US 20220197212A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2022/0197212 A1**

IINO (43) **Pub. Date: Jun. 23, 2022**

(54) **IMAGE FORMING APPARATUS**

(71) Applicant: **BROTHER KOGYO KABUSHIKI KAISHA**, Nagoya (JP)

(72) Inventor: **Hikaru IINO**, Niwa (JP)

(73) Assignee: **BROTHER KOGYO KABUSHIKI KAISHA**, Nagoya (JP)

(21) Appl. No.: **17/541,740**

(22) Filed: **Dec. 3, 2021**

(30) **Foreign Application Priority Data**

Dec. 18, 2020 (JP) 2020-210569

Publication Classification

(51) **Int. Cl.**
G03G 21/18 (2006.01)
G03G 21/16 (2006.01)

(52) **U.S. Cl.**
CPC . ***G03G 21/1853*** (2013.01); *G03G 2221/1654* (2013.01); *G03G 2221/1869* (2013.01); ***G03G 21/1647*** (2013.01)

(57) **ABSTRACT**

A cartridge frame includes a protruding rib protruding toward a first frame, a first bearing supporting one end of a photosensitive drum in an axial direction, and a second bearing supporting an other end of the photosensitive drum in the axial direction. The first frame includes a first guide rail configured to, when a process cartridge is attached to an apparatus main body, guide the protruding rib to slide along the first guide rail. A second frame includes a second guide rail configured to, when the process cartridge is attached to the apparatus main body, guide the second bearing to slide along the second guide rail. A size of the first guide rail in a width direction perpendicular to both the axial direction and an attachment direction of the process cartridge is smaller than a size of the second guide rail in the width direction.

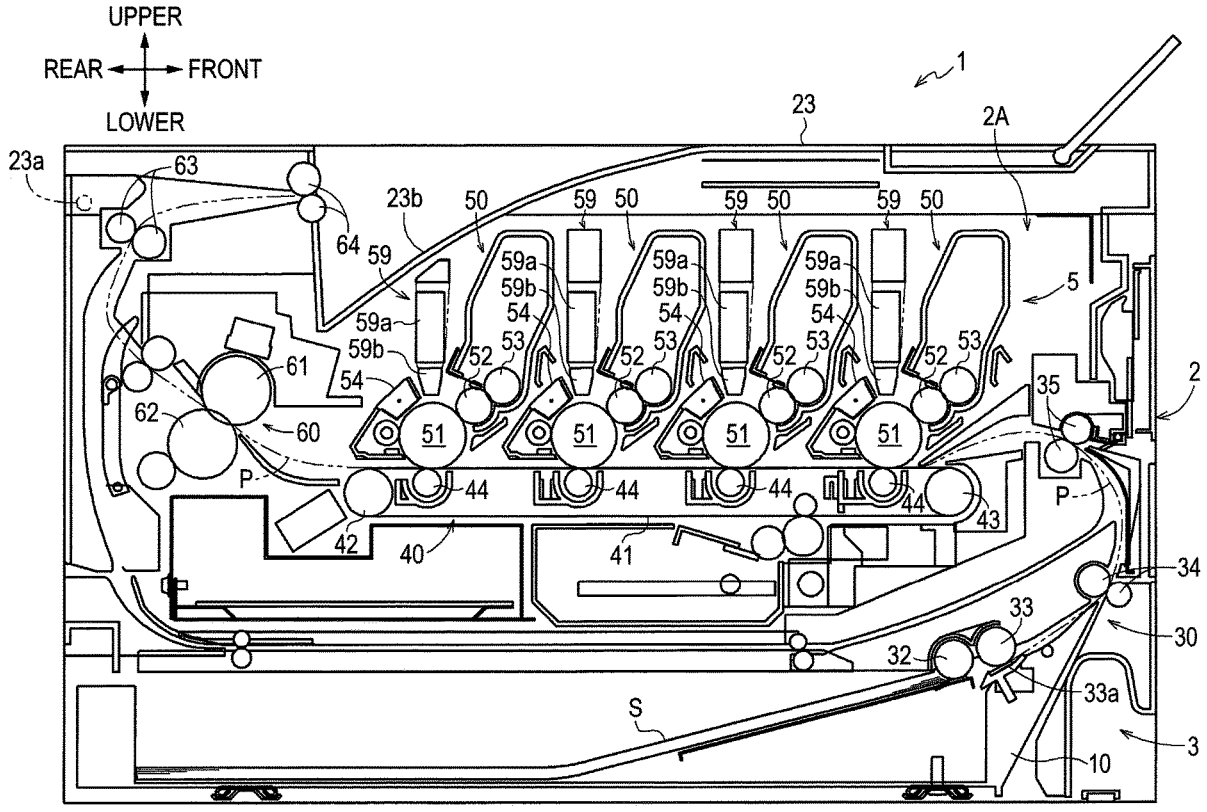

FIG. 1

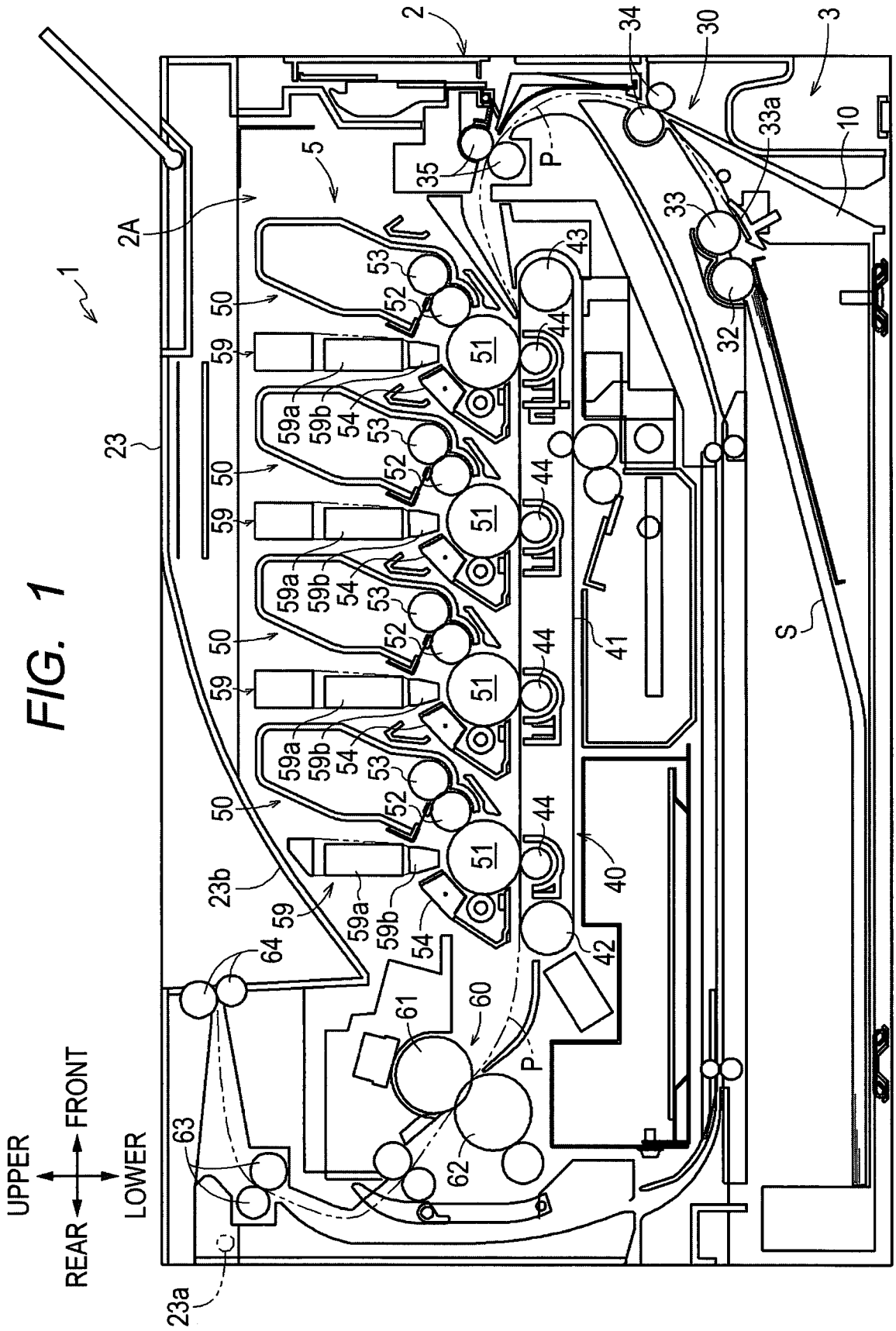
UPPER
FRONT
REAR
LOWER
1
2
2A
3
5
10
23
23a
23b
30
32
33
33a
34
35
40
41
42
43
44
50
51
52
53
54
59
59a
59b
60
61
62
63
64
P
S

