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**D E C I S I O N**  
**of 6 April 2006**

**Case Number:** T 0689/04 - 3.4.01

**Application Number:** 96910567.5

**Publication Number:** 0817972

**IPC:** G01P 3/44

**Language of the proceedings:** EN

**Title of invention:**

Bearing assembly having integrated speed sensor

**Patentee:**

RELIANCE ELECTRIC INDUSTRIAL COMPANY

**Opponent:**

DR. JOHANNES HEIDENHAIN GmbH

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 84, 123(2)

RPBA Art: 11(3)

**Keyword:**

-

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0689/04 - 3.4.01

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.01  
of 6 April 2006

**Appellant:** RELIANCE ELECTRIC INDUSTRIAL COMPANY  
(Patent Proprietor) 6040 Ponders Court  
Green, SC 29615 (US)

**Representative:** Bergmeier, Werner  
Friedrich-Ebert-Strasse 84  
D-85055 Ingolstadt (DE)

**Respondent:** DR. JOHANNES HEIDENHAIN GmbH  
(Opponent) Postfach 1260  
D-83292 Traunreut (DE)

**Representative:** -

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 19 March 2004  
revoking European patent No. 0817972 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** B. Schachenmann  
**Members:** G. Assi  
R. Bekkering

## Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal, received on 28 May 2004, against the decision of the opposition division, dispatched on 19 March 2004, revoking the European patent No. 0 817 972 (application number 96910567.5). The appeal fee was paid on 28 May 2004. The statement setting out the grounds of appeal was received on 19 July 2004.

II. An opposition had been filed against the patent as a whole and was based on Article 100(a) EPC, in particular on the grounds of lack of novelty (Article 54 EPC) and inventive step (Article 56 EPC).

In the decision under appeal, the opposition division held that the opposition prejudiced the maintenance of the patent.

III. In response to summons to oral proceedings before the Board of Appeal, dated 31 August 2005, the appellant, with a letter of 17 March 2006, informed the Board that it would not attend the oral proceedings.

IV. Oral proceedings were held on 6 April 2006 in the absence of the appellant.

V. The appellant requested in writing, with the letter of 17 March 2006, that a decision be issued based on the documents on record, i.e. that the decision under appeal be set aside and the patent be maintained with one of the set of claims filed by a letter of 6 March 2006 as auxiliary requests 1 to 5. The main request

filed with the letter of 6 March 2006 was not maintained.

VI. The respondent (opponent) requested that the appeal be dismissed.

VII. The wording of claim 1 amended according to the appellant's auxiliary request 1 is as follows:

*"A bearing apparatus for industrial environments comprising:*

*a bearing housing (48);*

*a bearing assembly contained in said housing (48) and including respective first and second ring members (54,56) capable of relative rotation, said first ring member (54) secured to said shaft (46) during operation to rotate therewith, wherein said housing (48) facilitates placement of the bearing assembly at a desired location for supporting said rotatable shaft (48), wherein said housing (48) is a pillow block housing or a flange housing; and*

*a sensor device (72,98,112,120) operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said first ring member (54);*

*a detection element rotatable with said first ring member (54), wherein said sensor device (72,98,112,120) is operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said detection element, wherein said sensor device (72,98,112,120) is mounted to said bearing housing (48) and wherein said sensor device (72,98,112,120) is situated in a sensing direction axially disposed with respect to said shaft (46)."*

The wording of claim 1 amended according to the appellant's auxiliary request 2 is as follows:

*"A bearing apparatus for industrial environments comprising:*

*a bearing housing (48);*

*a bearing assembly contained in said housing (48) and including respective first and second ring members (54,56) capable of relative rotation, said first ring member (54) secured to said shaft (46) during*

*operation to rotate therewith, wherein said housing (48) facilitates placement of the bearing assembly at a desired location for supporting said rotatable shaft (48), wherein said housing (48) is a pillow block housing or a flange housing;*

