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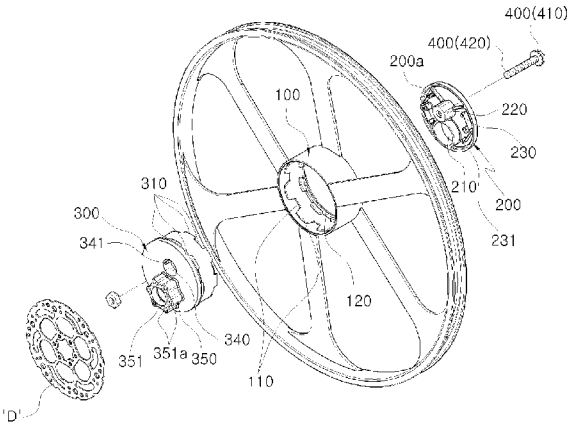
(54) Title: VARIABLE DEVICE FOR VARYING CENTRAL AXIS OF WHEEL

[Fig. 2]



(57) Abstract: Provided is a variable device for varying the central axis of a wheel, which simplifies a configuration of the variable device to thereby reduce a production cost and which controls an eccentricity position of the wheel conveniently and accurately step by step. The central axis variable device include: a rotating body along the inner circumference of which a first uneven portion is formed and both sides of which are pierced with respect to each other; a first cap that is combined at one side of the rotating body, and on the eccentric portion of which an eccentricity hole and a thread-coupling hole are formed; a second cap along the outer circumference of which a second uneven portion is formed in correspondence to the first uneven portion to thus be combined at the other side of the rotating body, and on which a shaft tube that is inserted into the eccentricity hole and an engagement hole corresponding to the coupling hole are formed; a coupling member that passes through the coupling hole and the engagement hole and couples the first and second caps with each other; a step groove that is stepped toward the engagement hole and that is formed at the side of the second cap; and an interference protrusion that has an elastic force to come in and out toward the step groove and is formed in the inner side of the second cap, in which the coupling member comprises a head portion on which a plurality of grooves are formed so that the interference protrusion is arranged into one of the plurality of grooves, and a thread portion that is thread-coupled with the coupling hole of the first cap.

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Description

Title of Invention: VARIABLE DEVICE FOR VARYING CENTRAL AXIS OF WHEEL

Technical Field

[1] The present invention relates to a variable device for varying the central axis of a wheel, and more particularly to a variable device for varying the central axis of a wheel, which simplifies a configuration of the variable device to thereby reduce a production cost and which smoothens an eccentricity control conveniently.

Background Art

[2] People today are highly interested in leisure activities. Accordingly, they are also highly interested in leisure sports.

[3] Bicycle riding, in-line skating, etc., are most popular representative leisure sports.

[4] Among them, bicycle riding is receiving popularity from many people irrespective of men and women, the old and the young, and seasons until now from former days. Further, bicycle riding does not only play a role of a transportation vehicle, but also enables people to enjoy an exercising effect simultaneously. Thus, it is expected that the popularity of the bicycle riding will be kept continuously.

[5] Here, bicycles are diversified in view of kinds and functions according to user's usage from general bicycles to mountain bicycles.

[6] That is, various kinds and transforms of equipment for leisure sports are required according to a modern life that is changing variously and quickly.

[7] For this, this applicant developed a shaking bicycle that can double interest and momentum by changing form and composition of a general bicycle, and gained a Korean Patent Registration No. 10-0583013 for an eccentricity device that is essential to embody the shaking bicycle.

[8] As can be seen from this, the eccentricity device is mounted on a wheel of a bicycle, to thereby help position of a wheel eccentric around a drive shaft.

[9] Accordingly, the wheel may be located at the center around the drive shaft, or may be eccentric from the drive shaft according to user's manipulation of the bicycle, to thus make the wheel eccentrically rotate and to thereby make a rider feel a ride comfort ascending and descending from surface of the ground.

Disclosure of Invention

Technical Problem

[10] However, the eccentricity device for the conventional shaking bicycle has the following problems.

[11] First, a manufacturing process is difficult because of complicated composition, and a

production cost increases due to an increase in man power during production.

[12] That is, since a screw and plural uneven portions are formed in a rotating frame and a circular shape control member respectively, and a latch is configured in the conventional art, a production cost is high.

[13] Second, as described above, since the rotating frame and the circular shape control member are combined with each other using a screw, and the uneven portions that have been engaged with each other secede from each other according to loosening of the screw coupling, the composition and method are very complicated and burdensome.

Solution to Problem

[14] To solve the above problems of the conventional art, it is an object of the present invention to provide a variable device for varying the central axis of a wheel, which simplifies a configuration of the variable device to thereby reduce a production cost and which controls an eccentricity position of the wheel conveniently and accurately step by step.

