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(54) **VEHICLE WHEEL BEARING INCLUDING SENSOR ASSEMBLY HAVING SEALING PORTION**

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(57) **ABSTRACT**

A vehicle wheel bearing includes a wheel hub provided with a wheel-mounting flange; an inner ring mounted on an outer circumferential surface of the wheel hub; an outer ring provided with a vehicle body-side mounting flange; a plurality of rolling elements for rotatably supporting the wheel hub and the inner ring relative to the outer ring; an outboard-side sealing member that seals a space between the wheel hub and the outer ring; a target ring mounted on one side of the inner ring and rotating together with the inner ring; and a sensor assembly that detects information about operating state(s) of a vehicle. The sensor assembly may comprise a wheel speed sensing portion that detects a change in a magnetic field generated by a sensor target of a target ring that rotates together with the vehicle wheel and measures the rotation speed of the wheel.

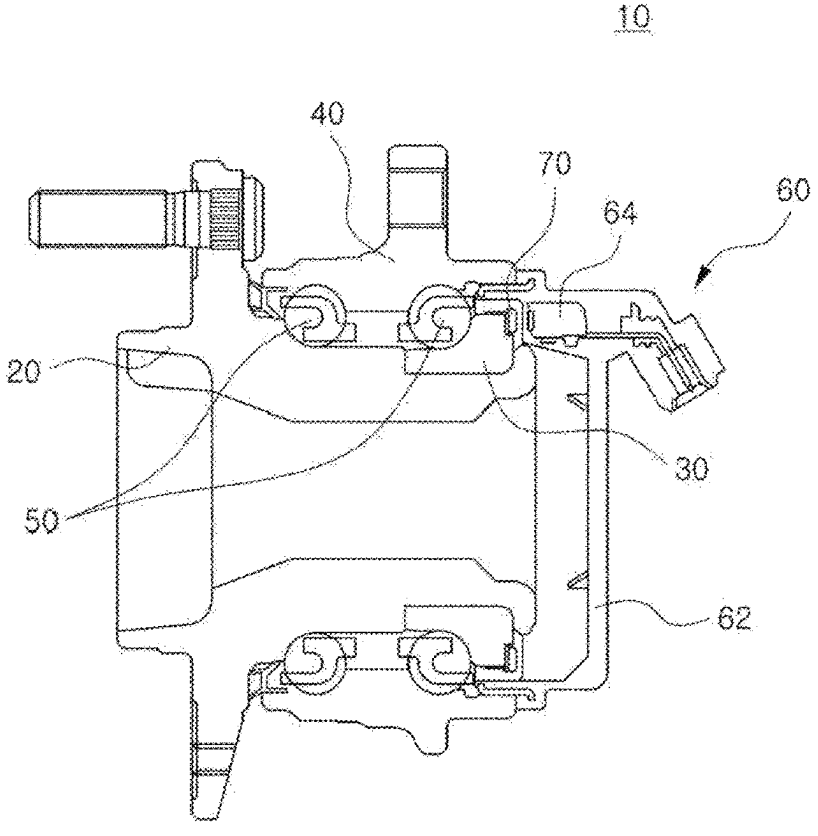


FIG. 1

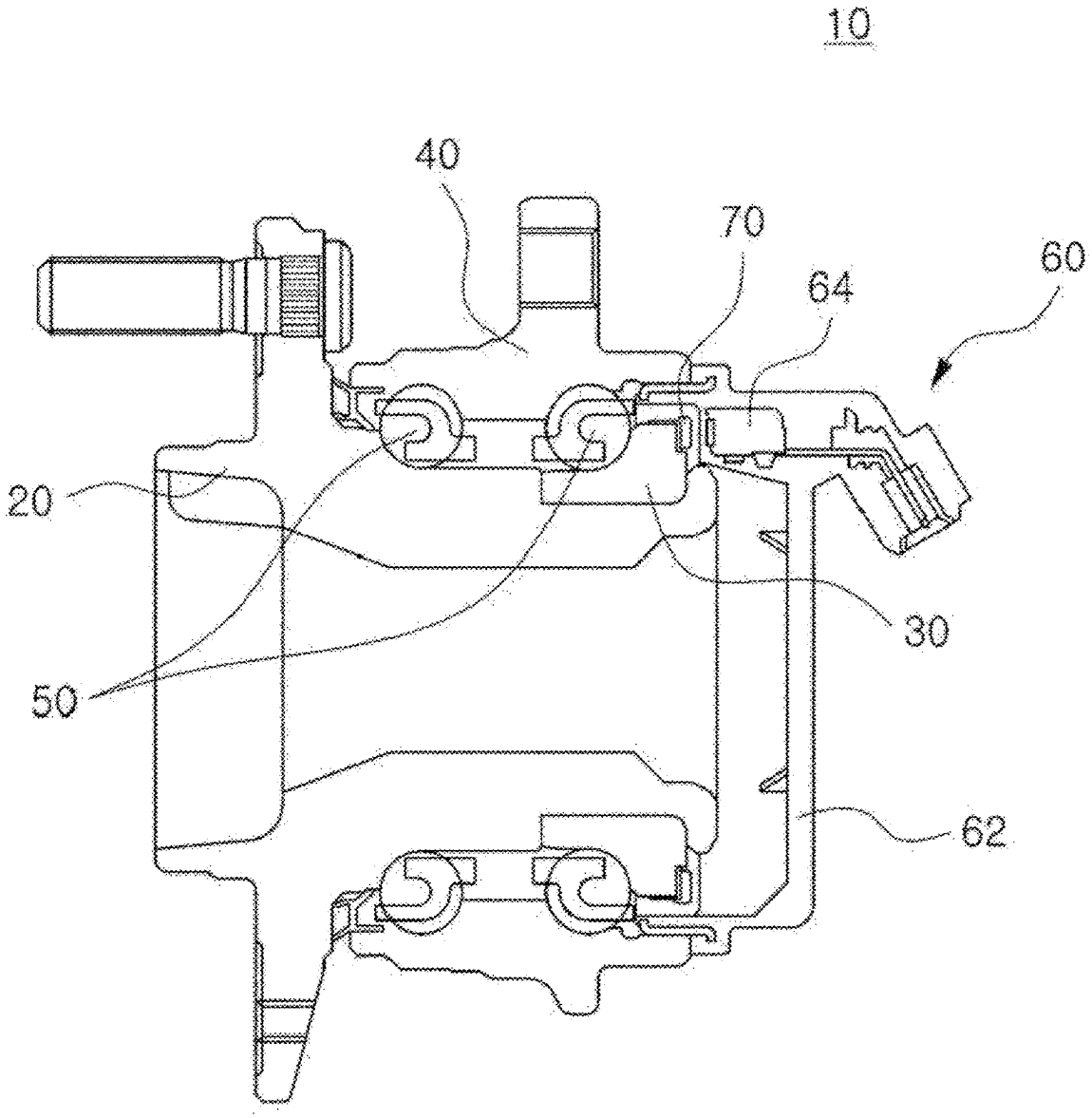


FIG. 2

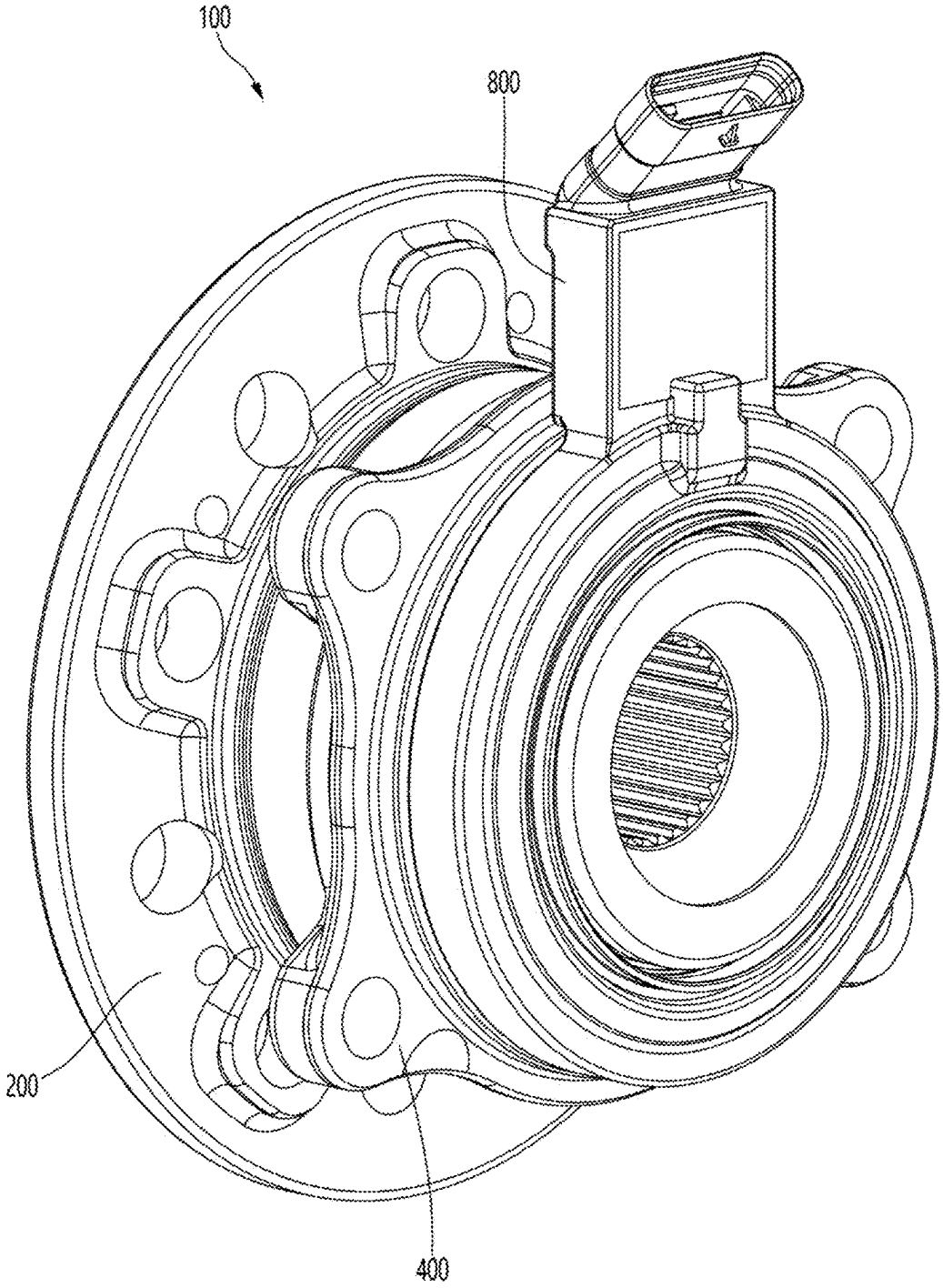


FIG. 3

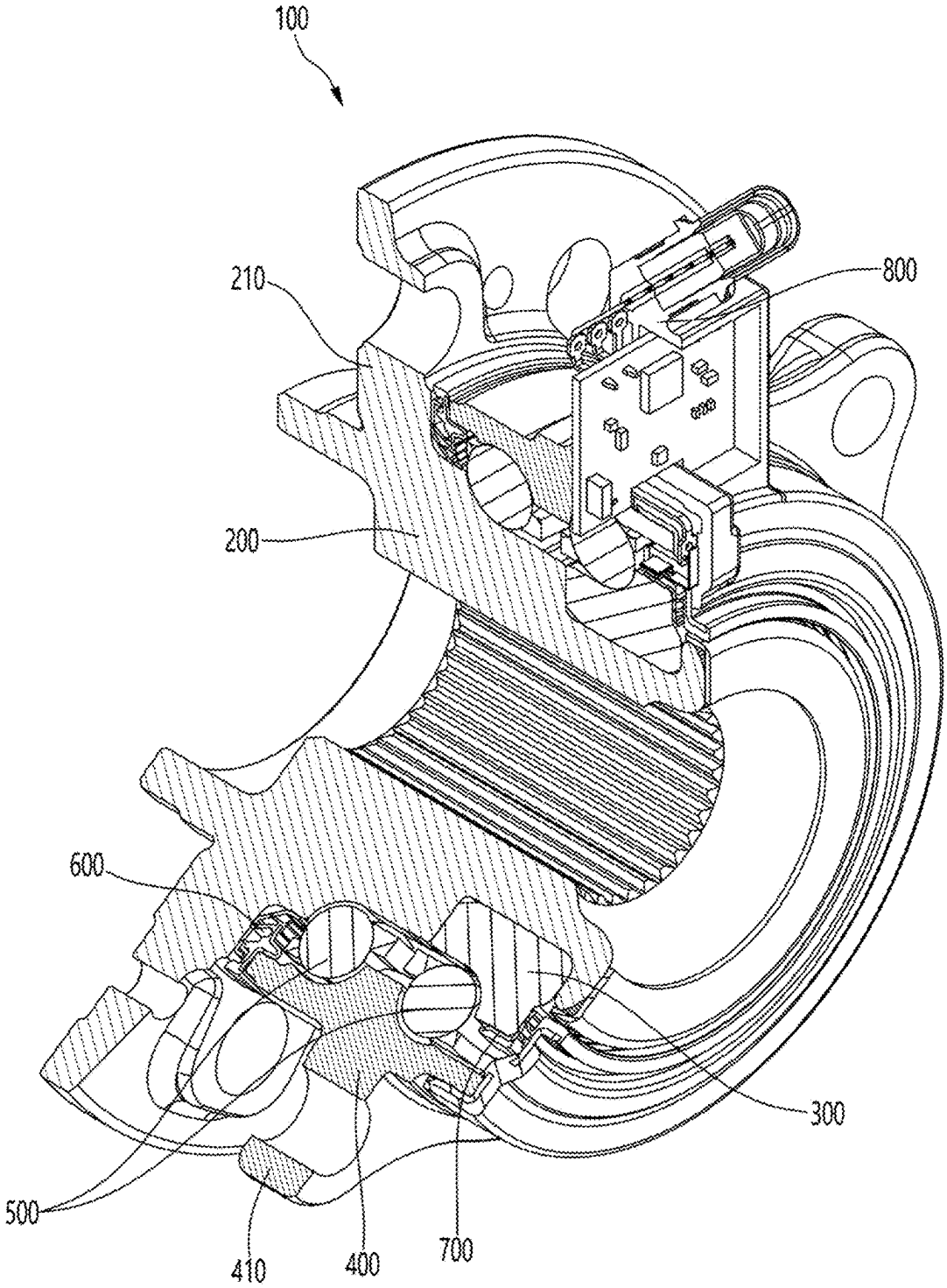


FIG. 4

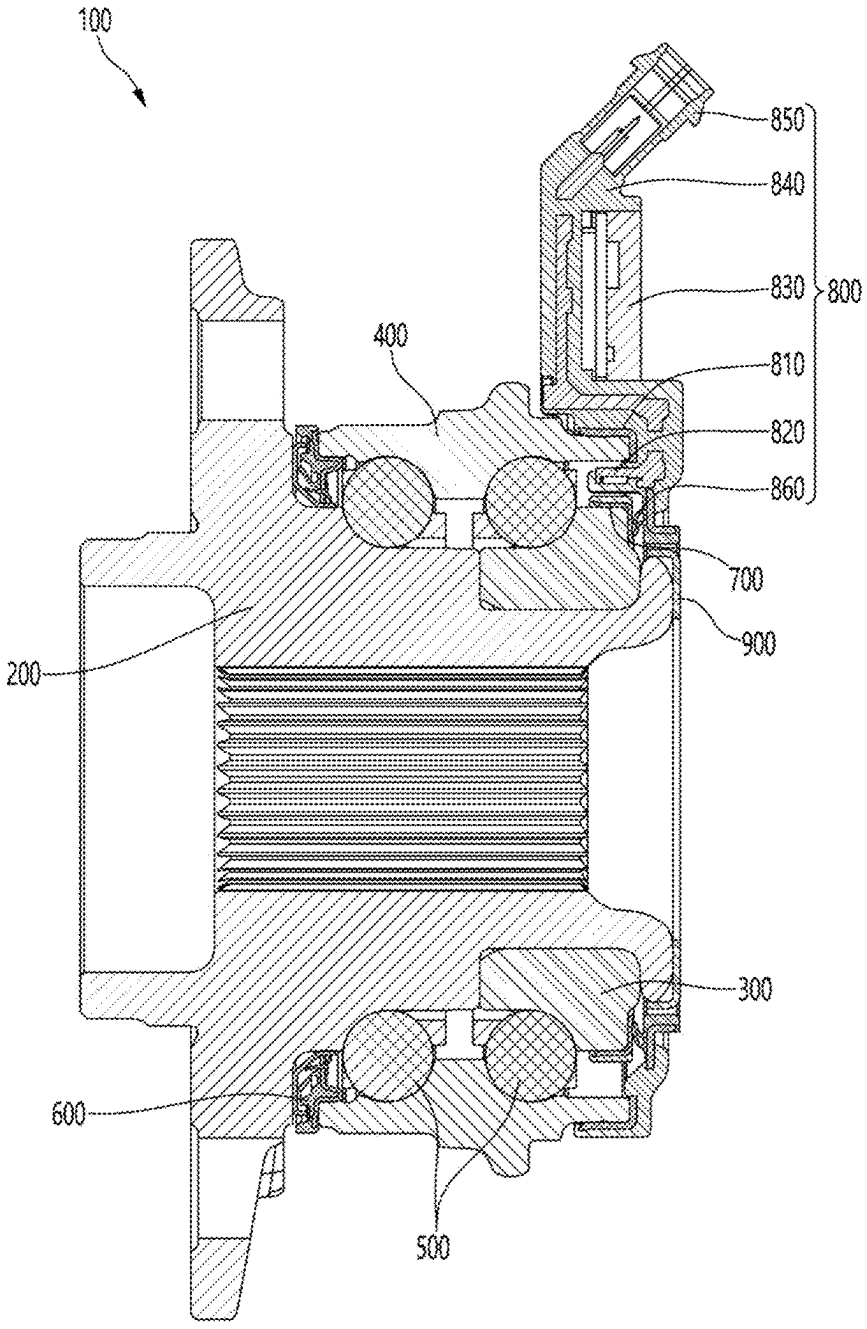


FIG. 5