*a clamping arrangement having a nut (66,80,84,100) or a clamping collar (106,118) for securement of the bearing assembly to said shaft (46); and*

*a sensor device (72,98,112,120) operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said first ring member (54), wherein said sensor device (72,98,112,120) is mounted to said bearing housing (48);*

*wherein said bearing assembly includes a detection element rotatable with said first ring member (54), wherein said sensor device (72,98,112,120) is operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said detection element,*

*wherein said detection element is said nut (66,80,84,100) or said clamping collar (106,118) utilized to secure said first ring member (54) to said shaft (46),*

*wherein said nut (66,80,84,100) or said clamping collar (106,118) is adapted to facilitate detection of the rotational rate of the shaft (46) by being*

*configured defining a plurality of slots (76) spaced apart about its circumference or by being configured defining a plurality of holes (82) at spaced apart locations about its circumference, with or without respective plug members (86,110) located therein or by having a sprocket element (90) or a slotted disc (102) attached thereto."*

The wording of claim 1 amended according to the appellant's auxiliary request 3 is as follows:

"A bearing apparatus comprising:

*a bearing housing (48);*

*a bearing assembly contained in said housing (48) and including respective first and second ring members (54,56) capable of relative rotation, said first ring member (54) secured to said shaft (46) during operation to rotate therewith, wherein said housing (48) facilitates placement of the bearing assembly at a desired location for supporting said rotatable shaft (48), wherein said housing (48) is a pillow block housing or a flange housing and wherein said housing (48) includes an end wall (52) for covering an end of said shaft (46), wherein the end wall (52) is a removable end cap (94) attached by bolts; and*

*a sensor device (72,98,112,120) operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said first ring member (54),*

*wherein said sensor device (72,98,112,120) is mounted to said removable end cap (94) of said bearing housing (48)."*

The wording of claim 1 amended according to the appellant's auxiliary request 4 is as follows:

"A bearing apparatus for industrial environments comprising:

*a bearing housing (48);*

*a bearing assembly contained in said housing (48) and including respective first and second ring members (54,56) capable of relative rotation, said first ring member (54) secured to said shaft (46) during operation to rotate therewith, wherein said housing (48) facilitates placement of the bearing assembly at a desired location for supporting said rotatable shaft (48), wherein said housing (48) is a pillow block housing or a flange housing, wherein said housing (48) includes an end wall (52) for covering an end of said shaft (46); and*

*a sensor device (72,98,112,120) operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said first ring member (54),*

*wherein said sensor device (72,98,112,120) is threaded into a bore formed in said end wall (52) of said bearing housing (48)."*

The wording of claim 1 amended according to the appellant's auxiliary request 5 is as follows:

"A bearing apparatus for industrial environments comprising:

*a bearing housing (48);*

*a bearing assembly contained in said housing (48) and including respective first and second ring members (54,56) capable of relative rotation, said first ring member (54) secured to said shaft (46) during operation to rotate therewith, wherein said housing (48)*

*facilitates placement of the bearing assembly at a desired location for supporting said rotatable shaft (48), wherein said housing (48) is a pillow block housing or a flange housing;*

*a clamping arrangement having a nut (66,80,84,100) or a clamping collar (106,118) for securement of the bearing assembly to said shaft (46); and*

*a sensor device (72,98,112,120) operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said first ring member (54), wherein said sensor device (72,98,112,120) is mounted to said bearing housing (48) and wherein said sensor device (72,98,112,120) is situated in a sensing direction axially disposed with respect to said shaft (46);*

*wherein said bearing assembly includes a detection element rotatable with said first ring member (54), wherein said sensor device (72,98,112,120) is operative to detect a rate of rotation of said shaft (46) by detecting a rate of rotation of said detection element,*

*wherein said detection element is said nut (66,80,84,100) or said clamping collar (106,118) utilized to secure said first ring member (54) to said shaft (46),*

