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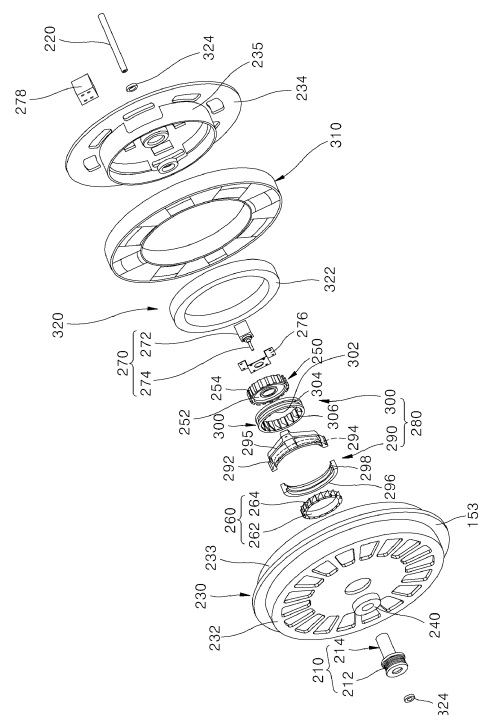
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(54) **FREEWHEEL ADJUSTABLE WHEEL AND EXERCISE BIKE HAVING SAME**

(57) A freewheel adjustable wheel of the present invention comprises: a rotary gear unit that is rotated by receiving power from a pedal part and is provided with a gear along the outer circumference thereof; a case part that supports the rotary gear unit to be rotatable; a clutch bearing that transmits the power to the case part when the rotary gear unit rotates in the forward direction; a clutch hub that rotates together with the rotary gear unit; clutch gears installed on the clutch hub and fixed to the case part; and a drive unit that supplies rotational power; and a moveable gear unit moved by means of the power of the driving unit.

[FIG. 4]



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Description

[Technical Field]

[0001] The present disclosure relates to a freewheel adjustable wheel and an exercise bike equipped with the same that may automatically adjust whether to transmit power of a pedal to a wheel when the pedal is rotated in a reverse direction.

[Background Art]

[0002] In general, as indoor exercise equipment to strengthen muscle strength, weight-lifting equipment to strengthen muscle strength and aerobic exercise equipment to strengthen a cardiopulmonary function are widely used as fitness equipment.

[0003] The aerobic exercise equipment is broadly categorized into treadmills that allow a user to walk or run on a crawler track, exercise bikes that involve pedaling to strengthen a leg muscle while providing a cardiopulmonary exercise, steppers that provide an effect of walking up stairs, and the like.

[0004] The exercise bike is installed in a specified place, and allows the exercise to be performed as a wheel rotates by an operation of stepping on the pedal. Such exercise bikes may be categorized into spinning bikes that allow a spinning exercise to be performed, and indoor bikes that rotate the wheels by rotating the pedals in a forward direction like a bicycle.

[0005] The spinning bike is applied with a non-free-wheel structure because of a nature of exercising while stepping on the pedal, while the indoor bike is applied with a freewheel structure.

[0006] In the non-free-wheel structure applied to the spinning bike, power is transmitted to the wheel both when the pedal is rotated in the forward direction and when the pedal is rotated in a reverse direction, so that the wheel rotates.

[0007] Additionally, in the freewheel structure applied to the indoor bike, the power is transmitted to the wheel when the pedal is rotated in the forward direction, and the power is not transmitted to the wheel when the pedal is rotated in the reverse direction.

[0008] Prior Art 1 (Korean Patent No. 10-1712711 B1, title of invention: crank set for freely switching between fixed gear and freewheel gear of single-gear bike) is an invention on a device that may switch between the fixed gear and the freewheel gear. The switching between the fixed gear and the freewheel gear by the crank set disclosed in Prior Art 1 is accomplished by coupling of a crank arm.

[0009] As a key and a coupling means disposed on a right crank arm of Prior Art 1 are respectively coupled to a crank arm fixing portion and a coupling hole, the crank set becomes in the fixed gear state.

[0010] In addition, as the coupling of the coupling means and the coupling hole is released, and at the same

time, the crank arm fixing portion and the key on an opposite side are coupled to each other by a 180-degree pivoting movement of a right crank arm in Prior Art 1, the crank set becomes in the freewheel gear state.

[0011] However, in Prior Art 1, the gear switching between the fixed gear and the freewheel requires a manual work to move the crank arm while the movement is stopped, which increases inconvenience of the user.

[0012] In addition, in Prior Art 1, only portions of the crank arm and an arm link are coupled to each other when switching between the freewheel mode and the non-free-wheel mode, so that a possibility of deterioration of durability of the parts is increased, which reduces operation reliability.

[0013] In addition, in Prior Art 1, the switching between the freewheel mode and the non-free-wheel mode is achieved by the user directly changing a location of the crank arm, which increases a work time.

[0014] Prior Art 2 (Korean Patent No. 10-1289817 B1, title of invention: device to control the rotation of the pedal) is an invention on a device that manually switches between the freewheel mode and the non-free-wheel mode of a pedal plate.

[0015] In Prior Art 2, a pedal shaft is installed through a center of the pedal plate, and a rotatable restraining protrusion is installed between the pedal plate and the pedal shaft. The switching between the freewheel mode and the non-free-wheel mode is achieved depending on whether the restraining protrusion is engaged with a gear disposed outwardly of the pedal shaft by rotation of the restraining protrusion.

[0016] However, in Prior Art 2, the switching between the freewheel mode and the non-free-wheel mode is achieved by manually rotating the restraining protrusion, which increases the inconvenience of the user.

[0017] In addition, in Prior Art 2, the two restraining protrusions are caught by a latch gear disposed outwardly of the pedal shaft, so that a possibility that durability of the restraining protrusions will decrease increases, which reduces operation reliability.

[0018] Additionally, Prior Art 2 has a problem of increasing a work time because the switching between the freewheel mode and the non-free-wheel mode is accomplished by turning a separate operation lever.

[Disclosure]

[Technical Problem]

[0019] The present disclosure is to provide a freewheel adjustable wheel and an exercise bike equipped with the same that may automatically switch an operation between a freewheel mode and a non-free-wheel mode.

[0020] In addition, the present disclosure is to provide a freewheel adjustable wheel and an exercise bike equipped with the same that may reduce wear of parts and improve operation reliability by expanding an engagement area size of a gear when switching an opera-

tion between a freewheel mode and a non-freewheel mode.

[0021] Additionally, the present disclosure is to provide a freewheel adjustable wheel and an exercise bike equipped with the same that may shorten a time required to switch an operation between a freewheel mode and a non-freewheel mode.

[0022] Purposes according to the present disclosure are not limited to the above-mentioned purpose. Other purposes and advantages according to the present disclosure that are not mentioned may be understood based on following descriptions, and may be more clearly understood based on embodiments according to the present disclosure. Further, it will be easily understood that the purposes and advantages according to the present disclosure may be realized using means shown in the claims and combinations thereof.

[Technical Solution]

[0023] A freewheel adjustable wheel and an exercise bike equipped with the same according to the present disclosure to solve the above-described problems are to automatically switch an operation between a freewheel mode and a non-freewheel mode.

[0024] Specifically, a moveable gear assembly may move in a vertical direction by an operation of a driver using a motor to synchronize rotations of a clutch gear and a clutch hub, so that the operation switching between the freewheel mode and the non-freewheel mode may be performed automatically.

[0025] Additionally, the present disclosure is to expand an engagement area size of a gear when switching the operation between the freewheel mode and the non-freewheel mode.

[0026] Specifically, the clutch gear is installed on the clutch hub, and a second moveable gear engaged with the clutch hub and the clutch gear is formed as a ring-shaped gear, thereby increasing a size of an area where the clutch hub and the clutch gear are engaged with each other. Therefore, when switching the operation between the freewheel mode and the non-freewheel mode, a size of an area where gears are engaged with each other increases compared to before, thereby preventing stress from concentrating on the respective gears.

[0027] Additionally, the present disclosure is to reduce a time required to switch the operation between the freewheel mode and the non-freewheel mode.

[0028] Specifically, when switching the operation between the freewheel mode and the non-freewheel mode, the operation is automatically switched using a driving force of the driver using the motor rather than manually switched by a person, thereby reducing the time required for the operation switching.

[0029] In addition, the moveable gear assembly may move vertically by the operation of the driver to synchronize rotations of the clutch gear and the clutch hub, thereby adjusting the freewheel mode and the non-freewheel

mode.

[0030] A freewheel adjustable wheel according to the present disclosure includes a rotary gear that rotates by receiving power from a pedal and is equipped with a gear along an outer circumference thereof, a casing rotatably supporting the rotary gear, a clutch bearing installed between the rotary gear and the casing, wherein the clutch bearing transmits power to the casing when the rotary gear rotates in a forward direction, a clutch hub that is fixed outwardly of the rotary gear and rotates together with the rotary gear, a clutch gear installed in series with the clutch hub and fixed to the casing, a driver that is fixed to the casing and supplies rotational power, and a moveable gear assembly that moves by power of the driver, wherein the moveable gear assembly moves in a freewheel mode of being engaged with the clutch hub and a non-freewheel mode of being engaged with the clutch hub and the clutch gear at the same time.

[0031] Further, the moveable gear assembly includes a first moveable gear and a second moveable gear.

[0032] The first moveable gear is installed in an annular shape outwardly of the clutch hub and moves in a straight direction by receiving power from the driver.

[0033] The first moveable gear includes a first assembly gear and a second assembly gear. The first assembly gear is installed on one side of the clutch hub and moves by an operation of the driver. The first assembly gear includes a first coupling protrusion. The first coupling protrusion is located at an inner side of the first assembly gear and is inserted into a coupling groove defined at an outer side of the second moveable gear.

[0034] The second assembly gear is installed on the other side of the clutch hub and connected to the first assembly gear. The second assembly gear includes a second coupling protrusion. The second coupling protrusion is located at an inner side of the second assembly gear and is inserted into the coupling groove.

[0035] The second moveable gear includes a gear located inwardly of the first moveable gear and engaged with the clutch hub and the clutch gear. The second moveable gear includes a second moveable gear body, a coupling groove, and an inner gear.

[0036] The second moveable gear body is installed in an annular shape. The coupling groove defines an annular groove along an outer circumference of the second moveable gear body and is coupled to a protrusion protruding inwardly of the moveable gear assembly. The inner gear protrudes inwardly of the second moveable gear body and is engaged with a gear disposed in the clutch gear and a gear disposed in the clutch hub.

[0037] A freewheel adjustable wheel according to the present disclosure includes a rotary gear that rotates by receiving power from a pedal and is equipped with a gear along an outer circumference thereof, a shaft installed horizontally through the rotary gear and fixed to a frame, a cover casing having the rotary gear and the shaft installed through a center thereof, wherein the cover casing is rotatably installed, a fixed casing installed in a shape

to shield an open portion of the cover casing, wherein rotation of the fixed casing is restricted, a clutch bearing installed between the rotary gear and the cover casing, wherein the clutch bearing transmits power to the cover casing when the rotary gear rotates in a forward direction, a clutch hub that is fixed outwardly of the rotary gear and rotates together with the rotary gear, a clutch gear installed in series with the clutch hub and fixed to the cover casing, a driver that is fixed to the fixed casing and supplies rotational power, and a moveable gear assembly that moves by power of the driver, wherein the moveable gear assembly moves in a freewheel mode of being engaged with the clutch hub and a non-freewheel mode of being engaged with the clutch hub and the clutch gear at the same time.

[0038] An exercise bike according to the present disclosure includes a frame supporting a saddle and a handle, a pedal installed on a rotatable disk installed on a side surface of the frame, a rotary gear that rotates by receiving power from the pedal and is equipped with a gear along an outer circumference thereof, a casing rotatably supporting the rotary gear, a clutch bearing installed between the rotary gear and the casing, wherein the clutch bearing transmits power to the casing when the rotary gear rotates in a forward direction, a clutch hub that is fixed outwardly of the rotary gear and rotates together with the rotary gear, a clutch gear installed in series with the clutch hub and fixed to the casing, a driver that is fixed to the casing and supplies rotational power, and a moveable gear assembly that moves by power of the driver, wherein the moveable gear assembly moves in a freewheel mode of being engaged with the clutch hub and a non-freewheel mode of being engaged with the clutch hub and the clutch gear at the same time.

[Advantageous Effects]

[0039] The freewheel adjustable wheel and the exercise bike equipped with the same according to the present disclosure may automatically switch the operation between the freewheel mode and the non-freewheel mode, thereby improving the user convenience.

[0040] In addition, according to the present disclosure, the wear of the parts may be reduced by expanding the engagement area size of the gear when switching the operation between the freewheel mode and the non-freewheel mode, thereby reducing maintenance costs.

[0041] In addition, according to the present disclosure, the power of the driver may be directly transmitted to the second moveable gear to shorten the time required to switch the operation between the freewheel mode and the non-freewheel mode, thereby improving the operation reliability.

