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(54) COMBINED EGR VALVE AND FRESH AIR VALVE FOR A VEHICLE

KOMBINIERTES AGR- UND FRISCHLUFT-VENTIL FÜR EIN FAHRZEUG

VANNE EGR ET VANNE D'AIR FRAIS COMBINÉES POUR UN VÉHICULE

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present disclosure relates to a valve for a vehicle, and more particularly to a valve for a vehicle having a compact size and for precisely controlling the timing of an operation of a fresh air valve depending on the state of an opening state of an exhaust gas recirculation (EGR) valve.

Discussion of the Related Art

[0002] In general, a method that has been the most popular thus far to prevent generation of nitrogen oxide (NO_x) from exhaust gas discharged from an engine installed in a vehicle has used an exhaust gas recirculation (EGR) valve for partially adding cooled exhaust gas to a mixer and inhaling the gas into a cylinder.

[0003] As disclosed in Korean Patent Publication No. 10-1338272, an EGR valve includes a fresh air flow passage into which outside fresh air is introduced, and an EGR flow passage in which exhaust gas discharged from an engine returns and is guided to be reintroduced to the engine.

[0004] Here, a fresh air control valve is provided in the fresh air flow passage, and an EGR control valve is provided in the EGR flow passage.

[0005] The EGR control valve and the fresh air control valve are operatively associated with each other by a power transfer device such as a gear and an actuator connected thereto rather than being separately moved.

[0006] According to the above conventional art, when the EGR valve is completely closed, the fresh air control valve is positioned in parallel to a flow direction of fresh air, and thus interference in introduction of fresh air is minimized and fresh air is capable of being introduced into the engine while being maintained in a maximum inflow rate.

[0007] When the EGR valve is open by a predetermined degree to re-introduce exhaust gas into the engine, while the fresh air control valve is simultaneously moved, a predetermined portion of a cross section of the fresh air flow passage is blocked, and accordingly, the EGR valve reduces the amount of fresh air introduced per hour.

[0008] When the EGR valve is completely open, the fresh air control valve is closed by a maximum degree, and thus the EGR valve further reduces the amount of fresh air introduced into the engine.

[0009] However, the conventional art has a problem in that a large space is occupied by the EGR valve due to a large size thereof to degrade a degree of freedom of space.

[Cited Reference]

[Patent Document]

[0010]

Korean Patent No. 10-1338272 (published on December 9, 2013)
Korean Patent No. 10-1987054 (published on June 10, 2019)
Korean Patent Laid-Open Publication No. 10-2017-0060452 (Laid-Open on June 1, 2017)

[0011] KR20190033133A discloses an EGR valve of an exhaust gas recirculation apparatus comprising: a valve housing provided with a fresh air inlet through which fresh air is introduced, and an exhaust air inlet through which recirculated exhaust air is introduced, and a mixed air outlet through which a mixture of fresh air and an EGR gas is discharged to an engine; and a valve body installed at the valve housing in order to selectively block the fresh air inlet and the exhaust air inlet. US 2013047968 A1 discloses three-way valve with two flaps comprising common control means for the two flaps and actuation means arranged each to drive, pivotwise, one of the two flaps, from one to the other of its open and closed position of one of the pathways, with a temporal phase-shift. FR 2926126 A1 discloses a valve having two closing units arranged in two inlet ways of the valve, respectively, where the closing units occupy opening, closing and intermediate positions, wherein one of the closing units drives the other closing unit into the closing or opening position, and is driven into the closing or opening position by a driving part.

SUMMARY OF THE INVENTION

[0012] An object of the present disclosure is to provide a valve for a vehicle having a compact size and for precisely controlling the timing of an operation of a fresh air valve depending on the state of an opening state of an exhaust gas recirculation (EGR) valve.

[0013] According to an aspect of the present disclosure, a valve for a vehicle includes a housing in which an exhaust gas recirculation (EGR) flow passage and a fresh air flow passage are formed, a driving motor, a gear train connected to the driving motor, a first output gear and a second output gear that are included in the gear train, a moving member installed on the second output gear and rotating together with the second output gear, a first shaft on which an EGR valve is installed and the first shaft fixed to the first output gear, a second shaft in which a fresh air valve is installed therein, a rotating member that is connected to the second shaft and that rotates together with the moving member and a fresh air valve output gear and simultaneously rotates the second shaft when the rotating member selectively comes into contact with the moving member of the second shaft to contact

the moving member and then pushes the moving member, and a third elastic restoration member installed between a second output gear installation portion in the housing and the second output gear, wherein the moving member comprises: a base portion fixed to the second output gear; and a flange protruding from the base portion and provided to contact the rotating member and is configured in plural at opposite sides, wherein the rotating member comprises: a fixing hole which the second shaft fixedly penetrates; a contact portion protruding to allow the moving member to reach and come into contact with the contact portion, an extension piece provided between the contact portions, a plurality of slit portions formed between the extension piece and the contact portion, wherein the third elastic restoration member has a one-end portion inserted into a slot in the second output gear installation portion, and the other-end portion caught by any one slit portion.

[0014] The flange and the contact portion may selectively come into contact with each other or are spaced apart from each other depending on rotation of the second output gear and the moving member.

[0015] The gear train may include a motor gear connected to a motor axis, an intermediate gear engaged with the motor gear, the first output gear engaged with the intermediate gear, and the second output gear engaged with the first output gear.

[0016] When the EGR valve is completely closed and the fresh air valve is completely open, if a motor is driven, the first output gear may rotate to begin to open the EGR valve, and the second output gear engaged with the first output gear may also rotate, but in contrast, the rotating member and the second shaft may not rotate before the moving member comes into contact with the rotating member to maintain the fresh air valve to be completely open.

[0017] The motor may be further driven when the EGR valve is partially open and the fresh air valve is completely open, and when the moving member comes into contact with the rotating member and then further rotates, the rotating member and the second shaft may rotate and the fresh air valve may begin to perform a closing operation.

[0018] The valve for the vehicle may further include a stopper provided on the housing, provided adjacent to the rotating member, provided to come contact with the contact portion, and configured to prevent the rotating member from rotating by a predetermined degree or greater.

[0019] The first output gear may be fixed to the first shaft and may allow the first shaft and the EGR valve fixed thereto to rotate as the first output gear rotates, and the second output gear may be rotatably installed on the first shaft and the first shaft may not be affected by rotation of the second gear before the moving member installed on the second output gear comes into contact with the rotating member.

[0020] When the fresh air flow passage is completely open and the EGR flow passage is completely closed, the moving member and the rotating member may not contact each other, when the fresh air flow passage is completely open and the EGR flow passage is partially open, the moving member and the rotating member may be provided to contact each other, and when the moving member pushes the rotating member, an opening degree of the fresh air valve with respect to the fresh air flow passage may be reduced, and an opening degree of the EGR valve with respect to the EGR flow passage may be increased.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The accompanying drawings, which are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the present disclosure and together with the description serve to explain the principle of the present disclosure. In the drawings:

FIG. 1 is a perspective view according to the present disclosure;

FIG. 2 is an exploded perspective view according to the present disclosure;

FIG. 3 is an exploded perspective view showing the state in which a second output gear and a moving member are spaced apart from a rotating member while the second output gear and the moving member are coupled according to the present disclosure;

FIG. 4 is a projection according to the present disclosure;

FIG. 5 is an internal perspective view according to the present disclosure;

FIG. 6 shows the state in which a fresh air valve is completely open and an exhaust gas recirculation (EGR) valve is completely closed according to the present disclosure;

FIG. 7 shows the state in which a fresh air valve is completely open and an EGR valve is partially open according to the present disclosure; and

FIG. 8 shows the state in which a fresh air valve is partially open and an EGR valve is completely open according to the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0022] As the present disclosure allows for various changes and numerous embodiments, particular embodiments will be illustrated in the drawings and described in detail in the written description.

[0023] The terms such as "first" and "second" are used herein merely to describe a variety of constituent elements, but the constituent elements are not limited by the terms.

[0024] The terms are used only for the purpose of distinguishing one constituent element from another con-

stituent element.

[0025] For example, a first element may be termed a second element and a second element may be termed a first element without departing from the teachings of the present disclosure.

[0026] As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0027] It will be understood that when an element, such as a layer, a region, or a substrate, is referred to as being "on", "connected to" or "coupled to" another element, it may be directly on, connected or coupled to the other element or intervening elements may be present.

[0028] In contrast, when an element is referred to as being "directly on," "directly connected to" or "directly coupled to" another element or layer, there are no intervening elements or layers present.

[0029] The singular forms "a," "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0030] It will be further understood that the terms "comprises" or "comprising" when used in this specification, specify the presence of stated features, integers, steps, operations, elements, or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, or groups thereof.

[0031] Hereinafter, the present disclosure will be described in detail by explaining exemplary embodiments of the present disclosure with reference to the attached drawings. The same reference numerals in the drawings denote like elements, and a repeated explanation thereof will not be given.

