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(54) **DEVELOPER CARTRIDGE WITH COUNTING MECHANISM**

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(63) Continuation of application No. 13/147,777, filed as application No. PCT/CN2010/071430 on Mar. 30, 2010, now Pat. No. 8,655,223.

(30) **Foreign Application Priority Data**

Aug. 5, 2009 (CN) 2009 1 0109292

(51) **Int. Cl.**
G03G 15/08 (2006.01)
G03G 15/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/0896*** (2013.01); *G03G 15/55* (2013.01); *G03G 15/553* (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/0896
USPC 399/12, 119, 106
See application file for complete search history.

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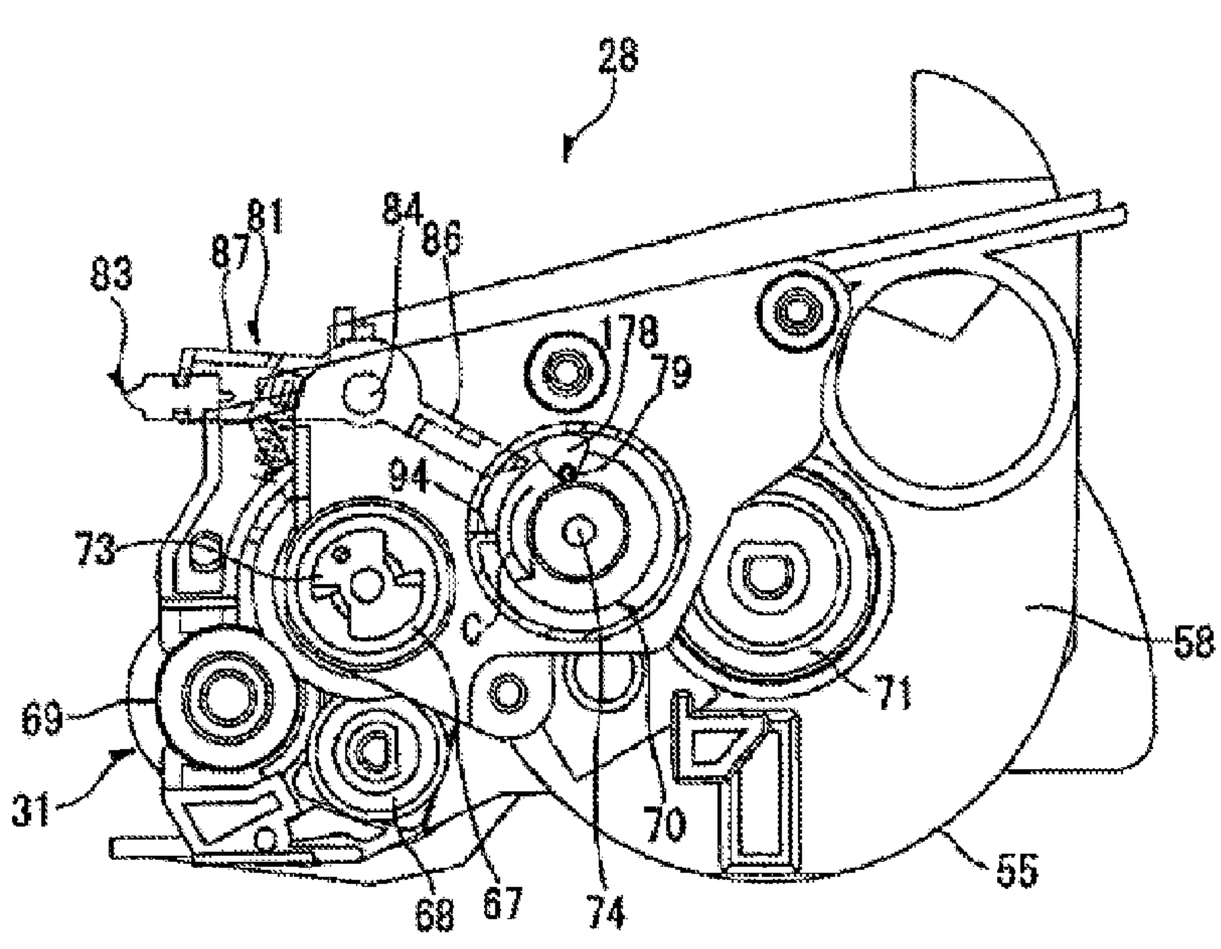
(57) **ABSTRACT**

The invention provides a developer cartridge with a counting mechanism. The developer cartridge comprises a developer and the counting mechanism, wherein the counting mechanism is provided with protrusions which come in contact with a contact lever on an electronic photographing device so as to count the developer cartridge; and each protrusion has a first position and a second position in the direction perpendicular to a side wall of the developer cartridge, and is, in the first position, in contact with the contact lever, but is not, in the second position, in contact with the contact lever. The working principle of the developer cartridge adopting the counting mechanism is greatly different from the prior art. Therefore, the structure of the counting mechanism of the developer cartridge is simpler and more convenient and reliable; the production precision and the production cost are reduced; and the market competitiveness of the developer cartridge is improved.