[0042] In addition, according to the present disclosure, there is no need to separately purchase exercise equipment that uses the freewheel mode and the non-freewheel mode, thereby reducing a cost of purchasing the exercise equipment.

[0043] In addition to the above-described effects, specific effects of the present disclosure will be described together while describing specific details for carrying out the disclosure below.

[Description of Drawings]

[0044]

FIG. 1 is a perspective view showing an exercise bike having a freewheel adjustable wheel according to an embodiment of the present disclosure.

FIG. 2 is a front view showing a state in which a freewheel adjustable wheel is installed inside an exercise bike according to an embodiment of the present disclosure.

FIG. 3 is a perspective view showing a state in which a belt member is connected to a freewheel adjustable wheel, according to an embodiment of the present disclosure.

FIG. 4 is an exploded perspective view of a freewheel adjustable wheel, according to an embodiment of the present disclosure.

FIG. 5 is a perspective view showing a state in which a moveable gear assembly is connected to a clutch hub, according to an embodiment of the present disclosure.

FIG. 6 is a perspective view showing a state in which a freewheel adjustable wheel operates in a freewheel mode, according to an embodiment of the present disclosure.

FIG. 7 is a perspective view showing a state in which a moveable gear assembly is located under a clutch gear, according to an embodiment of the present disclosure.

FIG. 8 is a cross-sectional view showing a state in which a freewheel adjustable wheel operates in a freewheel mode, according to an embodiment of the present disclosure.

FIG. 9 is a cross-sectional view showing a power transmission state when a freewheel adjustable wheel is in a freewheel mode, according to an embodiment of the present disclosure.

FIG. 10 is a perspective view showing a state in which a freewheel adjustable wheel operates in a non-freewheel mode, according to an embodiment of the present disclosure.

FIG. 11 is a perspective view showing a state in which a moveable gear assembly is connected to a clutch gear, according to an embodiment of the present disclosure.

FIG. 12 is a cross-sectional view showing a state in which a freewheel adjustable wheel operates in a non-freewheel mode, according to an embodiment of the present disclosure.

FIG. 13 is a cross-sectional view showing a power transmission state when a freewheel adjustable wheel is in a non-freewheel mode, according to an

embodiment of the present disclosure.

[Mode for Invention]

[0045] The above-mentioned purposes, features, and advantages will be described in detail later with reference to the attached drawings, so that those skilled in the art in the technical field to which the present disclosure belongs may easily practice the technical ideas of the present disclosure. In describing the present disclosure, when it is determined that a detailed description of the publicly known technology related to the present disclosure may unnecessarily obscure the gist of the present disclosure, the detailed description thereof will be omitted. Hereinafter, a preferred embodiment according to the present disclosure will be described in detail with reference to the attached drawings. In the drawings, identical reference numerals are used to indicate identical or similar components.

[0046] Although first, second, and the like are used to describe various components, these components are not limited by such terms. Such terms are only used to distinguish one component from another component, and unless specifically stated to the contrary, a first component may also be a second component.

[0047] Hereinafter, it may mean that when a first component is described to be disposed "on (or under)" a second component, the first component may not only be disposed in contact with a top surface (or a bottom surface) of the second component, but also be disposed on the second component with a third component interposed therebetween.

[0048] Additionally, it should be understood that when a component is described as being "connected to", "combined to", or "coupled to" another component, the components may be directly connected or coupled to each other, but other components may be "interposed" therebetween and the components may be "connected to", "combined to", or "connected to" each other via said other components.

[0049] Throughout the present document, unless otherwise stated, each component may be singular or plural.

[0050] As used herein, singular expressions include plural expressions, unless the context clearly dictates otherwise. In the present application, terms such as "composed of" or "include" should not be construed as necessarily including all of various components or steps described herein, and should be interpreted as being able to not including some of the components or the steps and further including additional components or steps.

[0051] Throughout the present disclosure, "A and/or B" means A, B, or A and B, unless otherwise specified, and "C to D" means C inclusive to D inclusive unless otherwise specified.

[0052] Hereinafter, a freewheel adjustable wheel 200 and an exercise bike 1 equipped with the same according to an embodiment of the present disclosure will be described.

[0053] FIG. 1 is a perspective view showing the exercise bike 1 having the freewheel adjustable wheel 200 according to an embodiment of the present disclosure, and FIG. 2 is a front view showing a state in which the freewheel adjustable wheel 200 is installed inside the exercise bike 1 according to an embodiment of the present disclosure.

[0054] As shown in FIGS. 1 and 2, the exercise bike 1 may operate in a freewheel mode and a non-freewheel mode. The operation of the exercise bike 1 switches between the freewheel mode and the non-freewheel mode by an operation of a driver 270 that uses a motor.

[0055] The exercise bike 1 uses a one-way clutch bearing 240, and thus transmits power only during rotation in a forward direction. In addition, because the power is transmitted even during rotation in a reverse direction by a moveable gear assembly 280 operated by the driver 270, the exercise bike 1 operates in the non-freewheel mode.

[0056] When the exercise bike 1 operates in the freewheel mode, the power is transmitted via the clutch bearing 240, enabling low-noise operation and significantly reducing a thickness and a size of a product compared to those of an existing exercise bike.

[0057] When the exercise bike 1 operates in the non-freewheel mode, a gear disposed in the moveable gear assembly 280 connects a gear of a clutch hub 250 with a gear of a clutch gear 260 to transmit the power.

[0058] In the exercise bike 1, the driver 270 operates to move the mobile gear assembly 280, so that various modifications are available within a technical idea of controlling the freewheel mode operation and the non-freewheel mode operation. The freewheel adjustable wheel 200 is installed inside the exercise bike 1, and the driver 270 is installed on the freewheel adjustable wheel 200.

[0059] The moveable gear assembly 280 is moved by the operation of the driver 270, and the power transmission is adjusted by the moveable gear assembly 280 being engaged only with the clutch hub 250 or being engaged with the clutch gear 260 and the clutch hub 250 simultaneously, so that the freewheel mode and the non-freewheel mode may be adjusted.

[0060] The exercise bike 1 according to an embodiment of the present disclosure may include at least one of a frame 10, a belt member 20, a rotatable disk, a pedal 40, a rotatable support shaft 50, a base 60, a seat housing 70, a handle, a display 90, a seat post 100, a seat 110, and the freewheel adjustable wheel 200.

[0061] Various modifications are available on the frame 10 within a technical idea of forming a body of the exercise bike 1. The frame 10 according to an embodiment of the present disclosure includes an outer frame 12, an inner frame 14, and a side frame 16.

[0062] The outer frame 12 is open at both side surfaces, is located above the base 60, and is fixed to the seat post 100. The freewheel adjustable wheel 200, the rotatable disk, and an inner disk are installed inside the outer frame 12.

[0063] The outer frame 12 forms an approximately ">-"-shaped frame, and the inner frame 14 is installed inwardly of the outer frame 12. The inner frame 14 supports the freewheel adjustable wheel 200 located inside the frame 10. The inner frame 14 has a shape in which a plurality of beam members are connected to each other, and one side of the inner frame 14 is fixed to the seat post and the other side thereof supports a shaft 220 of the freewheel adjustable wheel 200.

[0064] The side frame 16 is coupled to said both open side surfaces of the outer frame 12. The side frame 16 has a plate shape and is detachably installed on said both side surfaces of the outer frame 12, making it easy to repair and replace parts of the exercise bike 1.

[0065] Such frame 10 may be formed in various structures depending on a load distribution and a structure of the exercise bike 1.

[0066] The rotatable support shaft 50 is located inside the frame 10 and is installed in a horizontal direction. Both sides of the rotatable support shaft 50 may be connected to the inner disk. Said both sides of the rotatable support shaft 50 according to an embodiment of the present disclosure are connected to a center of the inner disk.

[0067] A disk-shaped rotatable disk 30 is fixed outwardly of the inner disk 31, and the pedal is detachably installed at an edge of the rotatable disk 30. The pedal is fastened to the rotatable disk 30 while forming a right angle to the rotatable disk 30. Therefore, when the user steps on the pedal, the rotatable disk and the inner disk rotate around the rotatable support shaft 50.

[0068] The rotatable disk 30 is formed in a shape of a circular panel. The side frame 16 has a circular hole for installing the rotatable disk 30. Because the rotatable disk 30 and the inner disk 31 are installed in the circular hole defined in the side frame 16, the parts located inside the frame 10 may be shielded.

[0069] Accordingly, the user, an infant, and a pet may be blocked from accessing an area located inside the frame 10, and a situation in which they are caught in the parts located inside the frame 10 during pedal rotation may be prevented.

[0070] Because the belt member 20 is wrapped around an outer edge of the inner disk, a rotary gear 210 disposed in the freewheel adjustable wheel 200 rotates by the rotation of the inner disk. One side of the belt member 20 is connected to the inner disk and the other side of the belt member 20 is connected to a pulley member 212 of the rotary gear 210.

[0071] The pedal 40 is rotatably installed on the rotatable disk mounted on a side surface of the frame 10. The pedal 40 is coupled to the rotatable disk by being threaded into a fastening groove defined in the rotatable disk 30. Additionally, the rotatable disk rotates together with the pedal 40.

[0072] The rotatable support shaft 50 is installed to extend through centers of the rotatable disk 30 and the inner disk 31, which are rotated by the pedal. The rotatable

disk 30 and the inner disk 31 function as driving wheels, and are connected to the pulley member 212 of the rotary gear 210, which will be described later, by a power transmitting member such as a belt or a chain. When the user steps on the pedal, the rotatable disk 30 and the inner disk 31 rotate, and as the inner disk 31 rotates, the belt member 20 and the rotary gear 210 rotate. Because the rotatable disk 30 shields the hole defined in the side frame 16, damage to the user, the infant, or the like caused by the rotation of the pedal 40 may be reduced.

[0073] The base 60 is installed below the frame 10 to support the frame 10. The base 60 is installed in a form of a plate, spaced apart from a lower side of the frame 10. Such base 60 may be formed in various forms.

[0074] The seat housing 70 is installed on the base 60. The seat housing 70 is in a shape of a square tube, extends upwardly of the base 60, and extends through the frame 10. A lower side of the seat housing 70 is fixed to the base 60. Additionally, because the frame 10 is fixed to the seat housing 70, the frame 10 is installed to be upwardly spaced apart from the base 60.

[0075] The seat housing 70 may be disposed at an angle with respect to the vertical direction of the frame 10. The seat housing is disposed between the rotatable support shaft 50 and the shaft 220. Such seat housing 70 may be formed in a shape of a polygonal pipe or a circular pipe.

[0076] A handle 80 that the user may grip is installed at one side of the frame 10. The display 90 that allows an operating state and an exercise record of the exercise bike 1 to be easily checked is installed at an upper side of the frame 10 adjacent to the handle 80.

[0077] The display 90 may output exercise information such as a speed and a rotational load of the exercise bike 1 on a screen.

[0078] The seat post 100 supporting a lower side of the seat 110 is installed on the seat housing 70. The seat post 100 may be installed inside the seat housing 70 to be able to adjust a height thereof. In one example, the seat post 100 may be fixed inside the seat housing 70. A cross-section of the seat post 100 may be formed in various shapes depending on the shape of the seat housing 70.

[0079] Because the seat post 100 is installed in the seat housing 70 to be able to adjust the height thereof, a vertical level of the seat 110 may be appropriately adjusted based on a height, a physical condition, and an exercise tendency of the user.

[0080] In the exercise bike 1 according to the present disclosure, the freewheel adjustable wheel 200 may be disposed rearwardly or forwardly of the rotatable support shaft 50. A shape of the frame 10 changes depending on the installation location of the freewheel adjustable wheel 200. Further, locations of the rotatable support shaft 50 and the shaft 220 are also changed.

[0081] FIG. 3 is a perspective view showing a state in which the belt member 20 is connected to the freewheel adjustable wheel 200, according to an embodiment of

the present disclosure, FIG. 4 is an exploded perspective view of the freewheel adjustable wheel 200, according to an embodiment of the present disclosure, FIG. 5 is a perspective view showing a state in which the moveable gear assembly 280 is connected to the clutch hub 250, according to an embodiment of the present disclosure, FIG. 6 is a perspective view showing a state in which the freewheel adjustable wheel 200 operates in a freewheel mode, according to an embodiment of the present disclosure, and FIG. 7 is a perspective view showing a state in which the moveable gear assembly 280 is located under the clutch gear 260, according to an embodiment of the present disclosure.

[0082] As shown in FIGS. 3 to 7, the freewheel adjustable wheel 200 includes the rotary gear 210, the shaft 220, a casing 230, the clutch bearing 240, the clutch hub 250, the clutch gear 260, the driver 270, the moveable gear assembly 280, a stator 310, and a bearing 320.

[0083] The rotary gear 210 rotates by receiving the power from the pedal 40, and various modifications are available within a technical idea in which the gear is disposed along an outer circumference. The rotary gear 210 according to an embodiment of the present disclosure includes the pulley member 212 and a rotatable body 214.

