An embodiment of the present invention will be described hereinafter with reference to the drawings.

[0028] **FIG. 1** shows a constitution of an image forming apparatus according to one embodiment of the present invention, **FIG. 2** and **FIG. 3** show partially enlarged views of **FIG. 1**, and the constitution will be described.

[0029] Here, a characteristic part of the present invention will mainly be described.

[0030] In **FIG. 1, 2**, after aligning, a pre-registration sensor **22** detects a time when registration rollers **1, 2** convey a sheet into a photosensitive drum **4**.

[0031] The conveyance time actually measured by the pre-registration sensor **22** is compared with an average conveyance time corresponding to a type of the sheet such as A**4**/A**3**, and a deviation amount can be detected. When the pre-registration sensor **22** is disposed behind the registration rollers **1**, **2** and the conveyance speed of the sheet is detected, further accurate detection can be carried out.

[0032] That is, the pre-registration sensor **22** is disposed in a position where the sheet is passed through the registration rollers **1, 2**, and then a conveyance speed 400 mm/sec of the sheet can be measured. Therefore, a measured result can be converted to the deviation amount. Additionally, reference numeral **23** denotes a conveyance roller for conveying the sheet from a supply sheet unit.

[0033] The surface of the photosensitive drum **4** is uniformly charged by a charging unit **5**.

[0034] Moreover, the surface of the photosensitive drum **4** is irradiated with a light in accordance with a character or a numeral to be printed, and an electrostatic latent image is formed. Subsequently, a toner is brought into contact with the surface of the photosensitive drum **4** by a developer unit **3**, and the toner is attached to an electrostatic latent image portion.

[0035] The toner attached to the surface of the photosensitive drum **4** in this manner is transferred to the sheet in a process of conveyance by a transfer belt **6**. Subsequently, the toner transferred to the sheet is fixed by heat and pressure by a fixer unit **7**.

[0036] **FIG. 4** shows and depicts a relation between a friction amount and a conveyance speed when the registration roller ϕ**20** is used. In the drawing, the ordinate indicates the conveyance speed (mm/sec), and the abscissa indicates a friction amount (mm).

[0037] When the friction amount is 0.2 mm (1% deviation) in terms of a diameter, the conveyance speed is 396 mm/sec, and a deviation amount of about 5 msec results with an LT size.

[0038] When the friction amount is 0.4 mm (2% deviation) in terms of the diameter, the conveyance speed is 392 mm/sec, and a deviation amount of a time of about 11 msec results with the LT size.

[0039] Therefore, with a friction amount of 1%, if a distance between the registration rollers **1**, **2** and the photosensitive drum **4** is 60 mm, the deviation amount is 0.6 mm

[0040] Moreover, with a deviation of 2%, the deviation allowed for a tip-end position has a boundary of 1 mm. In the speed detection of the registration rollers **1**, **2**, similarly as in the tip-end position, a deviation of 5 msec corresponding to about 0.6 mm is preferably detected and corrected. **FIG. 4** shows the relation between the amount and the speed with respect to a deviation of 1%.

[0041] Next, **FIG. 5** shows and depicts a relation between the number of passed sheets and the friction amount of a rubber roller in a case in which a sheet size is A**4** and rubber rollers are employed in the registration rollers **1**, **2**. The ordinates indicates the friction amount (mm), and the abscissa indicates the number of sheets (K sheets).

[0042] In general, a life of an apparatus body of a high-speed apparatus is enhanced. However, when the number of passed sheets reaches about 2000 K sheets, 4000 K sheets, the friction amount of the roller is about 0.2 mm, 0.4 mm. When 2000 K sheets are passed in this manner, the friction amount of about 0.2 mm (1%) is generated, and therefore a margin of the order of 3 to 5% is required for a registration portion.

[0043] The margin of 5% is converted to a time of about 25 msec.

[0044] Since about 10 msec corresponds to 1 CPM in the high-speed machine, 25 msec is treated as the margin for about 2 CPM.

[0045] The CPM is not determined only by the registration roller. However, a condition is satisfied in another portion, but a decrease of 2 CPM results with respect to the registration roller, and an apparatus body property is not sufficiently fulfilled.

[0046] In consideration of the above, in the image forming apparatus according to the embodiment of the present invention, the relation between the number of copy sheets and the friction amount shown in **FIG. 5** is used beforehand, and a control is performed in such a manner that a copy speed is corrected for every number of copy sheets (50 K sheets).

[0047] When the copy speed is determined by the number of sheets, a ratio of the sheet size largely differs (the ratio differs double with A4/A3), and therefore accurate approximation becomes difficult.