17 Claims, 17 Drawing Sheets



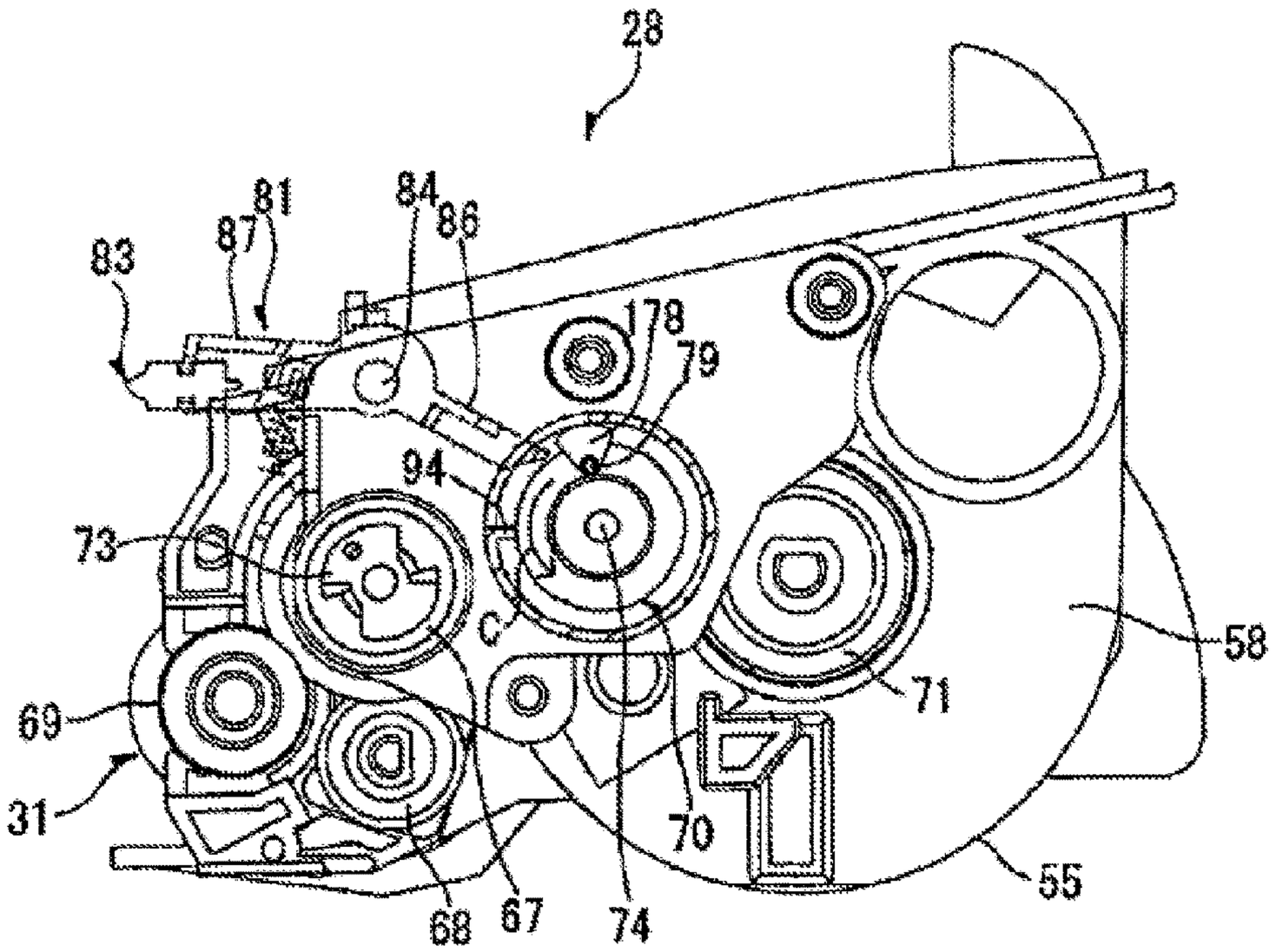


Fig. 1

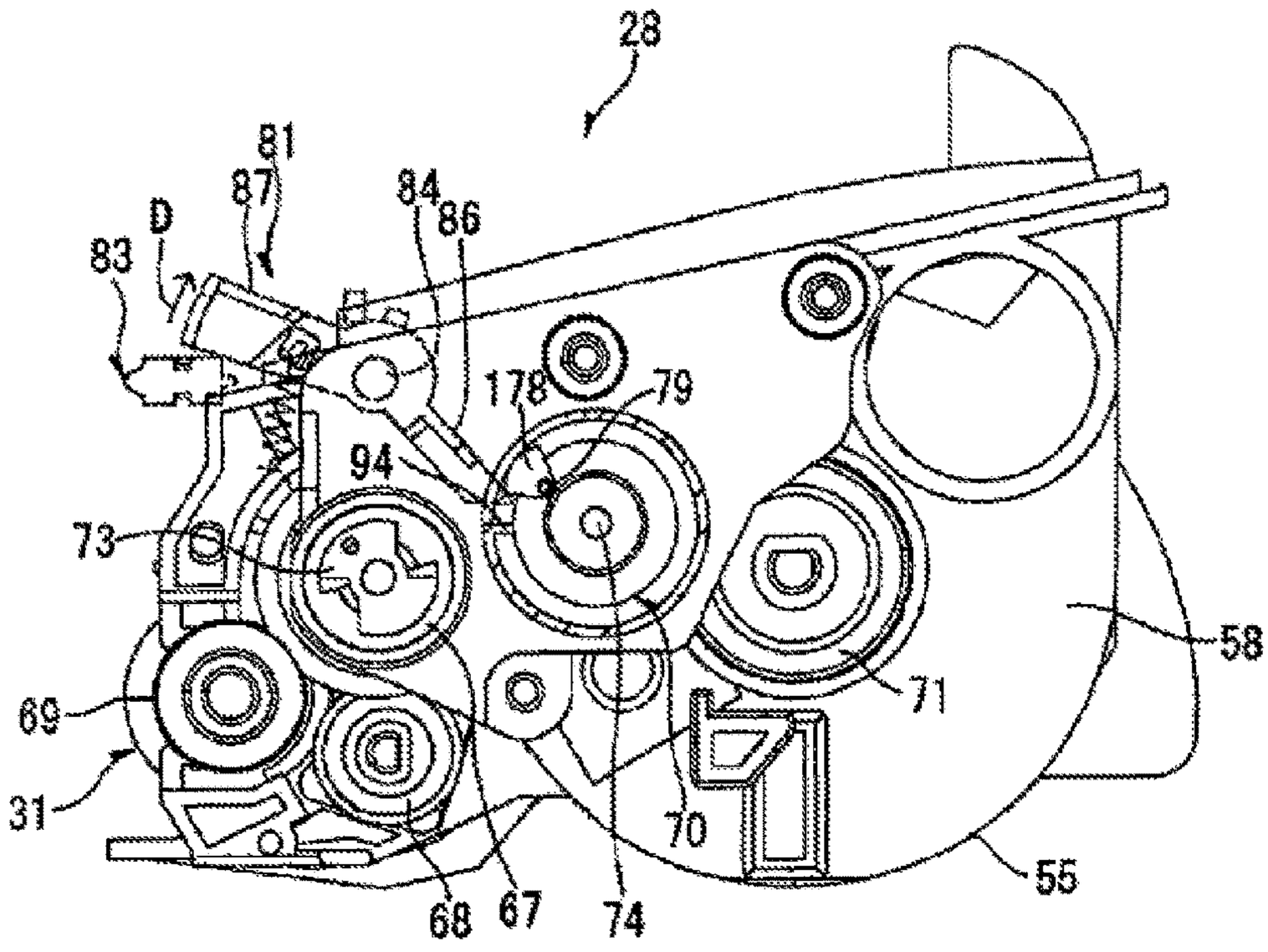


Fig. 2

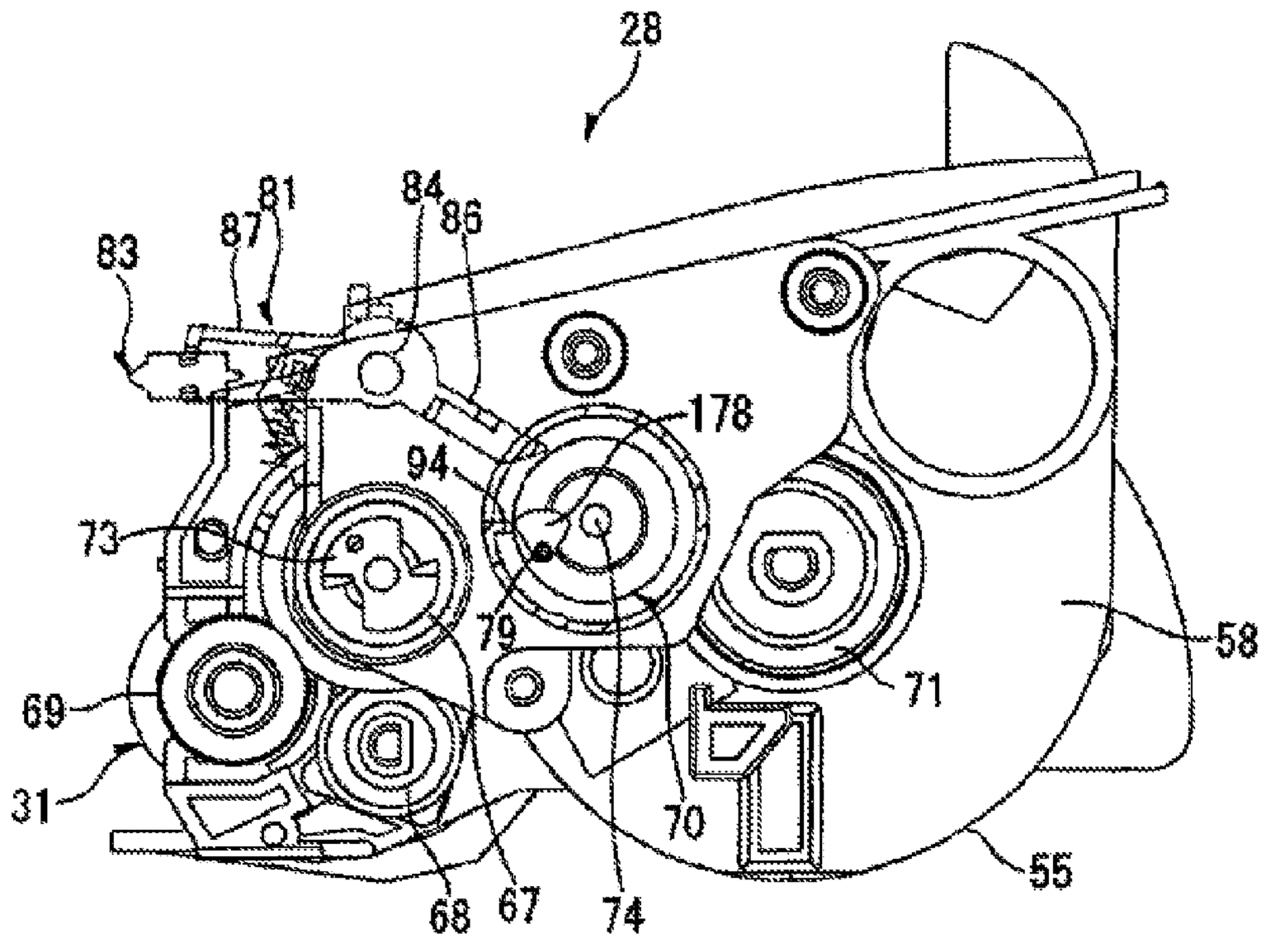


Fig. 3

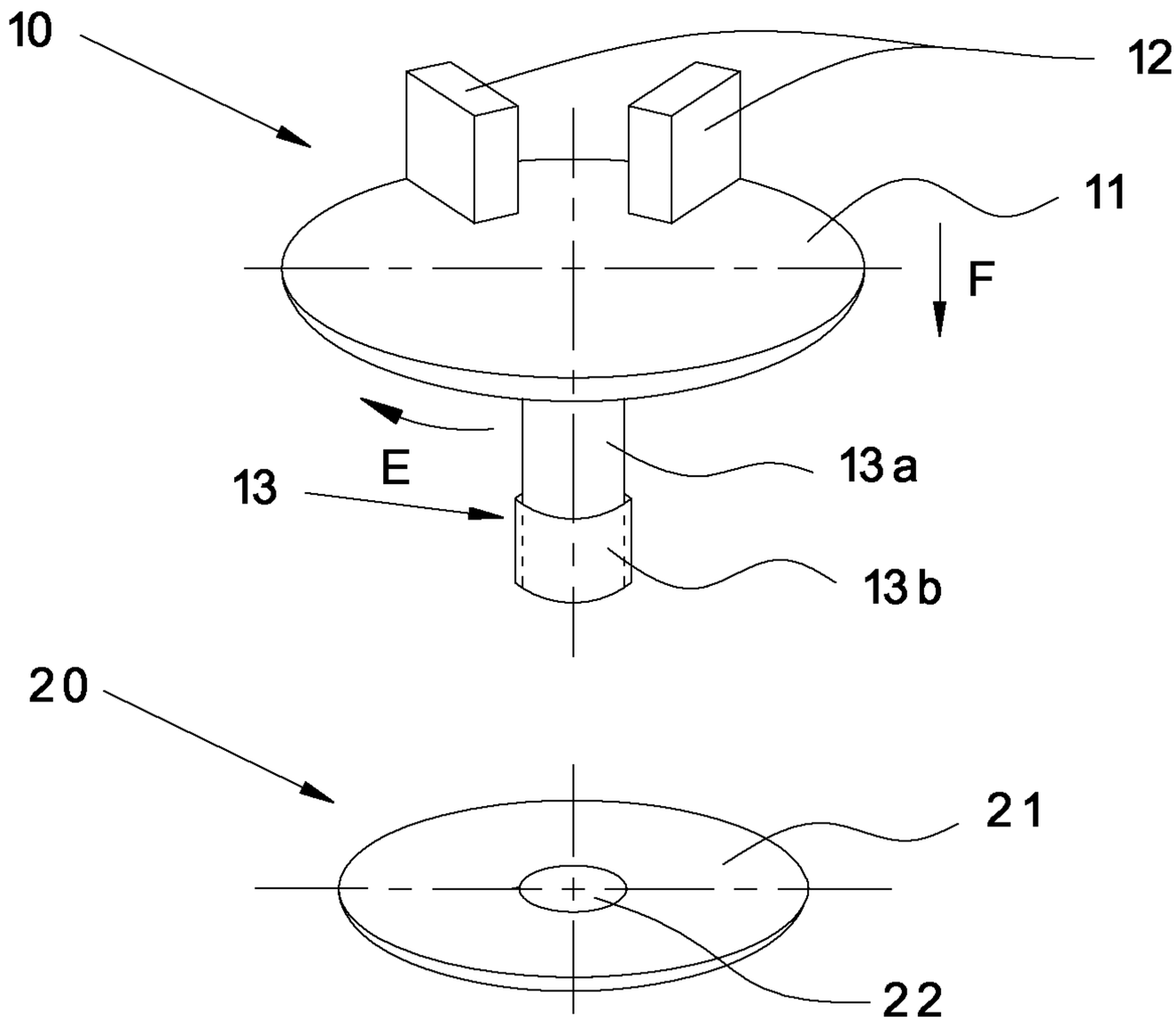


Fig. 4

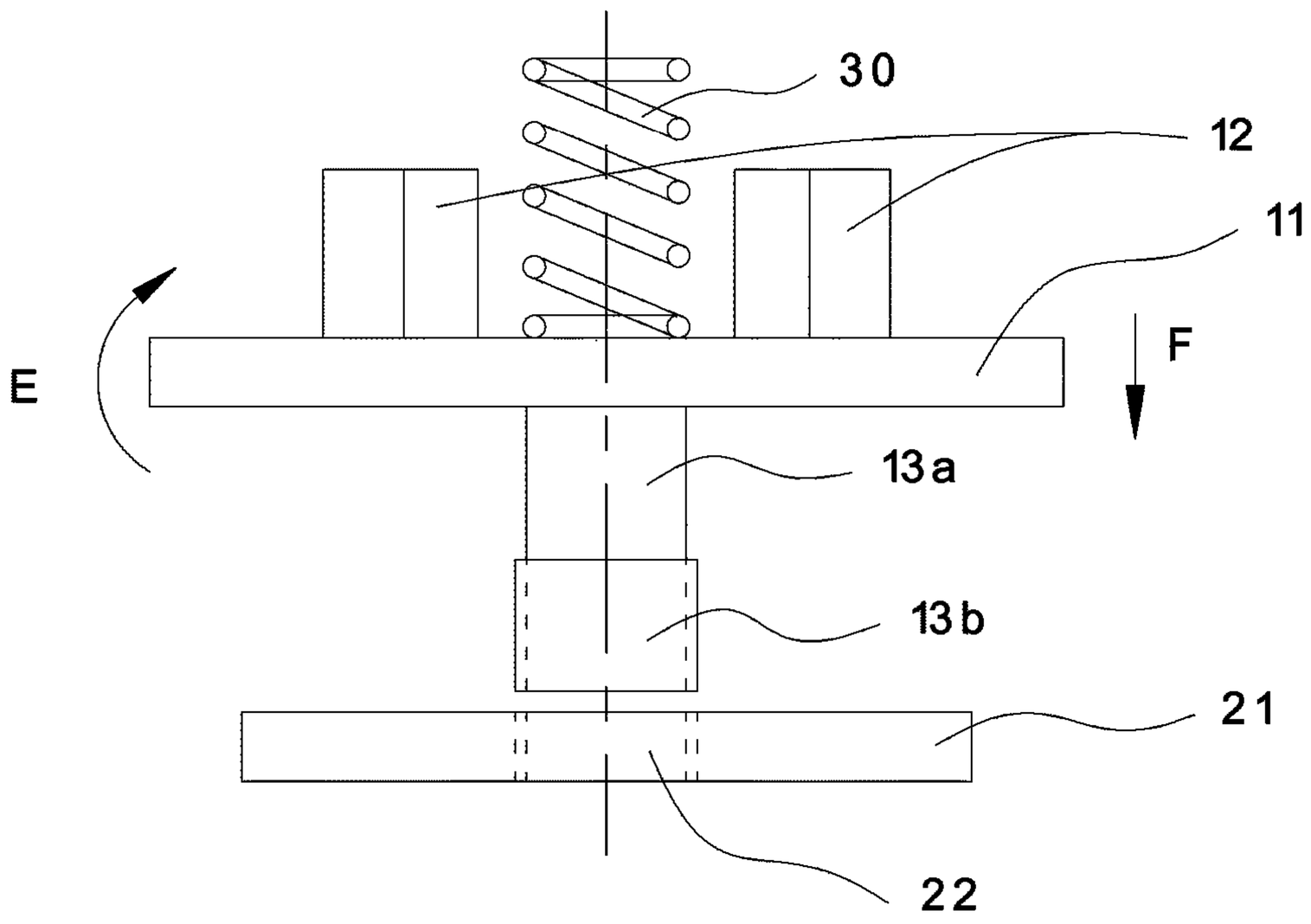


Fig. 5

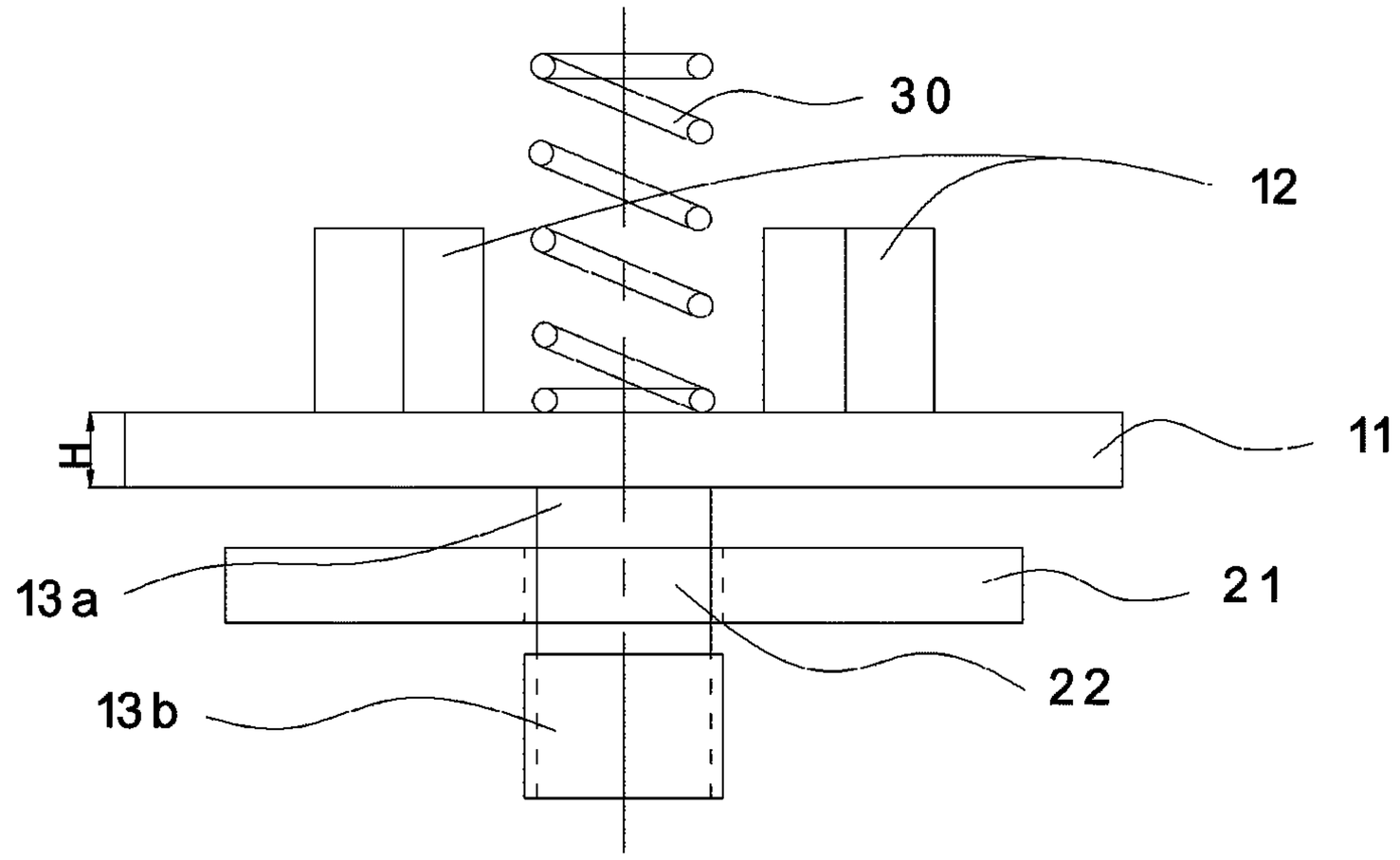


Fig. 6

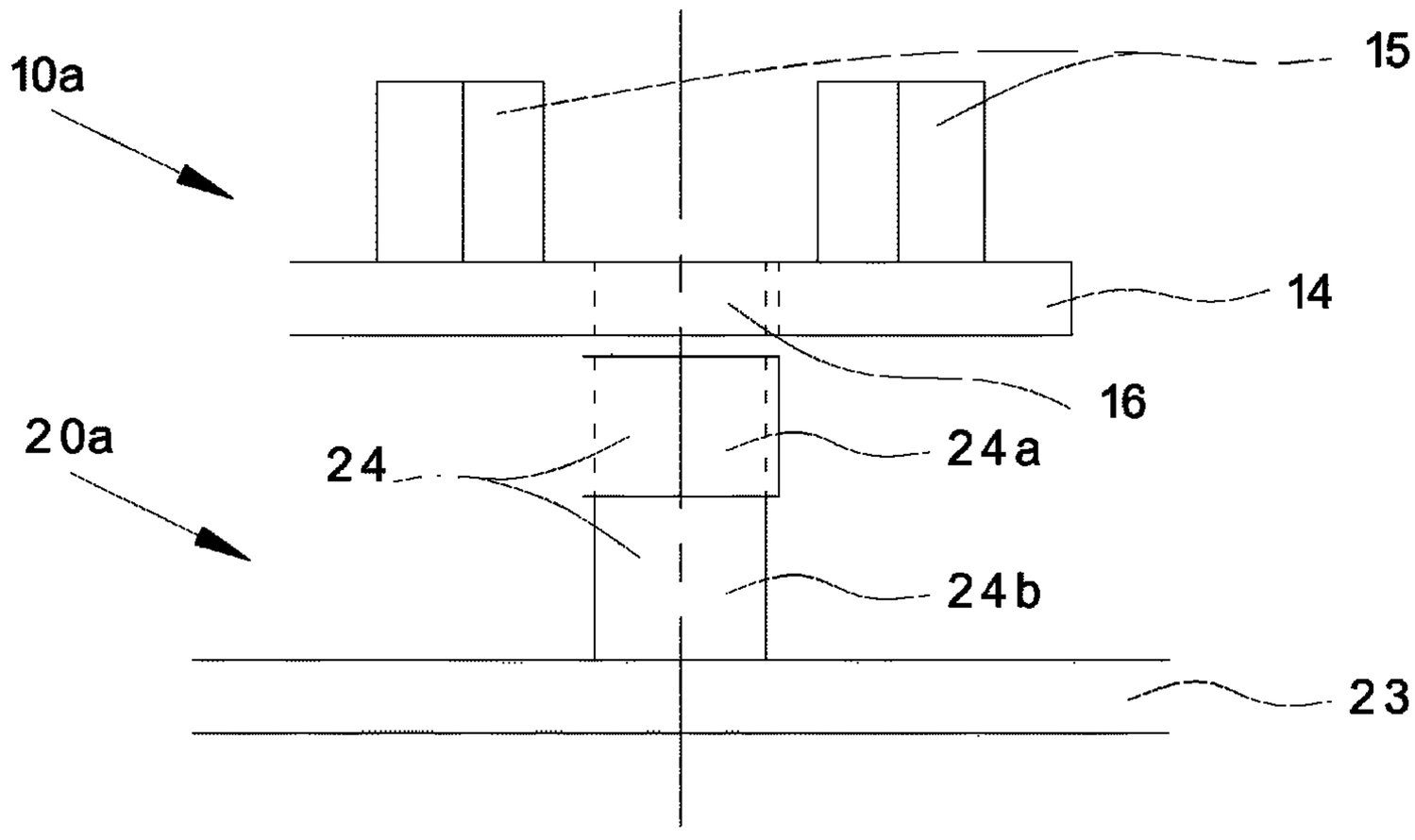


Fig. 7

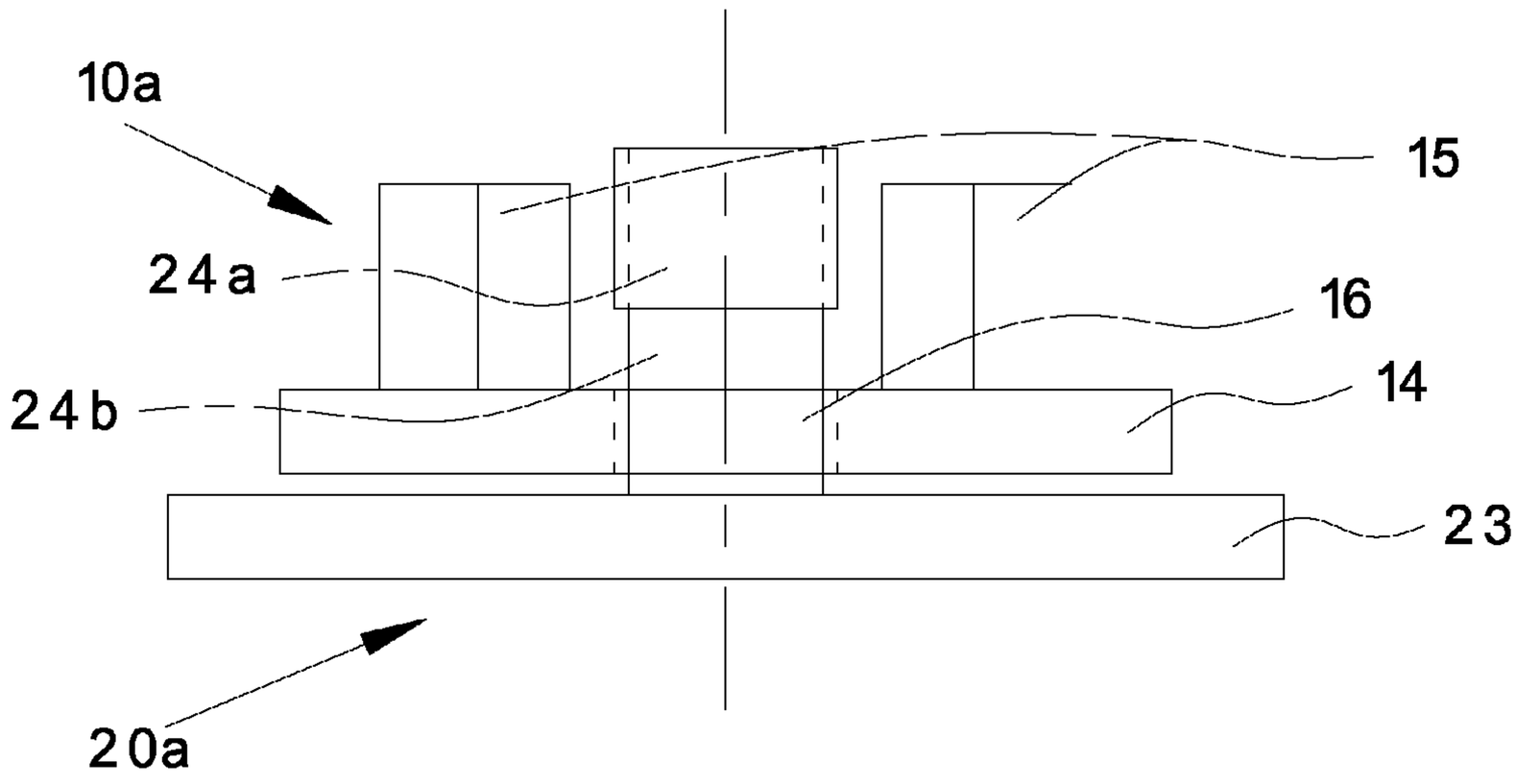


Fig. 8

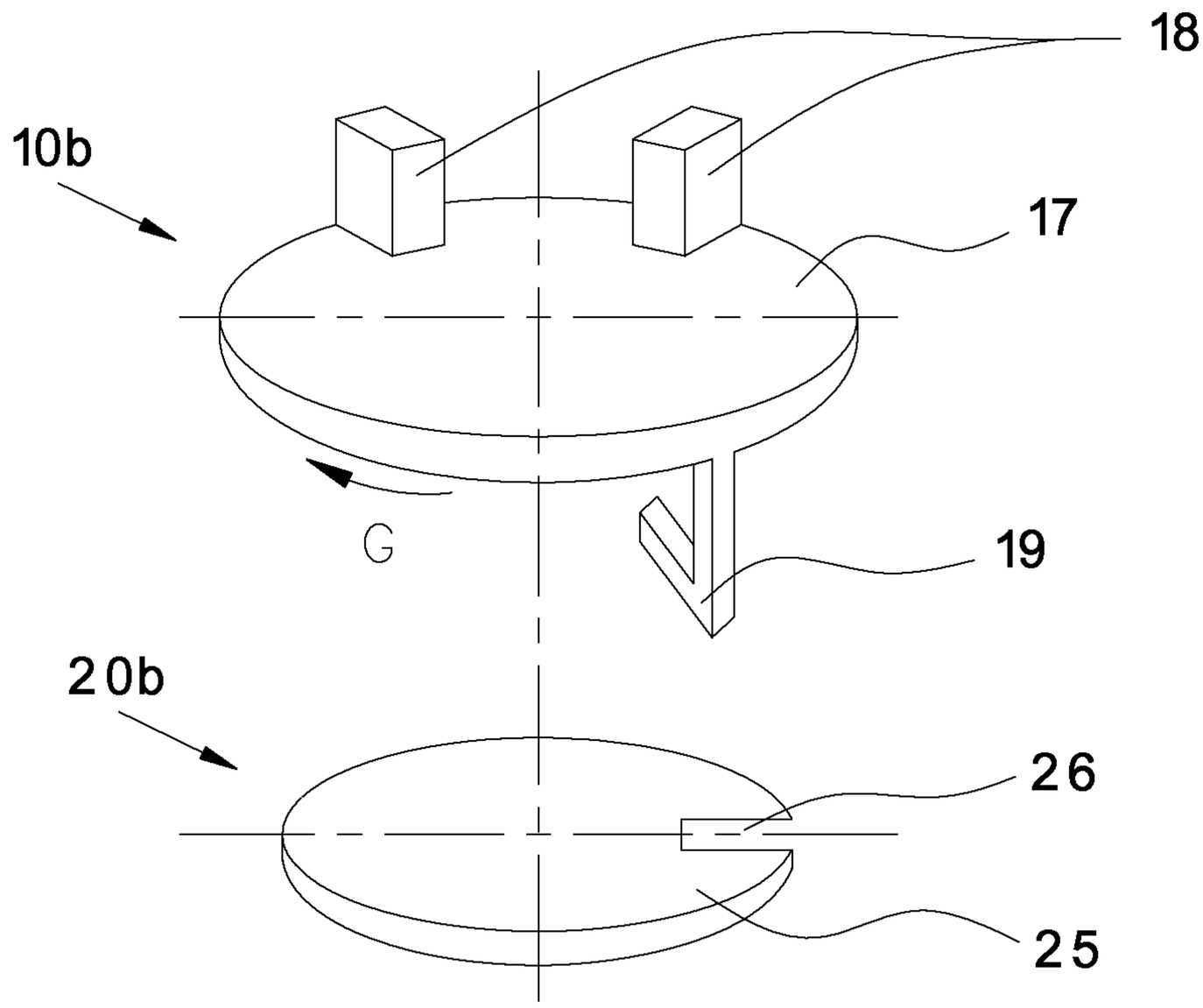


Fig. 9

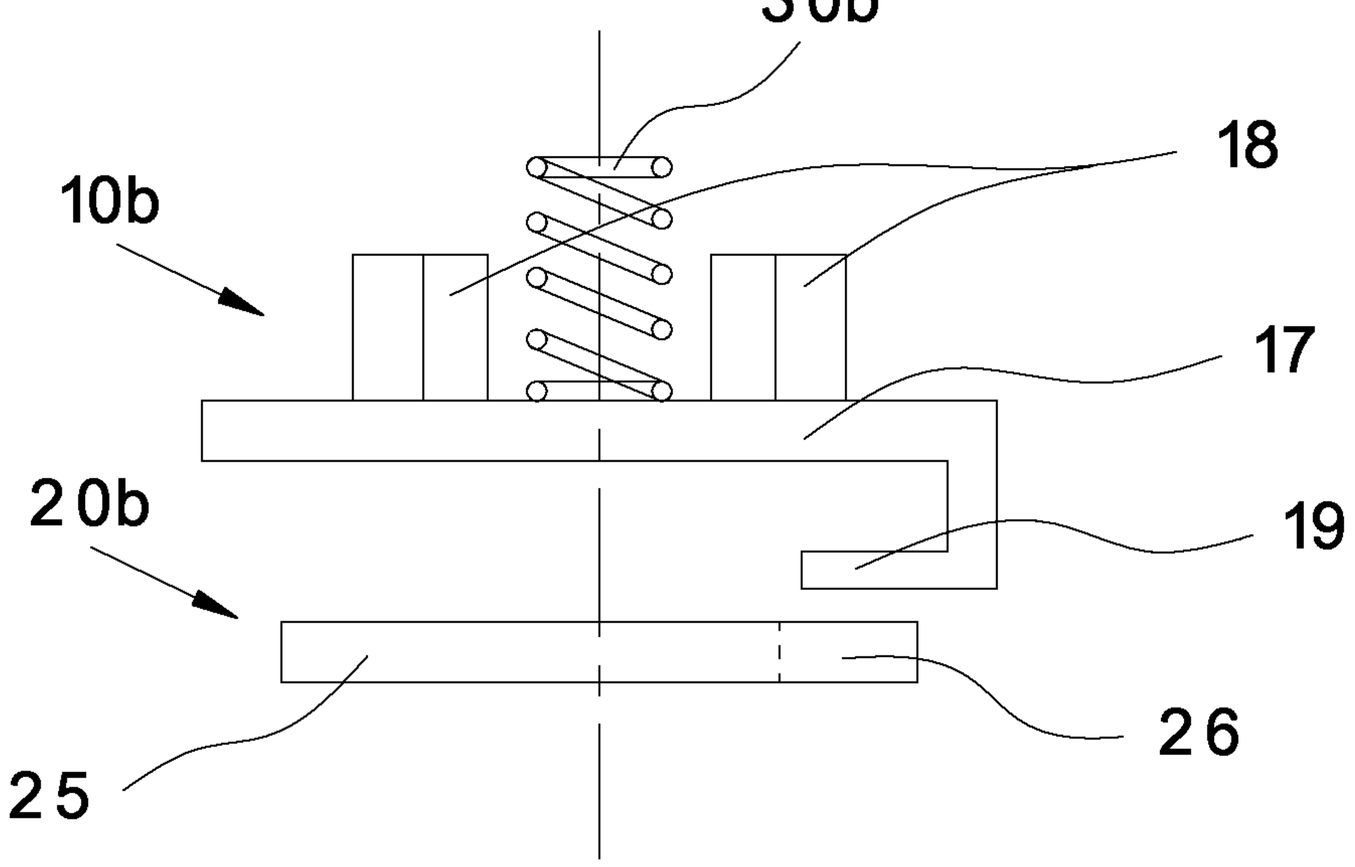


Fig. 10

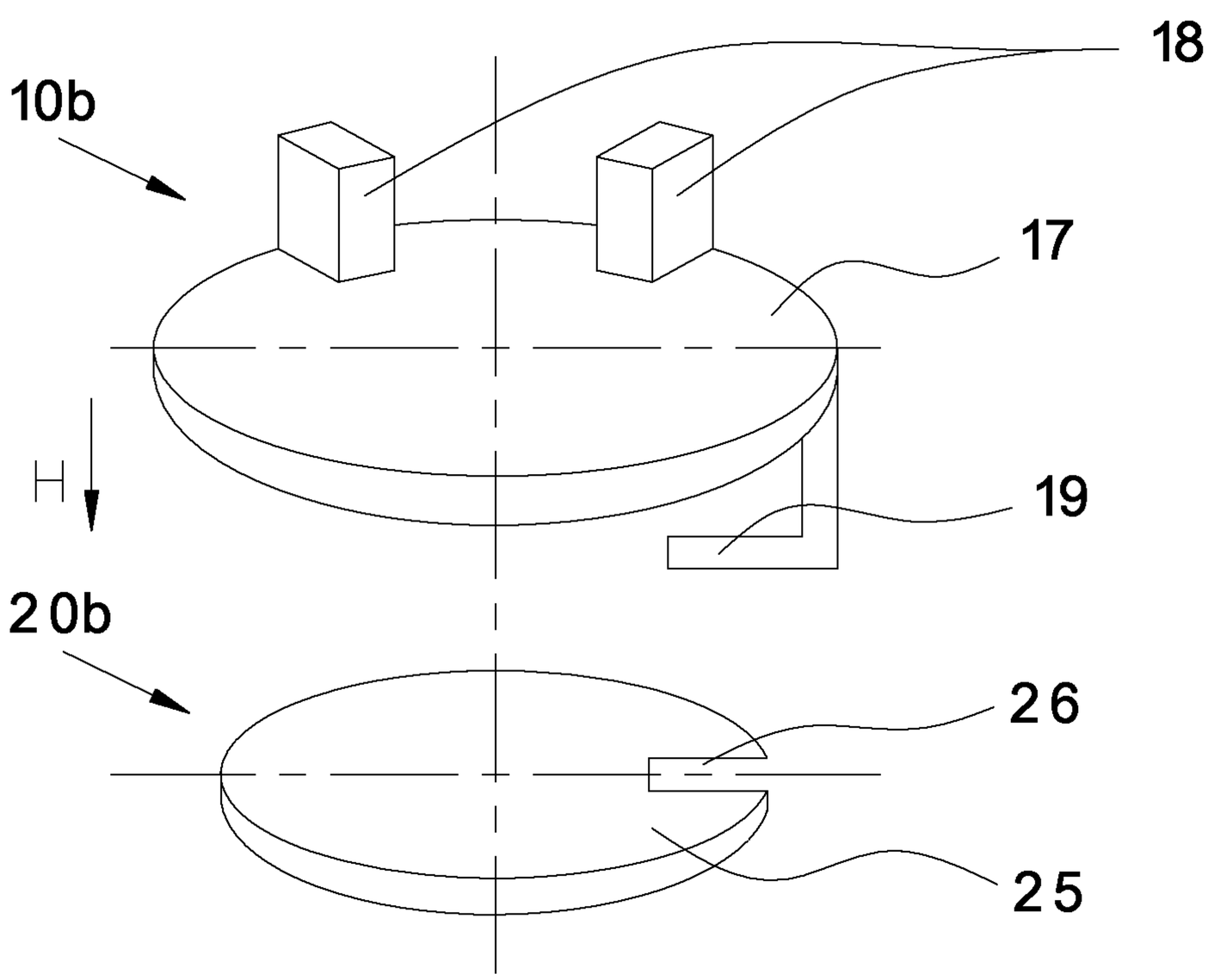


Fig. 11

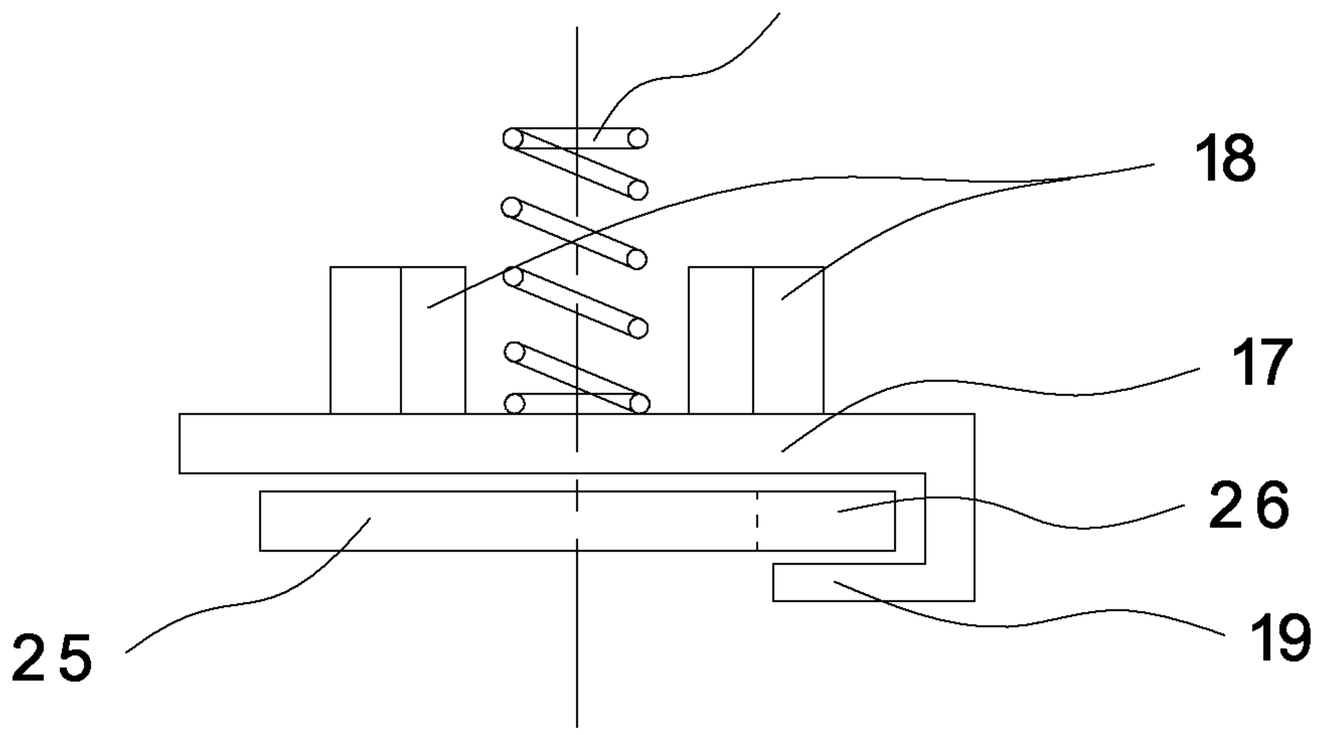


Fig. 12

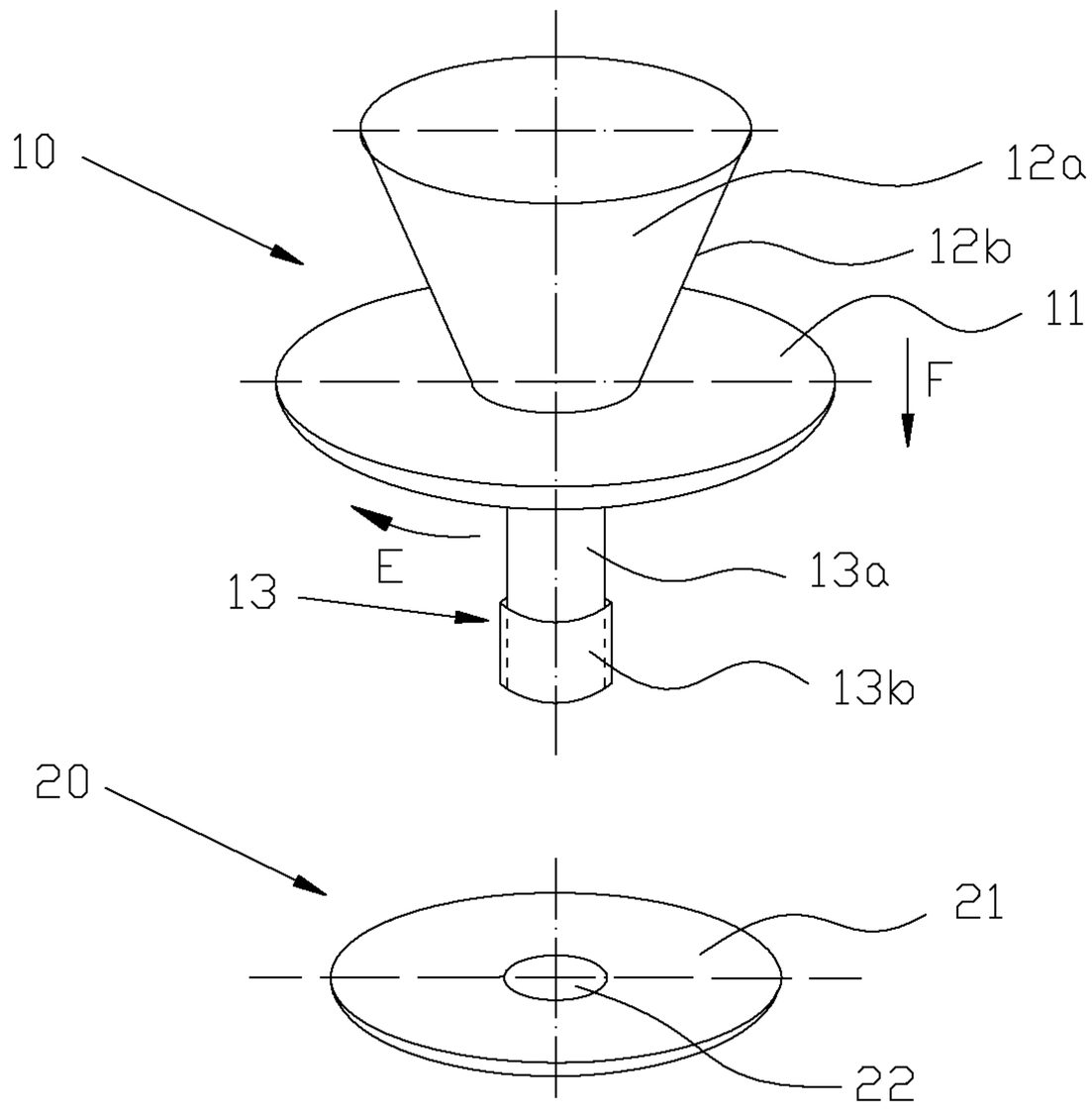


Fig. 13

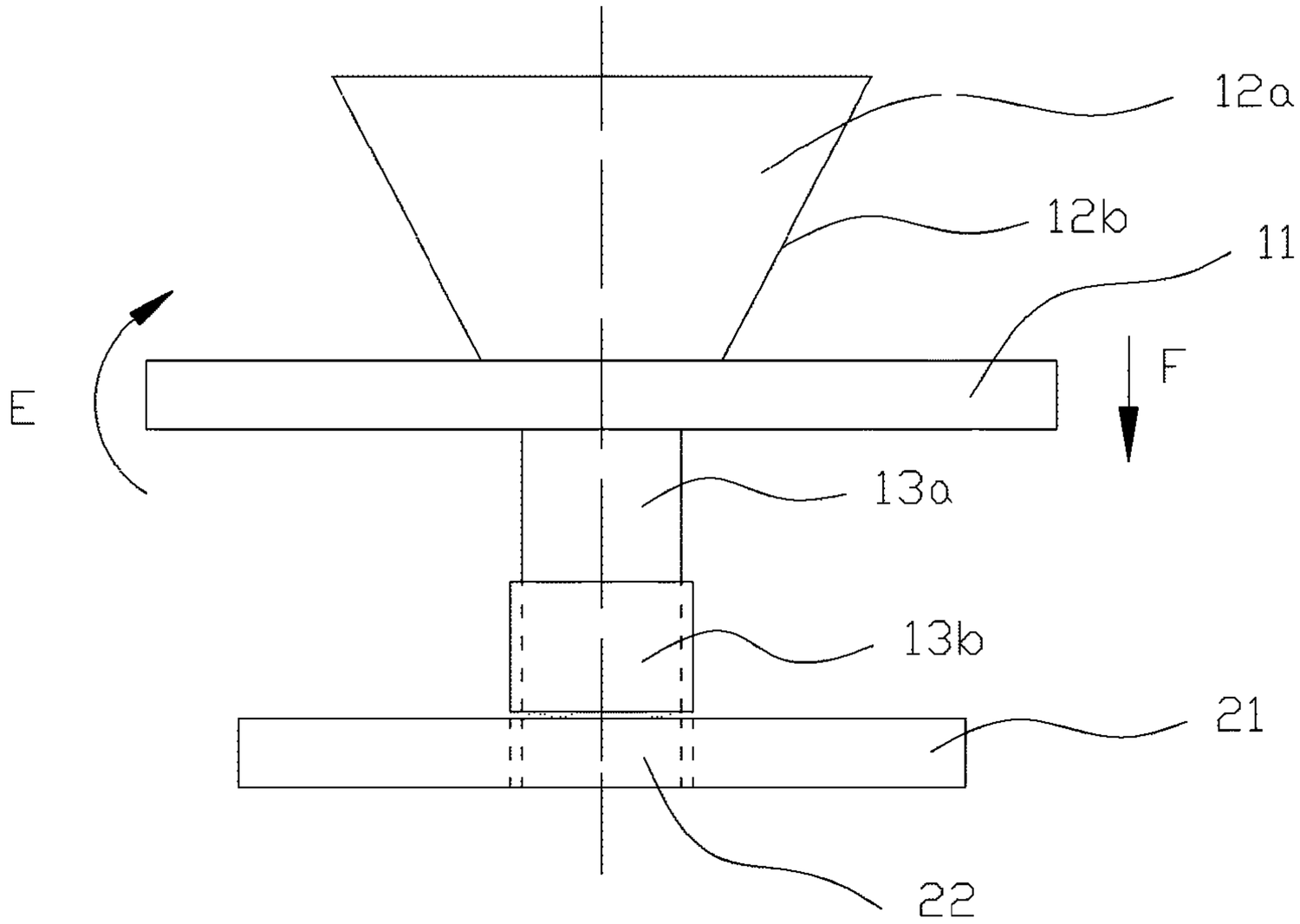


Fig. 14

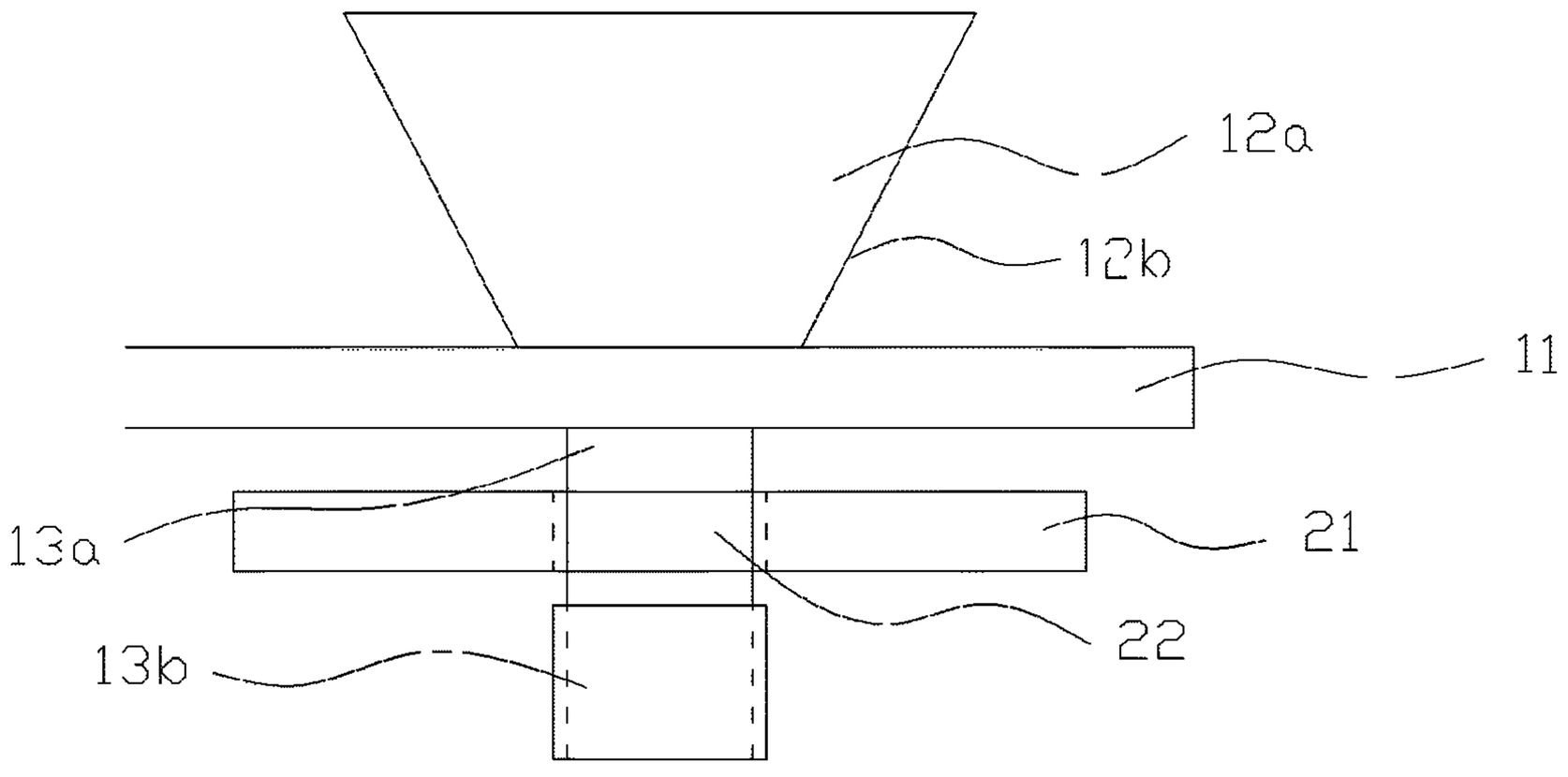


Fig. 15

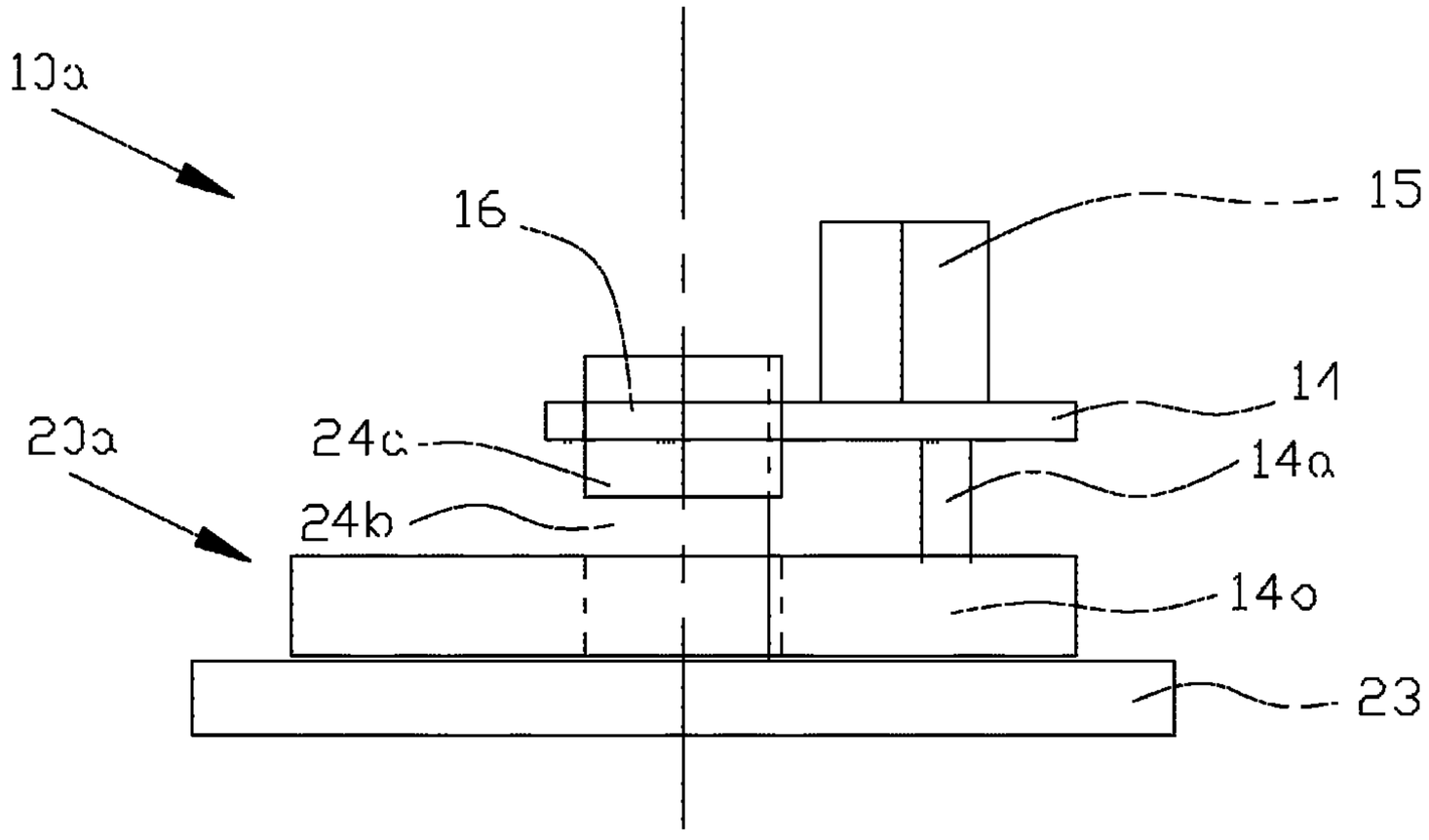


Fig. 16

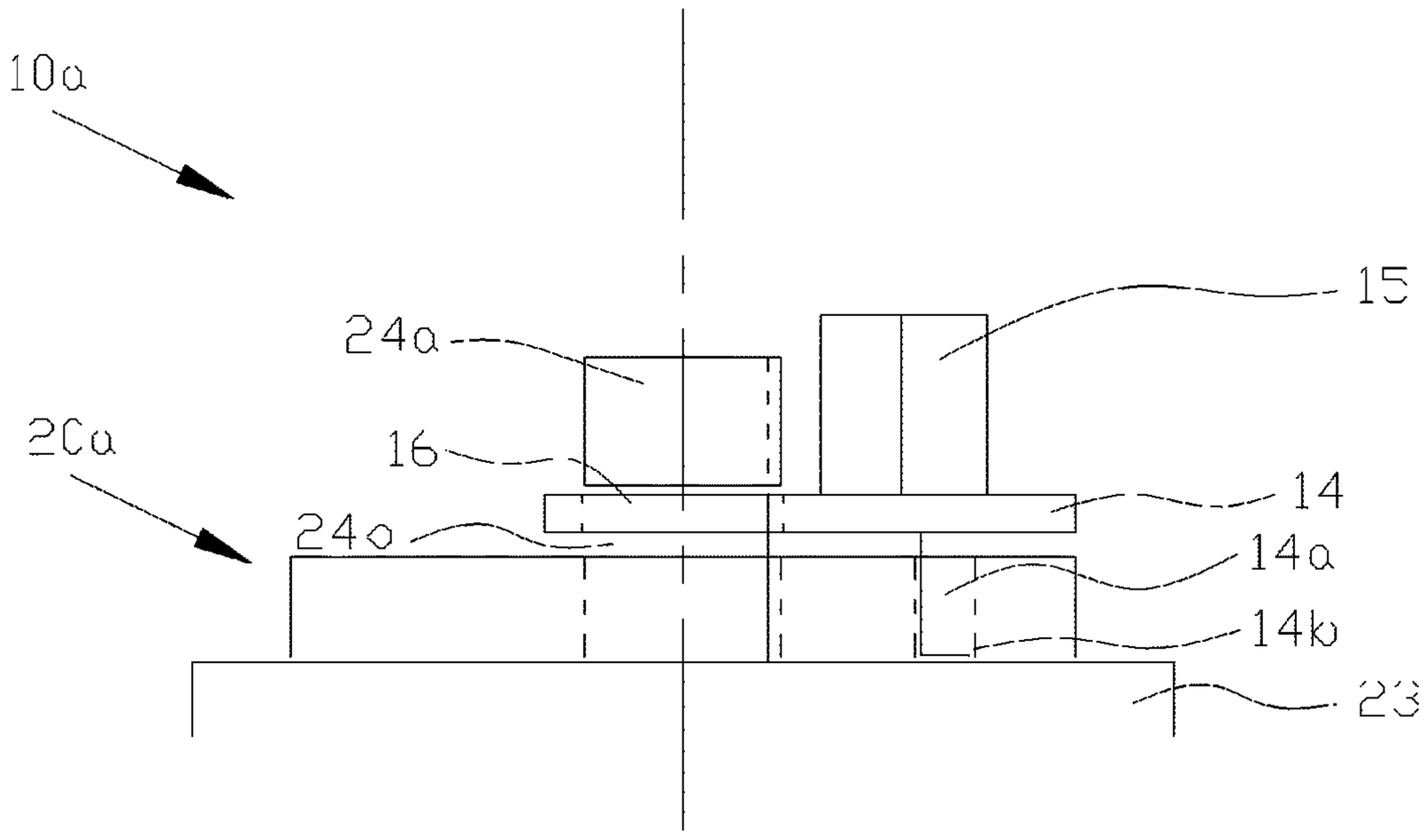


Fig. 17

DEVELOPER CARTRIDGE WITH COUNTING MECHANISM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 13/147,777, filed 3 Aug. 2011, which is a US National Stage of International Application No. PCT/CN2010/071430, filed 30 Mar. 2010, which claims the benefit of CN 200910109292.1, filed 5 Aug. 2009, each herein fully incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a developer cartridge with a counting mechanism.

2. Description of Related Art

The invention relates to a developer cartridge which can be detachably mounted on an electronic photographing device such as a laser printer, a duplicating machine and a facsimile machine, wherein a counting mechanism is arranged on the developer cartridge and can be used with a detector on the electronic photographing device to give instruction of whether the developer cartridge is a new developer cartridge to the electronic photographing device which can then restart calculating the service life of the developer cartridge.

As illustrated in FIGS. **1**, **2**, and **3**, the invention relates to a developer cartridge in the prior art, wherein the developer cartridge adopts a conventional counting mechanism.

