

Thereafter, the pushing member 21 slides to be contacted into the releasing portion, and the engaging projection is disengaged from the driving portion 20. Furthermore, the pushing member 21 pushes the main body of the toner bottle together with the sealing member toward the ~~change~~ front cover to a position where the operator can easily take the toner bottle out.

5 In this manner, the sliding movement (retraction, advancement) of the main body of the bottle used for unsealing the opening can be used for resealing the ~~open~~ opening with a simple structure. In addition, the slide movement distance of the pushing member can be made shorter than in the foregoing embodiments, and therefore, complication of the apparatus at the main body side can be avoided.

10 The structure for the engagement and disengagement between the main assembly of the image forming apparatus and the toner bottle or the photosensitive member may be used in Embodiments 2, 3 and 4.

 In Embodiments 1-6, only by the movement of the releasing projection of the main assembly of the apparatus in a direction (axial direction, for example) of relative motion of the sealing member relative to the main body, the engaging projection or projections are moved in a
15 direction or directions substantially perpendicular to the direction (radial direction, for example), and therefore, the structure for the disengagement is simple. Even when a plurality of engaging projections are provided, all the engaging projections are brought into disengaging positions by a force applied substantially at one position, and therefore, the structure for the disengagement is
20 simple. In Embodiments 1, 4, 5 and 6, the releasing force receiving portion of the sealing member is disposed substantially at the free end portion of the sealing member, so that releasing

force receiving portion can be engaged with the main assembly at a relatively early stage after the start of insertion of the toner bottle.

In ~~embodiments~~ Embodiments 1-4, the driving portion 20 provided in the main assembly of the image forming apparatus is provided with a locking hole and an engaging rib, and the sealing member 2 is provided with an engaging projection portion 3 engageable with the locking hole and the engaging rib of the driving portion 20, but the projection and recess relationship 15 may be ~~reverse~~ reversed. In other words, the driving portion 20 of the main assembly of the apparatus is provided with the engaging projection and the releasing portion (releasing projection), and the sealing member 2 is provided with the locking hole and the engaging rib.

10 With such a structure, the same advantageous effects are provided.

As described in the foregoing, according to these embodiments, the toner accommodating container and the main assembly of the image forming apparatus are locked in a ~~snap-fit~~ snap-fit type engagement, and the sealing member can be automatically engaged into or disengaged from the opening of the toner accommodating container, wherein the locking engagement can be

15 released with a simple structure without ~~load-on~~ effort by the user.

Therefore, the toner supply operation can be carried out by the user with much less ~~load~~ effort.

Such a sealing member, a toner accommodating container and an image forming apparatus can be provided at low cost.

20 While the invention has been described with reference to the structures disclosed herein, it is not confined to the details set forth and this application is intended to cover such

modifications or changes as may come within the purpose of the improvements or the scope of the following claims.

ABSTRACT OF THE DISCLOSURE:

A toner container detachably mountable to an image forming apparatus, includes a main body for containing toner; a sealing portion for sealing the toner discharge opening; locking projections for snap fitting engagement with holes provided in a cylindrical member of an image forming apparatus, wherein the projections receive from the cylindrical member unsealing forces for unsealing the toner discharge opening by a relative movement between the sealing portion and the toner container, wherein a number of the locking projections is larger than a number of ribs provided between the holes of the cylindrical member.

A toner supply container is detachably mountable to an assembly of an electrophotographic image forming apparatus having a driving member. The toner supply container includes a container body including an opening provided at a cylindrical surface of the container body configured to permit discharge of toner contained in the container body; a shutter for opening and closing the opening; and a coupling portion provided at a side of the container body and configured and positioned to engage with the driving member so as to receive a rotational drive force.

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SEALING MEMBER,
TONER ACCOMMODATING CONTAINER AND
IMAGE FORMING APPARATUS

5 FIELD OF THE INVENTION AND RELATED ART:

This application is a divisional application of Application No. 13/231,388, filed
September 13, 2011, which issued as U.S. Patent No. 8,290,394 on October 16, 2012, which is a
divisional application of Application No. 12/981,785, filed December 30, 2010, which issued as
U.S. Patent No. 8,045,901 on October 25, 2011, which is a divisional application of Application
10 No. 12/615,012, filed November 9, 2009, which issued as U.S. Patent No. 7,890,027 on February
15, 2011; which is divisional application of Application No. 12/169,895, filed July 9, 2008,
which issued as U.S. Patent No. 7,647,012 on January 12, 2010; which is a divisional application
of Application No. 11/200,179, filed August 10, 2005, which issued as U.S. Patent No. 7,430,384
on September 30, 2008; which is a divisional application of Application No. 10/429,741 filed
15 May 6, 2003, which issued as U.S. Patent No. 6,990,301 on January 24, 2006; and which is a
continuation-in-part application of Application No. 10/076,430 filed February 19, 2002, which
issued as U.S. Patent No. 6,879,789 on April 12, 2005.

The present invention relates to a toner accommodating container, a sealing member
therefor and an image forming apparatus, suitably usable with an image forming apparatus such
20 as a copying machine, a printer, and a facsimile machine.

In a conventional electrophotographic image forming apparatus such as an
electrophotographic copying machine or a printer, fine particle toner is used as a developer.

When the toner in the main assembly of the electrophotographic image forming apparatus is used up, the toner is supplied into the main assembly of the image forming apparatus using a toner accommodating container (toner supply container).

5 Here, the electrophotographic image forming apparatus is an apparatus which forms images on a recording material through an electrophotographic image formation type process. The electrophotographic image forming apparatus includes an electrophotographic copying machine, an electrophotographic printer (laser beam printer, LED printer, for example), a facsimile machine, word processor or the like.

10 Since the toner is a very fine powder, it is known to place, upon toner supplying operation, a toner supply container inside the main assembly of the image forming apparatus and to gradually supply the toner through a small opening to avoid scattering of the toner.

15 Any one of the above-described toner supply containers receives a driving force from the main assembly of an image forming apparatus to drive the feeding member in the toner supply container or the main body itself to discharge the toner. As for such a drive transmitting means, there are some methods. For example, Japanese Laid-Open Utility Model Application Hei 05-75768 discloses that a gear portion is provided on an outer surface of the toner bottle (toner supply container), and the gear is engaged with a driving gear, by which the toner bottle is rotated.

20 Japanese Laid-open Patent Application Hei 10-63084 discloses that an end surface of the toner bottle is provided with a projection, which is engaged with a recess formed in a driving portion of the main assembly of the image forming apparatus, thus transmitting the driving force.

Japanese Laid-open Patent Application Hei 10-63076 discloses another type. A rotating force transmitting portion of a main assembly of an image forming apparatus has an inner diameter which is provided with a plurality of engaging grooves, and the toner container is provided with projections engageable with the engaging grooves. The rotational driving force is transmitted through the engagement therebetween.

As described, various drive transmission methods are proposed for driving the toner supply container.

However, the conventional structures involve some problems.

In the case of Japanese Laid-Open Utility Model Application Hei 05-75768, when the toner bottle is inserted into the main assembly of the image forming apparatus, it is necessary to make the gear portion on the outer surface of the toner bottle properly engage with the driving gear portion in the main assembly of an image forming apparatus. This requires the user to be careful for the proper engagement. In addition, since the toner bottle is rotated through the meshing engagement between gears, the toner bottle receives forces tending to deviate the bottle in a direction perpendicular to the axis. Therefore, there is a possibility that the toner bottle is raised or is laterally deviated with a result of improper rotation. In order to avoid such a deviation, it is required that the entire outer circumference of the toner bottle be enclosed. This imposes difficulty in the toner bottle mounting and demounting operations. Additionally, the supplying system becomes complicated and expensive.

In the methods disclosed in Japanese Laid-open Patent Application Hei 10-63084 and Japanese Laid-open Patent Application Hei 10-63076, when the toner bottle is inserted such that

projection (or recess) provided at the end surface of toner bottle is properly engaged with the basis (or projection) of the main assembly side driving portion (main assembly driving portion), an indexing operation in the rotational direction is required. This degrades the developer supplying operativity, and even a slight deviation may result in inoperability.

5 In order to avoid such an improper engagement, it is required that toner bottle is provided on its outer surface with a guiding rib so as to determine the position of the toner bottle in the rotational direction upon the insertion thereof, or that a rotating operation of the engaging recess of the main assembly driving portion is controlled to stop at a predetermined rotational position whenever it stops. This also results in complications and a cost increase.

10 In most of the coupling drive transmissions using projection/recess engagement, when the phase deviation occurs between the toner bottle and the main assembly driving portion, it is required that the main assembly driving portion is retracted against a spring force, and the engaging position is established when the phase becomes aligned. With such a structure, even if there is a phase difference when the toner bottle is inserted, the main assembly driving portion is
15 retracted, and when the bottle is rotated in this state, the phase differences are eliminated sooner or later, and therefore, the engagement is established. However, the structure of the main assembly driving portion is complicated. In addition, the main assembly driving portion has to be movable toward the rear side, which requires additional space and therefore hinders
downsizing of the main assembly of the apparatus.

20 In the conventional example, it is not disclosed as to how to disengage the projection from the recess. Assuming that the operator uses force to pull the toner supply container out, or

the operator pushes the small projection with a finger, the usability is not good, or the driving portion of the image forming apparatus or the toner supply container may be damaged.

SUMMARY OF THE INVENTION:

5 Accordingly, it is a principal object of the present invention to provide a sealing member in which a sealing member is locked with an image forming apparatus in order to open or unseal a toner discharge opening of a toner accommodating container, and yet the sealing member can be released from the image forming apparatus with a simple structure.

10 It is another object of the present invention to provide a toner accommodating container in which a locking portion of the toner accommodating container is locked with an image forming apparatus, and the locking of the locking portion with the image forming apparatus can be released with a simple structure.

15 It is a further object of the present invention to provide a toner accommodating container in which a sealing member is locked with an image forming apparatus to open or unseal a toner discharge opening of the toner accommodating container, and yet the sealing member can be released from the image forming apparatus with a simple structure.

20 It is a further object of the present invention to provide an image forming apparatus in which a locking portion of a toner accommodating container is engaged with a portion to be locked of a mounting means, and the locking portion can be released from the portion to be locked with a simple structure.

It is a further object of the present invention to provide an image forming apparatus in which a locking portion of a sealing member is engaged with a portion to be locked of the mounting means to open or unseal a toner discharge opening of a toner accommodating container, and yet the locking portion can be released from the portion to be locked with a simple structure.

These and other objects, features and advantages of the present invention will become more apparent upon a consideration of the following description of the preferred embodiments of the present invention taken in conjunction with the accompanying drawings.

10 BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 is a sectional view of an image forming apparatus according to an embodiment of the present invention.

Figure 2 is a perspective view of the image forming apparatus shown in Figure 1.

Figure 3 is a perspective view illustrating mounting of a toner supply container into an image forming apparatus.

Figure 4 is a front view of an image forming apparatus of Figure 1.

Figure 5 is a side view of the image forming apparatus of Figure 1.

Figure 6 is a top plan view of the image forming apparatus in which a toner container front cover is shown as being in an open position.

Figures 7(A) through 7(C) are sectional views illustrating a toner supply container mounting operation, wherein Figure 7(A) shows an initial stage of the mounting operation,

Figure 7(B) shows the state in the process of mounting operation, and Figure 7(C) shows the state after the completion of the mounting operation.

Figure 8 is a partly broken perspective view of a toner supply container according to an embodiment of the present invention.

5 Figure 9 is a partly enlarged sectional view of a drive transmitting portion according to an embodiment of the present invention in which a driving shaft is provided on the main body side of the toner supply container.

Figure 10 is a partly broken perspective view of a toner supply container according to another embodiment of the present invention.

10 Figure 11 is a partly enlarged sectional view of a drive transmitting portion according to another embodiment of the present invention in which a driving shaft is provided on a sealing member side.

Figures 12(A) through 12(C) are side views of a sealing member according to an embodiment of the present invention, wherein Figure 12(A) is a front view, Figure 12(B) is a side view as seen in the direction X of Figure 12(A), and Figure 12(C) is a side view as seen in the direction Y of Figure 12(A).

Figure 13 is a sectional view of a sealing member taken along a line Z-Z of Figure 12(B).

Figure 14 is a perspective view of a driving force transmitting portion and a driving force receiving portion according to an embodiment of the present invention.

20 Figures 15(A) through 15(C) are partially sectional views illustrating engaging action of a drive transmitting portion of a toner bottle, in which Figure 15(A) shows a state before insertion

of a toner bottle, Figure 15(B) shows a state in the process of insertion, and Figure 15(C) shows a state after the completion of an inserting operation.

Figure 16 is a perspective view of a driving force receiving portion according to another embodiment of the present invention.

5 Figure 17 is a sectional view of the sealing member of Figure 16.

Figures 18(A) through 18(C) are illustrations of phase alignment when the toner bottle is inserted into the main assembly of the apparatus wherein Figure 18(A) shows a state in which an engaging rib and an engaging projection are aligned with each other, Figure 18(B) shows a state in which they are not aligned after rotation to a certain extent, and Figure 18(C) shows a state in which the engaging rib is abutted to the engaging projection to enable drive transmission.

Figures 19(A) through 19(C) show a sealing member according to an embodiment of the present invention, wherein Figure 19(A) is a left side view, Figure 19(B) is a front view, and Figure 19(C) is a right-hand side view.

Figure 20 is a perspective view of a driving force transmitting portion and a driving force receiving portion according to a further embodiment of the present invention, in which phase control operation is not necessary.

Figures 21(A) through 21(C) illustrate the drive transmitting portion of Figure 20 during a toner bottle inserting operation, wherein Figure 21(A) shows a state before insertion of the toner bottle, Figure 21(B) shows a state in the process of the inserting operation, and Figure 21(C) shows a state after completion of the inserting operation.

Figures 22(A) through 22(C) illustrate disengagement action at the drive transmitting portion of the toner bottle, wherein Figure 22(A) is before disengagement, Figure 22(B) is in the process of disengagement, and Figure 22(C) is after completion of the disengagement action.

Figures 23(A) through 23(C) are sectional views of a sealing member according to a further embodiment of the present invention, wherein Figure 23(A) is a side view, Figure 23(B) is a front view, and Figure 23(C) is a sectional view.

Figure 24 is a sectional view illustrating engagement of the sealing member of Figure 23 with a driving portion.

Figures 25(A) through 25(C) are illustrations of disengagement action at the drive transmitting portion of the toner bottle, wherein Figure 25(A) is before disengagement, Figure 25(B) is in the process of disengagement, and Figure 25(C) is after the completion of the disengagement action.

Figures 26(A) and 26(B) illustrate a sealing member according to a further embodiment of the present invention, wherein Figure 26(A) is a side view, and Figure 26(B) is a sectional view taken along a line X-X.

Figures 27(A) through 27(D) show a driving portion engageable with the sealing member of Figures 26(A) and 26(B) according to a further embodiment of the present invention, wherein Figure 27(A) is a front view, Figure 27(B) is a side view, Figure 27(C) is a sectional view taken along a line C-C of Figure 27(B), and Figure 27(D) is a sectional view taken along a line D-D of Figure 27(A).

Figures 28(A) through 28(C) illustrate engaging action between the sealing member of Figures 26(A) and 26(B) and the driving portion of Figures 27(A) through 27(D), wherein Figure 28(A) shows a state in which the toner bottle is being inserted, Figure 28(B) shows a state in the process of insertion, and Figure 28(C) shows a state after the completion of insertion.

5 Figures 29(A) through 29(C) illustrate disengagement action after the engagement shown in Figures 28(A) through 28(C), wherein Figure 29(A) is before the disengagement, Figure 29(B) is in the process of the disengagement, and Figure 29(C) is after completion of the disengagement action.

10 Figures 30(A) and 30(B) are sectional views of a sealing member according to a further embodiment of the present invention, wherein Figure 30(A) is before disengagement, and Figure 30(B) is in the process of disengagement.

Figure 31 is a perspective view of a toner supply container according to a further embodiment of the present invention.

15 Figures 32(A) through 32(C) show a sealing member according to a modified embodiment of Embodiment 2.

Figure 33 is a perspective view illustrating a drive transmission for a photosensitive drum according to a further embodiment of the present invention.

Figures 34(A) and 34(B) schematically show the sealing member which is rotating.

20 Figures 35(A) through 35(C) illustrate another example in which the phase alignment is not required.

Figure 36(A) shows the sealing member shown in Figures 35(A) through 35(C) and the driving portion, and Figure 36(B) shows a sectional view of the sealing member engaged with the driving portion.

5 DESCRIPTION OF THE PREFERRED EMBODIMENTS:

A sealing member, a toner accommodating container and an image forming apparatus according to the preferred embodiments of the present invention will be described in conjunction with the accompanying drawings.

(Embodiment 1)

Referring to Figure 1, a description will first be made as to an electrophotographic image forming apparatus which is an exemplary image forming apparatus which is mounted with a toner supply container (toner accommodating container) according to an embodiment of the present invention.

(Electrophotographic image forming apparatus)

Figure 1 shows an electrophotographic copying machine. An original 101 in a main assembly (main assembly of the apparatus) 100 is placed on an original supporting platen glass 102. A light image corresponding to the image information of the original 101 is an image on an electrophotographic photosensitive drum (image bearing member) 104 through a plurality of mirrors M and a lens Ln of an optical portion 103. On the basis of selection by the user on an operating portion 100a shown in Figure 2 or on the basis of automatic selection in accordance with the paper size of the original 101, an optimum sheet P is selected from the cassettes 105, 106, 107, 108. The recording material is not limited to the sheet of paper, but may be an OHP sheet, for example.

A single sheet P supplied from one of separating devices 105A, 106A, 107A, 108A, is fed to registration rollers 110 by way of a feeding portion 109, and the sheet P is fed to the transfer portion by the registration rollers 110 in synchronism with the rotation of the photosensitive drum 104 and the scanning timing of the optical portion 103. In the transfer portion, a toner image formed on the photosensitive drum 104 is transferred onto the sheet P by the transfer

discharger 111. The sheet P now having the transferred toner image is separated from the photosensitive drum 104 by a separation discharger 112.

The sheet P is fed into a fixing portion 114 by a feeding portion 113. In the fixing portion 114, the toner image is fixed on the sheet P by heat and pressure. Thereafter, the sheet P is
5 passed through a discharged sheet reversing portion 115 and discharged to a sheet discharge tray 117 by sheet discharging rollers 116 in the case of a one-sided copy mode. In the case of a duplex copy mode, the sheet P is re-fed to the registration rollers 110 through sheet refeeding paths 119, 120, under the control of a flapper 118 provided in the discharged sheet reversing portion 115. Then, the sheet is fed similarly to the case of the one-sided copy mode, and is
10 finally discharged to the sheet discharge tray 117.

In the case of a superimposed copy mode, the sheet P is temporarily and partly discharged by the sheet discharging rollers 116 through the discharged sheet reversing portion 115. Thereafter, at the timing when the trailing edge of the sheet passes by the flapper 118 while it is still nipped by the sheet discharging rollers 116, the flapper 118 is controlled, and the sheet
15 discharging roller 116 is rotated in the reverse direction, so that it is re-fed into the main assembly 100. Thereafter, the sheet is fed to the registration rollers 110 through the sheet refeeding portions 119, 120, and then the sheet is processed similarly to the case of the one-sided copy mode. It is finally discharged to the sheet discharge tray 117.

In the main assembly 100 of the apparatus, there are provided a developing device 201
20 (developing means), a cleaning device 202, the primary charger 203 and so on, around the photosensitive drum 104.

An electrostatic latent image is formed by exposing the photosensitive drum 104 to uniformly double to the image light corresponding to the image information of the original 101. The electrostatic latent image is developed with toner by a developing device 201. In order to supply the toner (developer) into the developing device 201, a toner supply container 1 is detachably mountable by the user into the main assembly 100 of the apparatus. The present invention is applicable to the case in which only the toner is supplied into the image forming apparatus from the toner supply container and to the case in which the toner and carrier are supplied therefrom. In this embodiment, the former is the case.

The developing device 201 comprises a toner hopper 201a (accommodating means) and a developing device 201b. The toner hopper 201a is provided with a stirring member 201c for stirring the toner supply designated from the toner supply container 1. The toner stirred by the stirring member 201c is supplied into the developing device 201b by a magnet roller 201d. The developing device 201b comprises a developing roller 201f and a feeding member 201e. The toner fed from the toner hopper 201a by the magnet roller 201d is fed to the developing roller 201f by the feeding member 201e, and is supplied to the photosensitive drum 104 by the developing roller 201f.

The cleaning device 202 functions to remove the toner remaining on the photosensitive drum 104. The primary charger 203 functions to electrically charge the photosensitive drum 104.

When the user opens a front cover 15 for exchange of the toner supply container which is a part of an outer casing shown in Figure 2, a container receiving tray 50, which is a part of the mounting means, is drawn out to a predetermined position by an unshown driving system. The

user places the toner supply container 1 on the container receiving tray 50. When the user takes the toner supply container 1 out of the main assembly 100 of the apparatus, the container receiving tray 50 is drawn out, and the toner supply container 1 is taken out of the tray 50.

5 The front cover 15 is provided exclusively for mounting and demounting (exchange) of the toner supply container 1, and therefore, it is opened and closed only for that purpose. When the maintenance operation for the main assembly 100 of the apparatus is to be carried out, the front cover 100c is opened.

The toner supply container 1 may be directly mounted to the main assembly 100 of the apparatus, and may be taken out.

10 (Toner supply operation)

Referring to Figure 7(A) and Figure 7(C), the toner supply operation from the toner supply container (toner bottle) in this embodiment, will be described. Figures 7(A) - 7(C) illustrate the process of toner supply in which the toner bottle 1 of this embodiment is inserted into the main assembly 100 of the apparatus.

15 As shown in the Figures, the main assembly 100 of the apparatus is provided with a toner supply device 400, and the toner supply device 400 is provided with a driving portion (driving force transmitting portion) 20 for connecting with and rotating the toner bottle 1. The driving portion 20 is rotatably supported by bearings 23, and is rotated by an unshown driving motor provided in the main assembly 100 of the apparatus.

20 The main assembly 100 of the apparatus is further provided with a partition 25 constituting a toner supply path 24 connecting with a hopper 201a, and to the partition 25, inner

and outer bearings 26a, 26b for rotatably bearing a part of the toner bottle 1 and for sealing the toner supply path 24, are fixed. Furthermore, a screw member 27 is disposed in the toner supply path 24 to feed the toner to the hopper 201a.

Figure 7(A) illustrates insertion of the toner bottle 1 into the main assembly 100 of the apparatus. One end of the toner bottle 1 is provided with a toner supply opening 1a, which will be called simply "opening", formed by a cylindrical member in this embodiment, the opening 1a sealed by a sealing member 2 at the free end of the cylinder.

Figure 7(B) shows a state in which the toner bottle 1 has been further inserted, and an engaging projection 3 (as a locking projection) provided at a free end portion of the sealing member 2 is engaged with a locking hole (retaining) with the driving portion 20 provided in the main assembly. The engagement between the driving portion 20 and the sealing member 2 is accomplished in the following manner. The user inserts the toner bottle 1 into the main assembly, and by this, the driving portion 20 is brought into contact with an upper surface (locking force receiving portion) of the engaging projection. By further inserting the toner bottle 1, the driving portion 20 presses down the engaging projection to displace it. Thereafter, when the pressing action by the driving portion 20 is released, the portion supporting the locking projection restores by its own elastic force, so that engagement is accomplished.

Thus, in this embodiment, the engagement is a so-called "snap-fit" type.

Since the locking surface 3b (locking portion) provided in the engaging projection 3 is locked with a locking hole (portion to be locked) against a thrust direction (axial direction)

motion, and therefore, as long as the locking is maintained, the sealing member 2 is retained at the fixed position by the driving portion 20, although small play is permissible.

As will be understood from Figure 7(C), after the sealing member 2 and the driving portion 20 are engaged, a slidable member 300 is retracted in a direction indicated by an arrow b in interrelation with a closing operation of the front cover 15 for exchange of the bottle. By this, the toner bottle 1 is retracted, too, but the sealing member is locked with the main assembly side of the image forming apparatus, and therefore, the sealing member 2 is away from the toner bottle 1, thus opening the opening 1a to enable toner supply.

At the time, the driving shaft 1b fixed to the main body 1A of the toner bottle 1, is not completely disengaged from the sealing member 2 even in the state of the opening 1a being sealed by the sealing member and even in the state of the opening being opened, and the engaging portion (hole portion) of the sealing member is kept engaged with the driving shaft 1b (portion to be engaged). The driving shaft 1b has a non-circular cross-sectional configuration, such as rectangular or triangular shape to permit driving force transmission. Correspondingly, the hole (engaging portion) has a complementary configuration for slidable fitting.

When an unshown motor is driven in this state, the rotational driving force is transmitted to a driving force receiving surface (driving force receiving portion) of the engaging projection of the sealing member 2 from the main assembly driving portion 20 (the driving portion provided in the main assembly), and the driving force is transmitted from the sealing member 2 to the driving shaft 1b, which rotates the toner bottle 1 to feed and discharge the toner.

Thus, the sealing member 2 has a function of sealing the opening 1a, a function of receiving the rotational driving force from the main assembly side of the image forming apparatus, and a function of transmitting the rotational driving force to the toner bottle 1 side.

5 The toner bottle 1 is rotatably supported by bottle receiving roller 23 provided on a container receiving tray 50, and therefore, can be smoothly rotated by a small driving torque. The bottle receiving roller 23 is disposed at each of four positions forming a saddle with respect to the main body 1A of the bottle. The bottle receiving rollers 23 are rotatably supported on the toner supply device 400 of the main assembly 100 of the apparatus. By the rotation of the toner bottle 1, the toner accommodated in the toner bottle 1 is discharged through the opening 1a
10 gradually, and the screw member 27 provided in the toner supply path 24 feeds the toner into the hopper 201a provided in the main assembly 100 of the apparatus, thus accomplishing the toner supply.

(Exchanging method for toner supply container)

A description will be made as to an exchanging method of the toner bottle.

15 With the image forming operation, the toner in the toner bottle 1 is consumed. When substantially all the toner therein is used up, the "no toner" is detected by a detecting means (unshown) provided in the main assembly 100 of the apparatus, and the event is notified to the user by a displaying means 100b (Figure 2) such as liquid crystal display.

In this embodiment, the toner bottle 1 is easily exchanged by the user, through the
20 following steps.

First, the front cover 15 which is in the closed state is rotated about a hinge 18 to an open position indicated by broken lines in Figure 6. In interrelation with the action of opening the front cover 15, the main body 1A of the bottle which takes the position indicated in Figure 7(C) is moved in a direction indicated by an arrow a in Figure 7(A) which is opposite from the direction of arrow b, by opening and closing means for the toner supplying portion which will be described hereinafter. By this, the sealing member 2 which is at an open position (away from the main body 1A of the bottle to open the toner supply opening 1a) is press-fitted into the toner supply opening 1a, so that the toner supply opening 1a is plugged (Figure 7(B)). At this time, the sealing member still maintains engagement with the main assembly of the image forming apparatus. Thereafter, a releasing ring applies a releasing force to a releasing projection, by which the releasing projection is depressed together with the engaging projection, so that engagement is released. By retracting the main body 1A of the bottle in a longitudinal direction of the bottle, the releasing operation between the sealing member and the main assembly of the image forming apparatus is completed.

Then, the user draws the empty toner bottle 1 which has been released from the main assembly 100 of the apparatus out of the main assembly 100 of the apparatus in the direction of arrow b (Figure 7(C)) which is opposite from the direction of arrow a (Figure 7(A)).

The user then inserts a new toner bottle 1 into the main assembly 100 of the apparatus in the direction of arrow a, and then closes the front cover 15. In interrelation with the front cover 15 closing action, the sealing member 2 locked with the main assembly of the image forming apparatus is moved away from the main body of the container by the toner supplying portion

opening and closing means, so that the toner supply opening 1a is unsealed (Figure 7(C)). The foregoing is the exchanging process of the toner supply container.

(Toner bottle)

Referring to Figure 8 and Figure 9, the toner bottle will be described.

5 The toner bottle 1 is generally cylindrical, and one end thereof is provided substantially at a center with an opening 1a by a projected portion. The diameter of the opening 1a is smaller than the diameter of the cylindrical portion 1A which is the main body of the bottle. The opening 1a is plugged with a sealing member 2 for sealing the opening 1a, and as will be understood from the description in conjunction with Figures 7(A) – (C), the opening 1a is unsealed and resealed
10 automatically by the sliding motion of the sealing member 2 relative to the toner bottle 1 in the longitudinal direction (arrow b) of the toner bottle 1.

At the free end portion of the sealing member 2, there is formed a cylindrical portion having an engaging projection 3 and a releasing force receiving portion 4 for disengaging from the driving portion 20 provided in the main assembly of the apparatus, and such a portion of the
15 cylindrical portion which supports the engaging projection and the releasing projection is elastically deformable (in order to enhance or assist the elastic deformation, slits are formed at lateral sides of the region so as to extend to the free end of the cylindrical portion, as will be described hereinafter).

The engaging projection 3 is engaged with the driving portion 20 and functions to
20 transmit the rotation to the toner bottle 1. The structures of the engaging projection 3 and the releasing force will be described in detail hereinafter.

The internal structure of the toner bottle 1 will be described.

As described in the foregoing, the toner bottle 1 is generally cylindrical in shape and is disposed generally horizontally in the main assembly 100 of the apparatus. It is rotated by the main assembly 100 of the apparatus. An inside of the toner bottle 1 has a projection 1c in the
5 form of a rib which extends helically. When the toner bottle 1 rotates, the toner is fed in the axial direction along the helical projection 1c, and the toner is discharged through the opening 1a formed at an end of the toner bottle 1.

The internal structure of the toner bottle 1 according to the present invention is not limiting, and the configuration of the structure may be any as long as the toner can be discharged
10 by rotation of the toner bottle 1. The main body of the toner bottle is not limited to that described in the foregoing. For example, it may have a rotation screw or the like for feeding the toner, and the rotation screw is driven by a rotational driving force received by the sealing member from the image forming apparatus, while the main body is fixed (not rotatable) on the main assembly of the image forming apparatus.

15 A feature of this embodiment is in the structure of the drive transmitting portion for connection with the main assembly 100 of the apparatus, and therefore, the internal structure of the toner bottle 1 may be any, and the bottle may have a helical projection 1c on the inner surface of the bottle.

For example, the internal structure of the bottle may be modified as shown in Figure 10.
20 In this modified example, there is provided in the main body of the bottle a baffle member 40 generally in the form of a plate. The surface of the baffle member 40 has, on a surface, a

plurality of inclined projections 40a which are inclined with respect to the direction of the axis of the toner bottle 1. One end of the inclined projection 40a extends to a neighborhood of the opening 1a. The toner is finally discharged from the inclined projection 40a through the opening 1a. By the rotation of the toner bottle 1, the toner is scooped by the baffle member 40 and then falls sliding on the surface of the baffle member 40. Because of the inclination of the inclined projection 40a, the toner is advanced toward the front side of the toner bottle 1. By repeating this operation, the toner in the toner bottle is gradually fed to the opening 1a while being stirred, and is discharged therethrough.

The driving type of this invention is not limited to the rotational driving type such as the type of this embodiment or modification. The toner bottle may be vibrated, swung or may be moved in another fashion to supply the toner. In other words, the driving may be rotation, swinging, vibration or another motion as long as the toner is discharged from the bottle as the toner bottle is moved by the main assembly 100 of the apparatus.

In the above-described modified example, the baffle member 40 in the form of the plate is a separate member from the toner bottle 1, and the rotational driving force is transmitted to the baffle member 40 through the sealing member 2 to indirectly rotate the toner bottle 1.

In this manner, the present invention is applicable when the toner bottle 1 is directly or indirectly driven through a sealing member 2.

In Figures 8 and 9, the main body 1A of the bottle is provided with the opening 1a at the one longitudinal end surface thereof, and a driving shaft 1b (portion to be engaged) is projected out of the opening 1a, the driving shaft 1b being integral with the main body 1A of the bottle and

being provided in the opening 1a. The driving shaft 1b is disposed substantially coaxially with the opening 1a, and is slidably engaged with an engaging hole 2a (engaging portion) formed in the sealing member 2. The engaging hole, as shown in Figure 9, is closed at an end remote from the driving shaft, so that toner leakage through the engaging hole is prevented.

5 The driving shaft 1b functions to transmit the rotational driving force from the main assembly 100 of the apparatus to the main body 1A of the bottle through the sealing member 2, and the cross-sectional configuration of the driving shaft 1b is non-circular, for example, rectangular configuration, H shape, D shape or the like to transmit the rotational driving force. The driving shaft 1b is fixed on the main body 1A of the bottle by proper means.

10 The driving shaft 1b may not be fixed on the main body 1A of the bottle but can be integral with the sealing member 2 as shown in Figure 11. In this case, the engaging hole 2a for transmitting the driving force from the driving shaft 1b is provided in the toner bottle 1 side, and that opening is formed so that they are maintained engaged with each other after the toner bottle is unsealed. In the modified example, the member defining the engaging hole 2a is supported by
15 a member 1c provided inside the opening 1a, but the discharge of the toner is permitted.

In this embodiment, the driving shaft 1b is fixed on the main body 1A of the bottle.
(Sealing member)

Referring to Figures 12 and 13, a description will be made as to the sealing member 2 (drive receiving member).

20 In Figures 12 and 13, the sealing member 2 comprises a sealing portion 2b for unsealably sealing the opening 1a of the toner bottle 1, and a coupling engagement portion 2c (cylindrical

portion) in the form of a cylinder engageable with the driving portion 20 of the main assembly of the apparatus. An outer diameter of a large diameter portion of the sealing portion 2b is larger than the inner diameter of the opening 1a by a proper degree. The sealing portion 2b is press-fitted into the opening 1a, by which the opening 1a (toner supply opening) is sealed by the sealing member 2.

As described in the foregoing, the sealing member 2 has an engaging hole 2a for transmitting the driving force received from the main assembly 100 of the apparatus to the driving shaft 1b by engagement with the driving shaft 1b. The engaging hole 2a extends continuously in the sealing portion 2b and the engaging portion 2c. The engaging hole 2a has a cross-sectional configuration which is complementary with the driving shaft 1b and which is slightly larger than the cross section of the driving shaft 1b. Because of this, the driving shaft 1b is loosely fitted in the engaging hole 2a. The engaging hole 2a and the driving shaft 1b have complementary polygonal configurations. In this embodiment, it is square.

Because of the loose fitting of the driving shaft 1b in the engaging hole 2a having such cross sections, the main body 1A of the bottle and the sealing member 2 are slidable relative to each other in the axial direction while being prevented from relative rotational motion therebetween. With this structure, when the toner bottle 1 is mounted (locked) on the toner supply device 400, the sealing member 2 is movable relative to the main body 1A of the bottle, that is, the unsealing of the opening 1a (toner supply opening) is enabled.

The engagement length between the engaging hole 2a and the driving shaft 1b is determined such that they are not disengaged from each other upon the relative movement

between the sealing member 2 and the main body 1A of the bottle for the unsealing. By doing so, the driving shaft 1b can receive the driving force through the sealing member 2 even if the sealing member 2 is moved away relatively from the main body 1A.

5 A description will be made as to the engaging projection 3 (locking projection) which is one of the features of the present invention.

The coupling engagement portion 2c of the sealing member 2 has an engaging projection 3 for receiving the driving force from the main assembly 100 of the apparatus. The engaging projection 3 is projected radially outwardly from the peripheral surface of the cylindrical portion of the coupling engagement portion 2c. The engaging projection comprises a drive receiving surface 3a (driving force receiving portion) for receiving the rotational driving force from the main assembly of the apparatus; and a locking surface 3b (locking portion) for snap-fit type locking of the sealing member 2 into a locking hole (portion to be locked) provided in the main assembly 100 of the apparatus when the sealing member 2 and the toner bottle 1 are moved away from each other (from the closed state to the open state). Thus, by the drive receiving surface 3a, the engaging hole 2a and the locking surface 3b, the engaging projection 3 performs three different functions, namely, a coupling function for receiving the rotational driving force from the main assembly of the apparatus, a transmitting function of transmitting the rotation to the toner bottle 1, and a locking function (retention function) for permitting relative sliding motion between the sealing member 2 and the main body of the toner bottle 1 so as to automatically open and close the opening.

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When the driving force is transmitted with the locking surface 3b locked with the main assembly driving portion 20, the surface 3b is effective to maintain a constant distance between the sealing member 2 and the toner bottle 1. This assures the formation of the path of the toner between the toner bottle 1 and the sealing member 2, so that the toner discharging amount is maintained constant. Thus, a toner bottle having an excellent constant amount discharging property can be accomplished. In addition, the sealing member 2 is assuredly locked with the main assembly driving portion 20 of the apparatus, and therefore, the sealing member 2 is not likely to disengage from the driving shaft during the toner discharging operation, thus further assuring the toner discharging.

10 According to such a structure, the automatic opening and closing operation of the sealing member 2 and the driving force transmitting operation can be accomplished by a single sealing member, so that an inexpensive and compact toner supply container can be provided.

The engaging projection 3 is preferably integral with the sealing member 2 from this standpoint of reduction of the number of constituent parts, but a separate member for the engaging projection 3 may be mounted to the sealing member 2. Such an example will be described in conjunction with a fourth embodiment.

The engaging projection 3 has a driving force receiving function as well as the locking function, and therefore, it has a certain degree of rigidity. In view of this, slits 2e or the like are formed at lateral ends of the engaging projection 3, so that only the part of the coupling engagement portion 2c where the engaging projection 3 is provided, can relatively freely deform elastically toward the inside. This is because the engaging projection 3 is displaced by the main

assembly 100 of the apparatus to effect the engagement and disengagement relative to the main assembly of the apparatus, as will be described hereinafter.

In this embodiment, the engaging projection 3 is integral with the sealing member 2.

5 The free end portion of the engaging projection 3 is provided with a tapered surface 3c (locking force receiving portion) so as to permit smooth insertion when the sealing member 2 is inserted into the driving portion 20 of the main assembly 100 of the apparatus. The tapered surface 3c receives a locking force from an inner surface of the driving portion 20 so that the engaging projection 3 (locking portion) is displaced inwardly to lock into the locking hole when the tapered surface 3c approaches relative to the locking hole 20h of the driving portion 20.

10 When the locking surface further approaches the locking hole to such an extent that contact of the tapered portion 3c to the inner surface of the driving portion 20, that is, the locking force is released, the portion supporting the engaging projection (locking portion) restores from the displaced position, thus completing the locking between the sealing member (locking portion) and the main assembly (portion to be locked) of the image forming apparatus.

15 After the completion of the locking action, the relative motion between the sealing member and the main body of the bottle is automatically imparted in the direction away from each other, by which the opening is unsealed to enable the toner to discharge. In this embodiment, the sealing member is engaged with the main assembly of the apparatus such that movement in the sliding direction is prevented, and in this state, the main body of the bottle is

20 retracted or advanced to automatically open or close the opening.

In addition, the coupling engaging portion 2c functions to minimize the deformation of the engaging projection 3 when the rotational driving force is imparted to the engaging projection 3. As shown in Figure 34(A), when a driving force F is imparted to the engaging projection 3, the engaging projection elastically deforms as shown in (A) and (B). However, it abuts the coupling engaging portion 2c, so that further deformation is prevented. Therefore, even when a large rotational driving force is imparted, the engaging projection 3 does not deform beyond the width of the slot because of the provision of the coupling engaging portion 2c. Therefore, the structure is suitable for use with a large capacity toner bottle. The amount of deformation of the engaging projection 3 is dependent on the width of the groove 2e, and therefore, the width of the groove 2e is preferably as small as possible.

Referring to Figures 12 and 13, a description will be made as to the structure of a releasing force receiving portion which is another one of the features of the present invention.

The engaging projection 3 described above is provided at each of two positions which are diametrically opposed to each other, and the two engaging projections 3 are connected by a connecting portion which functions as a releasing force receiving portion 4. When the releasing force receiving portion (releasing portion) 4 receives a force from the main assembly of the apparatus in the direction indicated by an arrow b, the engaging projections 3 are elastically deformed as indicated by chain lines in Figure 13. If the force application is stopped, the original position is restored. The releasing portion 4 has a relatively small thickness to permit elastic deformation, and the material is selected in consideration of such an elastic deformation.

It is preferable that sealing member 2 is manufactured through an injection molding from a plastic resin material or the like, but another material, or another manufacturing method is usable. They may be provided by connecting separate members. The sealing member 2 desirably has a proper elasticity since it is press-fitted into the opening 1a to seal it. The best material is low density polyethylene material, and preferable materials are polypropylene, normal chain polyamide, Nylon (tradename), high density polyethylene, polyester, ABS, HIPS (shock-resistant polystyrene) or the like.

By employing an elastically deformable elastic member for the parts supporting the engaging projection 3 and for the releasing portion 4, the locking and releasing between the driving portion 20 and the engaging projection 3 can be accomplished with a simple structure, utilizing the elastic deformation and restoration. The above-described materials have proper elasticities, and therefore, the engagement and disengagement of the driving portion 20 and the engaging projection 3 are easily effected with sufficient durability.

The releasing portion 4 is in the form of a bridge connecting the engaging projections 3, so that such a plurality of engaging projections 3 can be uniformly displaced by pushing one releasing portion.

It is not inevitable to integrally connect the engaging projections, but releasing portions may be provided for the respective engaging projections, as shown in Figures 16 and 17.

(Driving force receiving portion)

Referring to Figure 14, a description will be made as to the structure of the coupling engagement portion 2c provided in the sealing member 2, which is another one of the features of the present invention.

5 In this embodiment, the sealing member 2 is provided with the coupling engagement portion 2c in the form of a cylinder. As described in the foregoing, it also functions as a drive receiving member to receive the driving force from the driving force transmitting portion 20 provided in the toner supply device 400.

10 In the cylindrical coupling engagement portion 2c of the sealing member 2, the two parts provided with the respective engaging projections 3 are elastically deformable, such that parts are easily and elastically deformed by the tapered portion 3c of the engaging projection 3 being pressed by the driving portion 20. The releasing portion 4 is provided so as to connect the engaging projections 3, and the engaging projection 3 and the releasing portion 4 are integral with each other.

15 On the other hand, the locking hole 20h of the driving portion 20 provided in the main assembly 100 side of the apparatus is constructed so as to be locked with the engaging projection 3 (locking surface) of the sealing member 2. When the sealing member 2 is inserted into the driving portion 20, the smooth insertion is accomplished by providing the driving portion 20 with a tapered surface 20b defining an inner diameter gradually increasing toward the free end of
20 the driving portion 20. The sealing member 2 is smoothly inserted into the driving portion 20 because of the provision of the tapered surface 20b.

The driving portion 20 is provided with an engaging rib 20a for rotating the toner bottle 1, and the engaging rib 20a abuts the drive receiving surface 3a to transmit the rotational driving force to the sealing member after the engaging projection is engaged with the locking hole 20h.

Referring to Figure 15, the engagement between the driving portion 20 and the sealing member 2 in this embodiment will be described.

Figure 15(A) shows a state when the user is setting a new toner bottle 1 in the direction indicated by an arrow a in order to install it into the main assembly 100 of the apparatus, in which the toner bottle 1 has not yet engaged with the driving portion 20 in the main assembly of the apparatus.

When the toner bottle 1 is further inserted, the tapered portion 3c of the engaging projection 3 of the sealing member 2 is brought into contact with the tapered surface 20b of the driving portion 20, as shown in Figure 15(B), and the engaging projection 3 is being guided by the tapered surface 20b while being elastically deformed toward the inside.

With the further insertion of the toner bottle 1, the engaging projection 3 passes by the straight portion 20g extending from the tapered surface 20b, the engaging projection 3 is restored because of the provision of the space portion 20h (locking hole) not having the engaging rib 20a, by which the engaging projection 3 is locked with the driving portion 20, as shown in Figure 15(C). In this state, the engaging projection 3 is firmly locked relative to the driving portion 20, and the position of the sealing member 2 in the thrust direction (axial direction) is substantially fixed relative to the main assembly of the apparatus.

Therefore, even if the toner bottle 1 is retracted in the direction indicated by an arrow b, as shown in Figure 7(C), the sealing member 2 does not move in the same direction, but is firmly fixed to the driving portion 20. On the other hand, since the toner bottle 1 is inserted, the sealing member 2 is separated away from the toner bottle 1 with certainty, so that the opening 1a is
5 unsealed or opened. The sliding retracting operation of the toner bottle 1 may be interrelated with the opening and closing operation of the front cover 15 provided in the main assembly 100 of the apparatus.

As for the sliding operation, the toner bottle 1 may be slid with the sealing member 2 fixed, or the sealing member 2 may be slid with the toner bottle 1 fixed, or both of them may be
10 slid away from each other.

When the toner is used up from the toner bottle, the empty toner bottle is taken out to exchange it with a new toner bottle. The dismounting operation is carried out by the above-described steps in a reverse order.

In detail, when the operator opens the front cover, the following occurs. First, the main
15 body of the toner bottle advances toward the sealing member while the sealing member is locked in the main assembly of the apparatus, by which the sealing member of the opening is automatically sealed. By a pushing member 21 which will be described hereinafter, a releasing projection is actuated to release the engaging projection from the locking hole. Then, the main
20 body of the toner bottle is retracted together with the sealing member re-press-fitted into the opening, so that the sealing member is disengaged from the main assembly of the apparatus. By this, the toner bottle is prepared for being removed from the main assembly of the apparatus.

(Structure eliminating necessity of phase alignment)

A description will be made as to the structure eliminating the necessity of phase alignment when the toner bottle 1 is brought into engagement with the main assembly driving portion 20.

5 In a conventional drive transmitting means using a combination of projection and recess type coupling drive, it is necessary to engage a recess and a projection with phase alignment. This is not necessary according to this embodiment. Referring to Figure 18, this will be described.

10 Figure 18 shows a positional relation in the rotational direction between the engaging projection 3 and the engaging rib 20a when the sealing member 2 is inserted into the driving portion 20. The engaging rib 20a is provided at one position, and the engaging projection 3 is provided at two positions (3A, 3B).

15 Assuming that engaging rib 20a and the engaging projection 3 are not aligned with each other when the user inserts the toner bottle 1, when the toner bottle 1 is inserted into the predetermined position, the sealing member 2 is locked with the driving portion 20, and when the toner bottle 1 is retracted, the sealing member 2 is away from the toner bottle 1 to establish the toner dischargeable state.

20 However, depending on the position in the rotational direction of the toner bottle 1 upon the insertion of the toner bottle, the engaging projection 3A is aligned with the engaging rib 20a as shown in Figure 18(A). In this case, even if the toner bottle 1 is inserted into the predetermined position, the engaging projection 3A interferes with the engaging rib 20a so that it

is not released outwardly. Then, the locking is incomplete. If the toner bottle 1 is retracted in this state, the toner bottle 1 is retracted together with the sealing member 2 since the locking with the main assembly driving portion 20 is incomplete. The opening 1a cannot be unsealed or opened.

5 In order to avoid this, the number of engaging projections 3 is larger than that of the engaging ribs 20a by at least one, by which not all of the engaging ribs and engaging projections are aligned.

 In the case of Figure 18(B), one of the engaging projections 3A interferes with the engaging rib 20a, and therefore, is not locked with the main assembly driving portion 20.

10 However, the other one of the engaging projections 3B does not interfere with the engaging rib 20a, and therefore, it is correctly locked with the driving portion 20. Thus, even if one of the engaging projections 3A is not locked correctly, the other engaging projection 3B is correctly locked, and therefore, the toner bottle 1 is separated away from the sealing member 2 without problem, so that opening 1a is unsealed. After the opening 1a is unsealed, the incompletely
15 engaged engaging rib 20a is brought out of the interference sooner or later by the rotation of the main assembly driving portion 20 in the direction indicated by an arrow c, and therefore, correct locking of the engaging projection 3A is established. With further rotation, as shown in Figure 18(C), the engaging rib 20a is engaged with the engaging projection 3B, so that rotation is transmitted to rotate the toner bottle 1.

20 By providing the number of engaging projections 3 which is at least one larger than the number of engaging ribs 20a, at least one of the engaging projections is engaged with the locking

hole without an interference with the engaging rib irrespective of the position of the toner bottle 1 in the rotational direction. In this manner, the toner bottle 1 can be assuredly set in the apparatus.

5 The number of the engaging projections 3 may be four rather than two as in this embodiment. In that case, the number of the engaging ribs is not more than three.

In this case, even if the number of the engaging ribs and the number of the engaging projections are the same, as shown in Figures 35 and 36, the distance (phase) between the engaging ribs may be made different from the distance (phase) between the engaging projections, by which at least one engaging projection is not in line with the engaging rib upon the insertion 10 of the bottle, so that correct locking can be accomplished there.

When a plurality of engaging ribs are provided at different circumferential positions, it is preferable that engaging ribs are disposed at regular intervals in consideration of the drive transmission property.

15 Figure 20 shows another example which also eliminates the necessity for the phase alignment. In this modified example, a shallow locking groove 20e is extended in the entire inner circumference of the engaging portion 20d of the main assembly driving portion 20, and an engaging hole 20d for engagement with the engaging projection 3 is formed in the locking groove 20e. The locking groove 20e is not so deep as to completely engage with the engaging projection 3, but is so shallow as to permit half-engagement to permit automatic unsealing 20 action.

Referring to Figure 21, an operation upon the engagement in this modified example will be described.

In Figure 21(A), there is shown a state in which the toner bottle 1 has not yet been inserted into the main assembly driving portion 20, and the engaging hole 20d of the main assembly driving portion 20 and the engaging projection 3 and sealing member 2 are not aligned in the positions in the rotational direction, as indicated in X-X cross section. With the insertion of the toner bottle 1, the state shown in Figure 21(B) is reached, in which the engaging projection 3 is half-engaged with the locking groove 20e. In this state, when the toner bottle 1 is retracted, only the toner bottle 1 is retracted in the direction indicated by the arrow b since the sealing member 2 is locked with the locking groove 20e, so that sealing member 2 and the toner bottle 1 are spaced apart with certainty to unseal the opening 1a. When the main assembly driving portion 20 rotates in the direction indicated by an arrow c, the engaging hole 20d and the engaging projection 3 are aligned as shown in Figure 21(C), and the engaging projection 3 is now completely engaged with the engaging hole 20d to permit transmission of the rotational driving force.

In this manner, according to this embodiment, the toner bottle 1 can be properly set in the main assembly 100 of the apparatus simply by inserting the toner bottle 1 into the main assembly 100, without the necessity of adjusting the position of the bottle 1 in the rotational direction. Therefore, the exchange operation is simple and easy.

Additionally, since the opening and closing operation for the opening of the toner supply container is automatically executed in the main assembly of an image forming apparatus,

therefore, the user is not required to open or close the opening. This eliminates the possibility of contaminating the hands of the user.

(Releasing method)

Referring to Figure 22, a description will be made as to releasing between the engaging
5 projection 3 and the main assembly driving portion 20.

When the toner supply is completed, and the toner bottle 1 becomes empty, the current
toner bottle 1 is removed, and a new toner bottle is set.

At this time, it is necessary to release the sealing member 2 from the driving portion 20.

As shown in Figure 22, the inside of the main assembly of the apparatus, more
10 particularly, the inside of the driving portion 20 is provided with a pushing member 21. The
pushing member 21 is movable in the same direction as the direction of the axis of the driving
shaft 1b of the toner bottle 1.

Figure 22(A) shows a state in which the toner supply is completed, and the opening 1a of
the toner bottle 1 is in an open state.

15 When the locking between the driving portion 20 and the sealing member 2 is released,
the pushing member 21 is advanced in a direction indicated by an arrow a to the releasing
portion 4 at the free end of the sealing member 2, by which the releasing portion 4 is elastically
deformed in the same direction, and correspondingly, the engaging projection 3 integral with the
releasing portion 4 deforms toward the inside. By this, the engaging projection 3 is disengaged
20 from the main assembly driving portion 20.

The pushing member 21 further advances in the direction of arrow a, by which the sealing member 2 is press-fitted into the opening 1a, thus resealing the opening 1a of the toner bottle 1. The pushing member 21 is even further advanced in the direction of arrow a, by which the toner bottle 1 per se is retracted to slide the toner bottle 1 to a position to facilitate the user who is going to remove it.

As for the driving structure for the pushing member 21, it may be interrelated with the opening and closing operation of the front cover of the main assembly 100 of the apparatus such that when the front cover 15 is opened, the pushing member 21 moves in the direction of arrow a to effect disengagement between the sealing member 2 of the toner bottle 1 and the driving portion 20, and when the front cover 15 is closed, it is advanced in the direction of arrow b. Alternatively, a driving motor or the like is used to effect the disengaging operation independently. In another alternative, it is not interrelated with the front cover 15 of the main assembly 100 of the apparatus, but a manual lever is provided, which is manipulated by the user and is interrelated with the pushing member.

As described in the foregoing, according to the embodiments, the toner supply container can be locked in the main assembly of the electrophotographic image forming apparatus by a snap-fit type engagement with certainty by inserting the toner supply container. When it is to be taken out, the snap-fit type locking is easily released by pushing the releasing portion. Thus, the supplying operation from the toner supply container is accomplished with a very simple operation. Accordingly, a toner supply container of high operativity can be provided.

In addition, the disengagement of the drive transmission for the toner supply container is simultaneously effected, and also the opening and closing operation for the opening can be simultaneously effected.

5 These advantageous effects can be provided by very simple action at low cost with compact structure and reliable drive transmission.

In the toner dischargeable state, it is not necessary to provide means for rotatably supporting the driving shaft 1b at the main body side of the toner bottle. This simplifies the structure and avoids the problem of toner leakage, torque increase, production of coarse particles and so on.

10 (Embodiment 2)

Referring to Figures 23-25, and 32, a second embodiment of the present invention will be described. The same reference numerals as with the first embodiment are assigned to the elements having the corresponding functions, and a detailed description of the common structure is omitted for simplicity.

15 As shown in Figure 23, in this embodiment, the releasing projection 4 (releasing portion) is provided on an outer surface not inside the cylindrical coupling engagement portion 2c of the sealing member 2 as in the first embodiment. In this embodiment, engaging projection 3 and the releasing portion 4 are provided at each of four circumferentially equidistant positions so as to constitute pairs. The structures of the driving portion 20 for locking engagement with the
20 engaging projection of the sealing member are the same as with the Embodiment 1.

Correspondingly, the pushing member 21 is in the form of a cylinder covering the outside periphery of the driving portion 20 as shown in Figure 24 and is slidable for engagement with the releasing portion 4, rather than a slidable rod as in the first embodiment. The inner surface of the free end portion of the pushing member 21 (cylindrical member) is tapered such that inner
5 diameter increases, that is, the thickness of the cylinder reduces, toward the free end, by which the tapered portion 21a is engaged with the apex of the releasing portion 4 upon the engagement. Slits 2e are formed at the lateral sides of the supporting portion 2f for the engaging projection 3 and the releasing portion 4 to facilitate inward elastic deformation of the engaging projection 3 and the releasing portion 4 and restoration.

10 According to this embodiment, the entire sealing member can be integrally molded, and therefore, the production property of the sealing members is drastically improved, and the manufacturing cost can be reduced.

Figure 25(A) shows a state in which the toner supply is completed, and the opening 1a of the toner bottle 1 is still open.

15 When the engagement between the main assembly driving portion 20 and the sealing member 2 is to be released, the pushing member 21 is advanced to the releasing portion 4, as shown in Figure 25(B), so that releasing portion 4 is pressed inwardly by the inner surface of the pushing member 21. This displaces the releasing portion 4 inwardly (arrow d) by the elastic deformation of the supporting portion 2f, and simultaneously, the engaging projection 3 is
20 displaced inwardly together with the releasing portion 4. By this, the engaging projection 3 is

disengaged from the main assembly driving portion 20. The releasing steps are carried out in interrelation with the opening operation of the front cover by the operator.

Thereafter, the pushing member 21 is advanced in the direction of arrow a, so that sealing member 2 is returned to the sealing position of the toner bottle 1, as shown in Figure 25(C).

5 Subsequently, the pushing member 21 is further advanced to slide the toner bottle 1 *per se* to a position facilitating the user who is going to take the toner bottle 1 out.

As described in the foregoing, according to this embodiment, by the provision of the releasing portion 4 on the outer surface of the cylindrical portion 2c, the same advantageous effects as with the first embodiment described in the following can be provided. According to
10 this embodiment, when the sealing member 2 is produced by injection molding of a resin material, the mold can be easily removed, thus improving the production property.

A width of the engaging projection is larger than the width of the releasing projection, so that when the main body of the bottle is retracted for automatic unsealing of the opening, the engagement between the engaging projection (locking surface) and the driving portion 20 is
15 maintained. The releasing projection does not have such a function, and therefore, the width is reduced to minimize the resin material cost in the manufacturing.

It is a possible alternative that thin portion 2y is provided as shown in Figure 32 to make the base portions of the supporting portion 2f (supporting the engaging projection and the releasing projection) easy to deform. With this structure, the disengagement action is made sure
20 while maintaining a sufficient rigidity of the sealing member including the engaging projection which receives the rotational driving force.

(Embodiment 3)

Referring to Figures 26 through 29, a third embodiment of the present invention will be described.

5 In the second embodiment, as shown in Figure 24, the engaging projection 3 and the releasing portion (releasing projection) 4 for the sealing member 2 are provided at the outer surface of the engaging portion 2b. In this embodiment, as shown in Figure 26, the engaging projection 3 and the releasing projection 4 are provided at each of four circumferentially equidistant positions on an inner surface of the engaging portion 2b.

10 Corresponding to such a structure of the sealing member 2, the main assembly driving portion 20 has a configuration shown in Figure 27. The main assembly driving portion 20 comprises cylindrical portions including a free end portion 20b, a small diameter portion 20c, a large diameter portion 20d and a rear end 20e which have different outer diameters. It also comprises a through-hole 20f through which the pushing member 21 is penetrated. The inner diameter of the through-hole 20f is constant. The small diameter portion 20c has a minimum
15 outer diameter and is provided with an engaging rib 20a extending in the longitudinal direction of the driving portion 20 at each of the diametrically opposite positions.

Referring to Figure 28, a description will be made as to engagement between the driving portion 20 and the sealing member 2 in this embodiment.

20 Figure 28(A) shows a state in which the toner bottle 1 is inserted in a direction indicated by an arrow b for a user to install a new toner bottle 1 into the main assembly of the apparatus, in

which the toner bottle 1 has not yet been locked with the driving portion 20 provided in the main assembly of the apparatus.

As shown in Figure 28(B), when the toner bottle 1 is further inserted, the engaging projection 3 provided in the sealing member 2 is brought into contact with the main assembly driving portion 20 and is guided by the tapered surface 3c formed at the free end portion of the engaging projection 3, and is gradually and elastically deformed.

With further insertion, the engaging projection 3 having passed by the straight portion 20g, as shown in Figure 28(C), the forced deformation is released by the space portion 20h not having the engaging rib 20a, and the engaging projection 3 is firmly locked with the main assembly driving portion 20.

In the state shown in Figure 28(C), the engaging projection 3 is firmly engaged with the main assembly driving portion 20 such that position of the sealing member 2 in the thrust direction (axial direction) is fixed relative to the main body of the toner bottle 1. Therefore, when the toner bottle 1 is retracted thereafter, the sealing member 2 is not retracted together with the toner bottle 1 but is firmly fixed to the main assembly driving portion 20. On the other hand, only the toner bottle 1 is discarded, the sealing member 2 separates from the toner bottle 1 to unseal or open the opening 1a. The retracting operation of the toner bottle 1 may be such that the toner bottle 1 is slid in interrelation with the opening and closing operation of the front cover 15 (Figure, 2).

Referring to Figure 29, the releasing or disengaging action in this embodiment will be described.

When the sealing member 2 is to be disengaged from the main assembly driving portion 20, the pushing member 21 disposed at the central portion of the main assembly driving portion 20 is slid in the direction of arrow a, by which it is disengaged from the main assembly driving portion 20.

5 By advancing the pushing member 21 in the direction of arrow a relative to the releasing portion 4 provided in the inside of the sealing member 2, the part supporting the releasing portion 21, as shown in Figure 29(B), deforms outwardly so that releasing portion displaces outwardly, and therefore, the engaging projection 3 displaces outwardly. By this, the engaging projection 3 is disengaged from the main assembly driving portion 20.

10 With further advancement of the pushing member 21 in the direction of arrow a, the sealing member 2 is press-fitted into the opening 1a as shown in Figure 29(C). In this position, the sealing member 2 unseals the opening 1a of the toner bottle 1. By further advancement of the pushing member 21 in the direction of arrow a, the toner bottle 1 per se is slid backward to a position where the user can easily take the toner bottle 1 out.

15 As for the driving structure for the pushing member 21, it may be interrelated with the opening and closing operation of the front cover 15 of the main assembly 100 of the apparatus such that when the front cover 15 is opened, the pushing member 21 moves in the direction of arrow a to effect disengagement between the sealing member 2 of the toner bottle 1 and the driving portion 20, and when the front cover 15 is closed, it is advanced in the direction of arrow
20 b. Alternatively, a driving motor or the like is used to effect the disengaging operation independently. In another alternative, it is not interrelated with the front cover 15 of the main

assembly 100 of the apparatus, but a manual lever is provided, which is manipulated by the user and is interrelated with the pushing member.

In this embodiment, the releasing portion is not exposed to outside, and therefore, in case that toner supply container unintentionally falls, the releasing portion is not damaged, and
5 therefore, the shock-resistant property is high during the transportation.

In addition, by a very simple sliding of the pushing member in the forward and backward directions, the drive transmission of the toner bottle can be easily disengaged, and simultaneously, the opening and closing of the opening of the toner bottle can be accomplished.

These advantageous effects can be provided by very simple action at low cost with
10 compact structure and reliable drive transmission.

(Embodiment 4)

Referring to Figure 30, a fourth embodiment of the present invention will be described.

In this embodiment as shown in Figure 30, a sealing member 2, an engaging projection 3
and a releasing portion 4 mounted to the opening 1a of the toner bottle 1 are manufactured
15 separately with respect to each other, and then they are assembled.

As shown in this Figure, two movable arms 3e are mounted by hinge portions 3h on the end surface of the sealing member 2 such that they are opposed to each other. Each of the movable arms 3e is provided at its free end portion with an engaging projection 3 for the engagement which is similar to that in the first embodiment.

The engaging projections 3 are connected with each other by a link 3g through hinge portions 3i. The link 3g includes two members connected by a hinge which functions as a releasing portion 4.

From an inside of the movable arm 3e fixed projections 3f are projected opposed to each other at a central portion. A spring 3j is compressed between the fixed projections 3f. By the urging force provided by the spring 3j, the movable arm 3e is urged outwardly, so that engaging projection 3 is engageable with the main assembly driving portion 20 as shown in Figure 30(A). The main assembly driving portion 20 suitable in this embodiment is for example that shown in Figure 14.

With such a structure, when the toner bottle 1 is to be engaged with the main assembly driving portion 20 by the engaging projection 3, it is enough to insert the toner bottle 1 into the main assembly of the apparatus, similarly to Embodiment 1. More particularly, when the toner bottle 1 is inserted, the engaging projections 3 are brought into contact with the main assembly driving portion 20, by which the movable arms 3e are tilted inwardly against the spring force of the spring 3j together with the engaging projections 3. With further insertion, the engaging projections 3 are engaged with the main assembly driving portion 20 at a predetermined position by the spring force of the spring 3j, and simultaneously, the movable arms 3e restore the original position shown in Figure 30(A).

On the other hand, when they are to be disengaged from each other, as shown in Figure 30(B), the pushing member 21 is pushed against the releasing portion 4 in a direction indicated by an arrow a, the engaging projections 3 are easily tilted, so that they are disengaged.

Similarly to the following embodiments, the structure of this embodiment also provides the same advantageous effects.

In this embodiment, the elastic deformation is not used, the engaging projection 3 may be made of any material not exhibiting elastic deformation per se, and therefore, the choice of the material is very broad. For example, various materials such as aluminum, steel or magnesium, or wood, hard resin material or the like is usable. A higher engagement strength can be maintained, and durability is improved.

The parts are connected with a linking mechanism, which provides larger movable range than the elastic deformation, and therefore, a larger engagement area is usable. Therefore, the engagement is very firm with high reliability.

In this embodiment, the elastic deformation of the sealing member is not utilized unlike Embodiments 1-3, but a link type is employed. Therefore, durability is better, but the structure is rather complicated with the possible result of cost increase.

(Embodiment 5)

The present invention is not limited to the foregoing Embodiments. In Embodiment 5, the structures are the same as that of said embodiment shown in Figure 20 except for the portions which will be described.

For example, as shown in Figure 31, the opening 1a of the toner bottle 1 may be provided in the cylindrical surface 1d adjacent to the longitudinal end surface. In such a case, the coupling engagement portion 2c is not provided in the sealing member 2 and may be mounted rotatably in

an end surface of the main body 1A of the toner bottle. In this case, the opening 1a is unsealably sealed by a shutter member S.

The coupling engagement portion 2c performs a function of locking the main body 1A of the toner bottle with the main assembly (driving portion 20 shown in Figure 20) of the image forming apparatus by a locking portion (locking surface of the engaging projection 3), a function of receiving a rotational driving force from the main assembly side of the image forming apparatus by a driving force receiving portion (a drive receiving surface of the engaging projection 3), a function of disengaging the main body 1A of the toner bottle from the main assembly (driving portion 20) of the image forming apparatus by a releasing portion 4, and a function of transmitting the driving force received by the driving force receiving portion to the coupling engagement portion 2c and the toner feeding member fixed in the toner bottle. With this structure, a force of separating the toner bottle from the driving portion 20 of the main assembly of the apparatus for some reason or another, while the rotation is received from the main assembly of the apparatus, they are maintained engaged with each other, and therefore, it is avoided that transmission of the rotational driving force to the toner bottle is unintentionally disengaged.

(Embodiment 6)

Referring to Figure 33, a sixth embodiment will be described.

In the foregoing embodiment, the locking mechanism, the releasing mechanism and the drive transmission mechanism are used between an image forming apparatus and a toner supply container (sealing member). In this embodiment, use is made of an image forming apparatus and

an electrophotographic photosensitive member detachably mountable relative to the main assembly of the image forming apparatus, in which the photosensitive drum is exchanged with a new one after the service life. In the other aspects, the structures are the same as with Embodiment 1.

5 In Figure 33, the coupling engaging portion 2c provided at an end of a photosensitive drum 104 is engaged with a driving portion 20 of the main assembly of the image forming apparatus similarly to Embodiment 1, so that rotational driving force is transmitted from the driving portion 20 to the photosensitive member. The structures for the disengagement therebetween are similar to that of Embodiment 1.

10 As will be understood, the drive transmission mechanism of this invention is not limited to the toner supply container or the image forming apparatus, but is applicable to a structure for transmitting rotational, swing or reversing motion about a rotation axis.

The automatic sealing operation for the opening may be accomplished in the following manner.

15 In interrelation with an opening operation of the front cover by the operator, the main body of the toner bottle is advanced toward the sealing member with the engagement between the sealing member and the driving portion 20 maintained, by which the sealing member is press-fitted into the opening, thus accomplishing automatic sealing.

20 Thereafter, the pushing member 21 slides to be contacted into the releasing portion, and the engaging projection is disengaged from the driving portion 20. Furthermore, the pushing

member 21 pushes the main body of the toner bottle together with the sealing member toward the front cover to a position where the operator can easily take the toner bottle out.

In this manner, the sliding movement (retraction, advancement) of the main body of the bottle used for unsealing the opening can be used for resealing the opening with a simple structure. In addition, the slide movement distance of the pushing member can be made shorter than in the foregoing embodiments, and therefore, complication of the apparatus at the main body side can be avoided.

The structure for the engagement and disengagement between the main assembly of the image forming apparatus and the toner bottle or the photosensitive member may be used in Embodiments 2, 3 and 4.

