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Belt conveying device and image forming apparatus

Abstract

A belt conveying device includes a correction mechanism, a belt cleaning unit, a roller retaining member, a cleaning support member, and a posture maintaining unit. When a belt is meandering, the correction mechanism allows one end side of a meandering correction roller in an axial direction to move in the direction perpendicular to the axial direction, so as to correct meandering of the belt. The posture maintaining unit connects the roller retaining member and the cleaning support member, so as to maintain posture of the belt cleaning unit with respect to the meandering correction roller.

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Background/Summary

INCORPORATION BY REFERENCE

(1) This application is based upon and claims the benefit of priority from the corresponding Japanese Patent Application No. 2023-040502 filed Mar. 15, 2023, the entire contents of which are hereby incorporated by reference.

BACKGROUND

(2) The present disclosure relates to a belt conveying device and an image forming apparatus.

(3) As a component of an image forming apparatus such as a copier or a printer, there is known a belt conveying device including an endless belt, such as an intermediate transfer belt on which a plurality of toner images having different colors formed by photosensitive drums are sequentially overlaid as primary transfer, and from which the toner images are secondarily transferred onto a paper sheet, or a conveyor belt that absorbs and conveys the paper sheet. The belt conveying device has a problem that the belt may be shifted in an axial direction of a roller around which the belt is wrapped in a rotatable manner, and hence the belt may be meandering.

(4) To solve this problem, a technique to stop the meandering of the belt by adjusting alignment of the roller is proposed. However, when the alignment of the roller is adjusted, a contact angle between the belt and a cleaning blade for cleaning an outer circumferential surface of the belt is changed, and cleaning performance of the belt becomes unstable.

SUMMARY

(5) A belt conveying device according to one aspect of the present disclosure includes an endless

belt, a plurality of rollers, a correction mechanism, and a belt cleaning unit. The belt is wrapped around the plurality of rollers in a rotatable manner. The correction mechanism corrects meandering of the belt with respect to the roller. The belt cleaning unit removes attached matter on an outer circumferential surface of the belt. The correction mechanism is provided to a meandering correction roller that is one of the plurality of rollers, and includes a moving mechanism that allows one end side of the meandering correction roller in an axial direction to move in a direction perpendicular to the axial direction when the belt is meandering. Further, the belt conveying device includes a roller retaining member, a cleaning support member, and a posture maintaining unit. The roller retaining member retains a shaft of the meandering correction roller. The cleaning support member is attached to the shaft of the meandering correction roller so as to support the belt cleaning unit. The posture maintaining unit connects the roller retaining member and the cleaning support member, so as to maintain a posture of the belt cleaning unit with respect to the meandering correction roller.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a schematic cross-sectional front view of an image forming apparatus of one embodiment of the present disclosure.

(2) FIG. **2** is a schematic partial cross-sectional view of a belt conveying device of the image forming apparatus illustrated in FIG. **1**.

(3) FIG. **3** is a partial side view of a tension roller and its vicinity of the belt conveying device illustrated in FIG. **2**.

(4) FIG. **4** is a partial side view of the tension roller and its vicinity of FIG. **3**, indicating a state where an intermediate transfer belt is meandering.

(5) FIG. **5** is a perspective view of the belt conveying device illustrated in FIG. **2**.

(6) FIG. **6** is an enlarged partial perspective view of the belt conveying device illustrated in FIG. **5**.

(7) FIG. **7** is a perspective view of the belt conveying device illustrated in FIG. **2**, in the state where the intermediate transfer belt and the belt cleaning unit are removed.

(8) FIG. **8** is an enlarged partial perspective view of the belt conveying device illustrated in FIG. **7**.

DETAILED DESCRIPTION

(9) Hereinafter, an embodiment of the present disclosure is described with reference to the drawings. Note that the present disclosure is not limited to the following description.

(10) FIG. **1** is a schematic cross-sectional front view of an image forming apparatus **1** of the embodiment. FIG. **2** is a schematic partial cross-sectional view of a belt conveying device of the image forming apparatus **1** illustrated in FIG. **1**. An example of the image forming apparatus **1** of this embodiment is a tandem type color printer, which uses an intermediate transfer belt **41** to transfer a toner image onto a paper sheet S. The image forming apparatus **1** may be a so-called multifunction peripheral, which has functions such as printing, scanning (image reading), and facsimile transmission.

