

[Document Name] Description

[Title] Spinning Reel for Fishing

[Technical Field]

[0001]

The present invention relates to a spinning reel for fishing.

[Background]

[0002]

A spinning reel for fishing includes a spool shaft that moves forward and backward in response to the rotating operation of a handle, and a spool is mounted on this spool shaft (see Patent Literature 1). The spool is configured to rotate relatively to the spool shaft, and a spool sound making mechanism is provided on the spool shaft and the spool and makes the relative rotation of the spool known. The spool sound making mechanism includes a sound maker provided on the spool and a sound making member provided on the spool shaft.

[0003]

As shown in Patent Literature 1, the sound maker has, for example, a ratchet notch formed on an inner circumference surface of the spool. The sound maker has, for example, a click pawl spring having a protruded portion that protrudes in the radially outward direction. During the actual fishing, when the fishing line is pulled out and the spool is accordingly rotated, the protruded portions of the click pawl spring engage with the convex portions and the concave portions of the ratchet notch, generating a clicking sound.

[Prior Art]

[Patent Literatures]

[0004]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. 2005-073670

[Summary]

[Technical Problems]

[0005]

In the Patent Literature 1, the concave portion of the ratchet notch has a semi-arc shape, which increases the deformation amount of the click pawl spring in relation to the movement distance of the spool rotated when the fishing line is pulled out, and the click pawl spring receives more elastic resistance when the drag is on. This interrupts the smooth action of the drag. In addition, the conventional structure makes the sliding parts easy to wear out, reducing the sound making performance.

[0006]

The present invention was created to solve these problems, and an object thereof is to provide a spinning reel for fishing which prevents reduction in the sound making performance and reduces the resistance when the drag is on.

[Solution to Problems]

[0007]

In order to solve these problems, the present invention is a spinning reel for fishing, including: a reel body; a spool shaft provided on the reel body; a drag device; a spool rotatably and frictionally coupled by the drag device to a tip end of the spool shaft; and a spool sound making mechanism including: a sound maker formed in a convex-concave shape on an inner circumference surface of the spool, and a sound making member provided on the spool shaft, wherein the sound maker and the sound making member are engaged with each other; wherein the sound maker has convex portions and concave portions formed alternately in the circumferential direction; the concave portion has: a first apex that is an edge between it and one adjacent convex portion, a first surface that continues from the first apex and is curved inward in the radially outward direction, a second surface that continues from the first surface, and a second apex that continues from the second surface and is an edge between the concave portion and the

other adjacent convex portion; the second surface is formed on the opposite side to the direction in which the spool rotates when the fishing line is pulled out; a distance L2 from the second apex to the deepest portion of the concave portion is larger than a distance L1 from the first apex to the deepest portion of the concave portion.

[0008]

According to the present invention, since the distance L2 is larger than the distance L1, the sound making member moves smoothly from the second surface to the second apex. This reduces the resistance when the drag is on. In addition, by providing a depth in the radially outward direction on the first surface side, an acoustic space required to make a sound is secured. Also, since the sound making member moves smoothly on the second surface side, wear of the sliding members is prevented. As a result, reduction in the sound making performance is prevented.

[0009]

Preferably, the first surface is a curved surface and the second surface is an inclined surface. According to the present invention, the sound making member moves more smoothly from the second surface to the second apex.

[0010]

Also preferably, the sound making member has a click pawl spring that has a protruded portion protruding in the radially outward direction, and the protruded portion engages with the sound making member. According to the present invention, the protruded portion further enhances the sound making performance.

[Advantageous Effects]

[0011]

According to the spinning reel for fishing of the present invention, reduction in the sound making performance is prevented and the resistance when the drag is on is reduced.

[Brief Description of Drawings]

[0012]

[Fig. 1] Fig. 1 is a schematic side view of a spinning reel for fishing according to an embodiment of the present invention.

[Fig. 2] Fig. 2 is a partially omitted, enlarged horizontal section view of a sound maker provided on a spool and a sound making member mounted on a spool shaft according to an embodiment of the present invention.

