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(54) PROCESSING CARTRIDGE AND METHOD FOR MOUNTING PROCESSING CARTRIDGE

(57) Provided are a processing cartridge and a method for mounting a processing cartridge. The processing cartridge comprises a powder compartment part (200) and a waste powder compartment part (100); the processing cartridge is detachably mounted in an electronic imaging device; the electronic imaging device is provided with a protrusion which can expand and contract in the vertical direction; the processing cartridge also comprises a movable part (230); the movable part (230) is movably arranged in the processing cartridge; during the process of mounting of the processing cartridge, the movable part (230) may move relative to said protrusion. A fixed part is replaced by means of arranging the movable part (230); during the process of installation of the processing cartridge, the movable part (230) can move relative to the protrusion such that the protrusion inside the electronic imaging device can no longer be retracted downward in the vertical direction because of the mounting of the processing cartridge.

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Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This PCT application claims the priorities to the Chinese patent applications No. 201920379083.8, filed on March 22, 2019; No. 201920396676.5, filed on March 26, 2019; and No. 201921313025.1, filed on August 13, 2019. The above enumerated patent applications are incorporated herein by reference in their entirety.

TECHNICAL FIELD

[0002] The present disclosure generally relates to the field of image-forming technology and, more particularly, relates to a processing cartridge and its installation method.

BACKGROUND ART

[0003] A processing cartridge is a detachable part widely used in an electronic image-forming device.

[0004] In the existing technology, a fixing element may be disposed at the bottom of the processing cartridge; and the fixing element may frequently collide with a protrusion inside the electronic image-forming device during the process of installing the processing cartridge on the electronic image-forming device. The protrusion inside the electronic image-forming device may be connected to an elastic element, such that the protrusion may extend and retract along the vertical direction.

[0005] However, as the number of installing and removing the processing cartridge from the electronic image-forming device increases, the protrusion and the elastic element at the bottom of the protrusion may both be greatly worn for such design. There is a need to design an element which enables the protrusion inside the electronic image-forming device not to retract along the vertical direction (e.g., retract downwardly along the vertical direction) due to the installation of the processing cartridge.

DISCLOSURE OF THE INVENTION

[0006] The present disclosure provides a processing cartridge and an installation method of the processing cartridge, which enables the protrusion inside the electronic image-forming device not to retract along the vertical direction due to the installation of the processing cartridge.

[0007] One aspect of the present disclosure provides a processing cartridge. The processing cartridge includes a toner container and a waste toner container, wherein the processing cartridge is detachably installed in an electronic image-forming device, and a protrusion capable of extending and retracting along a vertical direction is disposed inside the electronic image-forming device; and a movable element, wherein the movable element is movably disposed at the processing cartridge and is capable of moving relative to the protrusion during a process of installing the processing cartridge.

[0008] Optionally, the movable element has a first position and a second position; during the process of installing the processing cartridge, the movable element receives a force from the electronic image-forming device, such that the movable element retracts into the processing cartridge to the first position; and after the installation of the processing cartridge is completed, the movable element is capable of moving from the first position to the second position; and when in the second position, the movable element is capable of receiving a pushing force from the electronic image-forming device, such that the toner container moves relative to the waste toner container.

[0009] Optionally, the movable element in the second position is closer to a lower side of the processing cartridge than the movable element in the first position; and after the installation of the processing cartridge is completed, the movable element, at least relying on gravity, moves toward the lower side of the processing cartridge from the first position to the second position.

[0010] Optionally, the processing cartridge is disposed with an accommodation container; the accommodation container is disposed with a detachment preventing portion; the movable element is disposed with an abutting portion; and the movable element is capable of moving relative to the accommodation container, and the abutting portion is capable of being abutted against the attachment preventing portion, thereby preventing the movable element from being separated from the accommodation container.

[0011] Optionally, the accommodation container is disposed with an elastic element; and the movable element, relying on gravity and an elastic force of the elastic element, moves toward the lower side of the processing cartridge from the first position to the second position.

[0012] Optionally, the processing cartridge is disposed with a rotating portion; and one end of the movable element is rotatably connected with the rotating portion, and the other end of the movable element relies on gravity and the elastic force of the elastic element to make the abutting portion being abutted against the detachment preventing portion.

[0013] Optionally, the movable element is disposed with a trench, and one end of the elastic element is abutted against inside the trench.

[0014] Optionally, the movable element has a pushing surface; and the pushing surface is capable of receiving a pushing force from the protrusion of the electronic image-forming device.

[0015] Optionally, the pushing surface is perpendicular to a horizontal plane; and/or the pushing surface is disposed with an engaging portion which matches the protrusion.

[0016] Optionally, the processing cartridge further includes a first pushing element, and a second pushing

element, wherein the first pushing element receives a force of the movable element along the vertical direction, and the second pushing element receives a force of the movable element along a horizontal direction;

when the movable element is in the first position, the first pushing element receives the force of the movable element along the vertical direction; and

when the movable element is in the second position, the first pushing element receives the force of the movable element along the vertical direction, and the second pushing element receives the force of the movable element along the horizontal direction.

[0017] Optionally, the processing cartridge further includes a locking element, wherein when the movable element is in the second position, the movable element is fixed, along the horizontal direction, with the processing cartridge through the locking element.

[0018] Another aspect of the present disclosure provides an installation method of the processing cartridge, wherein the processing cartridge is configured to be installed in an electronic image-forming device, and the electronic image-forming device is disposed with a protrusion capable of extending and retracting along a vertical direction. The method includes:

installing the processing cartridge into the electronic image-forming device along an installation direction; and

moving a movable element of the processing cartridge relative to the protrusion, wherein the movable element retracts into the processing cartridge.

[0019] Optionally, the movable element has a first position and a second position; during a process of installing the processing cartridge, the movable element receives a force from the electronic image-forming device, such that the movable element retracts into the processing cartridge to the first position; and
after the installation of the processing cartridge is completed, the movable element moves from the first position to the second position; and when in the second position, the movable element receives a pushing force from the electronic image-forming device, such that the toner container of the processing cartridge moves relative to the waste toner container of the processing cartridge.

[0020] The embodiments in the present disclosure may achieve at least the following beneficial effects.

[0021] The processing cartridge provided by the present application may replace the fixed element by the movable element. During the process of installing the processing cartridge, the movable element may move relative to the protrusion, such that the protrusion inside the electronic image-forming device may no longer be retracted along the vertical direction due to the installation of the processing cartridge.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 illustrates a structural top view when a processing cartridge is installed inside an electronic image-forming device;

FIG. 2 illustrates a structural bottom view when a processing cartridge is installed inside an electronic image-forming device;

FIG. 3 illustrates a cross-sectional view of a processing cartridge along a plane perpendicular to a length direction of the processing cartridge;

FIGS. 4-5 illustrate cross-sectional schematics of a movable element at two different positions on a processing cartridge;

FIGS. 4a and 5a illustrate enlarged schematics of a movable element in corresponding states of FIGS. 4 and 5;

FIG. 6 illustrates a cross-sectional view of an optimized structure of a movable element along a direction perpendicular to a length direction of a processing cartridge;

FIGS. 7-10 illustrate working principle schematics of a processing cartridge in different states in one embodiment;

FIG. 11 illustrates a structural view of a movable element in embodiment two;

FIG. 12 illustrates a stereoscopic structural schematic of a processing cartridge in embodiment three;

FIG. 13 illustrates a cross-sectional view of a processing cartridge in embodiment three;

FIG. 14 illustrates a stereoscopic structural schematic of a movable element in embodiment three;

FIGS. 15-16 illustrate cross-sectional schematic of a movable element in two different positions on a processing cartridge in embodiment three;

FIGS. 15a-16a illustrate enlarged schematics of a movable element in corresponding states of FIGS. 15-16;

FIG. 17 illustrates a local exposed schematic of a processing cartridge in embodiment four;

FIG. 18 illustrates a stereoscopic structural schematic of an end cover of a processing cartridge in embodiment four;

FIG. 19 illustrates a cross-sectional schematic of an end cover of a processing cartridge along a plane perpendicular to a length direction of the processing cartridge in embodiment four;

FIG. 20 illustrates a cross-sectional schematic of a processing cartridge along a plane perpendicular to a length direction of the processing cartridge in embodiment five; and

FIG. 21 illustrates a cross-sectional schematic of an optimized structure of a movable element along a direction perpendicular to a length direction of a processing cartridge in embodiment five.

BEST MODE FOR CARRYING OUT THE INVENTION

[0023] In order to clearly illustrate the purpose, technical solutions, and advantages of the present disclosure, the present application is further described in detail with reference to the accompanying drawings and embodiments. It should be understood that the embodiments described herein may merely be used to explain the present application and may not be used to limit the present application.

[0024] In the description of the present application, unless explicitly specified and limited otherwise, the terms "first" and "second" may merely be used for the purpose of description, and may not be understood as indicating or implying relative importance; unless otherwise specified or stated, the term "plurality" may refer two or more; and the terms "connection" and "fixation" should be understood in a broad sense, for example, the "connection" may be a fixed connection, a detachable connection, an integral connection, an electrical connection, or a direct connection or an indirect connection through an intermediate medium. For those skilled in the art, the specific meanings of the above-mentioned terms in present application may be understood according to specific situations. In the description of the present specification, it should be understood that the terminology such as "on" and "below" described in the embodiments of the present application may be described from the angle shown in the drawings and should not be understood as the limitation to the embodiments of the present application. Furthermore, in the context, it also needs to be understood that when it is mentioned that an element is connected "on" or "below" another element, it may not only be directly connected "on" or "below" another element, but also may be indirectly connected "on" or "below" another element through an intermediate element.

Embodiment 1

[0025] A processing cartridge, where a movable element may not press a protrusion of an electronic image-forming device and may not sink the protrusion during the installation process, is provided in the embodiments of the present disclosure. In the present application, the upper, lower, left and right sides of the processing cartridge may be the orientations when the processing cartridge is installed inside the electronic image-forming device; and the front and the rear may refer to the front and rear of the installation direction of the processing cartridge in the process of installing the electronic image-forming device. In the process of installing the processing cartridge, for example, it may specify that a toner container is at the front and a waste toner container is at the rear.

[0026] FIG. 1 illustrates a structural top view when the processing cartridge is installed inside the electronic image-forming device. As shown in FIG. 1, the processing may include a waste toner container 100 and a toner container 200. The waste toner container 100 may include a waste toner container upper surface 110 at the upper side of the processing cartridge; similarly, the upper part of the toner container 200 may include a toner container upper surface 210.

[0027] FIG. 2 illustrates a structural bottom view when the processing cartridge is installed inside the electronic image-forming device. As shown in FIG. 2, an included photosensitive drum 120 may be below the waste toner container 100; and the lower part of the toner container 200 may include a toner container lower surface 220. The processing cartridge may also include a movable element 230, which may be movably installed on the toner container lower surface 220. FIG. 3 illustrates a cross-sectional view of the processing cartridge along a plane perpendicular to a length direction of the processing cartridge. As shown in FIG. 3, the movable element 230 may be movably connected with the toner container 200. In some implementation solutions, the position of the movable element 230 on the processing cartridge may be closer to the lower side than the bottom surface 220 , that is, at least a portion of the movable element 230 may protrude relative to the bottom surface 220. In such way, when the processing cartridge is installed into the electronic image-forming device along the direction of an arrow E, the movable element 230 may first touch or be abutted against the protrusion installed inside the electronic image-forming device. By disposing the movable element 230 to replace a fixed element in the existing technology, the movable element 230 may move relative to the protrusion during the process of installing the processing cartridge. Therefore, the protrusion inside the electronic image-forming device may no longer be retracted downwardly along the vertical direction due to the installation of the processing cartridge. In one embodiment, the movable element 230 may be moved by the force of the protrusion. Obviously, the movable element

230 may also be moved by the force of other portions inside the electronic image-forming device.

