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OGAWA

(54) **ONE-WAY CLUTCH**

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(57) **ABSTRACT**

A one-way clutch includes a rotating body, an outer ring arranged on an outer periphery of the rotating body, a roller, a biasing member, and a recess portion. The outer ring includes an indent portion. A wedge-shaped space is formed between the indent portion and an outer peripheral surface of the rotating body. The roller is disposed in the wedge-shaped space. The biasing member biases the roller to one side of the wedge-shaped space. The outer ring has a protrusion at a position corresponding to a radially outer side of the indent portion. The recess portion is formed continuously with the side surface in a circumferential direction of the protrusion on the outer peripheral surface of the outer ring.

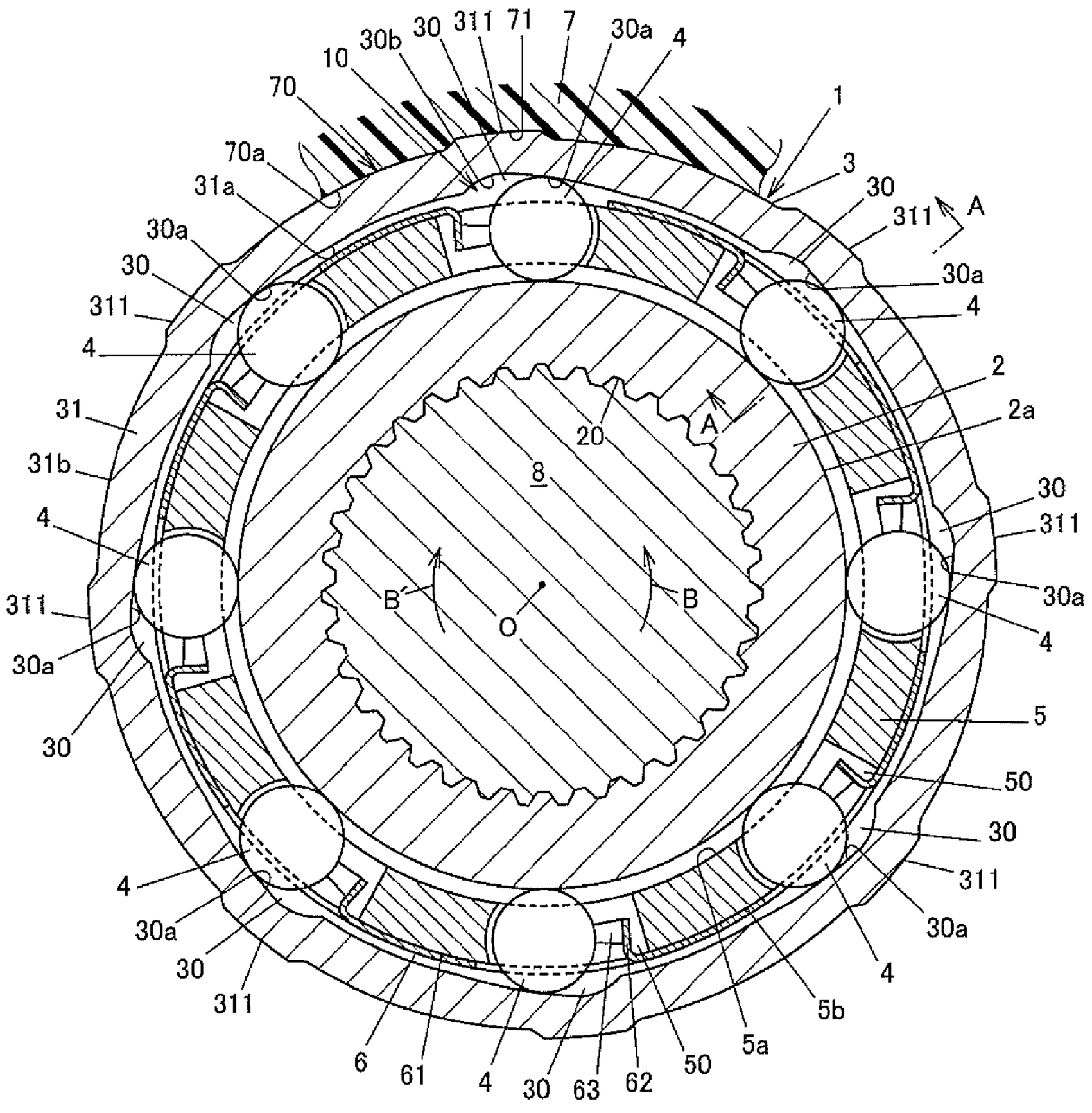
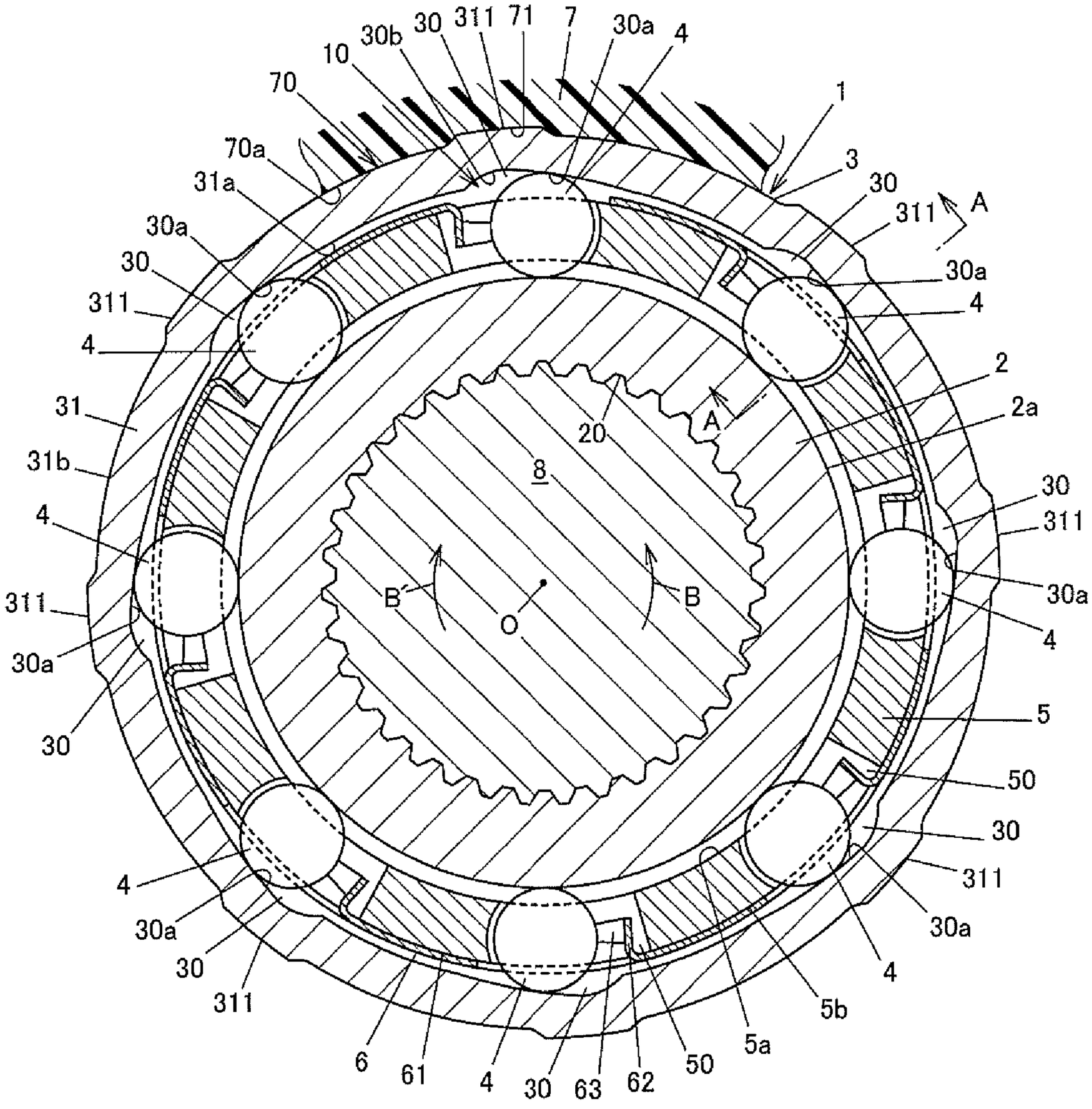