[0084] The pulley member 212 is connected to the belt member 20 and rotates by receiving the power from the pedal 40. Because the gear is disposed along the outer circumference of the pulley member 212, a slip phenomenon of the belt member 20 wrapped outwardly of the pulley member 212 may be reduced. The pulley member 212 is located outwardly of the casing 230 and receives the power of the pedal 40 via the belt member 20.

[0085] The rotatable body 214 extends from the pulley member 212 inwardly of the casing 230 and rotates together with the pulley member 212. The rotatable body 214 according to an embodiment of the present disclosure has a pipe shape.

[0086] The rotary gear 210 is installed in the casing 230 to rotate by receiving the power of the pedal 40. The shaft 220 is installed inwardly of the rotary gear 210. Both sides of the shaft 220 are coupled to the inner frame 14 so as not to rotate. The rotary gear 210 is fitted outwardly of the shaft 220. The rotary gear 210 is installed concentrically with the shaft 220. A shaft bearing 324 is installed between the shaft 220 and the rotary gear 210. Therefore, when the rotary gear 210 is rotated by the belt member 20, the shaft 220 does not rotate.

[0087] The shaft 220 extends through the rotary gear 210, is installed horizontally, and is fixed to the frame 10. The shaft 220 according to an embodiment of the present disclosure has a rod shape and is installed in a shape that extends through a rotation center of the casing 230.

[0088] Various modifications may be made on the casing 230 within a technical idea of rotatably supporting the rotary gear 210 and being installed inside the frame 10. The casing 230 according to an embodiment of the present disclosure includes a cover casing 232 and a

fixed casing 234.

[0089] The cover casing 232 rotates together with the clutch gear 260 and receives rotational power by forward rotation via the clutch bearing 240. The cover casing 232 includes the cover casing 232 that rotates and the fixed casing 234 that is fixed to the frame 10. Various modifications may be made on the cover casing 232 within a technical idea of being installed in a shape of surrounding the clutch bearing 240 and the moveable gear assembly 280.

[0090] The cover casing 232 is installed such that the rotary gear 210 and the shaft 220 extend through a center thereof, and is installed to be rotatable. The cover casing 232 is axially coupled to the rotary gear 210 and rotates in the freewheel mode and the non-freewheel mode. The rotary gear 210 is coupled to a rotation center of the cover casing 232.

[0091] In the freewheel mode, when the rotary gear 210 rotates in the forward direction, the cover casing 232 rotates in the forward direction, and when the rotary gear 210 rotates in the reverse direction, the cover casing 232 does not rotate. In the freewheel mode, when the rotary gear 210 rotates in the reverse direction, the cover casing 232 does not rotate and the rotary gear 210 idles in the cover casing 232.

[0092] In the non-freewheel mode, the cover casing 232 rotates whenever the rotary gear 210 rotates in the forward or reverse direction. In the non-freewheel mode, the power input via the rotary gear 210 is transmitted via the moveable gear assembly 280, so that the cover casing 232 rotates together with the rotary gear 210.

[0093] The fixed casing 234 supports the driver 270 and is installed in an open portion of the cover casing 232. Various modifications may be made on the fixed casing 234 within a technical idea of being installed in a shape of shielding the open portion of the cover casing 232 and restricted in rotation.

[0094] The cover casing 232 according to an embodiment of the present disclosure includes an outer casing 233 and an inner rib 236. The rotary gear 210 is rotatably coupled to the cover casing 232. The cover casing 232 may be formed overall in a disk shape. The rotary gear 210 extends through a center of the cover casing 232. The outer casing 233 may be formed around the cover casing 232 to surround the stator 310, which will be described later.

[0095] The outer casing 233, which protrudes vertically from an edge of the cover casing 232, is installed in an annular shape and faces an outer edge of the fixed casing 234.

[0096] The inner rib 236 is installed inwardly of the outer casing 233. The inner rib 236 and the outer casing 233 are installed in an annular shape, and a diameter of the inner rib 236 is smaller than a diameter of the outer casing 233. Further, the stator 310 and a wheel bearing 322 are installed between the outer casing 233 and the inner rib 236. The inner rib 236 protrudes from an inner side of the cover casing 232 toward the fixed casing 234.

[0097] The wheel bearing 322 is installed between an inner casing 235 of the fixed casing 234, which will be described later, and the inner rib 236.

[0098] The fixed casing 234 has a disk shape, and the inner casing 235 extending from the fixed casing 234 extends in a ring shape. A diameter of the inner casing 235 is greater than the diameter of inner rib 236 and smaller than the diameter of the outer casing 233.

[0099] Therefore, the stator 310 is installed between the outer casing 233 and the inner casing 235, and the wheel bearing 322 is installed between the inner casing 235 and the inner rib 236. When the cover casing 232 rotates while the rotation of the fixed casing 234 is restricted, friction is reduced by the wheel bearing 322 installed between the cover casing 232 and the fixed casing 234.

[0100] The clutch bearing 240 is installed between the rotary gear 210 and the casing 230, and various modifications are available on the clutch bearing 240 within a technical idea of transmitting the power to the casing 230 when the rotary gear 210 rotates in the forward direction.

[0101] The clutch bearing 240 is installed between the cover casing 232 and the rotary gear 210. An annular seating groove in which the clutch bearing 240 is seated may be defined at a center of the cover casing 232. The seating groove is concentric with the rotary gear 210 and the cover casing 232. The clutch bearing 240 is a one-way bearing that allows only rotation in one direction of the rotary gear 210. The clutch bearing 240 transmits the power to rotate the rotary gear 210 and the cover casing 232 together when the rotary gear 210 rotates in the forward direction. Further, when the rotary gear 210 rotates in the reverse direction, only the rotary gear 210 rotates and the power is not transmitted to the cover casing 232.

[0102] The clutch bearing 240 enables the freewheel mode of the cover casing 232 by rotating the cover casing 232 only when the rotary gear 210 rotates in the forward direction. The clutch bearing 240 is formed in a structure in which a bearing (not shown) is interposed between an inner ring (not shown) and an outer ring (not shown). When the clutch bearing 240 rotates in the forward direction, the bearing restrains the inner and outer rings and rotates integrally. Further, when rotating in the reverse direction, the bearing releases the restraint on the inner and outer rings. Various shapes, such as a spherical shape and a round bar shape, may be applied to the bearing. Various modifications may be made on such clutch bearing 240 within a technical idea of rotating the cover casing 232 only when the rotary gear 210 rotates in the forward direction.

[0103] The clutch hub 250 is fixed outwardly of the rotary gear 210, and various modifications are available on the clutch hub 250 within a technical idea of rotating with the rotary gear 210. The clutch hub 250 is coupled to an outer side of the rotary gear 210. The clutch hub 250 is installed to be concentric with the rotary gear 210. A first outer gear 254 is formed around the clutch hub 250.

[0104] The first outer gear 254 is an external gear

formed along an outer circumferential surface of the clutch hub 250. The clutch hub 250 rotates together with the rotary gear 210 about a center of the rotary gear 210, but is fixed to the rotary gear 210 so as not to move in an axial direction of the rotary gear 210. In this regard, the rotary gear 210 may be press-fitted into a center of the clutch hub 250 or gear-coupled with the center of the clutch hub 250. The clutch hub 250 may be formed in a shape of an annular disk.

[0105] The clutch hub 250 according to an embodiment of the present disclosure includes a hub body 252 and the first outer gear 254. The hub body 252 has a center coincident with a center of the rotatable body 214 and has a shape of a disk fixed outwardly of the rotatable body 214.

[0106] The first outer gear 254 is a gear that is installed along an outer circumference of the hub body 252 and is in a shape of a protrusion extending in a vertical direction.

[0107] The clutch gear 260 is installed in series with the clutch hub 250, and various modifications are available on the clutch gear 260 within a technical idea of being fixed to the casing 230. The clutch gear 260 according to an embodiment of the present disclosure is fixed to the cover casing 232 and rotates together with the cover casing 232. The clutch gear 260 is installed along a ring shape and has a center coincident with the center of the rotary gear 210. Further, the center of the clutch gear 260 is coincident with the center of the cover casing 232. The clutch gear 260 according to an embodiment of the present disclosure includes a gear body 262 and a second outer gear 264.

[0108] The gear body 262 is installed in an annular shape inwardly of the cover casing 232 and is fixed to the cover casing 232. The gear body 262 is fixed to the cover casing 232 and rotates together with the cover casing 232.

[0109] The second outer gear 264 protrudes outwardly of the gear body 262 and is engaged with the moveable gear assembly 280 to receive the power. The second outer gear 264 includes a gear having an inclined surface in a direction toward the clutch hub 250 so as to be engaged with a second moveable gear 300 disposed in the moveable gear assembly 280.

[0110] The second outer gear 264 according to an embodiment of the present disclosure includes a first straight gear 266 and a first inclined gear 268. The first straight gear 266 is a gear that protrudes along a circumference of the second outer gear 264 and extends in the vertical direction.

[0111] The first inclined gear 268 is an inclined surface formed at an end of the first straight gear 266. When the first outer gear 254 of the clutch hub 250 is installed under the second outer gear 264, the first inclined gear 268 is connected to a lower side of the first straight gear 266.

[0112] The first inclined gear 268 has a longitudinal cross-section in a right triangular shape. The first inclined gear 268 forms the inclined surface toward the clutch hub

250. A plurality of first inclined gears 268 are installed along the circumference of the gear body 262, and inclination angles of the plurality of first inclined gears 268 installed are the same.

[0113] The driver 270 is fixed to the casing 230, and various modifications are available within a technical idea of supplying the rotational power to move the moveable gear assembly 280. The driver 270 according to an embodiment of the present disclosure includes a driving body 272 and an output shaft 274. Additionally, the driver 270 may further include a motor bracket 276 and a motor casing 278.

[0114] The driving body 272 is fixed to the fixed casing 234 and supplies the rotational power. The driving body 272 may be directly fixed to the fixed casing 234, or may be fixed to the fixed casing 234 using the motor bracket 276 and the motor casing 278. The motor bracket 276 surrounds one side of the driving body 272 and is fixed to the fixed casing 234. The motor casing 278 defines an inner space into which the driving body 272 is to be inserted and is fixed to the fixed casing 234.

[0115] The driving body 272 uses the motor, and the output shaft 274 protruding outwardly of the driving body 272 rotates by the operation of the driving body 272. The output shaft 274 protrudes outwardly of the driving body 272, rotates by the operation of the driving body 272, and is connected to the moveable gear assembly 280 to move the moveable gear assembly 280. The output shaft 274 according to an embodiment of the present disclosure has a ball screw bar shape and is gear-coupled with the moveable gear assembly 280. Because the moveable gear assembly 280 is installed in a state of being restricted in rotation, the moveable gear assembly 280 moves in a straight direction by the rotation of the output shaft 274.

[0116] The moveable gear assembly 280 is moved by the power of the driver 270 and moves in the freewheel mode of being engaged with the clutch hub 250 and in the non-freewheel mode of being engaged with both the clutch hub 250 and the clutch gear 260 at the same time.

[0117] The moveable gear assembly 280 is disposed outwardly of the clutch hub 250, and transmits the power by being engaged only with the clutch hub 250 or engaged with both the clutch hub 250 and the clutch gear 260 at the same time.

[0118] When the moveable gear assembly 280 is engaged only with the clutch hub 250, the power to rotate the pedal in the forward direction is transmitted to the cover casing 232 via the rotary gear 210 and the clutch bearing 240, causing the cover casing 232 to rotate. Further, because the power to rotate the pedal in the reverse direction only rotates the rotary gear 210, the clutch hub 250, and the second moveable gear 300 of the moveable gear assembly 280, the rotational power is not transmitted to the cover casing 232. Accordingly, only when the rotary gear 210 rotates in the forward direction, the rotations of the clutch bearing 240 and the cover casing 232 are synchronized and the freewheel adjustable wheel

200 is driven in the freewheel mode.

[0119] Further, when the moveable gear assembly 280 is engaged with the clutch hub 250 and the clutch gear 260 at the same time to synchronize the rotations thereof, the moveable gear assembly 280 operates in the non-freewheel mode. In the non-freewheel mode, the power of the pedal is sequentially transmitted to the rotary gear 210, the clutch hub 250, the second moveable gear 300, and the clutch gear 260. In addition, as the power of the forward rotation, the power of the pedal may be sequentially transmitted to the rotary gear 210, the clutch bearing 240, and the cover casing 232. The second moveable gear 300, which is engaged with the clutch hub 250 and the clutch gear 260 at the same time, transmits both the forward and reverse rotation power, so that the second moveable gear 300 operates in the non-freewheel mode.

[0120] The moveable gear assembly 280 according to an embodiment of the present disclosure includes a first moveable gear 290 and the second moveable gear 300. Various modifications are available on the first moveable gear 290 within a technical idea of being installed in an annular shape outwardly of the clutch hub 250 and receiving the power from the driver 270 to move in a straight direction. The first moveable gear 290 according to an embodiment of the present disclosure includes a first assembly gear 292 and a second assembly gear 296.