[0032] As shown in FIG. 1, a valve for a vehicle may be a 3-way valve and according to the invention includes a fresh air flow passage 110 formed at one side of a housing 100 configuring a body and an exhaust gas recirculation (EGR) flow passage 120 formed at the other side. Here, the EGR flow passage 120 may be disposed in a perpendicular direction to a direction in which the fresh air flow passage 110 is disposed or may be disposed oblique thereto.

[0033] An EGR valve 200 for opening and closing the EGR flow passage 120 is provided in the EGR flow passage 120, and a fresh air valve 300 for opening and closing the fresh air flow passage 110 is provided in the fresh air flow passage 110. As described below, the fresh air valve 300 and the EGR valve 200 are operatively connected to each other.

[0034] A diameter of the fresh air flow passage 110 may be larger than that of the EGR flow passage 120 because the amount of introduced fresh air needs to be larger than the amount of EGR gas.

[0035] As shown in FIG. 2, a motor 10, a gear train connected to the motor 10, and two shafts 210 and 310 that are operatively connected to the gear trains are provided in the housing 100.

[0036] The two shafts include an EGR valve shaft (hereinafter referred to as a first shaft) 210 and a fresh air valve shaft (hereinafter referred to as a second shaft) 310.

[0037] A motor insertion portion 101 may be installed inside the housing 100, and the motor 10 may be fixedly inserted to the motor insertion portion 101.

[0038] The gear train may include a pinion gear 11 installed at a motor axis, and an intermediate gear 12 engaged with the pinion gear 11 and provided in the form of a multiple-layer gear; the gear train includes an EGR valve output gear (hereinafter referred to as a first output gear) 13 that may be engaged with a small-diameter portion of the intermediate gear 12, and a fresh air valve output gear (hereinafter referred to as a second output gear) 14 that may be engaged with the first output gear 13.

[0039] Here, the first and second output gears 13 and 14 may each be configured as a partial tooth gear on which a tooth form is formed on a partial edge.

[0040] A first output gear installation portion 15 on which the first output gear 13 is rotatably installed may be formed on the housing 100, and a first elastic restoration member 21 formed like a coil spring may be provided between the first output gear 13 and the first output gear installation portion 15.

[0041] A second output gear installation portion 16 on which the second output gear 14 is rotatably installed is formed on the housing 100, a third elastic restoration member 23 and optionally a second elastic restoration member 22 are installed between the second output gear installation portion 16 and the second output gear 14, and the third elastic restoration member 23 may be installed to be surrounded by the second elastic restoration member 22.

[0042] Here, the second elastic restoration member 22 may restore the second output gear 14 to the original position, and the third elastic restoration member 23 may restore a rotating member 400 that will be described below to the original position, and accordingly, force for restoring the second shaft 310 and the fresh air valve 300 to a complete opening position may be applied.

[0043] A moving member 500 is provided at one side of (or below) the second output gear 14, and the rotating member 400 that is rotatably installed on the second output gear installation portion 16 and is fixed to the second shaft 310 using welding or other fixing devices may be provided below the moving member 500.

[0044] The moving member 500 may be formed of a metallic material, may be fixed to the second output gear 14 using an inserting method, and rotates together with the second output gear 14.

[0045] The rotating member 400 is a component that may separately rotate from the second output gear 14 and the moving member 500, may be formed of a metallic material, and is fixed to the second shaft 310 to rotate together with the second shaft 310. The moving member 500 and the rotating member 400 may selectively come into contact with each other to rotate together, or when

the moving member 500 and the rotating member 400 are spaced apart from each other, only the moving member 500 may rotate, and the rotating member 400 may be kept stopped.

[0046] A base portion 510 shaped like a circular ring is provided in the moving member 500 and may be inserted between a plurality of partitions 14a and 14b provided below the second output gear 14. To this end, a through hole 530 may be installed in a central portion of the base portion 510.

[0047] Thus, a thin rib of the base portion 510 may be positioned between the partitions 14a and 14b.

[0048] The moving member 500 further includes a flange 520 that protrudes on the base portion 510. The flange 520 may be formed like '¬' and may include a horizontal extension 521 and a downward extension 522 that extends downward from the horizontal extension 521.

[0049] The flange 520 is configured in at least two and the at least two moving members 500 are positioned at opposite sides.

[0050] The flange 520 of the moving member 500 is configured to come in contact with the rotating member 400 and may be caught thereby. To this end, the rotating member 400 may be configured in an approximately circular plate and includes a contact portion 410 that extends therearound.

[0051] The contact portion 410 may be provided with a lateral cross section shaped like '¬'. An extension piece 420 is provided between the contact portion 410, and a plurality of slit portions 430 formed in a narrow shape are provided between the extension piece 420 and the contact portion 410, in which case a one-end portion 23a of the third elastic restoration member 23 is caught by any one slit portion 430.

[0052] The other-end portion 23b of the third elastic restoration member 23 is installed to be caught by the housing 100.

[0053] Here, the flange 520 and the contact portion 410 may selectively come into contact with each other or may be spaced apart from each other depending on rotation of the second output gear 14 and the moving member 500.

[0054] The EGR valve 200 may be coupled to the first shaft 210 by a predetermined coupling member, and the first shaft 210 may be coupled to the first output gear 13 through the EGR flow passage 120. Thus, whenever the first output gear 13 rotates, an opening degree of the EGR flow passage 120 may be adjusted or the EGR flow passage 120 may be open or closed while the first shaft 210 and the EGR valve 200 coupled thereto rotate.

[0055] A magnet 220 indicating a rotation state of the first shaft 210 may be provided at an end portion of the first shaft 210, and a hall sensor (not shown) may be provided at an opposite side. The hall sensor may be provided on a housing cover 30.

[0056] A butterfly type of the fresh air valve 300 may be coupled to the second shaft 310 through a predetermined coupling member, and the second shaft 310 may be fixed to the rotating member 400 through the fresh air flow passage 110. As the rotating member 400 rotates, an opening degree of the fresh air flow passage 110 may be adjusted or the fresh air flow passage 110 may be open or closed while the second shaft 310 and the fresh air valve 300 coupled thereto rotate.

[0057] A reference numeral 600 that is not described may be a bearing 600, and the bearing 600 may be installed at an end of the second shaft 310 while being inserted into the center of rotation of the second output gear 14, and thus the second output gear 14 may be rotatably supported by the second shaft 310. Here, the bearing 600 may be configured as a needle bearing or different bearing structures.

[0058] As shown in FIG. 3, a protrusion rib 17 protruding from the housing 100 is formed around the second output gear installation portion 16 provided on the housing 100, and a narrow slot 17a is formed in the protrusion rib 17.

[0059] The rotating member 400 may be rotatably installed on the protrusion rib 17, and the third elastic restoration member 23 may be installed below the rotating member 400. A one-end portion 23b of the third elastic restoration member 23 is inserted into the slot 17a provided in the protrusion rib 17, and the other-end portion 23a of the third elastic restoration member 23 is caught by one side of the rotating member 400.

[0060] As described above, the second shaft 310 is fixed to the center of the rotating member 400, and an end portion of the second shaft 310 may protrude. A bearing (not shown) may be installed on the protruding portion of the second shaft 310, and the bearing may be installed on the second output gear 14, and thus the second output gear 14 may be rotatably supported by the second shaft 310.

[0061] The moving member 500 may be fixed to a lower surface of the second output gear 14, and the second output gear 14, the moving member 500, and the rotating member 400 may be arranged to configure respective layers in the order stated in upward and downward directions.

[0062] An external circumference of the flange 520 of the moving member 500 may be smaller than that of the contact portion 410 of the rotating member 400 and may be larger than that of another portion (e.g., the extension piece 420) on which the contact portion is not formed.

[0063] Accordingly, when the second output gear 14 and the moving member 500 rotate, the flange 520 may get past the portion of an outer circumference of the rotating member 400, on which the contact portion 410 is not formed, and may be caught by the contact portion 410.

[0064] A part of the protrusion rib 17 may protrude upward to form a stopper 19. The stopper 19 may be disposed on a route on which the contact portion 410 moves and may come into contact with the contact portion 410 in order to prevent the rotating member 400 from exces-

sively rotating when the rotating member 400 rotates.

[0065] As shown in FIG. 4, in a valve 1 for a vehicle, the EGR valve 200 may completely close the EGR flow passage 120 in an ordinary state in which a motor is not driven, and the fresh air valve 300 may completely open the fresh air flow passage 110.

[0066] In this case, EGR gas may be prevented from being introduced into an engine.

[0067] In the state in which the EGR valve 200 may completely close the EGR flow passage 120 and the fresh air valve 300 completely opens the fresh air flow passage 110, the fresh air valve 300 may be disposed parallel to a direction in which the fresh air flow passage 110 is disposed and the EGR valve 200 may be disposed to cross the EGR flow passage 120 in a perpendicular direction to a direction in which the EGR flow passage 120 is disposed, as shown in FIG. 5.

