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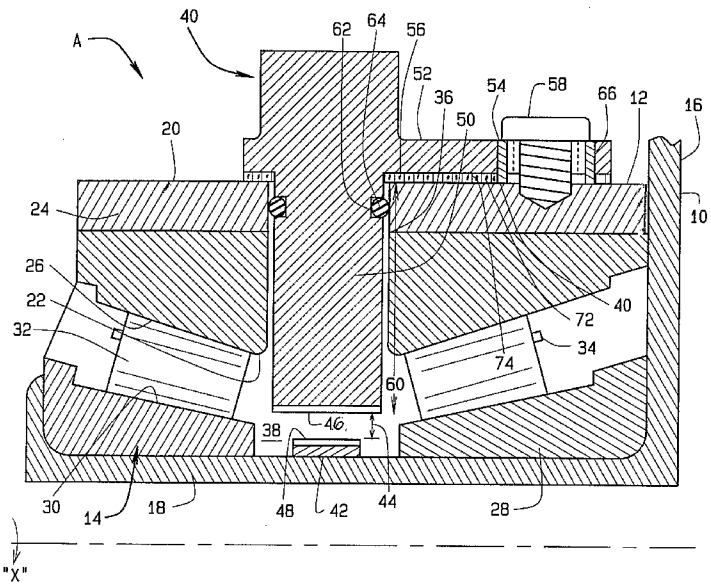
(54) Title: SENSOR GASKET



(57) Abstract: A gasket for sealing a sensor flange. The gasket (56) seals a sensor assembly (40) when the sensor assembly (40) is mounted to a housing (12). The gasket (56) comprises a body (70) made of a first material (72) and a second material wherein the second material (74) is embedded within the first material (72) in a grid or mesh pattern. When the senor assembly 40 mounts to the housing (12) at least one of the first material (72) and the second material (74) contacts the sensor flange (52) such that the contact with the sensor flange (52) controls positioning of the sensor flange (52) with respect to the housing (12).

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SENSOR GASKET

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Patent No. 60/730,451 filed on October 26, 2006 and is incorporated herein by reference.

TECHNICAL FIELD

The present disclosure relates in general to sensor assemblies, and more particular to a gasket of the sensor assembly that limits or prevents corrosion from contaminating a mounting surface when the sensor assembly mounts to a housing. The gasket also controls the positioning of the sensor assembly when the sensor assembly mounts to the housing.

BACKGROUND ART

During installation of a sensor assembly in a housing, a corrosion preventative, such as grease, is often applied to components of the sensor assembly. For sensor assemblies mounted in metal housings, the interface between the sensor assembly and housing is critical for controlling corrosion effects. As an example, the housing may include a bearing assembly that supports a rotating component that is positioned within the housing. A sensor instrument of the sensor assembly inserts through a bore of the bearing assembly wherein the sensor instrument monitors variables of the rotating component. The mounting surface for the sensor assembly is typically the reference surface that positions the sensor instrument. As such, the mounting surface must be located properly and must be protected from corrosion throughout the expected life of the sensor instrument.

Corrosion between the sensor assembly and the mounting surface of the housing can cause the sensor assembly to lift from the mounting surface, affecting a distancing gap between the sensor instrument and rotating component being monitored. This gap must be

maintained within a given range for the sensor instrument to function properly.

In order for corrosion to occur, there must be an electrochemical cell consisting of an anode, a cathode and conductive fluid or gas in contact with the anode and cathode. If even a small gap exists between the sensor assembly and the mounting surface and the gap allows a conductive fluid to get under the sensor assembly, an accelerated type of corrosion called crevice corrosion can occur. Crevice corrosion can exert a significant upward force against the sensor assembly. Therefore, protection of the mounting surface from corrosion is critical to proper operation of the sensor assembly. In addition, protection of the bore is critical for serviceability of the sensor instrument. If the bore not protected, a ring of corrosion will build up within the bore, making it difficult to remove and/or service the sensor instrument.

One application where severe environments exist is automotive wheel bearings where sensor assemblies are often mounted in bearing assemblies. For these applications, the mounting surface must be protected against the effects of water, saltwater and vehicle fluids. Additionally, automobiles and trucks of current manufacture contain many components that are acquired in packaged form from outside suppliers. The packaged components reduce the time required to assemble the vehicles and further improve the quality of the vehicles by eliminating critical adjustments from the assembly line. The sensor assemblies of these components experience many handling and shipping steps wherein each sensor assembly and mounting surface requires protection from corrosion during these steps.

Applications today use various methods to protect the sensor mounting surface, the primary means being the application of grease between the sensor assembly and the mounting surface. However, testing has shown that under severe corrosion conditions, the grease can be washed out, resulting in reduced performance. Other

applications such as those described in U.S. Patent Nos. 5,085,519, 5,123,755 and 5,192,138 (which are incorporated herein) use O-ring seals around the sensor assembly. These applications, however, expose the mounting surface of the sensor assembly to the environment.

The foregoing and other objects, features, and advantages of the disclosure as well as presently preferred embodiments thereof will become more apparent from the reading of the following description in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

In the accompanying drawings which form part of the specification:

Fig. 1 is a sectional view of a sensor assembly constructed in accordance with and embodying the present disclosure showing: the sensor assembly mounted in a housing, a bottom surface of a sensor flange being mounted against a gasket, with the gasket having a first soft material and a second hard material embedded in the first material for purposes of maintaining a radial position of the sensor flange, the sensor flange having an insert and a fastener wherein the insert passes through the gasket and the fastener applies a seating force to the sensor assembly;

Fig. 1A is top view of the gasket of Fig. 1 constructed in accordance with and embodying the present disclosure showing: the first soft material and the second hard material;

Fig. 2 is a sectional view of a sensor assembly constructed in accordance with and embodying the present disclosure showing: the sensor assembly mounted in the housing, the bottom surface of the sensor flange being mounted against the gasket, with the gasket having the first soft material and the second hard material embedded in the first

material, the sensor flange having an insert that contacts the second hard material;

Fig. 2A is top view of the gasket of Fig. 2 constructed in accordance with and embodying the present disclosure showing: the first soft material and the second hard material;

Fig. 3 is a sectional view of a sensor assembly constructed in accordance with and embodying the present disclosure showing: the sensor assembly mounted in the housing, the bottom surface of the sensor flange being mounted against a gasket, with a gasket having a plurality of apertures defined therethrough for purposes of maintaining a corrosion preventative and further showing the sensor flange having an insert that passes through the gasket;

Fig. 3A is a top view of an embodiment of the gasket of Fig. 3 wherein the plurality of apertures are uniformly distributed within the gasket;

Fig. 3B is a top view of an embodiment of the gasket of Fig. 3 wherein the plurality of apertures are randomly distributed within the gasket;

Fig. 3C is a top view of an of the gasket of Fig. 3 wherein the plurality of apertures are positioned around a sensor aperture and a fastener aperture;

Fig. 3D is a partial cross sectional view of the gasket of Fig. 3 illustrating a portion of a gasket having a pocket containing the corrosion preventative; and

Fig. 4 is a sectional view of a sensor assembly constructed in accordance with and embodying the present disclosure showing: the sensor assembly mounted in the housing, the bottom surface of the sensor flange being mounted against the gasket, with the gasket having apertures defined therethrough for purposes of maintaining a corrosion preventative and further showing the sensor flange having an insert that contacts a portion of the gasket.