(11) As illustrated in FIGS. **1** and **2**, the image forming apparatus **1** includes a sheet feed unit **3**, a sheet conveying unit **4**, an exposing unit **5**, an image forming unit **20**, a transfer unit **30**, a the fixing unit **6**, a sheet discharge part **7**, and a control unit **8**, which are disposed in a main body **2** of the image forming apparatus **1**.

(12) The sheet feed unit **3** is disposed in a bottom part of the main body **2**. The sheet feed unit **3** stores a plurality of paper sheets S before printing, and separates and feeds the paper sheets S one by one when printing is performed. The sheet conveying unit **4** extends in an up and down direction along a side wall of the main body **2**. The sheet conveying unit **4** conveys the paper sheet S fed from the sheet feed unit **3** to a secondary transfer part **33** and fixing unit **6**, and further discharges

the paper sheet S after fixing onto the sheet discharge part **7** through a sheet discharge outlet **4***a*. The exposing unit **5** is disposed above the sheet feed unit **3**. The exposing unit **5** emits a laser beam to the image forming unit **20**, the laser beam being controlled based on image data.

(13) The image forming unit **20** is disposed above the exposing unit **5** and below the intermediate transfer belt **41**. The image forming unit **20** includes a yellow image forming unit **20**Y, a cyan image forming unit **20**C, a magenta image forming unit **20**M, and a black image forming unit **20**B. These four image forming units **20** have the same basic structure. Therefore, in the following description, the suffix "Y", "C", "M", or "B" indicating the color may be omitted unless it is necessary to specify.

(14) The image forming unit **20** includes a photosensitive drum **21**, which is supported in a rotatable manner in a predetermined direction (in a clockwise direction in FIGS. **1** and **2**). The image forming unit **20** further includes a charging unit **22**, a developing unit **23**, and a drum cleaning unit **24**, which are disposed around the photosensitive drum **21** along the rotation direction thereof. Note that a primary transfer part **32** is disposed between the developing unit **23** and the drum cleaning unit **24**.

(15) The photosensitive drum **21** has a photosensitive layer on its outer circumferential surface. The charging unit **22** charges the outer circumferential surface of the photosensitive drum **21** at a predetermined potential. The exposing unit **5** exposes the outer circumferential surface of the photosensitive drum **21** charged by the charging unit **22**, so as to form an electrostatic latent image of an original image on the outer circumferential surface of the photosensitive drum **21**. The developing unit **23** supplies toner to the electrostatic latent image for development, so as to form a toner image. The four image forming units **20** form the toner images of different colors, respectively. The drum cleaning unit **24** removes and cleans attached matter such as the toner remaining on the outer circumferential surface of the photosensitive drum **21**, after the toner image is primarily transferred onto an outer circumferential surface of the intermediate transfer belt **41**. In this way, the image forming unit **20** forms the image (toner image), which is transferred onto the paper sheet S later.

(16) The transfer unit **30** includes a belt conveying device **40**, primary transfer parts **32**Y, **32**C, **32**M, and **32**B, the secondary transfer part **33**, and a belt cleaning unit **60**. The belt conveying device **40** is disposed above the four image forming units **20**. The belt conveying device **40** includes the intermediate transfer belt **41**, which is supported in a rotatable manner in a predetermined direction (in a counterclockwise direction in FIGS. **1** and **2**). The intermediate transfer belt **41** is an endless intermediate transfer body to which the toner images are primarily transferred, which have been formed on the outer circumferential surfaces of the photosensitive drums **21** of the four image forming units **20**, respectively. The four image forming units **20** are disposed in a line from an upstream side to a downstream side in the rotation direction of the intermediate transfer belt **41**, i.e., in a so-called tandem manner.

(17) The primary transfer parts **32**Y, **32**C, **32**M, and **32**B are disposed above the image forming units **20**Y, **20**C, **20**M, and **20**B of individual colors, respectively, via the intermediate transfer belt **41**. The secondary transfer part **33** is disposed on the upstream side of the fixing unit **6** in the paper sheet conveying direction of the sheet conveying unit **4**, and on the downstream side of the four image forming units **20**Y, **20**C, **20**M, and **20**B in the rotation direction of the intermediate transfer belt **41**. The belt cleaning unit **60** is disposed on the upstream side of the four image forming units **20**Y, **20**C, **20**M, and **20**B in the rotation direction of the intermediate transfer belt **41**.