[0068] In this case, the motor gear 11 and the large-diameter portion of the intermediate gear 12 may be engaged with each other, the small-diameter portion of the intermediate gear 12 and the first output gear 13 may be engaged with each other, the first output gear 13 and the second output gear 14 may be engaged with each other.

[0069] In this state, a one-end portion of the first output gear 13 and the other-end portion of the second output gear 14 may be engaged with each other. The flange 520 of the moving member 500 fixed to the second output gear 14 may be spaced apart from the contact portion 410 of the rotating member 400 fixed to the second shaft 310.

[0070] Hereinafter, an operation according to the present disclosure will be described.

[0071] As shown in FIG. 6, in the state in which power is not applied to the motor 10, the one-end portion of the first output gear 13 and the other-end portion of the second output gear 14 may be engaged with each other, the EGR valve 200 may block and completely close the EGR flow passage 120, and the fresh air valve 300 may completely open the fresh air flow passage 110.

[0072] In this case, EGR gas may be prevented from being introduced into the fresh air flow passage 110.

[0073] In this state, the flange 520 of the moving member 500 may be spaced apart from the contact portion 410 of the rotating member 400.

[0074] In this case, when power is applied to the motor 10 in order to re-introduce EGR gas to the engine, the motor gear 11 and the intermediate gear 12 may rotate, and accordingly, the first output gear 13 may rotate, and the second output gear 14 engaged with the first output gear 13 may also rotate, as shown in FIG. 7.

[0075] In this state, a region between a one-end portion and a central portion of the first output gear 13 and a central region of the second output gear 14 may be engaged with each other.

[0076] Since the first shaft 210 is fixed to the first output gear 13, the first shaft 210 may also rotate by an angle at which the first output gear 13 rotates and the EGR valve 200 fixed to the first shaft 210 may also rotate, and accordingly, the EGR flow passage 120 may also be partially open.

[0077] Accordingly, EGR gas may begin to be introduced into the fresh air flow passage 110.

[0078] However, the second output gear 14 may be rotatably disposed rather than being fixed to the second shaft 310, and accordingly, even if the second output gear 14 rotates, the second shaft 310 may not rotate.

[0079] However, the moving member 500 is fixed to the second output gear 14, and thus the second moving member 500 may rotate by an angle at which the second output gear 14 rotates, and the flange 520 of the moving member 500 may come into contact with the contact portion 410 of the rotating member 400.

[0080] In this case, the fresh air valve 300 may also be maintained to completely open the fresh air flow passage 110.

[0081] Accordingly, a relative ratio of a flow amount of fresh air to a flow amount of EGR gas is great, and thus a ratio of EGR gas of gas flowed to the engine may be relatively small.

[0082] In this state, when the state in which power applied to the motor is maintained, the first output gear 13 and the second output gear 14 engaged therewith may further rotate. In this state, a central region of the first output gear 13 and a one-end portion of the second output gear 14 may be engaged with each other.

[0083] When the first output gear 13 further rotates (counterclockwise direction), the EGR valve 200 may completely open the EGR flow passage 120. That is, the EGR valve 200 may be disposed parallel to a longitudinal direction of the EGR flow passage 120.

[0084] When the second output gear 14 further rotates, the flange 520 of the moving member 500 may rotate the rotating member 400 in a clockwise direction by pushing the contact portion 410 of the rotating member 400, as shown in FIG. 8.

[0085] In this case, an opening degree of the fresh air valve 300 with respect to the fresh air flow passage 110 may be reduced, and an opening degree of the EGR valve 200 with respect to the EGR flow passage 120 may be increased.

[0086] Since the rotating member 400 is fixedly coupled to the second shaft 310 and the fresh air valve 300 is disposed in the second shaft 310, the second shaft 310 and the fresh air valve 300 may rotate by a degree by which the rotating member 400 rotates, and accordingly, the fresh air flow passage 110 may be partially closed and an opening degree of the fresh air valve 300 may be reduced.

[0087] However, such rotation is not infinitely possible and is performed until the contact portion 410 comes into contact with the stopper 19 provided in the housing 100.

[0088] When the contact portion 410 comes into contact with the stopper 19, rotation of the rotating member 400, the moving member 500, and the second output gear 14 may not proceed any longer, and accordingly, rotation of the first output gear 13 may also stop.

[0089] The timing at which rotation of the first output gear 13 stops may correspond to the state in which the EGR valve 200 opens the EGR flow passage 120 by a maximum degree, that is, the state in which the EGR valve 200 is positioned parallel to the EGR flow passage 120, and in this case, a flow amount of EGR gas introduced into the fresh air flow passage 110 may be highest, and a ratio of EGR gas to gas introduced into the engine may be increased compared with the state of FIG. 7.

[0090] According to the present disclosure, an opening degree of a fresh air valve and an EGR valve may be adjusted through selective contact between a moving member and a rotating member and an operation in which the moving member pushes the rotating member, and thus the timing at which the opening degree is adjusted may be precisely adjusted.

[0091] When the moving member and the rotating member are formed of a metallic material, wear resistance may also be improved.

[0092] Because a first output gear rotates an EGR valve and simultaneously transfers rotating power to a second output gear, the first output gear may be capable of performing a multi-function, and accordingly, the number of gears for power transfer only may be reduced, thereby advantageously improving a utilization degree of space and achieving a compact size.

[0093] While the disclosure has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention as defined by the appended claims.

Claims

1. A valve (1) for a vehicle comprising:

a housing (100) in which an exhaust gas recirculation (EGR) flow passage (120) and a fresh air flow passage (110) are formed;
a driving motor (10);
a gear train connected to the driving motor;
a first output gear (13) and a second output gear (14) that are included in the gear train;
a moving member (500) installed on the second output gear and rotating together with the second output gear;
a first shaft (210) on which an EGR valve (200) is installed and the first shaft fixed to the first output gear;
a second shaft (310) on which a fresh air valve (300) is installed;
a rotating member (400) that is connected to the second shaft (310) and that rotates together with the moving member (500) and the fresh air valve (300) and the second output gear (14) and simultaneously rotates the second shaft (310) when the rotating member (400) selectively comes into contact with the moving member (500) of the second shaft (310) to contact the moving member (500) and then pushes the moving member (500),
a third elastic restoration member (23) installed between a second output gear installation portion (16) in the housing (100) and the second output gear (14),
characterized in that
the moving member (500) comprises:

a base portion (510) fixed to the second output gear (14); and
a flange (520) protruding from the base portion (510) and provided to contact the rotating member (400) and is configured in plural at opposite sides,

wherein the rotating member (400) comprises:

a fixing hole which the second shaft fixedly penetrates;
a contact portion (410) protruding to allow the moving member to reach and come into contact with the contact portion (410),
an extension piece (420) provided between the contact portion (410),
a plurality of slit portions (430) formed between the extension piece (420) and the contact portion (410),
wherein the third elastic restoration member (23) has a one-end portion (23b) inserted into a slot (17a) in the second output gear installation portion (16), and the other-end portion (23a) caught by any one slit portion (430).

2. The valve of claim 1, wherein the flange and the contact portion (410) selectively come into contact with each other or are spaced apart from each other depending on rotation of the second output gear and the moving member.

3. The valve of claim 1, wherein the gear train comprises

a motor gear (11) connected to a motor axis;
an intermediate gear (12) engaged with the motor gear (11);
the first output gear (13) engaged with the intermediate gear (12); and
the second output gear (14) engaged with the first output gear (13).

4. The valve of claim 1, wherein, when the EGR valve (200) is completely closed and the fresh air valve (300) is completely open, if a motor (10) is driven,

the first output gear (13) rotates to begin to open the EGR valve (200), and the second output gear (14) engaged with the first output gear (13) also rotates, but in contrast, the rotating member (400) and the second shaft (310) do not rotate before the moving member (500) comes into contact with the rotating member (400) to maintain the fresh air valve (300) to be completely open.

5. The valve of claim 4, wherein the motor (10) is further driven when the EGR valve (200) is partially open and the fresh air valve (300) is completely open, and when the moving member (500) comes into contact with the rotating member (400) and then further rotates, the rotating member (400) and the second shaft (310) rotate and the fresh air valve (300) begins to perform a closing operation.

6. The valve of claim 1, further comprising
a stopper (19) provided on the housing (100), provided adjacent to the rotating member (400), provided to come contact with the contact portion (410), and configured to prevent the rotating member (400) from rotating by a predetermined degree or greater.

7. The valve of claim 1, wherein the first output gear (13) is fixed to the first shaft (210) and allows the first shaft (210) and the EGR valve (200) fixed thereto to rotate as the first output gear (13) rotates; and
wherein the second output gear (14) is rotatably installed on the second shaft (310) and the second shaft (310) is not affected by rotation of the second output gear (14) before the moving member (500) installed on the second output gear (14) comes into contact with the rotating member (400).