FIG.1


70
10
30b
30
311
71
7
30a
4
1
70a
31a
3
30
311
A
30a
30
311
4
4
2
2a
31
20
A
31b
8
4
30
311
B'
B
O
311
30a
4
30a
30
5
50
30
311
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311
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61
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63
62
50
5a
5b

FIG.2

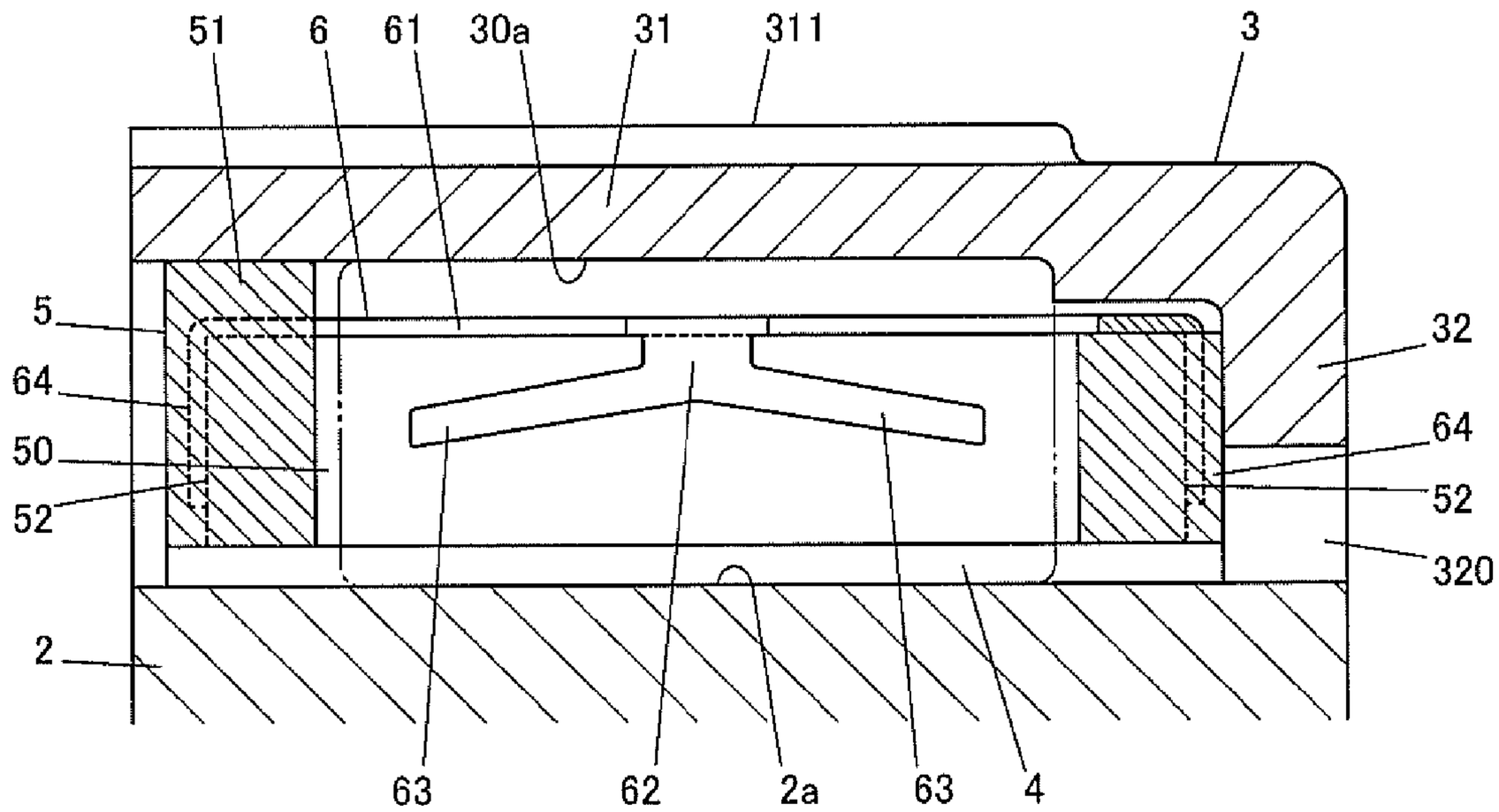
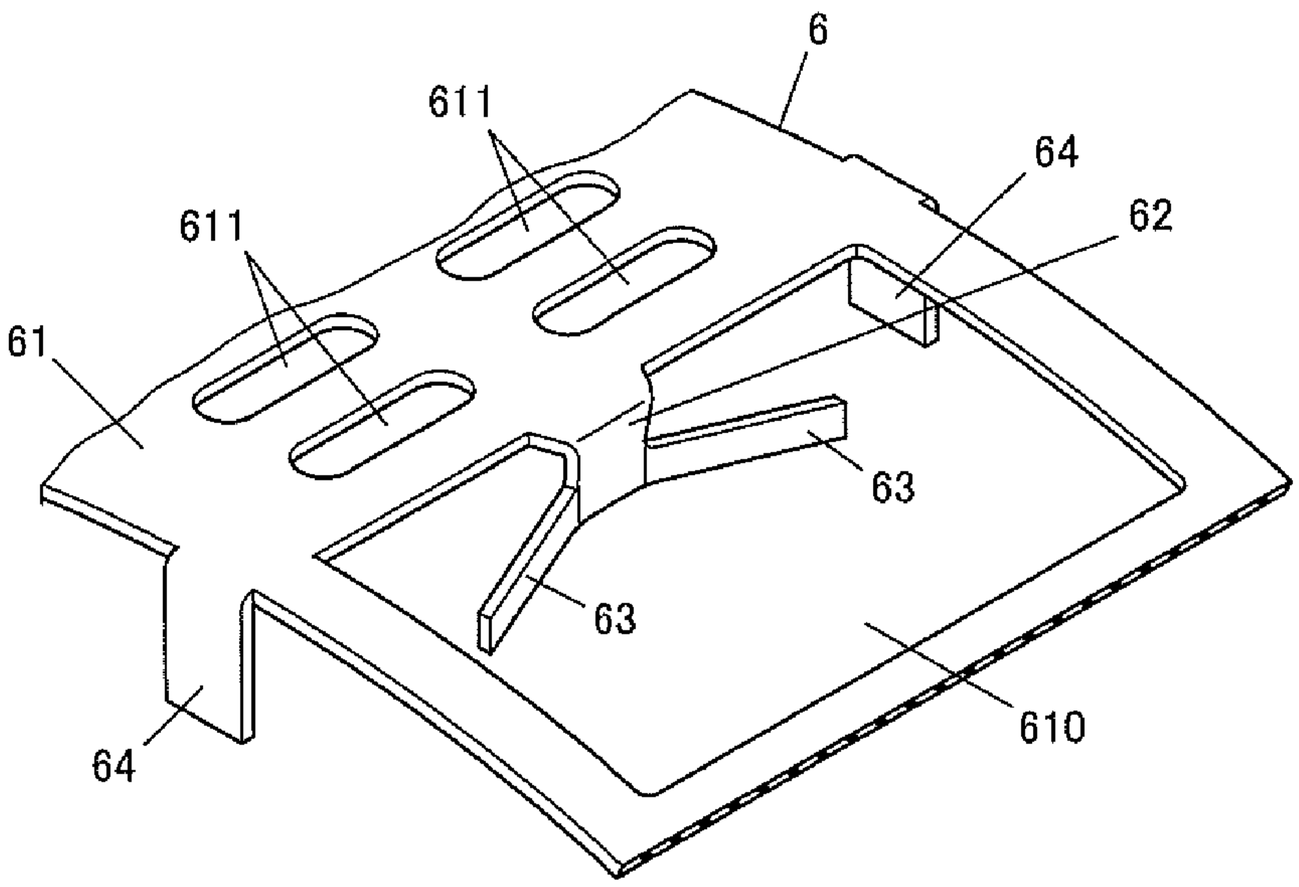


