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Kawamura et al.

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

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(21) Appl. No.: **13/857,200**

(22) Filed: **Apr. 5, 2013**

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Feb. 27, 2007 (JP) 2007-047838

(51) **Int. Cl.**
B65H 1/00 (2006.01)

(52) **U.S. Cl.**
USPC **271/171**; 271/145; 271/241

(58) **Field of Classification Search**
USPC 271/145, 171, 241
See application file for complete search history.

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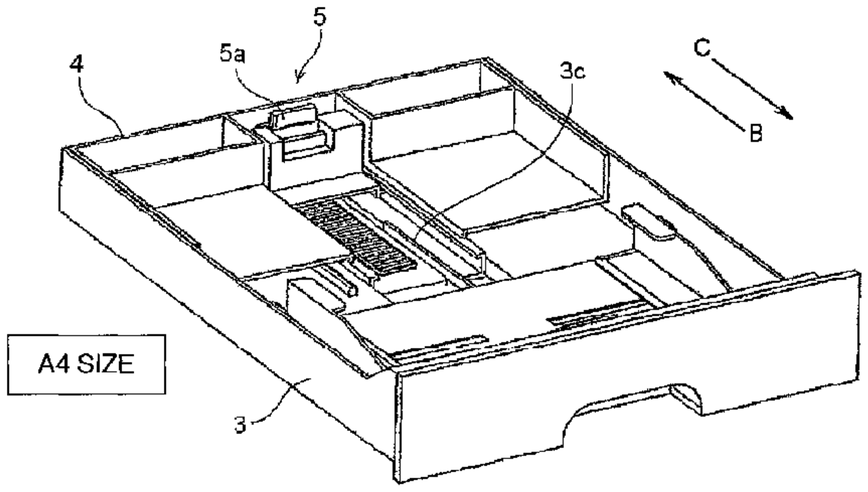
Primary Examiner — Ernesto Suarez

(74) *Attorney, Agent, or Firm* — Fitzpatrick, Cella, Harper & Scinto

(57) **ABSTRACT**

A slide cassette is slidably provided in a main cassette of a sheet cassette. When a sheet with a size larger than that of a sheet which may be stored in the main cassette is stored, the slide cassette is sled and moved to extend the sheet cassette. There is provided a fixing portion which may fix the slide cassette and the main cassette in a state in which the sheet cassette is in a shortened or an extended state by sliding the slide cassette. The fixing portion releases the fixing by an operation in which the slide cassette is sled in a shortening direction or extending direction.

8 Claims, 24 Drawing Sheets



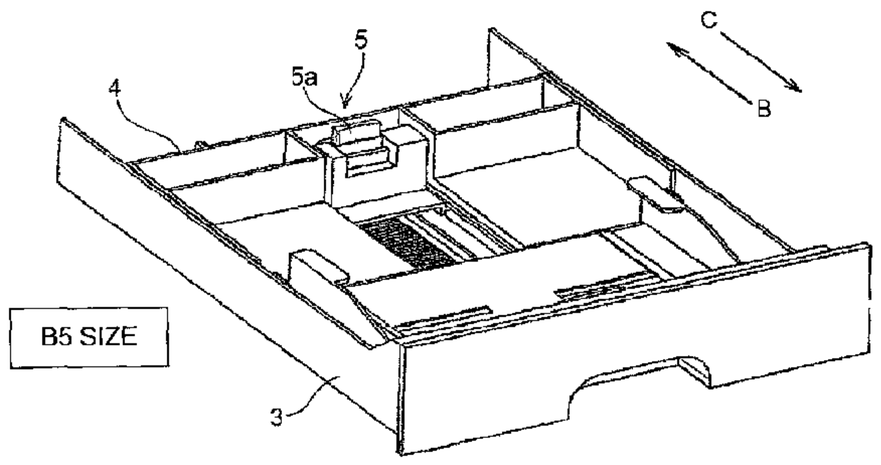
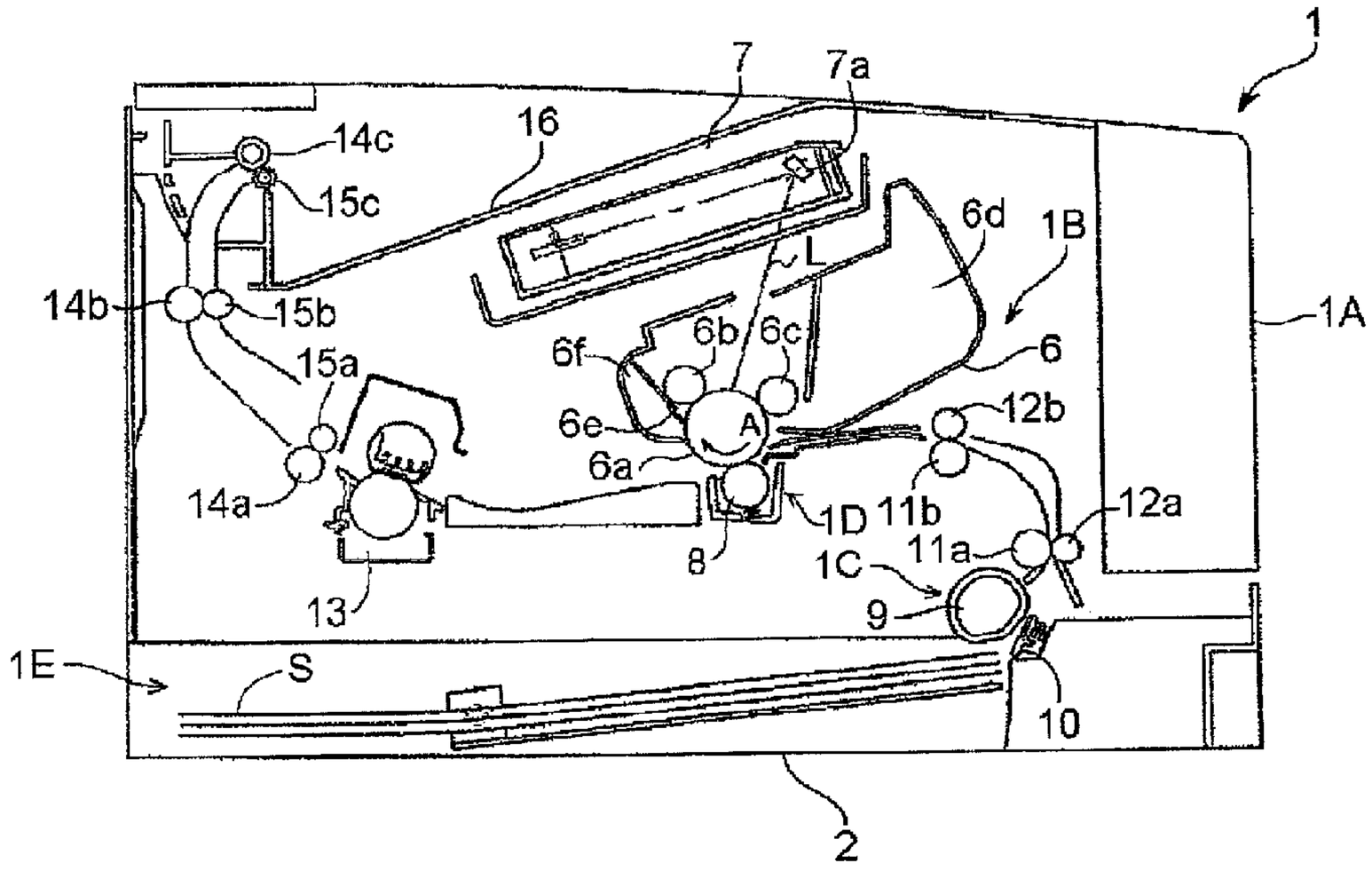


FIG. 1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14c
15c
6d
1B
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14b
15b
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6b
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6e
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2

FIG. 2

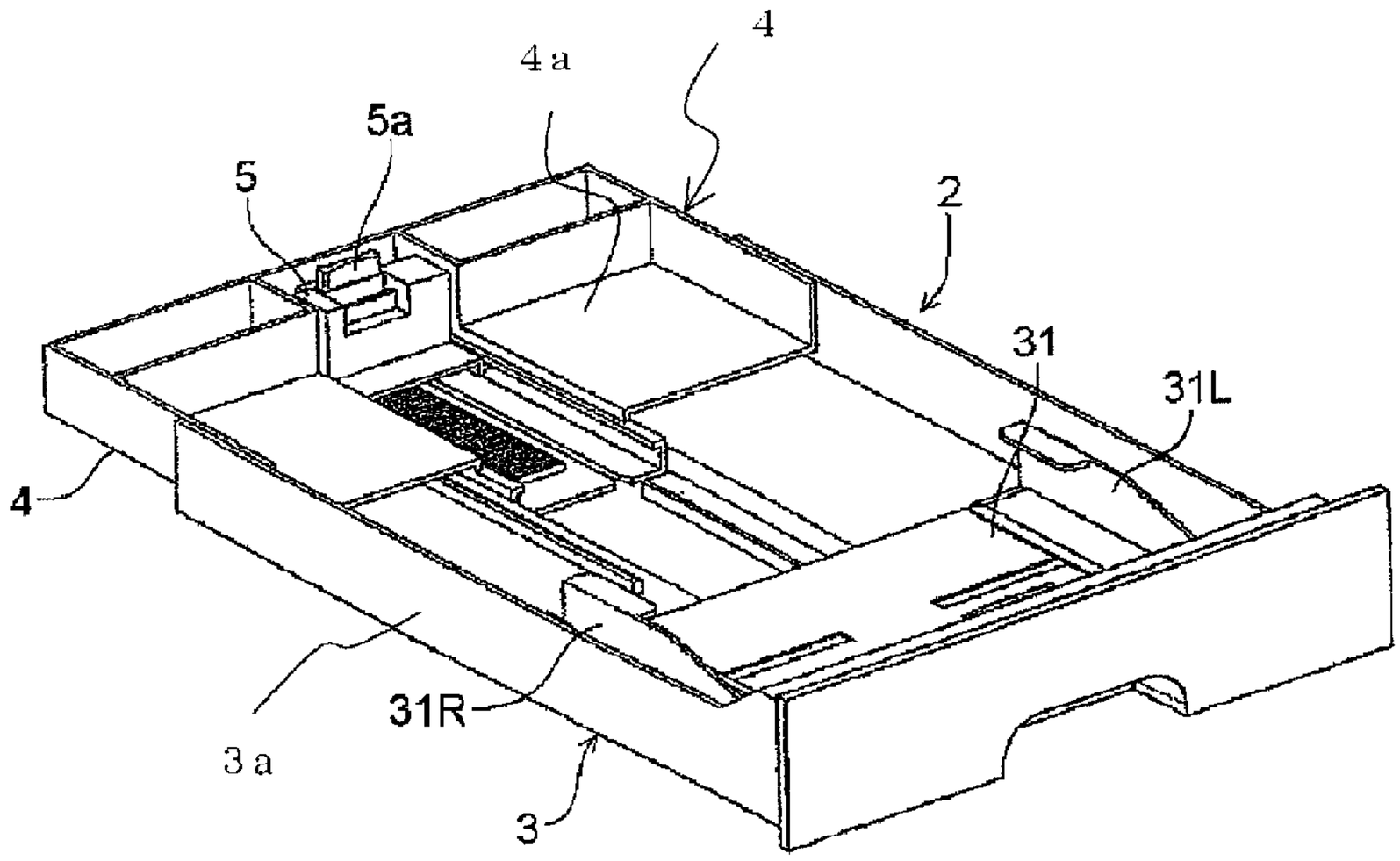


FIG. 3

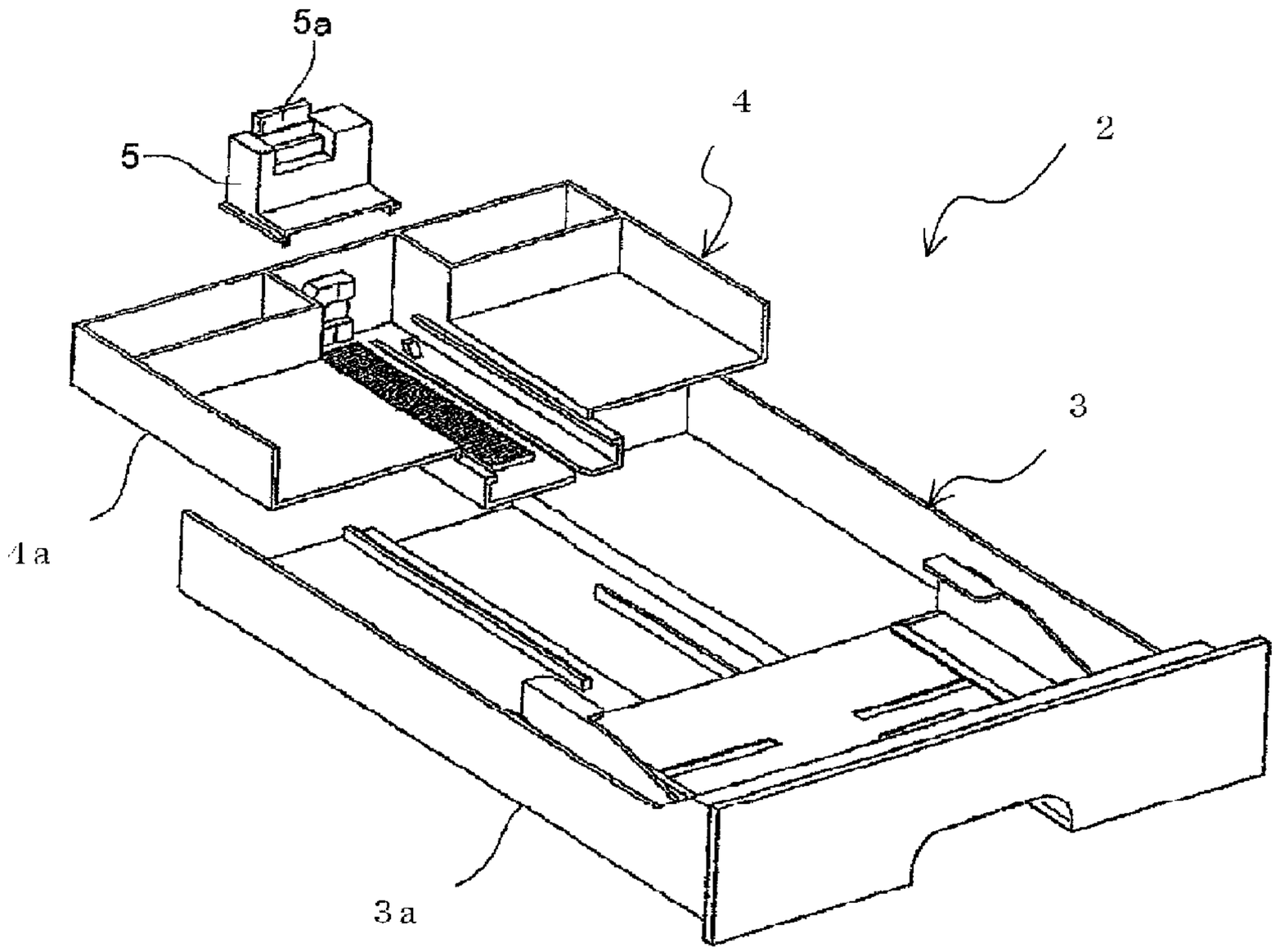


FIG. 4

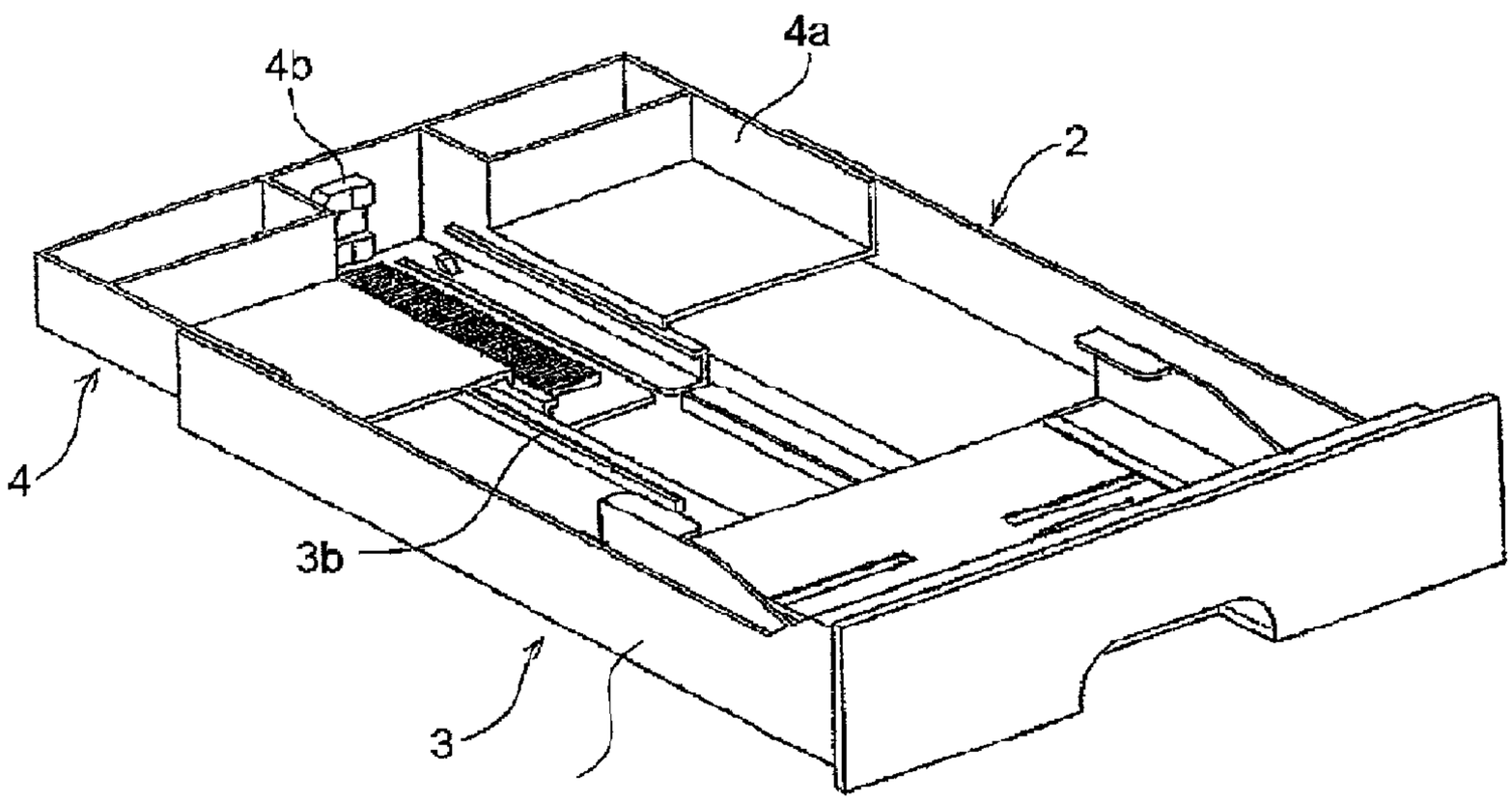


FIG. 5A

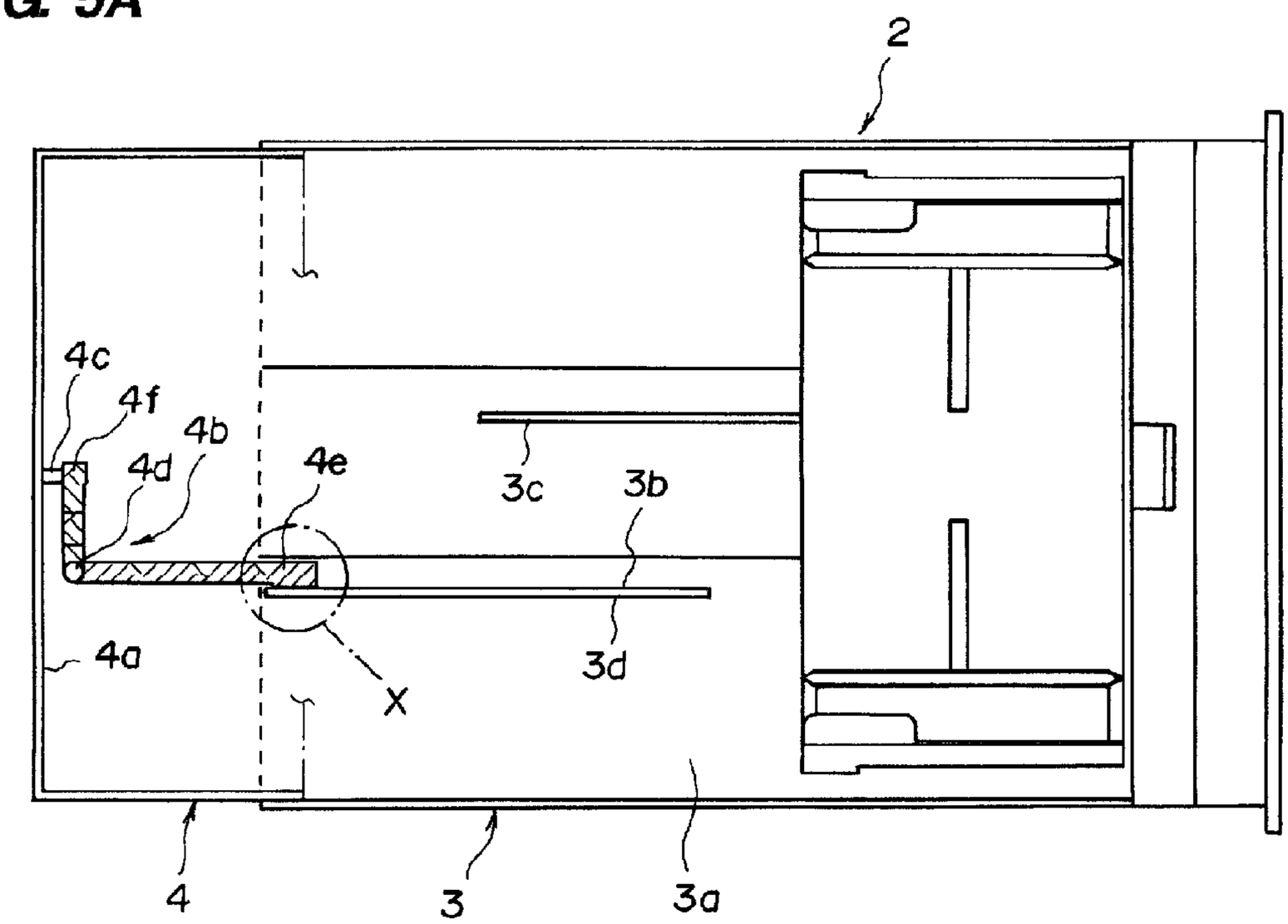
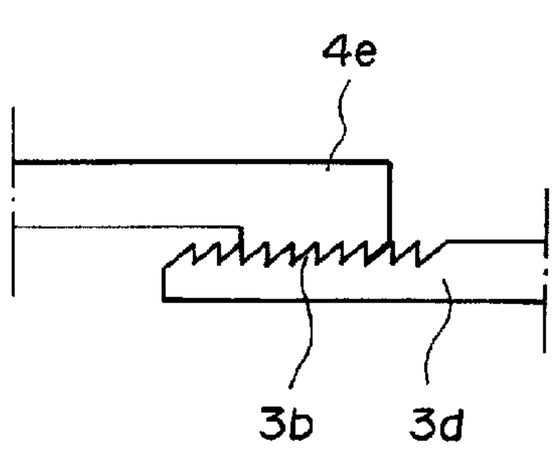