[0048] Then, the copy speed is determined in accordance with a timing of registration including the high-speed apparatus.

[0049] When the speed of registration is slowed down, and a conveyance timing is considered with the slowed speed, the copy speed gradually decreases because of the influence of the friction of the roller. On the other hand, when a large margin is taken, the property of the apparatus body cannot sufficiently be fulfilled.

[0050] In this respect, the friction amount of each roller is taken into consideration for the life control of the speed, signals of PPS of a pulse motor are counted, and a result satisfactorily agrees with a running distance.

[0051] The speed can also be controlled in accordance with the number of sheets. However, when the speed is controlled by the counted signals of PPS of the pulse motor, the result corresponds to the running distance of the roller, and the friction amount of the roller can be estimated. In order to accurately correct the speed, there is provided a function for measuring the conveyance time of the roller and correcting a state (friction coefficient) of the roller or the diameter (friction amount) or an initial dimension (component dispersion) of the roller. The margin and roller state are thereby grasped, and correction control is performed.

[0052] Returning to **FIG. 1, 3**, a process of reverse conveyance will be described.

[0053] First, in the reverse conveyance, the sheet is passed through the fixer unit **7**, and passed through a fixing discharge roller **29**. In an apparatus type in which a sheet interval is small or the conveyance speed is low, the conveyance speed of 400 mm/sec is accelerated to 700 mm/sec. This minimizes an overlap amount of sheets. The sheet is passed through a reverse/double-surface gate **8** and reaches a reverse position. Thereafter, the sheet is again conveyed at a speed of 700 mm/sec. In this case, when the speed of a sheet discharge roller **25** is controlled to be the same speed, the revere conveyance is realized. The reversed sheet is conveyed by a reverse conveyance roller **27**. In this case, the speed is detected by a reverse sensor based on an on/off timing of a reverse switch **9**.

[0054] In double-surface conveyance, the sheet is passed through the fixer unit **7**, and passed through the fixing discharge roller **29**. Similarly as the reverse conveyance, in the apparatus type in which the sheet interval is small or the conveyance speed is low, the conveyance speed of 400 mm/sec is accelerated to 700 mm/sec at a timing similar to the aforementioned timing. Subsequently, after the sheet is conveyed along a guide **15** to an ADU reverse position at the speed, an ADU gate **12** is closed. Subsequently, the sheet is conveyed to an ADU/reverse roller **10** at the speed of 700 mm/sec.

[0055] Moreover, in the embodiment, the conveyance speed by the conveyance rollers **13, 16, 17** is determined in order to control the speed in accordance with the sheet size and double-surface/reverse speed. Additionally, reference numerals **14, 20** denote sensors for detecting the conveyance speed.

[0056] When a main body reverses, the ADU/reverse sensor **11** measures the conveyance speed of the ADU/reverse roller **10**. The conveyance speed of the ADU/reverse roller **10** is measured by the ADU/reverse sensor **11**. The diameter or the state of the ADU/reverse roller **10** is judged based on a measurement result, and the speed correction control is adequately performed.

[0057] Next, **FIG. 6** shows and depicts a relation between the conveyance speed and the friction amount of the ADU/reverse roller **10**. In comparison of a graph of **FIG. 6** with the graph of **FIG. 4** with the conveyance speed of 400 mm/sec, it is seen that a reduction ratio of the conveyance speed with an increase of the friction amount increases with an accelerated conveyance speed even with the same friction amount.

[0058] Moreover, when such reduction ratio increases more, a large speed difference among the respective ADU/reverse rollers **10** appears. This largely changes in accordance with a speed ratio of 700 mm/sec for 400 mm/sec.

[0059] When a speed difference between the sheet discharge roller **25** and the ADU/reverse roller **10** is large (if the ADU/reverse roller **10** is worn), pulling occurs between the sheet discharge roller **25** and ADU/reverse roller **10**. Therefore, it is possible to set and keep a relation between the reverse copy speed and the sheet discharge roller **25** to be constant.

[0060] For this, the sheet discharge roller **25** is similarly controlled, or the sheet discharge roller **25** is controlled to obtain the conveyance speed adapted for the ADU/reverse roller **10** so that the rollers are correlated with each other, then occurrence of the problem can be reduced.

[0061] With 2% correction of the speed of the reverse roller, 400 mm/sec turns to 392 mm/sec, and 700 mm/sec turns to the speed of conveyance of 686 mm/sec. The speed is controlled so that the ratio of correction with respect to each speed becomes the same, and this enables the control in the roller in which two speeds exist.