FIG.3



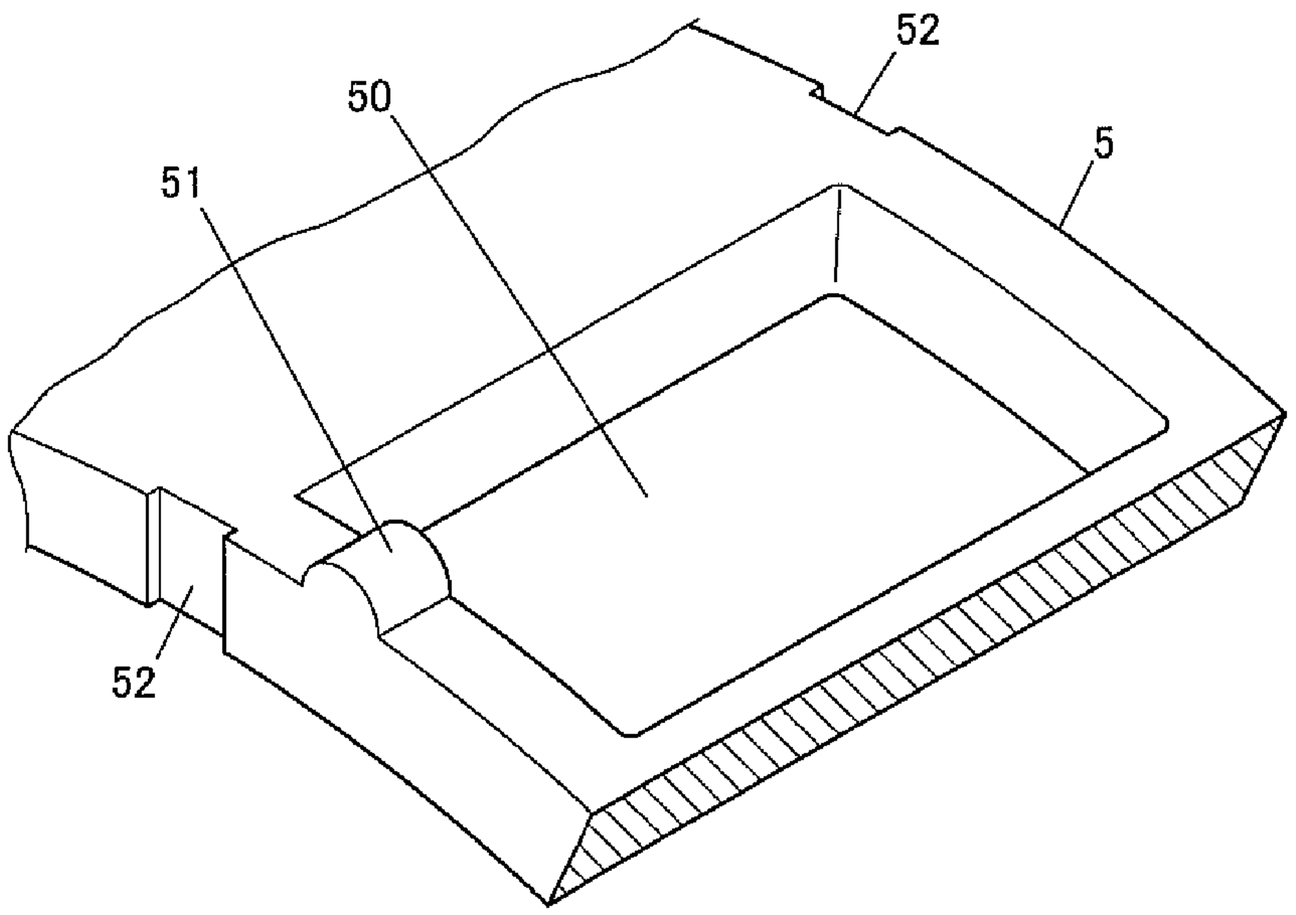


FIG.4(a)