[0028] FIGS. 4-5 illustrate cross-sectional schematics of the movable element at two different positions on the processing cartridge. FIGS. 4a and 5a illustrate enlarged schematics of the movable element 230 in corresponding states of FIGS. 4 and 5. The matching relationship between the toner container 200 and the movable element 230 may be a clearance fit, such that the movable element 230 may move relatively freely with respect to the toner container 200. In order to prevent the movable element 230 from detaching from the toner container 200, as shown in FIGS. 4 and 4a, the inside of the toner container 200 may also include an accommodation container 240, and a portion of the movable element 230 may be located in the accommodation container 240. In one embodiment, the movable element 230 may include an abutting portion 233, and the accommodating container 240 may include a detachment preventing portion 241. Through the interference between the abutting portion 233 and the detachment preventing portion 241, the movable element 230 may not be detached from the toner container 200.

[0029] The movable element 230 may have an abutting surface 231 which can be abutted against the electronic image-forming device. When the processing cartridge is installed in the electronic image-forming device, the processing cartridge may be lowered along the direction of an arrow F driven by certain mechanisms in the electronic image-forming device (e.g., when the door cover of the electronic image-forming device is closed or opened, a connecting rod mechanism, which is not shown in figures, may be triggered), such that the abutting surface 231 may be abutted against the protrusion of the electronic image-forming device. At this point, the movable element 230 may be retracted inside the processing cartridge along an arrow P, which is the state described in FIGS. 4 and 4a and called a first position at this point. Furthermore, since the movable element 230 and the toner container 200 are in a clearance fit, the resistance generated by the relative movement may be relatively small, such that the movable element 230 may not press the protrusion downwardly at this point. When the processing cartridge is installed in place, the internal movement of the electronic image-forming device may make the protrusion move along the direction opposite to the processing cartridge installation direction, and the protrusion may move away from the position abutting against the abutting surface 231 and move to the side close to a pushing surface 232. At this point, since the movable element 230 and the toner container 200 are in a clearance fit and the protrusion is no longer abutted against the abutting surface 231, the movable element 230 may be subjected to the action of gravity to extend out downwardly relative to the processing cartridge along an arrow Q. At this point (after the movable element 230 is extended out), the pushing surface 232 may be in contact with the protrusion, and the state at this point (FIGS. 5 and 5a) is called a second position. Obviously, when in the second position, since other components in the electronic image-forming device are abutted against the movable element 230 or other components inside the processing cartridge act on the movable element 230, the blocking portion 233 on the movable element 230 may be not in contact with the attachment preventing portion 241. However, compared to the first position, the second position may be closer to the lower side of the processing cartridge; and at least a portion of the front or rear projection of the pushing surface 232 overlaps the front or rear projection of the protrusion (the overlapping of one of the front projections and the rear projections may be regarded as the projection overlapping), which may be regarded as the second position.

[0030] When the movable element is in the second position and the electronic image-forming device drives the protrusion to move along the processing cartridge installation direction (the direction of the arrow E), the protrusion may exert a force on the pushing surface 232 and push the toner container 200 to move relative to the waste toner container 100 to implement the roller drum separation.

[0031] FIG. 6 illustrates a cross-sectional view of an optimized structure of the movable element along the direction perpendicular to the length direction of the processing cartridge. In FIG. 6, the pushing surface may be a new pushing surface 234 with a dotted line, which replaces the above-mentioned pushing surface 232. The new pushing surface 234 may maintain to be perpendicular to the horizontal plane when the processing cartridge is installed in the electronic image-forming device, which may adapt to the contact with an irregularly shaped protrusion. Through such arrangement, the force between the irregularly shaped protrusion and the pushing surface may also be same as that of other protrusions, and the pushing force may be directed in parallel with the horizontal direction, thereby more stably preforming the roller drum separation.

Embodiment 2

[0032] A processing cartridge, where a movable element may not press a protrusion of an electronic image-forming device and may not retract the protrusion during the installation process, is provided in the embodiments of the present disclosure. In the present application, the upper, lower, left and right sides of the processing cartridge may be the orientations when the processing cartridge is installed inside the electronic image-forming device; and the front and the rear may refer to the front and the rear of the installation direction of the processing cartridge in the process of installing the electronic image-forming device. In the process of installing the processing cartridge, for example, it may specify that a toner container is at the front and a waste toner container is at the rear.

[0033] FIGS. 7-10 illustrate working principle schemat-

ics of the processing cartridge in different states in one embodiment. The waste toner container may be omitted and not be shown in FIGS. 7 to 10. The toner container 1200 includes a movable element 1230, a first pushing element, and a second pushing element. The first pushing element may have a tendency to push the movable element 1230 downwardly, thereby making the movable element 1230 have a tendency of extending out downwardly along the vertical direction. For example, the first pushing element may include a first elastic element 1210 and a pushing plate 1240 connected to the first elastic element 1210. The second pushing element may have a tendency of pushing or pulling the movable element 1230 to move away from the waste toner container. For example, the second pushing element may include a second elastic element 1220 which is connected to the movable element 1230. That is, the first pushing element may receive the force of the movable element 1230 along the vertical direction, and the second pushing element may receive the force of the movable element 1230 along the horizontal direction. For example, when the movable element 1230 is in the first position, it can be considered that only the first pushing element may receive the force of the movable element 1230 along the vertical direction; and when the movable element 1230 is in the second position, it can be considered that the first pushing element may receive the force of the movable element 1230 along the vertical direction and the second pushing element may receive the force of the movable element 1230 along the horizontal direction. The toner container 1200 may further include a locking element 1250, which may not interfere with the first pushing element and/or the second pushing element in the movement. The locking element 1250 may act on the movable element 1230 at a specific position, such that the movable element 1230 may no longer move relative to the toner container 1200. In some implementation solutions, the movable element 1230 fixed by the locking element 1250 at the specific position may be regarded as a rigid connection between the movable element 1230 and the toner container 1200.

[0034] When the processing cartridge is installed in the electronic image-forming device and the door cover of the electronic image-forming device is not closed, the processing cartridge may be installed along the direction of the arrow E from the right to the left to the position in FIG. 7. The toner container 1200 shown in FIG. 7 may be the processing cartridge installed on the innermost side of the electronic image-forming device. When the processing cartridge is installed in the electronic image-forming device and the door cover of the electronic image-forming device is not closed, as shown in FIG. 7, under the action of the first pushing element and the second pushing element, the movable element 1230 may not only extend out along the vertical direction relative to the processing cartridge, but also be located at a position away from the waste toner container.

[0035] As shown in FIG. 8, when the door cover of the electronic image-forming device is closed, under the action of a connecting rod mechanism (not shown in FIG. 8) in the door cover, the processing cartridge may be lowered along the vertical direction (the direction of the arrow F). At this point, the movable element 1230 may be in contact with a movable rod 70 with a protrusion 71 inside the electronic image-forming device. In some implementation solutions, the movable element 1230 may be engaged at a trench 72 on the movable rod 70. At this point, the movable rod 70 may press the movable element 1230 to make the movable element 1230 rise for a certain distance along the vertical direction, which is called the first position at this point. That is, when in the first position, the movable element may apply a force along the vertical direction to the first pushing element. The trench 72 in FIG. 8 may only be a possible position and may also be relatively located on the right side of the protrusion 71 in FIG. 8. It should be understood that the protrusion 71 in one embodiment may also extend and retract along the vertical direction, but only the protrusion 71 and the movable rod 70 with the protrusion 71 may be shown in one embodiment.

[0036] Next, the internal movement of the electronic image-forming device may drive the movable rod 70 to move a short distance along the direction opposite to the installation direction of the processing cartridge to the electronic image-forming device (the direction of an arrow I) as shown in FIG. 9. At this point, the movable rod 70 may drive the movable element 1230 to move toward the direction of the waste toner container along the direction of the arrow I (that is, the direction opposite to the installation direction of the processing cartridge to the electronic image-forming device). When the movement ends, the movable element 1230 may reach the specific position where the locking element 1250 and the movable element 1230 may act. At this point, the movable element 1230 may be fixed relative to the toner container 1200 under the action of the locking element 1250 with further movement, which is called the second position. That is, in the second position, the movable element may apply a force along the vertical direction to the first pushing element and a force along the horizontal direction to the second pushing element. In one embodiment, the movable element 1230 in the first position and the second position may both at a same height. However, it should be understood that the movable element 1230 in the first position may be retracted into the processing cartridge, and the movable element 1230 in the second position may receive the pushing force provided by the electronic image-forming device. Afterwards, regardless of whether the movable rod 70 moves along the installation direction of the processing cartridge to the electronic image-forming device or is restored to such position, the movable element 1230 may no longer move relative to the toner container 1200. Therefore, when the movable rod 70 moves along the installation direction (the direction of an arrow I') of the processing cartridge to the electronic image-forming device, the toner container 1200 may be pushed to be separated from the waste toner container,

thereby completing the roller drum separation.

[0037] As shown in FIG. 10, when the door cover of the electronic image-forming device is opened without printing, the processing cartridge may rise along the vertical direction (the direction of an arrow F'). At this point, the movable rod 70 may no longer be in contact with the movable element 1230, the first pushing element may push the movable element 1230 to extend out downwardly along the vertical direction, and the movable element 1230 may no longer be located at the specific position with the locking element 1250, such that the locking element 1250 may no longer fix the movable element 1230 on the toner container 1200. Next, the second movable element may pull the movable element 1230 to move away from the waste toner container (the direction of an arrow Z) and the state when the door cover of the electronic image-forming device is not closed in FIG. 7 may be restored. That is, in the process that the movable element 1230 extends out downwardly along the vertical direction, the horizontal direction of the movable element 1230 may be restricted by the locking element 1250; and when the movable element 1230 is fully extended, the movable element 1230 may receive the force of the second pushing element to be restored to the first position at this point.

[0038] In other implementation solutions, as shown in FIG. 11, the movable element 1230 may not be used to cooperate with the trench 72, but a hook may be disposed at the free end of the movable element 1230. In some implementation solutions, the hook may include claw teeth 1231 and a pressing portion 1232. As the pressing portion 1232 and the movable rod 70 are pressed and abutted against each other, two claw teeth 1231 may move toward each other, thereby grasping the movable rod 70 tightly.

[0039] Obviously, the movable element 1230 extending along the vertical direction in one embodiment may also be fixed with the movable rod 70 after extending along a direction at an acute angle with the vertical direction, which may not be described in detail herein.

Embodiment 3

[0040] On the basis of exemplary embodiment one, another structure and arrangement of the movable element may be provided in one embodiment. During the installation process of the processing cartridge, the moving may not press the protrusion of the electronic image-forming device and may not make the protrusion be retracted downwardly. In the present application, the upper, lower, left and right sides of the processing cartridge may be the orientations when the processing cartridge is installed inside the electronic image-forming device; and the front and the rear may refer to the front and the rear of the installation direction of the processing cartridge in the process of installing the electronic image-forming device. In the process of installing the processing cartridge, for example, it may specify that a toner container is at the front, and a waste toner container is at the rear.

[0041] As shown in FIGS. 12-16a, a processing cartridge 20 may include a waste toner container 300 and a toner container 400; and the waste toner container 300 may include a photosensitive drum 320. A lower part of the toner container 400 may include a toner lower surface 420. The processing cartridge 20 may also include a movable element 430, which is movably connected with the toner container 400. In some implementation solutions, the movable element 430 may be located closer to the lower side of the processing cartridge than the bottom surface 420, and at least a portion of the movable element 430 may protrude relative to the bottom surface 420.

[0042] The toner container 400 may also include an accommodation container 440, and a portion of the movable element 430 may be located in the accommodation container 440. The toner container 400 may also include a rotating portion 450. In one embodiment, the rotating portion 450 may have an arc surface with a cylindrical outer peripheral surface, and the movable element 430 may include a rotatable portion 434. In one embodiment, the rotatable portion 434 may have an arc surface with a cylindrical inner peripheral surface, such that the rotatable portion 434 may entirely or partially surround the outer surface of the rotating portion 450, thereby implementing the rotation of the movable element 430 around the rotating portion 450. Furthermore, the structures of the rotatable portion 434 and the rotating portion 450 may be interchangeable.