In Embodiments 1-6, only by the movement of the releasing projection of the main assembly of the apparatus in a direction (axial direction, for example) of relative motion of the sealing member relative to the main body, the engaging projection or projections are moved in a direction or directions substantially perpendicular to the direction (radial direction, for example), and therefore, the structure for the disengagement is simple. Even when a plurality of engaging projections are provided, all the engaging projections are brought into disengaging positions by a force applied substantially at one position, and therefore, the structure for the disengagement is simple. In Embodiments 1, 4, 5 and 6, the releasing force receiving portion of the sealing member is disposed substantially at the free end portion of the sealing member, so that releasing force receiving portion can be engaged with the main assembly at a relatively early stage after the start of insertion of the toner bottle.

In Embodiments 1-4, the driving portion 20 provided in the main assembly of the image forming apparatus is provided with a locking hole and an engaging rib, and the sealing member 2 is provided with an engaging projection portion 3 engageable with the locking hole and the engaging rib of the driving portion 20, but the projection and recess relationship 15 may be reversed. In other words, the driving portion 20 of the main assembly of the apparatus is provided with the engaging projection and the releasing portion (releasing projection), and the sealing member 2 is provided with the locking hole and the engaging rib. With such a structure, the same advantageous effects are provided.

As described in the foregoing, according to these embodiments, the toner accommodating container and the main assembly of the image forming apparatus are locked in a snap-fit type engagement, and the sealing member can be automatically engaged into or disengaged from the opening of the toner accommodating container, wherein the locking engagement can be released with a simple structure without effort by the user.

Therefore, the toner supply operation can be carried out by the user with much less effort.

Such a sealing member, a toner accommodating container and an image forming apparatus can be provided at low cost.

While the invention has been described with reference to the structures disclosed herein, it is not confined to the details set forth and this application is intended to cover such modifications or changes as may come within the purpose of the improvements or the scope of the following claims.

ABSTRACT OF THE DISCLOSURE:

A toner supply container is detachably mountable to an assembly of an electrophotographic image forming apparatus having a driving member. The toner supply container includes a container body including an opening provided at a cylindrical surface of the container body configured to permit discharge of toner contained in the container body; a shutter for opening and closing the opening; and a coupling portion provided at a side of the container body and configured and positioned to engage with the driving member so as to receive a rotational drive force.

5

Electronic Patent Application Fee Transmittal

Application Number:	13617050
Filing Date:	14-Sep-2012
Title of Invention:	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS
First Named Inventor/Applicant Name:	Yusuke Yamada
Filer:	Lawrence A. Stahl/Michelle Sebastian
Attorney Docket Number:	00684.003330.18

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with \$0 paid	1253	1	1400	1400

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				1400

Electronic Acknowledgement Receipt

EFS ID:	15493163
Application Number:	13617050
International Application Number:	
Confirmation Number:	1149
Title of Invention:	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS
First Named Inventor/Applicant Name:	Yusuke Yamada
Customer Number:	5514
Filer:	Lawrence A. Stahl/Cu Tran
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Attorney Docket Number:	00684.003330.18
Receipt Date:	11-APR-2013
Filing Date:	14-SEP-2012
Time Stamp:	14:54:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

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1		00684003330_18_amdt_USB300.pdf	184869 4cad2aca6fd78e4fc6e44e91e6c2001e5918016	yes	7
Multipart Description/PDF files in .zip description					
		Document Description	Start	End	
		Extension of Time	1	1	
		Amendment/Req. Reconsideration-After Non-Final Reject	2	2	
		Specification	3	3	
		Claims	4	5	
		Applicant Arguments/Remarks Made in an Amendment	6	7	
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2	Miscellaneous Incoming Letter	00684003330_18_MARKED_US B300.pdf	185596 1c0d6094f41aea407b57ee82b9ecfb7e207c66fc	no	53
Warnings:					
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3		00684003330_18_CLEAN_USB103.pdf	172642 8d2f0ca7d43e98f671deb08c58e856b56c1c2204	yes	52
Multipart Description/PDF files in .zip description					
		Document Description	Start	End	
		Specification	1	51	
		Abstract	52	52	
Warnings:					
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4	Fee Worksheet (SB06)	fee-info.pdf	30673 0cbc89d8fa158f23ab243ecec9dd5b9b36233d03	no	2
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application No.: 13/617,050)	
	:	Examiner: Susan Shuk Yin Lee
First Named Inventor:)	
	:	Group Art Unit: 2852
Yusuke YAMADA)	
	:	Confirmation No.: 1149
Filed: September 14, 2012)	
	:	April 11, 2013
For: SEALING MEMBER, TONER)	
ACCOMMODATING CONTAINER	:	
AND IMAGE FORMING APPARATUS)	

Mail Stop Amendment
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, VA 22313-1450

PETITION FOR EXTENSION OF TIME
 AND
AMENDMENT

Sir:

Petition for Extension of Time

Applicants petition the Commissioner for Patents to extend the time for response to the Office Action dated October 11, 2012, for three (3) months from January 11, 2013, to April 11, 2013.

The \$1,400.00 fee for the extension under 37 C.F.R. § 1.17 is being paid electronically. Any deficiency in or overpayment of this fee should be charged or credited to Deposit Account No. 06-1205.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/617,050	Filing Date 09/14/2012	<input type="checkbox"/> To be Mailed
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FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)		FEE (\$)	
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A
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<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A
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INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =			X \$ =
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).					
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>						
			TOTAL		TOTAL	

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AMENDMENT	04/11/2013	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 1	Minus ** 20	=	X \$ =		OR	X \$ =
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus *** 3	=	X \$ =		OR	X \$ =
<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
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	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR	SMALL ENTITY	
AMENDMENT	Total <small>(37 CFR 1.16(i))</small>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	*	Minus	**	=	X \$ =		OR	X \$ =
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	X \$ =		OR	X \$ =
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<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
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/DAVID SASFAI/

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13617050
	Filing Date	2012-09-14
	First Named Inventor	Yusuke YAMADA
	Art Unit	2852
	Examiner Name	
	Attorney Docket Number	00684.003330.18

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	4060105		1977-11-29	Feldeisen et al.	
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(Not for submission under 37 CFR 1.99)

Application Number	13617050
Filing Date	2012-09-14
First Named Inventor	Yusuke YAMADA
Art Unit	2852
Examiner Name	
Attorney Docket Number	00684.003330.18

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Application Number		13617050
Filing Date		2012-09-14
First Named Inventor	Yusuke YAMADA	
Art Unit		2852
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Attorney Docket Number		00684.003330.18

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Application Number		13617050
Filing Date		2012-09-14
First Named Inventor	Yusuke YAMADA	
Art Unit		2852
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Attorney Docket Number		00684.003330.18

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First Named Inventor	Yusuke YAMADA	
Art Unit		2852
Examiner Name		
Attorney Docket Number		00684.003330.18

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First Named Inventor	Yusuke YAMADA
Art Unit	2852
Examiner Name	
Attorney Docket Number	00684.003330.18

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20040009017	A1	2004-01-15	Yoshino et al.	
	2	20050169674	A1	2005-08-04	Yoshino et al.	

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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² j	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	2300202	CA		1999-02-25	Showa Marutsutsu Co Ltd		<input type="checkbox"/>
	2	1237405C	CN		2006-01-18	Canon KK		<input type="checkbox"/>
	3	0 853 260	EP	A2	1998-07-15	Konishiroku Photo Ind		<input type="checkbox"/>
	4	0 897 137	EP	A1	1999-02-17	Canon KK		<input type="checkbox"/>
	5	0 897 138	EP	A1	1999-02-17	Canon KK		<input type="checkbox"/>
	6	0 905 577	EP	A2	1999-03-31	Canon KK		<input type="checkbox"/>

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		13617050
Filing Date		2012-09-14
First Named Inventor	Yusuke YAMADA	
Art Unit		2852
Examiner Name		
Attorney Docket Number		00684.003330.18

7	1 006 415	EP	A1	2000-06-07	Showa Marutsutsu Co Ltd	<input type="checkbox"/>
8	1 041 454	EP	A1	2000-10-04	Canon KK	<input type="checkbox"/>
9	2 287 100	GB	A	1995-09-06	Seiko Epson Corp	<input type="checkbox"/>
10	63-135359	JP		1988-06-07	Unitika Ltd	<input checked="" type="checkbox"/>
11	1-29745	JP		1989-09-11	Hoshi Denki Seizo Kabushiki Kaisha	<input type="checkbox"/>
12	3-256058	JP		1991-11-14	Ricoh KK	<input checked="" type="checkbox"/>
13	4-112474	JP		1992-09-30	Witoc of Jupiter Dentsu Kabushiki Kaisha	<input checked="" type="checkbox"/>
14	5-75768	JP		1993-03-26	Ricoh KK	<input checked="" type="checkbox"/>
15	8-211719	JP		1996-08-29	Ricoh Co Ltd	<input checked="" type="checkbox"/>
16	9-222786	JP		1997-08-26	Canon Inc	<input type="checkbox"/>
17	9-274366	JP		1997-10-21	Ricoh KK	<input type="checkbox"/>

**INFORMATION DISCLOSURE
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Attorney Docket Number		00684.003330.18

18	10-48936	JP		1998-02-20	Minolta Co Ltd		<input type="checkbox"/>
19	10-63076	JP		1998-03-06	Konishiroku Photo Ind		<input type="checkbox"/>
20	10-63084	JP		1998-03-06	Ricoh KK		<input type="checkbox"/>
21	10-68076	JP		1998-03-10	Mitsubishi Materials Corp		<input type="checkbox"/>
22	11-2744	JP		1999-01-06	Nippon Kokan KK		<input type="checkbox"/>
23	11-73000	JP		1999-03-16	Canon Inc		<input type="checkbox"/>
24	11-73001	JP		1999-03-16	Canon Inc		<input type="checkbox"/>
25	11-73002	JP		1999-03-16	Canon Inc		<input type="checkbox"/>
26	11-102109	JP		1999-04-13	Canon Inc		<input type="checkbox"/>
27	2002-42384	JP		2002-02-19	Canon Inc		<input type="checkbox"/>
28	2002-318490	JP		2002-10-31	Canon KK		<input type="checkbox"/>

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	Examiner Name	
	Attorney Docket Number	00684.003330.18

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NON-PATENT LITERATURE DOCUMENTS			Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	Konica Parts Catalog, Model 7020, 1st Edition, February 2000, CMPC-7020, Konica Business Technologies, Inc., and seven (7) sheets of annotated illustrations and photographs of Konica 7020 and 8050 toner bottles along with a cover sheet.	<input type="checkbox"/>
	2	European Search report dated 11/17/2008 in European Application No. 08163935.3 - 2209/1993003.	<input type="checkbox"/>
	3	Austrian Patent Office Written Opinion dated November 21, 2008, forwarded in Singapore Application No. 200602933-4 on December 18, 2008.	<input type="checkbox"/>
	4	European Search report dated 03/24/2009 in European Application No. 09151710.2 - 2209.	<input type="checkbox"/>
	5	Search and Examination Report from the Intellectual Property Office of Singapore, dated July 23, 2009, for Singapore Patent Application No., 200604752-6, which forwards Austrian Search Report and Written Opinion, both dated June 22, 2009, prepared by the Austrian Patent and Trademark Office.	<input type="checkbox"/>
	6	Search and Examination Report from the Intellectual Property Office of Singapore, dated April 26, 2007, for Singapore Patent Application No. 200602934-2, which forwards Danish Search and Examination Reports, both dated April 11, 2007, prepared by the Danish Patent and Trademark Office.	<input type="checkbox"/>
	7	Invitation to Respond to Written Opinion from the Intellectual Property Office of Singapore, dated April 17, 2007, for Singapore Patent Application No. 200407942-2, which forwards Australian Search Report and Written Opinion, both dated March 15, 2007, prepared for the Intellectual Property Office of Singapore.	<input type="checkbox"/>
	8	Australian Patent Office Examiner's First Report, for Australian Patent Application No. 2005201134, dated September 18, 2006.	<input type="checkbox"/>
	9	Letter from the Intellectual Property Office of Singapore, dated April 18, 2006, for Singapore Patent Application No. 200201079-1, which forwards Austrian Patent Office Supplementary Search Report, dated March 9, 2006.	<input type="checkbox"/>

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Attorney Docket Number	00684.003330.18

10	Invitation to Respond to Written Opinion from the Intellectual Property Office of Singapore, dated January 14, 2008, for Singapore Patent Application No. 200602933-4, which forwards Austrian Search Report and Written Opinion, both dated December 14, 2007, prepared by the Austrian Patent and Trademark Office.	<input type="checkbox"/>
11	Third-Party Observation filed in corresponding Japanese Laid-Open Publication No. 2002-318490, laid open Oct. 31, 2002 (Application No. 2002-42384).	<input type="checkbox"/>
12	Canadian Patent Office Search Report, dated February 20, 2004, for Canadian Application No. 2,372,419.	<input type="checkbox"/>
13	Search and Examination Report from the Intellectual Property Office of Singapore, dated January 31, 2004, for Singapore Patent Application No. 200201079-1, which forwards Austrian Patent Office Search Report and Written Opinion, both dated December 22, 2003, prepared by the Austrian Patent Office.	<input type="checkbox"/>
14	Notification of the First Office Action from the State Intellectual Property Office of the People's Republic of China, dated July 13, 2007, for Chinese Application No. 2005100702734.	<input type="checkbox"/>
15	Notification of the First Office Action from the State Intellectual Property Office of the People's Republic of China, dated July 13, 2007, for Chinese Application No. 2005100702749.	<input type="checkbox"/>
16	Notification of the First Office Action from the State Intellectual Property Office of the People's Republic of China, dated July 13, 2007, for Chinese Application No. 2005100702753.	<input type="checkbox"/>
17	Japanese Office Action, dated March 17, 2007, issued in Japanese Application No. 2006-211509 (English excerpt translation provided).	<input checked="" type="checkbox"/>
18	European Search Report, dated January 18, 2006, issued in European Application No. 02 003 651.3 – 2209.	<input type="checkbox"/>
19	European Search Report, dated September 3, 2007, issued in European Application No. 02 003 651.3 – 2209.	<input type="checkbox"/>
20	Examination Report dated December 10, 2009, prepared by the Austrian Patent Office and forwarded with a Search and Examination Report dated January 8, 2010, in counterpart Singapore Application No. 200602933-4.	<input type="checkbox"/>

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	Examiner Name	
	Attorney Docket Number	00684.003330.18

21	Extended European Search Report dated February 18, 2010, in counterpart European Application No. 08163934.6-2209/1993002.	<input type="checkbox"/>
22	Rejection Decision dated February 12, 2010, in counterpart Chinese Application No. 200510070274.9.	<input checked="" type="checkbox"/>
23	Communication dated December 10, 2010, forwarding a European Search Report dated December 6, 2010, in counterpart European Patent Application No. 10162683.6 - 2209/2216690.	<input type="checkbox"/>
24	Communication dated December 15, 2010, forwarding a European Search Report dated December 6, 2010, in counterpart European Patent Application No. 10182966.1 - 2209/2270607.	<input type="checkbox"/>

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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	First Named Inventor	Yusuke YAMADA
	Art Unit	2852
	Examiner Name	
	Attorney Docket Number	00684.003330.18

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/William M. Wannisky/	Date (YYYY-MM-DD)	2013-01-23
Name/Print	William M. Wannisky	Registration Number	28373

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13617050
	Filing Date		2012-09-14
	First Named Inventor	Yusuke YAMADA	
	Art Unit		2852
	Examiner Name		
	Attorney Docket Number		00684.003330.18

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5218407		1993-06-08	Matsushita et al.	
	2	5455662		1995-10-03	Ichikawa et al.	
	3	5557382		1996-09-17	Tatsumi et al.	
	4	5598254		1997-01-28	Ikesue et al.	
	5	5765079		1998-06-09	Yoshiki et al.	
	6	5822663		1998-10-13	Ichikawa et al.	
	7	5909609		1999-06-01	Yahata et al.	
	8	5915155		1999-06-22	Shoji et al.	

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9	5918090		1999-06-29	Ichikawa et al.	
10	5953567		1999-09-14	Muramatsu et al.	
11	5966574		1999-10-12	Ui et al.	
12	5970290		1999-10-19	Yoshiki et al.	
13	6097903		2000-08-01	Yahata et al.	
14	6289195	B1	2001-09-11	Ichikawa et al.	
15	6298208	B1	2001-10-02	Kawamura et al.	
16	6418293	B2	2002-07-09	Ichikawa et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20010008593	A1	2001-07-19	Tsuji et al.	

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	Art Unit	2852
	Examiner Name	
	Attorney Docket Number	00684.003330.18

2	20020044795	A1	2002-04-18	Kato	
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	Defendant Color Imaging, Inc.'s Invalidation Contentions Pursuant to Local Patent Rule 4.3, dated May 8, 2012, in Case No. 1:11-cv-03855-RLV in the United States District Court, Northern District of Georgia, Atlanta Division.	<input type="checkbox"/>
	2	Defendant General Plastic Industrial Co., Ltd.'s Invalidation Contentions Pursuant to Local Patent Rule 4.3, dated May 8, 2012, in Case No. 1:11-cv-03855-RLV in the United States District Court, Northern District of Georgia, Atlanta Division.	<input type="checkbox"/>
	3	Notice of Acceptance dated May 21, 2012, in Australian Application No. 2010201088.	<input type="checkbox"/>
	4	Notice of Acceptance dated May 21, 2012, in Australian Application No. 2010201089.	<input type="checkbox"/>
	5	Notice of Acceptance dated May 21, 2012, in Australian Application No. 2010201091.	<input type="checkbox"/>

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	Filing Date	2012-09-14
	First Named Inventor	Yusuke YAMADA
	Art Unit	2852
	Examiner Name	
	Attorney Docket Number	00684.003330.18

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/William M. Wannisky/	Date (YYYY-MM-DD)	2013-01-23
Name/Print	William M. Wannisky	Registration Number	28373

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
	:	Examiner: Unassigned
Yusuke YAMADA et al.)	
	:	Group Art Unit: 2852
Application No.: 13/617,050)	
	:	Confirmation No.: 1149
Filed: September 14, 2012)	
	:	January 23, 2013
For: SEALING MEMBER, TONER)	
ACCOMMODATING CONTAINER	:	
AND IMAGE FORMING APPARATUS)	

Mail Stop Amendment

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL LETTER

Sir:

Applicants are in receipt of a non-final Office Action mailed October 12, 2012, in the above-identified application. The one-month extended date for response to the Office Action is set for February 11, 2013, and a response thereto has not yet been filed. This Information Disclosure Statement is being filed so that it will be in the official file when the Examiner next acts on the application.

In compliance with the duty of disclosure under 37 C.F.R. § 1.56 and in accordance with the practice under 37 C.F.R. §§ 1.97 and 1.98, the Examiner's attention is directed to the documents listed on the enclosed PTO/SB/2008a ("citation form"). Copies of the cited

documents are not provided herewith, inasmuch as copies may be found in the filewrapper of one or more the "parent" applications of the present application.

REMARKS

The following related patents and patent applications are in the same family as the present application, and therefore have not been cited on the enclosed citation form.

Docket No.	Application No./ Application Date	Publication No./ Publication Date	Patent No./ Patent Issue Date
00684.003330	10/076,430 02/19/2002	2002/0127029 09/12/2002	6,879,789 04/12/2005
00684.003330.1	10/429,696 05/06/2003	2004/013445 01/22/2004	6,920,298 07/19/2005
00684.003330.2	10/429,741 05/06/2003	2004/0009006 01/15/2004	6,990,301 01/24/2006
00684.003330.3	10/962,675 10/13/2004	2005/0047818 03/03/2005	7,469,113 12/23/2008
00684.003330.4	11/200,069 08/10/2005	2006/0034641 02/16/2006	7,127,193 10/24/2006
00684.003330.5	11/200,179 08/10/2005	2006/0008290 01/12/2006	7,430,384 09/30/2008
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00684.003330.7	11/567,963 12/07/2006	2007/0134021 06/14/2007	7,386,251 06/10/2008
00684.003330.8	11/567,973 12/07/2006	2007/0098454 05/03/2007	7,433,633 10/07/2008
00684.003330.9	11/567,976 12/07/2006	2007/0092304 04/26/2007	7,376,369 05/20/2008
00684.003330.10	11/567,982 12/07/2006	2007/0086810 04/19/2007	7,324,777 01/29/2008
00684.003330.11	12/169,895 07/09/2008	2009/0003872 01/01/2009	7,647,012 01/12/2010

Docket No.	Application No./ Application Date	Publication No./ Publication Date	Patent No./ Patent Issue Date
00684.003330.12	12/615,012 11/09/2009	2010/0046982 02/25/2010	7,890,027 02/15/2011
00684.003330.13	12/685,186 01/11/2010	2010/0111560 05/06/2010	7,965,963 06/21/2011
00684.003330.14	12/685,204 01/11/2010	2010/0111561 05/06/2010	7,881,645 02/01/2011
00684.003330.15	12/685,199 01/11/2010	2010/0111573 05/06/2010	7,970,321 06/28/2011
00684.003330.16	12/981,785 12/30/2010	2011/0097107 04/28/2011	8,045,901 10/25/2011
00684.003330.17	13/231,388 09/13/2011	2012/0063807 03/15/2012	8,290,394 10/16/2012

This Information Disclosure Statement cites information which is of record in at least one of the family applications.

The Examiner's attention is also directed to:

- (1) Defendant Color Imaging Inc.'s Invalidity Contentions Pursuant to Local Patent Rule 4.3, and
- (2) Defendant General Plastic Industrial Co., Ltd.'s Invalidity Contentions Pursuant to Local Patent Rule 4.3

(collectively, "Invalidity Contentions").

The Invalidity Contentions were filed by each respective defendant in a lawsuit for patent infringement of U.S. Patent No. 7,647,012, from which the present application claims the benefit under 35 U.S.C. § 120. The Invalidity Contentions are listed on the citation form.

Each Invalidity Contention identifies an identical set of patent documents. Such patent documents are listed on the citation form. A copy of each Invalidity Contention was provided in

parent application, U.S. Patent Application No. 13/231,388, with the Information Disclosure Statement filed June 1, 2012 filed therein.

FEE

The \$180 fee necessitated by the filing of this paper is being paid electronically.

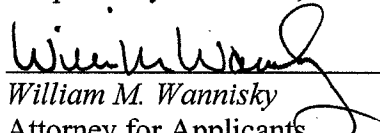
CONCLUSION

It is respectfully requested that the cited information be considered by the Examiner and that a copy of the citation form be returned indicating that such information has been considered.

It is believed that no fee is required for this paper. However, the Commissioner is hereby authorized to charge any fee which may be deemed necessary in connection with this paper to Deposit Account No. 06-1205.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address given below.

Respectfully submitted,


William M. Wannisky
Attorney for Applicants
Registration No. 28,373

FITZPATRICK, CELLA, HARPER & SCINTO
1290 Avenue of the Americas
New York, NY 10104-3800
Facsimile: (212) 218-2200
WMW:mds

Electronic Patent Application Fee Transmittal

Application Number:	13617050
Filing Date:	14-Sep-2012
Title of Invention:	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS
First Named Inventor/Applicant Name:	Yusuke Yamada
Filer:	Lawrence A. Stahl/Michelle Sebastian
Attorney Docket Number:	00684.003330.18

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	14766568
Application Number:	13617050
International Application Number:	
Confirmation Number:	1149
Title of Invention:	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS
First Named Inventor/Applicant Name:	Yusuke Yamada
Customer Number:	5514
Filer:	Lawrence A. Stahl/Cu Tran
Filer Authorized By:	Lawrence A. Stahl
Attorney Docket Number:	00684.003330.18
Receipt Date:	23-JAN-2013
Filing Date:	14-SEP-2012
Time Stamp:	12:21:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$180
RAM confirmation Number	11156
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Information Disclosure Statement (IDS) Form (SB08)	00684003330_18_SB08a_01_USA600.pdf	616400 40682bc230da0d74cfc8572370b832bf056148fb	no	14
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Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	00684003330_18_SB08a_02_USA600.pdf	613388 093511d61a39d58e9a5ede1bf9823d6efaff1dba	no	6
Warnings:					
Information:					
3	Transmittal Letter	00684003330_18_IDS_USA600.pdf	164517 45410d53991f6abab9093834f0808a4d3ce74e1c	no	4
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30604 ab83e4cf52938a329de0f460ad4ecae7079dd411	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1424909		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 4 columns: APPLICATION NUMBER (13/617,050), FILING OR 371(C) DATE (09/14/2012), FIRST NAMED APPLICANT (Yusuke Yamada), ATTY. DOCKET NO./TITLE (00684.003330.18)

CONFIRMATION NO. 1149

PUBLICATION NOTICE

5514
FITZPATRICK CELLA HARPER & SCINTO
1290 Avenue of the Americas
NEW YORK, NY 10104-3800



Title:SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS

Publication No.US-2013-0011159-A1
Publication Date:01/10/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/617,050	09/14/2012	Yusuke Yamada	00684.003330.18	1149

5514 7590 10/11/2012
FITZPATRICK CELLA HARPER & SCINTO
1290 Avenue of the Americas
NEW YORK, NY 10104-3800

EXAMINER

LEE, SUSAN SHUK YIN

ART UNIT	PAPER NUMBER
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2852

MAIL DATE	DELIVERY MODE
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10/11/2012

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 13/617,050	Applicant(s) YAMADA ET AL.	
	Examiner SUSAN LEE	Art Unit 2852	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
- 4) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) Claim(s) 1 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 6) Claim(s) _____ is/are allowed.
- 7) Claim(s) 1 is/are rejected.
- 8) Claim(s) _____ is/are objected to.
- 9) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 10) The specification is objected to by the Examiner.
- 11) The drawing(s) filed on 14 September 2012 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Art Unit: 2852

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claim 1 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,990,301. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of US Patent No. 6,990,301 reads on the instant invention's claim 1.

Claim 1 of US Patent No. 6,990,301 recites the same elements as the instant invention's claim 1, such as a sealing portion; locking projections for disengageable snap-hook engagement with holes to receive from the cylindrical member an unsealing force for unsealing the toner discharge opening by a relative movement between the sealing portion and the toner container; and a number of the locking projections is larger than a number of the ribs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN LEE whose telephone number is (571)272-2137. The examiner can normally be reached on Mon. - Fri., 9:30-7:00, Second Monday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Lindsay can be reached on (571) 272-1674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2852

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SUSAN LEE/
Primary Examiner, Art Unit 2852

sl

Notice of References Cited	Application/Control No. 13/617,050	Applicant(s)/Patent Under Reexamination YAMADA ET AL.	
	Examiner SUSAN LEE	Art Unit 2852	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-6,990,301	01-2006	Yamada et al.	399/106
	B US-			
	C US-			
	D US-			
	E US-			
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			


FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

NON-PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	V				
	W				
	X				

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Index of Claims</i> 	Application/Control No. 13617050	Applicant(s)/Patent Under Reexamination YAMADA ET AL.
	Examiner SUSAN LEE	Art Unit 2852

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
Final	Original	10/08/2012							
	1	✓							
	2	-							
	3	-							
	4	-							
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	18	-							
	19	-							
	20	-							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3284	((399/262) or (399/106) or (399/119) or (399/120) or (222/dig.1)).CCLS.	US-PGPUB; USPAT	OR	OFF	2012/10/08 19:24
L2	148902	(toner\$1 or develop\$4) near10 (seal\$4 or gasket or cap\$4)	US-PGPUB; USPAT	OR	ON	2012/10/08 20:01
L3	931736	(project\$4 or protrus\$3 or protrud\$4 or engage\$4 or engag\$3) near11 (hole\$4 or aperture or open\$4)	US-PGPUB; USPAT	OR	ON	2012/10/08 20:04
L4	117381	(project\$4 or protrus\$3 or protrud\$4 or engage\$4 or engag\$3) near11 (rib\$4)	US-PGPUB; USPAT	OR	ON	2012/10/08 20:05
L5	32010	(number or quantit\$4 or count\$4) near11 (rib\$4)	US-PGPUB; USPAT	OR	ON	2012/10/08 20:05
L6	14	2 same 3 same 4 same 5	US-PGPUB; USPAT	OR	ON	2012/10/08 20:06
L7	54245	(toner\$1 or develop\$4) near10 (seal\$4 or gasket or cap\$4)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:12
L8	97114	(project\$4 or protrus\$3 or protrud\$4 or engage\$4 or engag\$3) near11 (rib\$4)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:12
L9	18203	(number or quantit\$4 or count\$4) near11 (rib\$4)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:13
L10	833974	(project\$3 or projection or protrus\$3 or protrud\$3 or engagement or engag\$3) near11 (hole\$4 or aperture or open\$3 or opening)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:14
L11	1	7 and 9 and 8 and 10	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:14
L12	2	7 and 9 and 10	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:15
L13	1448	8 and 9	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:16
L14	2	13 and 7	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:16
L15	3	14 or 12	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:16

L16	68	7 and 8	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:17
L17	27	16 and 10	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:18
L18	29	15 or 17	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:18
L19	2	7 same 9 same 8 same 10	USOCR	OR	ON	2012/10/08 20:19
L20	40	7 same 8 same 10	USOCR	OR	ON	2012/10/08 20:20
L21	500	(yusuke near3 yamada).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:28
L22	281	(yutaka near3 ban).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:28
L23	187	(katsuya near3 murakami).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:28
L24	103	(fumio near3 tazawa).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:29
L25	144	(hironori near3 minagawa).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:29
L26	906	21 or 22 or 23 or 24 or 25	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:29
L27	50213	(number or quantit\$4 or count\$4) near11 (rib\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:30
L28	214495	(project\$4 or protrus\$3 or protrud\$4 or engage\$4 or engag\$3) near11 (rib\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:30
L29	44	26 and 27 and 28	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/10/08 20:30

EAST Search History (Interference)

<This search history is empty>

10/ 8/ 2012 8:39:33 PM


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BIB DATA SHEET
CONFIRMATION NO. 1149

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
13/617,050	09/14/2012	399	2852	00684.003330.18		
APPLICANTS						
Yusuke Yamada, Ibaraki-ken, JAPAN; Yutaka Ban, Tokyo, JAPAN; Katsuya Murakami, Ibaraki-ken, JAPAN; Fumio Tazawa, Chiba-ken, JAPAN; Hironori Minagawa, Ibaraki-ken, JAPAN;						
** CONTINUING DATA *****						
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SEARCH NOTES		
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East - see text search history printout	10/8/12	/sl/
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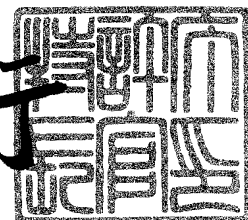
The country code and number
of your priority application,
to be used for filing abroad
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【発明の名称】 トナー補給容器、封止部材及びトナー補給装置

【請求項の数】 24

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【発明の名称】 トナー補給容器、封止部材及びトナー補給装置

【特許請求の範囲】

【請求項 1】 画像形成装置本体に着脱可能であって、前記画像形成装置本体へトナーを補給するためのトナー補給容器において、

前記画像形成装置本体に係止される係止部と、前記係止部が前記画像形成装置本体に係止された状態で前記画像形成装置本体から駆動力を受ける駆動力受け部と、前記係止部を変位させて前記画像形成装置本体との係止を解除するために前記画像形成装置本体から解除力を受ける解除力受け部と、を有することを特徴とするトナー補給容器。

【請求項 2】 前記係止部は前記解除力受け部に受けた解除力により弾性変形されることを特徴とする請求項 1 のトナー補給容器。

【請求項 3】 前記係止部及び前記駆動力受け部を備える突起を有することを特徴とする請求項 1 又は 2 のトナー補給容器。

【請求項 4】 前記係止部及び前記駆動力受け部を備える第 1 の突起と、前記解除力受け部を備える第 2 の突起と、を有し、前記第 1 の突起は前記第 2 の突起よりも前記トナー補給容器の装着方向先端側に設けられることを特徴とする請求項 3 のトナー補給容器。

【請求項 5】 前記第 2 の突起は前記第 1 の突起よりも外側へ突出していることを特徴とする請求項 4 のトナー補給容器。

【請求項 6】 前記画像形成装置へトナーを補給するための開口部を備えトナーを収容するトナー補給容器本体と、前記開口部を封止する封止部材と、を有し、前記封止部材は前記係止部及び前記駆動力受け部及び前記解除力受け部を備えることを特徴とする請求項 1 ～ 5 のいずれかの項に記載のトナー補給容器。

【請求項 7】 前記係止部が前記画像形成装置本体に係止された状態で、前記開口部を開封するために前記封止部材及び前記トナー補給容器本体の少なくとも一方を移動させることを特徴とする請求項 6 のトナー補給容器。

【請求項 8】 前記トナー補給容器本体内のトナーを前記開口部へ搬送する搬送部材を有し、前記搬送部材は前記駆動力受け部からの駆動力により駆動され

ることを特徴とする請求項 6 又は 7 のトナー補給容器。

【請求項 9】 前記トナー補給容器本体内のトナーを前記開口部へ搬送するとき、前記トナー補給容器本体は前記搬送部材を介して駆動されることを特徴とする請求項 8 のトナー補給容器。

【請求項 10】 前記係止部は、直鎖状ポリアミド系樹脂、ポリプロピレン系樹脂、ポリエチレン系樹脂、ポリエステル系樹脂、ABS樹脂、HIPS樹脂のいずれかにより形成されることを特徴とする請求項 1～9 のいずれかの項に記載のトナー補給容器。

【請求項 11】 前記係止部は複数設けられ、前記解除力受け部は前記各係止部をそれぞれ変位させるために複数設けられることを特徴とする請求項 1～10 のいずれかの項に記載のトナー補給容器。

【請求項 12】 画像形成装置本体に着脱可能であって、前記画像形成装置本体にトナーを補給するためのトナー補給容器の開口部を封止する封止部材において、

前記画像形成装置本体に係止される係止部と、前記係止部が前記画像形成装置本体に係止された状態で前記画像形成装置本体から駆動力を受ける駆動力受け部と、前記係止部を変位させて前記画像形成装置本体との係止を解除するために前記画像形成装置本体から解除力を受ける解除力受け部と、を有することを特徴とする封止部材。

【請求項 13】 前記係止部は前記解除力受け部に受けた解除力により弾性変形されることを特徴とする請求項 12 の封止部材。

【請求項 14】 前記係止部及び前記駆動力受け部を備える突起を有することを特徴とする請求項 12 又は 13 の封止部材。

【請求項 15】 前記係止部及び前記駆動力受け部を備える第 1 の突起と、前記解除力受け部を備える第 2 の突起と、を有し、前記第 1 の突起は前記第 2 の突起よりも前記封止部材の装着方向先端側に設けられることを特徴とする請求項 14 の封止部材。

【請求項 16】 前記第 2 の突起は前記第 1 の突起よりも外側へ突出していることを特徴とする請求項 15 の封止部材。

【請求項 17】 前記駆動力受け部に受けた駆動力は、前記トナー補給容器本体内のトナーを前記開口部へ搬送する搬送部材に伝達されることを特徴とする請求項 12～16 のいずれかの項に記載の封止部材。

【請求項 18】 前記係止部が前記画像形成装置本体に係止された状態で、前記開口部を開封するために前記封止部材を移動させることを特徴とする請求項 12～17 のいずれかの項に記載の封止部材。

【請求項 19】 前記係止部は、直鎖状ポリアミド系樹脂、ポリプロピレン系樹脂、ポリエチレン系樹脂、ポリエステル系樹脂、ABS樹脂、HIPS樹脂のいずれかにより形成されることを特徴とする請求項 12～18 のいずれかの項に記載の封止部材。

【請求項 20】 前記係止部は複数設けられ、前記解除力受け部は前記各係止部をそれぞれ変形させるために複数設けられることを特徴とする請求項 12～19 のいずれかの項に記載の封止部材。

【請求項 21】 トナーを補給するトナー補給装置において、
前記トナー補給装置本体に対して着脱可能なトナー補給容器と、前記トナー補給容器に設けられる係止部と係止可能な被係止部材であって、前記係止部と係止された状態で前記トナー補給容器に設けられる駆動力受け部に駆動力を伝達する被係止部材と、前記係止部を変位させて前記被係止部材との係止状態を解除するために前記トナー補給容器に設けられる解除力受け部に解除力を付与する解除力付与部材と、を有することを特徴とするトナー補給装置。

【請求項 22】 前記解除力付与部材は円筒形状であり、前記解除力付与部材を突起形状の前記係止部に当てて前記係止部を押し込むことにより前記係止部を変位させることを特徴とする請求項 21 のトナー補給装置。

【請求項 23】 前記トナー補給容器内のトナーを前記トナー補給容器に設けられる開口部へ搬送する搬送部材を有し、前記搬送部材は前記駆動力受け部からの駆動力により駆動されることを特徴とする請求項 22 のトナー補給装置。

【請求項 24】 前記開口部を封止する封止部材を有し、前記係止部が前記被係止部材と係止された状態で、前記開口部を開封するために前記トナー補給容器及び前記封止部材の少なくとも一方を移動させることを特徴とする請求項 21

～23のいずれかの項に記載のトナー補給装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】

本発明は、例えば電子写真画像形成装置などとされる画像形成装置の本体に着脱可能なトナー補給容器、封止部材及びトナー補給装置に関する。

【0002】

ここで電子写真画像形成装置とは、電子写真画像形成方式を用いて記録媒体に画像を形成するものである。そして、電子写真画像形成装置としては、例えば電子写真複写機、電子写真プリンタ（例えばレーザービームプリンタ、LEDプリンタなど）、ファクシミリ装置及びワードプロセッサ等が含まれる。

【0003】

【従来の技術】

従来、電子写真複写機やプリンタ等の電子写真画像形成装置には現像剤としての微粉末のトナーが使用されている。そして、電子写真画像形成装置本体のトナーが消費された場合には、トナー供給容器（トナー補給容器）を用いて画像形成装置本体へトナーを補給することが行われている。

【0004】

トナーは極めて微細な粉末であるため、トナー補給作業時には、トナーが飛散しないようにトナー補給容器を画像形成装置本体内の内部に据え置いて、小さな開口部から少量ずつトナーを排出する方式が知られている。

【0005】

これらの上述したトナー補給容器は、いずれの場合も画像形成装置本体側から、何らかの駆動を受けて、トナー補給容器側の搬送部材や容器本体を駆動させることで、トナーを排出させる構成になっている。こうした駆動伝達手段としては幾つかの方法があり、例えば実開平05-75768号公報に記載されているように、トナー補給容器としてのトナーボトルの外周面にギア部を設け、このギアに駆動源に連結された回転する駆動ギアを噛み合わせてトナーボトルを回転駆動させる構成がある。

【0006】

又、特開平10-63084号公報に記載されているような、トナーボトルの端面に回転駆動用の突起を設け、この突起を画像形成装置本体からの駆動部に設けた凹み部に係合させて、駆動を伝達する構成等がある。

【0007】

又、その他の例としては特開平10-63076号公報に開示されているような方法もある。これは画像形成装置本体の回転力伝達部の内径に複数の係合溝を設け、一方、トナー容器側にはその係合溝に係合するような突起が設けてあり、それらを係合させて回転駆動を伝達する構成となっている。

【0008】

このように、トナー補給容器を駆動させる方法として、種々の駆動伝達方法が提案されている。

【0009】

【発明が解決しようとする課題】

しかしながら、上記従来例では幾つかの技術的課題があった。

【0010】

実開平05-75768号公報に記載の方法の場合はトナーボトルを画像形成装置本体に挿入セットする際、トナーボトルの外周面に設けたギア部と画像形成装置本体内の駆動ギア部とをうまく噛み合わせる必要があり、この作業はユーザー自身が注意して挿入する必要があり、そのためユーザーに補給操作性における負担を強いることとなっていた。又、ギアとギアの噛み合わせによりトナーボトルを回転させるため、トナーボトルは回転モーメントにより、軸直角方向にずれようとする力を受け、このため、トナーボトルが浮き上がったり、横ずれして正常な回転ができなくなるおそれがある。このようなずれを防止するために、トナーボトルの周囲を全部包囲して支持する必要があるが、そのようにすると今度はトナーボトルの着脱操作を簡単に行うことができなくなると同時に補給システム自体の構成が複雑化し、コストアップにつながる。

【0011】

又、特開平10-63084号公報や特開平10-63076号公報記載の方

法の場合は、トナーボトル端面の突起（又は凹み部）を本体駆動部の凹み部（又は突起）に係合するようにトナーボトルを挿入する際に、トナーボトルの回転方向の位置合わせが必要となり、これをユーザー自ら行うことは補給操作性の低下を招くとともに、わずかな位置ずれにより、駆動が的確に伝達されない状態になる場合がある。

【0012】

このような係合不良を防止するために常にトナーボトル挿入時の回転方向の位置が決まるようにトナーボトル外面にガイドリブを設けたり、又、それに対応して本体駆動部の係合凹み部が常に所定の回転位置で停止するように回転動作を制御する必要があり、いずれも補給システムの構成の複雑化・コストアップ要因となる。

【0013】

又、こうした凹凸の係合によるカップリング駆動伝達の多くは、トナーボトルと本体駆動部の位相がズレて挿入された場合、本体駆動部をばねで退避させて、位相が合うと係合位置に戻るような構成にする場合がある。このような構成では、トナーボトルを挿入した時にボトルの位相がずれていても、本体駆動部が退避するため、そのうちボトルを回転させると位相が合って、係合することが可能になるが、本体駆動部の構成が複雑化することと、本体駆動部を奥側に退避させるため、余計なスペースを必要とすることから、装置本体のコンパクト化といった観点からも好ましくない。

【0014】

本発明は、前述した従来のトナー補給容器を更に発展させたものである。

【0015】

本発明の目的は、トナー補給容器の画像形成装置本体への着脱及びトナー補給動作を簡単な動作及び構成で確実にこなうことのできるトナー補給容器、封止部材及びトナー補給装置を提供することである。

【0016】

本発明の他の目的は、トナー補給容器によるトナー補給操作時にトナー補給容器の回転方向の位置合わせを必要とせず、簡単な操作で確実に補給できるトナー

補給容器、封止部材及びトナー補給装置を提供することである。

【0017】

本発明の他の目的は、トナー補給容器及び画像形成装置本体の機構が簡単で安価にすることができるトナー補給容器、封止部材及びトナー補給装置を提供することである。

【0018】

本発明の他の目的は、画像形成装置本体をコンパクト化できるトナー補給容器、封止部材及びトナー補給装置を提供することである。

【0019】

【課題を解決するための手段】

上記目的は本発明に係るトナー補給容器、封止部材及びトナー補給装置にて達成される。要約すれば、第1の本発明によると、画像形成装置本体に着脱可能であって、前記画像形成装置本体へトナーを補給するためのトナー補給容器において、

前記画像形成装置本体に係止される係止部と、前記係止部が前記画像形成装置本体に係止された状態で前記画像形成装置本体から駆動力を受ける駆動力受け部と、前記係止部を変位させて前記画像形成装置本体との係止を解除するために前記画像形成装置本体から解除力を受ける解除力受け部と、を有することを特徴とするトナー補給容器が提供される。一実施態様によると、前記係止部は前記解除力受け部に受けた解除力により弾性変形される。他の実施態様によると、前記係止部及び前記駆動力受け部を備える突起を有する。他の実施態様によると、前記係止部及び前記駆動力受け部を備える第1の突起と、前記解除力受け部を備える第2の突起と、を有し、前記第1の突起は前記第2の突起よりも前記トナー補給容器の装着方向先端側に設けられる。他の実施態様によると、前記第2の突起は前記第1の突起よりも外側へ突出している。他の実施態様によると、前記画像形成装置へトナーを補給するための開口部を備えトナーを収容するトナー補給容器本体と、前記開口部を封止する封止部材と、を有し、前記封止部材は前記係止部及び前記駆動力受け部及び前記解除力受け部を備える。他の実施態様によると、前記係止部が前記画像形成装置本体に係止された状態で、前記開口部を開封する

ために前記封止部材及び前記トナー補給容器本体の少なくとも一方を移動させる。他の実施態様によると、前記トナー補給容器本体内のトナーを前記開口部へ搬送する搬送部材を有し、前記搬送部材は前記駆動力受け部からの駆動力により駆動される。更に他の実施態様によると、前記トナー補給容器本体内のトナーを前記開口部へ搬送するとき、前記トナー補給容器本体は前記搬送部材を介して駆動される。他の実施態様によると、前記係止部は、直鎖状ポリアミド系樹脂、ポリプロピレン系樹脂、ポリエチレン系樹脂、ポリエステル系樹脂、ABS樹脂、HIPS樹脂のいずれかにより形成される。更に他の実施態様によると、前記係止部は複数設けられ、前記解除力受け部は前記各係止部をそれぞれ変位させるために複数設けられる。

【0020】

第2の本発明によると、画像形成装置本体に着脱可能であって、前記画像形成装置本体にトナーを補給するためのトナー補給容器の開口部を封止する封止部材において、

前記画像形成装置本体に係止される係止部と、前記係止部が前記画像形成装置本体に係止された状態で前記画像形成装置本体から駆動力を受ける駆動力受け部と、前記係止部を変位させて前記画像形成装置本体との係止を解除するために前記画像形成装置本体から解除力を受ける解除力受け部と、を有することを特徴とする封止部材が提供される。一実施態様によると、前記係止部は前記解除力受け部に受けた解除力により弾性変形される。他の実施態様によると、前記係止部及び前記駆動力受け部を備える突起を有する。他の実施態様によると、前記係止部及び前記駆動力受け部を備える第1の突起と、前記解除力受け部を備える第2の突起と、を有し、前記第1の突起は前記第2の突起よりも前記封止部材の装着方向先端側に設けられる。他の実施態様によると、前記第2の突起は前記第1の突起よりも外側へ突出している。他の実施態様によると、前記駆動力受け部に受けた駆動力は、前記トナー補給容器本体内のトナーを前記開口部へ搬送する搬送部材に伝達される。他の実施態様によると、前記係止部が前記画像形成装置本体に係止された状態で、前記開口部を開封するために前記封止部材を移動させる。他の実施態様によると、前記係止部は、直鎖状ポリアミド系樹脂、ポリプロピレン

系樹脂、ポリエチレン系樹脂、ポリエステル系樹脂、ABS樹脂、HIPS樹脂のいずれかにより形成される。更に他の実施態様によると、前記係止部は複数設けられ、前記解除力受け部は前記各係止部をそれぞれ変形させるために複数設けられる。

【0021】

第3の本発明によると、トナーを補給するトナー補給装置において、前記トナー補給装置本体に対して着脱可能なトナー補給容器と、前記トナー補給容器に設けられる係止部と係止可能な被係止部材であって、前記係止部と係止された状態で前記トナー補給容器に設けられる駆動力受け部に駆動力を伝達する被係止部材と、前記係止部を変位させて前記被係止部材との係止状態を解除するために前記トナー補給容器に設けられる解除力受け部に解除力を付与する解除力付与部材と、を有することを特徴とするトナー補給装置が提供される。一実施態様によると、前記解除力付与部材は円筒形状であり、前記解除力付与部材を突起形状の前記係止部に当てて前記係止部を押し込むことにより前記係止部を変位させる。他の実施態様によると、前記トナー補給容器内のトナーを前記トナー補給容器に設けられる開口部へ搬送する搬送部材を有し、前記搬送部材は前記駆動力受け部からの駆動力により駆動される。更に他の実施態様によると、前記開口部を封止する封止部材を有し、前記係止部が前記被係止部材と係止された状態で、前記開口部を開封するために前記トナー補給容器及び前記封止部材の少なくとも一方を移動させる。

【0022】

【発明の実施の形態】

以下、本発明に係るトナー補給容器、封止部材及びトナー補給装置を図面に則して更に詳しく説明する。

【0023】

実施例1

まず、本発明に係るトナー補給容器が装着される画像形成装置の一例である電子写真画像形成装置の構成について図1に基づいて説明する。

【0024】

[電子写真画像形成装置]

図1に示す電子写真複写機本体（以下、「装置本体」という）100において、原稿101が原稿台ガラス102の上に置かれると、原稿101の画像情報に応じた光像が光学部103の複数のミラーMとレンズL_nにより、像担持体としての電子写真感光体ドラム（以下、「感光体ドラム」という）104上に結像する。カセット105、106、107、108に積載された記録媒体（以下、「用紙」という）Pのうち、図2に示す操作部100aから使用者（ユーザー）が入力した情報もしくは原稿101の紙サイズから最適な用紙Pをカセット105～108の用紙サイズ情報から選択する。ここで、記録媒体としては用紙に限定されずに、例えばOHPシート等適宜選択できる。

【0025】

そして、給紙・分離装置105A、106A、107A、108Aにより搬送された1枚の用紙Pを、搬送部109を経由してレジストローラ110まで搬送し、更にレジストローラ110により用紙Pを感光体ドラム104の回転と、光学部103のスキヤンのタイミングを同期させて転写部に搬送する。転写部では、転写放電器111によって、感光体ドラム104上に形成されたトナー像を用紙Pに転写する。そして、分離放電器112によって、トナー像の転写された用紙Pを感光体ドラム104から分離する。

【0026】

この後、搬送部113により定着部114へ搬送された用紙Pは、定着部114において熱と圧力により用紙P上のトナー像を定着させた後、片面コピーの場合には、排紙反転部115を通過し、排紙ローラ116により排紙トレイ117へ排出される。又、両面コピーの場合には、排紙反転部115のフラップ118の制御により、再給紙搬送路119、120を経由してレジストローラ110まで搬送された後、片面コピーの場合と同様の経路をたどって排紙トレイ117へ排出される。

【0027】

又、多重コピーの場合には、用紙Pは排紙反転部115を通り、一度排紙ローラ116により一部が装置外へ排出される。そして、この後、用紙Pの終端がフ

ラップ118を通過し、排紙ローラ116にまだ挟持されているタイミングでラップ118を制御すると共に排紙ローラ116を逆回転させることにより、再度装置本体100内へ搬送される。更にこの後、再給紙搬送部119、120を経由してレジストローラ110まで搬送された後、片面コピーの場合と同様の経路をたどって排紙トレイ117へ排出される。

【0028】

ところで、上記構成の装置本体100において、感光体ドラム104の回りには現像手段としての現像装置201、クリーナ装置202、一次帯電器203等が配置されている。

【0029】

現像装置201は、原稿101の情報が光学部103により感光体ドラム104に形成された静電潜像を、トナーを用いて現像するものである。そして、この現像装置201へトナーを補給するためのトナー補給容器1が使用者によって装置本体100に着脱可能に装着されている。

【0030】

又、現像装置201は、収容手段としてのトナーホッパー201aと現像器201bとを有している。トナーホッパー201aは、トナー補給容器1から補給されたトナーを攪拌するための攪拌部材201cを有している。そして、この攪拌部材201cにより攪拌されたトナーは、マグネットローラ201dにより現像器201bに送られる。現像器201bは、現像ローラ201fと、送り部材201eを有している。そして、マグネットローラ201dによりトナーホッパー201aから送られたトナーは、送り部材201eにより現像ローラ201fに送られて、この現像ローラ201fにより感光体ドラム104に供給される。

【0031】

尚、クリーナ装置202は、感光体ドラム104に残留しているトナーを除去するためのものである。又、一次帯電器203は、感光体ドラム104を帯電するためのものである。

【0032】

図2に示す外装カバーの一部であるトナー補給容器交換用前カバー15（以下

、「交換用前カバー」という)を図3に示すように使用者が開けると、容器受け台50が、駆動系(不図示)によって所定の位置まで引き出される。そして、この容器受け台50上にトナー補給容器1を載置する。使用者がトナー補給容器1を装置本体100から取り出す際には、容器受け台50を引き出し、容器受け台50に載っているトナー補給容器1を取り出す。ここで、交換用前カバー15はトナー補給容器1を着脱(交換)するための専用カバーであって、トナー補給容器1を着脱するためだけに開閉される。尚、装置本体100のメンテナンスは、前面カバー100cを開閉することによって行われる。

【0033】

尚、容器受け台50を介することなく、トナー補給容器1を装置本体100に直接装着し、又、装置本体100から取り外してもよい。

【0034】

[トナー補給動作]

先ず、図7(A)～図7(C)を用いて本実施例におけるトナー補給容器(以下、「トナーボトル」という)のトナー補給動作について説明する。図7(A)～図7(C)は本実施例におけるトナーボトル1を装置本体100内に挿入してトナー補給を行う過程の状態を各段階毎に示した図である。

【0035】

同図に示すように、装置本体100にはトナー補給装置400が設けられ、更にトナー補給装置400には、トナーボトル1と連結してトナーボトル1を回転駆動させる駆動部(駆動力伝達部)20が具備されている。駆動部20はベアリング23によって回転可能に支持され、装置本体100内に設けた不図示の駆動モータにより回転駆動する構成になっている。

【0036】

又、装置本体100には、ホッパー201aに連通するトナー補給路24を形成する隔壁25が設けられ、この隔壁25には、トナーボトル1の一部を回転可能に支持し、かつトナー補給路24を密封する内外ベアリング26a、26bが固着されている。更に、トナー補給路24には補給トナーをホッパー201aに搬送するためのスクリュウ部材27が配置されている。

【0037】

図7（A）には、トナーボトル1を装置本体100に挿入させる状態が示されている。トナーボトル1先端の一端面には、本実施例では円筒状とされるトナー補給開口部（以下、単に「開口部」という）1aが設けてあり、開口部1aは、その先端開口が封止部材2により封止された状態にある。

【0038】

図7（B）には、トナーボトル1の挿入が更に進み、封止部材2の先端部に設けた係止部としての係合突起3が装置本体側の駆動部20と係合した状態が示されている。この駆動部20と封止部材2との係合はユーザーがトナーボトル1を挿入した時の挿入力によって行われる。この時、封止部材2は、係合突起3に設けた係止面3bによって駆動部20とスラスト方向（軸方向）に係止されているため、封止部材2はこの係止を解除しない限り、駆動部20に位置的に固定された状態にある。

【0039】

図7（C）には、封止部材2と駆動部20が係合した後、交換用前カバー15の閉動作に連動して、スライド部材300が矢印b方向に後退することでトナーボトル1も後退し、相対的に封止部材2がトナーボトル1から離れて開口部1aが開き、トナー補給が可能となった状態が示されている。この時、トナーボトル1の本体（以下、「ボトル本体」という）1Aに固定された駆動軸1bは封止部材2から完全に外れることはなく、駆動軸1bの一部が封止部材2内に残っている。尚、駆動軸1bは、その断面が、四角形や三角形などの回転駆動伝達が可能な非円形断面形状になっている。

【0040】

この状態で不図示のモータを駆動させると回転駆動力は本体駆動部20から封止部材2へと伝達し、更に封止部材2から駆動軸1bへと伝わることでトナーボトル1が回転する構成になっている。すなわちこの封止部材2はトナーを封止すると同時にトナーボトル1の回転駆動力を伝達させる2つの機能を果たしている。

【0041】

又、トナーボトル1は容器受け台50に設けられたボトル受けローラ23により回転可能に支持されているため、わずかな駆動トルクでもスムーズに回転することが可能である。このボトル受けローラ23はボトル本体1Aに対して靴となる位置に4ヶ所配設されている。ボトル受けローラ23は装置本体100のトナー補給装置400に回転自在に設けてある。このようにトナーボトル1が回転することでトナーボトル1の内部に収容されていたトナーが開口部1aから順次排出され、トナー補給路24に設けられたスクリュ部材27によって装置本体100側のホッパー201aへと搬送され、トナー補給が行われる。

【0042】

[トナー補給容器の交換方法]

次に、本発明におけるトナーボトルの交換方法について説明する。

【0043】

画像形成のプロセスに伴い、トナーボトル1内のトナーが略全量消費されると、装置本体100に設けられたトナー補給容器空検知手段（不図示）によってトナーボトル1内のトナーが無くなったことが検知され、その旨が液晶等の表示手段100b（図2参照）によりユーザーに知らされる。

【0044】

本実施例においてトナーボトル1の交換はユーザー自身が行い、その手順は以下の通りである。

【0045】

まず、閉じられた状態の交換用前カバー15をヒンジ18を中心に回動させて図6の破線で示す位置まで開く。この交換用前カバー15を開く動作に連動して後述のトナー補給部開閉手段により、上述の図7（C）の状態にあるボトル本体1Aが矢印bと反対方向の図7（A）に示す矢印a方向に移動して、それまでボトル本体1Aと離間した、トナー補給開口部1aを開放する状態にあった封止部材2がトナー補給開口部1aに圧入嵌合され、トナー補給開口部1aが閉止され、上記図7（B）に示す状態となる。

【0046】

次に、ユーザーは、装置本体100に装着されているトナーのなくなったトナ

ーボトル1を図7(A)に示す矢印a方向と逆方向に、即ち、図7(C)に示す矢印b方向に引き出し、装置本体100から取り外す。この後、ユーザーは新しいトナーボトル1を図7(A)に示す矢印aの向きに装置本体100へと挿入した後、交換用前カバー15を閉じる。そして、上述のように、この交換用前カバー15を閉める動作に連動してトナー補給部開閉手段により封止部材2が容器本体1Aから離間され、トナー補給開口部1aが開封される(図7(C))。以上が、トナー補給容器の交換手順である。

【0047】

[トナーボトル]

次に、本実施例のトナーボトルについて図8と図9を用いて更に説明する。

【0048】

トナーボトル1は略円筒形状に形成され、その一端面のほぼ中央にそのボトル本体、即ち、円筒部1Aより小径の開口部1aが突設されている。開口部1aには開口部1aを閉じる封止部材2が設けてあり、図7(A)～(C)に関連した説明にて理解されるように、この封止部材2がトナーボトル1の軸方向(矢印a-b方向)にスライドすることにより、開口部1aの開閉動作を行う構成になっている。封止部材2の先端部には弾性変形可能な係合突起3と、係合突起3の装置本体側の駆動部20との係合を解除する解除力受け部4とが設けてあり、この係合突起3は駆動部20と係合して、トナーボトル1に回転駆動を伝達する機能を果たす構成になっている。この係合突起3及び解除力受け部4の構成については後で詳細に述べる。

【0049】

先ず、トナーボトル1内部の構成について説明する。

【0050】

上述のように、トナーボトル1は略円筒形状を有しており、装置本体100内に略水平に配置され、装置本体100から回転駆動を受けて、回転する構成になっている。そして、このトナーボトル1の内面には螺旋状の突起1cが設けてある。トナーボトル1が回転することにより、この螺旋状突起1cに沿ってトナーが軸方向に搬送され、トナーボトル1端面に設けた開口部1aからトナーが排出

される構成になっている。

【0051】

本発明におけるトナーボトル1内部の構成については、トナーボトル1が回転することによりトナーが排出するボトル形状であれば、特にその形状や構成について限定するものではない。

【0052】

つまり、本発明の主旨は、駆動を受けることによってトナーを排出するトナーボトル1において、トナーボトル1と装置本体100との駆動伝達部の構成に特徴を持たせたことであるため、トナーボトル1の内部構成については、本実施例のように一般的によく知られているボトル内部に螺旋状突起1cを形成したものや、その他の構成のものであっても構わない。

【0053】

例えば、本実施例の変形例として図10に示すようなボトル内部の構成でも良い。本変形例では、ボトル本体内部に板状のバッフル部材40を設け、バッフル部材40の表面にトナーボトル1の軸線方向に対して傾斜した傾斜突起40aを複数設けており、この傾斜突起40aの一端は開口部1aに達している。トナーは最終的にこの傾斜突起40aから開口部1aを通して排出される構成になっている。トナーが排出する原理は、トナーボトル1の回転によってバッフル部材40で掻き揚げられたトナーがバッフル部材40表面上を滑り落ち、傾斜突起40aによってトナーボトル1の前方へ搬送される。この動作を繰り返すことによって、トナーボトル内部のトナーは順次、攪拌・搬送されて開口部1aから排出される。

【0054】

又、本発明における駆動の形式は、本実施例に示すような回転駆動だけに限定するものではなく、トナーボトルを振動、或いは、揺動、又はその他の方法等、何らかの駆動力を受けることによりトナーを補給するものであれば、特にその駆動の形式は問わない。つまり、装置本体100から何らかの駆動を受けることによってトナーを排出するトナーボトルであれば、その駆動は回転でも、揺動でも振動でも、いずれの駆動形式でもよい。

【0055】

また、前記変形例においては、この板状のバッフル部材40はトナーボトル1とは別部材で構成されており、封止部材2を介して、このバッフル部材40に回転駆動力を伝達することで間接的にトナーボトル1を回転させる構成になっている。

【0056】

このように、封止部材2を介してトナーボトル1を直接に或いは間接的に回転駆動力を伝える構成のいずれの構成を用いてもよい。

【0057】

図8及び図9において、上述のようにボトル本体1Aにはその一端面に開口部1aが設けてあり、開口部1a内にボトル本体1Aと一体に設けられた駆動軸1bが開口部1aから突出している。この駆動軸1bは開口部1aのほぼ中心軸線上に位置し、封止部材2に設けた係合穴2aと係合する。駆動軸1bは装置本体100から封止部材2を介して回転駆動力をボトル本体1Aへ伝達させるためのものであることから、駆動軸1bの断面形状は回転駆動力を伝達可能な四角形状やHカット形状、Dカット形状等の形状になっている。駆動軸1bは適宜手段によってボトル本体1Aに固定されている。

【0058】

尚、駆動軸1bはボトル本体1Aに固定せずに、図11に示すように封止部材2と一体に設けても何らかまわらない。その際は、駆動軸1bからの駆動力を伝達するための係合穴2aをトナーボトル1側に設ける必要がある。この変形例では、開口部1aの構成部材1cに係合穴2aを設けている。

【0059】

本実施例においてはボトル本体1Aに駆動軸1bを固定した構成を採用した。

【0060】

[封止部材]

次に、封止部材2について図12及び図13を用いて更に説明する。

【0061】

図12及び図13において、封止部材2はトナーボトル1の開口部1aを開封

可能に封止する封止部2 b、及び装置本体の駆動部2 0と係合する円筒状のカップリング係合部2 cを備えている。封止部2 bの外径は開口部1 aの内径よりも適当量大きく設定されている。そして、封止部2 bを開口部1 aに圧入嵌合することにより、封止部材2によって開口部1 aであるトナー補給口が密封される。

【0062】

上述のように、封止部材2は、駆動軸1 bと係合して装置本体1 0 0から受けた駆動力を駆動軸1 bに伝達するための係合穴2 aを有している。この係合穴2 aは封止部2 b及び係合部2 cにわたって形成されている。又、この係合穴2 aは駆動軸1 bの断面形状に対応した形状を有するとともに、駆動軸1 bよりも僅かに大きく形成されている。これにより駆動軸1 bは係合穴2 aに遊嵌される。又、係合穴2 aは駆動軸1 bと同断面であって、多角形である。本実施例では正方形を採用している。

【0063】

そして、このように駆動軸1 bが係合穴2 aに遊嵌されることにより、ボトル本体1 Aと封止部材2とは、ボトル本体1 Aの回転方向には互いに係止される一方、軸線方向へは相互に移動自在に構成されるようになっている。これにより、トナーボトル1をトナー補給装置4 0 0へ装着時、後述するように封止部材2とボトル本体1 Aとの離間が可能となり、トナー供給口すなわち開口部1 aの開封（開口）が可能となる。

【0064】

ところで、この係合穴2 aと駆動軸1 bとの係合長さは、封止部材2とボトル本体1 Aとが離間する際、外れることのない長さを有している。これにより封止部材2がボトル本体1と離間しても、駆動軸1 bは封止部材2を介して駆動力を受けられることができる。

【0065】

次に、本発明の特徴部分の一つである係合突起3について詳しく説明する。

【0066】

封止部材2には装置本体1 0 0からの駆動力を受けるためカップリング係合部2 cに係合突起3を設けている。係合突起3はカップリング係合部2 cの円筒面

よりも半径方向外側に向かって突出しており、かつ、回転方向の駆動力を伝達するための駆動力受け部としての駆動受け面3 aと、トナーボトル1と封止部材2とを離間させる際に、封止部材2を本体駆動部側に係止させるための係止部として作用する係止面3 bとを有している。すなわち、係合突起3はトナーボトル1の回転駆動とトナーボトル1の着脱方向における位置規制という、2つの異なる動きを、それぞれ駆動受け面3 aと係止面3 bとで果たしている。

【0067】

また、この係止面3 bは本体駆動部20と係止した状態で駆動力を受ける際に、封止部材2とトナーボトル1の離間距離を一定に保つことにより、トナーボトル1と封止部材2との開口が確保され、トナー排出量が一定量に保たれ、非常に定量排出性に優れたトナーボトルを提供できる。さらに封止部材2は装置本体駆動部20に確実に係止されているため、封止部材2の脱落するおそれもなく、確実にトナー排出を行うことができる。

【0068】

上記のような構成によれば、封止部材2の開閉動作と駆動力の伝達動作を一つの封止部材でできるのでコンパクトで安価な構成のトナー補給容器を提供できる。

【0069】

尚、係合突起3は基本的には封止部材2と一体で設けた方が部品点数の削減という観点から好ましいが、係合突起3のみを別部品として封止部材2に組み込んだ構成にしても特にかまわない。この構成については第4実施例で詳細に説明する。

【0070】

係合突起3を封止部材2と一体で設ける際には、係合突起3の両駆動受け面3 a側にスリット溝2 e等を設けて、係合突起3のみが自由に弾性変形させるような構成にするとよい。その理由は、この係合突起3が装置本体100からの作用によって変位することで後述する駆動伝達の解除動作を行うためである。

【0071】

尚、本実施例においては、係合突起3は封止部材2と一体に構成した。

【0072】

又、係合突起3の先端部は封止部材2が装置本体100の駆動部20に挿入される際に、スムーズに挿入されるようにテーパ面3cを有している。

【0073】

次に本発明の他の特徴である解除力受け部の構成について再度図12及び図13に基づいて説明する。

【0074】

係合突起3は対向方向に2箇所設けられているが、互いの係合突起同士を接続する接続部としての係合解除部、即ち、解除力受け部4が設けられている。この解除力受け部（以下、「解除部」という）4は矢印b方向に力が加わると、図13にて2点鎖線で示すように係合突起3を矢印d方向に弾性変形させるような役割を果たしており、力を除去すると、再び元の形に戻る構成になっている。従って、この解除部4は弾性変形しやすいように比較的薄肉化されており、又、それに適にした材質であることが好ましい。

【0075】

このような封止部材2はプラスチック等の樹脂を射出成形して製造するのが好ましいが、他の材料及び製造方法であっても、任意に分割、接合しても構わない。又、封止部材2は開口部1aに圧入嵌合してこれを密封するために適度な弾性が必要とされる。その材料としては低密度ポリエチレンが最も好ましく、次いでポリプロピレン、直鎖状ポリアミド、例えば商品名ナイロン、高密度ポリエチレン、ポリエステル、ABS、HIPS（耐衝撃性ポリスチレン）等が好ましく利用できる。

【0076】

上記のように、係合突起3及び解除部4を弾性変形可能な弾性部材とすることにより、弾性変形を利用して駆動部20及び係合突起3の係合離脱を容易に行なうことができる。又、上記の材料は、適度な弾性を有しているので、駆動部20及び係合突起3の係合離脱を容易に行なうことができ、且つ、十分な耐久性を有している。

【0077】

又、解除部4は係合突起3を接続するブリッジ状であることにより、一つの解除部を押圧することにより複数の係合突起3に対して均等に変位作用を及ぼすことができる。

【0078】

尚、この解除部4は上述したように互いの係合突起同士を必ずしも連結して一体化する必要はなく、図16及び図17に示すように個々の係合突起に対して独立した形に設けてもよい。

【0079】

[駆動力受け部]

次に本発明の特徴を最も良く表す、封止部材2に設けたカップリング係合部2cの構成について図14を用いて説明する。

【0080】

本発明において封止部材2は、本実施例では円筒状に形成されたカップリング係合部2cを備えており、トナー補給装置400の駆動力伝達部20からの駆動力を受けようになっている。

【0081】

封止部材2の円筒状のカップリング係合部2cには先に説明したように弾性変形可能な可撓性の係合突起3が2箇所に対向配置して設けられており、係合突起3は押圧されることで容易に弾性変形が可能な状態にある。更に係合突起3同士を互いに連結するように解除部4が設けられており、係合突起3と解除部4は一体となっている。