Corresponding reference numerals indicate corresponding parts throughout the several figures of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The following detailed description illustrates the disclosure by way of example and not by way of limitation. The description clearly enables one skilled in the art to make and use the disclosure, describes several embodiments, adaptations, variations, alternatives, and uses of the disclosure, including what is presently believed to be the best mode of carrying out the disclosure.

The disclosure relates to a sensor assembly that produces an output signal while preventing corrosion build-up on a sensor mounting surface of the sensor assembly. The sensor assembly of the present disclosure may relate to a variety of technologies. For example, a sensor instrument of the sensor assembly may monitor a variety of variables relating to an object to produce an output signal for the monitored variables. These variables may include but are not limited to speed, load, temperature or vibration. In all applications, the sensor assembly of the present disclosure interacts with a housing to prevent corrosion build-up on the sensor mounting surface.

For illustrative purposes, the following description illustrates the sensor assembly monitoring a speed variable. One application of this disclosure relates to automotive wheel bearings, that is to say a wheel end, where a sensor instrument of the sensor assembly mounts and projects into a bearing assembly, and the sensor instrument detects the speed of a rotating component such as a target wheel.

The bearing assembly may couple the road wheel to the suspension system of the automotive vehicle, particularly to a component of the suspension system, such as a steering knuckle, and enables the wheel to rotate about an axis of rotation, which is, of course, the axis of the bearing assembly. Aside from coupling the wheel to a component of the suspension system, the bearing assembly further

generates an electrical signal via the sensor assembly, which is responsive to the rotation of the target wheel and, indeed, represents the angular velocity at which the wheel revolves about the axis. This enables a controller in an antilock brake system or traction control system to monitor the angular velocity of the road wheel.

Referring now to the drawings, a hub assembly A (Fig. 1) mounts on a road wheel on a suspension system of a vehicle (not shown). The hub assembly A includes a hub 10 and a housing 12 that is generally located around the hub 10 and includes a bearing assembly generally shown as 14. The bearing assembly 14 enables the hub 10 to rotate relative to the housing 12 about an axis of rotation "X" with relatively little friction. The road wheel and brake rotor are attached to the hub 10, while the housing 12 is secured firmly against a component of the vehicle suspension system, such as the knuckle (not shown). The hub assembly A further has a flange 16 and a spindle 18, which are joined together as an integral member with the spindle 18 projecting from a face of the flange 16.

The bearing assembly 14 removeably mounts within the housing 12, wherein the housing 12 defines the axis "X" of rotation therethrough. The bearing assembly 14 permits the spindle 18 to rotate about the axis "X" of rotation and confines the spindle 18 radially and axially within the housing 12. In other words, the bearing assembly 14 transfers radial loads between the spindle 18 and the housing ~~10~~12 and also thrust loads in both axial directions.

The housing 12 has a generally cylindrical exterior surface 20 and an interior surface 22. In one embodiment, the housing 12 may form part of the bearing assembly 14. In that sense, the housing 12 constitutes outer races 24 of the bearing assembly 14. The outer races 24 may be in the form of cups having tapered raceways 26 which are presented toward the axis "X" of rotation. The bearing assembly 14 includes inner races 28 in the form of cones, which fit around the spindle

18 with interference fits. Each cone has a tapered raceway 30 that is presented outwardly away from the axis "X" of rotation.

In addition to the cones, the bearing assembly 14 includes rolling elements 32 in the form of rollers arranged in rows between the outer race 24 and the inner race 28, there being a separate row around each cone. The rolling elements 32 are seated between and contacting the inner race 28 and the outer race 24. The rolling elements 32 are confined within cages 34, which distribute the rolling elements 32 uniformly in their rows and thereby maintain the proper spacing between the rolling elements 32. The cages 34 also retain the rolling elements 32 around the inner race 28 when the inner race 28 is withdrawn from the housing/outer race. The rolling elements 32 transmit thrust and radial loads between the outer race 24 and the inner race 28, while reducing friction to a minimum. The housing 12 surrounds the spindle 18 as well as the two cones and the two rows of rolling elements 32.

The housing 12 includes a bore 36 that extends from the exterior surface 20 to an interior 38 of the housing 12 and opens out of both. The bore 36 in the housing 12 receives a sensor assembly generally shown as 40, which in turn, monitors a target wheel 42 that is positioned across a gap 44 within the interior 38 and rotates with the hub 10.

As shown, the bore 36 angles perpendicularly with respect to the axis "X" of rotation within the housing 12. In one embodiment (not shown in the Figures), the bore 36 angles obliquely with respect to the axis "X" of rotation within the housing. The bore 36 opens into the interior 38 of the housing 12 at one end and opens out of the exterior surface 20 at another end. At the interior end, the bore 36 opens opposite the target wheel 42. The sensor assembly 40 positions a sensor instrument 46 within the bore 36 such that the gap 44 exists between the target wheel 42 and the sensor instrument 46. In the illustrative example, the target wheel 42 has discontinuities 48 that take the form of teeth that are presented toward the sensor assembly 40.

The target wheel 42 along with its operative surface cooperates with the sensor instrument 46 to produce a pulsating signal when inner race 28 rotates within the outer race 24, with the frequency of the signal reflecting the angular velocity.

As shown in Fig. 1, sensor assembly 40 comprises a sensor body 50, a sensor flange 52, an insert 54, a gasket 56, a fastener 58 and the sensor instrument 46. The sensor assembly 40 of the present disclosure removeably fastens with the exterior surface 20 of the housing 12 via the sensor flange 52 and the fastener 58.

The sensor body 50 is positioned within the bore 36, wherein the sensor body 50 extends beyond the interior surface 22 and the exterior surface 20. The sensor body 50 positions the sensor instrument 46 beyond the exterior surface 20 at a predetermined distance 60. This predetermined distance 60 sets the proper gap 44 between the sensor instrument 46 and the target wheel 42.

The sensor body 50 further includes an annular groove 62 located between the interior surface 22 and the exterior surface 20. A seal 64 is radially positioned within the annular groove 62 such that the seal 64 isolates the sensor instrument 46 from the exterior surface 20 of the housing 12. This isolation by the seal 64 prevents contaminants from contacting the sensor instrument 46 and the target wheel 42. In one embodiment, the seal 64 comprises an O-ring. The O-ring when fitted into the annular groove 62 bears against the base of the groove 62, and when otherwise undistorted has a diameter exceeding the diameter of the bore 36.