[0043] In some implementation manners, in one embodiment, a portion of the rotating portion 450 may be connected to the toner container 400, and another portion of the rotating portion 450 may be a cylindrical surface for the rotatable part 434 to rotate. The rotatable portion 434 of the movable element 430 may have an opening D434a which is used to sleeve on the cylindrical surface of the rotating portion 450 in the form of clamping to install and position the movable element 430.

[0044] In some embodiments, the movable element 430 may include an abutting portion 433, and the accommodating container 440 may include a detachment preventing portion 441. Through the interference between the abutting portion 433 and the detachment preventing portion 441, the movable element 430 may not be detached from the toner container 400.

[0045] In some embodiments, the processing cartridge may further include an elastic element 460 to restrict the movement of the movable element 430. In one embodiment, the elastic element 460 may be a torsion spring, which is disposed in the toner container 400. During the movement of the movable element 430, the elastic element 460 may provide a pushing constraint to the movable element 430 to help the movable element 430 be restored. In some embodiments, the toner container 440 may be disposed with a positioning protrusion 470, and the elastic element 460 may be installed on the positioning protrusion 470. In one embodiment, the elastic element 460 may be located between the frame of the toner

container 400 and the movable element 430, such that one end of the elastic element 460 may be abutted against the movable element 430, and the other end of the elastic element 460 may be abutted against the frame of the processing cartridge. When the elastic element 460 is in its natural state, one end of the elastic element 460 may only be adjoined on the movable element 430, which may not exert a force on the movable element 430 or exert a force directed to the outside of the processing cartridge on the movable element 430. One end of the movable element 430 may be sleeved on the rotating portion 450 through the rotatable portion 434, and the other end of the movable element 430 may be abutted against the detachment preventing portion 441 through the abutting portion 433 under the action of its own gravity or the elastic element 460. In one embodiment, one end of the elastic element 460 may be abutted against inside a trench 435 of the movable element 430. As the movable element 430 rotates, one end of the elastic element 460 and the movable element 430 may have relative displacement adaptively; and under the restriction of two inner walls of the trench 435, it is ensured that the elastic element 460 may not be detached from the movable element 430, thereby providing a stable restraint during the movement of the movable element 430.

[0046] The movable element 430 may have an abutting surface 431 capable of abutting against the electronic image-forming device. When the processing cartridge is installed in the electronic image-forming device along the direction of the arrow E and the processing cartridge is lowered along the direction of the arrow F for the abutting surface 431 to be abutted against the inside of the electronic image-forming device, especially to be abutted against the protrusion inside the electronic image-forming device, the movable element 430 may be retracted inside the processing cartridge along an arrow M, which is the state described in FIGS. 15 and 15a. Since the movable element 430 and the toner container 400 are in a clearance fit, the resistance generated by the relative movement may be small; and the gravity of the movable element 430 may be sufficiently small, or the pushing force exerted by the elastic element 460 on the movable element 430 may be sufficiently small when the elastic part 460 is disposed, such that, at this point, the movable element 430 may not press the protrusion downwardly and may not make the protrusion be retracted downwardly. At this point, the state in FIGS. 15 and 15a may be called the first position. In the first position, when the movable element 430 is retracted upwardly into the processing cartridge by rotating around the rotating portion 450, the abutting portion 433 may not interfere with the detachment preventing portion 441. At this point, the elastic element 460 may receive the force of the movable element 430 which is in a deformed state, and the reaction force (the elastic restoring force) exerted on the movable element 430 may be the pushing force for restoring the movable element 430.

[0047] When the processing cartridge is installed in place, the internal movement of the electronic image-forming device may make the protrusion move along the direction opposite to the processing cartridge installation direction, and the protrusion may move away from the position being abutted against the abutting surface 431 and move to the side close to the pushing surface 432. At this point, since there is a clearance fit between the movable element 430 and the toner container 400, and the protrusion is no longer abutted against the abutting surface 431, the movable element 430 may be subjected to the action of gravity and the elastic restoring force of the elastic element 460 to extend out downwardly relative to the processing cartridge along an arrow N, thereby implementing the restoring operation. At this point (after the movable element 430 extends out), the forcing surface 432 may be in contact with the protrusion. The state at this point (FIGS. 16 and 16a) is called the second position. Obviously, when in the second position, it may be that because other components in the electronic image-forming device are abutted against the movable element 430 or other components inside the processing exert a force on the movable element 430, the abutting portion 433 on the movable element 430 may not be in contact with the detachment preventing portion 441. Therefore, in the second position, the force exerted by the elastic element 460 on the movable element 430 may be reduced or till the elastic element 460 restores to the above-mentioned natural state. Compared to the first position, the movable element in the second position may be closer to the lower side of the processing cartridge; and at least a portion of the front or rear projection of the pushing surface 432 overlaps the front or rear projection of the protrusion (the overlapping of one of the front projections and the rear projections may be regarded as the projection overlapping).

[0048] When the movable element is in the second position and the electronic image-forming device drives the protrusion to move along the processing cartridge installation direction (the direction of the arrow E), the protrusion may exert a force on the pushing surface 432 and push the toner container 400 to move relative to the waste toner container 300 to implement the roller drum separation.

[0049] In some embodiments, an engaging portion 432a may also be added to the pushing surface 432, and the position the engaging portion 432a may be used for engaging the protrusion. The structure of the engaging portion 432a may not be limited. The engaging portion 432a may be a trench structure or a protrusion structure, or a rough surface with a relatively large friction coefficient, which may limit the protrusion from slipping as much as possible when exerting a force on the pushing surface 432. In such way, when the protrusion exerts a force on the pushing surface 432, it is possible to push the toner container 400 to move relative to the waste toner container 300, so that the protrusion may not be detached easily from the pushing surface 432.

[0050] In one embodiment, it may ensure that the mov-

ing operation of the movable element 430 after each installation may be executed steady; and during the movement between the first position and the second position, the movable element 430 may be provided with a stable restoration and the roller drum separation may be maintained. Moreover, compared to that friction may be at both sides when the movable element moves in the accommodation container, which may result in the swing of the movable element, in exemplary embodiment one, the movable element in one embodiment may move more flexibly and steady in the form of rotation in the accommodation container.

Embodiment 4

[0051] As shown in FIGS. 17-19, another configuration manner of the movable element may be provided in one embodiment on the basis of exemplary embodiment eleven. The ends of the toner container 400 and the waste toner container 300 of the processing cartridge may be connected through a protective cover 500. An end cover 480 may be disposed on the end of the toner container 400. In one embodiment, the movable element 430 and the elastic element 460 may be disposed on the end cover 480, and the protective cover 500 may be disposed on the outer side of the end cover 480.

[0052] As shown in FIGS. 18 and 19, the end cover 480 may include an inner wall 482 facing the inner side of the processing cartridge. The end cover 480 may be disposed with the accommodation container 440, the rotating portion 450, and the detachment preventing portion 441, which may all be formed by extending out of the inner wall 482. A portion of the movable element 430 may be located in the accommodation container 440. Through the cooperation of the rotatable portion 434 and the rotating portion 450, the movable element 430 may rotatably move in the accommodation container 440. Furthermore, through the interference between the abutting portion 433 and the detachment preventing portion 441, the movable element 430 may not be detached from the end cover 480. The end cover 480 may also be disposed with the positioning protrusion 470, and the elastic element 460 may be installed on the positioning protrusion 470. A first end 460a of the elastic element 460 may be abutted against the movable element 430, and a second end 460b of the elastic element 460 may be abutted against a frame 481.

[0053] In some embodiments, the end cover 480 may be further provided with a first end wall 442 and a second end wall 443, such that the movable element 430 may be located between the first end wall 442 and the inner wall 482, and the second end 460b of the elastic element 460 may be located between the second end wall 443 and the inner wall 482, thereby preventing the movable element 430 and the elastic element 460 from being detached from the end cover 480 during the movement.

[0054] According to one embodiment, it should be understood that the movable element 430 may be disposed not only on the end cover 480, but also on the protective cover 500 or the waste toner container 300, as long as the movable element 430 may transmit the received pushing force, which is provided by the electronic image-forming device, to the toner container 400 of the processing cartridge, thereby enabling the relative movement between the toner container 400 and the waste toner container 300.

Embodiment 5

[0055] As shown in FIG. 20, another configuration manner of the movable element may be provided in one embodiment on the basis of exemplary embodiment nine. The processing cartridge may also include an elastic element 260, which is located between the frame of the toner container 200 and the movable element 230, and the elastic element 260 may provide a pushing constraint on the movable element 230 during the movement of the movable element 230 to help the movable element be restored. In one embodiment, the elastic element 260 may be disposed in the accommodation container 240. One end of the elastic element 260 may be abutted against the movable element B230, and the other end may be abutted against the frame of the processing cartridge. When the elastic element 260 is in a natural state, one end of the elastic element 260 may only touch the movable element 230, and no force may be exerted on the movable element 230 or a force directed to the outside of the processing cartridge may be exerted on the movable element 230. In some embodiments, the elastic element 260 may be a sponge, which may be respectively abutted against two abutting portions 233 of the movable element 230.

[0056] When the processing cartridge is installed in the electronic image-forming device and the abutting surface 231 of the movable element 230 is abutted against the inside of the electronic image-forming device, especially against the protrusion inside the electronic image-forming device, the movable element 230 may be retracted inside the processing cartridge. Since the movable element 230 and the toner container 200 are in a clearance fit, the resistance generated by the relative movement may be small; and the gravity of the movable element 230 may be sufficiently small, or the pushing force exerted by the elastic element 260 on the movable element 230 may be sufficiently small when the elastic element 260 is disposed, such that, at this point, the movable element 230 may not push the protrusion downwardly and may not make the protrusion be retracted downwardly. At this point, the movable element 230 may be in the first position.

[0057] When the processing cartridge is installed in place, the internal movement of the electronic image-forming device may make the protrusion move along the direction opposite to the processing cartridge installation direction, and the protrusion may move away from the position being abutted against the abutting surface 231

and move to the side close to the pushing surface 232. At this point, since there is a clearance fit between the movable element 230 and the toner container 200, and the protrusion is no longer abutted against the abutting surface 231, the movable element 230 may be subjected to the action of gravity and the elastic restoring force of the elastic element 260 to extend out downwardly, thereby implementing the restoring operation. At this point, the movable element 230 may be in the second position. In the second position, the force exerted by the elastic element 260 on the movable element 230 may be reduced or till the elastic element 260 restores to the above-mentioned natural state.

[0058] When the movable element is in the second position and the electronic image-forming device drives the protrusion to move along the processing cartridge installation direction, the protrusion may exert a force on the pushing surface 232 and push the toner container to move relative to the waste toner container, thereby implementing the roller drum separation.

[0059] Furthermore, as shown in FIG. 21, an optimized structure of the elastic element 260 may be provided. The elastic element 260 may be a single piece sponge which is located in the accommodating container 240 and directly abutted against two abutting portions 233 of the movable element 230.

[0060] The remaining structures may be same as those in exemplary embodiment one. In one embodiment, it may ensure that the moving operation of the movable element 230 after each installation may be executed steady; and during the movement between the first position and the second position, the movable element 230 may be provided with a stable restoration.

[0061] Finally, it should be noted that the above-mentioned embodiments may be merely used to describe the technical solution of the present disclosure, rather than limiting the present disclosure. Although the present disclosure has been described in detail with reference to the above-mentioned embodiments, those skilled in the art should understand that the technical solutions described in the above-mentioned embodiments may still be modified, or certain or all of the technical features may be equivalently replaced. Such modifications or replacements do not make the essence of the corresponding technical solutions outside the scope of the technical solutions of the embodiments of the present disclosure.

[0062] At last, further examples are provided below:

1. A processing cartridge, comprising:

a toner container and a waste toner container, wherein the processing cartridge is detachably installed in an electronic image-forming device, and a protrusion capable of extending and retracting along a vertical direction is disposed inside the electronic image-forming device; and

a movable element, wherein the movable element is movably disposed at the processing cartridge and is capable of moving relative to the protrusion during a process of installing the processing cartridge.