[0121] The first assembly gear 292 and the second assembly gear 296 are assembled together and installed in an annular shape. The first assembly gear 292 is installed on one side of the clutch hub 250 and moves by the operation of the driver 270. The first assembly gear 292 extends along a curved shape, and a first coupling protrusion 294, which is inserted into a coupling groove 304 defined at an outer side of the second moveable gear 300, is disposed.

[0122] In addition, a female screw hole is defined in an extension member 295 that protrudes outwardly of the first assembly gear 292, and the output shaft 274 disposed in the driver 270 is gear-connected by being inserted into the female screw hole defined in the extension member 295. Therefore, the first assembly gear 292 including the extension member 295 moves upward or downward depending on a rotation direction of the output shaft 274.

[0123] The second assembly gear 296 is installed on the other side of the clutch hub 250 and is connected to the first assembly gear 292. A second coupling protrusion 298, which is inserted into the coupling groove 304, is disposed at an inner side of the second assembly gear 296 extending along a curved shape.

[0124] The first assembly gear 292 and the second assembly gear 296 are coupled to each other to constitute the first moveable gear 290, and the first moveable gear 290 moves to a location facing the clutch hub or to a location to be engaged with the clutch hub 250 and the clutch gear by the power of the driver 270.

[0125] In addition, the first coupling protrusion 294, which protrudes inwardly of the first assembly gear 292,

and the second coupling protrusion 298, which protrudes inwardly of the second assembly gear 296, are inserted into the coupling groove 304 defined at the outer side of the second moveable gear 300, so that the second moveable gear 300 also moves by the operation of the first moveable gear 290.

[0126] The second moveable gear 300 is located inwardly of the first moveable gear 290 and has a gear engaged with the clutch hub 250 and the clutch gear 260.

[0127] The second moveable gear 300 is formed in an annular shape to be concentric with the clutch gear 260 and the clutch hub 250. An inner circumferential surface of the second moveable gear 300 includes an inner gear 306 formed in a shape of an internal gear to be engaged with the clutch hub 250 and the clutch gear 260.

[0128] The inner gear 306 is moved to one side along an axial direction of the rotary gear 210 and is engaged only with the clutch hub 250, or is moved to the other side along the axial direction of the rotary gear 210 and is engaged with the clutch hub 250 and the clutch gear 260 at the same time.

[0129] The second moveable gear 300 according to an embodiment of the present disclosure includes a second moveable gear body 302, the coupling groove 304, and the inner gear 306.

[0130] The second moveable gear body 302 is installed in an annular shape. An outer diameter of the second moveable gear body 302 is greater than an outer diameter of the clutch hub 250. The second moveable gear body 302 is installed between the clutch hub 250 and the first moveable gear 290.

[0131] Various modifications may be made on the coupling groove 304 within a technical idea of being coupled with the protrusion protruding inwardly of the moveable gear assembly 280. The coupling groove 304 according to an embodiment of the present disclosure defines an annular groove along an outer circumference of the second moveable gear body 302. The coupling groove 304 is coupled to the first coupling protrusion 294 and the second coupling protrusion, which are protrusions protruding inwardly of the first moveable gear 290. The coupling groove 304 defines the groove along a circular arc shape, and the first coupling protrusion 294 and the second coupling protrusion 298, which are fitted into the coupling groove 304, are also installed along the circular arc shape, so that the second moveable gear 300 is able to rotate inwardly of the first moveable gear 290. However, in a state in which the first moveable gear 290 does not move along the axial direction of the rotary gear 210, the second moveable gear 300 is blocked from moving alone along the axial direction of the rotary gear 210.

[0132] The inner gear 306 includes a plurality of inner gears protruding along an inner circumference of the second moveable gear body 302, and various modifications are available on the inner gear 306 within a technical idea of being engaged with the gear disposed in the clutch gear 260 and the gear disposed in the clutch hub 250. The inner gear 306 according to an embodiment of the

present disclosure includes a second straight gear 308 and a second inclined gear 309.

[0133] The second straight gear 308 is a gear that protrudes along the inner circumference of the second moveable gear body 302 and extends in the vertical direction.

[0134] The second inclined gear 309 is an inclined surface formed at an end of the second straight gear 308. When the clutch gear 260 is installed on the clutch hub 250, the second inclined gear 309 is installed at an upper side of the second straight gear 308.

[0135] The inclined surface of the second inclined gear 309 is installed at an angle corresponding to the inclined surface of the first inclined gear 268. The second inclined gear 309 has a right triangle shape. The second inclined gear 309 forms the inclined surface toward the first inclined gear 268. The second inclined gear 309 includes a plurality of second inclined gears installed along the inner circumference of the second moveable gear 300, and inclination angles of the plurality of second inclined gears 309 installed are the same.

[0136] A shape of the second outer gear 264 disposed in the clutch gear 260 is applied with an angle in one direction, and a shape of the inner gear 306 corresponding thereto is also applied with an angle in one direction opposite to that of the second outer gear 264, so that, when the moveable gear assembly 280 moves upward, the inner gear 306 rotates in one direction and moves linearly in the vertical direction at the same time. Therefore, the moving inner gear 306 is engaged with the fixed second outer gear 264, so that the operation of transmitting the power is performed quickly and accurately.

[0137] The bearing 320, which rotatably supports the parts rotated in the freewheel adjustable wheel 200, has a plurality of bearings. The bearing 320 according to an embodiment of the present disclosure includes the wheel bearing 322 and the shaft bearing 324.

[0138] Because the wheel bearing 322 is installed between the inner rib 236 of the cover casing 232 and the inner casing 235 of the fixed casing 234, the friction generated between the fixed casing 234 that is restricted in the rotation and the cover casing 232 that rotates is reduced.

[0139] The shaft bearing is installed between the shaft 220 and the rotary gear 210, and reduces the friction generated when the shaft 220 rotates.

[0140] The stator 310 is fixed to the fixed casing 234 and is installed in an annular shape along an edge of the fixed casing 234. The stator 310 applies a magnetic force to the cover casing 232 to adjust a rotational load of the cover casing 232. The stator 310 is fixed to the fixed casing 234 and is restricted in rotation. The stator 310 is an electromagnet with a coil wound around an iron core. As the power is applied to the coil, the magnetic force is generated from the stator 310. A strength of the magnetic force of the stator 310 may be adjusted by adjusting current applied to the coil of the stator 310.

[0141] As the strength of the magnetic force of the sta-

tor 310 increases, the rotational load on the cover casing 232 increases, so that a pedal force increases. When the strength of the magnetic force of the stator 310 decreases, the rotational load on the cover casing 232 decreases, so that the pedal force decreases. By adjusting the strength of the magnetic force of the stator 310, the rotational load on the cover casing 232 may be adjusted to adjust the pedal force of the user.

[0142] The stator 310 is fixed to the fixed casing 234 so as not to rotate together with the cover casing 232, and the fixed casing 234 is fixed to the frame 10. The fixed casing 234 may be fixed to the frame 10 by a fastening member such as a bolt and a rivet. The rotary gear 210 and the shaft 220 are installed to extend through a center of the fixed casing 234.

[0143] Because the stator 310 is disposed in the annular shape around the fixed casing 234, as a radius of the stator 310 increases as much as possible, the stator 310 may be formed as large as possible. Additionally, as a size of the stator 310 increases, a maximum magnetic force generated by the stator 310 may become greater, so that an adjustment range of the rotational load applied to the cover casing 232 may be further increased.

[0144] Additionally, when the stator 310 is disposed in a radial direction of the moveable gear assembly 280 and the clutch hub 250, installation thicknesses of the cover casing 232 and the stator 310 may be significantly reduced. Accordingly, the cover casing 232 in the exercise bike 1 may be manufactured with a relatively small thickness to narrow a gap between the pedals on both sides, thereby significantly improving a design freedom of the exercise bike 1.

[0145] Hereinafter, an operating state of the freewheel adjustable wheel 200 and the exercise bike 1 equipped with the same according to an embodiment of the present disclosure will be described in detail with reference to the attached drawings.

[0146] FIG. 8 is a cross-sectional view showing a state in which the freewheel adjustable wheel 200 operates in the freewheel mode, according to an embodiment of the present disclosure, and FIG. 9 is a cross-sectional view showing a power transmission state when the freewheel adjustable wheel 200 is in the freewheel mode, according to an embodiment of the present disclosure.

[0147] As shown in FIGS. 8 and 9, when the second moveable gear 300 is engaged only with the clutch hub 250, the power to rotate the clutch hub 250 is not transmitted to the cover casing 232. Further, when the pedal is rotated in the forward direction, the rotary gear 210 also rotates in the forward direction. When the rotary gear 210 rotates in the forward direction, the power to rotate the rotary gear 210 is transmitted to the cover casing 232 via the clutch bearing 240, so that the cover casing 232 rotates in the forward direction. Therefore, the freewheel adjustable wheel 200 and the exercise bike 1 equipped with the same operate in the freewheel mode.

[0148] FIG. 10 is a perspective view showing a state in which the freewheel adjustable wheel 200 operates in

the non-freewheel mode, according to an embodiment of the present disclosure, FIG. 11 is a perspective view showing a state in which the moveable gear assembly 280 is connected to the clutch gear 260, according to an embodiment of the present disclosure, FIG. 12 is a cross-sectional view showing a state in which the freewheel adjustable wheel 200 operates in the non-freewheel mode, according to an embodiment of the present disclosure, and FIG. 13 is a cross-sectional view showing a power transmission state when the freewheel adjustable wheel 200 is in the non-freewheel mode, according to an embodiment of the present disclosure.

[0149] As shown in FIGS. 10 to 13, when the second moveable gear 300 is engaged with the clutch hub 250 and the clutch gear 260, the power to rotate the clutch hub 250 rotates the clutch gear 260 via the second moveable gear 300. Because the clutch gear 260 is fixed to the cover casing 232, the cover casing 232 rotates together with the clutch gear 260.

[0150] Therefore, when the pedal is rotated in the forward or reverse direction, the rotary gear 210 also rotates in the forward or reverse direction. Therefore, the freewheel adjustable wheel 200 and the exercise bike 1 equipped with the same operate in the non-freewheel mode.

[0151] When the freewheel adjustable wheel 200 and the exercise bike 1 equipped with the same are in the freewheel mode, noise may not occur via the operation of the clutch bearing 240.

[0152] When the freewheel adjustable wheel 200 and the exercise bike 1 equipped with the same are in the freewheel mode, the clutch hub 250 and the clutch gear 260 rotate together by the second moveable gear 300, so that the cover casing 232 rotates together with the rotary gear 210.

[0153] In addition, because the moveable gear assembly 280, including the second moveable gear 300, and the driver 270 that moves the moveable gear assembly 280 are installed in one stage inwardly of the casing 230, a size and a thickness of the casing 230 are reduced, so that a design freedom of the freewheel adjustable wheel 200 may be increased.

[0154] Further, because the driver 270, which uses the motor, is installed inwardly of the freewheel adjustable wheel 200, the user may switch between the freewheel mode and the non-freewheel mode without getting off the exercise bike 1, thereby improving convenience of use.

[0155] Although the present disclosure has been described with reference to the accompanying drawings, the present disclosure is not limited by the embodiments disclosed herein and the drawings, and it is obvious that various modifications may be made by those skilled in the art within the scope of the technical idea of the present disclosure. In addition, although the effects based on the configuration of the present disclosure are not explicitly described and illustrated in the description of the embodiment of the present disclosure above, it is natural that

predictable effects of the corresponding configuration should also be recognized.

Claims

1. A freewheel adjustable wheel comprising:

a rotary gear configured to rotate by receiving power from a pedal and equipped with a gear along an outer circumference thereof;
a casing rotatably supporting the rotary gear;
a clutch bearing installed between the rotary gear and the casing, wherein the clutch bearing is configured to transmit power to the casing when the rotary gear rotates in a forward direction;
a clutch hub fixed outwardly of the rotary gear and configured to rotate together with the rotary gear;
a clutch gear installed in series with the clutch hub and fixed to the casing;
a driver fixed to the casing and configured to supply rotational power; and
a moveable gear assembly configured to move by power of the driver, wherein the moveable gear assembly moves in a freewheel mode of being engaged with the clutch hub and a non-freewheel mode of being engaged with the clutch hub and the clutch gear at the same time.

2. The freewheel adjustable wheel of claim 1, wherein the rotary gear includes:

a pulley member located outwardly of the casing and configured to receive power from the pedal via a belt; and
a rotatable body extending from the pulley member inwardly of the casing and configured to rotate together with the pulley member

3. The freewheel adjustable wheel of claim 2, wherein the clutch hub includes:

a disk-shaped hub body having a center coincident with a center of the rotatable body and fixed outwardly of the rotatable body; and
a first outer gear installed along an outer circumference of the hub body and formed in a shape of a protrusion extending in a vertical direction.