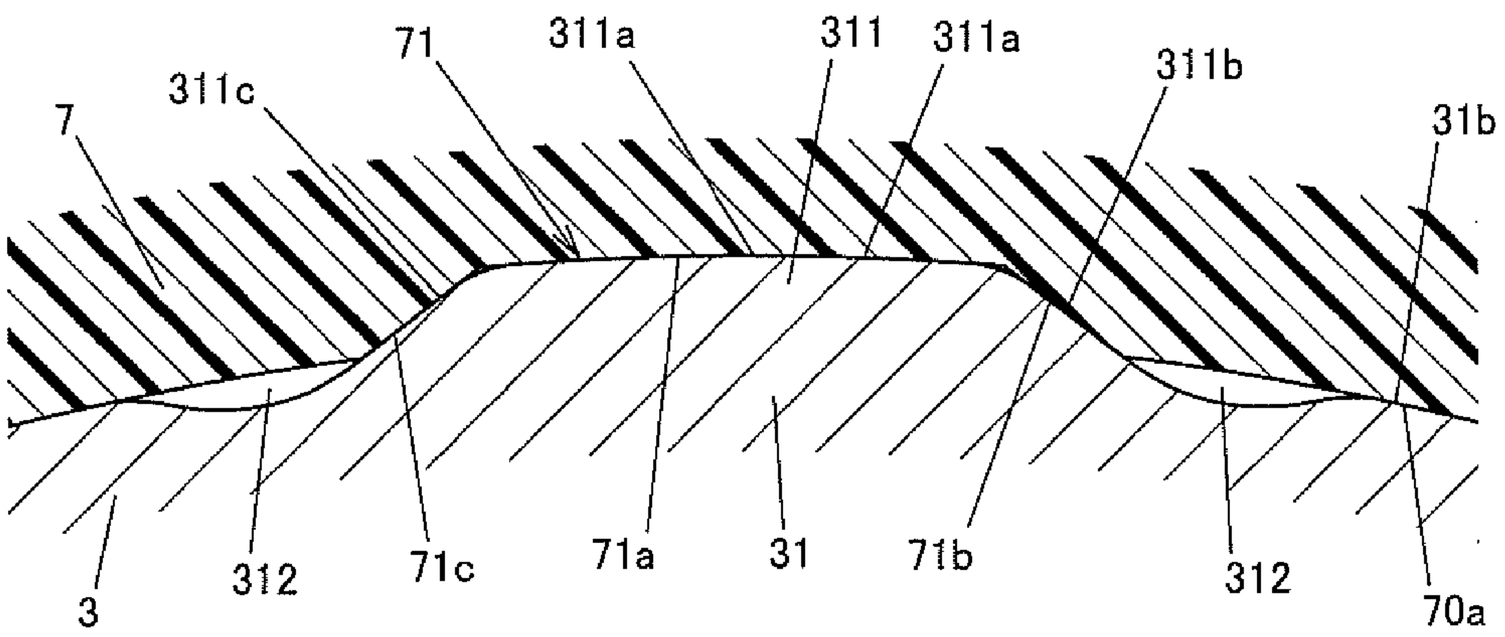


FIG.4(b)

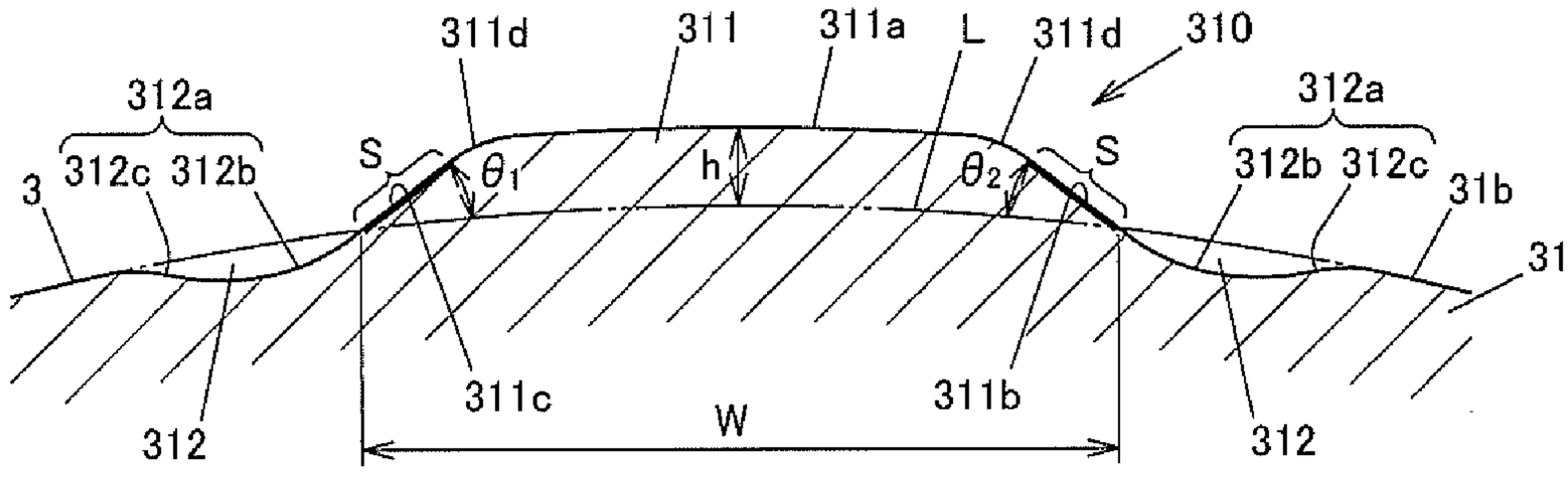


FIG.4(c)

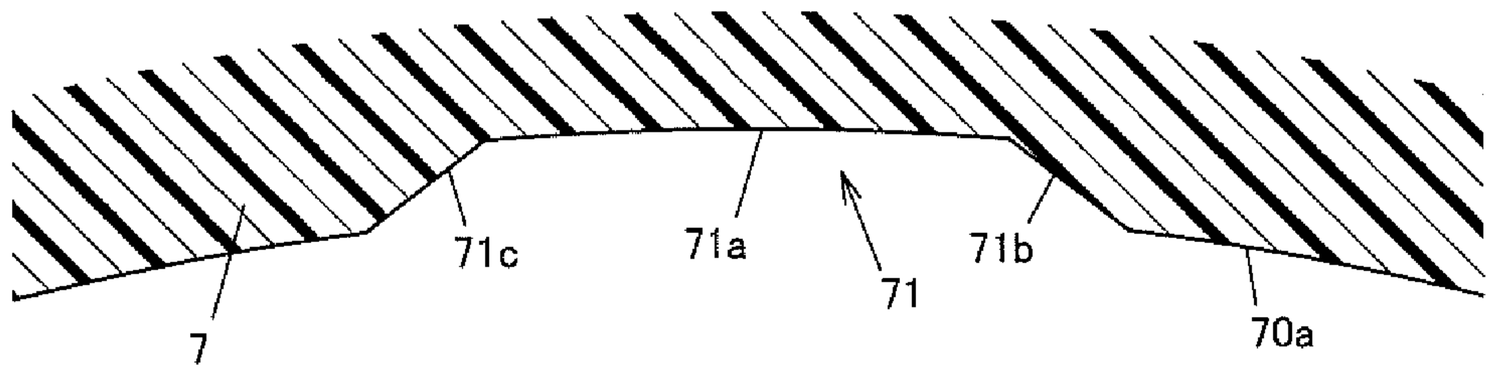


FIG.5(a)

FIG.5(b)

FIG.5(c)

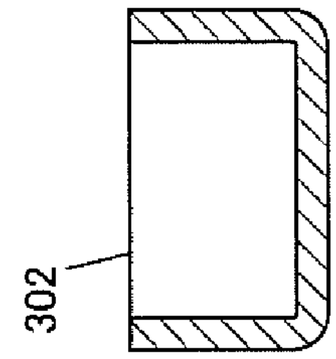


FIG.5(d)

FIG.5(e)