【0082】

一方、装置本体100側に設けた駆動部20は封止部材2の係合突起3と係合するように構成されており、封止部材2が駆動部20に挿入された時に滑らかに挿入できるように駆動部20の先端内径部は内径が徐々に縮径するようなテーパ面20bが設けてある。このテーパ面20bにより封止部材2は滑らかに駆動部20へと挿入される。又、駆動部20にはトナーボトル1を回転駆動させるための係合リブ20aが設けられている。この係合リブ20aは封止部材2が挿入された後、係合突起3を引っ掛けて回転駆動を伝達するためのものである。

【0083】

次に本実施例における駆動部20と封止部材2との係合の様子について図15を用いて説明する。

【0084】

図15(A)はユーザーが新しいトナーボトル1を装置本体100にセットするために、矢印a方向にトナーボトル1を挿入する際の様子を示したものであり、装置本体内の駆動部20と係合する前の状態である。

【0085】

トナーボトル1の挿入が進むと、図15(B)に示すように、封止部材2に設けた係合突起3が駆動部20のテーパ面20bに接触し、テーパ面20bに案内されながら徐々に内側に撓みながら弾性変形し挿入される。

【0086】

図15(C)に示すように、トナーボトル1の挿入が更に進み、テーパ面20bに続くストレート部20gを通過した係合突起3は係合リブ20aのない空間部分20hで撓みが解放され、ここで係合突起3が駆動部20と係合した状態になる。この状態において係合突起3は駆動部20としっかり係合されており、封止部材2のスラスト方向(軸方向)の位置は固定された状態となる。

【0087】

従って、その後、図7(C)に示すように、トナーボトル1を矢印b方向に後退させても、封止部材2はトナーボトル1と一緒に引きつられて後退することなく、しっかり駆動部20に固定される。一方、トナーボトル1だけが後退するため、封止部材2とトナーボトル1が確実に離間され開口部1aが開封する。尚、トナーボトル1の後退動作は装置本体100の前カバー15の開閉動作に連動してトナーボトル1をスライドさせるような構成にしてもよい。

【0088】

また、前記スライド動作については、前述したように封止部材2を固定して、トナーボトル1をスライドさせてもよいし、逆にトナーボトル1を固定して、封止部材2をスライドさせてもよいし、或いは封止部材2とトナーボトル1の両者を互いに離間する方向にスライドさせてもかまわない。

【0089】

[位相合わせを不要とする構成]

次に本発明における本体駆動部20とトナーボトル1の係合時の位相合わせを不要とする構成について図18を用いて説明する。

【0090】

従来の駆動伝達手段においては例えば凹凸の組合せによるカップリング駆動のような場合、凹部と凸部の位相を合わせて係合させる必要があったが、本発明ではこうした位相合わせなどの面倒な作業は一切必要ない。図18を用いてその理由を説明する。

【0091】

図18には、封止部材2が駆動部20に挿入された時の係合突起3と係合部である係合リブ20aの回転方向の位置関係が示されている。係合リブ20aは1箇所、係合突起3は2箇所設けた場合の例である。

【0092】

通常、ユーザーがトナーボトル1を挿入した時に、係合リブ20aと係合突起3の位置が共に同じ位置に重なることがなければ、トナーボトル1の挿入が所定の位置まで完了すると、封止部材2は駆動部20と係合し、次いでトナーボトル1が後退すると封止部材2とトナーボトル1が離間して、トナー排出可能な状態になる。

【0093】

しかし、挿入時のトナーボトル1の回転方向によっては、図18(A)に示すように、係合突起3と係合リブ20aの位置が重なってしまい、所定位置までトナーボトル1の挿入が終わっても係合突起3が係合リブ20aと干渉して外側に解放されず、引掛かりを保てずに係合が完了しない場合がある。その状態でトナーボトル1を後退させると、封止部材2は本体駆動部20との係止が保たれていないので、トナーボトル1と封止部材2と一緒に後退してしまい、開口部1aが開口しなくなるおそれがある。

【0094】

そこで、そのような事態を防ぐために本発明においては、係合リブ20aより

も係合突起3を少なくとも一つは常に多く設けることで、そうした問題を解消している。

【0095】

図18(A)の状態においては、一方の係合突起3 aは確かに係合リブ20 aに干渉しており、本体駆動部20に係止されていない状態であるが、他方の係合突起3は係合リブ20 aとは干渉しておらず、正しく駆動部20に係止されている。このように、仮に一方の係合突起3に係止されなくても、係合突起3によって係止されているため、何ら支障なくトナーボトル1が封止部材2から離間し、開口部1 aが開口することができる。そして開口部1 aが開口した後、図18(B)に示すように、やがて本体駆動部20が矢印c方向に回転すると、干渉していた係合リブ20 aが外れて係合突起3も正しく係止した状態となる。更に回転が進むと、図18(C)に示すように、係合リブ20 aは係合突起3に引掛かり、ここで回転駆動が伝達されてトナーボトル1が回転する。

【0096】

このように係合リブ20 aよりも、常に多くの係合突起3を設けることによって、ユーザーが任意の回転方向にトナーボトル1を挿入しても、トナーボトル1は正しく係止されて本体駆動部20に係合し、確実にセットされた状態にすることができる。

【0097】

尚、本発明においては、本実施例に示したように、係合突起3を2箇所設ける外にも、図19に示すように、係合突起3を4箇所に設けても勿論かまわない。

【0098】

又、位相合わせを不要とする上述した方法以外にも、その他の方法として図20に示すような方法でも位相合わせを不要とすることができる。すなわち、この変形例は、本体駆動部20の係合部20 dの内面全周にわたって、浅い係止溝20 eを設け、更に係止溝20 eの中に係合突起3と係合するための係合穴20 dを設ける構成を備えている。尚、この係止溝20 eは係合突起3が完全に係合するほど深い溝ではなく、半分程度引っ掛かるくらいの浅い溝でよい。

【0099】

図21により本変形例の構成による係合時の動作について説明する。

【0100】

図21(A)は、本体駆動部20にトナーボトル1を挿入する前の状態を示しており、この時の本体駆動部20の係合穴20dと封止部材2の係合突起3との回転方向の位置はX-X断面に示したように位相が合っていない状態である。やがてトナーボトル1の挿入が進み、図21(B)に示す状態になると、係合突起3は係止溝20eに半分程度引っ掛かった状態になる。この状態でトナーボトル1を後退させようとしても係止溝20eによって封止部材2は係止されているため、トナーボトル1だけが矢印b方向に後退し、封止部材2とトナーボトル1が確実に離間して開口部1aが開口した状態になる。そして本体駆動部20が矢印c方向に回転すると、図21(C)に示すように、係合穴20dと係合突起3との位置が合い、この時初めて係合突起3は完全に係合穴20dに係合し、回転駆動力を伝達することが可能になる。

【0101】

このように、本発明においては、ユーザーはトナーボトル1を挿入するだけで確実にトナーボトル1を装置本体100にセットすることができ、更にトナーボトル1の挿入の際にボトル1の回転方向の位置合せなどの面倒な作業を必要とせず簡単に動作で交換作業を行うことができる。

【0102】

又、トナー補給容器の開封動作を画像形成装置本体内で補給動作に連動させて行なうために、ユーザー自身が開封作業を行なう必要がなく、ユーザーは手を汚さずに簡単にトナー補給を行なうことができる。

【0103】

[係合の解除方法]

次に係合突起3と本体駆動部20との係合解除について図22を用いて説明する。

【0104】

トナー補給が終了し、トナーボトル1が空になると、古いトナーボトル1を取り外し、新しいトナーボトルに交換しなければならない。その際にそれまで係合

していた封止部材 2 と駆動部 2 0 の係合を解除する必要がある。

【0105】

図 2 2 に示すように、装置本体内部、詳しくは駆動部 2 0 の内部に押出し部材 2 1 が設けられている。押出し部材 2 1 はトナーボトル 1 の駆動軸 1 b の軸線方向と同方向に移動可能な構成になっている。

【0106】

図 2 2 (A) は、トナー補給が終わり、トナーボトル 1 の開口部 1 a が開口した状態を示している。

【0107】

駆動部 2 0 と封止部材 2 の係合を解除する際は封止部材 2 の先端に設けた解除部 4 に押出し部材 2 1 を矢印 a 方向に進入させることで、図 2 2 (B) に示すように、解除部 4 は矢印 a 方向に撓み、同時にこの解除部 4 と一体になっている係合突起 3 も内側に倒れる。これにより係合突起 3 と本体駆動部 2 0 との係合が解除される。その後更に押出し部材 2 1 が矢印 a 方向に進むことで、図 2 2 (C) に示すように、押出し部材 2 1 は封止部材 2 を開口部 1 a へ圧入させ、ここでトナーボトル 1 の開口部 1 a を密封する。更に押出し部材 2 1 が矢印 a 方向へ進むことで、今度はトナーボトル 1 自体を後退させて、ユーザーが取出しやすい位置までトナーボトル 1 をスライドさせる。

【0108】

この押出し部材 2 1 の駆動構成については、装置本体 1 0 0 の前カバー 1 5 の開閉動作に連動させて、前カバー 1 5 を開けた時に押出し部材 2 1 が矢印 a 方向移動して、駆動部 2 0 とトナーボトル 1 の封止部材 2 の分離を行い、前カバー 1 5 を閉じると矢印 b 方向に移動するといった構成にしてもよいし、あるいは別途駆動モータ等を用いて、独立した分離動作を行うような構成にしてもよい。あるいは装置本体 1 0 0 の前カバー 1 5 との連動動作ではなく、別途手動レバーを設け、これに連動して分離動作を行うような構成にする等、どのような方法でも構わない。

【0109】

上記のように、本実施例によれば、トナー補給容器を挿入するだけで確実に電

子写真画像形成装置本体に係合でき、且つ取り出す時には解除部を押圧するだけの動作で容易に係合が解除できるので、非常に簡単な動作及び構成でトナー補給容器の補給動作を行なうことができる。従って、操作性の高いトナー補給容器を提供できる。

【0110】

又、トナー補給容器の駆動伝達の解除が行えると同時に、開口部の開閉動作をも同時に実現させることが可能である。

【0111】

更に、このように非常に簡単な動作、かつ簡単で安価でコンパクトな構成にも拘らず、確実で信頼性の高い駆動伝達を実現できる。

【0112】

又、トナー補給容器に回転駆動を伝達するに際し、回転軸受機構が不要であり、簡単な構成でしかも軸受部でのトナー漏れ、トルクアップ、粗粒発生等の弊害が生じないトナー補給容器を提供できる。

【0113】

実施例2

次に本発明の第2実施例について図23～図25を用いて説明する。尚、前出の部材と同一機能を有する部材には同一符号を付す。

【0114】

本実施例は、図23に示すように、解除部としての解除突起4を、第1実施例のように封止部材2の円筒状カップリング係合部2cの内側ではなく、外周面に設けたことを特徴とする。又、本実施例では、係合突起3及び解除部4を円周方向に4分割した位置に4箇所設けた。

【0115】

又、上記解除部4の構成に応じて、押出し部材21を、第1実施例で装置本体側の駆動部20の軸中心から前後にスライドするようなシャフト状のものではなく、図24に示すように、駆動部20の外周を覆うような円筒形状で前後にスライド可能とし、かつ解除部4と係合可能に構成した。又、円筒状押出し部材21の先端部内周面は先端に向けて内径が大きくなる、つまり肉厚が薄くなるような

テーパ状に形成されており、係合時において、テーパ部21aが係合解除部4の頂部と係合する。更に、係合突起3及び解除部4が設けられた支持部2fの両側にスリット溝2eが形成されており、このスリット溝2eによって係合突起3及び解除部4が内側方向へ弾性変形する構成とされている。

【0116】

図25(A)に、トナー補給が終わり、トナーボトル1の開口部1aが開口した状態を示す。

【0117】

本体駆動部20と封止部材2との係合を解除する際は、図25(B)に示すように、押出し部材21を封止部材2の先端に設けた解除部4に矢印a方向に進入させることにより、解除部4は押出し部材21の内周面によって内側へと押圧されて矢印d方向に撓み、同時にこの解除部4と一体の係合突起3も内側に倒れる。これにより係合突起3と本体駆動部20との係合が解除される。

【0118】

その後更に押出し部材21を矢印a方向に進入させることで、図25(C)に示すように、封止部材2がトナーボトル1の封止位置まで戻される。次いで、押出し部材21はトナーボトル1自体を更に後退させて、ユーザーが取出しやすい位置までトナーボトル1をスライドさせる。

【0119】

このように本実施例によれば、円筒部2cの外周面に解除部4を設けることで、上記と同様の効果を得ることができる。又、このような形態にすると、封止部材2を樹脂の射出成形で製作したときに型が抜き易くなるため、生産性を向上させるにはより好適である。

【0120】

実施例3

次に本発明の第3実施例について図26～図29を用いて説明する。

【0121】

第2実施例では、図24に示したように、封止部材2の係合突起3及び解除部(解除突起)4を係合部2bの外周面上に設けたが、本実施例では、図26に示

すように、係合突起3及び解除部4を係合部2bの内周面上に、かつ、係合部2bを円周方向に4分割した位置に4箇所設けた。

【0122】

上記のような封止部材2の構成に対応して本体駆動部20は、図27に示すような形状を備えている。すなわち、本体駆動部20は、外径の異なる複数部分、先端部20b、小径部20c、大径部20d、及び後端部20eを有する概略円筒形を有し、押出し部材21が貫通する貫通穴20fの内径は均一とされている。そして、最も外径の小さい小径部20cには駆動部20の長手方向に延びる係合リブ20aが対向する位置に突設されている。

【0123】

次に、本実施例における駆動部20と封止部材2との係合の様子について図28を用いて説明する。

【0124】

図28(A)は、ユーザーが新しいトナーボトル1を画像形成装置本体にセットするために、矢印b方向にトナーボトル1を挿入する際の様子を示したものであり、装置本体内の駆動部20と係合する前の状態を示したものである。

【0125】

図28(B)に示すように、トナーボトル1の進入が進むと、封止部材2に設けた係合突起3が本体駆動部20に接触し、係合突起3の先端部に形成されたテーパ面3cに案内され、徐々に外側に撓みながら弾性変形し挿入される。

【0126】

更に進入が進み、ストレート部20gを通過した係合突起3は、図28(C)に示すように、係合リブ20aの無い空間部分20hで撓みが解放され、ここで係合突起3が本体駆動部20と係合した状態になる。

【0127】

この図28(C)に示す状態において、係合突起3は本体駆動部20としっかり係合されており、封止部材2のスラスト方向(軸方向)の位置は固定された状態となる。従ってその後トナーボトル1を後退させても、封止部材2はトナーボトル1と一緒に引きつられて後退することなく、しっかり本体駆動部20に固定

される。一方、トナーボトル1だけが後退すると、封止部材2とトナーボトル1が確実に離間し開口部1 aが開封する。尚トナーボトル1の後退動作は前カバー1 5（図2参照）の開閉動作に連動してトナーボトル1をスライドさせるような構成にしてもよい。

【0128】

次に、図29を参照して、本実施例における係合解除動作について説明する。

【0129】

本体駆動部20と封止部材2の係合を解除する際は、第1実施例と概略同様に、本体駆動部20の中央部に配置した押出し部材21を矢印a方向にスライドさせるだけで容易に解除することができる。

【0130】

封止部材2内側に設けた解除部4に対して押出し部材21を矢印a方向に進入させることで、図29（B）に示すように、解除部21は外側に押し開かれるように撓み、同時にこの解除部21と一体になっている係合突起3も外側に開く。これにより係合突起3と本体駆動部20との係合が解除される。

【0131】

その後更に押出し部材21が矢印a方向に進むことで、図29（C）に示すように、押出し部材21は封止部材2を開口部1 aへ圧入し、ここで封止部材2はトナーボトル1の開口部1 aを密封する。更に押出し部材21を矢印a方向へ進ませることで、トナーボトル1自体を後退させ、最後にはユーザーが取出しやすい位置までトナーボトル1をスライドさせる。

【0132】

この押出し部材21の構成については、装置本体100の前カバー15の開閉動作に連動させて、前カバー15を開けた時に押出し部材21が矢印a方向に移動して、分離を行い、前カバー15を閉じると矢印b方向に移動するといった構成にしてもよいし、あるいは別途駆動モータ等を用いて、独立した分離動作を行うような構成にしてもよい。あるいは前カバー15との連動動作ではなく、別途手動レバーを設け、これに連動して分離動作を行うような構成にする等、いずれの方法でも構わない。

【0133】

このように本実施例においては、解除部が表面に露出されないので、万が一トナー補給容器を落下させた場合でも、解除部が破損するおそれがなく、物流時の耐衝撃性に優れたトナー補給容器を提供できる。

【0134】

又、押出し部材が前後にスライドするという非常に単純な動作だけで、容易にトナーボトルの駆動伝達の解除が行えると同時に、トナーボトルの開口部の開閉動作をも同時に実現させることが可能である。

【0135】

このように非常に簡単な動作、かつ簡単で安価でコンパクトな構成にも拘らず、確実で信頼性の高い駆動伝達力を実現できる。

【0136】

実施例4

次に、本発明の第4実施例について図30を用いて説明する。

【0137】

本実施例では、図30に示すように、トナーボトル1の開口部1aに取り付けられる封止部材2、係合突起3、及び係合解除部4をそれぞれ別部品として製作し、各部品を組立てた構成を備えたものである。

【0138】

同図に示すように、封止部材2の端面にはヒンジ部3hを介して二つの可動アーム3eが対向するように取り付けられており、可動アーム3eの先端部には例えば第1実施例にて説明したのと同様の、本体駆動部20と係合を行なう係合突起3がそれぞれ設けられている。

【0139】

又、二つの係合突起3はヒンジ部3iを介してリンク部材3gによって連結されている。リンク部材3gは、ヒンジとして作用する解除部4によって連結された二つの部材から構成されている。

【0140】

更に、可動アーム3eの中央部内側には対向するように固定突起3fが突設さ

れており、固定突起3 fにはスプリング3 jが係止されている。このスプリング3 jの付勢力によって可動アーム3 eは外方に付勢され、それによって係合突起3は、図30(A)に示されるような、本体駆動部20との係合が可能な形態に保持される。尚、本実施例に好適な本体駆動部20としては、例えば図14に示したものを挙げることができる。

【0141】

上記のような構成において、トナーボトル1を係合突起3を介して本体駆動部20と係合させる場合には、例えば第1実施例と同様に、トナーボトル1を挿入するだけで係合することができる。すなわち、トナーボトル1が挿入されると係合突起3が本体駆動部20と接触し、可動アーム3 eがスプリング3 jの付勢力に抗して係合突起3と共に内側に倒れこみ、更に挿入が進むと、係合突起3はスプリング3 jの付勢力によって本体駆動部20と所定の位置で係合し、同時に可動アーム3 eは図30(A)の所定の位置に復帰する。

【0142】

一方、この係合を解除する場合は、図30(B)に示すように、押出し部材21を矢印a方向に解除部4に対して押し込むと、係合突起3は容易に内側に倒れこみ、係合が解除される。

【0143】

このように、上述した本実施例の構成においても、他の実施例と同様の効果を十分に発揮することができる。

【0144】

又、このような形態にすると弾性変形により係合突起3を解除させる必要がないため、弾性変形しない材質でも使用できるようになり、材質の選択肢が格段に広がる。例えばアルミや鉄、マグネシウムなどの各種金属材料や木材、硬質樹脂、等の各種材質を使用することが可能となり、より高い係合強度が維持でき、又同時に耐久性も向上させることができる。

【0145】

更に、各部品をリンク機構により可動させているので、弾性変形よりも可動範囲が広くなり、より大きな係合面積が確保できる。そのため係合部での引掛かり

がより強固になり、より信頼性の高い係合強度が得られる。

【0146】

実施例5

尚、本発明は以上説明してきた実施態様に限定されるものではなく、他の種々の実施態様が可能である。

【0147】

例えば、図31に示すように、トナーボトル1が、ボトル本体1Aの円筒面1dに開口部1aがある場合、カップリング係合部2cを上述した封止部材2に設けるのではなく、トナーボトル本体1Aの端面に直接設けてもよい。この場合、開口部1aはシャッタ部材Sにより開閉可能に封止される。

【0148】

【発明の効果】

以上説明したように、本発明のトナー補給容器は、画像形成装置本体に着脱可能であって、画像形成装置本体へトナーを補給するものであり、特に、画像形成装置本体に係止される係止部と、係止部が画像形成装置本体に係止された状態で画像形成装置本体から駆動力を受ける駆動力受け部と、係止部を変位させて画像形成装置本体との係止を解除するために画像形成装置本体から解除力を受ける解除力受け部と、を有する構成とされるので、トナー補給容器の画像形成装置本体への着脱及びトナー補給動作を簡単な動作及び構成で確実にこなうことができ、操作性を向上させることができる。又、トナー補給容器及び画像形成装置本体の機構を簡単で安価にすることができる。更に、画像形成装置本体をコンパクト化できる。

【0149】

又、本発明の封止部材は、画像形成装置本体に着脱可能であって、画像形成装置本体にトナーを補給するためのトナー補給容器の開口部を封止するものであり、特に、画像形成装置本体に係止される係止部と、係止部が画像形成装置本体に係止された状態で画像形成装置本体から駆動力を受ける駆動力受け部と、係止部を変位させて画像形成装置本体との係止を解除するために画像形成装置本体から解除力を受ける解除力受け部と、を有する構成とされるので、トナー補給容器の

画像形成装置本体への着脱及びトナー補給動作を簡単な動作及び構成で確実に行なうことができ、操作性の向上に寄与できる。又、トナー補給容器及び画像形成装置本体の機構を簡単で安価にすることに寄与できる。更に、画像形成装置本体をコンパクト化することに寄与できる。

【0150】

更に、本発明のトナー補給装置は、トナーを補給するトナー補給装置であり、特に、トナー補給装置本体に対して着脱可能なトナー補給容器と、トナー補給容器に設けられる係止部と係止可能な被係止部材であって、係止部と係止された状態でトナー補給容器に設けられる駆動力受け部に駆動力を伝達する被係止部材と、係止部を変位させて被係止部材との係止状態を解除するためにトナー補給容器に設けられる解除力受け部に解除力を付与する解除力付与部材と、を有する構成とされるので、トナー補給容器の画像形成装置本体への着脱及びトナー補給動作を簡単な動作及び構成で確実に行なうことができ、操作性を向上できる。又、トナー補給容器及び画像形成装置本体の機構を簡単で安価にすることに寄与できる。更に、画像形成装置本体をコンパクト化できる。

【図面の簡単な説明】

【図1】

本発明に係る画像形成装置の一実施例を示す断面図である。

【図2】

図1の画像形成装置を示す斜視図である。

【図3】

トナー補給容器を画像形成装置に装着する様子を示す斜視図である。

【図4】

図1の画像形成装置の正面図である。

【図5】

図1の画像形成装置の側面図である。

【図6】

トナー容器交換用カバーを開いた様子を示す画像形成装置の平面図である。

【図7】

トナー補給容器の装着動作、すなわち、(A) 装着開始時、(B) 装着途中、及び(C) 装着完了時を示す断面図である。

【図 8】

トナー補給容器の一実施例を示す一部切り欠き斜視図である。

【図 9】

駆動軸をトナー補給容器本体側に設けた場合の駆動伝達部の一実施例を示す部分拡大断面図である。

【図 10】

トナー補給容器の他の実施例を示す一部切り欠き斜視図である。

【図 11】

駆動軸を封止部材側に設けた場合の、駆動伝達部の他の実施例を示す部分拡大断面図である。

【図 12】

封止部材の一実施例を示す正面図(A)、(A)図のX方向から見た側面図(B)、同じくY方向から見た側面図である。

【図 13】

封止部材を示す図 12 (B) の線X-Xに沿った断面図である。

【図 14】

駆動力伝達部及び駆動力受け部の一実施例を示す斜視図である。

【図 15】

トナーボトルの駆動伝達部との係合時の様子、すなわち(A) トナーボトル挿入前、(B) 挿入途中、(C) 挿入完了時を示す部分断面図である。

【図 16】

駆動力受け部の他の実施例を示す斜視図である。

【図 17】

図 16 の封止部材の断面図である。

【図 18】

トナーボトル挿入時の位相合わせに関する、(A) 係合リブと係合突起の位相が重なった状態、(B) 回転が進み位相の重なりがなくなった状態、(C) 更に

回転が進み、係合突起に係合リブが引っかかり駆動伝達された状態を示す説明図である。

【図 19】

本発明における封止部材の他の実施例を示す (A) 左側面図、(B) 正面図、及び (C) 右側面図である。

【図 20】

位相合わせを不要とする駆動力伝達部と駆動力受け部の他の実施例を示す斜視図である。

【図 21】

図 20 の駆動伝達部におけるトナーボトル挿入時の様子、すなわち (A) トナーボトル挿入前、(B) 挿入途中、(C) 挿入完了時を示す縦断面図及び線 X-X に沿った断面図である。

【図 22】

トナーボトルの駆動伝達部における係合解除の様子、すなわち (A) 解除前、(B) 解除中、(C) 解除完了時を示す断面図である。

【図 23】

本発明に係る封止部材の他の実施例を示す (A) 側面図、(B) 正面図、及び (C) 断面図である。

【図 24】

図 23 の封止部材が駆動部と係合した状態を示す断面図である。

【図 25】

トナーボトルの駆動伝達部における係合解除の様子、すなわち (A) 解除前、(B) 解除中、及び (C) 解除完了時を示す断面図である。

【図 26】

本発明に係る封止部材の他の実施例を示す (A) 側面図、及び (B) 線 X-X に沿った断面図である。

【図 27】

図 26 の封止部材と係合する駆動部の他の実施例を示す (A) 正面図、(B) 側面図、(C) 図 (B) の線 C-C に沿った断面図、(C) 図 (A) の線 D-D

に沿った断面図である。

【図 2 8】

図 2 6 の封止部材及び図 2 7 の駆動部の係合時の様子、すなわち (A) トナーボトル挿入時、(B) 挿入途中、及び (C) 挿入完了時を示す断面図である。

【図 2 9】

図 2 8 の係合を解除する様子、すなわち (A) 解除前、(B) 解除中、及び (C) 解除完了時を示す断面図である。

【図 3 0】

本発明に係る封止部材の他の実施例を示す (A) 係合解除前、及び (B) 係合解除中を示す断面図である。

【図 3 1】

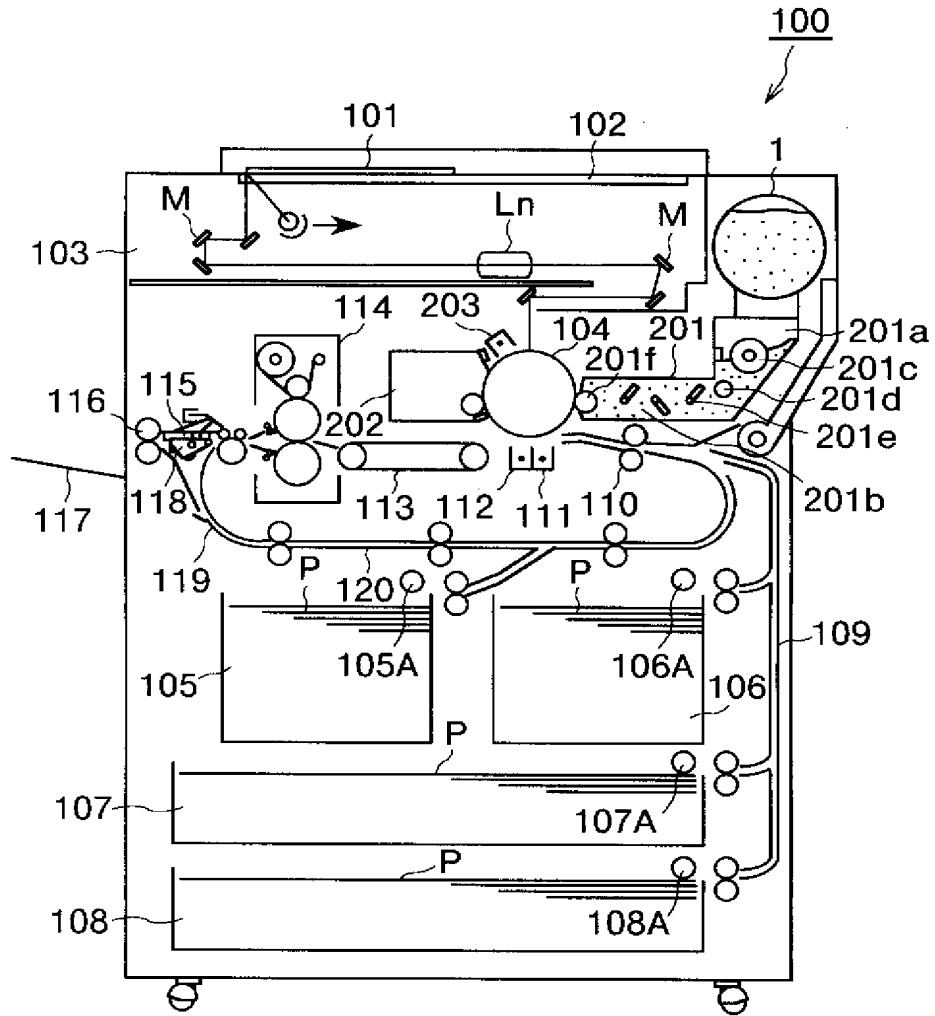
トナー補給容器の他の実施例を示す斜視図である。

【符号の説明】

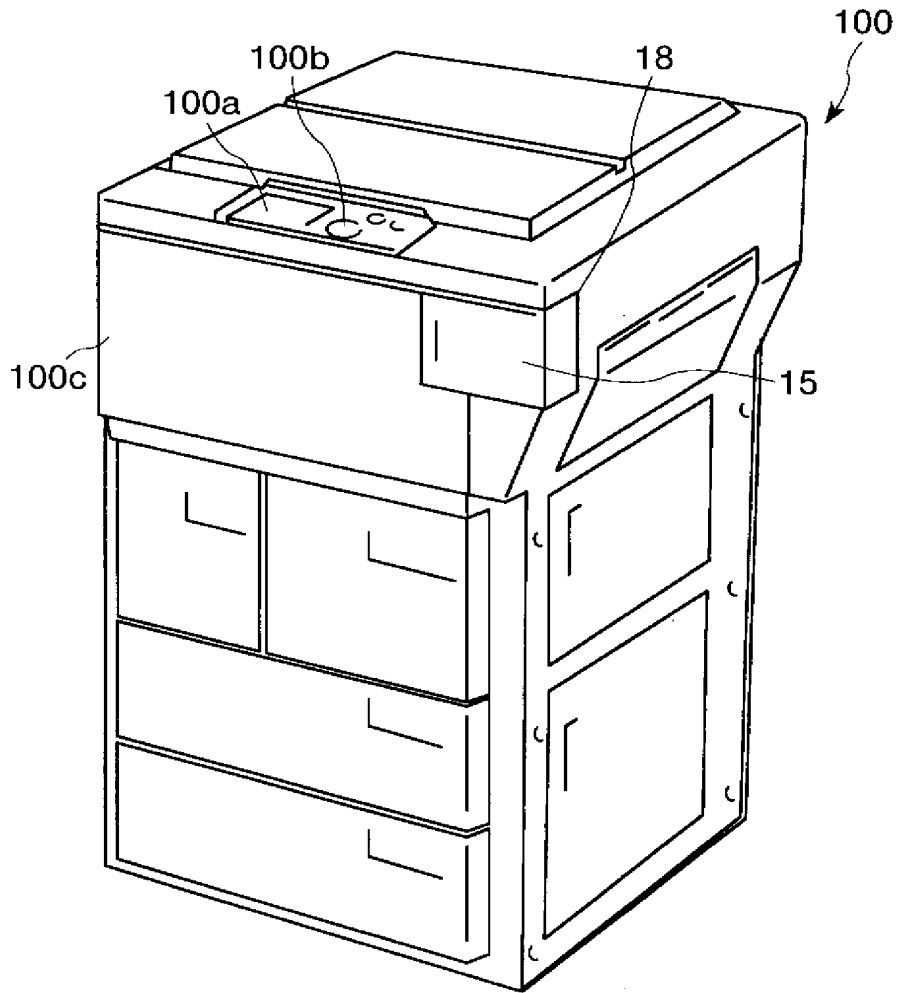
- | | |
|-------|-------------------|
| 1 | トナーボトル (トナー補給容器) |
| 1 A | ボトル本体 (トナー補給容器本体) |
| 2 | 封止部材 |
| 2 b | 封止部 |
| 2 c | カップリング係合部 |
| 3 | 係合突起 (係止部) |
| 3 a | 駆動受け面 (駆動力受け部) |
| 3 b | 係止面 |
| 4 | 解除突起 (解除力受け部) |
| 2 0 | 駆動部 |
| 2 1 | 押出し部材 |
| 1 0 0 | 画像形成装置本体 |
| 4 0 0 | トナー補給装置 |