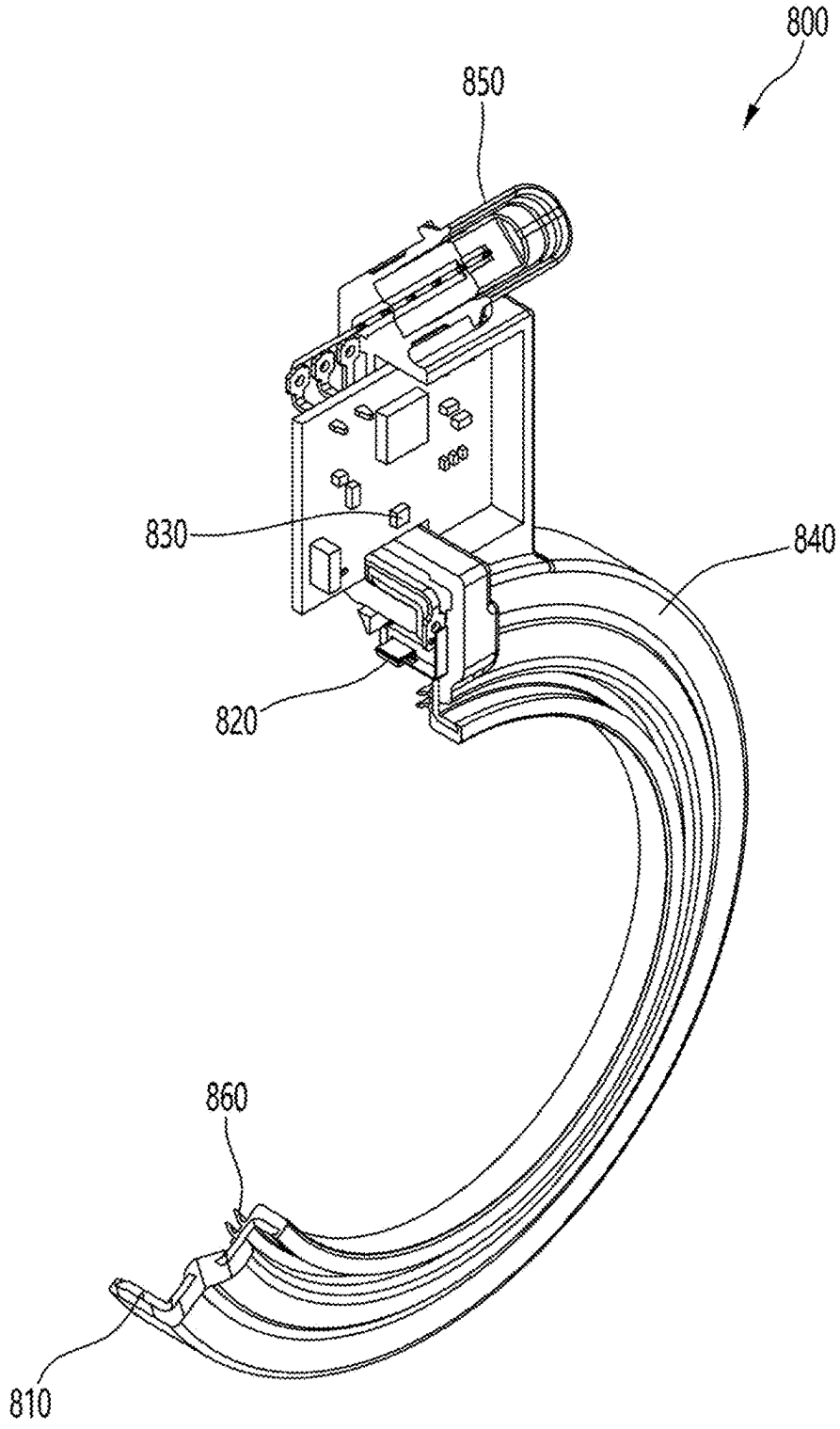


FIG. 6

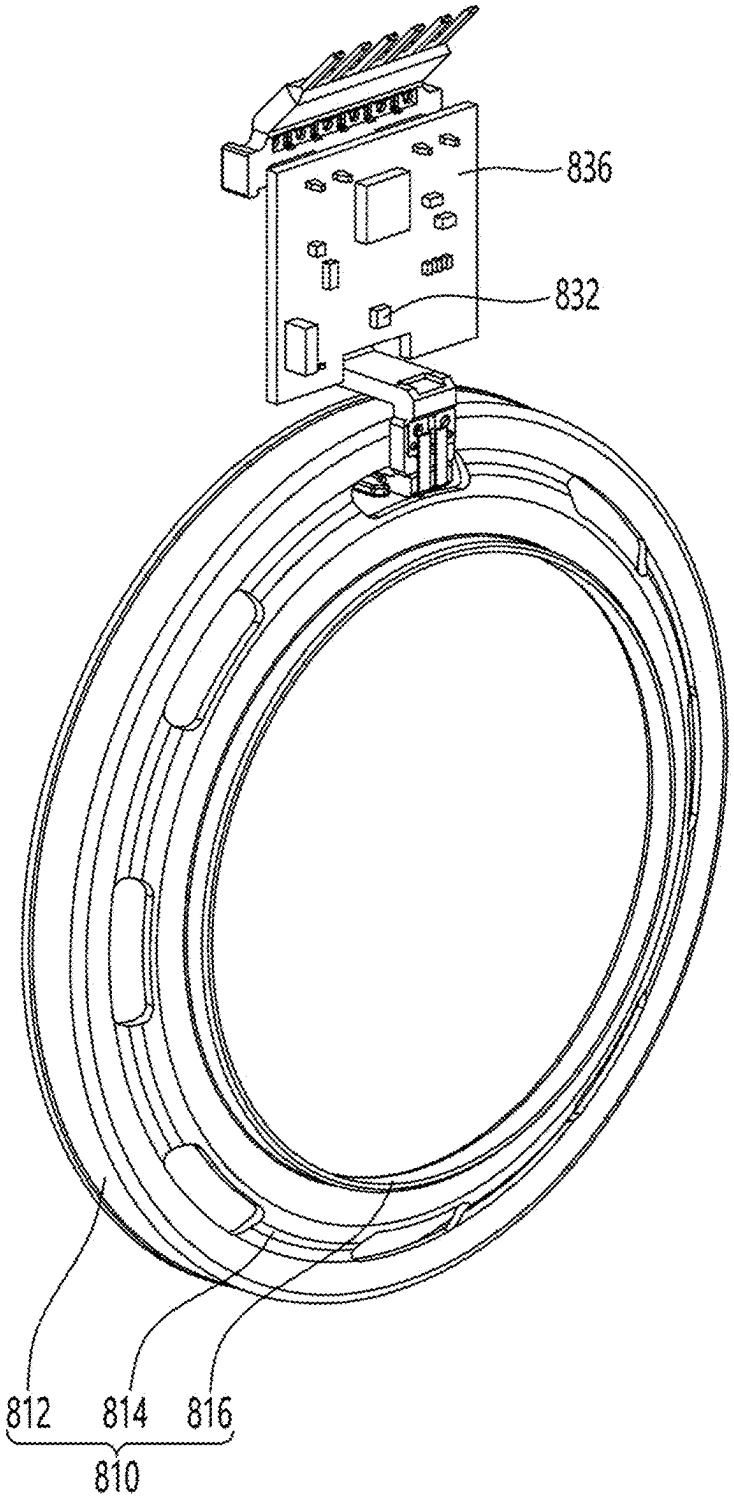


FIG. 7

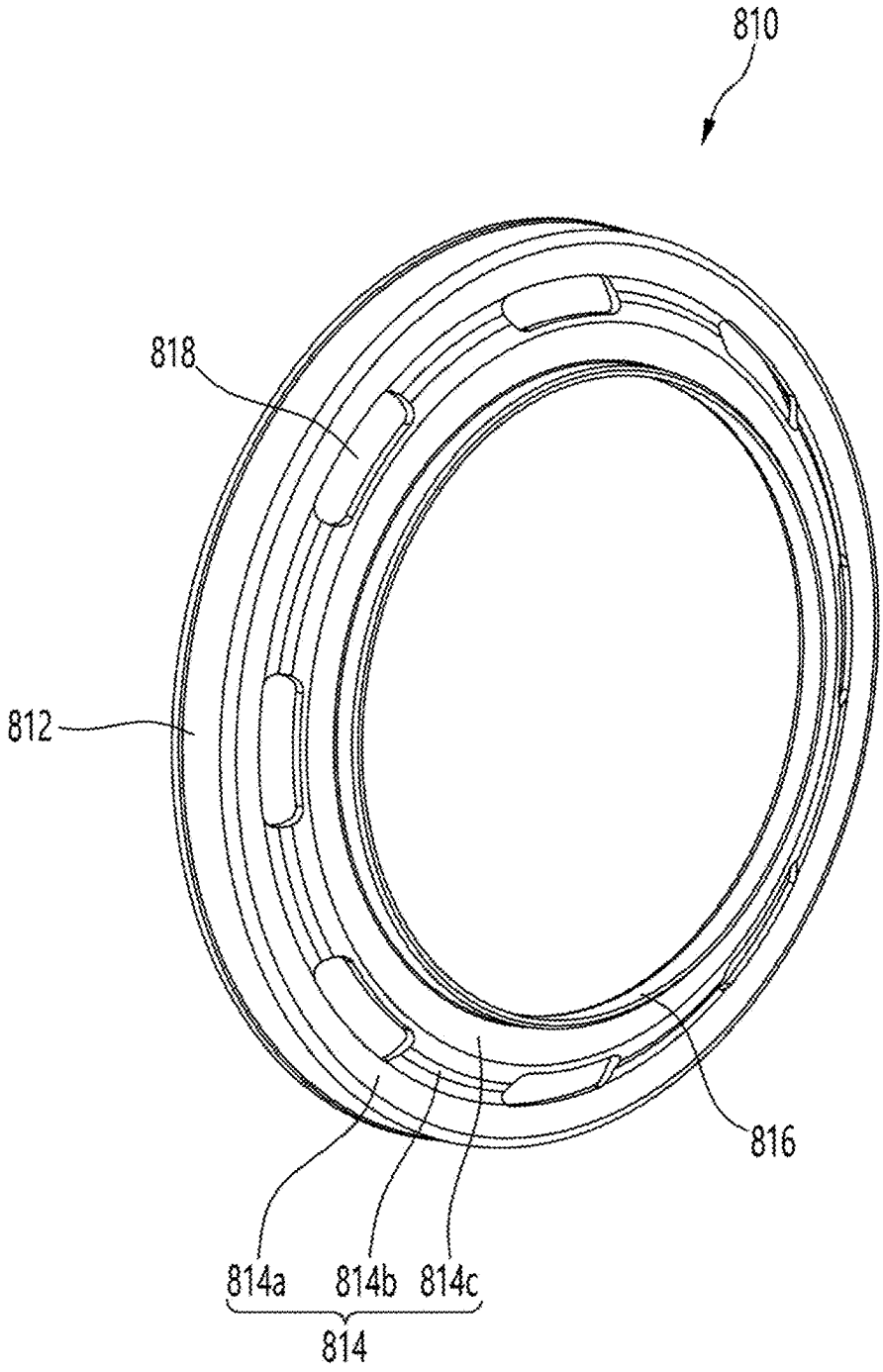


FIG. 8

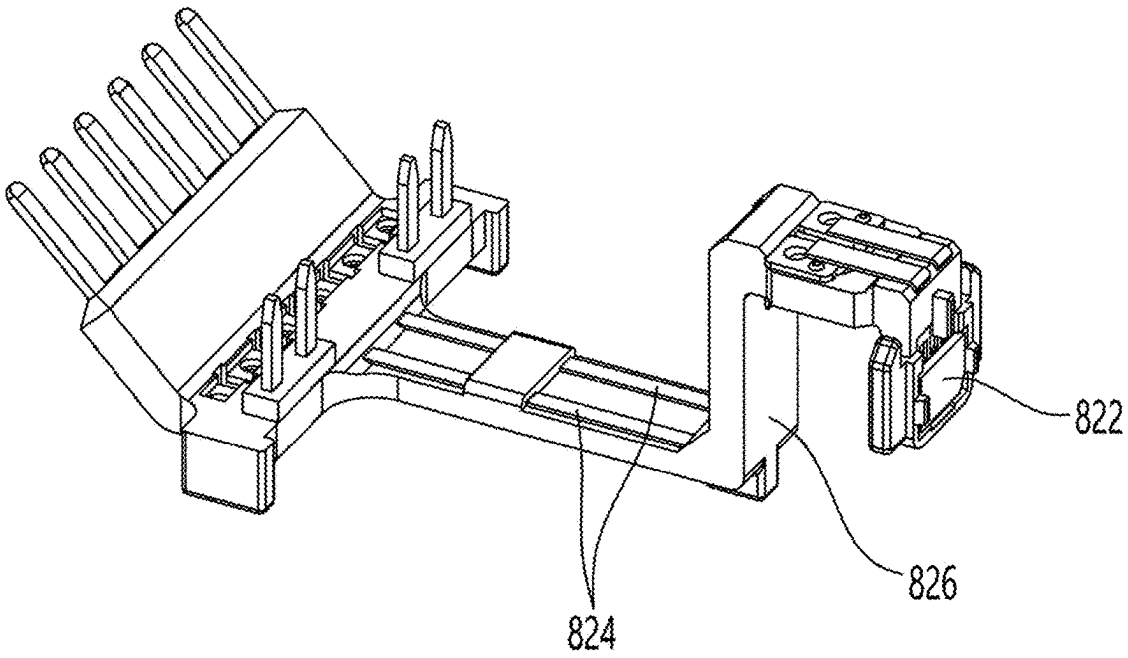


FIG. 9A

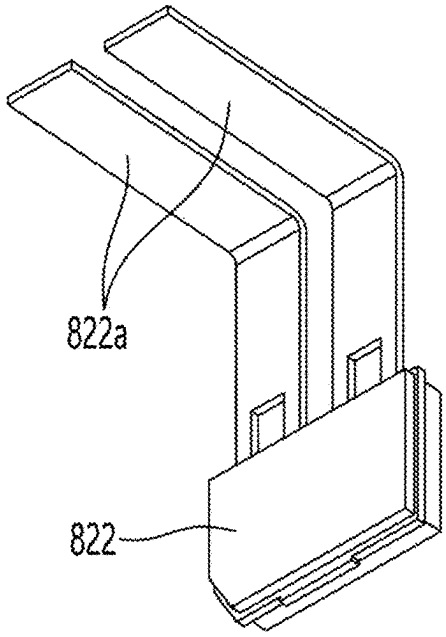


FIG. 9B

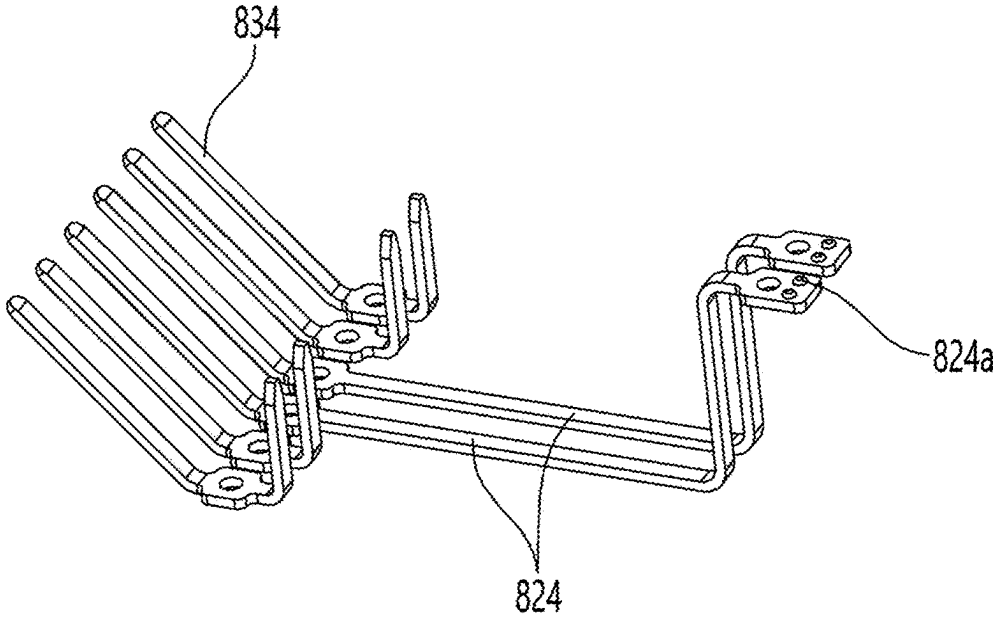
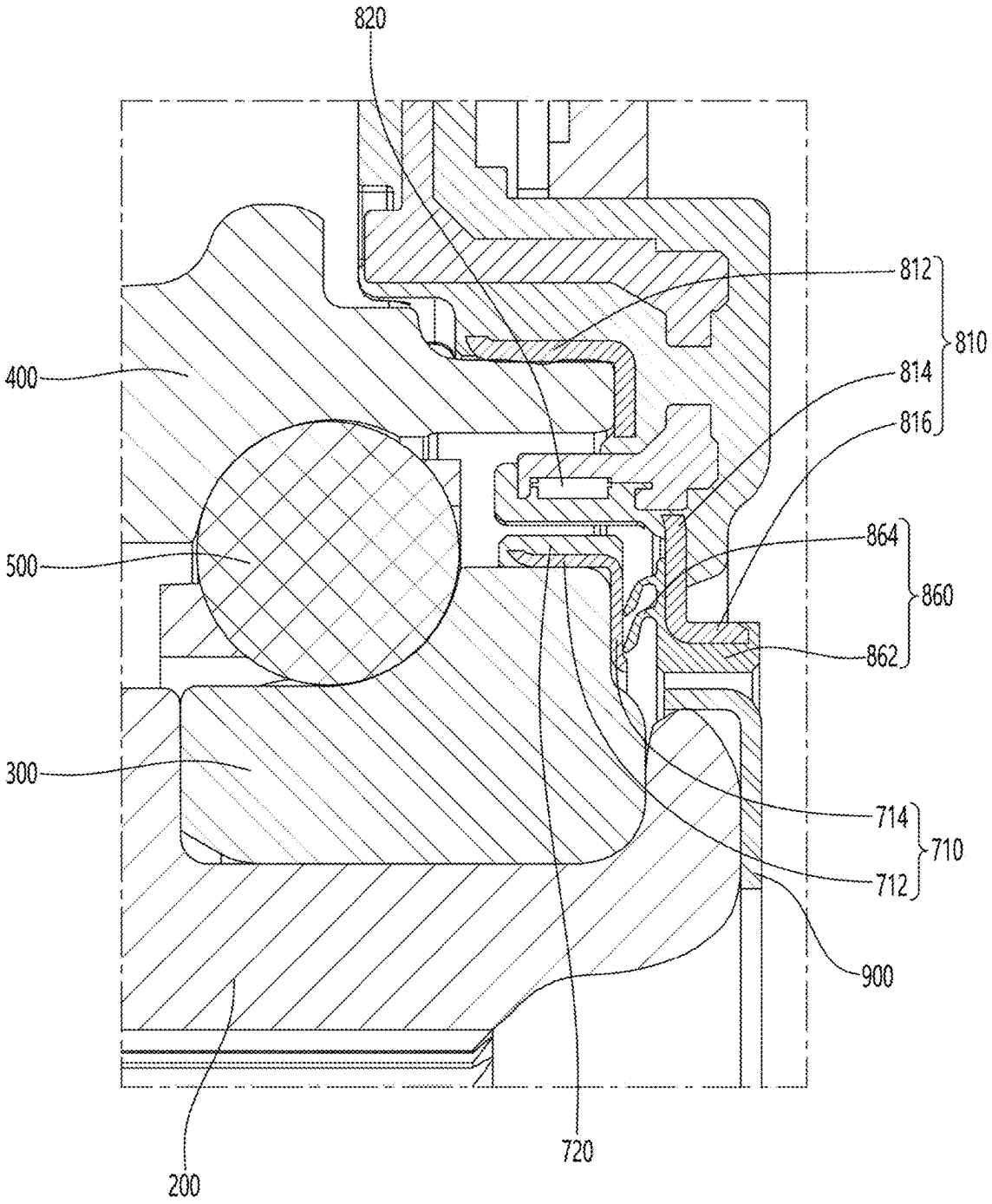


FIG. 10


820
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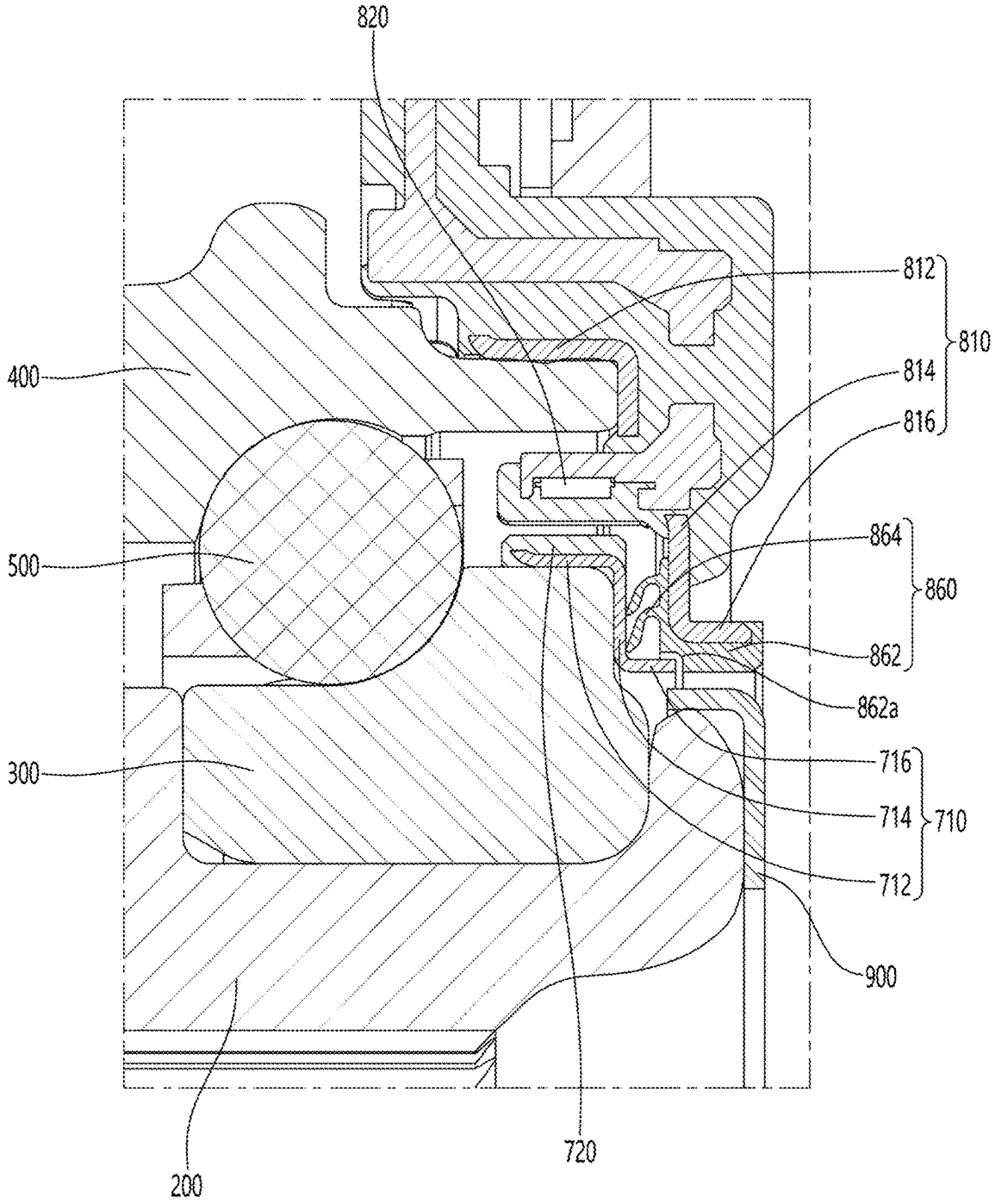
720
200