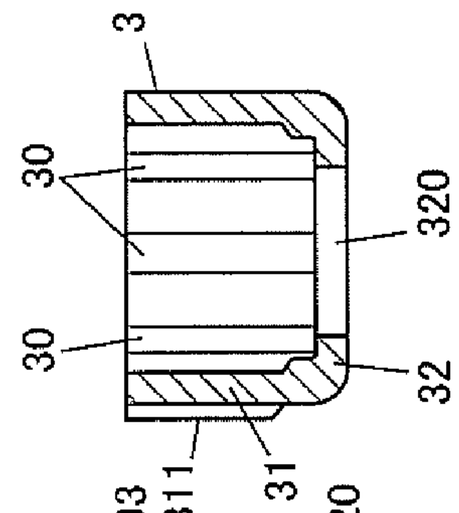
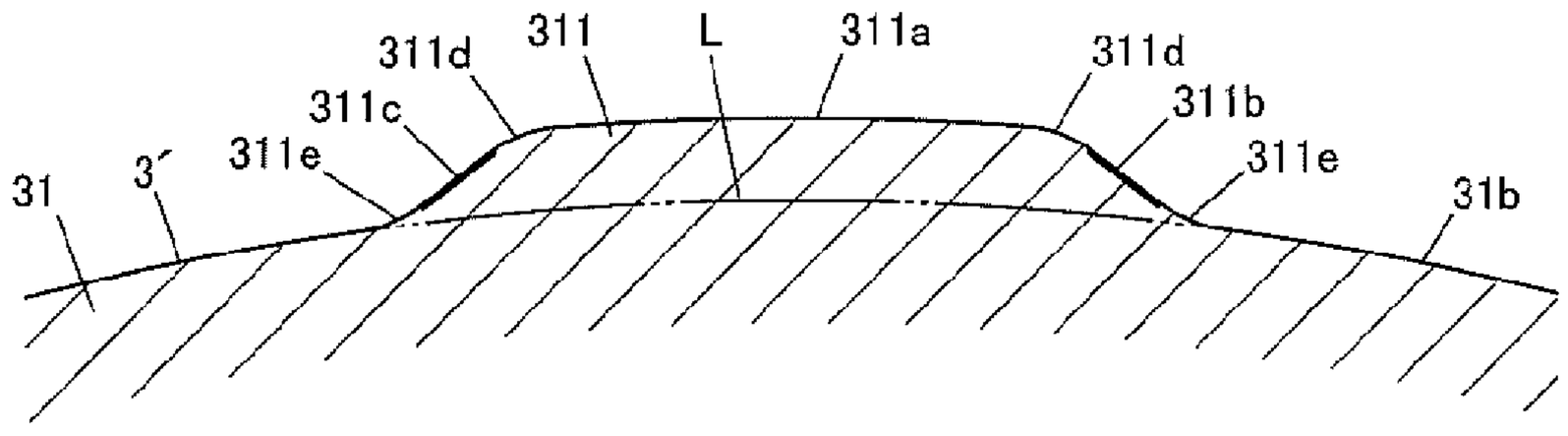


FIG.6

(COMPARATIVE EXAMPLE)



ONE-WAY CLUTCH

TECHNICAL FIELD

[0001] The present invention relates to a one-way clutch which allows rotation of a rotating body in one direction and restricts rotation in the other direction.

BACKGROUND ART

[0002] One-way clutches which allow rotation of rotating bodies in one direction and restrict rotation in the other direction are used for various applications. The one-way clutch described in Patent Literature 1 has an inner ring and an outer ring arranged concentrically with the inner ring. A wedge-shaped space is formed between the inner ring and the outer ring. A roller is placed in the wedge-shaped space. The roller is held by a holder and is biased toward a narrow portion of the wedge-shaped space by a leaf spring. When the inner ring rotates in the other direction, the one-way clutch is locked. In the locked state, the roller is interposed between the outer ring and the inner ring in the narrow portion of the wedge-shaped space and the rotation of the inner ring relative to the outer ring is restricted. When the inner ring rotates in the one direction, the roller moves to a wide portion of the wedge-shaped space and the inner ring can rotate with respect to the outer ring.

[0003] In the outer ring of the one-way clutch described in Patent Literature 1, a cam surface constituting the wedge-shaped space is inclined with respect to a rotation direction of the inner ring. When the outer ring is formed by drawing a steel plate, a plurality of protrusions protruding corresponding to the inclination of the cam surface are formed on a part of an outer peripheral surface of the outer ring, which is the part corresponding to the radially outer side of the wedge-shaped space (see FIG. 3 of Patent Literature 1). This protrusion can be used as a detent when the one-way clutch is used in a state where the outer ring is attached to an attachment hole of an attachment target member. In other words, by providing a fitting groove in the attachment hole of the attachment target member and fitting the protrusion of the outer ring into the fitting groove, it is possible to prevent the outer ring from rotating inside the attachment hole by a torque received from the inner ring.

[0004] However, when the attachment target member is made of a material softer than the outer ring such as resin, for example, if an inclination of the protrusion of the outer ring is gentle, the inner surface of the fitting groove which abuts on the protrusion of the outer ring may be pushed outward, depending on a magnitude of the torque received from the inner ring. In this case, the outer ring may rotate in the attachment hole. Therefore, for example, an upper limit of the torque acting on the inner ring may be restricted to a small value.

[0005] For this reason, it is conceivable that the inclination of the side surface of the protrusion on the outer peripheral surface of the outer ring is made steeper than the inclination of the cam surface so that the protrusion of the outer ring can be easily engaged with the fitting groove. However, when forming the outer ring with such a shape by drawing, the inclination of the both end portions of the protrusion in a circumferential direction of the outer ring becomes gentle (see R portion **311***e* in FIG. **6** to be described below) and it is not possible to secure a sufficient engagement margin with the inner surface of the fitting groove.

CITATION LIST

Patent Literature

[0006] [Patent Literature 1]: JP-A-2005-90716

SUMMARY OF INVENTION

[0007] According to an aspect of the invention, in an one-way clutch, while a side surface of a protrusion of an outer ring which functions as a detent for an attachment target member has an inclination steeper than that of a cam surface, an engagement margin of the protrusion of the outer ring which fits into a fitting groove of the attachment target member is secured, and thus the outer ring is reliably prevented from rotating.

BRIEF DESCRIPTION OF DRAWINGS

[0008] FIG. **1** is a cross-sectional view illustrating a one-way clutch according to an embodiment.

[0009] FIG. **2** is a cross-sectional view taken along the line A-A of FIG. **1**.

[0010] FIG. **3** is a perspective view illustrating a part of a holder and a biasing member of the one-way clutch.

[0011] FIG. **4**(*a*) is a cross-sectional view illustrating one protrusion of a plurality of protrusions of an outer ring and a fitting groove of an attachment target member into which the protrusion is fitted, in a cross section perpendicular to a direction parallel to a rotation axis. FIG. **4**(*b*) is a cross-sectional view illustrating the protrusion illustrated in FIG. **4**(*a*). FIG. **4**(*c*) is cross-sectional view illustrating the fitting groove illustrated in FIG. **4**(*a*).

[0012] FIGS. **5**(*a*) to **5**(*e*) are explanatory views illustrating an example of a manufacturing process of the outer ring.

[0013] FIG. **6** is a partial cross-sectional view illustrating an outer ring according to a comparative example.

DESCRIPTION OF EMBODIMENT

Embodiment

[0014] An embodiment will be described with reference to FIGS. **1** to **5**(*e*). The embodiments described below are shown as specific example for carrying out the invention. Although there are portions that specifically illustrate various technical matters that are technically preferable, the technical scope of the invention is not limited to those specific embodiments.

[0015] FIG. **1** is a cross-sectional view illustrating a one-way clutch according to the embodiment. FIG. **2** is a cross-sectional view taken along the line A-A of FIG. **1**. FIG. **3** is a perspective view illustrating a part of a holder and a biasing member of the one-way clutch. The one-way clutch **1** is attached in an attachment hole **70** formed in an attachment target member **7**. The one-way clutch **1** is used to allow a forward rotation of a shaft **8** with respect to the attachment target member **7** in a direction of the arrow B and to restrict a reverse rotation in a direction of the arrow B' corresponding to the opposite side. The entirety of the one-way clutch **1** is accommodated in the attachment hole **70** of the attachment target member **7**. However, only a part of the attachment target member **7** is illustrated in FIG. **1**.