FIG. 5B



DETAILS OF X PART

FIG. 6

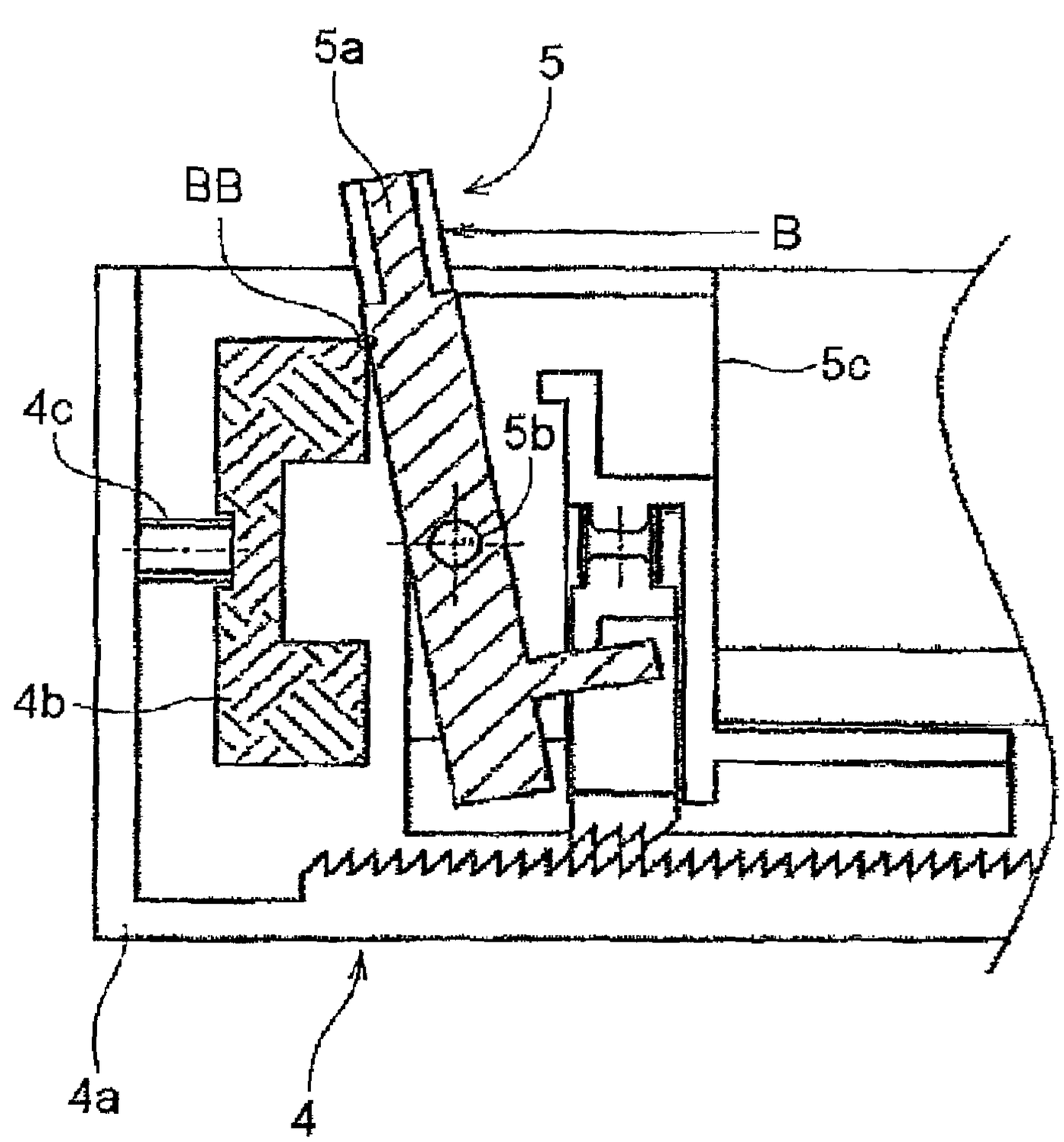


FIG. 7

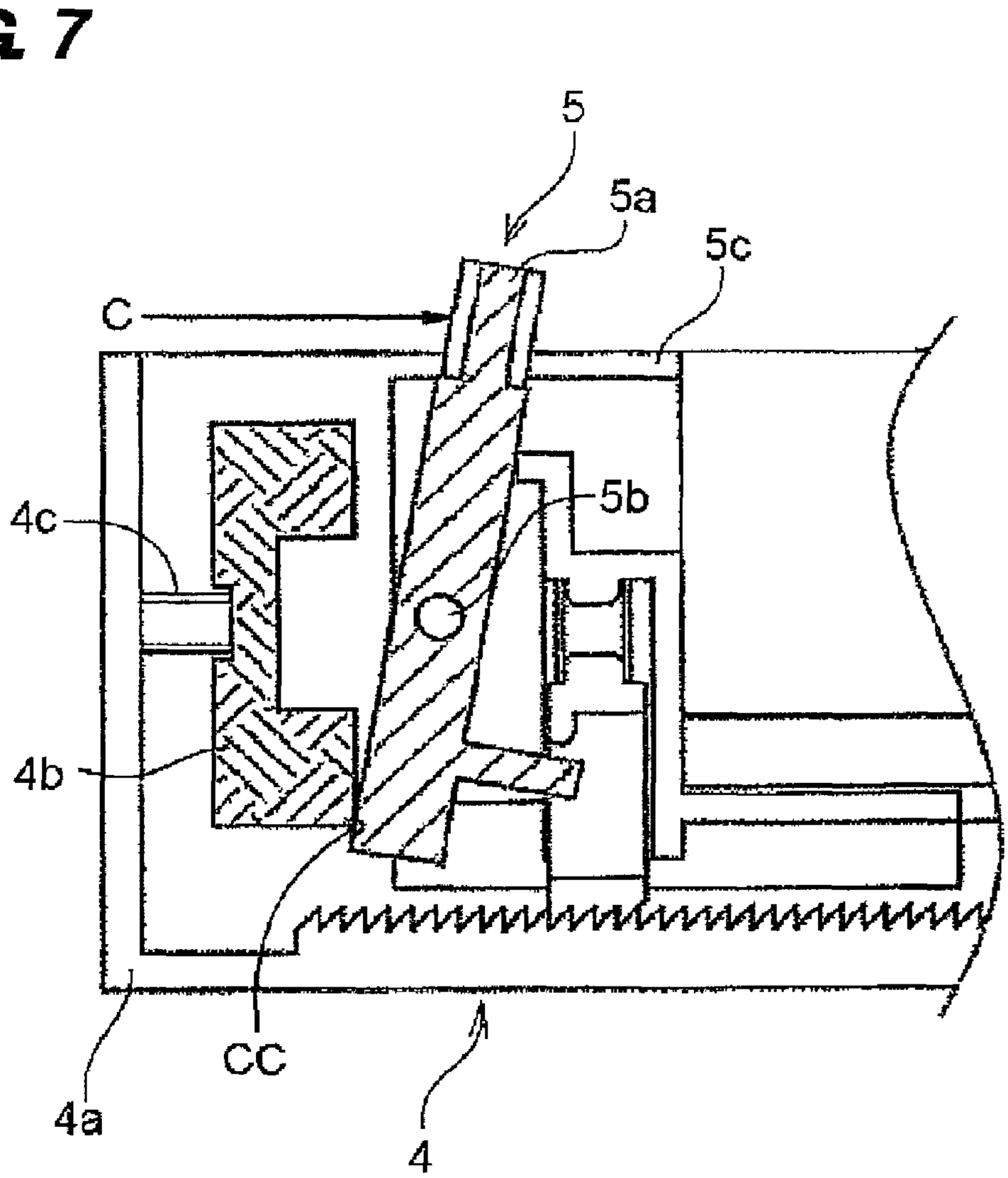


FIG. 8

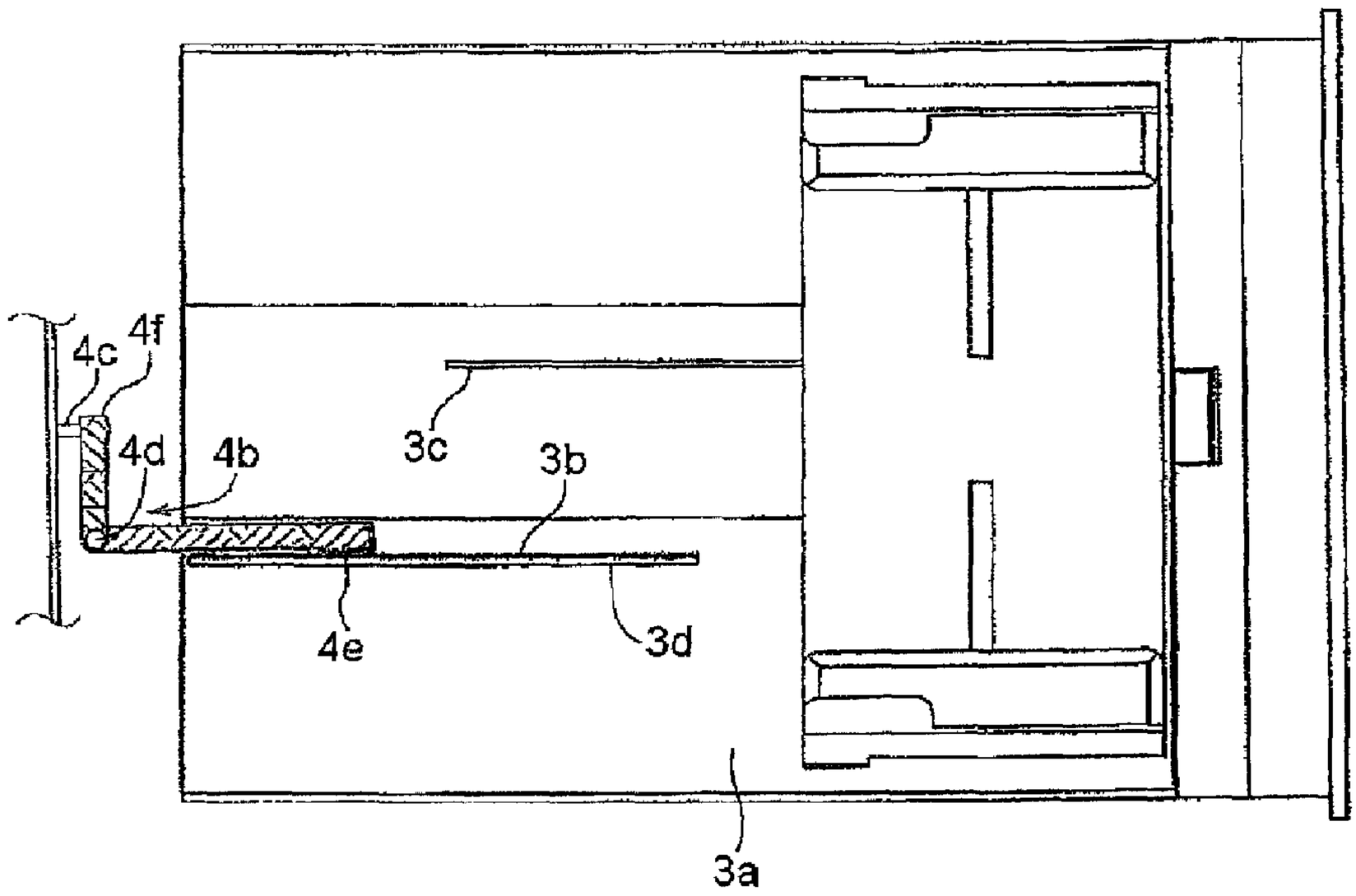


FIG. 9A

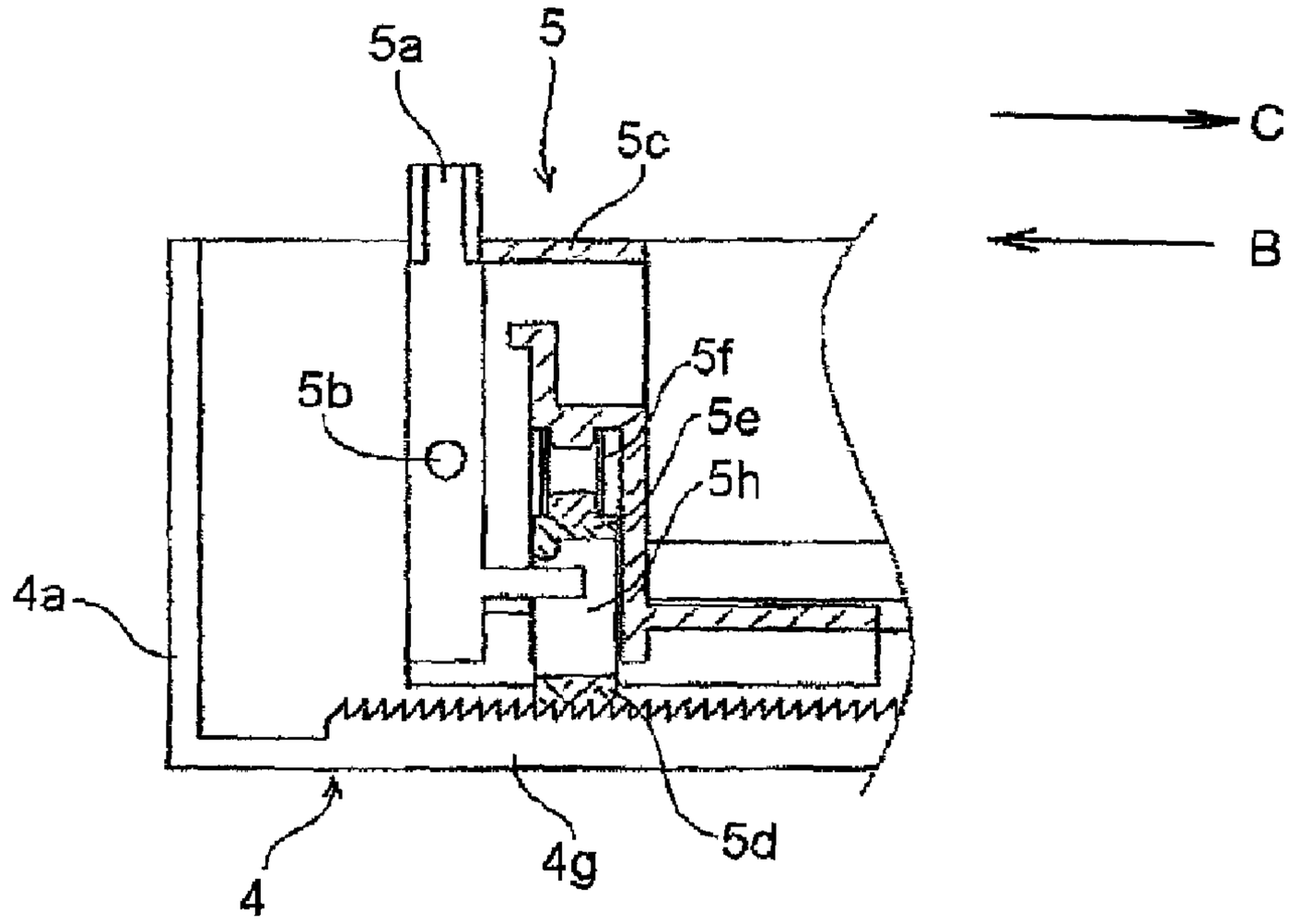


FIG. 9B

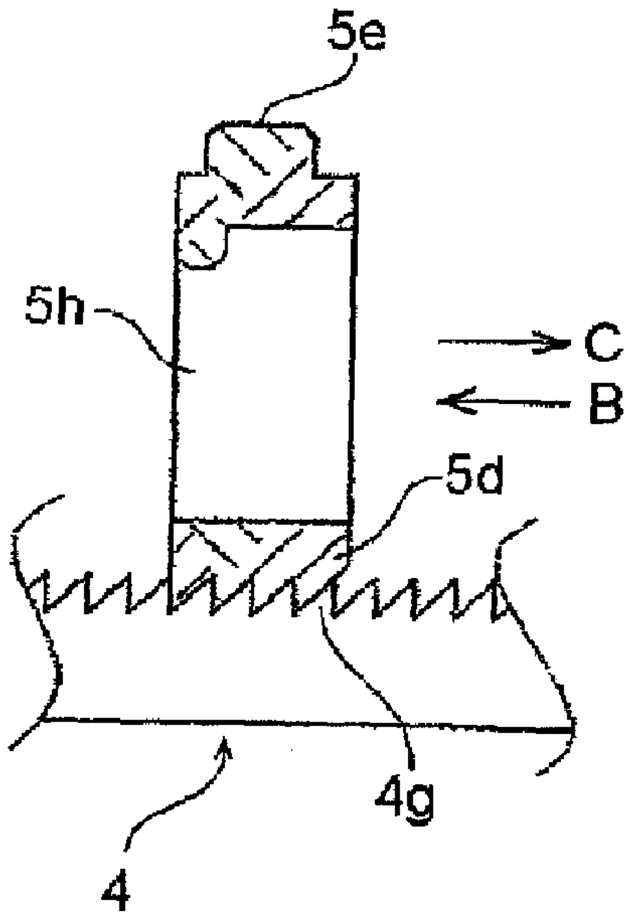


FIG. 10

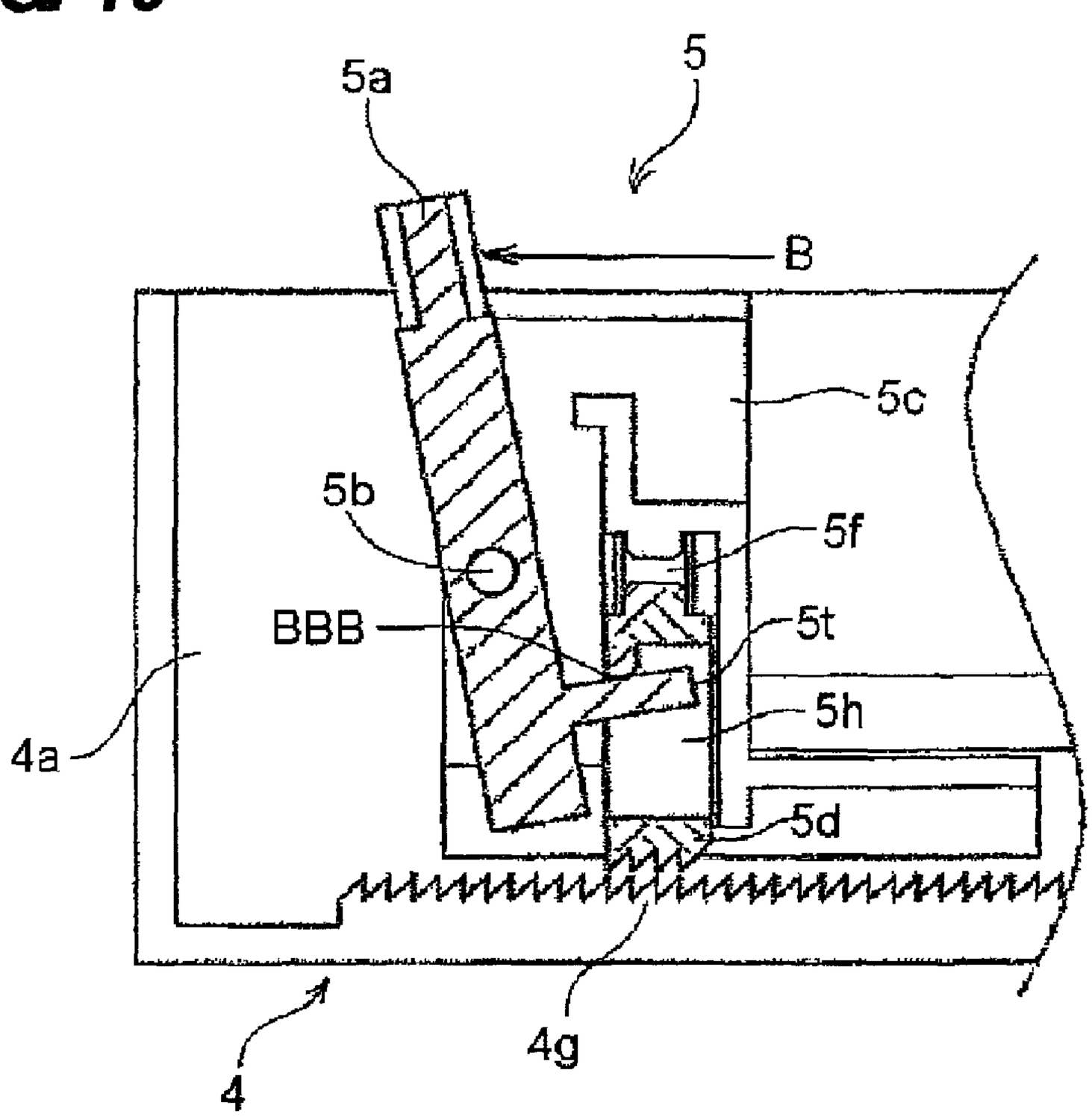


FIG. 11