(18) The primary transfer part **32** transfers the toner image formed on the outer circumferential surface of the photosensitive drum **21** to the intermediate transfer belt **41**. In other words, the toner images are primarily transferred to the outer circumferential surface of the intermediate transfer belt **41** at the primary transfer parts **32**Y, **32**C, **32**M, and **32**B of individual colors. Further, along with the rotation of the intermediate transfer belt **41**, the toner images of the four image forming units **20** are sequentially overlaid and transferred to the intermediate transfer belt **41** at

predetermined timings. Thus, a color toner image is formed on the outer circumferential surface of the intermediate transfer belt **41**, the color toner image including the overlaid toner images of yellow, cyan, magenta, and black colors.

(19) The color toner image on the outer circumferential surface of the intermediate transfer belt **41** is transferred to the paper sheet S, which is conveyed by the sheet conveying unit **4** in a synchronous manner, at a secondary transfer nip formed at the secondary transfer part **33**. The belt cleaning unit **60** removes and cleans attached matter such as the toner remaining on the outer circumferential surface of the intermediate transfer belt **41** after the secondary transfer. In this way, the transfer unit **30** transfers (records) the toner image formed on the outer circumferential surface of the photosensitive drum **21** to the paper sheet S.

(20) The fixing unit **6** is disposed above the secondary transfer part **33**. The fixing unit **6** heats and presses the paper sheet S with the transferred toner image so as to fix the toner image to the paper sheet S.

(21) The sheet discharge part **7** is disposed above the transfer unit **30**. The paper sheet S after the toner image is fixed and the printing is completed is conveyed to the sheet discharge part **7**. The paper sheet after printing (printed matter) is taken out from the top of the sheet discharge part **7**.

(22) The control unit **8** includes a CPU, an image processing unit, a storage unit, and other electronic circuits and components (which are not shown). On the basis of control programs and data stored in the storage unit, the CPU controls operations of individual structural elements disposed in the image forming apparatus **1**, so as to perform processes of functions of the image forming apparatus **1**. The sheet feed unit **3**, the sheet conveying unit **4**, the exposing unit **5**, the image forming unit **20**, the transfer unit **30**, and the fixing unit **6** individually receive commands from the control unit **8**, so as to cooperate for printing on the paper sheet S. For instance, the storage unit is constituted of a combination of a nonvolatile storage device such as a program read only memory (ROM) or data ROM, and a volatile storage device such as a random access memory (RAM).

(23) Next, a structure of the belt conveying device **40** and its vicinity is described with reference to FIG. **2**.

(24) As illustrated in FIG. **2**, the belt conveying device **40** is disposed above the four image forming units **20**Y, **20**C, **20**M, and **20**B, and is disposed along them. The belt conveying device **40** includes the intermediate transfer belt **41**, a drive roller **42**, a tension roller **43**, a pair of tension springs **44**, and a pair of roller retaining members **45**, which are provided to a in conveyor main body **40**A of the belt conveying device **40**.

(25) The intermediate transfer belt **41** is an endless belt wrapped around a plurality of rollers in a rotatable manner. The plurality of rollers includes the drive roller **42** and the tension roller **43** in this embodiment. A primary transfer roller **32***r* is disposed above each of the four image forming units **20**Y, **20**C, **20**M, and **20**B via the intermediate transfer belt **41**. Each of the four primary transfer rollers **32***r* is disposed at a position facing the photosensitive drum **21** via the intermediate transfer belt **41**, so as to contact with an inner circumferential surface of the intermediate transfer belt **41**.

(26) The drive roller **42** is disposed on the downstream side of the four image forming units **20**Y, **20**C, **20**M, and **20**B in the rotation direction of the intermediate transfer belt **41**. The drive roller **42** receives a drive force from a drive motor (not shown) so as to rotate the intermediate transfer belt **41** in the counterclockwise direction in FIG. **2**.

(27) The drive roller **42** is disposed adjacent to the secondary transfer part **33**. A secondary transfer roller **33***r* is disposed at the secondary transfer part **33**. The secondary transfer roller **33***r* is disposed at a position facing the drive roller **42** via the intermediate transfer belt **41**, so as to contact with the outer circumferential surface of the intermediate transfer belt **41**.

(28) The tension roller **43** is disposed on the upstream side of the four image forming units **20**Y, **20**C, **20**M, and **20**B in the rotation direction of the intermediate transfer belt **41**. The tension roller

43 rotates in the counterclockwise direction in FIG. **2** along with the rotation of the intermediate transfer belt **41**. The tension roller **43** is biased by the pair of tension springs **44** in the direction separating from the drive roller **42**. In this way, a predetermined tension is applied to the intermediate transfer belt **41**.

