問 1

[0002] A golf club (hereinafter referred to as a club) is mainly required to provide a long distance shot and a shot that does not curve (or less likely to curve). The requirements of such characteristics to clubs are important, whereas golfers are also very interested in finding clubs that fit themselves. A typical club was manufactured in consideration of static characteristics such as a length of a club shaft (hereinafter referred to as a shaft), balance, a club weight, and a shaft flex, and golfers assessed, imagined or only guessed the values of such characteristics from their past experiences in order to select their clubs.

[0003] On the other hand, a golf swing is a dynamic behavior, and thus a club selection has been focused on in consideration of dynamic characteristics, i.e., a specific vibration (which is a linear flexural specific vibration) of the club. The amount of this specific vibration depends on a shaft flexural rigidity, a shaft weight, a shaft length, and a weight of a club head (hereinafter referred to as a head). Specifically, during a down swing, a shaft is bent and recovered. Thus, the head speed reaches the maximum when the shaft is recovered and straight. Therefore, if the ball is hit on this timing, the maximum distance of such swing can be obtained (if the face of the head is directed correctly). It is said that such a swing behavior relates to the specific vibration of a golf club. A club having a specific vibration lower than the optimum reaches the hit point before reaching the maximum head speed. A club having a specific vibration larger than the optimum reaches the fit point after reaching the maximum head speed, and this might end up with a lower distance and a bad shot direction.

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[0025] As illustrated in FIG. 3, if the flange 10 of the holder 7 is pressed onto the side surface of the outer ring 2, the friction produced on the contact surface therebetween serves as a resistance against rotation of the holder 7. If the friction exceeds the elastic force of the elastic body 11, the inner ring 1 and the holder 7 rotate relative to each other, and the roller 6 engages with the cylinder surface 3 and the cam surface 5, and the rotation. Then, the rotation of the inner ring 1 is transferred to the outer ring 2 through the roller 6. The relative rotation between the inner ring 1 and the holder 7 also causes elastic deformation of the elastic body 11.

[0026] If the axial load to the flange 10 is removed in a state in which the inner ring 1 and the outer ring 2 transfer the rotation torque to each other, the restoration elasticity of the elastic body 11 causes the holder 7 to rotate toward a neutral position. Then, this rotation removes the engagement of the roller 6 with the cylinder surface 3 and the cam surface 5, and the inner ring 1 rotates alone. The elastic body 11 is installed between the inner ring 1 and the holder 7, and thus the roller 6 also revolves together with the holder 7.

[0027] During this time, the roller 6 is biased toward the inner periphery of the outer ring 2 by the elasticity piece 9, and prevented from moving toward the inner direction of the radius of the holder 7. Thus, the behavior of the roller 6 is stable in a low-speed rotation of the inner ring 1, the drag torque applied to the holder 7 is small, and the roller 6 does not engage with the cylinder surface 3 and the cam surface 5 by mistake.

[0028] The elasticity piece 9 prevents the roller 6 from moving along the radius direction of the holder 7. Thus, the roller 6 does not repeatedly collide with the cylinder surface 3 and the cam surface 5, and the vibration by the collision of the roller

6 hardly happen.　This provides a two-direction roller clutch having excellent vibration characteristics.

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1.　An electromagnetic bearing (10) for an axial force member (11) including a rotation shaft (12) and a distal region extending outwardly from the rotation shaft (12),

the electromagnetic bearing (10) comprising:

a ring-shaped magnetic metal member (14) including a single coil (15) and a pair of protrusions (20, 21),

the magnetic metal member (14) sandwiching the distal region of the axial force member (11),

the protrusions (20, 21) each having a facing surface facing the axial force member (11),

the facing surface defining a magnetic flux control gap at each end of the axial force member (11) along a rotation axis thereof,

the coil (15) generating a electromagnetic control magnetic flux passage (22) through the magnetic flux control gap, and

the axial force member (11) being accordingly positioned in an axial direction of electromagnetic bearing (10) relative to the magnetic metal member (14); and

pair of ring-shaped permanent magnets (16, 17) attached on the magnetic metal member (14) and each having a facing surface facing the axial force member (11),

the permanent magnets (16, 17) defining pair of magnetic gaps remote from the magnetic flux control gaps in a diameter direction of the electromagnetic bearing (10),

the pair of ring-shaped permanent magnets (16, 17) being each parallel with the electromagnetic control magnetic flux passage (22) through the pair of magnetic gaps, and

the permanent magnets (16, 17) generating bias magnetic flux passages (18, 19) each including a passage, at least half of which is different from the electromagnetic control magnetic flux passage (22).