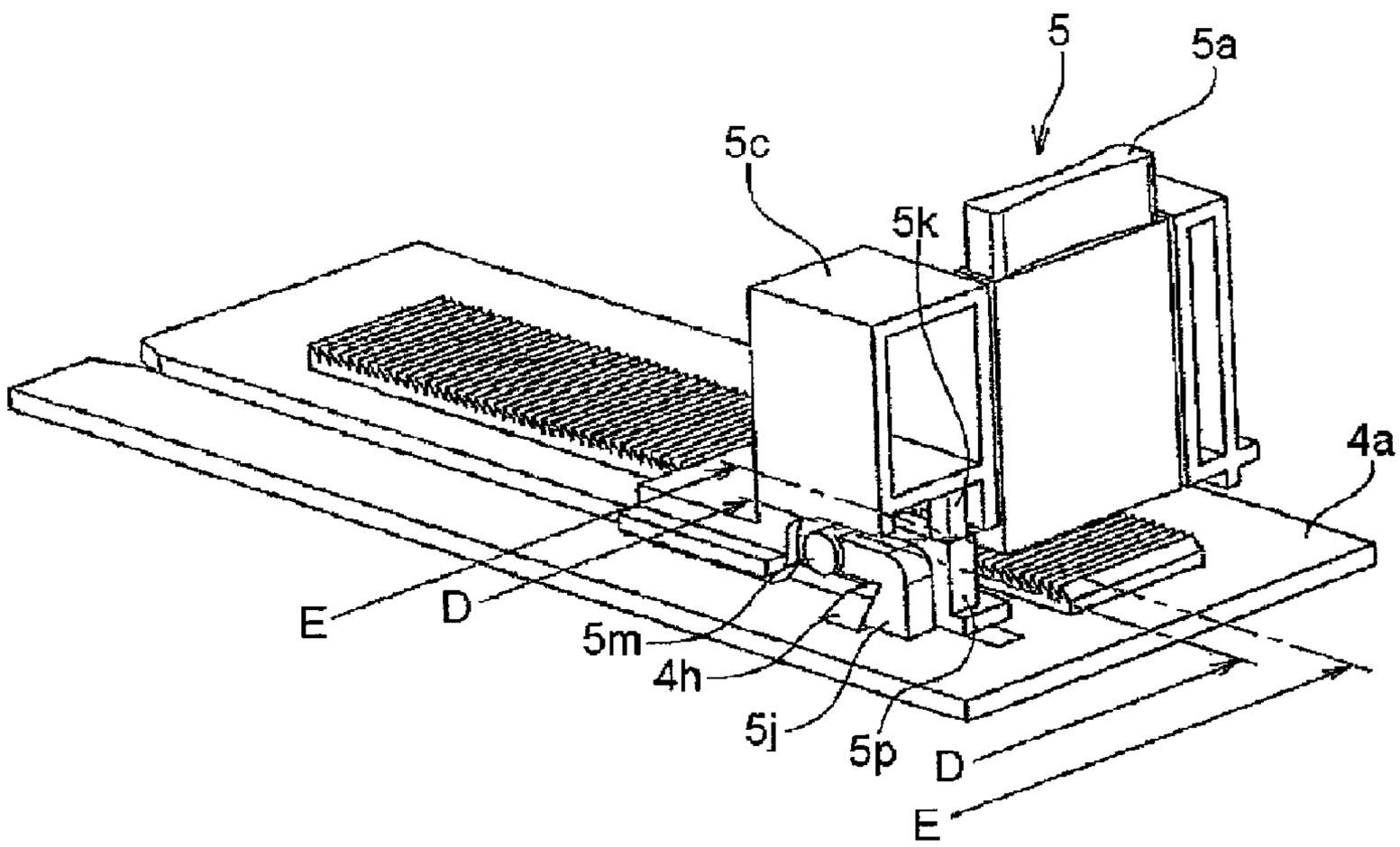


FIG. 12A

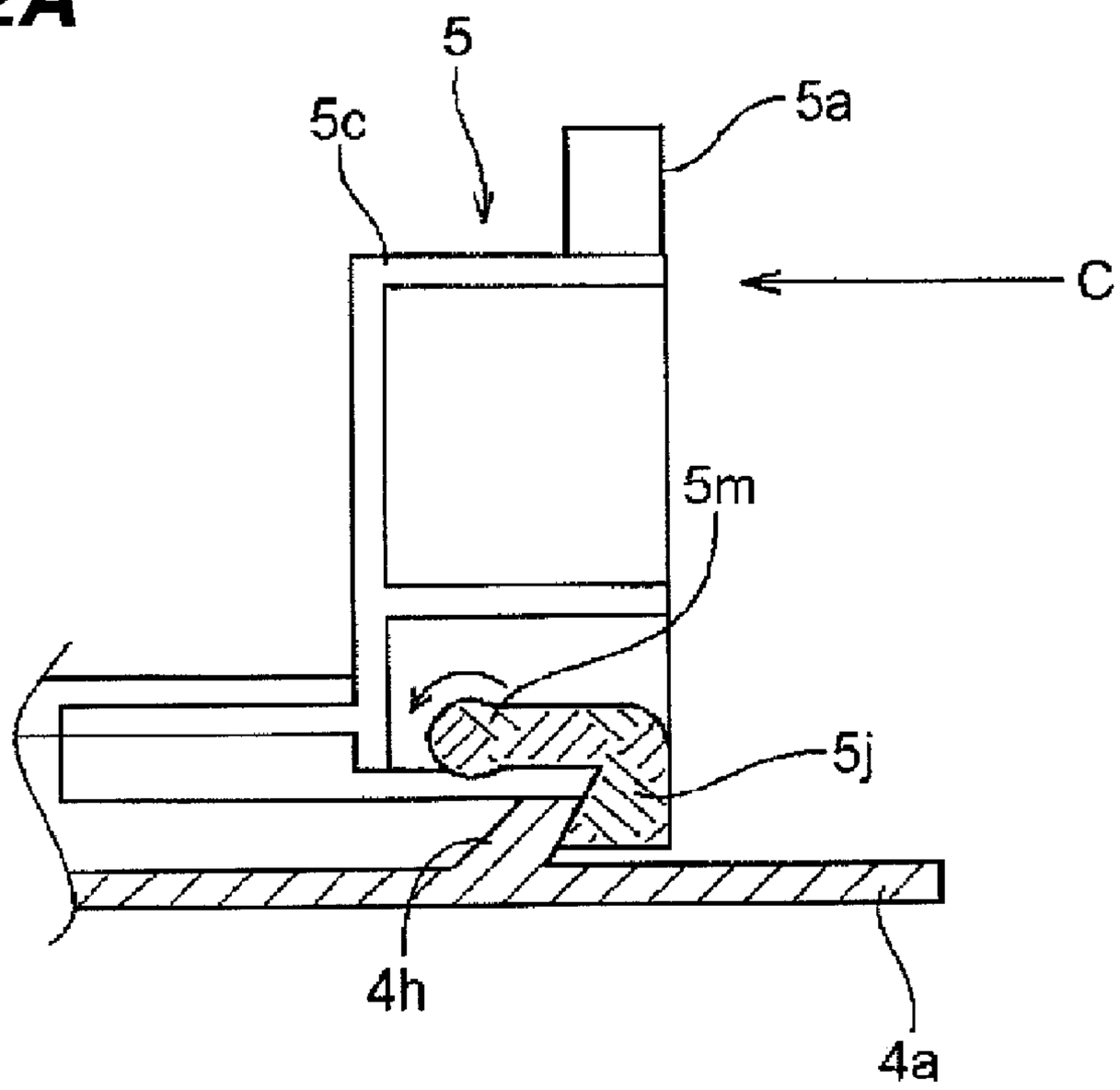


FIG. 12B

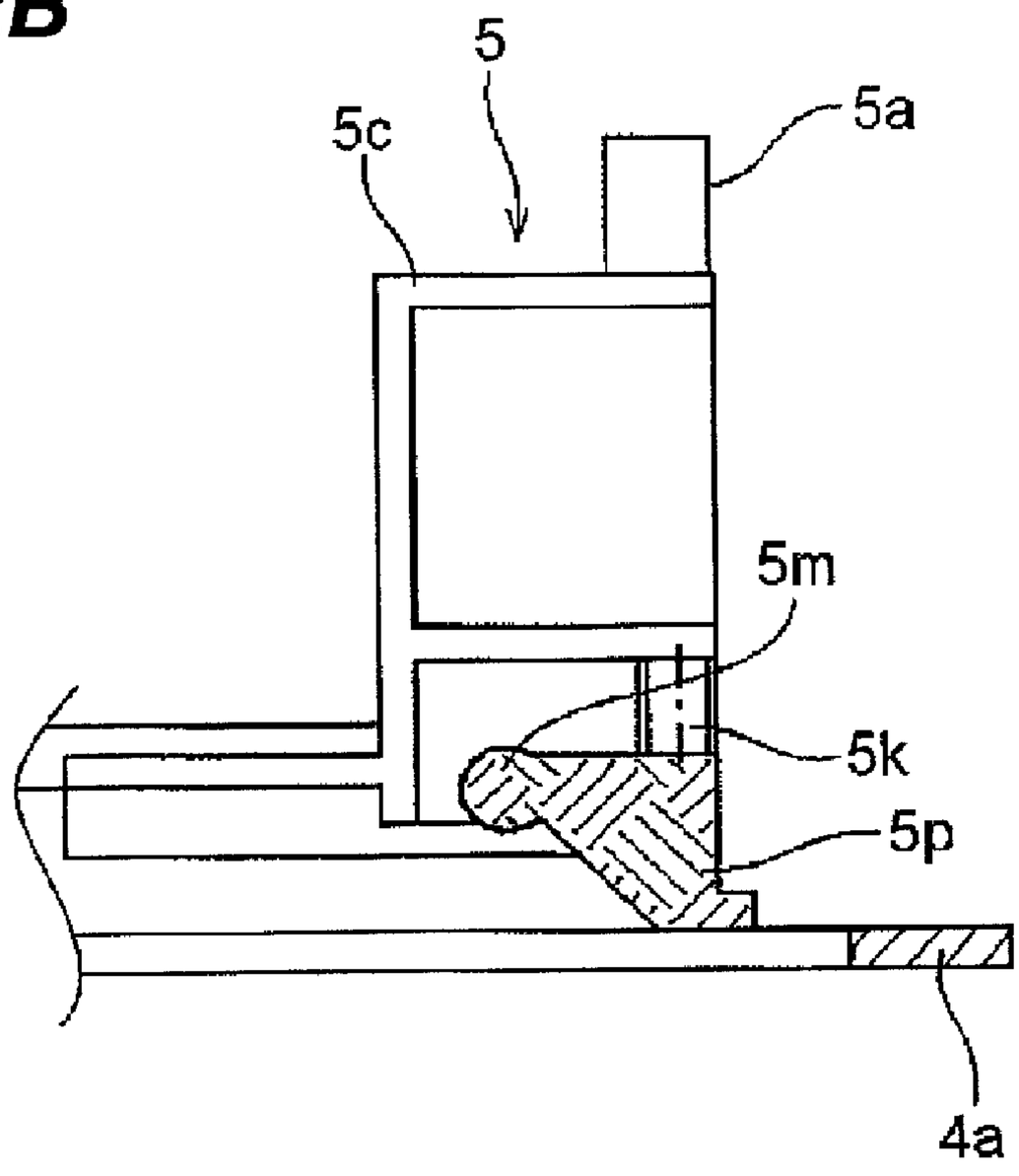


FIG. 13

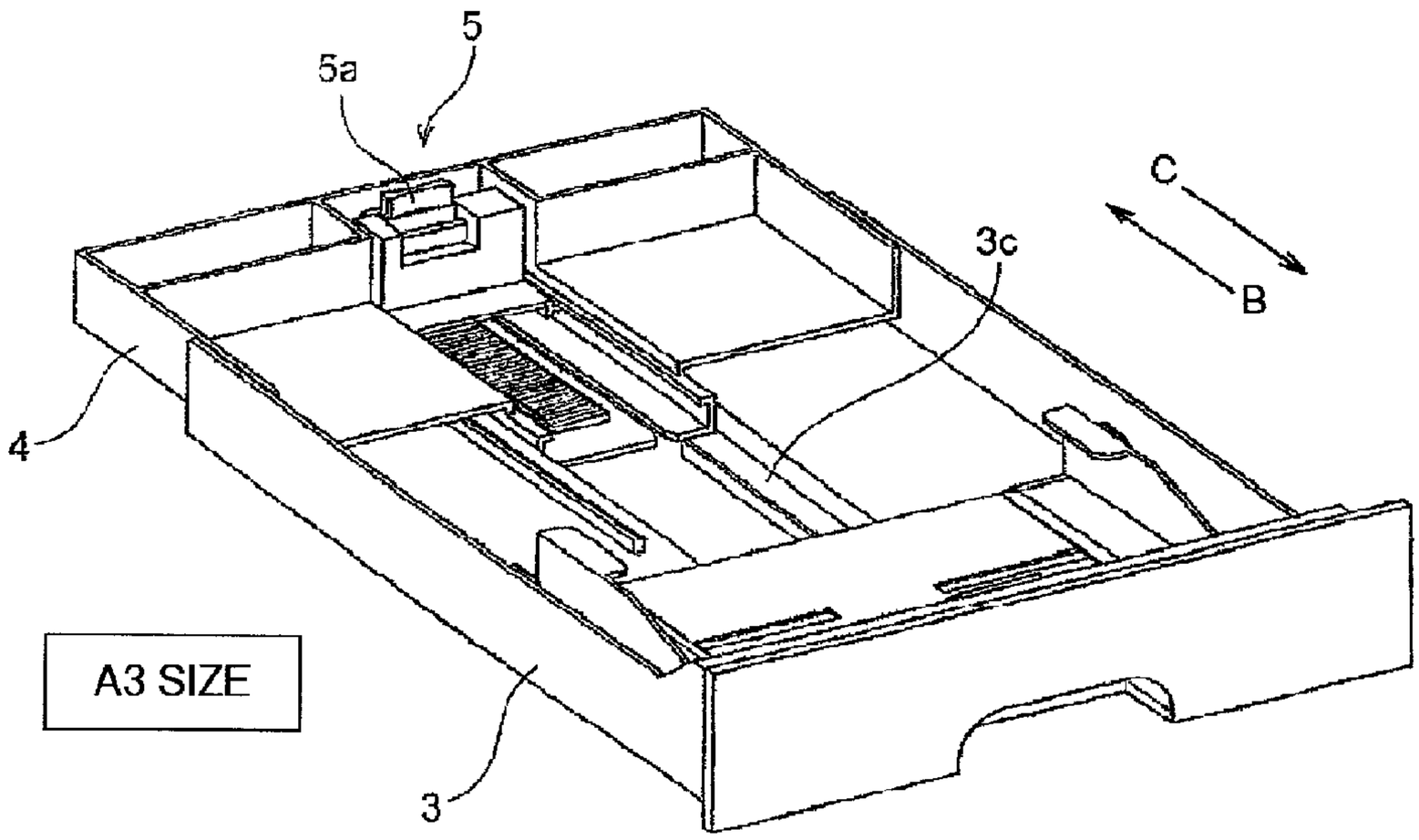


FIG. 14A

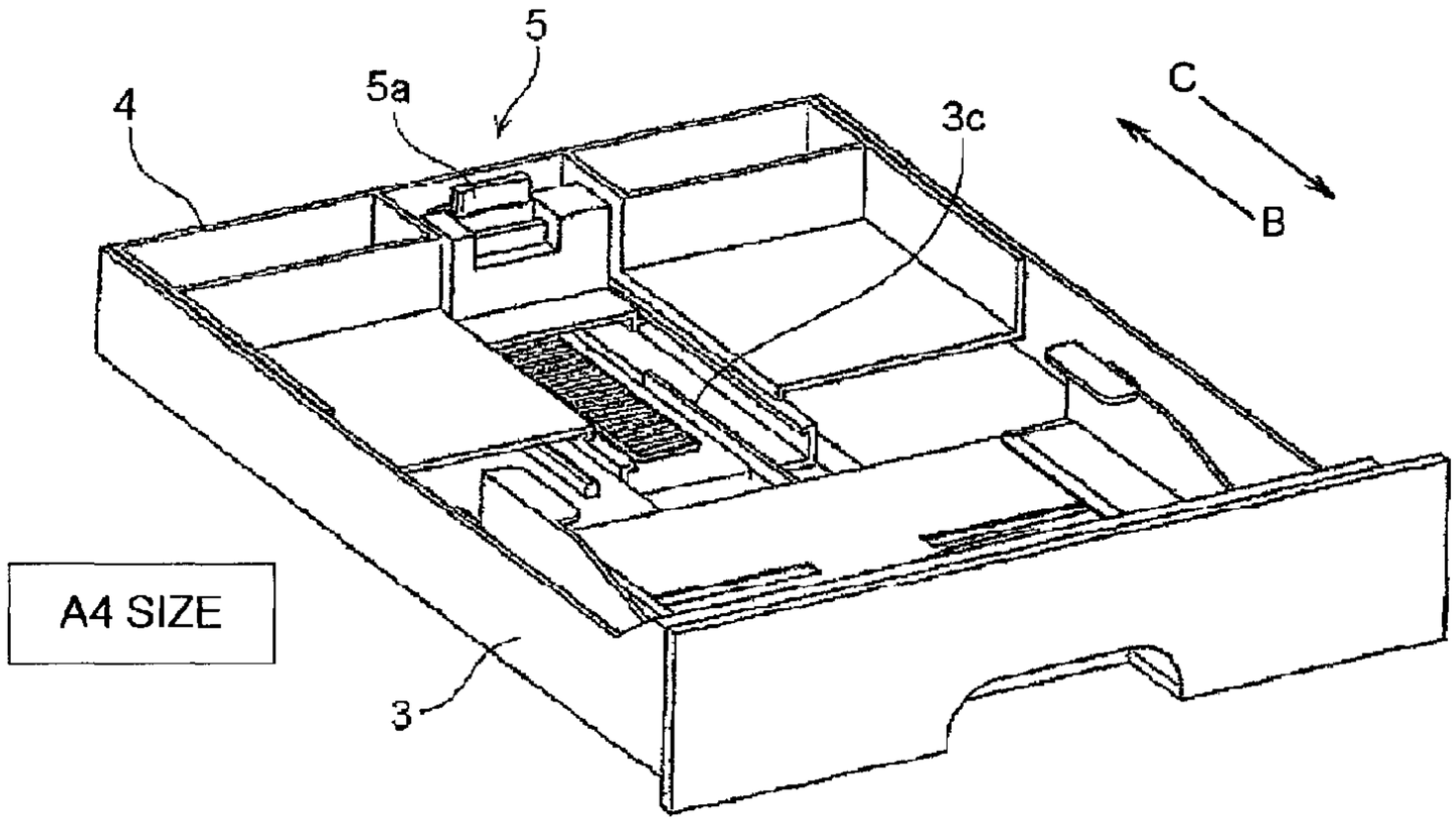


FIG. 14B

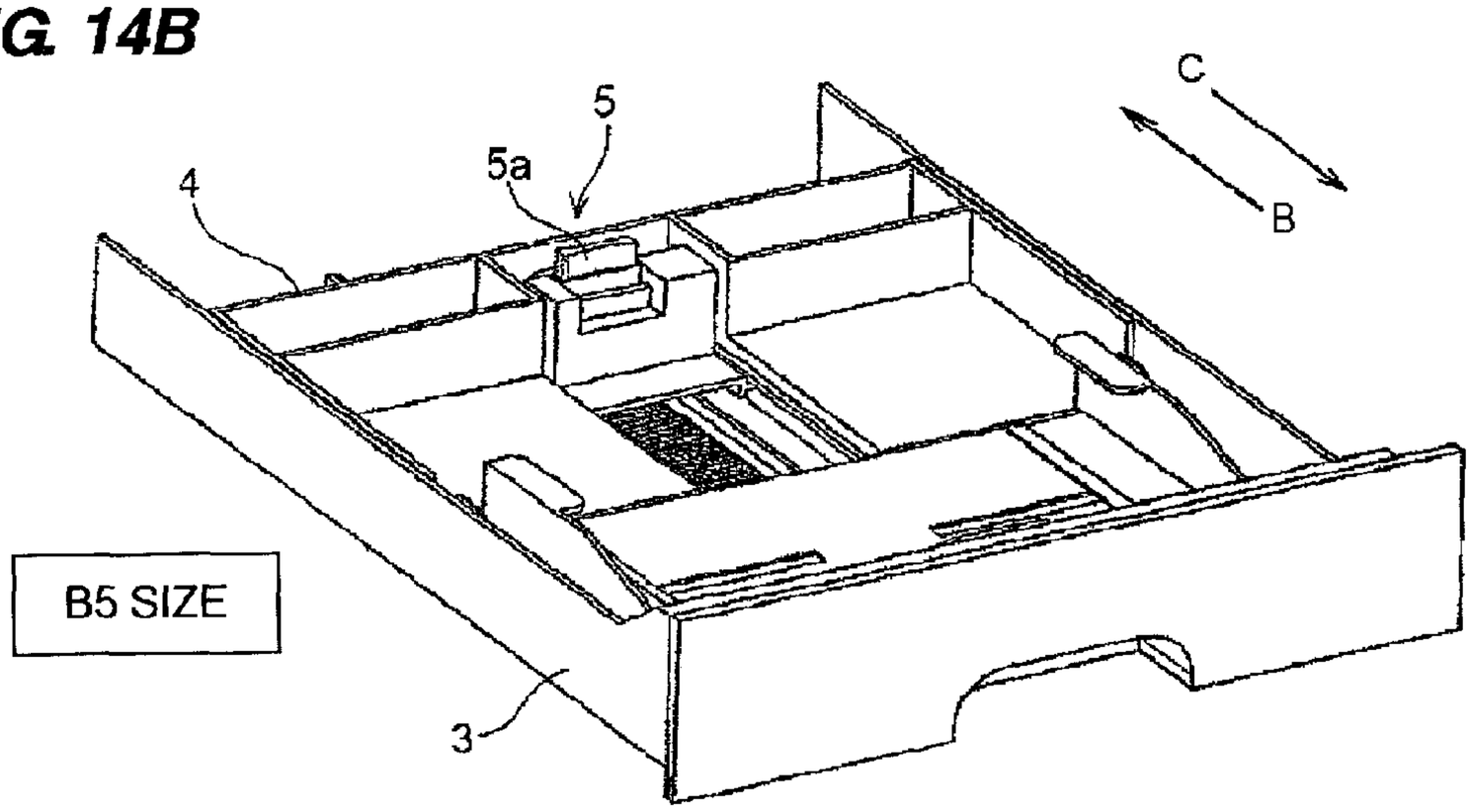


FIG. 15

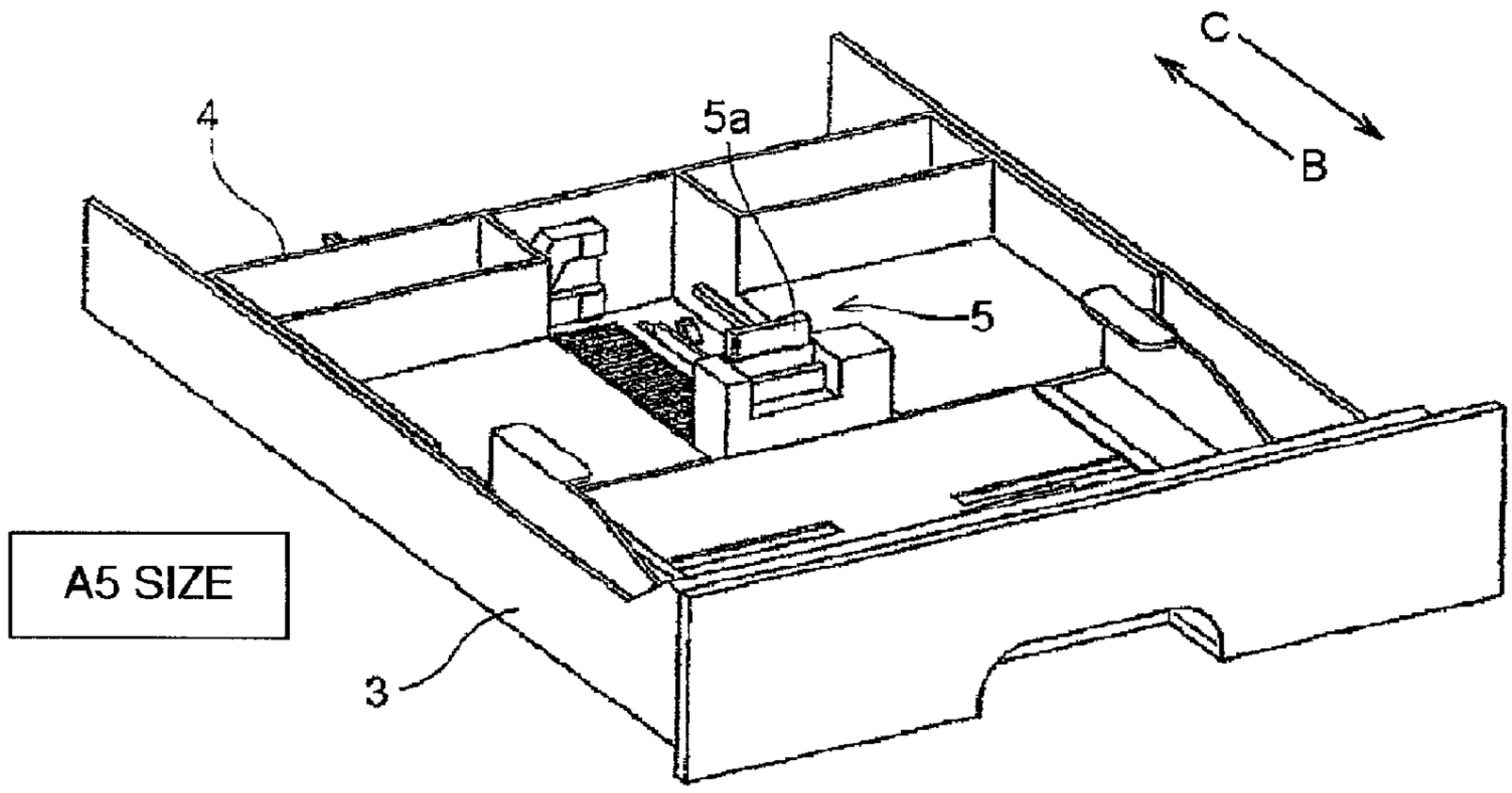


FIG. 16A