2. The processing cartridge according to example 1, wherein:

the movable element has a first position and a second position; during the process of installing the processing cartridge, the movable element receives a force from the electronic image-forming device, such that the movable element retracts into the processing cartridge to the first position; and

after the installation of the processing cartridge is completed, the movable element is capable of moving from the first position to the second position; and when in the second position, the movable element is capable of receiving a pushing force from the electronic image-forming device, such that the toner container moves relative to the waste toner container.

3. The processing cartridge according to example 2, wherein:
the movable element in the first position is closer to a lower side of the processing cartridge than the movable element in the second position; and after the installation of the processing cartridge is completed, the movable element, at least relying on gravity, moves toward the lower side of the processing cartridge from the first position to the second position.

4. The processing cartridge according to example 3, wherein:
the processing cartridge is disposed with an accommodation container; the accommodation container is disposed with a detachment preventing portion; the movable element is disposed with an abutting portion; and the movable element is capable of moving relative to the accommodation container, and the abutting portion is capable of being abutted against the attachment preventing portion, thereby preventing the movable element from being separated from the accommodation container.

5. The processing cartridge according to example 4, wherein:
the accommodation container is disposed with an elastic element; and the movable element, relying on gravity and an elastic force of the elastic element, moves toward the lower side of the processing cartridge from the first position to the second position.

6. The processing cartridge according to example 5, wherein:

the processing cartridge is disposed with a rotating portion; and one end of the movable element is rotatably connected with the rotating portion, and the other end of the movable element relies on gravity and the elastic force of the elastic element to make the abutting portion being abutted against the detachment preventing portion.

7. The processing cartridge according to example 6, wherein:
the movable element is disposed with a trench, and one end of the elastic element is abutted against inside the trench.

8. The processing cartridge according to any one of examples 2-7, wherein:
the movable element has a pushing surface; and the pushing surface is capable of receiving a pushing force from the protrusion of the electronic image-forming device.

9. The processing cartridge according to example 8, wherein:
the pushing surface is perpendicular to a horizontal plane; and/or the pushing surface is disposed with an engaging portion which matches the protrusion.

10. The processing cartridge according to example 2, further including:
a first pushing element, and a second pushing element, wherein:

the first pushing element receives a force of the movable element along the vertical direction, and the second pushing element receives a force of the movable element along a horizontal direction;

when the movable element is in the first position, the first pushing element receives the force of the movable element along the vertical direction; and

when the movable element is in the second position, the first pushing element receives the force of the movable element along the vertical direction, and the second pushing element receives the force of the movable element along the horizontal direction.

11. The processing cartridge according to example 10, further including:
a locking element, wherein when the movable element is in the second position, the movable element is fixed, along the horizontal direction, with the processing cartridge through the locking element.

12. A method for installing a processing cartridge, wherein the processing cartridge is configured to be installed in an electronic image-forming device, and the electronic image-forming device is disposed with a protrusion capable of extending and retracting along a vertical direction, the method comprising:

installing the processing cartridge into the electronic image-forming device along an installation direction; and

moving a movable element of the processing cartridge relative to the protrusion, wherein the movable element retracts into the processing cartridge.

13. The method according to example 12, wherein:

the movable element has a first position and a second position; during a process of installing the processing cartridge, the movable element receives a force from the electronic image-forming device, such that the movable element retracts into the processing cartridge to the first position; and

after the installation of the processing cartridge is completed, the movable element moves from the first position to the second position; and when in the second position, the movable element receives a pushing force from the electronic image-forming device, such that the toner container of the processing cartridge moves relative to the waste toner container of the processing cartridge.

Claims

1. A processing cartridge (20), comprising:

a toner container (200, 1200, 400) and a waste toner container (100, 300), wherein the processing cartridge (20) is detachably installed in an electronic image-forming device, and a protrusion (71) configured for extending and retracting along a vertical direction is disposed inside the electronic image-forming device; and
a movable element (230, 1230, 430), wherein the movable element (230, 1230, 430) is movably disposed at the processing cartridge (20) and is configured for moving relative to the protrusion (71) during a process of installing the processing cartridge (20); wherein
the processing cartridge (20) is disposed with an accommodation container (240, 440); the accommodation container (240, 440) is disposed with a detachment preventing portion (241, 441); the movable element (230, 1230, 430) is

disposed with an abutting portion (233, 433); and the movable element (230, 1230, 430) is configured for moving relative to the accommodation container (240, 440), and the abutting portion (233, 433) is configured for being abutted against the attachment preventing portion, thereby preventing the movable element (230, 1230, 430) from being separated from the accommodation container (240, 440); and
the accommodation container (240, 440) is disposed with an elastic element (260, 460); and the elastic element (260, 460) is configured to exert a force directed to an outside of the processing cartridge (20) on the movable element (230, 1230, 430).

2. The processing cartridge (20) according to claim 1, wherein
a part of the movable element (230, 1230, 430) is located in the accommodation container (240, 440), and the movable element (230, 1230, 430) is rotatably movable in in the accommodation container (240, 440).

3. The processing cartridge (20) according to claim 1, wherein:

the movable element (230, 1230, 430) has a first position and a second position; during the process of installing the processing cartridge (20), the movable element (230, 1230, 430) receives a force from the electronic image-forming device, such that the movable element (230, 1230, 430) retracts into the processing cartridge (20) to the first position; and
after the installation of the processing cartridge (20) is completed, the movable element (230, 1230, 430) is configured for moving from the first position to the second position; and when in the second position, the movable element (230, 1230, 430) is configured for receiving a pushing force from the electronic image-forming device, such that the toner container (200, 1200, 400) moves relative to the waste toner container (100, 300).

4. The processing cartridge (20) according to claim 3, wherein:
the movable element (230, 1230, 430) in the first position is closer to a lower side of the processing cartridge (20) than the movable element (230, 1230, 430) in the second position; and after the installation of the processing cartridge (20) is completed, the movable element (230, 1230, 430) moves toward the lower side of the processing cartridge (20) from the first position to the second position.

5. The processing cartridge (20) according to claim 1, wherein:
the movable element (230, 1230, 430), relying on an elastic force of the elastic element (260, 460), moves toward the lower side of the processing cartridge (20) from the first position to the second position.

6. The processing cartridge (20) according to claim 5, wherein:
the processing cartridge (20) is disposed with a rotating portion (450); and one end of the movable element (230, 1230, 430) is rotatably connected with the rotating portion (450), and the other end of the movable element (230, 1230, 430) relies on the elastic force of the elastic element (260, 460) to make the abutting portion (233, 433) being abutted against the detachment preventing portion (241, 441).

7. The processing cartridge (20) according to claim 6, wherein: the movable element (230, 1230, 430) is disposed with a trench (72, 435), and one end of the elastic element (260, 460) is abutted against inside the trench (72, 435).

8. The processing cartridge (20) according to any one of claims 3 and 4, wherein:
the movable element (230, 1230, 430) has a pushing surface (232, 234, 432); and the pushing surface (232, 234, 432) is configured for, when the movable element (230, 1230, 430) is in the second position, receiving a pushing force from the protrusion (71) of the electronic image-forming device, such that the toner container (200, 1200, 400) moves relative to the waste toner container (100, 300).

9. The processing cartridge (20) according to claim 8, wherein:
the pushing surface (232, 234, 432) is perpendicular to a horizontal plane; and/or the pushing surface (232, 234, 432) is disposed with an engaging portion (432a) which matches the protrusion (71).

10. The processing cartridge (20) according to claim 9, wherein the engaging portion (432a) is a trench structure or a protrusion structure.

