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問 1

[0002]　Golf clubs (hereinafter, abbreviated as "clubs") have been most required to fly a ball without curving (suppress curving). Golfers not only put emphasis on such characteristics of the clubs, but also have much interest in finding suited golf clubs for their own. Hitherto, the clubs have been manufactured in consideration of static characteristics such as a length of a club shaft (hereinafter, abbreviated as "shaft"), balance, weight of the club, and hardness of the shaft. Thus, golfers have no other choice than to select the clubs by estimating and judging values of those characteristics based on their own past experiences or only with their filling.

[0003]

Meanwhile, the golf swing is a dynamic motion. Thus, attention has been drawn to selection of the club in consideration of dynamic characteristics of the club, specifically, natural frequency (more specifically, primary flexural natural frequency). The natural frequency is influenced by flexural rigidity of the shaft, weight of the shaft, length of the shaft, weight of a club head (hereinafter, abbreviated as "head").　Outline of the natural frequency is as follows.　The shaft deflects and then reverts during a downswing.　A head speed is maximum probably at a time when the shaft reverts to be straight. Thus, by hitting the ball at this timing, a maximum flying distance by the swing is obtained (note that, a face of the head needs to be properly directed). The natural frequency of the golf club is said to be relevant to such swings.　When a natural frequency of a club used is relatively lower than an optimum natural frequency, the ball is hit before reaching the maximum head speed. When the natural frequency of the club used is relatively higher, the ball is high after reaching the maximum head speed. As a result, a flying distance is reduced, and directionality is deteriorated.

問 2

[0025]

As illustrated in FIG. 3, when the flange 10 of the cage 7 is held in press contact with the side surface of the outer ring 2, frictional force to be applied to the contact surface is generated as rotational resistance of the cage 7. When the frictional force exceeds an elastic force of the elastic member 11, the inner ring 1 and the cage 7 are rotated relative to each other. With this, the rollers 6 are engaged with the cylindrical surface 3 and the cam surfaces 5, and the rotation of the inner ring 1 is transmitted to the outer ring 2 through intermediation of the rollers 6. Further, when the inner ring 1 and the cage 7 are rotated relative to each other, the elastic member 11 is elastically deformed.

[0026]

Under a state in which rotational torque is transmitted between the inner ring 1 and the outer ring 2, when the axial load to the flange 10 is removed, by elastic restoration of the elastic member 11, the cage 7 is rotated toward the neutral position. As a result of the rotation, the rollers 6 are disengaged from the cylindrical surface 3 and the cam surfaces 5, and the inner ring 1 is idled. Further, the elastic member 11 is interposed between the inner ring 1 and the cage 7. With this, the rollers 6 are revolved together with the cage 7.

[0027]

At this time, the rollers 6 are biased by the elastic pieces 9 toward the inner periphery of the outer ring 2, and hence are prevented from moving toward the radially inner side of the cage 7. Thus, behavior of the rollers 6 during low speed rotation of the inner ring 1 is stabilized. With this, drag torque to be applied to the cage 7 is reduced, and undesired engagement of the rollers 6 with the cylindrical surface 3 and the cam surfaces 5 is prevented.

[0028]

Further, the elastic pieces 9 prevent the rollers 6 from moving in the radial direction of the cage 7, and hence the rollers 6 do not repeatedly collide against the cylindrical surface 3 or the cam surfaces 5. As a result, vibration is scarcely generated by the collision of the rollers 6. With this, a bi-directional roller clutch having excellent vibration characteristics can be provided.

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1. An electromagnetic bearing (10), comprising:

an axial member (11) having a rotary shaft (12) and a distal region expanding outward from the rotary shaft (12);

an annular magnetic iron-based member (14) including

a single coil 15, and

a pair of projection portions (20 and 21),

the pair of projection portions (20 and 21) having opposed surfaces to be opposed to the axial member (11) across the distal region of the axial member (11),

the opposed surfaces defining magnetic-flux control clearances on both end sides in an axial direction of the rotary shaft (12) of the axial member (11),

the coil (15) generating a magnetic flux path (22) across the magnetic-flux control clearances, to thereby position the axial member (11) in the axial direction with respect to the magnetic iron-based member (14);

a pair of annular permanent magnet (16 and 17)

mounted to the magnetic iron-based member (14),

having opposed surfaces to be opposed to the axial member (11),

defining a pair of magnetic clearances at a position radially away from the magnetic-flux control clearances, and

generating bias magnetic flux paths (18 and 19) other than the magnetic flux path (22) across the pair of magnetic clearances, the magnetic flux paths (18 and 19) each being generated parallel to the magnetic flux path (22) in a region having a length at least half of a height of each of the pair of annular permanent magnet (16 and 17).