(29) The pair of tension springs **44** are retained in the pair of roller retaining members **45**, respectively. The pair of tension springs **44** are each constituted of a helical compression spring, for example, and are disposed between a shaft **431** of the tension roller **43** and the pair of roller retaining members **45**, respectively. The pair of tension springs **44** biases the tension roller **43** in the direction separating from the drive roller **42**.

(30) The pair of roller retaining members **45** are respectively disposed on both ends of the tension roller **43** in the axial direction (the direction perpendicular to the paper of FIG. **2**). Each of the pair of roller retaining members **45** has a shaft **451**, which is disposed closer to the drive roller **42** than the tension roller **43**, so as to extend in parallel to the axial direction of the tension roller **43**. Each of the pair of roller retaining members **45** is supported by the conveyor main body **40**A in a rotatable manner about the axis of the shaft **451**.

(31) The pair of roller retaining members **45** are each made of sheet metal, for example, and each extend in the direction perpendicular to the up and down direction (the up and down direction in FIG. **2**) and to the axial direction of the tension roller **43** (i.e., extend in the left and right direction in FIG. **2**). The pair of roller retaining members **45** each retain the shaft **431** of the tension roller **43** movably in the direction approaching or separating from the drive roller **42**. The pair of roller retaining members **45** are respectively biased by a pair of biasing members **54** described later, which are disposed above the pair of roller retaining members **45**, in the direction rotating clockwise in FIG. **2** about the axis of the shaft **451**, i.e., in the direction that the tension roller **43** side moves upward.

(32) Next, a structure of the tension roller **43** and its vicinity of the belt conveying device **40** is described with reference to FIGS. **3** and **4**. FIG. **3** is a partial cross-sectional view of the tension roller **43** and its vicinity of the belt conveying device **40** illustrated in FIG. **2**. FIG. **4** is a partial cross-sectional view of the tension roller **43** and its vicinity illustrated in FIG. **3**, indicating a state where the intermediate transfer belt **41** is meandering.

(33) Note that FIGS. **3** and **4** are diagrams of one end and its vicinity of the tension roller **43** in the axial direction Dx, viewed from the direction perpendicular to the axial direction Dx of the tension roller **43**. In FIGS. **3** and **4**, the left side is the inner side of the tension roller **43** in the axial direction Dx, and the right side is the outer side of the tension roller **43** in the axial direction Dx.

(34) The belt conveying device **40** further includes a correction mechanism **50** illustrated in FIGS. **3** and **4**. The correction mechanism **50** is disposed on the shaft **431** of the tension roller **43**, and on each side of the tension roller **43** in the axial direction Dx. In other words, in this embodiment, the tension roller **43** is the meandering correction roller, and the correction mechanism **50** is provided to the tension roller **43**. The correction mechanism **50** corrects meandering of the intermediate transfer belt **41** with respect to the tension roller **43**.

(35) The correction mechanism **50** includes a pair of belt guides **51**, a moving mechanism **50**A, and the pair of biasing members **54** (see FIGS. **2**, **6**, and **8**). The moving mechanism **50**A includes a pair of tilt bearings **52**, and a pair of main body guides **53**.

(36) The pair of belt guides **51** are respectively disposed at both ends of the tension roller **43** in the axial direction Dx. The pair of belt guides **51** are respectively disposed inside the pair of tilt bearings **52** and outside the intermediate transfer belt **41** in the axial direction Dx of the tension roller **43**. The pair of belt guides **51** are each a circular ring member extending radially from the center that is the axis of the tension roller **43**. The shaft **431** of the tension roller **43** penetrates the radial centers of the pair of belt guides **51** in the axial direction Dx. The pair of belt guides **51** can move in the axial direction Dx of the tension roller **43**. The pair of belt guides **51** have a pair of guide walls **511**, respectively.