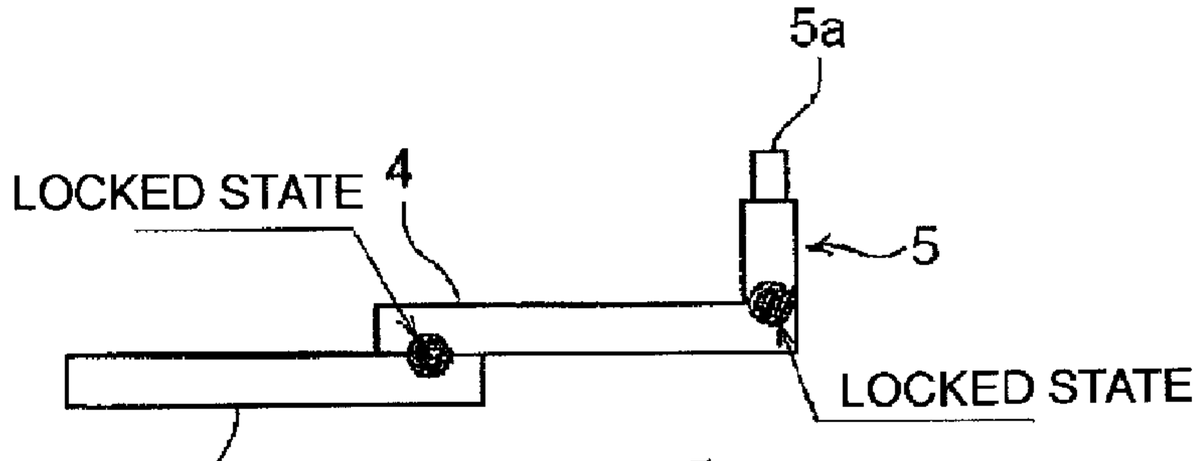


FIG. 16B

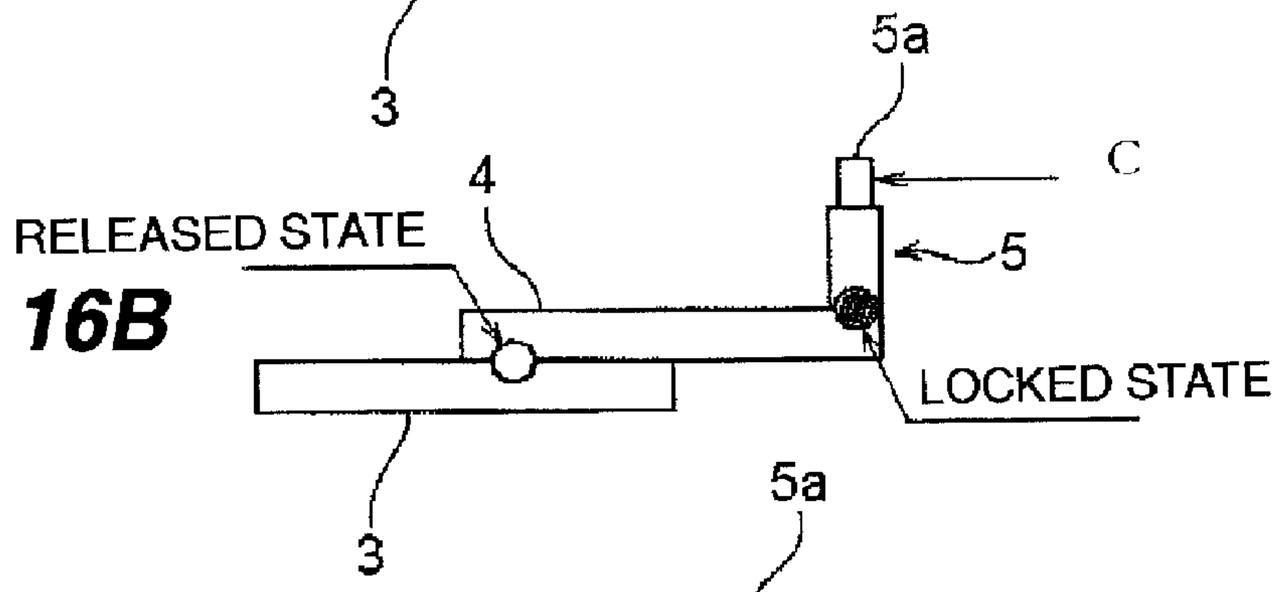


FIG. 16C

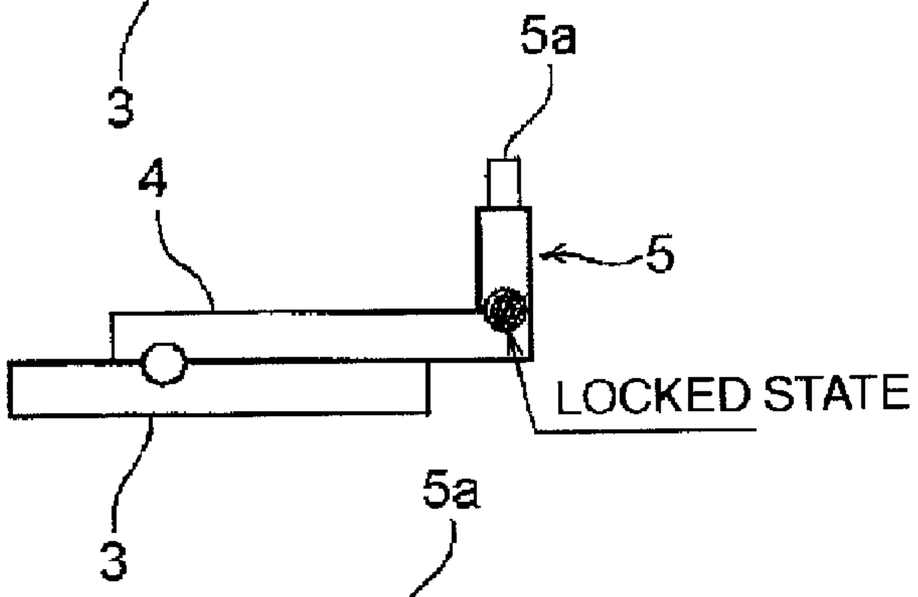


FIG. 16D

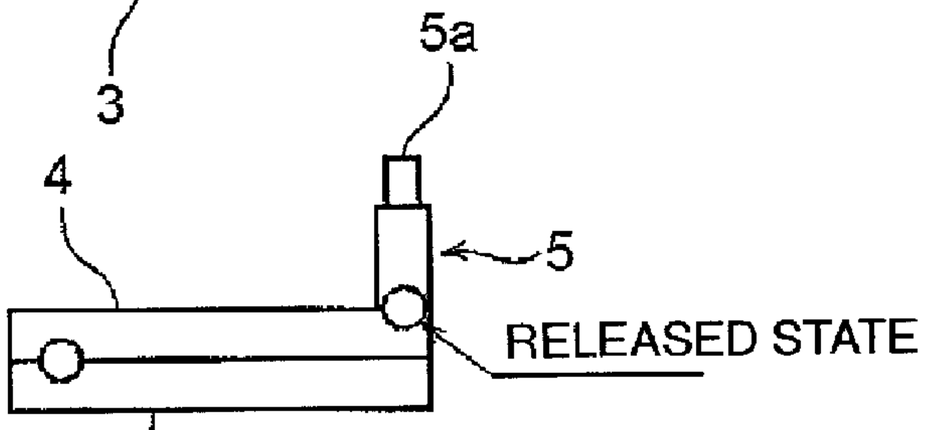


FIG. 16E

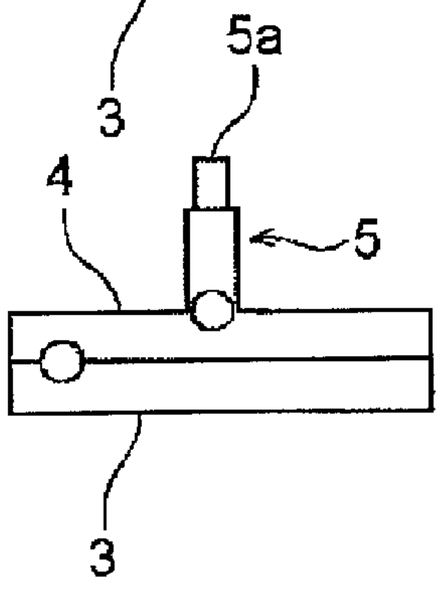


FIG. 17

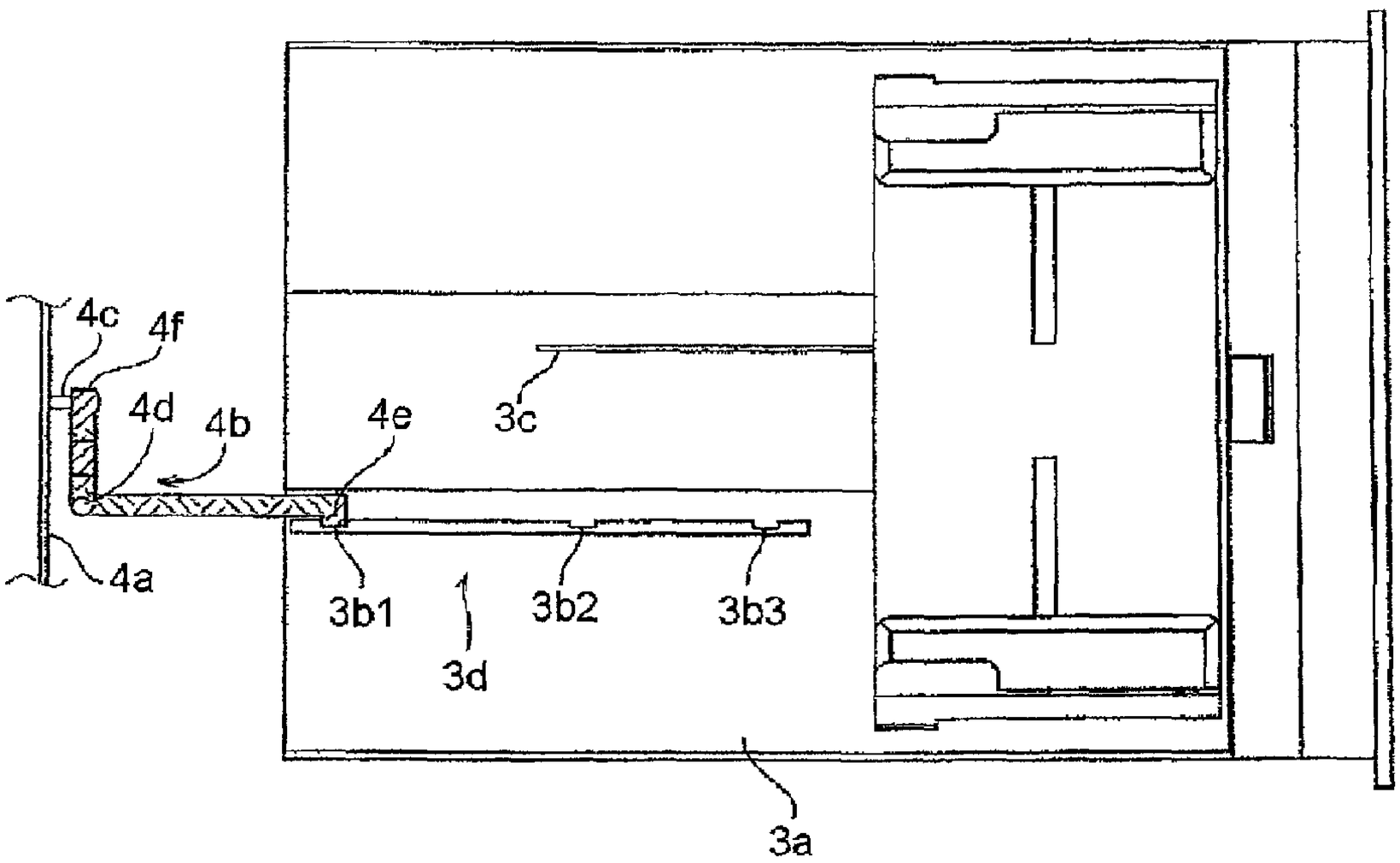


FIG. 18A

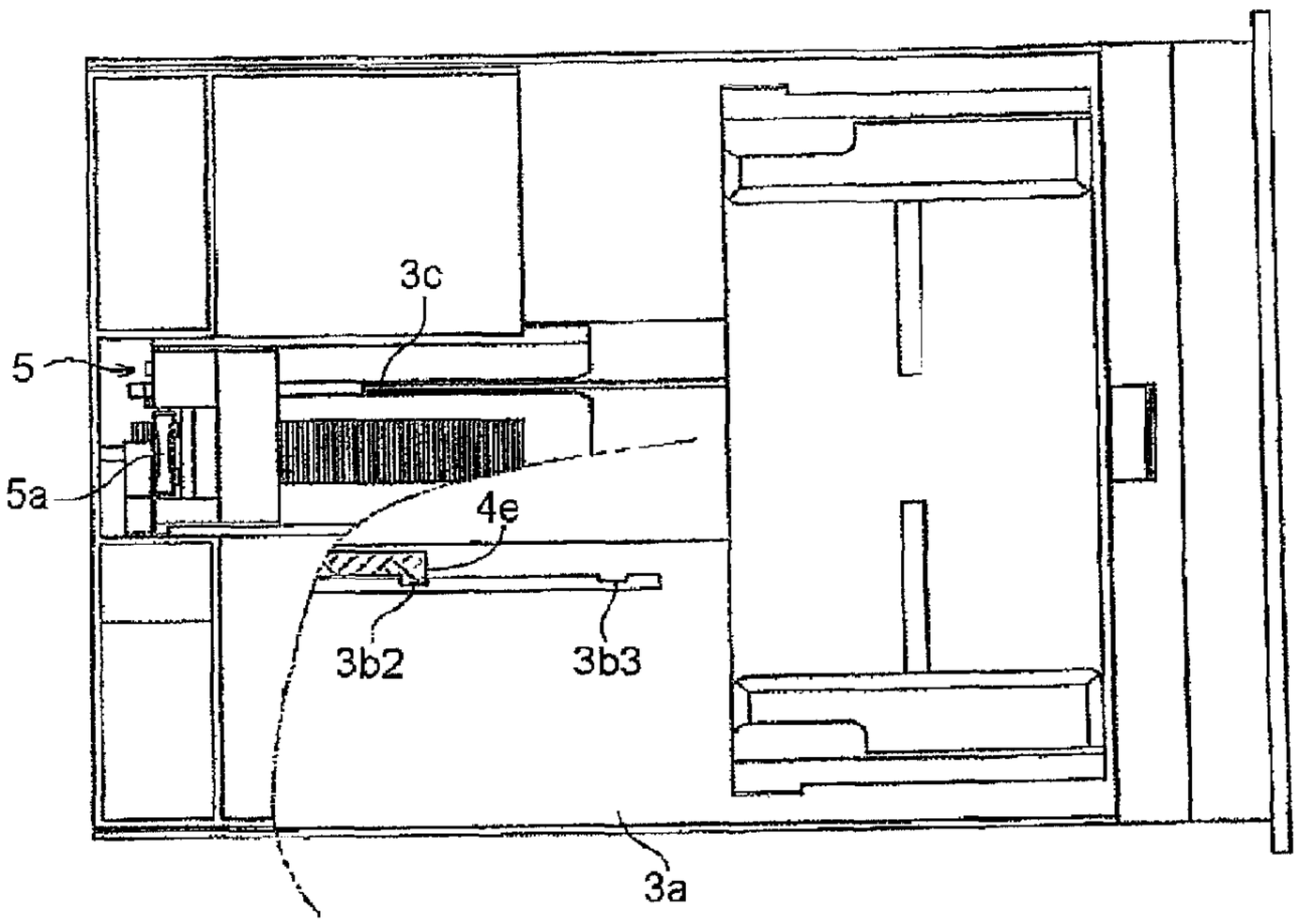
