

-1-



G00002

TONER BOTTLE, TONER SUPPLY SYSTEM AND
IMAGE FORMING APPARATUS USING SAME



166166

FIELD OF THE INVENTION AND RELATED ART

5 The present invention relates to a toner
supply container for supplying toner into an
electrophotographic image forming apparatus for
forming an image on a recording material with toner
and an electrophotographic image forming apparatus
10 using the same.

Here, the electrophotographic image forming
apparatus is an apparatus wherein an image is formed
on a recording material through an electrophotographic
image formation type. Examples of the
15 electrophotographic image forming apparatus include an
electrophotographic copying machine, an
electrophotographic printer(e.g. Laser beam printer,
LED printer), a facsimile machine, a word processor or
the like.

20 In an electrophotographic image forming
apparatus such as an electrophotographic copying
machine, a laser beam printer, a photosensitive drum
uniformly charged is selectively exposed to light.
By this, an electrostatic latent image is formed.
25 The electrostatic latent image is developed with toner
to form a toner image. Then, the toner image is
transferred onto a recording material. In such an

-2-

apparatus, whenever the toner is used up, it has to be replenished or supplied. The toner supply container for supplying the toner to the image forming apparatus is classified into a removing type wherein an entire amount of toner is replenished at once into a toner reception container of the main assembly of the image forming apparatus and a leaving type container wherein the container is mounted and is retained therein. Here, the leaving type container gradually supplies the toner into the developing device until the toner therein is used up.

Recently, the leaving type toner supply container is increasingly used from the standpoint of downsizing of the image forming apparatus. In order to prevent scattering of remaining toner through a toner discharging opening, an openable member for sealing the opening is provided.

For example, Japanese Patent Application Publication No. HEI- 7-82268 discloses a mechanism for permitting opening of the discharging opening by rotation of the container after it is mounted to the main assembly. Japanese Laid-open Patent Application No. HEI- 7-306578 discloses a use of a handle for opening and closing the discharging opening.

The present invention further develops the mechanism and system.

-3-

SUMMARY OF THE INVENTION

Accordingly, it is a principal object of the present invention to provide a toner supply container and an electrophotographic image forming apparatus
5 usable with the toner supply container wherein the toner can be supplied assuredly into the main assembly of the electrophotographic image forming apparatus.

It is another object of the present invention to provide a toner supply container detachably
10 mountable to a main assembly of an electrophotographic image forming apparatus and an electrophotographic image forming apparatus to which the toner supply container is detachably mountable.

It is a further object of the present
15 invention to provide a toner supply container which can supply the toner gradually while it is kept loaded in the main assembly of the electrophotographic image forming apparatus, and an electrophotographic image forming apparatus to which the toner supply container
20 is detachably mountable.

It is a further object of the present invention to provide a toner supply container which can supply the toner gradually in accordance with the consumption of the toner while it is kept loaded in
25 the main assembly of the electrophotographic image forming apparatus and an electrophotographic image forming apparatus to which the toner supply container

-4-

is detachably mountable.

It is a further object of the present invention to provide a toner supply container having a toner discharging opening which can be opened by mounting it to the main assembly of the electrophotographic image forming apparatus, and an electrophotographic image forming apparatus to which the toner supply container is detachably mountable.

It is a further object of the present invention to provide a toner supply container having a toner discharging opening which can be opened by rotating a rotatable member relative to a toner accommodating portion when it is mounted to the main assembly of an electrophotographic image forming apparatus, and an electrophotographic image forming apparatus to which the toner supply container is detachably mountable.

It is a further object of the present invention to provide a toner supply container having a toner discharging opening which can be opened through a member provided in the main assembly of the electrophotographic image forming apparatus, and an electrophotographic image forming apparatus to which said toner supply container is detachably mountable.

It is a further object of the present invention to provide a toner supply container wherein a toner discharging opening of the toner accommodating

-5-

portion and a toner receiving opening of a main assembly of the apparatus are interrelatedly opened when the container is mounted to the main assembly of the electrophotographic image forming apparatus, and
5 an electrophotographic image forming apparatus to which the toner supply container is detachably mountable.

It is a further object of the present invention to provide a toner supply container having
10 an improved operativity of supplying the toner to the main assembly of the electrophotographic image forming apparatus, and an electrophotographic image forming apparatus usable with the toner supply container.

It is a further object of the present
15 invention to provide a toner supply container having a rotating force receiving portion for receiving, through a rotating force transmission member provided in the main assembly of the apparatus, the rotating force produced by rotation of the rotatable member to
20 open the toner discharging opening when the container is mounted to the main assembly of the apparatus.

According to an aspect of the present invention, there is provided a toner supply container for supplying toner into a main assembly of an
25 electrophotographic image forming apparatus, comprising:

a toner accommodating portion for

-6-

accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

5 a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

a sealing member for openably sealing said toner discharging opening;

10 an openable member for openably sealing said toner discharging opening;

a rotatable member which is rotatable relative to said toner accommodating portion;

a rotating force receiving portion for
15 receiving rotating force produced by rotation of said rotatable member through a rotating force transmission member provided in the main assembly of said electrophotographic image forming apparatus to unseal
said toner discharging opening by the rotation of said
20 rotatable member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus.

According to another aspect of the present invention, there is provided a toner supply container
25 for supplying toner into a main assembly of electrophotographic image forming apparatus, comprising:

-7-

a toner accommodating portion for
accommodating toner to be supplied into a main
assembly of the electrophotographic image forming
apparatus;

5 a toner discharging opening for discharging
the toner accommodated in the toner accommodating
portion, said toner discharging opening being provided
in said toner accommodating portion;

a sealing member for openably sealing said
10 toner discharging opening;

a sealing member for openably sealing said
toner discharging opening;

a rotatable member which is rotatable
relative to said toner accommodating portion;

15 a rotating force receiving portion for
receiving rotating force produced by rotation of said
rotatable member through a rotating force transmission
member provided in the main assembly of said
electrophotographic image forming apparatus to unseal
20 a main assembly openable member which seals a toner
reception opening provided in the main assembly of
said electrophotographic image forming apparatus by
rotation of said rotatable member, when said toner
supply container is mounted to the main assembly of
25 said electrophotographic image forming apparatus.

According to a further aspect of the present
invention, there is provided an electrophotographic

-8-

image forming apparatus for forming an image on a recording material with toner, which electrophotographic image forming apparatus is supplied with the toner from a toner supply container, comprising:

(a) rotating force transmission member;

(b) a toner container mounting portion for mounting said toner container, said toner container including:

10 a toner accommodating portion for accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

a toner discharging opening for discharging
15 the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

a sealing member for openably sealing said toner discharging opening;

20 a container openable member for openably sealing said toner discharging opening;

a rotatable member which is rotatable relative to said toner accommodating portion;

a rotating force receiving portion for
25 receiving rotating force produced by rotation of said rotatable member to unseal said toner discharging opening by rotation of said rotatable member through

-9-

said rotating force transmission member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus;

(c) a feeding member for feeding the
5 recording material.

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
10 present invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 ia a perspective view of a toner
15 supply container according to Embodiment 1 of the present invention.

Figure 2 ia an exploded perspective view of a toner supply container of Embodiment 1.

Figure 3 is a perspective view illustrating
20 an engaging relation between the main assembly of the apparatus and the toner supply container of Embodiment 1.

Figure 4, (a) is a perspective view of the toner supply container of Embodiment 1 in a toner
25 supplying operation, and (b) is a sectional view of an engageable member shown in (a), (c) is a perspective view of an engageable member of another example.

-10-

Figure 5 is a longitudinal sectional view illustrating an engaging relation between the main assembly of the apparatus and the toner supply container of Embodiment 1.

5 Figure 6 is a longitudinal sectional view illustrating a relation between the main assembly of the apparatus and the toner supply container of Embodiment 1 in a toner supplying operation.

 Figure 7 is a perspective view of a locking
10 mechanism of a toner container and a handle in Embodiment 1.

 Figure 8 is a sectional view of a locking mechanism of the toner container and the handle of Embodiment 1.

15 Figure 9 is a perspective view of a toner supply container according to Embodiment 1 of the present invention.

 Figure 10 is a perspective view illustrating an engaging relation between a main assembly of an
20 apparatus and the toner supply container of Embodiment 2.

 Figure 11 is a perspective view illustrating a perspective view between the main assembly of the apparatus and the toner supply container of Embodiment
25 2 in a toner supplying operation.

 Figure 12 is a sectional view illustrating an engaging relation between the main assembly of the

-11-

apparatus and the toner supply container of Embodiment 2.

Figure 13 is a longitudinal sectional view illustrating an engaging relation between the main
5 assembly of the apparatus and the toner supply container of Embodiment 2 in a toner supplying operation.

Figure 14 is a perspective view showing a mounting direction of the toner supply container
10 relative to the main assembly of the apparatus in Embodiment 2 of the present invention.

Figure 15, (a), (b) are illustrations of an engaging portion of the handle and the shutter.

Figure 16 is a perspective view of a shutter
15 in Embodiment 2 according to another example.

Figure 17, (a) is a perspective view of a shutter engaging portion according to another example, and (b) shows a driving line.

Figure 18 is a perspective view of a toner
20 supply container shown in Embodiment 3.

Figure 19 is longitudinal sectional view schematically showing a toner feeding apparatus, and (a) shows that of a screw type, and (b) shows that of a flexible blade type.

25 Figure 20 is a longitudinal sectional view of an image forming apparatus to which the present invention is applicable.

-12-

Figure 21 is a perspective view of an outer appearance of the apparatus of Figure 20.

Figure 22 is a longitudinal sectional view of an image forming apparatus according to Embodiment 4
5 of the present invention.

Figure 23 is an exploded perspective view of a toner supply container according to Embodiment 4 of the present invention.

Figure 24 is a perspective view of a toner
10 supply container of a modified example of Embodiment 4.

Figure 25 is a perspective view illustrating an engaging relation between the main assembly of the apparatus and the toner supply container according to
15 Embodiment 4 of the present invention.

Figure 26 is a longitudinal sectional view schematically showing a toner feeding apparatus of a flexible blade type.

Figure 27 ((a), (b)) is a longitudinal
20 sectional view of a toner supply container.

Figure 28 is a longitudinal sectional view illustrating an engaging relation between the main assembly of the apparatus and the toner supply container according to Embodiment 4 of the present
25 invention.

Figure 29 is a longitudinal sectional view illustrating an engaging relation between the main

-13-

assembly of the apparatus and the toner supply container of Embodiment 4 in a toner supplying operation.

Figure 30 is a longitudinal sectional view of
5 a container according to a further embodiment using a seal member for sealing a toner discharging opening.

Figure 31 is a front view of a longitudinal trailing edge of toner supply container of Embodiment 4.

10 Figure 32 is a perspective view of a toner supplying apparatus of Embodiment 5 and a developing device.

Figure 33 is an exploded perspective view of a toner supply container according to Embodiment 5 of
15 the present invention.

Figure 34 is a longitudinal sectional view of a toner supply container of Embodiment 5.

Figure 35 is a longitudinal sectional view of a toner supply container of Embodiment 5.

20 Figure 36 is a perspective view illustrating an engaging relation between the main assembly of the apparatus and the toner supply container according to Embodiment 5 of the present invention.

Figure 37 is a perspective view illustrating
25 an engaging relation between the main assembly of the apparatus and the toner supply container according to Embodiment 5 of the present invention.

-14-

Figure 38 is a perspective view of a toner supplying apparatus according to Embodiment 5 of the present invention.

Figure 39 is a perspective view of an image forming apparatus according to Embodiment 5 of the present invention.

Figure 40 is a perspective view of a driving side of a toner supplying apparatus according to Embodiment 5 of the present invention.

Figure 41 is a perspective view of a driving side of a toner supplying apparatus according to Embodiment 5 of the present invention.

Figure 42 is a perspective view of a non-driving side of a toner supplying apparatus of Embodiment 5 of the present invention.

Figure 43 is a perspective view of an image forming apparatus illustrating an interrelation between the front door and the shutter of the toner supply container.

Figure 44 is a side view of an image forming apparatus including a main assembly of a clam-shell type image forming apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First, Embodiment 1 will be described. Then, other embodiments will be described.

The embodiments are directed to a toner

-15-

supply container for supplying toner to a main assembly of an electrophotographic image forming apparatus, comprising:

5 A toner accommodating portion of accommodating toner;

Toner discharging opening, provided in the toner accommodating portion, for discharging the accommodated toner;

10 An openable member for openably sealing the toner discharging opening;

A driving force receiving portion for receiving driving force for moving the openable member to open the toner discharging opening when it is mounted to the main assembly of the electrophotographic image forming apparatus.

<Embodiment 1>

(Electrophotographic image forming apparatus)

Figure 20 is a longitudinal sectional view of an electrophotographic image forming apparatus(image forming apparatus) loaded with a toner supply container according to an embodiment of the present invention.

25 An original 101 is placed on an original supporting platen glass 102 by an operator. A light image of the original is formed on a photosensitive drum 104 by a plurality of mirrors and a lens of an optical system 103. On the other hand, a size of the

-16-

recording material (sheet of paper, OHP sheet or the like) is selected from the recording materials P stored in feeding cassettes 105-108 on the basis of the information inputted by the operator. One of
5 the rollers is selected from the pick-up rollers 105A-108A which corresponds to the selected feeding cassette, is rotated. The sheet is fed to a registration roller 110. The registration roller 110 feeds the sheet P to the photosensitive drum 104 in
10 synchronism with the timing of scanning operation of the optical portion 103 and with the rotation of the photosensitive drum 104. Onto the sheet P, a toner image is transferred from the photosensitive drum 104 by transferring means 111. Thereafter, the sheet P
15 is separated from the photosensitive drum 104 by separating means 112. Then, the sheet P is fed to a fixing portion 114 by a feeding portion 113. The toner image is fixed on the sheet P by heat and pressure in the fixing portion 114. Thereafter,
20 1) in the case of one-sided copy (copy only on one side of the sheet), the sheet P is passed through a sheet reversing portion 115 and is then discharged to a tray 117 by discharging rollers 116.