(37) The pair of guide walls **511** are disposed at radial outer edges of the pair of belt guides **51**, respectively, so as to protrude outward in the radial direction and to extend annularly in the circumferential direction. The pair of guide walls **511** are disposed at positions facing each other so as to sandwich the intermediate transfer belt **41** in the axial direction Dx of the tension roller **43**. The pair of guide walls **511** respectively face and contact with side end edges **41***e* of the intermediate transfer belt **41** in the axial direction Dx of the tension roller **43**.
(38) The pair of tilt bearings **52** are respectively disposed outside of the pair of belt guides **51** in the axial direction Dx of the tension roller **43**. The pair of tilt bearings **52** support the shaft **431** of the tension roller **43** in a rotatable manner about the axis thereof. The pair of tilt bearings **52** can move in the axial direction Dx of the tension roller **43**.
(39) The pair of tilt bearings **52** respectively have a pair of tilted parts **521** and a pair of parallel parts **522**. In other words, each of the pair of tilt bearings **52** has the tilted part **521** and the parallel part **522**.
(40) The pair of tilted parts **521** are respectively formed continuously to the pair of parallel parts **522**, at insides of the pair of parallel parts **522** in the axial direction Dx of the tension roller **43**. The pair of tilted parts **521** are positioned on the upper side of the shaft **431** of the tension roller **43**, and respectively face the pair of main body guides **53** in the up and down direction.
(41) The outer surfaces of the pair of tilted parts **521** are tilted from the axial direction Dx of the tension roller **43**. In detail, the tilted part **521** is tilted outward from the radial center of the tension roller **43** (upward in FIGS. **3** and **4**), from outside to inside in the axial direction Dx of the tension roller **43** (from right side to left side in FIGS. **3** and **4**). The pair of tilted parts **521** are tilted symmetrically with respect to the center in the axial direction Dx of the tension roller **43**.
(42) The pair of parallel parts **522** are respectively formed continuously to the pair of tilted parts **521**, at outsides of the pair of tilted parts **521** in the axial direction Dx of the tension roller **43**. The outer surfaces of the pair of parallel parts **522** extends in parallel to the axial direction Dx of the tension roller **43**.
(43) The pair of main body guides **53** are disposed at positions facing the pair of tilted parts **521**, respectively, and are fixed to the main body **2**. The pair of main body guides **53** are constituted of a pair of plate-like members, for example, and are disposed on the upper side of the tilt bearing **52**, so as to extend in the direction perpendicular to the up and down direction (the up and down direction in FIGS. **3** and **4**) and to the axial direction Dx of the tension roller **43** (i.e., extend in the direction perpendicular to the paper of FIGS. **3** and **4**). The pair of main body guides **53** respectively face and contact with the pair of tilt bearings **52** in the up and down direction and in the axial direction Dx.
(44) The pair of biasing members **54** (see FIGS. **2**, **6**, and **8**) are disposed above the pair of roller retaining members **45**, respectively. The biasing members **54** are each constituted of a helical extension spring, for example, and are disposed between the conveyor main body **40**A and the pair of roller retaining members **45**, respectively.
(45) The pair of biasing members **54** respectively bias the pair of roller retaining members **45** in the direction rotating about the axis of the shaft **451** in the clockwise direction in FIG. **2**. Thus, the pair of biasing members **54** bias the shaft **431** of the tension roller **43** upward via the pair of roller retaining members **45**, respectively. In other words, the pair of biasing members **54** bias the pair of tilt bearings **52** toward the pair of main body guides **53**, so that the pair of tilt bearings **52** maintain contacts with the pair of main body guides **53**, respectively.
(46) As illustrated in FIG. **3**, when the pair of biasing members **54** bias the shaft **431** of the tension roller **43** upward, the pair of tilt bearings **52** are pressed to the pair of main body guides **53**, respectively. The pair of main body guides **53** contact with the pair of parallel parts **522** of the pair of tilt bearings **52**, respectively. When the intermediate transfer belt **41** normally rotates without meandering, the shaft **431** of the tension roller **43** is substantially horizontal. During the normal rotation of the intermediate transfer belt **41**, the state illustrated in FIG. **3** is maintained.