FIG. 2

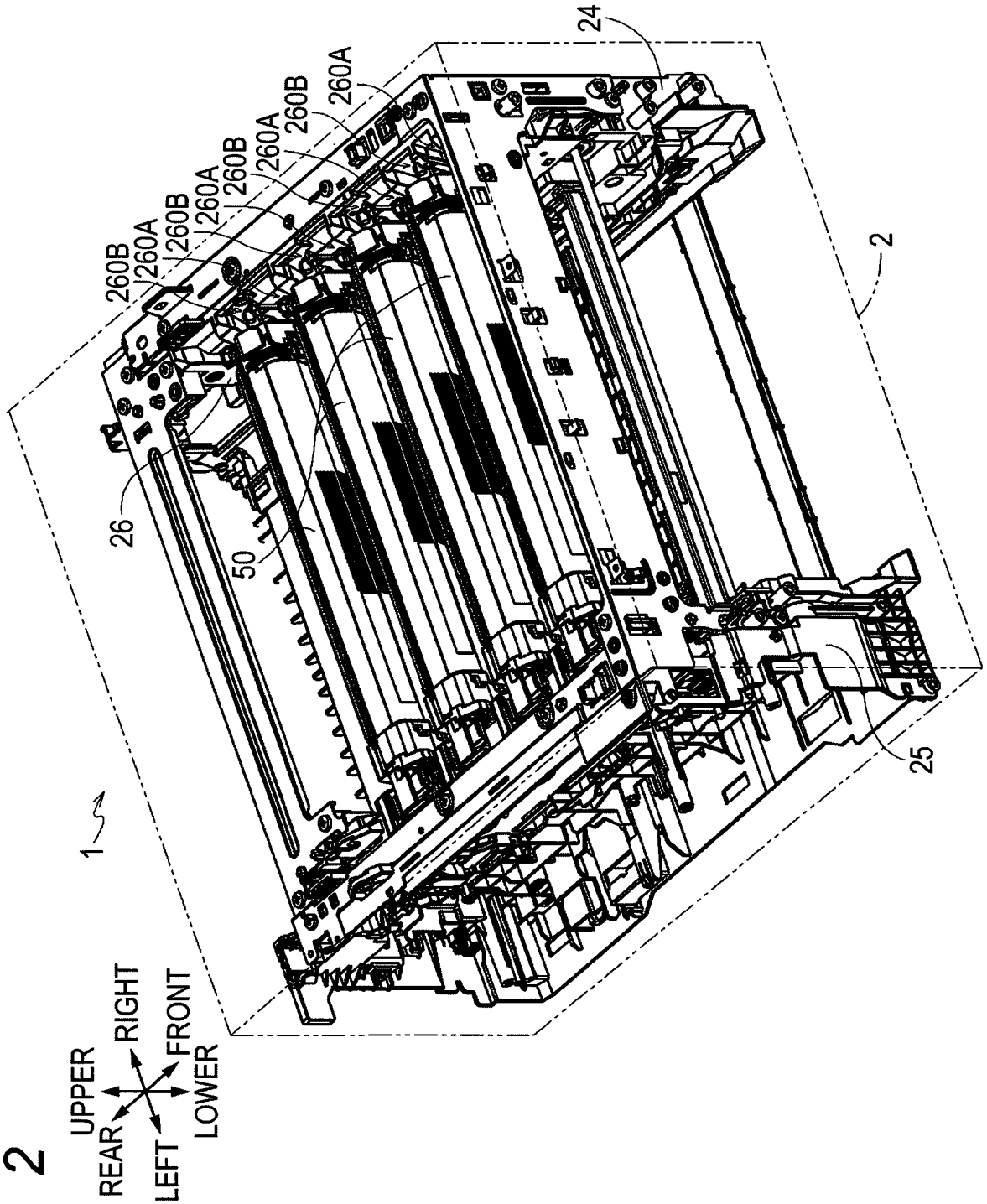

FIG. 3

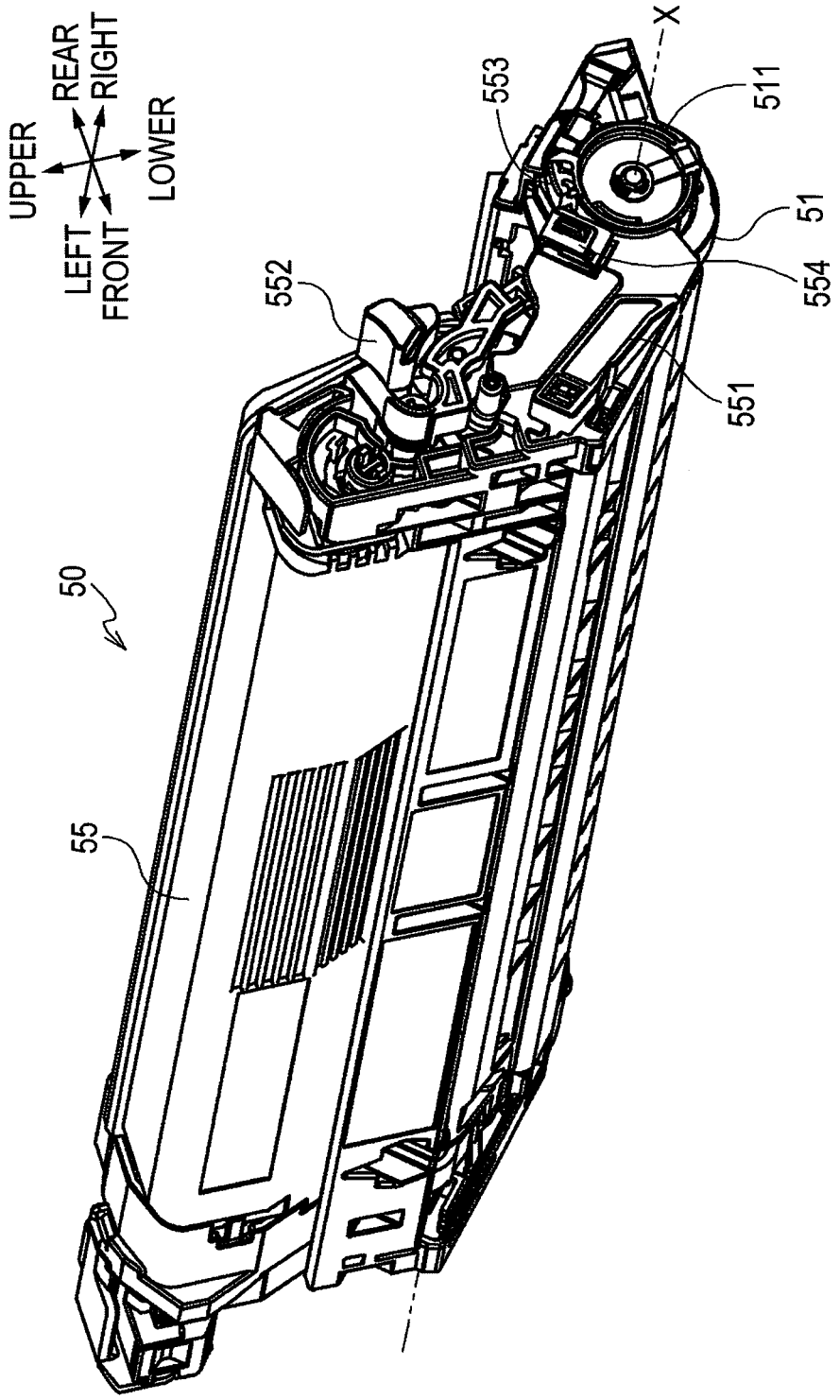
UPPER
REAR
RIGHT
LOWER
LEFT
FRONT
X
553
511
51
554
552
551
50
55

FIG. 4

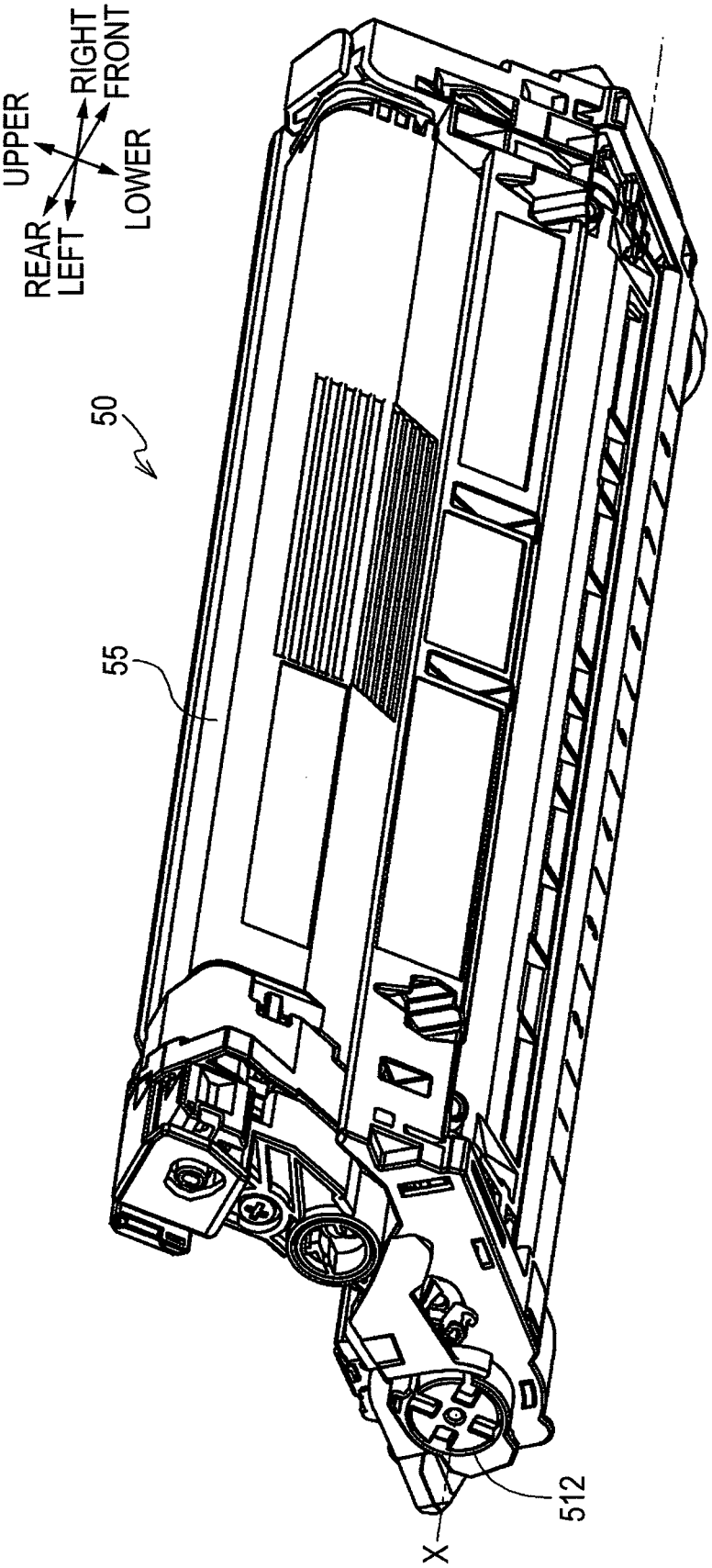

FIG. 5A

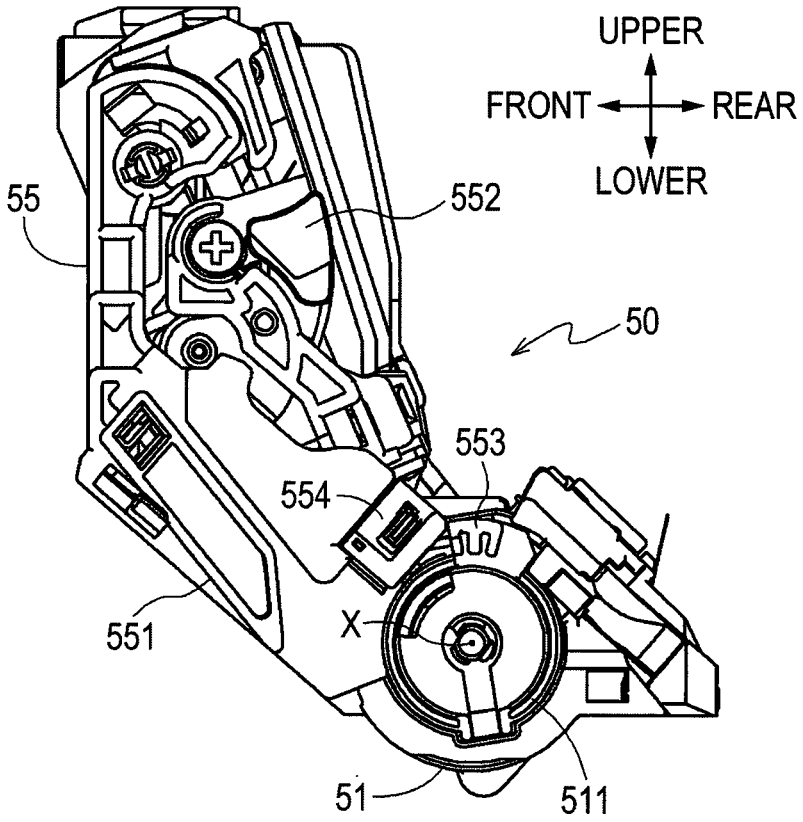
UPPER
FRONT
REAR
LOWER
55
552
50
553
554
551
X
51
511