FIG. 11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VEHICLE WHEEL BEARING INCLUDING SENSOR ASSEMBLY HAVING SEALING PORTION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of International Application No. PCT/KR2023/016511 filed on Oct. 23, 2023, which claims priority to Korean Patent Application No. 10-2022-0136894 filed on Oct. 21, 2022, the entire contents of which are herein incorporated by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to a vehicle wheel bearing including a sensor assembly that detects an operating state(s) of a vehicle, and more particularly, to a vehicle wheel bearing configured to include a sealing portion for performing a sealing function in a sensor assembly.

BACKGROUND ART

[0003] A wheel bearing is a device for rotatably mounting and supporting a vehicle wheel to a vehicle body, and may be divided into a wheel bearing mounted on an driving wheel of a vehicle and a wheel bearing mounted on an driven wheel of a vehicle.

[0004] Referring to FIG. **1**, an example of a vehicle wheel bearing used in the related arts is shown as an example.

[0005] As shown in FIG. **1**, the wheel bearing **10** may be configured so that a rotating element on which a wheel is mounted [for example, wheel hub **20** and inner ring **30**] is coupled to a non-rotating element [for example, outer ring **40**] that is fixed to a vehicle body through rolling elements **50**, and thus a vehicle wheel can be rotatably mounted relative to the vehicle body, and a wheel speed sensor **60** may be provided on one side of the wheel bearing **10** to detect a rotational speed of the wheel.

[0006] Conventionally, the wheel speed sensor **60** may be configured such that a sensing portion **64** is positioned adjacent to a sensor target **70** (for example, encoder), which is mounted to a rotating element [for example, inner ring **30**] and rotating together with the wheel, and may be configured to detect a rotational speed of the wheel by detecting changes in the magnetic field generated by the rotating sensor target **70**. In addition, the rotational speed information of the wheel detected through the wheel speed sensor **60** may be transmitted to the ECU or the like of the vehicle, and may be used for operating control systems such as ABS or ECS.

[0007] Meanwhile, the wheel speed sensor **60** may be formed to have a structure in which the sensing portion **64** is provided in a housing **62** mounted on one side of the wheel bearing, and may be configured to detect a rotational speed of the wheel by detecting changes in a magnetic field caused by the rotation of the sensor target **70** through the sensing portion **64**. In addition, a terminal portion(s) extending from or coupled to the sensing portion **64** may be configured to be exposed to the outside through a connector portion formed in the housing **62** and coupled to a cable or the like to transmit the detected rotation speed information to an external control device or the like.

DISCLOSURE

Technical Problem

[0008] The present disclosure is for the purpose of providing a vehicle wheel bearing, which is a wheel bearing including a sensor assembly, configured to prevent foreign substances from being introduced into the wheel bearing even without installing a separate sealing member by integrally providing a sealing portion to a sensor assembly (for example, a wheel speed sensor).

Technical Solution

[0009] Representative configurations of the present disclosure for achieving the above- described purpose are as follows.

[0010] According to an example embodiment of the present disclosure, a vehicle wheel bearing for rotatably mounting and supporting a vehicle wheel to a vehicle body is provided. The vehicle wheel bearing according to an example embodiment of the present disclosure may be configured to comprise a wheel hub provided with a wheel-mounting flange; an inner ring mounted on an outer circumferential surface of the wheel hub; an outer ring provided with a vehicle body-side mounting flange; a plurality of rolling elements for rotatably supporting the wheel hub and the inner ring relative to the outer ring; an outboard-side sealing member that seals a space between the wheel hub and the outer ring; a target ring mounted on one side of the inner ring and rotating together with the inner ring; and a sensor assembly that detects information about operating state(s) of a vehicle. According to an example embodiment of the present disclosure, the sensor assembly may comprise a wheel speed sensing portion that detects a change in a magnetic field generated by a sensor target of a target ring that rotates together with the vehicle wheel and measures the rotation speed of the wheel, and one side of the sensor assembly is provided with a sealing portion for preventing introduction of foreign substances.

[0011] According to an example embodiment of the present disclosure, the sensor assembly may be formed as a sensor cap structure which is mounted and fixed on one side of the outer ring.

[0012] According to an example embodiment of the present disclosure, the sensor assembly may comprise a press-fit ring mounted on an outer circumferential surface or an inner circumferential surface of the outer ring, and the sealing portion may be provided on one side of the press-fitting ring.

[0013] According to an example embodiment of the present disclosure, the sealing portion may comprise a base portion attached to one side of the press-fit ring and one or more sealing lips formed by extending from the base portion.

[0014] According to an example embodiment of the present disclosure, the sealing lip may be formed as a contact-type sealing lip.

[0015] According to an example embodiment of the present disclosure, the sealing portion may be configured to be integrally formed by vulcanization on one side of the press-fitting ring.

[0016] According to an example embodiment of the present disclosure, the press-fit ring may comprise a mounting portion that is press-fitted to the outer circumferential surface or the inner circumferential surface of the outer ring; a

radial extension portion that extends in a radial direction from the mounting portion; and an axial extension portion that is bent and extends in the axial direction from the radial extension portion, and a labyrinth structure for preventing introduction of foreign substances from an outside may be formed by the axial extension portion.

[0017] According to an example embodiment of the present disclosure, the base portion of the sealing portion attached to the axial extension portion of the press-fit ring may be configured to be positioned adjacent to the wheel hub or a washer member mounted thereto to form a labyrinth structure therebetween.

[0018] According to an example embodiment of the present disclosure, the target ring may comprise a frame mounted on the inner ring; and a sensor target attached to the frame, the frame of the target ring may comprise a mounting portion that is press-fitted to an outer circumferential surface of the inner ring; a radial extension portion that extends in the radial direction from the mounting portion; and an axial extension portion that is bent and extends in the axial direction from the radial extension portion, and the base portion of the sealing portion attached to the axial extension portion of the press-fit ring may be configured to be adjacent to the axial extension portion of the frame of the target ring to form a labyrinth structure therebetween.

[0019] According to an example embodiment of the present disclosure, a step portion having a radially concave recess structure may be provided on one side of the base portion of the sealing portion, and the axial extension portion of the frame of the target ring may be disposed to be accommodated in the step portion.

[0020] According to an example embodiment of the present disclosure, the sensor target may be configured to be provided in the mounting portion of the frame, and the sealing lip of the sealing portion may be configured to be located inward in the radial direction from the sensor target.

[0021] According to an example embodiment of the present disclosure, the sensor assembly may further comprise an acceleration sensing portion that detects acceleration information of the vehicle.

[0022] According to an example embodiment of the present disclosure, the acceleration sensing portion may comprise an acceleration sensor that detects acceleration information of the vehicle, and the acceleration sensor may be configured to be provided on a printed circuit board (PCB) substrate provided in the sensor assembly.

[0023] According to an example embodiment of the present disclosure, the acceleration sensor may be configured to be positioned further outward in an axial direction than an inner axial end of the wheel hub.

[0024] According to an example embodiment of the present disclosure, the acceleration sensor may be configured to be positioned outward in the radial direction from a vehicle body-side end of the outer ring on which the press-fitting ring is mounted.

[0025] In addition, the vehicle wheel bearing according to the present disclosure may further comprise other additional components as long as they do not harm the technical idea of the present disclosure.

Advantageous Effects

[0026] A vehicle wheel bearing according to an example embodiment of the present disclosure is provided with a sealing portion in a sensor assembly so that the introduction of external foreign substances can be prevented even without providing a separate sealing member (inboard-side sealing member) on a vehicle body-side end of the wheel bearing, to which the sensor assembly is mounted adjacent thereto.

[0027] Also, since the vehicle wheel bearing according to an example embodiment of the present disclosure has the sealing portion in the sensor assembly, even when the sensor assembly is formed to have a ring-shaped structure in which a central portion thereof is hollow to open so that the sensor assembly can be used in a wheel bearing for a drive shaft, the introduction of external foreign substances can be prevented without a separate sealing member.

[0028] Furthermore, the vehicle wheel bearing according to an example embodiment of the present disclosure is configured so that a wheel speed sensing portion and an acceleration sensing portion are provided together in the sensor assembly so that various information about operating states of a vehicle can be obtained using one sensor assembly.

[0029] In addition, the vehicle wheel bearing according to an example embodiment of the present disclosure is configured so that the acceleration sensing portion provided in the sensor assembly is configured to be located outside an outer ring in a radial direction, thereby preventing the occurrence of interference with a counterpart part when assembling the wheel bearing and the sensor assembly to the vehicle and improving a freedom of design of the counterpart part.

DESCRIPTION OF DRAWINGS

[0030] FIG. **1** exemplarily shows a vehicle wheel bearing provided with a wheel speed sensor.

[0031] FIG. **2** exemplarily shows a structure of the vehicle wheel bearing (vehicle wheel bearing having a sensor assembly) according to an example embodiment of the present disclosure.

[0032] FIG. **3** exemplarily shows a partial cutaway view of the vehicle wheel bearing shown in FIG. **2**.

[0033] FIG. **4** exemplarily shows a cross-sectional structure of the vehicle wheel bearing shown in FIGS. **2** and **3**.

[0034] FIG. **5** exemplarily shows the sensor assembly of the vehicle wheel bearing shown in FIGS. **2** to **4**.

[0035] FIG. **6** exemplarily shows an internal structure (structure in which a housing is omitted) of the sensor assembly shown in FIG. **5**.

[0036] FIG. **7** exemplarily shows a press-fit ring of the sensor assembly shown in FIG. **5**.