【書類名】 図面

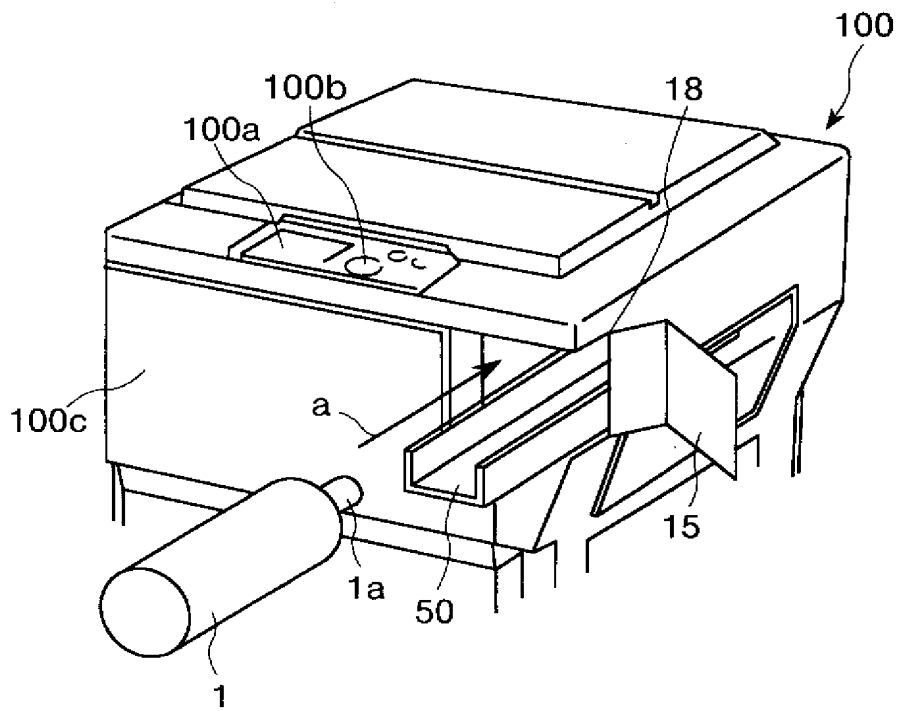
【図1】



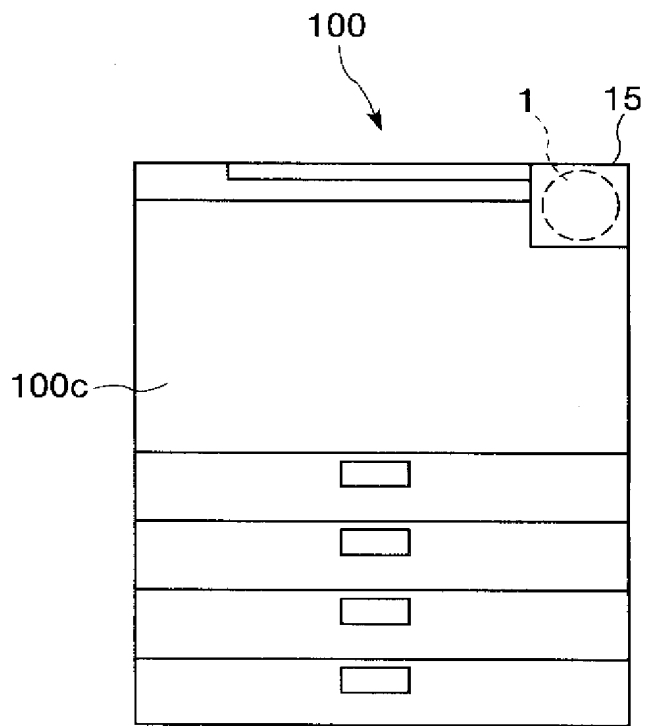
【図2】



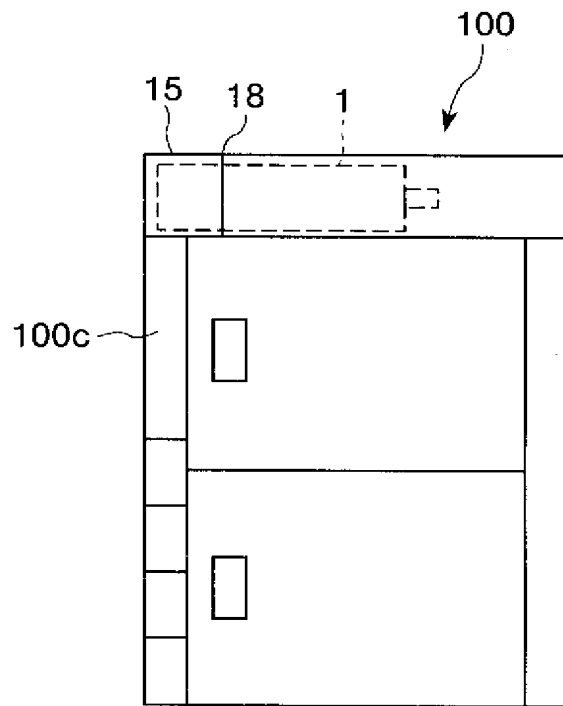
【図3】



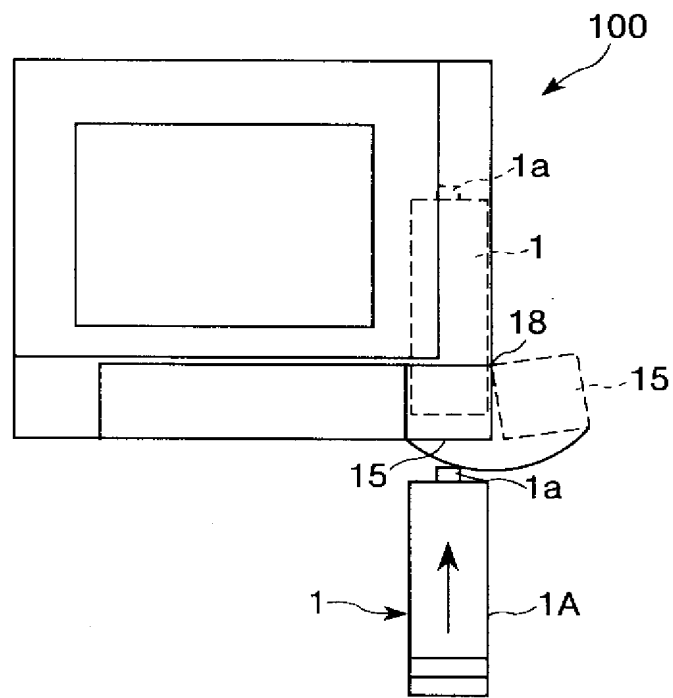
【図4】



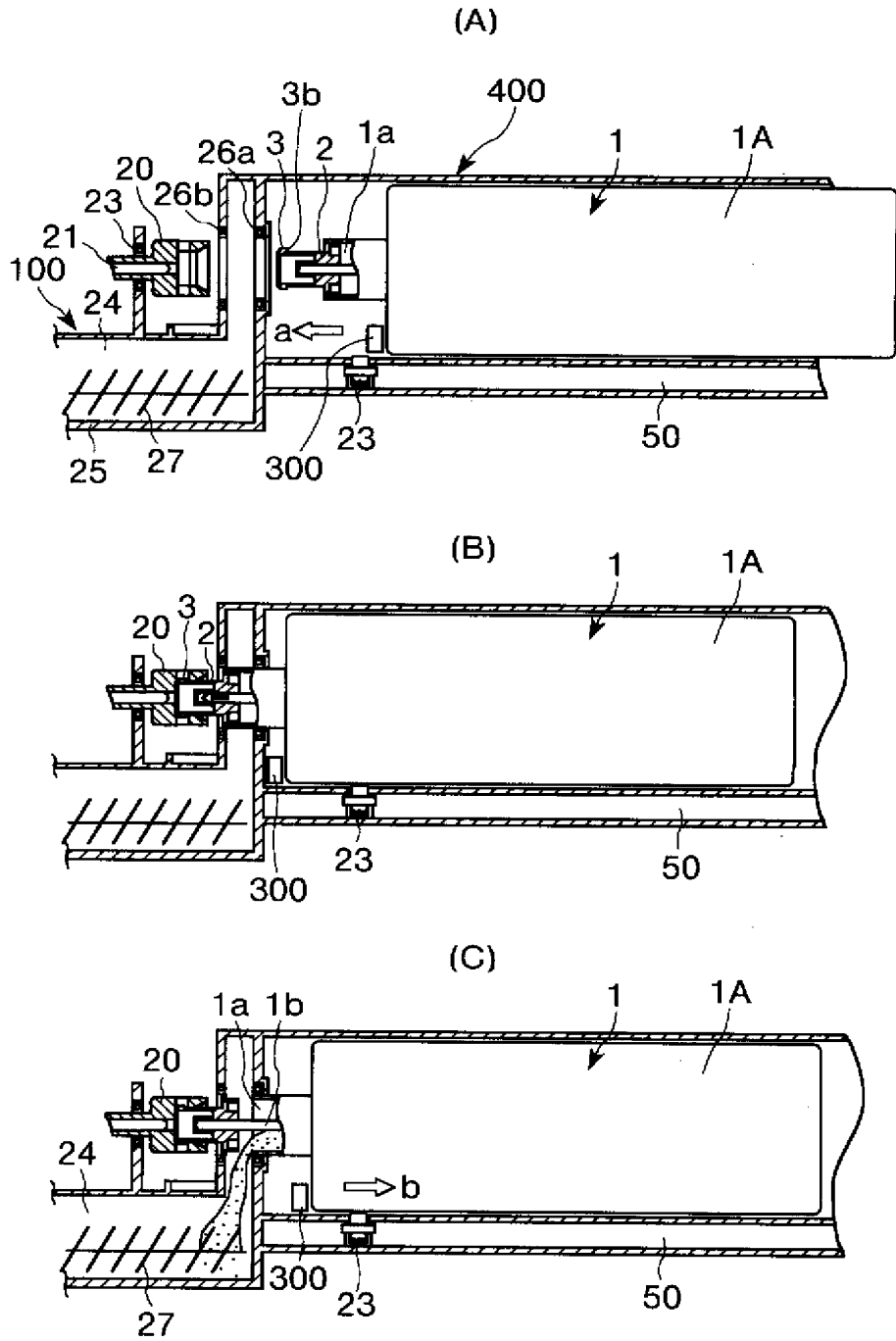
【図5】



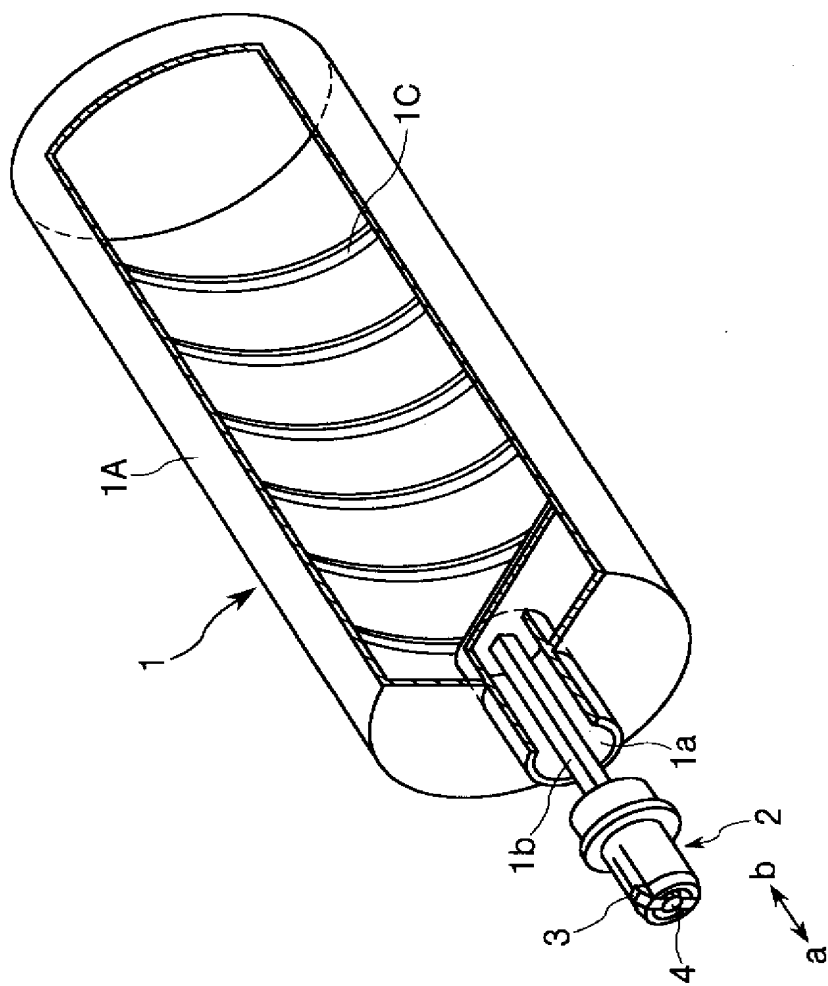
【図6】



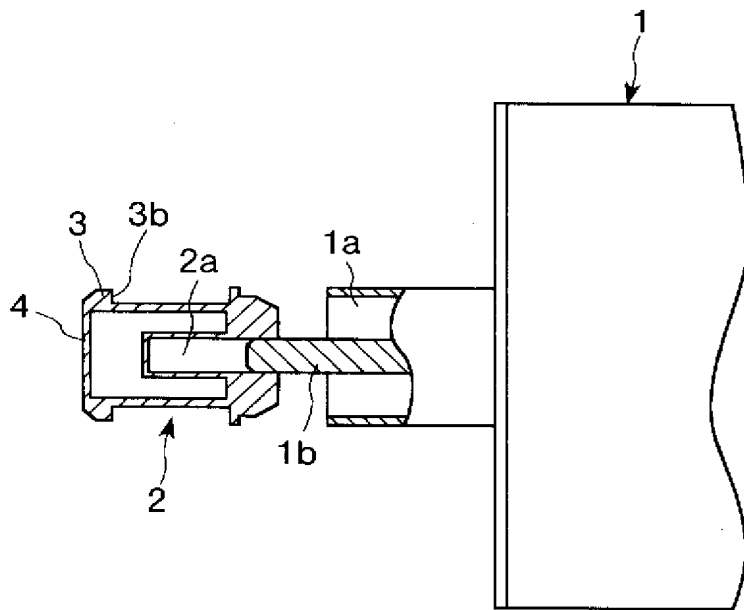
【図7】



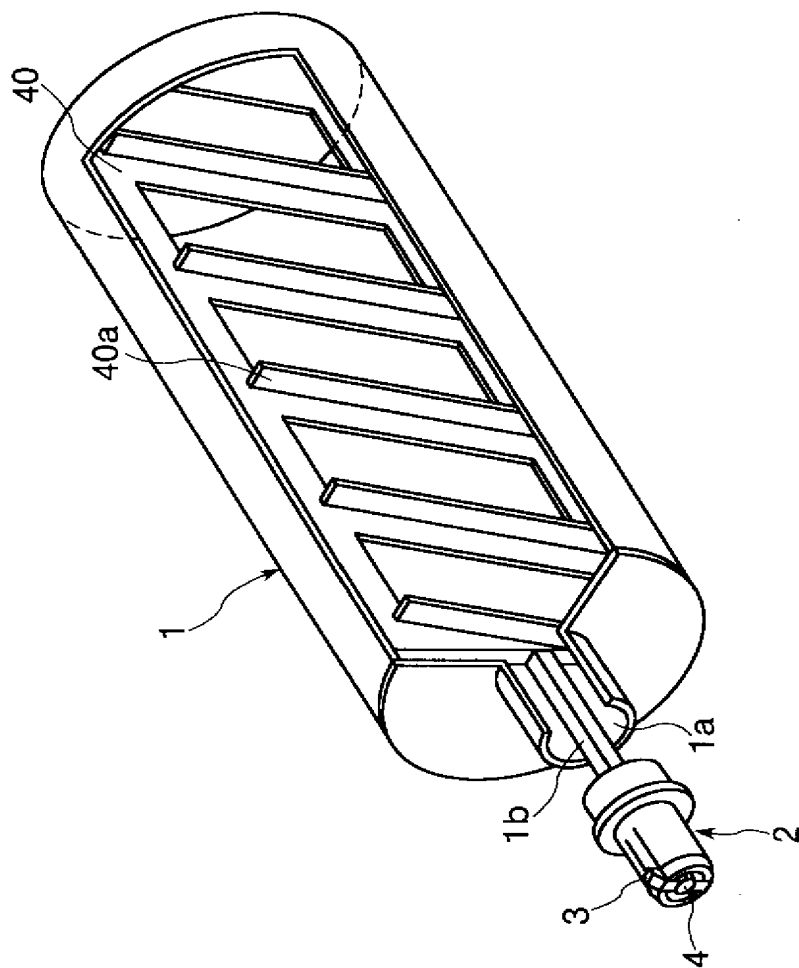
【図8】



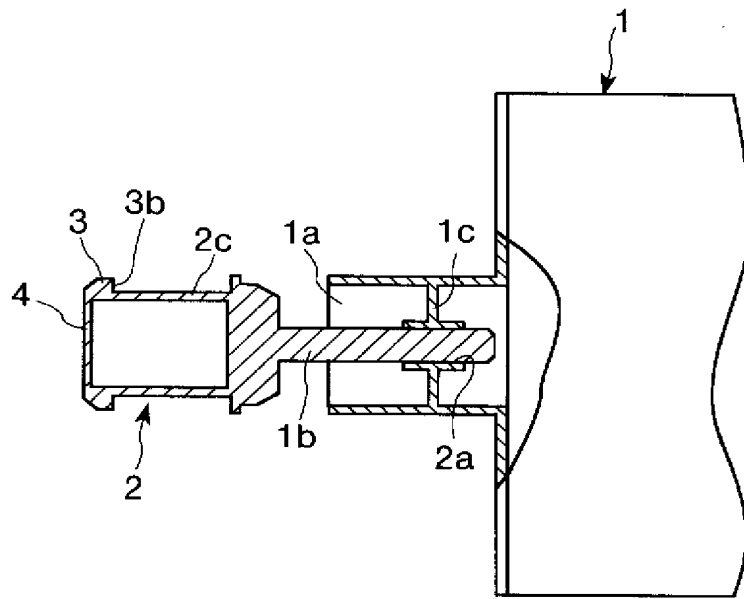
【図9】



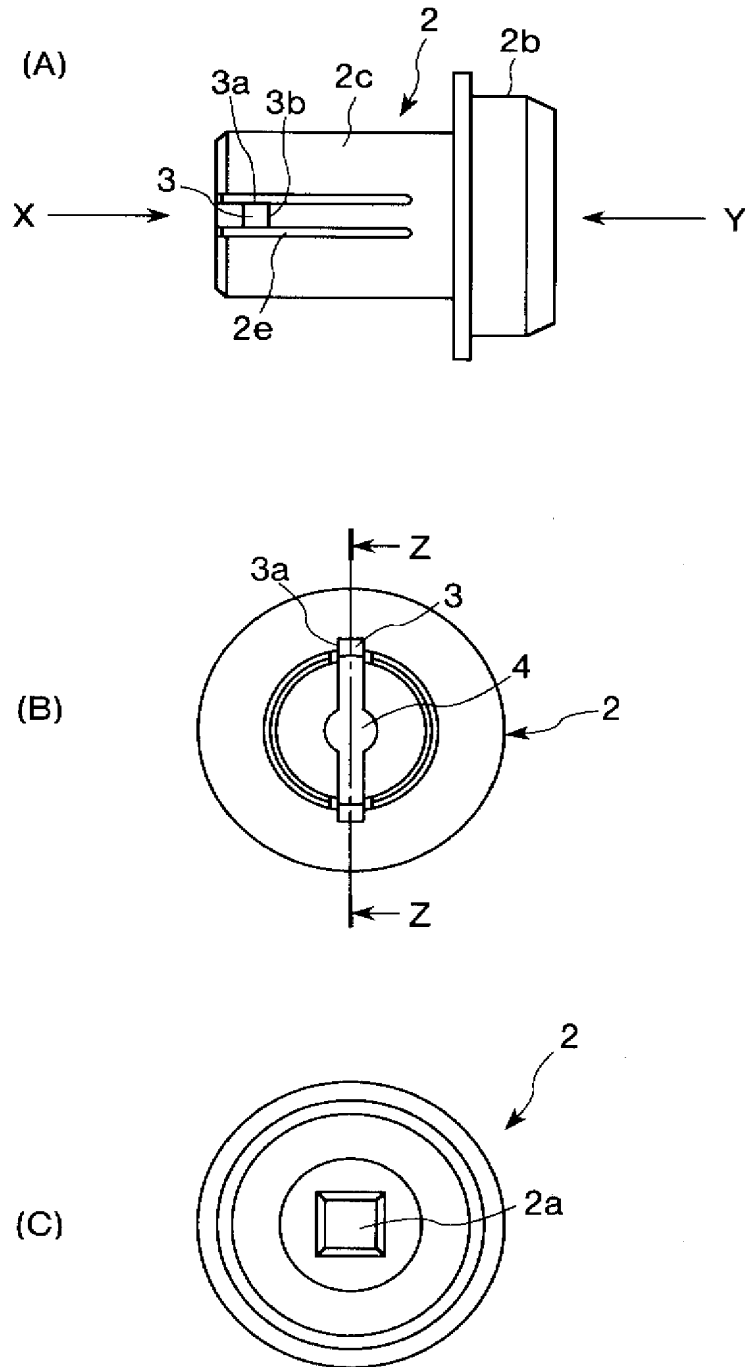
【図10】



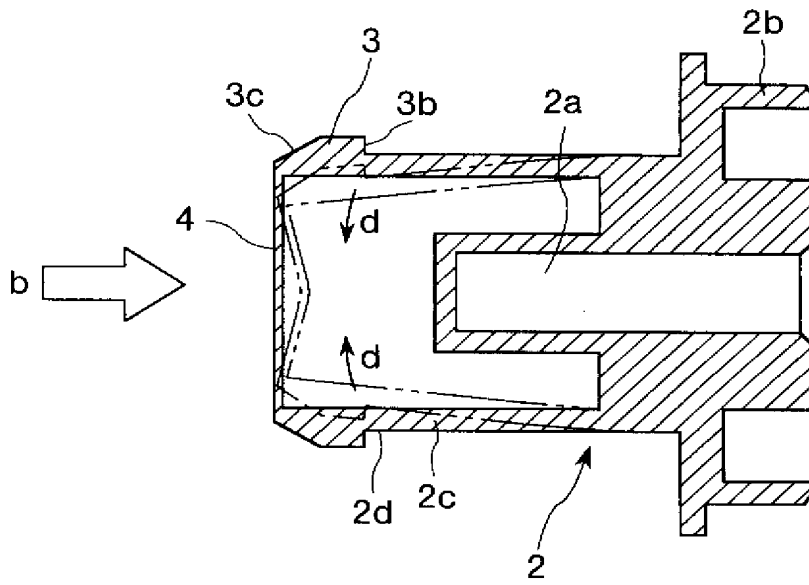
【図 1 1】



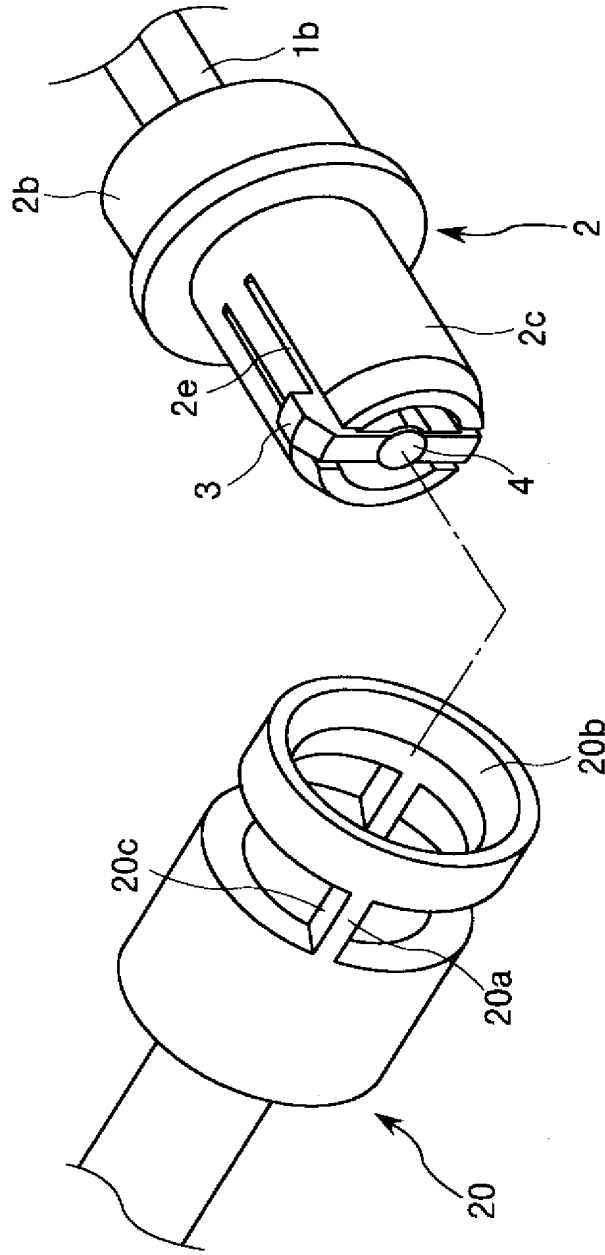
【図12】



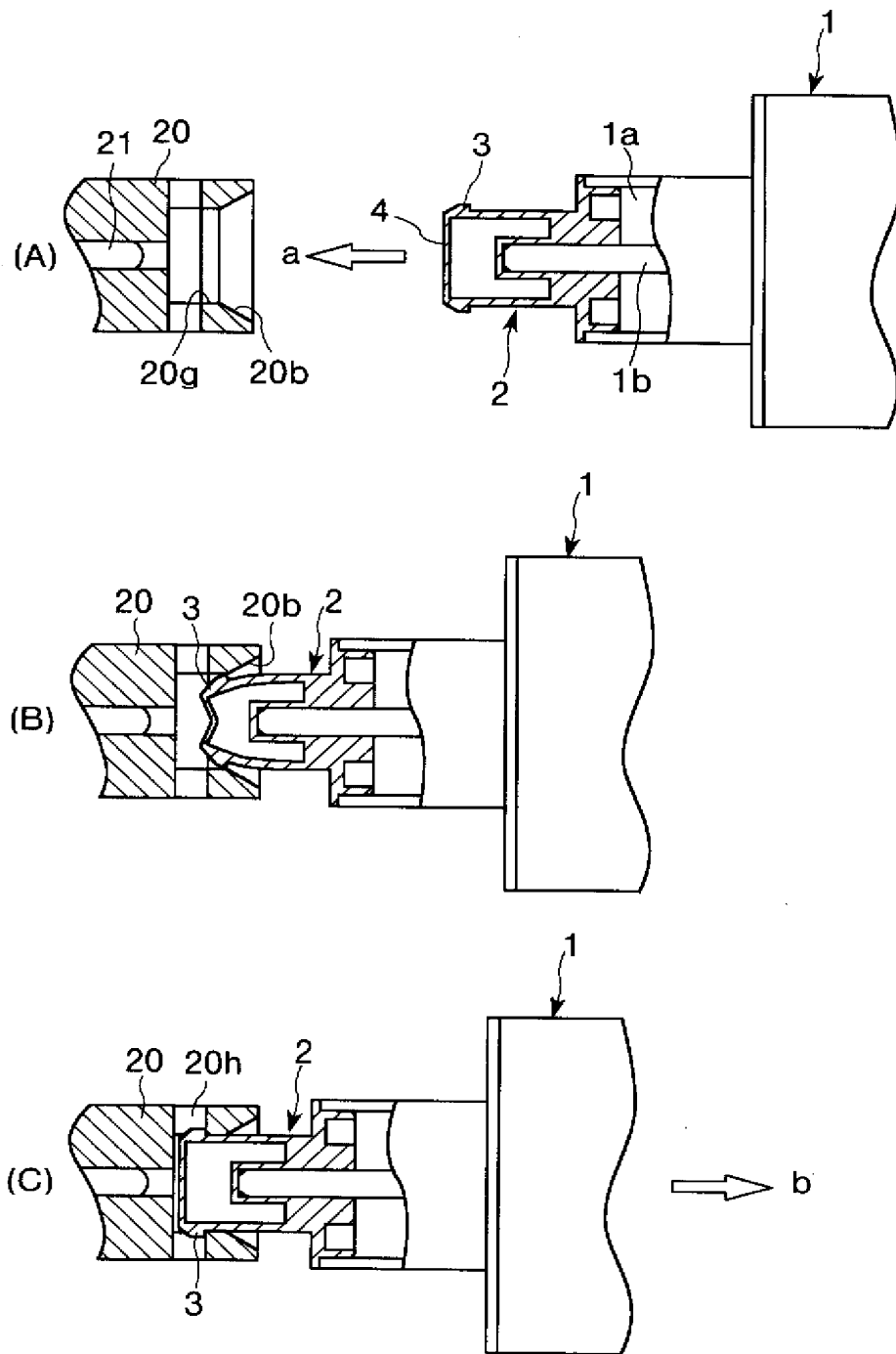
【図13】



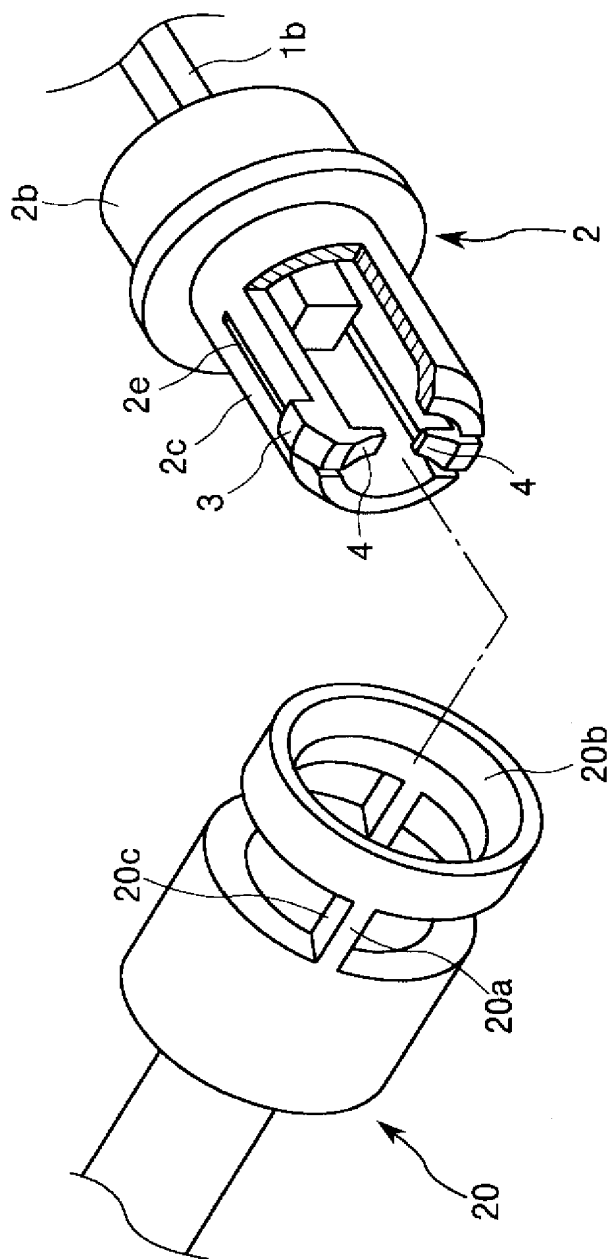
【図14】



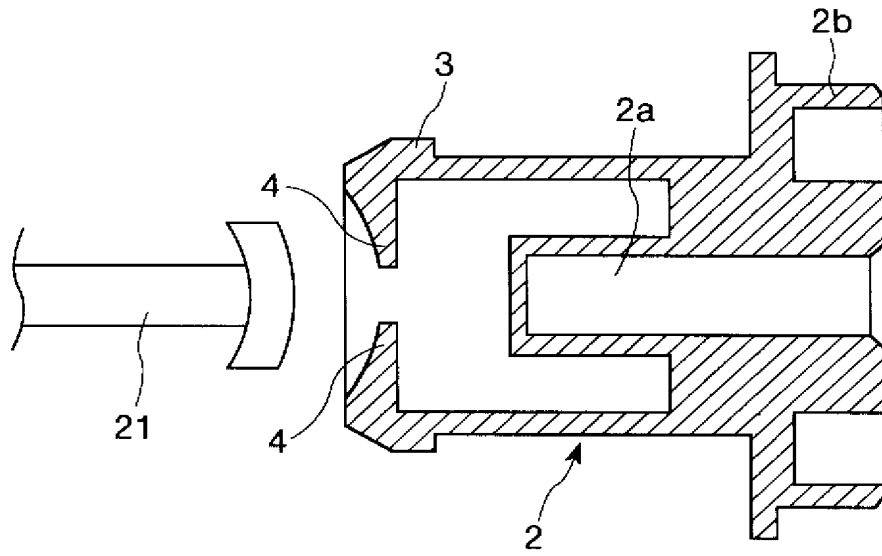
【図15】



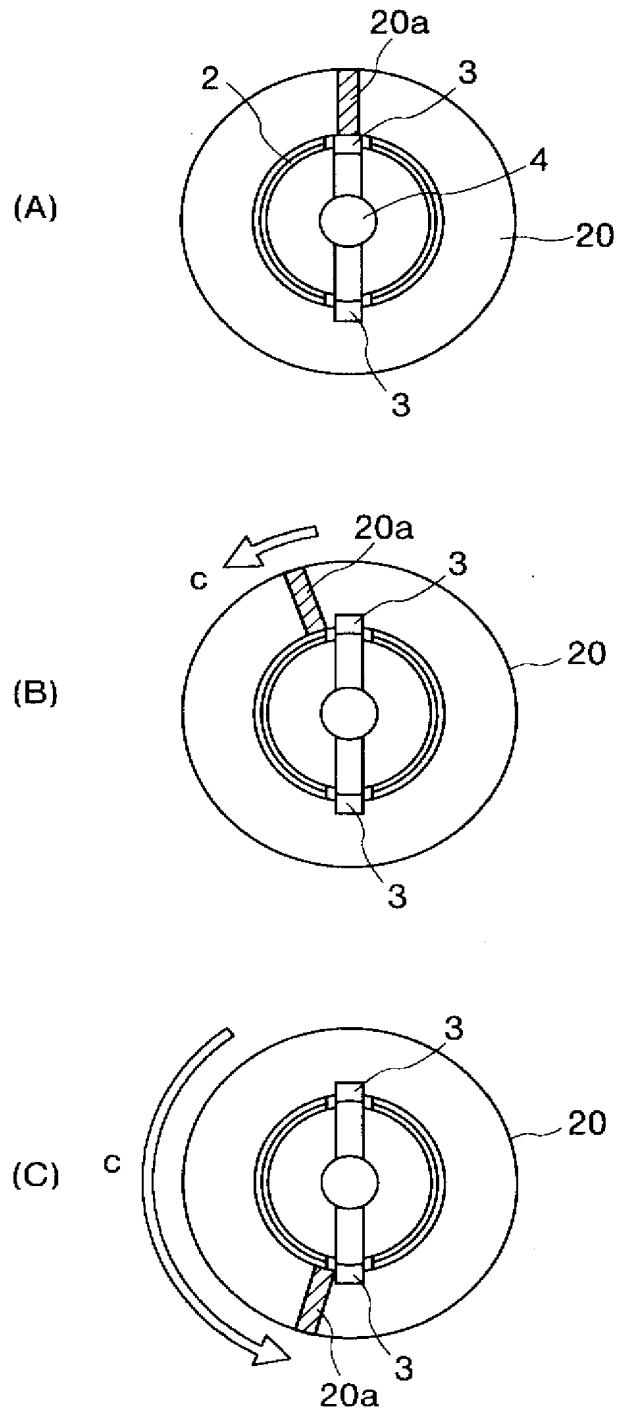
【図16】



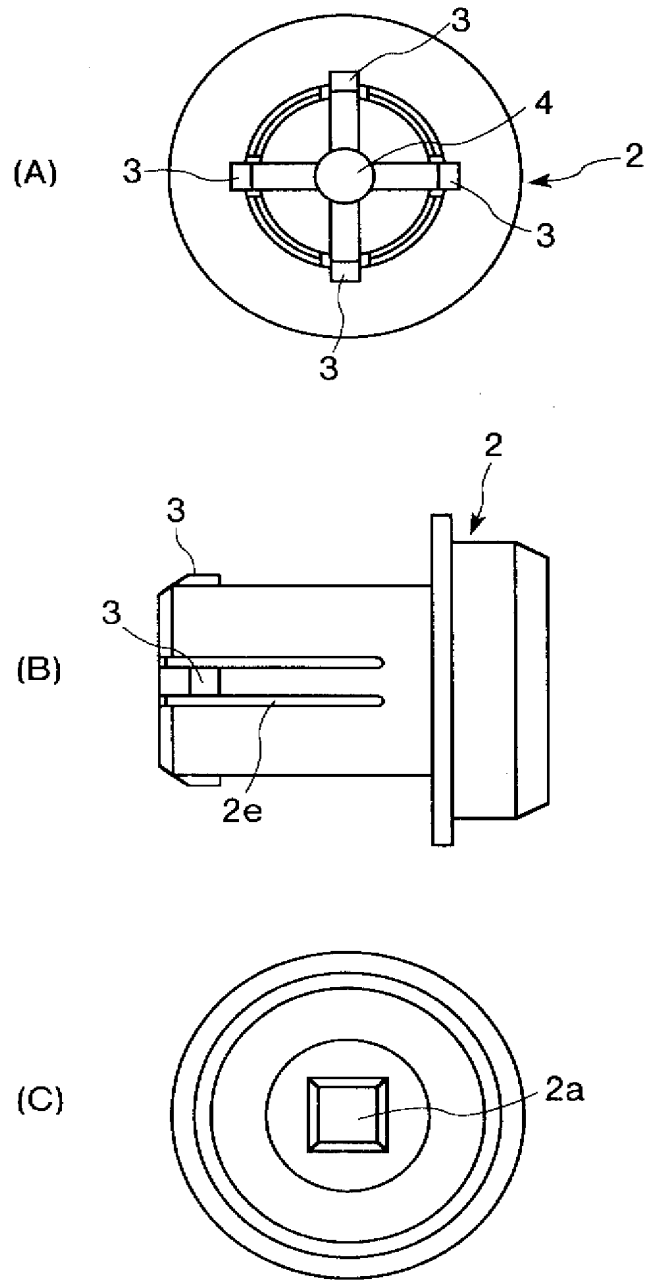
【図17】



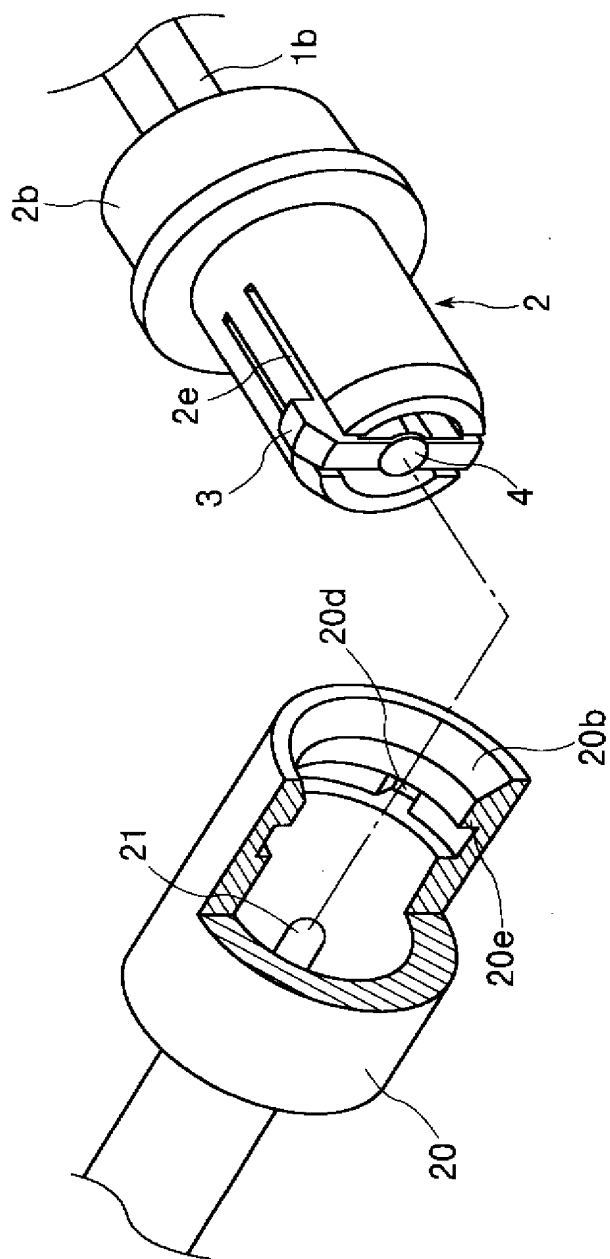
【図18】



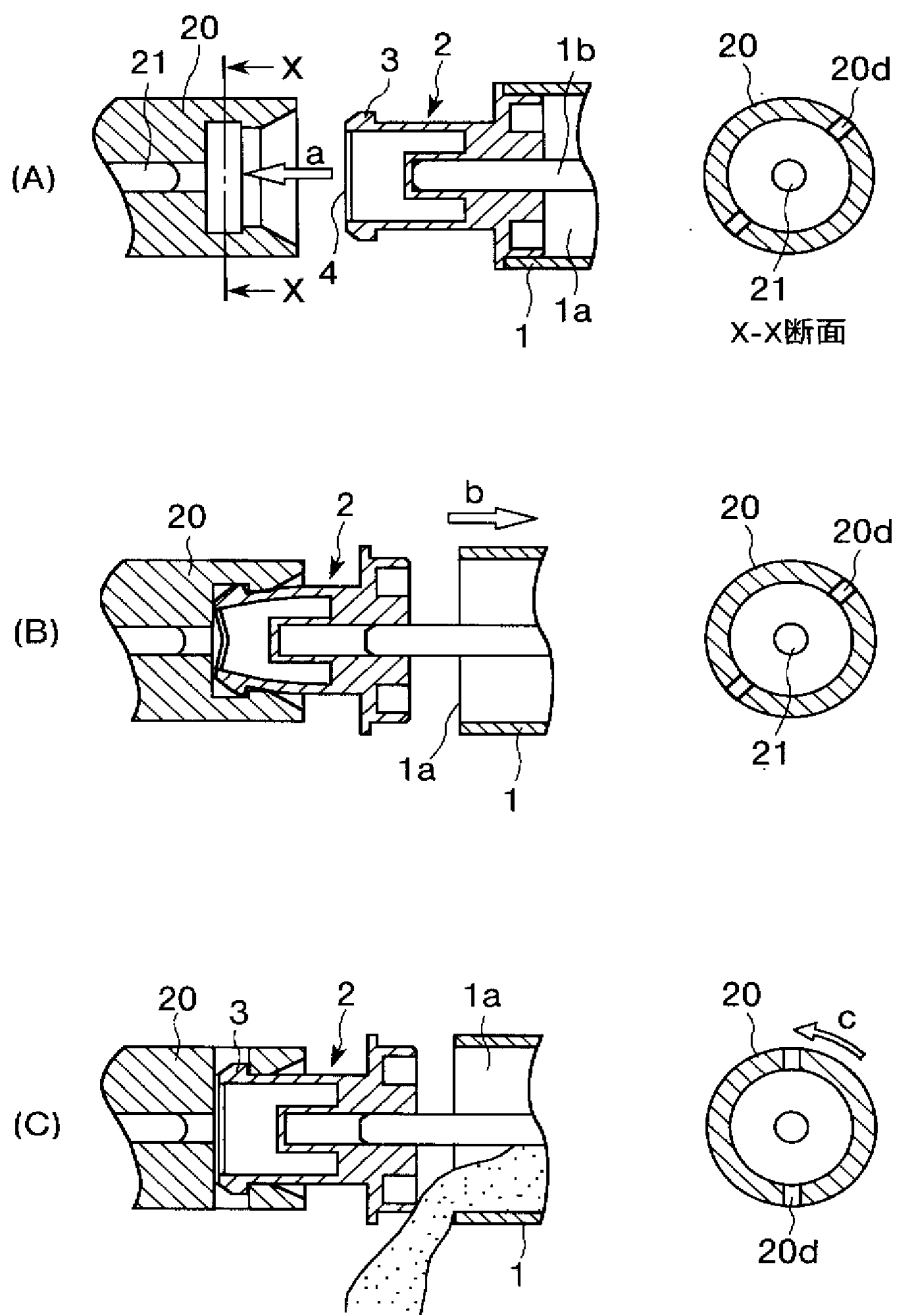
【図19】



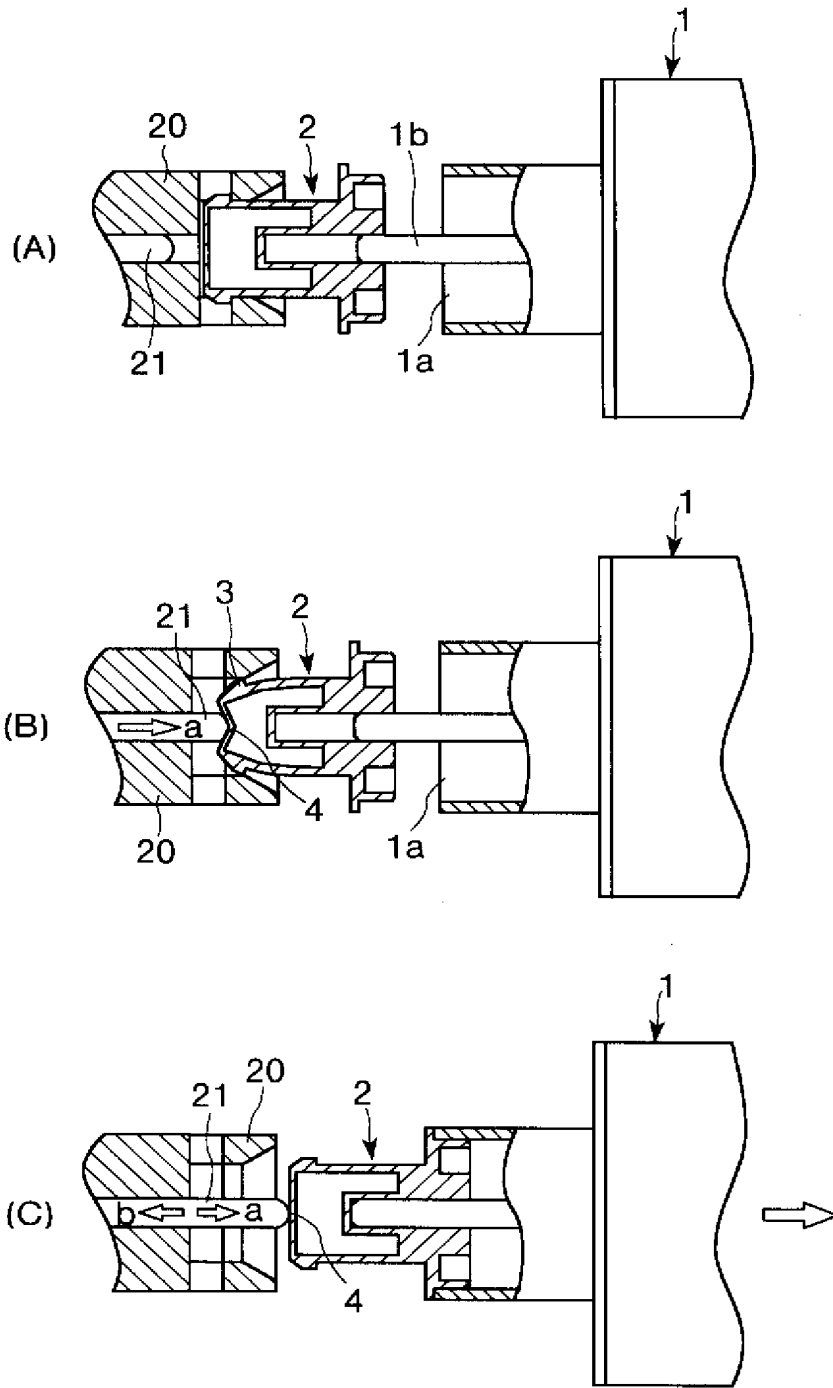
【図20】



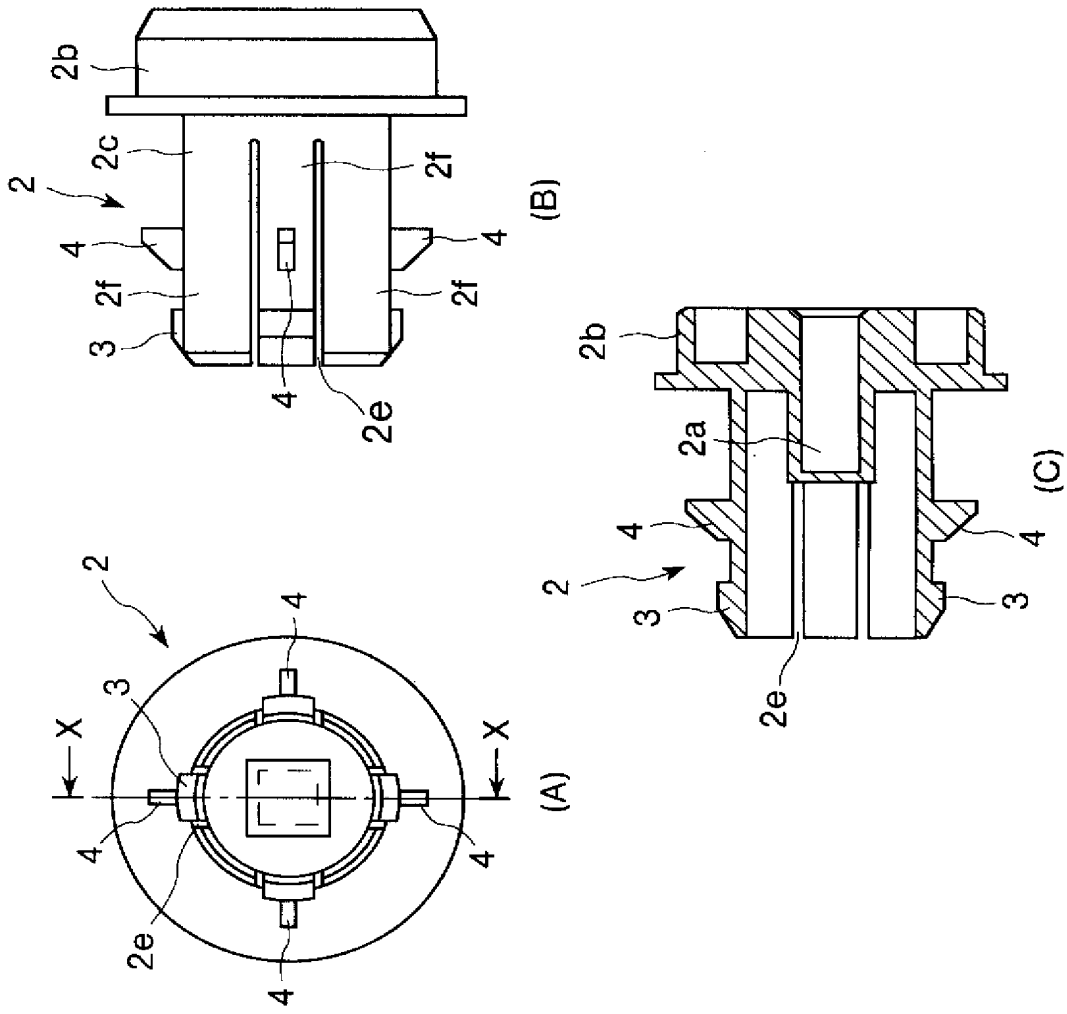
【図 2 1】



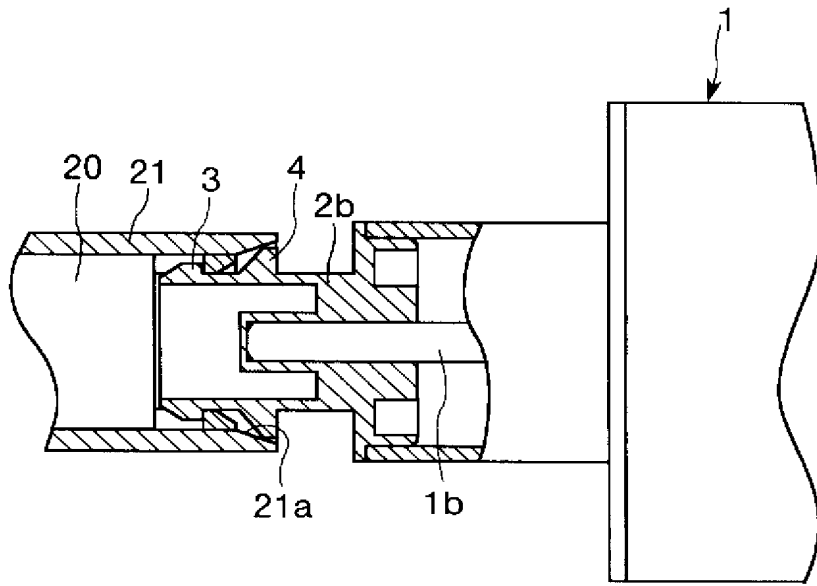
【図 2 2】



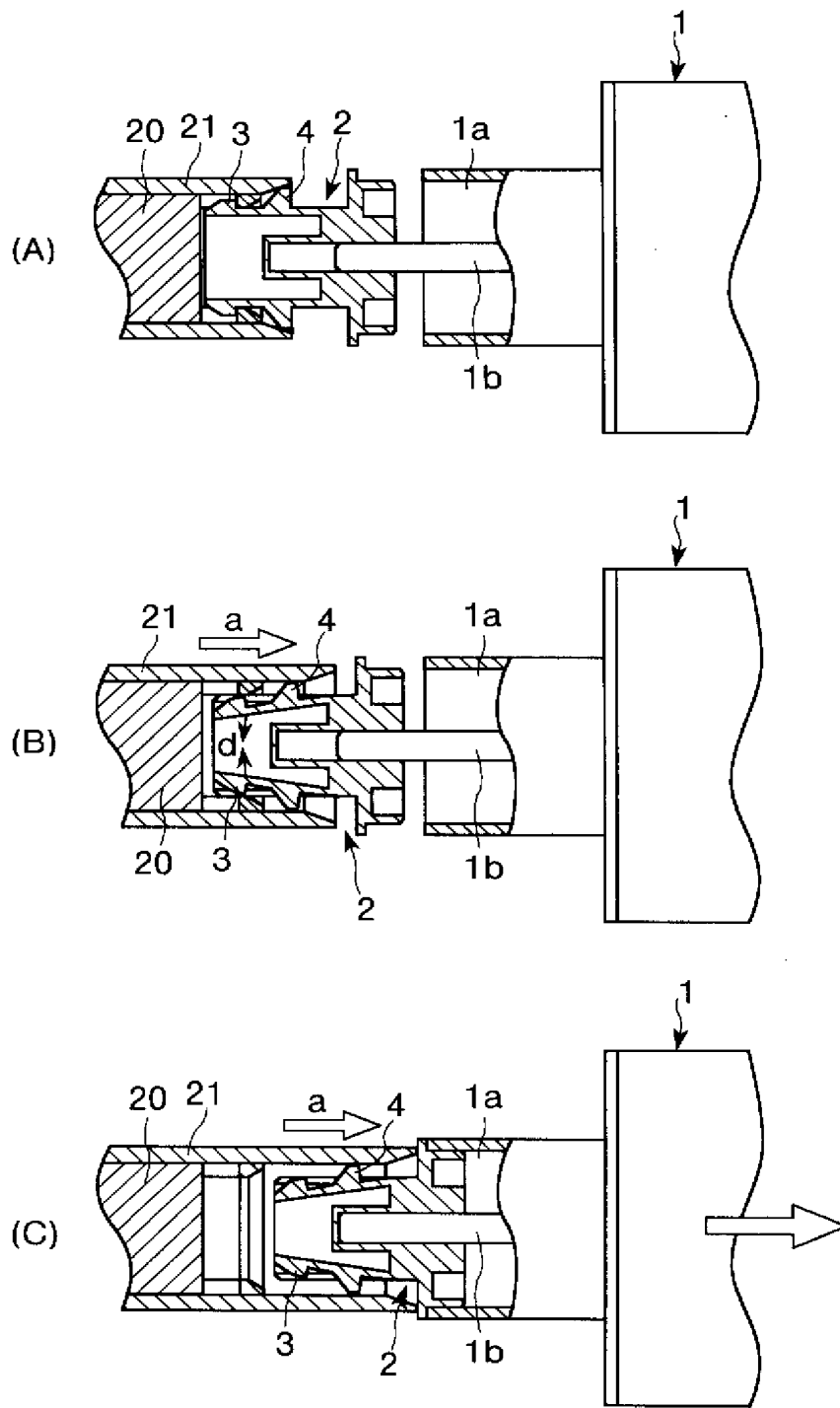
【図23】



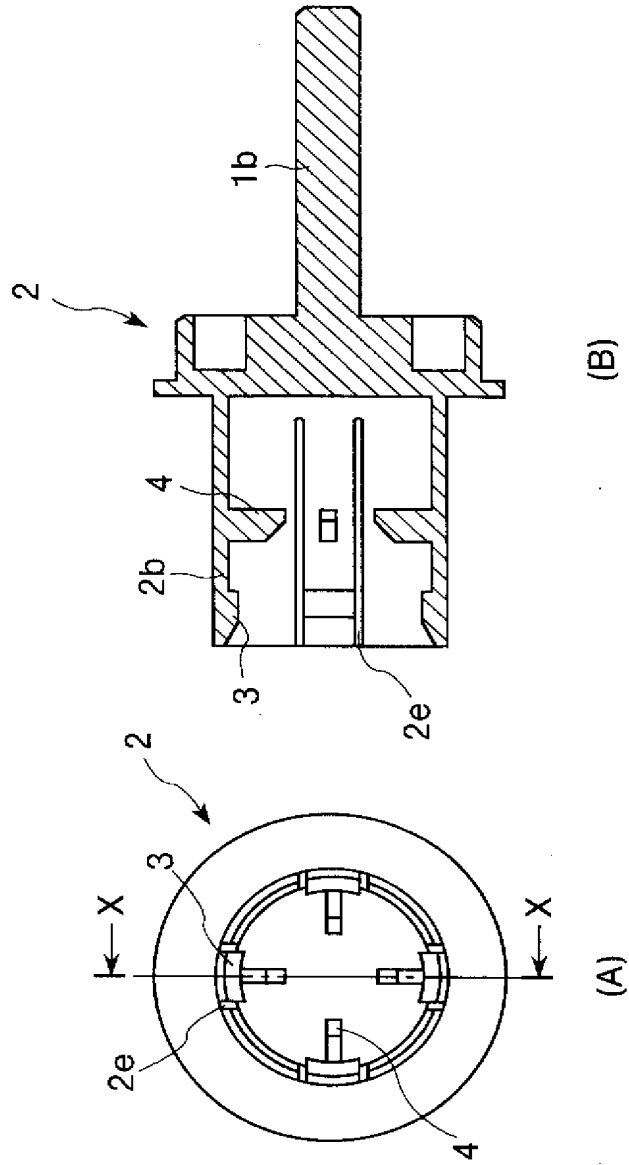
【図24】



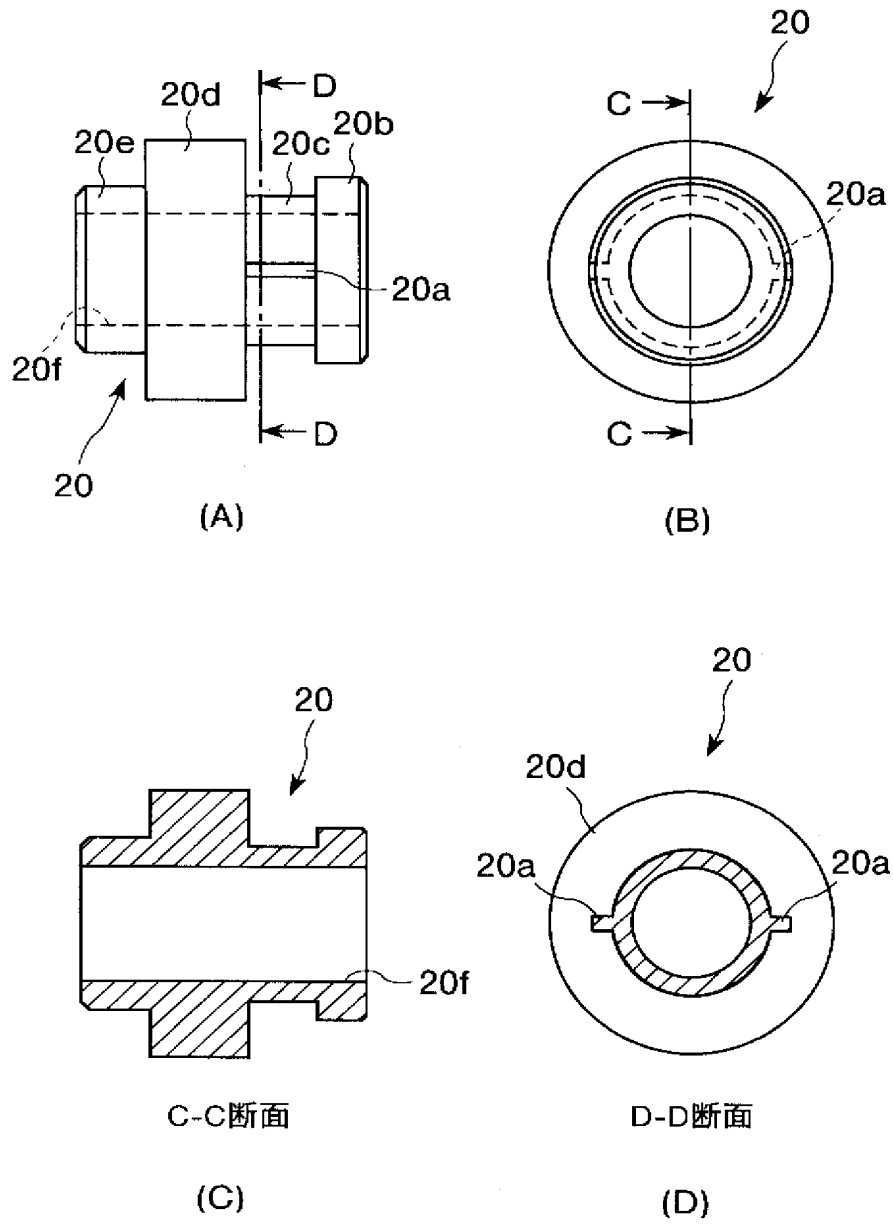
【図 25】



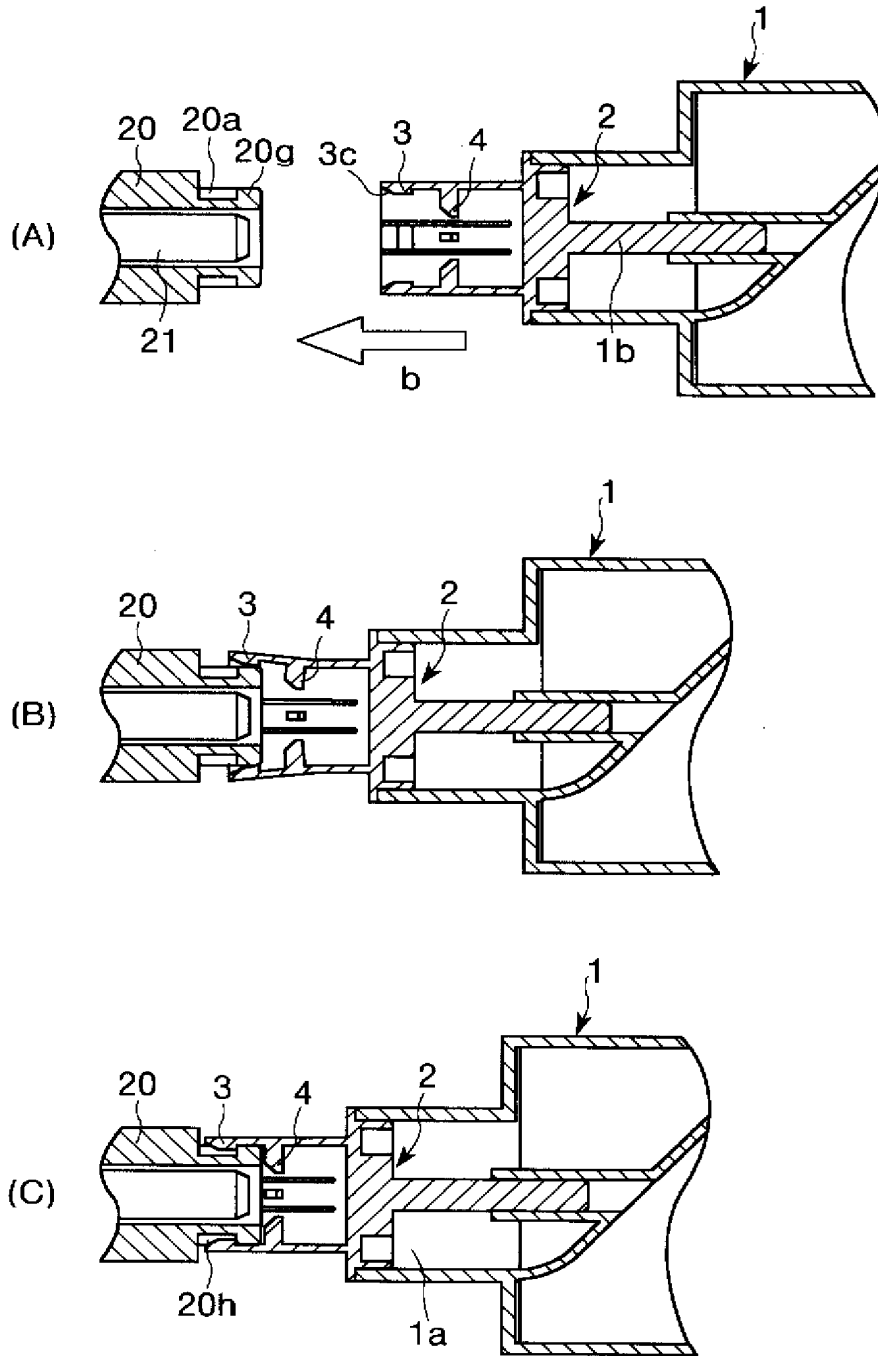
【図26】



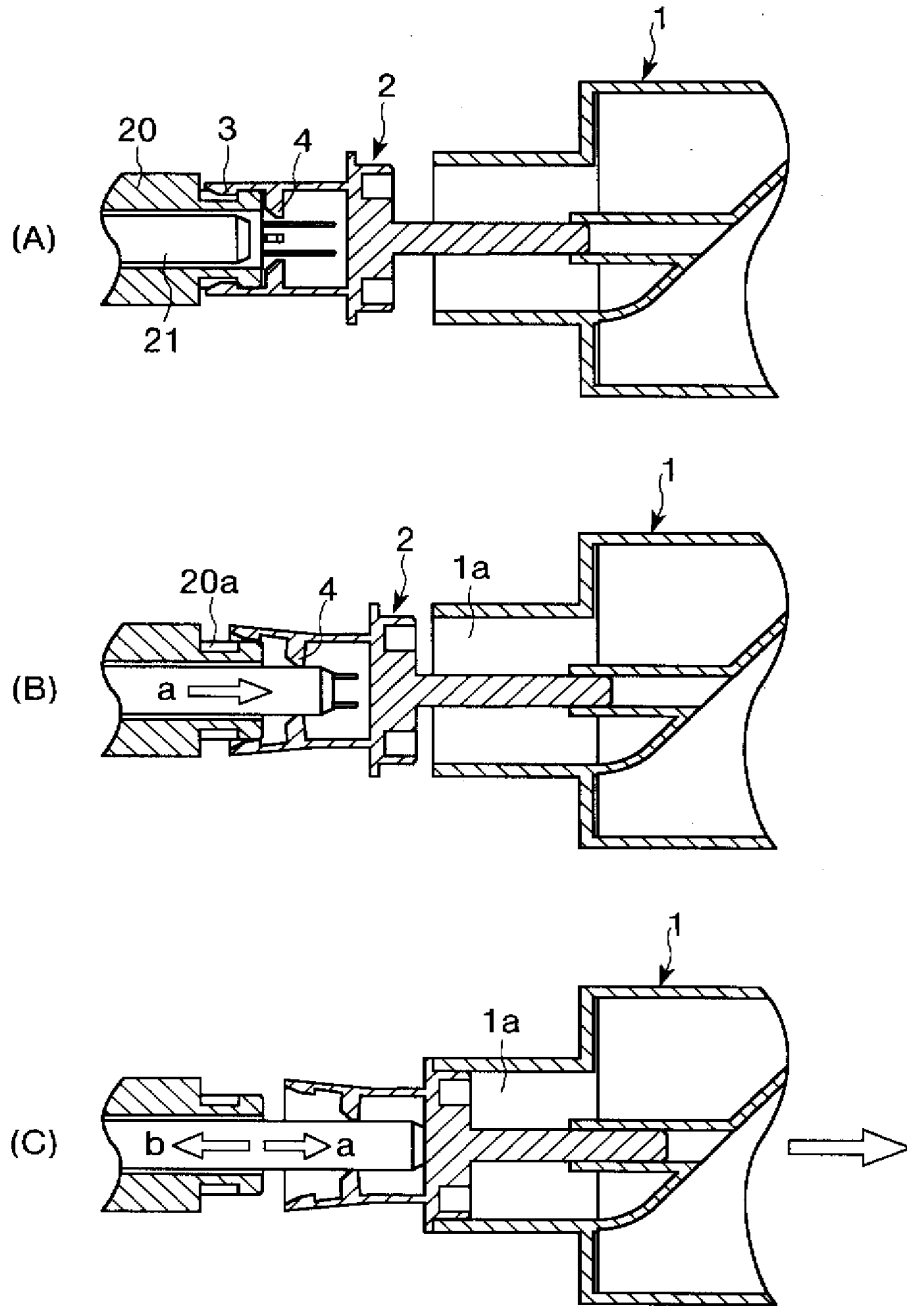
【図 27】



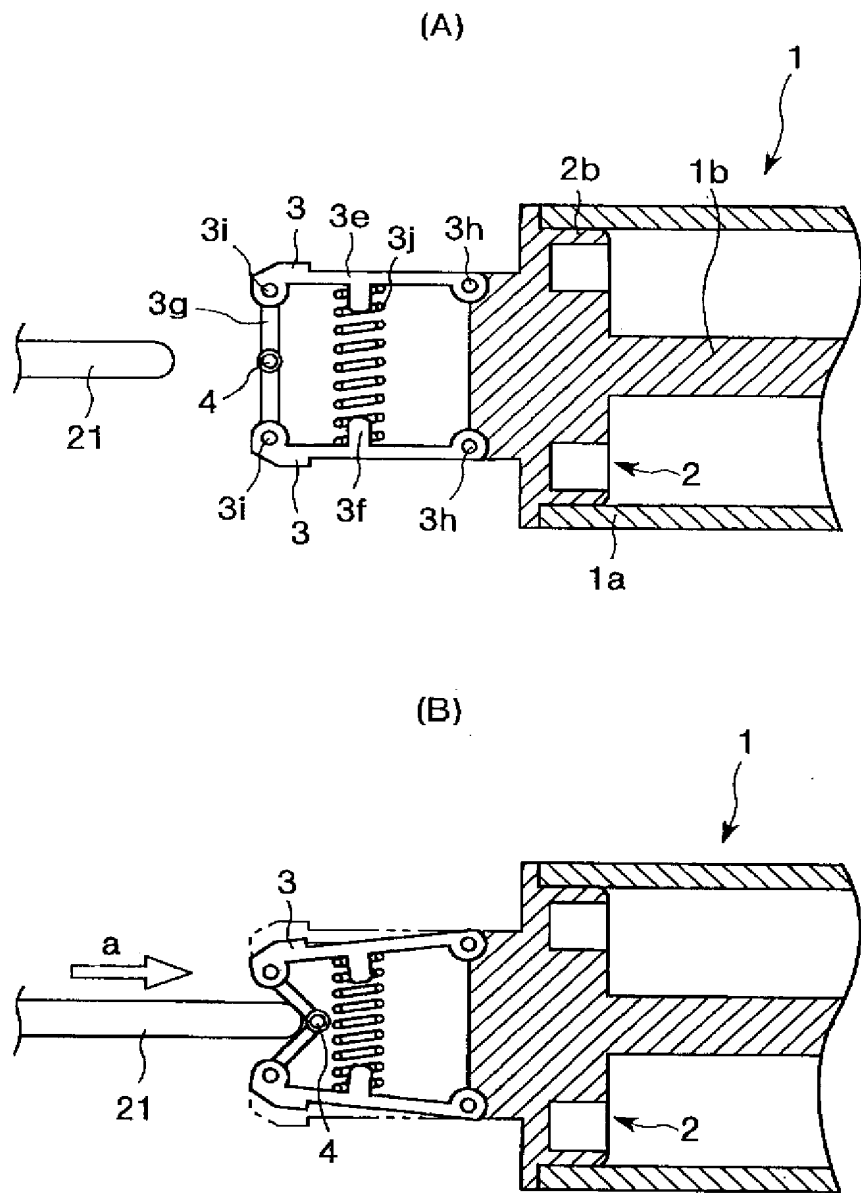
【図 28】



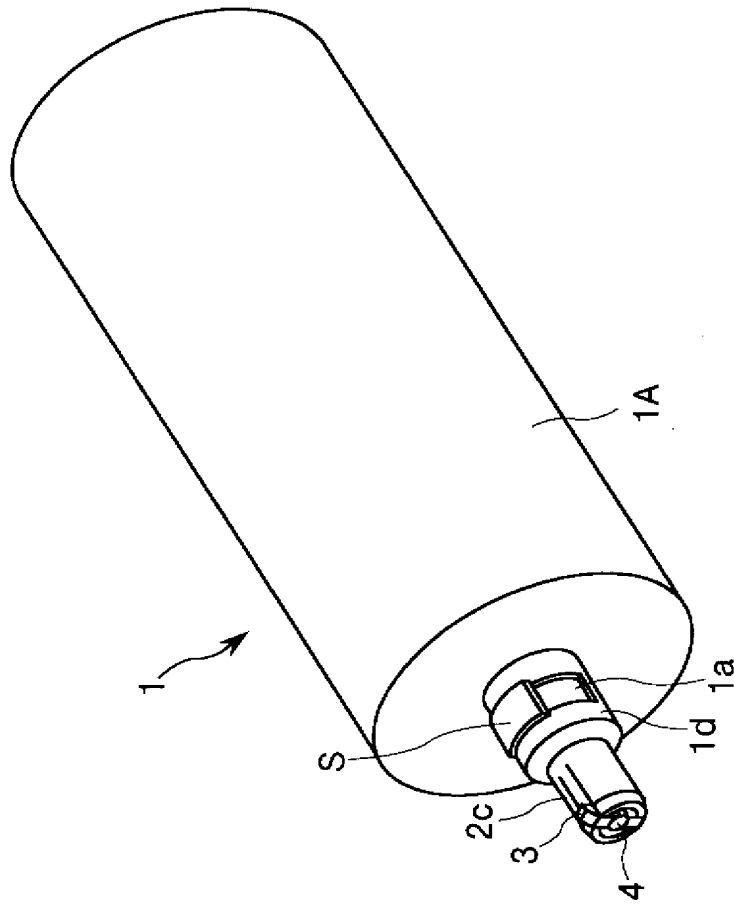
【図 29】



【図30】



【図 3 1】



【書類名】 要約書

【要約】

【課題】 ユーザーがトナーボトルの補給操作時にトナーボトルの回転方向の位置合わせを必要とせず、簡単な操作で確実に補給できるようにする。

【解決手段】 画像形成装置本体に着脱可能であって、画像形成装置本体へトナーを補給するためのトナー補給容器1は、画像形成装置本体に係止される係止部3と、係止部3が画像形成装置本体に係止された状態で画像形成装置本体から駆動力を受ける駆動力受け部3aと、係止部3を変位させて画像形成装置本体との係止を解除するために画像形成装置本体から解除力を受ける解除力受け部4と、を有する。

【選択図】 図7

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日 本 国 特 許 庁
JAPAN PATENT OFFICE

別紙添付の書類に記載されている事項は下記の出願書類に記載されている事項と同一であることを証明する。

This is to certify that the annexed is a true copy of the following application as filed with this Office.

出 願 年 月 日
Date of Application: 2001年 6月28日

出 願 番 号
Application Number: 特願2001-197546

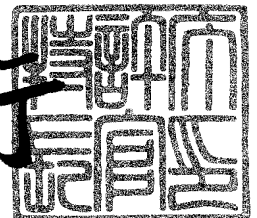
パリ条約による外国への出願
に用いる優先権の主張の基礎
となる出願の国コードと出願
番号

The country code and number
of your priority application,
to be used for filing abroad
under the Paris Convention, is
J P 2 0 0 1 - 1 9 7 5 4 6

出 願 人
Applicant(s): キヤノン株式会社

特許庁長官
Commissioner,
Japan Patent Office

2012年10月 2日
深野弘行



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【整理番号】 4460044

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【あて先】 特許庁長官殿

【国際特許分類】

G03G 15/08 112

【発明の名称】 駆動伝達機構、トナー補給容器及びトナー補給装置

【請求項の数】 17

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【手数料の表示】

【予納台帳番号】 009128

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【物件名】 明細書 1

【物件名】 図面 1

【物件名】 要約書 1

【包括委任状番号】 9703884

【プルーフの要否】 要

【書類名】 明細書

【発明の名称】 駆動伝達機構、トナー補給容器及びトナー補給装置

【特許請求の範囲】

【請求項 1】 回転駆動発生側の駆動伝達部材と、前記駆動伝達部材と回転軸線方向に着脱自在とされ、前記駆動伝達部材からの回転駆動を受ける駆動受け部材と、を有する回転駆動を伝達する駆動伝達機構において、

前記駆動伝達部材及び前記駆動受け部材のいずれか一方の部材である第 1 部材は、回転軸線方向と交差する方向に変位可能な爪状の係合突起部を有しており、

前記係合突起部は、前記駆動伝達部材及び前記駆動受け部材の他方の部材である第 2 部材によって変位されながら前記第 2 部材と接近し、所定位置まで接近すると変位が復帰することで、前記第 2 部材と回転軸線に沿って離間する方向に係止されると共に、前記第 2 部材と回転方向に係合され、

前記第 2 部材は、前記係合突起部を変位させる変位部と、前記係合突起部を回転軸線に沿って離間する方向に係止する軸線方向係止部と、前記係合突起部と回転方向に係合する回転方向係合部とを有し、

前記係合突起部は、前記回転方向係合部の数よりも少なくとも一つ以上は多く設けたことを特徴とする駆動伝達機構。

【請求項 2】 回転駆動発生側の駆動伝達部材と、前記駆動伝達部材と回転軸線方向に着脱自在とされ、前記駆動伝達部材からの回転駆動を受ける駆動受け部材と、を有する回転駆動を伝達する駆動伝達機構において、

前記駆動伝達部材と前記駆動受け部材のいずれか一方の部材である第 1 部材は、回転軸線方向と交差する方向に変位可能な爪状の係合突起部を有しており、

前記係合突起部は、前記駆動伝達部材及び前記駆動受け部材の他方の部材である第 2 部材によって変位されながら前記第 2 部材と接近し、所定位置まで接近すると変位が復帰することで、前記第 2 部材と回転軸線に沿って離間する方向に係止されると共に、前記第 2 部材と回転方向に係合され、

前記第 2 部材は、前記係合突起部を変位させる変位部と、前記係合突起部を回転軸線に沿って離間する方向に係止する軸線方向係止部と、前記係合突起部と回転方向に係合する回転方向係合部とを有し、

前記係合突起部と前記回転方向係合部はそれぞれ複数設けてあり、複数の前記係合突起部の角度配置と複数の前記回転方向係合部の角度配置が異なることを特徴とする駆動伝達機構。

【請求項 3】 前記駆動伝達部材に前記回転方向係合部を設け、前記駆動受け部材に前記係合突起部を設けたことを特徴とする請求項 1 又は 2 に記載の駆動伝達機構。

【請求項 4】 前記係合突起部は、弾性変形可能な弾性部材であることを特徴とする請求項 1、2 又は 3 に記載の駆動伝達機構。

【請求項 5】 前記係合突起部の材質は、直鎖状ポリアミド系樹脂、ポリプロピレン系樹脂、ポリエチレン系樹脂、ポリエステル系樹脂、ABS樹脂、HIP樹脂のいずれかであることを特徴とする請求項 1～4 のいずれかの項に記載の駆動伝達機構。

【請求項 6】 画像形成装置本体に着脱可能なトナー補給容器と、前記トナー補給容器から前記画像形成装置本体へトナーを補給するためのトナー補給機構とを備えたトナー補給装置において、

前記トナー補給機構は、請求項 1～5 のいずれかの項に記載の駆動伝達機構を備え、前記画像形成装置本体側の回転駆動を前記トナー補給容器に伝達することを特徴とするトナー補給装置。

【請求項 7】 前記駆動受け部材は、前記トナー補給容器の開口を封止する封止部材に設けていることを特徴とする請求項 6 に記載のトナー補給装置。

【請求項 8】 前記封止部材は、前記トナー補給容器と回転方向には互いに係止され、軸線方向には互いに移動自在であり、前記開口部を開口した状態においても、前記トナー補給容器と回転方向に係合した状態を保つことを特徴とする請求項 6 又は 7 に記載のトナー補給装置。

【請求項 9】 前記トナー補給容器は、前記封止部材が前記画像形成装置本体に係止され、画像形成装置本体からの作用により前記封止部材が引き抜かれることで、前記開口部が開封されることを特徴とする請求項 6、7 又は 8 に記載のトナー補給装置。

【請求項 10】 前記トナー補給容器は、前記封止部材が前記画像形成装置

本体に係止され、画像形成装置本体からの作用により前記トナー補給容器が移動することによって、前記開口部が開封されることを特徴とする請求項6、7又は8に記載のトナー補給装置。

【請求項11】 前記トナー補給容器は略円筒形状であって、前記駆動受け部材から伝達された回転駆動力によって回転することでトナーを搬送・排出するように構成されていることを特徴とする請求項6～10のいずれかの項に記載のトナー補給装置。

【請求項12】 画像形成装置本体に着脱可能であって、請求項1～5のいずれかの項に記載の駆動伝達機構により前記画像形成装置本体からの回転駆動を受けることによって前記画像形成装置本体へトナーを補給するためのトナー補給容器において、

前記駆動伝達機構の前記駆動受け部材を前記トナー補給容器側に設けることを特徴とするトナー補給容器。

【請求項13】 前記駆動受け部材は、前記トナー補給容器の開口を封止する封止部材に設けていることを特徴とする請求項12に記載のトナー補給容器。

【請求項14】 前記封止部材は、前記トナー補給容器と回転方向には互いに係止され、軸線方向には互いに移動自在であり、前記開口部を開口した状態においても、前記トナー補給容器と回転方向に係合した状態を保つことを特徴とする請求項12又は13に記載のトナー補給容器。

【請求項15】 前記トナー補給容器は、前記封止部材が前記画像形成装置本体に係止され、前記画像形成装置本体からの作用により封止部材が引き抜かれることで、前記開口部が開封されることを特徴とする請求項12、13又は14に記載のトナー補給容器。

【請求項16】 前記トナー補給容器は、前記封止部材が前記電子写真画像形成装置本体に係止され、前記画像形成装置本体からの作用により前記トナー補給容器が移動することによって前記開口部が開封されることを特徴とする請求項12、13又は14に記載のトナー補給容器。

【請求項17】 前記トナー補給容器は略円筒形状であって、前記駆動受け部材から伝達された回転駆動力によって回転することでトナーを搬送・排出する

ように構成されていることを特徴とする請求項12～16のいずれかの項に記載のトナー補給容器。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】

本発明は、例えば電子写真画像形成装置などとされる画像形成装置の本体に着脱可能なトナー補給容器及びトナー補給装置、更には、画像形成装置本体からの駆動力をトナー補給容器或いは感光体ドラムなどに伝達するための駆動伝達機構に関する。

【0002】

ここで電子写真画像形成装置とは、電子写真画像形成方式を用いて記録媒体に画像を形成するものである。そして、電子写真画像形成装置としては、例えば電子写真複写機、電子写真プリンタ（例えばレーザービームプリンタ、LEDプリンタなど）、ファクシミリ装置及びワードプロセッサ等が含まれる。

【0003】

【従来の技術】

従来、電子写真複写機やプリンタ等の電子写真画像形成装置には現像剤としての微粉末のトナーが使用されている。そして、電子写真画像形成装置本体のトナーが消費された場合には、トナー供給容器（トナー補給容器）を用いて画像形成装置本体へトナーを補給することが行われている。

【0004】

トナーは極めて微細な粉末であるため、トナー補給作業時には、トナーが飛散しないようにトナー補給容器を画像形成装置本体内の内部に据え置いて、小さな開口部から少量ずつトナーを排出する方式が知られている。

【0005】

これらの上述したトナー補給容器は、いずれの場合も画像形成装置本体側から、何らかの駆動を受けて、トナー補給容器側の搬送部材や容器本体を駆動させることで、トナーを排出させる構成になっている。こうした駆動伝達手段としては幾つかの方法があり、例えば実開平05-75768号公報に記載されているよ

うに、トナー補給容器としてのトナーボトルの外周面にギア部を設け、このギアに駆動源に連結された回転する駆動ギアを噛み合わせてトナーボトルを回転駆動させる構成がある。

【0006】

又、特開平10-63084号公報に記載されているような、トナーボトルの端面に回転駆動用の突起を設け、この突起を画像形成装置本体からの駆動部に設けた凹み部に係合させて、駆動を伝達する構成等がある。

【0007】

又、その他の例としては特開平10-63076号公報に開示されているような方法もある。これは画像形成装置本体の回転力伝達部の内径に複数の係合溝を設け、一方、トナー容器側にはその係合溝に係合するような突起が設けてあり、それらを係合させて回転駆動を伝達する構成となっている。

【0008】

このように、トナー補給容器を駆動させる方法として、種々の駆動伝達方法が提案されている。

【0009】

【発明が解決しようとする課題】

しかしながら、上記従来例では幾つかの技術的課題があった。

【0010】

実開平5-75768号公報に記載の方法の場合はトナーボトルを画像形成装置本体に挿入セットする際、トナーボトルの外周面に設けたギア部と画像形成装置本体内の駆動ギア部とをうまく噛み合わせる必要があり、この作業はユーザー自身が注意して挿入する必要があり、そのためユーザーに補給操作性における負担を強いることとなっていた。又、ギアとギアの噛み合わせによりトナーボトルを回転させるため、トナーボトルは回転モーメントにより、軸直角方向にずれようとする力を受け、このため、トナーボトルが浮き上がったり、横ずれして正常な回転ができなくなるおそれがある。このようなずれを防止するために、トナーボトルの周囲を全部包囲して支持する必要があるが、そのようにすると今度はトナーボトルの着脱操作を簡単に行うことができなくなると同時に補給システム自

体の構成が複雑化し、コストアップにつながる。

【0011】

又、特開平10-63084号公報や特開平10-63076号公報記載の方法の場合は、トナーボトル端面の突起（又は凹み部）を本体駆動部の凹み部（又は突起）に係合するようにトナーボトルを挿入する際に、トナーボトルの回転方向の位置合わせが必要となり、これをユーザー自ら行うことは補給操作性の低下を招くとともに、わずかな位置ずれにより、駆動が的確に伝達されない状態になる場合がある。

【0012】

このような係合不良を防止するために常にトナーボトル挿入時の回転方向の位置が決まるようにトナーボトル外面にガイドリブを設けたり、又、それに対応して本体駆動部の係合凹み部が常に所定の回転位置で停止するように回転動作を制御する必要があり、いずれも補給システムの構成の複雑化・コストアップ要因となる。

【0013】

又、こうした凹凸の係合によるカップリング駆動伝達の多くは、トナーボトルと本体駆動部の位相がズレて挿入された場合、本体駆動部をばねで退避させて、位相が合うと係合位置に戻るような構成とされる。このような構成では、トナーボトルを挿入した時にボトルの位相がずれていても、本体駆動部が退避するため、そのうちボトルを回転させると位相が合って、係合することが可能になるが、本体駆動部の構成が複雑化することと、本体駆動部を奥側に退避させるため、余計なスペースを必要とすることから、装置本体のコンパクト化といった観点からも好ましくない。

【0014】

本発明は、前述した従来のトナー補給容器を更に発展させたものである。

【0015】

本発明の目的は、トナー補給容器によるトナー補給操作時にトナー補給容器の回転方向の位置合わせを必要とせず、簡単な操作で確実に補給できる駆動伝達機構、トナー補給容器及びトナー補給装置を提供することである。

【0016】

本発明の他の目的は、回転軸線を中心とする回転、揺動、反転といった駆動を伝達するための駆動伝達機構を提供することである。

【0017】

【課題を解決するための手段】

上記目的は本発明に係る駆動伝達機構、トナー補給容器及びトナー補給装置にて達成される。要約すれば、第1の本発明によると、回転駆動発生側の駆動伝達部材と、前記駆動伝達部材と回転軸線方向に着脱自在とされ、前記駆動伝達部材からの回転駆動を受ける駆動受け部材と、を有する回転駆動を伝達する駆動伝達機構において、

前記駆動伝達部材及び前記駆動受け部材のいずれか一方の部材である第1部材は、回転軸線方向と交差する方向に変位可能な爪状の係合突起部を有しており、

前記係合突起部は、前記駆動伝達部材及び前記駆動受け部材の他方の部材である第2部材によって変位されながら前記第2部材と接近し、所定位置まで接近すると変位が復帰することで、前記第2部材と回転軸線に沿って離間する方向に係止されると共に、前記第2部材と回転方向に係合され、

前記第2部材は、前記係合突起部を変位させる変位部と、前記係合突起部を回転軸線に沿って離間する方向に係止する軸線方向係止部と、前記係合突起部と回転方向に係合する回転方向係合部とを有し、

前記係合突起部は、前記回転方向係合部の数よりも少なくとも一つ以上は多く設けたことを特徴とする駆動伝達機構である。本発明によると、万が一、係合突起部と回転方向係合部との位相が重なった場合でも、常に係合突起部の数が多いために確実に駆動受け部材が駆動伝達部材に係止することができる。

【0018】

第2の本発明によると、回転駆動発生側の駆動伝達部材と、前記駆動伝達部材と回転軸線方向に着脱自在とされ、前記駆動伝達部材からの回転駆動を受ける駆動受け部材と、を有する回転駆動を伝達する駆動伝達機構において、

前記駆動伝達部材と前記駆動受け部材のいずれか一方の部材である第1部材は、回転軸線方向と交差する方向に変位可能な爪状の係合突起部を有しており、

前記係合突起部は、前記駆動伝達部材及び前記駆動受け部材の他方の部材である第2部材によって変位されながら前記第2部材と接近し、所定位置まで接近すると変位が復帰することで、前記第2部材と回転軸線に沿って離間する方向に係止されると共に、前記第2部材と回転方向に係合され、

前記第2部材は、前記係合突起部を変位させる変位部と、前記係合突起部を回転軸線に沿って離間する方向に係止する軸線方向係止部と、前記係合突起部と回転方向に係合する回転方向係合部とを有し、

前記係合突起部と前記回転方向係合部はそれぞれ複数設けてあり、複数の前記係合突起部の角度配置と複数の前記回転方向係合部の角度配置が異なることを特徴とする駆動伝達機構が提供される。本発明によると、万が一、係合突起部と回転方向係合部との一部の位相が重なった場合でも、他の部分の位相が異なるために確実に駆動受け部材が駆動伝達部材に係止することができる。

【0019】

上記本発明の一実施態様によると、前記駆動伝達部材に前記回転方向係合部を設け、前記駆動受け部材に前記係合突起部を設ける。他の実施態様によると、前記係合突起部は、弾性変形可能な弾性部材であり、又、前記係合突起部の材質は、直鎖状ポリアミド系樹脂、ポリプロピレン系樹脂、ポリエチレン系樹脂、ポリエステル系樹脂、ABS樹脂、HIPS樹脂のいずれかである。この構成によると、適度な弾性を有し、弾性変形を利用して駆動伝達部材と駆動受け部材の係合、脱着を容易に行なうことができ、しかも、十分な耐久性を有する。

【0020】

第3の本発明によると、画像形成装置本体に着脱可能なトナー補給容器と、前記トナー補給容器から前記画像形成装置本体へトナーを補給するためのトナー補給機構とを備えたトナー補給装置において、

前記トナー補給機構は、上記構成の駆動伝達機構を備え、前記画像形成装置本体側の回転駆動を前記トナー補給容器に伝達することを特徴とするトナー補給装置が提供される。

【0021】

第4の本発明によると、画像形成装置本体に着脱可能であって、上記構成の駆

動伝達機構により前記画像形成装置本体からの回転駆動を受けることによって前記画像形成装置本体へトナーを補給するためのトナー補給容器において、

前記駆動伝達機構の前記駆動受け部材を前記トナー補給容器側に設けることを特徴とするトナー補給容器が提供される。

【0022】

上記第3及び第4の本発明の一実施態様によると、前記駆動受け部材は、前記トナー補給容器の開口を封止する封止部材に設けている。この構成によれば、封止部材の開閉動作と駆動力の伝達動作をひとつの封止部材で行うことができるのでコンパクトで安価な構成となる。

【0023】

他の実施態様によれば、前記封止部材は、前記トナー補給容器と回転方向には互いに係止され、軸線方向には互いに移動自在であり、前記開口部を開口した状態においても、前記トナー補給容器と回転方向に係合した状態を保つ。この構成によれば、トナー補給容器内に回転駆動を伝達するに当たり、回転軸受け機構が不要であり、しかも軸受け部でのトナー漏れ、トルクアップ、粗粒発生などの弊害を生じない。

【0024】

他の実施態様によれば、前記トナー補給容器は、前記封止部材が前記画像形成装置本体に係止され、前記画像形成装置本体からの作用により封止部材が引き抜かれることで、前記開口部が開封される。又、他の実施態様によれば、前記トナー補給容器は、前記封止部材が前記電子写真画像形成装置本体に係止され、前記画像形成装置本体からの作用により前記トナー補給容器が移動することによって前記開口部が開封される。斯かる構成によれば、トナー補給容器の開封動作を画像形成装置本体内で補給動作に連動させて行なうために、ユーザー自身が開封作業を行なう必要がなく、ユーザーは手を汚さずに簡単な補給が行なえる。

【0025】

更に他の実施態様によれば、前記トナー補給容器は略円筒形状であって、前記駆動受け部材から伝達された回転駆動力によって回転することでトナーを搬送・排出するように構成されている。この構成によれば、トナー補給容器内に回転駆

動を伝達するに当たり、回転軸受け機構が不要であり、簡単な構成でしかも軸受け部でのトナー漏れ、トルクアップ、粗粒発生などの弊害を生じない。

【0026】

【発明の実施の形態】

以下、本発明に係る駆動伝達機構、トナー補給容器及びトナー補給装置を図面に則して更に詳しく説明する。

【0027】

実施例1

まず、本発明に係るトナー補給容器が装着される画像形成装置の一例である電子写真画像形成装置の構成について図1に基づいて説明する。

【0028】

[電子写真画像形成装置]

図1に示す電子写真複写機本体（以下、「装置本体」という。）100において、原稿101が原稿台ガラス102の上に置かれると、原稿101の画像情報に応じた光像が光学部103の複数のミラーMとレンズL_nにより、像担持体としての電子写真感光体ドラム（以下、「感光体ドラム」という。）104上に結像する。カセット105、106、107、108に積載された記録媒体（以下、「用紙」という）Pのうち、図2に示す操作部100aから使用者（ユーザー）が入力した情報若しくは原稿101の紙サイズから最適な用紙Pをカセット105～108の用紙サイズ情報から選択する。ここで、記録媒体としては用紙に限定されずに、例えばOHPシート等適宜選択できる。

【0029】

そして、給紙・分離装置105A、106A、107A、108Aにより搬送された1枚の用紙Pを、搬送部109を経由してレジストローラ110まで搬送し、更にレジストローラ110により用紙Pを感光体ドラム104の回転と、光学部103のスキヤンのタイミングを同期させて転写部に搬送する。転写部では、転写放電器111によって、感光体ドラム104上に形成されたトナー像を用紙Pに転写する。そして、分離放電器112によって、トナー像の転写された用紙Pを感光体ドラム104から分離する。

【0030】

この後、搬送部113により定着部114へ搬送された用紙Pは、定着部114において熱と圧力により用紙P上のトナー像を定着させた後、片面コピーの場合には、排紙反転部115を通過し、排紙ローラ116により排紙トレイ117へ排出される。又、両面コピーの場合には、排紙反転部115のフラップ118の制御により、再給紙搬送路119、120を経由してレジストローラ110まで搬送された後、片面コピーの場合と同様の経路をたどって排紙トレイ117へ排出される。

【0031】

又、多重コピーの場合には、用紙Pは排紙反転部115を通り、一度排紙ローラ116により一部が装置外へ排出される。そして、この後、用紙Pの終端がフラップ118を通過し、排紙ローラ116にまだ挟持されているタイミングでフラップ118を制御すると共に排紙ローラ116を逆回転させることにより、再度装置本体100内へ搬送される。更にこの後、再給紙搬送部119、120を経由してレジストローラ110まで搬送された後、片面コピーの場合と同様の経路をたどって排紙トレイ117へ排出される。

【0032】

ところで、上記構成の装置本体100において、感光体ドラム104の回りには現像手段としての現像装置201、クリーナ装置202、一次帯電器203等が配置されている。

【0033】

現像装置201は、原稿101の情報が光学部103により感光体ドラム104に形成された静電潜像を、トナーを用いて現像するものである。そして、この現像装置201へトナーを補給するためのトナー補給容器1が使用者によって装置本体100に着脱可能に装着されている。

【0034】

又、現像装置201は、収容手段としてのトナーホッパー201aと現像器201bとを有している。トナーホッパー201aは、トナー補給容器1から補給されたトナーを攪拌するための攪拌部材201cを有している。そして、この攪

拌部材201cにより攪拌されたトナーは、マグネットローラ201dにより現像器201bに送られる。現像器201bは、現像ローラ201fと、送り部材201eを有している。そして、マグネットローラ201dによりトナーホッパー201aから送られたトナーは、送り部材201eにより現像ローラ201fに送られて、この現像ローラ201fにより感光体ドラム104に供給される。

【0035】

尚、クリーナ装置202は、感光体ドラム104に残留しているトナーを除去するためのものである。又、一次帯電器203は、感光体ドラム104を帯電するためのものである。

【0036】

図2に示す外装カバーの一部であるトナー補給容器交換用前カバー15（以下、「交換用前カバー」という）を図3に示すように使用者が開けると、容器受け台50が、駆動系（不図示）によって所定の位置まで引き出される。そして、この容器受け台50上にトナー補給容器1を載置する。使用者がトナー補給容器1を装置本体100から取り出す際には、容器受け台50を引き出し、容器受け台50に載っているトナー補給容器1を取り出す。ここで、交換用前カバー15はトナー補給容器1を着脱（交換）するための専用カバーであって、トナー補給容器1を着脱するためだけに開閉される。尚、装置本体100のメンテナンスは、前面カバー100cを開閉することによって行われる。

【0037】

尚、容器受け台50を介することなく、トナー補給容器1を装置本体100に直接装着し、又、装置本体100から取り外してもよい。

【0038】

[トナー補給動作]

先ず、図7(A)～図7(C)を用いて本実施例におけるトナー補給容器（以下、「トナーボトル」という。）のトナー補給動作について説明する。図7(A)～図7(C)は本実施例におけるトナーボトル1を装置本体100内に挿入してトナー補給を行う過程の状態を各段階毎に示した図である。

【0039】

同図に示すように、装置本体100にはトナー補給装置400が設けられ、更にトナー補給装置400には、トナーボトル1と連結してトナーボトル1を回転駆動させる駆動部（駆動力伝達部）20が具備されている。駆動部20はベアリング23によって回転可能に支持され、装置本体100内に設けた不図示の駆動モータにより回転駆動する構成になっている。

【0040】

又、装置本体100には、ホッパー201aに連通するトナー補給路24を形成する隔壁25が設けられ、この隔壁25には、トナーボトル1の一部を回転可能に支持し、かつトナー補給路24を密封する内外ベアリング26a、26bが固着されている。更に、トナー補給路24には補給トナーをホッパー201aに搬送するためのスクリュウ部材27が配置されている。

【0041】

図7（A）には、トナーボトル1を装置本体100に挿入させる状態が示されている。トナーボトル1先端の一端面には、本実施例では円筒状とされるトナー補給開口部（以下、単に「開口部」という。）1aが設けてあり、開口部1aは、その先端開口が封止部材2により封止された状態にある。

【0042】

図7（B）には、トナーボトル1の挿入が更に進み、封止部材2の先端部に設けた係止部としての係合突起、即ち、爪部3が装置本体側の駆動部20と係合した状態が示されている。この駆動部20と封止部材2との係合はユーザーがトナーボトル1を挿入した時の挿入力によって行われる。この時、封止部材2は、爪部3に設けた係止面3bによって駆動部20と回転軸線方向（軸方向）に係止されているため、封止部材2はこの係止を解除しない限り、駆動部20に位置的に固定された状態にある。

【0043】

図7（C）には、封止部材2と駆動部20が係合した後、交換用前カバー15の閉動作に連動して、スライド部材300が矢印b方向に後退することでトナーボトル1も後退し、相対的に封止部材2がトナーボトル1から離れて開口部1aが開き、トナー補給が可能となった状態が示されている。この時、トナーボトル

1の本体（以下、「ボトル本体」という。）1 Aに固定された駆動軸1 bは封止部材2から完全に外れることはなく、駆動軸1 bの一部が封止部材2内に残っている。尚、駆動軸1 bは、その断面が、四角形や三角形などの回転駆動伝達が可能な非円形断面形状になっている。

【0044】

この状態で不図示のモータを駆動させると回転駆動力は本体駆動部20から封止部材2へと伝達し、更に封止部材2から駆動軸1 bへと伝わることでトナーボトル1が回転する構成になっている。すなわちこの封止部材2はトナーを封止すると同時にトナーボトル1の回転駆動力を伝達させる2つの機能を果たしている。

【0045】

又、トナーボトル1は容器受け台50に設けられたボトル受けローラ23により回転可能に支持されているため、わずかな駆動トルクでもスムーズに回転することが可能である。このボトル受けローラ23はボトル本体1 Aに対して靴となる位置に4ヶ所配設されている。ボトル受けローラ23は装置本体100のトナー補給装置400に回転自在に設けてある。このようにトナーボトル1が回転することでトナーボトル1の内部に収容されていたトナーが開口部1 aから順次排出され、トナー補給路24に設けられたスクリュ部材27によって装置本体100側のホッパー201 aへと搬送され、トナー補給が行われる。

【0046】

[トナー補給容器の交換方法]

次に、本発明におけるトナーボトルの交換方法について説明する。

【0047】

画像形成のプロセスに伴い、トナーボトル1内のトナーが略全量消費されると、装置本体100に設けられたトナー補給容器空検知手段（不図示）によってトナーボトル1内のトナーが無くなったことが検知され、その旨が液晶等の表示手段100 b（図2参照）によりユーザーに知らされる。