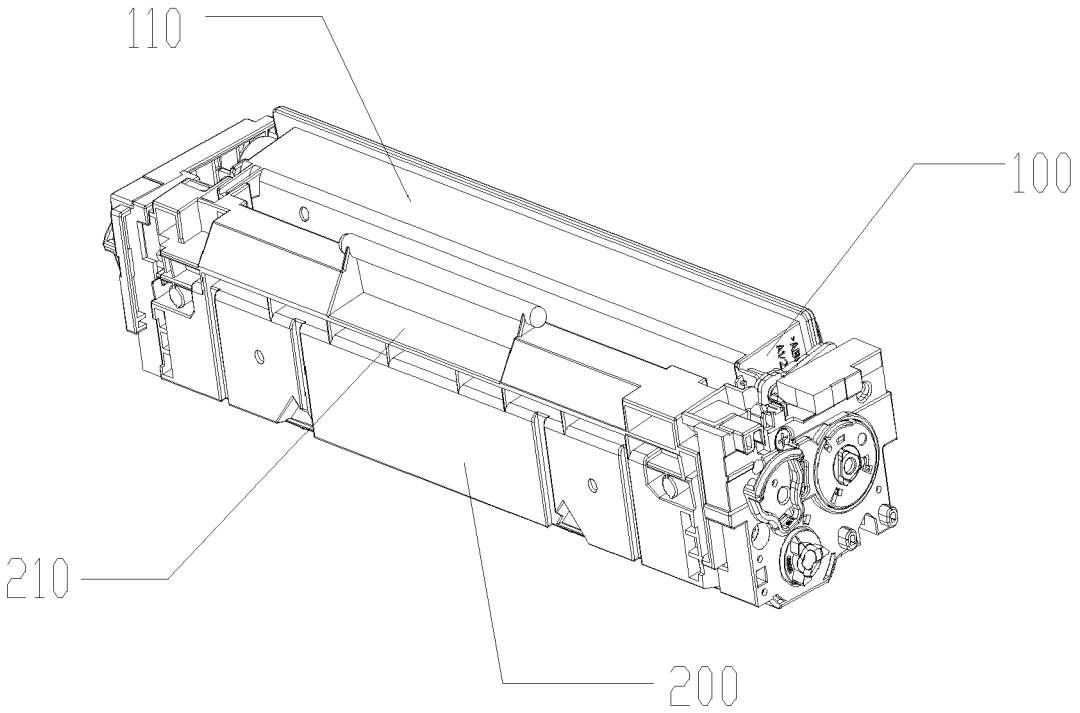

FIG. 1

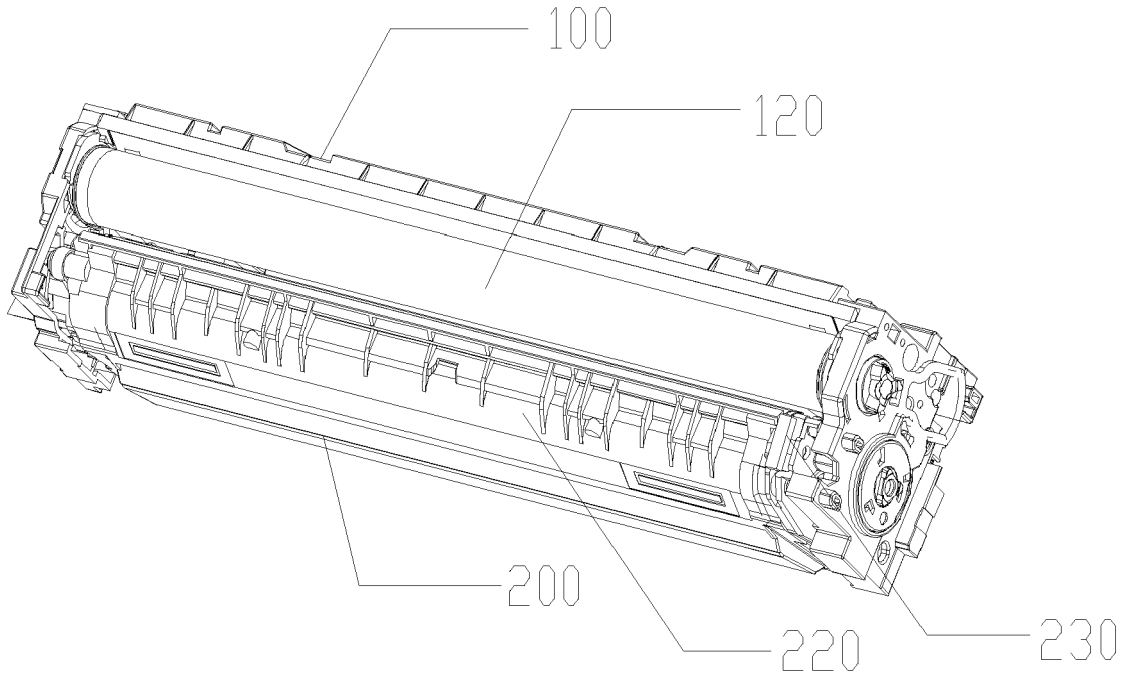

FIG. 2

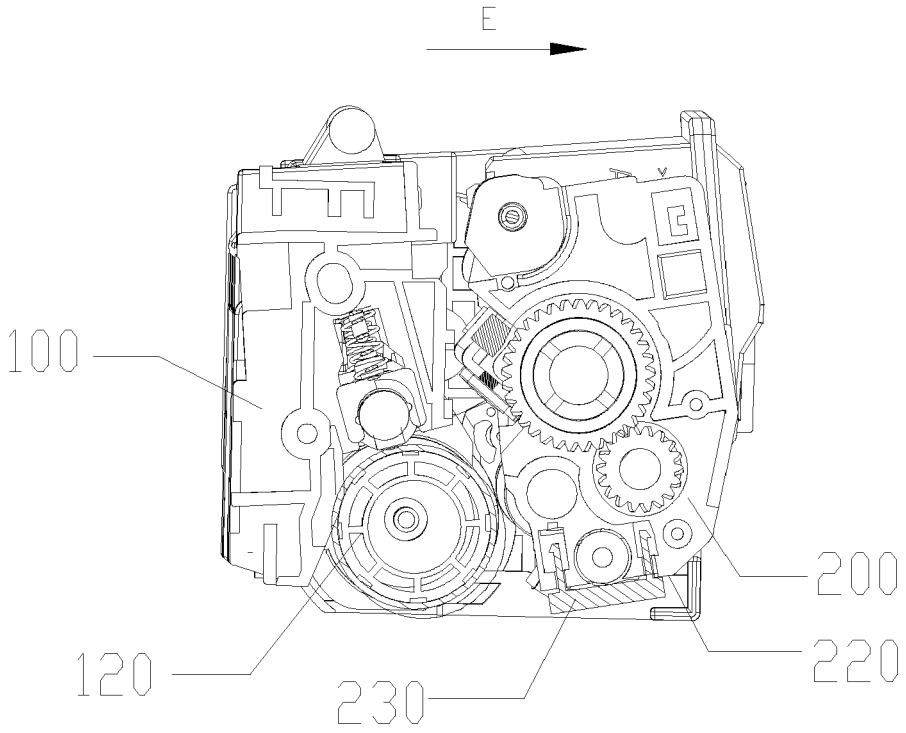

FIG. 3

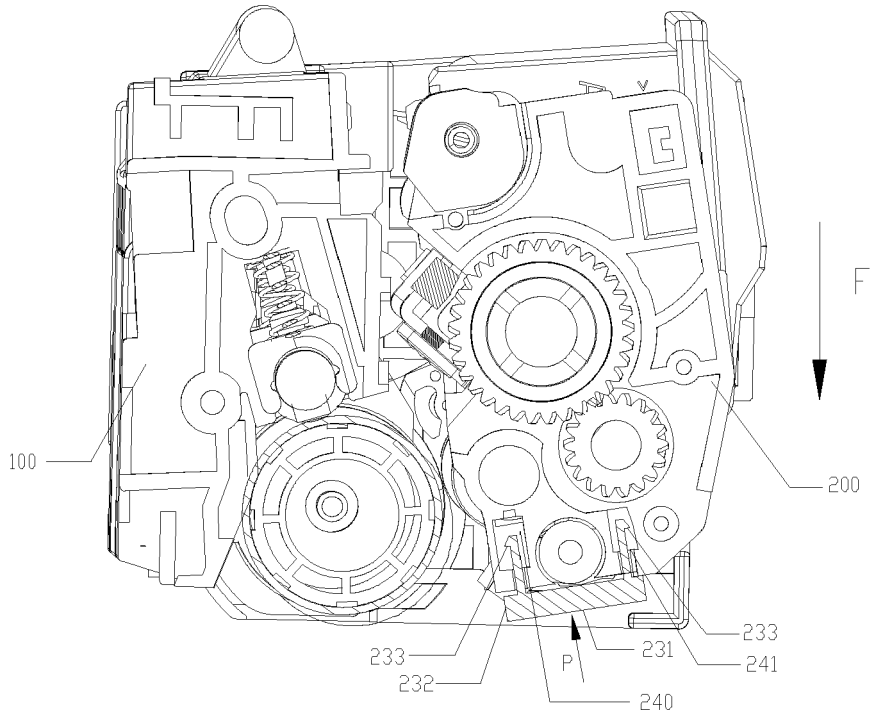

FIG. 4

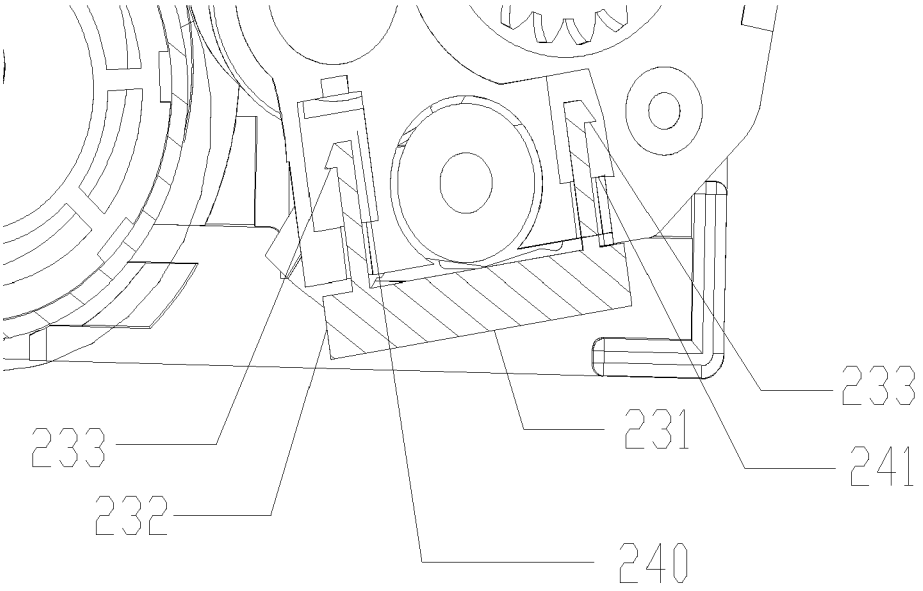

FIG. 4a

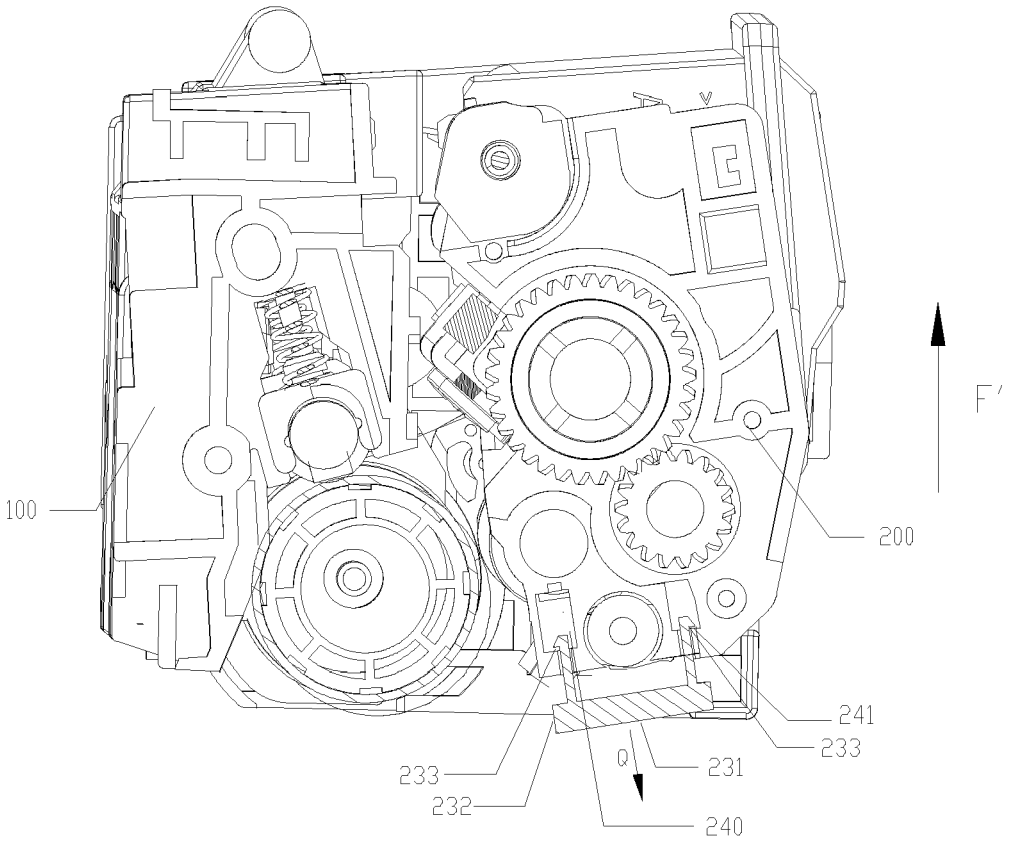

FIG. 5

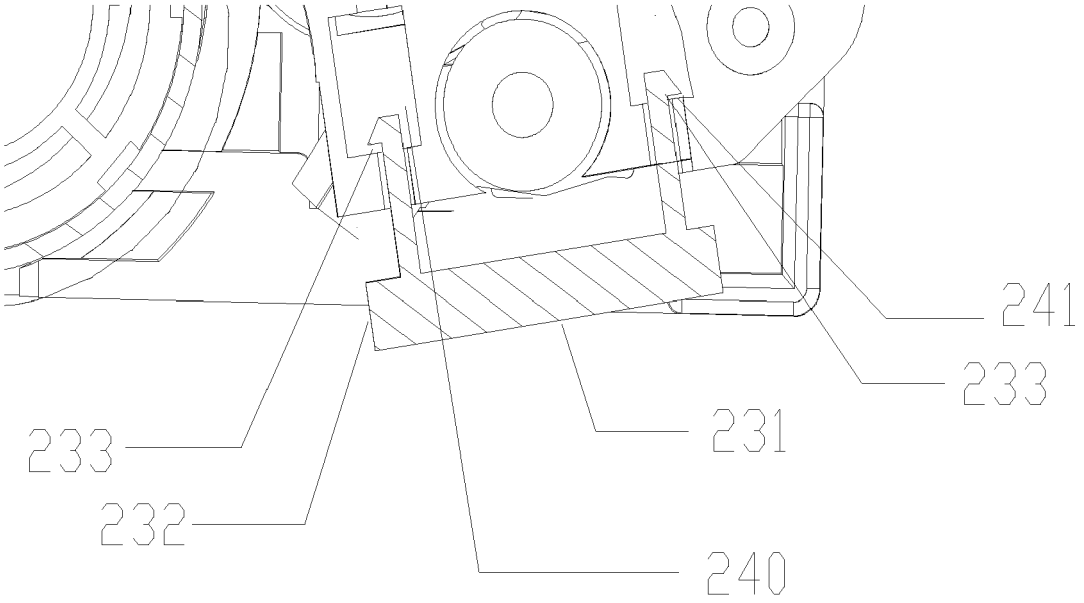

FIG. 5a

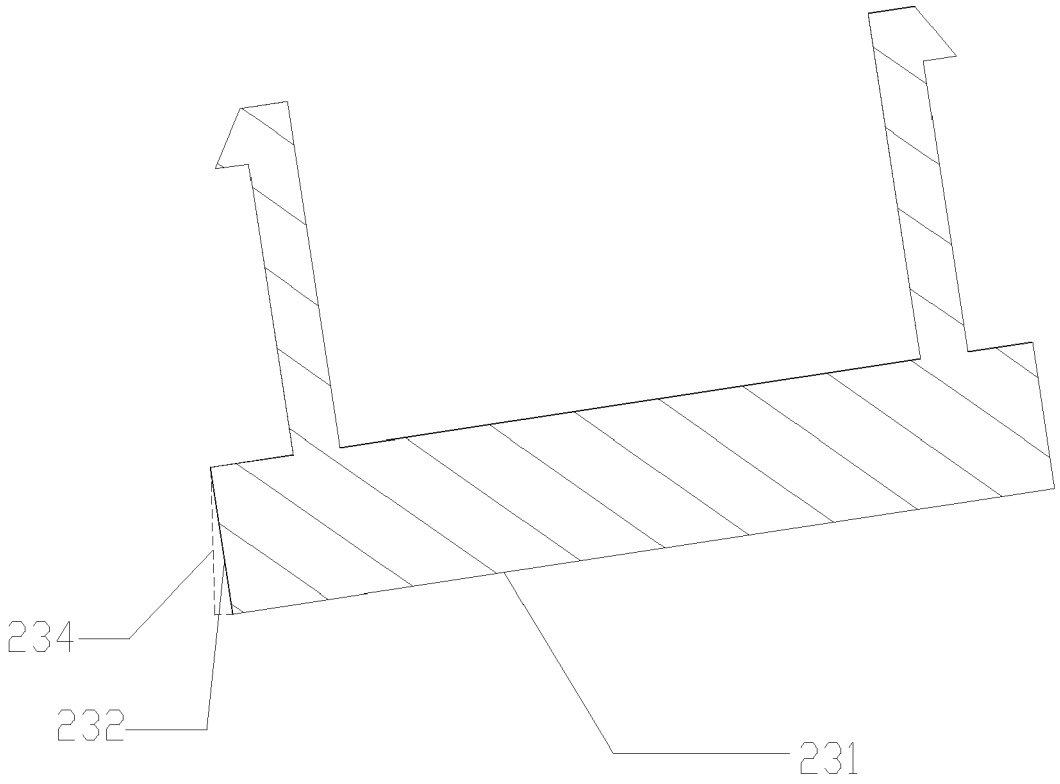