The sensor flange 52 extends over a portion of the exterior surface 20 of the housing 12. As shown in Fig. 1, the sensor flange 52 is adjacently positioned to the exterior surface 20. In an embodiment, the sensor flange 52 integrally forms with the sensor body 50 and extends outward from the sensor body 50. The sensor flange 52 includes a flange aperture 66 defined therethrough. The flange aperture

66 is sized to accept the insert 54 that in turn accepts the fastener 58 such that the fastener 58 removeably fastens the sensor flange 52 to the exterior surface 22. In another embodiment (not shown), the sensor flange, in the form of a fitting, removeably connects with the sensor body.

The insert 54 is positioned within the flange aperture 66. In an embodiment, the insert 54 is integrally molded into the sensor flange 52 at the flange aperture 66. The insert 54 provides a barrier against water and other conductive fluids that accelerate corrosion. The insert 54 may comprise a material such as but not limited to steel, stainless steel, bronze alloy and brass. As shown, in Fig. 1, the insert 54 extends beyond the bottom surface of the sensor flange 52 to contact the exterior surface 20.

The gasket 56 is disposed between and in contact with the sensor flange 52 and the exterior surface 20 of the housing 12, wherein the exterior surface 20 becomes the mounting surface for the sensor assembly 40. The gasket 56 provides barrier protection for the mounting surface 20 and the sensor bore 36. The gasket 56 seals the mounting surface 20 directly under the sensor flange 52 from contaminants, providing barrier protection against corrosion for the both the mounting surface 20 and the bore 36.

Turning to Fig. 1A and referring to Fig. 1, the gasket 56 comprises a body 70 made from a first material 72 and a second material 74. The second material 74 is embedded within the first material 72 as a mesh. As such, the first material 72 and the second material 74 form a grid pattern within the body 70. The first material 72 may comprise a soft material such as, but not limited to, silicone gel. The second material 74 comprises a harder substance than the first material 72. The second material 74 may comprise materials such as, but not limited to, glass-filled thermoplastic, phenolic resin, steel and aluminum.

The body 70 further comprises a sensor aperture 76 and a fastener aperture 78 defined therethrough. The sensor aperture 76 is sized to allow the sensor body 50 to pass through while the fastener aperture 78 is sized to allow the fastener 58 and insert 54 to pass through. The fastener aperture 78 is designed such that the inner diameter of the fastener aperture 78 is larger than the outer diameter of the insert 54.

During connection of the sensor assembly 40 to the housing 12, the gasket 56 is placed over portions of the exterior surface 20 to align the sensor aperture 76 with the bore 36. The sensor body 50 inserts within the bore 36 to position the sensor instrument 46 across the gap 44 from the target wheel 42. The sensor flange 52 extends outward over portions of the exterior surface 20 to align the flange aperture 66 with the fastener aperture 78 of the gasket 56 while positioning the insert 54 within the fastener aperture 78 of the gasket 56. The fastener 58 fits through the insert 54 and removeably connects the sensor flange 52 with the housing 12. When the sensor assembly 40 mounts to the housing 12, the sensor aperture 76 surrounds the sensor body 50 and the fastener aperture 78 surrounds the insert 54. The fastener 58 applies a seating force against the sensor flange 52 and the insert 54 to force the sensor flange 52 toward the exterior surface 20 and to removeably fasten the sensor flange 52 to the exterior surface 20. The fastener 58 also compresses the gasket 56 against the exterior surface 20.

As previously noted, the insert 54 extends beyond the bottom surface of the sensor flange 52 to contact the exterior surface 20. In one embodiment, the insert 54 extends below the sensor flange 52 by an amount greater than the thickness of the second material 74 but less than the thickness of the first material 72. Accordingly, the first material 72 is compressed to provide a seal between the sensor flange 52 and the exterior surface 20. The sensor flange 52 does not directly contact

the second material 74. Positioning of the sensor instrument 46 is controlled by contact of the insert 54 with the exterior surface 20.

Consequently, the fastening of the sensor flange 52 and associated insert 54 controls the positioning of the sensor instrument 46 such that the sensor instrument 46 extends the predetermined distance 60 with respect to the exterior surface 20 to set the gap 44 between the sensor instrument and the target wheel 42.

In another embodiment, the insert 54 extends below the sensor flange 52 by an amount less than the thickness of the second material 74. In this embodiment, the sensor flange 52 will come in contact with the second material 74. Accordingly, the second material 74 contacts the sensor flange 52 when the sensor assembly 40 is assembled to the housing 12 such that the thickness of the second material 74 controls the positioning of the sensor instrument 46. In particular, the second material 74 has a thickness dimension such that the thickness dimension controls the positioning of the sensor flange 52 with respect to the housing 12 such that the radial position of the sensor body 50 is accurately maintained. Consequently, the fastening of the sensor flange 52 and associated insert 54 controls the positioning of the sensor instrument 46 such that the sensor instrument 46 extends the predetermined distance 60 with respect to the exterior surface 20 to set the gap 44 between the sensor instrument 46 and the target wheel 42.

Another embodiment of the disclosure is shown in Fig 2. It incorporates the housing 12, the bearing assembly 14, the sensor body 50, the sensor flange 52, the sensor instrument 46, the gasket 56 and the fastener 58 of the embodiment of Fig 1. The gasket 56 is disposed between and in contact with the sensor flange 52 and the exterior surface 20 of the housing 12, wherein the exterior surface 20 becomes the mounting surface for the sensor assembly 40. The gasket 56 provides barrier protection for the mounting surface and the sensor bore 36. The gasket 56 comprises the first material 72 having the harder

second material 74 embedded within in the mesh/grid pattern. As shown in Fig. 2, insert 80, however, extends minimally beyond the bottom surface of the sensor flange 52 and the insert 80 contacts a top portion of the gasket 56.

As shown in Fig. 2A, the body 70 of the gasket 56 further comprises the sensor aperture 76 and a fastener aperture 82 defined therethrough. The sensor aperture 76 is sized to allow the sensor body 50 to pass through while the fastener aperture 82 is sized to allow the fastener 58 to pass through. The fastener aperture 82 is designed such that the inner diameter of the fastener aperture 82 is smaller than the outer diameter of the insert 80 (Fig. 2) resulting in the insert 80 being mounted against the body 70 when the sensor assembly 40 mounts with the housing 12. The materials of the gasket 56 still provide a defined thickness such that the radial position of the sensor body 50 is accurately maintained.

Turning to Fig. 3, another embodiment of the present disclosure is shown. This embodiment incorporates the housing 12, the bearing assembly 14, the sensor body 50, the sensor flange 52, the sensor instrument 46, the insert 54 and fastener 58 of the embodiment of Fig. 1.