[15] To accomplish the object of the present invention, there is provided a variable device for varying the central axis of a wheel, the central axis variable device comprising:

[16] a rotating body along the inner circumference of which a first uneven portion is formed and both sides of which are pierced with respect to each other;

[17] a first cap that is combined at one side of the rotating body, and on the eccentric portion of which an eccentricity hole and a thread-coupling hole are formed;

[18] a second cap along the outer circumference of which a second uneven portion is formed in correspondence to the first uneven portion to thus be combined at the other side of the rotating body, and on which a shaft tube that is inserted into the eccentricity hole and an engagement hole corresponding to the coupling hole are formed;

[19] a coupling member that passes through the coupling hole and the engagement hole and couples the first and second caps with each other;

[20] a step groove that is stepped toward the engagement hole and that is formed at the side of the second cap; and

[21] an interference protrusion that has an elastic force to come in and out toward the step groove and is formed in the inner side of the second cap,

[22] wherein the coupling member comprises a head portion on which a plurality of grooves are formed so that the interference protrusion is arranged into one of the plurality of grooves, and a thread portion that is thread-coupled with the coupling hole of the first cap.

[23] Preferably but not necessarily, the central axis variable device further comprises an interference unit that is formed in the rotating body and the first cap in order to

interfere with free rotation of the rotating body.

[24] Preferably but not necessarily, the central axis variable device further comprises a bent piece that is formed inwards from the rotating body along the border of one side of the rotating body, wherein the interference unit comprises: an interference groove that is formed at a position corresponding to each recess portion of the first uneven portion in the bent piece; and a leaf spring that is elastically supported on the inner surface of the first cap and is inserted into the interference groove.

[25] Preferably but not necessarily, a separation preventive member is detachably formed in the inner surface of the first cap, and interferes with the bent piece, to thus prevent the rotating body and the first cap from being separated from each other.

[26] Preferably but not necessarily, the central axis variable device further comprises a spring that elastically supports the inner surface of the first cap and the inner surface of the second cap with respect to each other, between the inner surface of the first cap and the inner surface of the second cap.

[27] Preferably but not necessarily, a disc unit that constrains power of a bicycle is provided at the outside of the second cap.

Advantageous Effects of Invention

[28] The central axis variable device according to the present invention has the following effects.

[29] First, a composition of the central axis variable device is simplified and a production cost thereof is reduced. In addition, a series of processes that control eccentricity position of a wheel is simple.

[30] Second, a coupling member that couples first and second caps includes a head portion on which a plurality of grooves are formed. An interference protrusion that is elastically provided into the plurality of grooves in the second cap, to thereby maximize a coupling force of the coupling member.

[31] Third, a leaf spring is inserted in an interference groove formed in a rotating body, and is elastically supported on the inner surface of the first cap, to thereby interfere with free rotation of the rotating body.

[32] That is, a flow of the rotating body is prevented to thus provide a temporary assembly state. Accordingly, the present invention provides an effect of exactly guiding the position of the rotating body with which the second cap is combined.

[33] Fourth, since a separation preventive member that interferes with bent piece of the rotating body is detachably formed in the inner surface of the first cap, there is an effect that the first cap is not easily detached from the rotating body.

[34] Fifth, since a spring that elastically supports the inner surface of the first cap and the inner surface of the second cap with respect to each other, is provided between the

inner surface of the first cap and the inner surface of the second cap, there is an effect of making the second cap pushed out evenly by the elastic force of the spring in a process that the second cap is pushed out from the rotating body when a coupling force of a coupling member is loosened.

[35] Accordingly, since the corresponding positions in the rotating body and the second cap are not loose, they can be reunited smoothly.

Brief Description of Drawings

[36] The above and other objects and advantages of the present invention will become more apparent by describing the preferred embodiment thereof in detail with reference to the accompanying drawings in which:

[37] Figure 1 is a side view showing a state where a central axis variable device of a wheel according to a preferred embodiment of the present invention is placed on a tail gear wheel of a bicycle;

[38] Figure 2 is an exploded perspective view showing a disjointed state of a central axis variable device of a wheel according to a preferred embodiment of this invention;

[39] Figure 3a shows left-hand, lateral and right-hand views of a rotating body of a central axis variable device of a wheel according to a preferred embodiment of this invention;

[40] Figure 3b shows left-hand, lateral and right-hand views of a first cap of a central axis variable device of a wheel according to a preferred embodiment of this invention;

[41] Figure 3c shows left-hand, lateral and right-hand views of a second cap of a central axis variable device of a wheel according to a preferred embodiment of this invention;

[42] Figure 4 is a perspective view showing a coupling member of a central axis variable device of a wheel according to a preferred embodiment of this invention;

[43] Figures 5a and 5b are a cross-sectional view showing tightening and loosening of a first cap and a second cap of a central axis variable device of a wheel according to a preferred embodiment of this invention; and

[44] Figure 6 is a perspective view showing a coupled state of a central axis variable device of a wheel according to a preferred embodiment of this invention.

Best Mode for Carrying out the Invention

[45] The present invention provides a variable device for varying the central axis of a wheel. The central axis variable device comprises: a rotating body along the inner circumference of which a first uneven portion is formed and both sides of which are pierced with respect to each other; a first cap that is combined at one side of the rotating body, and on the eccentric portion of which an eccentricity hole and a thread-coupling hole are formed; a second cap along the outer circumference of which a second uneven portion is formed in correspondence to the first uneven portion to thus be combined at the other side of the rotating body, and on which a shaft tube that is

inserted into the eccentricity hole and an engagement hole corresponding to the coupling hole are formed; a coupling member that passes through the coupling hole and the engagement hole and couples the first and second caps with each other; a bent piece that is formed inwards from the rotating body along the border of one side of the rotating body; a separation preventive member that is detachably formed in the inner surface of the first cap, and that interferes with the bent piece, to thus prevent the rotating body and the first cap from being separated from each other; a step groove that is stepped toward the engagement hole and that is formed at the side of the second cap; and an interference protrusion that has an elastic force to come in and out toward the step groove and is formed in the inner side of the second cap, wherein the coupling member comprises a head portion on which a plurality of grooves are formed so that the interference protrusion is arranged into one of the plurality of grooves, and a thread portion that is thread-coupled with the coupling hole of the first cap.