FIG. 5B

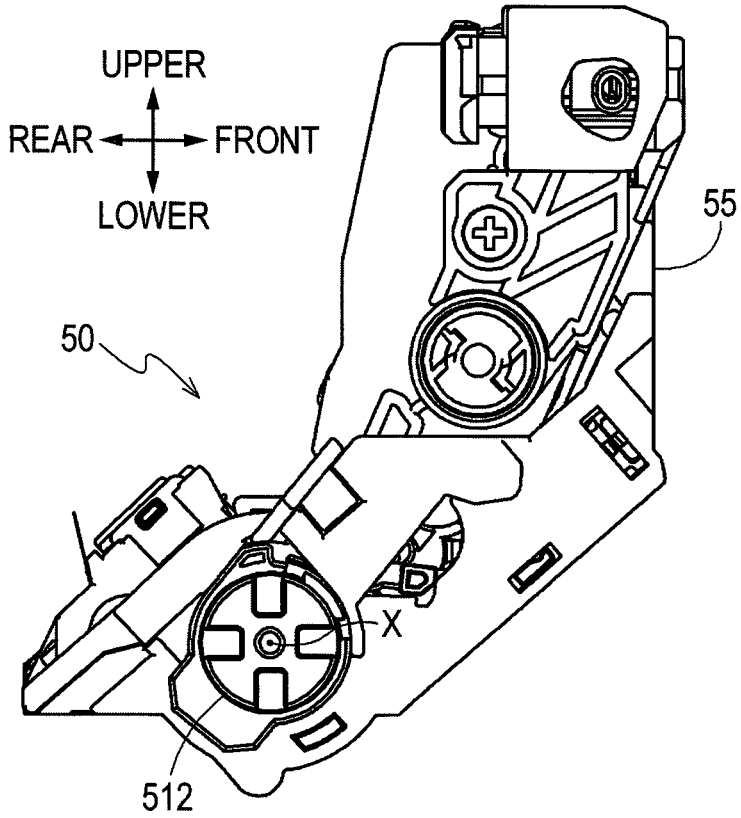
UPPER
REAR
FRONT
LOWER
55
50
X
512

FIG. 6

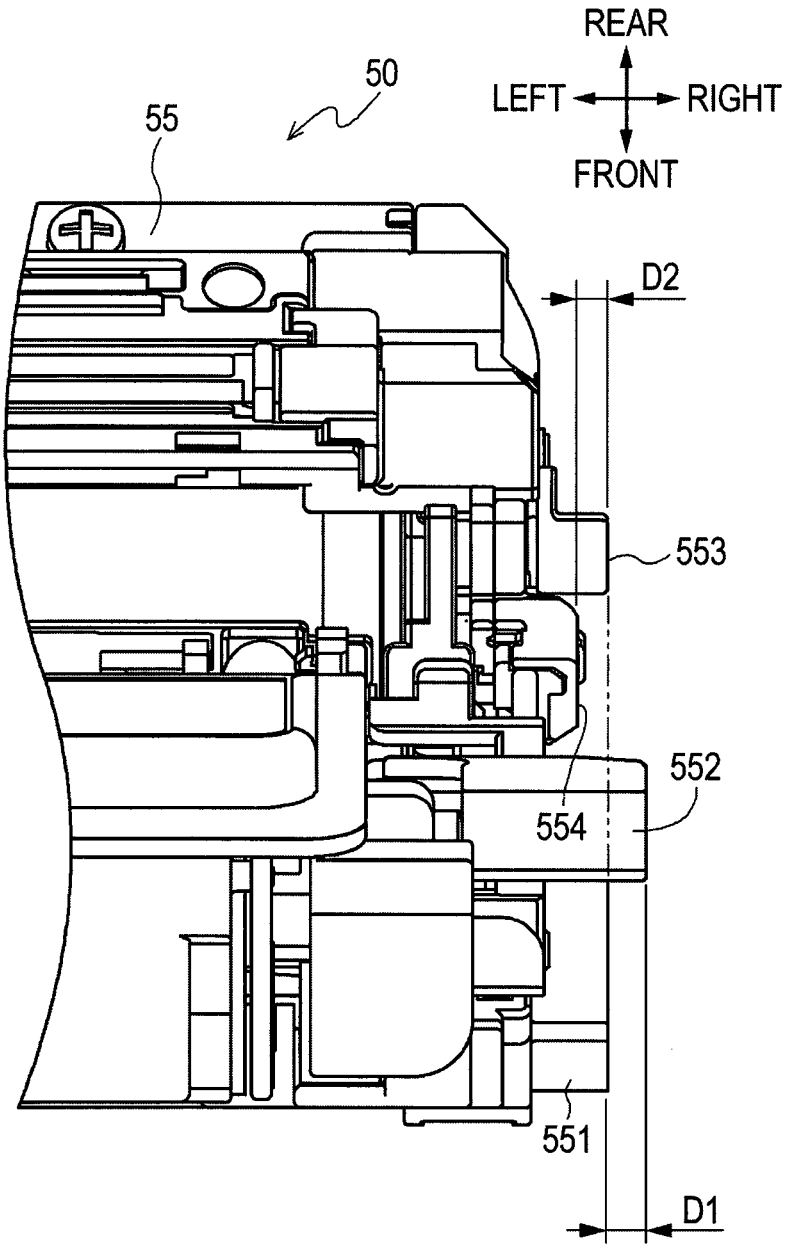

FIG. 7

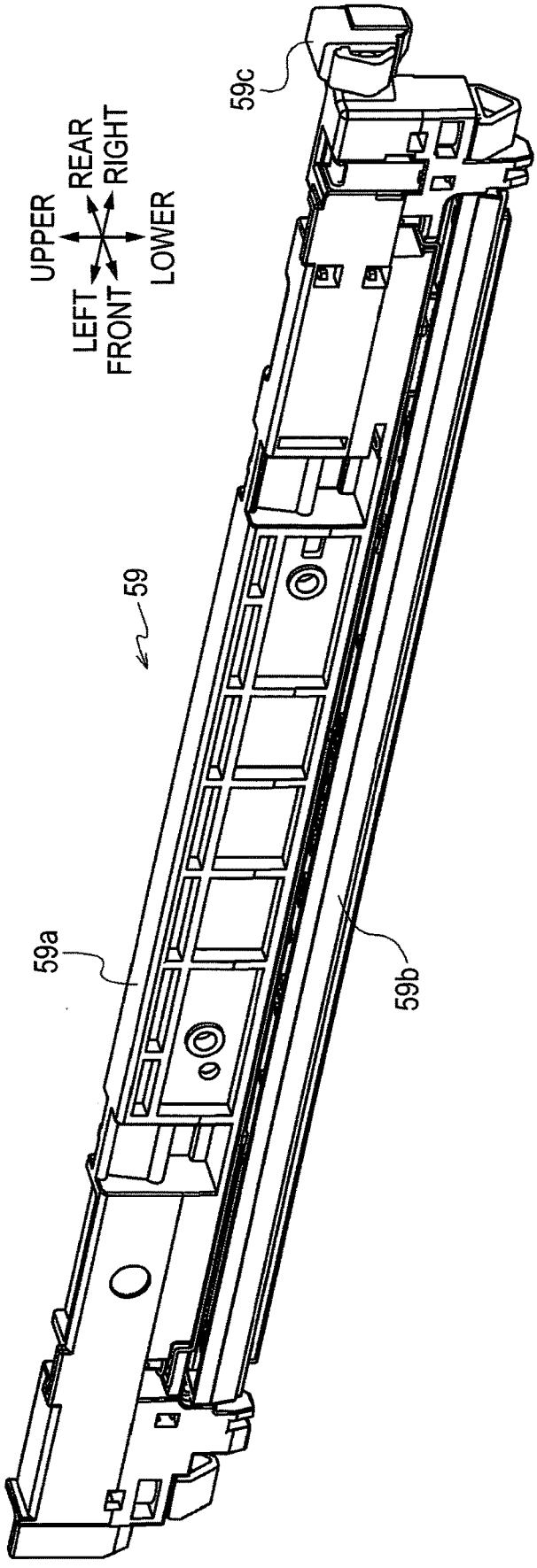

FIG. 8

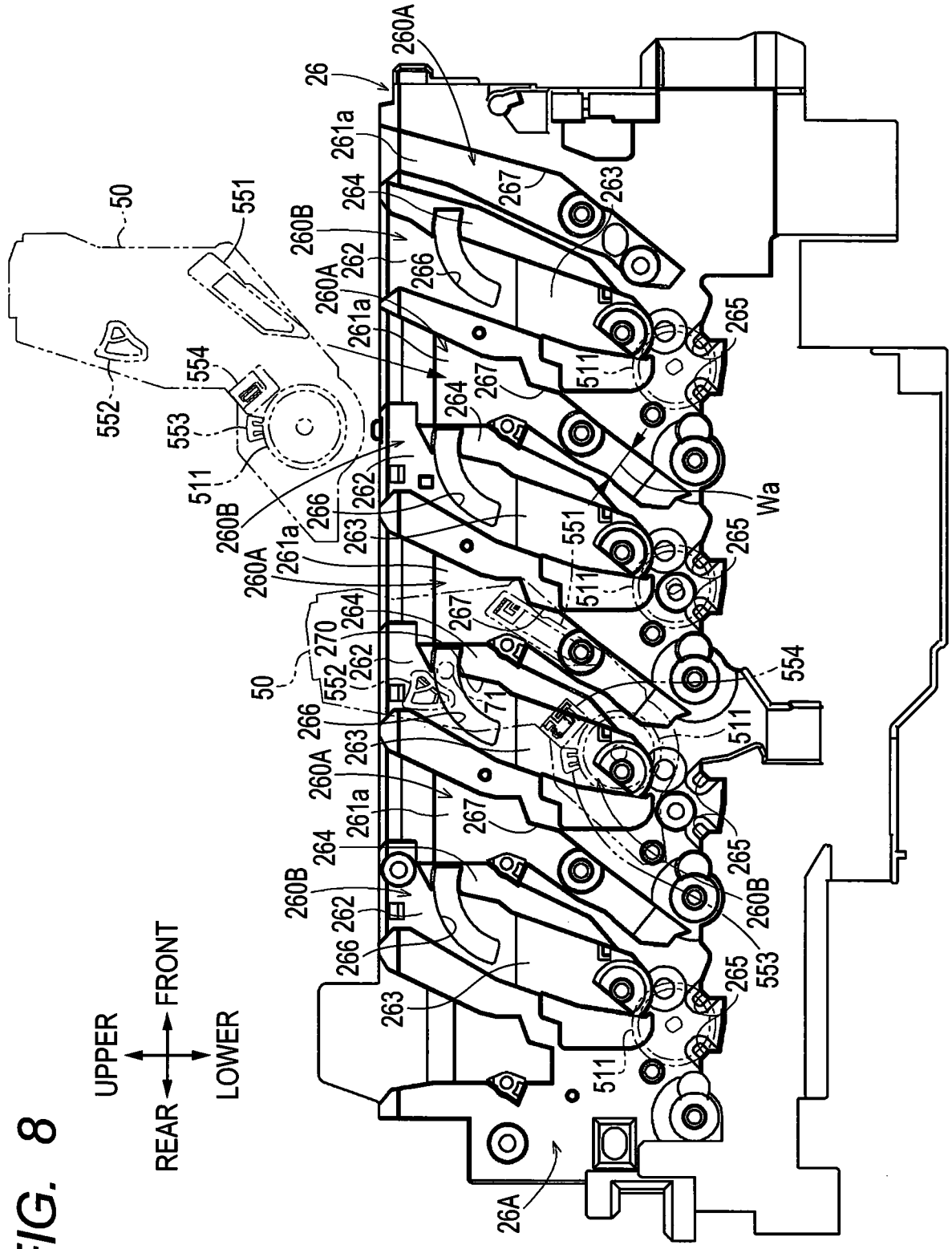
UPPER
FRONT
REAR
LOWER
26
260A
261a
264
267
263
260B
262
266
265
511
551
50
552
553
554
Wa
270
71
26A

FIG. 9

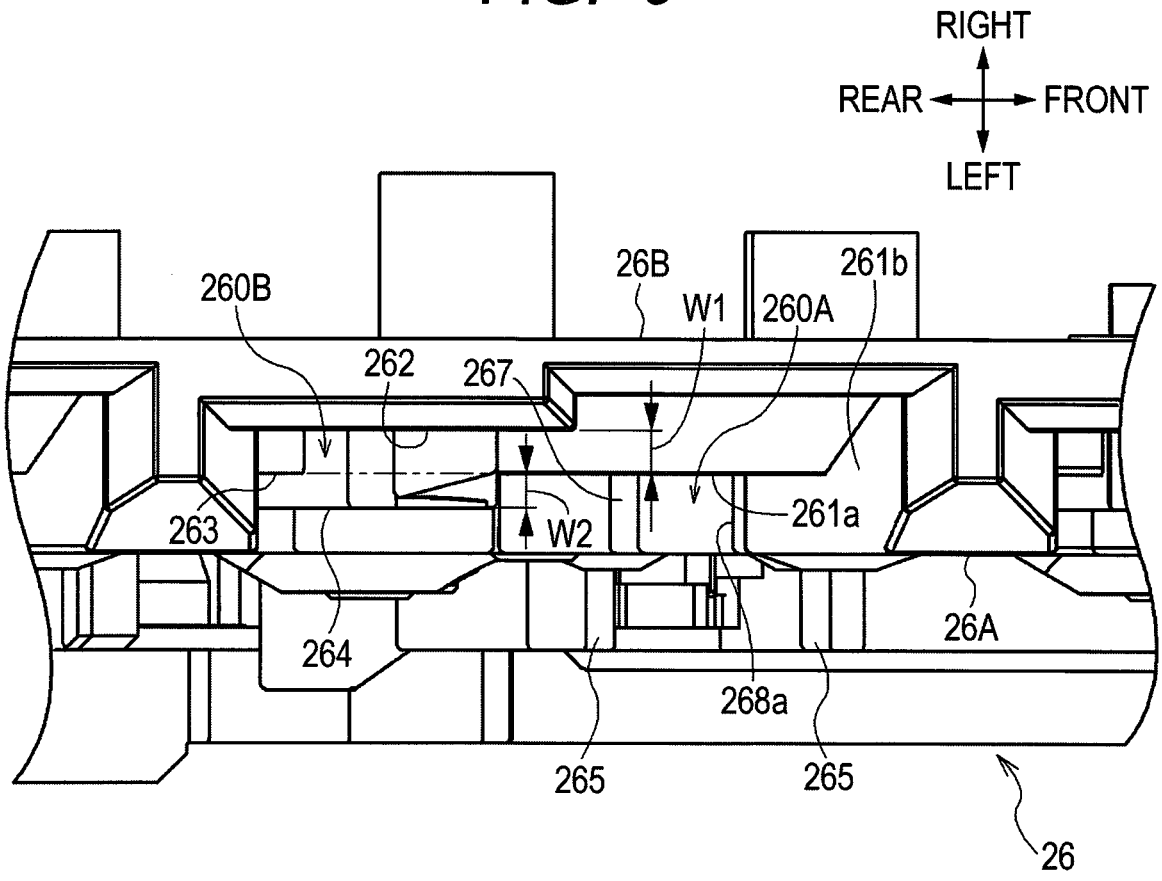
RIGHT
REAR
FRONT
LEFT
260B
26B
W1
260A
261b
262
267
263
W2
261a
264
26A
268a
265
265
26