2) in the case of superimposed copy mode, the
25 sheet P is fed to feeding paths 119, 120 by a flapper 118 in the reversing portion 115. The sheet reaches the registration roller 110. Thereafter, similarly to

-17-

the operation described above, the sheet is fed through the image formation station, the feeding portion and the fixing portion, and then is discharged to the tray 117.

5 3) in the case of duplex copy, the sheet P is fed through the reversing portion 115 and is partly discharged by the discharging roller 116 tentatively. Then, the terminal end of the sheet P is passed through the flapper 118, and then, the discharging
10 roller 116 is rotated in the opposite direction. The sheet P is fed into the apparatus, again. The sheet P is fed to feeding portions 119, 120 and is fed to the registration roller 110. Similarly to the operation described above, the sheet is fed through the image
15 formation station, the feeding portion and the fixing portion, and is then discharged to the tray 117.

In the electrophotographic image forming apparatus having the structures described above, there are provided, around the photosensitive drum 104, a
20 developing device 201, a cleaning means 202 and a primary charging means 203. The developing device 201 functions to develop an electrostatic latent image formed on the photosensitive drum 104 with toner. A toner supply container 1 for supplying the toner to
25 the developing device 201 is demountably mounted to the main assembly 124 of the apparatus.

Here, the developing device 201 includes a

-18-

developing roller 201a which is spaced from the
photosensitive drum 104 by a small gap(approx. 300 μ m).
Upon the developing operation, a thin toner layer is
formed on a peripheral surface of the developing
5 roller 201a by a developing blade 201b. The
electrostatic latent image formed on the
photosensitive drum 104 is developed by application of
a developing bias to the developing roller 201a. The
charging means 202 functions to charge the
10 photosensitive drum 104. The cleaning means
functions to remove the toner remaining on the
photosensitive drum 104.

The amount of the toner decreases with the
developing operation executed, and the toner is
15 gradually supplied from the toner supply apparatus
100.

The description will be made as to exchange
of the toner supply container 1.

First, shortage of the toner in the toner
20 supply apparatus 100 is notified to a notification
portion 124a. Then, the operator, as shown in Figure
21, opens an openable member 121 for closing the
opening 122, formed in the main assembly 124 of the
apparatus. At a rear portion of the opening 122, a
25 holder 31 (mounting means) is provided to permit the
toner supply container 1 to be demountably mounted.
The toner supply container 1 is inserted into the

-19-

holder 31 in a longitudinal direction thereof. At this time, the container 1 is guided by a guide extended along the longitudinal direction of the holder 31, and is inserted to a predetermined position. After the insertion, the operator rotates the handle 15 of the toner supply container 1, by which the toner is supplied from the toner supply container 1 into the developing device 201. When the openable member 121 is closed by the operator, a main switch is actuated so that image forming apparatus is made operable.

When a sensor(unshown) generates a signal indicative of the toner t decrease in the developing device 201, the toner feeding member 29 rotates. By this, the toner is gradually supplied into the developing device 201 from the container 11. When the amount of the toner reaches a predetermined level, the feeding member 29 is stopped. This operation is repeated. When the toner is not supplied even when the sensor produces the signal, the display is made on the notification portion 124a to promote the operator to exchange the toner supply container. Designated by 201c, d are toner feeding members in the developing device.

(Toner supply container)

The toner supply container 1 (Figure 1) of this embodiment is mounted to the toner supply

-20-

apparatus 100 of the image forming apparatus. It is kept placed in the image forming apparatus, and supplies the toner into the developing device gradually until the toner accommodated therein is used up. It is a so-called leaving (built-in) type. However, the present invention is not limited to the leaving type but is usable with a so-called removing type.

The toner supply container 1, as shown in Figure 2 (part exploded view), comprises a toner container 11 (toner accommodating portion), a first flange 12 and a second flange 13 mounted to the respective longitudinal ends of the toner container 11. It further comprises a cap 14 engaged into the first flange 12 and a handle 15 engaged rotatably with the first flange 12. Furthermore, it comprises a shutter 16 for opening and closing the toner discharging opening 11a of the toner container 11. A toner stirring member may be provided in the toner container 11 to feed the toner.

(Structure of toner accommodating portion)

The toner container 11 is a hollow cylindrical member. A toner discharging opening 11a is formed in a circumference thereof. Engaging portions 11b are provided at lateral end portions of the toner discharging opening 11a. The engaging portions 11b are engaged with a shutter 16 to open and close

-21-

the shutter 16 in the circumferential direction
(direction indicated by an arrow).

In this embodiment, the configuration is
cylindrical, but it is not inevitable. For example,
5 the cross-section may be elliptical, or a
configuration having a corner of corners. The
structure of the toner container 11 and the number of
parts in this embodiment are not inevitable, either.
The toner container 11 is filled with powdery toner.
10 The toner may be black chromatic toner, chromatic
toner which may be one component magnetic toner, one
component non-magnetic toner or the like.

(Structure of first and second flanges 12,
13)

15 The first flange 12 and the second flange 13
are hollow cylindrical members. They are engaged
with and bonded to the respective longitudinal ends of
the toner container 11. They seal the toner container
11. The first flange 12 is provided with an opening
20 12a for filling the toner. The opening 12a is sealed
by a cap 14 after the container 11 is filled with the
toner. The second flange 13 has an end plate 13b.
The second flange 13 is provided with a projection 13a
extended in the longitudinal direction on the outer
25 surface. The projection 13a functions to positioning
the container 1 in the circumferential direction when
it is inserted into the main assembly of the image

-22-

forming apparatus. It also functions to prevent rotation of the container 11 in the main assembly of the apparatus. The position of the projection 13a may be changed depending on the color of the toner accommodated in the container 1 to prevent mounting at an erroneous position.

The projection 13a may be provided on the first flange 12 or on the toner container 11. However, from the standpoint of operativity, it is preferably provided on the second flange 13. When the projection 13a is provided on the second flange 13, the positioning can be easily controlled by the operator when it is inserted. In addition, the event of the erroneous mounting can be quickly recognized.

The first flange 12 or the second flange 13 may be formed integrally with the toner container 11 or a part of the toner container 11. If the second flange 13 has a particular non-cylindrical cross-section, the projection 13a may not be provided.

(Structure of the rotatable member)

The rotatable handle 15 is a cylindrical member. One end thereof is provided with a rectangular grip 15e. The other end is hollow and cylindrical, and is open. The handle 15 is rotatably connected with the first flange 12. The handle 15 is provided with an engaging portion 15a for transmitting driving force along a part of the outer periphery

-23-

thereof. The engaging portion 15a has a gear. The engaging portion 15a is engaged with a gear as a driving force reception side engaging portion 21a provided in a driving force transmission member 21
5 (rotating force transmission member) in the main assembly 124 of the apparatus, when the toner supply container 1 is mounted to the main assembly 124 of the image forming apparatus. The engaging portion 15a is engageable with a driving force reception side
10 engaging portion 21a in a series of operations for mounting the toner supply container 1 to the main assembly 124 of the apparatus. Therefore, the engaging portion 15a is preferably provided on the outer surface of the handle 15. The driving force
15 transmission member 21 includes a driving force reception side engaging portion 21a and a driving force transmission side engaging portion 21b at the opposite ends of the shaft 21s rotatably supported on the main assembly 124 of the apparatus. The shaft
20 21s is mounted to the main assembly 124 of the apparatus by a bearing (unshown).

The engaging portion 15a and the engaging portion 21a provided at one end of the driving force transmission member 21, the engaging portion 21b
25 provided at the other end of the driving force transmission member 21 and the driving force reception side engaging portion 22a of the shutter 16, are gears

-24-

engageable with each other. The gear has tooth arranged along a circumferential direction of the container. It is not limited to a gear, but may be a friction wheel, a pin wheel, or may be a gear having one teeth (projection) when the angle of rotation required for the opening and closing of the shutter is small (this applies to the other embodiments).

A locking member 15b is provided (Figure 7, 8) to lock the handle 15 to the toner container 11 before the toner supply container 1 is mounted to the main assembly 124 of the image forming apparatus and after it is demounted therefrom. The locking member 15b is engaged with an elongated groove 15c formed in the outer periphery of the cylindrical of the handle 15, for movement in the longitudinal direction. A compression coil spring 15d is provided between the end of the groove 15c and the locking member 15b. When the toner supply container 1 is out of the main assembly 124 of the apparatus, the locking member 15b is engaged with the hole portion 12b of the toner container 11 by the spring force of the spring 15d. Therefore, the handle 15 is not rotatable. Structure of the locking mechanism is not limited to this, if it is engageable with the toner container 11 and is releasable upon the mounting of the container. The locking mechanism may be omitted, if not necessary.

On the other hand, a main assembly projection

-25-

23 is fixed to a toner supplying apparatus 100 of the main assembly 124 of the apparatus. The main assembly projection 23 prevents movement of the locking member 15b in the process of mounting the toner supply

5 container 1 to the toner supplying apparatus 100.

Therefore, the locking member 15b retracts and disengages from the hole portion 12b. Then, the handle 15 becomes rotatable.

(Toner feeding member)

10 As shown in Figure 19, a screw 25 is provided in the toner supply container 1. The screw 25 is provided with screw blades 25R, 25L which are twisted in different directions. As indicated by arrows a, b, they feed the toner in the toner container 11

15 toward the toner discharging opening 11a. The screw 25 is supported rotatably on the end plate 13b of the second flange 13. The gear 26 is fixed to the shaft of the screw 25 outside the end plate 13b. When the toner supply container 1 is mounted to the main

20 assembly 124 of the apparatus, the gear 26 is brought into meshing engagement with a gear (unshown) which is eventually engaged with the driving source in the main assembly 124 of the apparatus.

As shown in Figure 19, (b), the toner feeding

25 member may be a feeding blade 28. The feeding blade 28 is rotatably supported on the end plate 13b of the second flange 13. It is fixed to a feeding shaft 27

-26-

fixed to the gear 26 outside the end plate 13b. It is made of a flexible material such as a plastic resin material or the like. The feeding blade 28 is provided with a plurality of blades each having a claw portion 28a inclined toward the toner discharging opening 11a. Therefore, as shown in Figure indicated by the arrows a, b, it can feed the toner in the toner container 11 toward the toner discharging opening 11a. (Structure of the shutter 16)

10 The shutter 16 which is an openable member, is engaged with an engaging portion 11b provided around the toner discharging opening 11a. It slides along the circumference to open and close the toner discharging opening 11a. The cross-section (taken
15 along a line perpendicular to the longitudinal direction of the toner supply container 1) of the shutter 16 is arcuated so as to be extended along the outer surface of the toner container 11.

 When the toner supply container 1 is mounted
20 to the main assembly 124 of the apparatus, the shutter 16 is brought into engagement with a shutter engageable member 22 which is provided in the main assembly 124 of the apparatus and which is
 interrelated with the engaging portion 21b. In other
25 words, the engaging portion 21b and the engageable member 22 are provided in the main assembly of the apparatus. When the container 1 is mounted to the

-27-

main assembly 1 of the apparatus in the longitudinal direction, the engageable member 22 is engaged with the shutter 16.

As shown in Figure 4, (b), the shutter engageable member 22 is supported to the bearing portion 2 provided in the main assembly 124 of the apparatus such that it is rotatable but not movable in the axial direction. The outer periphery is provided with a driving force reception side engaging portion 22a (rotating force receiving portion) for receiving the rotating force from the handle 15. The engageable member 22 is provided with an engaging portion 22b for engagement with the both edges 16c (in the container inserting direction of the shutter 16). The engaging portion 22a has a plurality of tooth. The shutter 16 receives the rotating force by the contact portion 16h contacted to the engaging portion 22b. Thus, portion 16h is a rotating force receiving portion.

Figure 4, (c) shows another embodiment. In this embodiment, the engageable member 22 is engaged with a rail portion(unshown) provided in the toner supplying apparatus 100 and moves in the circumferential direction, by the provision of the sliding portion 22c at the opposite axial ends. It also functions as a shutter mechanism for opening and closing the toner supply opening communicating to the developing device 201 from the toner supplying

-28-

apparatus 100.

(Toner supplying operation)

The description will be made as to a toner supplying operation using the toner supply container 1 according to this embodiment of the present invention.

(1) mounting of the toner supply container 1

The toner supply container 1 having the structures described above, is inserted into the toner supplying apparatus 100 of the main assembly 124 of the apparatus in the direction of arrow c (Figure 21). At this time, the projection 13a of the toner supply container 1 is engaged with the engaging portion 24 of the main assembly 124 of the apparatus. First, the engaging portion 22b of the engageable member 22 is engaged with the shutter 16. The shutter 16 moves sliding on the engaging portion 22b. The engaging portion 21a provided in the main assembly 124 of the apparatus is brought into engagement with the engaging portion 15a of the handle 15, and the engageable member 22 provided in the main assembly is brought into engagement with the shutter 16. As shown in Figure 8, (a) and Figure 8, (b), the locking member 15b is stopped by the projection 23. Therefore, the locking member 15b enters the groove 15c while compressing the compression coil spring 15d, and the locking member 15b is disengaged from the hole portion 12b. By this, the locking between the handle 15 and

-29-

the toner container 11 is released. Then, the handle 15 becomes manually rotatable relative to the toner container 11.