Gasket 84 is disposed between and in contact with the sensor flange 52 and the exterior surface 20 of the housing 12, wherein the exterior surface 20 becomes the mounting surface for the sensor assembly 40. The gasket 84 provides barrier protection for the mounting surface 20 and bore 36.

In this embodiment, however, the gasket 84 includes a body 86 comprising a hard material. The hard material of the gasket 84 has a thickness that controls the predetermined distance 60 that the sensor instrument 46 extends beyond the exterior surface 20 of the housing 12. As such, the gasket 84 provides a thickness such that the radial position of the sensor body 50 within the bore 36 is accurately maintained.

As shown in Figs. 3A-3B, the body 86 further comprises the sensor aperture 76 and the fastener aperture 78 defined therethrough. Furthermore, as shown, the gasket 86 includes a plurality of apertures 88 defined therethrough. Each aperture 88 may retain a corrosion preventative 90 such as grease. In an embodiment, the plurality of apertures 88 is uniformly distributed throughout the gasket 84 (Fig. 3A). In another embodiment, the plurality of apertures 88 is non-uniformly distributed throughout the gasket 84 (Fig. 3B). Still further, in an embodiment, the plurality of apertures 88 is distributed near and around the sensor aperture 76 and the fastener aperture 78 (Fig. 3C). In an embodiment, the gasket 84 may include pockets 92 to hold the corrosion preventative 90 (Fig. 3D). Fig. 3D illustrates a partial cross sectional view of a pocket 92 maintaining the corrosion preventative 90 against the exterior surface 20.

In these embodiments, the position of the sensor flange 52 is maintained by tightening the bottom surface of the sensor flange 52 against the gasket 84. The corrosion preventative 90 protects the exterior surface/mounting surface from corrosion effects while the gasket 84 protects against wash out of the corrosion preventative 90. As shown in Fig. 3, the insert 54 contacts the exterior surface 20 as previously discussed. In another embodiment, insert 94 (Fig. 4) contacts the gasket 84.

For the embodiments, during assembly of the sensor body to the housing, the operator determines, based on the gap and target wheel, the predetermined distance that the sensor instrument extends into the interior of the housing. The operator then inserts the appropriate gasket around the sensor body to dispose the sensor instrument within the interior of the housing. The operator fastens the sensor flange to the exterior surface of the housing such that the material of the gasket controls the position of the sensor instrument to achieve the predetermined distance.

During operation of the hub assembly, the hub rotates with the road wheel. Since the inner races are pressed over the spindle of the hub, they also rotate, as does the target wheel, which is pressed over an extension of one of the inner races. As the teeth of the target wheel move past a pickup area on the sensor instrument, they disrupt a magnetic field and cause the sensor body to produce a pulsating electrical signal, the frequency of which reflects the angular velocity of the hub. During operation, the gasket protects the exterior surface/mounting surface from corrosion effects while maintaining the radial position of the sensor flange.

In the embodiments, the present disclosure provides sensors, which are robust against environmental effects such as corrosion and are easily serviceable. The mounting surface for the sensor is protected from the environment and not subjected to corrosion or other environmental effects. The disclosure provides various means for attaching the sensor assembly to the particular housing, means for controlling the position of the sensor relative to the target wheel and means for sealing the mounting surface. Furthermore, as previously mentioned, the sensor assembly of the present disclosure may be used for a variety of sensor technologies. For illustrative purposes, the sensor assembly was shown with a bearing arrangement wherein the sensor assembly may be used with all bearing types.

The sensors and their respective target wheels have utility beyond hub assemblies and antilock braking systems or traction control systems. Indeed, the sensors may be used in any housing that contains a bore, which opens toward a rotating member that carries a target wheel.

In view of the above, it will be seen that the several objects of the disclosure are achieved and other advantageous results are obtained. As various changes could be made in the above constructions without departing from the scope of the disclosure, it is intended that all matter

contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

CLAIMS:

1. A gasket for sealing a sensor flange of a sensor assembly when the sensor assembly is mounted to a housing, the gasket comprising:

a body made of a first material and a second material wherein the second material is embedded within the first material such that at least one of the first material and the second material contacts the sensor flange when the sensor assembly is assembled to the housing such that the contact with the sensor flange controls positioning of the sensor flange with respect to the housing.

2. The gasket of claim 1 wherein the second material is embedded within the first material in a mesh pattern.

3. The gasket of claim 2 wherein the second material comprises a harder substance than the first material.

4. The gasket of claim 1 wherein the first material comprises a silicone gel.

5. The gasket of claim 1 wherein the second material comprises at least one of a resin material, a glass filled thermoplastic material, a steel material and an aluminum material.

6. The gasket of claim 1 wherein the body further comprises a plurality of apertures defined therethrough.

7. The gasket of claim 6 wherein the plurality of apertures are uniformly distributed within the body.

8. The gasket of claim 6 wherein the plurality of apertures are randomly distributed within the body.

9. The gasket of claim 6 wherein the body further comprises a corrosion preventative positioned within the plurality of apertures.

10. The gasket of claim 6 wherein the body further comprises a sensor aperture and a fastener aperture defined therethrough such that the plurality of apertures is positioned around the sensor aperture and the fastener aperture.

11. A gasket for sealing a sensor flange of a sensor assembly when the sensor assembly is mounted to a housing, the gasket comprising:

a body made of a material having a plurality of apertures defined therethrough; and

a corrosion preventative positioned within the plurality of apertures wherein the gasket is disposed between the sensor flange and an exterior surface of the housing such that the corrosion preventative protects against corrosion effects applied to the exterior surface of the housing.

12. The gasket of claim 11 wherein the material comprises at least one of a resin material, a glass filled thermoplastic material, a steel material and an aluminum material.

13. The gasket of claim 11 wherein the plurality of apertures are uniformly distributed within the body.

14. The gasket of claim 11 wherein the plurality of apertures are randomly distributed within the body.

15. The gasket of claim 11 wherein the body further comprises a sensor aperture and a fastener aperture defined therethrough such that the plurality of apertures is positioned around the sensor aperture and the fastener aperture.

16. A sensor assembly that mounts to a housing, the housing having an interior surface, an exterior surface and a bore disposed through and in between the interior surface and the exterior surface of the housing, the exterior surface of the housing being positioned across a gap from a target wheel, the sensor assembly comprising:

a sensor body positioned within the bore and extending beyond the interior surface and the exterior surface, the sensor body having a sensor instrument, the sensor body positioning the sensor instrument beyond the interior surface of the housing at a predetermined distance with respect to the exterior surface;

a sensor flange integrated with the sensor body, the sensor flange extending outward from the sensor body in a position adjacent the exterior surface, the sensor flange having a fastener that removeably fastens the sensor flange to the exterior surface;

a gasket disposed between and contacting the sensor flange and the exterior surface to seal the exterior surface, the gasket comprising a body made of a first material and a second material wherein the second material is embedded within the first material in a mesh pattern such that at least one of the first material and the second material contacts the sensor flange when the fastener removeably fastens the sensor flange to the housing wherein the contact between at least the first material and the second material and the sensor flange along with the integration of the sensor flange and the sensor body controls the positioning of the sensor instrument within the housing such that the sensor instrument extends the predetermined distance.