【0048】

本実施例においてトナーボトル1の交換はユーザー自身が行い、その手順は以

下の通りである。

【0049】

先ず、閉じられた状態の交換用前カバー15をヒンジ18を中心に回転させて図6の破線で示す位置まで開く。この交換用前カバー15を開く動作に連動して後述のトナー補給部開閉手段により、上述の図7(C)の状態にあるボトル本体1Aが矢印bと反対方向の図7(A)に示す矢印a方向に移動して、それまでボトル本体1Aと離間した、トナー補給開口部1aを開放する状態にあった封止部材2がトナー補給開口部1aに圧入嵌合され、トナー補給開口部1aが閉止され、上記図7(B)に示す状態となる。

【0050】

次に、ユーザーは、装置本体100に装着されているトナーのなくなったトナーボトル1を図7(A)に示す矢印a方向と逆方向に、即ち、図7(C)に示す矢印b方向に引き出し、装置本体100から取り外す。なお取り外す際の爪部3の係止解除の方法は後で詳細に述べる。この後、ユーザーは新しいトナーボトル1を図7(A)に示す矢印aの向きに装置本体100へと挿入した後、交換用前カバー15を閉じる。そして、上述のように、この交換用前カバー15を閉める動作に連動してトナー補給部開閉手段により封止部材2が容器本体1Aから離間され、トナー補給開口部1aが開封される(図7(C))。以上が、トナー補給容器(トナーボトル)の交換手順である。

【0051】

[トナー補給容器(トナーボトル)]

次に、本実施例のトナーボトルについて図8と図9を用いて更に説明する。

【0052】

トナーボトル1は略円筒形状に形成され、その一端面のほぼ中央にそのボトル本体、即ち、円筒部1Aより小径の開口部1aが突設されている。開口部1aには開口部1aを閉じる封止部材2が設けてあり、図7(A)～(C)に関連した説明にて理解されるように、この封止部材2がトナーボトル1の軸方向(矢印a-b方向)にスライドすることにより、開口部1aの開閉動作を行う構成になっている。封止部材2の先端部には弾性変形可能な爪部3と、爪部3の装置本体側

の駆動部20との係合を解除する解除力受け部4とが設けてあり、この爪部3は駆動部20と係合して、トナーボトル1に回転駆動を伝達する機能を果たす構成になっている。この爪部3及び解除力受け部4の構成については後で詳細に述べる。

【0053】

先ず、トナーボトル1内部の構成について説明する。

【0054】

上述のように、トナーボトル1は略円筒形状を有しており、装置本体100内に略水平に配置され、装置本体100から回転駆動を受けて、回転する構成になっている。そして、このトナーボトル1の内面には、図8に示すように、螺旋状の突起1cが設けてある。トナーボトル1が回転することにより、この螺旋状突起1cに沿ってトナーが軸方向に搬送され、トナーボトル1端面に設けた開口部1aからトナーが排出される構成になっている。

【0055】

本発明におけるトナーボトル1内部の構成については、トナーボトル1が回転することによりトナーが排出するボトル形状であれば、特にその形状や構成について限定するものではない。

【0056】

つまり、本発明の主旨は、駆動を受けることによってトナーを排出するトナーボトル1において、トナーボトル1と装置本体100との駆動伝達部の構成に特徴を持たせたことであるため、トナーボトル1の内部構成については、本実施例のように一般的によく知られているボトル内部に螺旋状突起1cを形成したものや、その他の構成のものであっても構わない。

【0057】

例えば、本実施例の変形例として図11に示すようなボトル内部の構成でも良い。本変形例では、ボトル本体内部に板状のバッフル部材40を設け、バッフル部材40の表面にトナーボトル1の軸線方向に対して傾斜した傾斜突起40aを複数設けており、この傾斜突起40aの一端は開口部1aに達している。トナーは最終的にこの傾斜突起40aから開口部1aを通過して排出される構成になって

いる。トナーが排出する原理は、トナーボトル1の回転によってバッフル部材40で掻き揚げられたトナーがバッフル部材40表面上を滑り落ち、傾斜突起40aによってトナーボトル1の前方へ搬送される。この動作を繰り返すことによって、トナーボトル内部のトナーは順次、攪拌・搬送されて開口部1aから排出される。

【0058】

なお、本実施例においては、回転駆動を示したが、この駆動を前記回転軸線を中心とする揺動又は反転に代えて、排出試験を行なってみたが、多少のトナー搬送性の低下はあったものの駆動の伝達に関しては全く問題なかった。

【0059】

従って、本発明における駆動の形式は、本実施例に示すような回転駆動だけに限定するものではなく、トナーボトルを反転、或いは、揺動、又はその他の方法等、何らかの駆動力を受けることによりトナーを補給するものであれば、特にその駆動の形式は問わない。つまり、装置本体100から何らかの駆動を受けることによってトナーを排出するトナーボトルであれば、その駆動は回転でも、揺動でも反転でも、いずれの駆動形式でもよい。

【0060】

また、前記変形例においては、この板状のバッフル部材40はトナーボトル1とは別部材で構成されており、封止部材2を介して、このバッフル部材40に回転駆動力を伝達することで間接的にトナーボトル1を回転させる構成になっている。

【0061】

このように、封止部材2を介してトナーボトル1を直接に或いは間接的に回転駆動力を伝える構成のいずれの構成を用いてもよい。

【0062】

図8及び図9において、上述のようにボトル本体1Aにはその一端面に開口部1aが設けてあり、開口部1a内にボトル本体1Aと一体に設けられた駆動軸1bが開口部1aから突出している。この駆動軸1bは開口部1aのほぼ中心軸線上に位置し、封止部材2に設けた係合穴2aと係合する。駆動軸1bは装置本体

100から封止部材2を介して回転駆動力をボトル本体1Aへ伝達させるためのものであることから、駆動軸1bの断面形状は回転駆動力を伝達可能な四角形状やHカット形状、Dカット形状等の形状になっている。駆動軸1bは適宜手段によってボトル本体1Aに固定されている。

【0063】

尚、駆動軸1bはボトル本体1Aに固定せずに、図10に示すように封止部材2と一体に設けても何らかまわらない。その際は、駆動軸1bからの駆動力を伝達するための係合穴2aをトナーボトル1側に設ける必要がある。この変形例では、開口部1aの構成部材1cに係合穴2aを設けている。

【0064】

本実施例においてはボトル本体1Aに駆動軸1bを固定した構成を採用した。

【0065】

[封止部材]

次に、封止部材2について図12及び図13を用いて更に説明する。

【0066】

図12及び図13において、封止部材2はトナーボトル1の開口部1aを開封可能に封止する封止部2b、及び装置本体の駆動部20と係合する円筒状のカップリング係合部2cを備えている。封止部2bの外径は開口部1aの内径よりも適当量大きく設定されている。そして、封止部2bを開口部1aに圧入嵌合することにより、封止部材2によって開口部1aであるトナー補給口が密封される。

【0067】

上述のように、封止部材2は、駆動軸1bと係合して装置本体100から受けた駆動力を駆動軸1bに伝達するための係合穴2aを有している。この係合穴2aは封止部2b及び係合部2cにわたって形成されている。又、この係合穴2aは駆動軸1bの断面形状に対応した形状を有するとともに、駆動軸1bよりも僅かに大きく形成されている。これにより駆動軸1bは係合穴2aに遊嵌される。又、係合穴2aは駆動軸1bと同断面であって、多角形である。本実施例では正方形を採用している。

【0068】

そして、このように駆動軸 1 b が係合穴 2 a に遊嵌されることにより、ボトル本体 1 A と封止部材 2 とは、ボトル本体 1 A の回転方向には互いに係止される一方、軸線方向へは相互に移動自在に構成されるようになっている。これにより、トナーボトル 1 をトナー補給装置 4 0 0 へ装着時、後述するように封止部材 2 とボトル本体 1 A との離間が可能となり、トナー供給口すなわち開口部 1 a の開封（開口）が可能となる。

【0069】

ところで、この係合穴 2 a と駆動軸 1 b との係合長さは、封止部材 2 とボトル本体 1 A とが離間する際、外れることのない長さを有している。これにより封止部材 2 がボトル本体 1 と離間しても、駆動軸 1 b は封止部材 2 を介して駆動力を受けることができる。

【0070】

次に、本発明の特徴部分の一つである係合突起、即ち、爪部 3 について詳しく説明する。

【0071】

封止部材 2 には装置本体 1 0 0 からの駆動力を受けるためカップリング係合部 2 c に駆動受け部材である係合突起、即ち、爪部 3 を設けている。爪部 3 はカップリング係合部 2 c の円筒面よりも半径方向外側に向かって突出しており、かつ、回転方向の駆動力を伝達するための駆動力受け部としての駆動受け面 3 a と、トナーボトル 1 と封止部材 2 とを離間させる際に、封止部材 2 を本体駆動部側に係止させるための係止部として作用する係止面 3 b とを有している。すなわち、爪部 3 はトナーボトル 1 の回転駆動とトナーボトル 1 の着脱方向における位置規制という、2つの異なる働きを、それぞれ駆動受け面 3 a と係止面 3 b とで果たしている。

【0072】

また、この係止面 3 b は本体駆動部 2 0 と係止した状態で駆動力を受ける際に、封止部材 2 とトナーボトル 1 の離間距離を一定に保つことにより、トナーボトル 1 と封止部材 2 との開口が確保され、トナー排出量が一定量に保たれ、非常に定量排出性に優れたトナーボトルを提供できる。さらに封止部材 2 は装置本体駆

動部20に確実に係止されているため、封止部材2の脱落するおそれもなく、確実にトナー排出を行うことができる。

【0073】

上記のような構成によれば、封止部材2の開閉動作と駆動力の伝達動作を一つの封止部材でできるのでコンパクトで安価な構成のトナー補給容器を提供できる。

【0074】

尚、爪部3は基本的には封止部材2と一体で設けた方が部品点数の削減という観点から好ましいが、爪部3のみを別部品として封止部材2に組み込んだ構成にしても特にかまわない。

【0075】

爪部3を封止部材2と一体で設ける際には、爪部3の両駆動受け面3a側にスリット溝2e等を設けて、爪部3のみが自由に弾性変形できる爪のような形状が好ましい。その理由は、この爪部3が装置本体100からの作用によって変位することで後述する駆動伝達の解除動作を行うためである。

【0076】

尚、本実施例においては、爪部3は封止部材2と一体に構成した。

【0077】

又、爪部3の先端部は封止部材2が装置本体100の駆動部20に挿入される際に、スムーズに挿入されるようにテーパ面3cを有している。

【0078】

次に本発明の他の特徴である解除力受け部の構成について再度図12及び図13に基づいて説明する。

【0079】

爪部3は対向方向に2箇所設けられているが、互いの係合突起同士を接続する接続部としての係合解除部、即ち、解除力受け部4が設けられている。この解除力受け部（以下、「解除部」という）4は矢印b方向に力が加わると、図13にて2点鎖線で示すように爪部3を矢印d方向に弾性変形させるような役割を果たしており、力を除去すると、再び元の形に戻る構成になっている。従って、この

解除部4は弾性変形しやすいように比較的薄肉化されており、又、それに適にした材質であることが好ましい。

【0080】

このような封止部材2はプラスチック等の樹脂を射出成形して製造するのが好ましいが、他の材料及び製造方法であっても、任意に分割、接合しても構わない。又、封止部材2は開口部1aに圧入嵌合してこれを密封するために適度な弾性が必要とされる。その材料としては低密度ポリエチレンが最も好ましく、次いでポリプロピレン、直鎖状ポリアミド、例えば商品名ナイロン、高密度ポリエチレン、ポリエステル、ABS、HIPS（耐衝撃性ポリスチレン）等が好ましく利用できる。

【0081】

上記のように、爪部3及び解除部4を弾性変形可能な弾性部材とすることにより、弾性変形を利用して駆動部20及び爪部3の係合離脱を容易に行なうことができる。又、上記の材料は、適度な弾性を有しているので、駆動部20及び爪部3の係合離脱を容易に行なうことができ、且つ、十分な耐久性を有している。

【0082】

又、解除部4は爪部3を接続するブリッジ状であることにより、一つの解除部を押圧することにより複数の爪部3に対して均等に変位作用を及ぼすことができる。

【0083】

尚、この解除部4は上述したように互いの係合突起3同士を必ずしも連結して一体化する必要はなく、図16に示すように個々の係合突起に対して独立した形に設けてもよい。

【0084】

[駆動伝達部の構成]

次に本発明の特徴を最も良く表す、封止部材2に設けたカップリング係合部2cの構成について図14を用いて説明する。

【0085】

本発明において封止部材2は、本実施例では円筒状に形成された駆動力受け部

となっているカップリング係合部2cを備えており、トナー補給装置400の駆動力伝達部20からの駆動力を受けるようになっている。

【0086】

封止部材2の円筒状のカップリング係合部2cには先に説明したように弾性変形可能な可撓性の爪部3が2箇所に対向配置して設けられており、爪部3は押圧されることで容易に弾性変形が可能な状態にある。更に爪部3同士を互いに連結するように解除部4が設けられており、爪部3と解除部4は一体となっている。

【0087】

一方、装置本体100側に設けた駆動部20は封止部材2の爪部3と係合するように構成されており、封止部材2が駆動部20に挿入された時に滑らかに挿入できるように駆動部20の先端内径部は内径が徐々に縮径するようなテーパ面20bが設けてある。このテーパ面20bにより封止部材2は滑らかに駆動部20へと挿入される。

【0088】

又、駆動部20にはトナーボトル1を回転駆動させるための係合リブ20aが設けられており、この係合リブ20aは封止部材2が挿入された後、封止部材2に設けた爪部3を引っ掛けて回転駆動を伝達するためのものである。

【0089】

次に本実施例における駆動部20と封止部材2との係合の様子について図15を用いて説明する。

【0090】

図15(A)は、ユーザーが新しいトナーボトル1を画像形成装置本体にセットするために、矢印方向にトナーボトル1を挿入する際の様子を示したものであり、画像形成装置本体内の駆動部20と係合する前の状態を示す。

【0091】

やがて、トナーボトル1の挿入が進むと、図15(B)のように封止部材2に設けた爪部3が本体駆動部20のテーパ面20bに接触し、テーパ面20bに案内されて徐々に内側に撓みながら弾性変形して挿入される。

【0092】

更に、挿入が進み、ストレート部20gを通過した爪部3は図15(C)のように係合リブ20aの無い空間部分で撓みが解放され、ここで爪部3が本体駆動部20と係合した状態になる。この図15(C)の状態において爪部3は本体駆動部20としっかり係合されており、封止部材2のスラスト方向(軸方向)の位置は固定された状態となる。

【0093】

従って、その後トナーボトル1を矢印b方向に後退させても、封止部材2はトナーボトル1と一緒に引きつられて後退することなく、しっかり本体駆動部20に固定され、一方トナーボトル1だけが後退するため、確実に封止部材2とトナーボトル1が離間され開口部1aが開封する。

【0094】

尚、トナーボトル1の後退動作は、不図示の画像形成装置本体の前カバー15の開閉動作に連動してトナーボトル1をスライドさせるような構成にしてもよい。

【0095】

[位相合わせについての説明]

次に、本発明における本体駆動部20とトナーボトル1の係合時の位相合わせについて図17を用いて説明する。

【0096】

従来の駆動伝達手段においては、例えば凹凸の組合せによるカップリング駆動のような場合、凹部と凸部の位相を合わせて係合させる必要があったが、本発明ではこうした位相合わせなどの面倒な作業は一切必要が無い。図17を用いてその理由を説明する。

【0097】

図17は、封止部材2が駆動部20に挿入された時の爪部3と係合リブ20aの回転方向の位置関係を示した部分断面図であり、係合リブ20aは1箇所、爪部3(3A、3B)は2箇所設けた場合の例を示す。

【0098】

通常、ユーザーがトナーボトルを挿入した時に、係合リブ20aと爪部3の位

置が共に同じ位置に重ならなければ、トナーボトル1の挿入が所定の位置まで完了すると、封止部材2は本体駆動部20と係合し、やがてボトル1が後退した後封止部材2とトナーボトル1が離間して、トナー排出可能な状態になる。

【0099】

しかし、挿入時のボトル1の回転方向によっては図17(A)に示したように爪部3Aと係合リブ20aの位置が重なってしまい、所定位置までボトルの挿入が終わっても爪部3Aは係合リブ20aと干渉して外側に解放されず、引掛かりを保てずに係合が完了しない場合がある。その状態で、ボトルを後退させると封止部材2は本体駆動部20との係止が保たれていないので、ボトル1と封止部材2と一緒に後退してしまい、開口部1aが開口しなくなるおそれがある。

【0100】

そこで、そのような事態を防ぐために本発明においては、係合リブ20aの数よりも爪部3の数を少なくとも一つ以上は常に多く設けることで、そうした問題を解消している。

【0101】

図17(A)の状態においては、爪部3Aは確かに係合リブ20aに干渉しており、本体駆動部20に係止されていない状態であるが、もうひとつの爪部3bは係合リブ20aとは干渉しておらず、正しく駆動部20に係止されているため、仮に爪部3Aに係止されなくても、爪部3Bによって係止されているため、何ら支障なくボトルが離間し、開口することができる。

【0102】

そして、開口した後、図17(B)に示すように、やがて本体駆動部20が矢印c方向に回転すると、干渉していた係合リブ20aが外れて爪部3Aも正しく係止した状態となる。更に回転が進むと図17(C)に示すように係合リブ20aは爪部3Bに引掛かり、ここで回転駆動が伝達されてボトル1が回転する。

【0103】

このように係合リブ20aの数よりも、常に爪部、即ち、係合突起3の数を多く設けることにより、ユーザーが任意の回転方向にトナーボトル1を挿入しても、トナーボトル1は正しく係止されて本体駆動部20と係合し、確実にセットさ

れた状態にすることができる。

【0104】

又、係合リブ20aと爪部3を複数設けた場合には、図16に二点鎖線で示すように、係合リブ20aと爪部3の数が同じであった場合でも、図17(D)に示すようにそれぞれの位相角度を異にすることにより、ボトル1挿入時に爪部3と係合リブ20aの位置が重なってしまうことが防止できる。

【0105】

このように本発明においては、ユーザーはトナーボトル1を挿入するだけで確実にトナーボトル1を画像形成装置本体にセットすることができ、さらにトナーボトル1の挿入の際にボトル1の回転方向の位置合せなどの面倒な作業を必要とせず簡単な動作で交換作業が行える。

【0106】

[係合の解除方法]

次に爪部3と本体駆動部20との係合解除について図18を用いて説明する。

【0107】

トナー補給が終了し、トナーボトル1が空になると、古いトナーボトル1を取り外し、新しいトナーボトルに交換しなければならない。その際にそれまで係合していた封止部材2と駆動部20の係合を解除する必要がある。

【0108】

図18に示すように、装置本体内部、詳しくは駆動部20の内部に押出し部材21が設けられている。押出し部材21はトナーボトル1の駆動軸1bの軸線方向と同方向に移動可能な構成になっている。

【0109】

図18(A)は、トナー補給が終わり、トナーボトル1の開口部1aが開口した状態を示している。

【0110】

駆動部20と封止部材2の係合を解除する際は封止部材2の先端に設けた解除部4に押出し部材21を矢印a方向に進入させることで、図18(B)に示すように、解除部4は矢印a方向に撓み、同時にこの解除部4と一体になっている爪

部3も内側に倒れる。これにより爪部3と本体駆動部20との係合が解除される。その後更に押出し部材21が矢印a方向に進むことで、図18(C)に示すように、押出し部材21は封止部材2を開口部1aへ圧入させ、ここでトナーボトル1の開口部1aを密封する。更に押出し部材21が矢印a方向へ進むことで、今度はトナーボトル1自体を後退させて、ユーザーが取出しやすい位置までトナーボトル1をスライドさせる。

【0111】

この押出し部材21の駆動構成については、装置本体100の前カバー15の開閉動作に連動させて、前カバー15を開けた時に押出し部材21が矢印a方向移動して、駆動部20とトナーボトル1の封止部材2の分離を行い、前カバー15を閉じると矢印b方向に移動するといった構成にしてもよいし、或いは別途駆動モータ等を用いて、独立した分離動作を行うような構成にしてもよい。又、装置本体100の前カバー15との連動動作ではなく、別途手動レバーを設け、これに連動して分離動作を行うような構成にする等、どのような方法でも構わない。

【0112】

このように、本発明においては、押出し部材21が前後にスライドするという非常に単純な動作だけで、容易にトナーボトル1の駆動伝達の解除が行なえると同時に、開口部1aの開閉動作をも同時に実現させることが可能である。従って、非常に簡単な動作そして簡単で安価でコンパクトな構成にも拘らず、確実で信頼性の高い駆動伝達力を実現できる。

【0113】

実施例2

次に本発明の第2実施例について図19～図23を用いて説明する。

【0114】

図19は、爪部3が本体駆動部20の中心方向に向かって係合するような方向に配置した場合の実施例を示したものである。

【0115】

第1の実施例との違いは、爪部3の係合方向が内側から外側に向かって係合す

るか、或いは、外側から内側に向かって係合するかの違いであり、第2の実施例は外側から内側に向かって係合する場合を示している。

【0116】

尚、本実施例においては、爪部3及び解除部4を円周方向に4分割した位置に4箇所設けた例を示す。

【0117】

上記のような封止部材2の構成に対応して本体駆動部20は、図20に示すような形状を備えている。すなわち、本体駆動部20は、外径の異なる複数部分、先端部20b、小径部20c、大径部20d、及び後端部20eを有する概略円筒形を有し、押出し部材21が貫通する貫通穴20fの内径は均一とされている。そして、最も外径の小さい小径部20cには駆動部20の長手方向に延びる係合リブ20aが対向する位置に突設されている。即ち、本実施例では、係合リブ20aは、2箇所に設けられている。

【0118】

次に、本実施例における駆動部20と封止部材2との係合の様子について図21を用いて説明する。

【0119】

図21(A)は、ユーザーが新しいトナーボトル1を画像形成装置本体にセットするために、矢印b方向にトナーボトル1を挿入する際の様子を示したものであり、装置本体内の駆動部20と係合する前の状態を示したものである。

【0120】

図21(B)に示すように、トナーボトル1の進入が進むと、封止部材2に設けた爪部3が本体駆動部20に接触し、爪部3の先端部に形成されたテーパ面3cに案内され、徐々に外側に撓みながら弾性変形し挿入される。

【0121】

更に進入が進み、ストレート部20gを通過した爪部3は、図21(C)に示すように、係合リブ20aの無い空間部分20hで撓みが解放され、ここで爪部3が本体駆動部20と係合した状態になる。

【0122】

この図21(C)に示す状態において、爪部3は本体駆動部20としっかり係合されており、封止部材2のスラスト方向(軸方向)の位置は固定された状態となる。従ってその後トナーボトル1を後退させても、封止部材2はトナーボトル1と一緒に引きつられて後退することなく、しっかり本体駆動部20に固定される。一方、トナーボトル1だけが後退すると、封止部材2とトナーボトル1が確実に離間し開口部1aが開封する。尚トナーボトル1の後退動作は前カバー15(図2参照)の開閉動作に連動してトナーボトル1をスライドさせるような構成にしてもよい。

【0123】

図22は、封止部材2が駆動部20に挿入された時の爪部3と係合リブ20aの回転方向の位置関係を示した部分断面図であり、図22(A)と図22(B)は、係合リブ20aが2箇所、爪部3(3A、3B、3C、3D)は4箇所設けた場合の例を示す。

【0124】

図22(A)の状態においては、爪部3A、3Cは係合リブ20aに干渉しており、本体駆動部20に係止されていない状態であるが、他の爪部3B、3Dは係合リブ20aとは干渉しておらず、正しく駆動部20に係止されている。そのため、仮に爪部3A、3Cに係止されなくても、爪部3B、3Dによって係止されているため、何ら支障なくトナーボトル1が離間し、開口することができる。

【0125】

そして、開口した後、図22(B)に示すように、やがて本体駆動部20が矢印方向に回転すると、干渉していた係合リブ20aが外れて爪部3A、3Cも正しく係止した状態となり、更に回転が進むと係合リブ20aは爪部3B、3Dに引掛かり、ここで回転駆動が伝達されてトナーボトル1が回転する。

【0126】

このように、本実施例においても第1の実施例と同様、係合リブ20aの数よりも爪部3の数を少なくとも一つ以上は常に多く設けることにより、ユーザーが任意の回転方向にトナーボトル1を挿入しても、トナーボトル1は正しく係止されて本体駆動部20に係合し、確実にセットされた状態にすることができる。

【0127】

更に、係合リブ20aと爪部3を両方とも複数設けた場合には、図22(C)に示すように係合リブ20aと係合突起3の数が同じであった場合でも、それぞれの位相角度を異にすることにより、トナーボトル1挿入時に爪部3と係合リブ20aの位置が重なってしまうことが防止できる。

【0128】

このように本発明においては、ユーザーはトナーボトルを挿入するだけで確実にトナーボトル1を複写機本体にセットすることができ、さらにトナーボトル1の挿入の際にボトル1の回転方向の位置合せなどの面倒な作業を必要とせず、簡単な動作で交換作業が行える。

【0129】

次に、図23を参照して、本実施例における係合解除動作について説明する。

【0130】

本体駆動部20と封止部材2の係合を解除する際は、第1実施例と概略同様に、本体駆動部20の中央部に配置した押出し部材21を矢印a方向にスライドさせるだけで容易に解除することができる。

【0131】

封止部材2内側に設けた解除部4に対して押出し部材21を矢印a方向に進入させることで、図23(B)に示すように、解除部21は外側に押し開かれるように撓み、同時にこの解除部21と一体になっている爪部3も外側に開く。これにより爪部3と本体駆動部20との係合が解除される。

【0132】

その後更に押出し部材21が矢印a方向に進むことで、図23(C)に示すように、押出し部材21は封止部材2を開口部1aへ圧入し、ここで封止部材2はトナーボトル1の開口部1aを密封する。更に押出し部材21を矢印a方向へ進ませることで、トナーボトル1自体を後退させ、最後にはユーザーが取出しやすい位置までトナーボトル1をスライドさせる。

【0133】

この押出し部材21の構成については、装置本体100の前カバー15の開閉

動作に連動させて、前カバー 15 を開けた時に押出し部材 21 が矢印 a 方向に移動して、分離を行い、前カバー 15 を閉じると矢印 b 方向に移動するといった構成にしてもよいし、あるいは別途駆動モータ等を用いて、独立した分離動作を行うような構成にしてもよい。あるいは前カバー 15 との連動動作ではなく、別途手動レバーを設け、これに連動して分離動作を行うような構成にする等、いずれの方法でも構わない。

【0134】

このように本実施例においては、解除部が表面に露出されないので、万が一トナー補給容器を落下させた場合でも、解除部が破損するおそれがなく、物流時の耐衝撃性に優れたトナー補給容器を提供できる。

【0135】

又、押出し部材が前後にスライドするという非常に単純な動作だけで、容易にトナーボトルの駆動伝達の解除が行えると同時に、トナーボトルの開口部の開閉動作をも同時に実現させることが可能である。

【0136】

従って、非常に簡単な動作、かつ簡単で安価でコンパクトな構成にも拘らず、確実に信頼性の高い駆動伝達力を実現できる。

【0137】

実施例 3

次に、本発明の第 3 の実施例について図 24 を用いて説明する。

【0138】

第 1 の実施例及び第 2 の実施例は、画像形成装置のトナー補給容器及びトナー補給装置に本発明の駆動伝達機構を応用した例について説明したが、第 3 の実施例では、本駆動伝達機構を感光体ドラムの駆動伝達に応用した例を示す。

【0139】

図 24 では、感光体ドラム 104 に画像形成装置本体側から発生した駆動を駆動部 20 から伝達する構成を示している。

【0140】

尚、本実施例に示した駆動伝達機構の構成は、第 1 の実施例にて説明した駆動

伝達機構とその構成及び作用は全く同じであり、再度の説明は省略する。

【0141】

このように、本発明の駆動伝達機構は、トナー補給容器及びトナー補給装置に限定するものでなく、回転軸線を中心とする回転、揺動、反転といった駆動を伝達する構成に適用可能である。

【0142】

上記第1～第3の実施例では、駆動伝達機構は、回転駆動発生側の駆動伝達部材20側に回転方向係合部20aを設け、駆動伝達部材20からの回転駆動を受ける駆動受け部材2c、即ち、封止部材2側に係合突起部3を設けるものとして説明したが、回転駆動発生側の駆動伝達部20材側に係合突起部を設け、駆動伝達部材20からの回転駆動を受ける駆動受け部材2c、即ち、封止部材2側に回転方向係合部を設ける構成としても良く、同様の作用効果を得ることができる。

【0143】

【発明の効果】

以上説明したように、本発明に係る駆動伝達機構は、回転駆動発生側の駆動伝達部材と、駆動伝達部材と回転軸線方向に着脱自在とされ、前記駆動伝達部材からの回転駆動を受ける駆動受け部材とのいずれか一方の部材である第1部材は、回転軸線方向と交差する方向に変位可能な爪状の係合突起部を有しており、係合突起部は、駆動伝達部材及び駆動受け部材の他方の部材である第2部材によって変位されながら第2部材と接近し、所定位置まで接近すると変位が復帰することで、第2部材と回転軸線に沿って離間する方向に係止されると共に、第2部材と回転方向に係合され、第2部材は、係合突起部を変位させる変位部と、係合突起部を回転軸線に沿って離間する方向に係止する軸線方向係止部と、係合突起部と回転方向に係合する回転方向係合部とを有し、

(A) 係合突起部は、回転方向係合部の数よりも少なくとも一つ以上は多く設けた構成とするか、或いは、

(B) 係合突起部と回転方向係合部はそれぞれ複数設けてあり、複数の係合突起部の角度配置と複数の前記回転方向係合部の角度配置が異なる構成とされるので、

(1) 駆動伝達部材と駆動受け部材のそれぞれの位相合わせを行なう必要のない駆動伝達機構が実現でき、駆動の種類は、回転軸線を中心とする回転、揺動、反転いずれの駆動方法も可能である。

(2) 斯かる駆動伝達機構をトナー補給装置及びトナー補給容器に応用することで、トナー補給容器を画像形成装置本体に挿入し、画像形成装置本体の何らかの作用により、トナー補給容器は画像形成装置本体の回転駆動部と係合し、且つトナー補給可能状態にセットされるため、非常に操作性の優れたトナー補給作業が実現できる。

といった作用効果を奏し得る。

【図面の簡単な説明】

【図1】

画像形成装置の一実施例を示す断面図である。

【図2】

図1の画像形成装置の斜視図である。

【図3】

トナー補給容器を画像形成装置に装着する様子を示す斜視図である。

【図4】

図1の画像形成装置の正面図である。

【図5】

図1の画像形成装置の側面図である。

【図6】

トナー容器交換用カバーを開いた様子を示す画像形成装置の平面図である。

【図7】

トナー補給容器の装着動作、即ち、(A)装着開始時、(B)装着途中、及び(C)装着完了時を示す断面図である。

【図8】

トナー補給容器の一実施例を示す一部切り欠き斜視図である。

【図9】

駆動軸をトナー補給容器本体側に設けた場合の駆動伝達部の一実施例を示す部

分拡大断面図である。

【図 1 0】

駆動軸を封止部材側に設けた場合の、駆動伝達部の他の実施例を示す部分拡大断面図である。

【図 1 1】

トナー補給容器の他の実施例を示す一部切り欠き斜視図である。

【図 1 2】

封止部材の一実施例を示す正面図（A）、（A）図のX方向から見た側面図（B）、同じくY方向から見た側面図である。

【図 1 3】

封止部材を示す図 1 2（B）の線Z-Zに沿った断面図である。

【図 1 4】

位相合わせを不要とする駆動力伝達部と駆動力受け部の一実施例を示す斜視図である。

【図 1 5】

図 1 4 の駆動伝達部におけるトナーボトル挿入時の様子、即ち、（A）トナーボトル挿入前、（B）挿入途中、（C）挿入完了時を示す縦断面図である。

【図 1 6】

位相合わせを不要とする駆動力伝達部と駆動力受け部の他の実施例を示す斜視図である。

【図 1 7】

トナーボトル挿入時の位相合わせに関する説明図であり、（A）係合リブと係合突起の位相が重なった状態、（B）回転が進み位相の重なりがなくなった状態、（C）更に回転が進み、係合突起に係合リブが引っ掛かり駆動伝達された状態、（D）係合リブと係合突起を複数及び同数設け、それぞれ位相角度を異にした状態、を示す図である。

【図 1 8】

トナーボトルの駆動伝達部における係合解除の様子、即ち、（A）解除前、（B）解除中、（C）解除完了時を示す断面図である。

【図 1 9】

本発明に係る封止部材の他の実施例を示す (A) 側面図、及び (B) 線 X-X に沿った断面図である。

【図 2 0】

図 1 9 の封止部材と係合する駆動部の他の実施例を示す (A) 正面図、(B) 側面図、(C) 図 2 1 (B) の線 C-C に沿った断面図、(C) 図 2 0 (A) の線 D-D に沿った断面図である。

【図 2 1】

図 1 9 の封止部材及び図 2 0 の駆動部の係合時の様子、即ち、(A) トナーボトル挿入時、(B) 挿入途中、及び (C) 挿入完了時を示す断面図である。

【図 2 2】

トナーボトル挿入時の位相合わせに関する説明図であり、(A) 係合リブと係合突起の位相が重なった状態、(B) 回転が進み位相の重なりがなくなった状態、(C) 係合リブと係合突起を複数及び同数設け、それぞれ位相角度を異にした状態、を示す図である。

【図 2 3】

図 2 2 の係合を解除する様子、即ち、(A) 解除前、(B) 解除中、及び (C) 解除完了時を示す断面図である。

【図 2 4】

本発明の駆動伝達機構の他の実施例で、感光体ドラムの駆動伝達を示す斜視図である。

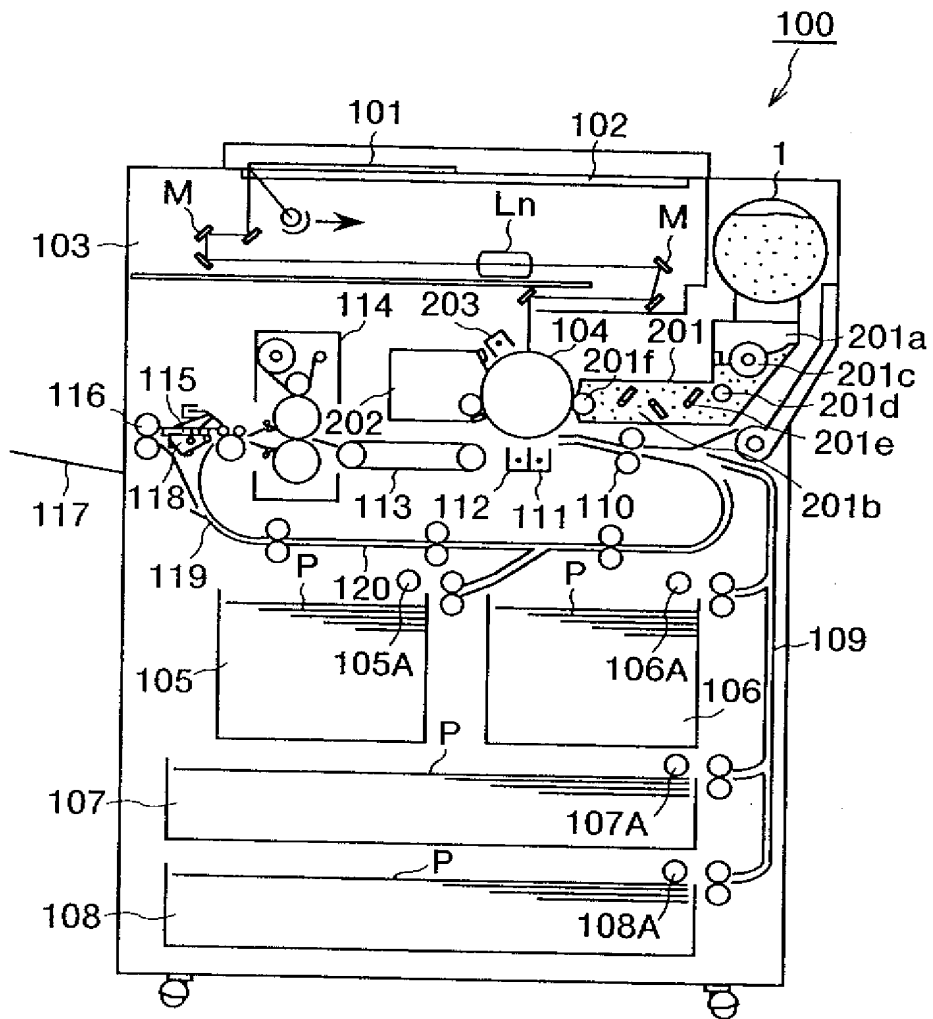
【符号の説明】

- | | |
|-----|-------------------|
| 1 | トナーボトル (トナー補給容器) |
| 1 A | ボトル本体 (トナー補給容器本体) |
| 2 | 封止部材 |
| 2 b | 封止部 |
| 2 c | カップリング係合部 |
| 3 | 爪部 (係合突起) |
| 3 a | 駆動受け面 (駆動力受け部) |

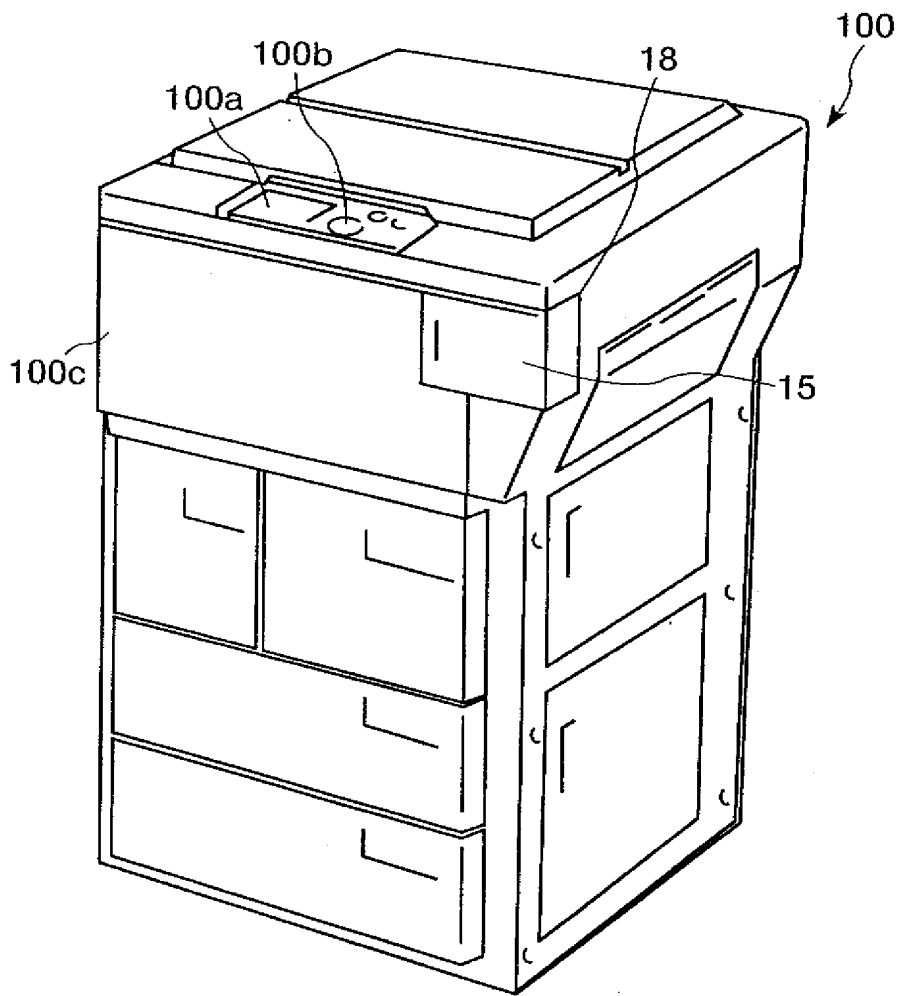
3 b	係止面
4	解除突起（解除力受け部）
2 0	駆動部
2 0 a	係合リブ（駆動伝達部材）
2 1	押し出し部材
1 0 0	画像形成装置本体
1 0 4	感光体ドラム
4 0 0	トナー補給装置