(2) toner supply

5 Referring to Figure 4, (a) and Figure 6, the toner supply will be described. The operator manually rotates the handle 15 in the counterclockwise direction while the toner supply container 1 is in the main assembly 124. By this rotation, the rotational
10 driving force is transmitted to the transmission member 21 provided in the main assembly 124 of the apparatus through the engaging portion 21a from the engaging portion 15a of the handle 15. The driving force is transmitted to the engageable member 22
15 through the engaging portion 22a interrelated with the engaging portion 21b. By the driving force thus transmitted, the shutter 16 slides in the circumferential direction of the container 11. This opened the toner discharging opening 11a (width of W)
20 to enable the toner supply. At this time, the projection 13a of the container 1 is engaged with the engaging portion 24 provided in the main assembly 124. Therefore, the container 11 is not moved with the rotation of the handle 15.

25 (3) dismounting of the toner supply container
1

By the operator rotating the handle 15 in the

-30-

clockwise direction, the driving force in the opposite direction is transmitted to the shutter 16 in the order similar to (2). The shutter 16 closes the toner discharging opening 11a (width W). Then, the operator draws the container 1 out of the toner supplying apparatus 100. By this, the locking member 15b is engaged with the hole portion 12b of the first flange. The handle 15 is locked to the container 11. Thus, a series of the toner supplying operations is completed. In the operations, the container 11 is immovable. Therefore, no limitation is imposed on the configuration of the container 11 (cylindrical is not inevitable). Since the shutter 16 and the handle 15 are separate members from each other, the position of the toner discharging opening 11a is not necessarily adjacent to the handle, thus increasing the design latitude of the toner supply container 1. The shutter 16 is permitted to be opened when the container 1 is mounted to the mounting position in the main assembly 124 of the apparatus. Therefore, when the container 1 is out of the main assembly of the apparatus, the shutter 16 is prevented from being opened inadvertently.

The description will be made as to a toner supplying operation.

The container 1 of this embodiment, the rotating force of the handle 15 is transmitted to the

-31-

shutter 16 through a plurality of engaging portions, namely, the engaging portion 15a, the engaging portion 21a, the engaging portion 21b and the engaging portion 22a. Therefore, it is possible to freely use the engagement ratios (gear ratios) in the design of the engaging portions.

When the sliding movement distance of the shutter 16 is long, the engagement ratio of the handle 15 (gear ratio) is made large, so that operation(rotation) distance of the handle 15 can be shortened. When the opening and closing torque of the shutter 16 is large, the engagement ratio (gear ratio) of the handle 15 is made small, so that torque required for the operation (rotation) of the handle 15 can be decreased. Thus, the angle of rotation and/or the operation torque of the handle 15 can be properly selected.

The configuration, the structure and the number of parts of each of the drive transmission member 21, the engageable member 22, the handle 15 and the shutter 16, can be properly selected. The rotational direction of the handle 15 is not limited (this applies to the other embodiments).

<Embodiment 2>

Referring to Figures 9-15, Embodiment 2 will be described. The same reference numerals as in Embodiment 1 are assigned to the elements having the

-32-

corresponding functions, and detailed descriptions thereof are omitted for simplicity.

Embodiment 2 shown in Figure 9 is different from Embodiment 1 in that driving force reception side engaging portion 22a is provided in the toner supply container 1. In other words, the driving force reception side engaging portion 16a is provided in the shutter 16 of the toner supply container 1. The engaging portion 16a provided in the shutter 16 is engaged with the engaging portion 21b in the series of the container 1 inserting operations into the main assembly 124 of the apparatus. The engaging portion 16a is provided on the outer surface of the shutter 16. The number thereof is not limited. The engaging portion 16a has tooth engaged with the gear of the engaging portion 21b.

The engaging portion 16a is inserted into the toner supplying apparatus 100 of the main assembly 124 of the apparatus while the projection 13a of the container 1 is engaged with the engaging portion 24 of the main assembly 124 of the apparatus. By this, the engaging portion 16a is engaged with the driving force transmission side engaging portion 21b of the drive transmission member 21 provided in the main assembly 124 of the apparatus.

When the operator rotates the handle 15, the driving force is transmitted to the transmission

-33-

member 21 through the engaging portion 21a from the engaging portion 15a provided in the handle 15. Further, it is transmitted to the engaging portion 16a provided in the shutter 16 from the engaging portion 21b. By the driving force thus transmitted, the shutter 16 causes to slide the engaging portion 11b of the toner container 1 in the circumferential direction. This opens the toner discharging opening 11a (width W) (Figures 11, 13). This enables the toner supply. The closing operation of the toner discharging opening 11a (width W) is effected by the transmission of the driving force in the opposite direction.

In the series of the toner supplying operations, the projection 13a of the container 1 is locked by the engaging portion 24 of the main assembly 124 of the apparatus, similarly to Embodiment 1. Therefore, the toner container 11 is not interrelated with the rotation of the handle 15, but is fixed by the main assembly 124 of the apparatus.

The mounting of the container 1 to the toner supplying apparatus 201 provided in the main assembly 124 of the apparatus, is effected by insertion in the direction of indicated by the arrow X from the second flange 13 side. Therefore, the engaging portion 16a passes by the engaging portion 21a of the transmission member 21 and is brought into engagement with the

-34-

engaging portion 21b at the rear side. As shown in Figure 15, (a), the outer configuration of the engaging portion 16a is smaller than that of the engaging portion 15a. Or, as shown in Figure 15, (b),
5 it is preferable that angles of the engaging portion 16a and the engaging portion 15a before the mounting, is not overlapped with the other, from the standpoint of mounting operativity.

According to this embodiment, the engageable
10 member 22 is not necessary, and therefore, the structure of the main assembly can be simplified.

Furthermore, as shown in Figure 16, the engaging portion 16a may be provided at each of the opposite ends of the shutter 16, by which the sliding
15 movement of the shutter 16 is smooth. The engaging portion 16a may be provided at one position or at three or more positions.

As shown in Figure 17, the direction of the sliding movement of the shutter 16 is coaxial with the container 11. The engaging portion 16a may be in the
20 form of a rack extended in the axial direction of the container 11. In this case, the main assembly of the apparatus is provided with a first drive transmission member 21A having an engaging portion 21a engageable
25 with the engaging portion 15a and a bevel gear 21c at the end. Also, a second drive transmission member 21B is provided which has a pinion 21e rotatably

-35-

supported by a shaft 21f. The pinion 21e is integral with the bevel gear 21d engaged with the gear 21c. By doing so, the pinion 21e of the second drive transmission member 21B is engaged with the rear side
5 end of the engaging portion 16a. Therefore, by the operator rotating the handle 15, the pinion 21e is rotated to advance the shutter 16 toward the rear side.

<Embodiment 3>

10 Referring to Figure 18, a toner container 11 according to Embodiment 3 will be described. The same reference numerals as in Embodiment 1 are assigned to the elements having the corresponding functions, and detailed descriptions thereof are
15 omitted for simplicity.

In Embodiment 3 shown in Figure 18, the engaging portion 22a of the engageable member 22 is provided as the engaging portion 16a in the shutter 16 of container 1, similarly to Embodiment 2. The
20 configuration of the container 11 is non-cylindrical. The cross-section of the container 11 is an arcuated portion 11d which is close to semicircle and a trapezoidal portion 11c connected thereto. The inside constitutes a single space. The shutter 16
25 moves along a short side (in the direction perpendicular to the mounting-and-demounting direction of the container 1) along a side surface of the

-36-

trapezoidal portion 11c (direction indicated by the arrow Y). By this, the toner opening 11a is opened and closed. The transmission member 21 (not shown in Figure 18) is similar to that of Embodiment 1, and the
5 engaging portion 21a is engaged with the engaging portion 15a, and the engaging portion 21b is engaged with the engaging portion 16a. Here, the engaging portion 16a is in the form of a rack extended on the shutter 16 in the moving direction of the shutter 16.

10 In Embodiment 3, the toner supply is possible without the rotating operation of the container 11 similarly to Embodiment 2. Therefore, the configuration of the container is not limited to any particular shape. Then, the space above the toner
15 container mounting portion which has been a dead space, as shown in Figure 13, can be utilized as the container 11 capacity.

Using such a configuration, the increase of the volume of the toner container is achieved, and the
20 space efficiency of the toner supply container can be increased. From the standpoint of the discharging property of the toner and the reduction of the remaining toner amount, it is preferable to provide toner feeding means in the container 11.

25 In the Embodiments 1-3, the angle of rotation of the handle 15 is preferably 60° to 120° from the standpoint of operativity.

-37-

<Embodiment 4>

The Embodiment 4 will be described in detail. The description will be made as to (1) general arrangement of the main assembly of the image forming apparatus to which the toner supply container is
5 mounted, (2) structure of the toner supply container and (3) toner supplying operation method.

(general arrangement of the main assembly of the image forming apparatus to which the toner supply
10 container is mounted)

Figure 22 is a longitudinal sectional view of the main assembly 124A of a full color image forming apparatus to which the toner supply container of this embodiment is mounted.

15 There are provided photosensitive drums 104a, 104b, 104c and 104d for forming toner images of magenta, cyan, yellow and black colors, and a transfer belt 125 disposed below the photosensitive drum 104a-104d. The photosensitive drums 104a, 104b, 104c and
20 104d are rotated by ultrasonic motors ((unshown), and around them, there are provided primary chargers 203a, 203b, 203c and 203d, developing devices 204a, 204b, 204c and 204d, and transfer chargers 111a, 111b, 111c and 111d, respectively. Above the photosensitive
25 drums 104a-104d, there are disposed exposure devices 103a, 103b, 103c and 103d constituted by LED or the like, respectively.

-38-

The photosensitive drums 104a, 104b, 104c, 104d are charged by the chargers 203a, 203b, 203c, 203d, respectively. They are exposed then to color-separated yellow, magenta, cyan, black light images by the exposure devices 103a, 103b, 103c and 103d, respectively. By this, electrostatic latent images for yellow color, magenta color, cyan color and black color toner images are formed on the photosensitive drums 104a, 104b, 104c and 104d, respectively. Then, the latent images are developed by the developing devices 204a, 204b, 204c and 204D, respectively. Thus, yellow color, magenta color, cyan color and black color toner images are formed on the photosensitive drums 104a, 104b, 104c and 104d sequentially.

A sheet P is fed out of a cassette 105 or 106 by a pick-up roller 105A or 106A one by one. It is fed to a registration roller 110 by a feeding portion 109 including a feeding roller and a paper guide. It is timed by the roller 110, is electrostatically attracted on the transfer belt 125, and is fed in the direction indicated by an arrow A. The sheet P attracted on the transfer belt 125 is fed sequentially to the transfer portions faced to the photosensitive drums 104a, 104b, 104c, 104d by the rotation of the transfer belt 125. The toner images on the photosensitive drums 104a, 104b, 104c and 104d are

-39-

superimposedly transferred onto the sheet P by the transfer chargers (transfer blades) 111a, 111b, 111c and 111d. By doing so, a full-color toner image is formed.

5 The sheet P now having the toner images thus transferred, is fed to the fixing portion 114 from the transfer belt 125 portion. The toner image is fixed on the sheet P by the heat and pressure. Thus, a full-color printed image is formed on the sheet P.

10 Then, it is discharged to outside of the main assembly of the apparatus by sheet discharge feeding means 126 provided downstream of the fixing portion 114.

 The belt feeding portion 127 comprises a transfer belt 125, a driving roller 129 which receives

15 a driving force from a pulse motor 128 and plurality of supporting rollers 131, 132 and 133, around which the transfer belt 125 is trained.

 A transfer belt cleaner 134 is provided to remove the toner deposited on the transfer belt 125.

20 It is contacted to or disengaged from the transfer belt 125 by a mechanism (unshown), upon necessity. The toner is removed from the transfer belt 125 by rotation of a cleaner brush.

 The toners are supplied from toner supplying

25 apparatuses 100a, 100b, 100c, 100d into the developing devices 204a, 204b, 204c, 204d.

 When the toner is used up, the operator opens

-40-

toward himself a front door(unshown) of the main assembly 124A of the apparatus. The toner supply containers loaded in the toner supplying apparatuses 100a, 100b, 100c and 100d are exchanged. Then, the
5 front door is closed, in response to which the main switch is actuated. By this, the toner feeding member or toner feeding members of the exchanged new toner supply container or containers 1a, 1b, 1c and/or 1d are rotated by driving force from the main assembly
10 124A, so that toner is supplied into the toner supplying apparatus or apparatuses 100a, 100b, 100c and/or 100d.

(Structure of toner supply container)

The toner supply containers 1a, 1b, 1c, 1d of
15 this embodiment are mounted to the toner supplying apparatus 100a, 100b, 100c, 100d provided in the main assembly 124A of the color copying machine shown in Figure 22. They are left in the apparatus, and supply the toner into the toner supplying apparatuses
20 100a, 100b, 100c, 100d gradually, until the toner is used up. So, it is a so-called leaving type toner supply container.