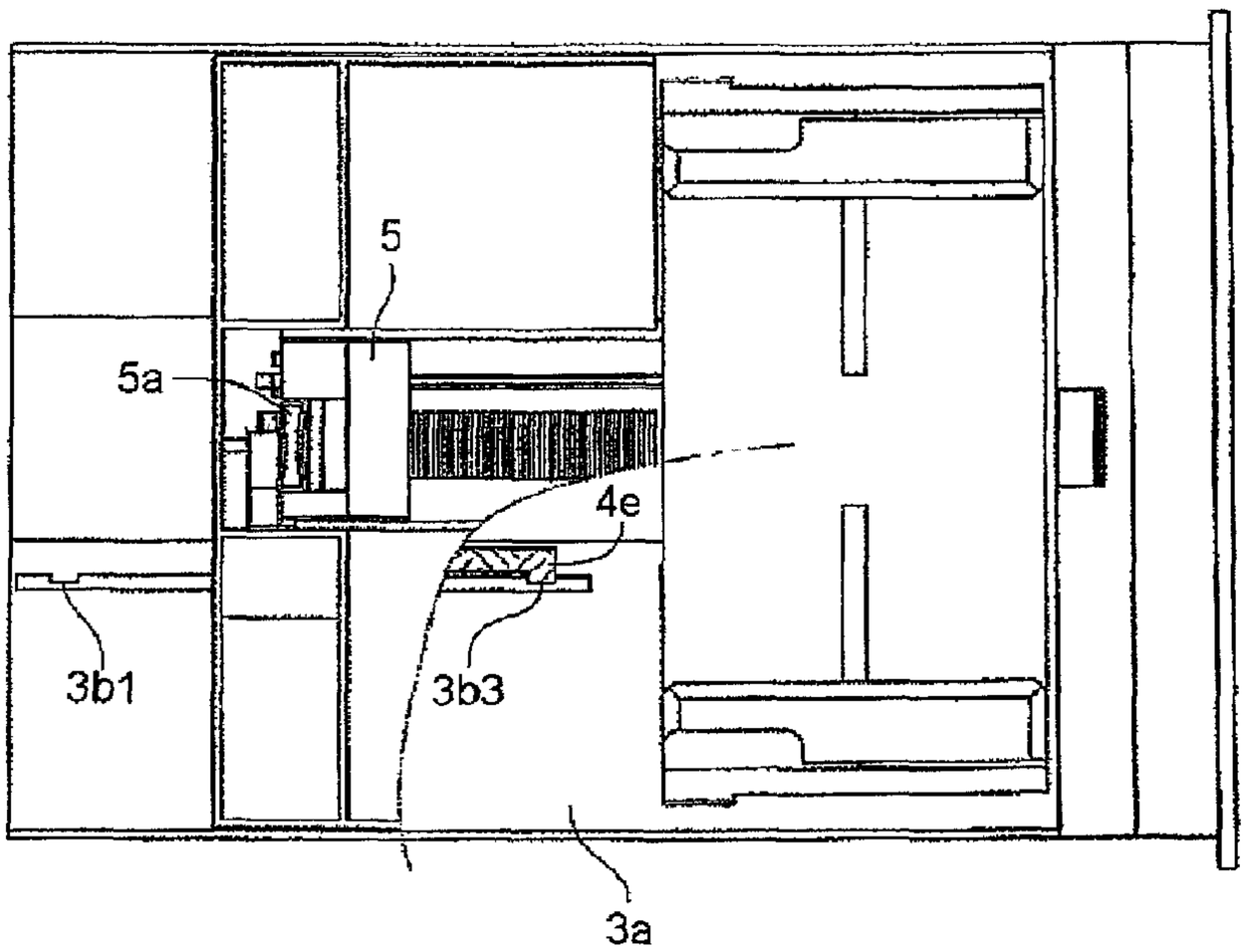
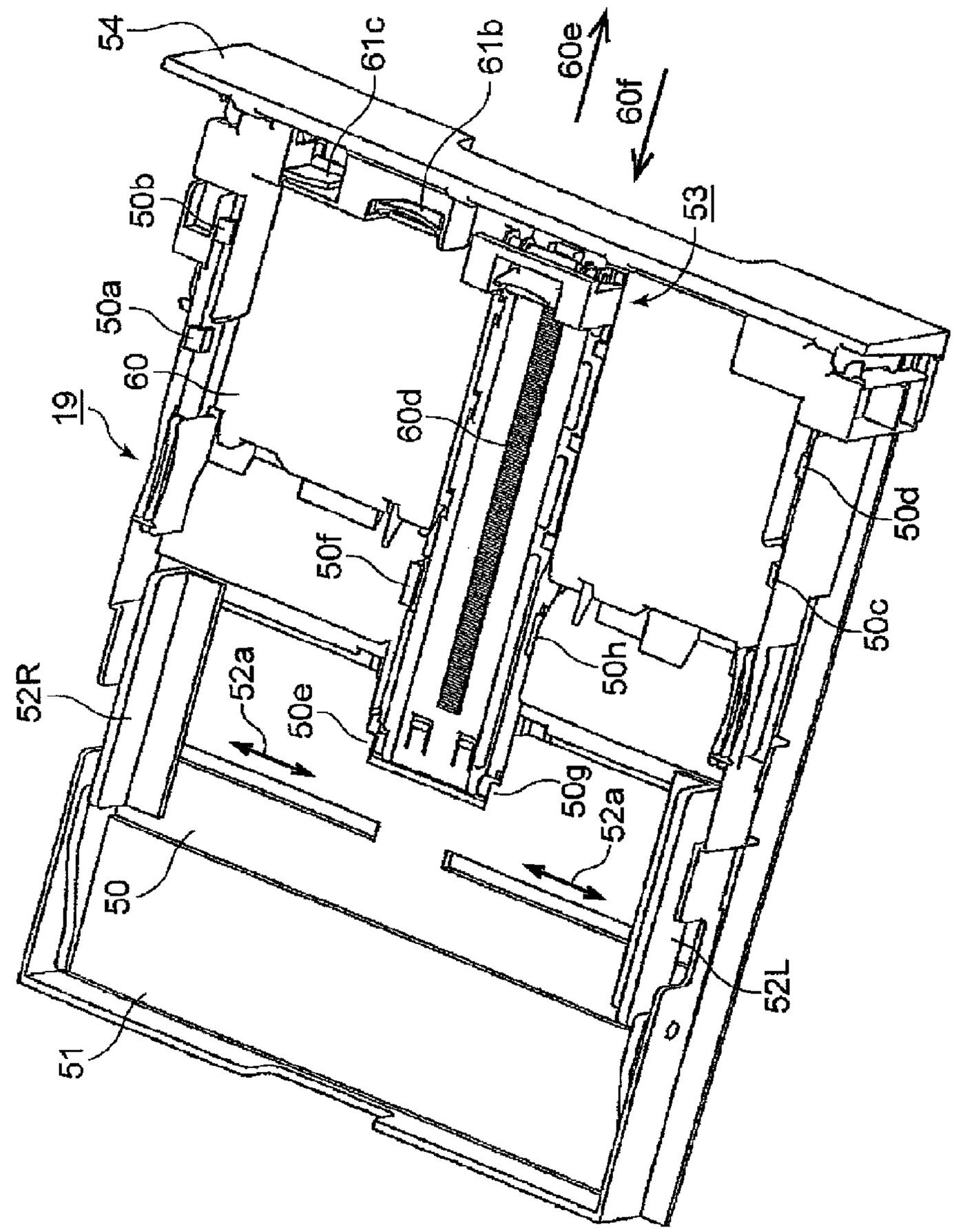


FIG. 18B

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50a
60
19
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52a
50e
50g
52a
50
52L
51

FIG. 19

FIG. 20A

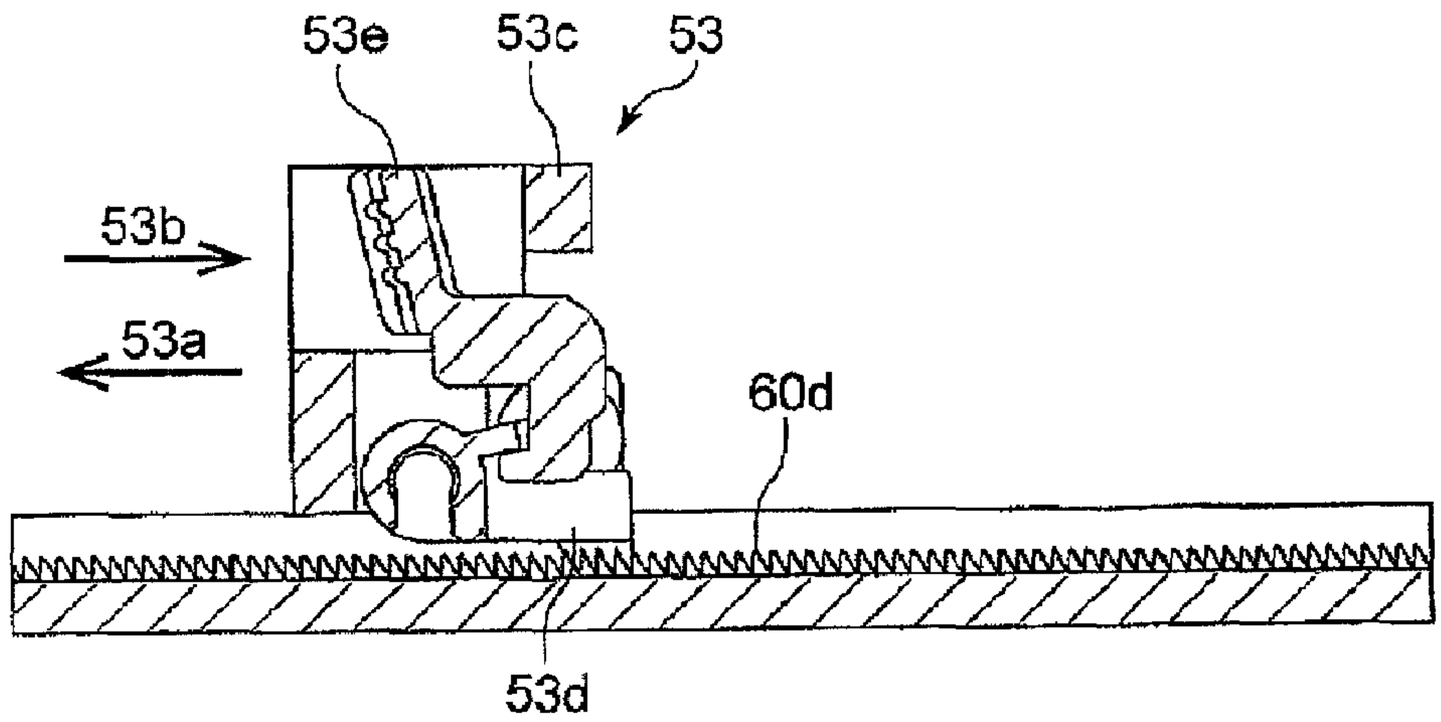
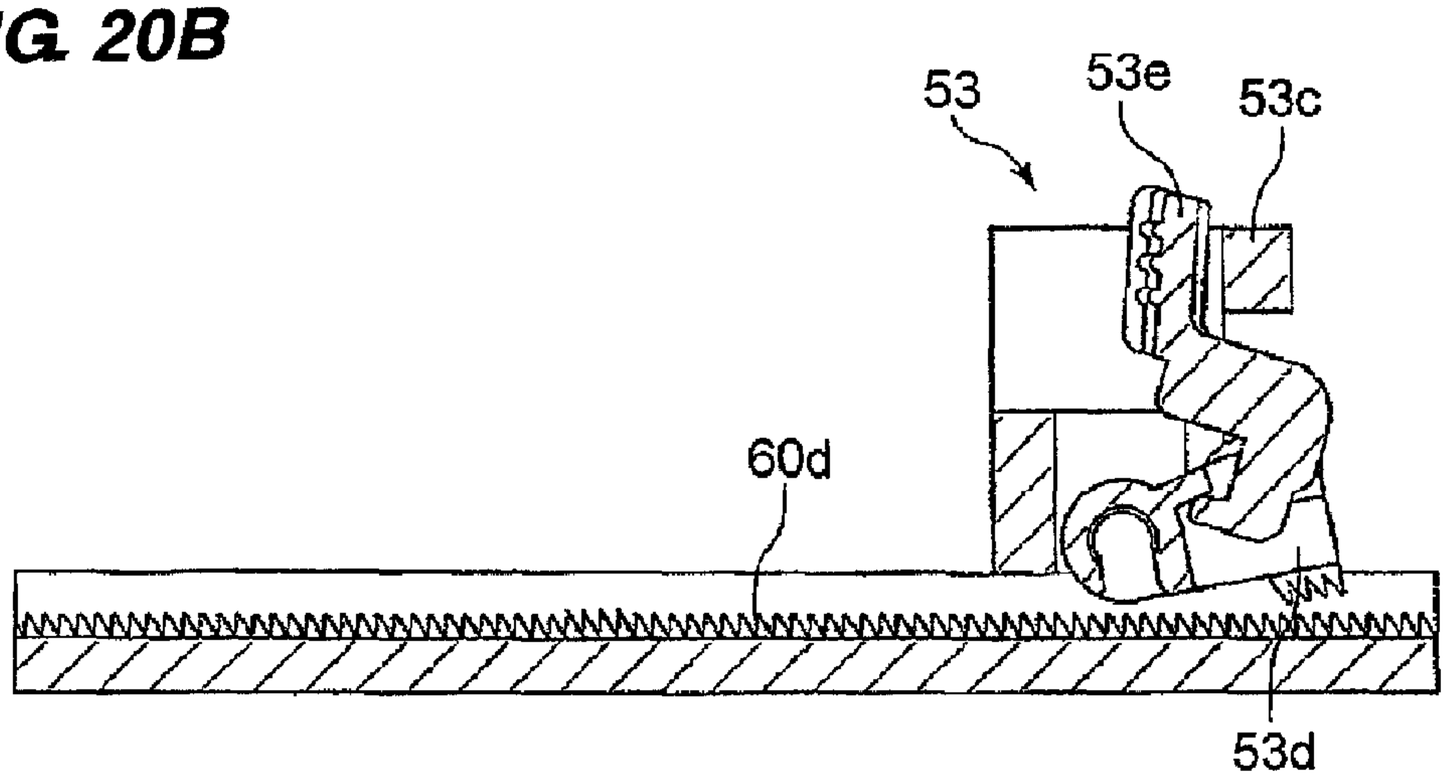
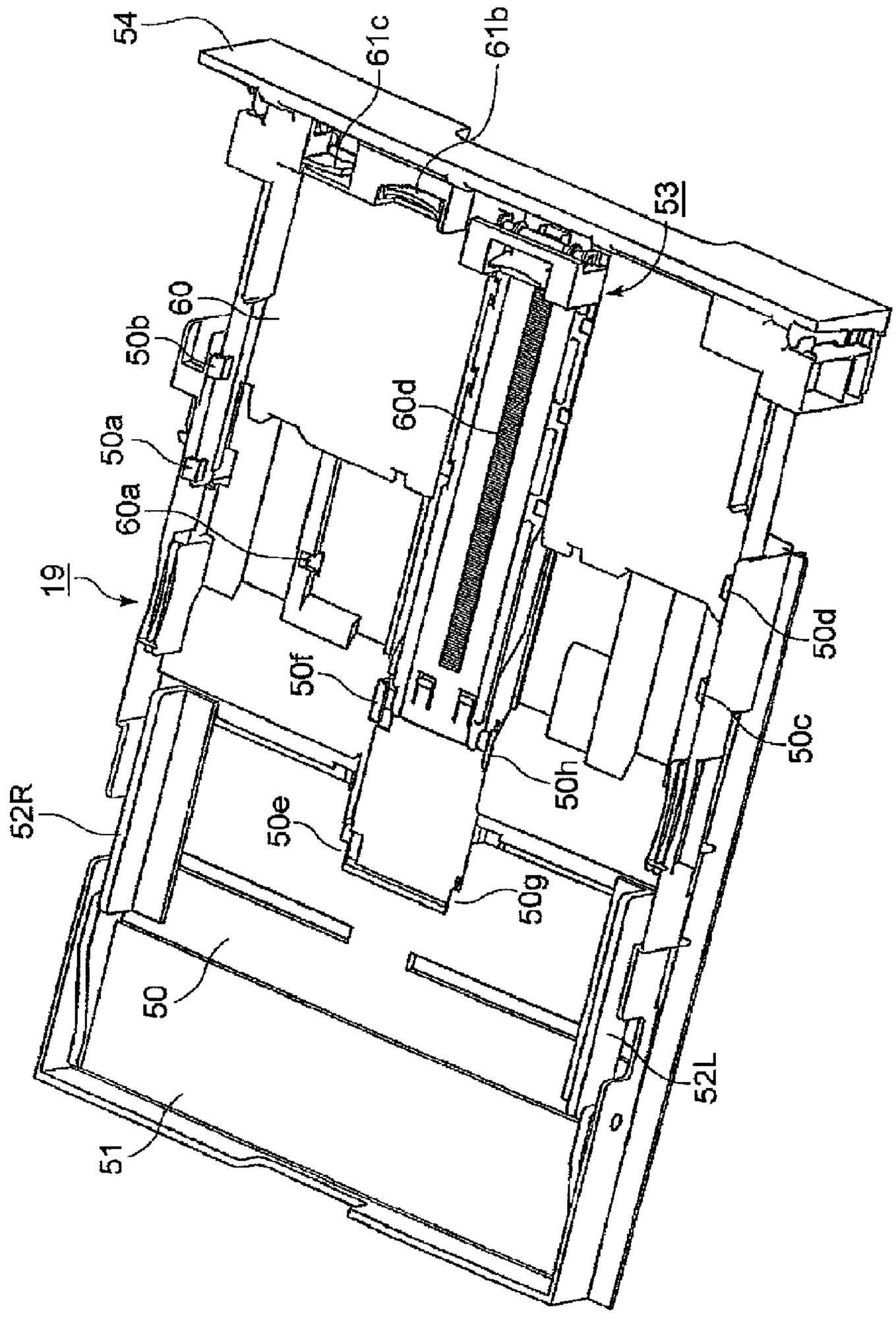