【書類名】 図面

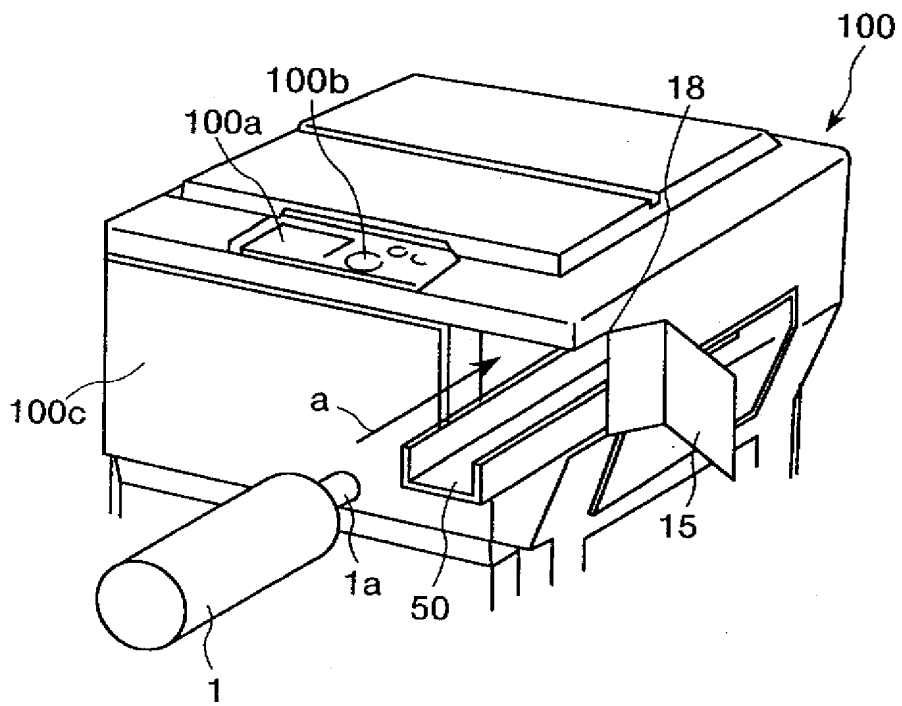
【図1】



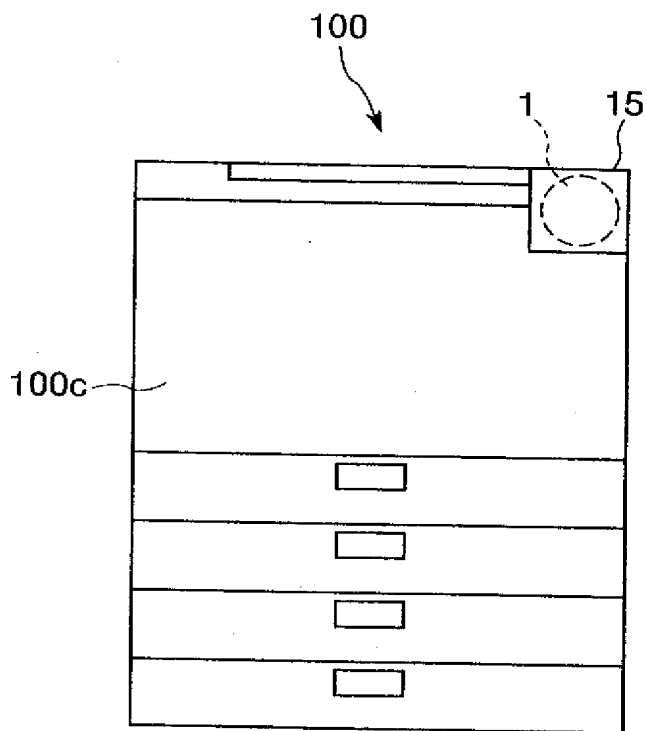
【図2】



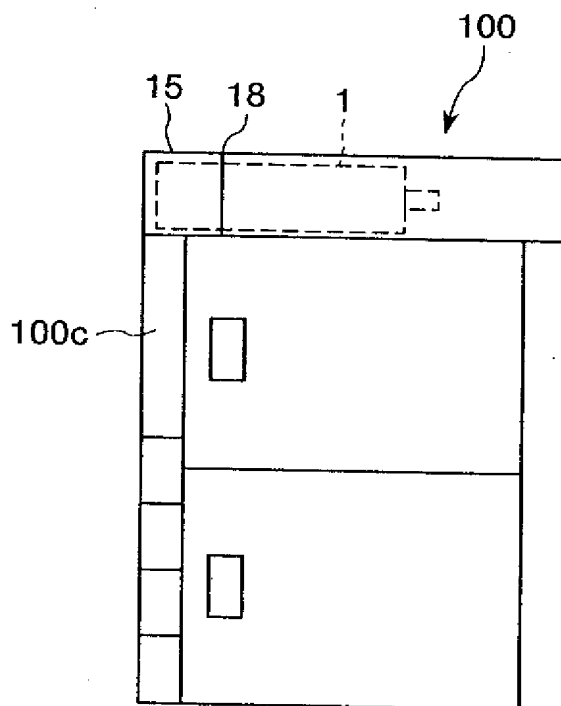
【図3】



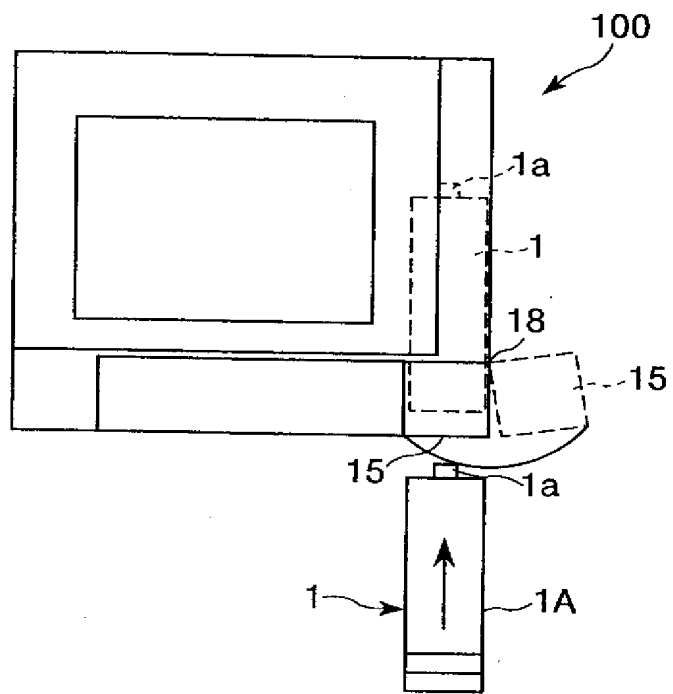
【図4】



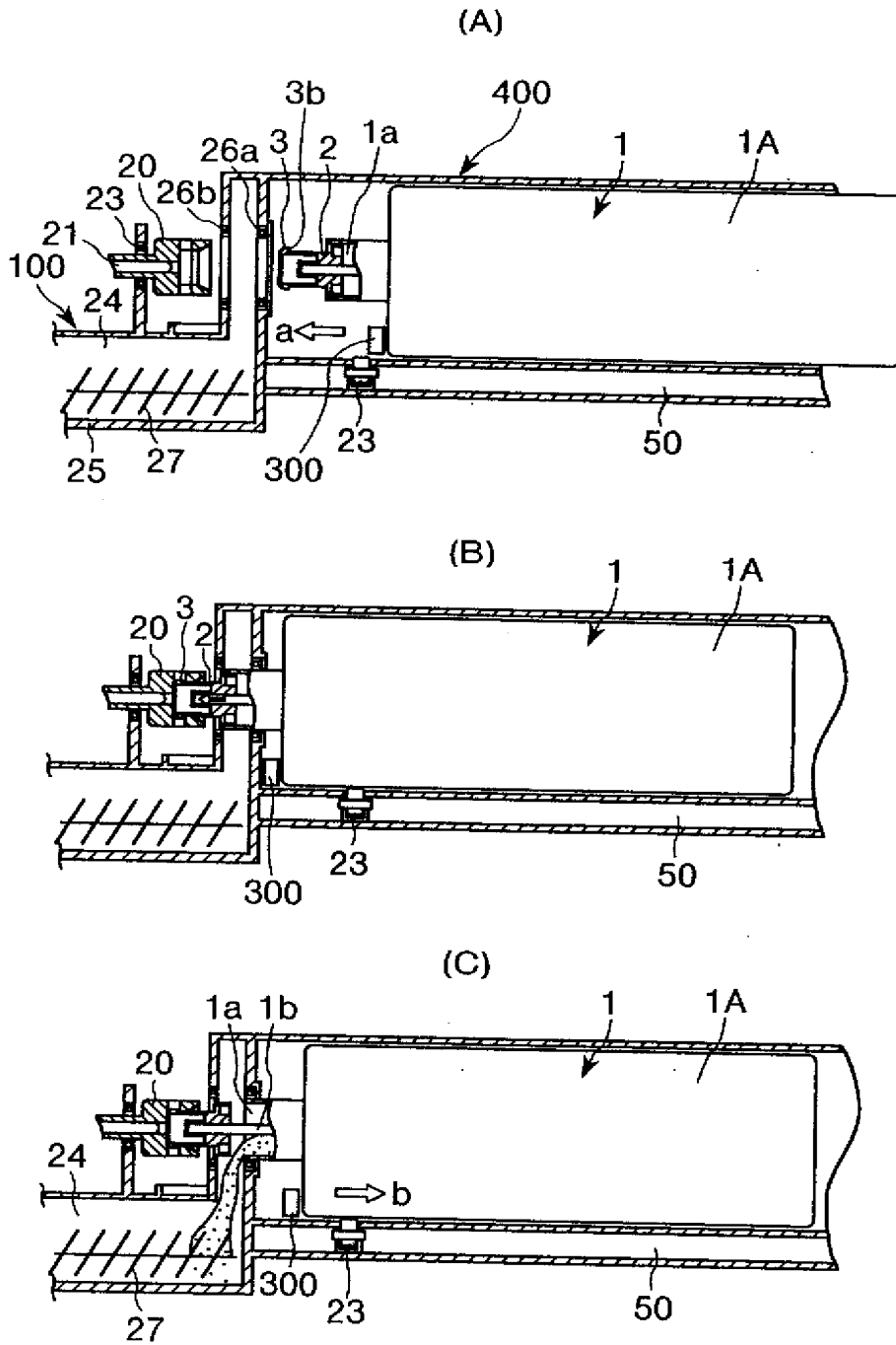
【図 5】



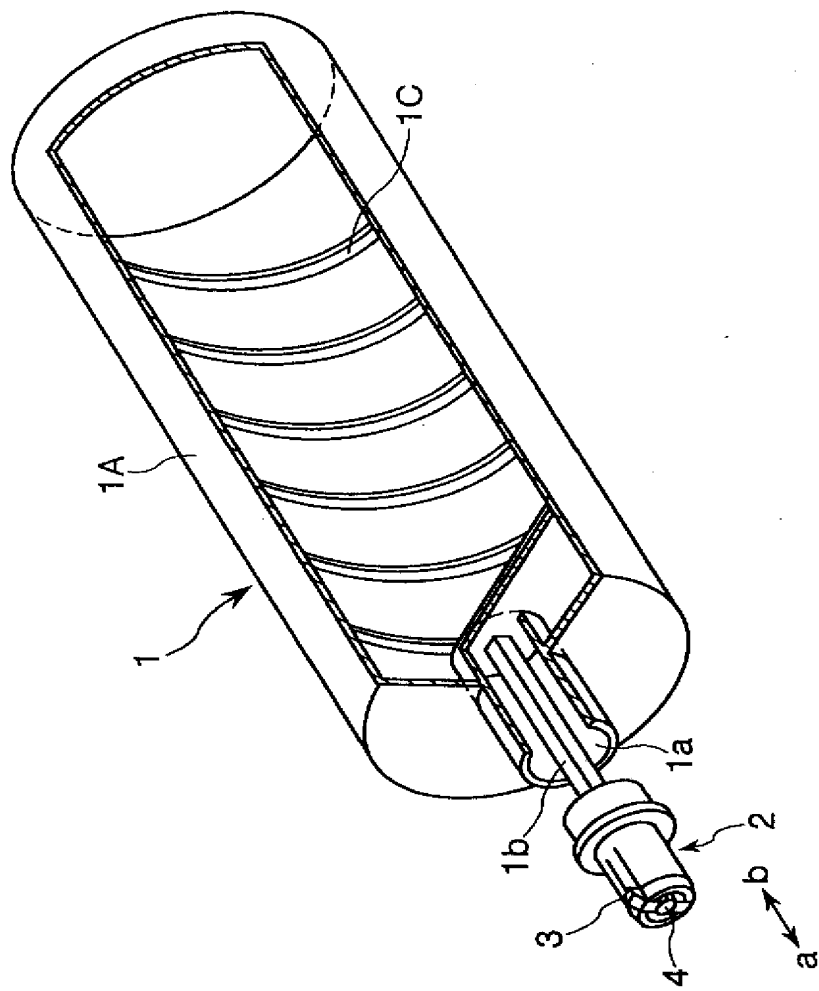
【図6】



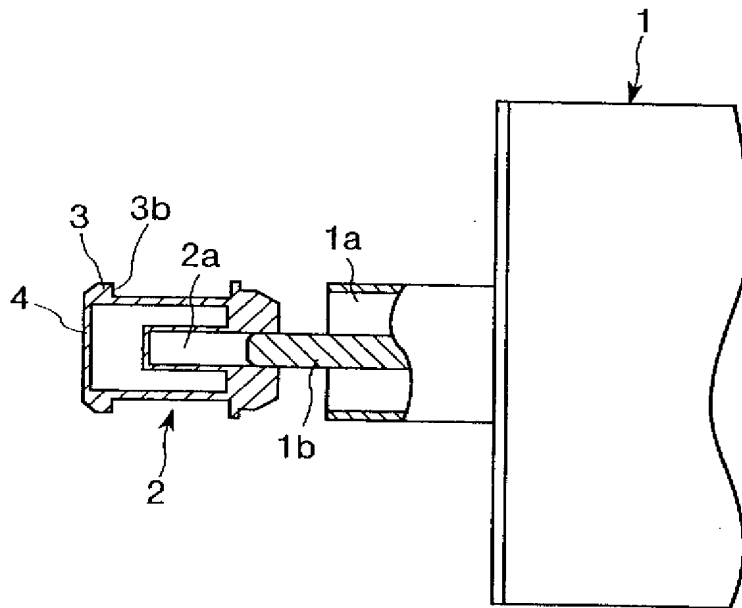
【図7】



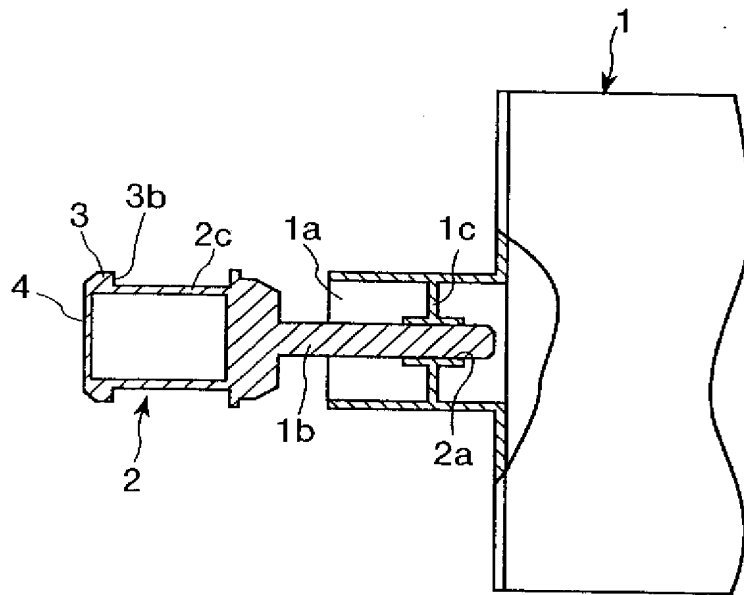
【図8】



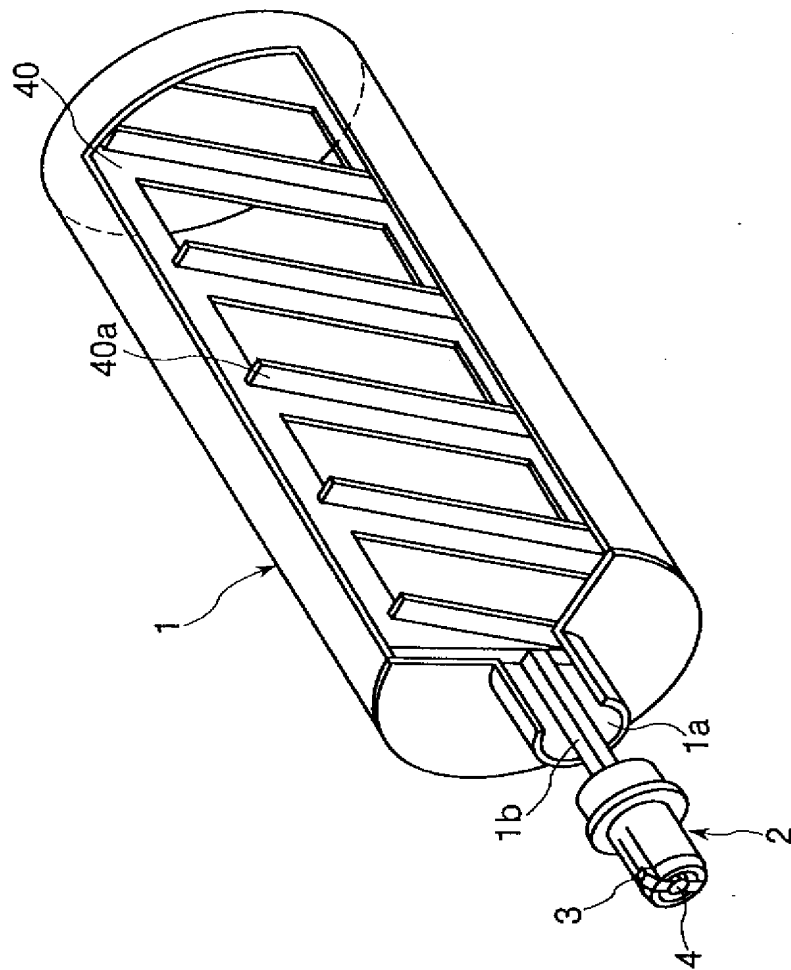
【図9】



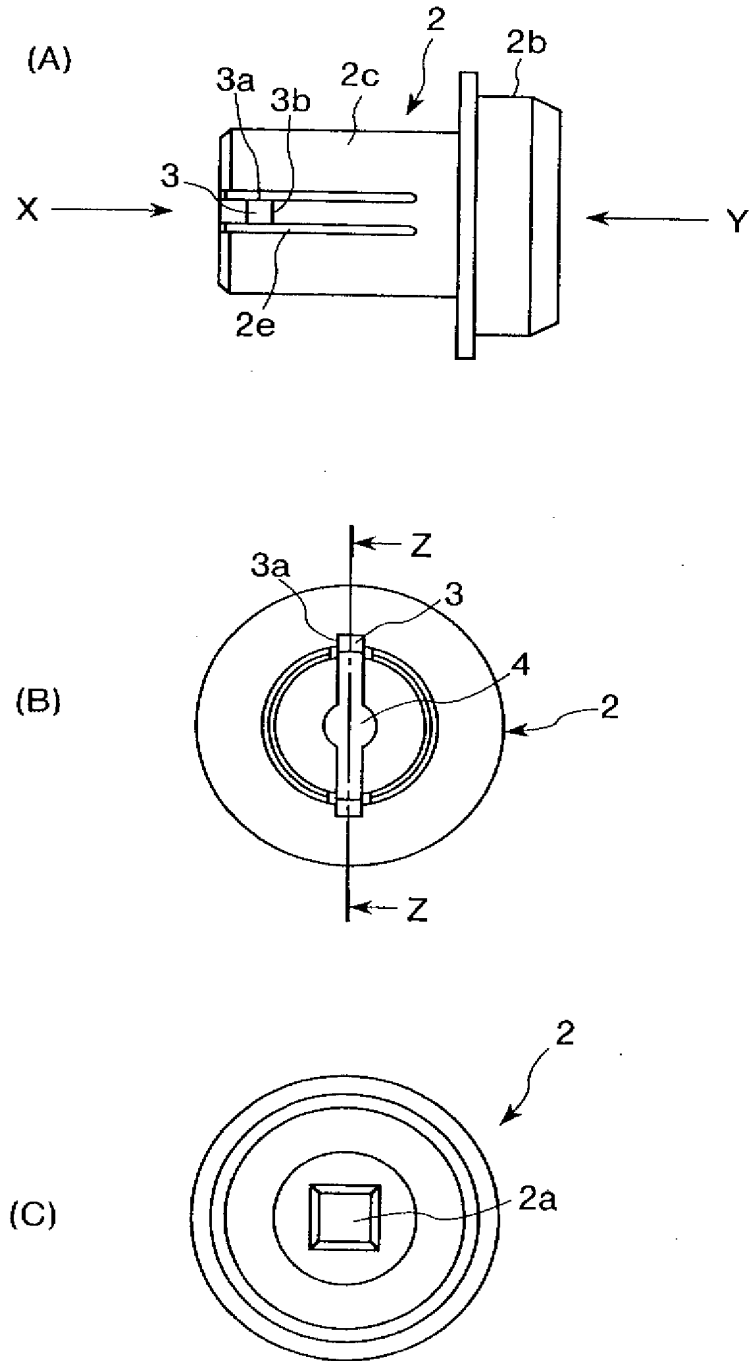
【図10】



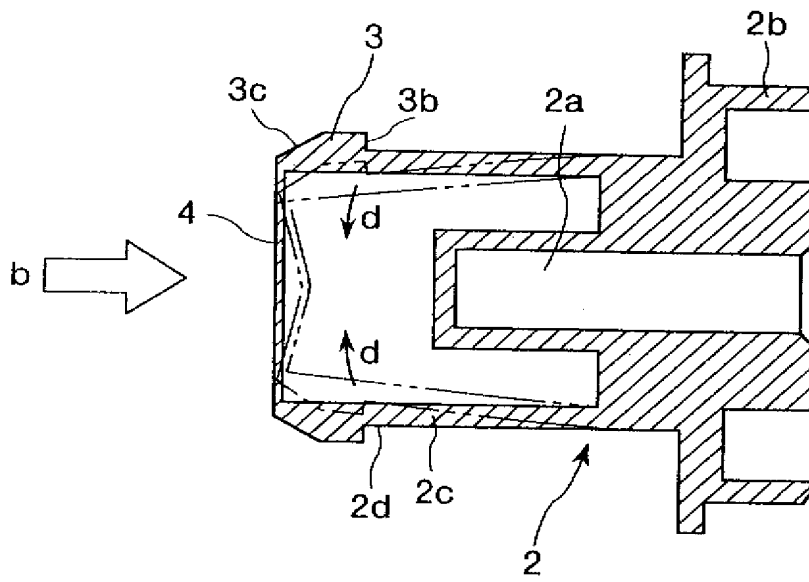
【図11】



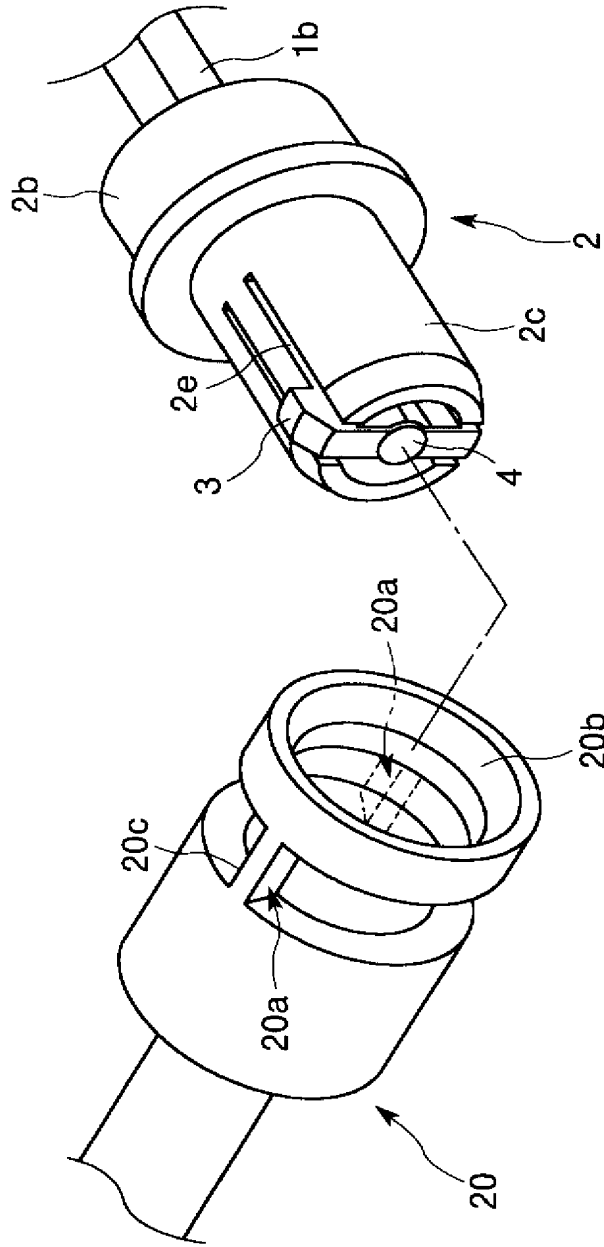
【図12】



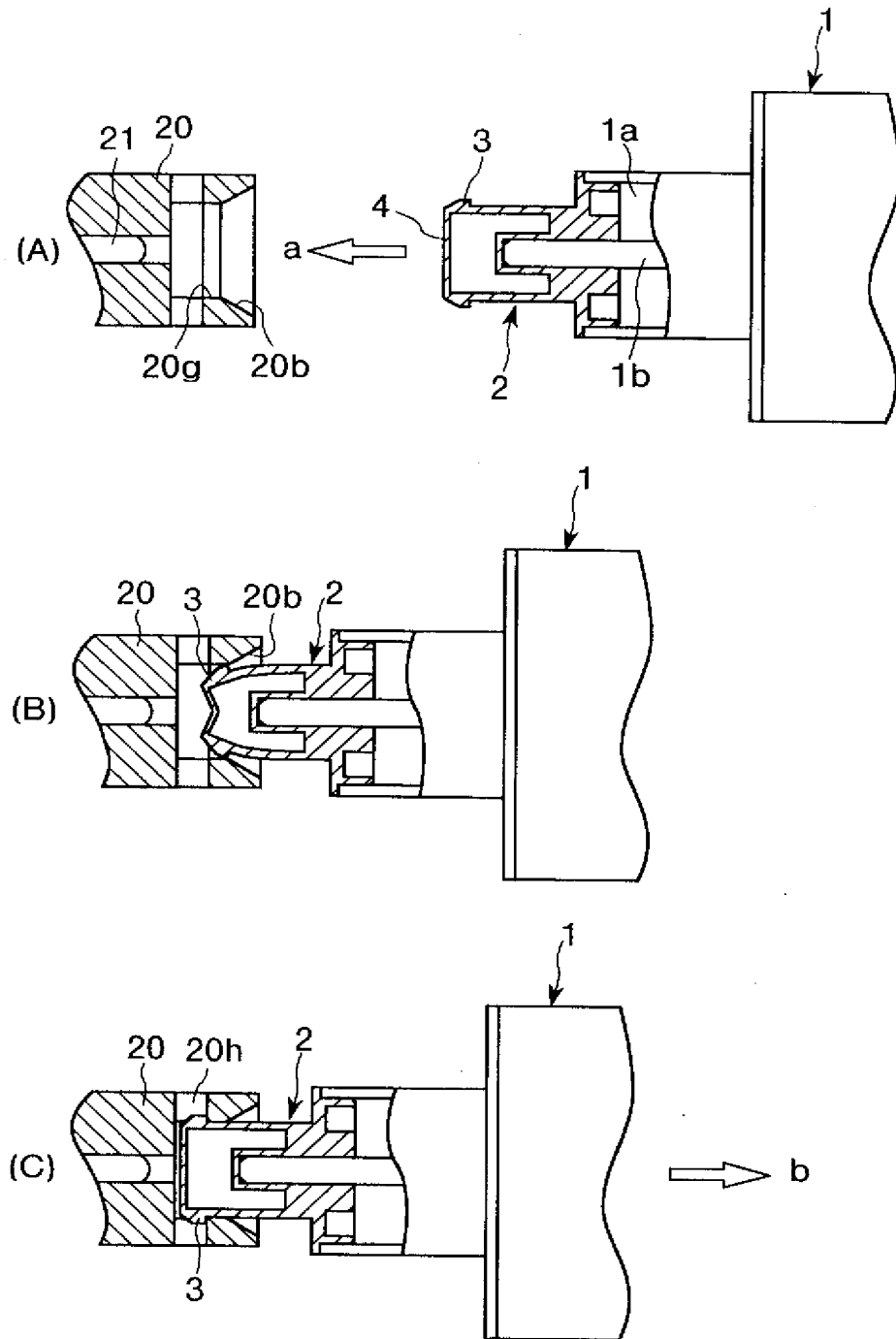
【図13】



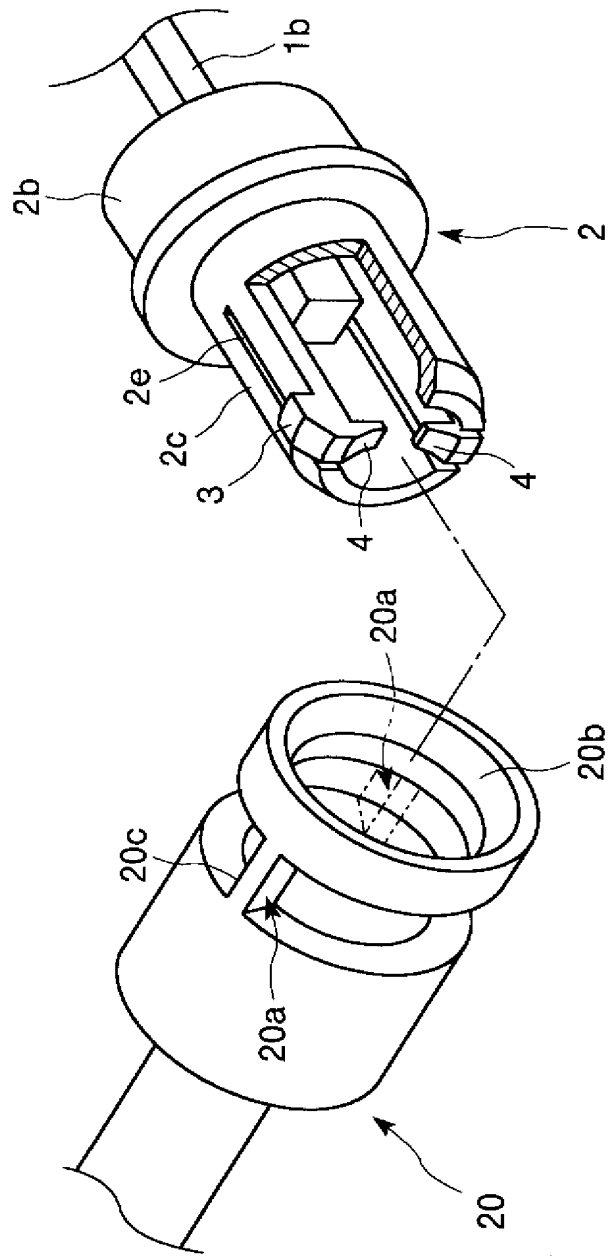
【図14】



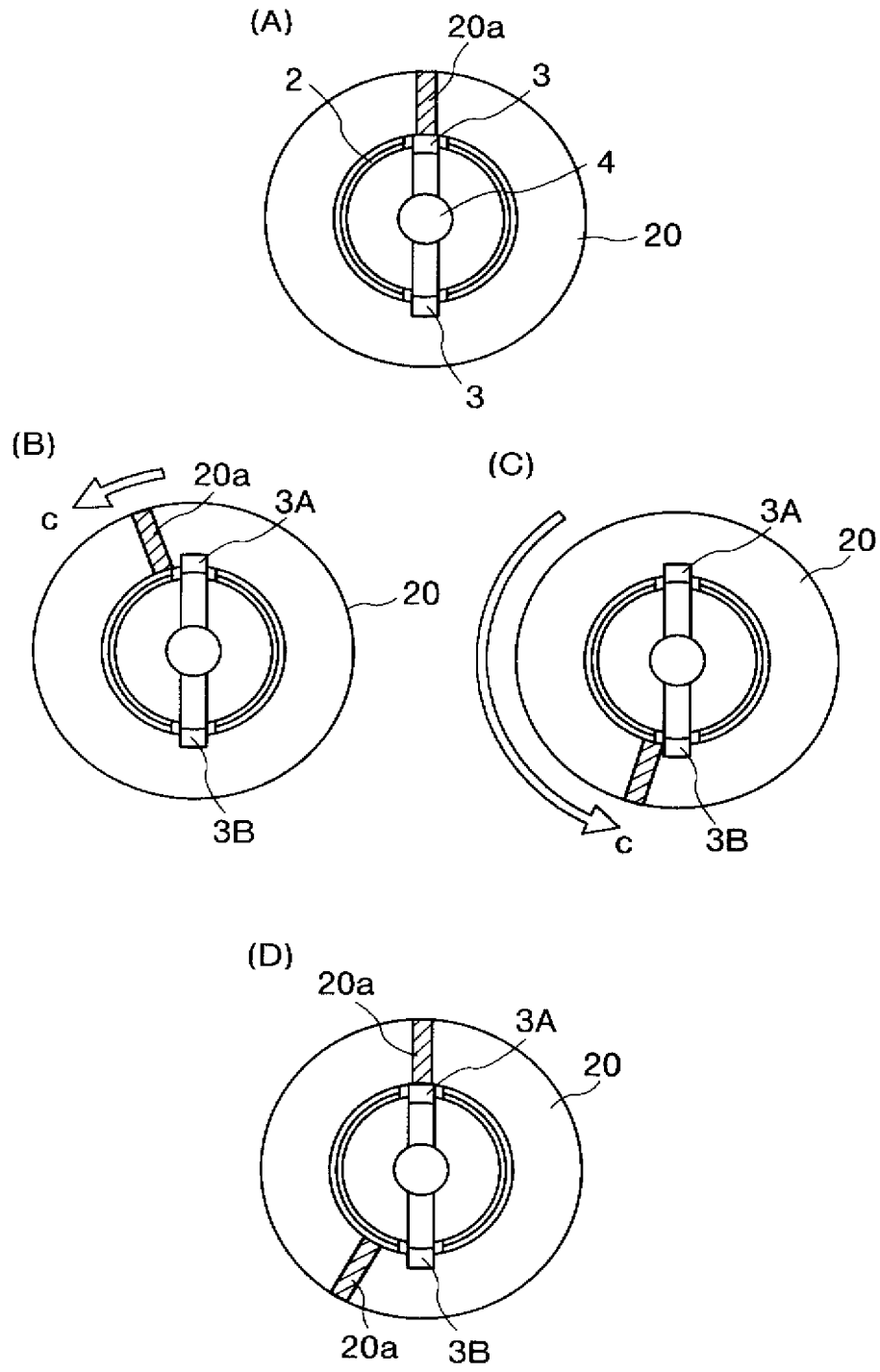
【図15】



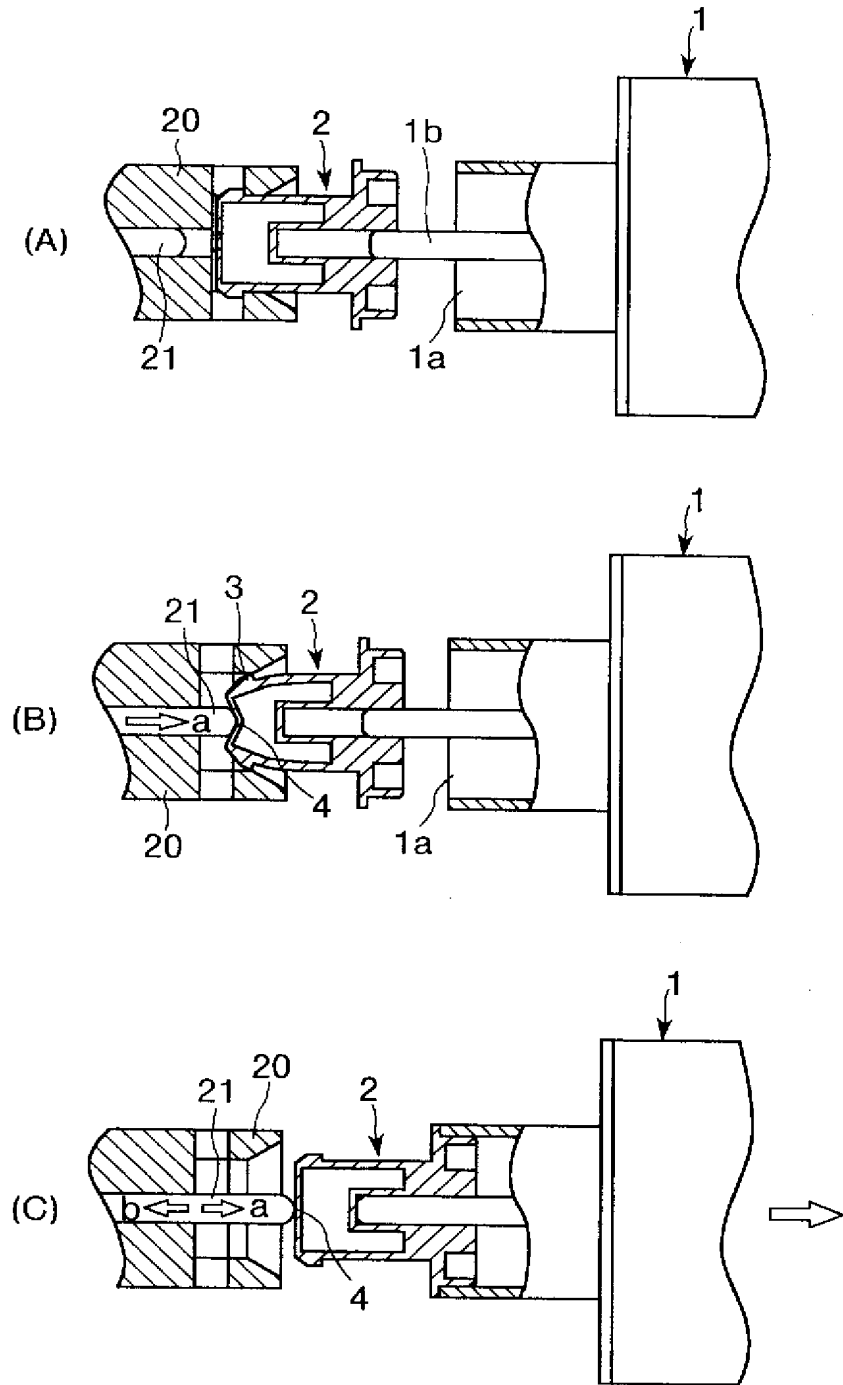
【図16】



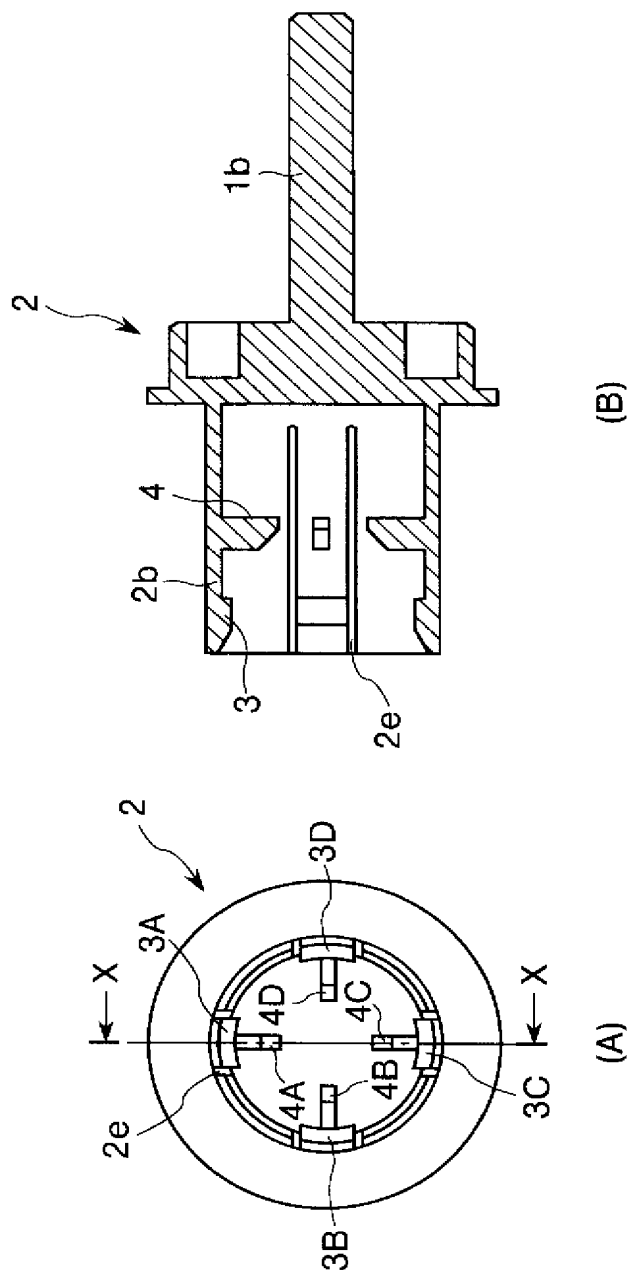
【図17】



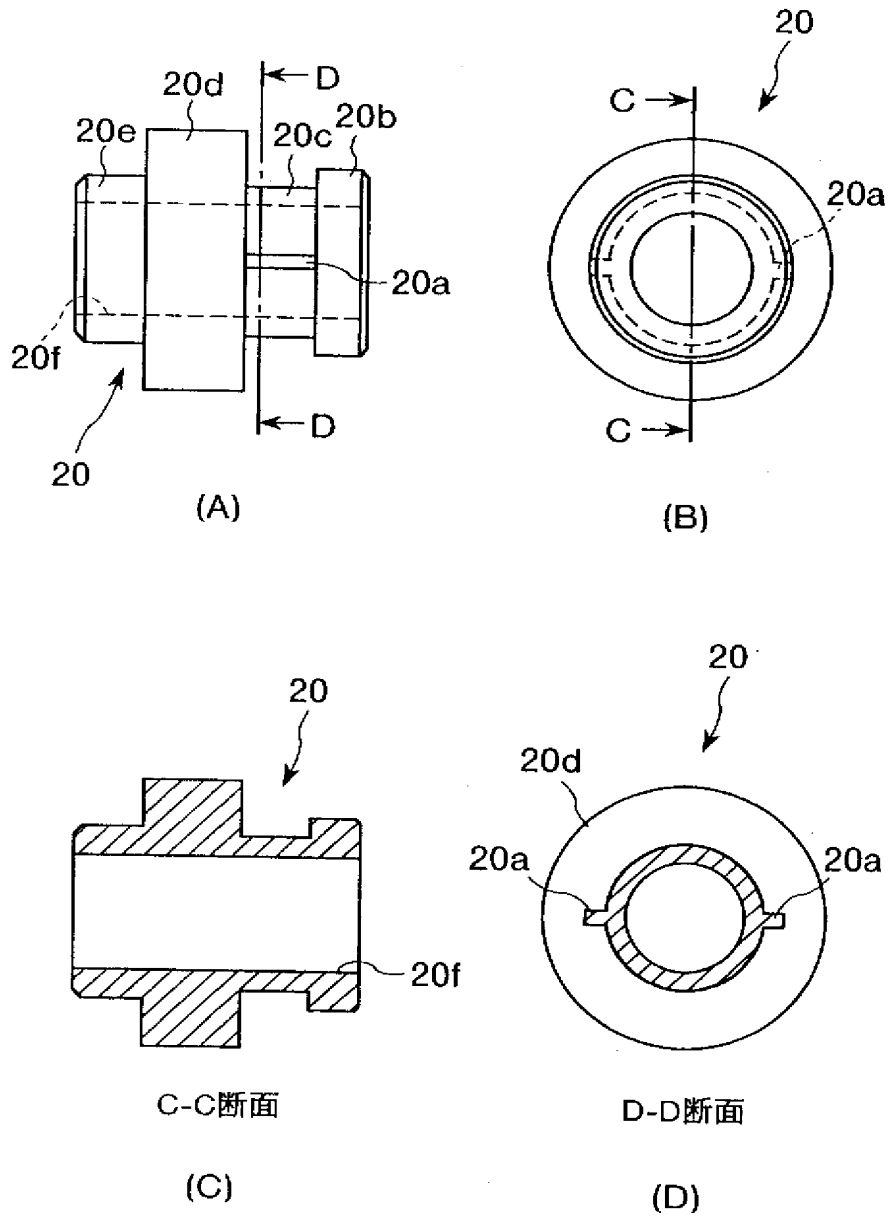
【図18】



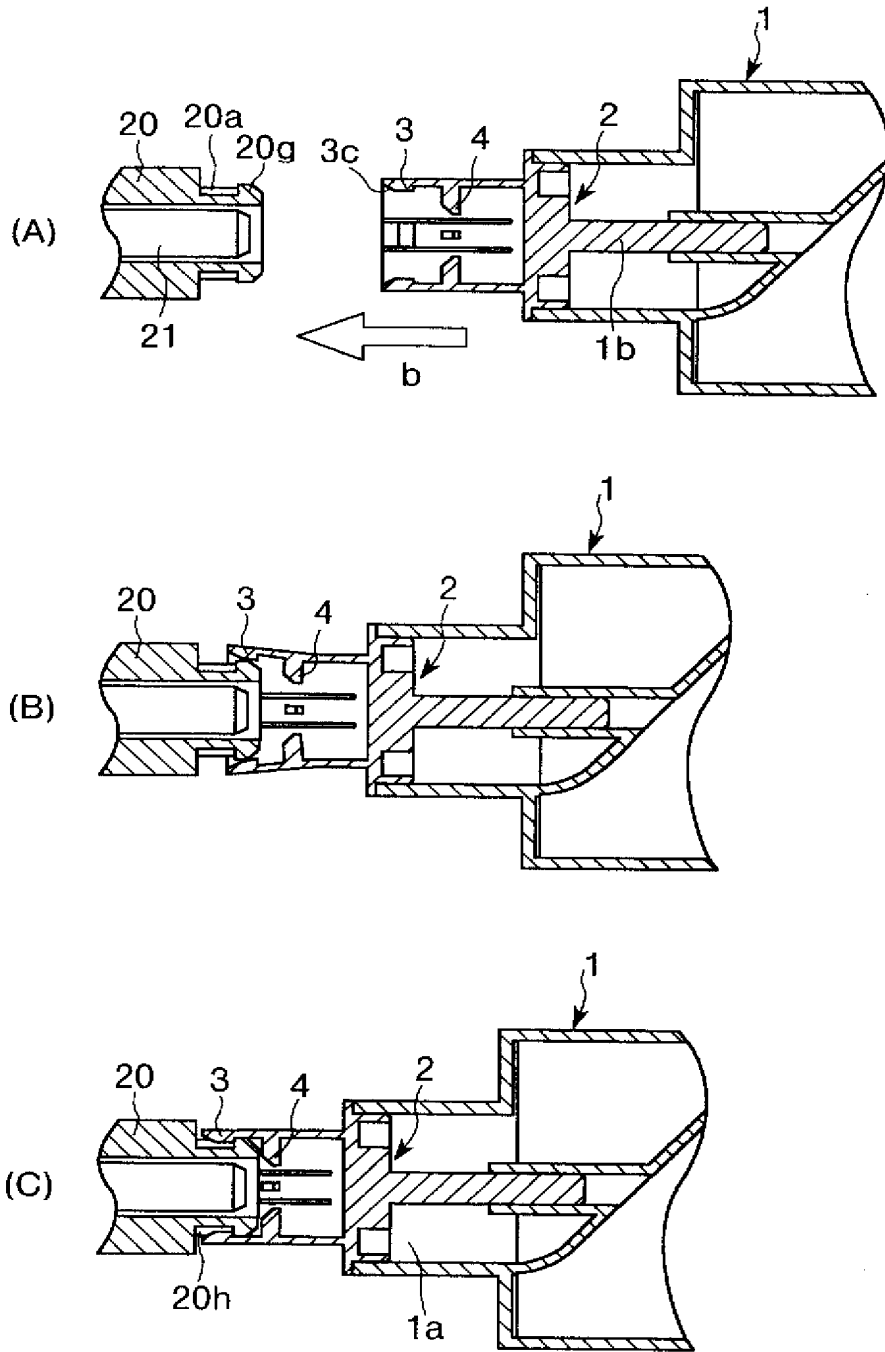
【図19】



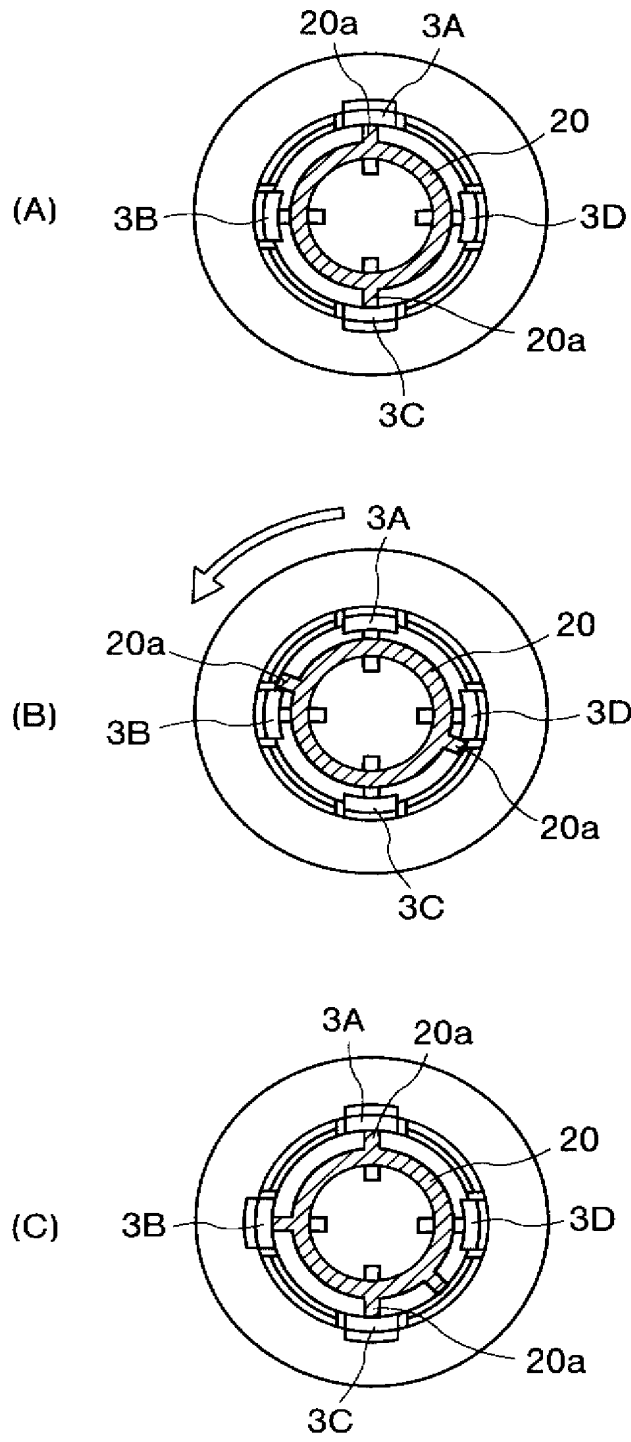
【図20】



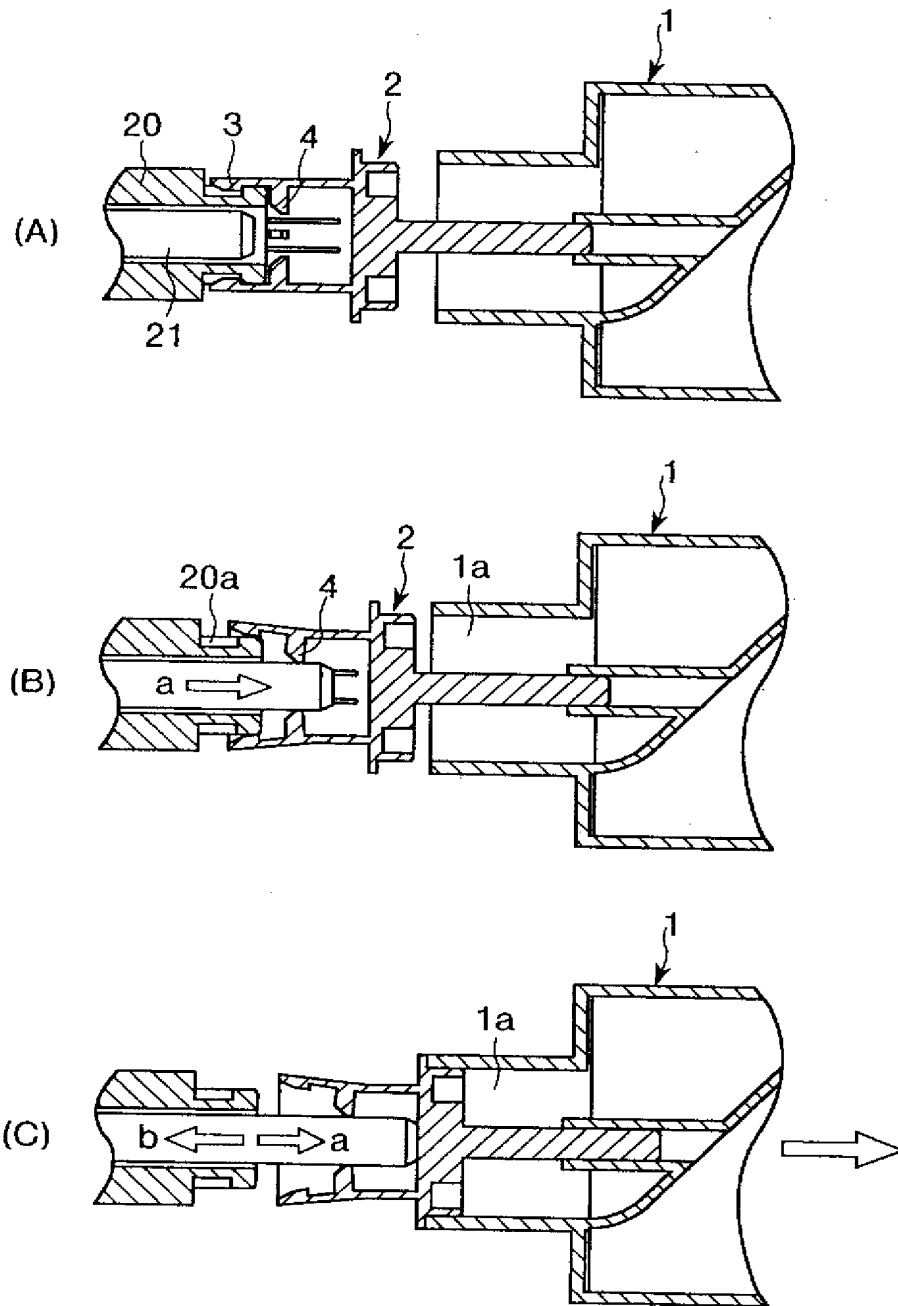
【図 2 1】



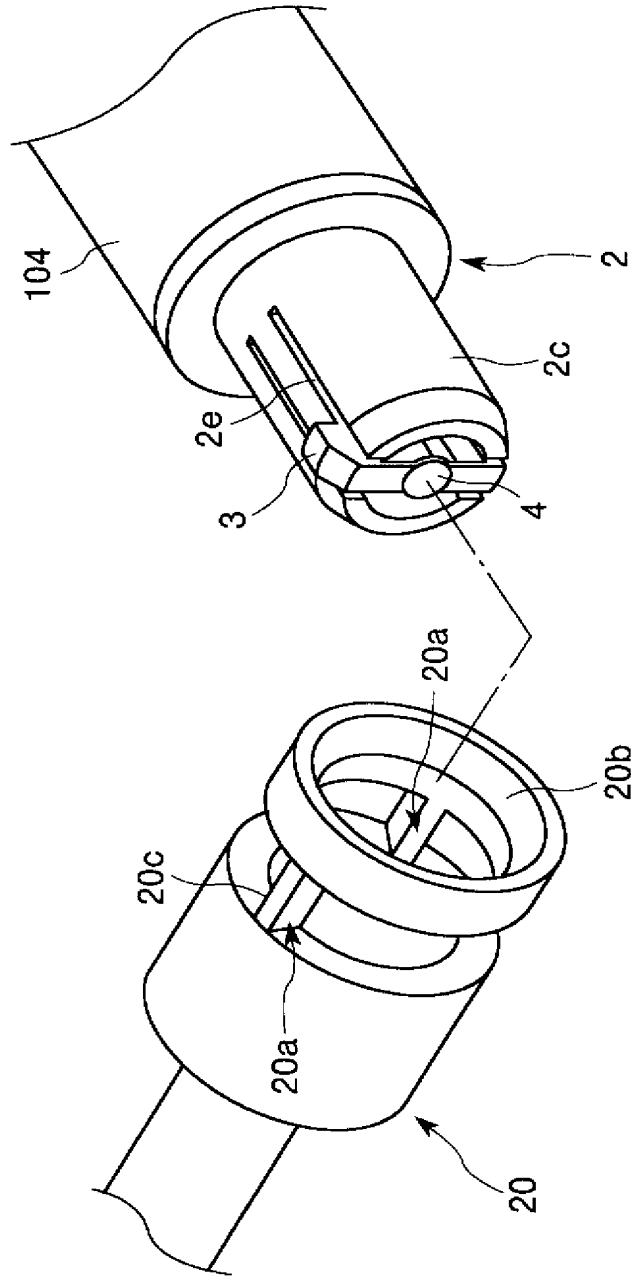
【図 2 2】



【図 23】



【図24】



【書類名】 要約書

【要約】

【課題】 トナー補給容器によるトナー補給操作時にトナー補給容器の回転方向の位置合わせを必要とせず、簡単な操作で確実に補給できる、駆動伝達機構、トナー補給容器及びトナー補給装置を提供する。

【解決手段】 画像形成装置本体側に略円筒形状の駆動伝達部材20を設け、トナー補給容器側に駆動受け部材2を設ける。駆動受け部材2に設けた係合突起部3は、駆動伝達部材20に設けた回転方向係合部20aの数よりも少なくとも一つ以上は多い。

【選択図】 図14

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FILING RECEIPT



Date Mailed: 09/28/2012

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Assignment For Published Patent Application

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Power of Attorney: The patent practitioners associated with Customer Number 05514

Domestic Priority data as claimed by applicant

This application is a DIV of 13/231,388 09/13/2011 PAT 8290394 *
which is a DIV of 12/981,785 12/30/2010 PAT 8045901
which is a DIV of 12/615,012 11/09/2009 PAT 7890027
which is a DIV of 12/169,895 07/09/2008 PAT 7647012
which is a DIV of 11/200,179 08/10/2005 PAT 7430384
which is a DIV of 10/429,741 05/06/2003 PAT 6990301
which is a CIP of 10/076,430 02/19/2002 PAT 6879789
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

JAPAN 2001-042536 02/19/2001

JAPAN 2001-197546 06/28/2001

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If Required, Foreign Filing License Granted: 09/27/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/617,050**

Projected Publication Date: 01/10/2013

Non-Publication Request: No

Early Publication Request: No

Title

SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS

Preliminary Class

399

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
13/617,050

APPLICATION AS FILED - PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(j))	1 minus 20 =	*
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

SMALL ENTITY

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

OR OTHER THAN SMALL ENTITY

RATE(\$)	FEE(\$)
N/A	380
N/A	620
N/A	250
x 60 =	0.00
x 250 =	0.00
	0.00
	0.00
TOTAL	1250

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
Independent (37 CFR 1.16(h))	*	Minus	***	=	
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR OTHER THAN SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
Independent (37 CFR 1.16(h))	*	Minus	***	=	
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR OTHER THAN SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

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UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 CFR 1.53(b))	Attorney Docket No. 00684.003330.18	
	First Inventor Yusuke YAMADA	
	Title	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS
	Express Mail Label No.	
APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria VA 22313-1450	
1. <input type="checkbox"/> Fee Transmittal Form (e.g. PTO/SB/17) <i>(Submit an original and a duplicate for fee processing)</i> 2. <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. 3. <input checked="" type="checkbox"/> Specification <i>Total Pages</i> [72] Both the claims and abstract must start on a new page <i>(For information on the preferred arrangement, see MPEP 6.08.01(a))</i> 4. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) <i>Total Sheets</i> [34] 5. <input checked="" type="checkbox"/> Oath or Declaration <i>Total Sheets</i> [2] a. <input type="checkbox"/> Newly executed (original or copy) b. <input checked="" type="checkbox"/> Copy from a prior application (37 CFR 1.63(d)) <i>(for continuation/divisional with Box 18 completed)</i> i. <u>DELETION OF INVENTOR(S)</u> <input type="checkbox"/> Signed statement attached deleting inventor(s) named in the prior application (see 37 CFR) 1.63(d)(2) and 1.33(b) 6. <input checked="" type="checkbox"/> Application Data Sheet. See 37 CFR 1.76 7. <input type="checkbox"/> CD-ROM or CD-R in duplicate, large table or Computer Program (<i>Appendix</i>) <input type="checkbox"/> Landscape Table on CD 8. <input type="checkbox"/> Nucleotide and/or Amino Acid Sequence Submission <i>(if applicable, items a. - c. are required)</i> a. <input type="checkbox"/> Computer Readable Form (CRF) b. Specification Sequence Listing on: i. <input type="checkbox"/> CD-ROM or CD-R (2 copies); or ii. <input type="checkbox"/> paper c. <input type="checkbox"/> Statements verifying identity of above copies	ACCOMPANYING APPLICATION PARTS 9. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 10. <input type="checkbox"/> 37 CFR 3.73(b) Statement <input type="checkbox"/> Power of Attorney (when there is an assignee) 11. <input type="checkbox"/> English Translation Document <i>(if applicable)</i> 12. <input type="checkbox"/> Information Disclosure (PTO/SB/08 or PTO-1449) <input type="checkbox"/> Copies of citations attached 13. <input checked="" type="checkbox"/> Preliminary Amendment 14. <input type="checkbox"/> Return Receipt Postcard (MPEP 503) <i>(Should be specifically itemized)</i> 15. <input type="checkbox"/> Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i> 16. <input type="checkbox"/> Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent or its equivalent. 17. <input checked="" type="checkbox"/> Other: Claim to Priority; Notification of Recordation of Assignment Document at Reel 014472, Frame 0830 on 09/10/2003	
18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76: <input type="checkbox"/> Continuation <input checked="" type="checkbox"/> Divisional <input type="checkbox"/> Continuation-in-part (CIP) of prior application No.: 13/231,388, filed 09/13/2011 Prior application information: Examiner: Susan Shuk Yin Lee Group Art Unit: 2884		
19. CORRESPONDENCE ADDRESS		
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Signature	Date	September 14, 2012
Name (Print/Type)	William M. Wannisky	Registration No. (Attorney/Agent) 28,373

FCHS_WS 8141759v1.doc

10/429,741 **SEALING MEMBER, TONER ACCOMMODATING
CONTAINER AND IMAGE FORMING APPARATUS** 00684.003330.2 09-14-
2012::12:11:50

Patent Assignment Abstract of Title

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Application #: 10429741

Filing Dt: 05/06/2003

Patent #: 6990301

Issue Dt: 01/24/2006

PCT #: NONE

Publication #: US20040009006

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Inventors: Yusuke Yamada, Yutaka Ban, Katsuya Murakami, Fumio Tazawa, Hironori Minagawa

Title: SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS

Assignment: 1

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Exec Dt: 08/26/2003

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Exec Dt: 08/20/2003

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Search Results as of: 09/14/2012 12:11:23 PM

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Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS			
First Named Inventor/Applicant Name:	Yusuke Yamada			
Filer:	Lawrence A. Stahl			
Attorney Docket Number:	00684.003330.18			
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1250

Electronic Acknowledgement Receipt

EFS ID:	13747865
Application Number:	13617050
International Application Number:	
Confirmation Number:	1149
Title of Invention:	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS
First Named Inventor/Applicant Name:	Yusuke Yamada
Customer Number:	5514
Filer:	Lawrence A. Stahl/Denni Godfrey
Filer Authorized By:	Lawrence A. Stahl
Attorney Docket Number:	00684.003330.18
Receipt Date:	14-SEP-2012
Filing Date:	
Time Stamp:	14:37:11
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	yes
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Payment was successfully received in RAM	\$1250
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Deposit Account	503939
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1		Spec_003330_18_USA400.pdf	5775900 9487a7e2689ac18317aeea73687d6951d4fba08f	yes	72
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	65	
	Claims		66	71	
Abstract		72	72		
Warnings:					
Information:					
2	Drawings-only black and white line drawings	Drawings_003330_18_USB104.pdf	1859121 b2ea43fdff4551b41ed54889e38b0c88df88754c	no	34
Warnings:					
Information:					
3	Oath or Declaration filed	Declaration_003330_18_USA400.pdf	276032 a6851838e77dde2ddef3fe354da0e92b1bd80d51	no	2
Warnings:					
Information:					
4	Miscellaneous Incoming Letter	ClaimtoPriority_003330_18_USA400.pdf	197196 10e32e6759f55468ca1c9ea4b90d6e7fa96693ce	no	2
Warnings:					
Information:					
5		PreliminaryAMD_003330_18_USA400.pdf	221051 7335943cf93f26e474a49ea44d9fe7b274584075	yes	3
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	
	Claims		2	2	
Applicant Arguments/Remarks Made in an Amendment		3	3		
Warnings:					
Information:					

6	Application Data Sheet	ADS_003330_18_USA400.pdf	2139808 a09f958964fc65a452d23f047ca891467dae1c70	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
7	Transmittal of New Application	UtilityTransmittal_003330_18_USA400.pdf	257728 6acc626cc630073562175a0af3febb9a5d672612	no	2
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	33137 3aba830622de3fe8c6a8257f7cfe4aed963a169e9	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			10759973		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

SEALING MEMBER,
TONER ACCOMMODATING CONTAINER AND
IMAGE FORMING APPARATUS

5 FIELD OF THE INVENTION AND RELATED ART:

This application is a continuation-in-part application of Application No. 10/076,430 filed February 19, 2002.

10 The present invention relates to a toner accommodating container, a sealing member therefor and an image forming apparatus, suitably usable with an image forming apparatus such as a copying machine, a printer, facsimile machine.

15 In a conventional electrophotographic image forming apparatus such as an electrophotographic copying machine or a printer, fine particles toner is used as a developer. When the toner in the main assembly of the electrophotographic image forming apparatus is used up, the toner is supplied into the
20 main assembly of the image forming apparatus using a toner accommodating container (toner supply container).

Here, the electrophotographic image forming apparatus is an apparatus which forms images on a
25 recording material through an electrophotographic image formation type process. The electrophotographic image forming apparatus includes a, an

electrophotographic copying machine, an
electrophotographic printer (laser beam printer, LED
printer, for example), a facsimile machine, word
processor or the like.

5 Since the toner is very fine powder, it is
known to place, upon toner supplying operation, a
toner supply container inside the main assembly of the
image forming apparatus and to gradually supply the
toner through a small opening to avoid scattering of
10 the toner.

 Any one of the above-described toner supply
containers receives a driving force from the main
assembly of an image forming apparatus to drive the
feeding member in the toner supply container or the
15 main body itself to discharge the toner. As for such
a drive transmitting means, there are some methods.
For example, Japanese Laid-Open Utility Model
Application Hei 05-75768 discloses that gear portion
is provided on an outer surface of the toner bottle
20 (toner supply container), and the gear is engaged with
a driving gear, by which the toner bottle is rotated.

 Japanese Laid-open Patent Application Hei 10-
63084 discloses that end surface of the toner bottle
is provided with a projection, which is engaged with a
25 recesses formed in a driving portion of the main
assembly of the image forming apparatus, thus
transmitting the driving force.

Japanese Laid-open Patent Application Hei 10-63076 discloses another type. A rotating force transmitting portion of the main assembly of image forming apparatus has an inner diameter which is provided with a plurality of engaging grooves, and the toner container is provided with projections engageable with the engaging grooves. The rotational driving force is transmitted through the engagement therebetween.

As described, various drive transmission methods are proposed for driving the toner supply container.

However, the conventional structures involve some problems.

In the case of Japanese Laid-Open Utility Model Application Hei 05-75768, when the toner bottle is inserted into the main assembly of the image forming apparatus, it is necessary to make the gear portion on the outer surface of the toner bottle properly engage with the driving gear portion in the main assembly of image forming apparatus. This requires the user to be careful for the proper engagement. In addition, since the toner bottle is rotated through the meshing engagement between gears, the toner bottle receives forces tending to deviate the bottle in a direction perpendicular to the axis. Therefore, there is a possibility that toner bottle is

raised or is laterally deviated with a result of
improper rotation. In order to avoid such a
deviation, it is required that entire outer
circumference of the toner bottle is enclosed. This
5 imposes difficulty in the toner bottle mounting and
mounting operation. Additionally, the supplying
system becomes complicated and expensive.

In the methods disclosed in Japanese Laid-
open Patent Application Hei 10-63084 and Japanese
10 Laid-open Patent Application Hei 10-68076, when the
toner bottle is inserted such that projection (or
recess) provided at the end surface of toner bottle is
properly engaged with the basis (or projection) of the
main assembly side driving portion (main assembly
15 driving portion), an indexing operation in the
rotational direction is required. This degrades the
developer supplying operativity, and even a slight
deviation may result in an inoperability.

In order to avoid such an improper
20 engagement, it is required that toner bottle is
provided on its outer surface with a guiding rib so as
to determine the position of the toner bottle in the
rotational direction upon the insertion thereof, or
that rotating operation of the engaging recess of the
25 main assembly driving portion is controlled to stop at
a predetermined rotational position whenever it stops.
This also results in complication and cost increase.

In most of the coupling drive transmission using projection/recess engagement, when the phase deviation occurs between the toner bottle and the main assembly driving portion, it is required that main
5 assembly driving portion is retracted against a spring force, and the engaging position is established when the phase becomes aligned. With such a structure, even if there is a phase difference when the toner bottle is inserted, the main assembly driving portion
10 is retracted, and when the bottle is rotated with the state, the face differences is eliminated sooner or later, and therefore, the engagement is established. However, the structure of the main assembly driving portion is complicated. In addition, the main
15 assembly driving portion has to be movable toward the rear side, which requires an additional space and therefore hinder downsizing of the main assembly of the apparatus.

In the conventional example, it is not
20 disclosed as to how to disengage the projection from the recess. Assuming that operator forces to pull the toner supply container out, or the operator pushes the small projection by the finger, the usability is not good, or the driving portion of the image forming
25 apparatus or the toner supply container may be damaged.

SUMMARY OF THE INVENTION:

Accordingly, it is a principal object of the present invention to provide a sealing member in which a sealing member is locked with an image forming apparatus in order to open or unseal a toner discharge opening of a toner accommodating container, and yet the sealing member can be released from the image forming apparatus with a simple structure.

It is another object of the present invention to provide a toner accommodating container in which a locking portion of the toner accommodating container is locked with an image forming apparatus, and it the locking of the locking portion with the image forming apparatus can be released with a simple structure.

It is a further object of the present invention to provide a toner accommodating container in which a sealing member is locked with an image forming apparatus to open or unseal a toner discharge opening of the toner accommodating container, and yet the sealing member can be released from the image forming apparatus with a simple structure.

It is a further object of the present invention to provide an image forming apparatus in which a locking portion of a toner accommodating container is engaged with a portion to be locked of mounting means, and it the locking portion can be released from the portion to be locked with a simple

structure.

It is a further object of the present invention to provide an image forming apparatus in which a locking portion of a sealing member is engaged
5 with a portion to be locked of the mounting means to open or unseal a toner discharge opening of a toner accommodating container, and yet the locking portion can be released from the portion to be locked with a simple structure.

10 These and other objects, features and advantages of the present invention will become more apparent upon a consideration of the following description of the preferred embodiments of the present invention taken in conjunction with the
15 accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 is a sectional view of an image forming apparatus according to an embodiment of the
20 present invention.

Figure 2 is a perspective view of the image forming apparatus shown in Figure 1.

Figure 3 is a perspective view illustrating mounting of a toner supply container into an image
25 forming apparatus.

Figure 4 is a front view of an image forming apparatus of Figure 1.

Figure 5 is a side view of the image forming apparatus of Figure 1.

Figure 6 is a top plan view of the image forming apparatus in which a toner container exchange cover is shown as being in an open position.

Figure 7 is sectional views illustrating a toner supply container mounting operation, wherein (A) shows an initial stage of the mounting operation, (B) shows the state in the process of mounting operation, and (C) shows the state after the completion of the mounting operation.

Figure 8 is a partly broken perspective view of a toner supply container according to an embodiment of the present invention.

Figure 9 is a partly enlarged section of view of a drive transmitting portion according to an embodiment of the present invention in which a driving shaft is provided on the main body side of the toner supply container.

Figure 10 is a partly broken perspective view of a toner supply container according to another embodiment of the present invention.

Figure 11 is a partly enlarged section of view of a drive transmitting portion according to another embodiment of the present invention in which a driving shaft is provided on a sealing member side.

Figure 12 is a side view of a sealing member

according to an embodiment of the present invention, wherein (A) is a front view, (B) is a side view as seen in the direction X of (A), and (C) is a side view as seen in the direction Y of (A).

5 Figure 13 is a sectional view of a sealing member taken along a line X-X of (B) of Figure 12.

 Figure 14 is a perspective view of a driving force transmitting portion and a driving force receiving portion according to an embodiment of the present invention.

 Figure 15 is a partially sectional view illustrating engaging action of a drive transmitting portion of a toner bottle, in which (A) shows a state before insertion of toner bottle, (B) shows a state in the process of insertion, (C) shows a state after the completion of inserting operation.

 Figure 16 is a perspective view of a driving force receiving portion according to another embodiment of the present invention.

20 Figure 17 is a sectional view of the sealing member of Figure 16.

 Figure 18 is an illustration of phase alignment when the toner bottle is inserted into the main assembly of apparatus wherein (A) shows a state in which an engaging rib and an engaging projection are aligned with each other, (B) shows a state in which they are not aligned after rotation to a certain

extent, and (C) shows a state in which the engaging rib is abutted to the engaging projection to enable drive transmission.

Figure 19 shows a sealing member according to an embodiment of the present invention, wherein (A) is a left side view, (B) is a front view, and (C) is a right-hand side view.

Figure 20 is a perspective view of a driving force transmitting portion and a driving force receiving portion according to a further embodiment of the present invention, in which phase control operation is not necessary.

Figure 21 illustrates the drive transmitting portion of Figure 20 during a toner bottle inserting operation, wherein (A) shows a state before insertion of the toner bottle, (B) shows a state in the process of the inserting operation, and (C) shows a state after completion of the inserting operation.

Figure 22 illustrates disengagement action at the drive transmitting portion of the toner bottle, wherein (A) is before disengagement, (B) is in the process of disengagement, (C) is after completion of the disengagement action.

Figure 23 is a sectional view of a sealing member according to a further embodiment of the present convention, wherein (A) is a side view, (B) is a front view, and (C) is a sectional view.

Figure 24 is a sectional view illustrating engagement of the sealing member of Figure 23 with a driving portion.

5 Figure 25 is an illustration of disengagement action at the drive transmitting portion of the toner bottle, wherein (A) is before disengagement, (B) is in the process of disengagement, and (C) is after the completion of the disengagement action.

10 Figure 26 illustrates a sealing member according to a further embodiment of the present invention, wherein (A) is a side view, and (B) is a sectional view taken along a line X-X.

15 Figure 27 shows a driving portion engageable with the sealing member of Figure 26 according to a further embodiment of the present invention, wherein (A) is a front view, (B) is a side view, (C) is a sectional view taken along a line C-C of (B), (D) is a sectional view taken along a line D-D of (A).

20 Figure 28 illustrates engaging action between the sealing member of Figure 26 and the driving portion of Figure 27, wherein (A) shows a state in which the toner bottle is being inserted, (B) shows a state in the process of insertion, and (C) shows a state after the completion of insertion.

25 Figure 29 illustrates disengagement action after the engagement shown in Figure 28, wherein (A) is before the disengagement, (B) is in the process of

the disengagement, and (C) is after completion of the disengagement action.

Figure 30 is a sectional view of a sealing member according to a further embodiment of the present invention, wherein (A) is before disengagement, and (B) is in the process of disengagement.

Figure 31 is a perspective view of a toner supply container according to a further embodiment of the present invention.

Figure 32 shows a sealing member according to a modified embodiment of Embodiment 2.

Figure 33 is a perspective view illustrating a drive transmission for a photosensitive drum according to a further embodiment of the present invention.

Figure 34 schematically shows the sealing member which is rotating.

Figure 35 illustrates another example in which the phase alignment is not required.

Figure 36 is a section of view in which the sealing member shown in Figure 35 is engaged with the driving portion.

25

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

A sealing member, a toner accommodating

container and an image forming apparatus according to the preferred embodiments of the present invention will be described in conjunction with the accompanying drawings.

5 (Embodiment 1)

Referring to Figure 1, the description will first be made as to an electrophotographic image forming apparatus which is an exemplary image forming apparatus to which a toner supply container (toner
10 accommodating container) according to an embodiment of the present invention.

(Electrophotographic image forming apparatus)

Figure 1 shows an electrophotographic copying machine. An original 101 in a main assembly (main
15 assembly of apparatus) 100 is placed on an original supporting platen glass 102. A light image corresponding to the image information of the original 101 is image on an electrophotographic photosensitive drum (image bearing member) 104 through a plurality of
20 mirrors M and a lens Ln of an optical portion 103. On the basis of selection by the user on an operating portion 100a shown in Figure 2 or on the basis of automatic selection in accordance with the paper size of the original 101, an optimum sheet P is selected
25 from the cassettes 105, 106, 107, 108. The recording material is not limited to the sheet of paper, but may be an OHP sheet, for example.

A single sheet P supplied from one of separating devices 105A, 106A, 107A, 108A, is fed to registration rollers 110 by way of a feeding portion 109, and the sheet P is fed to the transfer portion by
5 the registration rollers 110 in synchronism with the rotation of the photosensitive drum 104 and the scanning timing of the optical portion 103. In the transfer portion, a toner image formed on the photosensitive drum 104 is transferred onto the sheet
10 P by the transfer discharger 111. The sheet P now having the transferred toner image is separated from the photosensitive drum 104 by a separation discharger 112.

The sheet P is fed into a fixing portion 114
15 by a feeding portion 113. In the fixing portion 114, the toner image is fixed on the sheet P by heat and pressure. Thereafter, the sheet P is passed through a discharged sheet reversing portion 115 and discharged to a sheet discharge tray 117 by sheet discharging
20 rollers 116 in the case of a one sided copy mode. In the case of a duplex copy mode, the sheet P is refeed to the registration rollers 110 through sheet refeeding paths 119, 120, under the control of a flapper 118 provided in the discharged sheet reversing
25 portion 115. Then, the sheet is fed similarly to the case of the one-sided copy mode, and is finally discharged to the sheet discharge tray 117.

In the case of a superimposed copy mode, the sheet P is temporarily and partly discharged by the sheet discharging rollers 116 through the discharged sheet reversing portion 115. Thereafter, at the
5 timing when the trailing edge of the sheet passes by the flapper 118 while it is still nipped by the sheet discharging rollers 116, the flapper 118 is controlled, and the sheet discharging roller 116 is rotated in the reverse direction, so that it is refeed
10 into the main assembly 100. Thereafter, the sheet is fed to the registration rollers 110 through the sheet refeeding portions 119, 120, and then the sheet is processed similarly to the case of the one-sided copy mode. It is finally discharged to the sheet discharge
15 tray 117.

In the main assembly 100 of apparatus, there are provided a developing device 201 (developing means), a cleaning device 202, the primary charger 203 and so on, around the photosensitive drum 104.

20 An electrostatic latent image is formed by exposing the photosensitive drum 104 uniformly to double to the image light corresponding to the image information of the original 101. The electrostatic latent image is developed with toner by a developing
25 device 201. In order to supply the toner (developer) into the developing device 201, a toner supply container 1 is detachably mountable by the user into

the main assembly 100 of apparatus. The present invention needs applicable to the case in which only the toner is supplied into the image forming apparatus from the toner supply container and to the case in which the toner and carrier are supplied therefrom. In this embodiment, the former is the case.

The developing device 201 comprises a toner hopper 201a (accommodating means) and a developing device 201b. The toner hopper 201a is provided with a stirring member 201c for stirring the toner supply designated from the toner supply container 1. The toner stirred by the stirring member 201c is supplied into the developing device 201b by a magnet roller 201d. The developing device 201b comprises a developing roller 201f and a feeding member 201e. The toner fed from the toner hopper 201a by the magnet roller 201d is fed to the developing roller 201f by the feeding member 201e, and it supplied to the photosensitive drum 104 by the developing roller 201f.

The cleaning device 202 functions to remove the toner remaining on the photosensitive drum 104. The primary charger 203 functions to electrically charge the photosensitive drum 104.

When the user opens a front cover 15 for exchange of the toner supply container (front cover) which is a part of an outer casing shown in Figure 2, a container receiving tray 50 which is a part of

mounting means is drawn out to a predetermined position by an unshown driving system. The user places the toner supply container 1 on the container receiving tray 50. When the user takes the toner supply container 1 out of the main assembly 100 of the apparatus, the container receiving tray 15 is drawn out, and the toner supply container 1 is taken out of the tray 50.

The front cover 15 is provided exclusively for mounting and demounting (exchange) of the toner supply container 1, and therefore, it is opened and closed only for the purpose. When the maintenance operation for the main assembly 100 of the apparatus is to be carried out, the front cover 100c is opened.

The toner supply container 1 may be directly mounted to the main assembly 100 of the apparatus, and may be taken out.

(Toner supply operation)

Referring to Figure 7, (A), Figure 7, (C), the toner supply operation from the toner supply container (toner bottle) in this embodiment, will be described. Figure 7, (A) - (C) illustrates the process of toner supply in which the toner bottle 1 of this embodiment is inserted into the main assembly 100 of the apparatus.

As shown in the Figure, the main assembly 100 of the its apparatus is provided with a toner supply

device 400, and the toner supply device 400 is provided with a driving portion (driving force transmitting portion) 20 for collecting with and rotating the toner bottle 1. The driving portion 20
5 is rotatably supported by bearings 23, and is rotated by an unshown driving motor provided in the main assembly 100 of the apparatus.

The main assembly 100 of apparatus is further provided with a partition 25 constituting a toner
10 supply path 24 connecting with a hopper 201a, and to the partition 25, inner and outer bearing 26a, 26b as for rotatably bearing a part of the toner bottle 1 and for sealing the toner supply path 24, are fixed. Furthermore, a screw member 27 is disposed in the
15 toner supply path 24 to feed the toner to the hopper 201a.

Figure 7, (A) illustrates insertion of the toner bottle 1 into the main assembly 100 of the apparatus. One end of the toner bottle 1 is provided
20 with a toner supply opening 1a, which will be called simply "opening", formed by a cylindrical member in this embodiment, the opening 1a sealed by a sealing member 2 at the free end of the cylinder.

Figure 7, (B) shows a state in which the
25 toner bottle 1 has been further inserted, and an engaging projection 3 (locking projection) provided at a free end portion of the sealing member 2 is engaged

with a locking hole (retaining) with the driving
portion 20 provided in the main assembly. The
engagement between the driving portion 20 and the
sealing member 2 is accomplished in the following
5 manner. The user inserts the toner bottle 1 into the
main assembly, and by this, the driving portion 20 is
brought into contact with an upper surface (locking
force receiving portion) of the engaging projection.
By further inserting the toner bottle 1, the driving
10 portion 20 presses down the engaging projection to
displace it. Thereafter, when the pressing action by
the driving portion 20 is released, the portion
supporting the locking projection restores by its own
elastic force, so that engagement is accomplished.

15 Thus, in this embodiment, the engagement is a
so-called "snap fit" type.

Since the locking surface 3b (locking
portion) provided in the engaging projection 3 is
locked with a locking hole (portion to be locked)
20 against a thrust direction (axial direction) motion,
and therefore, as long as the locking is maintained,
the sealing member 2 is retained at the fixed position
by the driving portion 20, although small play is
permissible.

25 As will be understood from Figure 7, (C),
after the sealing member 2 and the driving portion 20
are engaged, a slidable member 300 is retracted in a

direction indicated by an arrow b in interrelation with a closing operation of the front cover 15 for exchange of the bottle. By this, the toner bottle 1 is retracted, too, but the sealing member is locked
5 with the main assembly side of the image forming apparatus, and therefore, the sealing member 2 is away from the toner bottle 1, thus opening the opening 1a to enable toner supply.

At the time, the driving shaft 1b fixed to
10 the main body 1A of the toner bottle 1, is not completely disengaged from the sealing member 2 even in the state of the opening 1a being sealed by the sealing member and evening the state of the opening being opened, and the engaging portion (hole portion)
15 of the sealing member is kept engaged with the driving shaft 1b (portion to be engaged). The driving shaft 1b has a non-circular cross-sectional configuration, such as rectangular or triangular shape shape to permit driving force transmission. Correspondingly,
20 the hole (engaging portion) has a complementary configuration for slidable fitting.

When an unshown motor is driven in this state, the rotational driving force is transmitted to a driving force receiving surface (driving force
25 receiving portion) of the engaging projection of the sealing member 2 from the main assembly driving portion 20 (the driving portion provided in the main

assembly), and the driving force is transmitted from the sealing member 2 to the driving shaft 1b, which rotates the toner bottle 1 to feed and discharge the toner.

5 Thus, the sealing member 2 has a function of sealing the opening 1a, a function of receiving the rotational driving force from the main assembly side of image forming apparatus, as a function of transmitting the rotational driving force to the toner
10 bottle 1 side.

 The toner bottle 1 is rotatably supported by bottle receiving roller 23 provided on a container receiving Table 50, and therefore, can be smoothly rotated by a small driving torque. The bottle
15 receiving roller 23 is disposed at each of four positions forming a saddle with respect to the main body 1A of the bottom. The bottle receiving rollers 23 are rotatably supported on the toner supply device 400 of the main assembly 100 of the apparatus. By the
20 rotation of the toner bottle 1, the toner accommodated in the toner bottle 1 is discharged through the opening 1a gradually, and the screw member 27 provided in the toner supply path 24 feeds the toner into the hopper 201a provided in the main assembly 100 of
25 apparatus, thus accomplishing the toner supply.
(Exchanging method for toner supply container)

 The description will be made as to an

exchanging method of the toner bottle.

With the image forming operation, the toner in the toner bottle 1 is consumed. When substantially all the toner therein is used up, the "no toner" is
5 detected by a detecting means (unshown) provided in the main assembly 100 of the apparatus, and the event is notified to the user by displaying means 100b (Figure 2) such as liquid crystal display.

In this embodiment, the toner bottle 1 easy
10 exchange by the user, through the following steps.

First, the front cover 15 which is in the close state is rotated about a hinge 18 to an open position indicated by broken lines in Figure 6. In interrelation with the action of opening the front
15 cover 15, the main body 1A of the bottle which takes the position indicated in (C) of Figure 7 is moved in a direction indicated by an arrow an in (A) of Figure 7 which is opposite from the direction of arrow b, by opening and closing means for the toner supplying
20 portion which will be described hereinafter. By this, the sealing member 2 which is at an open position (away from the main body 1A of the bottle to open the toner supply opening 1a) is press-fitted into the toner supply opening 1a, so that toner supply opening
25 1a is plugged (Figure 7, (B)). At this time, the sealing member still maintains engagement with the main assembly of the image forming apparatus.

Thereafter, a releasing ring applies a releasing force to a releasing projection, by which the releasing projection is depressed together with the engaging projection, so that engagement is released. By
5 retracting the main body 1A of the bottle in a longitudinal direction of the bottle, the releasing operation between the sealing member and the main assembly of the image forming apparatus is completed.

Then, the user draws the vacant toner bottle
10 1 which has been released from the main assembly 100 of the apparatus out of the main assembly 100 of the apparatus in the direction of arrow b (Figure 7 (C)) which is opposite from the direction of arrow a (Figure 7 (A) arrow a).

15 The user then inserts a new toner bottle 1 into the main assembly 100 of the apparatus in the direction of arrow a, and then close the front cover 15. In interrelation with the front cover 15 closing action, the sealing member 2 locked with the main
20 assembly of the image forming apparatus is moved away from the main body of the container by the toner supplying portion opening and closing means, so that toner supply opening 1a is unsealed (Figure 7, (C)). The foregoing is the exchanging process of the toner
25 supply container.

(Toner bottle)

Referring to Figure 8 and Figure 9, the toner

bottle will be described.

The toner bottle 1 is generally cylindrical, and one end thereof is provided substantially at a center with an opening 1a by a projected portion. The diameter of the opening 1a is smaller than the diameter of the cylindrical portion 1A which is the main body of the bottle. The opening 1a is plugged with a sealing member 2 for sealing the opening 1a, and as will be understood from the description in conjunction with Figure 7, (A) - (C), the opening 1a is unsealed and resealed automatically by the sliding motion of the sealing member 2 relative to the toner bottle 1 in the longitudinal direction (arrow b) of the toner bottle 1.

At the free end portion of the sealing member 2, there is formed a cylindrical portion having an engaging projection 3 and a releasing force receiving portion 4 for disengaging from the driving portion 20 provided in the main assembly of apparatus, and such a portion of the cylindrical portion as supports the engaging projection and the releasing projection is elastically deformable (in order to enhance or assist the elastic information, slits are formed at lateral sides of the region so as to extend to the free end of the cylindrical portion, as will be described hereinafter).

The engaging projection 3 is engaged with the

driving portion 20 and functions to transmit the rotation to the toner bottle 1. The structures of the engaging projection 3 and the releasing force will be described in detail hereinafter.

5 The internal structure of the toner bottle 1 will be described.

 As described in the foregoing, the toner bottle 1 is generally cylindrical in shape and is disposed generally horizontally in the main assembly 10 100 of apparatus. It is rotated by the main assembly 100 of apparatus. An inside of the toner bottle 1 has a projection 1c in the form of a rib which extends helically. When the toner bottle 1 rotates, the toner is fed in the axial direction along the helical 15 projection 1c, and the toner is discharged through the opening 1a formed at an end of the toner bottle 1.

 The internal structure of the toner bottle 1 according to the present invention is not limiting, and the configuration or the structure may be any as 20 long as the toner can be discharged by rotation of the toner bottle 1. The main body of the toner bottle is not limited to that described in the foregoing. For example, it may have a rotation screw or the like for feeding the toner, and the rotation screw is driven by 25 a rotational driving force received by the sealing member from the image forming apparatus, while the main body is fixed (not rotatable) on the main

assembly of the image forming apparatus.

The feature this embodiment is in the structure of the drive transmitting portion for connection with the main assembly 100 of the apparatus, and therefore, the internal structure of the toner bottle 1 may be any, and the bottle may have a helical projection 1c on the inner surface of the bottle.

For example, the internal structure of the bottle may be modified as shown in Figure 10. In this modified example, there is provided in the main body of the bottle is baffle member 40 generally in the form of a plate. The surface of the baffle member 40 has, on a surface, a plurality of inclined projections 40a which are inclined with respect to the direction of the axis of the toner bottle 1. One end of one of the inclined projection 40a extends to a neighborhood of the opening 1a. The toner is finally discharged from the inclined projection 40a through the opening 1a. By the rotation of the toner bottle 1, the toner is scooped by the baffle member 40 and then falls sliding on the surface of the baffle member 40. Because of the inclination of the inclined projection 40a, the toner is advanced toward the front side of the toner bottle 1. By repeating this operation, the toner in the toner bottle is gradually fed to the opening 1a while being stirred, and is discharged

therethrough.

The driving type of this invention is not limited to the rotational driving type such as the type of this embodiment or modification. The toner
5 bottle may be vibrated, swung or may be moved in another fashion to supply the toner. In other words, the driving may be rotation, swing, vibration or another as long as the toner is discharged from the bottle by the toner bottle is moved by the main
10 assembly 100 of apparatus.

In the above-described modified example, the baffle member 40 in the form of the plate is a separate member from the toner bottle 1, and the rotational driving force is transmitted to the baffle
15 member 40 through the sealing member 2 to indirectly rotate the toner bottle 1.

In the manner, the present invention is applicable when the toner bottle 1 is directly or indirectly driven through a sealing member 2.

20 In Figures 8 and 9, the main body 1A of the bottle is provided with the opening 1a at the one longitudinal end surface thereof, and a driving shaft 1b (portion to be engaged) is projected out of the opening 1a, the driving shaft 1b being integral with
25 the main body 1A of the bottle and being provided in the opening 1a. The driving shaft 1b is disposed substantially coaxially with the opening 1a, and is

slidably engaged with an engaging hole 2a (engaging portion) formed in the sealing member 2. The engaging hole, as shown in Figure 9, is closed at an end remote from the driving shaft, so that toner leakage through
5 the engaging hole is prevented.

The driving shaft 1b functions to transmit the rotational driving force from the main assembly 100 of the apparatus to the main body 1A of the bottle through the sealing member 2, the cross-sectional
10 configuration of the driving shaft 1b is non-circular, for example, rectangular configuration, H shape, D shape or the like to transmit the rotational driving force. The driving shaft 1b is fixed on the main body 1A of the bottle by proper means.

15 The driving shaft 1b may not be fixed on the main body 1A of the bottle but is integral with the sealing member 2 as shown in Figure 11. In this case, the engaging hole 2a for transmitting the driving force from the driving shaft 1b is provided in the
20 toner bottle 1 side, and that opening is formed so that they are its maintained engaged with each other after the toner bottle is unsealed. In the modified example, the member defining the engaging hole 2a its supported by a member 1c provided inside the opening
25 1a, but the discharge of the toner is permitted.

In this embodiment, the driving shaft 1b is fixed on the main body 1A of the bottle.

(Sealing member)

Referring to Figures 12 and 13, the description will be made as to the sealing member 2 (drive receiving member).

5 In Figures 12 and 13, the sealing member 2 comprises a sealing portion 2b for unsealably sealing the opening 1a of the toner bottle 1, and a coupling engagement portion 2c (cylindrical portion) in the form of a cylinder engageable with the driving portion
10 20 of the main assembly of apparatus. An outer diameter of a large diameter portion of the sealing portion 2b is larger than the inner diameter of the opening 1a by a proper degree. The sealing portion 2b is press-fitted into the opening 1a, by which the
15 opening 1a (toner supply opening) is sealed by the sealing member 2.

As described in the foregoing, the sealing member 2 has an engaging hole 2a for transmitting the driving force received from the main assembly 100 of
20 the apparatus to the driving shaft 1b by engagement with the driving shaft 1b. The engaging hole 2a extended continuously in the sealing portion 2b and the engaging portion 2c. The engaging hole 2a has a cross-sectional configuration which is complementary
25 with the driving shaft 1b and which is slightly larger than the cross-section of the driving shaft 1b. Because of this, the driving shaft 1b is loosely

fitted in the engaging hole 2a. The engaging hole 2a and the driving shaft 1b have complementary polygonal configurations. In this embodiment, it is square.

Because of the loose fitting of the driving shaft 1b in the engaging hole 2a having such cross-sections, the main body 1A of the bottle and the sealing member 2 are slidable relative to each other in the axial direction while being prevented from relative rotational motion therebetween. With this structure, when the toner bottle 1 is mounted (locked) on the toner supply device 400, the sealing member 2 is movable relative to the main body 1A of the bottle, that is, the unsealing of the opening 1a (toner supply opening) is enabled.