FIG. 6

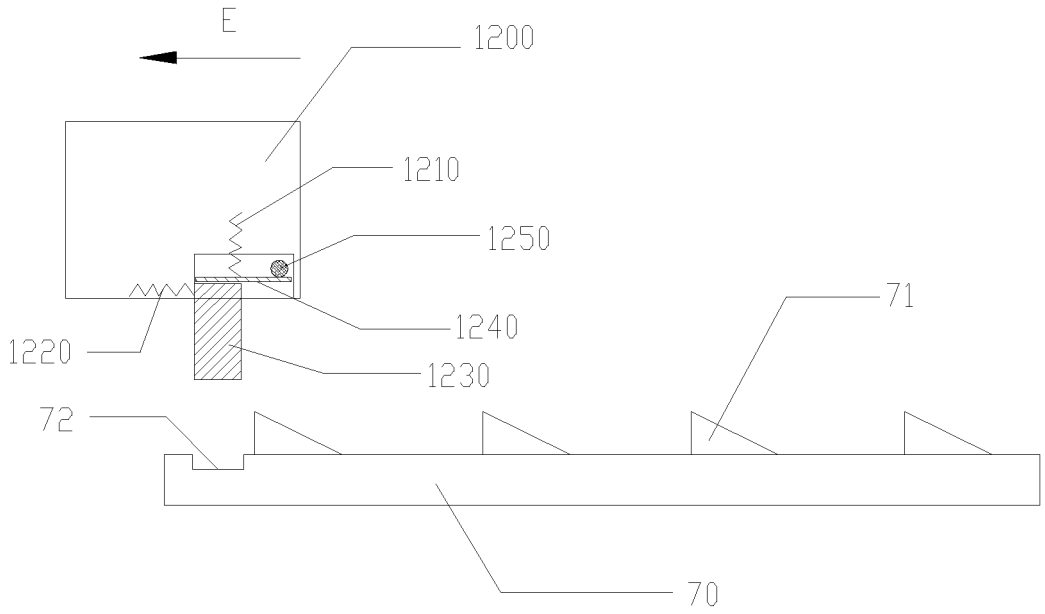
E
1200
1210
1250
1240
1220
1230
71
72
70

FIG. 7

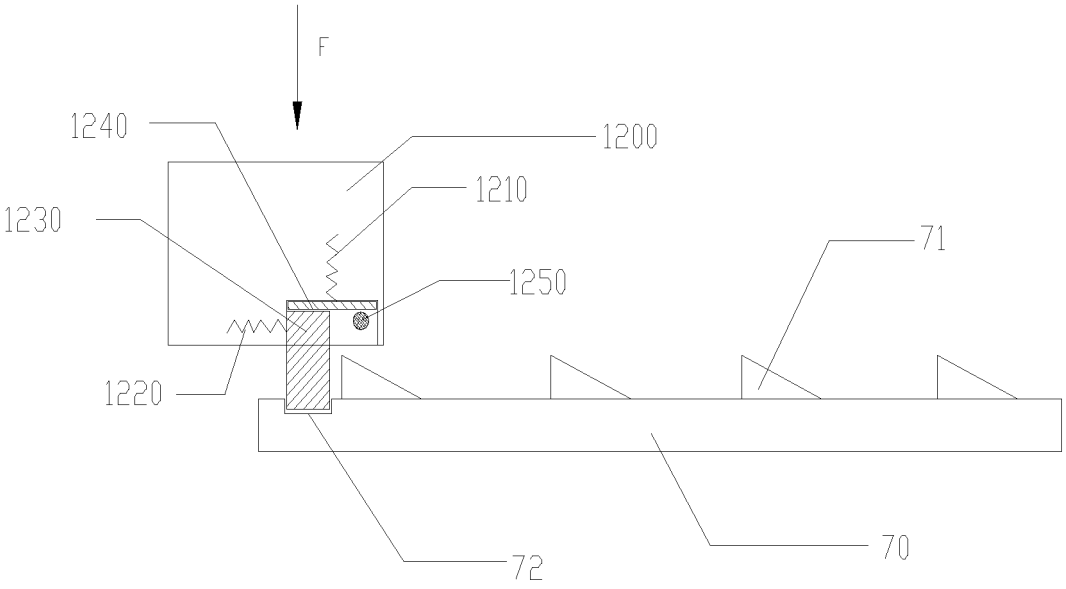
F
1240
1200
1210
1230
71
1250
1220
72
70

FIG. 8

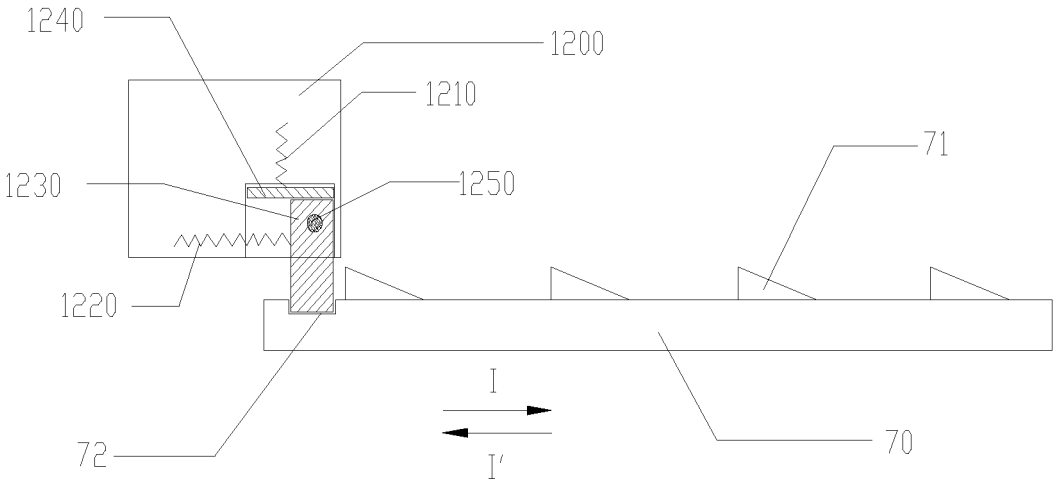
1240
1200
1210
71
1230
1250
1220
I
I'
72
70

FIG. 9

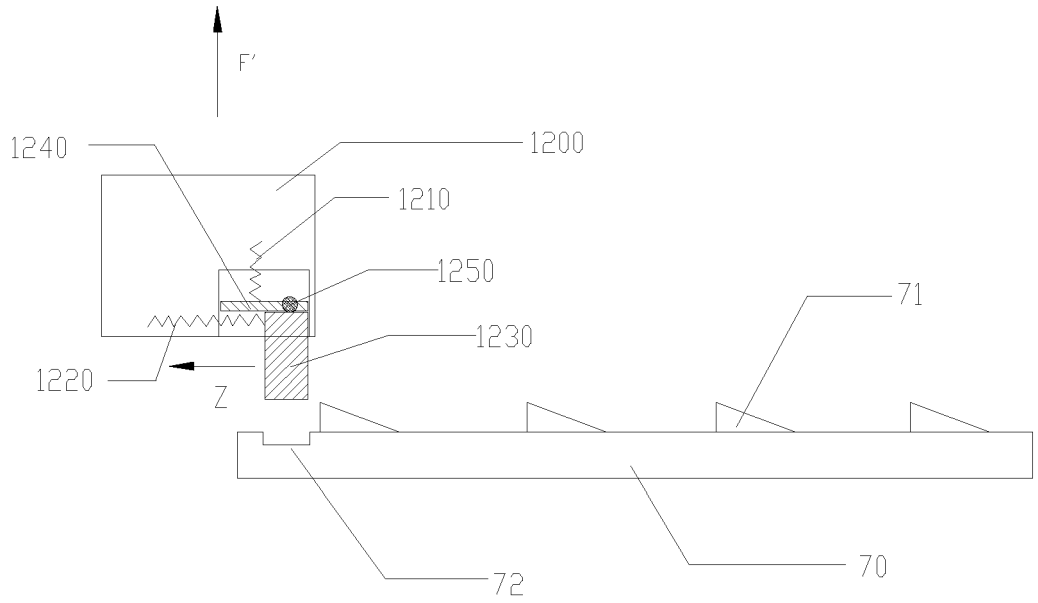
F'
1240
1200
1210
1250
71
1230
1220
Z
72
70