A toner hopper **55**, a developing component **31**, a toner feeding component (not shown), a stirring component (not shown) and a developer (not shown) are arranged on the developer cartridge **28**, wherein the developing component **31**, the toner feeding component and the stirring component are all fixed on the toner hopper **55**; and the developer is stored in the toner hopper **55**. During the working process of the developer cartridge, firstly, the developer stored in the toner hopper **55** is stirred and conveyed by the stirring component to the toner feeding component; secondly, the received developer is conveyed to the developing component **31** by the toner feeding component; and finally, a developer layer is formed on the surface of the developing component **31** after the developing component **31** receives the developer from the toner feeding component.

A side wall **58** is arranged on one side of the toner hopper **55**, and a developing component gear **69**, a toner feeding component gear **68**, an input gear **67**, an intermediate gear **70** and a stirring component driving gear **71** are all arranged and supported on the side wall **58**. During the working process of the developer cartridge, a power receiving part **73** on the input gear **67** receives power from the electronic photographing device and respectively transmits the power to the developing component gear **69**, the toner feeding component gear **68** and the intermediate gear **70** which are engaged with the input gear **67**; the stirring component driving gear **71** is engaged with the intermediate gear **70** and

receives the power from the intermediate gear **70**; the developing component gear **69**, the toner feeding component gear **68** and the stirring component driving gear **71** are respectively arranged on shafts of the developing component **31**, the toner feeding component (not shown) and the stirring component (not shown); and the components are driven to rotate together with the gears which are arranged on the shafts of the components. Therefore, during the working process of the developer cartridge, the developing component **31**, the toner feeding component (not shown) and the stirring component (not shown) are driven to rotate in the developer cartridge after the input gear **67** receives the power from the electronic photographing device.