FIG. 10

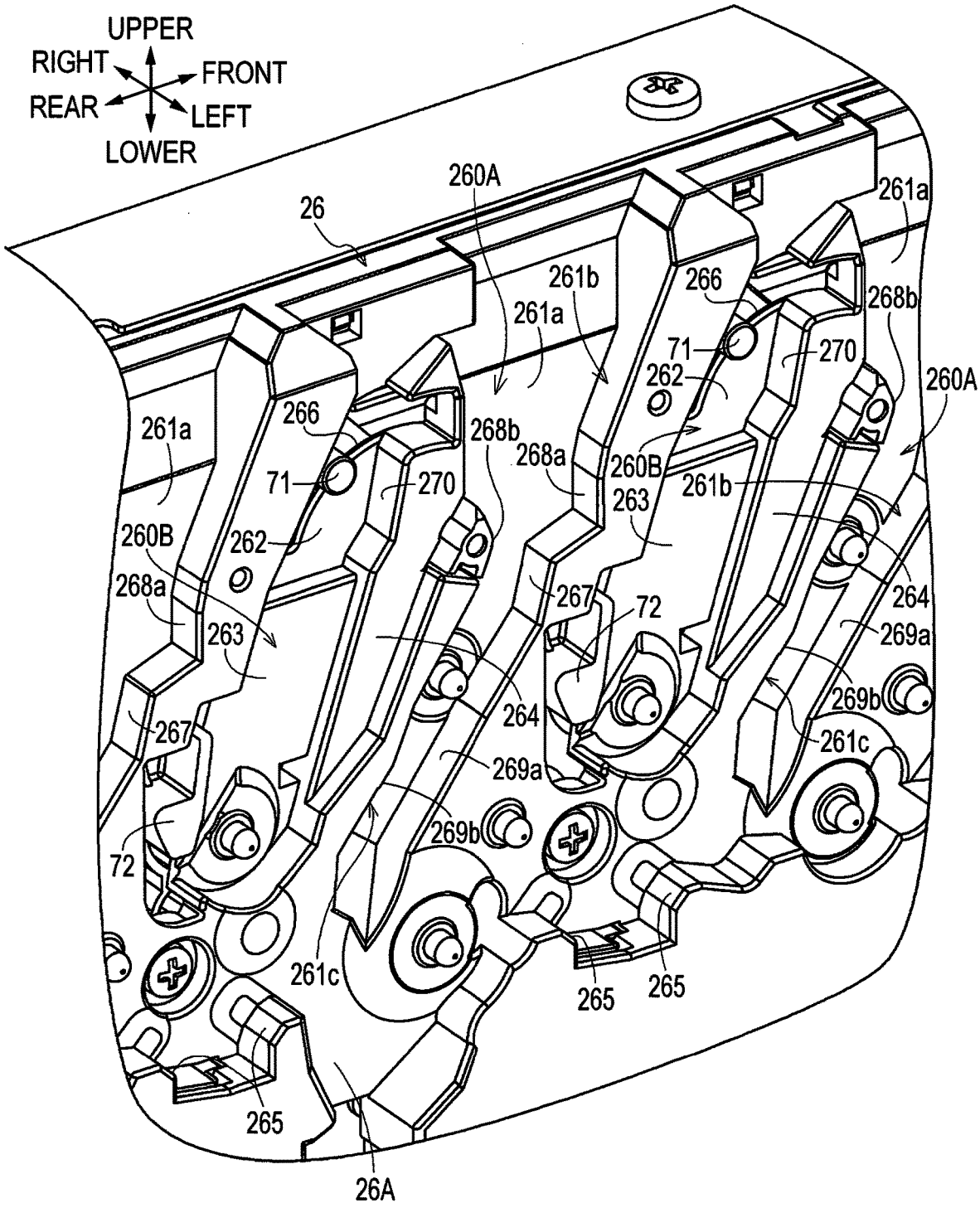
UPPER
RIGHT
FRONT
REAR
LEFT
LOWER
26
260A
261a
261b
266
268b
71
270
262
260A
261a
266
268b
268a
260B
261b
71
270
263
260B
262
264
268a
267
72
269a
263
264
269b
267
261c
269a
269b
72
261c
265
265
265
26A

FIG. 11

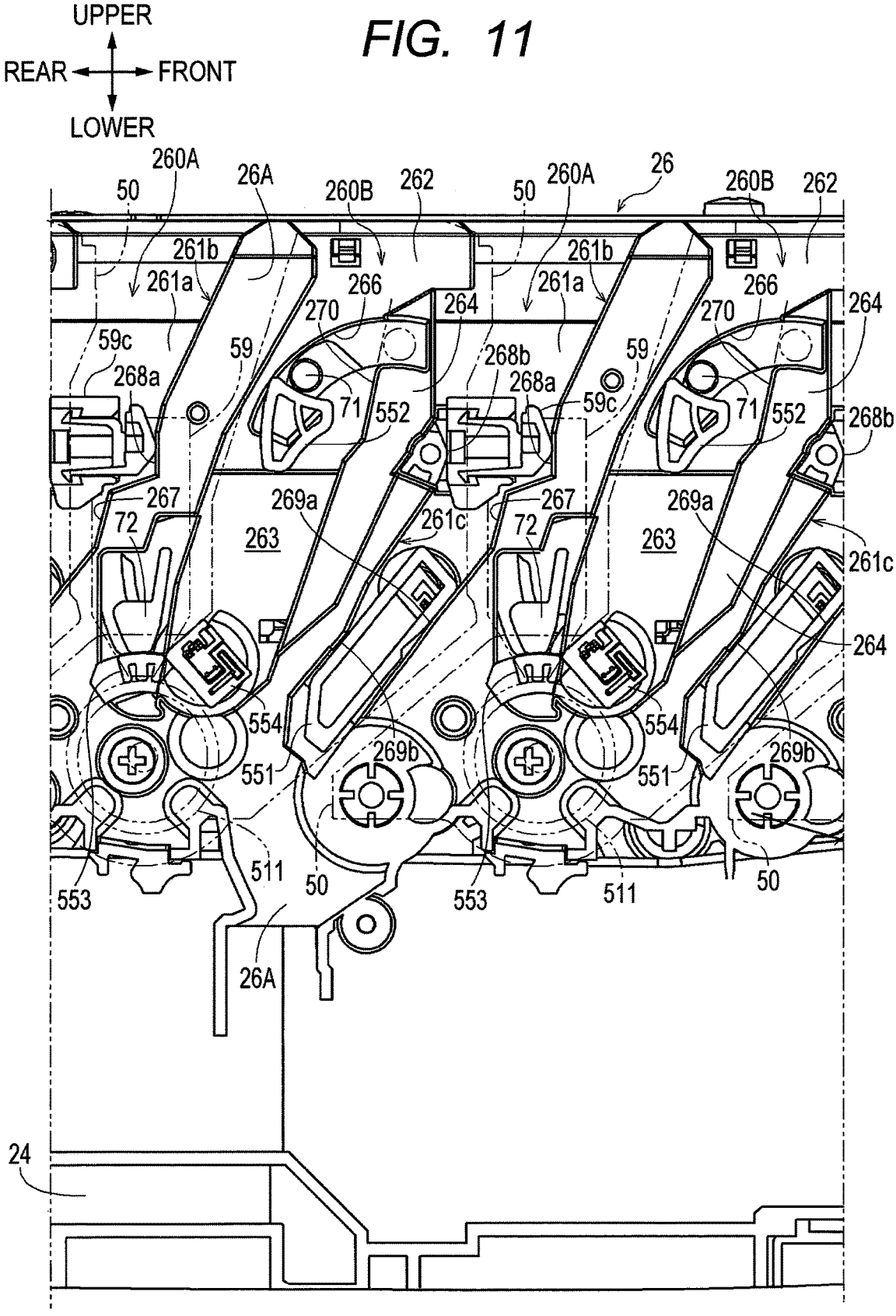
UPPER
REAR
FRONT
LOWER
260A
26A
260B
262
50
26
261b
261a
266
270
264
59c
59
268a
268b
71
552
267
72
269a
261c
263
554
551
269b
553
511
24

FIG. 12

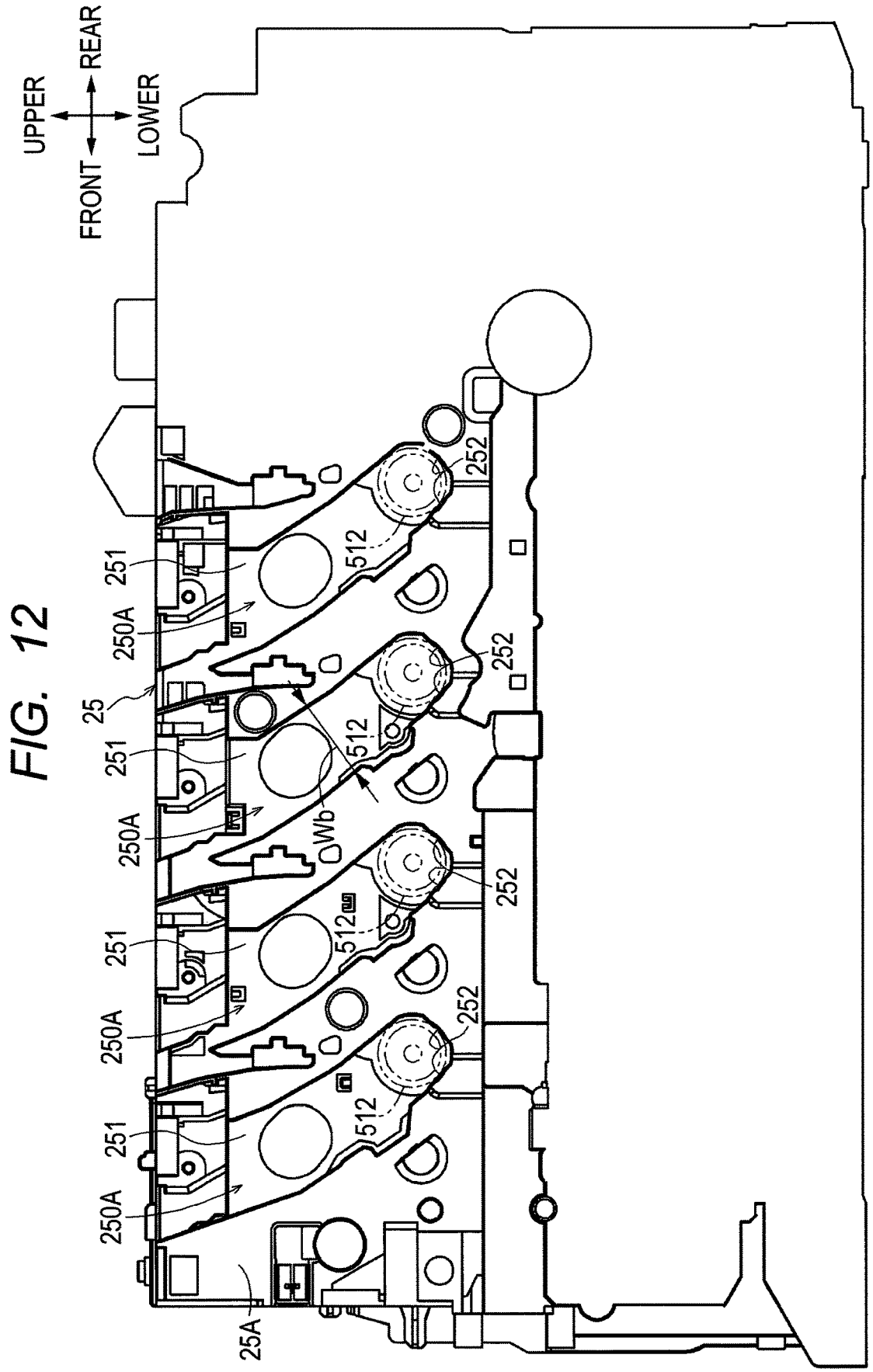

FIG. 13

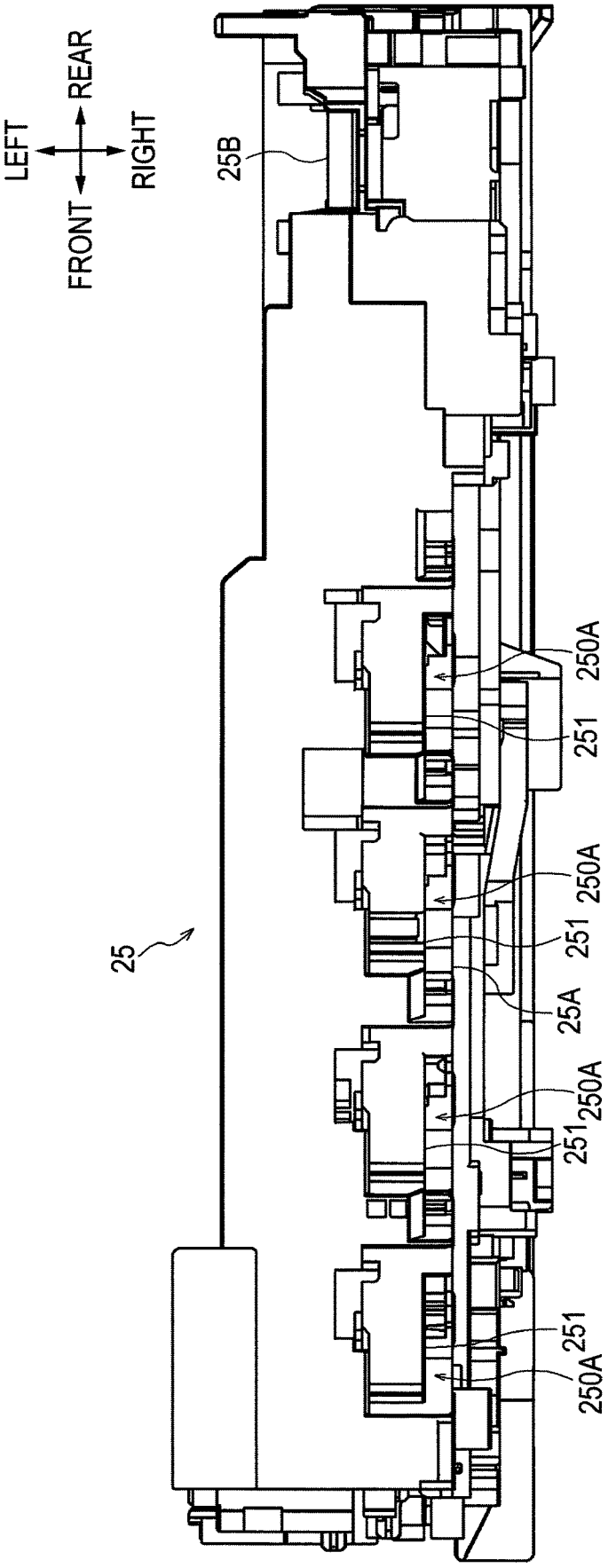
LEFT
REAR
RIGHT
FRONT
25B
25
250A
251
250A
251
25A
250A
251
250A
251
250A

IMAGE FORMING APPARATUS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from Japanese Patent Application No. 2020-210569 filed Dec. 18, 2020. The entire content of the priority application is incorporated herein by reference.