FIG. 20B

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52L
51

FIG. 21

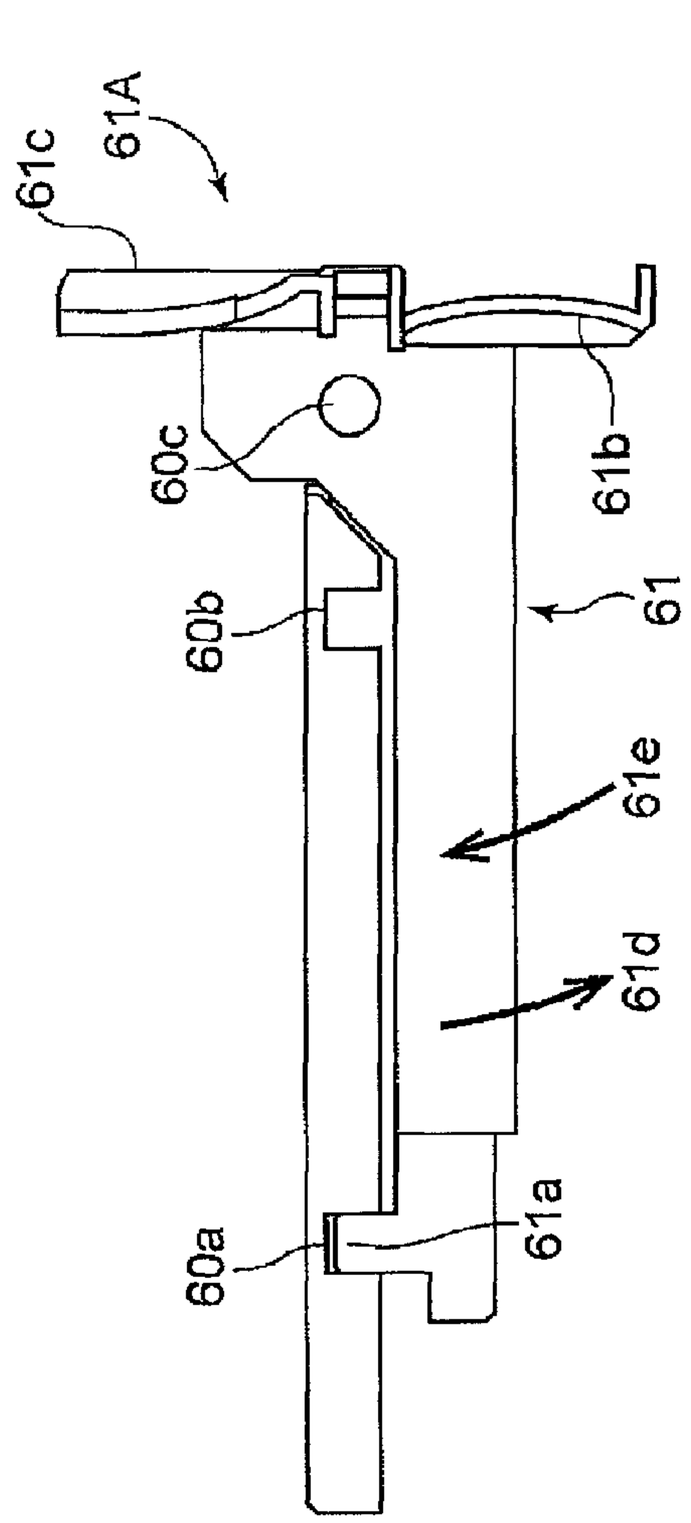


FIG. 22A

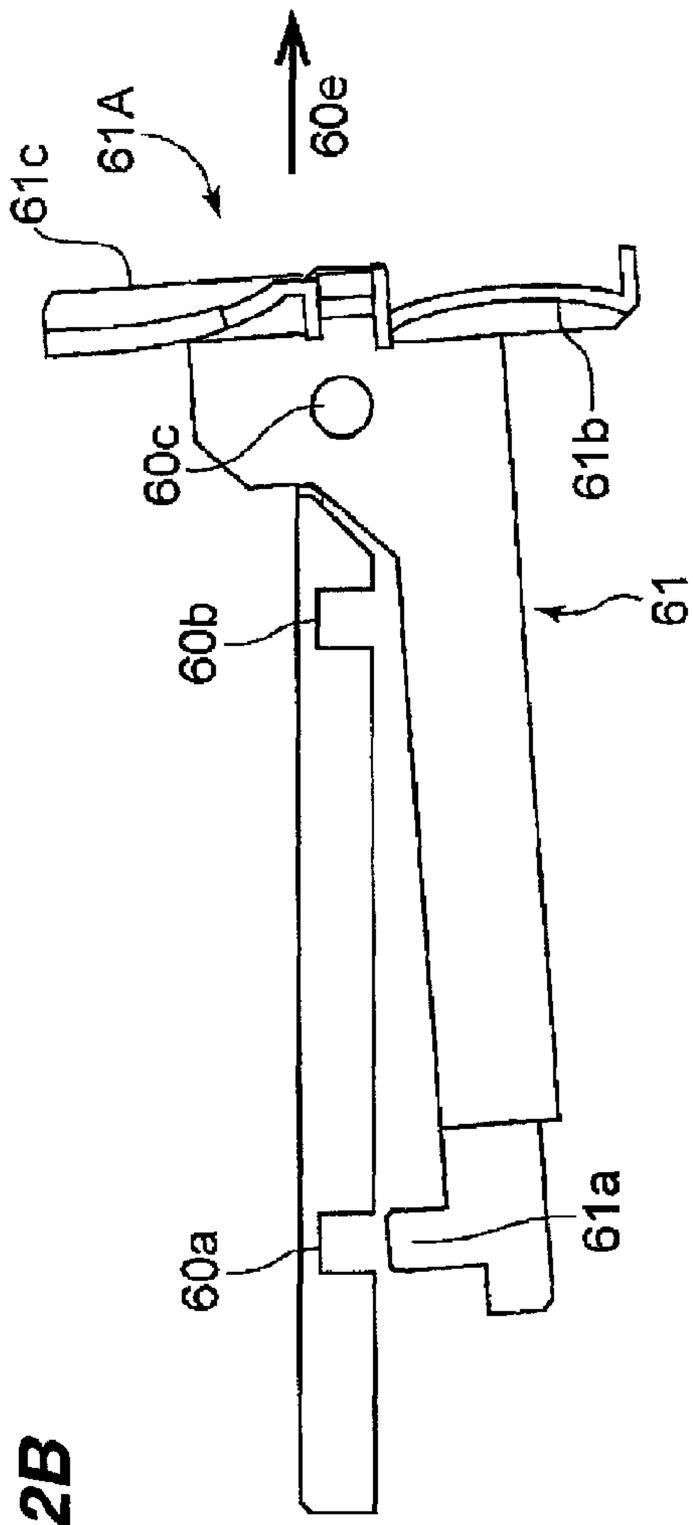


FIG. 22B

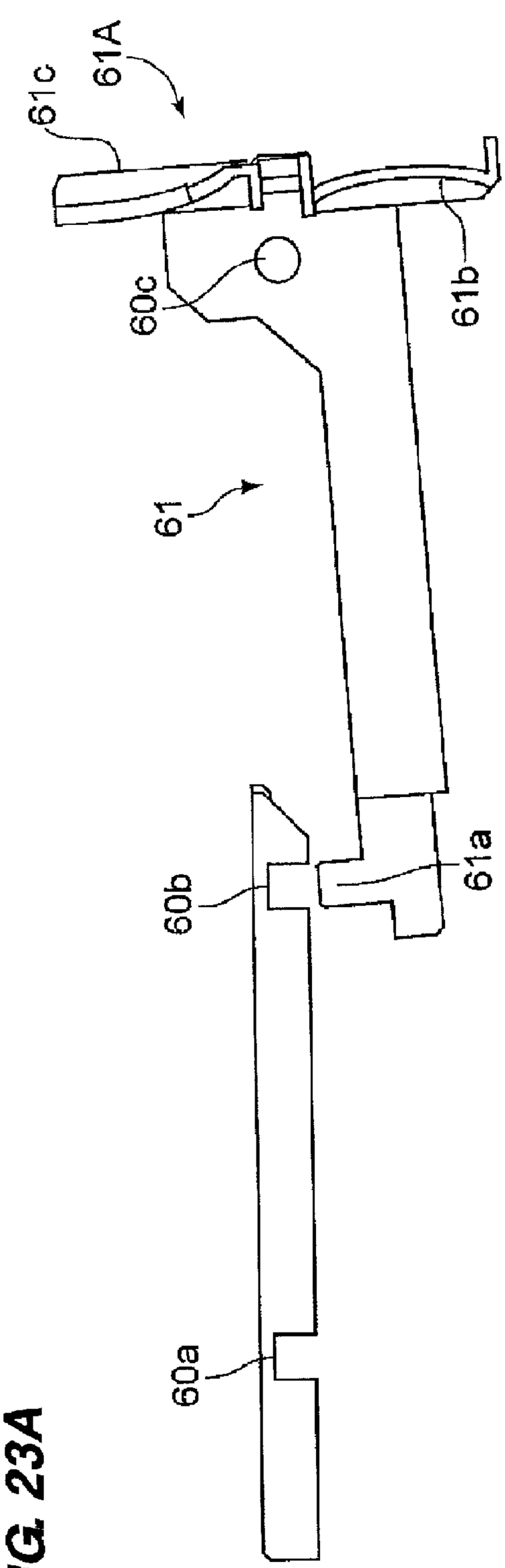


FIG. 23A

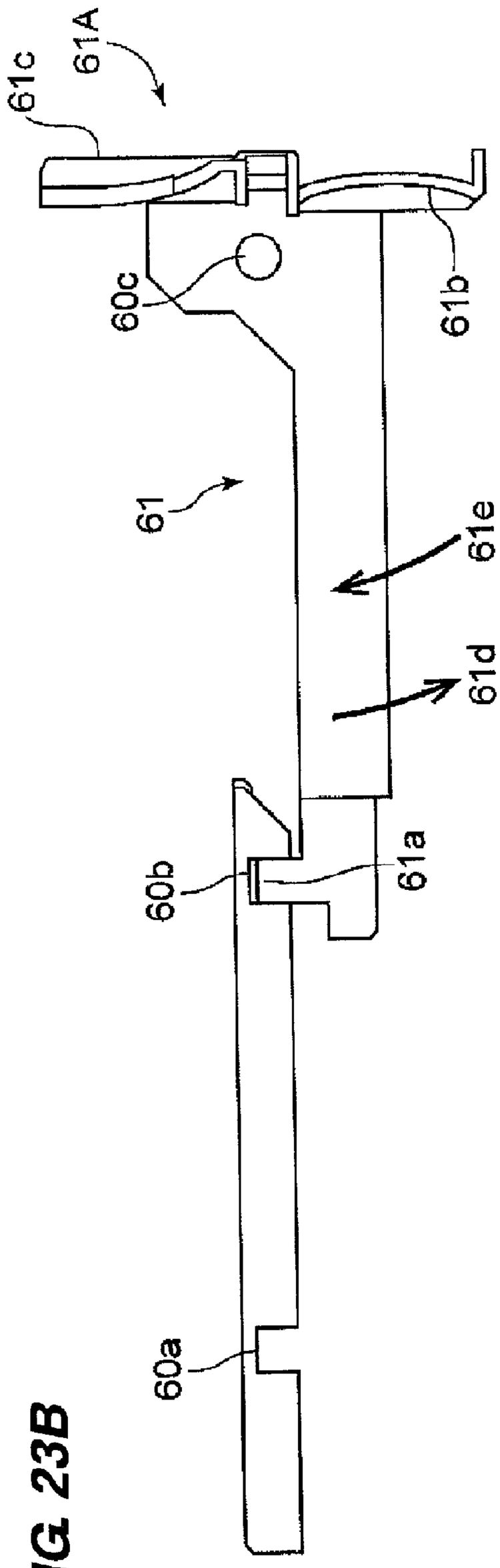


FIG. 23B

FIG. 24A

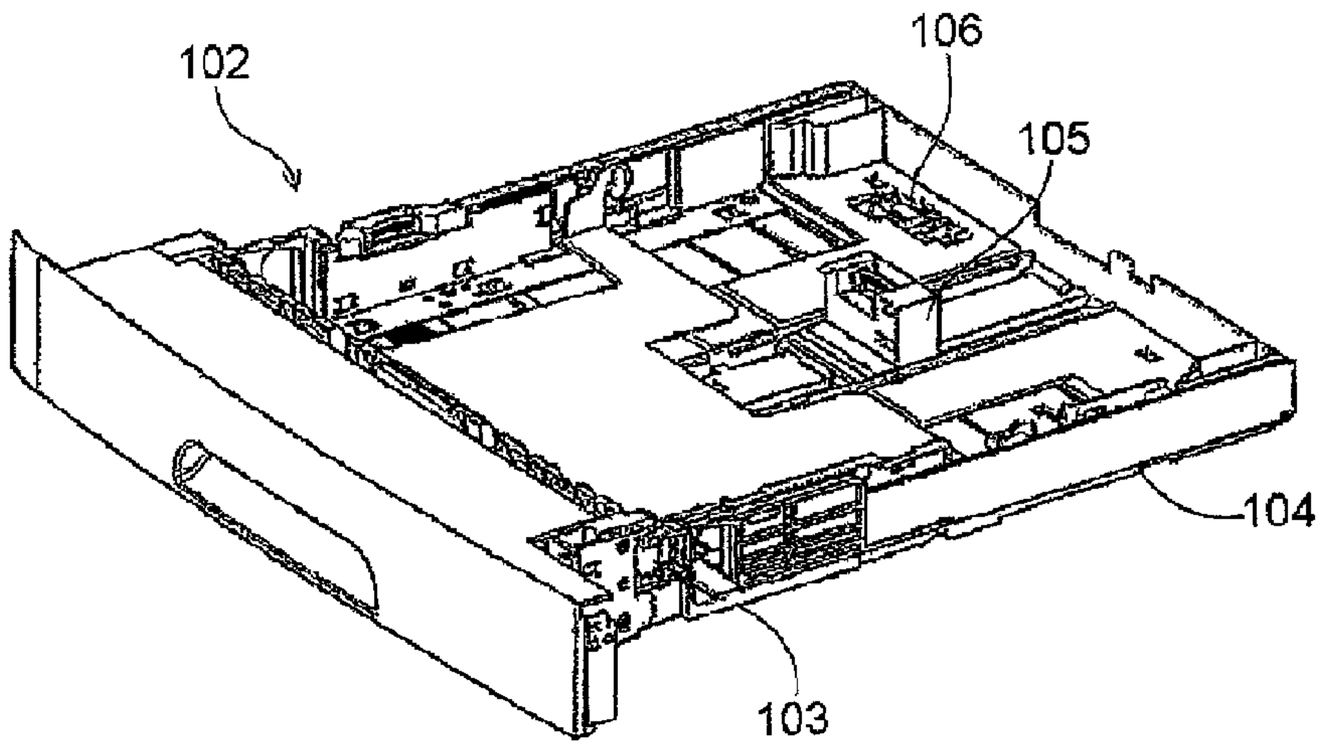
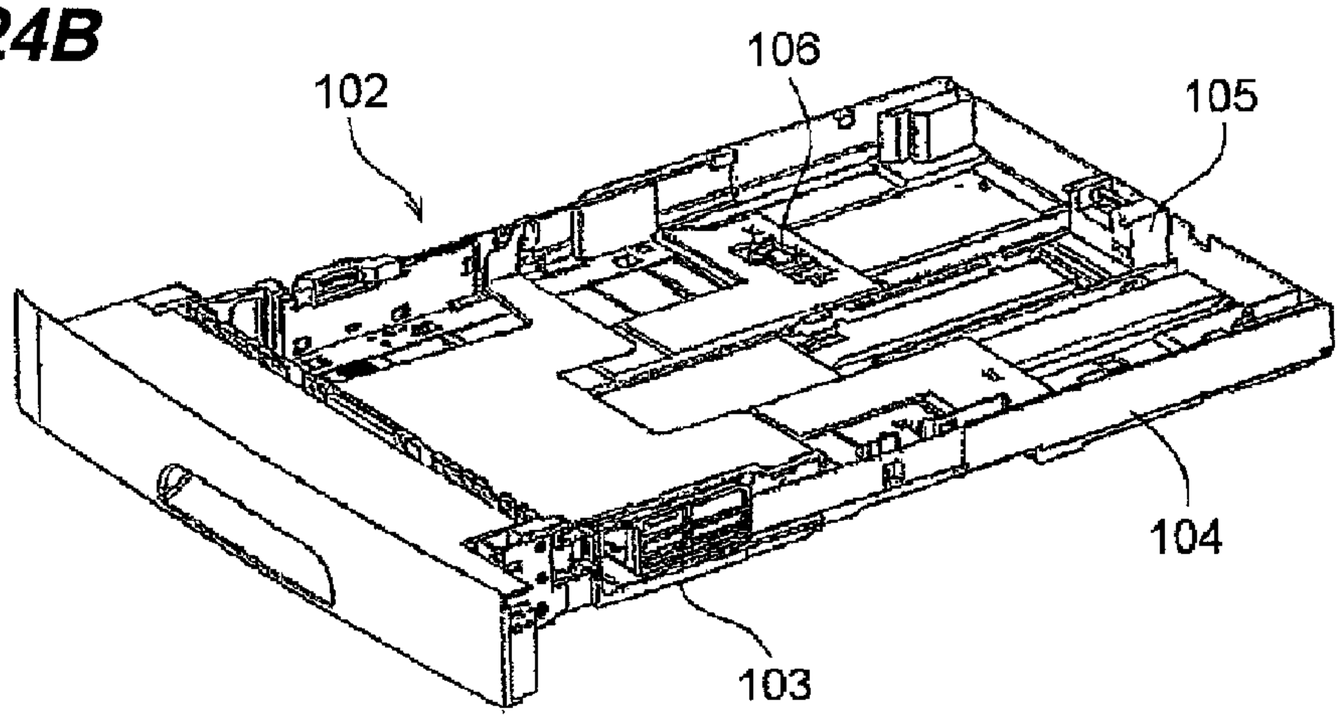


FIG. 24B



SHEET FEEDING DEVICE AND IMAGE FORMING APPARATUS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a sheet feeding device, and an image forming apparatus, and, especially, to a configuration of a sheet cassette storing sheets.

2. Description of the Related Art

Conventionally, there has been widely spread an image forming apparatus, such as a copying machine, a printer, and a facsimile, which is provided with a sheet feeding device, and in which a sheet is fed from the sheet feeding device to an image forming portion for image forming. Moreover, such a sheet feeding device has generally had a configuration in which a main body of the image forming apparatus installs a sheet cassette as a sheet storage portion in such a way that the cassette may be pulled out, and a sheet stored in the sheet cassette is fed to image forming portion through a sheet feeding roller.

The sheet cassette has a rear end regulating member which regulates a position of the rear end of a stored sheet in the sheet feeding direction (hereinafter, called the rear end) when the sheet with a size smaller than that of a sheet with the maximum size which may be stored is stored. The sheet cassette also has a side end regulating member which regulates a side end position in a direction (hereinafter, called a width direction) orthogonal to the sheet feeding direction of a sheet.

Such a sheet cassette is configured so that, while the side end of a sheet is regulated by the side end regulating member, the rear end is regulated by the rear end regulating member, and the position of the side end, and that of the point of the sheet of the sheet are always regulated to predetermined positions. Thereby, as the sheet is positioned at a predetermined position when the sheet cassette is stored in the main body of the image forming apparatus, stable feeding of a sheet may be performed with less skewed feeding and position deviations.

Incidentally, the size of the image forming apparatus has been reduced in recent years in order to improve the space efficiency. However, when the size of the image forming apparatus has been reduced as described above, there is a case in which the length of the main body of the image forming apparatus is shorter than that of a sheet with the maximum length, which is used for image forming. In this case, there is caused a state in which a sheet cassette is protruded from the main body of the image forming apparatus when the sheet cassette is installed in the main body of the image forming apparatus. Thereby, when a user who does not use such a long sheet uses an image forming apparatus, or when the image forming apparatus is used without using a long sheet, there has been caused a problem that the space efficiency becomes worse by a portion by which the sheet cassette is protruded from the main body of the image forming apparatus.

Incidentally, in order to solve the problem, there has been a sheet cassette which includes a main cassette, and a slide cassette which is slidably provided into the main cassette, and in which a slide cassette is pulled out for use according to the size of a sheet. In such a telescopic sheet cassette, the sheet cassette is used as it is in a case in which a small size sheet is stored, and a slide cassette is drawn out for use when a large size sheet is stored. Such technology has been disclosed in Japanese Patent Application Laid-Open No. 2004-107009.

In such a conventional sheet cassette, the slide cassette is fixed at a pulling out position, or at a storing position in the main cassette by a fixed portion. Then when the slide cassette is pulled out, or is stored, fixing of the main cassette and the slide cassette by the fixed portion is released.

FIG. **24**A and FIG. **24**B are perspective views of such a conventional telescopic sheet cassette. In FIG. **24**A and FIG. **24**B, there are shown a telescopic sheet cassette **102**, a main cassette **103**, a slide cassette **104** which is installed in such a way that the cassette may be sled into a main cassette, a fixed portion **106**, and a rear end regulating member **105**.

When a sheet with a small size is stored, the sheet cassette **102** is used in such a way that, as shown in FIG. **24**A, the slide cassette **104** is moved to a position at which the size of the cassette **104** is reduced. Moreover, when a sheet with a large size is stored, the sheet cassette **102** is used in such a way that, as shown in FIG. **24**B, the slide cassette **104** is drawn out from the main cassette **103**. When the size of the sheet cassette **102** is enlarged, or reduced, a fixed portion **106** which fixes the position of the main cassette **103** and that of the slide cassette **104** between each other is released.

For example, when sheets with different sizes are stored in the sheet cassette in such a conventional sheet cassette, the slide cassette **104** is drawn out or stored. When such operation is performed, the size of a sheet to be stored is changed.

When the size of a sheet is changed as described above, a position of the rear end regulating member **105** is required to be changed, wherein the position determines the position of the rear end of the sheet. That is, a work to move the slide cassette, and that to move the rear end regulating member are different from each other in a conventional sheet cassette. Thereby, when the size of the sheet is changed, a user is required to perform two kinds of operations. That is, there has been a problem that the usability is not good.

SUMMARY OF THE INVENTION

The present invention has been made considering the circumstances as described above, and provides a sheet feeding device, and an image forming apparatus, by which the usability may be improved.

The present invention has the following configuration in a sheet feeding device which feeds a sheet stored in a sheet cassette, wherein the sheet cassette has: a first cassette portion; a second cassette portion slidably connected with the first cassette portion in order to change the size of a sheet storage portion according to the size of a sheet to be stored; and a fixed portion which is able to fix the first cassette portion and the second cassette portion in a state in which the sheet cassette is shortened or extended by sliding of the second cassette portion, wherein the fixing of the fixed portion is released based on either an operation in which the second cassette portion is slid in a shortening direction to shorten the sheet cassette or an operation in which the second cassette portion is slid in an extending direction to extend the sheet cassette.

Further features of the present invention will become apparent from the following description of exemplary embodiments (with reference to the attached drawings).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic drawing illustrating a configuration of a laser beam printer as one example of an image forming

apparatus provided with a sheet feeding device according to a first embodiment of the present invention;

FIG. **2** is a perspective view of a sheet cassette installed in the color laser beam printer;

FIG. **3** is an exploded perspective view of the sheet cassette;

FIG. **4** is a perspective view illustrating a state in which a rear end regulating member is detached from the slide cassette of the sheet cassette;

FIG. **5**A and FIG. **5**B are top views illustrating a state in which the rear end regulating member is detached from the slide cassette;

FIG. **6** is a view illustrating a state in which, in a portion installing the rear end regulating member, a rear end regulating lever provided in the rear end regulating member is pressed in a slide cassette drawing direction;

FIG. **7** is a view illustrating a state in which the rear end regulating lever provided in the rear end regulating member is pressed in a slide cassette storing direction;

FIG. **8** is a view illustrating a state in which a slide cassette is stored by pressing the rear end regulating lever in the slide cassette storing direction;

FIG. **9**A and FIG. **9**B are views illustrating a second fixed portion in the rear end regulating member;

FIG. **10** is a view illustrating a state of the second fixed portion when the rear end regulating lever is pressed in the slide cassette storing direction;

FIG. **11** is a perspective view illustrating a configuration of a third fixed portion fixing the rear end regulating member in the slide cassette;

FIG. **12**A is a sectional view taken on line D-D in FIG. **11**;

FIG. **12**B is a sectional view taken on line E-E in FIG. **11**;

FIG. **13** is a perspective view illustrating a state in which the sheet cassette is set in an A3 size specification;

FIG. **14**A is a perspective view illustrating a state in which the sheet cassette is set in an A4 size specification;

FIG. **14**B is a perspective view illustrating a state in which the sheet cassette is set in a B5 size specification;

FIG. **15** is a perspective view illustrating a state in which the sheet cassette is set in an A5 size specification;

FIG. **16**A through FIG. **16**E are schematic views illustrating an outline of expansion and contraction operation of a sheet cassette according to the first embodiment;

FIG. **17** is a view illustrating a configuration of a sheet cassette according to a second embodiment of the present invention;

FIG. **18**A is a view illustrating a state in which the sheet cassette is set in an A4 size specification;

FIG. **18**B is a view illustrating a state in which the sheet cassette is set in a B5 size specification;

FIG. **19** is a view illustrating a configuration of a sheet cassette according to a third embodiment of the present invention;

FIG. **20**A and FIG. **20**B are views illustrating a configuration of a rear end regulating member installed in the sheet cassette;

FIG. **21** is a perspective view illustrating a state in which a slide cassette drawably installed in the sheet cassette is drawn out;

FIG. **22**A is a first view illustrating fixing operation of a fixing lever provided in the slide cassette;

FIG. **22**B is a first view illustrating releasing operation of the fixed fixing lever provided in the slide cassette;

FIG. **23**A is a second view illustrating fixing operation of a fixing lever provided in the slide cassette;

FIG. **23**B is a second view illustrating releasing operation of the fixed fixing lever provided in the slide cassette; and

FIG. **24**A and FIG. **24**B are perspective views of a conventional expansion-and-contraction-type sheet cassette.