Mode for the Invention

[46] Hereinbelow, a variable device for varying the central axis of a wheel (hereinafter referred to as a variable device) according to a preferred embodiment of the present invention will be described with reference to the accompanying drawings, that is, Figures 1 to 6.

[47] For convenience of explanation, an example that a variable device according to this invention is placed on a bicycle will be described below.

[48] However, the variable device according to the present invention can be placed to all devices that are driven by a wheel or wheels, for example, a motorcycle etc., as well as a bicycle, and can be applied to all wheels without being limited to a front wheel or a rear wheel.

[49] Figure 1 is a side view showing a state where a central axis variable device of a wheel according to a preferred embodiment of the present invention is placed on a tail gear wheel of a bicycle.

[50] Here, the variable device controls a distance difference about distance between a central axis being a drive shaft "S" of a bicycle and the outer circumferential surface of a rear wheel of the bicycle, to thus play a role of making the rear wheel with respect to the ground roll uniformly or travel eccentrically.

[51] That is, since a distance difference is kept between a drive shaft "S" and the outer circumferential surface that contacts the ground of a rear wheel, position of the drive shaft "S" around the center of the rear wheel is kept eccentric to thus vary a rolling function of the rear wheel.

[52] Since the function of the above-described variable device is disclosed in the Korean Patent Registration No. 10-0583013, the detailed description thereof will be omitted.

[53] Hereinbelow, composition and function of the variable device according to a preferred embodiment of this invention will be described with reference to Figures 2 through 6.

[54] As illustrated in Figure 2, the variable device includes a rotating body 100, a first cap 200, a second cap 300 and a coupling member 400.

[55] A rear wheel is mounted in the rotating body 100. A rim including a plurality of spokes are provided on the outer circumferential surface of the rotating body 100.

[56] Here, the rotating body 100 is formed in a cylindrical shape, and both sides of the rotating body 100 is provided in a perforating state.

[57] Here, a plurality of uneven portions are formed along the circumference of the inner circumferential surface of the rotating body 100.

[58] Here, the uneven portions formed on the rotating body 100 are called a first uneven portion 110 for convenience of explanation.

[59] Here, intervals between the uneven portions in the first uneven portion 110 are equally formed, and the concave and convex portions in the first uneven portion 110 are preferably formed eight in number, respectively.

[60] Accordingly, the rotating body 100 may be rotated by one-eighth rounds step by step, and a binding force of the rotating body 100 may be further strengthened due to a coupling with a second uneven portion to be later described.

[61] As illustrated in Figure 3a, a bent piece 120 is formed along the border of one side of the rotating body 100.

[62] The bent piece 120 prevents the first cap 300 from being easily detached from the rotating body 100 by a separation preventive member to be described later. The detailed description of the bent piece 120 will follow.

[63] Here, the bent piece 120 is formed inwards from the rotating body 100 along the border of one side of the rotating body 100.

[64] As can be seen from Figure 3a, a plurality of interference grooves 121 are formed along the circumference of the bent piece 120.

[65] The interference grooves 121 guide a correct position at the time of a mutual coupling between the rotating body 100 and the second cap 300. A leaf spring to be described later is disposed on the interference grooves 121, thereby preventing free rotation of the rotating body 100 and thus making a coupling of the second cap 300 easily performed.

[66] Here, the interference grooves 121 are formed at the positions corresponding to the concave portions of the first uneven portion formed in the rotating body 100, respectively.

[67] The first cap 200 is formed at one side of the variable device, and is combined at one side of the rotating body 100.

[68] An eccentricity hole 210 and a coupling hole 220 are formed at the first cap 200, which communicate with an inner side of the rotating body 100.

[69] A shaft tube 320 for coupling the drive shaft "S" of a bicycle passes through the eccentricity hole 210. The eccentricity hole 210 is formed at a position eccentric from the center of the first cap 200.

[70] The coupling member 400 that combines the first cap 200 and the second cap 300 at both sides of the rotating body 100 passes through a coupling hole 220.

[71] Meanwhile, as shown in Figure 3b, leaf springs 230 that are elastically supported are provided at the inner surface of the first cap 200.

[72] Each leaf spring 230 interfere with the rotating body 100 so that the rotating body 100 does not freely rotate on the first cap 200, and is inserted into a corresponding interference groove 121 of the rotating body 100.

[73] That is, the center of the leaf spring 230 is inserted into the interference groove 121 so that rotation of the rotating body 100 is interfered. Accordingly, position of the second cap 300 can be guided correctly as a technological characteristic of the present invention.

[74] The leaf springs 230 are mounted to be opposite each other on the inner surface of the first cap 200.