The toner supply container 100a, 100b, 100c and 100d have the same structures. As shown in
25 Figure 23, it has a toner container 11 including a first flange 12 and a second flange 13 which are welded to each other into an integral member. It has

-41-

a cap 14 fitted into one end of the toner container 11. It further comprises a handle 15 rotatably engaged into one end of the toner container 11. It further comprises a toner feeding member (unshown) in the toner container 11, and a coupling (unshown) for supporting the toner feeding member and for transmitting driving force. There are further provided a shutter 16 for opening and closing the toner discharging opening 11a of the toner container 11, and a seal member 35 for sealing between the shutter 16 and the toner discharging opening 11a. (Toner container)

The toner container 11, as shown in Figure 27, has a cross-section (taken along a line perpendicular to the longitudinal direction of the container) of an arcuated portion which is close to a semicircle and a rectangular portion 11h connected thereto. The inside thereof is a single elongated hollow space. The outer surface of the arcuated portion 11g is provided with a toner discharging opening 11a. A shutter supporting member 11e is provided at longitudinal ends of the toner discharging opening 11a. The shutter 16 is supported by a supporting member 11e so as to be movable between a close position(Figure 27, (a)) for closing the toner discharging opening 11a, and an opening position(Figure 27, (b)) for opening the toner

-42-

discharging opening 11a, the opening position being retracted from the close position. Depending on the size of the toner discharging opening 11a in a direction crossing with the longitudinal direction of the container 11, the sliding movement distance of the shutter 16 is required to be long. Therefore, as shown in Figure 24, the arcuated portion is extended, and the projection 32 may have an arcuated configuration having the angle θ of 270° as seen from the center of the container 1a.

The projection 32 is provided in the second flange 13. The projection 32 is used for positioning, after the container 1a is mounted to the toner supplying apparatus 100a, 100b, 100c or 100d of the main assembly 124A of the apparatus. The projections 32 may be provided at different positions corresponding the colors of the toners contained in the containers, so that erroneous mounting of a toner supply container at a position for a different color can be avoided. In other words, the projection 32 has a color discrimination function. The projections 32 are provided on the outer surfaces of the containers 11 accommodating different color toners, preferably, at different positions on the outer surface of a free end portions or leading end portions (downstream) of the toner supply container in the inserting direction into the toner supplying

-43-

apparatus. By doing so, the user can quickly position the container, and can quickly recognize erroneous mounting of the toner supply container, if it occurs.

5 At a rear end(upstream) in the container inserting direction, an opening 12a (toner filling opening) for filling the toner is provided. In the filling port 12a, a cross-shaped rib 12c is provided. It is provided at a center thereof with an axial bore
10 12d for supporting the toner feeding member. Around the filling port 12a, there is provided a circular wall portion 12e for engagement with a handle which will be described hereinafter. The filling port 12a is sealed by mounting of a cap 14 after the toner
15 filling. The first flange 12 is connected with the toner container 11 into an integral member.

 An end surface of the second flange 13 is provided with a hole 13c into which the driving force receiving portion (e.g. Coupling) for supporting the
20 toner feeding member at the outside of the container 11 and for transmitting driving force, is inserted. Around the hole 13c, a wall portion 13d for supporting the outer surface of the coupling is provided (Figures 23, 31).

25 The configuration of the toner container may be square prism, hexagonal prism, cylindrical or the like.

-44-

(Handle)

The handle 15 is cylindrical in shape. One end thereof is provided with a straight grip 15e. The other end is in the form of a hollow cylindrical shape and is open. The handle 15 is manually rotatable relative to the wall portion 12e provided at one end of the container 11. An engaging portion 15a for transmitting the driving force is provided. The engaging portion 15a is provided on the outer surface of the handle 15. And, it has tooth.

The engaging portion 15a is provided with a segment gear configuration engageable with an engaging portion 21a of a driving force transmission member 21 provided in the supplying apparatus when the container 1a, 1b, 1c or 1d is inserted into a proper one of the supplying apparatuses 100a, 100b, 100c and 100d. It is engageable with the engaging portion 21a in the series of the container 1 inserting operations.

The driving force transmission member 21 is provided with an engaging portion 21a and an engaging portion 21b at each of the opposite ends of the shaft 21s rotatably supported on the supplying apparatus. The engaging portions 21a, 21b are in the form of gears having tooth. In this embodiment, the engaging portion 21a has one gear teeth. However, the structure or the number of the driving force reception mechanism is not limited to this embodiment, if it

-45-

functions to receive the driving force. In this embodiment, the engaging portion 21b is in meshing engagement with the gear 16d (segment gear) through an idler gear as the driving force transmission side
5 engaging portion 21g. In this embodiment, the transmission member 21, the engaging portions 21a and 21b and the engaging portion 21g are provided in the main assembly of the apparatus.

(Toner feeding member)

10 A feeding shaft 27 for supporting the toner feeding member 29 is rotatably supported in the axial bore 12d (Figure 23) at one end. At the other end, it is supported so as to transmit the rotating force by a coupling 26a (Figure 26). The feeding
15 member 29 is provided with a feeding blade 28 of flexible material fixed to the shaft 27. The coupling 26a is rotatably supported on the container 11.

The feeding blade 28 rubs the inner surface
20 of the arcuation shape portion 11g (Figure 23, 27). The blade 28 is in the form of a plurality of blades having claw portion 28a with an inclined portion 28b projected in the rotational direction at the free end side edge relative to the toner discharging opening
25 11a. Therefore, it can feed the toner in the container 11 toward the opening 11a. The opening 11a is disposed at a front side(upstream) as seen in the

-46-

inserting direction of the container 1a into the main assembly of the apparatus. Thus, all of the claw portions 28a are directed in the same direction. When the container 1a is mounted to the supplying apparatus 100a, the coupling 26a is engaged with the driving side coupling(unshown) provided in the supplying apparatus, and receives the driving force to rotate the feeding member 29.

If the toner in the container 11 can be fed to the toner discharging opening, the toner feeding member is not inevitable. However, by the provision of the toner feeding member, the toner can be assuredly supplied.

Figure 31 shows an end at the side receiving the driving force for the toner supply container. A coupling 26a functioning as a driving force receiving member is rotatably supported on the end surface of the container 11. The opposite axial ends of the coupling 26a are in the form of axial coupling. It is coupled with an end of the feeding shaft 27 of the feeding member 29 in the container 11. Outside the container 11, there is provided a rotating force receiving portion. The rotating force receiving portion is connected with a driving member, provided in each of the supplying apparatus, for transmitting the rotating force when the container 1a is mounted to the main assembly 124A of the apparatus. The

-47-

rotating force receiving portion is in the form of projections 26a1 extended in the radial direction, as shown in Figure 31. The recess 26a formed by the projections 26a1 therebetween is engaged with the projection(unshown) of the driving member, so that they are coupled.

(Shutter)

The shutter 16 shown in Figure 23 is provided with a sliding portion 16f at each of the opposite longitudinal ends of the shutter 16. The sliding portion 16f is engaged with a shutter supporting member 11e functioning as a guiding member provided at each of the opposite longitudinal ends of the opening 11a. The shutter 16 slides in a circumferential direction of the container 11 to close and open the opening 11a. A section taken along a plane perpendicular to the longitudinal direction of each of the containers 1a, 1b, 1c, 1d of the shutter 16 is arcuated so as to extend along the outer surface of the container 11. The sliding portion 16f and the supporting member 11e have hook-shape section taken along a plane perpendicular to the longitudinal direction.

The shutter 16, as shown in Figure 25, is provided with a driving force reception side engaging portion 16d functioning as a rotating force receiving portion engageable with a gear functioning as the

-48-

engaging portion 21g when any of the containers 1a, 1b, 1c, 1d is mounted to the associated one of the supplying apparatuses 100a, 100b, 100c, 100d. The engaging portion 16d is provided with a plurality of tooth. The engaging portion 16d is engageable with the engaging portion 21g by a series of inserting operation of the container to the associated supplying apparatus. It is preferable that engaging portion 16d is disposed on the outer surface of the shutter 16. Further preferably, the diameter of an addendum circle of a segment gear configuration of the engaging portion 16d has substantially the same outer diameter of the shutter 16 except for the engaging portion 16d. By this, the space in the direction of height is saved. Therefore, said engaging portion 16d is provided on the outer surface adjacent an edge of the shutter 16 closer to the coupling 26a. Thus, when the shutter 16 is at a closing position, it is engaged with or disengaged from the engaging portion 21g. Through a series of inserting operation into the container, the engaging portion 21g provided in the supplying apparatus 100a and the engaging portion 16d are engaged. Therefore, the sliding portion 16f(16f1) adjacent the side of the shutter 16 having the coupling 26a has a length shorter than the engaging portion 16d (A in Figures 23, 25). Thus, it is preferable that sliding portion 16f1 is disposed such

-49-

that when the container is inserted into the supplying apparatus, the end surface 16h adjacent the shutter 16 directly faced to the engaging portion 21g functions as the engaging portion 16d. In this embodiment, therefore, a cut-away portion 16g is provided to shorten the sliding portion 16f1. Therefore, the engaging portion 21g and the shutter 16 are not interfered.

When the thickness of the shutter 16 is large, the sliding portion 16f1 is provided to cover the total arcuated length of the shutter 16. The portion corresponding to the cut-away portion 16g may be a recess through which the engaging portion 21g is passed.

The shutter 16 is engaged with a main assembly shutter 34 for closing and opening the toner supply opening 33 provided in the supplying apparatus 100a as shown in Figure 28. In interrelation with the sliding movement of the shutter 16 provided in the container 1a, the main assembly shutter 34 can be slid.

The engaging portions 21b, 21g in this embodiment, are constituted by two gears. However, if the drive transmission mechanism is provided, the structure or the number of the gears is not limited.

The toner supplying apparatus 100a comprises a supply container receiving portion having a semi-

-50-

cylindrical lower portion 54a and a rectangular upper portion 54b to be complementary with the outer shape of the container 11, in the cross-section, as shown in Figures 28, 29, and comprises a supplying apparatus

5 main assembly 54 integral with a frame of the developing device 204a therebelow. On the inner surface, there is provided a guiding rail 55 extended in the circumferential direction at a lower portion 54a. The guiding rail 55 is engaged with the guide

10 34a of the main assembly shutter 34. The guiding rail 55 and the guide 34a have the hook-shape cross-section, which are nested. Two leads of rail 55 and the guide 34a are extended parallel with each other. Therefore, the main assembly shutter 34 is supported

15 on the main assembly 54 of the supplying apparatus. An inner surface of the main assembly shutter 34 has a radius which is the same as that of the outer periphery of the shutter 16. The main assembly shutter 34 has abutment edges 34b extended in the

20 longitudinal direction, at the opposite sides perpendicular to the moving direction. The length between the abutment edges 34b along the inner surface of the main assembly shutter 34 is equal to the length of the outer arcuation of the shutter 16. Therefore,

25 when the container 1a is inserted into the supplying apparatus 100a, the edges of the shutter 16 are engaged in the space between the surfaces 34b1

-51-

radially projected from the abutment edge 34b of the main assembly shutter 34. Therefore, the main assembly shutter 34 is interrelatedly moved by the opening and closing of the shutter 16. Therefore, by
5 facing the toner discharging opening 11a and the toner supply opening 33 to each other, the shutter 16 is opened to permit the toner to be supplied into the developing device 204a.

(Seal member)

10 The sealing member in the form of a seal member 35 is of elastic material (Figure 23). It functions to seal between the shutter 16 and the discharging opening 11a. It therefore prevents leakage of the toner from the inside of the container
15 11 upon falling shock or the like. To accomplish this, the seal member 35 is stuck on the outer surface of the container 11 so as to enclose the discharging opening 11a. More particularly, the material of the seal member 35 may be rubber such as silicon,
20 urethane, polyethylene foam or the like, sponge. Preferably, it is low polyurethane foam having a hardness of 20° - 70° , a compression set not more than 10%, a cell size of 60-300 μ m, a density of 0.15-0.50g/cm², and it is used with compression of 5-50%.

25 The seal member 35 may be stuck on a surface faced to the discharging opening 11a of the shutter 16 rather than around the discharging opening 11a.

-52-

Referring to Figure 30, the description will be made as to another embodiment wherein a seal member is used to seal the toner discharging opening.

In this embodiment, the function of opening
5 and closing the main assembly shutter provided in the main assembly of the apparatus and the function of sealing the toner discharging opening are separated.

In this embodiment, the seal member 35 is in the form of a flexible welded film 35a. The seal
10 member 35 is welded on a seat 11i enclosing the discharging opening 11a. It sealing the opening 11a. Seal member 35 is folded back adjacent one side of the opening 11a. When the container 1a is mounted to the main assembly of the apparatus, the opening 11a is
15 unsealed by the operator pulling the other end 35a2 of the seal member 35a. This type in which the film 35a is peeled off the edge portion of the toner discharging opening 11a, is not limiting, but it may by a type wherein the film may be torn, upon the toner
20 supply.

The shutter 16 does not have the sealing function for the discharging opening 11a. The shutter 16 is provided with an elongated hole 16. The shutter 16 opens and closes a main assembly shutter 34
25 provided in the main assembly of the apparatus. The mechanism is the same as the foregoing embodiment.

According to this embodiment, there is

-53-

provided a toner supply container for supplying toner into a main assembly of an electrophotographic image forming apparatus, comprising:

A toner accommodating portion (toner container 11) for accommodating toner to be supplied into a main assembly (124A, 124B) of the electrophotographic image forming apparatus;

A toner discharging opening (11a) for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

a sealing member (seal member 35) for openably sealing said toner discharging opening (11a);

A rotatable member (handle 15) which is rotatable relative to said toner accommodating portion;

A rotating force receiving portion (driving force reception side engaging portion 16d) for receiving rotating force produced by rotation of said rotatable member through a rotating force transmission member (driving force transmission member 21) provided in the main assembly of said electrophotographic image forming apparatus to unseal a main assembly openable member (main assembly shutter 34) which seals a toner reception opening (toner supply opening 33) provided in the main assembly of said electrophotographic image forming apparatus by rotation of said rotatable

-54-

member, when said toner supply container (1) is mounted to the main assembly of said electrophotographic image forming apparatus.