(47) As illustrated in FIG. **4**, when the intermediate transfer belt **41** is meandering, the intermediate transfer belt **41** contacts with the guide wall **511** of one of the belt guides **51**, and push the belt guide **51** outward in the axial direction Dx (to the right side in FIG. **4**). The belt guide **51** moves outward in the axial direction Dx (to the right side in FIG. **4**). Then, the belt guide **51** pushes the tilt bearing **52**, which is disposed adjacent to face the belt guide **51** in the axial direction Dx, outward in the axial direction Dx (to the right side in FIG. **4**). The tilt bearing **52** moves outward in the axial direction Dx (to the right side in FIG. **4**).
(48) In this way, the main body guide **53** contacting with the parallel part **522** of the tilt bearing **52** slides on the outer surface of the parallel part **522**, and contacts the tilted part **521** of the tilt bearing **52**. In other words, when the intermediate transfer belt **41** is meandering, the main body guide **53** contacts the tilted part **521** of the tilt bearing **52** that moves in the axial direction Dx of the tension roller **43**.
(49) Furthermore, when the tilt bearing **52** moves outward in the axial direction Dx (to the right side in FIG. **4**), the main body guide **53** slides on the slope of the tilted part **521**, and one end side of the tension roller **43** in the axial direction Dx (the right side in FIG. **4**) moves downward. Thus, when the intermediate transfer belt **41** is meandering, the moving mechanism **50**A (the tilt bearing **52** and the main body guide **53**) allows the one end side of the tension roller **43** in the axial direction Dx to move in the direction perpendicular to the axial direction Dx. In other words, when the intermediate transfer belt **41** is meandering, the main body guide **53** moves the one end side of the tension roller **43** in the axial direction Dx, together with the tilt bearing **52** that moves in the axial direction Dx of the tension roller **43**, in the direction perpendicular to the axial direction Dx.
(50) Then, the entire tension roller **43** is inclined, and the meandering of the intermediate transfer belt **41** is stopped. In this way, the intermediate transfer belt **41** continues to rotate stably. Thus, the correction mechanism **50** corrects meandering of the intermediate transfer belt **41** with respect to the tension roller **43**.
(51) Next, a structure of the belt cleaning unit **60** and its vicinity is described with reference to FIGS. **2**, **5**, **6**, **7**, and **8**. FIGS. **5** and **6** are respectively a perspective view and an enlarged partial perspective view of the belt conveying device **40** illustrated in FIG. **2**. FIGS. **7** and **8** are respectively a perspective view and an enlarged partial perspective view, indicating the state where the intermediate transfer belt **41** and the belt cleaning unit **60** are removed in the belt conveying device **40** illustrated in FIG. **2**. Note that FIGS. **5**, **6**, **7**, and **8** are diagrams of the belt conveying device **40** viewed from the back side.
(52) The belt conveying device **40** further includes the belt cleaning unit **60**, a cleaning support member **46**, and a posture maintaining unit **47**, which are illustrated in FIGS. **2**, **5**, **6**, **7**, and **8**.
(53) The belt cleaning unit **60** is disposed at a position facing the tension roller **43** via the intermediate transfer belt **41**. As illustrated in FIG. **2**, the belt cleaning unit **60** includes a cleaning blade **61**, a collecting screw **62**, and a housing **63**.
(54) The cleaning blade **61** is disposed in an upper part of the housing **63**. The cleaning blade **61** is fixed to the housing **63** so that its tip contacts with the outer circumferential surface of the intermediate transfer belt **41**. The cleaning blade **61** extends in the axial direction Dx of the tension roller **43** (the direction perpendicular to the paper of FIG. **2**), and contacts with the intermediate transfer belt **41** over the entire range in the axial direction Dx. The cleaning blade **61** is disposed tilted at a predetermined angle with respect to the outer circumferential surface of the intermediate transfer belt **41**, and its tip is directed to the upstream side in the rotation direction of the intermediate transfer belt **41**.
(55) The cleaning blade **61** is made of polyurethane rubber, for example, and an intrusion of the cleaning blade **61** into the intermediate transfer belt **41** is set to a predetermined value. Note that material, hardness, size of the cleaning blade **61**, contact pressure thereof on the intermediate transfer belt **41**, and the like are preferably set to any values in accordance with specification of the intermediate transfer belt **41**. The cleaning blade **61** removes attached matter such as toner

remaining on the outer circumferential surface of the intermediate transfer belt **41**. The attached matter of the intermediate transfer belt **41** removed by the cleaning blade **61** is collected through an opening of the housing **63**, which is disposed on the upstream side of the cleaning blade **61** in the rotation direction of the intermediate transfer belt **41**, into the housing **63**.

(56) The collecting screw **62** is disposed in a lower part of the housing **63**. The collecting screw **62** has a structure including a shaft extending in the axial direction Dx of the tension roller **43**, and a helical conveying blade extending in the axial direction on the outer circumferential surface of the shaft. The collecting screw **62** is supported by the housing **63** in a rotatable manner about the axis of the collecting screw **62**. The collecting screw **62** is disposed partially inside the housing **63**. As illustrated in FIGS. **5** and **6**, an attached matter discharge unit **621** is disposed at one end of the collecting screw **62** in the axial direction and protrudes outside the housing **63**.