DESCRIPTION OF THE EMBODIMENTS

Hereinafter, exemplary embodiments according to the present invention will be described in detail, referring to drawings.

FIG. **1** is a schematic drawing illustrating a configuration of a laser beam printer as one example of an image forming apparatus provided with a sheet feeding device according to a first embodiment of the present invention.

A laser beam printer **1** and a main body **1**A of the laser beam printer (hereinafter, called the main body of the printer) are shown in FIG. **1**. The laser beam printer **1** has an image forming portion **1**B; a sheet feeding device **1**C feeding a sheet S to an image forming portion **1**B; a fixing portion **13** fixing a toner image transferred on the sheet on the sheet S in a transfer portion **1**D; and the like.

The image forming portion **1**B is detachably provided with a process cartridge **6** having a photosensitive drum **6**a, a charging roller **6**b, a development sleeve **6**c, a cleaning blade **6**e, and a toner container **6**d. The image forming portion **1**B also has a laser exposure device **7** forming an electrostatic latent image on the photosensitive drum **6**a by exposing the surface of the photosensitive drum **6**a.

The charging roller **6**b is a charging device by which the surface of the photosensitive drum **6**a is uniformly charged, and the development sleeve **6**c is a development device by which an electrostatic latent image formed by a laser exposure device **7** is made to appear as a visible toner image by adhering toner thereto. Moreover, the cleaning blade **6**e removes toner remained on the surface of the photosensitive drum **6**a after the toner image is transferred, and stores the removed toner in a waste toner container **6**f formed in the process cartridge **6**.

The sheet feeding device **1**C has a sheet cassette **2**, and a sheet feeding roller **9** with a half moon shape feeding a sheet S on the sheet cassette one by one. The sheet cassette **2** is provided as a sheet storage portion in the lower portion of the printer main body **1**A, and is detachably installed in the main body **1**A of the printer. The sheet cassette **2** also has a separation pad **10** as a separating device. The sheet cassette **2** is detachably installed in an installing space **1**E provided in the bottom of the main body **1**A of the printer.

The transfer portion **1**D includes the photosensitive drum **6**a, and a transfer roller **8**, wherein the roller **8** is pressed against the photosensitive drum **6**a to form a transfer nip, and a toner image on the photosensitive drum **6**a is transferred on the sheet S by the transfer roller **8** when the sheet S passes the transfer nip.

Then, an image forming operation in the laser beam printer **1** with the above-described configuration will be described.

When the image forming operation is started, the photosensitive drum **6**a is rotated in the direction of an arrow A in the first place, and is charged in a predetermined polarity and in a predetermined potential by the charging roller **6**b fed from a not shown high voltage power supply. Then, laser light L is irradiated on the photosensitive drum **6**a after the surface is charged, and, thereby, an electrostatic latent image is formed on the photosensitive drum, wherein the light L is irradiated from the laser exposure device **7**, based on image information, and is reflected by a reflection mirror **7**a.

Subsequently, the electrostatic latent image is developed by adhering moderately charged toner to the electrostatic latent image, and is visualized as a toner image, wherein toner is filled in the toner container **6**d along with rotation of the

development sleeve **6**c to obtain the moderately charged toner, which is supplied onto the photosensitive drum **6**a.

On the other hand, the sheet S stacked and stored in the sheet cassette **2** is fed from the sheet feeding roller **9** at predetermined timing, in parallel with the toner image forming operation. The sheet feeding roller **9** is held during standby at a position at which the roller **9** and the separation pad **10** are not contacted with each other, and, when the image forming operation is started, the roller **9** makes one rotation to convey the sheet S along with the rotation in a state in which the sheet S is located between the separation pad **10** and the sheet feeding roller **9**.

The surface friction coefficient, the contact angle, and the shape of the separation pad **10** as a sheet separating device are set in such a way that only a sheet S of the uppermost layer is sent out at each sheet feeding operation. Thereby, when the sheets S are fed one on top of the other, conveying of the sheet S on the side of the separation pad is regulated by the separation pad **10**, and only the sheet S on the side of the sheet feeding roller is conveyed. Thereby, the sheets S stacked and stored in the sheet cassette **2** are conveyed one by one to a pair of registration rollers **11**b and **12**b through a pair of conveying rollers **11**a and **12**a without being conveyed one on top of the other.

Subsequently, the skewed feeding of the sheet S, which has been conveyed to the pair of registration rollers **11**b and **12**b, is conveyed through the pair of registration rollers **11**b and **12**b. Thereafter, the sheet S is conveyed to the transfer portion **1**D while timing is controlled in such a way that the point of the sheet S and the point of the toner image formed on the surface of the photosensitive drum **6**a are in agreement with each other by the pair of registration rollers **11**b and **12**b. Subsequently, a toner image on the surface of the photosensitive drum **6**a is transferred on the sheet S conveyed to the transfer portion **1**D as described above.

Here, transfer residual toner, which have not been used for transferring, and is remained on the photosensitive drum **6**a, is stored in the waste toner container **6**f by the cleaning blade **6**e. Then, the photosensitive drum **6**a the surface of which has been cleaned repeatedly enters the following image forming process.

Then, the sheet S onto which a toner image has been transferred is conveyed to the fixing portion **13**, at which the toner image is fixed on the sheet S. Thereafter, the sheet S on which the toner image has been fixed is conveyed to a pair of discharge rollers **14**c and **15**c by a pair of conveying rollers **14**a and **15**a, and a pair of conveying rollers **14**b and **15**b, which are disposed in a sheet conveying portion downstream of the fixing portion **13**. Thereafter, the sheet S is delivered onto a discharge tray **16** provided in the upper portion of the main body of the printer **1**A by the pair of discharge rollers **14**c and **15**.

FIG. **2** is an exploded perspective view of a sheet cassette, and FIG. **3** is an exploded perspective view of the sheet cassette. As shown in FIG. **2** and FIG. **3**, the sheet cassette **2** is provided with: a main cassette (a first cassette portion) **3** as the main body of a sheet storage portion; and a slide cassette (a second cassette portion) **4** which is slidably (drawably) connected with the main cassette **3**.

As will be shown in FIG. **13** through FIG. **15** described later, sheets with different sizes are stored in the sheet cassette **2** by drawing out the slide cassette **4**, or by storing therein according to the size of a sheet.

The main cassette **3** is provided with a main-cassette main body **3**a, and an intermediate plate **31** which supports the point side of the sheet for upward rotation, and presses the sheet S against the sheet feeding roller **9**. The sheet S is sent out by rotation of the sheet feeding roller **9**.

The slide cassette **4** is provided with: a main body **4**a of the slide cassette; and a rear end regulating member **5** movably provided in the sheet feeding direction in order to regulate the rear end position of a sheet stored in the sheet cassette **2**.

The intermediate plate **31** is provided with side regulating members **31**R and **31**L regulating the side end position of a sheet stored in the sheet cassette **2** in the width direction. A stable sheet feeding is realized because a sheet is surely positioned regardless of the size of the sheet by regulating the side end of a sheet by the side regulating members **31**R and **31**L, and by regulating the rear end by the rear end regulating member **5**.

FIG. **4** is a perspective view illustrating a state in which a rear end regulating member **5** is detached from the slide cassette **4** of the sheet cassette **2**. A first fixed portion **4**b as shown in FIG. **4** is rotated with a rotating shaft **4**d provided vertical to the main body **4**a of the slide cassette as a fulcrum as shown in FIG. **5**A.

A first fixing spring **4**c is provided between this first fixed portion **4**b and the main body **4**a of the slide cassette, and a receiving surface **4**f against which the first fixing spring **4**c is pressed is provided at one rotating end of the first fixed portion **4**b. Moreover, a latch portion **4**e engaging an engaged portion **3**b including triangular teeth is provided at the other end of the first fixed portion **4**b, wherein the portion **3**b is provided perpendicular to the bottom surface of the main cassette main body **3**a in the main cassette **3**, and, as shown in an X detail drawing of FIG. **5**B, is provided on the other sidewall surface of a rib **3**d extending in the sheet-feeding direction.

The latch portion **4**e in the first fixed portion **4**b includes triangular teeth, and to engage the engaged portion **3**b in the main-cassette main body **3**a usually by energizing force by the first fixing spring **4**c.

Then, the slide cassette **4** may be fixed to the main cassette **3** by engaging the latch portion **4**e of the first fixed portion **4**b and the engaged portion **3**b of the main-cassette main body **3**a, as described above.

In the first embodiment, the first fixed portion includes: the first fixed portion **4**b; the first fixing spring **4**c; and the engaged portion **3**b of the main-cassette main body **3**a, which engages the latch portion **4**e of the first fixed portion **4**b. The slide cassette **4** is fixed to the main cassette **3** by the first fixed portion in such a way that a state in which the sheet cassette **2** is shortened, or a state in which the cassette **2** is extended is kept.

FIG. **6** is a cross section of an installation portion of the rear end regulating member **5** in the slide cassette **4**, and, as shown in FIG. **6**, the rear end regulating member **5** is provided with: a rear end regulating lever (operation portion) **5**a; and a rear end regulating holder **5**c holding the rear end regulating lever **5**a in such a way that the lever **5**a may be rotated centering around the rotating shaft **5**b.

When the slide cassette **4** is pulled out, for example, according to the size of a sheet, that is, when the sheet cassette **2** is extended from a shortened state, the rear end regulating lever **5**a is pressed in the direction of an arrow B (in the extending direction) as shown in FIG. **6**.

Then, when the rear end regulating lever **5**a is pressed as described above, the rear end regulating lever **5**a is inclined centering around the rotating shaft **5**b shown in FIG. **6**, and the first fixed portion **4**b is pressed in at a point BB, resisting the force of the first fixing spring **4**c. When the rear end regulating lever **5**a is pushed as described above, the first fixed portion **4**b is moved in parallel by a not-shown guide member.

Thereby, engagement between the latch portion **4**e of the first fixed portion **4**b shown in FIG. **5**A and the engaged portion **3**b of the main-cassette main body **3**a is released to release fixing of the first fixed portion **4**b. That is, the slide cassette **4** may be drawn out. Thereby, when the rear end regulating lever **5**a is further pressed in the direction of the arrow B, the slide cassette **4** may be drawn out.

When pressing of the rear end regulating lever **5**a is released after the slide cassette **4** is drawn out as described above, the latch portion **4**e and the engaged portion **3**b in the main cassette main body **3**a are engaged with each other to fix the slide cassette **4** to the main-cassette main body **3**.

On the other hand, when the slide cassette **4** is stored according to the size of a sheet, that is, when the sheet cassette **2** is shortened from a extended state, the rear end regulating lever **5**a is pressed in the direction of an arrow C (in the shortening direction) as shown in FIG. **7**. Then, when the rear end regulating lever **5**a is pressed as described above, the rear end regulating lever **5**a is inclined in the direction of the arrow C, centering around the rotating shaft **5**b, and the first fixed portion **4**b is pushed at a point CC, resisting the force of the first fixing spring **4**c.

Thereby, the first fixed portion **4**b is rotated, centering around the rotating shaft **4**b, engagement between the latch portion **4**e and the engaged portion **3**b of the main-cassette main body **3**a is released to release fixing of the first fixed portion **4**b. That is, the slide cassette **4** may be moved in the storing direction. Thereafter, when the rear end regulating lever **5**a is further pressed in the direction of the arrow C under this condition, the slide cassette **4** is stored in the main cassette as shown in FIG. **8**. Thereafter, when the pressing of the rear end regulating lever **5** in the direction of the arrow C is released, the slide cassette **4** is fixed to the main cassette **3** by the first fixing spring **4**c.

That is, in the first embodiment, the first fixed portion **4**b is moved in the engaging releasing direction along with the pressing operation of the rear end regulating lever (lever member) **5**a in the sliding direction, and the fixing of the first fixed portion is released.

Incidentally, when sheets with different sizes are stored in the sheet cassette **2**, the rear end regulating member **5** is required to be moved according to the size of a sheet to be stored, and to be fixed to the slide cassette **4**. Following are the description for the second fixed portion fixing the rear end regulating member **5** on the slide cassette at a position corresponding to the size of a sheet to be stored.

FIG. **9**A and FIG. **9**B are views illustrating the second fixed portion fixing the rear end regulating member **5** at a position corresponding to the size of a sheet to be stored.

A second fixed portion **5**h and a second fixing spring **5**f are arranged in the rear end regulating holder **5**c as shown in FIG. **9**A and FIG. **9**B. The second fixed portion **5**h is arranged in such a way that the portion **5**h may be slidably moved in a vertical direction to the rear end regulating holder **5**c, and the bottom surface has a latch portion **5**d which engages the engaged portion **4**g, wherein the portion **4**g is formed on the main body **4**a of the slide cassette, and includes triangular teeth extending in a sheet feeding direction. Moreover, a receiving surface **5**e of the second fixing spring **5**f is provided on the upper surface.

Then, the latch portion **5**d in the second fixed portion **5**h includes triangular teeth, and to engage the engaged portion **4**g on the slide cassette main body **4**a usually by energizing force by the second fixing spring **5**f. Then, the rear end regulating lever **5**a may be fixed to the slide cassette **4** by engagement between the latch portion **5**d in the second fixed portion **5**h and the engaged portion **4**g on the slide cassette main body **4**a.

That is, in the first embodiment, the second fixed portion includes: a second fixed portion **5**h; the second fixing spring **5**f; and an engaged portion **4**g on the main body **4**a of the slide cassette engaging the latch portion **5**d of the second fixed portion **5**h.

As shown in FIG. **9**B, the shape of teeth of the latch portion **5**d of the second fixed portion **5**h, and that of the engaged portion **4**g on the main body **4**a of the slide cassette are provided in such a way that movement of the second fixed portion **5**h in a direction (drawing-out direction) opposite to the sheet feeding one shown by the arrow B is prohibited. Moreover, the tooth shape of the latch portion **5**d and that of the engaged portion **4**g are provided in such a way that, when the second fixed portion **5**h is moved in a sheet feeding direction (storage direction) shown by the arrow C, the second fixed portion **5**h may be moved while the portion **5**h is retracted upward.

That is, (the second fixed portion **5**h of) the rear end regulating member **5** is fixed with regard to movement in the direction (drawing-out direction) of the arrow B, but the movement in the direction (storage direction) of the arrow C is possible, based on the shape of the teeth in the latch portion **5**d and that of the engaged portion **4**g.

Incidentally, when the rear end regulating lever **5**a is pressed in the direction of the arrow B as shown, for example, in FIG. **10**, in the second fixed portion configured described above, the rear end regulating lever **5**a is inclined in the direction of the arrow B. An engaging protrusion **5**t, which engages with the second fixed portion **5**h when inclined as described above, is provided on the rear end regulating lever **5**a. Thereby, when the rear end regulating lever **5**a is inclined, the engaging protrusion **5**t raises the second fixed portion **5**h at a point BBB, resisting the force of the second fixing spring **5**f.

Thereby, engaging between the latch portion **5**d and the engaged portion **4**g is released to release fixing of the rear end regulating lever **5**a to the slide cassette **4**. Then, when fixing of the rear end regulating lever **5**a is released, as described above, and, thereafter, the rear end regulating lever **5**a is pressed in the direction of the arrow B, the rear end regulating member **5** may be moved to a position corresponding to the size of the sheet.

When the rear end regulating lever **5**a is pressed in the direction of the arrow B as described above, fixing of the first fixed portion **4**b is released as already described. Thereby, the slide cassette **4** is moved to a position corresponding to the size of the sheet integrally with the rear end regulating member **5**. When pressing of the rear end regulating lever **5**a in the direction of the arrow B is released after the rear end regulating member **5** reaches a predetermined position, the rear end regulating member **5** is fixed to the slide cassette **4**, and the slide cassette **4** is fixed to the main cassette **3** by the second fixing spring **5**f.

Incidentally, the slide cassette **4** is sled integrally with the rear end regulating member **5** when the slide cassette **4** is sled in the extending direction in which the sheet cassette **2** is extended in the first embodiment. Moreover, when the slide cassette **4** is sled in the shortening direction in which the sheet cassette **2** is shortened, the slide cassette **4** is sled integrally with the rear end regulating member **5** to a predetermined position.

Subsequently, the third fixed portion is described below which fixes the rear end regulating member **5** at the slide cassette **4** for synchronization with the extending and con-

tracting operation of the slide cassette **4** as described above. FIG. **11** is a perspective view illustrating a configuration of the third fixed portion fixing the rear end regulating member **5** in the slide cassette **4**. FIG. **12**A is a sectional view taken on line D-D in FIG. **11**, and FIG. **12**B is a sectional view taken on line E-E in FIG. **11**.

In the rear end regulating holder **5**c, a third fixed portion **5**j is rotatably provided to the rear end regulating holder **5**c, centering around the rotating shaft **5**m. In the third fixed portion **5**j, an abut portion **5**p is formed which may abut to a fixing releasing member **3**c protruding on the bottom surface of the main-cassette main body **3**a as shown in FIG. **13**. The third fixed portion **5**j is energized downward by a third fixing spring **5**k.

The third fixed portion **5**j engages the engaged portion **4**h protruded from the slide cassette main body **4**a usually by energizing force by the third fixing spring **5**k. When the rear end regulating member **5** is pressed as described above in the direction of the arrow C by engaging the third fixed portion **5**j with the engaged portion **4**h on the slide cassette main body **4**a, the rear end regulating member **5** is fixed to the slide cassette **4**.

That is, in the first embodiment, the third fixed portion includes: the third fixed portion **5**j; the third fixing spring **5**k; and the engaged portion **4**h protruding on the slide cassette main body **4**a engaged with the third fixed portion **5**j. When the rear end regulating member **5** is pressed by the third fixed portion in the direction of the arrow C, the rear end regulating member **5** and the slide cassette **4** are moved as one body until the slide cassette **4** reach a predetermined position. Releasing of the third fixed portion will be described later.

Subsequently, extending operation and contracting one of the sheet cassette **2** according to the first embodiment will be described.

Firstly, an operation is described by which the length of the sheet cassette **2** in the sheet feeding direction is shortened to a shorter one, for example, from an A3 size specification to an A4 size specification, a B5 size specification, and an A5 size specification.

FIG. **13** is a perspective view illustrating a state in which the sheet cassette **2** is set in an A3 size specification. When a specification is changed from this state to the A4 size specification, the rear end regulating lever (lever member) **5**a is pressed in the direction of the arrow C.

Thereby, the rear end regulating lever **5**a pushes the first fixed portion **4**b as shown in FIG. **7**, and, thereby, fixing of the slide cassette **4** to the main cassette **3** by the first fixed portion is released.

When the rear end regulating lever **5**a is pressed in the direction of the arrow C, the rear end regulating member **5** is fixed to the slide cassette **4** by the third fixed portion as shown in FIG. **12**A and FIG. **12**B. Thereby, when the rear end regulating lever **5**a is kept being pushed thereafter, the rear end regulating member **5** and the slide cassette **4** are moved in a direction in which the sheet cassette **2** is shortened.

Thereafter, the sheet cassette **2** has an A4 size specification shown in FIG. **14**A. Furthermore, when the rear end regulating lever **5**a is kept being pushed in the direction of the arrow C thereafter, the slide cassette **4** is stored in the main cassette. At this time, the sheet cassette **2** has a B5 size specification shown in FIG. **14**B. That is, the first embodiment has a configuration in which the slide cassette **4** is drawn out when a sheet with a size of a B5 size or larger is stored.

Incidentally, when a sheet with the B5 size specification or smaller, the rear end regulating lever **5**a is kept being pushed in the direction of the arrow C thereafter. As the slide cassette **4** is stored in the main cassette, only the rear end regulating member **5** is moved thereafter.

In order to move only the rear end regulating member **5** as described above, it is required to release fixing of the third fixed portion **5**j. Thereby, in the first embodiment, the fixing releasing member **3**c is protruded on the bottom surface of the main-cassette main body **3**a as shown in FIG. **13** as described above, and, when the slide cassette **4** is stored, the fixing releasing member **3**c is provided in such a way that the member **3**c abuts against the abut portion **5**p shown in FIG. **12**B.

Moreover, when the rear end regulating member **5** is further pushed after the abut portion **5**p abuts against the fixing releasing member **3**c as described above, the third fixed portion **5**j is rotated upward in the direction of the arrow shown in FIG. **12**A, centering around the rotating shaft **5**m, while resisting the third fixing spring **5**k. Thereby, the third fixed portion **5**j is released from the engaged portion **4**h of the slide cassette main body **4**a, and fixing of the third fixed portion to the slide cassette **4** in the rear end regulating member **5** is released.

Thus, when the rear end regulating member **5** is further pushed after the slide cassette **4** is moved to a predetermined position in such a way that a sheet with a B5 size specification is stored in the main cassette, fixing by the third fixed portion is released.

When the rear end regulating lever **5**a is further kept being pushed in the direction of the arrow C thereafter, the rear end regulating member **5** is moved on the slide cassette **4**, based on the tooth shape of the latch portion **5**d of the second fixed portion **5**h, and that of the engaged portion **4**g on the slide cassette main body **4**a as shown in FIG. **9**B. Then, the rear end regulating member **5** is immediately moved to a position corresponding to the A5 size specification as shown in FIG. **15**.

Subsequently, an operation is described below in which the sheet cassette **2** is extended in the direction in which the length in the sheet feeding direction is lengthened, for example, from the A5 size specification to the B5 size specification, the A4 size specification, and the A3 size specification.