[0037] FIG. **8** exemplarily shows the internal structure (wheel speed sensor, lead frame, or the like) of the sensor assembly shown in FIG. **5**.

[0038] FIG. **9** exemplarily shows the wheel speed sensor and the lead frame of the sensor assembly shown in FIG. **5**.

[0039] FIG. **10** exemplarily shows a vehicle body-side end structure of the vehicle wheel bearing shown in FIGS. **2** to **4**.

[0040] FIG. **11** exemplarily shows a vehicle body-side end structure of a vehicle wheel bearing according to another embodiment of the present disclosure.

DETAILED DESCRIPTION

[0041] The example embodiments described below are provided for the purpose of describing the technical ideas of the present disclosure, and the scope of the rights of the

present disclosure is not limited to the example embodiments presented below or the specific descriptions thereof.

[0042] All technical and scientific terms used in this specification, unless otherwise defined, have the meaning commonly understood by a person of ordinary skill in the art to which the present disclosure belongs, and all terms used in this specification have been selected for the purpose of more clearly describing the present disclosure and have not been selected to limit the scope of the rights of the present disclosure.

[0043] The expressions "comprising," "including," "having," and the like used in this specification should be understood as open-ended terms implying the possibility of including other example embodiments, unless otherwise stated in the phrase or sentence in which the expression is included.

[0044] In this specification, "axial" means a direction extending along the rotational center axis of the wheel bearing ("axially inward" means a direction toward the vehicle body, and "axially outward" means a direction toward the wheel), "radial" means a direction perpendicular to the "axial direction" away from or closer to the rotational center axis, and "circumferential" means a direction of rotation centered on the above- described "axial direction."

[0045] The singular forms used in this specification may include plural meanings unless otherwise stated, and the same applies to the singular forms used in the claims.

[0046] When it is described in this specification that a component is "located" or "formed" on one side of another component, it should be understood that the component can be located or formed in direct contact with one side of the other component, or can be located or formed with another new component interposed therebetween.

[0047] Hereinafter, a preferred example embodiment of the present disclosure is described in detail to the extent that a person skilled in the art to which the present disclosure belongs can easily practice the present disclosure with reference to the attached drawings. In the attached drawings, the same or corresponding components are indicated by the same reference numerals, and in the description of the example embodiments below, duplicate description of identical or corresponding components may be omitted. However, even when a description(s) of a particular component is omitted in the description below, it is not intended that this component is not included in the example embodiment.

[0048] First, referring to FIGS. **2** to **4**, a vehicle wheel bearing according to an example embodiment of the present disclosure is exemplarily shown. The vehicle wheel bearing according to an example embodiment of the present disclosure may be formed to have an overall structure similar to that of a vehicle wheel bearing in the related arts, and is characterized in that a sealing portion is provided on one side of a sensor assembly mounted on the wheel bearing, as described below, to perform a sealing function together with the sensor assembly.

[0049] Specifically, a vehicle wheel bearing **100** according to an example embodiment of the present disclosure may be configured so that a rotating element [for example, a wheel hub **200** and an inner ring **300**] is coupled to a non-rotating element [for example, an outer ring **400**] via rolling elements **500** as shown in the drawings to perform a function of rotatably supporting a vehicle wheel relative to a vehicle body.

[0050] According to an example embodiment of the present disclosure, the wheel hub **200** may be formed to have a generally cylindrical structure extending in an axial direction, and a wheel-mounting flange **210** (hub flange) may be provided on one outer circumferential surface of the wheel hub **200**. The wheel-mounting flange **210** may be formed to have a shape radially extending outward from the outer circumferential surface of the wheel hub **200** and may be used for mounting the vehicle wheel to the wheel hub **200** using a hub bolt or the like. Meanwhile, the inner ring **300** may be configured to be mounted on a vehicle body-side end of the wheel hub **200**, and a raceway surface (inner raceway surface) for rolling elements may be formed on a part of the outer circumferential surface of the wheel hub **200** to support the rolling elements **500** from an inner side in the radial direction.

[0051] According to an example embodiment of the present disclosure, at least one inner ring **300** may be mounted on the outer circumferential surfaces of the wheel hub **200**, and a raceway surface (inner raceway surface) for rolling elements may be formed on an outer circumferential surface of the inner ring **300** to support the rolling elements **500** from an inner side in the radial direction. For example, the inner ring **300** may be configured to be press-fitted and fixed to a mounting portion provided in the vicinity of the vehicle body-side end of the wheel hub **200**, and may be configured to be supported/fixed on the wheel hub **200** by a forming portion **220** formed by plastically deforming the vehicle body-side end of the wheel hub **200** outward in the radial direction as shown in FIG. **4**.

[0052] According to an example embodiment of the present disclosure, the outer ring **400** may be configured to comprise a vehicle body-side mounting flange **410**, which is used for mounting the wheel bearing to the vehicle body, on an outer circumferential surface thereof, and raceway surfaces, with which the rolling elements **500** come into contact. The raceway surfaces (outer raceway surfaces) formed on the inner circumferential surface of the outer ring **400** may be configured to cooperate with the raceway surfaces (inner raceway surfaces) formed on the wheel hub **200** and/or the inner ring **300** to accommodate and support the rolling elements **500**, which are rolling members, between these raceway surfaces.

[0053] According to an example embodiment of the present disclosure, the rolling elements **500** may be disposed between the rotating element [for example, the wheel hub **200** and/or the inner ring **300**] of the wheel bearing **100** and the non-rotating element [for example, the outer ring **400**] of the wheel bearing **100**, and may perform a function of rotatably supporting the rotating element of the wheel bearing relative to the non-rotating element.

[0054] Although the wheel bearing of the example embodiment shown in the drawing is configured in a form in which one raceway surface for supporting the rolling elements is directly formed on a part of an outer circumferential surface of the wheel hub, the wheel bearing according to an example embodiment of the present disclosure is not necessarily limited to this structure, and may be modified and implemented to have various other structures, such as a configuration in which two inner rings are mounted on the wheel hub to support the rolling elements through two inner rings.

[0055] According to an example embodiment of the present disclosure, a sealing member **600** (outboard-side sealing

member) may be mounted at an axial outer end portion of the wheel bearing **100** to prevent external foreign substances from being introduced into a bearing space where the rolling elements **500** are located.

[0056] According to an example embodiment of the present disclosure, a target ring **700** (for example, an encoder ring) used for measuring a rotational speed of the wheel may be provided at an axial inner end portion of the wheel bearing **100**.

[0057] According to an example embodiment of the present disclosure, the target ring **700** may be configured to be mounted on the rotating element [for example, the inner ring **300**] of the wheel bearing **100** and rotate together with the vehicle wheel.

[0058] According to an example embodiment of the present disclosure, the target ring **700** may be configured to comprise a frame **710** press-fitted and mounted to the rotating element [for example, the inner ring **300**] of the wheel bearing **100** and a sensor target **720** (for example, an encoder) attached to the frame **710**.

[0059] According to an example embodiment of the present disclosure, the frame **710** of the target ring **700** can be configured to comprise a mounting portion **712** press-fitted to an outer circumferential surface of the inner ring **300**; and a radial extension portion **714** extending inward in the radial direction from the mounting portion **712**.

[0060] According to an example embodiment of the present disclosure, the sensor target **720** (for example, an encoder) may be configured to be integrally formed on one side of the frame **710**. For example, in the example embodiment shown in the drawing, the target ring **700** is configured so that the sensor target **720** is integrally formed on an outer circumferential surface of the mounting portion **712** of the frame **710**.

[0061] According to an example embodiment of the present disclosure, the sensor target **720** may be configured to generate changes in the magnetic field while rotating together with the inner ring **300**, and the sensor assembly **800**, which will be described below, may be configured to detect a rotational speed of the wheel by detecting the changes in the magnetic field through a wheel speed sensing portion **820**.

[0062] According to an example embodiment of the present disclosure, the sensor assembly **800** may be provided on one side of the wheel bearing **100** and configured to detect information about the operating state(s) of the vehicle, such as the rotational speed of the wheel.

[0063] According to an example embodiment of the present disclosure, the sensor assembly **800** may be configured to be installed at the axial inner end of the wheel bearing **100**, and may be configured to be fixedly mounted on the outer ring **400** or a chassis member or the like on which the outer ring **400** is mounted.

[0064] According to an example embodiment of the present disclosure, the sensor assembly **800** may be formed as a cap-type structure in which the sensor assembly **800** is press-fitted and mounted on the axial inner end of the outer ring **400**, and may be formed as a ring-shaped structure in which a central portion thereof is hollow to open so that the sensor assembly **800** can also be used for a wheel bearing for a driving shaft. (refer to FIGS. **4** and **5**)

[0065] According to an example embodiment of the present disclosure, the sensor assembly **800** may be configured to comprise a press-fit ring **810** and may be configured to be press-fitted and mounted to an outer circumferential surface or an inner circumferential surface of the outer ring **400** via press-fit ring **810**.

[0066] According to an example embodiment of the present disclosure, the press-fit ring **810** may be configured to comprise a mounting portion **812** coupled to an outer circumferential surface or an inner circumferential surface of the outer ring **400**; a radial extension portion **814** extending in the radial direction from the mounting portion **812**; and an axial extension portion **816** bent and extending in the axial direction from the radial extension portion **814**.

[0067] According to an example embodiment of the present disclosure, the mounting portion **812** of the press-fit ring **810** is a portion that is press-fitted and coupled to the outer circumferential surface or the inner circumferential surface of the outer ring **400**. In addition, in the case of the example embodiment shown in the drawings, the sensor assembly **800** may be configured to be press-fitted and coupled to the outer circumferential surface of the outer ring by the press-fit ring **810**.

[0068] According to an example embodiment of the present disclosure, the radial extension portion **814** may be configured to comprise a first radial extension portion **814***a* that is bent and extends from the mounting portion **812**; a coupling portion **814***b* that is bent and extends from the first radial extension portion **814***a;* and a second radial extension portion **814***c* that is bent and extends from the coupling portion **814***b,* as shown in the drawings.

[0069] According to this structure, since the first radial extension portion **814***a* and the second radial extension portion **814***b* may be positioned spaced in the axial direction from each other through the coupling portion **814***b,* even when the press-fit ring **810** is mounted on the outer ring **400** so that the first radial extension portion **814***a* comes into contact with an axial end surface of the outer ring **400**, the press-fit ring **810** may be prevented from interfering with the inner ring **300**.