[Fig. 3] Fig. 3 is a section view cut along the line III-III of Fig. 2, of the sound maker provided on the spool and the sound making member mounted on the spool shaft according to an embodiment of the present invention.

[Fig. 4] Fig. 4 is an enlarged vertical section view of the spool according to an embodiment of the present invention.

[Fig. 5] Fig. 5 is an enlarged view of a ratchet notch of the sound maker according to an embodiment of the present invention.

[Fig. 6] Fig. 6 is a comparative table for comparing the action states of the spool sound making mechanisms of a Comparative Example and an Example.

[Fig. 7] Fig. 7 is an enlarged view of the Comparative Example of the spool rotation angle of 0°.

[Fig. 8] Fig. 8 is an enlarged view of the Comparative Example of the spool rotation angle of 4°.

[Fig. 9] Fig. 9 is an enlarged view of the Example of the spool rotation angle of 0°.

[Fig. 10] Fig. 10 is an enlarged view of the Example of the spool rotation angle of 4°.

[Description of Embodiments]

[0013]

Now, a spool for a spinning reel for fishing according to an embodiment of the present invention will be described with reference to the drawings as appropriate. In the descriptions of the embodiment, the words "top", "bottom", "front", and "back" are used in terms of the directions

shown in Fig. 1, and "right" and "left" are used in terms of the directions shown in Fig. 2.

[0014]

As shown in Fig. 1, a spinning reel for fishing R1 primarily includes: a reel body 1 formed with a foot 1A to be mounted on a fishing rod that is not shown in the figure, a rotor 2 that rotates toward the front of the reel body 1, and a spool 10 that moves in the front-rear direction in synchronization with the rotating movement of the rotor 2.

[0015]

A handle shaft 3 is rotatably supported on the reel body 1 by means of a bearing that is not shown in the figure, and a handle 4 that is operated for reeling-in is mounted on a protruding end of the handle shaft 3. On the handle shaft 3, a shaft cylinder is fixed in such a manner that its loosening is prevented. On the shaft cylinder, a drive gear 6 with inner teeth to drive the rotor 2 for reeling-in is integrally formed. This drive gear 6 meshes with a pinion gear 7a of a drive shaft cylinder 7, which extends in a direction perpendicular to the handle shaft 3 and has an inner cavity extending in the axial direction.

[0016]

The drive shaft cylinder 7 is rotatably supported on the reel body 1 by means of a bearing, and a spool shaft 8 that extends in a direction perpendicular to the handle shaft 3 is inserted into the cavity of the drive shaft cylinder 7 in such a manner that it moves in the axial direction, with a spool 10 to be mounted on a tip end side of the spool shaft 8.

[0017]

A rear end of the spool shaft 8 includes a known oscillating mechanism 9 for moving the spool shaft 8 forward and backward.

[0018]

The drive shaft cylinder 7 extends toward the spool 10, and the rotor 2 is mounted on the front end of the drive shaft cylinder 7 by means of a nut 7b (see Fig. 2). The drive shaft cylinder 7 is restricted from rotating in the reverse direction (rotation in the direction of casting the fishing line) by a one-way clutch that is not shown in the figure.

[0019]

The rotor 2 includes a cylindrical portion 2a (see Fig. 2) positioned in a skirt portion 10a of the spool 10, and a pair of arm portions 2b, 2c. At the front ends of the arm portions 2b, 2c, bail support members 2d, 2e are rotatably supported between a reel-in position and a casting position, and a bail 2f to pick up the fishing line in the casted state is provided between the bail support members 2d, 2e. One base end of the bail 2f is mounted on a line roller 2g integrally provided on the bail support member 2d, and the other base end is mounted on the bail support member 2e.

[0020]

As shown in Fig. 1, the spool 10 has a cylindrical shape with a fishing-line winding body 10c, which provided between the skirt portion 10a and a front flange 10, for winding around the fishing line that is not shown in the figure. Details of the spool 10 will be described below.

[0021]

In the spinning reel for fishing R1, when the handle 4 is operated for reeling-in, the rotor 2 is rotated by means of the drive gear 6 and the pinion gear 7a, and the spool 10 is moved forward and backward by means of the pinion gear 7a and the oscillating mechanism 9. As a result, the fishing line that is not shown in the figure is evenly wound on the fishing-line winding body 10c of the spool 10 by means of a line roller 2g.