8. The valve of claim 1, wherein, when the fresh air flow passage (110) is completely open and the EGR flow passage (120) is completely closed, the moving member (500) and the rotating member (400) do not contact each other;

wherein, when the fresh air flow passage (110) is completely open and the EGR flow passage (130) is partially open, the moving member (500) and the rotating member (400) are provided to contact each other; and
wherein, when the moving member (500) pushes the rotating member (400), an opening degree of the fresh air valve (300) with respect to the fresh air flow passage (110) is reduced, and an opening degree of the EGR valve (200) with respect to the EGR flow passage (120) is increased.

Patentansprüche

1. Ventil (1) für ein Fahrzeug umfassend:

ein Gehäuse (100), in dem ein Abgasrückführungs (*exhaust gas recirculation*; EGR)-Strömungsdurchgang (120) und ein Frischluft-Strömungsdurchgang (110) gebildet sind;
einen Antriebsmotor (10);
einen Getriebezug, der mit den Antriebsmotor verbunden ist;
ein erstes Ausgangszahnrad (13) und ein zweites Ausgangszahnrad (14), die in dem Getriebezug umfasst sind;
ein Bewegungselement (500), das an dem zweiten Ausgangszahnrad installiert ist und sich zusammen mit dem zweiten Ausgangszahnrad dreht;
eine erste Welle (210), an der ein EGR-Ventil (200) installiert ist, wobei die erste Welle an dem ersten Ausgangszahnrad fixiert ist;
eine zweite Welle (310), an der ein Frischluftventil (300) installiert ist;
ein Drehelement (400), das mit der zweiten Welle (310) verbunden ist und das sich zusammen mit dem Bewegungselement (500) und dem Frischluftventil (300) und dem zweiten Ausgangszahnrad (14) dreht und gleichzeitig die zweite Welle (310) dreht, wenn das Drehelement (400) selektiv in Kontakt mit dem Bewegungselement (500) der zweiten Welle (310) kommt, um das Bewegungselement (500) zu kontaktieren, und dann das Bewegungselement (500) schiebt,
ein drittes elastisches Rückstellelement (23), das zwischen einem zweiten Ausgangszahnrad-Installationsabschnitt (16) in dem Gehäuse (100) und dem zweiten Ausgangszahnrad (14) installiert ist,
dadurch gekennzeichnet, dass
das Bewegungselement (500) umfasst:

einen Basisabschnitt (510), der an dem zweiten Ausgangszahnrad (14) fixiert ist; und
einen Flansch (520), der von dem Basisabschnitt (510) vorsteht und dazu vorgesehen ist, das Drehelement (400) zu kontaktieren, und an gegenüberliegenden Seiten in der Mehrzahl konfiguriert ist,

wobei das Drehelement (400) umfasst:

ein Fixierloch, das die zweite Welle fixiert durchdringt;
einen Kontaktabschnitt (410), der vorsteht, um zu erlauben, dass das Bewegungselement den Kontaktabschnitt (410) erreicht

und mit ihm in Kontakt kommt,
ein Erstreckungsteil (420), das zwischen dem Kontaktabschnitt (410) vorgesehen ist,
eine Vielzahl von Schlitzabschnitten (430), die zwischen dem Erstreckungsteil (420) und dem Kontaktabschnitt (410) vorgesehen sind,
wobei das dritte elastische Rückstellelement (23) einen Abschnitt (23b) an einem Ende, der in einen Schlitz (17a) in dem zweiten Ausgangszahnrad-Installationsabschnitt (16) eingefügt ist, und den Abschnitt (23a) an dem anderen Ende aufweist, der durch irgendeinen Schlitzabschnitt gefangen ist.

2. Ventil nach Anspruch 1, wobei der Flansch und der Kontaktabschnitt (410) abhängig von einer Drehung des zweiten Ausgangszahnrads und des Drehelements selektiv miteinander in Kontakt kommen oder voneinander beabstandet sind.

3. Ventil nach Anspruch 1, wobei der Getriebezug umfasst:

ein Motorzahnrad (11), das mit einer Motorachse verbunden ist;
ein Zwischenzahnrad (12), das mit dem Motorzahnrad (11) in Eingriff ist;
das erste Ausgangszahnrad (13), das mit dem Zwischenzahnrad (12) in Eingriff ist; und
das zweite Ausgangszahnrad (14), das mit dem ersten Ausgangszahnrad (13) in Eingriff ist.

4. Ventil nach Anspruch 1, wobei, wenn das EGR-Ventil (200) vollständig geschlossen ist und das Frischluftventil (300) vollständig offen ist, falls ein Motor (10) angetrieben wird, sich das erste Ausgangszahnrad (13) dreht, um zu beginnen, das EGR-Ventil (200) zu öffnen, und sich das zweite Ausgangszahnrad (14), das mit dem ersten Ausgangszahnrad (13) in Eingriff ist, auch dreht, aber im Gegensatz dazu sich das Drehelement (400) und die zweite Welle (310) nicht drehen, bevor das Bewegungselement (500) mit dem Drehelement (400) in Kontakt kommt, um das Frischluftventil (300) vollständig offen zu halten.

5. Ventil nach Anspruch 4, wobei der Motor (10) weiter angetrieben wird, wenn das EGR-Ventil (200) teilweise offen ist und das Frischluftventil (300) vollständig offen ist, und wenn das Bewegungselement (500) in Kontakt mit dem Drehelement (400) kommt und sich dann weiter dreht, sich das Drehelement (400) und die zweite Welle (310) drehen und das Frischluftventil (300) beginnt, einen Schließvorgang durchzuführen.

6. Ventil nach Anspruch 1, ferner umfassend:
einen Anschlag (19), der an dem Gehäuse (100) vorgesehen ist, der angrenzend an das Drehelement (400) vorgesehen ist, der vorgesehen ist, um mit dem Kontaktabschnitt (410) in Kontakt zu kommen, und der dazu konfiguriert ist, zu verhindern, dass sich das Drehelement (400) um einen vorbestimmten Grad oder mehr dreht.

7. Ventil nach Anspruch 1, wobei das erste Ausgangszahnrad (13) an der ersten Welle (210) fixiert ist und erlaubt, dass sich die erste Welle (210) und das daran fixierte EGR-Ventil (200) drehen, wenn sich das erste Ausgangszahnrad (13) dreht; und
wobei das zweite Ausgangszahnrad (14) drehbar an der zweiten Welle (310) installiert ist und die zweite Welle (310) durch eine Drehung des zweiten Ausgangszahnrads (14) nicht beeinflusst wird, bevor das an dem zweiten Ausgangszahnrad (14) installierte Bewegungselement (500) in Kontakt mit dem Drehelement (400) kommt.

8. Ventil nach Anspruch 1, wobei, wenn der Frischluft-Strömungsdurchgang (110) vollständig offen ist und der EGR-Strömungsdurchgang (120) vollständig geschlossen ist, das Bewegungselement (500) und das Drehelement (400) einander nicht kontaktieren;

wobei, wenn der Frischluft-Strömungsdurchgang (110) vollständig offen ist und der EGR-Strömungsdurchgang (120) teilweise offen ist, das Bewegungselement (500) und das Drehelement (400) dazu vorgesehen sind, einander zu kontaktieren; und
wobei, wenn das Bewegungselement (500) das Drehelement (400) schiebt, ein Öffnungsgrad des Frischluftventils (300) in Bezug auf den Frischluft-Strömungsdurchgang (110) reduziert wird, und ein Öffnungsgrad des EGR-Ventils (200) in Bezug auf den EGR- Strömungsdurchgang (120) vergrößert wird.

Revendications

1. Vanne (1) pour un véhicule comprenant :

un logement (100) dans lequel un passage d'écoulement (120) de recirculation des gaz d'échappement (EGR) et un passage d'écoulement d'air frais (110) sont formés ;
un moteur d'entraînement (10) ;
un train d'engrenages relié au moteur d'entraînement ;
un premier engrenage de sortie (13) et un second engrenage de sortie (14) qui sont inclus dans le train d'engrenages ;
un élément mobile (500) installé sur le second

engrenage de sortie et tournant conjointement avec le second engrenage de sortie ;
un premier arbre (210) sur lequel une vanne EGR (200) est installée et le premier arbre est fixé au premier engrenage de sortie ;
un second arbre (310) sur lequel une vanne d'air frais (300) est installée ;
un élément rotatif (400) qui est relié au second arbre (310) et qui tourne conjointement avec l'élément mobile (500) et la vanne d'air frais (300) et le second engrenage de sortie (14) et tourne simultanément le second arbre (310) lorsque l'élément rotatif (400) vient en contact de manière sélective avec l'élément mobile (500) du second arbre (310) pour être en contact avec l'élément mobile (500) puis pousse l'élément mobile (500),
un troisième élément de restauration élastique (23) installé entre une portion d'installation de second engrenage de sortie (16) dans le logement (100) et le second engrenage de sortie (14),
caractérisée en ce que l'élément mobile (500) comprend :

une portion de base (510) fixée au second engrenage de sortie (14) ; et
une bride (520) faisant saillie à partir de la portion de base (510) et prévue pour être en contact avec l'élément rotatif (400) et est configurée de manière plurielle sur des côtés opposés,

dans laquelle l'élément rotatif (400) comprend :

un orifice de fixation dans lequel le second arbre pénètre de manière fixe ;
une portion de contact (410) faisant saillie pour permettre à l'élément mobile d'atteindre et de venir en contact avec la portion de contact (410),
une pièce d'extension (420) prévue entre la portion de contact (410),
une pluralité de portions de fentes (430) formées entre la pièce d'extension (420) et la portion de contact (410),
dans laquelle le troisième élément de restauration élastique (23) présente une première portion d'extrémité (23b) insérée dans une lumière (17a) dans la seconde portion d'installation d'engrenage de sortie (16), et l'autre portion d'extrémité (23a) étant attrapée par une quelconque portion de fente (430).