[75] Here, both ends of each leaf spring 230 are preferably placed on a pair of supports 231

[76] Here, the center of each leaf spring 230 is preferably bent in a form corresponding to the interference groove 121 of the rotating body 100.

[77] Meanwhile, an engagement boss 200a of Figure 5a or 5b is formed on the inner surface of the first cap 200, and a separation preventive member 240 is detachably combined with the engagement boss 200a.

[78] The separation preventive member 240 prevents the first cap 200 from being separated from the rotating body 100.

[79] In more detail, even at a state where the first cap 200 is not coupled by the coupling member 400, the first cap 200 is caught by the bent piece 120 of the rotating body 100 to thus avoid the first cap 200 from being detached from the rotating body 100.

[80] For this, the engagement boss 200a is preferably formed between the supports 231, and the separation preventive member 240 is made in a form of interfering the bent piece 120 of the rotating body 100 at a state of being combined with the engagement boss 200a.

[81] Next, the second cap 300 is combined with the other side of the rotating body 100, in order to form the variable device of the present invention. A second uneven portion 310 is formed along the circumference of the outer circumferential surface of the second cap 300.

[82] The second uneven portion 310 corresponds to the first uneven portion 110 of the rotating body 100, and the number of the respective concave and convex portions of the second uneven portion 310 is eight as in the case of the first uneven portion 110.

[83] The shaft tube 320 with which the drive shaft "S" of a bicycle is coupled and an engagement hole 330 through which the coupling member 400 is coupled are formed on the second cap 300.

[84] The shaft tube 320 is extended from the inner surface of the second cap 300, and is exposed to the outside through the eccentricity hole 210.

[85] In addition, the coupling member 400 passes through the engagement hole 330, and the engagement hole 330 corresponds to the coupling hole 220.

[86] Here, the engagement hole 330 is perforated to the outside of the second cap 300. A step groove 340 that is formed with a step by the engagement hole 330 is formed at the outer surface of the second cap 300.

[87] A head portion of a coupling member 400 to be described later is arranged in the step groove 340.

[88] Here, as illustrated in Figure 3c, an interference projection 341 that is projected toward the step groove 340, is provided in the step groove 340.

[89] The interference protrusion 341 interferes with the head portion of the coupling member 400, to thereby prevent a coupling force of the coupling member 400 from being loosened.

[90] The interference protrusion 341 is provided at the inner side of the second cap 300 to have an elastic force, and can come in and out with the elastic force toward the step groove 340.

[91] Meanwhile, a disc unit "D" is placed as a brake unit on the outer side of the second cap 300.

[92] That is, as illustrated in Figures 2 through 6, a disc unit "D" is placed as a brake unit in the variable device according to this invention.

[93] For this, a mounting protrusion 350 on which the disc unit "D" is placed is further formed on the outer surface of the second cap 300.

[94] A throughhole 351 that communicates with the inner portion of the shaft tube 320 is formed in the mounting protrusion 350. A plurality of screw holes 351a through which the disc unit "D" is screw-coupled are formed on the circumference of the throughhole 351.

[95] Next, the coupling elements 400 plays a role of combining the first cap 200 and the second cap 300 with each other at both sides of the rotating body 100, and includes a head portion 410 and a thread portion 420.

[96] The head portion 410 is arranged in the step groove 340 of the second cap 300, and the thread part 420 is exposed into the coupling hole 220 of the first cap 200 through

the engagement hole 330.

[97] Here, as illustrated in Figure 4, a plurality of grooves 411 are formed along the circumference of the head portion 410.

[98] The grooves 411 are regions through the interference protrusion 341 that comes in and out from the step groove 340 is arranged. If the interference protrusion 341 is arranged into one of the grooves 411, the head portion 410 does not rotate. As a result, the coupling member 400 does not loosen.

[99] In addition, the thread portion 420 is extended from the head portion 410, and is exposed through the coupling hole 220 of the first cap 200, to then be engaged by a nut.

[100] Meanwhile, a spring 500 is provided in the inner side of the rotating body 100, and both end portions of the spring 500 elastically supports the inner surface of the first cap 200 and the second cap 300, respectively.

[101] The spring 500 makes the second uneven portion 310 of the second cap 300 not lean to either side thereof but be pushed out evenly in a process of separating the second uneven portion 310 of the second cap 300 from the first uneven portion 110 of the rotating body 100 to make the rotating body 100 rotate.

[102] Hereinbelow, coupling and action of the variable device constructed above will be described.

[103] First, the first cap 200 is combined at one side of the rotating body 100.

[104] Here, the center of the leaf spring 230 mounted on the inner surface of the first cap 200 is inserted into the interference groove 121 that is formed in the bent piece 120 of the rotating body 100.

[105] Accordingly, the rotating body 100 does not freely rotate by interference of the leaf spring 230.

[106] Then, the separation preventive member 240 is combined with the engagement boss of the first cap 200.

[107] Here, as illustrated in Figures 5a and 5b, the separation preventive member 240 interferes with the bent piece 120 of the rotating body 100, thereby preventing the first cap 200 from being detached from the rotating body 100 even before the first cap 200 is coupled by the coupling member 400.

[108] This state can be seen as a temporary assembly of the first cap 200 with respect to the rotating body 100.