[0022]

Now, details of the spool 10 will be described. As shown in Figs. 2 and 4, the spool 10 includes a spool body 11 and a sound maker 20 provided separately from the spool body 11. The spool body 11 and the sound maker 20 are separate in the present embodiment, but they may be integrated. As shown in Fig. 2, the spool body 11 is mounted on the spool shaft 8 by means of a retaining member 30. The spool shaft 8 has a body portion 8a which is circular in cross section, and a tip end 8b which is substantially oval in cross section. The outer circumference surface of the tip end 8b has a straight portion and a curved portion. A step 8c is formed at an edge portion between the body portion 8a and the tip end 8b.

[0023]

The retaining member 30 is mounted on the tip end 8b. A hole 8d is formed in the tip end 8b in such a manner that it penetrates through the tip end 8b in a direction perpendicular the axial direction. In the hole 8d, a locking pin 33 for locking the retaining member 30 is inserted.

[0024]

The retaining member 30 has a cylindrical shape, into which the tip end 8b of the spool shaft 8 is inserted, and includes a base 31a and a flange 31b. The base 31a has a circular inner circumferential portion 31c (see Fig. 3) having an inner diameter to be mounted on the curved portion of the substantially oval cross-section of the tip end 8b, and an inner circumferential portion 31d (see Fig. 2) that is formed at the front side of the circular inner circumferential portion 31c and has a substantially oval cross-section to be mounted on both the straight portion and the curved portion of the substantially oval cross-section of the tip end 8b. In the inner circumferential portion 31d, a through-hole 32 into which the locking pin 33 is inserted is formed. The through-hole 32 communicates

with the hole 8d of the tip end 8b of the spool shaft 8. The retaining member 30 is mounted in such a manner that it is impossible to move in the axial direction or rotate in the circumferential direction, with the locking pin 33 locked in the hole 8d through the through-hole 32.

[0025]

On the outer surface of the rear portion of the base 31a, a rear bearing 18b is externally fitted. The rear bearing 18b is retained, so that it does not loosen, by a washer 34 disposed on a rear end surface of the base 31a. Between the washer 34 and the step 8c of the spool shaft 8, a support 41 configuring a sound making member 40 is held. The sound making member 40 has the metal support 41 and a metal click pawl spring 42 supported on the metal support 41.

[0026]

As shown in Fig. 3, the support 41 has four hook portions 41a extending on both the left and right sides. The click pawl spring 42 is a thin metal plate member having elasticity. The click pawl spring 42 is substantially U-shaped as a whole in a front view and includes a protruded portion 44 protruding to the left side (radially outward). A tip end of the protruded portion 44 has a curved surface. The protruded portion 44 is disposed between the hook portions 41a, 41a on the left side. The two ends 45, 45 of the click pawl spring 42 are locked to the hook portions 41a, 41a on the right side.

[0027]

As shown in Fig. 2, a support wall 12 and a middle wall 13 are formed inside the spool body 11 as the structure to hold the spool body 11 on the retaining member 30. The support wall 12 has a substantially disc-like shape and integrally extends radially inward from the inner surface of the fishing-line winding body 10c. The middle wall 13 has a cylindrical shape and integrally extends rearward from an extending end of the support wall 12. The

sound maker 20 is mounted on a rear portion of the middle wall 13 by a screw structure as described below. On the front side of the support wall 12, a cylindrical drag housing 18 (see Fig. 4) that houses a drag device T (see Fig. 1) is formed. The drag device T applies a braking force to a fishing line being pulled out when a fish is hooked during the actual fishing. A desired braking force is applied to the spool 10 that is held rotatably on the spool shaft 8, by adjusting a drag knob Ta (see Fig. 1) of the drag device T.