2. Vanne selon la revendication 1, dans laquelle la bride et la portion de contact (410) viennent sélectivement en contact l'une avec l'autre ou sont distantes l'une de l'autre en fonction de la rotation du second engrenage de sortie et de l'élément mobile.

3. Vanne selon la revendication 1, dans laquelle le train d'engrenages comprend :

un engrenage de moteur (11) relié à un axe de moteur ;
un engrenage intermédiaire (12) engagé avec l'engrenage de moteur (11) ;
le premier engrenage de sortie (13) engagé avec l'engrenage intermédiaire (12) ; et
le second engrenage de sortie (14) engagé avec le premier engrenage de sortie (13).

4. Vanne selon la revendication 1, dans laquelle, lorsque la vanne EGR (200) est entièrement fermée et la vanne d'air frais (300) est entièrement ouverte, si un moteur (10) est entraîné, le premier engrenage de sortie (13) tourne pour commencer à ouvrir la vanne EGR (200), et le second engrenage de sortie (14) engagé avec le premier engrenage de sortie (13) tourne également, mais par contre l'élément rotatif (400) et le second arbre (310) ne tournent pas avant que l'élément mobile (500) ne vienne en contact avec l'élément rotatif (400) pour maintenir la vanne d'air frais (300) ouverte entièrement.

5. Vanne selon la revendication 4, dans laquelle le moteur (10) est en outre entraîné lorsque la vanne EGR (200) est partiellement ouverte et la vanne d'air frais (300) est entièrement ouverte, et lorsque l'élément mobile (500) vient en contact avec l'élément rotatif (400) puis continue à tourner, l'élément rotatif (400) et le second arbre (310) tournent et la vanne d'air frais (300) commence à réaliser une opération de fermeture.

6. Vanne selon la revendication 1, comprenant en outre :
une butée (19) prévue sur le logement (100), prévue de manière adjacente à l'élément rotatif (400), prévue pour venir en contact avec la portion de contact (410), et configurée pour empêcher l'élément rotatif (400) de tourner selon un degré prédéterminé ou plus.

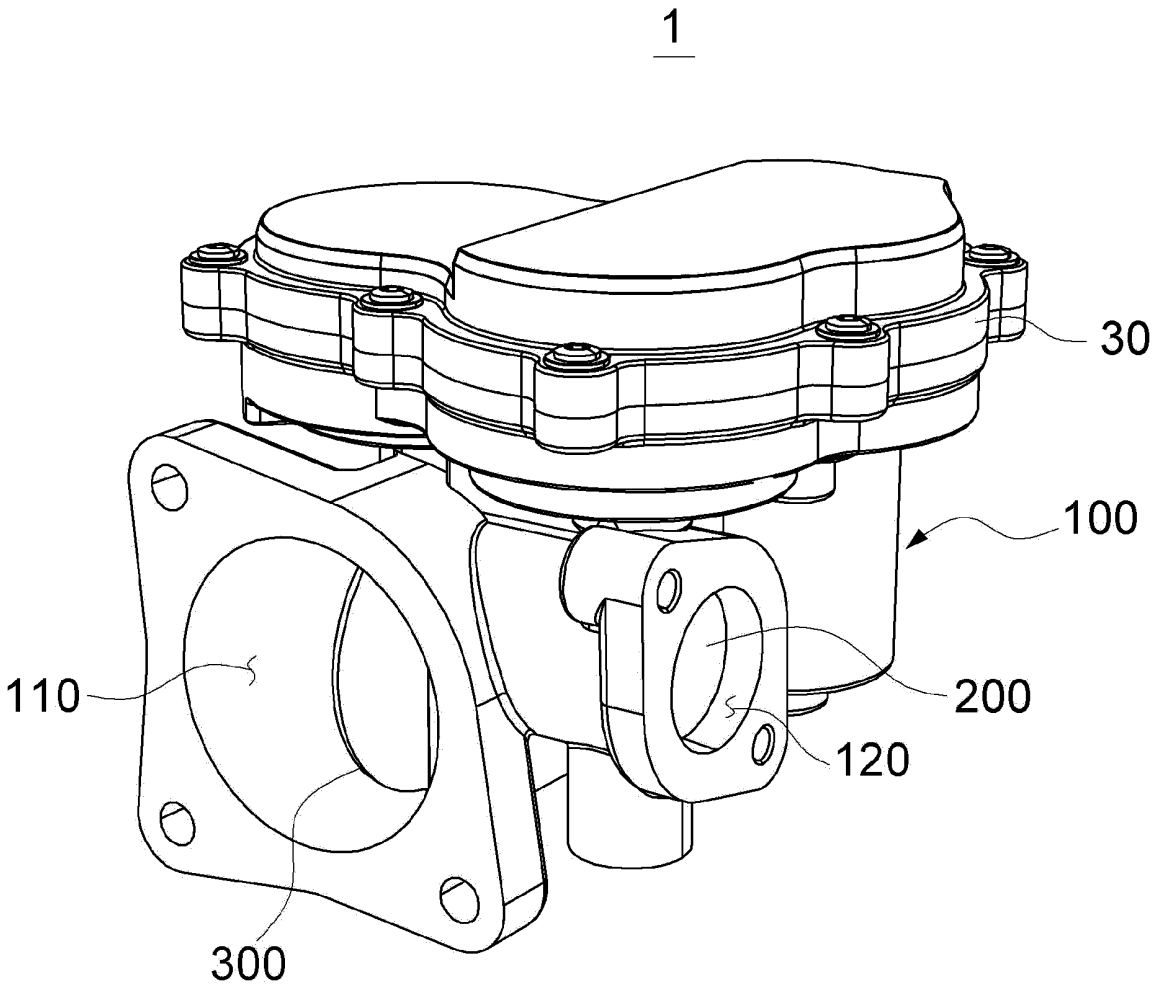
7. Vanne selon la revendication 1, dans laquelle le premier engrenage de sortie (13) est fixé au premier arbre (210) et permet au premier arbre (210) et à la vanne EGR (200) fixée à celui-ci de tourner lorsque le premier engrenage de sortie (13) tourne ; et
dans laquelle le second engrenage de sortie (14) est installé de manière rotative sur le second arbre (310) et le second arbre (310) n'est pas affecté par la rotation du second engrenage de sortie (14) avant que l'élément mobile (500) installé sur le second engrenage de sortie (14) ne vienne en contact avec l'élé-

ment rotatif (400).