(57) The collecting screw **62** conveys the attached matter of the intermediate transfer belt **41**, which has been collected into the housing **63**, to the attached matter discharge unit **621** in the axial direction Dx of the tension roller **43**. The attached matter of the intermediate transfer belt **41** conveyed by the collecting screw **62** is discharged from the attached matter discharge unit **621** to the outside of the housing **63**, and is further conveyed to a recovery container (not shown) for storage, which is disposed outside the housing **63**.

(58) The housing **63** has a box shape extending in the axial direction Dx of the tension roller **43** over substantially the entire range of the intermediate transfer belt **41**. The housing **63** supports the cleaning blade **61** and the collecting screw **62**. The housing **63** stores the attached matter of the intermediate transfer belt **41** removed by the cleaning blade **61**.

(59) As illustrated in FIGS. **5** and **6**, the cleaning support member **46** is fixed to each end of the tension roller **43** in the axial direction Dx, outside the housing **63** of the belt cleaning unit **60**. The cleaning support member **46** is disposed adjacent to the roller retaining member **45** outside the roller retaining member **45** in the axial direction Dx.

(60) The cleaning support member **46** is made of sheet metal, for example, and extends in the direction perpendicular to the up and down direction and to the axial direction Dx of the tension roller **43**. The shaft **431** of the tension roller **43** penetrates the cleaning support member **46** at one end part. In other words, the cleaning support member **46** is attached to the shaft **431** of the tension roller **43**, so as to support the belt cleaning unit **60**.

(61) As illustrated in FIGS. **5**, **6**, **7**, and **8**, the posture maintaining unit **47** is provided to the roller retaining member **45** and the cleaning support member **46**. In detail, the posture maintaining unit **47** is disposed at the part where the roller retaining member **45** and the cleaning support member **46** overlap in the axial direction Dx of the tension roller **43**.

(62) The posture maintaining unit **47** is formed on each of the roller retaining member **45** and the cleaning support member **46**, as a mechanism connecting the roller retaining member **45** and the cleaning support member **46**. In this way, the cleaning support member **46** cannot rotate about the axis of the shaft **431** of the tension roller **43** with respect to the roller retaining member **45**. In other words, the posture maintaining unit **47** connects the roller retaining member **45** and the cleaning support member **46**, so as to maintain posture of the belt cleaning unit **60** with respect to the tension roller **43**.

(63) According to the structure described above, the posture maintaining unit **47** that maintains posture of the belt cleaning unit **60** is formed as a connecting section between the roller retaining member **45** and the cleaning support member **46**, and it is not disposed outside the intermediate transfer belt **41** in the radial direction. In other words, the posture maintaining unit **47** can be constituted without adding other members and without disposing it outside the intermediate transfer belt **41** in the radial direction or in the axial direction. Therefore, with a small sized structure in which an increase in the number of component members is suppressed, cleaning performance of the intermediate transfer belt **41** can be stabilized, and meandering of the intermediate transfer belt **41** can be stopped.