The engagement length between the engaging hole 2a and the driving shaft 1b is determined such that they are not disengaged from each other upon the relative movement between the sealing member 2 and the main body 1A of the bottle for the unsealing. By doing so, the driving shaft 1b can receive the driving force through the sealing member 2 even if the sealing member 2 is moved away relatively from the main body 1.

The description will be made as to the engaging projection 3 (locking projection) which is one of the features of the present invention.

The coupling engagement portion 2c of the

sealing member 2 has an engaging projection 3 for receiving the driving force from the main assembly 100 of apparatus. The engaging projection 3 is projected radially outwardly from the peripheral surface of the cylindrical portion of the coupling engagement portion 2c. The engaging projection comprises a drive receiving surface 3a (driving force receiving portion) for receiving the rotational driving force from the main assembly of the apparatus; and a locking surface 3b (locking portion) for snap fit type locking of the sealing member 2 into a locking hole (portion to be locked) provided in the main assembly of apparatus when the sealing member 2 and the toner bottle 1 are moved away from each other (from the closed state to the open state). Thus, by the drive receiving surface 3a, the engaging hole 2a and the locking surface 3b, the engaging projection 3 performs three different functions, namely, a coupling function for receiving the rotational driving force from the main assembly of apparatus, a transmitting function of transmitting the rotation to the toner bottle 1, and a locking function (retention function) for permitting relative sliding motion between the sealing member 2 and the main body of the toner bottle 1 so as to automatically open and close the opening.

When the driving force is transmitted with the locking surface 3b locked with the main assembly

driving portion 20, the surface 3b is effective to maintain a constant distances between the sealing member 2 and the toner bottle 1. This assures the formation of the path of the toner between the toner
5 bottle 1 and the sealing member 2, so that toner discharging amount is maintained constant. Thus, a toner bottle having an excellent constant amount discharging property can be accomplished. In addition, the sealing member 2 is assuredly locked
10 with the main assembly driving portion 20 of the apparatus, and therefore, the sealing member 2 is not likely to disengage from the driving shaft during the toner discharging operation, thus further assuring the toner discharging.

15 According to such a structure, the automatic opening and closing operation of the sealing member 2 and the driving force transmitting operation can be accomplished by a single sealing member, so that inexpensive and compact toner supply container can be
20 provided.

The engaging projection 3 is preferably in general with the sealing member 2 from this standpoint of reduction of the number of constituent parts, but a separate member for the engaging projection 3 may be
25 mounted to the sealing member 2. Such an example will be described in conjunction with a fourth embodiment.

The engaging projection 3 has a driving force

receiving function as well as the locking function,
and therefore, it has a certain degree of rigidity.
In view of this, slits 2e or the like are formed at
lateral ends of the engaging projection 3, so that
5 only the part of the coupling engagement portion 2c
where the engaging projection 3 is provided, can
relatively freely deformable elastically toward the
inside. This is because the engaging projection 3 is
displaced by the main assembly 100 of apparatus to
10 effect the engagement and disengagement relative to
the main assembly of apparatus, as will be described
hereinafter.

In this embodiment, the engaging projection 3
is integral with the sealing member 2 in this
15 embodiment.

The free end portion of the engaging
projection 3 is provided with a taper (locking force
receiving portion) so as to permit smooth insertion
when the sealing member 2 is inserted into the driving
20 portion 20 of the main assembly 100 of apparatus. The
tapered surface 3c receives a locking force from an
inner surface of the driving portion 20 so that
engaging projection 3 (locking portion) is displaced
inwardly to lock into the locking hole when the
25 tapered surface 3c approaches relatively to the
locking hole 20h of the driving portion 20. When the
locking surface further approaches to the locking hole

to such an extent that contact of the tapered portion
3c to the inner surface of the driving portion 20,
that is, the locking force is released, the portion
supporting the engaging projection (locking portion)
5 restores from the displaced position, thus completing
the locking between the sealing member (locking
portion) and the main assembly (portion to be locked)
of the image forming apparatus.

After the completion of the locking action,
10 the relative motion between the sealing member and the
main body of the bottle is automatically imparted in
the direction away from each other, by which the
opening is unsealed to enable the toner discharge. In
this embodiment, the sealing member is engaged with
15 the main assembly of apparatus such that movement in
the sliding direction is prevented, and in this state,
the main body of the bottle is retracted or advanced
to automatically open or close the opening.

In addition, the coupling engaging portion
20 2c functions to minimize the formation of the engaging
projection 3 when the rotational driving force is
imparted to the engaging projection 3.
As shown in Figure 34, (A), when the in driving force
F is imparted to the engaging projection 3, the
25 engaging projection elastically deforms as shown in
(A) and (B). However, it abuts the coupling engaging
portion 2c, so that a further the formation is

prevented. Therefore, even when a large rotational driving force is imparted, the engaging projection 3 does not deform beyond the width of the slot because of the provision of the coupling engaging portion 2c.
5 Therefore, the structure is enough for use with a large capacity toner bottle. The amount of the formation of the engaging projection 3 is dependent on the width of the groove 2e, and therefore, the width of the groove 2e is preferably as small as possible.

10 Referring to Figures 12 and 13, the description will be made as to the structure of a releasing force receiving portion which is another one of the features of the present invention.

The engaging projection 3 described above is
15 provided at each of two positions which are diametrically opposed to each other, and the two engaging projections 3 are connected by a connecting portion which functions as a releasing force receiving portion 4. When the releasing force receiving portion
20 (releasing portion) 4 receives a force from the main assembly old apparatus in the direction indicated by an arrow b, the engaging projections 3 are elastically deformed as indicated by chain lines in Figure 13. If the force application is stopped, the original
25 position is restored. The releasing portion 4 has a relatively small thickness to permit the elastic deformation, and the material is selected in

consideration of such an elastic deformation.

It is preferable that sealing member 2 is manufactured through an injection molding from a plastic resin material or the like, but another material, or another manufacturing method is usable. They may be provided by connecting separate members. The sealing member 2 desirably has a proper elasticity since it is press-fitted into the opening 1a to seal it. The best material is low density polyethylene material, and preferable materials are polypropylene, normal chain polyamide, Nylon (tradename), high density polyethylene, polyester, ABS, HIPS (shock-resistant polystyrene) or the like.

By employing an elastically deformable elastic member for the parts supporting the engaging projection 3 and for the releasing portion 4, the locking and releasing between the driving portion 20 and the engaging projection 3 can be accomplished with a simple structure, utilizing the elastic deformation and restoration. The above-described materials have proper elasticities, and therefore, the engagement and disengagement of the driving portion 20 and the engaging projection 3 are easily effected with sufficient durability.

The releasing portion 4 is in the form of a bridge connecting the engaging projections 3, so that such a plurality of engaging projections 3 can be

uniformly displaced by pushing one releasing portion.

It is not inevitable to integrally connect the engaging projections, but releasing portions may be provided for the respective engaging projections, as shown in Figures 16 and 17.

(Driving force receiving portion)

Referring to Figure 14, the description will be made as to the structure of the coupling engagement portion 2c provided in the sealing member 2, which is another one of the features of the present invention.

In this embodiment, the sealing member 2 is provided with the coupling engagement portion 2c in the form of a cylinder. As described in the foregoing, it also functions as a drive receiving member to receive the driving force from the driving force transmitting portion 20 provided in the toner supply device 400.

In the cylindrical coupling engagement portion 2c of the sealing member 2, the two parts provided with the respective engaging projections 3 are elastically deformable, such that parts are easily and elastically deformed by the tapered portion 3c of the engaging projection 3 being pressed by the driving portion 20. The releasing portion 4 is provided so as to connect the engaging projections 3, and the engaging projection 3 and the releasing portion 4 are integral with each other.

On the other hand, the locking hole 20h of the driving portion 20 provided in the main assembly 100 side of the apparatus is constructed so as to be locked with the engaging projection 3 (locking surface) of the sealing member 2. When the sealing member 2 is inserted into the driving portion 20, the smooth insertion is accomplished by providing the driving portion 20 with a tapered surface 20b defining gradually decreasing inner diameter at the free end of the driving portion 20. The sealing member 2 is smoothly inserted into the driving portion 20 because of the provision of the tapered surface 20b.

The driving portion 20 is provided with an engaging rib 20a for rotating the toner bottle 1, and the engaging rib 20a abuts the drive receiving surface 3a to transmit the rotational driving force to the sealing member after the engaging projection is engaged with the locking hole 20h.

Referring to Figure 15, the engagement between the driving portion 20 and the sealing member 2 in this embodiment will be described.

In Figure 15, (A) shows a state when the user is setting a new toner bottle 1 in the direction indicated by an arrow an in order to install it into the main assembly 100 of the apparatus, in which the toner bottle 1 is not yet been engaged with the driving portion 20 in the main assembly of apparatus.

When the toner bottle 1 is further inserted, the tapered portion 3c of the engaging projection 3 of the sealing member 2 is brought into contact with the tapered surface 20b of the driving portion 20, as shown in (B) in Figure 15, and the engaging projection 3 is being guided by the tapered surface 20b while being elastically deformed toward inside.

With the further insertion of the toner bottle 1, the engaging projection 3 passes by the straight portion 20g containing from the tapered surface 20b, the engaging projection 3 restores because of the provision of the space portion 20h (locking hole) not having the engaging rib 20a, by which the engaging projection 3 is locked with the driving portion 20, as shown in (C) in Figure 15. In the state, the engaging projection 3 is firmly locked relative to the driving portion 20, and the position of the sealing member 2 in the thrust direction (axial direction) is substantially fixed relative to the main assembly of apparatus.

Therefore, even if the toner bottle 1 is retracted in the direction indicated by an arrow arrow b, as shown in (C) in Figure 7, the sealing member 2 does not move in the same direction, but is firmly fixed to the driving portion 20. On the other hand, since the toner bottle 1 is instructed, the sealing member 2 is separated away from the toner bottle 1

with certainty, so that opening 1a is unsealed or
opened. The sliding retracting operation of the toner
bottle 1 may be interrelated with the opening and
closing operation of the front cover 15 provided in
5 the main assembly 100 of the apparatus.

As for the sliding operation, the toner
bottle 1 may be slid with the sealing member 2 fixed,
or the sealing member 2 may be slid with the toner
bottle 1 fixed, or both of them may be slid away from
10 each other.

When the toner is used up from the toner
bottle, the empty toner bottle is taken out to
exchange it with a new toner bottle. The dismounting
operation is carried out by the above-described steps
15 in a reverse order.

In detail, when the operator opens the front
cover, the following occurs. First, the main body of
the toner bottle advances toward the sealing member
while the sealing member is locked in the main
20 assembly of the apparatus, by which the sealing member
of the opening is automatically sealed. By a pushing
member 21 which will be described hereinafter, a
releasing projection is actuated to release the
engaging projection from the locking hole. Then, the
25 main body of the toner bottle is retracted together
with the sealing member re-press-fitted into the
opening, so that sealing member is disengaged from the

main assembly of the apparatus. By this, the toner bottle is prepared for being removed from the main assembly of the apparatus.

(Structure eliminating necessity of phase alignment)

5 The description will be made as to the structure eliminating the necessity of phase alignment when the toner bottle 1 is brought into engagement with the main assembly driving portion 20.

10 In a conventional drive transmitting means using a combination of projection and recesses type coupling drive, it is necessary to engage a recess and a projection with phase alignment. This is not necessary according to this embodiment. Referring to Figure 18, this will be described.

15 Figure 18 shows a positional relation in the rotational direction between the engaging projection 3 and the engaging rib 20a when the sealing member 2 is inserted into the driving portion 20. The engaging rib 20a is provided at one position, and the engaging projection 3 is provided at two positions (3A, 3B).

20 Assuming that engaging rib 20a and the engaging projection 3 are not aligned with each other when the user inserts the toner bottle 1, when the toner bottle 1 is inserted into the predetermined position, the sealing member 2 is locked with the driving portion 20, and when the toner bottle 1 is retracted, the sealing member 2 is away from the toner

25

bottle 1 to establish the toner dischargeable state.

However, depending on the position in the rotational direction of the toner bottle 1 upon the insertion of the toner bottle, the engaging projection 3A is aligned with the engaging rib 20a as shown in (A) of Figure 18. In this case, even if the toner bottle 1 is inserted into the predetermined position, the engaging projection 3A interfere with the engaging rib 20a so that it is not released outwardly. Then, the locking is incomplete. If the toner bottle 1 is retracted with the state, the toner bottle 1 is retracted together with the sealing member 2 since the locking with the main assembly driving portion 20 is incomplete. The opening 1a cannot be unsealed or opened.

In order to avoid this, the number of engaging projections 3 is larger than that of the engaging ribs 20a by at least one, by which not all of the engaging rib (s) and engaging projection (s) are aligned.

In the case of (A) of Figure 18, one of the engaging projections 3A interferes with the engaging rib 20a, and therefore, is not locked with the main assembly driving portion 20. However, the other one of the engaging projections 3B does not interfere with the engaging rib 20a, and therefore, it is correctly locked with the driving portion 20. Thus, even if one

of the engaging projections 3A is not locked
correctly, the other engaging projection 3B is
correctly locked, and therefore, the toner bottle 1 is
separated away from the sealing member 2 without
5 problem, so that opening 1a is unsealed. After the
opening 1a is unsealed, the incompletely engaged
engaging rib 20a is brought out of the interference
sooner or later by the rotation of the main assembly
driving portion 20 in the direction indicated by an
10 arrow c, and therefore, correct locking of the
engaging projection 3A is established. With further
rotation, as shown in (C) of Figure 18, the engaging
rib 20a is engaged with the engaging projection 3B, so
that rotation is transmitted to rotate the toner
15 bottle 1.

By providing the number of engaging
projections 3 which is at least one larger than the
number of engaging ribs 20a, at least one of the
engaging projections is engaged with the locking hole
20 without an interference with the engaging rib
irrespective of the position of the toner bottle 1 in
the rotational direction. In this manner, the toner
bottle 1 can be assuredly set in the apparatus.

The number of the engaging projections 3 may
25 be four rather than two as in this embodiment. In
that case, the number of the engaging ribs is not more
than three.

In this case, even if the number of the engaging ribs and the number of the engaging projections are the same, as shown in Figures 35 and 36, the distance (phase) between the engaging rib may
5 be made different from the distance (phase) between the engaging projections, by which at least one engaging projections is not the line with the engaging rib upon the insertion of the bottle, so that correct looking can be accomplished there.

10 When a plurality of engaging ribs are provided at different circumferential position, it is preferable that engaging ribs are disposed at regular intervals in consideration of the drive transmission property.

15 Figure 20 shows another example which also eliminates the necessity for the phase alignment. In this modified example, a shallow locking groove 20e is extended in the entire inner circumference of the engaging portion 20d of the main assembly driving
20 portion 20, and an engaging hole 20d for engagement with the engaging projection 3 is formed in the locking groove 20e. The locking groove 20e is not as deep as to completely engaged with the engaging projection 3, but is so shallow as to permit half
25 engagement to permit automatic unsealing action.

Referring to Figure 21, the operation upon the engagement in this modified example will be

described.

In Figure 21, (A), there is shown a state in which the toner bottle 1 has not yet been inserted into the main assembly driving portion 20, and the
5 engaging hole 20d of the main assembly driving portion 20 and the engaging projection 3 sealing member 2 are not aligned in the positions in the rotational direction, as indicated in X-X cross-section. With the insertion of the toner bottle 1, the state shown
10 in (B) of Figure 21 is reached, in which the engaging projection 3 is half-engaged with the locking groove 20e. With the state, when the toner bottle 1 is retracted, only the toner bottle 1 is retracted in the direction indicated by the arrow b since the sealing
15 member 2 is locked with the locking groove 20e, so that sealing member 2 and the toner bottle 1 are spaced apart with certainty to unseal the opening 1a. When the main assembly driving portion 20 rotates in the direction indicated by an arrow c, the engaging
20 hole 20d and the engaging projection 3 are aligned as shown in (C) of Figure 21, and the engaging projection 3 is now completely engaged with the engaging hole 20d to permit transmission of the rotational driving force.

25 In this manner, according to this embodiment, the toner bottle 1 can be properly set in the main assembly 100 of the apparatus simply by inserting the

toner bottle 1 into the main assembly 100, without the necessity of adjusting the position of the bottle 1 in the rotational direction. Therefore, the exchange operation is simple and easy.

5 Additionally, since the opening and closing operation for the opening of the toner supply container is automatically executed in the main assembly of an image forming apparatus, and therefore, the user is not required to open or close the opening.
10 This eliminates the possibility of contaminating the hands of the user.

(Releasing method)

 Referring to Figure 22, the description will be made as to releasing between the engaging
15 projection 3 and the main assembly driving portion 20.

 When the toner supply is completed, and the toner bottle 1 becomes empty, the current toner bottle 1 is removed, and a new toner bottle is set.

 At this time, it is necessary to release the
20 sealing member 2 from the driving portion 20.

 As shown in Figure 22, the inside of the main assembly of the apparatus, more particularly, the inside of the driving portion 20 is provided with a pushing member 21. The pushing member 21 is movable
25 in the same direction as the direction of the axis of the driving shaft 1b of the toner bottle 1.

 In Figure 22, (A) shows a state in which the

toner supply is completed, and the opening 1a of the toner bottle 1 is in an open state.

When the locking between the driving portion 20 and the sealing member 2 is released, the pushing member 21 is announced in a direction indicated by an arrow a to the releasing portion 4 at the free end of the sealing member 2, by which the releasing portion 4 is elastically deformed in the same direction, and correspondingly, the engaging projection 3 integral with the releasing portion 4 the forms toward inside. By this, the engaging projection 3 is disengaged from the main assembly driving portion 20.

The pushing member 21 further advances in the direction of arrow a, by which the sealing member 2 is press-fitted into the opening 1a, thus resealing the opening 1a of the toner bottle 1. The pushing member 21 is even further advanced in the direction of arrow a, by which the toner bottle 1 per se is retracted to slide the toner bottle 1 to a position to facilitate the user who is going to remove it.

As for the driving structure for the pushing member 21, it may be interrelated with the opening and closing operation of the front cover 15 of the main assembly 100 of apparatus such that when the front cover 15 is opened, the pushing member 21 moves in the direction of arrow a to effect disengagement between the sealing member 2 of the toner bottle 1 and the

driving portion 20, and when the front cover 15 is closed, it is advanced in the direction of arrow b. Alternatively, a driving motor or the like is used to effect the disengaging operation independently. In
5 another alternative, it is not interrelated with the front cover 15 of the main assembly 100 of the apparatus, but a manual lever is provided, which is manipulated by the user and is interrelated with the pushing member.

10 As described in the foregoing, according to the embodiments, the toner supply container can be locked in the main assembly of the electrophotographic image forming apparatus by a snap fit type engagement with certainty by inserting the toner supply
15 container. When it is to be taken out, the snap fit type locking is easily released by pushing the releasing portion. Thus, the supplying operation from the toner supply container is accomplished with a very simple operation. Accordingly, a toner supply
20 container of high operativity can be provided.

In addition, the disengagement of the drive transmission for the toner supply container is simultaneously effected, and also the opening and closing operation for the opening can be
25 simultaneously effected.

These advantageous effects can be provided by very simple action at low cost with compact structure

and reliable drive transmission.

In the toner dischargeable state, it is not necessary to provide means for rotatably supporting the driving shaft 1b at the main body side of the toner bottle. This simplify the structure and avoids the problem of toner leakage, torque increase, production of coarse particles and so on.

(Embodiment 2)

Referring to Figures 23-25, 32, a second embodiment of the present invention will be described. The same reference numerals as with the first embodiment are assigned to the elements having the corresponding functions, and the detailed description of the common structure is omitted for simplicity.

As shown in Figure 23, in this embodiment, the releasing projection 4 (releasing portion) is provided on an outer surface not inside the cylindrical coupling engagement portion 2c of the sealing member 2 as in the first embodiment. In this embodiment, engaging projection 3 and the releasing portion 4 are provided at each of four circumferentially equidistant positions so as to constitute pairs. The structures of the driving portion 20 for locking engagement with the engaging projection of the sealing member is the same as with the Embodiment 1.

Correspondingly, the pushing member 21 is in

the form of a cylinder covering the outside periphery of the driving portion 20 as shown in Figure 24 and is slidable for engagement with the releasing portion 4, rather than a slidable rod as in the first embodiment.

5 The inner surface of the free end portion of the pushing member 21 (cylindrical member) is tapered such that inner diameter increases, that is, the thickness of the cylinder reduces, toward the free end, by which the tapered portion 21a is engaged with the apex of
10 the releasing portion 4 upon the engagement. Slits 2e are formed at the lateral sides of the supporting portion 2f for the engaging projection 3 and the releasing portion 4 to facilitate inward elastic deformation of the engaging projection 3 and the
15 releasing portion 4 and restoration.

According to this embodiment, the entire sealing member can be integrally molded, and therefore, the production property of the sealing members is drastically improved, and the manufacturing
20 cost can be reduced.

In Figure 25, (A) shows a state in which the toner supply is completed, and the opening 1a of the toner bottle 1 is still open.

When the engagement between the main assembly
25 driving portion 20 and the sealing member 2 are to be released, the pushing member 21 is advanced to the releasing portion 4, as shown in (B) in Figure 25, so

that releasing portion 4 is pressed inwardly by the inner surface of the pushing member 21. This displaces the releasing portion 4 inwardly (arrow d) by the elastic deformation of the supporting portion 2f, and simultaneously, the engaging projection 3 is displaced inwardly together with the releasing portion 4. By this, the engaging projection 3 is disengaged from the main assembly driving portion 20. The releasing steps are carried out in interrelation with the opening operation of the exchange cover by the operator.

Thereafter, the pushing member 21 is advanced in the direction of arrow a, so that sealing member 2 is returned to the sealing position of the toner bottle 1, as shown in (C) of Figure 25. Subsequently, the pushing member 21 is further advanced to slide the toner bottle 1 per se to a position facilitating the user who is going to take the toner bottle 1 out.

As described in the foregoing, according to this embodiment, by the provision of the releasing portion 4 on the outer surface of the cylindrical portion 2c, the same advantageous effects as with the first embodiment described in the following can be provided. According to this embodiment, when the sealing member 2 is produced by injection molding of a resin material, the mold can be easily removed, and thus improving the production property.

A width of the engaging projection is larger than the width of the releasing projection, so that when the main body of the bottle is retracted for automatic unsealing of the opening, the engagement
5 between the engaging projection (locking surface) and the driving portion 20 is maintained. The releasing projection does not have such a function, and therefore, the width is reduced to minimize the resin material cost in the manufacturing.

10 It is a possible alternative that thin portion 2y is provided as shown in Figure 32 to make the base portions of the supporting portion 2f (supporting the engaging projection and the releasing projection) easy to deform. With this structure, the
15 disengagement action is made sure while maintaining a sufficient rigidity of the sealing member including the engaging projection which receives the rotational driving force.

(Embodiment 3)

20 Referring to Figures 26 through 29, a third embodiment of the present invention will be described.

In the second embodiment, as shown in Figure 24, the engaging projection 3 and the releasing portion (releasing projection) 4 for the sealing
25 member 2 are provided at the outer surface of the engaging portion 2b. In this embodiment, as shown in Figure 26, the engaging projection 3 and the releasing

projection 4 are provided at each of four circumferentially equidistant positions on an inner surface of the engaging portion 2b.

Corresponding to such a structure of the sealing member 2, the main assembly driving portion 20 has a configuration shown in Figure 27. The main assembly driving portion 20 comprises a cylindrical portions including a free end portion 20b, a small diameter portion 20c, a large diameter portion 20d and a rear end 20e which have different outer diameters. It also comprises a through-hole 20f through which the pushing member 21 is penetrated. The inner diameter of the through-hole 20f is constant. The small diameter portion 20c has a minimum outer diameter and is provided with an engaging rib 20a extending in the longitudinal direction of the driving portion 20 at each of the diametrically opposite positions.

Referring to Figure 28, the description will be made as to engagement between the driving portion 20 and the sealing member 2 in this embodiment.

In Figure 28, (A) shows a state in which the toner bottle 1 is inserted in a direction indicated by an arrow b for a user to install a new toner bottle 1 into the main assembly of apparatus, in which the toner bottle 1 is not yet been locked with the driving portion 20 provided in the main assembly of apparatus.

As shown in (B) of Figure 28, when the toner

bottle 1 is further inserted, the engaging projection 3 provided in the sealing member 2 is brought into contact with the main assembly driving portion 20 and is guided by the tapered surface 3c formed at the free end portion of the engaging projection 3, and is gradually and elastically deformed.

With further insertion, the engaging projection 3 having passed by the straight portion 20g, as shown in (C) of Figure 28, the forced deformation is released by the space portion 20h not having the engaging rib 20a, and the engaging projection 3 is firmly locked with the main assembly driving portion 20.

In the state shown in (C) of Figure 28, the engaging projection 3 is firmly engaged with the main assembly driving portion 20 such that position of the sealing member 2 in the thrust direction (axial direction) is fixed relative to main body of the toner bottle 1. Therefore, when the toner bottle 1 is retracted thereafter, the sealing member 2 is not retracted together with the toner bottle 1 but is firmly fixed to the main assembly driving portion 20. On the other hand, only the toner bottle 1 is destructive, the sealing member 2 becomes away from the toner bottle 1 the unseal or open the opening 1a. The retracting operation of the toner bottle 1 may be such that toner bottle 1 is slid in interrelation with

the opening and closing operation of the front cover
15 (Figure. 2).

Referring to Figure 29, the releasing or
disengaging action in this embodiment will be
5 described.

When the sealing member 2 is to be disengaged
from the main assembly driving portion 20, the pushing
member 21 disposed at the central portion of the main
assembly driving portion 20 is slid in the direction
10 of arrow a, and only by which it is disengaged from
the main assembly driving portion 20.

By advancing the pushing member 21 in the
direction of arrow a relative to the releasing portion
4 provided in the inside of the sealing member 2, the
15 part supporting the releasing portion 21, as shown in
(B) of Figure 29, deforms outwardly so that releasing
portion displaces outwardly, and therefore, the
engaging projection 3 displaces outwardly. By this,
the engaging projection 3 is disengaged from the main
20 assembly driving portion 20.

With further advancement of the pushing
member 21 in the direction of arrow a, the sealing
member 2 is press-fitted into the opening 1a as shown
in (C) of Figure 29. In this position, the sealing
25 member 2 unseals the opening 1a of the toner bottle
1. By further advancement of the pushing member 21 in
the direction of arrow a, the toner bottle 1 per se is

slid backward to a position where the user can easily take the toner bottle 1 out.

As for the driving structure for the pushing member 21, it may be interrelated with the opening and closing operation of the front cover 15 of the main assembly 100 of apparatus such that when the front cover 15 is opened, the pushing member 21 moves in the direction of arrow a to effect disengagement between the sealing member 2 of the toner bottle 1 and the driving portion 20, and when the front cover 15 is closed, it is advanced in the direction of arrow b. Alternatively, a driving motor or the like is used to effect the disengaging operation independently. In another alternative, it is not interrelated with the front cover 15 of the main assembly 100 of the apparatus, but a manual lever is provided, which is manipulated by the user and is interrelated with the pushing member.

In this embodiment, not releasing portion is not exposed to outside, and therefore, in case that toner supply container is unintentionally let fall, the releasing portion is not damaged, and therefore, the shock resistant property is high during the transportation.

In addition, by a very simple sliding of the pushing member in the forward and backward directions, the drive transmission of the toner bottle can be

easily disengaged, and simultaneously, the opening and closing of the opening of the toner bottle can be accomplished.

5 These advantageous effects can be provided by very simple action at low cost with compact structure and reliable drive transmission.

(Embodiment 4)

Referring to Figure 30, a fourth embodiment of the present invention will be described.

10 In this embodiment, as shown in Figure 30, a sealing member 2, an engaging projection 3 and a releasing portion 4 mounted to the opening 1a of the toner bottle 1 are manufactured separately with respective to each other, and then they are assembled.

15 As shown in this Figure, two movable arms 3e are mounted by hinge portions 3h on the end surface of the sealing member 2 such that they are opposed to each other. Each of the movable arm 3e is provided at its free end portion with an engaging projection 3 for effect with the engagement which is similar to that in
20 the first embodiment.

The engaging projections 3 are connected with each other by a link 3g through hinge portions 3i. The link 3g includes two members connected by a hinge
25 which function as a releasing portion 4.

From an inside of the movable arm 3e fixed projections 3f are projected opposed to each other at

a central portion. A spring 3j compressed between the fixed projections 3f. By the urging force provided by the spring 3j, the movable arm 3e urged outwardly, so that engaging projection 3 is engageable with the main assembly driving portion 20 as shown in (A) of Figure 30. The main assembly driving portion 20 suitable in this embodiment is for example that shown in Figure 14.

With such a structure, when the toner bottle 1 is to be engaged with the main assembly driving portion 20 by the engaging projection 3, it is enough to insert the toner bottle 1 into the main assembly of apparatus, similarly to Embodiment 1. More particularly, when the toner bottle 1 is inserted, the engaging projections 3 are brought into contact with the main assembly driving portion 20, by which the movable arms 3e are tilted inwardly against the spring force of the spring 3j together with the engaging projections 3. With further insertion, the engaging projection 3 are engaged with the main assembly driving portion 20 at a predetermined position by the spring force of the spring 3j, and simultaneously, the movable arms 3e restore the original position shown in (A) of Figure 30.

On the other hand, when they are to be disengaged from each other, as shown in (B) of Figure 30, the pushing member 21 is pushed against the

releasing portion 4 in a direction indicated by an arrow a, the engaging projections 3 are easily tilted, so that they are disengaged.

5 Similarly to the following embodiments, the structure of this embodiment also provides the same advantageous effects.

10 In this embodiment, the elastic deformation is not use, the engaging projection 3 may be made of any material not exhibiting elastic deformation per se, and therefore, the choice of the material is very big. For example, various materials such as aluminum, a steel or magnesium, or wood, hard resin material or the like is usable. A higher engagement strength can be maintained, and the durability is improved.

15 The parts are connected with linking mechanism, which provides larger movable range than the elastic deformation, and therefore, a larger engagement area is usable. Therefore, the engagement is very firm with high reliability.

20 In this embodiment, the elastic deformation of the sealing member is not utilize unlike Embodiments 1-3, but a link type is employed. Therefore, the durability is better, but the structure is rather complicated with the possible result of cost
25 increase.

(Embodiment 5)

The present invention is not limited to the

foregoing Embodiments. In Embodiment 5, the structures are the same as that of said embodiment (Figure 20) except for the portions which will be described.

5 For example, as shown in Figure 31, the opening 1a of the toner bottle 1 may be provided in the cylindrical surface 1d adjacent the longitudinal end surface. In such a case, the coupling engagement portion 2c is not provided in the sealing member 2 and
10 may be mounted rotatably in an end surface of the main body 1A of the toner bottle. In this case, the opening 1a is unsealably sealed by a shutter member S.

 The coupling engagement portion 2c as a function of locking the main body 1A of the toner
15 bottle with the main assembly (driving portion 20 shown in Figure 20) of the image forming apparatus by a locking portion (locking surface of the engaging projection 3), a function of receiving a rotational
20 driving force from the main assembly side of the image forming apparatus by a driving force receiving portion (a drive receiving surface of the engaging projection 3), a function of disengaging the main body 1A of the toner bottle from the main assembly (driving portion 20) of the image forming apparatus by a releasing
25 portion 4, and a function of transmitting the driving force received by the driving force receiving portion to the coupling engagement portion 2c and the toner

feeding member fixed in the toner bottle. With this structure, a force of separating the toner bottle from the driving portion 20 of the main assembly of apparatus for some reason or another, while the rotation is received from the main assembly of apparatus, they are maintained engaged with each other, and therefore, it is avoided that transmission of the rotational driving force to the toner bottle is unintentionally disengaged.

10 (Embodiment 6)

Referring to Figure 33, a sixth embodiment will be described.

In the foregoing embodiment, the locking mechanism, the releasing mechanism and the drive transmission mechanism are used between an image forming apparatus and a toner supply container (sealing member). In this embodiment, the use is made between an image forming apparatus and an electrophotographic photosensitive member detachably mountable relative to the main assembly of the image forming apparatus, in which the photosensitive drum is exchanged with a new one after the service life. In the other aspects, the structures are the same as with Embodiment 1.

25 In Figure 33, the coupling engaging portion 2c provided at an end of a photosensitive drum 104 is engaged with a driving portion 20 of the main assembly

of the image forming apparatus similarly to Embodiment 1, so that rotational driving force is transmitted from the driving portion 20 to the photosensitive member. The structures for the disengagement
5 therebetween is similar to that of Embodiment 1.

As will be understood, the drive transmission mechanism of this invention is not limited to the toner supply container or the image forming apparatus, but is applicable to a structure for transmitting
10 rotational, swing or reversing motion about a rotation axis.

The automatic sealing operation for the opening may be accomplished in the following manner.

In interrelation with and opening operation
15 of the exchange cover by the operator, the main body of the toner bottle is advanced toward the sealing member with the engagement between the sealing member and the driving portion 20 maintained, by which the sealing member is press-fitted into the opening, thus
20 accomplishing automatic sealing.

Thereafter, the pushing member 21 slides to be contacted into the releasing portion, and the engaging projection is disengaged from the driving portion 20. Furthermore, the pushing member 21 pushes
25 the main body of the toner bottle together with the sealing member toward the change cover to a position where the operator can easily take the toner bottle

out.

In this manner, the sliding movement (retraction, advancement) of the main body of the bottle used for unsealing the opening can be used for resealing the open with a simple structure. In addition, the slide movement distance of the pushing member can be made shorter than in the foregoing embodiments, and therefore, complication of the apparatus at the main body side can be avoided.

The structure for the engagement and disengagement between the main assembly of the image forming apparatus and the toner bottle or the photosensitive member may be used in Embodiments 2, 3 and 4.

In Embodiments 1-6, only by the movement of the releasing projection of the main assembly of apparatus in a direction (axial direction, for example) of relative motion of the sealing member relative to the main body, the engaging projection or projections are moved in a direction or directions substantially perpendicular to the direction (radial direction, for example), and therefore, the structure for the disengagement is simple. Even when a plurality of engaging projections are provided, all the engaging projections are brought into disengaging positions by a force applied substantially at one position, and therefore, the structure for the

disengagement is simple. In Embodiments 1, 4, 5 and 6, the releasing force receiving portion of the sealing member is disposed substantially at the free end portion of the sealing member, so that releasing force receiving portion can be engaged with the main assembly at a relatively early stage after the start of insertion of the toner bottle.

In embodiments 1-4, the driving portion 20 provided in the main assembly of the image forming apparatus is provided with a locking hole and an engaging rib, and the sealing member 2 is provided with an engaging projection portion 3 engageable with the locking hole and the engaging rib of the driving portion 20, but the projection and recess relationship may be reverse. In other words, the driving portion 20 of the main assembly of the apparatus is provided with the engaging projection and the releasing portion (releasing projection), and the sealing member 2 is provided with the locking hole and the engaging rib. With such a structure, the same advantageous effects are provided.

As described in the foregoing, according to these embodiments, the toner accommodating container and the main assembly of the image forming apparatus are locked in a snap fit type engagement, and the sealing member can be automatically engaged into or disengaged from the opening of the toner accommodating

container, wherein the locking engagement can be released with a simple structure without load on the user.

Therefore, the toner supply operation can be
5 carried out by the user with much less load.

Such a sealing member, a toner accommodating container and an image forming apparatus can be provided at low cost.

While the invention has been described with
10 reference to the structures disclosed herein, it is not confined to the details set forth and this application is intended to cover such modifications or changes as may come within the purpose of the improvements or the scope of the following claims.

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WHAT IS CLAIMED IS:

1. A sealing member for sealing a toner discharge opening of a toner container detachably mountable to an image forming apparatus, said sealing member having a substantially cylindrical shape, said
5 sealing member comprising:

a sealing portion for sealing said toner discharge opening;

locking projections for snap-fitting
10 engagement with holes provided in a cylindrical member of an image forming apparatus,

wherein said projections receive from the cylindrical member unsealing forces for unsealing said toner discharge opening by a relative movement between
15 said sealing portion and the toner container,

wherein a number of said locking projections is larger than a number of ribs provided between the holes of the cylindrical member.

20 2. A sealing member according to Claim 1, further comprising a rotational force receiving portion for receiving from the ribs rotational forces for discharging the toner through said toner discharge opening.

25 3. A sealing member according to Claim 2, wherein said locking projections are capable of

receiving the driving forces.

4. A sealing member according to Claim 2 or 3,
wherein said unsealing force receiving portion
5 receives the unsealing force prior to receiving the
rotational force.

5. A sealing member according to Claim 4,
wherein at least one of said locking projections is
10 engaged with one of said holes prior to said
rotational force receiving portion receives the
rotational force.

6. A sealing member for sealing a toner
15 discharge opening of a toner container detachably
mountable to an image forming apparatus, said sealing
member having a substantially cylindrical shape, said
sealing member comprising:

20 a sealing portion for sealing said toner
discharge opening;

locking projections, provided on a peripheral
portion, for snap-fitting engagement with holes
provided in a cylindrical member of an image forming
apparatus,

25 wherein said projections receive from the
cylindrical member unsealing forces for unsealing said
toner discharge opening by a relative movement between

said sealing portion and the toner container,
wherein a positional phase of said locking
projections is different from a positional phase of
ribs provided between the holes of the cylindrical
5 member.

7. A sealing member according to Claim 6,
further comprising a rotational force receiving
portion for receiving from the ribs rotational forces
10 for discharging the toner through said toner discharge
opening.

8. A sealing member according to Claim 7,
wherein said locking projections are capable of
15 receiving the driving forces.

9. A sealing member according to Claim 7 or 8,
wherein said unsealing force receiving portion
receives the unsealing force prior to receiving the
20 rotational force.

10. A sealing member according to Claim 9,
wherein at least one of said locking projections is
engaged with one of said holes prior to said
25 rotational force receiving portion receives the
rotational force.

11. A toner container detachably mountable to an image forming apparatus, said toner container comprising:

a main body for containing toner;

5 a sealing portion for sealing said toner discharge opening;

locking projections for snap-fitting engagement with holes provided in a cylindrical member of an image forming apparatus,

10 wherein said projections receive from the cylindrical member unsealing forces for unsealing said toner discharge opening by a relative movement between said sealing portion and the toner container,

15 wherein a number of said locking projections is larger than a number of ribs provided between the holes of the cylindrical member.

12. A toner container according to Claim 11, further comprising a rotational force receiving
20 portion for receiving from the ribs rotational forces for discharging the toner through said toner discharge opening.

13. A toner container according to Claim 12,
25 wherein said locking projections are capable of receiving the driving forces.

14. A toner container according to Claim 12 or 13, wherein said unsealing force receiving portion receives the unsealing force prior to receiving the rotational force.

5

15. A toner container according to Claim 14, wherein at least one of said locking projections is engaged with one of said holes prior to said rotational force receiving portion receives the rotational force.

10

16. A toner container detachably mountable to an image forming apparatus, said toner container comprising:

15

a main body for containing toner;

a sealing portion for sealing said toner

discharge opening;

locking projections, provided on a peripheral portion, for snap-fitting engagement with holes

20

provided in a cylindrical member of an image forming apparatus,

wherein said projections receive from the cylindrical member unsealing forces for unsealing said toner discharge opening by a relative movement between said sealing portion and the toner container,

25

wherein a positional phase of said locking projections is different from a positional phase of

ribs provided between the holes of the cylindrical member.

5 17. A toner container according to Claim 16, further comprising a rotational force receiving portion for receiving from the ribs rotational forces for discharging the toner through said toner discharge opening.

10 18. A toner container according to Claim 17, wherein said locking projections are capable of receiving the driving forces.

15 19. A toner container according to Claim 17 or 18, wherein said unsealing force receiving portion receives the unsealing force prior to receiving the rotational force.

20 20. A toner container according to Claim 19, wherein at least one of said locking projections is engaged with one of said holes prior to said rotational force receiving portion receives the rotational force.

25

ABSTRACT OF THE DISCLOSURE:

A toner container detachably mountable to an image forming apparatus, includes a main body for containing toner; a sealing portion for sealing the toner discharge opening; locking projections for snap-fitting engagement with holes provided in a cylindrical member of an image forming apparatus, wherein the projections receive from the cylindrical member unsealing forces for unsealing the toner discharge opening by a relative movement between the sealing portion and the toner container, wherein a number of the locking projections is larger than a number of ribs provided between the holes of the cylindrical member.

15

20

25

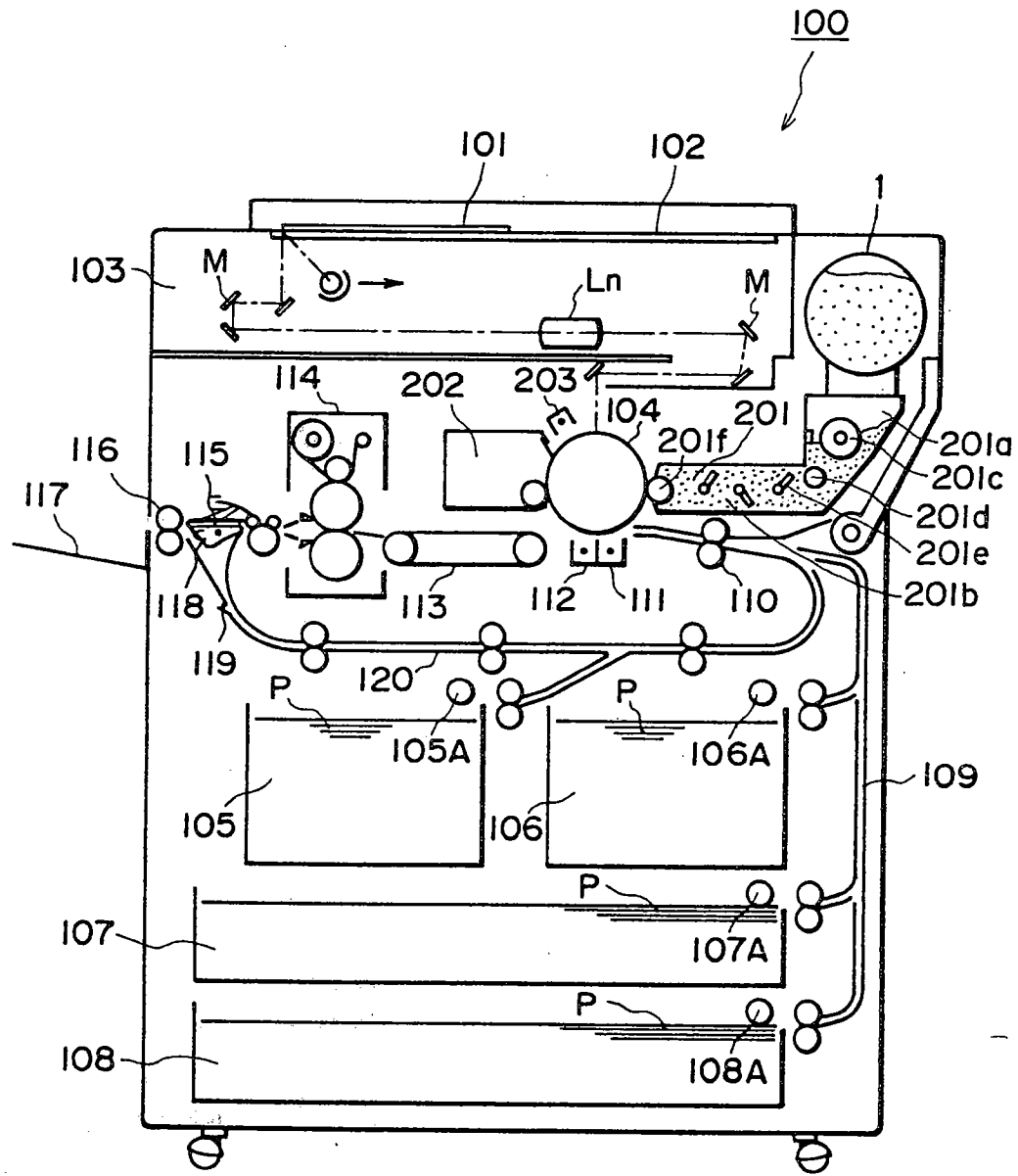


FIG. 1

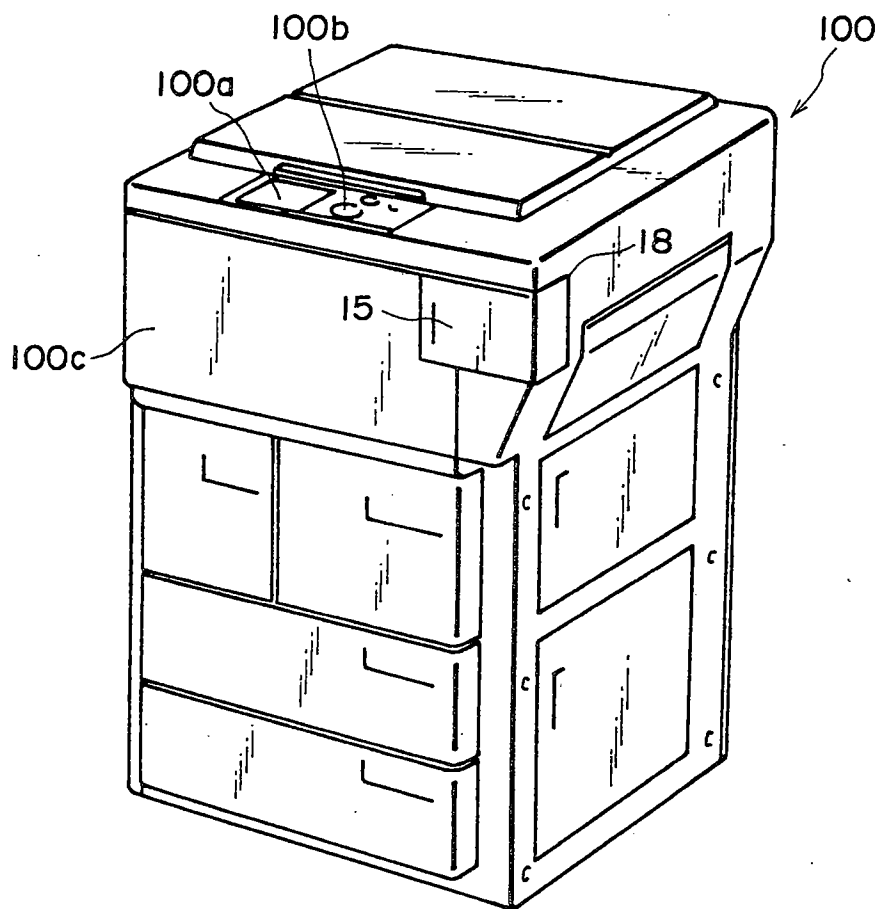


FIG. 2

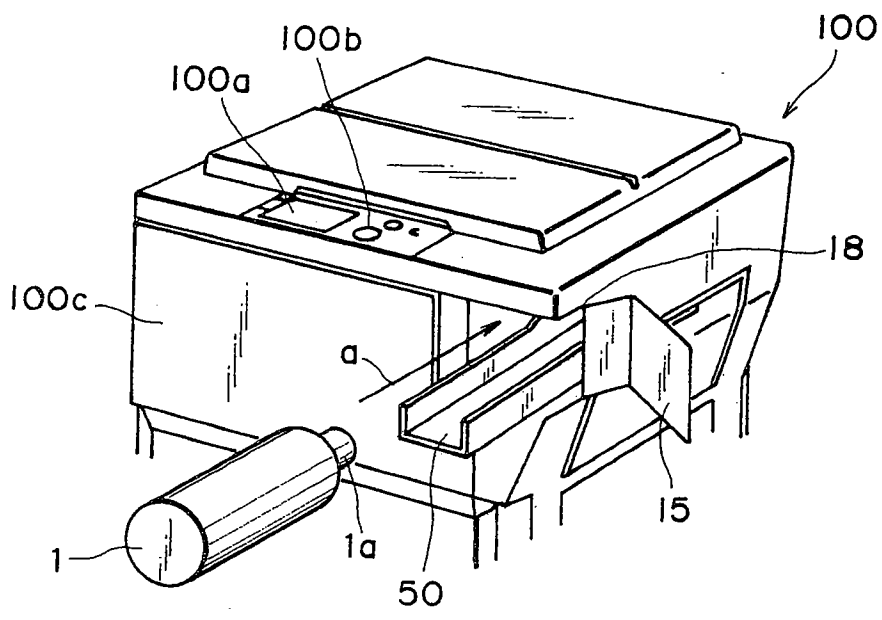


FIG. 3

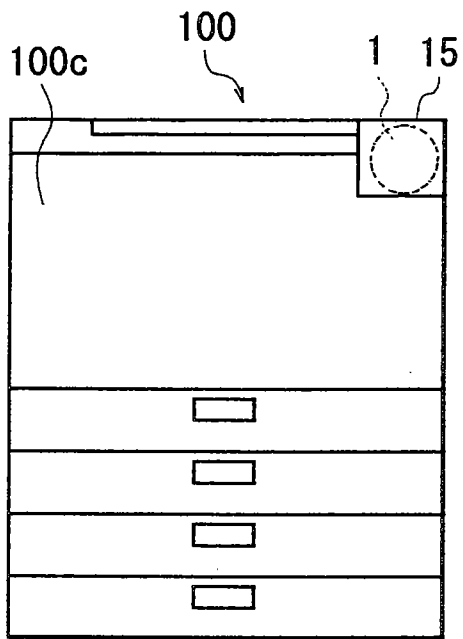


FIG. 4

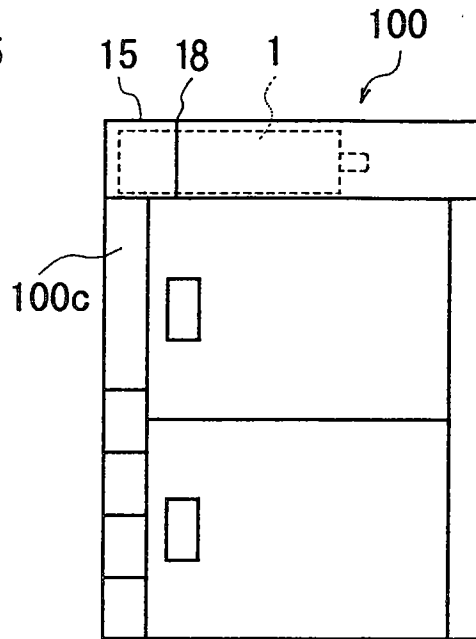


FIG. 5

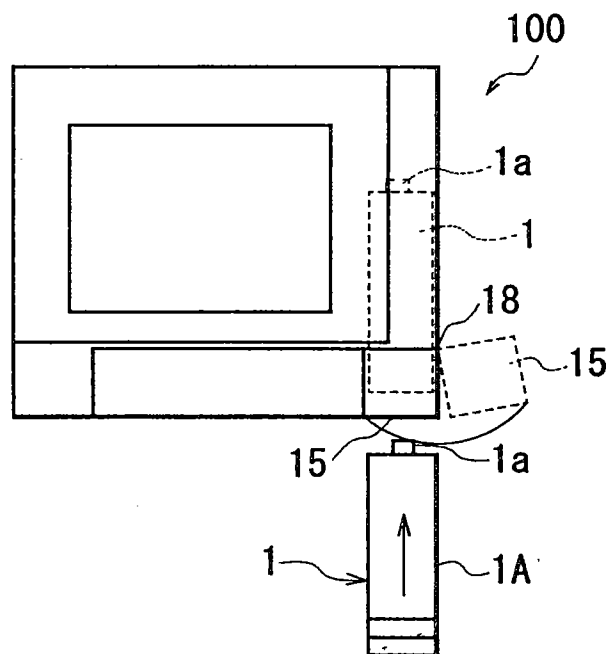


FIG. 6

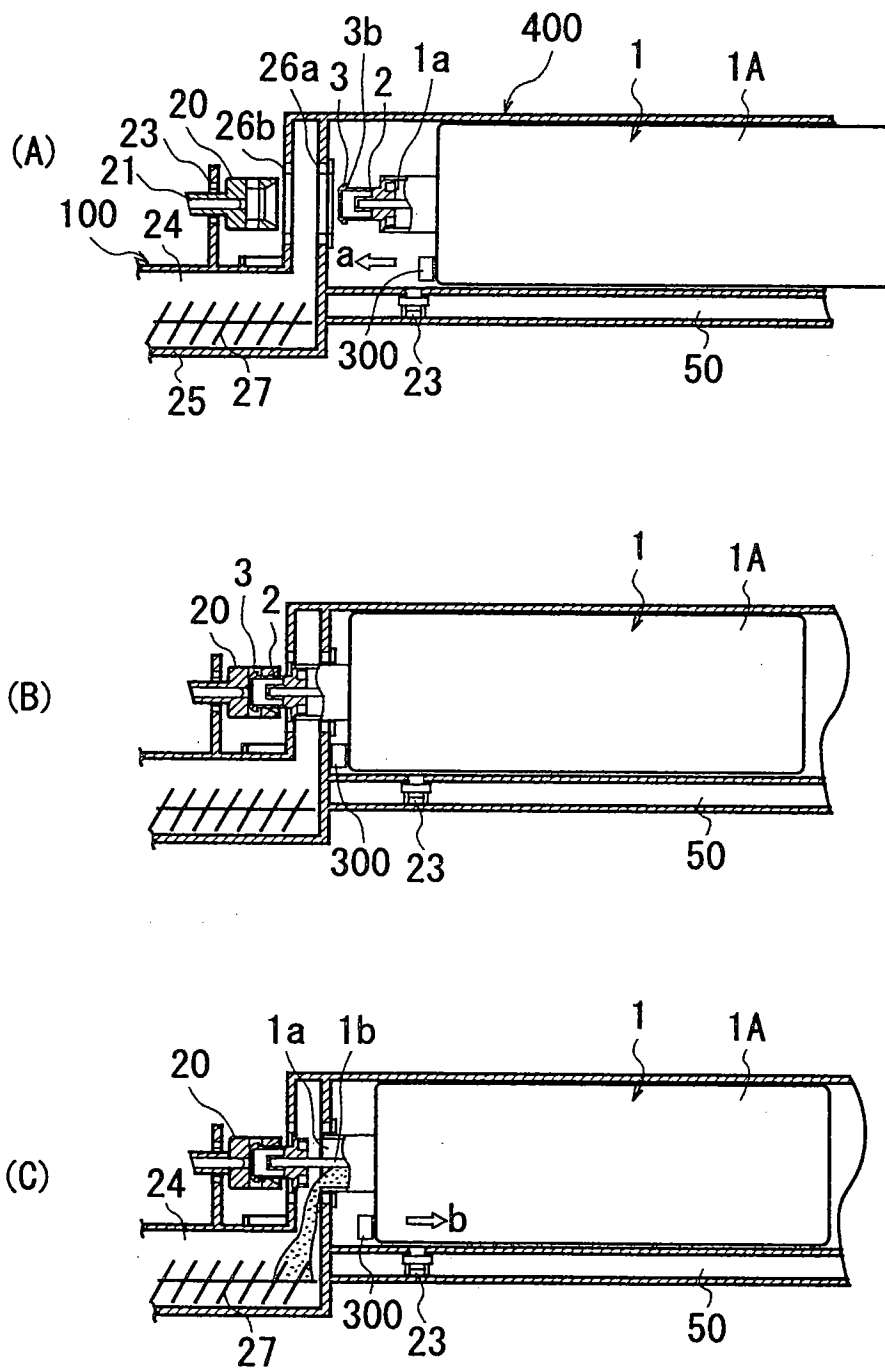


FIG. 7

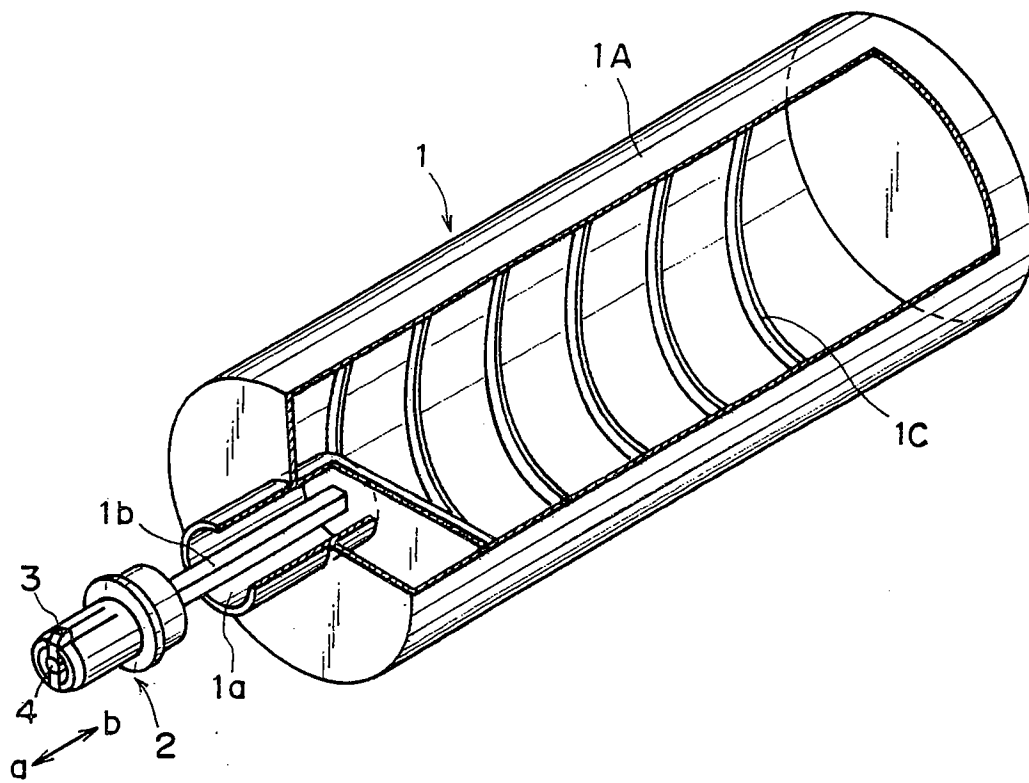


FIG. 8

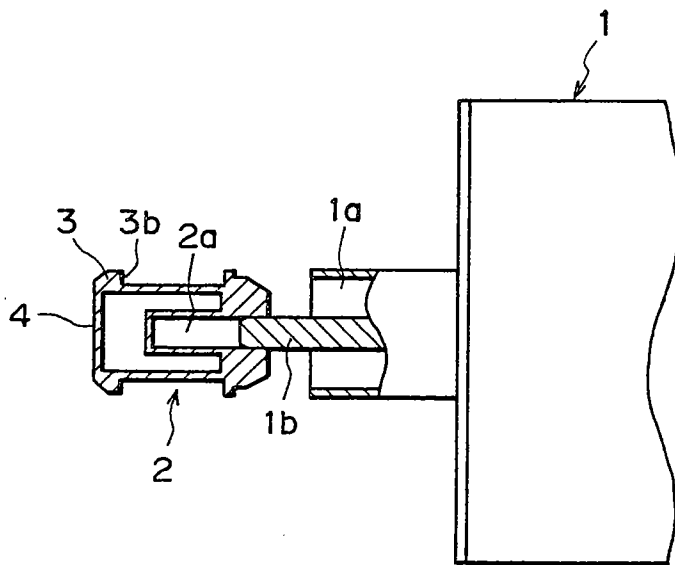


FIG. 9

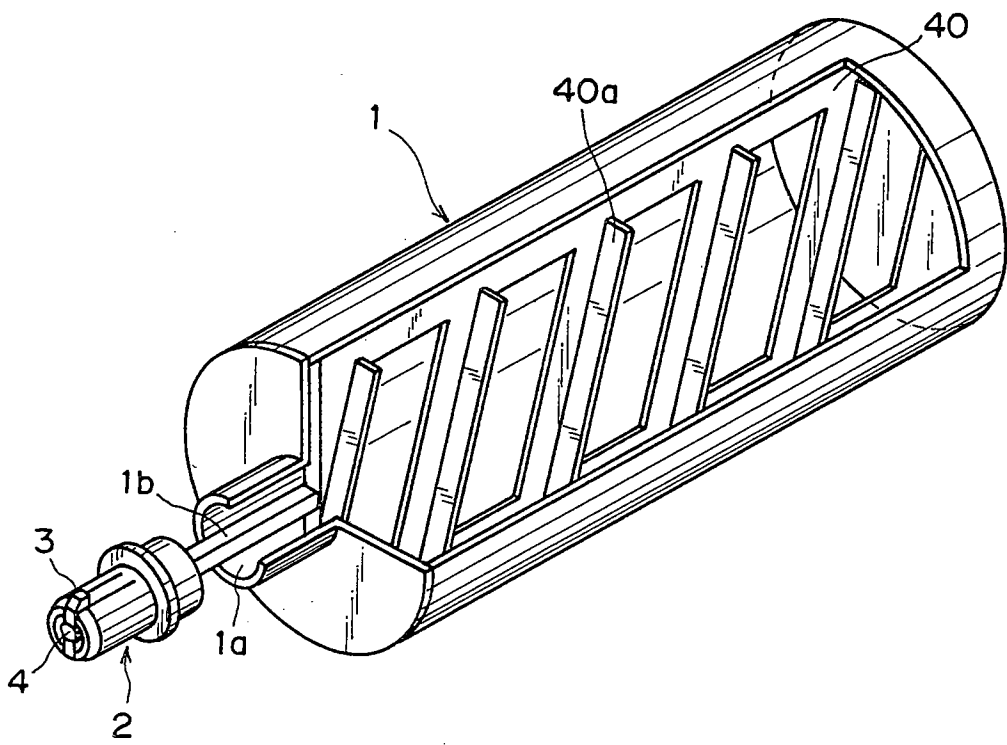


FIG. 10

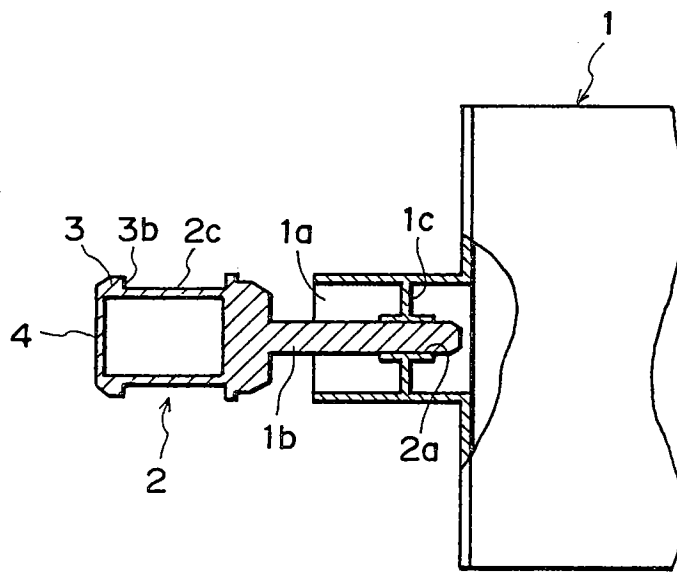


FIG. II

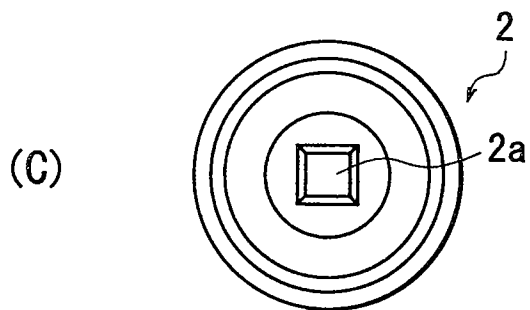
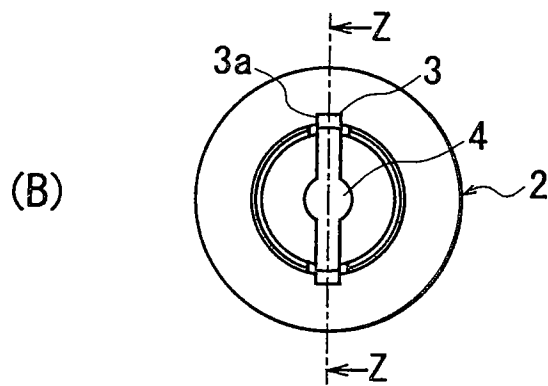
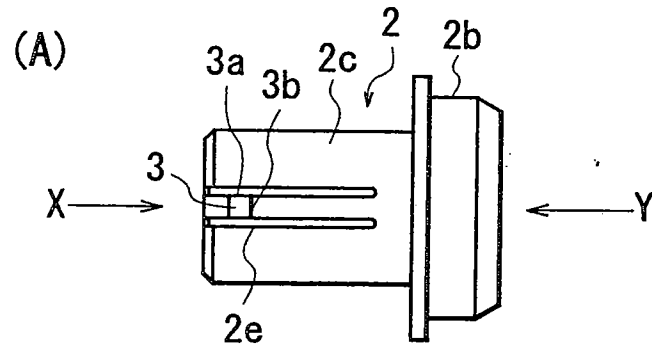