*wherein said nut (66,80,84,100) or said clamping collar (106,118) is adapted to facilitate detection of the rotational rate of the shaft (46) by being configured defining a plurality of slots (76) spaced apart about its circumference or by being configured defining a plurality of holes (82) at spaced apart locations about its circumference, with or without respective plug members (86,110) located therein or by having a sprocket element (90) or a slotted disc (102) attached thereto."*



## Reasons for the Decision

1. The appeal is admissible.
2. Claim 1 of the appellant's auxiliary request 1
  - 2.1 The respondent submitted that the amended claim 1 according to the appellant's auxiliary request 1 did not meet the requirements of Article 84 EPC as regarded clarity and support by the description and, moreover, contravened Article 123(2) EPC.
  - 2.2 In particular, the respondent argued that the amendment to claim 1 of the patent as granted by way of addition of the expression "*for industrial environments*" after "*bearing apparatus*" contravened both Article 84 and 123(2) EPC. In the appellant's view, however, this amendment, which was disclosed in the application as filed, further specified the meaning of the term "*bearing apparatus*" by indicating the environment in which the bearing apparatus was used.

In the Board's judgement, the expression "*industrial environments*" is indeed so broad to be undefined (Article 84 EPC). Depending on the particular industrial facility, a bearing apparatus may be subjected to completely different environment conditions which determine its structure, functionality and durability. For example, a bearing apparatus for a conveyor system in a mine has to meet other requirements than a bearing apparatus for an automobile wheel or a gas turbine engine. Thus, the amendment is

not suitable for indirectly specifying the features of the claimed bearing apparatus so as to differentiate it from the prior art apparatuses used in car industry.

Moreover, the amendment extends beyond the content of the application as filed (Article 123(2) EPC). The quotation cited by the appellant, i.e. page 2, lines 16 to 19 of the application, refers to "*fast-paced industrial environments in which conveyors are generally utilized*". This particular disclosure is not sufficient for supporting the amendment in its generality.

- 2.3 The respondent also argued that the amendment to claim 1 of the patent as granted by way of addition of the expression "*wherein said sensor device (72,98,112,120) is situated in a sensing direction axially disposed with respect to said shaft (46)*" contravened Article 84 EPC. In its view, the amended claim 1 was not supported by the description having regard to the embodiment of Figure 4.

This view is indeed correct because Figure 4 illustrates a sensor device 78 which is oriented radially with respect to shaft 46 (see paragraph [0043]), whereas claim 1 prescribes that the sensor device is situated in a sensing direction axially disposed with respect to the shaft.

- 2.4 For these reasons, claim 1 of the appellant's auxiliary request 1 has been amended in such a way that it lacks clarity and support by the description (Article 84 EPC) and, moreover, contains subject-matter which extends

beyond the content of the application as filed  
(Article 123(2) EPC).

2.5 Therefore, the auxiliary request 1 is not allowable.

3. Claim 1 of the appellant's auxiliary requests 2 and 5

3.1 The objections under Articles 84 and 123(2) EPC with regard to the amendment "*industrial environments*", discussed in point 2.2 above, are also valid for the auxiliary requests 2 and 5.

3.2 The objection under Article 84 EPC with regard to the amendment concerning the axial arrangement of the sensor device, discussed in point 2.3 above, also applies to the auxiliary request 5.

3.3 The respondent stated that the amended claim 1 included many alternative features (see the conjunctions "*or*"). Thus, combinations of features resulted, which were not originally disclosed. As an example, the respondent mentioned the combination of an optical sensor with a nut or a clamping collar having a plurality of slots along its circumference.