(Toner supply operation)

5 The description will be made as to a toner supplying operation using the toner supply container 1a according to this embodiment of the present invention.

(1) mounting of the toner supply container 1a

10 The front door (unshown) provided in the main assembly 124A of the apparatus is opened toward the operator by 90°, then the projection 32a of the container 1a is engaged with the groove portion 24a (Figure 28) of the supplying apparatus 100a. The
15 container 1a is inserted into the supplying apparatus 100a with the side having the coupling 26a at the leading end. Then, the shutter 16 of the container 1a and the main assembly shutter 34 in the supplying apparatus 100a are engaged with each other (Figure
20 28). The engaging portion 21g and the engaging portion 16d of the shutter 16 are brought into engagement with each other. Finally, the engaging portion 21a is engaged with the engaging portion 15a of the handle 15.

25 (2) placing of toner supply container and toner supply

With the container 1a mounted to the

-55-

supplying apparatus 100a, the operator rotates the handle 15 manually by 90° in the clockwise direction. By this, driving force of the rotation is transmitted to the transmission member 21 through the engaging portion 21a from the engaging portion 15a.

Furthermore, it is transmitted to the engaging portion 16d of the shutter 16 from the engaging portion 21g. By the driving force thus transmitted, the shutter 16 is slid in the circumferential direction while engaging with the supporting member 11e of the container 11. At this time, the main assembly shutter 34 is interrelatedly slid with the sliding movement of the shutter 16. Therefore, the discharging opening 11a of the container 1a and the supply opening 33 of the supplying apparatus 100a are simultaneously opened. And, by rotating the toner feeding member 29 by the coupling 26a receiving the driving force from the main assembly 124A of the apparatus, the toner supply is started.

During this operation, the container 11 does not rotate. Therefore, the container 1a is not interrelated with the rotation of the handle 15, and is fixed in the supply container 100a.

(3) dismounting of the toner supply container

The operator rotates the handle 15 in the counterclockwise direction by 90°. By this, the driving force in the opposite direction is transmitted

-56-

in the opposite order. The shutter 16 closes the discharging opening 11a, and the main assembly shutter 34 closes the supply opening 33. Thus, the series of toner supplying operations is completed.

5 In the mounting of the container 1a to the supplying apparatus 100a, the coupling 26a side takes first position. Therefore, the engaging portion 16d passes through the engaging portion 21a and is brought into engagement with the engaging portion 21g. To
10 accomplish this, the diameter of the addendum circle of the segment gear-like engaging portion 16d is preferably smaller than the diameter of the dedendum circle of the segment gear-like engaging portion 15a.

 With such a structure, the container is
15 stationary (not moved) during the series of toner supplying operations. Therefore, the configuration of the container is not limited. Thus, a container configuration having a higher space efficiency can be used. Since the shutter and the handle are separate
20 members, the position of the toner discharging opening may be adjacent the handle. Therefore, the latitude of the design of the toner supply container may be high.

 The toner supply container of this
25 embodiment, rotation of the handle is transmitted to the driving force receiving portion of the shutter through a plurality of engaging portions, namely, the

-57-

engaging portion of the handle, engaging portion of the drive transmission member and the engaging portion of the shutter. Therefore, it is possible to freely use the engagement ratios (gear ratios) in the design of the engaging portions.

When the sliding movement distance for opening and closing the shutter is long, the engagement ratio of the handle 15 (gear ratio) is made large, so that operation(rotation) distance of the handle can be shortened. When the opening and closing torque of the shutter is large, the engagement ratio (gear ratio) of the handle is made small, so that torque required for the operation (rotation) of the handle can be decreased.

For example, the angle of rotation of the handle for opening and closing the shutter is made 90° . When the toner supply container is inserted to the supplying apparatus, grip 15e is positioned in the perpendicular direction. The grip 15e takes the horizontal position when the handle is rotated in the clockwise direction by 90° to discharge the toner. By doing so, the operator can easily operates, and the operator can easily recognize the state of the container 1a. The angle of rotation of the handle 15e for the shutter is preferably in the range of 60° - 120° from the standpoint of operativity.

<Embodiment 5>

-58-

The Embodiment 5 will be described in detail.
In this embodiment, when the toner supply container is mounted to the main assembly of the apparatus, it is mounting in the direction crossing with the
5 longitudinal direction of the container. The shutter is slid in interrelation with opening and closing of a door of a main assembly of the apparatus.

Figure 32 is a perspective view of a toner supplying apparatus 100A and a developing device 201.
10 The supplying apparatus 100A comprises a toner supply container 1A and a supply container receiving portion 41. The supply container receiving portion 41 comprises a buffer portion 42 for temporarily storing the toner supplied from the container 1A, a feeding
15 screw 43 for feeding the toner from the buffer portion 42 to the developing device 201, a buffer shutter(unshown) for covering a toner reception opening of the buffer portion 42.

When the toner in the supplying apparatus
20 100A is used up, the front door 44 (Figure 39) of the main assembly 124A of the apparatus is opened, the toner supply container 1A and the supply container receiving portion 41 are exposed.

The container 1A is inserted into the supply
25 container receiving portion 41 in the direction perpendicular to the longitudinal direction (arrow A in Figures 32, 39).

-59-

(Structure of toner supply container)

The toner supply container 1A of this embodiment is a so-called leaving type toner supply container.

5 As shown in Figure 33, the container 1A is provided with a toner container 11 having a flange 45 at the opening 11g. It comprises a cap 14 at one end of the toner container 11, a handle 15A rotatably engaged to an end of the toner container 11, and a
10 toner feeding member 29 provided in the toner container 11. One end of the toner feeding member 29 is supported from outside of the container 11. The container 1A further comprises a coupling 46 functioning as a driving force receiving member,
15 shutter 16 for opening and closing the toner discharging opening 11a, and a seal member 35.

(Toner container)

The toner container 11 is in the form of a hollow cylindrical member. The section taken along a
20 plane in the longitudinal direction of the toner discharging opening 11a of the container 11, as shown in Figures 34 and 35, includes an arcuated portion 11i having an angle θ of 270° as seen from the center, and a rectangular portion 11j. In the outer surface of
25 the arcuated portion 11i, there is provided a toner discharging opening 11a. Around the toner discharging opening 11a, there is provided a shutter supporting

-60-

member 11e for supporting a shutter 16 which is movable between a close position for closing the toner discharging opening 11a and an opening position (retracted from the close position) for opening it.

5 With such a structure, a size of the toner discharging opening 11a can be increased in the circumferential direction of the toner container 11, and the sliding distance of the shutter 16 can be expanded. The configuration of the toner container 11 may be the
10 same as in Embodiments 1-4.

A rib 11f is provided extending in the inserting direction of the container 1A on the outer surface of the arcuated portion 11i of the container 11, so that toner supply container containing wrong
15 toner is prevented from being mounted when the container 1A is inserted into the toner supplying apparatus 100A provided in the main assembly 124B of the apparatus. (Figure 32) The discrimination rib 11f is engageable with a groove portion 151 formed in
20 a back side of the front door 44. The positions of the ribs 11f are different in the positions in the longitudinal direction of the container 11, so that properness of the toner is discriminated. The receiving portion 41 may be provided with a groove
25 portion 152 for engagement with the rib 11f (Figure 32).

One of the end surfaces is provided with an

-61-

opening 12a functioning as a filling port for filling the toner. The inside of the filling port is provided with a cross-rib 12c. The center thereof is provided with an axial bore 12d for supporting the toner feeding member 29. The filling port 12a is sealed by a cap 14 after toner filling. The opening 11g at the other end surface is provided with an engaging portion 45b. To the engaging portion 45b, a flange 45 including a hole 45a for supporting the toner feeding member on the container and for rotatably supporting a coupling 46 for transmitting driving force, is fixed; and around the hole 45a, there are provided a wall portion 45a1 for the hole 45a for supporting the outer surface 46a of the coupling 46 and a wall portion 45d for engagement with the handle 15A which will be described hereinafter. In this embodiment, the handle 15A is engaged with the coupling 46 side, but it may be engaged with the side having the opening 12a.

(Handle)

The handle 15 is cylindrical in shape. One end thereof has a wall surface 15g with an opening 15f opposed to the coupling 46 at the center portion thereof. The other end is in the form of a hollow cylindrical. The outer surface 15k of the handle 15A is provided with a grip 15e. The handle 15A is rotatably engaged manually with the wall portion 45d

-62-

provided at the end of the container 11. The handle 15A has an engaging portion 15a (gear) for transmitting the driving force. In place of the grip 15e, a projection interrelated with the opening and closing of the front door 44 may be provided on the wall surface 15g, as will be described hereinafter, by which the rotation of the handle can be interrelated with the opening and closing of the front door.

The engaging portion 15a has a segment gear configuration which is engageable with the driving force reception side engaging portion 21a of the driving force transmission member 21 provided in the supplying apparatus 100A when the container 1A is inserted into the supplying apparatus 100A. It is disposed on the outer surface 15k of the handle 15A to permit engagement with the engaging portion 21a in the series of operations.

As shown in Figures 36, 37, a transmission member 21 which is partly hidden as indicated by phantom line, has a driving force reception side engaging portion 21a at one end of the shaft 21s rotatably supported on the supplying apparatus 100A and has an engaging portions 21a at the other end.

The description will be made as to a shutter 16 (openable member) and an engaging portion with the main assembly shutter 34. As shown in Figure 38, the engaging portions 21b, 21i in the form of gears fixed

-63-

d to the other end of the shaft 21s are in meshing engagement with the engaging portions 21g, 21j in the form of gears, respectively. The engaging portion 21g can be brought into engagement with the engaging
5 portion 16a in the form of a segment gear in the radial direction. The engaging portion 21i is fixed to the rotation shaft 21u rotatably supported on the supply container receiving portion 41. The engaging portion 21k which is a gear fixed to the rotation
10 shaft 21u is engaged normally with the engaging portion 34c in the form of a segment gear provided on the outer periphery of the main assembly shutter 34.

The main assembly shutter 34 opens and closes the toner supply opening 33 provided in the shutter
15 disposition portion 41e of the supply container receiving portion 41. Therefore, it is provided so as to open in the direction in the direction of an arrow Y on the outer periphery of the shutter disposition portion 41e. A guiding member of the shutter 34 is
20 in the form of a rail similarly to the shutter 16.

The transmission member 21 is disposed on the outside of the receiving portion 41. The teeth
portion of the engaging portions such as the engaging portion 21a, engaging portion 21g or the like, which
25 are brought into engagement with the container 1A in the radial direction, is positioned in the receiving portion 41. Therefore, the receiving portion 41 may

-64-

be provided with an opening. In this example, there is provided an opening 41d so that engaging portions 21b, 21g, 21i, 21j are positioned in the receiving portion 41. In order to position the engaging
5 portion 21a in the receiving portion 41, there is provided an opening 41c (Figure 39).

(Toner feeding member)

A feeding shaft 27 has an end rotatably supported in an axial bore 12d of the cross-shape rib
10 12c provided in the opening 12a of the container 11. The other end is engaged with a male shaft 46a of a coupling 46. The toner feeding member 29 includes a feeding blade 28 of flexible member fixed to the feeding shaft 27.

15 The feeding blade 29 rubs the inner surface of the container 11. It has a plurality of claw portions 28a inclined in the longitudinal direction. Therefore, it can feed the toner toward the discharging opening 11a in the container 11.

20 The coupling 46 is engaged with the coupling provided in the supplying apparatus 100A to receive the driving force when the supply container 1A is mounted to the supplying apparatus 100A.

(Shutter)

25 The shutter 16 functioning as an openable member is engaged with the supporting member 11e provided around the discharging opening 11a. It is

-65-

slidable in the circumferential direction to open and close the discharging opening 11a.

The shutter 16 includes an engaging portion 16d (Figure 36) in the form of a segment gear engageable with an engaging portion 21g provided in the supplying apparatus 100A when the container 1A is mounted to the supplying apparatus 100A. The engaging portion 16d is engageable with the engaging portion 21g by a series of operations of mounting the container 1A to the supplying apparatus 100A. It is preferable that engaging portion 16d is disposed on the outer surface of the shutter 16.

(Toner supply operation)

The description will be made as to a toner supplying operation using the toner supply container 1A of the present invention.

(1) mounting of the toner supply container

As shown in Figure 39, the front door 44 is opened toward the operator. The container 1A is inserted in the direction of the arrow A, while the rib 11f of the container 11 is engaged with the groove portion 151 provided in the back side of the front door 44. The engaging portion 21g is engaged with the engaging portion 16d, and the engaging portion 21a is engaged with the engaging portion 15a, respectively.

(2) toner supply

With the container 1A mounted in the

-66-

supplying apparatus 100A, the operator manually rotates the grip 15e toward the rear side. The driving force of the rotation is transmitted to the transmission member 21 through the engaging portion 21a from the engaging portion 15a. Further, it is transmitted to the engaging portion 16d from the engaging portion 21g. By the driving force thus transmitted, the shutter 16 slides along the supporting member 11e. At this time, the engaging portion 34c of the main assembly shutter 34 receives the driving force from the engaging portion 21k interrelated with the engaging portion 21b. Therefore, the discharging opening 11a and the supply opening 33 are simultaneously opened (Figure 42). The toner feeding member 29 is rotated through the coupling 46 which receives the driving force from the main assembly 124B of the apparatus. By this, the supply of the toner is started. The main assembly shutter 34 may be such that it opens in interrelation with the movement of the shutter 16 of the container 1A.