BACKGROUND

[0002] An image forming apparatus includes a process cartridge having a photosensitive drum and attachable to and detachable from an apparatus main body, a frame supporting one end of the process cartridge in the axial direction of the photosensitive drum, and a frame supporting the other end of the process cartridge in the axial direction.

SUMMARY

[0003] According to one aspect, this specification discloses an image forming apparatus. The image forming apparatus includes an apparatus main body and a process cartridge. The apparatus main body includes a first frame and a second frame apart from each other. The first frame includes a first guide rail. The second frame includes a second guide rail. The process cartridge includes a cartridge frame and a photosensitive drum supported by the cartridge frame. The photosensitive drum is rotatable about an axis extending in an axial direction. The process cartridge is attachable to the apparatus main body in an attachment direction. One end of the process cartridge in the axial direction is supported by the first frame. An other end of the process cartridge in the axial direction is supported by the second frame. The cartridge frame includes: a protruding rib protruding toward the first frame, the first guide rail configured to, when the process cartridge is attached to the apparatus main body, guide the protruding rib to slide along the first guide rail; a first bearing supporting one end of the photosensitive drum in the axial direction; and a second bearing supporting an other end of the photosensitive drum in the axial direction, the second guide rail configured to, when the process cartridge is attached to the apparatus main body, guide the second bearing to slide along the second guide rail. A size of the first guide rail in a width direction perpendicular to both the axial direction and the attachment direction is smaller than a size of the second guide rail in the width direction.

[0004] According to the above configuration, since the first guide rail guides the protruding rib of the cartridge frame instead of the first bearing that supports the one end of the photosensitive drum, the size of the first guide rail in the width direction is reduced. This reduces the space occupied by the first guide rail in the first frame, and increases the degree of freedom in arranging parts in the first frame.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Embodiments in accordance with this disclosure will be described in detail with reference to the following figures wherein:

[0006] FIG. **1** is a central cross-sectional view showing an image forming apparatus;

[0007] FIG. **2** is a perspective view showing the inside of an apparatus main body;

[0008] FIG. **3** is a perspective view of a process cartridge as viewed from the front right side;

[0009] FIG. **4** is a perspective view of the process cartridge as viewed from the front left side;

[0010] FIG. **5**A is a right side view showing the process cartridge;

[0011] FIG. **5**B is a left side view showing the process cartridge;

[0012] FIG. **6** is a plan view showing a right end portion of the process cartridge;

[0013] FIG. **7** is a perspective view showing an exposure head;

[0014] FIG. **8** is a left side view showing a support frame;

[0015] FIG. **9** is a plan view showing the support frame;

[0016] FIG. **10** is a perspective view showing the left side of the support frame;

[0017] FIG. **11** is a left side view showing the relationship among protruding ribs and protruding members of the process cartridge, a positioning portion of the exposure head, and each portion of the support frame;

[0018] FIG. **12** is a right side view showing a left main body frame; and

[0019] FIG. **13** is a plan view showing the left main body frame.

DETAILED DESCRIPTION

[0020] In the image forming apparatus described above, when the process cartridge is attached to the apparatus main body, a bearing that supports one end in the axial direction of the photosensitive drum is guided by a guide rail formed in a frame supporting one end of the process cartridge, and a drum shaft that protrudes from the other end in the axial direction of the photosensitive drum is guided by a guide rail formed in a frame supporting the other end of the process cartridge.

[0021] In a case where the bearing of the photosensitive drum and the drum shaft are guided by the guide rail of the frame as described above, the size of the guide rail in the width direction crossing both the axial direction and the attachment-detachment direction of the process cartridge tends to be large. As the width of the guide rail increases, the space occupied by the guide rail in the frame increases, and the degree of freedom in arranging parts in the frame decreases.

[0022] In view of the foregoing, an aspect of an objective of this disclosure is to provide an image forming apparatus configured to reduce the space in the frame occupied by the guide rail for guiding the process cartridge that is attached to the apparatus main body and to increase the degree of freedom in arranging parts in the frame.

[0023] Next, an aspect of this disclosure will be described with reference to the accompanying drawings.

[0024] [Image Forming Apparatus]

[0025] An image forming apparatus **1** shown in FIG. **1** is a color laser printer that forms an image of a plurality of colors on a sheet S by an electrophotographic method.

[0026] In the following description, the right side in FIG. **1** is defined as the front side of the image forming apparatus **1**, the left side in FIG. **1** is defined as the rear side of the image forming apparatus **1**, the near side in the direction perpendicular to the drawing surface in FIG. **1** is defined as the left side of the image forming apparatus **1**, and the far side in the direction perpendicular to the drawing surface in FIG. **1** is defined as the right side of the image forming

apparatus **1**. Further, the upper side and the lower side in FIG. **1** are defined as the upper side and the lower side of the image forming apparatus **1**, respectively.

[0027] The image forming apparatus **1** includes an apparatus main body **2**, a paper feed unit **3**, and an image forming unit **5**. The paper feed unit **3** includes a paper feed tray **10** that supports a sheet S and a paper conveyance unit **30** that conveys the sheet S. The image forming unit **5** forms an image on the sheet S that has been conveyed by the paper feed unit **3**.

[0028] The apparatus main body **2** is formed in a substantially rectangular parallelepiped shape, and accommodates the paper feed unit **3** and the image forming unit **5**. An opening **2**A is opened on the upper surface of the apparatus main body **2**. The apparatus main body **2** includes a top cover **23** that covers the opening **2**A so as to be open and close.

[0029] The top cover **23** is configured to be pivotable about a pivot shaft **23***a* at the rear end, and is movable between a closed position for closing the opening **2**A and an open position for opening the opening **2**A by pivoting about the pivot shaft **23***a*. The top cover **23** of the apparatus main body **2** is formed with a paper discharge tray **23***b* that inclines downward from the front side toward the rear side.

[0030] The paper feed unit **3** is arranged at the lower part of the apparatus main body **2**, and conveys the sheet S supported by the paper feed tray **10** to the image forming unit **5** by the paper conveyance unit **30**. The paper feed tray **10** is configured to be slidable in the front-rear direction. The paper feed tray **10** is configured to be movable between an accommodated position accommodated in the apparatus main body **2** and a separation position pulled forward from the accommodated position.

[0031] The paper conveyance unit **30** includes a paper feed roller **32**, a separation roller **33**, a separation pad **33***a*, a conveyance roller pair **34**, and a registration roller pair **35**. Within the apparatus main body **2**, a conveyance path P for the sheet S from the paper feed tray **10** to the paper discharge tray **23***b* through the image forming unit **5** is formed.

[0032] The sheet S supported by the paper feed tray **10** is separated one sheet at a time by the paper feed roller **32**, the separation roller **33**, and the separation pad **33***a*, and is sent out to the conveyance path P. The paper feed roller **32** is a roller that conveys the sheet S from the paper feed tray **10** toward the image forming unit **5**. The separation roller **33** and the separation pad **33***a* constitute a separation means for separating the sheet S supported by the paper feed tray **10** one sheet at a time.

[0033] The sheet S sent out to the conveyance path P is conveyed toward the image forming unit **5** by the conveyance roller pair **34** and the registration roller pair **35**. The registration roller pair **35** regulates the movement of the leading end of the sheet S that is conveyed and temporarily stops the sheet S, and then conveys the sheet S toward the image forming unit **5** at a particular timing.

[0034] The image forming unit **5** is arranged above the paper feed unit **3**, and includes four process cartridges **50** arranged in the front-rear direction. Each process cartridge **50** is provided for each of the black, yellow, magenta, and cyan colors. The process cartridges **50** are detachably attached to the apparatus main body **2**. Each process cartridge **50** includes a photosensitive drum **51**, a development roller **52**, a supply roller **53**, and a charger **54**.

[0035] The process cartridge **50** is attached to the apparatus main body **2** in an orientation that an axis X (see FIG. **3**) of the photosensitive drum **51** extends in the left-right direction. The left-right direction is an example of an axial direction. The development roller **52** is configured to be movable between a contact position at which the development roller **52** contacts the photosensitive drum **51** and a separation position at which the development roller **52** is separated from the photosensitive drum **51**. The supply roller **53** supplies the toner contained in the process cartridge **50** to the development roller **52**. The charger **54** charges the photosensitive drum **51**.

[0036] The apparatus main body **2** includes an exposure head **59** for exposing the surface of the photosensitive drum **51**. The exposure head **59** is an example of an exposure device. The exposure head **59** is supported by the top cover **23**. Four exposure heads **59** are provided for respective ones of the photosensitive drums **51**, and the exposure heads **59** are arranged in the front-rear direction.

[0037] The exposure head **59** has a main body **59***a* extending downward from the top cover **23** and an exposure portion **59***b* arranged at the lower end of the main body **59***a*. The exposed portion **59***b* is arranged adjacent to the upper side of the photosensitive drum **52** in a state where the top cover **23** is closed. The exposure unit **59***b* is an LED array including a plurality of LED elements arranged in the left-right direction.

[0038] A transfer belt **41** is arranged to face the lower side of the photosensitive drums **51** with the conveyance path P interposed therebetween. The transfer belt **41** is stretched between a drive roller **42** and a follow roller **43** arranged in front of the drive roller **42**. The transfer belt **41**, the drive roller **42**, and the follow roller **43** constitute a belt device **40**. A transfer roller **44** is arranged at a position facing each photosensitive drum **51** with the transfer belt **41** interposed therebetween.

[0039] In the image forming unit **5**, the photosensitive drum **51** uniformly charged by the charger **54** is selectively exposed by the exposure head **59**. By this exposure, electric charges are selectively removed from the surface of the photosensitive drum **51**, and an electrostatic latent image is formed on the surface of the photosensitive drum **51**.

[0040] The toner contained in the process cartridge **50** is positively charged between the supply roller **53** and the development roller **52**, and is supported on the surface of the development roller **52**. A development bias is applied to the development roller **52**, and when the electrostatic latent image formed on the photosensitive drum **51** faces the development roller **52**, toner is supplied from the development roller **52** to the electrostatic latent image due to the potential difference between the electrostatic latent image and the development roller **52**. In this way, a toner image is formed on the surface of the photosensitive drum **51**.

[0041] When the sheet S conveyed toward the image forming unit **5** reaches the transfer belt **41**, the sheet S is conveyed by the transfer belt **41** and sequentially passes between the transfer belt **41** and each photosensitive drum **51**. Then, the toner image on the surface of the photosensitive drum **51** is transferred to the sheet S by the transfer bias applied to the transfer roller **44** when the toner image faces the sheet S.

[0042] The transfer belt **41** in the present embodiment is configured as a conveyance belt that conveys the sheet S to which the toner image is transferred. Alternatively, the

transfer belt may be configured as an intermediate transfer belt in which a toner image is transferred to the belt itself and the toner image transferred to the belt is further transferred to the sheet S.

[0043] The sheet S on which the toner image is transferred is conveyed to a fixing device **60**. The fixing device **60** includes a heating roller **61** and a pressure roller **62** in pressure contact with the heating roller **61**. The sheet S conveyed to the fixing device **60** passes between the heating roller **61** and the pressure roller **62** and the toner image is thermally fixed.

[0044] The sheet S on which the toner image is thermally fixed is conveyed from the fixing device **60** to the downstream side in the conveyance direction, and is further conveyed by an intermediate paper discharge roller pair **63** and a paper discharge roller pair **64** arranged downstream of and the intermediate paper discharge roller pair **63** in the conveyance direction, and is discharged to the paper discharge tray **23***b*.

[0045] As shown in FIG. **2**, the apparatus main body **2** includes a right main body frame **24** and a left main body frame **25** which are arranged apart from each other in the left-right direction. The right main body frame **24** is located at the right end of the apparatus main body **2** and extends in the front-rear direction and the upper-lower direction. The left main body frame **25** is located at the left end of the apparatus main body **2** and extends in the front-rear direction and the upper-lower direction. A support frame **26** is attached to an inside surface of the right main body frame **24**, which is the surface facing the left main body frame **25**. The support frame **26** is an example of a first frame, and the left main body frame **25** is an example of a second frame. The right main body frame **24** (an example of a third frame) is located at the outer side of the support frame **26** in the axial direction.