When setting of the sheet cassette **2** is changed from a state set for the A5 size specification to a state for the B5 size specification as shown in FIG. **15**, the rear end regulating lever **5**a is pressed in the direction of the arrow B in the first place. Thereby, as shown in FIG. **10**, the engaging protrusion **5**t of the rear end regulating lever **5**a raises the second fixed portion **5**h to release fixing of the rear end regulating member **5** to the slide cassette **4**. Thereby, the rear end regulating member **5** is moved on the slide cassette **4** to obtain a configuration corresponding to the B5 size specification shown in FIG. **14**B.

When this state is achieved, abutment of the fixing releasing member **3**c to the abut portion **5**p is released, the third fixed portion **5**j is rotated downward by the third fixing spring **5**k, centering around the rotating shaft **5**m, and the third fixed portion **5**j engages the engaged portion **4**h on the slide cassette main body **4**a. Thereby, the rear end regulating member **5** is fixed to the slide cassette **4**.

Subsequently, when the rear end regulating lever **5**a is further pressed in the direction of the arrow B, the rear end regulating lever **5**a pushes the first fixed portion **4**b as shown in FIG. **6** to release fixing of the slide cassette **4** to the main cassette **3**. Thereafter, when the rear end regulating lever **5**a is kept being pushed in the direction of the arrow B, the rear end regulating member **5** and the slide cassette **4** are moved as one

body, corresponding to a specification from the A4 size specification shown in FIG. **14**A to the A3 size specification shown in FIG. **13**.

FIG. **16**A through FIG. **16**E are schematic views illustrating the outline of the extension operation and contraction operation of the sheet cassette **2** according to the present embodiment, which has been described.

FIG. **16**A shows a state in which the slide cassette **4** is drawn out to a position corresponding to the maximum size of a sheet. At this state, the slide cassette **4** is in a fixed state (● mark) to the main cassette **3** by the first fixed portion, and the rear end regulating member **5** is in a fixed state (● mark) to the slide cassette **4** by the third fixed portion.

FIG. **16**B shows a state in which the rear end regulating lever **5**a of the rear end regulating member **5** is operated in the direction of the arrow C, and, as described above, the first fixed portion is put into a release state (○ mark) by operating the rear end regulating lever **5**a to store the slide cassette **4** in the main cassette.

FIG. **16**C shows a state just before the state in which the slide cassette **4** is stored in the main cassette. At this time, the third fixed portion is still in a fixed state (● mark). FIG. **16**D shows a state just after the state in which the slide cassette **4** is stored in the main cassette. At this time, the third fixed portion is put into a release state (○ mark). Subsequently, the rear end regulating member **5** is fixed at a position corresponding to the minimum size of a sheet shown in FIG. **16**E by keeping operating the rear end regulating lever **5**a.

As described above, fixing of the slide cassette **4** to the main cassette **3**, and fixing of the rear end regulating member **5** to the slide cassette **4** may be released by sliding operation of (the rear end regulating lever **5**a of) the rear end regulating member **5**.

That is, the usability is improved in the first embodiment, because two operations of an rear end regulating operation by the rear end regulating member **5**, and an expansion and contraction operation of the sheet cassette **2** are performed at the same time by one operation of the rear end regulating lever **5**a.

In the first embodiment, the engaged portion **3**b of the main-cassette main body **3**a, which engages the latch portion **4**e in the first fixed portion **4**b shown in FIG. **5**A and FIG. **5**B, has a consecutive shape according to a slide range of the slide cassette **4**. The reason is that the present invention may be abutted to a size between an A3 size and an A4 size (paper with, for example, a B4 size, or other sizes), and a size between an A4 size and a B5 size (paper with, for example, a letter size, or other size paper). Then, the usability may be improved by forming the engaged portion **3**b in the main cassette main body **3**a as described above in a case in which various types of specifications for sheet sizes are required.

Subsequently, a second embodiment according to the present invention will be described.

FIG. **17** is a view illustrating a configuration of a sheet cassette according to the second embodiment. The same reference numbers in FIG. **17** as those in FIG. **5** indicate the same or equivalent portions. Moreover, FIG. **17** shows a state in which a sheet cassette **2** is in a set state corresponding to an A3 specification.

In FIG. **17**, **3**b**1** through **3**b**3** are engaging concave portions provided in a main cassette **3** as an engaged portion formed on the sidewall surface of the rib **3**d extending in the direction of a sheet feed.

Then, the second embodiment has a configuration in which the latch portion **4**e of the first fixed portion **4**b engages the engaging concave portions **3**b**1** through **3**b**3** by energizing force of the first fixing spring **4**c.

The engaging concave portion **3**b**1** is a component by which the slide cassette **4** is drawn out from the main cassette **3**, and is fixed at a position corresponding to the A3 size position. Moreover, the engaging concave portion **3**b**2** is a component by which the slide cassette **4** is drawn out from the main cassette **3**, and is fixed at a position corresponding to the A4 size position shown in FIG. **18**A. The engaging concave portion **3**b**3** is a component by which the slide cassette **4** is pushed into the main cassette **3**, and is fixed at a position corresponding to the B5 size position shown in FIG. **18**B.

Then, the usability is improved even in the second embodiment, because two operations of rear end regulating operation of a sheet, and expansion and contraction operation of the sheet cassette **2** may be performed by one operation of the rear end regulating lever **5**a as well as the first embodiment.

Moreover, in the second embodiment, the engaging concave portions **3**b**1** through **3**b**3** are provided at sliding positions of the slide cassette **4**, for example, at the positions corresponding to the sizes of the stored sheet, for example, to A3, A4, and B5 for positioning of the main cassette **3** and the slide cassette **4**. Thereby, the usability is improved in a case corresponding only to paper with a standard size.

Subsequently, a third embodiment according to the present invention will be described. Here, only portions different from the configurations of the first and second embodiments will be described.

FIG. **19** is a view illustrating a configuration of a sheet cassette **19** according to the third embodiment, and the sheet cassette **19** is provided with: a rear end cover **54**; a main cassette **50** as a main body of a sheet storage portion; an intermediate plate **51**; side regulating members **52**R and **52**L; and a rear end regulating member **53**. The intermediate plate **51** is rotatably provided for supporting a sheet, and pushes a sheet S against the sheet feeding roller **9** (refer to FIG. **1**). Then, the sheet S is sent out by rotating the sheet feeding roller **9**.

The side regulating members **52**R and **52**L regulates the side end position of a sheet stored in the main cassette **50** in the width direction, and the rear end regulating member **53** regulates the rear end position of a sheet stored in the main cassette **50**. Then, as positioning of a sheet may be performed, regardless of the size of the sheet, by regulating the side end of the sheet by the side regulating members **52**R and **52**L, and on the other hand, by regulating the rear end of the sheet by the regulating member **53**, stable feeding of a sheet may be performed without causing a skewed feeding and a horizontal deviation.

The side regulating members **52**R and **52**L are connected with each other by not-shown pinion gears, and may be moved in the direction of the arrow **52**a in synchronization with each other. Moreover, not-shown friction members contacting with the main cassette **50** are provided on the bottom surface of the side regulating members **52**R and **52**L.

The side regulating members **52**R and **52**L are not extended in the width direction even if they receive reaction force of the sheet S by resistance force caused by the friction member during paper feeding. Thereby, malfunctions such as skewed feeding of a sheet may be prevented. The resistance force caused by the friction member is set in such a way that a user simply operates the side regulating members **52**R and **52**L.

Moreover, the rear end regulating member **53** has a function by which the member **53** abuts against the rear end of a sheet to regulate a position of a sheet as shown in FIG. **20**A and FIG. **20**B, and the member **53** includes: a rear end regulating plate **53**c; a holding member **53**d; a switch **53**e, and the like. The holding member **53**d, and the switch **53**e are rotat-

ably supported, respectively, and the holding member **53**d is energized by an elastic member such as a not-shown spring in the clockwise direction in FIG. **20**A and FIG. **20**B.

The holding member **53**d is provided with a plurality of teeth with a triangular shape on the bottom surface. The rear end regulating member **53** is held at a set position corresponding to the sheet size by engaging the teeth and the train **60**d of rack teeth, which are provided in an after-described slide cassette **60**, and include triangular teeth. Moreover, engaging of triangular teeth of the holding member **53**d and the train **60**d of rack teeth is released by rotating the switch **53**e in the clockwise direction in FIG. **20**A and FIG. **20**B to rotate the holding member **53**d in the anti-clockwise direction in FIG. **20**, resisting the energizing force of the not-shown member.

Even when the rear end regulating member **53** receives force from the sheet S in the direction of the arrow **53**b, for example, during sheet feeding, by engaging between the teeth of the holding member **53**d and those of the train **60**d of rack teeth, the sheet S may be kept being held at a predetermined position without moving the rear end regulating member **53**. When the teeth of the holding member **53**d ride across the train **60**d of rack teeth, the rear end regulating member **53** may be moved in the direction of the arrow **53**a in a state in which a certain load is abutted.

The switch **53**e releases engaging of the holding member **53**d, and, for example, when the rear end regulating member **53** is moved from a position shown in FIG. **20**A to a position shown in FIG. **20**B, the switch **53**e is pushed in the direction of the arrow **53**b in the first place.

When the switch **53**e is pushed as described above, the holding member **53**d is rotated in the direction in which the teeth of the holding member **53**d is detached from the train **60**d of rack teeth, and the rear end regulating member **53** may be moved in the direction of the arrow **53**a and the arrow **53**b. Then, in a state in which the holding member **53**d is rotated as described above, that is, in a state in which the switch **53**e is pushed, the rear end regulating member **53** may be moved to a position shown in FIG. **20**B by pushing the switch **53**e in the direction of the arrow **53**b.

When the switch **53**e is separated after the rear end regulating member **53** is moved to the position shown in FIG. **20**B, the holding member **53**d is rotated by a not-shown energizing member, and is moved to a position at which the member **53**d is engaged with the train **60**d of rack teeth. Thereby, the rear end regulating member **53** is held at this position.

Incidentally, the slide cassette **60**, according to the present invention, as a drawing portion is drawably provided in the main cassette **50** of the sheet cassette **19** as shown in FIG. **19**, wherein the slide cassette **60** extends, or contracts the sheet cassette **19**. In the third embodiment, the slide cassette **60** is moved in the direction of an arrow **60**e, and an arrow **60**f by engaging with a plurality of guides **50**a through **50**h provided on the sidewall of the main cassette **50**.

The whole of the sheet cassette **19** may be shortened by moving the slide cassette **60** in the direction of the arrow **60**f, and the whole of the sheet cassette **19** may be extended by moving in the direction of the arrow **60**e.

When a sheet with a size larger than the size of a sheet which may be stored in the main cassette **50** is stored in the sheet cassette **19**, the slide cassette **60** is drawn out in the extending direction indicated by the arrow **60**e, and is moved to a position shown in FIG. **21**. When a sheet having a size which may be stored in the main cassette **50** is stored, the sheet is stored in the main cassette **50** as show in FIG. **19** by pushing the slide cassette **60** in the shortening direction of the arrow **60**f as shown in FIG. **19**.

When the slide cassette **60** is drawn out to a position shown in FIG. **21**, or when the cassette **60** is returned to a storage position shown in FIG. **19**, a fixing lever (lever member) **61** forming the fixed portion is provided to the slide cassette **60** in order to hold the slide cassette **60** at this position.

A fixing lever **61** is swingably provided in the direction of an arrow **61**d, and in the direction of an arrow **61**e, centering around a swing shaft **60**c provided in the slide cassette **60**, and is energized in the direction of the arrow **61**e by a not-shown spring, as shown in FIG. **22**.

Moreover, an engaging portion **61**a is protruded on a swing end portion in an opposite side to the drawing direction shown by the arrow **60**e, wherein the slide cassette **60** is drawn out in the direction of the arrow **60**e. The engaging portion **61**a selectively engages a first, and second engaging grooves **60**a and **60**b as an engaged portion, wherein the grooves are provided in the main cassette **50**. When the slide cassette **60** is stored in the main cassette **50**, the engaging portion **61**a engages the first engaging groove **60**a, and when the slide cassette **60** is drawn out, the engaging portion **61**a engages the second engaging groove **60**b.

On the other hand, a pressing operation portion **61**A is provided at one swing end of the fixing lever **61** in the drawing-out direction from the swing shaft **60**c, wherein the portion **61**A is pressed by a user when the slide cassette **60** is moved. The pressing operation portion **61**A is provided with a shortening operation portion **61**c provided at one end of the swing shaft **60**c, and an extending operation portion **61**b provided on the other end.

Then, for example, when the slide cassette **60** is drawn out, the extending operation portion **61**b is pressed in the drawing-out direction indicated by the arrow **60**e. When the extending operation portion **61**b is pressed as described above for drawing-out operation, the fixing lever **61** firstly swings with the swing shaft **60**c as a fulcrum in the direction, shown by the arrow **61**d, in which engaging between the engaging portion **61**a and the first engaging groove **60**a is released. Thereby, the engaging portion **61**a is detached from the first engaging groove **60**a, as shown in FIG. **22**B.

Thereafter, when the extending operation portion **61**b is further pushed in the direction of the arrow **60**e under this condition for drawing out operation, the sheet cassette **19** extends after sliding movement of the slide cassette **60** from the main cassette **50**. Then, the slide cassette **60** bumps against a not-shown bumping surface for stop. At this time, the fixing lever **61** is located at a position shown by of FIG. **23**A.

Then, when the extending operation portion **61**b is released at this position, the fixing lever **61** swings in the direction of the arrow **61**e by a spring. Accordingly, the engaging portion **61**a provided at the other swing end of the fixing lever **61** engages the second engaging groove **60**b as shown in FIG. **23**B. Thereby, the slide cassette **60** is fixed at a position at which the cassette **60** is drawn out to the main cassette **50**.

Thus, fixing by the fixing lever **61** may be released and the slide cassette **60** may be drawn out only by drawing-out operation in which the extending operation portion **61**b is pressed in such a way that the slide cassette **60** is drawn out. That is, fixing of the slide cassette **60** may be released in synchronization with the drawing out operation of the slide cassette **60** only by pressing operation of the extending operation portion **61**b in the moving direction of the slide cassette **60** in order to extend the sheet cassette **19**.

On the other hand, when the slide cassette **60** is stored in the main cassette **50**, the shortening operation portion **61**c is pressed in a direction in which the sheet cassette **19** is shortened in a direction opposite to the drawing out direction.

When the shortening operation portion **61**c is pressed as described above, the fixing lever **61** swings in the direction of the arrow **61**d shown in FIG. **23**B with the swing axis **60**c as a fulcrum in the first place. Thereby, the engaging portion **61**a swings in a direction in which engaging of the portion **61**a and the second engaging groove **60**b is released. Thereby, the engaging portion **61**a is detached from the second engaging groove **60**b as shown in FIG. **23**A, and fixing by the fixing lever **61** is released.

Thereafter, when the shortening operation portion **61**c is further pressed under this condition, the fixing lever **61**, together with the slide cassette **60**, is moved. After a while, the slide cassette **60** bumps against the not-shown bumping surface, and the slide cassette **60** stops. At this time, the status of the fixing lever **61** is shown in FIG. **22**B.

Then, when the shortening operation portion **61**c is separated at this position, and the pressing is released, the fixing lever **61** swings in the direction of the arrow **61**e shown in FIG. **22**A by a spring, and the engaging portion **61**a engages the first engaging groove **60**a. Thereby, the slide cassette **60** is fixed at a position at which the slide cassette **60** is stored to the main cassette **50**.

Thus, fixing by the fixing lever **61** may be released only by pressing the shortening operation portion **61**c in a direction in which the sheet cassette **19** is shortened and the slide cassette **60** may be stored. That is, fixing of the slide cassette **60** may be released in synchronization with the storage operation of the slide cassette **60** only by pressing the shortening operation portion **61**c in the direction, in which the slide cassette **60** is moved, in order to shorten the sheet cassette **19**.

As described above, fixing by the fixing lever **61** may be released along with a drawing out operation, and a storing operation of the slide cassette **60** according to the third embodiment. Accordingly, the operability of the slide cassette **60** is improved.

Although only one drawing-out position is provided for the slide cassette **60** in the third embodiment, a plurality of drawing out positions may be acceptably provided according to the sizes of stored sheets.

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

This application claims the benefit of Japanese Patent Application No. 2007-20685, filed Jan. 31, 2007, Japanese Patent Application No. 2007-47838, filed Feb. 27, 2007 which are hereby incorporated by reference herein in their entirety.

What is claimed is:

1. A sheet feeding device feeding sheets stored in a sheet storage portion of a sheet cassette, wherein the sheet cassette comprises:

a first cassette portion;

a second cassette portion slidably connected with the first cassette portion in order to change the size of the sheet storage portion according to the size of a sheet to be stored;

a rear end regulating member which is movably provided in the second cassette portion, and which regulates the rear end of a sheet stored in the sheet cassette;

a *first* fixed portion which is able to fix the first cassette portion and the second cassette portion in a state in which the **[**sheet cassette**]** *size of the sheet storage portion* is shortened or extended by sliding of the second cassette portion;

[an operating portion provided on the rear end regulating member which releases the fixing by the fixed portion,

wherein the fixing of the fixed portion is released by either an operation of which the operating portion is press-operated in a shortening direction where the second cassette portion is slid to shorten the sheet cassette or an operation of which the operating portion is press-operated in an extending direction where the second cassette portion is slid to extend the sheet cassette;**]**

a second fixed portion which fixes the rear end regulating member to the second cassette portion at a position corresponding to the size of a sheet to be stored;

an operating portion provided on the rear end regulating member which releases the fixing of the first cassette portion and the second cassette portion by the first fixed portion and which releases the fixing of the rear end regulating member and the second cassette portion by the second fixed portion; and

a third fixed portion which fixes the rear end regulating member and the second cassette portion in such a way that the second cassette portion and the rear end regulating member slide and move on the first cassette portion as one body,

wherein, when the second cassette portion is slid to shorten the **[**sheet cassette**]** *size of the sheet storage portion* and is positioned at a predetermined position, the third fixing portion is released by engaging a fixing releasing member provided on the first cassette portion so as to release the fixing between the rear end regulating member and the second cassette portion, and

when the third fixed portion is released *at the predetermined position*, the second fixed portion is configured to release the fixing of the rear end regulating member by **[**either the**]** *an* operation of **[**which**]** the operating portion **[**is press-operated in the shortening direction or the operation of which the operating portion is press-operated in the extending direction**]**.

2. The sheet feeding device according to claim **1**, wherein the *first* fixed portion has:

an engaged portion provided in the first cassette portion; and

an engaging portion which is provided in the second cassette portion, and engages the engaged portion,

wherein the operating portion moves the engaging portion in order to release engaging between the engaging portion and the engaged portion even when the operating portion is pressed in either of the two directions of the shortening direction, and the extending direction.

3. The sheet feeding device according to claim **2**, wherein the engaged portion is provided along a sliding range of the second cassette portion.

4. An image forming apparatus comprising a sheet feeding device feeding a sheet stored in a sheet storage portion of a sheet cassette, and an image forming portion forming an image on a sheet fed from the sheet feeding device, wherein the sheet cassette comprises:

a first cassette portion;

a second cassette portion slidably connected with the first cassette portion in order to change the size of the sheet storage portion according to the size of a sheet to be stored;

a rear end regulating member which is movably provided in the second cassette portion, and which regulates the rear end of a sheet stored in the sheet cassette;

a *first* fixed portion which is able to fix the first cassette portion and the second cassette portion in a state in

which the [sheet cassette] *size of the sheet storage portion* is shortened or extended by sliding of the second cassette portion; [and]

[an operating portion provided on the rear end regulating member which releases the fixing by the fixed portion, wherein the fixing of the fixed portion is released based on either an operation of which the operating portion is press-operated in a shortening direction where the second cassette portion is slid to shorten the sheet cassette or an operation of which the operating portion is press-operated in an extending direction where the second cassette portion is slid to extend the sheet cassette;]

a second fixed portion which fixes the rear end regulating member to the second cassette portion at a position corresponding to the size of a sheet to be stored;

an operating portion provided on the rear end regulating member which releases the fixing of the first cassette portion and the second cassette portion by the first fixed portion and which releases the fixing of the rear end regulating member and the second cassette portion by the second fixed portion; and

a third fixed portion which fixes the rear end regulating member and the second cassette portion in such a way that the second cassette portion and the rear end regulating member slide and move on the first cassette portion as one body,

wherein, when the second cassette portion is slid to shorten the [sheet cassette] *size of the sheet storage portion* and is positioned at a predetermined position, the third [fixing] *fixed* portion is released by engaging a fixing releasing member provided on the first cassette portion so as to release the fixing between the rear end regulating member and the second cassette portion, and

when the third fixed portion is released *at the predetermined position*, the second fixed portion is configured to release the fixing of the rear end regulating member by

[either the] *an* operation of [which] the operating portion [is press-operated in the shortening direction or the operation of which the operating portion is press-operated in the extending direction].

5. The [sheet feeding device] *image forming apparatus* according to claim **4**, wherein the *first* fixed portion has:

an engaged portion provided in the first cassette portion; and

an engaging portion which is provided in the second cassette portion, and engages the engaged portion,

an operating portion which moves the engaging portion in order to release engaging between the engaging portion and the engaged portion even when the operating portion is pressed in either of the two directions of the shortening direction, and the extending direction.

6. The [sheet feeding device] *image forming apparatus* according to claim **5**, wherein the engaged portion is provided along a sliding range of the second cassette portion.

7. The sheet feeding device according to claim 1, wherein the fixing of the first fixed portion is released by either an operation of which the operating portion is press-operated in a shortening direction where the second cassette portion is slid to shorten the size of the sheet storage portion or an operation of which the operating portion is press-operated in an extending direction where the second cassette portion is slid to extend the size of the sheet storage portion.

8. The image forming apparatus according to claim 4, wherein the fixing of the first fixed portion is released by either an operation of which the operating portion is press-operated in a shortening direction where the second cassette portion is slid to shorten the size of the sheet storage portion or an operation of which the operating portion is press-operated in an extending direction where the second cassette portion is slid to extend the size of the sheet storage portion.

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