The angle of rotation of the handle 15A required for opening and closing of the shutter 16 is preferably 60° - 120° .

The wall surface 41a of the receiving portion 41 is provided with a handle holding portion 47 (Figures 32, 40, 41) interrelated with opening and

-67-

closing of the front door 44; and when the container 1A is mounted to the supplying apparatus 100A, the projection 15h (Figure 43) is engaged with the holding portion 47. By this, the rotation of the handle 15A can be interrelated with the opening and closing of the front door 44. More particularly, after the loading of the container 1A into the supplying apparatus 100A, the handle 15A is rotated by closing the front door 44. In the same order as described in the foregoing, the driving force is transmitted to the shutters 16, 34. Therefore, the discharging opening 11a and the supply opening 33 can be simultaneously opened. Thus, the grip 15e is unnecessary.

During the operation, the toner container 11 is fixed in the supplying apparatus 100A.

The projection 15h is provided on the end surface of the handle 15A, and is provided with a projection 15h1.

(3) dismounting of the toner supply container

By rotation of the handle 15A toward the operator, or by opening the front door 44 of the main assembly 124B, driving force in the opposite direction is transmitted in the order similar to (2). The shutter 16 closes the discharging opening 11a, and the main assembly shutter 34 closes the supply opening 33, thus completing the series of the toner supplying operations.

-68-

With such a structure, the toner container is not moved during the series of the toner supplying operation. Therefore, the configuration of the toner container is not limited. The toner container
5 configuration can be selected so as to provide a high space efficiency. Since the shutter handle is a separate member, the position of the toner discharging opening is not limited to the neighborhood of the handle. By the interrelation of the handle with the
10 opening and closing of the front door, the number of steps included in the toner supply operation is reduced.

Each of the engaging portions 15a, 16a, 16d, 21a, 21 b, 21g, 22a is provided with a plurality of
15 tooth 15a1, 16a1, 16d1, 21a1, 21 b1, 21g1, 22a1.
(Other modifications)

In Embodiment 5, the toner supply container is mounted to or dismounted from the main assembly of the image forming apparatus in the direction crossing
20 with the longitudinal direction of the toner supply container. The shutter of the toner supply container is opened and closed in interrelation with the opening and closing of the door. Further, it opens and closes the main assembly shutter.

25 Other modifications will be described.

As shown in Figure 43, similarly to Embodiments 1-4, when the toner supply container is

-69-

mounted to or dismounted from the main assembly 124,
124A of the apparatus in the longitudinal direction,
the door 124f and the toner supply container 1 are
interrelated with each other. Figure 44 shows a
5 further embodiment. In the embodiment, the main
assembly of the apparatus opens and closes the upper
frame 124c relative to the lower frame 124d about the
hinge 124e. In the case that toner supply container
1a, 1b, 1c, 1d is mounted or demounted in the
10 longitudinal direction or in the direction
perpendicular thereto, relative to the upper frame
124c (or lower frame 124d), the opening and closing of
the upper frame 124c and the opening and closing of
the shutter of the toner supply container 1a-1d may be
15 interrelation with each other.

The mechanism for locking the handle may be
used in the other embodiments. The toner supply
container of this embodiment can be used with the main
assembly of this embodiment.

20 Accordingly, the embodiments described in the
foregoing provide:

A toner supply container (1, 1A, 1a-1d) for
supplying the toner to the main assembly (124A, 124B)
of the electrophotographic image forming apparatus,
25 comprising:

a toner accommodating portion(toner container
11) for accommodating toner (t) to be supplied into a

-70-

main assembly of the electrophotographic image forming apparatus;

a toner discharging opening (11a) for discharging the toner accommodated in said toner accommodating portion, wherein said toner discharging opening is provided in said toner accommodating portion;

an openable member (shutter 16) for openably sealing said toner discharging opening;

10 a rotatable member (handle 15) rotatable relative to said toner accommodating portion;

a rotating force receiving portion (driving force reception side engaging portion 16a, 16d, contact portion 16n) for receiving rotating force
15 produced by rotation of said rotatable member through a rotating force transmission member (driving force transmission member) provided in the main assembly of said electrophotographic image forming apparatus to unseal said toner discharging opening by the rotation
20 of said rotatable member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus.

Said rotatable member includes a grip portion (grip 15e) and a plurality of tooth (15a1) integral
25 with said grip portion, wherein the rotating force produced by rotation of said grip portion by an operator is transmitted to said rotating force

-71-

receiving portion through the tooth and the driving
force transmission member (21) when said toner supply
container is mounted to the main assembly of said
electrophotographic image forming apparatus, and
5 wherein by the transmission, said openable member is
moved from a sealing position to an opening position
to unseal the toner discharging opening.

Said rotatable member (handle 15A) includes a
plurality of tooth (15a1), and said rotatable member
10 rotates in interrelation with opening and closing of a
door (44), and wherein rotating force produced by
rotation of said rotatable member in interrelation
with a closing operation of said door after said toner
supply container is mounted to the main assembly of
15 said electrophotographic image forming apparatus, is
transmitted to said rotating force receiving portion
(engaging portion 16d) through said tooth and said
driving force transmission member (link 49, shaft 21S
or the like), by which said openable member is moved
20 from a sealing position to an open position to unseal
said toner discharging opening, wherein said door is
openable relative to the main assembly of said
electrophotographic image forming apparatus and is
opened and closed to mount said toner supply container
25 to the main assembly of said electrophotographic image
forming apparatus (Figures 32 to 42).

Said rotating force receiving portion

-72-

(engaging portion 16a, 16d) includes a plurality of tooth(16a1) provided integrally with said openable member (shutter 16), and when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said tooth is engaged with a main assembly gear portion (21b, 21g) of said driving force transmission member to receive driving force for moving said openable member to said opening position from said sealing position from the main assembly gear portion, wherein said openable member is a curved plate member slidable along an outer surface of said toner accommodating portion ((container 11) (Figures 9-29 and 31-42)).

Said plate member (shutter 16) is slidable in a direction crossing with a longitudinal direction of said toner accommodating portion.

The tooth are disposed at a side opposite from a side having a grip portion(15e) relative to said toner discharging opening (11a) in longitudinal direction of said toner accommodating portion, and wherein the tooth are arranged in the direction crossing with the longitudinal direction of said toner accommodating portion along one end of said toner discharging opening.

The container further comprises an elastic sealing member (35) provided around a toner discharging opening on an outer surface of said toner

-73-

accommodating portion, and said elastic sealing member is positioned between said toner accommodating portion and said plate member.

Said toner discharging opening (11a) is
5 disposed adjacent to said grip portion (15c) in the longitudinal direction of said toner accommodating portion (container 11), wherein said toner supply container is inserted into the main assembly (124A, 124B) of said electrophotographic image forming
10 apparatus in the longitudinal direction of said toner accommodating portion, said container further comprising a driving force receiving portion (coupling 26a) on an end opposite from the end having the grip portion in the longitudinal direction of said toner
15 accommodating portion, wherein when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said driving force receiving portion receives driving force for rotating a toner feeding member (screw 25, feeding
20 blade 28, toner feeding member 29) provided in said toner accommodating portion ((Figure 19).

Said rotatable member (handle 15) is rotated through 60° - 120° when said toner supply container (1) is mounted to the main assembly (124A, 124B) of said
25 electrophotographic image forming apparatus.

Said toner supply container (1) is mounted to the main assembly of said electrophotographic image

-74-

forming apparatus while said toner discharging opening (11a) is faced down and while said toner accommodating portion (container 11) is prevented from rotating in a direction substantially perpendicular to the longitudinal direction thereof.

Said rotatable member (handle 15) is an integrally-molded product of resin material provided at one longitudinal end of said toner accommodating portion (container 11), and said one end is at an upstream side in a mounting direction of said toner supply container relative to the main assembly of said electrophotographic image forming apparatus, the mounting direction being along the longitudinal direction of said toner supply container.

The container further comprises a toner filling opening (12a), at one longitudinal end of said toner accommodating portion (container 11), for filling toner into said toner accommodating portion, wherein said toner filling opening is sealed by a cap (14), and said toner filling opening and cap are covered with said rotatable member.

A projection height of said rotating force receiving portion is smaller than a projection height of a driving force transmitting portion provided on said rotatable member so as to avoid interference between a rotating force receiving portion of said openable member and said drive transmission member

-75-

when said toner supply container is inserted into the main assembly of said apparatus.

A rotating force receiving portion of said openable member and a driving force transmitting
5 portion of said rotatable member are provided at positions different from each other in a direction crossing with the longitudinal direction of said toner accommodating portion.

Said driving force transmitting portion is
10 provided with a plurality of tooth, which are engaged with a gear provided in the main assembly of said apparatus when toner supply container is mounted to the main assembly of said apparatus.

There is further provided:

15 A toner supply container for supplying toner into a main assembly of electrophotographic image forming apparatus, comprising:

a toner accommodating portion (container 11) for accommodating the toner;

20 a toner discharging opening (11a), provided in said toner accommodating portion, for discharging toner accommodated in said toner accommodating portion;

an openable member (shutter 16) for openably
25 sealing said toner discharging opening;

a driving force receiving portion (engaging portion 16a, contact portion 16h) for receiving

-76-

driving force to move said openable member to open said toner discharging opening when said container is mounted to the main assembly of said electrophotographic image forming apparatus.

5 There is further provided:

A toner supply container for supplying toner to a main assembly of electrophotographic image forming apparatus, comprising:

 a toner accommodating portion (container 11)
10 for accommodating the toner;

 a toner discharging opening (11a), provided in said toner accommodating portion, for discharging the toner accommodated in said toner accommodating portion;

15 an openable member (shutter 16) for openably sealing said toner discharging opening,

 a rotatable member (handle 15) rotatable relative to said toner accommodating portion

 wherein when the container is mounted to the
20 main assembly of said electrophotographic image forming apparatus, a toner receiving opening provided in the main assembly of said apparatus can be opened by rotating said rotatable member.

 There is further provided:

25 A toner supply container for supplying toner to the main assembly of electrophotographic image forming apparatus, comprising:

-77-

a toner accommodating portion (container 11)
for accommodating the toner;

a toner discharging opening (11a), provided
in said toner accommodating portion, for discharging
5 the toner accommodated in said toner accommodating
portion;

an openable member (shutter 16) for openably
sealing said toner discharging opening,

a rotatable member (handle 15) rotatable
10 relative to said toner accommodating portion

wherein when the container is mounted to the
main assembly of said electrophotographic image
forming apparatus, rotating force of said rotatable
member is transmitted to said openable member through
15 a rotating force transmission member provided in the
main assembly of said apparatus.

There is further provided:

A toner supply container (1) for supplying
toner (t) to a main assembly (124A, 124B)i of an
20 electrophotographic image forming apparatus, wherein
the main assembly of said apparatus includes a first
main assembly engaging portion (driving force
reception side engaging portion 21a), a second main
assembly engaging portion (driving force transmission
25 side engaging portion 21a engaging portion 22b), and a
driving force transmitting portion (shaft 21s) for
transmitting to said second main assembly engaging

-78-

portion driving force received by said first main assembly engaging portion;

a toner accommodating portion (container 11) for accommodating the toner;

5 a toner discharging opening (11a) for discharging the toner accommodated in said toner accommodating portion;

an openable member (shutter 16) for openably sealing said toner discharging opening, a first
10 container engaging portion (driving force transmission side engaging portion 15a) for transmitting the driving force to said first main assembly engaging portion when said toner supply container is mounted to the main assembly of said apparatus;

15 a second container engaging portion for receiving driving force from said second main assembly engaging portion when said toner supply container is mounted to the main assembly of said apparatus.

wherein when said toner supply container is
20 mounted to the main assembly of said apparatus, the driving force transmitted to the main assembly of said apparatus by said first container engaging portion is received from the main assembly of apparatus by the second container engaging portion, and the openable
25 member is moved by the driving force to unseal said toner discharging opening.

The first main assembly engaging portion and

-79-

the second main assembly engaging portion are not limited to the gear disclosure in the foregoing. For example, they may be a friction wheel, pin wheel or the like. Similarly, the first container engaging portion and the second container engaging portion are not limited to the gears disclosed in the foregoing. If the transmission of the driving force is possible relative to the first main assembly engaging portion and the second main assembly engaging portion, a friction wheel, pin wheel or the like are usable. When a gear is used, the tooth may be formed on the entire circle, or only on a part thereof, or they are not limited to tooth. For example, the configuration or number of the tooth are properly selected by one skilled in the art. The driving force transmitting portion is not limited to the shaft. It may be any if the transmission of the driving force is possible, such as a gear train.

As described in the foregoing, according to the present invention, the toner supply operativity can be improved.

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 purposes of the improvements or the scope of the following claims.

- 80 -

What is claimed is:

1. A toner supply container for supplying toner into a main assembly of an electrophotographic image forming apparatus, wherein said toner supply container is detachably mountable to the main assembly of said electrophotographic image forming apparatus, said toner supply container comprising:

a toner accommodating portion for accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided

in said toner accommodating portion;

an openable member for openably sealing said toner discharging opening;

a rotatable member, which is rotatable relative to said toner accommodating portion, for imparting a rotating force to a rotating force transmission member provided in the main assembly when said toner supply container is mounted to the main assembly;

a rotating force receiving portion for receiving the rotating force from said rotating force transmission member when said toner supply container is mounted to the main assembly to move said openable member relative to said toner accommodating portion so as to open said toner discharging opening.