An information detection mechanism **81** and an optical sensor **83** are arranged on the electronic photographing device, wherein the information detection mechanism **81** comprises a rotary shaft **84**, a contact lever **86** and a light blocking portion **87**; a moving member **178** is arranged on the intermediate gear **70** of the developer cartridge **28** and can rotate around the rotary shaft **79**; the moving member **178** and the rotary shaft **79** are arranged on the intermediate gear **70** and can rotate along with the intermediate gear **70**; and the side wall **58** is also provided with a blocking protrusion **94** which is motionless relative to the side wall **58**.

A counting mechanism in the prior art is composed of the moving member **178** and the blocking protrusion **94** on the developer cartridge **28**.

FIG. **1** is a schematic diagram of the developer cartridge **28** on the initial state, in which the contact lever **86** on the information detection mechanism **81** is not in contact with any object (including the moving member **178**); the information detection mechanism **81** does not rotate; the light blocking portion **87** is positioned inside the optical sensor **83** as a barrier; and the optical sensor **83** does not send out signals to the electronic photographing device.

As illustrated in FIG. **2**, the input gear **67** is engaged with the intermediate gear **70** and transmits the power to the intermediate gear **70** after the power receiving part **73** on the input gear **67** receives the power from the electronic photographing device, and the intermediate gear **70** is driven to rotate; and the moving member **178** is arranged on the intermediate gear **70**, so the moving member **178** rotates along with the intermediate gear **70**. As the moving member **178** is extended outwardly, the moving member **178** comes in contact with the contact lever **86** in the rotation process and the information detection mechanism **81** is driven to rotate around the rotary shaft **84**, herein the light blocking portion **87** after rotation is not positioned inside the optical sensor **83** as a barrier. The optical sensor **83** transmits information to the electronic photographing device after detecting light signals. After the developer cartridge **28** is verified as a new developer cartridge, the electronic photographing device restarts calculating the service life of the developer cartridge, and the counting function of the developer cartridge is realized.