4. The freewheel adjustable wheel of claim 1, wherein the casing includes:

a cover casing configured to rotate together with the clutch gear and receive rotational power via the clutch bearing, wherein the cover casing is installed in a shape to surround the clutch bear-

ing and the moveable gear assembly; and
a fixed casing supporting the driver and installed in an open portion of the cover casing.

5. The freewheel adjustable wheel of claim 4, wherein the clutch gear includes:

a gear body installed in an annular shape inwardly of the cover casing and fixed to the cover casing; and
a second outer gear protruding outwardly of the gear body and being engaged with the moveable gear assembly to receive power.

6. The freewheel adjustable wheel of claim 4, further comprising a stator fixed to the fixed casing and installed in an annular shape along an edge of the fixed casing, wherein the stator is configured to generate a magnetic force.

7. The freewheel adjustable wheel of claim 4, wherein the driver includes:

a driving body fixed to the fixed casing and configured to supply rotational power; and
an output shaft protruding outwardly of the driving body, wherein the output shaft is configured to rotate by an operation of the driving body, and is connected to the moveable gear assembly to move the moveable gear assembly.

8. The freewheel adjustable wheel of claim 1, wherein the moveable gear assembly includes:

a first moveable gear installed in an annular shape outwardly of the clutch hub and configured to move in a straight direction by receiving power from the driver; and
a second moveable gear located inwardly of the first moveable gear and including a gear being engaged with the clutch hub and the clutch gear.

9. The freewheel adjustable wheel of claim 8, wherein the first moveable gear includes:

a first assembly gear installed on one side of the clutch hub and configured to move by an operation of the driver; and
a second assembly gear installed on the other side of the clutch hub and connected to the first assembly gear,
wherein a first coupling protrusion inserted into a coupling groove defined at an outer side of the second moveable gear is disposed at an inner side of the first assembly gear,
wherein a second coupling protrusion inserted into the coupling groove is disposed at an inner side of the second assembly gear.

10. The freewheel adjustable wheel of claim 8, wherein the second moveable gear includes:

a second moveable gear body installed in an annular shape;
 a coupling groove defining an annular groove along an outer circumference of the second moveable gear body and coupled to a protrusion protruding inwardly of the moveable gear assembly; and
 an inner gear protruding inwardly of the second moveable gear body and being engaged with a gear disposed in the clutch gear and a gear disposed in the clutch hub.

11. A freewheel adjustable wheel comprising:

a rotary gear configured to rotate by receiving power from a pedal and equipped with a gear along an outer circumference thereof;
 a shaft installed horizontally through the rotary gear and fixed to a frame;
 a cover casing having the rotary gear and the shaft installed through a center thereof, wherein the cover casing is rotatably installed;
 a fixed casing installed in a shape to shield an open portion of the cover casing, wherein rotation of the fixed casing is restricted;
 a clutch bearing installed between the rotary gear and the cover casing, wherein the clutch bearing is configured to transmit power to the cover casing when the rotary gear rotates in a forward direction;
 a clutch hub fixed outwardly of the rotary gear and configured to rotate together with the rotary gear;
 a clutch gear installed in series with the clutch hub and fixed to the cover casing;
 a driver fixed to the fixed casing and configured to supply rotational power; and
 a moveable gear assembly configured to move by power of the driver, wherein the moveable gear assembly moves in a freewheel mode of being engaged with the clutch hub and a non-freewheel mode of being engaged with the clutch hub and the clutch gear at the same time.

12. The freewheel adjustable wheel of claim 11, wherein the rotary gear includes:

a pulley member located outwardly of the cover casing and configured to receive power from the pedal via a belt; and
 a rotatable body extending from the pulley member inwardly of the cover casing and configured to rotate together with the pulley member.

13. The freewheel adjustable wheel of claim 12, wherein

the clutch hub includes:

a disk-shaped hub body having a center coincident with a center of the rotatable body and fixed outwardly of the rotatable body; and
 a first outer gear installed along an outer circumference of the hub body and formed in a shape of a protrusion extending in a vertical direction.

14. The freewheel adjustable wheel of claim 11, wherein the clutch gear includes:

a gear body installed in an annular shape inwardly of the cover casing and fixed to the cover casing; and
 a second outer gear protruding outwardly of the gear body and being engaged with the moveable gear assembly to receive power.

15. The freewheel adjustable wheel of claim 11, further comprising a stator fixed to the fixed casing and installed in an annular shape along an edge of the fixed casing, wherein the stator is configured to generate a magnetic force to adjust a rotational load on the cover casing.

16. The freewheel adjustable wheel of claim 11, wherein the driver includes:

a driving body fixed to the fixed casing and configured to supply rotational power; and
 an output shaft protruding outwardly of the driving body, wherein the output shaft is configured to rotate by an operation of the driving body, and is connected to the moveable gear assembly to move the moveable gear assembly.

17. The freewheel adjustable wheel of claim 11, wherein the moveable gear assembly includes:

a first moveable gear installed in an annular shape outwardly of the clutch hub and configured to move in a straight direction by receiving power from the driver; and
 a second moveable gear located inwardly of the first moveable gear and including a gear being engaged with the clutch hub and the clutch gear.

18. The freewheel adjustable wheel of claim 17, wherein the first moveable gear includes:

a first assembly gear installed on one side of the clutch hub and configured to move by an operation of the driver; and
 a second assembly gear installed on the other side of the clutch hub and connected to the first assembly gear,
 wherein a first coupling protrusion inserted into

a coupling groove defined at an outer side of the second moveable gear is disposed at an inner side of the first assembly gear, wherein a second coupling protrusion inserted into the coupling groove is disposed at an inner side of the second assembly gear. 5

19. The freewheel adjustable wheel of claim 17, wherein the second moveable gear includes:

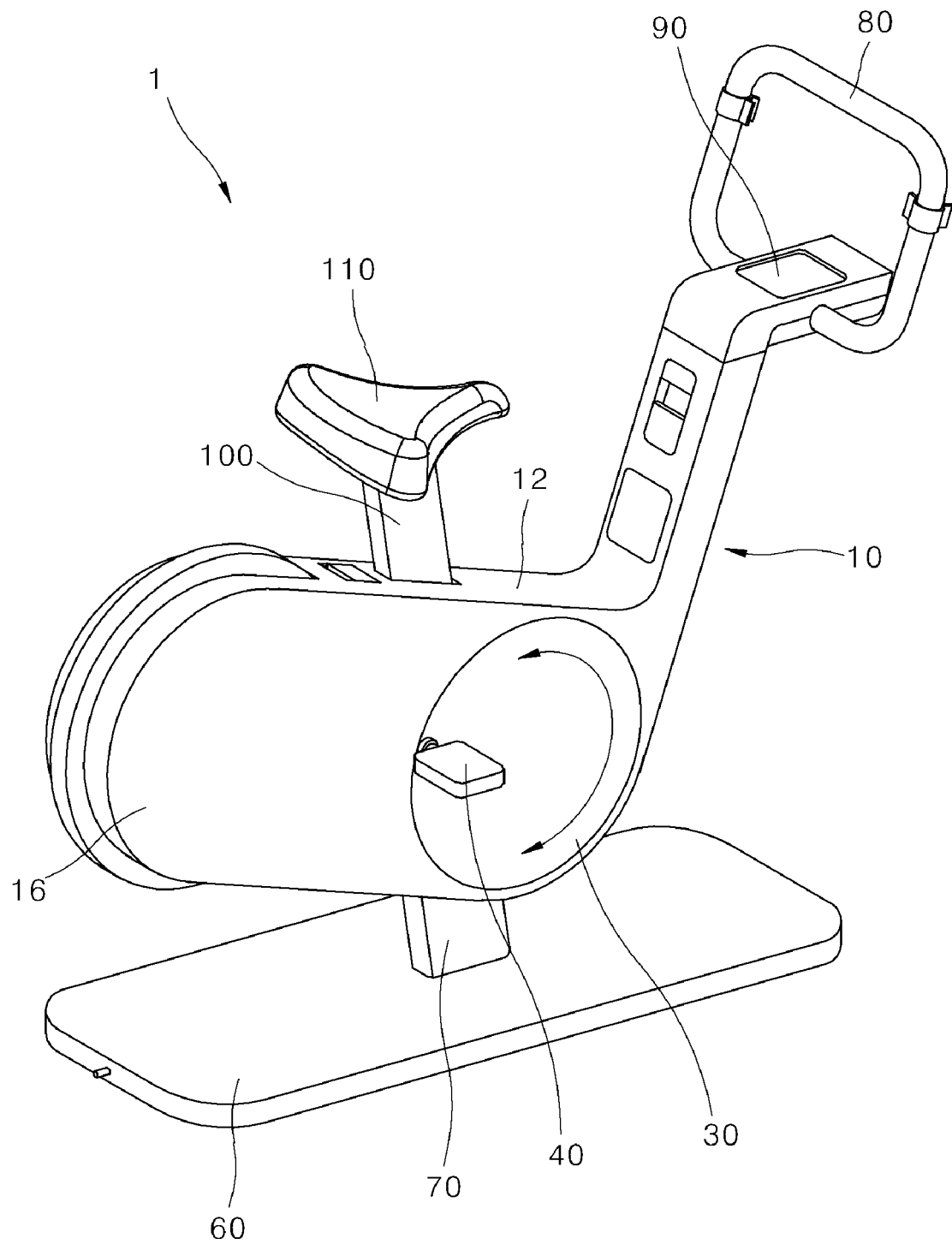
a second moveable gear body installed in an annular shape; 10
 a coupling groove defining an annular groove along an outer circumference of the second moveable gear body and coupled to a protrusion protruding inwardly of the moveable gear assembly; and 15
 an inner gear protruding inwardly of the second moveable gear body and being engaged with a gear disposed in the clutch gear and a gear disposed in the clutch hub. 20

20. An exercise bike comprising:

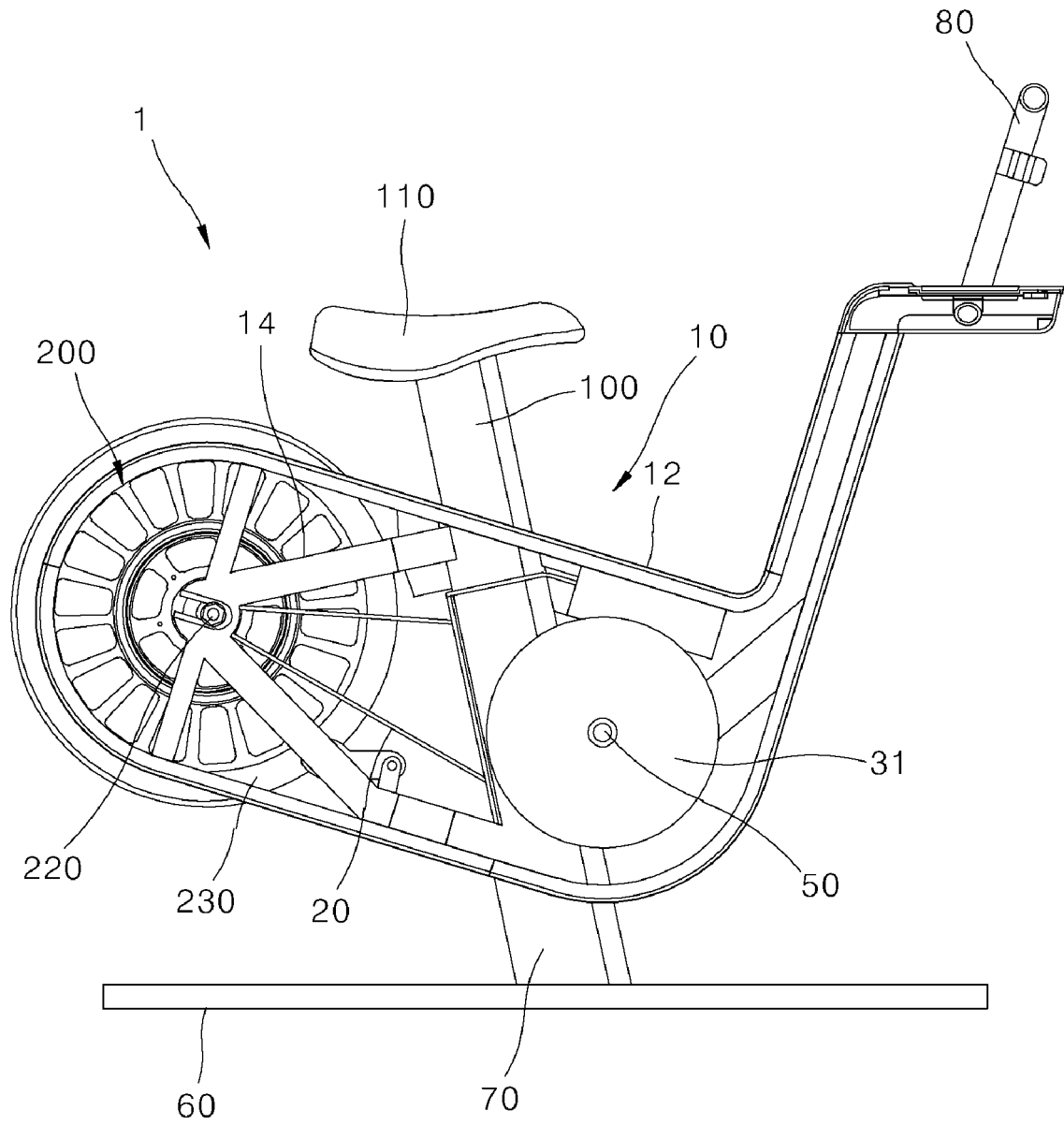
a frame supporting a saddle and a handle; 25
 a pedal installed on a rotatable disk installed on a side surface of the frame;
 a rotary gear configured to rotate by receiving power from the pedal and equipped with a gear along an outer circumference thereof; 30
 a casing rotatably supporting the rotary gear;
 a clutch bearing installed between the rotary gear and the casing, wherein the clutch bearing is configured to transmit power to the casing when the rotary gear rotates in a forward direction; 35
 a clutch hub fixed outwardly of the rotary gear and configured to rotate together with the rotary gear;
 a clutch gear installed in series with the clutch hub and fixed to the casing; 40
 a driver fixed to the casing and configured to supply rotational power; and
 a moveable gear assembly configured to move by power of the driver, wherein the moveable gear assembly moves in a freewheel mode of being engaged with the clutch hub and a non-freewheel mode of being engaged with the clutch hub and the clutch gear at the same time. 45
 50