[0046] The process cartridge **50** is arranged between the support frame **26** and the left main body frame **25**, and is detachably supported by the support frame **26** and the left main body frame **25**. The support frame **26** is located to the right of the process cartridge **50** and supports the right end of the process cartridge **50**. The left main body frame **25** is located to the left of the process cartridge **50** and supports the left end of the process cartridge **50**. The right end is an example of one end in the axial direction, and the left end is an example of the other end in the axial direction.

[0047] [Process Cartridge]

[0048] As shown in FIGS. **3** to **6**, the process cartridge **50** has a cartridge frame **55** that supports the photosensitive drum **51** and the development roller **52**.

[0049] A protruding rib **551** and a first bearing **511** are provided at the right end of the cartridge frame **55**. The protruding rib **551** protrudes toward the support frame **26**. The first bearing **511** supports one end of the photosensitive drum **51** in the axial direction X. A second bearing **512** is provided at the left end of the cartridge frame **55**. The second bearing **512** supports the other end of the photosensitive drum **51** in the axial direction X. The protruding rib **551** may be integrally molded with the cartridge frame **55**, for example. As shown in FIG. **5**A, the protruding rib **551** is located at a position spaced from the first bearing **511**. The protruding rib **551** is located upstream of the first bearing **511** in the attachment direction in which the process cartridge **50** is attached to the apparatus main body **2**.

[0050] An arm **552**, a lever contact portion **553**, and an electrode **554** protruding toward the support frame **26** are provided at the right end of the cartridge frame **55**. The arm **552**, the lever contact portion **553**, and the electrode **554** are examples of protruding members.

[0051] The arm **552** is a member for moving the development roller **52** between the contact position and the separation position. When no pressing force is applied to the arm **552**, the development roller **52** moves to the contact position. When the arm **552** is pressed from above, the development roller **52** moves to the separation position. The arm **552** is supported by the cartridge frame **55**.

[0052] The arm **552** is formed such that the protruding amount toward the support frame **26** is larger than that of the protruding rib **551**. That is, the protruding position (outermost position) of the arm **552** in the axial direction is located farther outward than the protruding position (outermost position) of the protruding rib **551** in the axial direction (see FIG. **6**). The difference in the protruding amount of the arm **552** and the protruding rib **551** toward the support frame **26** is a protruding amount difference D**1**.

[0053] The apparatus main body **2** includes a boss **71** configured to press the arm **552** (see FIGS. **10** and **11**). The boss **71** is movable to a pressing position for pressing the arm **552** of the process cartridge **50** and a retracted position separated from the arm **522**.

[0054] When the boss **71** moves to the pressing position, the arm **552** is pressed by the boss **71**, and the development roller **52** moves to the separation position. When the boss **71** moves to the retracted position, the boss **71** is separated from the arm **522** and the development roller **52** moves to the contact position. That is, the boss **71** moves the development roller **52** between the contact position and the separation position.

[0055] The apparatus main body **2** includes a lock lever **72** (see FIGS. **10** and **11**) that presses and fixes the photosensitive drum **51** when the process cartridge **50** is attached to the apparatus main body **2**, and the lock lever **72** contacts the lever contact portion **553**. The lock lever **72** is supported by the support frame **26**. The lever contact portion **553** is formed at the first bearing **511**. The protruding amount of the lever contact portion **553** toward the support frame **26** is the same as that of the protruding rib **551**. That is, the protruding position (outermost position) of the lever contact portion **553** in the axial direction is the same as the protruding position (outermost position) of the protruding rib **551** in the axial direction (see FIG. **6**).

[0056] The electrode **554** is an electrode for supplying power to the charger **54**, and the charger **54** and the electrode **554** are supported by the cartridge frame **55**. The electrode **554** is formed such that the protruding amount toward the support frame **26** is smaller than that of the protruding rib **551**. That is, the protruding position (outermost position) of the electrode **554** in the axial direction is located farther inward than the protruding position (outermost position) of the protruding rib **551** in the axial direction (see FIG. **6**). The difference in the protruding amount of the electrode **554** and the protruding rib **551** toward the support frame **26** is a protruding amount difference D**2**.

[0057] [Exposure Head]

[0058] As shown in FIG. **7**, the exposure head **59** has a positioning portion **59***c* at the right end of the main body **59***a*. The image forming apparatus **1** is configured such that the positioning portion **59***c* contacts the support frame **26** to

restrict the movement of the exposure head **59** in the front-rear direction. The front-rear direction is an example of a horizontal direction perpendicular to the axial direction X.

[0059] [Support Frame]

[0060] As shown in FIGS. **8** to **11**, the support frame **26** has an inner side surface **26**A facing the process cartridge **50** in the axial direction X and an outer side surface **26**B opposite to the inner side surface **26**A and facing the right main body frame **24** in the axial direction X. The inner side surface **26**A is an example of a first side surface.

[0061] The support frame **26** has a first guide rail **260**A and a retracting rail **260**B. The first guide rail **260**A and the retracting rail **260**B are formed at the inner side surface **26**A side of the support frame **26**. Each of the first guide rail **260**A and the retracting rail **260**B is formed at four locations along the front-rear direction, corresponding to the number of process cartridges **50** supported by the support frame **26**.

[0062] When the process cartridge **50** is attached to the apparatus main body **2**, the first guide rail **260**A guides the protruding rib **551** by making sliding contact with the protruding rib **551** of the process cartridge **50**. The size (dimension) of the first guide rail **260**A in a width direction perpendicular to both the attachment-detachment direction of the process cartridge **50** and the axial direction X is a width Wa.

[0063] The first guide rail **260**A has a first guide surface **261***a*, a first step surface **261***b*, and a second step surface **261***c*. The first guide surface **261***a* is located farther rightward than the inner side surface **26**A, that is, farther outward than the inner side surface **26**A in the axial direction X.

[0064] The first step surface **261***b* is formed between the inner side surface **26**A and one end of the first guide surface **261***a* in the width direction of the first guide rail **260**A. The second step surface **261***c* is formed between the inner side surface **26**A and the other end of the first guide surface **261***a* in the width direction of the first guide rail **260**A.

[0065] The first step surface **261***b* and the second step surface **261***c* are formed between the inner side surface **26**A and the first guide surface **261***a* in the width direction of the first guide rail **260**A. The first step surface **261***b* is located at the front side of the second step surface **261***c*.

[0066] The first guide rail **260**A forms a groove shape recessed outward from the inner side surface **26**A in the axial direction X by the first guide surface **261***a*, the first step surface **261***b*, and the second step surface **261***c*.

[0067] At least part of the first guide surface **261***a* is arranged at a position overlapping the trajectory of the protruding rib **551** when the process cartridge **50** is attached to the apparatus main body **2** when viewed from the axial direction X, and makes sliding contact with the protruding rib **551** when the process cartridge **50** is attached to the apparatus main body **2**. The first guide surface **261***a* guides the protruding rib **551** by making sliding contact with the protruding rib **551**. When the protruding rib **551** is guided by the first guide surface **261***a*, positioning in the left-right direction of the process cartridge **50** attached to the apparatus main body **2** is realized.

[0068] The retracting rail **260**B is formed in a groove shape recessed outward from the inner side surface **26**A in the axial direction X such that when the process cartridge **50** is attached to the apparatus main body **2**, the protruding members such as the arm **552**, the lever contact portion **553**, and the electrode **554** do not interfere with the retracting rail **260**B. The retracting rail **260**B has a first retracting surface **262**, a second retracting surface **263**, and a third retracting surface **264**.

[0069] The first retracting surface **262** is located farther rightward than the inner side surface **26**A, that is, farther outward than the inner side surface **26**A in the axial direction X. The first retracting surface **262** is located farther rightward than the first guide surface **261***a*, that is, farther outward than the first guide surface **261***a* in the axial direction X. The difference in position between the first retracting surface **262** and the first guide surface **261***a* in the axial direction X is a position difference W**1**. The position difference W**1** is equal to or larger than the protruding amount difference D**1** (W**1**≥D**1**).

[0070] At least part of the first retracting surface **262** is arranged at a position overlapping the trajectory of the arm **552** when the process cartridge **50** is attached to the apparatus main body **2** when viewed from the axial direction X. The protruding amount of the arm **552** toward the support frame **26** is larger than that of the protruding rib **551** by the protruding amount difference D**1**.

[0071] However, since the first retracting surface **262** is located at the right side of the first guide surface **261***a* by the position difference W**1**, in a state where the protruding rib **551** of the process cartridge **50** is guided by the first guide surface **261***a* when the process cartridge **50** is attached to the apparatus main body **2**, the first retracting surface **262** and the arm **552** are in sliding contact with each other or are separated from each other in the axial direction X. That is, since the first retracting surface **262** is in a position retracted from the arm **552** in the axial direction X and does not interfere with the arm **552** when the process cartridge **50** is attached to the apparatus main body **2**, the attaching operation of the process cartridge **50** is unlikely to be hindered.

[0072] The second retracting surface **263** is located farther rightward than the inner side surface **26**A, that is, farther outward than the inner side surface **26**A in the axial direction X. The second retracting surface **263** is at the same position as the first guide surface **261***a* in the axial direction X.

[0073] At least part of the second retracting surface **263** is arranged at a position overlapping the trajectory of the lever contact portion **553** when the process cartridge **50** is attached to the apparatus main body **2** when viewed from the axial direction X. The protruding amount of the lever contact portion **553** toward the support frame **26** is the same as that of the protruding rib **551**, and the second retracting surface **263** and the first guide surface **261***a* are at the same positions in the axial direction X.

[0074] Therefore, in a state where the protruding rib **551** of the process cartridge **50** is guided by the first guide surface **261***a* when the process cartridge **50** is attached to the apparatus main body **2**, the second retracting surface **263** and the lever contact portion **553** are in sliding contact with each other in the axial direction X. That is, since the second retracting surface **263** is in a position retracted from the lever contact portion **553** in the axial direction X, and does not interfere with the lever contact portion **553** when the process cartridge **50** is attached to the apparatus main body **2**, the attaching operation of the process cartridge **50** is unlikely to be hindered.

[0075] The third retracting surface **264** is located farther rightward than the inner side surface **26**A, that is, farther outward than the inner side surface **26**A in the axial direction X. The third retracting surface **264** is located farther leftward

than the first guide surface **261***a*, that is, farther inward than the first guide surface **261***a* in the axial direction X. The difference in position between the third retracting surface **264** and the first guide surface **261***a* in the axial direction X is a position difference W**2**. The position difference W**2** is equal to or smaller than the protruding amount difference D**2** (W**2**≥D**2**).

[0076] At least part of the third retracting surface **264** is arranged at a position overlapping the trajectory of the electrode **554** when the process cartridge **50** is attached to the apparatus main body **2** when viewed from the axial direction X. The third retracting surface **264** is located at the left side of the first guide surface **261***a* by the position difference W**2**.

[0077] However, since the protruding amount of the electrode **554** toward the support frame **26** is smaller than that of the protruding rib **551** by the protruding amount difference D**2**, in a state where the protruding rib **551** of the process cartridge **50** is guided by the first guide surface **261***a* when the process cartridge **50** is attached to the apparatus main body **2**, the third retracting surface **264** and the electrode **554** are in sliding contact with each other or are separated from each other in the axial direction X. That is, since the third retracting surface **264** is in a position retracted from the electrode **554** in the axial direction X and does not interfere with the electrode **554** when the process cartridge **50** is attached to the apparatus main body **2**, the attaching operation of the process cartridge **50** is unlikely to be hindered.

[0078] A positioning portion **265** is provided at the inner side surface **26**A of the support frame **26**. The positioning portion **265** contacts the first bearing **511** supporting one end of the photosensitive drum **51** to position the photosensitive drum **51** when the process cartridge **50** is attached to the apparatus main body **2**. The positioning portion **265** is located farther leftward than the inner side surface **26**A, that is, farther inward than the inner side surface **26**A in the axial direction X. The positioning portion **265** is configured to support the first bearing **511** of the process cartridge **50** attached to the apparatus main body **2** from below.

[0079] In a state where the first bearing **511** is supported by the positioning portion **265**, when the lock lever **72** contacts the lever contact portion **553** of the first bearing **511** from above, the photosensitive drum **51** is fixed in a positioned state.

[0080] In this way, since the positioning of the photosensitive drum **50** is realized by the positioning portion **265** formed at the support frame **26**, in a configuration that the protruding rib **551** of the process cartridge **50** is guided by the first guide rail **260**A when the process cartridge **50** is attached to the apparatus main body **2**, the positional accuracy of the photosensitive drum **51** is maintained.

[0081] The support frame **26** has a through-hole **266** that penetrates in the left-right direction and is formed in an arc shape. The through-hole **266** is mainly formed in a portion of the first retracting surface **262** of the support frame **26**. Each of the positioning portion **265** and the through-hole **266** is formed at four locations along the front-rear direction, corresponding to the number of process cartridges **50** supported by the support frame **26**.

[0082] The first guide rail **260**A has a restricting portion **267**, a first positioning portion **268***a* (an example of a first exposure positioning portion), a second positioning portion **268***b* (an example of a second exposure positioning portion), a third positioning portion **269***a* (an example of a first rib positioning portion), and a fourth positioning portion **269***b* (an example of a second rib positioning portion).