17. The sensor assembly of claim 16 wherein the sensor flange further comprises a flange aperture defined therethrough which is sized to accept the fastener.

18. The sensor assembly of claim 17 further comprising an insert positioned within the fastener aperture.

19. The sensor assembly of claim 18 wherein the insert extends beyond the sensor flange such that the insert contacts the exterior surface when the fastener removeably fastens the sensor flange to the exterior surface.

20. The sensor assembly of claim 18 wherein the insert contacts a portion of the gasket when the fastener removeably fastens the sensor flange to the exterior surface.

21. The sensor assembly of claim 16 wherein the gasket comprises a sensor aperture defined therethrough and comprises a fastener aperture defined therethrough wherein the sensor aperture surrounds the sensor

body and the fastener aperture surrounds the insert when the sensor assembly mounts to the housing.

22. The sensor assembly of claim 18 wherein the insert is integrally molded into the sensor flange.

23. The sensor assembly of claim 18 wherein the insert comprises at least one of a steel material, a stainless steel material, a bronze alloy material and a brass material.

24. The sensor assembly of claim 16 wherein the second material has a thickness dimension such that the thickness dimension controls the positioning of the sensor flange with respect to the exterior surface when the fastener removeably fastens the sensor flange to the exterior surface wherein the positioning of the sensor flange controls the predetermined distance that the sensor instrument extends from the exterior surface.

25. The sensor assembly of claim 16 wherein the body further comprises a plurality of apertures defined through the first material and the second material.

26. The sensor assembly of claim 25 wherein the body further comprises a corrosion preventative positioned within the plurality of apertures.

27. A bearing assembly having an axis of rotation, the bearing assembly being mountable within a housing that has an interior surface and an exterior surface, the bearing assembly comprising:

an outer race having a pair of raceways presented toward the axis of rotation and a bore defined therethrough the outer race and positioned opposite the axis of rotation;

a pair of inner races located within the outer race and each having a raceway that is presented toward raceways of the outer race, so that the one raceway of the outer race encircles the raceway of one of the inner races and the other raceway of the outer race encircles the raceway of the other inner race;

rolling elements arranged in rows between the raceways of the outer and inner races;

a sensor assembly having a sensor body and a sensor flange, the sensor body being positioned within the bore and extending beyond the exterior surface and the exterior surface of the housing, the sensor body having a sensor instrument that extends beyond the interior surface, the sensor flange extending outward from the body in a position adjacent the exterior surface of the housing, the sensor flange having a fastener that removeably fastens the sensor flange to the exterior surface;

a gasket disposed between and contacting the sensor flange and the exterior surface to seal the exterior surface, the gasket comprising a body made of a first material and a second material wherein the second material is embedded within the first material in a mesh pattern such that the second material contacts the sensor flange when the fastener removeably fastens the sensor flange to the exterior surface wherein the contact between the second material and the sensor flange controls the positioning of the sensor instrument within the housing.

28. The gasket of claim 27 wherein the second material comprises a harder substance than the first material.

29. The gasket of claim 27 wherein the body of the gasket further comprises a plurality of apertures defined through the first material and the second material.

30. The gasket of claim 27 wherein the body of the gasket further comprises a corrosion preventative positioned within the plurality of apertures.

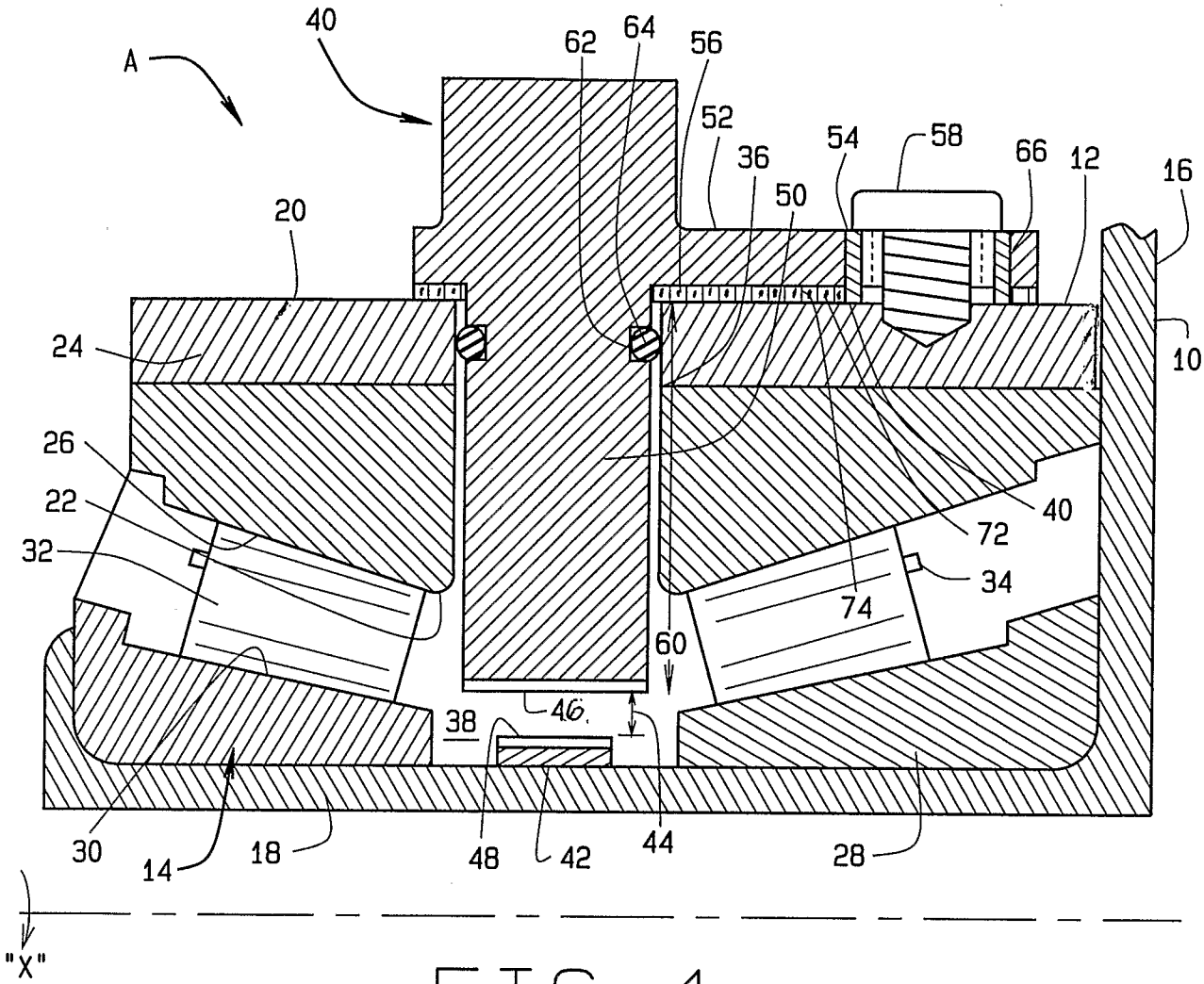
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FIG. 1