FIG. 10

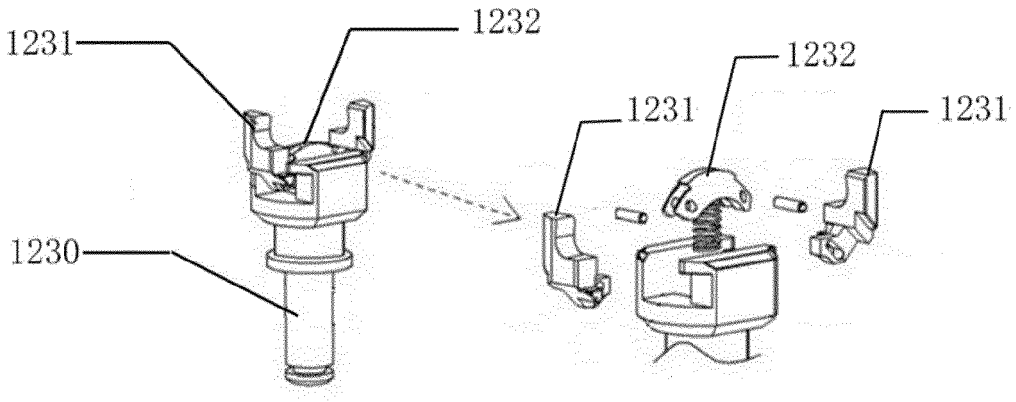

FIG. 11

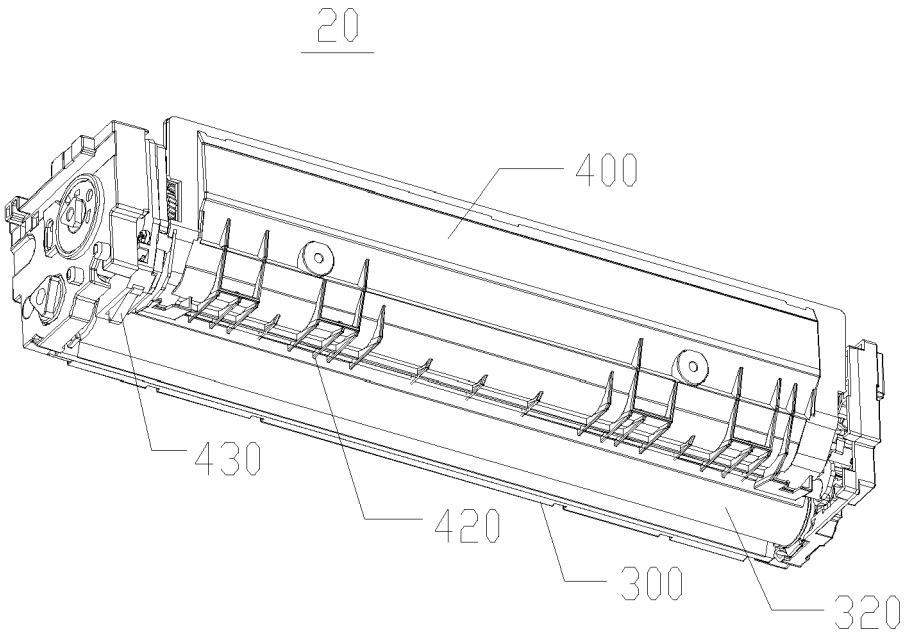

FIG. 12

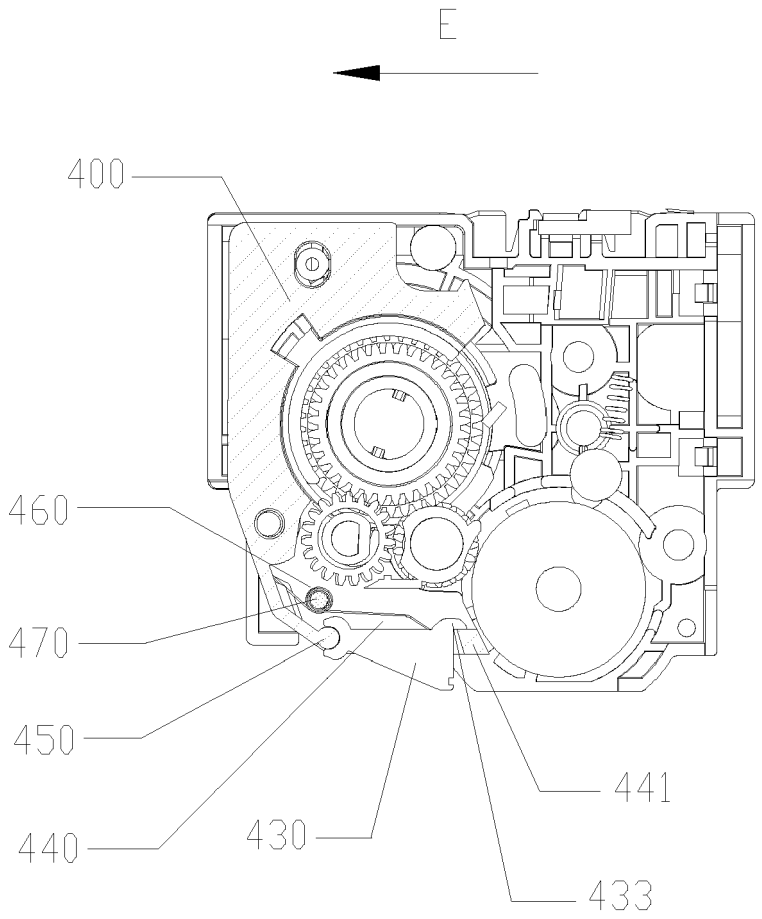

FIG. 13

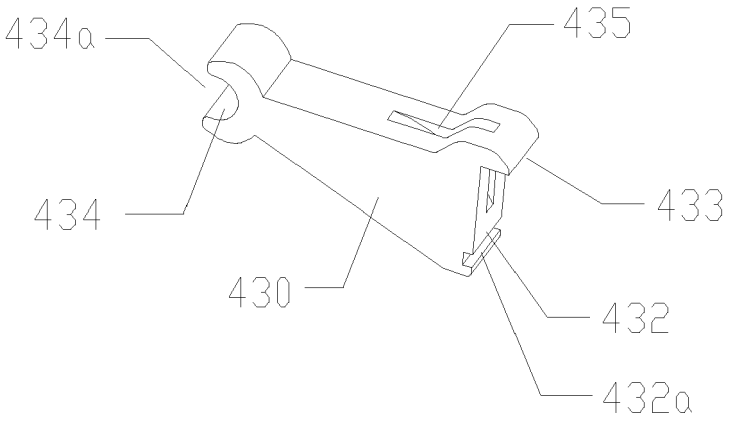

FIG. 14

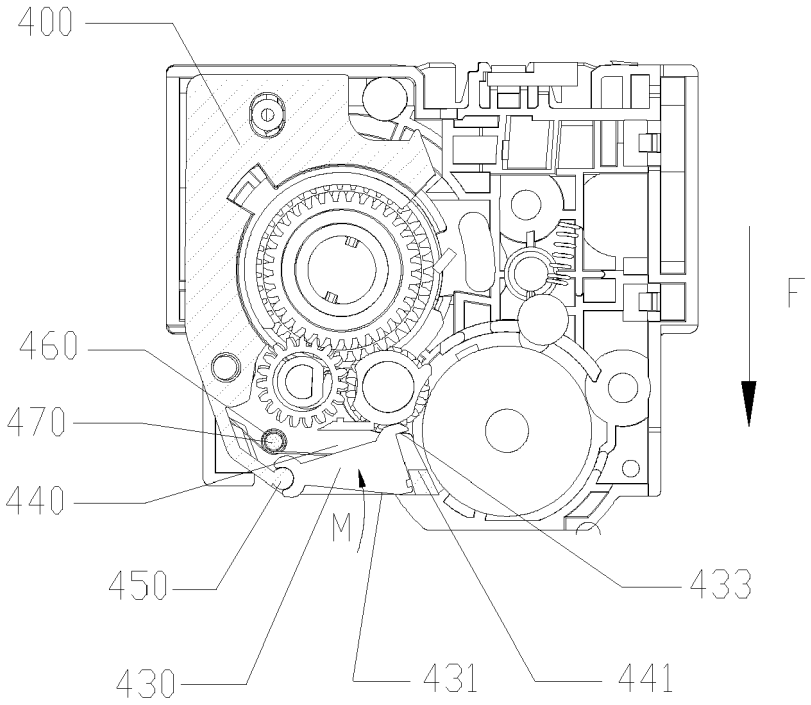

FIG. 15

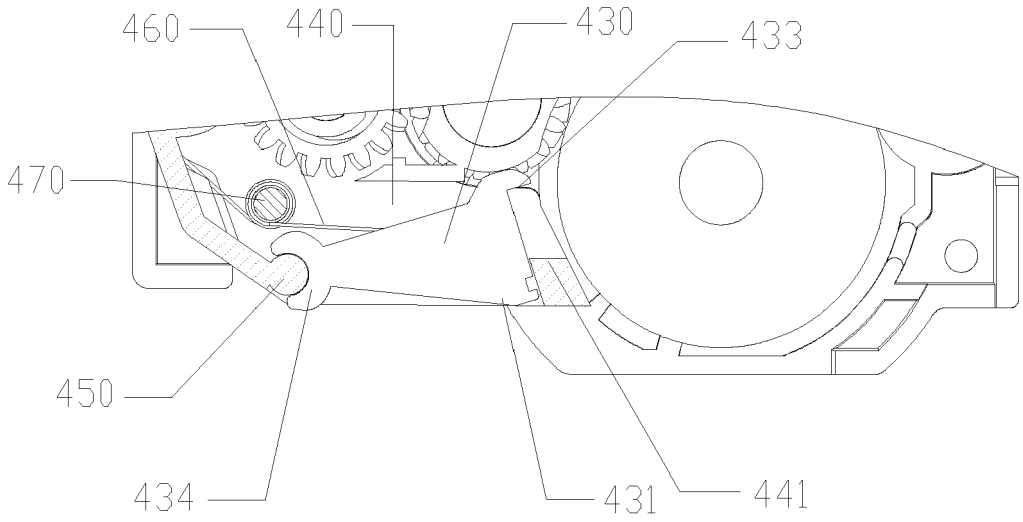

FIG. 15a

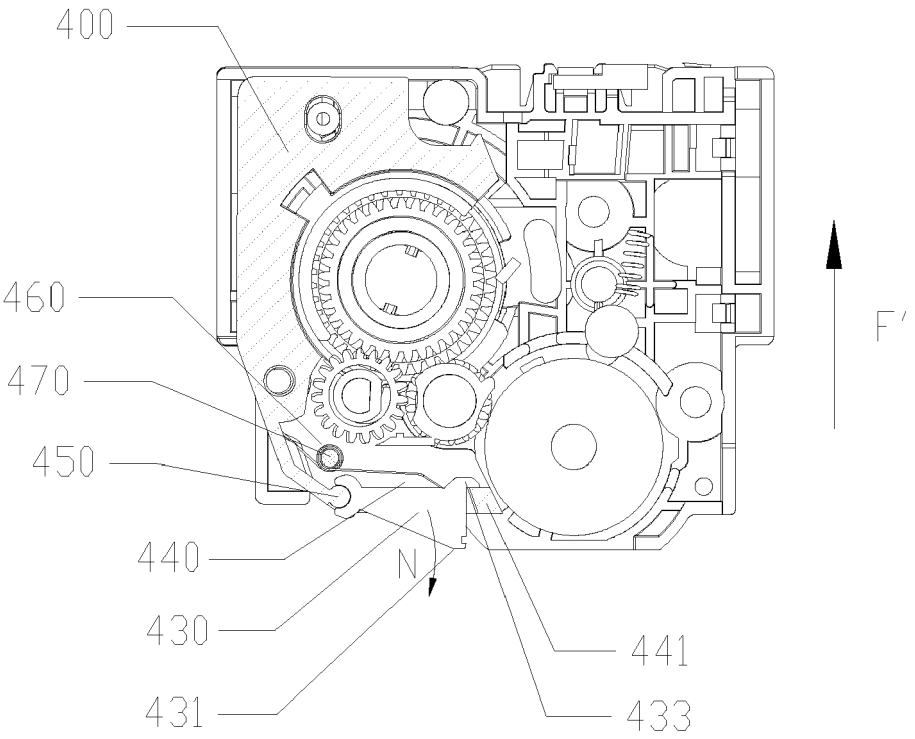

FIG. 16

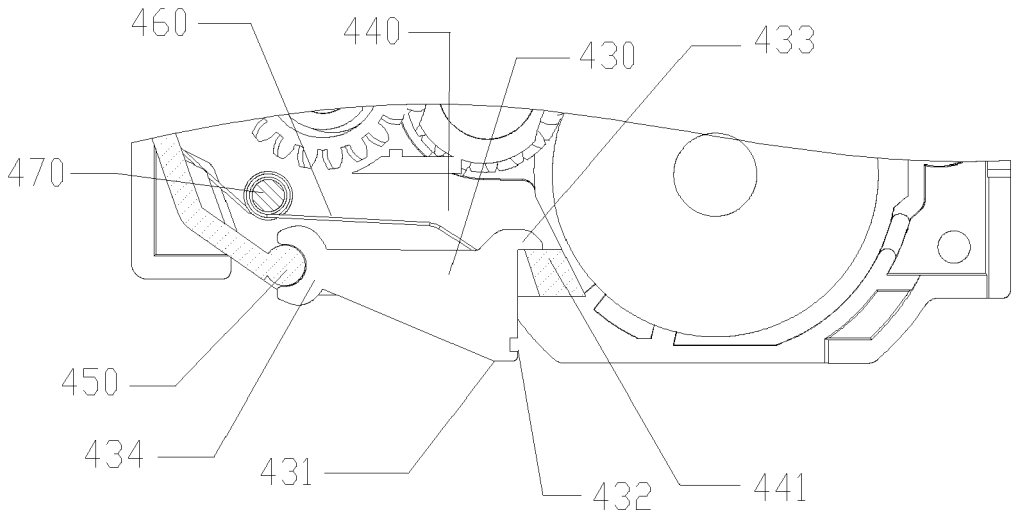

FIG. 16a