[109] Next, the spring 500 is arranged in the inner side of the first cap 200 and then the first cap 200 is covered with the second cap 300. Then, the second cap 300 is combined at the other side of the rotating body 100.

[110] Here, the second cap 300 is arranged at the other side of the rotating body 100 while having an elastic force.

[111] Next, the coupling member 400 is made to pass through the engagement hole 330 of the second cap 300 and the coupling hole 220 of the first cap 200 and then is engaged by a nut.

[112] Here, the head portion 410 of the coupling member 400 is arranged in the step groove 340, and an interference protrusion 341 is arranged in one of the grooves 411 of the head portion 410, to thereby prevent the coupling member 400 from loosening.

[113] Here, a special tool for turning the head portion 410 is used to turn the coupling member 400. A socket wrench (not shown) is used as the special tool.

[114] That is, the interference protrusion 341 that is withdrawn into the step groove 340 is pushed out into the inner side of the second cap 300 by the socket wrench, in a process of inserting the socket wrench into the step groove 340.

[115] Accordingly, the head portion 410 is turned using the socket wrench, to thereby tighten or loosen the coupling member 400.

[116] Thereafter, if tightening or loosening of the coupling member 400 is ended, the socket wrench is separated from the head portion 410.

[117] Here, the interference protrusion 341 is inserted into one of the grooves 411 of the head portion 410 by a restoring force, to thereby prevent the coupling member 400 from loosening.

[118] Then, the disc unit "D" that is a brake unit is combined with the mounting protrusion 350.

[119] As illustrated in Figure 6, the disc unit "D" is made to correspond to screw holes 351a of the mounting protrusion 350, and then is combined with the mounting protrusion 350, using special bolts and so on.

[120] As described above, the coupling of the variable device is completed.

[121] Meanwhile, section of the combined variable device as described above is illustrated in Figure 5a.

[122] In this state, in order to make position of the rear wheel eccentric around the drive shaft "S" or the eccentric rear wheel restored into a correct position, the first uneven portion 110 and the second uneven portion 310 are uncoupled with each other and then the rotating body 100 is made to rotate.

[123] For this, the coupling member 400 is loosened so that the coupling force of the first cap 200 and the second cap 300 decreases slowly.

[124] Here, the second cap 300 starts to be pushed out evenly from the rotating body 100 by the elastic force of the spring that has supported the first cap 200 and the second cap 300.

[125] Accordingly, engagement of the first uneven portion 110 and the second uneven portion 310 is released, to thereby enable the rotating body 100 to rotate as illustrated in Figure 5b.

[126] Here, since the concave and convex portions in the first uneven portion 110 and the second uneven portion 310 are formed eight in number, respectively, the rotating body 100 may be rotated by one-eighth rounds at a time.

[127] Here, since the rotating body 100 is elastically supported by the leaf spring 230, it is not rotated excessively.

[128] That is, since the interference groove 121 formed in the bent piece 120 of the rotating body 100 is shifted one by one, while holding the leaf spring 230, the rotating body 100 can rotate step by step.

[129] Thus, as the rotating body 100 rotates step by step, position of the rear wheel mounted on the rotating body 100 is also variable around the drive shaft "S."

[130] That is, since the rotating body 100 is variable around the drive shaft "S," that is, position of rear wheel is variable eccentrically, a rolling action of the rear wheel with respect to the ground is made irregularly.

[131] As described above, the wheel central axis variable device according to the present invention can be made into a simple composition to thus reduce a production cost. Further, an eccentricity position of the rotating body can be simply varied.

[132] Meanwhile, the present invention is not limited to the above-described embodiment, and it is possible for one who has an ordinary skill in the art to modify or change all the electric roast cooking devices for cooking foods in various forms, within the scope of the technical spirits or ideas.

Industrial Applicability

[133] As described above, a variable device for varying the central axis of a wheel according to the present invention can be applied in a leisure sports field using a variety of bicycles from a general bicycle to a mountain bicycle.

Claims

[Claim 1] A variable device for varying the central axis of a wheel, the central axis variable device comprising:
a rotating body along the inner circumference of which a first uneven portion is formed and both sides of which are pierced with respect to each other;
a first cap that is combined at one side of the rotating body, and on the eccentric portion of which an eccentricity hole and a thread-coupling hole are formed;
a second cap along the outer circumference of which a second uneven portion is formed in correspondence to the first uneven portion to thus be combined at the other side of the rotating body, and on which a shaft tube that is inserted into the eccentricity hole and an engagement hole corresponding to the coupling hole are formed;
a coupling member that passes through the coupling hole and the engagement hole and couples the first and second caps with each other;
a bent piece that is formed inwards from the rotating body along the border of one side of the rotating body;
a separation preventive member that is detachably formed in the inner surface of the first cap, and that interferes with the bent piece, to thus prevent the rotating body and the first cap from being separated from each other;
a step groove that is stepped toward the engagement hole and that is formed at the side of the second cap; and
an interference protrusion that has an elastic force to come in and out toward the step groove and is formed in the inner side of the second cap,
wherein the coupling member comprises a head portion on which a plurality of grooves are formed so that the interference protrusion is arranged into one of the plurality of grooves, and a thread portion that is thread-coupled with the coupling hole of the first cap.

[Claim 2] The central axis variable device according to claim 1, further comprising an interference unit that is formed in the rotating body and the first cap in order to interfere with free rotation of the rotating body.