[0016] The one-way clutch **1** includes an inner ring **2** as a rotating body, an outer ring **3**, a plurality of rollers **4**, an annular holder **5**, and a biasing member **6**. The shaft **8** is connected to the inner ring **2** so as not to be relatively

rotatable. The outer ring **3** is disposed around the outer periphery of the inner ring **2**. The plurality of rollers **4** are disposed between the inner ring **2** and the outer ring **3**. A plurality of holding holes **50** for holding the plurality of rollers **4** are formed in the annular holder **5**. The biasing member **6** biases the roller **4** to one side of the holding hole **50** along a circumferential direction of the holder **5**. In FIG. **2**, the roller **4** is illustrated by a virtual line (two-dot chain line).

[0017] The inner ring **2**, the outer ring **3**, the roller **4**, and the holder **5** are made of a steel material such as SCM415. The biasing member **6** is made of, for example, a SUP material (spring steel). The attachment target member **7** is made of a material softer than the outer ring **3**. In the embodiment, the attachment target member **7** is made of resin.

[0018] The one-way clutch **1** may be used, for example, for a paper feeding mechanism of a copying machine, a printer, or the like. The inner ring **2** which rotates with the shaft **8** is allowed to rotate in one direction with respect to a housing as the attachment target member **7**. The rotation of the inner ring **2** in the other direction (reverse direction) is restricted by the wedge effect of the roller **4**. When the one-way clutch **1** is used in the paper feeding mechanism of the copying machine, the printer, or the like, a force which rotates the shaft **8** in the reverse direction may be applied when manually handling a paper jam.

[0019] A fitting hole **20** is provided at a center of the inner ring **2**. The shaft **8** is fitted into the fitting hole **20**. In the embodiment, the shaft **8** is connected to the inner ring **2** so as not to rotate relative to the inner ring **2** by spline fitting. However, the shaft **8** may be fixed to the inner ring **2** by, for example, a bolt. Further, the inner ring **2** and the shaft **8** may be integrated. In this case, the rotation of the rotating body in which the inner ring **2** and the shaft **8** are integrated in the reverse direction is restricted by the wedge effect of the roller **4**.

[0020] The outer ring **3** includes a substantially cylinder-shaped cylindrical portion **31** and an inner flange portion **32** (see FIG. **2**) which protrudes radially inward from one end portion of the cylindrical portion **31**. Further, a cam surface **30***a* is provided on a part of an inner peripheral surface **31***a* of the cylindrical portion **31** of the outer ring **3**. The cam surface **30***a* is inclined with respect to a rotation direction of the inner ring **2**. A plurality of indent portions **30** are formed in the cylindrical portion **31** of the outer ring **3**. A wedge-shaped space **10** is formed between the plurality of indent portions **30** of the outer ring **3** and an outer peripheral surface **2***a* of the inner ring **2**. The cam surface **30***a* is the bottom surface of the indent portion **30**. That is, a space between the cam surface **30***a* of the outer ring **3** and the outer peripheral surface **2***a* of the inner ring **2** forms the wedge-shaped space **10**. The cylindrical roller **4** is disposed in the wedge-shaped space **10**.

[0021] The radial width of the wedge-shaped space **10** in a radial direction of the inner ring **2** and the outer ring **3** is narrower than a diameter of the roller **4** at one end in the circumferential direction of the inner ring **2** and the outer ring **3** and wider than the diameter of the roller **4** at the other end in the circumferential direction. The roller **4** is held by the holder **5** so that the central axis direction thereof is parallel to a rotation axis O of the inner ring **2** and the shaft **8**.

[0022] The dimension of the holder **5** in the radial direction of the inner ring **2** and the outer ring **3** is smaller than the diameter of the roller **4**. Parts of the roller **4** protrude from an inner peripheral surface **5**(*a*) and an outer peripheral surface **5**(*b*) of the holder **5**. In the embodiment, eight holding holes **50** are provided in the holder **5** at equal intervals along the circumferential direction. One roller **4** is accommodated in each holding hole **50**. The holder **5** is provided with a plurality of convex portions **51** (see FIGS. **2** and **3**) for fixing to the outer ring **3** at a plurality of locations. In FIG. **3**, one of the convex portions **51** is illustrated. The convex portion **51** may be joined to the outer ring **3** by welding, for example.

[0023] As illustrated in FIG. **3**, the biasing member **6** is integrally includes a belt-shaped annular body portion **61** disposed to face the outer peripheral surface **5**(*b*) of the holder **5**, an extending portion **62** extending from the annular body portion **61** into the holding hole **50**, a pair of spring portions **63** protruding from the extending portion **62**, and a plurality of engaging portions **64** engaged with engaged portions **52** formed in the holder **5**. A plurality of square holes **610** are formed in the annular body portion **61** at positions corresponding to the plurality of holding holes **50** of the holder **5**. The extending portion **62** protrudes into the square hole **610**. A plurality of punched holes **611** for weight reduction may be formed in the annular body portion **61**.

[0024] The biasing member **6** is fixed to the holder **5** by the engaging portion **64** engaging with the engaged portion **52**. In the embodiment, the engaging portion **64** is formed as a protruding piece which protrudes radially inward from the end portion in the width direction (axial direction) of the annular portion **61** and the engaged portion **52** is formed as a notch formed in the axial end surface of the holder **5**.

[0025] The pair of spring portions **63** protrude from the extending portion **62** in a direction inclined with respect to the axial direction of the holder **5**. In the spring portions **63**, a pair of tip end portions which abut on the outer peripheral surface of the roller **4** are free ends. The biasing member **6** biases the roller **4** to the one side of the wedge-shaped space **10** where the distance between the cam surface **30***a* and the outer peripheral surface **2***a* of the inner ring **2** is narrowed by the pair of spring portions **63** abutting the roller **4**.

[0026] In the one-way clutch **1** configured as described above, when the shaft **8** rotates in the reverse direction (arrow B' direction), the roller **4** rolls on the cam surface **30***a* of the outer ring **3** and the outer peripheral surface **2***a* of the inner ring **2** and is interposed between the outer ring **3** and the inner ring **2** to prevent further rotation of the shaft **8** in the reverse direction. On the other hand, when the shaft **8** rotates in the forward direction (arrow B direction), the rotation of the inner ring **2** moves the roller **4** to a portion where the wedge-shaped space **10** has a large radial width and the shaft **8** can freely rotate with respect to the attachment target member **7**.

[0027] In the attachment target member **7**, fitting grooves **71** respectively extending in a direction parallel to the rotation axis O are formed on an inner peripheral surface **70***a* of the attachment hole **70**. The outer ring **3** has a plurality of protrusions **311** which fit into the fitting grooves **71** at positions corresponding to the radially outer side of the indent portion **30** in the cylindrical portion **31**. The outer ring **3** is restricted from rotating relative to the attachment target member **7** by fitting the protrusions **311** into the fitting grooves **71**. In the embodiment, as illustrated in FIG. **2**, the

protrusion **311** is provided in a partial region in the axial direction of the cylindrical portion **31**. However, the protrusion **311** may be provided over the entire cylindrical portion **31** in the axial direction.

[0028] FIG. **4**(*a*) is a cross-sectional view illustrating one protrusion **311** of the plurality of protrusions **311** of the outer ring **3** and the fitting groove **71** of the attachment target member **7** into which the protrusion **311** is fitted, in a cross section perpendicular to the direction parallel to the rotation axis O. FIG. **4**(*b*) is a cross-sectional view illustrating the protrusion **311** illustrated in FIG. **4**(*a*). FIG. **4**(*c*) is a cross-sectional view illustrating the fitting groove **71** illustrated in FIG. **4**(*a*).