-81-

2. A container according to Claim 1, wherein said rotatable member includes a grip portion and a plurality of teeth integral with said grip portion, wherein the rotating force produced by rotation of said grip portion by an operator is transmitted to said rotating force receiving portion through the teeth and the rotating force transmission member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, and wherein by the transmission, said openable member is moved from a sealing position to an opening position to unseal the toner discharging opening.

3. A container according to Claim 1, wherein said rotatable member includes a plurality of teeth and said rotatable member rotates in interrelation with opening and closing of a door, and wherein rotating force produced by rotation of said rotatable member in interrelation with a closing operation of said door after said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, is transmitted to said rotating force receiving portion through said teeth and said rotating force transmission member, by which said openable member is moved from a sealing position to an open position to unseal said toner discharging

-82-

opening, wherein said door is openable relative to the main assembly of said electrophotographic image forming apparatus and is opened and closed to mount said toner supply container to the main assembly of
5 said electrophotographic image forming apparatus.

4. A container according to Claim 2 or 3, wherein said rotating force receiving portion includes a plurality of teeth provided integrally with said
10 openable member, and when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said teeth is engaged with a main assembly gear portion of said rotating force transmission member to receive
15 driving force for moving said openable member to said opening position from said sealing position from the main assembly gear portion, wherein said openable member is a curved plate member slidable along an outer surface of said toner accommodating portion.

20

5. A container according to Claim 4, wherein said plate member is slidable in a direction crossing with a longitudinal direction of said toner accommodating portion.

25

6. A container according to Claim 5, wherein the teeth are disposed at a side opposite from a side

-83-

having a grip portion relative to said toner
discharging opening in longitudinal direction of said
toner accommodating portion, and wherein the teeth are
arranged in the direction crossing with the
5 longitudinal direction of said toner accommodating
portion along one end of said toner discharging
opening.

7. A container according to Claim 6, further
10 comprising an elastic sealing member provided around said
toner discharging opening on an outer surface of said
toner accommodating portion, and said elastic sealing
member is positioned between said toner accommodating
portion and said plate member.

15

8. A container according to Claim 2, wherein
said toner discharging opening is disposed adjacent to
said grip portion in the longitudinal direction of
said toner accommodating portion, wherein said toner
20 supply container is inserted into the main assembly of
said electrophotographic image forming apparatus in
the longitudinal direction of said toner accommodating
portion, said container further comprising a driving
force receiving portion on an end opposite from the
25 end having the grip portion in the longitudinal
direction of said toner accommodating portion, wherein
when said toner supply container is mounted to the

-84-

main assembly of said electrophotographic image forming apparatus, said driving force receiving portion receives driving force for rotating a toner feeding member provided in said toner accommodating
5 portion.

9. A container according to Claim 2 or 3, wherein said rotatable member is rotated through 60°-120° when said toner supply container is mounted to
10 the main assembly of said electrophotographic image forming apparatus.

10. A container according to Claim 4, wherein said toner supply container is mounted to the main
15 assembly of said electrophotographic image forming apparatus while said toner discharging opening is faced down and while said toner accommodating portion is prevented from rotating in a direction substantially perpendicular to the longitudinal
20 direction thereof.

11. A container according to Claim 6, wherein said rotatable member is an integrally-molded product of resin material provided at one longitudinal end of
25 said toner accommodating portion, and said one end is at an upstream side in a mounting direction of said toner supply container relative to the main assembly

-85-

of said electrophotographic image forming apparatus, the mounting direction being along the longitudinal direction of said toner supply container.

5 12. A container according to Claim 11, further comprising a toner filling opening, at one longitudinal end of said toner accommodating portion, for filling toner into said toner accommodating portion, wherein said toner filling opening is sealed
10 by a cap, and said toner filling opening and cap are covered with said rotatable member.

1 13. A toner supply container for supplying toner into a main assembly of an electrophotographic image forming apparatus, wherein said toner supply container is detachably mountable to the main assembly of said electrophotographic image forming apparatus, said toner supply container, comprising:

2 a toner accommodating portion for accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

 a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

 an openable member for openably sealing said toner discharging opening;

2 a rotatable member, which is rotatable relative to said toner accommodating portion, wherein said rotatable member is provided with a plurality of teeth engageable with a main assembly gear portion

-86-

provided in the main assembly of said
electrophotographic image forming apparatus, and said
teeth supplying rotational force to the main assembly
5 gear portion when said toner supply container is
mounted to the main assembly of said
electrophotographic image forming apparatus;

a rotating force receiving portion for
receiving the rotating force from said rotating force
transmission member when said toner supply container
is mounted to the main assembly, said rotating force
10 receiving portion is provided with a plurality of
teeth integral with said openable member to move said
openable member relative to said toner accommodating
portion so as to open said toner discharging opening.

14. A container according to Claim 13, wherein'
15

-87-

the main assembly gear portion includes a first main assembly gear portion and a second main assembly gear portion rotatable integrally with the first main assembly gear portion, and the teeth of said rotatable member are engageable with said first main assembly gear portion and the teeth of said openable member are engageable with said second main assembly gear portion when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus.

15. A container according to Claim 13, wherein said rotatable member includes a grip portion for gripping, which is integral with the teeth of said rotatable member, wherein the rotating force produced by rotation of said grip portion by an operator is transmitted to said rotating force receiving portion through the teeth of said rotatable member and the driving force transmission member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, and wherein by the transmission, said openable member is moved from a sealing position to an opening position to unseal the toner discharging opening.

16. A container according to Claim 13, wherein said rotatable member rotates in interrelation with

-88-

opening and closing of a door, and wherein rotating force produced by rotation of said rotatable member in interrelation with a closing operation of said door after said toner supply container is mounted to the
5 main assembly of said electrophotographic image forming apparatus, is transmitted to said rotating force receiving teeth through said teeth of said rotatable member and said driving force transmission member, by which said openable member is moved from a
10 sealing position to an open position to unseal said toner discharging opening, wherein said door is openable relative to the main assembly of said electrophotographic image forming apparatus and is opened and closed to mount said toner supply container
15 to the main assembly of said electrophotographic image forming apparatus.

17. A container according to Claim 15, 16, wherein when said toner supply container is mounted to
20 the main assembly of said electrophotographic image forming apparatus, said rotating force receiving teeth is engaged with a main assembly gear portion of said driving force transmission member to receive driving force for moving said openable member to said opening
25 position from said sealing position from the main assembly gear portion, wherein said openable member is a curved plate member slidable along an outer surface

-89-

of said toner accommodating portion.

18. A container according to Claim 17, wherein
said plate member is slidable in a direction crossing
5 with a longitudinal direction of said toner
accommodating portion.

19. A container according to Claim 18, wherein
the teeth are disposed at a side opposite from a side
10 having a grip portion relative to said toner
discharging opening in longitudinal direction of said
toner accommodating portion, and wherein the teeth are
arranged in the direction crossing with the
longitudinal direction of said toner accommodating
15 portion along one end of said toner discharging
opening.

20. A container according to Claim 18, further
comprising an elastic sealing member provided around a
20 toner discharging opening on an outer surface of said
toner accommodating portion, and said elastic sealing
member is positioned between said toner accommodating
portion and said plate member.

21. A container according to Claim 15, wherein
said toner discharging opening is disposed adjacent to
said grip portion in the longitudinal direction of

-90-

said toner accommodating portion, wherein said toner supply container is inserted into the main assembly of said electrophotographic image forming apparatus in the longitudinal direction of said toner accommodating portion, said container further comprising a driving force receiving portion on an end opposite from the end having the grip portion in the longitudinal direction of said toner accommodating portion, wherein when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said driving force receiving portion receives driving force for rotating a toner feeding member provided in said toner accommodating portion.

15

22. A container according to Claim 15, 16, wherein said rotatable member is rotated through 60° - 120° when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus.

20

23. A container according to Claim 17, wherein said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus while said toner discharging opening is faced down and while said toner accommodating portion is prevented from rotating in a direction

25

-91-

substantially perpendicular to the longitudinal direction thereof.

24. A container according to Claim 19, wherein
5 said rotatable member is an integrally-molded product of resin material provided at one longitudinal end of said toner accommodating portion, and said one end is at an upstream side in a mounting direction of said toner supply container relative to the main assembly
10 of said electrophotographic image forming apparatus, the mounting direction being along the longitudinal direction of said toner supply container.

25. A container according to Claim 24, further
15 comprising a toner filling opening, at one longitudinal end of said toner accommodating portion, for filling toner into said toner accommodating portion, wherein said toner filling opening is sealed by a cap, and said toner filling opening and cap are
20 covered with said rotatable member.

26. A toner supply container for supplying
powdery toner into a main assembly of
electrophotographic image forming apparatus,
25 comprising:

a toner accommodating portion for
accommodating powdery toner to be supplied to the main

-92-

assembly of said electrophotographic image forming apparatus;

5 a grip member provided at one longitudinal end of said toner accommodating portion, said grip member is for being gripped by an operator and being rotatable relative to said toner accommodating portion.

10 a first plurality of teeth provided integrally with said grip member, said teeth being arranged in a direction substantially perpendicular to a longitudinal direction of said toner accommodating portion, wherein said teeth is engageable with a first gear of a main assembly gear portion provided in the main assembly of said electrophotographic image forming apparatus when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus;

20 a toner discharging opening for discharging the toner accommodated in said toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion adjacent said grip member in the longitudinal direction of said toner accommodating portion.

25 a plate member, slidable along an outer surface of said toner accommodating portion, for openably sealing said toner discharging opening, said plate member being slidable in a direction

-93-

substantially perpendicular to the longitudinal direction of said toner accommodating portion and being curved along the outer surface of said toner accommodating portion;

5 a plurality of second teeth for receiving rotating force produced by rotation of said grip member to unseal said toner discharging opening by the rotation of grip member when said toner supply container is mounted to the main assembly of said
10 electrophotographic image forming apparatus, said second teeth being arranged in a direction substantially perpendicular to the longitudinal direction of said toner accommodating portion and being disposed at a side opposite from a side having
15 said grip member relative to said toner discharging opening in the longitudinal direction of said toner accommodating portion, wherein said second teeth are integral with said plate member, and are engageable with a second gear of the main assembly gear portion
20 provided in the main assembly of said electrophotographic image forming apparatus when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus to reception rotating force produced by rotation of said
25 grip member through said first teeth and the second gear;

 a toner feeding member, provided in said

-94-

toner accommodating portion, for feeding the toner accommodated in said toner accommodating portion toward said toner discharging opening.

a driving force receiving member for
5 receiving driving force to rotate said toner feeding member by the main assembly of said electrophotographic image forming apparatus when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus,
10 said driving force receiving member being provided at a portion opposite from a portion having said grip member in the longitudinal direction of said toner accommodating portion.

a toner filling opening for filling the toner
15 in said toner accommodating portion, the toner filling opening being provided at a portion opposite from a portion having said driving force receiving member in the longitudinal direction of said toner accommodating portion, wherein said toner filling opening is sealed
20 by a cap, and wherein said toner filling opening and said cap are covered with said grip member.

27. A container according to Claim 26, further comprising an elastic sealing member provided around said
25 toner discharging opening on an outer surface of said toner accommodating portion, and said elastic sealing member is positioned between said toner accommodating

-95-

portion and said plate member.

28. A container according to Claim 26 or 27,
wherein said toner supply container is inserted into
5 the main assembly of said electrophotographic image
forming apparatus along the longitudinal direction of
said toner accommodating portion.

29. A container according to Claim 26, wherein
10 said rotatable member is rotated through 60° - 120° by
an operator when said toner supply container is
mounted to the main assembly of said
electrophotographic image forming apparatus.

15 30. A container according to Claim 26, wherein
said toner supply container is mounted to the main
assembly of said electrophotographic image forming
apparatus while said toner discharging opening is
faced down and while said toner accommodating portion
20 is prevented from rotating in a direction
substantially perpendicular to the longitudinal
direction thereof.

31. A container according to Claim 26, wherein
25 said rotatable member is integrally molded with said
first teeth from resin material, and one end having
said grip member is at an upstream side in a mounting

-96-

direction of said toner supply container relative to the main assembly of said electrophotographic image forming apparatus, the mounting direction being along the longitudinal direction of said toner supply
5 container.

32. A toner supply container for supplying toner into a main assembly of an electrophotographic image forming apparatus, wherein said toner supply container is detachably mountable to the main assembly of said
10 electrophotographic image forming apparatus, said toner supply container, comprising:

a toner accommodating portion for accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

1 a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

an openable member for openably sealing said toner discharging opening;

2 a rotatable member, which is rotatable relative to said toner accommodating portion, for imparting a rotating force to a rotating force transmission member provided in the main assembly when said toner supply container is mounted to the main

-97-

assembly;

a rotating force receiving portion for receiving the rotating force from said rotating force transmission member when said toner supply container is mounted to the main assembly of said apparatus;

5 wherein a main assembly openable member which seals a toner reception opening provided in the main assembly of said electrophotographic image forming apparatus is opened by the rotating force received by said rotating force receiving portion.

33. A container according to Claim 32, wherein
10 said rotatable member includes a grip portion and a plurality of teeth integral with said grip portion, wherein the rotating force produced by rotation of said grip portion by an operator is transmitted to said rotating force receiving portion through the
15 teeth and the driving force transmission member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, and wherein by the transmission, said main assembly openable member is moved from a sealing
20 position to an opening position to unseal the toner receiving opening.