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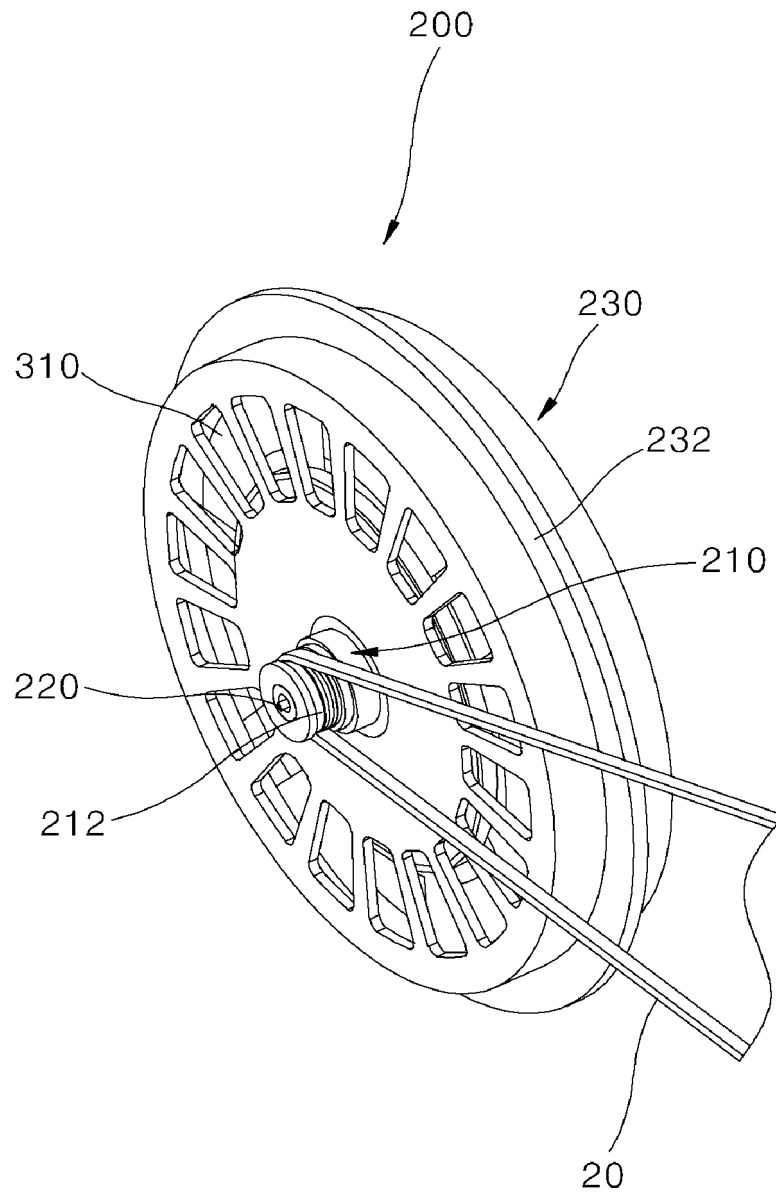
[FIG. 1]



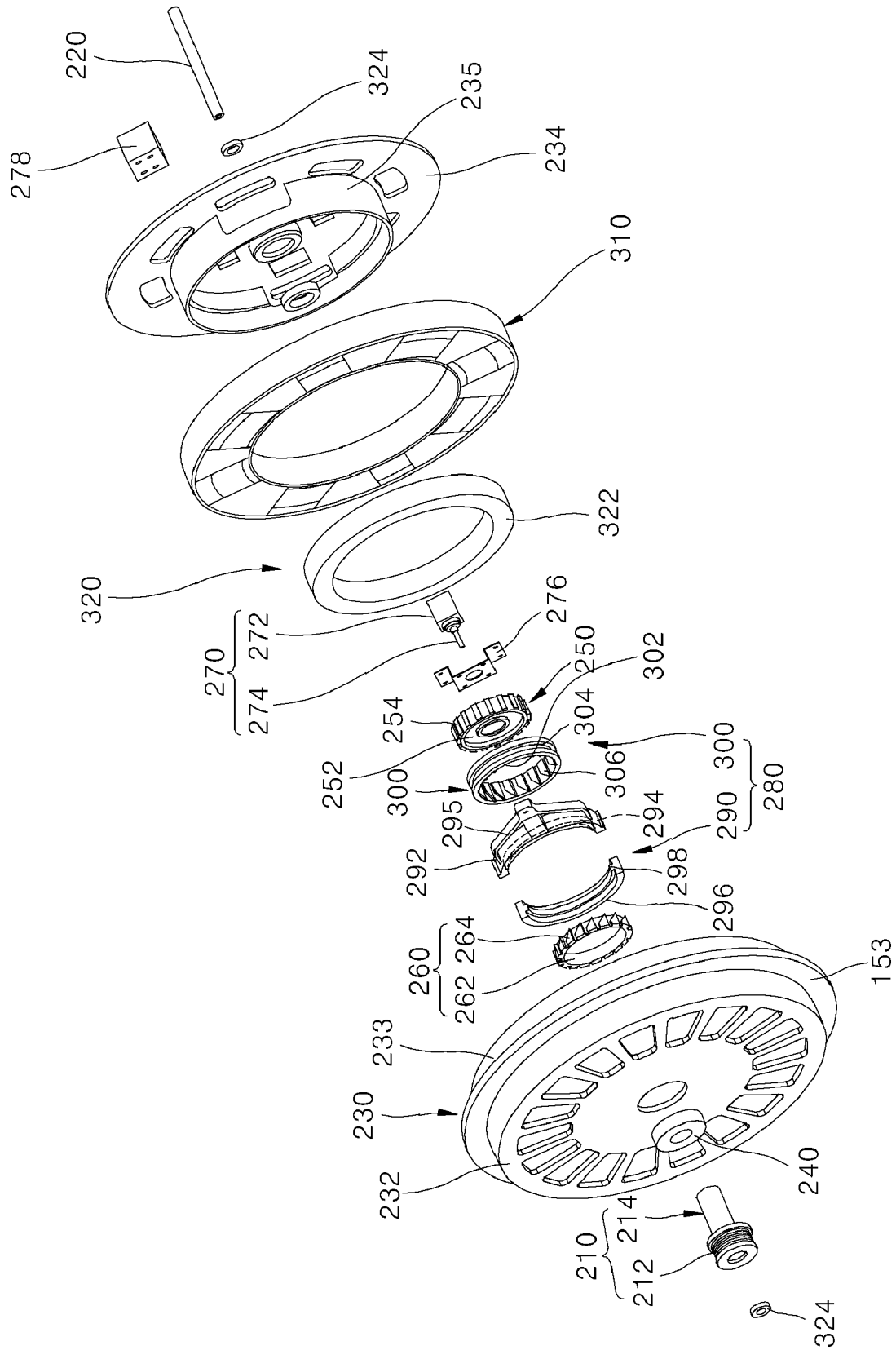
[FIG. 2]



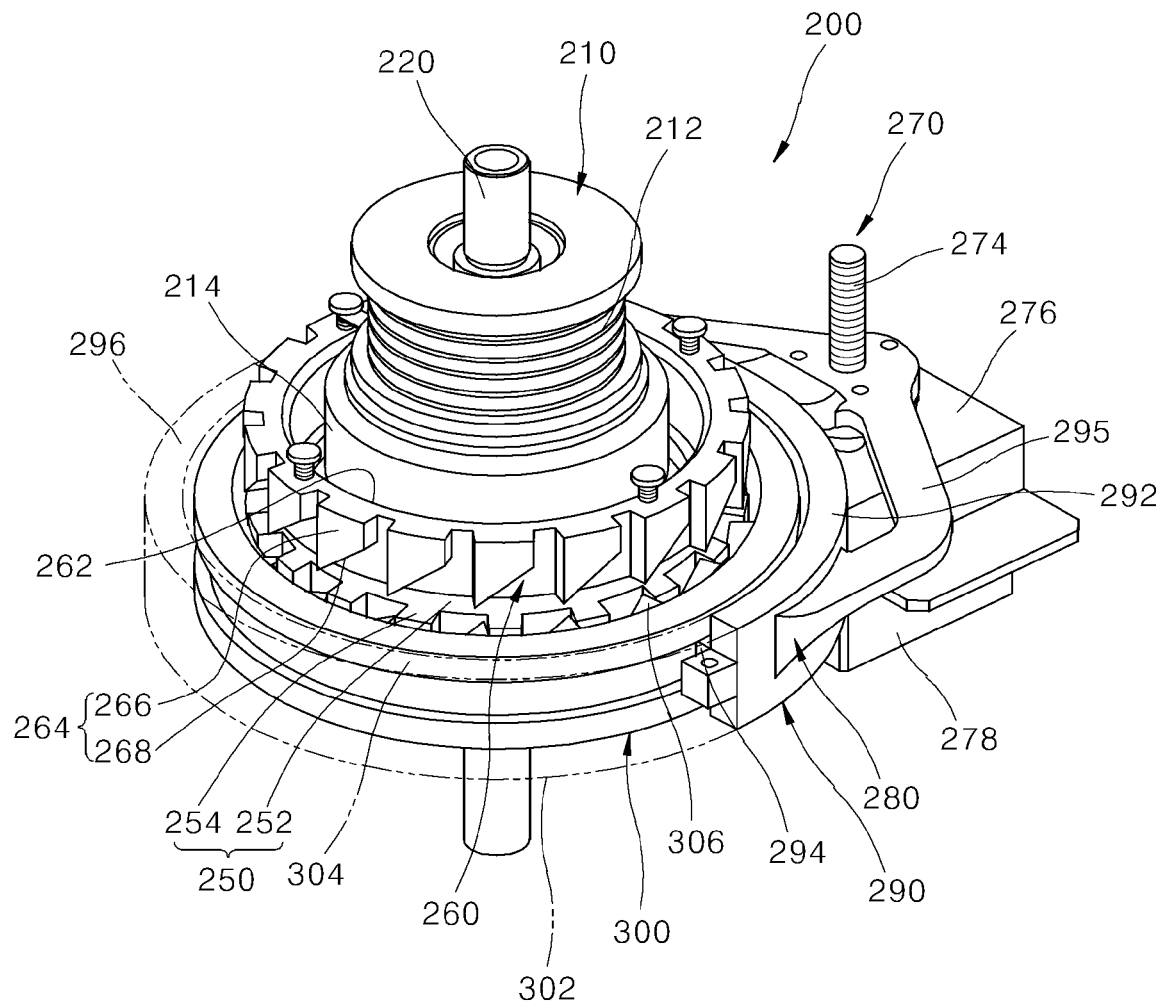
[FIG. 3]