The intermediate gear **70** continues to rotate; the moving member **178** is separated from the contact lever **86**; the information detection mechanism **81** is restored to the initial state as shown in FIG. **1** under the action of a restoring force (an elastic restoring force, for example, a spring); the light blocking portion **87** is positioned inside the optical sensor **83** as a barrier; and the electronic photographing device does not receive the information from the optical sensor. As the side wall **58** is provided with the blocking protrusion **94**, the moving member **178** comes in contact with the blocking protrusion **94** when the intermediate gear **70** continues to

rotate, thus the moving member **178** is driven to rotate around the rotary shaft **79** and is not extended outwardly again when the moving member **178** rotates to the contracted state as illustrated in FIG. **3**. As the blocking protrusion **94** is designed into an intermediate supporting shaft **74** which is closer to the intermediate gear **70** than the contact lever **86**, the moving member **178** cannot come in contact with the contact lever **86** again when the intermediate gear **70** continues to rotate. Therefore, the optical sensor **83** does not detect the light signals again and the electronic photographing device does not count again as well. The developer cartridge is only counted once during the whole working process.

The counting mechanism adopted in the prior art verifies the developer cartridge as a new developer cartridge by counting the developer cartridge once, and the moving member rotates around the rotary shaft. Therefore, for solving the problem of how to guarantee that the moving member does not rotate around the rotary shaft when in contact with the contact lever but the information detection mechanism is driven to rotate and that the moving member rotates around the rotary shaft when in contact with the blocking protrusion, higher matching precision requirement between the moving member and the rotary shaft is required to meet, thus the production process is difficult to control and the production cost of the developer cartridge is correspondingly increased.

BRIEF SUMMARY OF THE INVENTION