[0062] Moreover, during the control between two rollers, it is preferable to control both the rollers so that the difference is 1% or less. When the conveyance speed is accelerated, with the 2% deviation, the difference is 4 mm with an A4 size, and becomes double, that is, 8 mm with the A3 size. In order to minimize an influence onto the pulse motor even when a loosening position of the sheet is necessary or the pulling occurs, the speed is preferably detected by the sheet size.

[0063] Next, **FIG. 7** shows and depicts a statistical result of a component dispersion.

[0064] Assuming that a dispersion is ±0.03 on the drawing with respect to a design value of ϕ20 mm, defective products of the order of 1 to 3% are generated. When the speed control correction of the present invention is used even in the defective products, the dispersion can be changed to ±0.05 or ±0.1, and a yield can largely be improved. For setting, in order to appropriately set the speed, only one sheet with a large size such as **A3** is used, and the speed of the roller is measured by each sensor, and corrected.

[0065] Thereafter, when the corrected speed is used, any sheet can be conveyed without any problem.

[0066] Here, **FIG. 8** shows and depicts a constitution of a control system of the image forming apparatus according to the embodiment. In **FIG. 8, a** controller **50** is constituted of a CPU for controlling an operation, a ROM in which software of the operation of the image forming apparatus is stored, and a RAM in which image data or another operational data is temporarily stored.

[0067] An image processor **53** processes an original image read by a scanner **52**, processes image data from a page memory **55**, and the like, and outputs the processed image data to the page memory **55**, a printer **54**, and an HDD **56**. The image data from the image processor **53** is registered in the page memory **55**.

[0068] The HDD **56** is an external storage device represented by a hard disk in which various data is stored. For example, when a plurality of sheets are copied, a compressed image is registered, and the compressed image is read and printed during printing.

[0069] The conveyance roller correction control by the image forming apparatus according to the embodiment will be described hereinafter in detail with reference to a flowchart of **FIG. 9**.

[0070] When the conveyance roller correction control is started, a print key of an operation panel **51** is depressed, and the sheet size is determined (step **S1**). Subsequently, each driving motor is turned ON by the controller **50** at each timing, and driving is started (step **S2**).

[0071] Subsequently, the sheet is conveyed by a method and timing determined with respect to each sensor, and the conveyance of the sheet is measured by a sensor for detecting the sheet based on a conveyance time from when the sensor turns ON until the sensor turns OFF (steps **S3** to **S5**).

[0072] Moreover, the controller **50** detects the timing at which the sensor turns OFF, calculates a time actually required for the sheet conveyance, and distinguishes an error from the existing setting (step **S6**).

[0073] Here, when a measured time T is not within 1%, each pulse motor speed control is performed (step **S7**), and it is judged whether or not to perform continuous sheet passing (step **S8**).

[0074] Here, when the continuous sheet passing is performed, the flow returns to the step **S3**. When the continuous sheet passing is not performed and when the measured time T is within 1% in the step **S6**, each pulse motor is turned off, and the operation is ended (step **S9**).

[0075] The measured time is preferably judged every time. However, the measured time does not largely change. Therefore, a control for changing the speed of the motor is carried out when a measurement error exceeds 1%.

[0076] Another conveyance roller correction control by the image forming apparatus according to the embodiment will next be described hereinafter in detail with reference to a flowchart of **FIG. 10**.

[0077] When the conveyance roller correction control is started, the print key of the operation panel **51** is depressed, and the sheet size is determined (step **S10**). Subsequently, each driving motor is turned ON by the controller **50** at each timing, and driving is started (step **S11**).

[0078] Subsequently, the sheet is conveyed by the method and timing determined with respect to each sensor, and the conveyance of the sheet is measured by the sensor for detecting the sheet based on the conveyance time from when the sensor turns ON until the sensor turns OFF (steps **S12** to **S14**).

[0079] Moreover, the controller detects the timing at which the sensor turns OFF, calculates the time actually required for the sheet conveyance, and distinguishes the error from the existing setting (step **S15**).

[0080] Here, with the measured time T not within 0.5%, it is further judged whether or not the measured time T is within 1% (step **S16**). When the time is within 1%, a counter N is incremented (step **S17**). It is judged whether or not the counter N indicates a counted value of 100 or more (step **S18**).

[0081] Here, when the counter indicates **100** or more, each pulse motor speed control is performed (step **S19**), and it is judged whether or not to perform the continuous sheet passing (step **S20**).

[0082] When the continuous sheet passing is performed, the flow returns to the step **S12**. When the continuous sheet passing is not performed, when the measured time T is within 0.5% in the step **S15**, and when the counter does not indicate 100 or more in the step **S18**, each pulse motor is turned off, and the operation is ended (step **S21**).