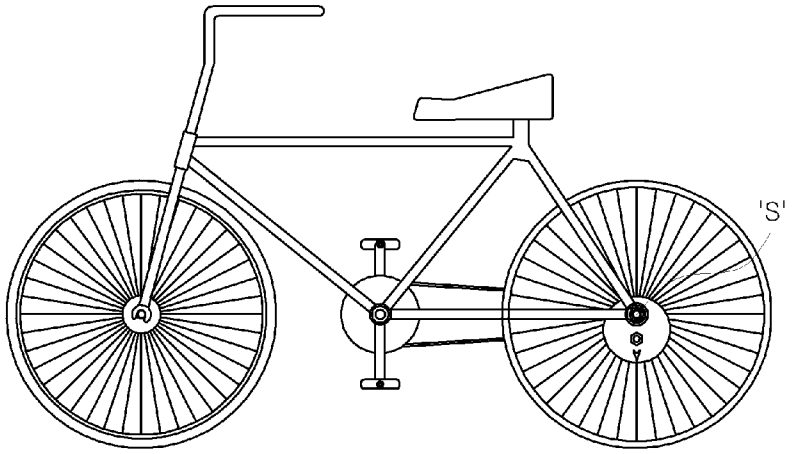
[Claim 3] The central axis variable device according to claim 2, wherein the interference unit comprises:
an interference groove that is formed at a position corresponding to

each recess portion of the first uneven portion in the bent piece; and a leaf spring that is elastically supported on the inner surface of the first cap and is inserted into the interference groove.

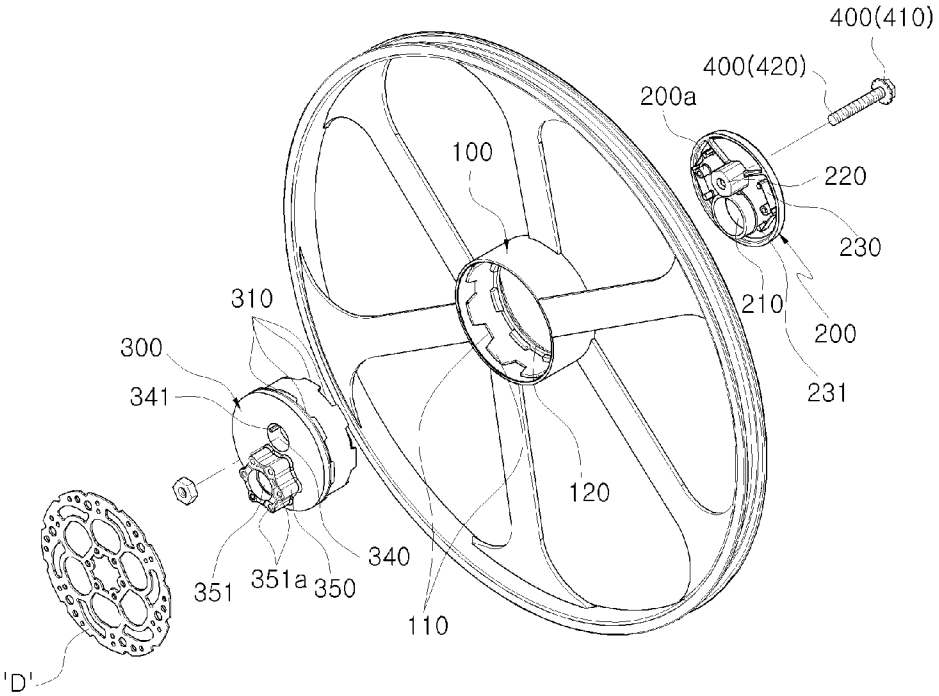
[Claim 4] The central axis variable device according to any one of claims 1 to 3, further comprising a spring that elastically supports the inner surface of the first cap and the inner surface of the second cap with respect to each other, between the inner surface of the first cap and the inner surface of the second cap.

[Claim 5] The central axis variable device according to any one of claims 1 to 3, wherein a disc unit that constrains power of a bicycle is provided at the outside of the second cap.

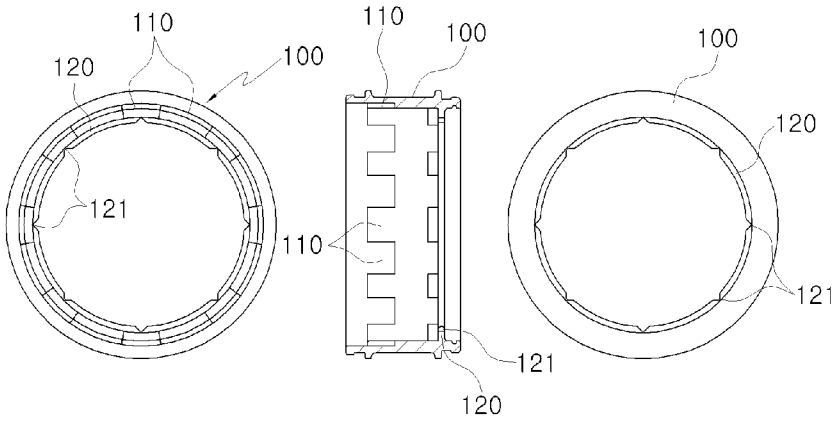
[Fig. 1]