Briefly described, in a preferred form, the present invention comprises a developer cartridge with a counting mechanism to solve the problems of difficult production, high precision, etc. in the prior art.

In order to solve the technical problems, the invention adopts the technical proposal that:

The invention relates to a developer cartridge with a counting mechanism, which comprises a cartridge body for accommodating a developer, the counting mechanism and a counting mechanism driving member, wherein the counting mechanism comprises protrusions which count the developer cartridge by moving from a first position in which the protrusions are in contact with a contact lever on an electronic photographing device to a second position in which the protrusions are not in contact with the contact lever on the electronic photographing device when driven by the counting mechanism driving member. Moreover, the protrusions are driven by the counting mechanism driving member to move in the direction perpendicular to a side wall of the cartridge body.

The counting mechanism driving member comprises an input gear which receives power from the electronic photographing device and a gear which is engaged with the input gear, and drives the protrusions on the counting mechanism to be in rotation movement through power transmission between the input gear and the gear.

A power component is arranged on the counting mechanism.

The counting mechanism comprises a rotary member and a fixed member, wherein the fixed member is fixed on the side wall of the developer cartridge; the rotary member can rotate relative to the developer cartridge; a cylinder is also arranged on the rotary member and comprises a threaded portion an unthreaded portion; the fixed member is provided with a screwed hole corresponding to the cylinder; and the rotary member is provided with the protrusions.

Another aspect of the counting mechanism is that the counting mechanism comprises a rotary member and a fixed member, wherein the fixed member is fixed on the side wall of the developer cartridge; the rotary member can rotate relative to the developer cartridge; the rotary member is provided with a screwed hole and the protrusions; a cylinder corresponding to the screwed hole is arranged on the fixed member; and the cylinder comprises a threaded portion and an unthreaded portion.