(64) In addition, the posture maintaining unit **47** includes a protrusion **471** and an aperture **472**.
(65) The protrusion **471** is provided to the roller retaining member **45**. The protrusion **471** protrudes outward in the axial direction Dx of the tension roller **43**. In other words, the protrusion **471** protrudes toward the cleaning support member **46** in the axial direction Dx.
(66) The aperture **472** is provided to the cleaning support member **46**. The aperture **472** penetrates the cleaning support member **46** in the axial direction Dx of the tension roller **43**. The protrusion **471** is inserted in the aperture **472**. In this way, the roller retaining member **45** and the cleaning support member **46** are connected to each other.
(67) According to the structure described above, the structure for connecting the roller retaining member **45** and the cleaning support member **46** can be easily formed. In other words, with the simple structure, the roller retaining member **45** and the cleaning support member **46** can be connected to each other, so that posture of the belt cleaning unit **60** can be maintained.
(68) Note that a protrusion may be provided to the cleaning support member **46** while an aperture may be provided to the roller retaining member **45**, so that the roller retaining member **45** and the cleaning support member **46** are connected to each other.
(69) In addition, the protrusion **471** is formed by bending a part of roller retaining member **45** that is a plate-like member. In detail, the protrusion **471** is formed by bending a part of the roller retaining member **45** protruding outward in the radial direction of the tension roller **43**, toward the cleaning support member **46**, i.e., outward in the axial direction Dx.
(70) According to the structure described above, the protrusion **471** can be formed easily only by bending a part of the roller retaining member **45**. In other words, the roller retaining member **45** and the cleaning support member **46** can be connected to each other with the simple structure, and posture of the belt cleaning unit **60** can be maintained.
(71) In addition, as described above, the moving mechanism **50**A includes the pair of tilt bearings **52** and the pair of main body guides **53**. The correction mechanism **50** further includes the pair of biasing members **54**. At the tension roller **43**, a tension is applied to the intermediate transfer belt **41**, and hence the intermediate transfer belt **41** tends to meander. Therefore, by providing the tension roller **43** with the correction mechanism **50** that is an alignment adjusting mechanism, performance of stopping meandering of the intermediate transfer belt **41** can be improved.
(72) In addition, as the structure described above, the image forming apparatus **1**, which has a small sized structure in which an increase in the number of component members is suppressed by providing the belt conveying device **40**, can stabilize cleaning performance of the intermediate transfer belt **41** and can stop meandering of the intermediate transfer belt **41**. In this way, the image forming apparatus **1** can continue to form high quality images.
(73) Although the embodiment of the present disclosure is described above, the scope of the present disclosure is not limited to the above description, but can be variously modified for implementation within the scope of the disclosure without deviating from the spirit thereof.
(74) For instance, in the embodiment described above, the belt conveying device **40** includes the intermediate transfer belt **41** on which toner images formed by the four image forming units **20** are sequentially overlaid and transferred, but the present disclosure is not limited to this structure. The present disclosure can also be applied to a belt conveying device including a conveyor belt that conveys a recording medium on which an image is recorded by an image forming unit, for example.
(75) In addition, in the embodiment described above, the image forming apparatus **1** is a so-called tandem type image forming apparatus for color printing, but it is not limited to this type. The image forming apparatus may be any type of image forming apparatus for color printing other than the tandem type, as long as it includes an intermediate transfer belt.

Claims

1. A belt conveying device comprising: an endless belt; a plurality of rollers around which the belt is wrapped in a rotatable manner; a correction mechanism including a pair of belt guides, a moving mechanism, and a pair of biasing members, the correction mechanism correcting meandering of the belt with respect to the roller; and a belt cleaning unit including a cleaning blade, a collecting screw, and a housing the belt cleaning unit removing attached matter on an outer circumferential surface of the belt, wherein the correction mechanism is provided to a meandering correction roller that is one of the plurality of rollers, and includes a moving mechanism including a pair of tilt bearings and a pair of main body guides, the moving mechanism allowing one end side of the meandering correction roller in an axial direction to move in a direction perpendicular to the axial direction when the belt is meandering, and wherein the belt conveying device further comprises a roller retaining member that extends in a direction perpendicular to an up and down direction and to the axial direction of the meandering correction roller and that retains a shaft of the meandering correction roller, a cleaning support member that extends in the direction perpendicular to the up and down direction and to the axial direction of the meandering correction roller and that is attached to the shaft of the meandering correction roller so as to support the belt cleaning unit, and a posture maintaining unit that connects the roller retaining member and the cleaning support member, so as to maintain a posture of the belt cleaning unit with respect to the meandering correction roller, and the posture maintaining unit includes a protrusion provided to one of the roller retaining member and the cleaning support member, and an aperture provided to the other so that the protrusion is inserted in the aperture.

2. The belt conveying device according to claim 1, wherein the protrusion is formed by bending a part of the roller retaining member or the cleaning support member, which is made of a plate-like member.

3. The belt conveying device according to claim 1, wherein the moving mechanism includes a pair of tilt bearings having a pair of tilted parts tilted symmetrically in the axial direction of the meandering correction roller, the tilt bearings supporting the shaft of the meandering correction roller in a rotatable manner, and being movable in the axial direction of the meandering correction roller, and a pair of main body guides, which contact with the pair of tilted parts, and allow one end side of the meandering correction roller in the axial direction to move in the direction perpendicular to the axial direction, together with the pair of tilt bearings that move in the axial direction of the meandering correction roller, when the belt is meandering, and the correction mechanism further includes a pair of biasing members that bias the pair of tilt bearings toward the pair of main body guides, respectively, so that the pair of tilt bearings maintain contacts with the pair of main body guides, respectively.

4. An image forming apparatus comprising: a plurality of image forming units; and the belt conveying device according to claim 1, which is disposed adjacent to the image forming units, wherein the belt is an intermediate transfer belt on which toner images formed by the image forming units are sequentially overlaid and transferred.