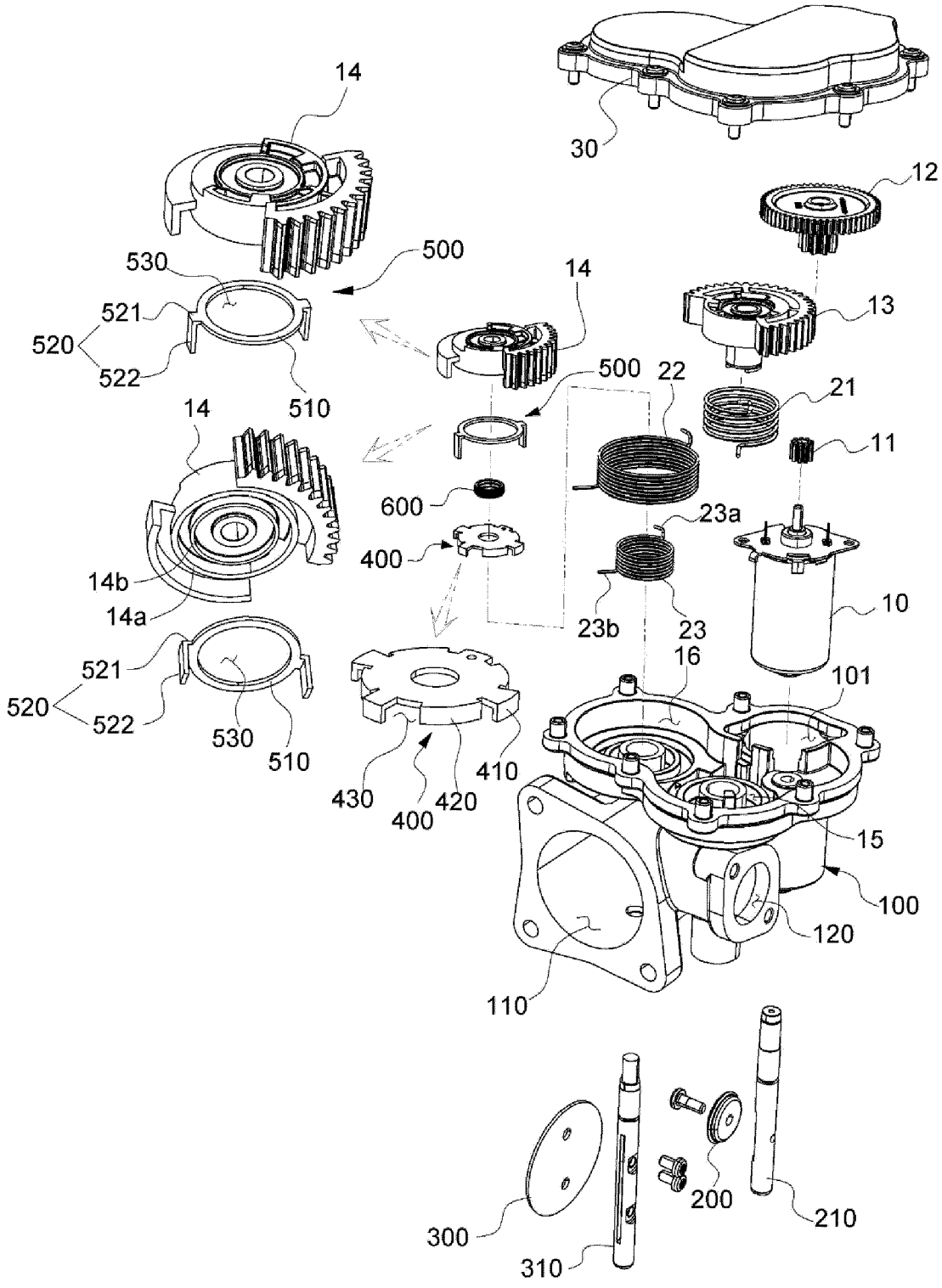
8. Vanne selon la revendication 1, dans laquelle, lorsque le passage d'écoulement d'air frais (110) est entièrement ouvert et le passage d'écoulement EGR (120) est entièrement fermé, l'élément mobile (500) et l'élément rotatif (400) ne sont pas en contact l'un avec l'autre ;

dans laquelle, lorsque le passage d'écoulement d'air frais (110) est entièrement ouvert et le passage d'écoulement EGR (120) est partiellement ouvert, l'élément mobile (500) et l'élément rotatif (400) sont prévus pour être en contact l'un avec l'autre ; et
dans laquelle, lorsque l'élément mobile (500) pousse l'élément rotatif (400), un degré d'ouverture de la vanne d'air frais (300) par rapport au passage d'écoulement d'air frais (110) est réduit, et un degré d'ouverture de la vanne EGR (200) par rapport au passage d'écoulement EGR (120) est augmenté.