The rotary member comprises a first rotary member and a second rotary member, wherein the first rotary member is provided with a concave hole; and a protruded post is arranged on the second rotary member and is used with the concave hole to achieve synchronous rotation between the second rotary member and the first rotary member.

Another aspect of the counting mechanism is that the counting mechanism comprises a rotary member and a fixed member, wherein the rotary member can rotate relative to the developer cartridge; a support pillar is arranged on the rotary member; the fixed member is provided with an opening corresponding to the support pillar; and the rotary member is provided with the protrusions.

A thread pitch or a plurality of thread pitches are arranged on the threaded portion.

A power component is arranged on the rotary member to provide power to the rotary member and to drive the rotary member to rotate.

A hanging wall is arranged on the rotary member, and a gear is arranged on the outer circumference of the hanging wall and engaged with the input gear.

The width of the hanging wall is small enough to make the rotary member stop rotating when the rotary member is in the second position.

The width of the hanging wall is large enough to make the rotary member keep rotating when the rotary member is in the second position.

The counting mechanism also comprises an elastic component which applies an elastic force, for driving the rotary member to move close to the fixed member, to the rotary member.

The fixed member is fixed on the side wall of the developer cartridge.

The fixed member can rotate a certain angle relative to the side wall of the developer cartridge.

The protrusions are truncated cones or inverted truncated cones and come in contact with the contact lever when the rotary member moves close to or away from the side wall of the developer cartridge.

Due to adoption of the technical proposal, the counting mechanism driving member drives the protrusions to move in the direction perpendicular to the side wall of the cartridge body, and the first position and the second position are positioned in different positions at different distance from the side wall of the cartridge body, thus the problems of, not only guaranteeing that the moving member does not rotate around the rotary shaft when in contact with the contact lever but also guaranteeing that the high matching precision requirement on driving the information detection mechanism to rotate is met, in the prior art do not occur. Therefore, the invention solves the problems of difficult production, high precision requirement, etc. in the prior art. The working principle of the technical proposal adopted by the invention is greatly different from that in the prior art. Therefore, the invention has the advantages of making the structure of the counting mechanism of the developer cartridge simpler and more convenient and reliable, reducing the production pre-

cision and production cost, and improving the market competitiveness of the developer cartridge.

These and other objects, features and advantages of the present invention will become more apparent upon reading the following specification in conjunction with the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation of a counting mechanism on a developer cartridge in the prior art when the counting mechanism is on the initial state;

FIG. **2** is a side elevation of the counting mechanism on the developer cartridge in the prior art when the counting mechanism comes in contact with an information detection mechanism under the condition of rotation;

FIG. **3** is a side elevation of the counting mechanism on the developer cartridge in the prior art when a moving member on the counting mechanism is on the contracted state after rotating around a rotary shaft;

FIG. **4** is structure diagrams of a rotary member and a fixed member in the Embodiment 1;

FIG. **5** is a schematic diagram of a counting mechanism on the initial state in the Embodiment 1;

FIG. **6** is a schematic diagram of the counting mechanism on the final state in the Embodiment 1;

FIG. **7** is a schematic diagram of a counting mechanism on the initial state in the Embodiment 2;

FIG. **8** is a schematic diagram of the counting mechanism on the final state in the Embodiment 2;

FIGS. **9** and **10** are schematic diagrams of a counting mechanism on the initial state in the Embodiment 3;

FIGS. **11** and **12** are schematic diagrams of the counting mechanism on the final state in the Embodiment 3;

FIG. **13** is a structure diagram of a counting mechanism in the Embodiment 5;

FIGS. **14** and **15** are respectively a schematic diagram of the counting mechanism on the initial state and a schematic diagram of the counting mechanism on the final state in the Embodiment 5;

FIG. **16** is a schematic diagram of a counting mechanism on the initial state in the Embodiment 7; and

FIG. **17** is a schematic diagram of the counting mechanism on the final state in the Embodiment 7.

DETAIL DESCRIPTION OF THE INVENTION

To facilitate an understanding of the principles and features of the various embodiments of the invention, various illustrative embodiments are explained below. Although exemplary embodiments of the invention are explained in detail, it is to be understood that other embodiments are contemplated. Accordingly, it is not intended that the invention is limited in its scope to the details of construction and arrangement of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or carried out in various ways. Also, in describing the exemplary embodiments, specific terminology will be resorted to for the sake of clarity.

It must also be noted that, as used in the specification and the appended claims, the singular forms "a," "an" and "the" include plural references unless the context clearly dictates otherwise. For example, reference to a component is intended also to include composition of a plurality of components. References to a composition containing "a" constituent is intended to include other constituents in addition to the one named.

Also, in describing the exemplary embodiments, terminology will be resorted to for the sake of clarity. It is intended that each term contemplates its broadest meaning as understood by those skilled in the art and includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Ranges may be expressed herein as from "about" or "approximately" or "substantially" one particular value and/or to "about" or "approximately" or "substantially" another particular value. When such a range is expressed, other exemplary embodiments include from the one particular value and/or to the other particular value.

Similarly, as used herein, "substantially free" of something, or "substantially pure", and like characterizations, can include both being "at least substantially free" of something, or "at least substantially pure", and being "completely free" of something, or "completely pure".

By "comprising" or "containing" or "including" is meant that at least the named compound, element, particle, or method step is present in the composition or article or method, but does not exclude the presence of other compounds, materials, particles, method steps, even if the other such compounds, material, particles, method steps have the same function as what is named.

It is also to be understood that the mention of one or more method steps does not preclude the presence of additional method steps or intervening method steps between those steps expressly identified. Similarly, it is also to be understood that the mention of one or more components in a composition does not preclude the presence of additional components than those expressly identified.

The materials described as making up the various elements of the invention are intended to be illustrative and not restrictive. Many suitable materials that would perform the same or a similar function as the materials described herein are intended to be embraced within the scope of the invention. Such other materials not described herein can include, but are not limited to, for example, materials that are developed after the time of the development of the invention.

Embodiment 1

Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge shown in FIG. **1**.

FIG. **4** is a structure diagram of a counting mechanism in the Embodiment 1. The counting mechanism comprises a rotary member **10** and a fixed member **20**, wherein the rotary member **10** is provided with a hanging wall **11**, protrusions **12** and a cylinder **13**; the cylinder **13** comprises an unthreaded portion **13**a and a threaded portion **13**b; the fixed member **20** comprises a footwall **21** and a screwed hole **22** corresponding to the threaded portion **13**b, is fixed on the side wall **58** of the toner hopper **55** of the developer cartridge as shown in FIG. **1**, and is motionless relative to the toner hopper **55**; and a gear (not shown in the figure) is arranged on the outer circumference of the hanging wall **11** of the rotary member **10** and engaged with the input gear **67**, and receives power from the input gear **67** to drive the rotary member **10** to rotate around a central shaft of the hanging wall **11**.

When the counting mechanism is on the initial state, the threaded portion **13**b on the rotary member **10** is not engaged

with or partially engaged with the screwed hole **22** of the fixed member **20**. As shown in FIG. **5**, a certain distance is maintained between the hanging wall **11** of the rotary member **10** and the footwall **21** of the fixed member **20**; the protrusions **12** of the rotary member **10** are extended outwardly in the direction perpendicular to the side wall **58**; and the protrusions **12** are in a first position so as to come in contact with the contact lever **86** on the electronic photographing device when the threaded portion **13**b and the screwed hole **22** are engaged with each other, thus the counting function of the developer cartridge **28** is realized.

As the gear on the outer circumference of the hanging wall **11** of the rotary member **10** is engaged with the input gear **67**, the threaded portion **13**b of the rotary member **10** is engaged with the screwed hole **22** of the fixed member **20** when the hanging wall **11** rotates (along the E direction as shown in FIG. **5**) after receiving power from the input gear **67**. Due to the thread engagement, a downward acting force F along the axial direction of the cylinder **13** is applied to the threaded portion **13**b by the screwed hole **22**, and the rotary member **10** is driven to move downward (along the F direction as shown in FIG. **5**) to be close to the fixed member **20**. As the protrusions **12** are extended outwardly in the direction perpendicular to the side wall **58**, the protrusions **12** come in contact with the contact lever **86** when the threaded portion **13**b is engaged with the screwed hole **22**, thus the counting function is realized.

When the threaded portion **13**b is not engaged with the screwed hole **22** again, the unthreaded portion **13**a comes in contact with the screwed hole **22** (the outside diameter of the unthreaded portion **13**a is less than that of the threaded portion **13**b and less than the inside diameter of the screwed hole **22** as well), and the acting force in the F direction as shown in FIG. **5** is not applied to the rotary member **10** by the screwed hole **22**, thus the rotary member **10** does not move downward again. When the rotary member **10** and the fixed member **20** are on the state as shown in FIG. **6**, the space between the rotary member **10** and the fixed member **20** is small or the rotary member **10** and the fixed member **20** are adjacent to each other. Herein, the protrusions **12** on the rotary member **2 10** are in the second position in the direction perpendicular to the side wall **58**, so the protrusions **12** on the rotary member **10** cannot come in contact with the contact lever **86** again.

In the embodiment, the width of the hanging wall **11** of the rotary member **10** is small, so when the rotary member **10** moves to the state as shown in FIG. **6**, the hanging wall **11** of the rotary member **10** is not engaged with the input gear **67** again; the rotary member **10** does not rotate; the protrusions **12** are not in contact with the contact lever **86**; and the counting function of the developer cartridge **28** does not work.

In the embodiment, as a thread pitch is arranged on the threaded portion **13**b, the screwed hole **22** is engaged with the unthreaded portion **13**a after the one-turn engagement with the threaded portion **13**b; the protrusions **12** are only subjected to one rotation along with the rotary member **10**; and each protrusion **12** only comes in contact with the contact lever **86** once before rotating from the first position to the second position.

Another aspect of the embodiment is that two or more than two thread pitches are arranged on the threaded portion **13**b, thus the screwed hole **22** is engaged with the unthreaded portion **13**a after the engagement with the threaded portion **13**b for two turns or more than two turns; the protrusions **12** are subject to two rotations or more than two rotations along with the rotary member **10**; and each protrusion **12** comes in contact with the contact lever **86** twice or more than twice before rotating from the first position to the second position.

Another aspect of the embodiment is that the width H of the hanging wall **11** of the rotary member **10** or the width of the input gear **67** can be set to be large enough to drive the rotary member **10** to be always engaged with the input gear **67** during the downward movement. Moreover, when the rotary member **10** is on the state as shown in FIG. **6**, the gear on the outer circumference of the hanging wall **11** is still engaged with the input gear **67** when the threaded portion **13**b is not engaged with the screwed hole **22**, and the rotary member **10** still rotates, namely the rotary member **10** always rotates during the whole working process of the developer cartridge **28**.

Another aspect of the embodiment is that a gear is not arranged on the rotary member **10** to be engaged with the input gear **67**, and a power component is arranged on the rotary member **10** to drive the rotary member **10** to rotate. For example, a torsion spring is arranged on the rotary member **10** to provide power to the rotary member **10**.

In the embodiment, the elastic component **30** in contact with the rotary member **10** is also adopted, wherein a downward acting force along the direction as shown in FIG. **5** is applied to the rotary member **10** by the elastic component to help the threaded portion **13**b of the rotary member **10** be in better engagement with the screwed hole **22** of the fixed member **20**.

Embodiment 2

The FIGS. **7** and **8** illustrate the Embodiment 2. Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge of the Embodiment 1.

The counting mechanism of the embodiment comprises a rotary member **10**a and a fixed member **20**a, wherein the rotary member **10**a is provided with a hanging wall **14**, protrusions **15** and a screwed hole **16**; a footwall **23** and a cylinder **24** are arranged on the fixed member **20**a; the cylinder **24** comprises a threaded portion **24**a and an unthreaded portion **24**b; a gear is arranged on the outer circumference of the hanging wall **14** of the rotary member **10**a and engaged with the input gear **67**; and the fixed member **20**a is arranged on the side wall **58** of the toner hopper **55** and is motionless relative to the toner hopper **55**.

FIG. **7** is a schematic diagram of the counting mechanism of the embodiment on the initial state. Herein the protrusions **15** on the rotary member **10**a are extended out of the side wall **58** and can come in contact with the contact lever **86** on the electronic photographing device when the threaded portion **24**a is engaged with the screwed hole **16**, thereby the counting function of the developer cartridge is realized.

FIG. **8** is a schematic diagram of the counting mechanism of the embodiment on the final state. Herein the threaded portion **24**a is not engaged with the screwed hole **16** which rotates around the unthreaded portion **24**b, and the protrusions **15** are not extended out of the side wall **58** and are not in contact with the contact lever on the electronic photographing device, thereby the counting function of the developer cartridge does not work.

It is obvious to those having ordinary skill in the art that the working process and working principle of the counting mechanism of the embodiment are the same with those of the Embodiment 1; and no further detailed description is given herein.