FIG. 12

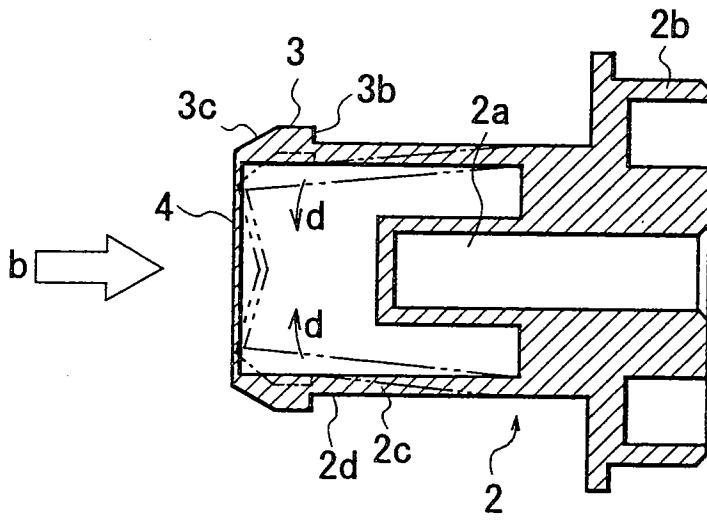


FIG. 13

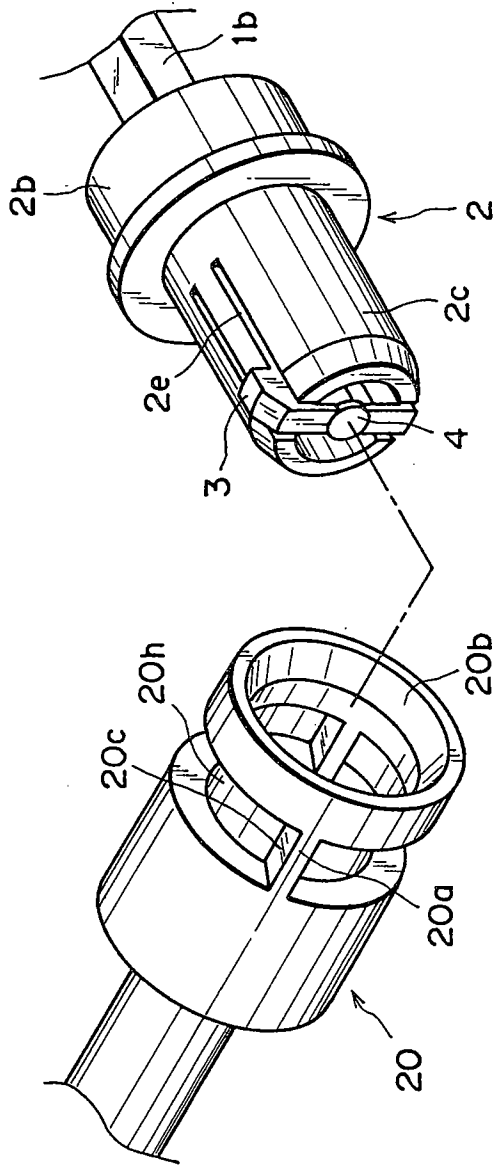


FIG. 14

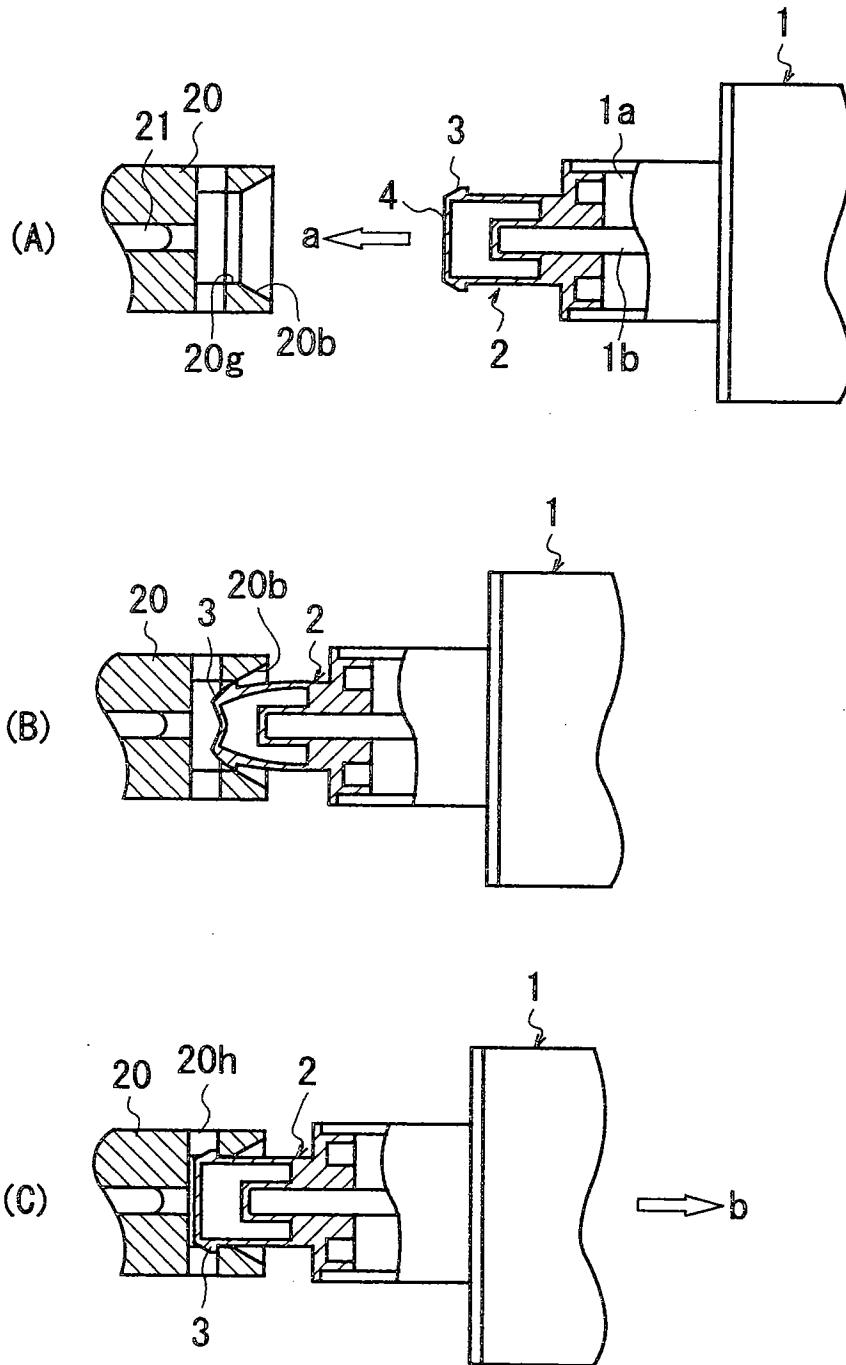


FIG. 15

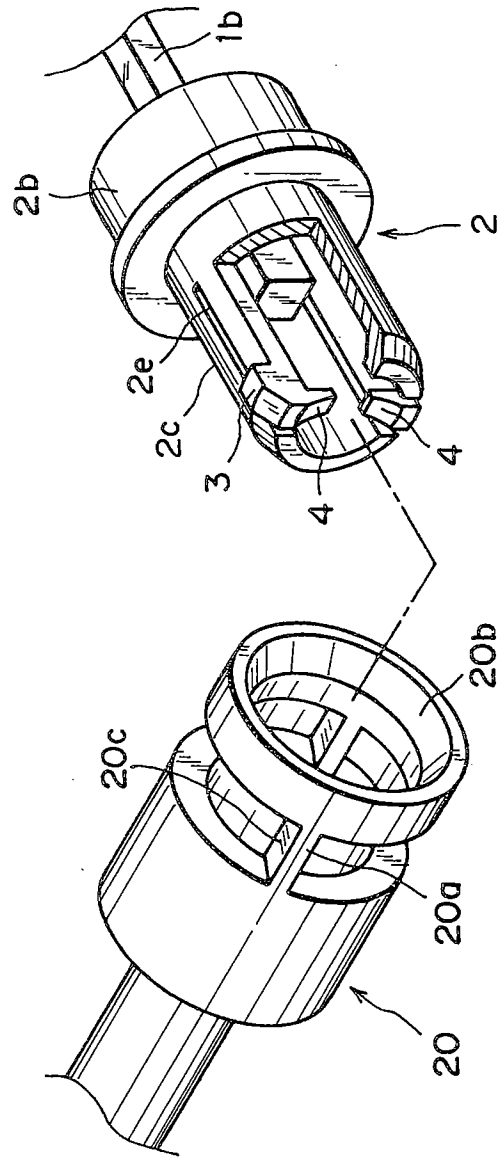


FIG. 16

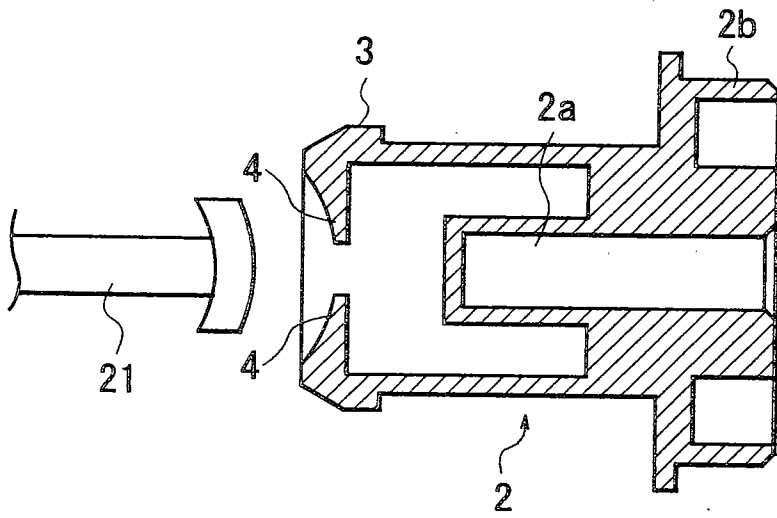


FIG. 17

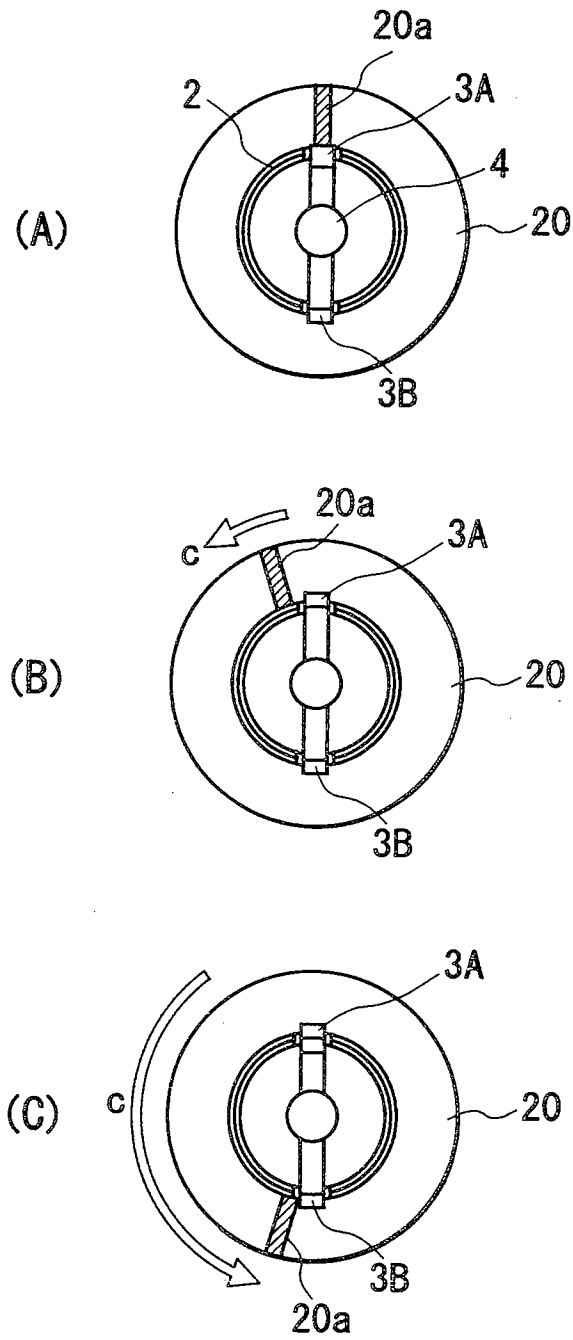


FIG. 18

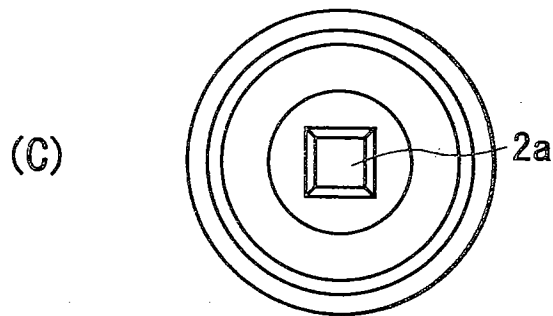
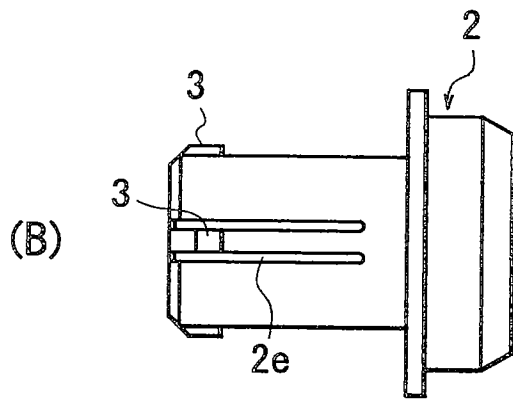
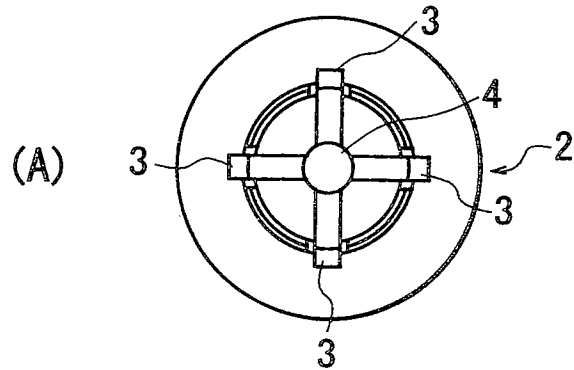


FIG. 19

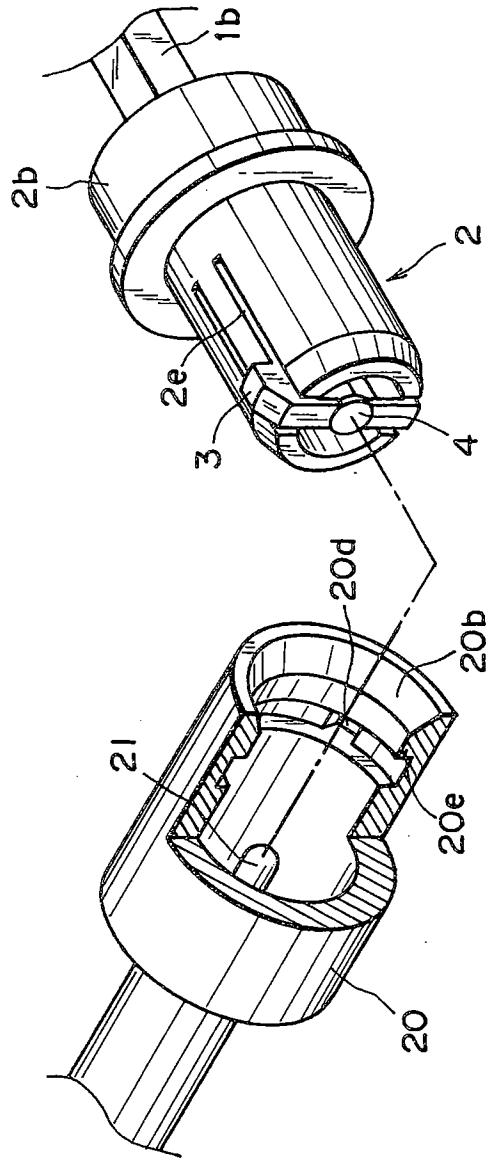


FIG. 20

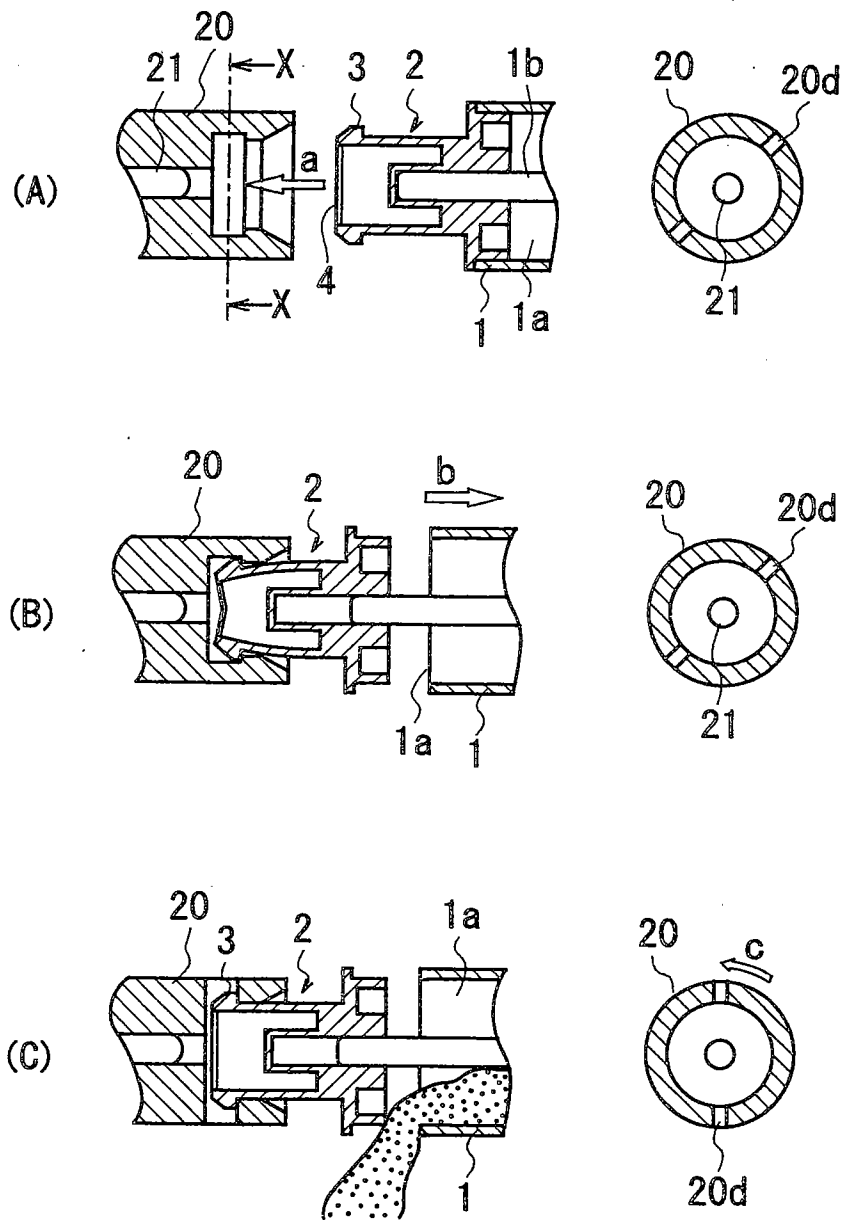


FIG. 21

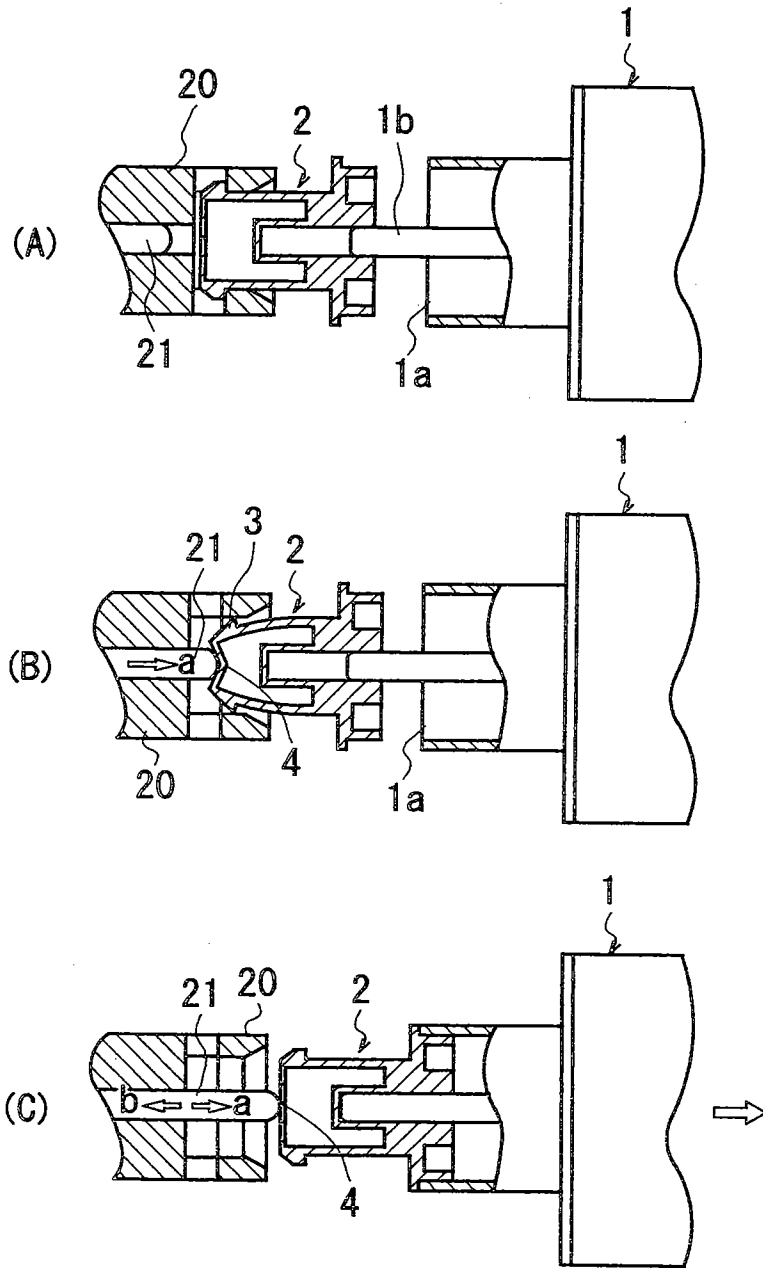


FIG. 22

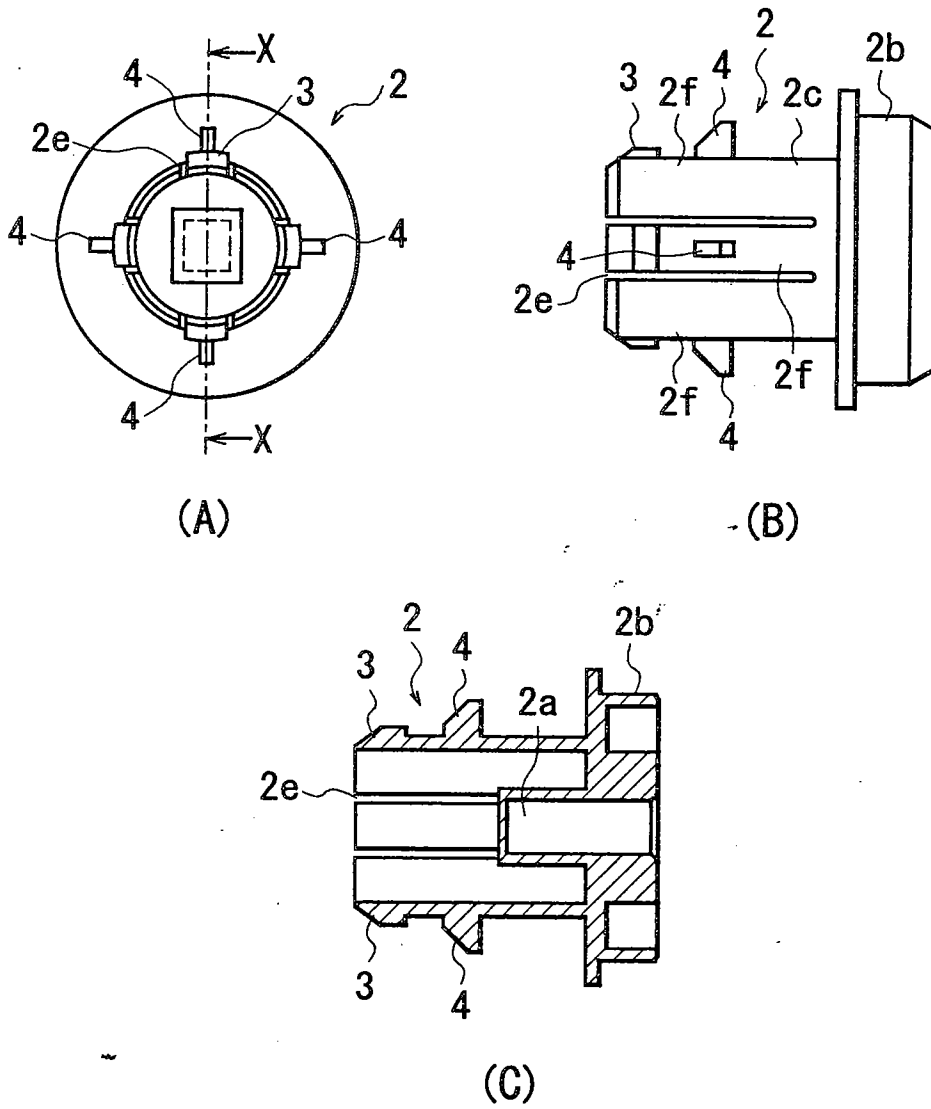


FIG. 23

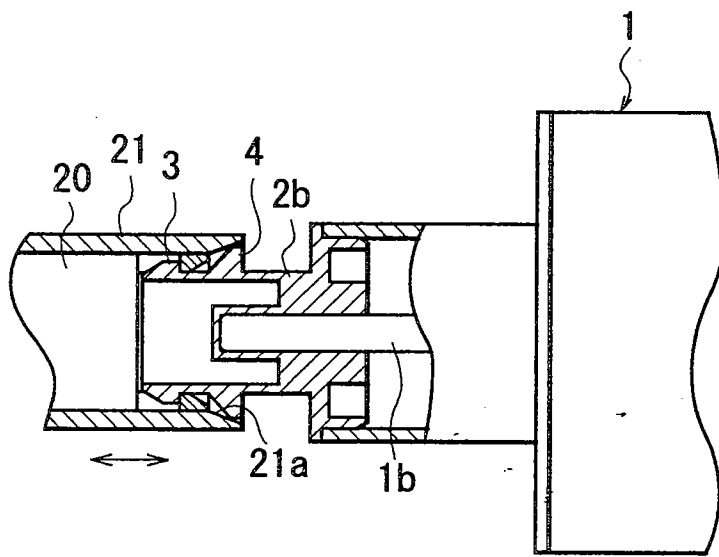


FIG. 24

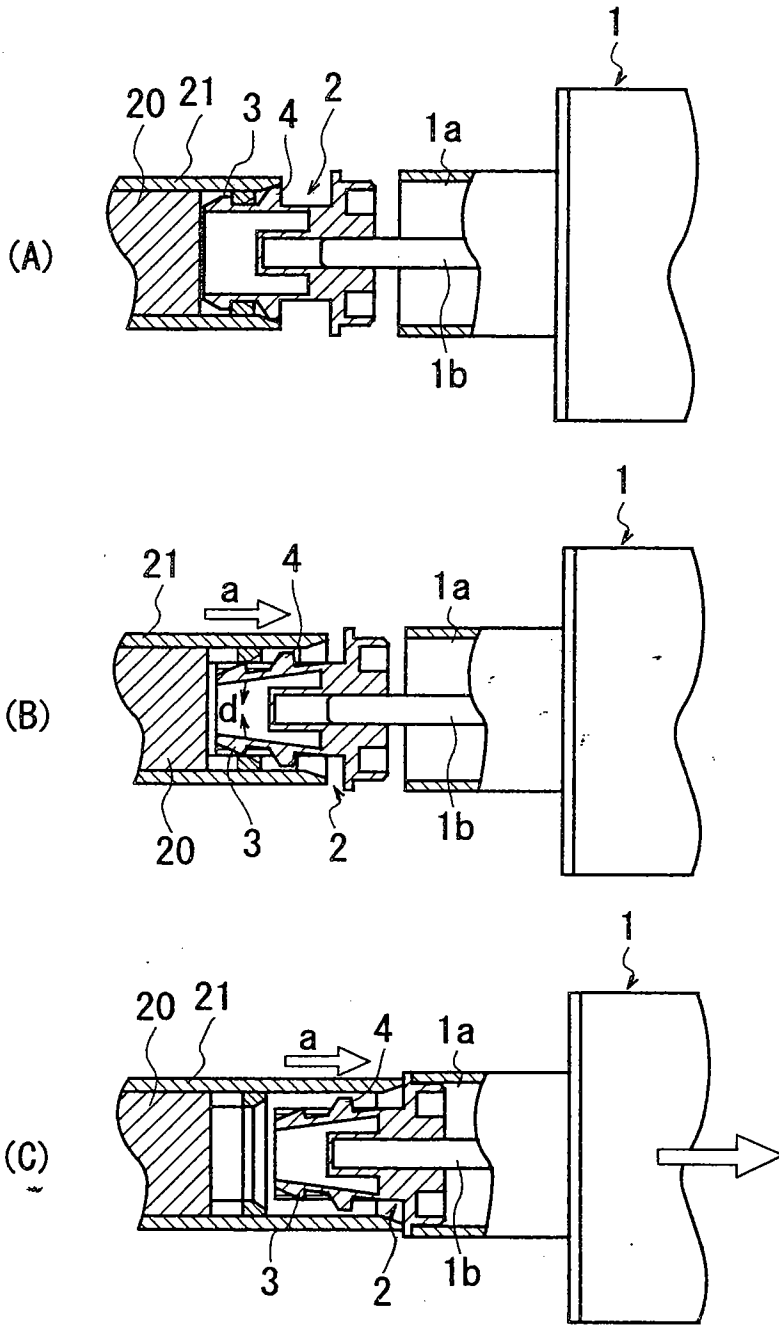


FIG. 25

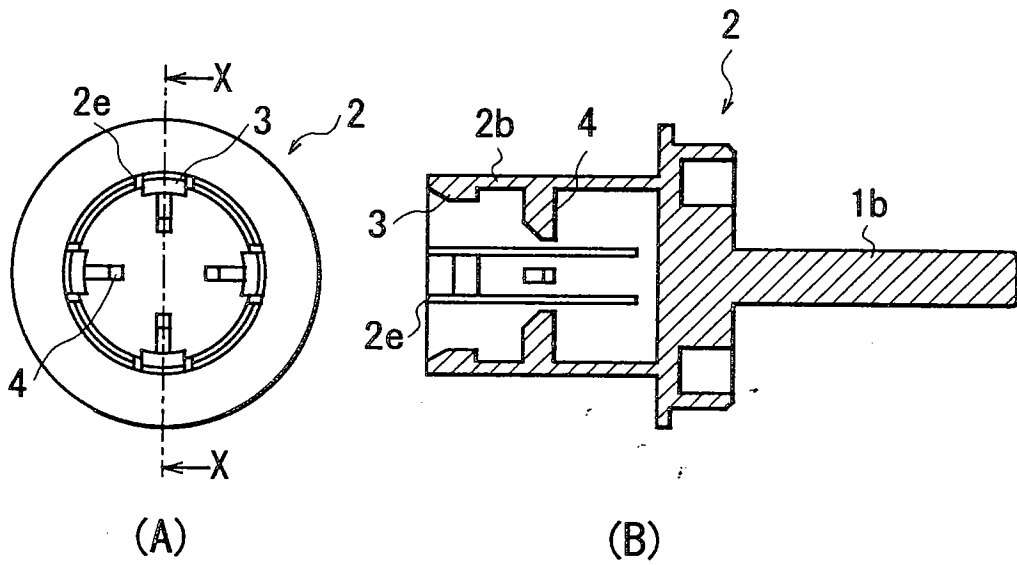


FIG. 26

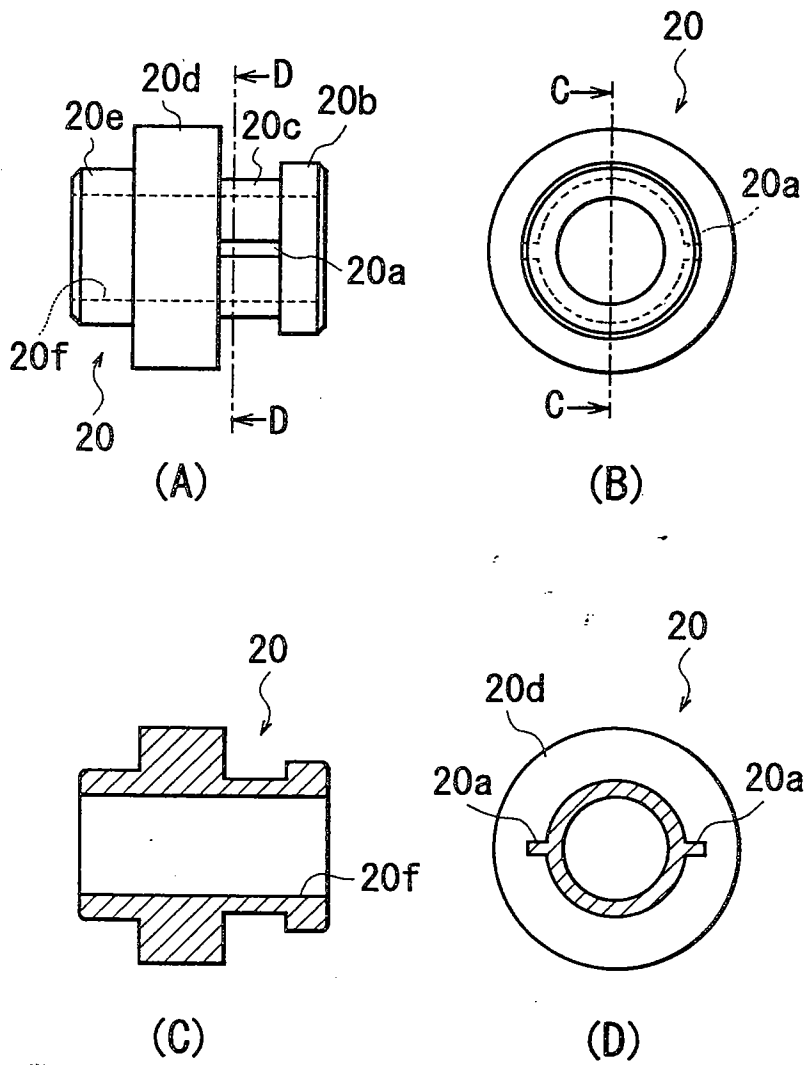


FIG. 27

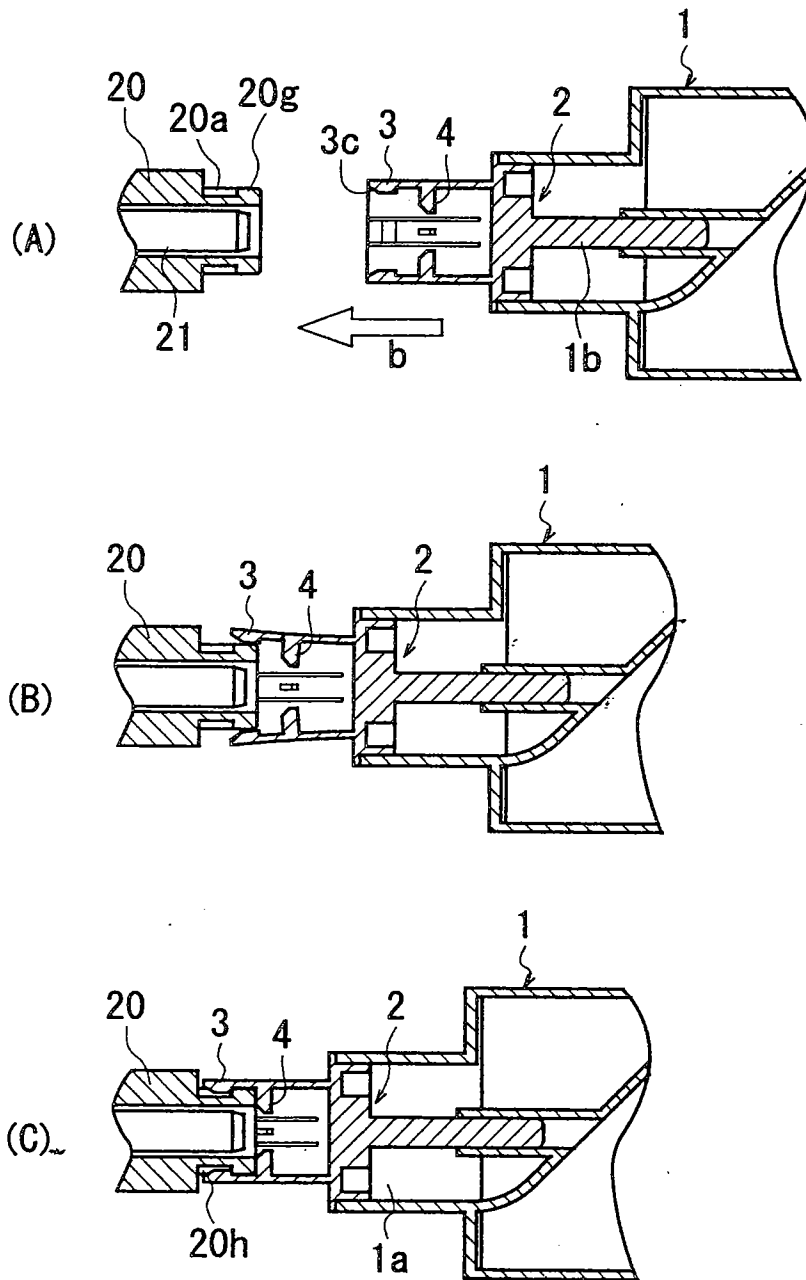


FIG. 28

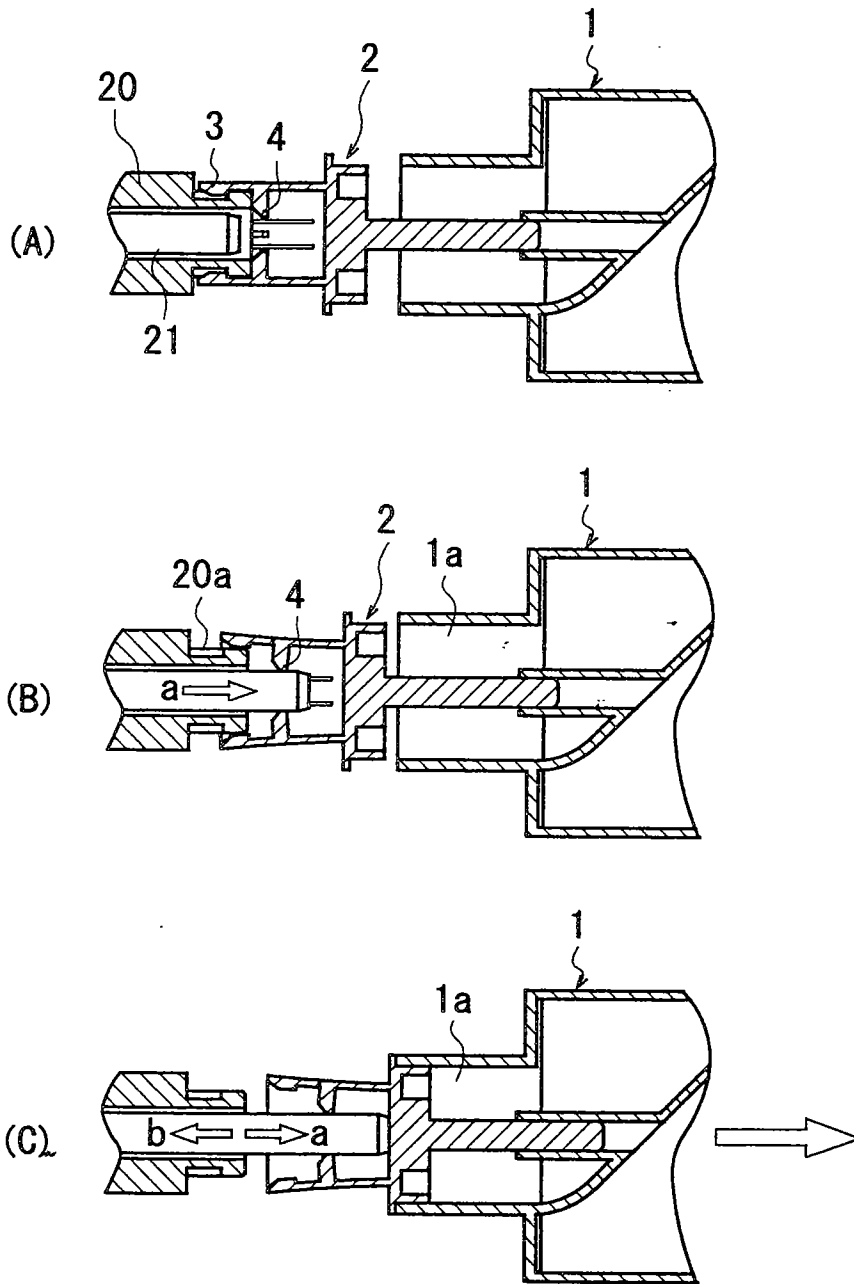
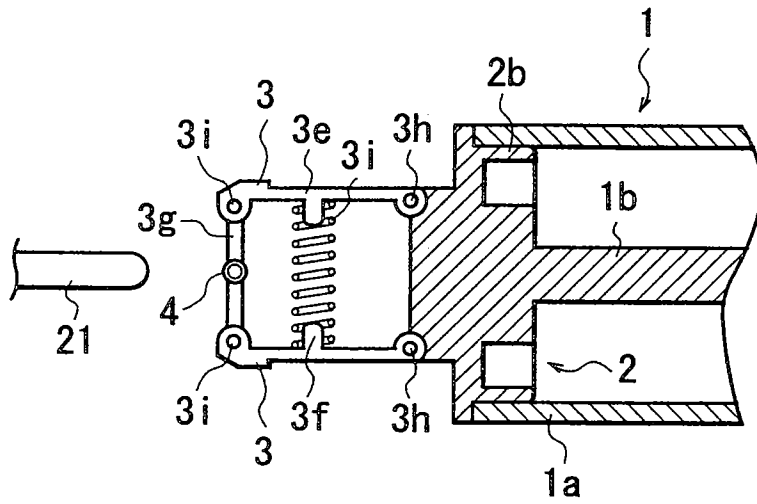
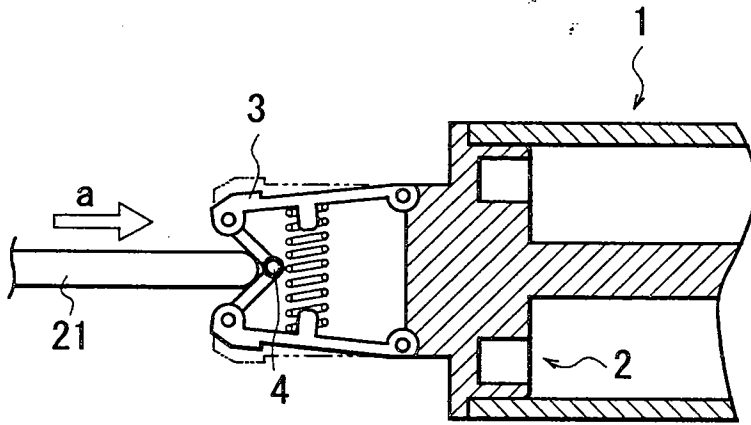


FIG. 29



(A)



(B)

FIG. 30

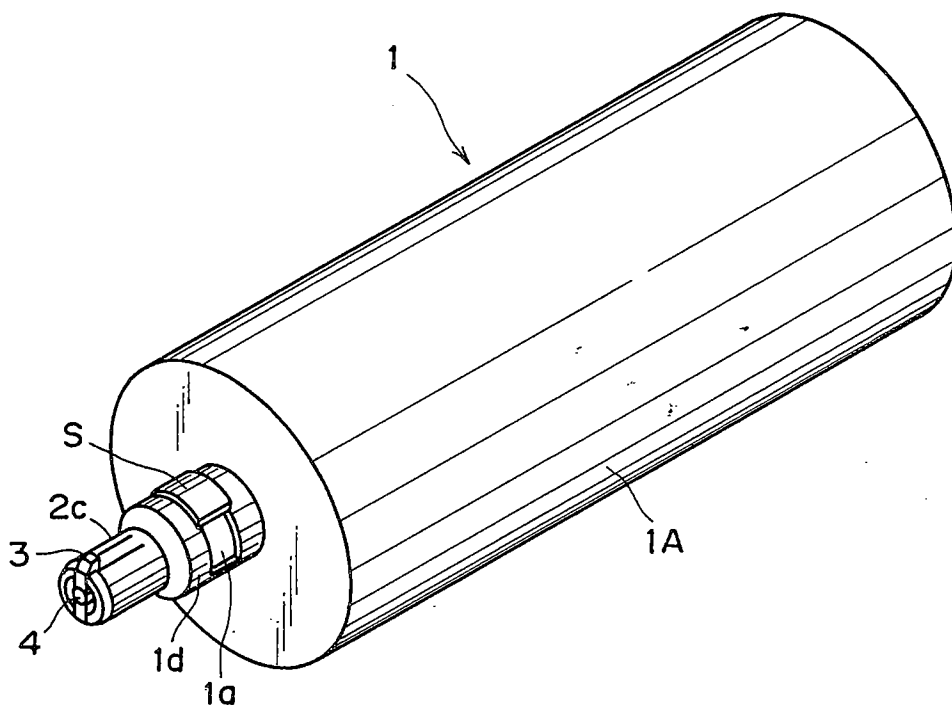


FIG. 31

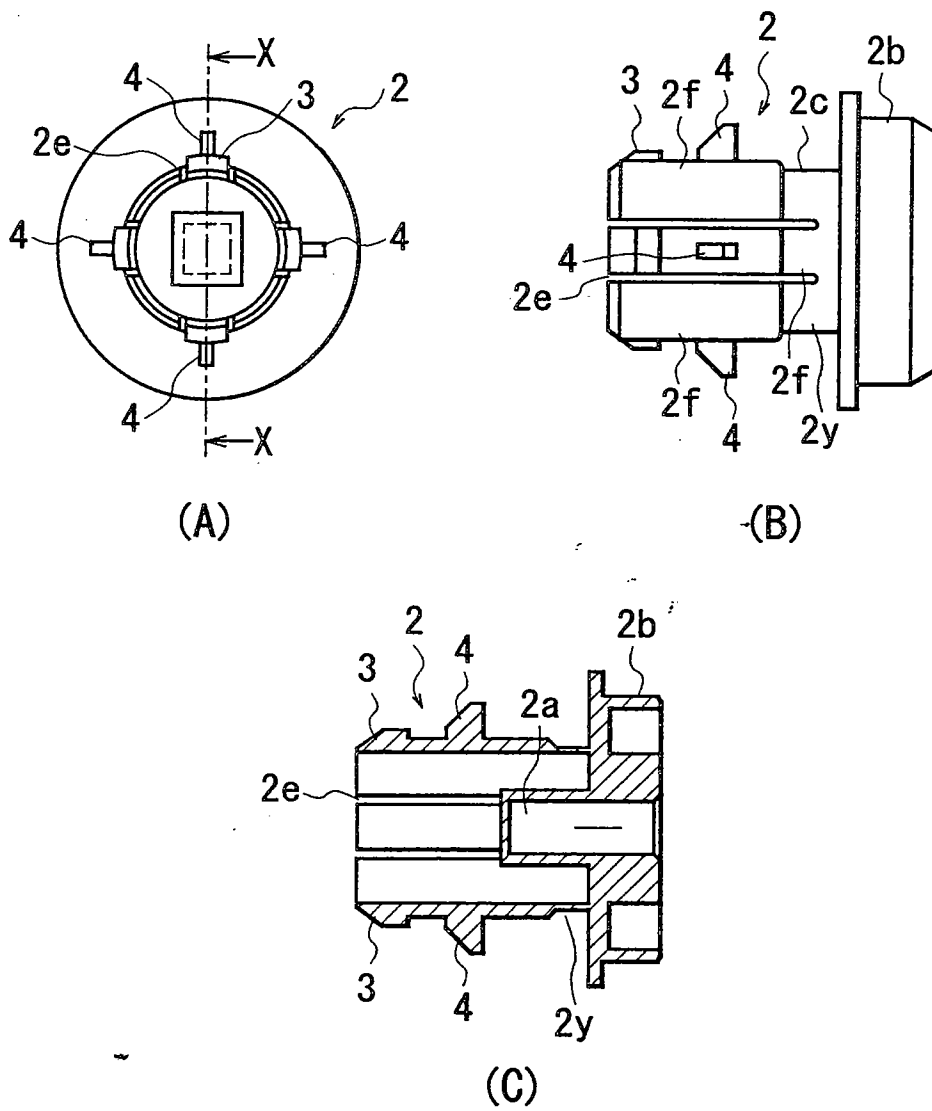


FIG. 32

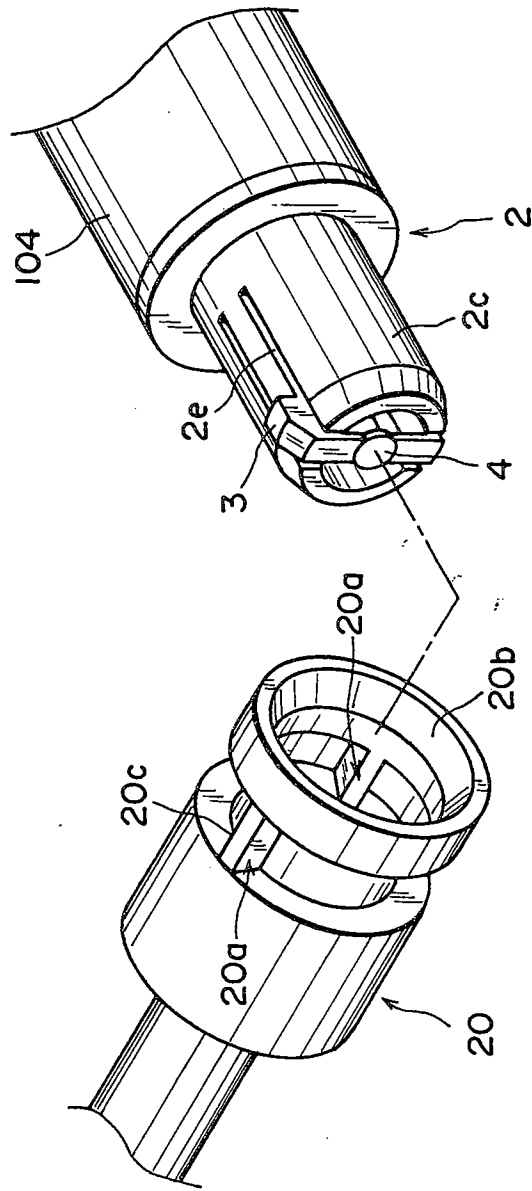


FIG. 33

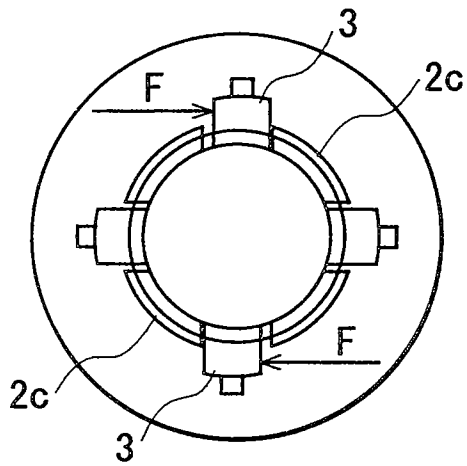


FIG. 34A

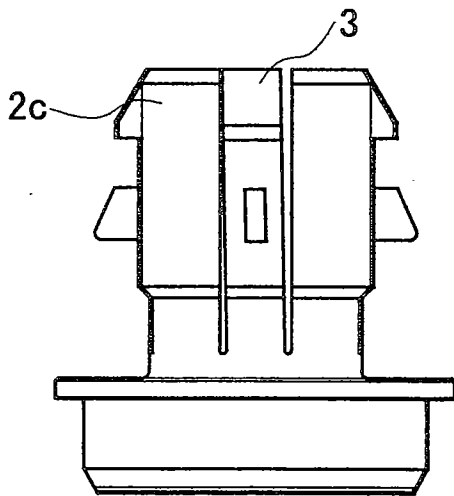


FIG. 34B

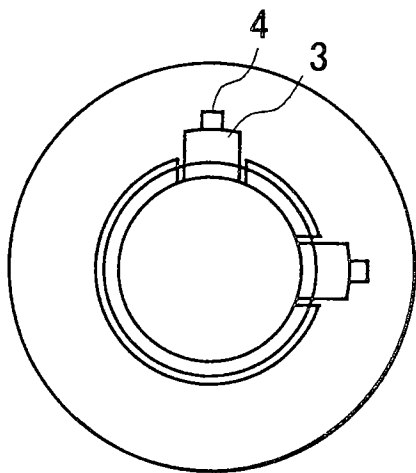


FIG. 35A

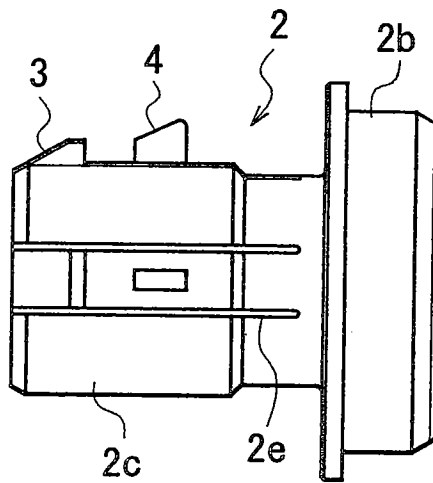


FIG. 35B

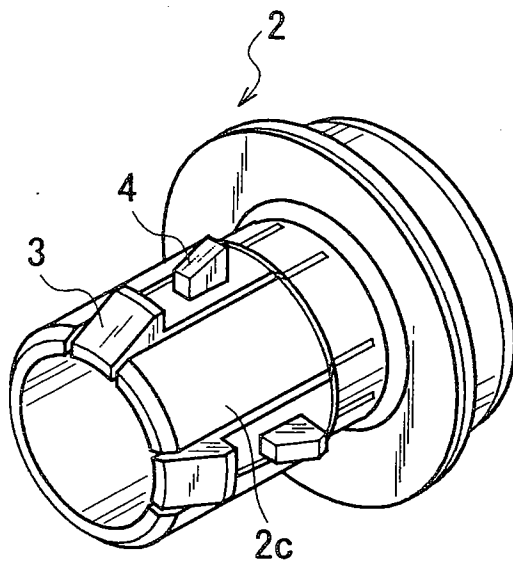


FIG. 35C

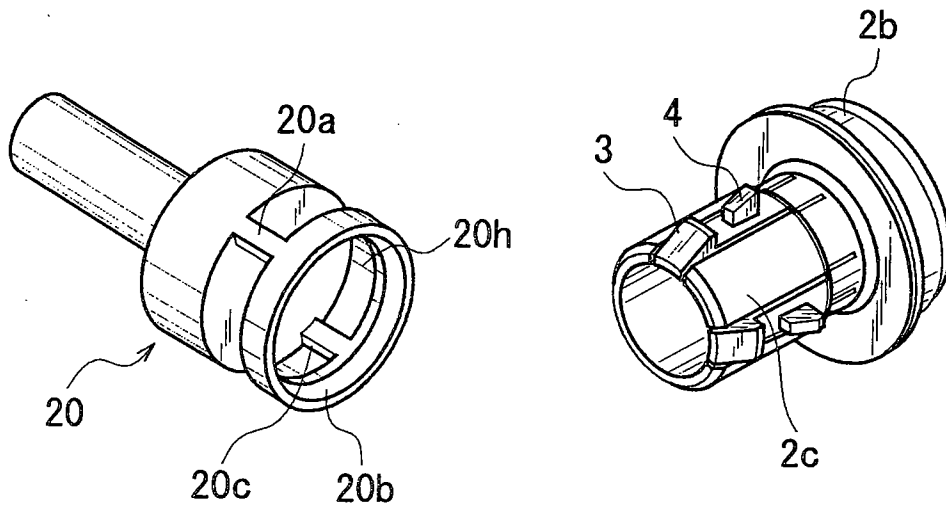


FIG. 36A

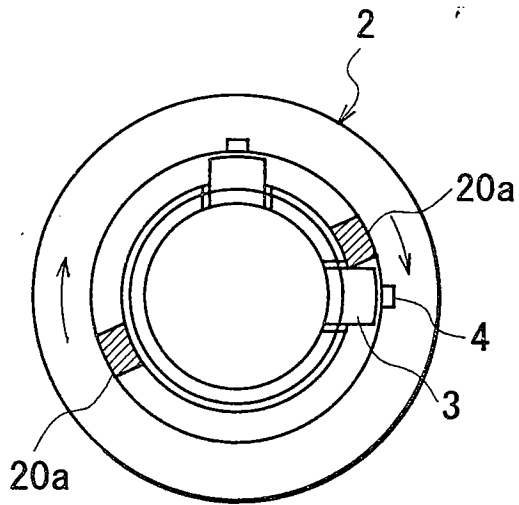


FIG. 36B

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR C-I-P PATENT APPLICATION**

(Page 1)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a

patent is sought on the invention entitled SEALING MEMBER, TONER ACCOMMODATING
CONTAINER AND IMAGE FORMING APPARATUS

_____ , the specification of which

is attached hereto was filed on 6/MAY/2003 as United States Appl'n No. or

PCT International Application No. 10/429,741

and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b), of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designates at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

<u>Country</u>	<u>Application No.</u>	<u>Filed(Day/Mo./Yr.)</u>	<u>Priority Claimed (Yes/No)</u>
Japan	042536/2001(Pat.)	19/FEB/2001	Yes
Japan	197546/2001(Pat.)	28/JUN/2001	Yes

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>Application No.</u>	<u>Filed(Day/Mo./Yr.)</u>	<u>Status(Patent/Pending/Abandoned)</u>
10/076,430	19/FEB/2002	Pending

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

<u>Application No.</u>	<u>Filed (Day/Mo./Yr.)</u>	<u>Status (Patented, Pending, Abandoned)</u>
------------------------	----------------------------	--

I hereby appoint the practitioners associated with the firm and Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to the address associated with that Customer Number:

FITZPATRICK, CELLA, HARPER & SCINTO

Customer Number: 05514

COMBINED DECLARATION AND POWER OF ATTORNEY
FOR C-I-P PATENT APPLICATION
(Page 2)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that Such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First Inventor Yusuke YAMADA
 Inventor's signature *Yusuke Yamada*
 Date August 26, 2003 Citizen/Subject of JAPAN
 Residence 6-13-5 Keyakidai, Moriya-shi, Ibaraki-ken, Japan
 Post Office Address c/o CANON KABUSHIKI KAISHA
3-30-2 Shimomaruko, Ohta-ku, Tokyo, Japan

Full name of Second Inventor, if any Yutaka BAN
 Inventor's signature *Yutaka Ban*
 Date August 20, 2003 Citizen/Subject of JAPAN
 Residence 4-10-11-104 Minamimagome, Ohta-ku, Tokyo, Japan
 Post Office Address c/o CANON KABUSHIKI KAISHA
3-30-2 Shimomaruko, Ohta-ku, Tokyo, Japan

Full name of Third Inventor, if any Katsuya MURAKAMI
 Inventor's signature *Katsuya Murakami*
 Date August 26, 2003 Citizen/Subject of JAPAN
 Residence 3-4-21-102 Shinmachi, Toride-shi, Ibaraki-ken, Japan
 Post Office Address c/o CANON KABUSHIKI KAISHA
3-30-2 Shimomaruko, Ohta-ku, Tokyo, Japan

Full name of Fourth Inventor, if any Fumio TAZAWA
 Inventor's signature *Fumio Tazawa*
 Date August 26, 2003 Citizen/Subject of JAPAN
 Residence 3-18-7-305 Shibasakidai, Abiko-shi, Chiba-ken, Japan
 Post Office Address c/o CANON KABUSHIKI KAISHA
3-30-2 Shimomaruko, Ohta-ku, Tokyo, Japan

Full name of Fifth Inventor, if any Hironori MINAGAWA
 Inventor's signature *Hironori Minagawa*
 Date August 26, 2003 Citizen/Subject of JAPAN
 Residence 7-16-1 Matsugaoka, Moriya-shi, Ibaraki-ken, Japan
 Post Office Address c/o CANON KABUSHIKI KAISHA
3-30-2 Shimomaruko, Ohta-ku, Tokyo, Japan

Full name of Sixth Inventor, if any _____
 Inventor's signature _____
 Date _____ Citizen/Subject of _____
 Residence _____
 Post Office Address _____

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Divisional Application of:)	
	:	Examiner: Unassigned
Yusuke YAMADA et al.)	
	:	Group Art Unit: Unassigned
Divisional of Application No.: 13/231,388)	
	:	Confirmation No.: Unassigned
Filed: Concurrently Herewith)	
	:	September 14, 2012
For: SEALING MEMBER, TONER)	
ACCOMMODATING CONTAINER	:	
AND IMAGE FORMING APPARATUS)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CLAIM TO PRIORITY

Sir:

Applicants hereby claim priority in the above-identified divisional application under the International Convention and all rights to which they are entitled under 35 U.S.C. § 119 based upon the following foreign Japanese Priority Applications:

2001-042536, filed 02/19/2001; and

2001-197546, filed 06/28/2001.

A Claim to Priority, along with certified copies of the priority documents, was filed with a Submission of Priority Documents on May 15, 2002, in Application No. 10/076,430, filed February 19, 2002, which is the parent application of Application No. 10/429,741, filed May 6, 2003, which is the parent application of Application No. 11/200,179, filed August 10, 2005, which is the parent application of Application No. 12/169,895, filed July 9, 2008, which is the parent application of Application No. 12/615,012, filed November 9, 2009, which is the parent

application of Application No. 12/981,785, filed December 30, 2010, which is the parent of Application No. 13/231,388, filed September 13, 2011, which is the parent of the present application. Accordingly, copies of the priority documents are not being submitted herewith.

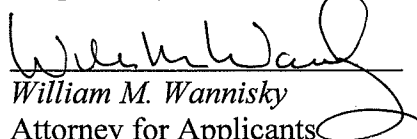
Applicants respectfully request an acknowledgment in the first Official Action of this divisional application that the certified copies of the priority documents were received in Application No. 10/076,430, and an indication that certified copies are not required to be filed in this divisional application.

Favorable consideration hereof is earnestly solicited.

It is believed that no fee is required for this paper. However, the Commissioner is hereby authorized to charge any fee which may be deemed necessary in connection with this paper to Deposit Account No. 06-1205.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address given below.

Respectfully submitted,


William M. Wannisky
Attorney for Applicants
Registration No. 28,373

FITZPATRICK, CELLA, HARPER & SCINTO
1290 Avenue of the Americas
New York, NY 10104-3800
Facsimile: (212) 218-2200
WMW:mds

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Divisional Application of:)	
	:	Examiner: Unassigned
Yusuke YAMADA et al.)	
	:	Group Art Unit: Unassigned
Divisional of Application No.: 13/231,388)	
	:	Confirmation No.: Unassigned
Filed: Concurrently Herewith)	
	:	September 14, 2012
For: SEALING MEMBER, TONER)	
ACCOMMODATING CONTAINER	:	
AND IMAGE FORMING APPARATUS)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Prior to examination on the merits, Applicants submit the following amendments and remarks for the Examiner's consideration:

2

Amendments to the Claims:

Please cancel Claims 2 through 20, without prejudice to or disclaimer of the subject matter recited therein.

1. (Original) A sealing member for sealing a toner discharge opening of a toner container detachably mountable to an image forming apparatus, said sealing member having a substantially cylindrical shape, said sealing member comprising:

a sealing portion for sealing said toner discharge opening;

locking projections for snap-fitting engagement with holes provided in a cylindrical member of an image forming apparatus,

wherein said projections receive from the cylindrical member unsealing forces for unsealing said toner discharge opening by a relative movement between said sealing portion and the toner container,

wherein a number of said locking projections is larger than a number of ribs provided between the holes of the cylindrical member.

Claims 2 through 20 (Cancelled).

REMARKS

The present application is a divisional application of U.S. Patent Application No. 13/231,388, filed September 13, 2011.

Claim Status

Claim 1 is currently pending in this application. Original Claims 2 through 20 have been cancelled without prejudice to or disclaimer of the subject matter recited therein. Applicant presently intends to file a new set of claims in this divisional application to replace pending Claim 1 and is in the process of preparing those claims.

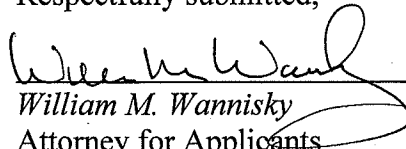
Conclusion

Favorable consideration of the present application is earnestly solicited.

The Commissioner is hereby authorized to charge any fee which may be deemed necessary in connection with this paper to Deposit Account No. 06-1205.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address given below.

Respectfully submitted,


William M. Wannisky
Attorney for Applicants
Registration No. 28,373

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New York, NY 10104-3800
Facsimile: (212) 218-2200
WMW:mds

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	00684.003330.18
	Application Number	
Title of Invention	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS	
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.		

Secrecy Order 37 CFR 5.2

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Applicant Information:

Applicant 1				
Applicant Authority <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix
	Yusuke		YAMADA	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Ibaraki-ken	Country Of Residence ⁱ	JP	
Citizenship under 37 CFR 1.41(b)		JP		
Mailing Address of Applicant:				
Address 1	30-2, Shimomaruko 3-chome, Ohta-ku			
Address 2				
City	Tokyo	State/Province		
Postal Code		Country	JP	
Applicant 2				
Applicant Authority <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix
	Yutaka		BAN	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Tokyo	Country Of Residence ⁱ	JP	
Citizenship under 37 CFR 1.41(b)		JP		
Mailing Address of Applicant:				
Address 1	30-2, Shimomaruko 3-chome, Ohta-ku			
Address 2				
City	Tokyo	State/Province		
Postal Code		Country	JP	
Applicant 3				
Applicant Authority <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix
	Katsuya		MURAKAMI	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Ibaraki-ken	Country Of Residence ⁱ	JP	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	00684.003330.18
		Application Number	
Title of Invention	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS		

Citizenship under 37 CFR 1.41(b) ⁱ	JP		
Mailing Address of Applicant:			
Address 1	30-2, Shimomaruko 3-chome, Ohta-ku		
Address 2			
City	Tokyo	State/Province	
Postal Code		Country	JP

Applicant 4			
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name
	Fumio		TAZAWA
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Chiba-ken	Country Of Residence ⁱ	JP
Citizenship under 37 CFR 1.41(b) ⁱ	JP		

Mailing Address of Applicant:			
Address 1	30-2, Shimomaruko 3-chome, Ohta-ku		
Address 2			
City	Tokyo	State/Province	
Postal Code		Country	JP

Applicant 5			
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name
	Hironori		MINAGAWA
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Ibaraki-ken	Country Of Residence ⁱ	JP
Citizenship under 37 CFR 1.41(b) ⁱ	JP		

Mailing Address of Applicant:			
Address 1	30-2, Shimomaruko 3-chome, Ohta-ku		
Address 2			
City	Tokyo	State/Province	
Postal Code		Country	JP
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. <input type="button" value="Add"/>			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.	
Customer Number	05514

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	00684.003330.18
		Application Number	
Title of Invention	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS		

Email Address		<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>
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Application Information:

Title of the Invention	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS		
Attorney Docket Number	00684.003330.18	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	34	Suggested Figure for Publication (if any)	

Publication Information:

<input type="checkbox"/>	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/>	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	05514		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.					
Prior Application Status	Pending	<input type="button" value="Remove"/>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)		
	Division of	13/231388	2011-09-13		
Prior Application Status	Patented	<input type="button" value="Remove"/>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13/231388	Division of	12/981785	2010-12-30	8045901	2011-10-25

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	00684.003330.18		
		Application Number			
Title of Invention	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS				

Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/981785	Division of	12/615012	2009-11-09	7890027	2011-02-15
Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/615012	Division of	12/169895	2008-07-09	7647012	2010-01-12
Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/169895	Division of	11/200179	2005-08-10	7430384	2008-09-30
Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11/200179	Division of	10/429741	2003-05-06	6990301	2006-01-24
Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
10/429741	Continuation in part of	10/076430	2002-02-19	6879789	2005-04-12
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).					
				<input type="button" value="Remove"/>	
Application Number	Country ¹	Parent Filing Date (YYYY-MM-DD)	Priority Claimed		
2001-042536	JP	2001-02-19	<input checked="" type="radio"/> Yes <input type="radio"/> No		
				<input type="button" value="Remove"/>	
Application Number	Country ¹	Parent Filing Date (YYYY-MM-DD)	Priority Claimed		
2001-197546	JP	2001-06-28	<input checked="" type="radio"/> Yes <input type="radio"/> No		
Additional Foreign Priority Data may be generated within this form by selecting the Add button.					

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.	
Assignee 1	
If the Assignee is an Organization check here.	<input checked="" type="checkbox"/>
Organization Name	Canon Kabushiki Kaisha

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	00684.003330.18
	Application Number	
Title of Invention	SEALING MEMBER, TONER ACCOMMODATING CONTAINER AND IMAGE FORMING APPARATUS	

Mailing Address Information:			
Address 1	30-2, Shimomaruko 3-chome, Ohta-ku		
Address 2			
City	Tokyo	State/Province	
Country	JP	Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Assignee Data may be generated within this form by selecting the Add button.			

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/William M. Wannisky/			Date (YYYY-MM-DD)	2012-09-14
First Name	William	Last Name	Wannisky	Registration Number	28373

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/617,050	Filing Date 09/14/2012	<input type="checkbox"/> To be Mailed
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APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	SMALL ENTITY <input type="checkbox"/>	OR		SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		OR	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A			N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*	X \$ =			X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =			X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		SMALL ENTITY	
AMENDMENT	09/14/2012	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 1	Minus ** 20	= 0	X \$ =		OR	X \$60=	0
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus ***3	= 0	X \$ =		OR	X \$250=	0
<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>							OR		
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		SMALL ENTITY	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus **	=	X \$ =		OR	X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus ***	=	X \$ =		OR	X \$ =	
<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>							OR		
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.					Legal Instrument Examiner: /LYNN NELSON/				
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".									
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".									
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
 If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.