[0028]

As shown in Fig. 4, the middle wall 13 is formed concentrically with the central axis O1 of the spool body 11, and as shown in Fig. 2, an insertion hole 19 is formed inside the middle wall 13 to insert a part of the retaining member 30 and the tip end 8b of the spool shaft 8. As shown in Fig. 2, the middle wall 13 has a large-diameter portion 13a that is continuous with the support wall 12 and a small-diameter portion 14 that is continuous with the rear side of the large-diameter portion 13a. On the outer surface of the middle wall 13, a step 16 (see Fig. 4) is formed at an edge portion between the large-diameter portion 13a and the small-diameter portion 14.

[0029]

On the inner circumferential surface of the large-diameter portion 13a, a ring-shaped partition wall 15 that partitions the inner circumferential surface of the large-diameter portion 13a into front and rear is protruded. On the front side of the partition wall 15, a front bearing 18 is internally fitted on the inner circumference surface of the large-diameter portion 13a. The front bearing 18a is retained, so that it does not loosen, by a retaining member 13b, which is locked to the inner surface of the large-diameter portion 13a, and the partition wall 15. The front bearing 18a includes an inner ring that is mounted on the outer circumference surface of the front of the base 31a of

the retaining member 30. A rear surface of the partition wall 15 is in contact with a front surface of the flange portion 31b of the retaining member 30 by means of two washers 35.

[0030]

Between the retaining member 30 and the middle wall 13, the front bearing 18a and the rear bearing 18b are disposed next to each other in the front-rear direction. As a result, the spool body 11 is stably held at the tip end 8b of the spool shaft 8 by the two front and rear bearings 18a, 18b.

[0031]

As shown in Figs. 2 and 4, the small-diameter portion 14 is a portion on which the sound maker 20 is mounted. The small-diameter portion 14 includes, on the outer circumference surface of its rear portion, a male thread 14a that serves as a thread portion of the screw structure. The male thread 14a is formed concentrically with the insertion hole 19 if viewed from the axial direction of the insertion hole 19. In other words, the male thread 14a is disposed concentrically with a circle around the central axis O1 of the spool. In the present embodiment, the sound maker 20 is screwed to the small-diameter portion 14, but it may be coupled by press-fitting. The rear bearing 18b includes an outer ring that is externally fitted on the retaining member 30 and mounted on the inner circumference surface of the rear portion of the small-diameter portion 14.

[0032]

The sound maker 20 is a member mounted on the middle wall 13 of the spool body 11 by the screw structure and has a cylindrical shape. The sound maker 20 is entirely formed of a resin such as a fiber-reinforced resin including carbon fibers, glass fibers, etc. In other words, it has a different hardness from that of the click pawl spring 42 as the sound making member. A spool sound making mechanism is

constituted by the engagement of the sound maker 20 and the sound making member 40 (click claw spring 42).

[0033]

As shown in Figs. 2 and 4, the sound maker 20 includes a ring-shaped bottom wall 21, an inner circumferential wall 22 that extends rearward from a radially inner portion of the bottom wall 21, and an outer circumferential wall 23 that is spaced apart radially outward from the inner circumferential wall 22 and extends rearward from a radially outer portion of the bottom wall 21. The sound maker 20 includes a concave portion (concave annular space) 25 enclosed by the bottom wall 21, the inner circumferential wall 22 and the outer circumferential wall 23. As shown in Fig. 4, the concave-shape portion 25 is rearwardly annularly open.

[0034]

As shown in Figs. 2 and 4, the entire inner circumferential surface of the inner circumferential wall 22 has a female thread 22a formed thereon, and the female thread 22a serves as a threaded screw portion of the screw structure. The female thread 22a is screwed to the male thread 14a of the middle wall 13.

[0035]

As shown in Fig. 3, a ratchet notch 24 is formed on the inner circumference surface of the outer circumferential wall 23. The protruded portion 44 of the click pawl spring 42 makes elastic contact with the ratchet notch 24. As shown in Fig. 5, the ratchet notch 24 includes convex portions 51 and concave portions 61 formed alternately on the entire inner circumferential surface of the outer circumferential wall 23. The concave portion 61 is curved inward in the radially outward direction. The portion formed between the adjacent concave portions 61, 61 is the convex portion 51. The concave portion 61 has a first surface 62 and a second surface 63. The corner that is the edge between the convex portion 51 on one side and

the concave portion 61 is referred to as the first apex 64. The corner that is the edge between the convex 51 on the other side and the concave portion 61 is referred to as the second apex 65. In the concave portion 61, the position farthest from the central axis O1 of the spool (see Fig. 4) is referred to as the deepest portion 66. The edge between the first surface 62 and the second surface 63 is illustrated with an imaginary line 67.