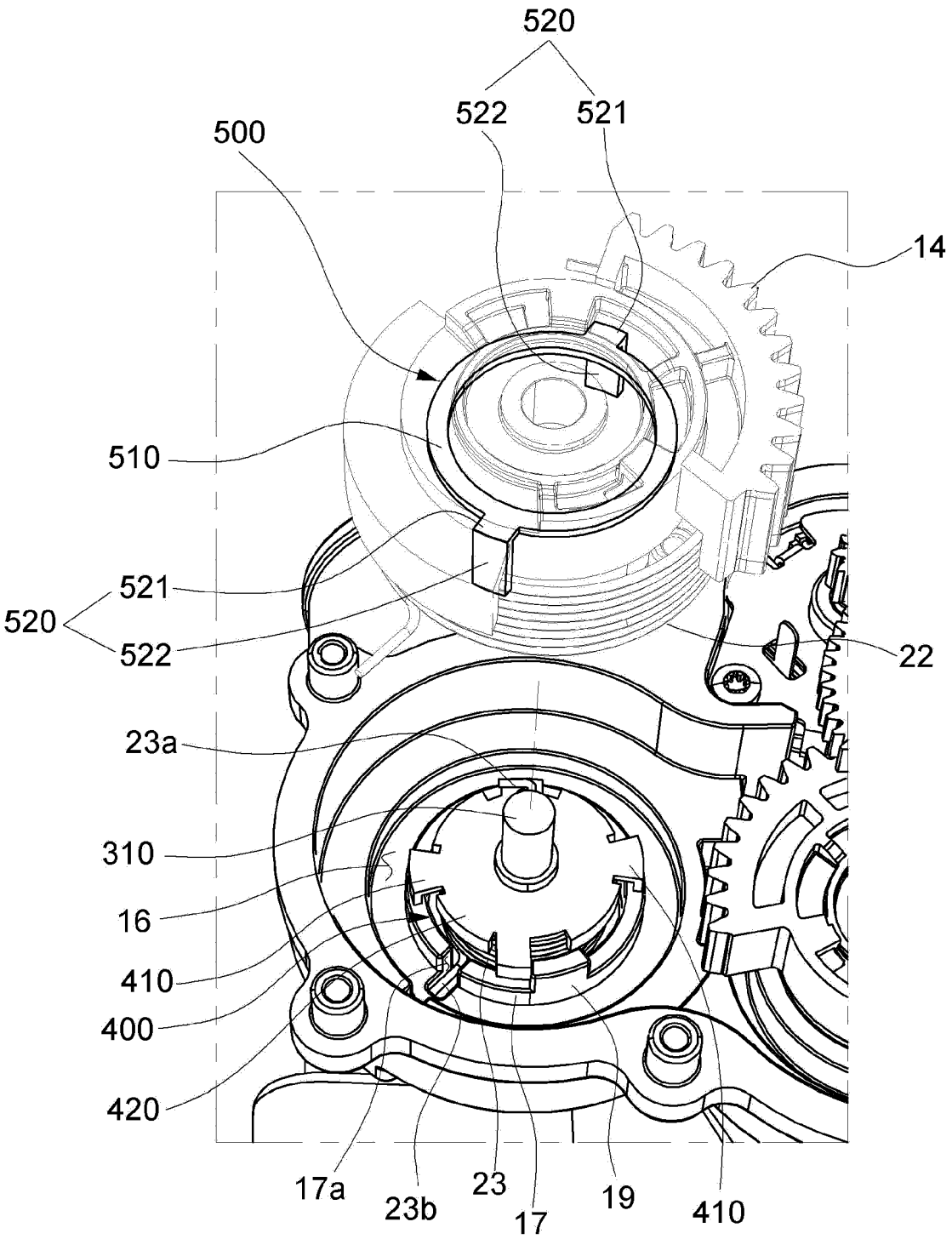
【Fig. 1】



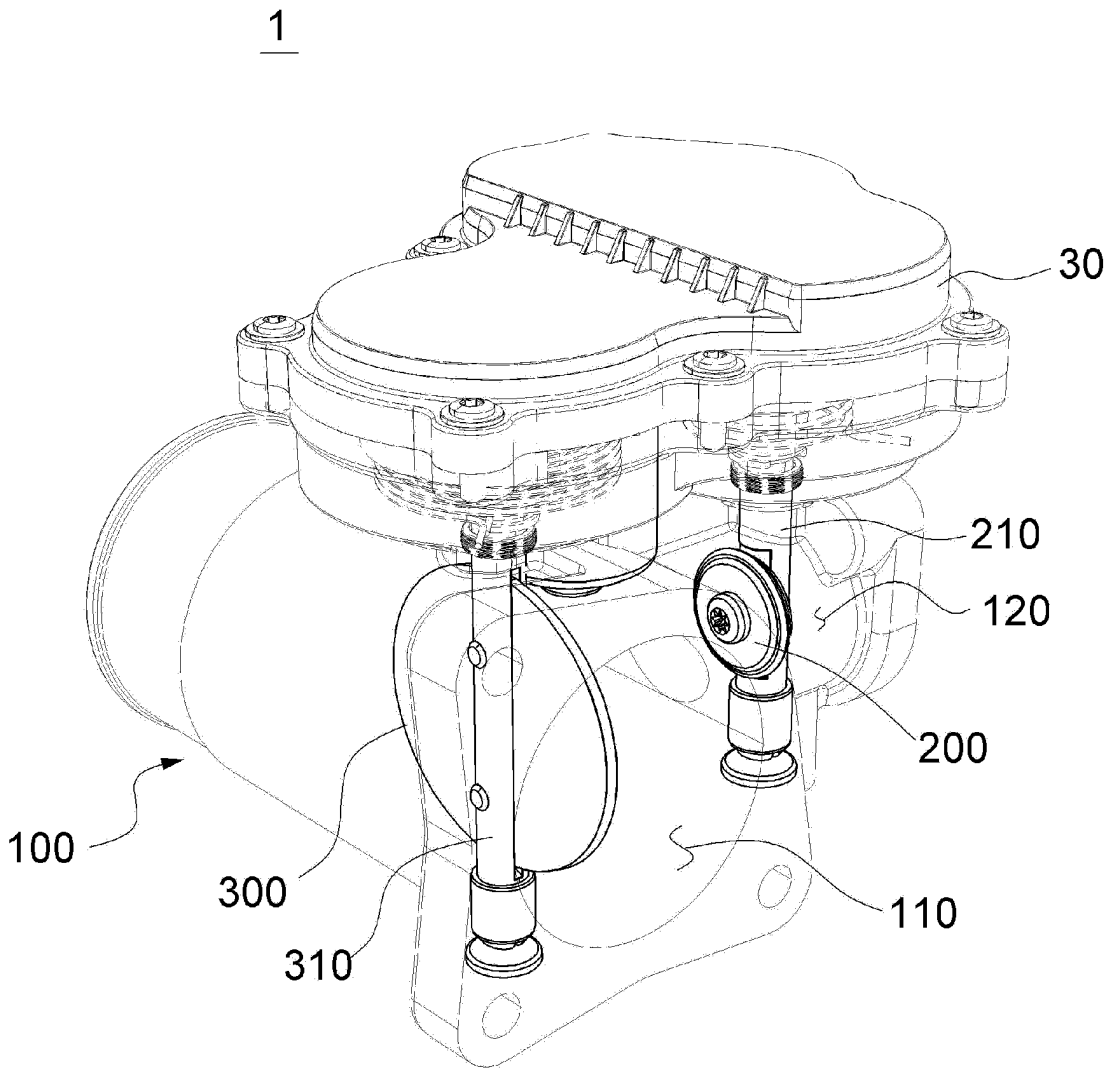
【Fig. 2】


14
30
12
530
500
14
13
521
520
522
510
500
22
21
14
11
600
23a
400
14b
14a
10
23b
23
16
521
520
522
530
510
101
430
400
420
410
15
100
120
110
300
200
210
310

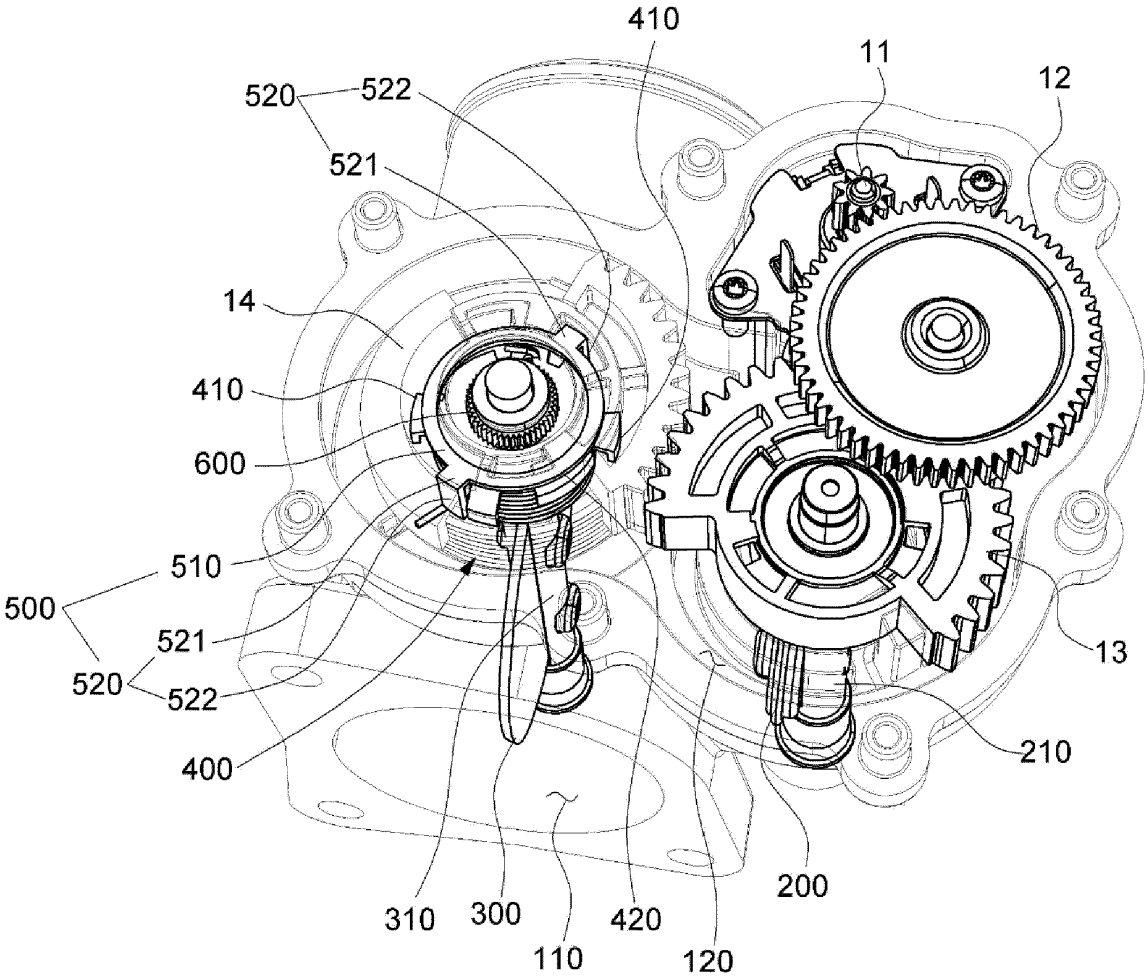
【Fig. 3】


520
522
521
500
14
510
521
520
522
22
23a
310
16
410
400
420
17a
23b
23
17
19
410