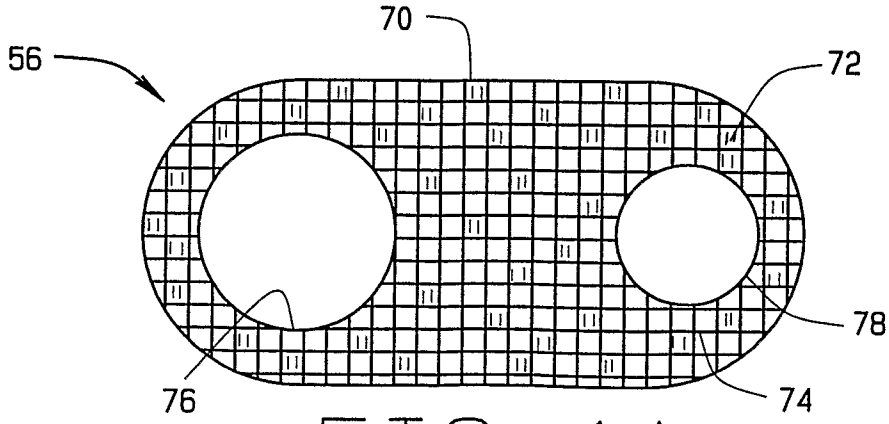
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FIG. 1A

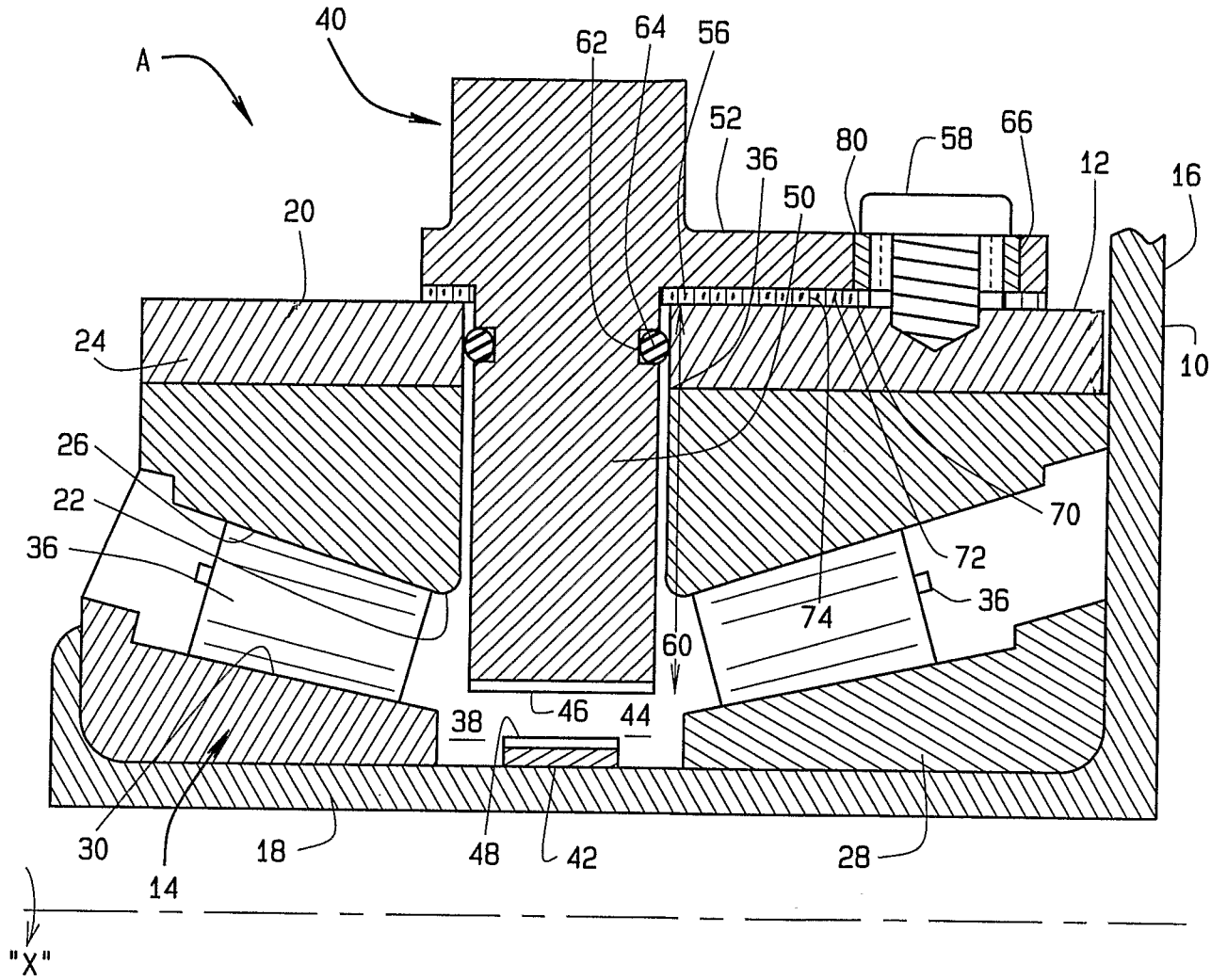
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FIG. 2

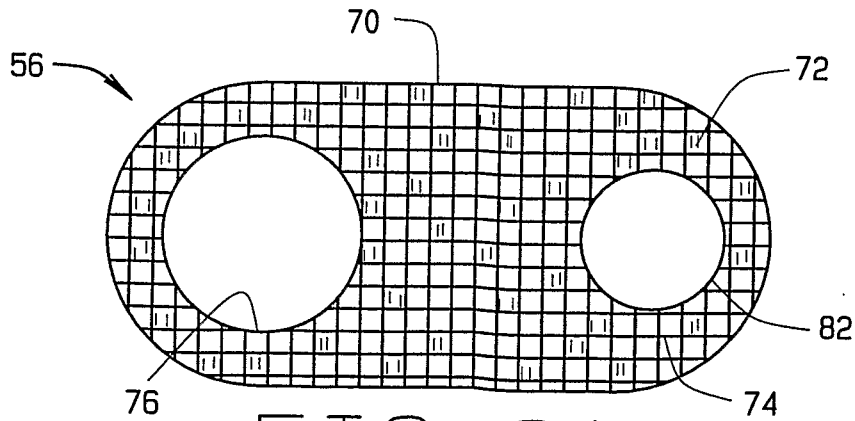
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FIG. 2A