[0036]

With the deepest portion 66 as the edge therebetween, the circumferential direction toward one side is referred to as the direction P, and the direction toward the other side is referred to as the direction Q. The direction P is the direction in which the spool 10 rotates when a fish is hooked and the fishing line is pulled out during the actual fishing. The second surface 63 is formed in the concave portion 61 in the direction Q (opposite to the direction in which the spool 10 rotates when the fishing line is pulled out).

[0037]

The first surface 62 is a curved surface (arc-shaped surface) that continues from the first apex 64 to the imaginary line 67. The second surface 63 is an inclined surface that continues from the imaginary line 67 to the second apex 65. The distance L2 from the second apex 65 to the deepest portion 66 is larger than the distance L1 from the first apex 64 to the deepest portion 66. In other words, the deepest portion 66 is disposed on the first apex 64 side (on the side of the direction P) in terms of the widthwise direction of the concave portion 61. Thus, the shape of the concave portion 61 is asymmetric.

[0038]

Provided that the above distances L1 and L2 are satisfied, the first surface 62 may be an inclined surface, and the second surface 63 may be a curved surface (arc-shaped surface). Also, provided that the above distances L1

and L2 are satisfied, the first surface 62 and the second surface 63 may be both curved surfaces or inclined surfaces.

[0039]

As shown in Figs. 2 and 4, the rear end of the outer circumferential wall 23 protrudes further rearward than the rear end of the inner circumferential wall 22 and is disposed in the inside area of the skirt portion 10a, using the space formed between it and the cylindrical portion 2a of the rotor 2 in the rear. As a result, the area of the concave-shape portion 25 enclosed by the outer circumferential wall 23 is expanded towards the rear. This contributes to improving the sound-making effect. The rear end of the outer circumferential wall 23 is tapered and expands in diameter, and serves as an assembly guide portion of the click pawl spring 42.

[0040]

As shown in Fig. 4, radially outside the outer circumferential wall 23, a gap S1 is formed between the outer circumferential wall 23 and the fishing-line winding body 10c and the skirt portion 10a (line stopper 10s) of the spool body 11. The gap S1 serves as a space to put a finger in to mount or remove the sound maker 20 on and from the spool body 11. The gap S1 also helps the sound from the sound maker 20 to resonate more.

[0041]

To be mounted on the spool body 11, the sound maker 20 is inserted into the skirt portion 10a from the rear of the spool body 11, and with the inner circumferential wall 22 of the sound maker 20 aligned with the small-diameter portion 14 of the middle wall 13 of the spool body 11, the sound maker 20 is rotated in the direction to be screwed. In this manner, the female thread 22a is screwed to the male thread 14a, and the sound maker 20 is mounted on the spool body 11 (middle wall 13). The bottom wall 21 of the sound maker 20 is configured to make contact with the step

16 of the middle wall 13 through screwing, and thus the sound maker 20 is pressure-fixed to the middle wall 13 through the contacting. Since the bottom wall 21 of the sound maker 20 makes contact with the step 16, damage caused by over-tightening of the sound maker 20 is prevented. After assembled, the sound maker 20 can be removed from the spool body 11 by unscrewing.

[0042]

When the sound maker 20 is mounted on the spool body 11 as shown in Fig. 2, the rear bearing 18b, the sound maker 20, the outer diameter portion of the spool body 11 (fishing-line winding body 10c and skirt portion 10a) are disposed in order radially outward from the center axis of the insertion hole 19 (central axis O1 of the spool body 11).