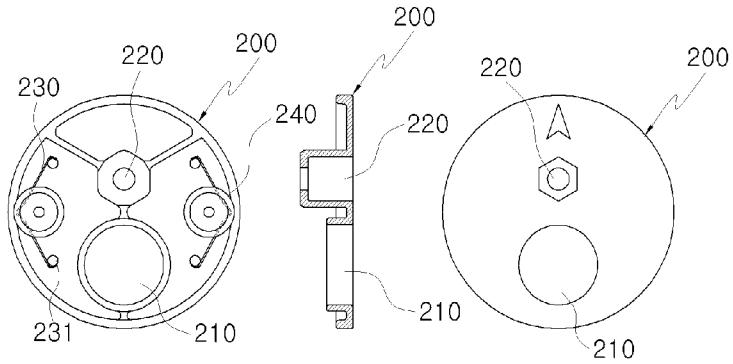
[Fig. 2]



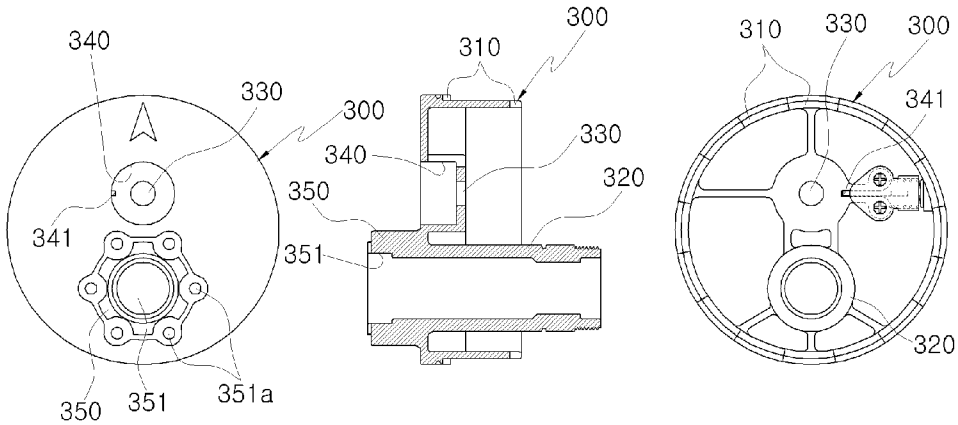
[Fig. 3a]



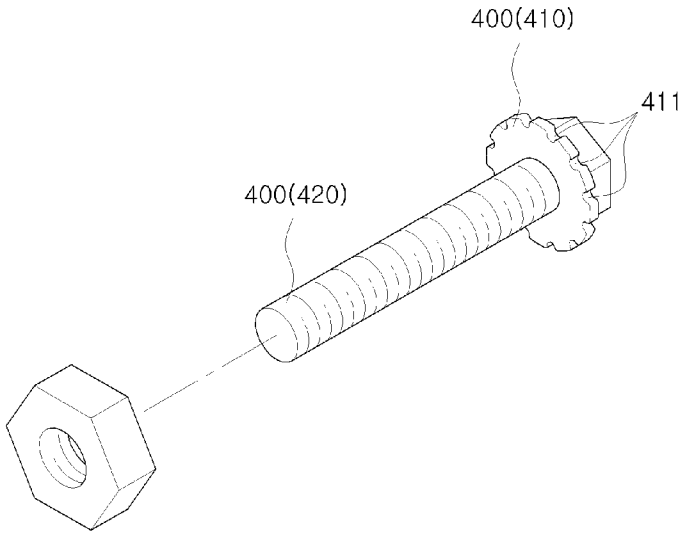
[Fig. 3b]