[0083] In this example, even when the deviation amount does not exceed a given value, the same result is continuously generated. There is provided a counter for checking the number of times. When the counter reaches the given value, the correction is permitted, the speed is corrected, and further stable conveyance is realized.

[0084] In the present invention, the current control state of the roller is recorded as information to the control panel or a serviceman, the state of the roller can therefore be judged, it can be judged whether or not a change is necessary, and for this purpose, a display function is provided.

[0085] Furthermore, when a correction reference value is changed in accordance with the sheet size (e.g., about 0.5% for **A3**, about 1% for **A4**, and the like), the conveyance time of the sheet can accurately be measured.

[0086] Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be

made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

What is claimed is:

1. An image forming apparatus comprising:

a roller which conveys a sheet;

a sensor which detects a time for conveying the sheet by said roller; and

a controller which compares the conveyance time of the sheet by said roller actually measured by the sensor with an average conveyance time of the sheet corresponding to a sheet size, and correcting a conveyance speed of the sheet by said roller so as to set the conveyance speed of the roller to be constant based on a comparison result.

2. The image forming apparatus according to claim 1, wherein said controller compares the conveyance time of a first sheet detected by the sensor with the conveyance time of the sheet after a predetermined number of sheets, and performs the correction control so as to set the conveyance speed of the sheet by said roller to be constant, when a difference of the time is large.

3. The image forming apparatus according to claim 1, wherein said controller performs the correction control so as to set the conveyance speed of the sheet by the roller to be constant based on an output of said sensor, when a jam occurs in a conveyance process of the sheet by said roller.

4. The image forming apparatus according to claim 1, wherein said controller performs the correction control so as to change the conveyance speed of the sheet by said roller in a range in which a change is prevented from being generated in a speed of image formation.

5. The image forming apparatus according to claim 1, further comprising a display section for performing a predetermined warning display,

wherein the predetermined warning display is performed in said display section, when said correction controller judges a state of the roller to be outside a range capable of being handled by the correction control.

6. The image forming apparatus according to claim 1, wherein said controller performs the correction control of the conveyance speed of the sheet by said roller also based on the size of the sheet conveyed by said roller.

7. The image forming apparatus according to claim 1, wherein said controller performs the correction control of the conveyance speed of the sheet by said roller for every number of copy sheets based on a relation between the number of copy sheets and a friction amount of the roller.

8. The image forming apparatus according to claim 1, further comprising a pulse motor for driving said roller, p1 wherein said controller counts a pulse signal of the pulse motor, estimates a friction amount of the roller, and performs the correction control.

9. A method for controlling an image forming apparatus, comprising:

a first step of conveying a sheet by a roller;

a second step of detecting a time for conveying the sheet by said roller by a sensor; and

a third step of comparing the conveyance time of the sheet by said roller actually measured by the sensor with an average conveyance time of the sheet corresponding to a sheet size, and correcting a conveyance speed of the sheet by said roller so as to set the conveyance speed of the roller to be constant based on a comparison result by a controller.

10. The method for controlling the image forming apparatus according to claim 9, wherein said third step by the controller comprises steps of: comparing the conveyance time of a first sheet detected by the sensor with the conveyance time of the sheet after a predetermined number of sheets; and performing a correction control so as to set the conveyance speed of the sheet by said roller to be constant, when a difference of the time is large.

11. The method for controlling the image forming apparatus according to claim 9, wherein said third step by the controller comprises a step of performing the correction control so as to set the conveyance speed of the sheet by the roller to be constant based on an output of said sensor, when a jam occurs in a conveyance process of the sheet by said roller.

12. The method for controlling the image forming apparatus according to claim 9, wherein said third step by the controller comprises a step of performing the correction control so as to change the conveyance speed of the sheet by said roller in a range in which a change is prevented from being generated in a speed of image formation.

13. The method for controlling the image forming apparatus according to claim 9, further comprising: a fourth step of performing a predetermined warning display by a display section,

wherein said fourth step comprises a step of performing the predetermined warning display in the display section, when said controller judges a state of the roller to be outside a range capable of being handled by the correction control in said third step.

14. The method for controlling the image forming apparatus according to claim 9, wherein said third step by the controller comprises a step of performing the correction control of the conveyance speed of the sheet by said roller also based on the size of the sheet conveyed by said roller.

15. The method for controlling the image forming apparatus according to claim 9, wherein said third step by the controller comprises a step of performing the correction control of the conveyance speed of the sheet by said roller for every number of copy sheets based on a relation between the number of copy sheets and a friction amount of the roller.

16. The method for controlling the image forming apparatus according to claim 9, wherein said third step by the controller comprises steps of: counting a pulse signal of a pulse motor and estimating a friction amount of the roller; and performing the correction control.

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