[0043]

Now, the action of the spool sound making mechanism will be described by comparing a Comparative Example and an Example. Fig. 6 is a comparison table for comparing the action state of the spool sound making mechanisms of the Comparative Example and the Example. The first row of the table in Fig. 6 presents the Comparative Example (embodiment according to Patent Literature 1), and the second row presents the Examples (embodiment according to the present invention). From left to right of the table, the figures represent the engagement states of the spools in which the rotation angles are increased by 1° . The deformation amount D shown in the figures are the deformation amount of the protruded portion 44. The deformation amount D represents the distance to the tip end of the protruded portion 44 (distance moved radially outward) with respect to the position of the tip end of the protruded portion 44 in the case that the spool rotation angle is 0° . The click pawl spring 42 does not rotate when the fishing line is pulled out, whereas a sound is produced when the sound maker 20 (the spool 10) rotates.

[0044]

Fig. 7 is an enlarged table of the Comparative Example of the spool rotation angle of 0° . Fig. 8 is an enlarged table of the Comparative Example of the spool rotation angle of 4° . As shown in Figs. 7 and 8, the ratchet notch of the Comparative Example has convex portions 71 and concave portions 81 formed alternately on the inner circumference surface in the circumferential direction. The concave portion 81 is a symmetrical, semi-arc-shaped curved surface. The edges between the concave portion 81 and the adjacent convex portions 71 are a first apex 84 and a second apex 85. The widthwise center line of the concave portion 81 is referred to as the center line V1.

[0045]

As shown in Fig. 7, when the spool rotation angle of the Comparative Example is 0° , the widthwise center line 44a of the protruded portion 44 of the click pawl spring 42 is on the center line V1 of the concave portion 81. At this time, the protruded portion 44 is most deeply fitted into the concave portion 81. The curvature of the concave portion 81 is larger than that of the tip end of the protruded portion 44, and thus the deepest portion 86 of the concave portion 81 does not contact the protruded portion 44, whereas the protruded portion 44 is in contact (point contact) with both the first apex 84 and the second apex 85. As shown in Fig. 6, when the spool rotation angle is 1° to 3° , the protruded portion 44 slides in contact with the second apex 85. Then, as shown in Fig. 8, when the spool rotation angle is 4° , the center line 44a of the protruded portion 44 is near the second apex 85 of the concave portion 81, with a deformation amount D of 0.25 mm.

[0046]

Fig. 9 is an enlarged table of the Example of the spool rotation angle of 0° . Fig. 10 is an enlarged table of the Example of the spool rotation angle of 4° . As shown in Figs. 9 and 10, the concave portion 61 of the Example is

the above-described shape, which is asymmetrical with the deepest portion 66 that is eccentric, and has the first surface 62 that is a curved surface and a second surface 63 that is an inclined surface. The curvature radius of the first surface 62 is smaller than that of the concave portion 81 of the Comparative Example shown in Fig. 7. The depth dimension of the deepest portion 66 of the concave portion 61 is the same or approximately the same as that of the deepest portion 86 of the concave portion 81. The widthwise center line of the concave portion 61 is referred to as the center line V2.

[0047]

When the spool rotation angle of the Example is 0° , the center line 44a of the protruded portion 44 of the click pawl spring 42 is on the center line V2 of the concave portion 61. At this time, the protruded portion 44 is most deeply fitted into the concave portion 81. Also at this time, the protruded portion 44 is not in contact with the deepest portion 66 or the second apex 65, but is in contact with the first apex 64 and the second surface 63. The center line 44a of the protruded portion 44 is on the direction Q side with respect to the deepest portion 66. As shown in Fig. 6, when the spool rotation angle is 1° to 3° , the protruded portion 44 slides along the second surface 63. Then, when the spool rotation angle is 4° as shown in Fig. 10, the center line 44a of the protruded portion 44 is near the second apex 65 of the concave portion 61, with a deformation amount D of 0.19 mm. Although not specifically illustrated in the figure, when the spool rotation angle of the Example is 7° , the deformation amount D is 0.25 mm. And when the spool 10 rotates further and the protruded portion 44 falls into the concave portion 61 from the first apex 64 of the adjacent concave portion 61, to an angle of 0° (when a part of the protruded portion 44 hits the second surface 63), a clicking sound is generated.