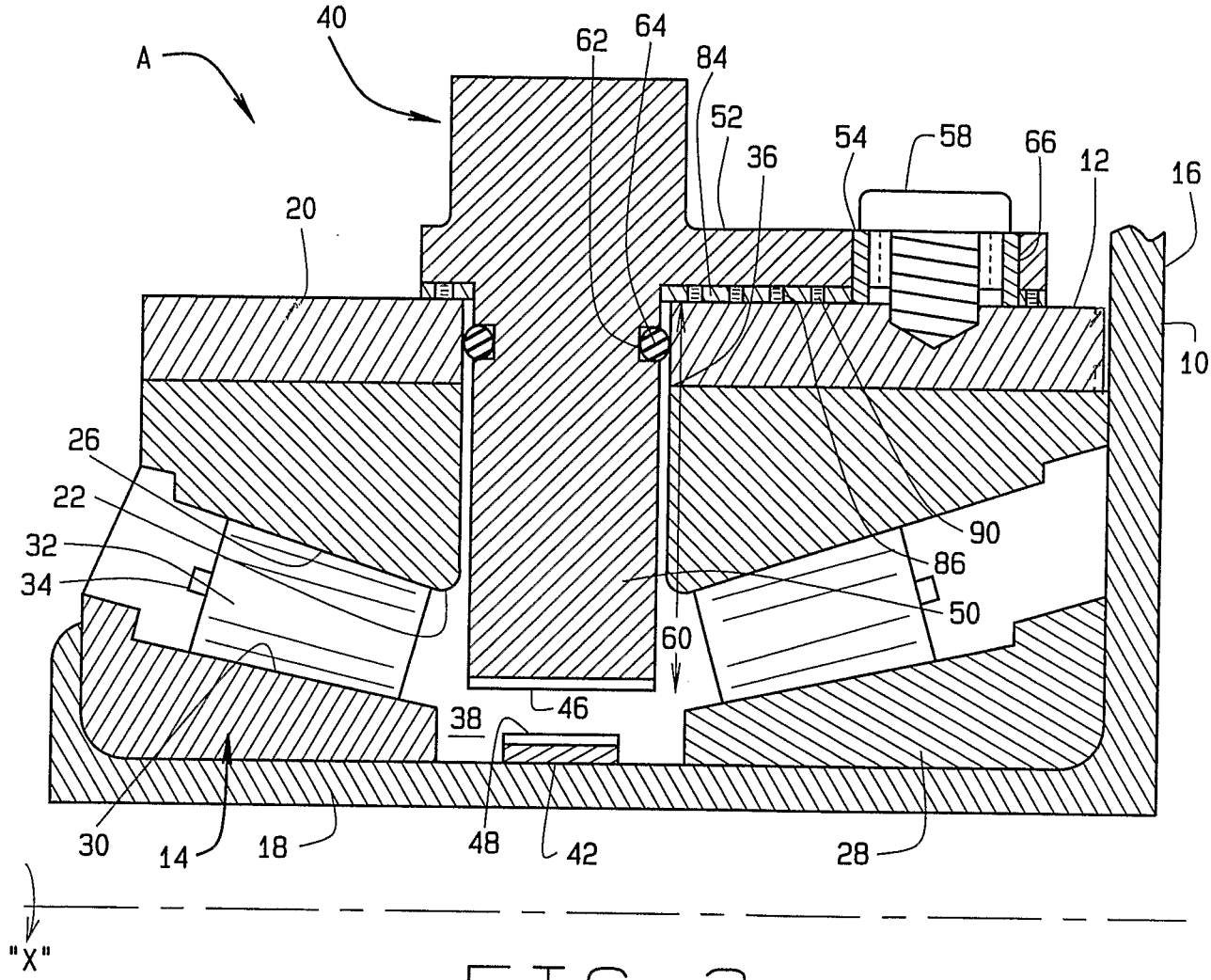
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FIG. 3

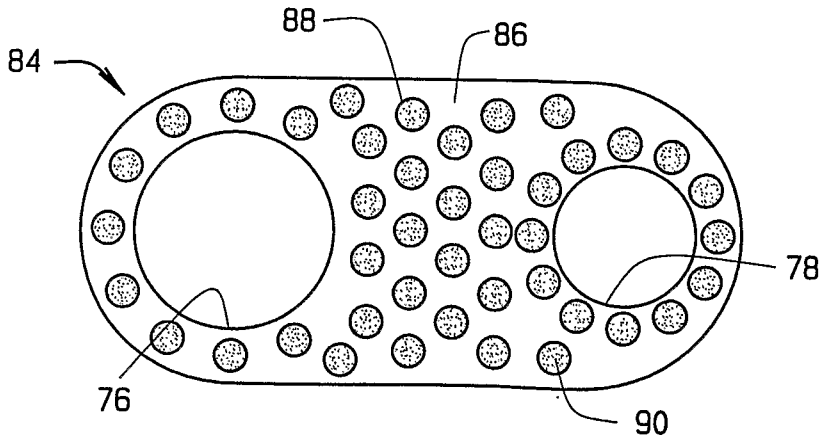
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FIG. 3A