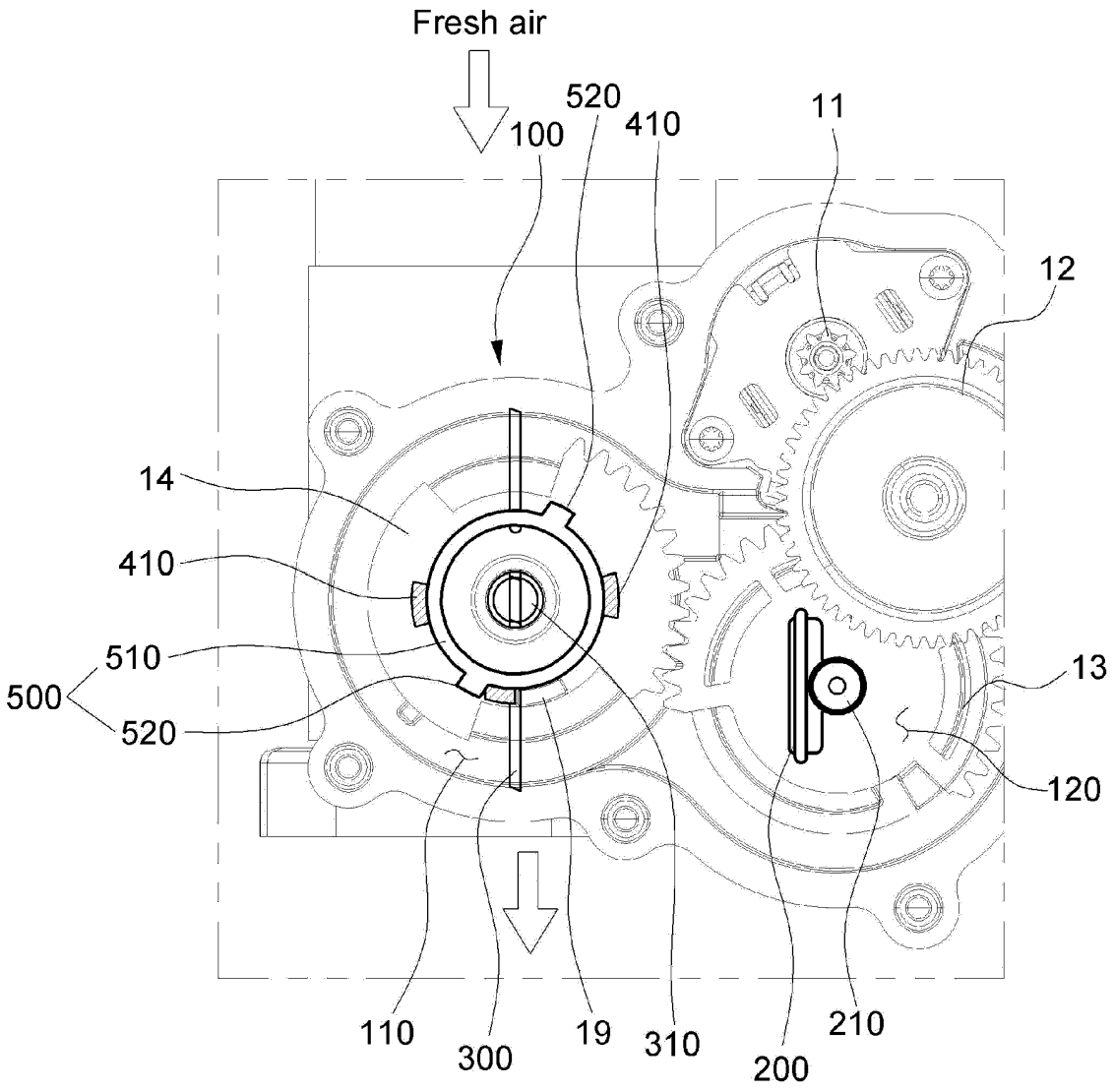
【Fig. 4】



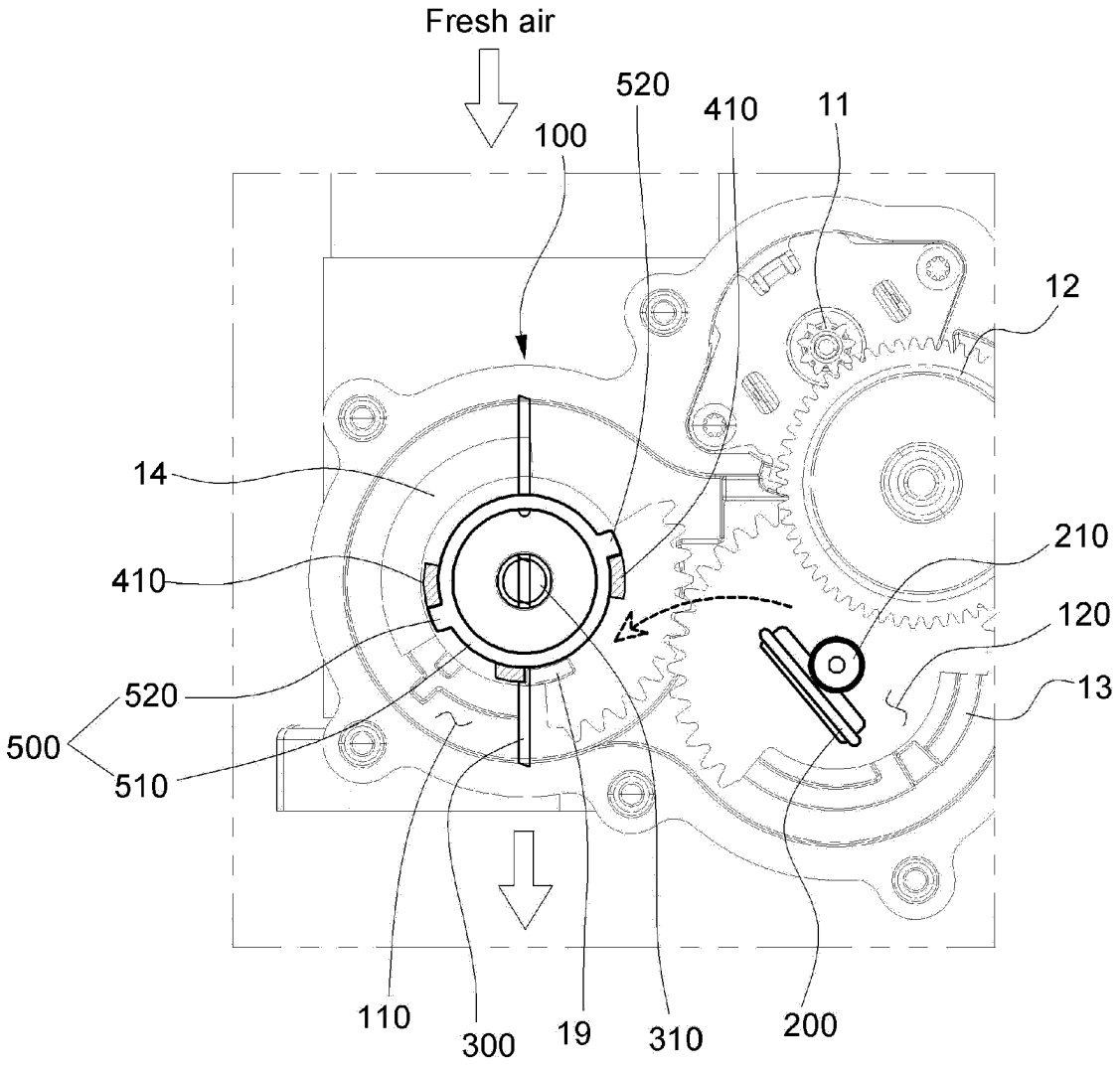
【Fig. 5】


410
11
12
520
522
521
14
410
600
510
500
521
520
522
400
13
210
200
310
300
420
110
120

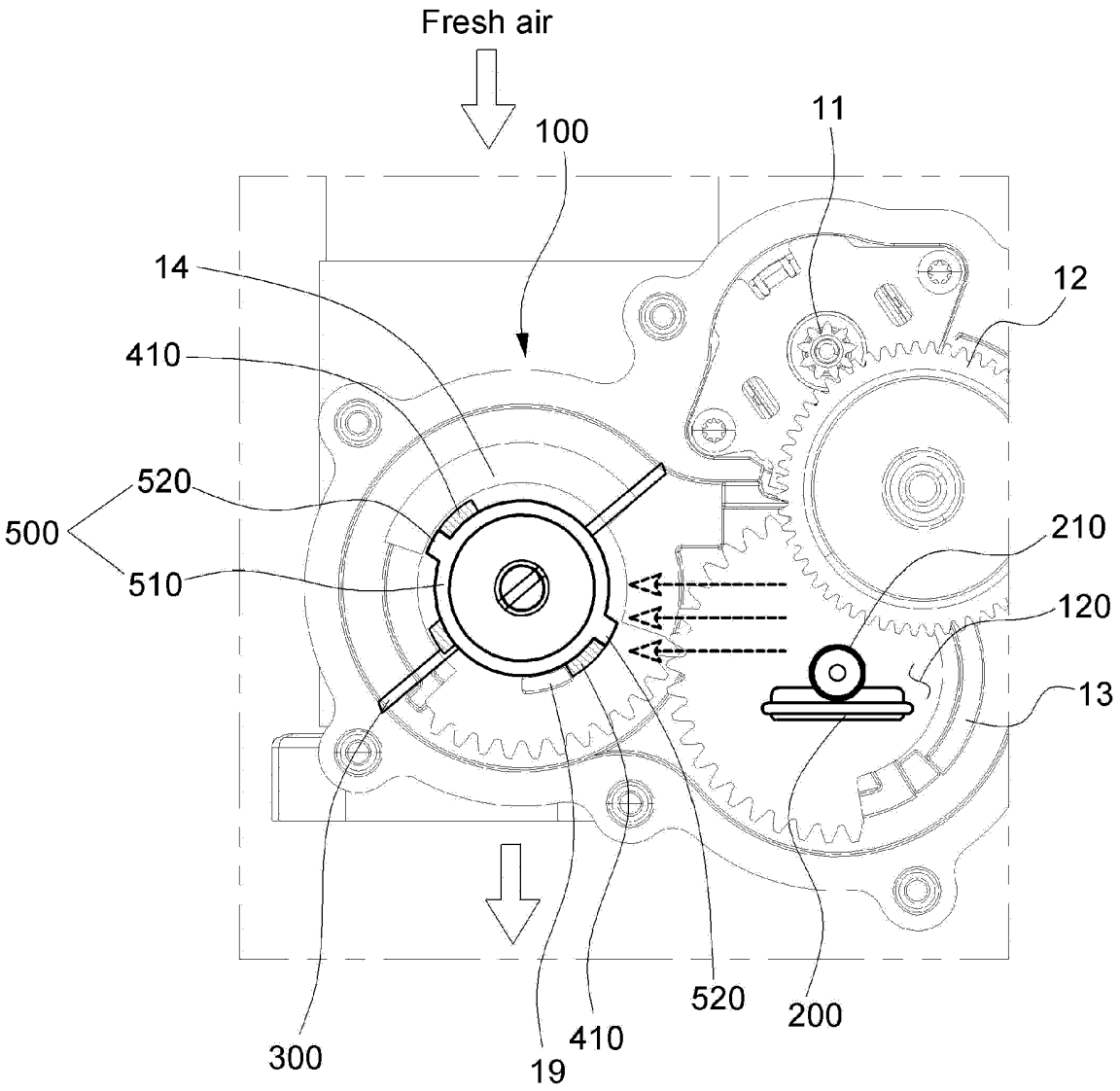
【Fig. 6】


Fresh air
520
410
11
100
12
14
410
510
500
520
13
120
110
300
19
310
200
210

【Fig. 7】


Fresh air
520
410
11
100
12
14
210
410
120
520
13
500
510
110
300
19
310
200

【Fig. 8】


Fresh air
100
11
14
12
410
520
500
510
210
120
13
300
19
410
520
200

REFERENCES CITED IN THE DESCRIPTION

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