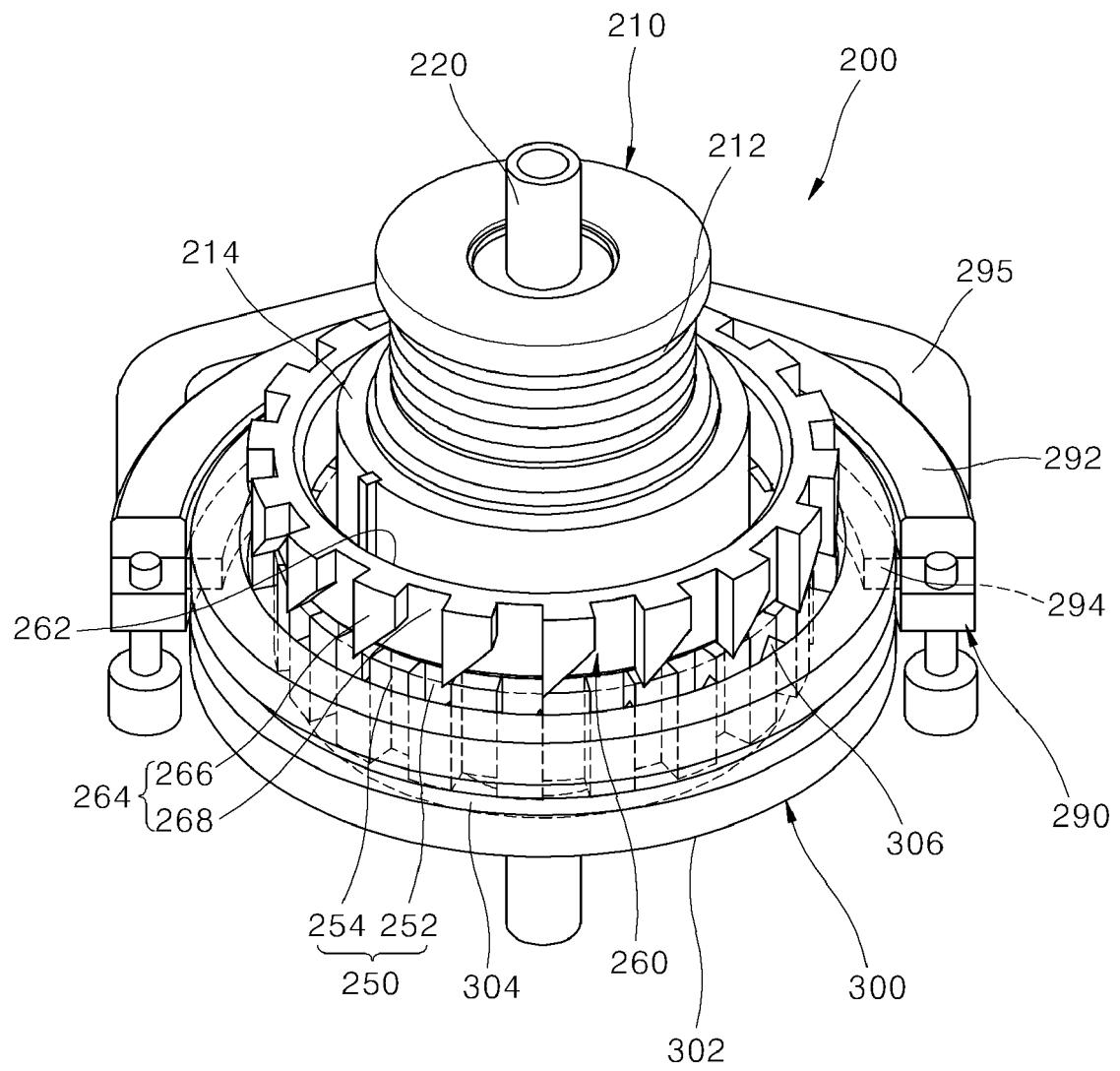
[FIG. 4]



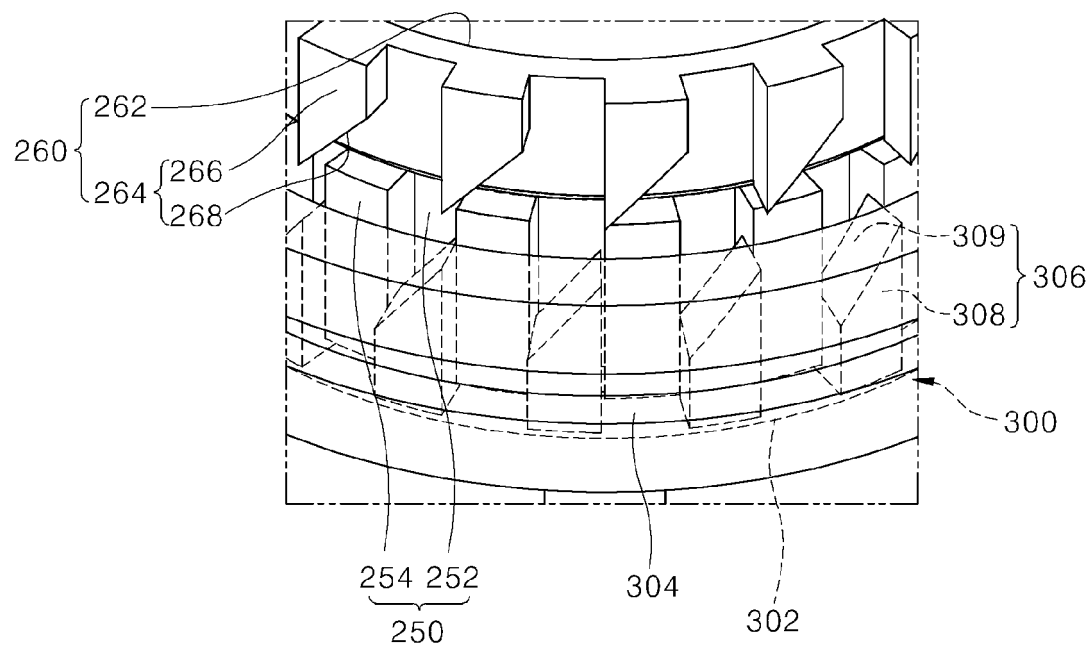
[FIG. 5]



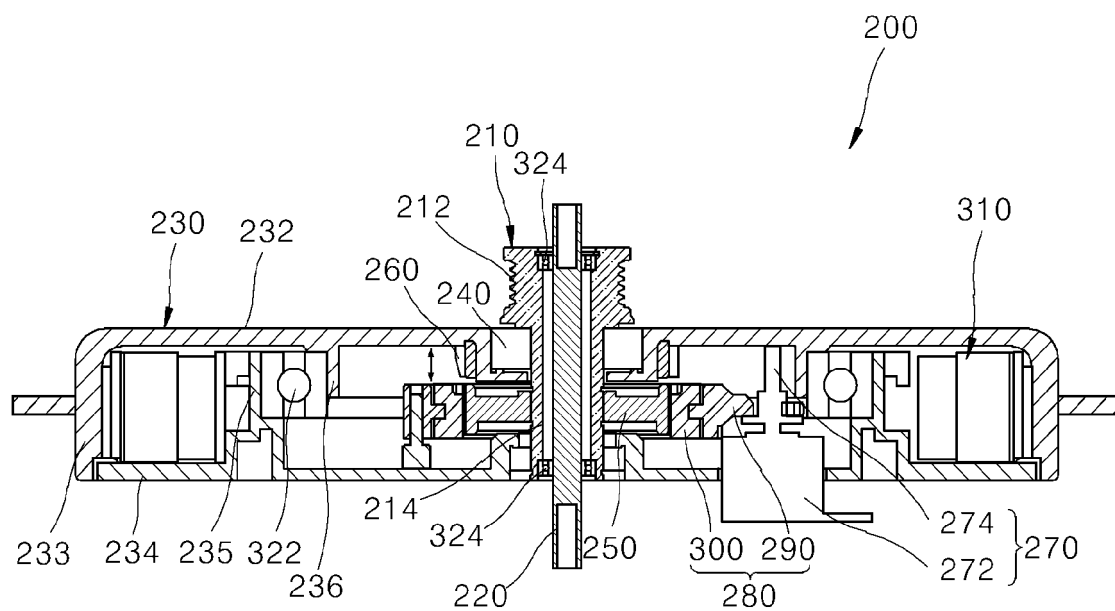
[FIG. 6]



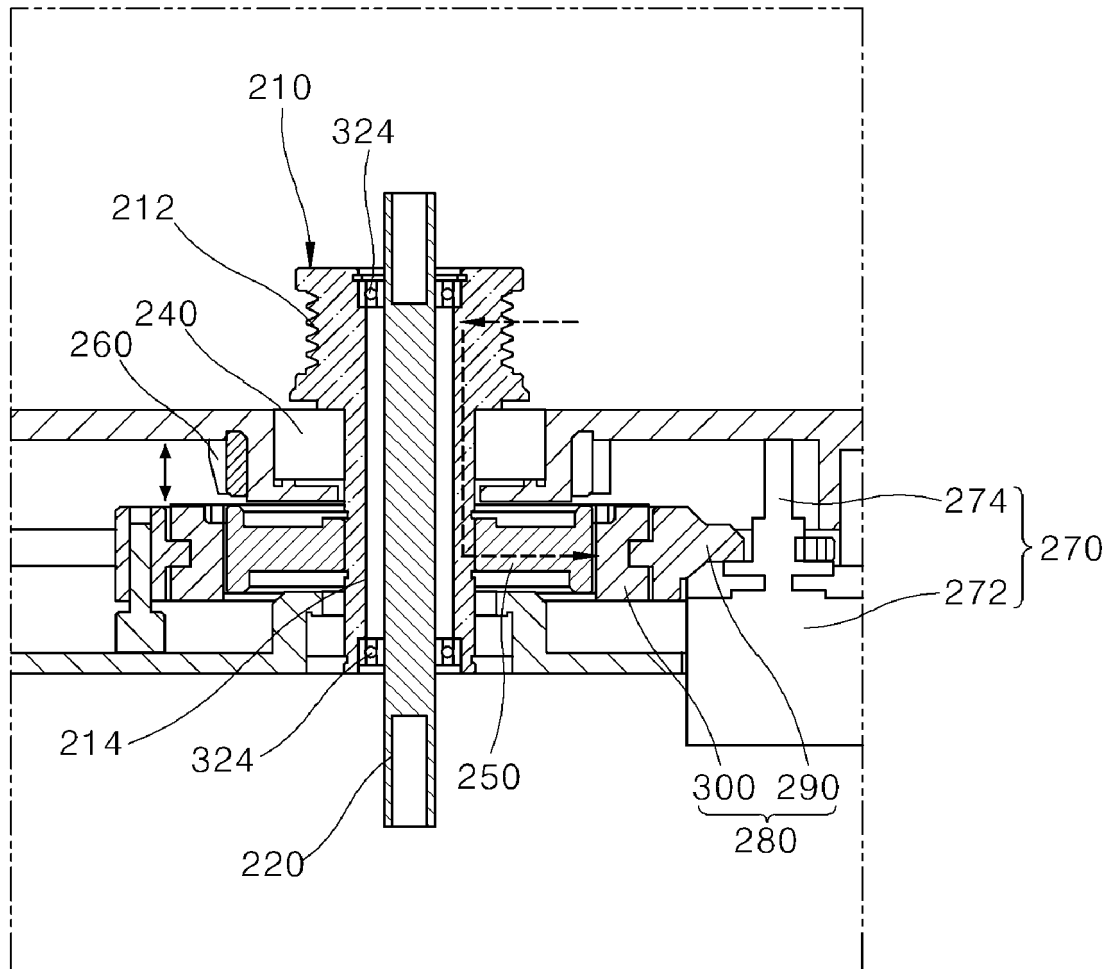
[FIG. 7]



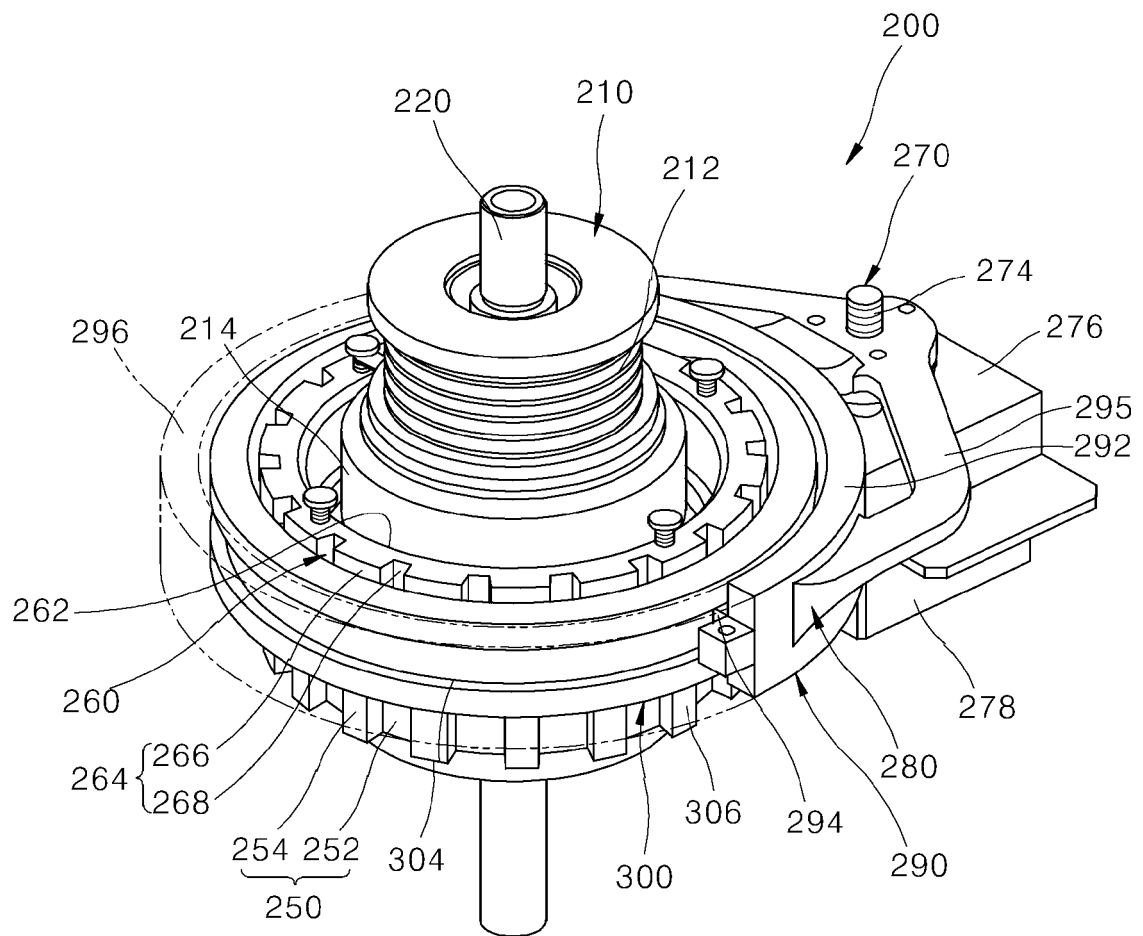
[FIG. 8]