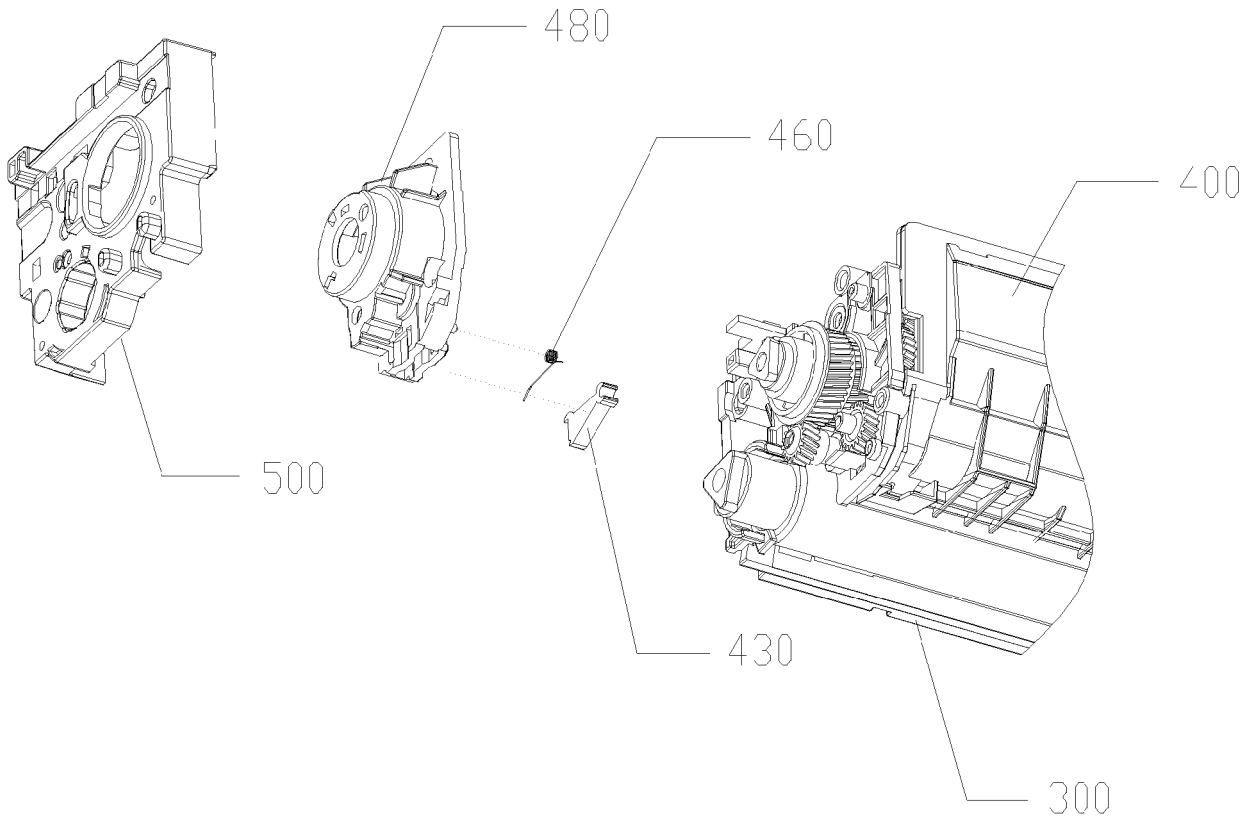

FIG. 17

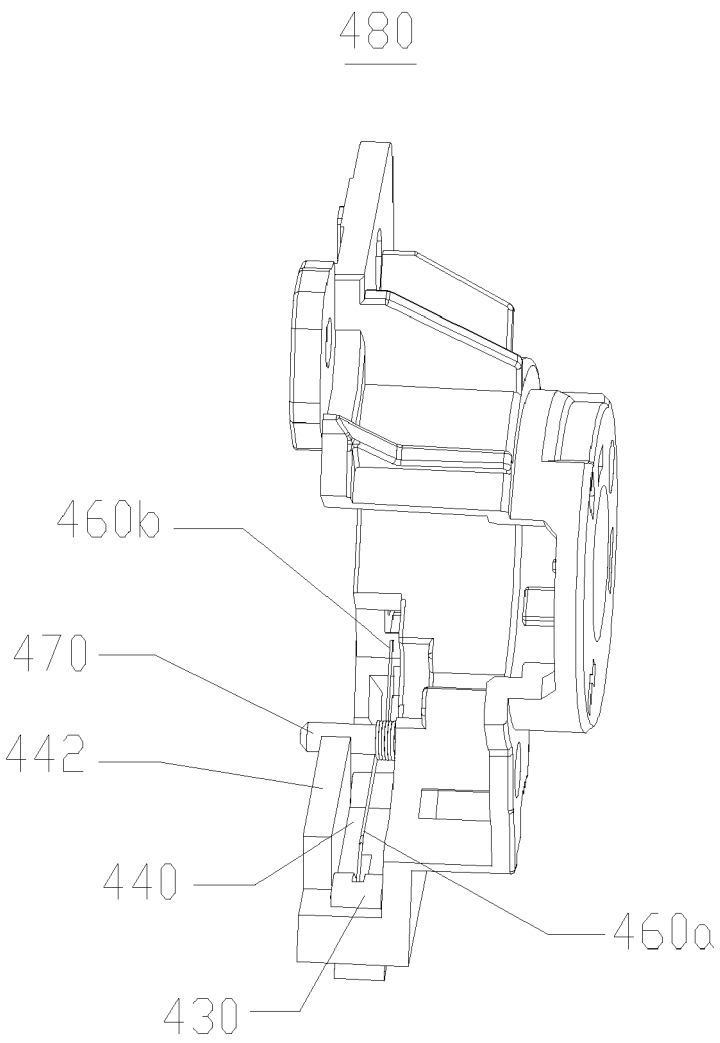

FIG. 18

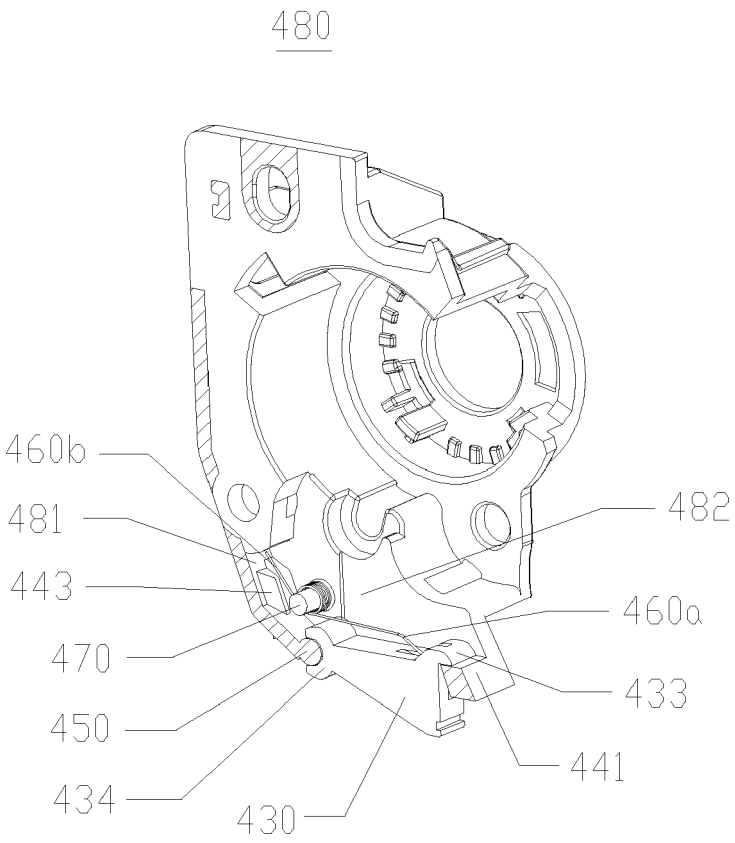

FIG. 19

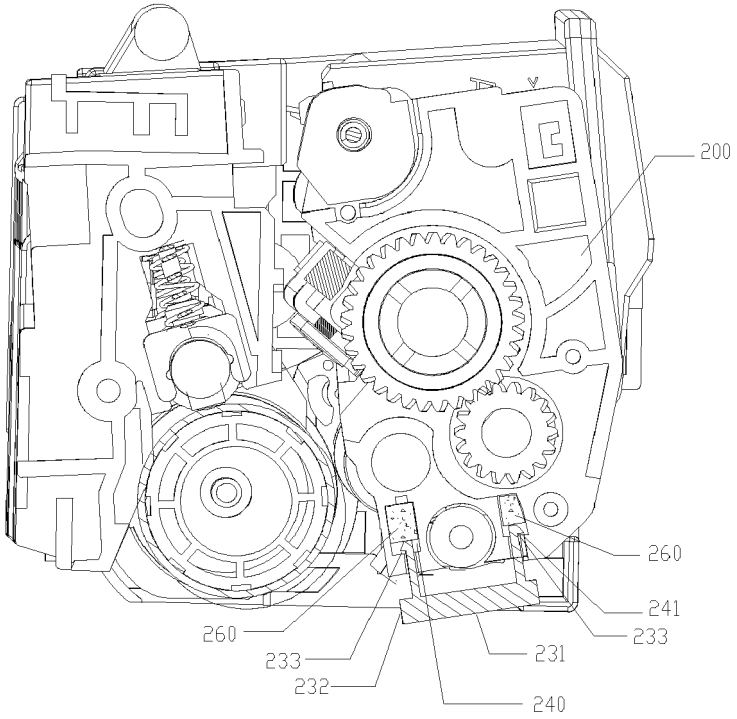
200
260
241
233
231
260
233
232
240

FIG. 20

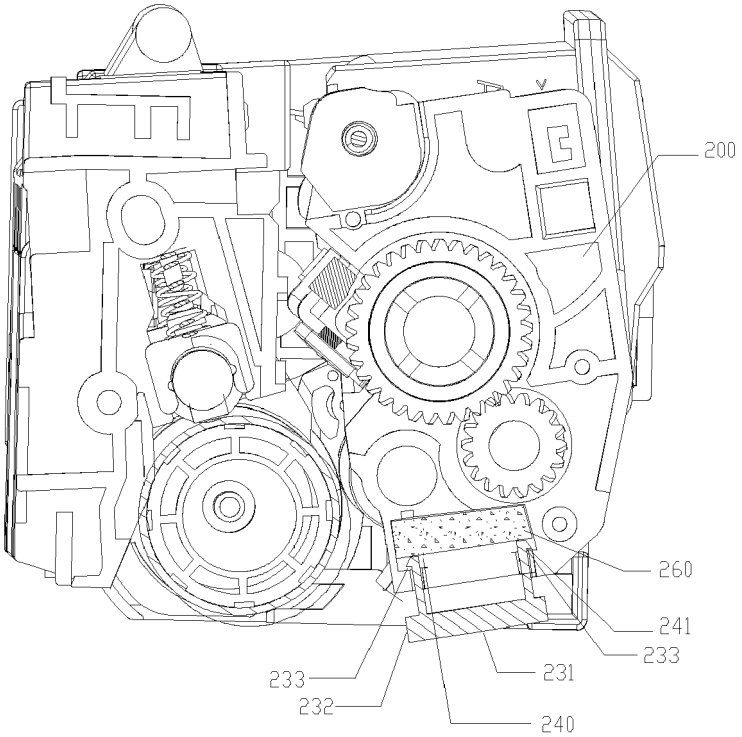
200
260
241
233
231
233
232
240

FIG. 21

REFERENCES CITED IN THE DESCRIPTION

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