[0083] The restricting portion **267** is formed at the first step surface **261***b* of the first guide rail **260**A. The restricting portion **267** restricts the movement of the process cartridge **50** toward the front side by contacting the protruding rib **551** of the process cartridge **50** that is attached to and detached from the apparatus main body **2**.

[0084] The first positioning portion **268***a* is formed at the first step surface **261***b* of the first guide rail **260**A. The first positioning portion **268***a* contacts the front surface of the positioning portion **59***c* of the exposure head **59** extending downward from the top cover **23** at the closed position. When the first positioning portion **268***a* contacts the front surface of the positioning portion **59***c*, the movement of the exposure head **59** toward the front side is restricted. The front side is an example of one side in the horizontal direction perpendicular to the axial direction X.

[0085] The second positioning portion **268***b* is formed at the second step surface **261***c* of the first guide rail **260**A. The second positioning portion **268***b* contacts the rear surface of the positioning portion **59***c* of the exposure head **59** extending downward from the top cover **23** at the closed position. When the second positioning portion **268***b* contacts the rear surface of the positioning portion **59***c*, the movement of the exposure head **59** toward the rear side is restricted. The rear side is an example of the other side in the horizontal direction perpendicular to the axial direction X.

[0086] In this way, the first positioning portion **268***a* contacts the front surface of the positioning portion **59***c* and the second positioning portion **268***b* contacts the rear surface of the positioning portion **59***c* such that the positioning portion **59***c* is sandwiched between the first positioning portion **268***a* and the second positioning portion **268***b*. In this way, the positioning of the exposure head **59** in the front-rear direction is realized.

[0087] The third positioning portion **269***a* is formed at the first step surface **261***b* of the first guide rail **260**A. The third positioning portion **269***a* contacts the front surface of the protruding rib **551** of the process cartridge **50** attached to the apparatus main body **2**. Since the third positioning portion **269***a* contacts the front surface of the protruding rib **551**, the movement of the process cartridge **50** attached to the apparatus main body **2** to one side in the width direction of the first guide rail **260**A is restricted.

[0088] The fourth positioning portion **269***b* is formed at the second step surface **261***c* of the first guide rail **260**A. The fourth positioning portion **269***b* contacts the rear surface of the protruding rib **551** of the process cartridge **50** attached to the apparatus main body **2**. Since the fourth positioning portion **269***b* contacts the rear surface of the protruding rib **551**, the movement of the process cartridge **50** attached to the apparatus main body **2** to the other side in the width direction of the first guide rail **260**A is restricted.

[0089] In this way, the third positioning portion **269***a* contacts the front surface of the protruding rib **551**, and the fourth positioning portion **269***b* contacts the rear surface of the protruding rib **551** such that the protruding rib **551** is sandwiched between the third positioning portion **269***a* and the fourth positioning portion **269***b*. In this way, positioning of the process cartridge **50** attached to the apparatus main body **2** in the width direction of the first guide rail **260**A is realized.

[0090] The third positioning portion **269***a* and the fourth positioning portion **269***b* are arranged downstream of the first positioning portion **268***a* and the second positioning portion **268***b* in the attachment direction in which the process cartridge **50** is attached to the apparatus main body **2**.

[0091] In this way, the third positioning portion **269***a* and the fourth positioning portion **269***b* that position the process cartridge **50** are located near the photosensitive drum **51** in the attachment direction in which the process cartridge **50** is attached to the apparatus main body **2**, and the positioning accuracy of the photosensitive drum **51** when the process cartridge **50** is attached to the apparatus main body **2** is enhanced.

[0092] [Left Main Body Frame]

[0093] As shown in FIGS. **12** and **13**, the left main body frame **25** has an inner side surface **25**A facing the process cartridge **50** in the axial direction X and an outer side surface **25**B opposite to the inner side surface **25**A.

[0094] The left main body frame **25** has a second guide rail **250**A. The second guide rail **250**A is formed at the inner side surface **25**A side of the left main body frame **25**. The second guide rail **250**A is formed at four locations along the front-rear direction corresponding to the number of process cartridges **50** supported by the left main body frame **25**.

[0095] The second guide rail **250**A guides the second bearing **512** by making sliding contact with the second bearing **512** of the photosensitive drum **51** in the process cartridge **50** when the process cartridge **50** is attached to the apparatus main body **2**. The size (dimension) of the second guide rail **250**A in the width direction perpendicular to both the axial direction X and the attachment-detachment direction of the process cartridge **50** is a width Wb. The width Wa of the first guide rail **260**A is smaller than the width Wb of the second guide rail **250**A.

[0096] The second guide rail **250**A has a second guide surface **251**. The second guide surface **251** is located farther leftward than the inner side surface **25**A, that is, farther outward than the inner side surface **25**A in the axial direction X. The second guide rail **250**A is formed in a groove shape in which the second guide surface **251** is recessed from the inner side surface **25**A outward in the axial direction X.

[0097] At least part of the second guide surface **251** is arranged at a position overlapping the trajectory of the second bearing **512** when the process cartridge **50** is attached to the apparatus main body **2** when viewed from the axial direction X, and makes sliding contact with the second bearing **512** when the process cartridge **50** is attached to the apparatus main body **2**. The second guide surface **251** guides the second bearing **512** by making sliding contact with the second bearing **512**. When the second bearing **512** is guided by the second guide surface **251**, positioning of the process cartridge **50** in the left-right direction is realized.

[0098] The second guide rail **250**A has a positioning portion **252** that is contacted by the second bearing **512** of the photosensitive drum **51** when the process cartridge **50** is attached to the apparatus main body **2**. The positioning portion **252** is formed at the inner side surface **25**A side of the left main body frame **25**, and is located at the lower end of the second guide rail **250**A. The photosensitive drum **51** is positioned by the positioning portion **252** supporting the second bearing **512** of the process cartridge **50** attached to the apparatus main body **2** from below.

[0099] [Attaching Operation of Process Cartridge]

[0100] When the process cartridge **50** is attached to the apparatus main body **2** in the image forming apparatus **1**, the process cartridge **50** is inserted into the apparatus main body **2** from above. In the process cartridge **50** inserted into the apparatus main body **2**, the protruding rib **551** of the process cartridge **50** is guided by the first guide rail **260**A of the support frame **26**, and the second bearing **512** of the process cartridge **50** is moved downward in a state of being guided by the second guide rail **250**A of the left main body frame **25**.

[0101] When the process cartridge **50** moves downward, the first bearing **511** of the photosensitive drum **51** contacts the positioning portion **265**, and the second bearing **512** contacts the positioning portion **252**, the positioning of the photosensitive drum **51** with respect to the apparatus main body **2** is realized, and the process cartridge **50** is attached to the apparatus main body **2**.

[0102] In this case, the positioning of the process cartridge **50** in the left-right direction is realized when the protruding rib **551** is guided by the first guide rail **260**A and the second bearing **512** is guided by the second guide rail **250**A.

[0103] As described above, in the process cartridge **50**, since the first guide rail **260**A guides the protruding rib **551** of the cartridge frame **55** instead of the first bearing **511** that supports one end of the photosensitive drum **50**, the width Wa of the first guide rail **260**A in the width direction is reduced. In this way, the space occupied by the first guide rail **260**A in the support frame **26** is reduced, and the degree of freedom in arrangement of parts in the support frame **26** is increased.

[0104] In a state where the protruding rib **551** is guided by the first guide surface **261***a*, the first retracting surface **262** of the retracting rail **260**B corresponding to the arm **552** of the process cartridge **50** is at a position retracted from the arm **552**, and the arm **552** and the first retracting surface **262** do not interfere with each other. That is, although the protruding amount of the arm **552** toward the support frame **26** is larger than that of the protruding rib **551** by the protruding amount difference D**1**, since the first retracting surface **262** is at the right side of the first guide surface **261***a* by the position difference W**1**, the arm **552** and the support frame **26** do not interfere with each other, and the attaching operation of the process cartridge **50** is unlikely to be hindered.

[0105] In a state where the protruding rib **551** is guided by the first guide surface **261***a*, the second retracting surface **263** of the retractable rail **260**B corresponding to the lever contact portion **553** of the process cartridge **50** is at a position retracted from the lever contact portion **553**, and the lever contact portion **553** and the second retracting surface **263** do not interfere with each other. That is, since the protruding amount of the lever contact portion **553** toward the support frame **26** is the same as that of the protruding rib **551**, and the second retracting surface **263** and the first guide surface **261***a* are at the same position in the axial direction X, the lever contact portion **553** and the support frame **26** do not interfere with each other, and the attaching operation of the process cartridge **50** is unlikely to be hindered.

[0106] Since the second retracting surface **263** and the first guide surface **261***a* are located at the same position in the axial direction X, the space at the outer side surface **26**B side of the portion of the support frame **26** where the second retracting surface **263** is formed will not be excessively small. In this way, the degree of freedom in arrangement of

parts on the outer side surface **26**B side of the support frame **26** is unlikely to be excessively limited.

[0107] In a state where the protruding rib **551** is guided by the first guide surface **261***a*, the third retracting surface **264** of the retractable rail **260**B corresponding to the electrode **554** of the process cartridge **50** is at a position retracted from the electrode **554**, and the electrode **554** and the third retracting surface **264** do not interfere with each other. That is, although the third retracting surface **264** is located at the left side of the first guide surface **261***a* by the difference W**2**, since the protruding amount of the electrode **554** toward the support frame **26** is smaller than that of the protruding rib **551** by the protruding amount difference D**2**, the electrode **554** and the support frame **26** do not interfere with each other, and the attaching operation of the process cartridge **50** is unlikely to be hindered.

[0108] Since the third retracting surface **264** is located at the left side of the first guide surface **261***a*, the space at the outer side surface **26**B side of the portion of the support frame **26** where the third retracting surface **264** is formed is increased. In this way, the degree of freedom in arrangement of parts at the outer side surface **26**B side of the support frame **26** is increased.

[0109] As described above, in the image forming apparatus **1**, the process cartridge **50** has protruding members such as the arm **552**, the lever contact portion **553**, and the electrode **554**. These protruding members are arranged in spaces formed by the first retracting surface **262**, the second retracting surface **263**, and the third retracting surface **264** of the retracting rail **260**B, respectively, and the attaching operation of the process cartridge **50** will not be hindered.

[0110] In the image forming apparatus **1**, when the process cartridge **50** attached to the apparatus main body **2** is taken out, the protruding rib **551** is guided by the first guide surface **261***a*, the arm **552**, the lever contact portion **553**, and the electrode **554** do not interfere with the first retracting surface **262**, the second retracting surface **263**, and the third retracting surface **264**, respectively.

[0111] In the image forming apparatus **1**, the protruding amount of the arm **552** toward the support frame **26** is larger than that of the protruding rib **551** by the protruding amount difference D**1**, the protruding amount of the lever contact portion **553** toward the support frame **26** is the same as that of the protruding rib **551**, and the protruding amount of the electrode **554** toward the support frame **26** is smaller than that of the protruding rib **551** by the protruding amount difference D**2**.

[0112] The first retracting surface **262** is located at the right side of the first guide surface **261***a* by the position difference W**1**, the second retracting surface **263** is located at the same position as the first guide surface **261***a* in the axial direction X, and the third retracting surface **264** is located at the left side of the first guide surface **261***a* by the position difference W**2**.

[0113] In this way, the first guide surface **261***a*, the first retracting surface **262**, the second retracting surface **263**, and the third retracting surface **264** are located so as to correspond to the protruding amounts of the arm **552**, the protruding rib **551**, the lever contact portion **553**, and the electrode **554** toward the support frame **26**. This enhances the degree of freedom in arrangement of parts of the support frame **26** while suppressing the arm **552**, the lever contact portion **553**, and the electrode **554** from interfering with the support frame **26**.

[0114] The boss **71** configured to press the arm **552** of the process cartridge **50** is supported by the outer side surface **26**B of the support frame **26**. As shown in FIG. **10**, the boss **71** protrudes leftward from the first retracting surface **262** through the through-hole **266** from the position between the support frame **26** and the right main body frame **24** in the axial direction X. That is, the boss **71** penetrates the first retracting surface **262** in the axial direction X and protrudes toward the process cartridge **50** side. The boss **71** moves between a pressing position and a retracted position along the arc shape of the through-hole **266**.

[0115] As shown in FIGS. **10** and **11**, the retracting rail **260**B has a step surface **270** between the first retracting surface **262** and the third retracting surface **264**, and the boss **71** is configured to be located on the rear side (the position indicated by a solid line in FIG. **11**) of the step surface **270** when the boss **71** is at the pressing position in the front-rear direction and to be located at the front side (the position indicated by a two-dot chain line in FIG. **11**) of the step surface **270** when the boss **71** is at the retracted position.

[0116] Since the boss **71** is attached to the support frame **26** with play in the moving direction, a portion of the boss **71** may protrude rearward from the step surface **270** even when the boss **71** is at the retracted position (see FIG. **8**). In this way, when the process cartridge **50** is attached to the apparatus main body in a state where the boss **71** protrudes rearward from the step surface **270**, the boss **71** may interfere with the arm **552** passing through the first retracting surface **262** having the through-hole **266** and the boss **71** may be moved toward the pressing position by the arm **552**.