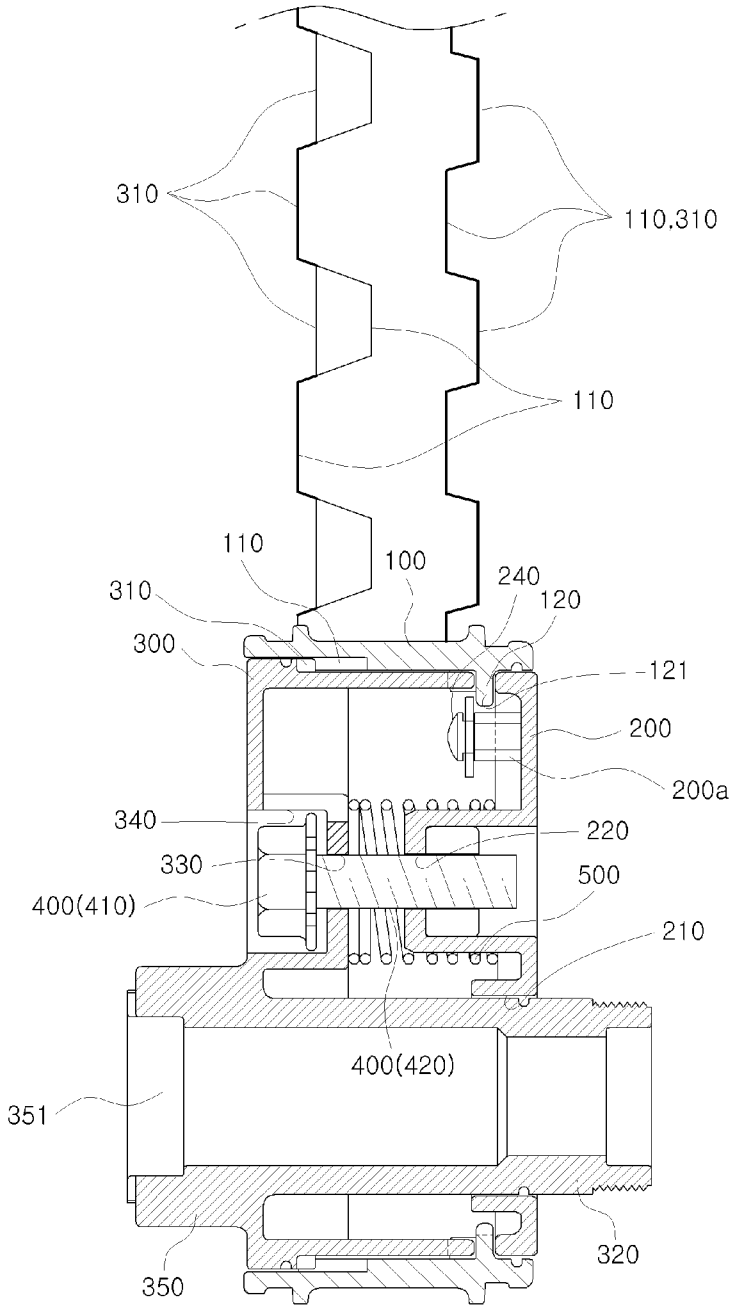
[Fig. 3c]



[Fig. 4]



[Fig. 5a]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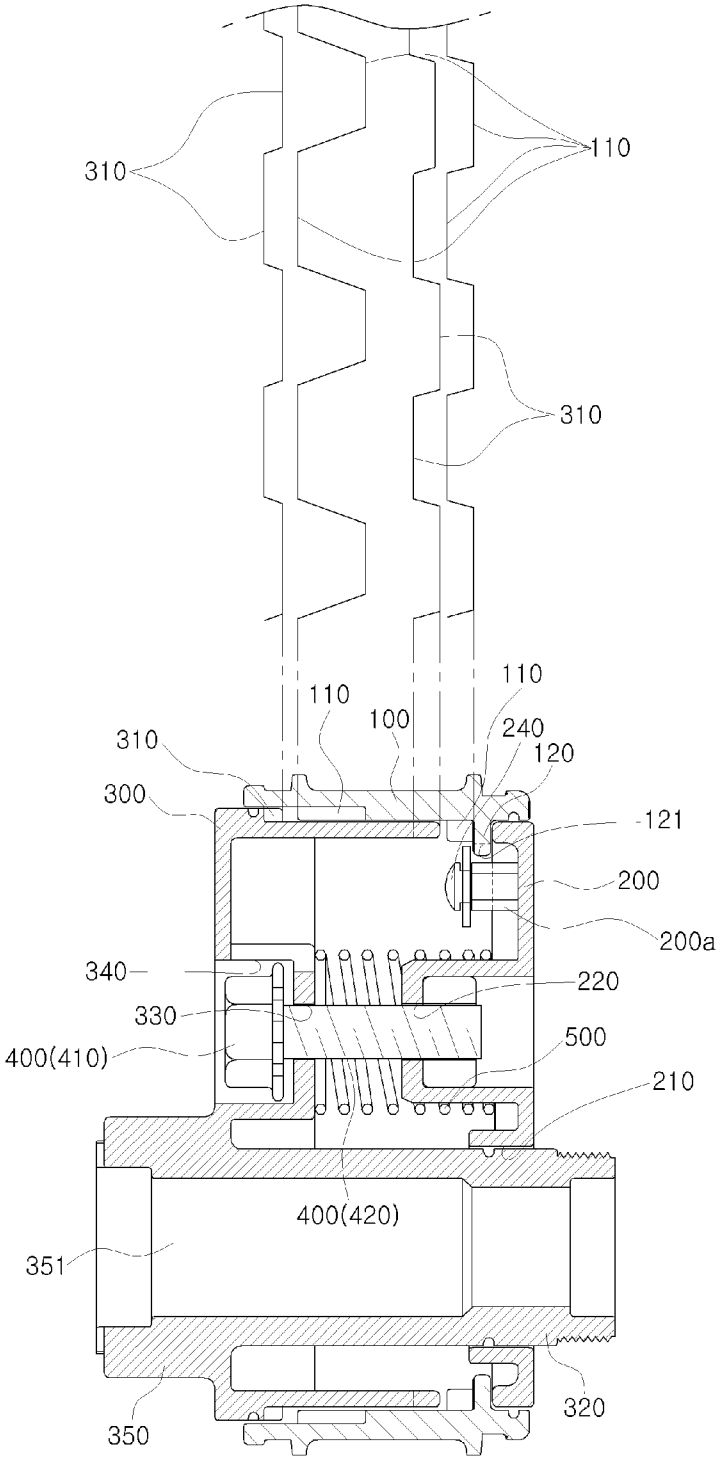
[Fig. 5b]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[Fig. 6]