As compared with claim 1 of the patent as granted, the amended claim 1 includes *inter alia* the new features concerning a clamping arrangement having a nut or a collar, wherein the nut or the collar has a plurality of slots spaced apart about its circumference. The claimed bearing apparatus further includes a sensor device that may be an optical sensor (see claims 1 and 6 of the patent as granted; claims 1 and 5 of the auxiliary requests 2 and 5). The combination of these

features is not disclosed in the application as filed. Indeed, the use of an optical sensor is illustrated in Figure 5 (see paragraph [0049]). In this configuration, a nut is provided, which has a slotted disc attached thereto. The optical sensor includes a light source which directs light upon the slotted disc. The slots in the disc cause varying degrees of light reflection back toward the optical sensor during shaft rotation. Such reflection is sensed by a photodetector within the optical sensor. The frequency of the variations in reflection is thus indicative of shaft speed. It results from this disclosure that the surface of the slotted disk must be able to reflect light. Such a characteristic, however, is not disclosed in relation to the slotted nut or clamping collar, which as a matter of fact are intended for use with a magnetic-type sensor (see claim 3 of the patent as granted corresponding to claim 2 of the auxiliary requests 2 and 5).

3.4 For these reasons, claim 1 of the appellant's auxiliary requests 2 and 5 has been amended in such a way that it lacks clarity and support by the description (Article 84 EPC) and, moreover, contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

3.5 Therefore, the auxiliary requests 2 and 5 are not allowable.

4. Claim 1 of the appellant's auxiliary request 3

4.1 The respondent stated that there was an inconsistency between the amended claim 1 and the embodiments according to Figures 3 and 4, in which the housing end wall was not a removable end cap.

As compared with claim 1 of the patent as granted, the amended claim 1 includes the new features that the housing includes an end wall for covering an end of the shaft, wherein the end wall is a removable end cap attached by bolts, the sensor device being mounted to the said removable end cap. These new features are disclosed in relation to the embodiment of Figure 5.

Figures 3 and 4, however, show another embodiment, according to which the housing includes a top portion 48 situated on a base 50 (see paragraph [0033]), both having a supporting function for the outer ring member 56 of the bearing apparatus. The sensor device is mounted to the front side of the base.

The construction of Figures 3 and 4 essentially differs from that of Figure 5, in which the removable end cap does not support the outer ring member of the bearing apparatus.

4.2 For these reasons, in view of the embodiments of Figures 3 and 4, claim 1 of the appellant's auxiliary request 3 has been amended in such a way that it lacks support by the description (Article 84 EPC).

4.3 Therefore, the auxiliary request 3 is not allowable.

5. Claim 1 of the appellant's auxiliary request 4

5.1 The objections under Articles 84 and 123(2) EPC with regard to the amendment "*industrial environments*" discussed in point 2.2 above are also valid for the auxiliary request 4.

5.2 The respondent stated that there was an inconsistency between the amended claim 1 and the disclosure in column 7, lines 24 to 26 (Article 84 EPC).

As compared with claim 1 of the patent as granted, the amended claim 1 includes the new features that the housing includes an end wall for covering an end of the shaft, the sensor device being threaded into a bore formed in the end wall. These features imply that the sensor device is axially disposed with respect to the shaft (see Figure 3), this interpretation being confirmed by the use of the reference sign 52 for the end wall. The axial arrangement of the sensor device, however, is in contradiction with the radial disposition according to Figure 4.

5.3 For these reasons, claim 1 of the appellant's auxiliary request 4 has been amended in such a way that it lacks clarity and support by the description (Article 84 EPC) and, moreover, contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

5.4 Therefore, the auxiliary request 4 is not allowable.

6. Owing to the appellant's absence at the oral proceedings, the remediable deficiencies of the

auxiliary requests 1 to 5 could not be removed. However, a continuation of the procedure in writing so as to give the appellant an opportunity to further amend the claims, description and drawings was not equitable considering that the appellant should have been present at the oral proceedings and carries the responsibility for its absence (see Article 11(3) of the Rules of Procedure of the Boards of Appeal).

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

R. Schumacher

B. Schachenmann