[0117] Therefore, in the image forming apparatus **1**, the restricting portion **267** is formed at the first step surface **261***b* of the first guide rail **260**A. Thus, when the process cartridge **50** is attached to the apparatus main body **2**, the restricting portion **267** and the protruding rib **551** of the process cartridge **50** contact each other whereby the movement of the process cartridge **50** toward the front side is restricted.

[0118] Since the movement of the process cartridge **50** toward the front side is restricted by the restricting portion **267**, the trajectory of the arm **552** when the process cartridge **50** is attached to the apparatus main body **2** is restricted to a position where the arm **552** and the boss **71** do not interfere with each other, and unexpected movement of the boss **71** is suppressed. If the trajectory of the arm **552** when the process cartridge **50** is attached to the apparatus main body **2** is restricted to a position where the arm **552** and the boss **71** do not interfere with each other, the restricting portion **267** may be formed at the second step surface **261***c*.

[0119] In the image forming apparatus **1**, the process cartridge **50** is attached to the apparatus main body **2** from above, and the protruding rib **551** is located at the lower side of the process cartridge **50** when the process cartridge **50** is in a posture (the posture shown in FIG. **8**) of being attached to the apparatus main body **2**. In particular, when the process cartridge **50** is in a posture of being attached to the apparatus main body **2**, a part of the protruding rib **551** overlaps the photosensitive drum **50** located at the lower end of the process cartridge **50** when viewed from the horizontal direction (the front-rear direction).

[0120] Therefore, the protruding rib **551** is guided by the first guide rail **260**A from the start of attaching the process cartridge **50** to the apparatus main body **2**, and the process cartridge **50** is easily attached to the apparatus main body **2**.

[0121] In the image forming apparatus **1**, the attachment direction in which the process cartridge **50** is attached to the apparatus main body **2** is inclined relative to the vertical direction such that the upstream side of the process cartridge **50** in the attachment direction is located farther frontward than the downstream side of the process cartridge **50** in the horizontal direction perpendicular to the axial direction X. The first guide rail **260**A and the retracting rail **260**B are generally inclined rearward from the upper end side toward the lower end side. That is, the upper end of the first guide rail **260**A is located farther frontward than the lower end is, and the upper end of the retracting rail **260**B is located farther frontward than the lower end is.

[0122] The first guide rail **260**A is arranged at the front side of the retracting rail **260**B. The front side is one side in the horizontal direction perpendicular to the axial direction X.

[0123] In the image forming apparatus **1**, when the user attaches the process cartridge **50** to the apparatus main body **2**, the process cartridge **50** is inserted into the apparatus main body **2** from the front side. Since the first guide rail **260**A for guiding the protruding rib **551** is arranged at the front side of the retracting rail **260**B, the visibility of the first guide rail **260**A from the user is improved, and the mountability of the process cartridge **50** is improved (that is, an attaching operation of the process cartridge **50** becomes easier).

[0124] While the disclosure has been described in detail with reference to the above aspects thereof, it would be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the claims.

What is claimed is:

1. An image forming apparatus comprising:

an apparatus main body including a first frame and a second frame apart from each other, the first frame including a first guide rail, the second frame including a second guide rail; and

a process cartridge including a cartridge frame and a photosensitive drum supported by the cartridge frame, the photosensitive drum being rotatable about an axis extending in an axial direction, the process cartridge being attachable to the apparatus main body in an attachment direction, one end of the process cartridge in the axial direction being supported by the first frame, an other end of the process cartridge in the axial direction being supported by the second frame,

the cartridge frame including:

a protruding rib protruding toward the first frame, the first guide rail configured to, when the process cartridge is attached to the apparatus main body, guide the protruding rib to slide along the first guide rail;

a first bearing supporting one end of the photosensitive drum in the axial direction; and

a second bearing supporting an other end of the photosensitive drum in the axial direction, the second guide rail configured to, when the process cartridge is attached to the apparatus main body, guide the second bearing to slide along the second guide rail,

a size of the first guide rail in a width direction perpendicular to both the axial direction and the attachment direction being smaller than a size of the second guide rail in the width direction.

2. The image forming apparatus according to claim **1**, wherein the process cartridge includes a protruding member protruding toward the first frame; and

wherein the first frame includes a retracting rail configured not to interfere with the protruding member when the process cartridge is attached to the apparatus main body.

3. The image forming apparatus according to claim **2**, wherein the process cartridge includes a development roller supported by the cartridge frame, the development roller being movable between a contact position at which the development roller contacts the photosensitive drum and a separation position at which the development roller is separated from the photosensitive drum; and

wherein the protruding member includes an arm supported by the cartridge frame, a protruding amount of the arm toward the first frame being larger than a protruding amount of the protruding rib toward the first frame, the arm being for moving the development roller between the contact position and the separation position.

4. The image forming apparatus according to claim **3**, wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has a first guide surface located farther outward than the first side surface in the axial direction; and

wherein the retracting rail has a retracting surface located farther outward than the first side surface and the first guide surface in the axial direction, the retracting surface being configured not to interfere with the arm when the process cartridge is attached to the apparatus main body.

5. The image forming apparatus according to claim **2**, wherein the apparatus main body includes a lock lever supported by the first frame, the lock lever being configured to press and fix the photosensitive drum in a state where the process cartridge is attached to the apparatus main body; and

wherein the protruding member includes a lever contact portion formed at the first bearing and configured to be contacted by the lock lever, a protruding amount of the lever contact portion toward the first frame being equal to a protruding amount of the protruding rib toward the first frame.

6. The image forming apparatus according to claim **5**, wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has a first guide surface located farther outward than the first side surface in the axial direction; and

wherein the retracting rail has a retracting surface located farther outward than the first side surface in the axial direction and located at a same position as the first guide surface in the axial direction, the retracting surface being configured not to interfere with the lever contact portion when the process cartridge is attached to the apparatus main body.

7. The image forming apparatus according to claim **2**, wherein the process cartridge includes a charger supported by the cartridge frame and configured to charge the photosensitive drum; and

wherein the protruding member includes an electrode supported by the cartridge frame, a protruding amount of the electrode toward the first frame being smaller

than a protruding amount of the protruding rib toward the first frame, the electrode being for supplying power to the charger.

8. The image forming apparatus according to claim **7**, wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has a first guide surface located farther outward than the first side surface in the axial direction; and

wherein the retracting rail has a retracting surface located farther outward than the first side surface and farther inward than the first guide surface in the axial direction, the retracting surface being configured not to interfere with the electrode when the process cartridge is attached to the apparatus main body.

9. The image forming apparatus according to claim **2**, wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has a first guide surface located farther outward than the first side surface in the axial direction;

wherein the process cartridge includes a development roller supported by the cartridge frame, the development roller being movable between a contact position at which the development roller contacts the photosensitive drum and a separation position at which the development roller is separated from the photosensitive drum;

wherein the protruding member includes an arm supported by the cartridge frame, a protruding amount of the arm toward the first frame being larger than a protruding amount of the protruding rib toward the first frame, the arm being for moving the development roller between the contact position and the separation position;

wherein the retracting rail has an arm retracting surface located farther outward than the first side surface and the first guide surface in the axial direction, the arm retracting surface being configured not to interfere with the arm when the process cartridge is attached to the apparatus main body; and

wherein a difference between a position of the arm retracting surface and a position of the first guide surface in the axial direction is equal to or larger than a difference between the protruding amount of the arm toward the first frame and the protruding amount of the protruding rib toward the first frame.

10. The image forming apparatus according to claim **2**, wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has a first guide surface located farther outward than the first side surface in the axial direction;

wherein the process cartridge includes a charger supported by the cartridge frame and configured to charge the photosensitive drum;

wherein the protruding member includes an electrode supported by the cartridge frame, a protruding amount of the electrode toward the first frame being smaller than the protruding amount of the protruding rib, the electrode being for supplying power to the charger;

wherein the retracting rail has an electrode retracting surface located farther outward than the first side surface and farther inward than the first guide surface in the axial direction, the electrode retracting surface being configured not to interfere with the electrode when the process cartridge is attached to the apparatus main body; and

wherein a difference between a position of the electrode retracting surface and the position of the first guide surface in the axial direction is equal to or smaller than a difference between the protruding amount of the electrode toward the first frame and the protruding amount of the protruding rib toward the first frame.

11. The image forming apparatus according to claim **2**, wherein the attachment direction is inclined relative to a vertical direction such that an upstream side of the process cartridge in the attachment direction is located farther toward one side in a horizontal direction than a downstream side of the process cartridge in the attachment direction, the horizontal direction being perpendicular to the axial direction; and

wherein the first guide rail is located farther toward the one side in the horizontal direction than the retracting rail.

12. The image forming apparatus according to claim **4**, wherein the apparatus main body includes a boss supported by the first frame, the boss penetrating through the retracting surface in the axial direction and protruding toward the process cartridge, the boss being movable between a pressing position at which the boss presses the arm and a retracted position at which the boss is separated from the arm;

wherein the first guide rail has a step surface between the first guide surface and the first side surface in the width direction; and

wherein the step surface includes a restricting portion configured to, when the process cartridge is attached to the apparatus main body, contact the protruding rib and restrict a trajectory of the arm to a position at which the arm does not interfere with the boss located at the retracted position.

13. The image forming apparatus according to claim **1**, wherein the apparatus main body includes:

a top cover covering an upper side of the apparatus main body; and

an exposure device supported by the top cover and configured to expose the photosensitive drum;

wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has:

a first guide surface located farther outward than the first side surface in the axial direction;

a first step surface formed between the first side surface and one end of the first guide surface in the width direction; and

a second step surface formed between the first side surface and an other end of the first guide surface in the width direction;

wherein the first step surface includes a first exposure positioning portion configured to contact the exposure device, thereby restricting movement of the exposure device toward one side in a horizontal direction perpendicular to the axial direction; and

wherein the second step surface includes a second exposure positioning portion configured to contact the exposure device, thereby restricting movement of the exposure device toward an other side in the horizontal direction.

14. The image forming apparatus according to claim **1**, wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has:

a first guide surface located farther outward than the first side surface in the axial direction;

a first step surface formed between the first side surface and one end of the first guide surface in the width direction; and

a second step surface formed between the first side surface and an other end of the first guide surface in the width direction;

wherein the first step surface includes a first rib positioning portion configured to contact the protruding rib, thereby restricting movement of the process cartridge toward one side in the width direction; and

wherein the second step surface includes a second rib positioning portion configured to contact the protruding rib, thereby restricting movement of the process cartridge toward an other side in the width direction.

15. The image forming apparatus according to claim **1**, wherein the apparatus main body includes:

a top cover covering an upper side of the apparatus main body; and

an exposure device supported by the top cover and configured to expose the photosensitive drum;

wherein the first frame has a first side surface facing the process cartridge in the axial direction;

wherein the first guide rail has:

a first guide surface located farther outward than the first side surface in the axial direction;

a first step surface formed between the first side surface and one end of the first guide surface in the width direction; and

a second step surface formed between the first side surface and an other end of the first guide surface in the width direction;

wherein the first step surface includes:

a first exposure positioning portion configured to contact the exposure device, thereby restricting movement of the exposure device toward one side in a horizontal direction perpendicular to the axial direction; and

a first rib positioning portion configured to contact the protruding rib, thereby restricting movement of the process cartridge toward one side in the width direction;

wherein the second step surface includes:

a second exposure positioning portion configured to contact the exposure device, thereby restricting movement of the exposure device toward an other side in the horizontal direction; and

a second rib positioning portion configured to contact the protruding rib, thereby restricting movement of the process cartridge toward an other side in the width direction; and

wherein the first rib positioning portion and the second rib positioning portion are arranged downstream of the first exposure positioning portion and the second exposure positioning portion in the attachment direction.

16. The image forming apparatus according to claim **1**, wherein the first frame has:

a first side surface facing the process cartridge in the axial direction; and

a drum positioning portion located farther inward than the first side surface in the axial direction, the drum positioning portion being configured to contact the first bearing to position the photosensitive drum in a state where the process cartridge is attached to the apparatus main body.

17. The image forming apparatus according to claim **1**, wherein the process cartridge is configured to be attached to the apparatus main body from above; and

wherein, when the process cartridge is in a posture of being attached to the apparatus main body, the protruding rib is located at a lower side of the cartridge frame.

18. The image forming apparatus according to claim **1**, wherein the process cartridge is configured to be attached to the apparatus main body from above; and

wherein, when the process cartridge is in a posture of being attached to the apparatus main body, a part of the protruding rib overlaps the photosensitive drum as viewed from a horizontal direction.

19. The image forming apparatus according to claim **1**, wherein the apparatus main body further includes a third frame to which the first frame is attached, the third frame being located farther outward than the first frame in the axial direction.

20. The image forming apparatus according to claim **1**, wherein the protruding rib is located at a position spaced from the first bearing; and

wherein the protruding rib is located upstream of the first bearing in the attachment direction.

* * * * *