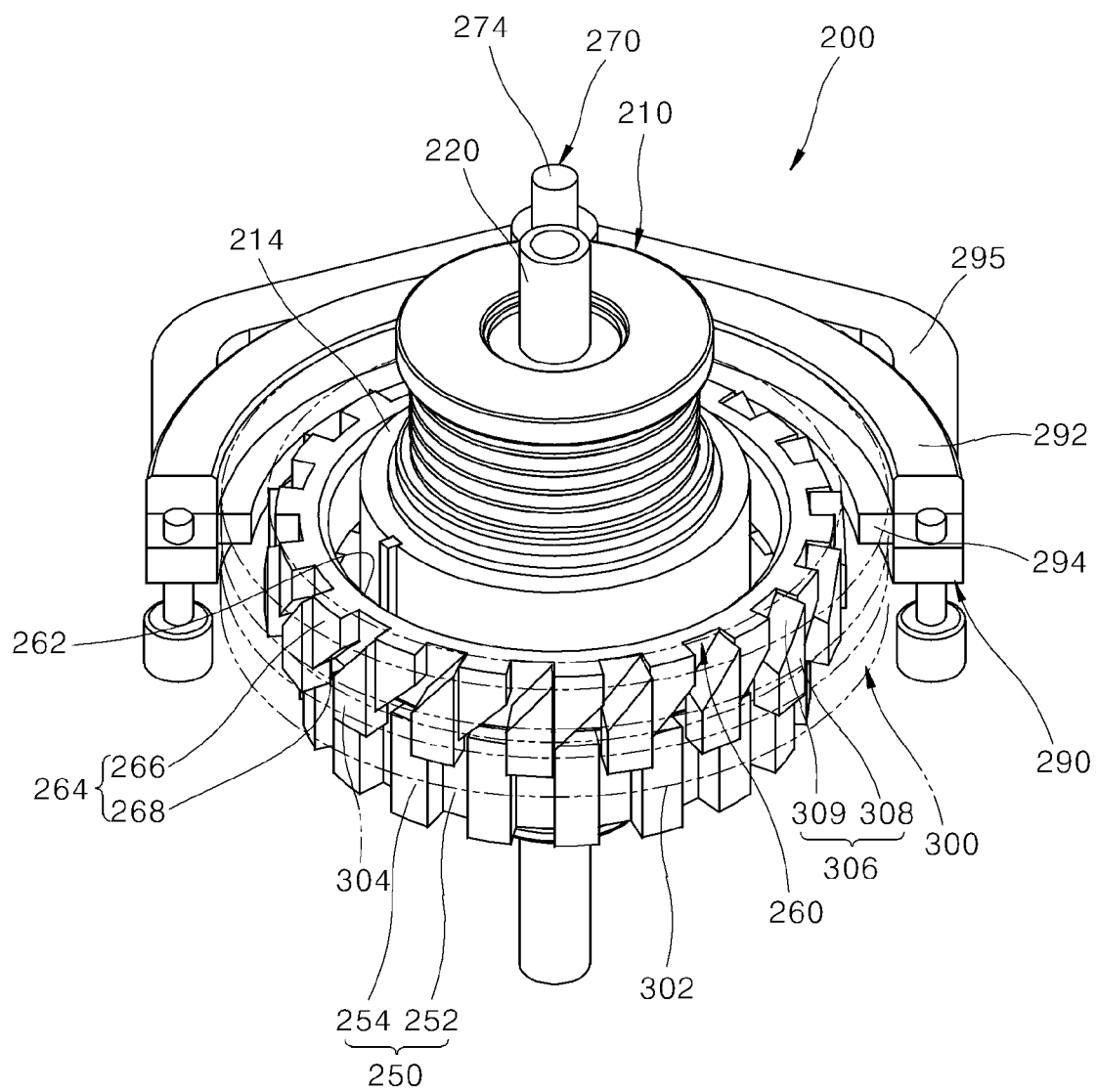
[FIG. 9]



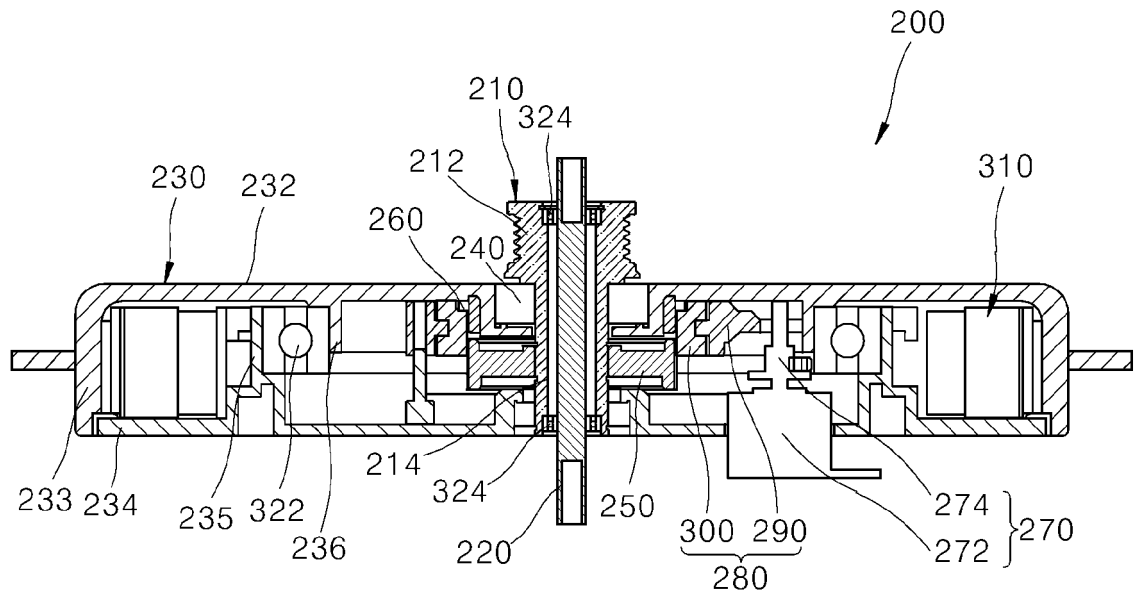
[FIG. 10]



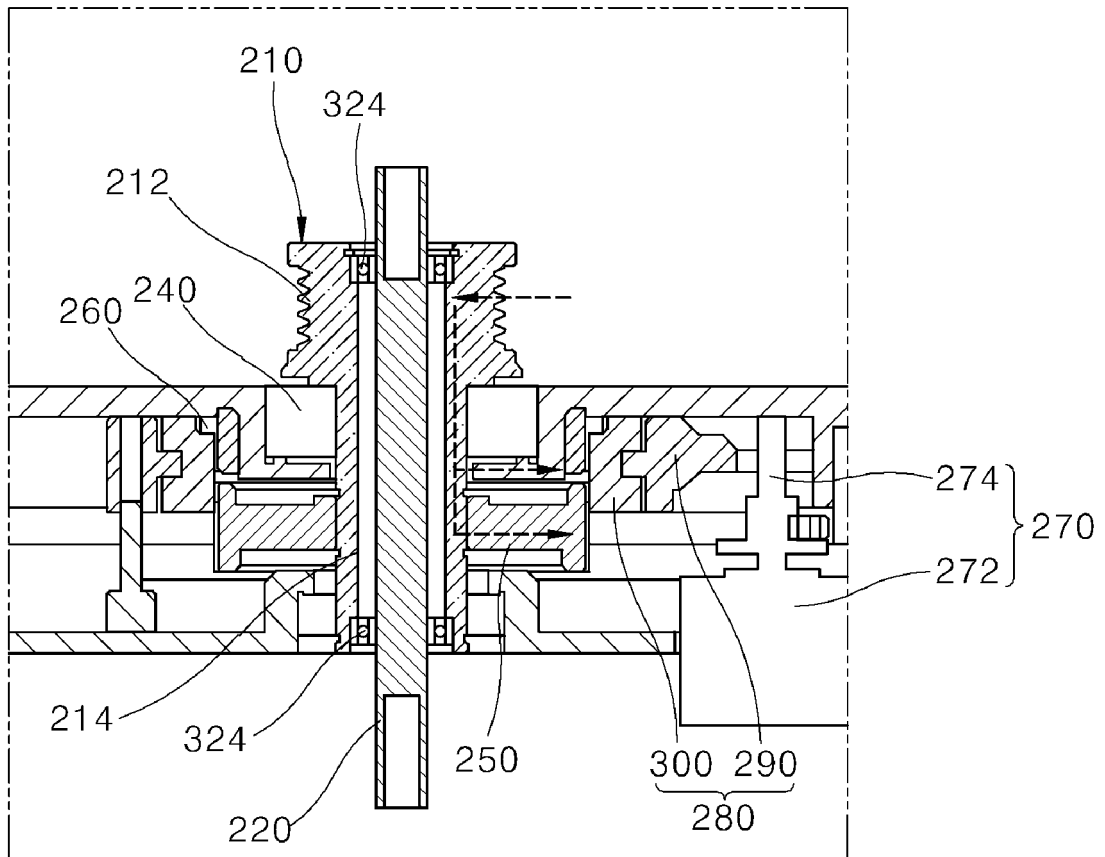
[FIG. 11]



[FIG. 12]



[FIG. 13]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/000462

5	A. CLASSIFICATION OF SUBJECT MATTER A63B 22/06(2006.01)i; A63B 23/04(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC		
10	B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A63B 22/06(2006.01); A61B 5/00(2006.01); A63B 21/00(2006.01); A63B 23/04(2006.01); B60K 17/12(2006.01); B62M 11/00(2006.01) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models: IPC as above Japanese utility models and applications for utility models: IPC as above		
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) & keywords: 프리휠(freewheel), 조절형 바퀴(adjustable wheels), 헬스 자전거(fitness bike), 회전기어부(rotation gear part), 구동부(driving part)		
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
25	Y A	KR 10-2022-0033118 A (LG ELECTRONICS INC.) 16 March 2022 (2022-03-16) See paragraphs [0047]-[0074] and [0109] and figures 1-4.	1-4,6,11-13,15,20 5,7-10,14,16-19
30	Y	KR 20-1996-0002582 Y1 (LEE, Kwang Hee) 27 March 1996 (1996-03-27) See paragraphs [0006]-[0009], claim 1 and figures 1-2 and 4-6.	1-4,6,11-13,15,20
35	Y	KR 20-0212251 Y1 (LIM, Kwang-Chul) 15 February 2001 (2001-02-15) See paragraphs [0024]-[0040] and figures 3-4.	1-4,6,11-13,15,20
	Y	KR 10-1865520 B1 (SONG, Byoungwoo) 07 June 2018 (2018-06-07) See claim 6.	6,15
	Y	KR 10-2107993 B1 (SNS REHABILITATION CENTER) 08 May 2020 (2020-05-08) See claim 1 and figures 1-2.	20
40	☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
45	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "D" document cited by the applicant in the international application "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
50	Date of the actual completion of the international search 26 June 2023		Date of mailing of the international search report 26 June 2023
55	Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208 Facsimile No. +82-42-481-8578		Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2023/000462

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				TW	202224725	A	01 July 2022
				WO	2022-055263	A1	17 March 2022
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KR	20-0212251	Y1	15 February 2001	KR	10-0383190	B1	09 May 2003
KR	10-1865520	B1	07 June 2018	None			
KR	10-2107993	B1	08 May 2020	None			

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REFERENCES CITED IN THE DESCRIPTION

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