34. A container according to Claim 32, wherein
said rotatable member includes a plurality of teeth
25 and said rotatable member rotates in interrelation with opening and closing of a door, and wherein rotating force produced by rotation of said rotatable

-98-

member in interrelation with a closing operation of
said door after said toner supply container is mounted
to the main assembly of said electrophotographic image
forming apparatus, is transmitted to said rotating
5 force receiving portion through said teeth and said
rotating force transmission member, by which said main
assembly openable member is moved from a sealing
position to an open position to unseal said toner
receiving opening, wherein said door is openable
10 relative to the main assembly of said
electrophotographic image forming apparatus and is
opened and closed to mount said toner supply container
to the main assembly of said electrophotographic image
forming apparatus.

15

35. A container according to Claim 33 or 34,
wherein said rotating force receiving portion includes
a plurality of teeth and when said toner supply
container is mounted to the main assembly of said
20 electrophotographic image forming apparatus, said
teeth is engaged with a main assembly gear portion of
said driving force transmission member to receive
driving force for moving said main assembly openable
member to said opening position from said sealing
25 position from the main assembly gear portion, wherein
said main assembly openable member is a curved plate
member slidable along an outer surface of said toner

-99-

accommodating portion.

36. A container according to Claim 35, wherein
said plate member is slidable in a direction crossing
5 with a longitudinal direction of said toner
accommodating portion.

37. A container according to Claim 36, wherein
the teeth of said rotating force receiving portion are
10 disposed at a side opposite from a side having a grip
portion relative to said toner discharging opening in
longitudinal direction of said toner accommodating
portion, and wherein the teeth are arranged in the
direction crossing with the longitudinal direction of
15 said toner accommodating portion along one end of said
toner discharging opening.

38. A container according to Claim 33, wherein
said toner discharging opening is disposed adjacent to
20 said grip portion in the longitudinal direction of
said toner accommodating portion, wherein said toner
supply container is inserted into the main assembly of
said electrophotographic image forming apparatus in
the longitudinal direction of said toner accommodating
25 portion, said container further comprising a driving
force receiving portion on an end opposite from the
end having the grip portion in the longitudinal

-100-

direction of said toner accommodating portion, wherein
when said toner supply container is mounted to the
main assembly of said electrophotographic image
forming apparatus, said driving force receiving
5 portion receives driving force for rotating a toner
feeding member provided in said toner accommodating
portion.

39. A container according to Claim 33, 34,
10 wherein said rotatable member is rotated through 60° -
 120° when said toner supply container is mounted to
the main assembly of said electrophotographic image
forming apparatus.

15 40. A container according to Claim 34, wherein
said toner supply container is mounted to the main
assembly of said electrophotographic image forming
apparatus while said toner discharging opening is
faced down and while said toner accommodating portion
20 is prevented from rotating in a direction
substantially perpendicular to the longitudinal
direction thereof.

41. A container according to Claim 37, wherein
25 said rotatable member is an integrally-molded product
of resin material provided at one longitudinal end of
said toner accommodating portion, and said one end is

-101-

at an upstream side in a mounting direction of said toner supply container relative to the main assembly of said electrophotographic image forming apparatus, the mounting direction being along the longitudinal
5 direction of said toner supply container.

42. A container according to Claim 32, 35 or 37, wherein said sealing member is a flexible seal and is unsealed by peeled off a surface of said toner
10 accommodating portion by an operator, wherein the seal is peeled after said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus.

15 43. An electrophotographic image forming apparatus for forming an image on a recording material with toner, which electrophotographic image forming apparatus is supplied with the toner from a toner supply container, comprising:

(a) rotating force transmission member;
20 (b) a toner container mounting portion for detachably mounting said toner supply container, said toner supply container including:

a toner accommodating portion for accommodating toner to be supplied into a main assembly of the electrophotographic image forming
25 apparatus;

-102-

a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

5 a container openable member for openably sealing said toner discharging opening;

a rotatable member, which is rotatable relative to said toner accommodating portion, for imparting a rotating force to the rotating force transmission member provided in the main assembly when said toner supply container is mounted to the main assembly;

10

a rotating force receiving portion for receiving the rotating force from said rotating force transmission member when said toner supply container is mounted to the main assembly to move said openable member relative to said toner accommodating portion so as to open said toner discharging opening;

15

said apparatus further comprising:

(c) a feeding member for feeding the recording material.

20

44. An apparatus according to Claim 43, wherein said rotating force transmission member includes a main assembly gear portion, and said main assembly gear portion includes a first gear and a second gear, wherein said first gear and second gear are rotated integrally through a shaft, wherein when said toner supply container is mounted to the main assembly of

25

-103-

said electrophotographic image forming apparatus, said first gear is engaged with a first plurality of teeth provided on said rotatable member, and said second gear is engaged with a second plurality of teeth
5 provided on said rotating force receiving portion.

45. An apparatus according to Claim 43, further comprising a toner reception opening for receiving the toner to be supplied from said toner supply container,
10 and a main assembly openable member for openably sealing said toner reception opening, wherein when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said container openable member and main
15 assembly openable member are moved in interrelation with each other.

46. An electrophotographic image forming apparatus for forming an image on a recording material
20 with toner, which electrophotographic image forming apparatus is supplied with the toner from a toner supply container, comprising:

- (a) a main assembly gear portion;
- (b) a toner container mounting portion for
25 mounting said toner container, said toner container including:
 - a toner accommodating portion for

-104-

accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

5 a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

a sealing member for openably sealing said toner discharging opening;

10 a container openable member, slidable along an outer surface of said toner accommodating portion, for openably sealing said toner discharging opening, said container openable member being slidable in a direction crossing with a longitudinal direction of said toner accommodating portion;

15 a rotatable member which is rotatable relative to said toner accommodating portion and which is provided at one longitudinal end of said toner accommodating portion, said rotatable member being provided with a first plurality of teeth arranged on a line and engageable with said main assembly gear portion when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus.

25 a second plurality of teeth as a rotating force receiving portion for receiving rotating force produced by rotation of said rotatable member through

-105-

said teeth provided on said rotatable member and said main assembly gear portion to unseal said toner discharging opening by the rotation of said rotatable member when said toner supply container is mounted to
5 the main assembly of said electrophotographic image forming apparatus, wherein the teeth as said rotating force receiving portion is integral with said container openable member;

(c) a feeding member for feeding the
10 recording material.

47. An apparatus according to Claim 43, wherein said main assembly gear portion includes a first gear and a second gear, wherein said first gear and second
15 gear are rotated integrally through a shaft, wherein when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said first gear is engaged with a first plurality of teeth provided on said rotatable
20 member, and said second gear is engaged with a second plurality of teeth provided on said rotating force receiving portion.

48. An apparatus according to Claim 43, further
25 comprising a toner reception opening for receiving the toner to be supplied from said toner supply container, and a main assembly openable member for openably

-106-

sealing said toner reception opening, wherein when
said toner supply container is mounted to the main
assembly of said electrophotographic image forming
apparatus, said container openable member and main
5 assembly openable member are moved in interrelation
with each other.

49. An electrophotographic image forming
apparatus for forming an image on a recording material
10 with toner which electrophotographic image forming
apparatus is supplied with the toner from a toner
supply container, comprising:

(a) a main assembly gear portion including a
first gear and a second gear;

15 (b) a toner container mounting portion for
mounting said toner container, said toner container
including;

a toner accommodating portion for
accommodating powdery toner to be supplied to the main
20 assembly of said electrophotographic image forming
apparatus;

a grip member provided at one longitudinal
end of said toner accommodating portion, said grip
member is for being gripped by an operator and being
25 rotatable relative to said toner accommodating
portion.

a first plurality of teeth provided

-107-

integrally with said grip member, said teeth being arranged in a direction substantially perpendicular to a longitudinal direction of said toner accommodating portion, wherein said teeth is engageable with the first
5 gear when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus;

a toner discharging opening for discharging the toner accommodated in said toner accommodating
10 portion, said toner discharging opening being provided in said toner accommodating portion adjacent said grip member in the longitudinal direction of said toner accommodating portion;

a plate member, slidable along an outer
15 surface of said toner accommodating portion, for openably sealing said toner discharging opening, said plate member being slidable in a direction substantially perpendicular to the longitudinal direction of said toner accommodating portion and
20 being curved along the outer surface of said toner accommodating portion;

a plurality of second teeth for receiving rotating force produced by rotation of said grip member to unseal said toner discharging opening by the
25 rotation of grip member when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said

-108-

second teeth being arranged in a direction substantially perpendicular to the longitudinal direction of said toner accommodating portion and being disposed at a side opposite from a side having said grip member relative to said toner discharging opening in the longitudinal direction of said toner accommodating portion, wherein said second teeth are integral with said plate member, and are engageable with the second gear when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus to reception rotating force produced by rotation of said grip member through said first teeth and the second gear;

15 a toner feeding member, provided in said toner accommodating portion, for feeding the toner accommodated in said toner accommodating portion toward said toner discharging opening.

20 a driving force receiving member for receiving driving force to rotate said toner feeding member by the main assembly of said electrophotographic image forming apparatus when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus,

25 said driving force receiving member being provided at a portion opposite from a portion having said grip member in the longitudinal direction of said toner

-109-

accommodating portion.

a toner filling opening for filling the toner in said toner accommodating portion, the toner filling opening being provided at a portion opposite from a portion having said driving force receiving member in the longitudinal direction of said toner accommodating portion, wherein said toner filling opening is sealed by a cap, and wherein said toner filling opening and said cap are covered with said grip member; and

(c) a feeding member for feeding the recording material.

50. An apparatus according to Claim 49, further comprising a toner reception opening for receiving the toner to be supplied from said toner supply container, and a main assembly openable member for openably sealing said toner reception opening, wherein when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said plate member and main assembly openable member are moved in interrelation with each other.

51. An electrophotographic image forming apparatus for forming an image on a recording material with toner, which electrophotographic image forming apparatus is supplied with the toner from a toner

-110-

supply container, comprising:

(a) rotating force transmission member;

(b) a toner container mounting portion for mounting said toner container, said toner container
5 including:

a toner accommodating portion for accommodating toner to be supplied into a main assembly of the electrophotographic image forming apparatus;

10 a toner discharging opening for discharging the toner accommodated in the toner accommodating portion, said toner discharging opening being provided in said toner accommodating portion;

a sealing member for openably sealing said
15 toner discharging opening;

a rotatable member which is rotatable relative to said toner accommodating portion;

20 a rotating force receiving portion for receiving rotating force produced by rotation of said rotatable member through a rotating force transmission member provided in the main assembly of said electrophotographic image forming apparatus to unseal
25 a main assembly openable member which seals a toner reception opening provided in the main assembly of said electrophotographic image forming apparatus by

-111-

rotation of said rotatable member, when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus;

5 a feeding member for feeding the feeding member.

52. An apparatus according to Claim 51, wherein said rotating force transmission member includes a main assembly gear portion, and said main assembly
10 gear portion includes a first gear and a second gear, wherein said first gear and second gear are rotated integrally through a shaft, wherein when said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said
15 first gear is engaged with a first plurality of teeth provided on said rotatable member, and said second gear is engaged with a second plurality of teeth provided on said rotating force receiving portion.

20 53. An apparatus according to Claim 51, further comprising a toner reception opening for receiving the toner to be supplied from said toner supply container, and a main assembly openable member for openably sealing said toner reception opening, wherein when
25 said toner supply container is mounted to the main assembly of said electrophotographic image forming apparatus, said container openable member and main

-112-

assembly openable member are moved in interrelation with each other.

54. A container according to Claim 1, wherein a
5 projection height of said rotating force receiving
portion is smaller than a projection height of a
driving force transmitting portion provided on said
rotatable member so as to avoid interference between a
rotating force receiving portion of said openable
10 member and said rotating force transmission member when said
toner supply container is inserted into the main assembly of
said apparatus.

55. A container according to Claim 1, wherein a
15 rotating force receiving portion of said openable
member and a driving force transmitting portion of
said rotatable member are provided at positions
different from each other in a direction crossing with
the longitudinal direction of said toner accommodating
20 portion.

56. An apparatus according to Claim 54 or 55,
wherein said driving force transmitting portion is
provided with a plurality of teeth which are engaged
25 with a gear provided in the main assembly of said
apparatus when toner supply container is mounted to
the main assembly of said apparatus.

-113-

57. A toner supply container for supplying toner to a main assembly of an electrophotographic image forming apparatus, wherein the main assembly including a first main assembly engaging portion, a second main assembly engaging portion and a driving force transmitting portion for transmitting to said second main assembly engaging portion driving force received by said first main assembly engaging portion, said container comprising:

10 a toner accommodating portion for accommodating the toner;

a toner discharging opening for discharging the toner accommodated in said toner accommodating portion;

15 an openable member for openably sealing said toner discharging opening

a first container engaging portion for transmitting driving force to said first main assembly engaging portion when said toner supply container is mounted to the main assembly of said apparatus;

20 a second container engaging portion for receiving driving force from said second main assembly engaging portion when said toner supply container is mounted to the main assembly of said apparatus;

wherein when said toner supply container is mounted to the main assembly of said apparatus, the driving force transmitted to the main assembly of said apparatus by said first container engaging portion is

-114-

received by said second container engaging portion
from the main assembly of said apparatus, and said
openable member is moved by the driving force to open
said toner discharging opening.

5

10

15

20

25