[0029] The protrusion **311** has a width W in the circumferential direction of the cylindrical portion **31** of, for example, 1.9 mm and extends parallel to the rotation axis O. Further, the protrusion **311** has a tip end surface **311***a* having a circular arc section with the rotation axis O as the center of the arc and first and second side surfaces **311***b* and **311***c* inclined with respect to the rotation direction of the inner ring **2**. The first and second side surfaces **311***b* and **311***c* are both side surfaces of the protrusion **311** in the circumferential direction. In FIG. **4**(*b*), the first and second side surfaces **311***b* and **311***c* are indicated by bold lines. The tip end surface **311***a* is formed in a range including a portion corresponding to the outer side of a deepest portion **30***b* (see FIG. **1**) of the indent portion **30** in the radial direction of the cylindrical portion **31**. The first side surface **311***b* is formed at a portion corresponding to the outside of the cam surface **30***a*. The second side surface **311***c* is formed in a portion corresponding to the outside of the inner peripheral surface **31***a* of the cylindrical portion **31** where the indent portion **30** is not formed.

[0030] Between the tip end surface **311***a* and the first side surface **311***b* and between the tip end surface **311***a* and the second side surface **311***c*, R-portions (rounded portions) **311***d* each having a predetermined radius of curvature are formed respectively. The radius of curvature of the R-portion **311***d* is, for example, 0.3 mm. In the cross section illustrated in FIGS. **4**(*a*) and **4**(*b*), the first and second side surfaces **311***b* and **311***c* have straight like shapes continuous to the respective R-portions **311***d*. The dimension between the first side surface **311***b* and the second side surface **311***c* in the circumferential direction of the cylindrical portion **31** gradually increases as it moves away from the tip end surface **311***a*.

[0031] On an outer peripheral surface **31***b* of the cylindrical portion **31** of the outer ring **3** between the plurality of protrusions **311**, a pair of recess portions **312** which are respectively formed continuously to the first and second side surfaces **311***b* and **311***c* are provided. In other words, the protrusion **311** is provided between the pair of recess portions **312**. Hereinafter, a partial region in the circumferential direction of the cylindrical portion **31**, the region including the pair of recess portions **312** and one protrusion **311** provided therebetween, is referred to as a protruding region **310**. In the embodiment, eight protruding regions **310** are formed at equal intervals on the cylindrical portion **31**. The first and second side surfaces **311***b* and **311***c* are straight portions S in which the cross-sectional shape of the protruding region **310** is a straight like line in the cross section shown in FIG. **4**(*b*). An imaginary line L illustrated in FIG. **4**(*b*) is an extension line obtained by extending the outer peripheral surface **31***b* of the cylindrical portion **31** between two protruding regions **310** adjacent in the circumferential direction in the circumferential direction with respect to the rotation axis O.

[0032] A height h of the protrusion **311** with respect to the imaginary line L is, for example, one tenth of the circumferential width W of the protrusion **311**. Moreover, in the example of illustration of FIG. **4**(*a*) and FIG. **4**(*b*), the angles θ**1** and θ**2** formed by the first and second side surfaces **311***b* and **311***c* and the circumferential direction of the cylindrical portion **31** along the virtual line L are 30°. A preferable range of the angles θ**1** and θ**2** is 30° or more and 45° or less. When the angles θ**1** and θ**2** are less than 30°, the effect of preventing the outer ring **3** from rotating with respect to the attachment target member **7** cannot be sufficiently obtained. When the angles θ**1** and θ**2** exceed 45°, it is difficult to accurately form the protrusion **311** by drawing processing described below.

[0033] The inclination angle of the cam surface **30***a* with respect to the circumferential direction of the cylindrical portion **31** is, for example, 10°. Accordingly, the angles θ**1** and θ**2** which are the inclination angles of the first and second side surfaces **311***b* and **311***c* with respect to the circumferential direction of the cylindrical portion **31** are larger than the inclination angle of the cam surface **30***a*.

[0034] The recess portion **312** is recessed from the imaginary line L inward in the radial direction of the cylindrical portion **31**. The inner surface **312***a* of the recess portion **312** is a curved surface having a radius of curvature of 0.3 mm or more in the cross section illustrated in FIGS. **4**(*b*) and **4**(*c*). In the embodiment, the inner surfaces **312***a* of the recess portions **312** in the cross section illustrated in FIG. **4**(*b*) are constituted of first curved surfaces **312***b* continuous with the first and second side surfaces **311***b* and **311***c* and second curved surfaces **312***c* which smoothly connect the outer peripheral surface **31***b* of the cylindrical portion **31** with respect to the protruding regions **310** adjacent in the circumferential direction and the first curved surfaces **312***b*. The first curved surface **312***b* is a curved surface which indents inward with respect to the radial direction of the cylindrical portion **31** and the second curved surface **312***c* is a curved surface which protrudes outward with respect to the radial direction of the cylindrical portion **31**.

[0035] A preferable range of the radius of curvature of the inner surface **312***a* (first and second curved surfaces **312***b* and **312***c*) of the recess portion **312** is 0.3 mm or more and 1.0 mm or less. In the embodiment, the curvature radii of the first curved surface **312***b* and the second curved surface **312***c* are both 0.5 mm. When the curvature radii of the first curved surface **312***b* and the second curved surface **312***c* are less than 0.3 mm, it is difficult to accurately form the recess portion **312** by drawing processing described below. When the curvature radii of the first curved surface **312***b* and the second curved surface **312***c* exceed 1.0 mm, the recess portion **312** becomes larger than necessary. The radius of curvature of the first curved surface **312***b* and the radius of curvature of the second curved surface **312***c* may be the same or different. In this way, the protruding region **310** in the cross section perpendicular to the rotation axis O is constituted of a curve having a curvature radius of 0.3 mm or more, except for the first and second side surfaces **311***b* and **311***c* formed in a straight line and those curves are formed smoothly and continuously.

[0036] As illustrated in FIG. **4**(*c*), the inner surface of the fitting groove **71** of the attachment target member **7** includes

a bottom surface **71***a* and a pair of abutment surfaces **71***b* and **71***c*. The bottom surface **71***a* faces the tip end surface **311***a* of the protrusion **311** of the outer ring **3**. The abutment surface **71***b* abuts on the first side surface **311***b* of the protrusion **311** and the abutment surface **71***c* abuts on the second side surface **311***c* of the protrusion **311**.

[0037] Manufacturing Method of Outer Ring **3**

[0038] A method for manufacturing the outer ring **3** will be described with reference to FIG. **5**.

[0039] FIGS. **5**(*a*) to **5**(*e*) are explanatory views illustrating an example of the manufacturing process of the outer ring **3**. The outer ring **3** is formed by a transfer press in which a plurality of press processes are sequentially performed at a multistage processing station. FIG. **5**(*a*) illustrates a disk-shaped thin steel plate **300** which is a material of the outer ring **3** and FIGS. **5**(*b*) and **5**(*c*) respectively illustrate first and second pressed bodies **301** and **302** in the middle of processing, which are pressed into a cup shape. The second pressed body **302** is drawn by an upper die (punch) **91** and a lower die (die) **92** as illustrated in FIG. **5**(*d*), in such a manner that the second pressed body **302** becomes a third pressed body **303**. Further, the outer ring **3** is obtained by forming a through-hole **320** in the center part of the bottom portion of the third pressed body **303** as illustrated in FIG. **5**(*e*).