Embodiment 3

Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge shown in FIG. **1**.

As illustrated in FIG. **9**, the counting mechanism of the embodiment comprises a rotary member **10**b and a fixed member **20**b, wherein the rotary member **10**b comprises a hanging wall **17**, protrusions **18** and a support pillar **19**; the fixed member **20**b comprises a footwall **25** and an opening **26**, is fixed on the side wall **58** of the toner hopper **55**, and is motionless relative to the developer cartridge **28**; a gear is arranged on the outer circumference of the hanging wall **17** of the rotary member **10**b and engaged with the input gear **67** of the developer cartridge; and the rotary member **10**b can rotate clockwise around the center of the hanging wall **17** (along the G direction as shown in FIG. **9**).

FIGS. **9** and **10** are schematic diagrams of the counting mechanism of the embodiment on the initial state. When the counting mechanism is on the state, the protrusions **18** on the rotary member **10**b are in the first position in the direction perpendicular to the side wall **58**. As the protrusions **18** on the rotary member **10**b are extended outwardly in the direction perpendicular to the side wall **58**, the protrusions **18** come in contact with the contact lever **86** on the electronic photographing device in the rotation process, thus the counting function of the developer cartridge is realized.

When the counting mechanism is on the initial state, a certain angle is formed between the support pillar **19** on the rotary member **10**b and the opening **26** on the fixed member **20**b in a staggered manner, and a certain distance is maintained between the hanging wall **17** of the rotary member **10**b and the footwall **25** of the fixed member **20**b, as shown in FIG. **10**. Therefore, guarantee can be made that the protrusions **18** on the rotary member **10**b come in contact with the contact lever **86** in the rotation process of the rotary member **10**b.

When the rotary member **10**b rotates a certain angle (less than or equal to 360°) along the rotation direction as shown in FIGS. **9** and **10**, the rotary member **10**b is on the final state as shown in FIGS. **11** and **12**. When the rotary member **10**b is on the state, the support pillar **19** on the rotary member **10**b is over against the opening **26** on the fixed member **20**b. Because the support pillar **19** is smaller than the opening **26**, the rotary member **10**b moves closer to the fixed member **20**b (in the H direction as shown in FIG. **11**) under the action of an elastic force applied by the elastic component **30**b; the protrusions **18** on the rotary member **10**b move closer to the side wall **58**; the hanging wall **17** of the rotary member **10**b and the footwall **25** of the fixed member **20**b are adjacent to each other; and the protrusions **18** are in the second position in the direction perpendicular to the side wall **58** and cannot come in contact with the contact lever **86** on the electronic photographing device again, thus the counting function of the developer cartridge does not work.

In the embodiment, the width of the gear on the outer circumference of the hanging wall **17** of the rotary member **10**b is very small, so the gear on the outer circumference of the hanging wall **17** is not engaged with the input gear **67** again after the rotary member **10**b is close to the fixed member **20**b (on the state as shown in FIGS. **11** and **12**), thus the rotary member **10**b does not rotate again.

Another aspect of the embodiment is that the width of the gear on the outer circumference of the hanging wall **17** can be set to be large enough so that the gear on the outer circumference of the hanging wall **17** can still be engaged with the input gear **67** after the rotary member is on the state shown in FIGS. **11** and **12**. The rotary member **10**b still rotates on the state shown in FIGS. **11** and **12**.

Another aspect of the embodiment is that a gear is not arranged on the rotary member **10**b to be engaged with the input gear **67**, and a power component is arranged on the rotary member **10**b to provide power to the rotary member **10**b and to drive the rotary member **10**b to rotate. For example, a torsion spring is arranged on the rotary member **10**b to provide power to the rotary member **10**b.

Another aspect of the embodiment is that the fixed member **10**b is arranged on the side wall **58** of the developer cartridge and can rotate a certain angle (such as 60 DEG, 90 DEG, etc.) relative to the side wall **58**, and the support pillar **19** is over against the opening **26** after driven to rotate a larger angle (more than 360°).

Embodiment 4

Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge of the Embodiment 3.

In the embodiment, the rotary member **10**b is fixed on the side wall **58** of the toner hopper **55** and is motionless relative to the side wall **58**; the fixed member **20**b can rotate relative to the developer cartridge **28**; the fixed member **20**b is provided with the protrusions **18** which rotate along with the fixed member **20**b; the hanging wall **17** and the support pillar **19** are arranged on the rotary member **10**b; the fixed member **20**b is also provided with the footwall **25** and the opening **26**; a gear is arranged on the outer circumference of the footwall **25** of the fixed member **20**b and engaged with the input gear **67**; and the protrusions **18** come in contact with the contact lever **86** in the rotation process, thus the counting function of the developer cartridge is realized.

Embodiment 5

Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge of the Embodiment 1.

FIGS. **13**, **14**, and **15** illustrate the Embodiment 5, wherein a protrusion **12**a on the counting mechanism of the embodiment has the structure of an inverted truncated cone. When the rotary member **10** is in downward rotation movement, an inclined plane **12**b of the protrusion **12**a comes in contact with the contact lever **86** on the electronic photographing device, thus the counting function of the developer cartridge is realized; and when the inclined plane **12**b is separated from the contact lever **86**, the information detection mechanism **81** on the electronic photographing device is not positioned inside the optical sensor as a barrier again, thus the counting function of the electronic photographing device does not work.

Another aspect of the embodiment is that: the protrusion **12**a has a structure of a truncated cone, and an inclined plane on the protrusion **12**a comes in contact with the contact lever **86** during the upward rotation movement, thus the counting function of the developer cartridge is realized.

Embodiment 6

Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge of the Embodiment 3.

The protrusions of the embodiment have the same structure with those of the Embodiment 5.

Embodiment 7

Unless otherwise specified, the developer cartridge of the embodiment has the same structure with the developer cartridge of the Embodiment 2.

As illustrated in FIG. **16**, the hanging wall **23** and the cylinder **24** are arranged on the fixed member **20**a which is fixed on the side wall **58** of the toner hopper **55**; a first rotary member **14**c and a second rotary member **14**d are arranged on the rotary member **10**a; the first rotary member **14**c is provided with a concave hole **14**b; a protruded post **14**a is arranged on the second rotary member **14**d and used with the concave hole **14**b; the first rotary member **14**c is arranged on an unthreaded portion **24**b on the cylinder **24**; the second rotary member **14**d is also provided with the screwed hole **16** and the protrusions **15**; and the screwed hole **16** is engaged with a threaded portion **24**a on the cylinder **24**.

During the working process of the developer cartridge, a gear is arranged on the outer circumference of the first rotary member **14**c and can receive power from the input gear **67** and keep rotating. In the rotation process of the first rotary member **14**c, as the protruded post **14**a is used with the concave hole **14**b, the second rotary member **14**d and the first rotary member **14**c are driven to be in synchronous rotation; the second rotary member **14**d is engaged with the threaded portion **24**a through the screwed hole **16** and moves close to the first rotary member **14**c, i.e. from the state as shown in FIG. **16** to the state as shown in FIG. **17**.

The first rotary member **14**c of the embodiment is a hanging wall.

It is obvious to those having ordinary skill in the art that the counting function of the developer cartridge can also be realized when the protrusions on the counting mechanism come in contact with the contact lever of the information detection mechanism when the rotary member moves away from the fixed member.

Numerous characteristics and advantages have been set forth in the foregoing description, together with details of structure and function. While the invention has been disclosed in several forms, it will be apparent to those skilled in the art that many modifications, additions, and deletions, especially in matters of shape, size, and arrangement of parts, can be made therein without departing from the spirit and scope of the invention and its equivalents as set forth in the following claims. Therefore, other modifications or embodiments as may be suggested by the teachings herein are particularly reserved as they fall within the breadth and scope of the claims here appended.

What is claimed is:

1. A developer cartridge **[**with a counting mechanism**]** comprising:

a counting mechanism;

a counting mechanism driving member; and

a cartridge body for accommodating a developer, the counting mechanism and **[**a**]** *the* counting mechanism driving member;

wherein the counting mechanism **[**comprising**]** *comprises* a protrusion moving under **[**the**]** *a* driving action of the counting mechanism driving member from a second position in which the protrusion being not in contact with a contact lever on an electronic photographing device to a first position in which the protrusion being in contact with the contact lever on the electronic photographing device **[**so as to count the developer cartridge**]**; and

wherein the counting mechanism driving member **[**driving**]** *drives* the protrusion to move away from a side wall of the cartridge body in a direction perpendicular to the side wall, *and* the protrusion in the first position is farther away from the side wall than in the second position in the direction perpendicular to the side wall.

2. The developer cartridge according to claim **1**, wherein the counting mechanism comprises a rotary member and a fixed member;

wherein the fixed member is fixed on the side wall of the developer cartridge;

wherein the rotary member can rotate relative to the developer cartridge; *and* the protrusion is arranged on a surface of the rotary member **[**far**]** away from the fixed member; and

wherein the protrusion in the first position is farther away from the fixed member than in the second position in the direction perpendicular to the side wall.

3. The developer cartridge according to claim **2** further comprising a hanging wall also arranged on the rotary member, and a gear **[**is**]** arranged on **[**the**]** *an* outer circumference of the hanging wall and engaged with the counting mechanism driving member.

4. The developer cartridge according to claim **3**, wherein **[**the**]** *a* width of the hanging wall is small enough to make the rotary member not rotate when the rotary member is in the first position.

5. The developer cartridge according to claim **3**, wherein **[**the**]** *a* width of the hanging wall is large enough to make the rotary member keep rotating when the rotary member is in the first position.

6. The developer cartridge according to claim **2** further comprising a cylinder arranged on one of the rotary member **[**or**]** *and* the fixed member, and **[**comprises**]** *having* a threaded portion and an unthreaded portion; the other one of the rotary member **[**or**]** *and* the fixed member **[**is**]** *being* provided with a screwed hole corresponding to the cylinder.

7. The developer cartridge according to claim **6**, wherein a thread pitch or a plurality of thread pitches are arranged on the threaded portion.

8. The developer cartridge according to claim **2**, wherein the rotary member comprises a first rotary member and a second rotary member; the first rotary member is provided with a concave hole; a protruded post is arranged on the second rotary member; and the protruded post is used with the concave hole to drive the second rotary member and the first rotary member to be in synchronous rotation.

9. The developer cartridge according to claim **8**, *wherein:*

when the protrusion on the rotary member is in the second position, the threaded portion on the rotary member is not engaged with or partially engaged with the screwed hole;

when the protrusion on the rotary member is in the first position, the threaded portion is not engaged with the screwed hole **[**again**]**, and the unthreaded portion comes in contact with the screwed hole.

10. The developer cartridge according to claim **2**, wherein the protrusion **[**is**]** *includes a* truncated cone or inverted truncated cones, and **[**come**]** *comes* in contact with **[**the**]** *a* contact lever *on an electronic photographing device* when the rotary member **[**move**]** *moves* away from the side wall of the developer cartridge.

11. A developer cartridge, comprising

a counting mechanism;

a counting mechanism driving member; and

a cartridge body for accommodating a developer, the counting mechanism, and the counting mechanism driving member,

wherein the counting mechanism comprises a rotary member and a fixed member;

wherein the fixed member is fixed on a side wall of the developer cartridge;

wherein the counting mechanism further comprises a protrusion arranged on a surface of the rotary member away from the fixed member; and

wherein, being driven by the counting mechanism driving member, the rotary member rotates relative to the developer cartridge to engage and disengage the fixed member to start and stop a counting function of the counting mechanism.

12. The developer cartridge according to claim 11, further comprising a hanging wall also arranged on the rotary member; and a gear arranged on an outer circumference of the hanging wall and engaged with the counting mechanism driving member.

13. The developer cartridge according to claim 12, further comprising:

a cylinder arranged on one of the rotary member and the fixed member, and having a threaded portion and an unthreaded portion; the other one of the rotary member and the fixed member being provided with a screwed hole corresponding to the cylinder.

14. The developer cartridge according to claim 13, wherein a thread pitch or a plurality of thread pitches are arranged on the threaded portion.

15. The developer cartridge according to claim 12, wherein the rotary member comprises a first rotary member and a second rotary member; the first rotary member is provided with a concave hole; a protruded post is arranged on the second rotary member; and the protruded post is used with the concave hole to drive the second rotary member and the first rotary member to be in synchronous rotation.

16. The developer cartridge according to claim 11, wherein:

the protrusion moves from a second position in which the protrusion being not in contact with a contact lever on an electronic photographing device to a first position in which the protrusion being in contact with the contact lever on the electronic photographing device so as to count the developer cartridge; and

the counting mechanism driving member drives the protrusion to move away from a side wall of the cartridge body in a direction perpendicular to the side wall, and the protrusion in the first position is farther away from the side wall than in the second position in the direction perpendicular to the side wall.

17. The developer cartridge according to claim 16, wherein:

the protrusion in the first position is farther away from the fixed member than in the second position in the direction perpendicular to the side wall.

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