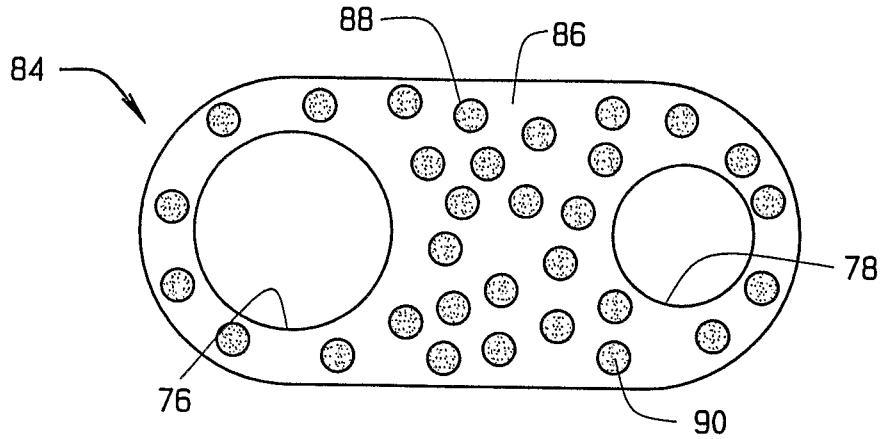

FIG. 3B

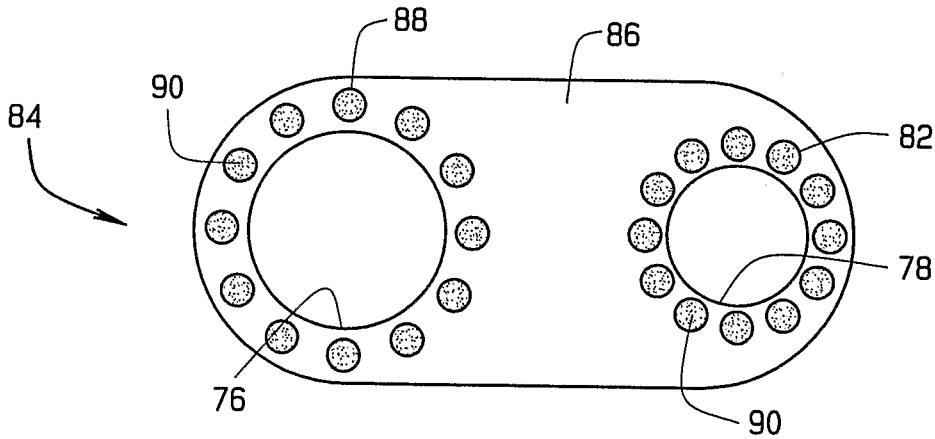

FIG. 3C

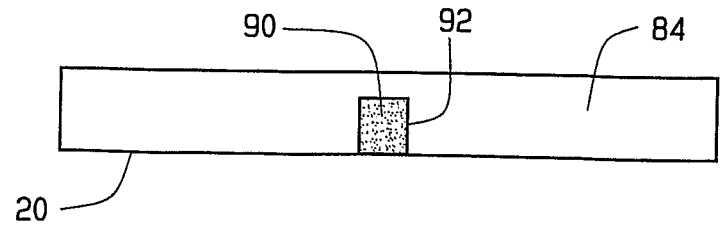

FIG. 3D

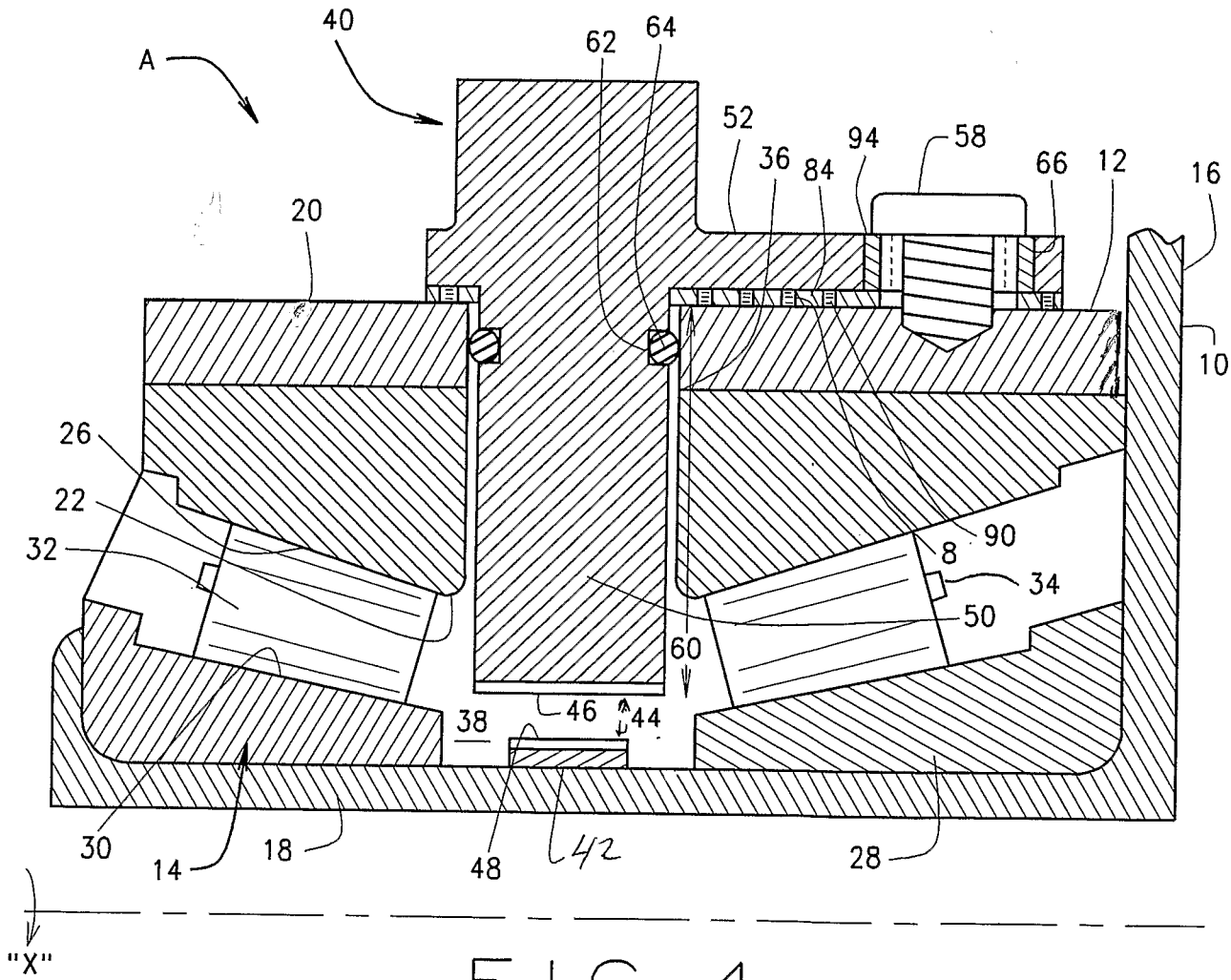
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FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/042307

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16J15/12 G01P3/44 F16C19/52

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F16J G01P F16C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 191 950 A1 (HILTNER LUTHER G) 29 June 1965 (1965-06-29) column 1, line 67 - column 2, line 54 column 3, lines 8-55; figures	1-9
A	US 6 530 577 B1 (BUSBY JEFF [US] ET AL) 11 March 2003 (2003-03-11) column 1, line 45 - column 3, line 24; figures 1-6	1-5
A	EP 1 491 899 A (NTN TOYO BEARING CO LTD [JP]) 29 December 2004 (2004-12-29) paragraph [0027]; figure 3	16-30
A	US 4 595 897 A1 (AMANO HIROYUKI [JP] ET AL) 17 June 1986 (1986-06-17) the whole document	16-26

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 March 2007	23/03/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Sbaihi, Marc

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2006/042307

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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