[0070] According to an example embodiment of the present invention, the wheel speed sensing portion **820** used for detecting the rotation speed of the vehicle wheel may be provided in the sensor assembly **800**.

[0071] According to an example embodiment of the present disclosure, the wheel speed sensing portion **820** may comprise a wheel speed sensor **822** that detects the rotation speed of the wheel, and the wheel speed sensor **822** may perform a function of detecting the rotation speed of the wheel by detecting changes in the magnetic field generated by the rotation of the sensor target **720**.

[0072] According to an example embodiment of the present disclosure, the wheel speed sensor **822** provided in the wheel speed sensing portion **820** may be formed as a Hall sensor, an anisotropic magneto resistance (AMR) sensor, a giant magneto resistance (GMR) sensor, or the like, similar to a wheel speed sensor for conventional vehicles.

[0073] According to an example embodiment of the present disclosure, the wheel speed sensor **822** may be configured to be disposed opposite to the sensor target **720** provided in the target ring **700** inward and outward in the radial direction. For example, in the case of the example embodiment shown in the drawings, the wheel speed sensing portion **820** may be inserted and coupled through a through hole **818** provided in the press-fit ring **810** so that the wheel speed sensor **822** is configured to be disposed to face the sensor target **720**.

[0074] According to an example embodiment of the present disclosure, the wheel speed sensor **822** may comprise a lead terminal **822***a* extending outward and may be configured to electrically connect the wheel speed sensor **822** to an external power supply and control device via the lead terminal **822***a*.

[0075] According to an example embodiment of the present disclosure, the lead terminal **822***a* provided in the wheel speed sensor **822** may be configured to have a plurality of terminals including a power terminal(s) for supplying power and a signal terminal(s) for transmitting a signal.

[0076] According to an example embodiment of the present disclosure, the lead terminal **822***a* provided in the wheel speed sensor **822** may be configured to be electrically connected to an external power supply and/or control device via a conductive terminal portion **824**.

[0077] According to an example embodiment of the present disclosure, the conductive terminal portion **824** may be formed in the shape of a pair of thin and long metal plates as shown in FIGS. **8** and **9**, and may be configured to have a plurality of terminals including a power terminal for transmitting power and a signal terminal for transmitting a signal.

[0078] According to an example embodiment of the present disclosure, as shown in FIGS. **8** and **9**, the conductive terminal portion **824** may be configured so that one end thereof is electrically connected to the lead terminal **822***a* provided in the wheel speed sensor **822**, and the other end thereof is exposed to the outside through a connector portion **850** to be electrically connected to an external power supply or control device through a connection connector or the like.

[0079] Meanwhile, one end of the conductive terminal portion **824** may comprise a protrusion portion **824***a* to be configured to more easily come into contact with the lead terminal **822***a* of the wheel speed sensor **822**, and a plurality of terminals provided on the conductive terminal portion **824** may be formed in substantially the same or similar shapes.

[0080] However, the conductive terminal portion **824** is not limited to being formed in the above-described structure, and may be formed in various arbitrary shapes that may be electrically connected to the wheel speed sensor **822**, and a plurality of terminals (power terminals and signal terminals) may be formed in different shapes.

[0081] In addition, although the wheel speed sensor and the conductive terminal portion are configured to be formed separately and then electrically connected in the example embodiment shown in the drawings, the wheel speed sensor may be configured so that the longer lead terminal of the wheel speed sensor extend and the wheel speed sensing portion is formed without the conductive terminal portion (that is, the wheel speed sensor and the conductive terminal portion are formed integrally).

[0082] According to an example embodiment of the present disclosure, the wheel speed sensor **822** and the conductive terminal portion **824**, which constitute the wheel speed sensing portion **820**, may be configured to be mounted and supported on an insert body portion **826** (refer to FIG. **8**).

[0083] According to an example embodiment of the present disclosure, the insert body portion **826** may be formed using a method such as plastic injection molding, and may be configured to surround all or a part of the wheel speed sensor **822** and/or the conductive terminal portion **824**.

[0084] For example, the wheel speed sensing portion **820** may be configured to be formed by injection molding the insert body portion **826** together with the conductive terminal portion **824** and then electrically connecting the wheel speed sensor **822** to the conductive terminal portion **824**, or may be configured to be formed by injection molding the insert body portion **826** at a state that the wheel speed sensor **822** and the conductive terminal portion **824** are electrically connected.

[0085] According to an example embodiment of the present invention, the sensor assembly **800** may be configured to further comprise an acceleration sensing portion **830** that detects acceleration information (vibration information) of a traveling vehicle.

[0086] According to an example embodiment of the present disclosure, the accelerating sensing portion **830** may be disposed spaced apart from the wheel speed sensing portion **820** described above, thereby simplifying the structure of the sensor assembly **800** and preventing signal interference that may occur between the wheel speed sensing portion **820** and the acceleration sensing portion **830**.

[0087] According to an example embodiment of the present disclosure, the acceleration sensing portion **830** may comprise one or more acceleration sensors **832** that detect acceleration information (vibration information) of the vehicle, and the acceleration sensor **832** may be configured to be mounted on a printed circuit board (PCB) substrate **836** provided in the sensor assembly **800** as shown in FIGS. **3** and **5**.

[0088] According to an example embodiment of the present disclosure, the acceleration sensor **832** provided in the acceleration sensing portion **830** may be configured as any one of a one-axis acceleration sensor capable of measuring acceleration in one of the mutually perpendicular x, y, and z-axis directions, a two-axis acceleration sensor capable of measuring acceleration in two directions, or a three-axis acceleration sensor capable of measuring acceleration in all three directions. In addition, acceleration information measured from the acceleration sensors may be configured to be used to diagnose the operating state of chassis components or wheel bearings of a vehicle, to eliminate noise generated while the vehicle is driving, or to control the driving of the vehicle.

[0089] According to an example embodiment of the present disclosure, the acceleration sensor **832** may be configured to be positioned outward in the axial direction relative to the inner axial end of the wheel hub **200** [for example, in the case of the example embodiment shown in the drawings, the axial end portion of the forming portion **220** provided at the inner axial end of the wheel hub **200**].

[0090] According to an example embodiment of the present disclosure, it may be preferable that the acceleration sensor **832** be configured to be positioned outward in the radial direction from the vehicle body-side end of the outer ring **400** on which the press-fit ring **810** is mounted.

[0091] According to an example embodiment of the present disclosure, it may be more preferable that the acceleration sensing portion **830** be configured to be positioned outward in the radial direction from the mounting portion **812** of the press-fit ring **810** mounted on the outer ring **400**.

[0092] According to an example embodiment of the present disclosure, the sensor assembly **800** may be configured so that at least a part of the connector portion **850** is

positioned outward in the radial direction from the vehicle body-side end of the outer ring **400** to which the press-fit ring **810** is mounted.

[0093] In this way, since the sensor assembly **800** of the vehicle wheel bearing **100** according to an example embodiment of the present disclosure is configured so that the acceleration sensor **832** is positioned outward in the radial direction from the outer ring **400**, the sensor assembly **800** may not extend in the axial direction toward the vehicle body as much as the wheel bearing **100**, thereby reducing the risk of interference with the counterpart part when assembling the wheel bearing (and sensor assembly) to the vehicle and improving the freedom of design of the counterpart part.

[0094] According to an example embodiment of the present disclosure, it may be preferable that the acceleration sensor **832** be configured to be positioned adjacent to the mounting portion **812** of the press-fit ring **810**.

[0095] In this way, shaking of the sensor may be prevented by arranging the acceleration sensor **832** adjacent to the mounting portion **812** of the press-fit ring **810** that supports the mounting of the sensor assembly **800**, thereby preventing distortion of the vibration signal, and thus enabling easier and more accurate detection of vibration information.

[0096] According to an example embodiment of the present disclosure, the acceleration sensor **832** may be configured to be disposed on the PCB substrate **836** provided in the sensor assembly **800**.

[0097] According to an example embodiment of the present disclosure, the PCB substrate **836** may be configured to be disposed perpendicular to the rotational axis of the wheel bearing **100** so that the sensor assembly **800** is formed in a more compact structure. (refer to FIGS. **3** and **5**)

[0098] According to an example embodiment of the present disclosure, the acceleration sensing portion **830** may comprise a conductive terminal portion **834** and may be configured to electrically connect the acceleration sensor **832** to an external power supply and/or control device via conductive terminal portion **834**.

[0099] According to an example embodiment of the present disclosure, the conductive terminal portion **834** of the acceleration sensing portion **830** may be formed similarly to the conductive terminal portion **824** of the wheel speed sensing portion **820** described above. For example, the conductive terminal portion **834** may be configured to be formed in a thin and long metal plate shape, and may be configured to have a plurality of terminals including a power terminal for transmitting power and a signal terminal for transmitting a signal.

[0100] According to an example embodiment of the present disclosure, one end of the conductive terminal portion **834** may be connected to the PCB substrate **836** and electrically connected to the acceleration sensor **832** mounted on the PCB substrate **836** through a circuit pattern (not shown) formed on the PCB substrate **836**, and the other end of the conductive terminal portion **834** may be exposed to the outside through the connector portion **850** and configured to be electrically connected to an external power supply, a control device, or the like through a connection connector and/or cable.

[0101] According to an example embodiment of the present disclosure, the sensor assembly **800** may be configured so that all or a part of the wheel speed sensor **822**, the acceleration sensor **832**, the conductive terminal portions **824** and **834**, and the like are surrounded and protected by a housing **840**, and the housing **840** of the sensor assembly **800** may be configured to be formed through plastic injection molding or the like.

[0102] According to an example embodiment of the present disclosure, the housing **840** may perform a function of forming a basic body of the sensor assembly **800**, and the connector portion **850** may be provided on one side of the housing **840** to electrically connect the wheel speed sensor **822** and the acceleration sensor **832** provided in the sensor assembly **800** to an external power supply or control device.

[0103] According to an example embodiment of the present disclosure, the sensor assembly **800** may comprise a sealing portion **860** for preventing the introduction of external foreign substances.

[0104] According to an example embodiment of the present disclosure, the sealing portion **860** may be configured to be provided on one side of the press-fit ring **810**. For example, the sealing portion **860** may be configured to be provided on the axial extension portion **816** and/or the radial extension portion **814** of the press-fit ring **810**.

[0105] According to an example embodiment of the present disclosure, the sealing portion **860** may be configured to comprise a base portion **862** attached to one side of the press-fit ring **810**; and one or more sealing lips **864** formed to extend from the base portion **862**.