[0048]

According to the present embodiment described above, since the distance L2 of the concave portion 61 is larger than the distance L1, the protruded portion 44 of the click pawl spring 42 moves smoothly along the second surface 63 on the direction Q side to the second apex 65. In other words, with respect to the spool rotation angle, the distance that the protruded portion 44 moves radially outward is smaller than in the Comparative Example, and the amount of deformation of the click pawl spring 42 is also smaller. As a result, the resistance is reduced when the drag is on.

[0049]

Also, by providing a depth in the radially outward direction on the first surface 62 side, an acoustic space (space enclosed by the concave portion 61 and the protruded portion 44) required to produce a sound is secured. This reduces the resistance when the drag is on, and a good sound of precision feel is produced. In addition, since the protruded portion 44 of the click pawl spring 42 moves smoothly on the second surface 63 side, wear of the sliding members, especially the second surface 63 and the second apex 65 is prevented. As a result, wear of the ratchet notch 24 is prevented, and so is the sound making performance.

[0050]

The second surface 63 may be a curved surface, but with it being an inclined surface, the protruded portion 44 of the click pawl spring 42 moves more smoothly from the second surface 63 to the second apex 65.

[0051]

Also, with the click pawl spring 42 having the protruded portion 44 that protrudes radially outward, engagement with the ratchet notch 24 is achieved more easily, and the sound making performance is further enhanced. Also, provided that the distances L1 and L2 are satisfied, the curvature radius of the first surface 62 and

the inclination angle of the second surface 63 may be set as appropriate. Thus, the pitch of the ratchet notches 24 (number of the concave portions 61) and the like can be designed in the same manner as the conventional ones, and the same sound making performance and major drag performance as before are available.

[0052]

Also, as in the present embodiment, providing the sound maker 20 using a space at the rear of the spool 10, which can be made larger in diameter, allows to increase the pitch of the ratchet notches 24. As a result, the beats of the sound produced along with the rotation of the spool 10 can be increased, and a sound with a feel of precision is produced.

[0053]

Although an embodiment of the present invention is described above, the designs may be modified as appropriate to the extent that does not depart from the intended purposes of the present invention. For example, the spool body 11 and the sound maker 20 may be integral or separate. The sound maker 20 may be provided on any other portion of the inner circumference surface of the spool body 11. Also, in the above embodiment, the edge between the first surface 62 and the second surface 63 (see the imaginary line 67) is set on the direction Q side of the deepest portion 66, but it may be set on the deepest portion 66 or on the direction P side of the deepest portion 66.

[Description of Reference Numerals]

[0054]

8 spool shaft
10 spool
11 spool body
20 sound maker
24 ratchet notch
51 convex portion
61 concave portion

62 first surface
63 second surface
64 first apex
65 second apex
66 deepest portion
L1 distance
L2 distance
R1 spinning reel for fishing

[Document Name] Claims

[Claim 1]

A spinning reel for fishing, comprising:

a reel body;

a spool shaft provided on the reel body;

a drag device;

a spool rotatably and frictionally coupled by the drag device to a tip end of the spool shaft; and

a spool sound making mechanism including: a sound maker formed in a convex-concave shape on an inner circumference surface of the spool, and a sound making member provided on the spool shaft, wherein the sound maker and the sound making member are engaged with each other; wherein

the sound maker has convex portions and concave portions formed alternately in the circumferential direction;

the concave portion has: a first apex that is an edge between it and one adjacent convex portion, a first surface that continues from the first apex and is curved inward in the radially outward direction, a second surface that continues from the first surface, and a second apex that continues from the second surface and is an edge between the concave portion and the other adjacent convex portion;

the second surface is formed on the opposite side to the direction in which the spool rotates when the fishing line is pulled out;

a distance L2 from the second apex to the deepest portion of the concave portion is larger than a distance L1 from the first apex to the deepest portion of the concave portion.

[Claim 2]

The spinning reel for fishing according to claim 1, wherein the first surface is a curved surface and the second surface is an inclined surface.

[Claim 3]

The spinning reel for fishing according to claim 1 or 2, wherein the sound making member has a click pawl spring that has a protruded portion protruding in the radially outward direction, and the protruded portion engages with the sound making member.