[0040] In the drawing process using the upper die **91** and the lower die **92**, after the upper die **91** is inserted inside the cup-shaped second pressed body **302**, the upper die **91** is pressed down into a die hole **920** of the lower die **92** together with the second pressed body **302**. A plurality of convex portions **911** having a shape corresponding to the indent portion **30** are provided on the outer peripheral surface of the upper die **91**. On the inner peripheral surface of the die hole **920** of the lower die **92**, a protruding region forming portion **921** having an uneven shape corresponding to the protrusion **311** and the recess portion **312** of the protruding region **310** is provided. The outer diameter of the second pressed body **302** is reduced by the drawing process and the indent portion **30** and the protruding region **310** are formed.

Comparative Example

[0041] FIG. **6** is a partial cross-sectional view illustrating an outer ring **3'** according to a comparative example. As similar to the outer ring **3** according to the embodiment described above, the outer ring **3'** has a protrusion **311** in a portion corresponding to the outside of the indent portion **30**, but the recess portion **312** is not formed. That is, the outer ring **3'** is drawn by a lower die which does not have a convex portion corresponding to the recess portion **312**.

[0042] In the outer ring **3'**, the lengths of the linear portions (straight portions indicated by bold lines) of the first and second side surfaces **311***b* and **311***c* in the protrusion **311** are shortened and both end portions in the circumferential direction of the protrusion **311** are, for example, R-portions **311***e* having curvature radii of 0.3 mm. Therefore, the length of the effective engagement margin for preventing the outer ring **3'** from rotating becomes short. As a result, when a large force for rotating the inner ring **2** in the reverse direction is applied to the shaft **8**, there is a concern that the outer ring **3'** may be rotated with respect to the attachment target member **7**.

[0043] In the outer ring **3** according to the embodiment, since the R-portion **311***e* is not formed, it is possible to ensure a large effective engagement margin due to the first and second side surfaces **311***b* and **311***c*. Therefore, the rotation of the outer ring **3** relative to the attachment target member **7** can be more reliably prevented than those of the outer ring **3'** according to the comparative example.

Effect of Embodiment

[0044] According to the one-way clutch **1** according to the embodiment described above, it is possible to securely prevent the outer ring **3** from rotating by securing the engagement margin of the protrusion **311** of the outer ring **3** with respect to the fitting groove **71** of the attachment target member **7**, while the inclination of the first and second side surfaces **311***b* and **311***c* of the protrusion **311** of the outer ring functioning as a detent against the attachment target member **7** is set to be larger than the inclination of the cam surface **30***a*. Further, the inner surface **312***a* of the recess portion **312** is a curved surface having a radius of curvature of 0.3 mm or more in a cross section perpendicular to the rotation axis O of the inner ring **2**. Therefore, the pair of recess portions **312** and the protrusion **311** in the protruding region **310** can be processed with high accuracy by following the shape of the protruding region forming portion **921** of the die hole **920** of the lower die **92**.

APPENDIX

[0045] Hereinbefore, although one viewpoint of the invention is demonstrated based on the embodiment, the embodiment does not limit the invention described in claims. In addition, all the combinations of features described in the embodiment are not necessarily essential to the means for solving the problems of the invention.

[0046] Further, the invention can be appropriately modified and implemented without departing from the spirit of the present invention. For example, in the embodiment described above, as an application of the one-way clutch **1**, a case where the rotation of the shaft **8** of the paper feeding mechanism of a copying machine or a printer is regulated in one side is exemplified. However, the application of the one-way clutch **1** is not limited to this and the one-way clutch **1** may be used for a fishing reel, for example. Further, the number of rollers **4** and indent portions **30** is not limited to the above and can be changed as appropriate. Furthermore, in the embodiment described above, a case where the pair of spring portions **63** of the biasing member **6** is constituted of a leaf spring is described. However, the spring portion **63** is not limited to this and the roller **4** may be biased by a coil spring, for example.

[0047] According to the embodiment, the one-way clutch **1** is attached in the attachment hole **70** formed in the attachment target member **7**. In the one-way clutch **1**, rotation in one direction of the rotating body **2** rotating with respect to the attachment target member **7** is allowed and rotation in the other direction of the rotating body **2** is restricted. The one-way clutch **1** includes the rotating body **2**, the outer ring **3** disposed on the outer periphery of the rotating body, the roller **4**, the biasing member **6**, and the recess portion **312**. The outer ring **3** includes the indent portion **30** which forms a wedge-shaped space **10** between the cam surface **30***a* formed to be inclined with respect to the rotation direction of the rotating body **2** and the outer peripheral surface **2***a* of the rotating body **2**. The roller **4** is disposed in the wedge-shaped space **10**. The biasing member **6** biases the roller **4** to one side of the wedge-shaped space

10 where the distance between the cam surface **30***a* and the outer peripheral surface **2***a* of the rotating body **2** is narrowed. The outer ring **3** has the protrusion **311** which fits into the fitting groove **71** formed in the inner peripheral surface **70***a* of the attachment hole **70** at a position corresponding to the radially outer side of the indent portion **30**. In the outer peripheral surface **31***b* of the outer ring **3**, the recess portion **312** is formed continuously to the side surfaces **311***b* and **311***a* in the circumferential direction of the protrusion **311**.

[0048] According to the one-way clutch of the embodiment, it is possible to reliably prevent the outer ring from rotating by securing the engagement margin for the protrusion of the outer ring which fits into the fitting groove of the attachment target member, while the inclination of the side surface of the protrusion of the outer ring which functions as a detent against the attachment target member is set to be larger than the inclination of the cam surface.

[0049] This application is based on a Japanese patent application filed on Jul. 18, 2017 (Japanese Patent Application No. 2017-139302), the contents of which are incorporated herein by reference.

REFERENCE SIGNS LIST

[0050] **1**: one-way clutch
[0051] **10**: wedge-shaped space
[0052] **2**: inner ring (rotating body)
[0053] **3**: outer ring
[0054] **30**: indent portion
[0055] **30***a*: cam surface
[0056] **311**: protrusion
[0057] **312**: recess portion
[0058] **4**: roller
[0059] **5**: holder
[0060] **50**: holding hole
[0061] **6**: biasing member
[0062] **7**: attachment target member
[0063] **70**: attachment hole
[0064] **71**: fitting groove

1. A one-way clutch to be attached into an attachment hole formed in an attachment target member, in which a rotating body is rotatable in one direction relative to the attachment target member and the rotating body is restricted to rotate in the other direction, the one-way clutch comprising:

the rotating body;

an outer ring disposed on an outer periphery of the rotating body;

a roller;

a biasing member; and

a recess portion,

wherein the outer ring includes an indent portion that forms a wedge-shaped space between a cam surface inclined with respect to a rotation direction of the rotating body and an outer peripheral surface of the rotating body,

wherein the roller is disposed in the wedge-shaped space,

wherein the biasing member biases the roller to one side of the wedge-shaped space where a distance between the cam surface and the outer peripheral surface of the rotating body is narrow,

wherein the outer ring has a protrusion to fit into a fitting groove formed on an inner peripheral surface of the attachment hole at a position corresponding to a radially outer side of the indented portion, and

wherein the recess portion is formed on an outer peripheral surface of the outer ring so as to be continuous to a circumferential side surface of the protrusion.

2. The one-way clutch according to claim **1**, wherein an inner surface of the recess portion has a curved surface with a curvature radius of 0.3 mm or more in a cross section perpendicular to a rotation axis of the rotating body.

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