[0106] According to an example embodiment of the present disclosure, the sealing lip **864** provided in the sealing portion **860** may be configured as a contact-type side lip that performs sealing by coming into contact with the axial end surface of a counterpart member.

[0107] According to an example embodiment of the present disclosure, the sealing lip **864** provided in the sealing portion **860** may be configured to perform sealing by coming into contact with the axial end surface of the radial extension portion **714** of the frame **710** of the target ring **700**.

[0108] According to an example embodiment of the present disclosure, the sealing lip **864** provided on the sealing portion **860** may be configured so that the sealing lip **864** comes into contact with a predetermined interference amount when the press-fit ring **810** of the sensor assembly **800** is mounted on the outer ring **400**.

[0109] According to an example embodiment of the present disclosure, the sealing portion **860** may be configured to be positioned inward in the axial direction relative to the sensor target **720**, and more preferably, to be positioned inward in the radial direction relative to the sensor target **720**.

[0110] According to this structure, the wheel bearing **100** according to an example embodiment of the present disclosure may perform a sealing function by the sealing portion **860** provided in the sensor assembly **800** even without a separate sealing member (inboard-side sealing member) provided at the vehicle body-side end, thereby simplifying the structure and assembly process of the wheel bearing **100**.

[0111] Particularly, since the wheel bearing **100** according to an example embodiment of the present disclosure is configured so that the sealing lip **860** provided to the sensor assembly **800** has a contact-type sealing lip **864** on the radially inner side, compared to the inboard-side sealing member provided to a conventional wheel bearing, the diameter of the contact-type sealing lip **864** is reduced compared to a sealing member in the related art, and thus, a contact area of the contact-type sealing lip **864** is reduced so

that the drag torque generated by the contact-type sealing lip **864** during operation of the vehicle may be reduced.

[0112] According to an example embodiment of the present disclosure, the sealing portion **860** may be integrally formed on one side of the press-fit ring **810** through vulcanization or the like.

[0113] For this purpose, the sensor assembly **800** according to an example embodiment of the present disclosure may be configured so that an end portion of the press-fit ring **810** is exposed to the outside of the housing **840** [in the case of the example embodiment shown in the drawings, end portion of the radial extension portion **814** and the axial extension portion **816** of the press-fit ring **810** are configured to be exposed to the outside of the housing **840**], and the sealing portion **860** may be configured to be integrally formed with the portion of the press-fit ring **810** exposed to the outside of the housing **840**.

[0114] According to an example embodiment of the present disclosure, the axial extension portion **816** of the press-fit ring **810** may be disposed adjacent to the wheel hub [for example, the forming portion **220** provided at the axial inner end of the wheel hub **200**] or a washer member **900** mounted thereon, to form a labyrinth structure between the base portion **862** of the sealing portion **860** attached to the axial extension portion **816** of the press-fit ring **810** and the wheel hub (or a washer member mounted thereon).

[0115] In this way, when a labyrinth structure is formed on the upper side of the sealing portion **860**, the introduction of foreign substances from the outside may be more stably suppressed by the labyrinth structure, which may be advantageous in securing sealing properties.

[0116] Meanwhile, according to an example embodiment of the present disclosure, the target ring **700** may be configured to further comprise an axial extension portion **716** that is bent and extends from the radial extension portion **714** at an end portion thereof (for example, refer to the example embodiment shown in FIG. **11**), to form a narrower labyrinth structure between the base portion **862** of the sealing portion **860** attached to the axial extension portion **816** of the press-fit ring **810** and the axial extension portion **716** of the frame **710** of the target ring **700**, thereby improving sealing performance.

[0117] According to an example embodiment of the present disclosure, the base portion **862** of the sealing portion **860** may comprise a step portion **862***a* having a radially concave recess structure at one side thereof, and the axial extension portion **716** of the frame **710** of the target ring **700** may be accommodated in and disposed adjacent to the step portion **862***a*. (refer to FIG. **11**), to further maximize the labyrinth effect.

[0118] Although the present disclosure has been described with specific details such as specific components and limited examples, the examples are provided only to help a more general understanding of the present disclosure, and the present disclosure is not limited thereto, and a person having ordinary knowledge in the technical field to which the present disclosure belongs may make various modifications and variations from this description.

[0119] Therefore, the idea of the present disclosure should not be limited to the example embodiments described above, and not only the claims described below but also all modifications equivalent to or equivalent to the claims are considered to fall within the scope of the idea of the present disclosure.

REFERENCE SIGNS LIST

[0120] **100**: wheel bearing
[0121] **200**: wheel hub
[0122] **210**: wheel-mounting flange
[0123] **220**: forming portion
[0124] **300**: inner ring
[0125] **400**: outer ring
[0126] **410**: vehicle body-side mounting flange
[0127] **500**: rolling element
[0128] **600**: outboard-side sealing member
[0129] **700**: target ring
[0130] **710**: frame
[0131] **720**: encoder
[0132] **800**: sensor assembly
[0133] **810**: press-fitting ring
[0134] **820**: wheel speed sensing portion
[0135] **830**: acceleration sensing portion
[0136] **840**: housing
[0137] **850**: connector portion
[0138] **860**: sealing portion
[0139] **862**: base portion
[0140] **864**: sealing lip

What is claimed is:

1. A vehicle wheel bearing (**100**) for rotatably mounting and supporting a vehicle wheel to a vehicle body, comprising:

a wheel hub (**200**) provided with a wheel-mounting flange (**210**);

an inner ring (**300**) mounted on an outer circumferential surface of the wheel hub (**200**);

an outer ring (**400**) provided with a vehicle body-side mounting flange (**410**);

a plurality of rolling elements (**500**) for rotatably supporting the wheel hub (**200**) and the inner ring (**300**) relative to the outer ring (**400**);

an outboard-side sealing member (**600**) that seals a space between the wheel hub (**200**) and the outer ring (**400**);

a target ring (**700**) mounted on one side of the inner ring (**300**) and rotating together with the inner ring (**300**); and

a sensor assembly (**800**) that detects information about operating state(s) of a vehicle,

wherein the sensor assembly (**800**) comprises a wheel speed sensing portion (**820**) that detects a change in a magnetic field generated by a sensor target (**720**) of a target ring (**700**) that rotates together with a vehicle wheel and measures the rotation speed of the wheel, and

wherein one side of the sensor assembly (**800**) is provided with a sealing portion (**860**) for preventing introduction of foreign substances.

2. The vehicle wheel bearing of claim **1**, wherein the sensor assembly (**800**) is formed as a sensor cap structure which is mounted and fixed on one side of the outer ring (**400**).

3. The vehicle wheel bearing of claim **2**, wherein the sensor assembly (**800**) comprises a press-fit ring (**810**) mounted on an outer circumferential surface or an inner circumferential surface of the outer ring (**400**), and

the sealing portion (**860**) is provided on one side of the press-fitting ring (**810**).

4. The vehicle wheel bearing of claim **3**, wherein the sealing portion (**860**) comprises a base portion (**862**)

attached to one side of the press-fit ring (**810**) and one or more sealing lips (**864**) formed by extending from the base portion (**862**).

5. The vehicle wheel bearing of claim **4**, wherein the sealing lip (**864**) is formed as a contact-type sealing lip.

6. The vehicle wheel bearing of claim **5**, wherein the sealing portion (**860**) is configured to be integrally formed by vulcanization on one side of the press-fitting ring (**810**).

7. The vehicle wheel bearing of claim **6**, wherein the press-fit ring (**810**) comprises a mounting portion (**812**) that is press-fitted to the outer circumferential surface or the inner circumferential surface of the outer ring (**400**); a radial extension portion (**814**) that extends in a radial direction from the mounting portion (**812**); and an axial extension portion (**816**) that is bent and extends in the axial direction from the radial extension portion (**814**), and

wherein a labyrinth structure for preventing introduction of foreign substances from an outside is formed by the axial extension portion (**816**).

8. The vehicle wheel bearing of claim **7**, wherein the base portion (**862**) of the sealing portion (**860**) attached to the axial extension portion (**816**) of the press-fit ring (**810**) is configured to be positioned adjacent to the wheel hub (**200**) or a washer member (**900**) mounted thereto to form a labyrinth structure therebetween.

9. The vehicle wheel bearing of claim **7**, wherein the target ring (**700**) comprises a frame (**710**) mounted on the inner ring (**300**); and a sensor target (**720**) attached to the frame (**710**),

wherein the frame (**710**) of the target ring (**700**) comprises a mounting portion (**712**) that is press-fitted to an outer circumferential surface of the inner ring (**300**); a radial extension portion (**714**) that extends in the radial direction from the mounting portion (**712**); and an axial extension portion (**716**) that is bent and extends in the axial direction from the radial extension portion (**714**), and

the base portion (**862**) of the sealing portion (**860**) attached to the axial extension portion (**816**) of the press-fit ring (**810**) is configured to be adjacent to the axial extension portion (**716**) of the frame (**710**) of the target ring (**700**) to form a labyrinth structure therebetween.

10. The vehicle wheel bearing of claim **9**, wherein a step portion (**862***a*) having a radially concave recess structure is provided on one side of the base portion (**862**) of the sealing portion (**860**), and

wherein the axial extension portion (**716**) of the frame (**710**) of the target ring (**700**) is disposed to be accommodated in the step portion (**862***a*).

11. The vehicle wheel bearing of claim **7**, wherein the sensor target (**720**) is configured to be provided in the mounting portion (**712**) of the frame (**710**), and the sealing lip (**864**) of the sealing portion (**860**) is configured to be located inward in the radial direction from the sensor target (**720**).

12. The vehicle wheel bearing of claim **11**, wherein the sensor assembly (**800**) further comprises an acceleration sensing portion (**830**) that detects acceleration information of the vehicle.

13. The vehicle wheel bearing of claim **12**, wherein the acceleration sensing portion (**830**) comprises an acceleration sensor (**832**) that detects acceleration information of the vehicle, and the acceleration sensor (**832**) is configured to be provided on a printed circuit board (PCB) substrate (**836**) provided in the sensor assembly (**800**).

14. The vehicle wheel bearing of claim **13**, wherein the acceleration sensor (**832**) is configured to be positioned further outward in an axial direction than an inner axial end of the wheel hub (**200**).

15. The vehicle wheel bearing of claim **14**, wherein the acceleration sensor (**832**) is configured to be positioned outward in the radial direction from a vehicle body-side end of the outer ring (**400**) on which the press-fitting ring (**810**) is mounted.

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