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**Datasheet for the decision
of 30 January 2014**

Case Number: T 0789/12 - 3.2.08

Application Number: 04727948.4

Publication Number: 1613869

IPC: F16D1/08, F16C35/02,
F16C35/073, F16C35/077

Language of the proceedings: EN

Title of invention:

TOLERANCE RING ASSEMBLY

Patent Proprietor:

Saint-Gobain Performance Plastics Rencol Limited

Opponent:

Schmidt, Ryan

Headword:

Relevant legal provisions:

EPC Art. 123(2), 54, 56
RPBA Art. 12(4), 13(1)

Keyword:

Main request - added subject-matter (yes)
Auxiliary request - late filed (admitted)
Auxiliary request - added subject-matter (no)
Auxiliary request - novelty and inventive step (yes)

Decisions cited:

G 0001/99

Catchword:



**Beschwerdekammern
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Chambres de recours**

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Case Number: T 0789/12 - 3.2.08

**D E C I S I O N
of Technical Board of Appeal 3.2.08
of 30 January 2014**

Appellant: Schmidt, Ryan
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
2 February 2012 concerning maintenance of the
European Patent No. 1613869 in amended form.**

Composition of the Board:

Chairman: T. Kriner
Members: M. Alvazzi Delfrate
C. Schmidt

Summary of Facts and Submissions

- I. By its decision given to the post on 2 February 2012 the opposition division found that European patent No. 1 613 869, in amended form according to auxiliary request B then on file, and the invention to which it related met the requirements of the EPC.
- II. The appellant (opponent) lodged an appeal against this decision on 2 April 2012, paying the appeal fee on the same day. The statement of grounds for appeal was filed on 6 June 2012.
- III. Oral proceedings before the Board of Appeal were held on 30 January 2014.
- IV. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed and that the patent be maintained in the amended form agreed by the opposition division or, in the alternative, that the patent be maintained on the basis of auxiliary request 1 filed at the oral proceedings before the Board of Appeal.

- V. Claims 1 and 2 of the main request read as follows:

"1. A method of assembling an apparatus comprising: inserting a tolerance ring (13) in a bore in a housing, the tolerance ring comprising:
a band (16) of resilient material having corrugated protrusions (2) extending radially outwards from the band, and a guide portion (14) contiguous with, and extending axially from the whole circumference of the

band (16), wherein the band has annular portions, which have no radial protrusions, axially flanking the protrusions, and the guide portion (14) comprises at least one guide surface (15a, 15b) inclined at an constant angle relative to the axis of the band along the length of the guide surface such that the free end of the guide portion is wider than the opening of the band, the protrusions of the tolerance ring engaging the wall of the bore when the tolerance ring is inserted into the bore;
inserting an end of a shaft into the guide portion of the tolerance ring; and moving the shaft along the axis of the band into the band, so that the annular portions of the band engage the shaft."

"2. A method of assembling an apparatus, comprising: mounting a tolerance ring (22) on a shaft, the tolerance ring comprising a band (23) of resilient material having corrugated protrusions (2) extending radially inwards towards the axis of the band, and a guide portion (24a, 24b) contiguous with, and extending axially from the whole circumference of the band, wherein the band has annular portions, which have no radial protrusions, axially flanking the protrusions, and the guide portion (24a, 24b) comprises at least one guide surface inclined relative to the axis of the band such that the free end of the guide portion is narrower than the opening of the band, the protrusions of the tolerance ring engaging the shaft;
inserting the guide portion of the tolerance ring into a bore in a housing; and moving the shaft and tolerance ring axially into the bore such that the annular portions of the band engage the wall of the bore."

Claims 1 and 2 of auxiliary request 1 differ from claims 1 and 2 of the main request by the following amendments (differences indicated):

"moving the shaft along the axis of the band into the band, so that ~~the annular portions of the band engages~~ the shaft, whereby the protrusions are compressed to exert a radial spring force between the shaft and the wall of the bore." (claim 1)

"moving the shaft and tolerance ring axially into the bore such that ~~the annular portions of the band engages~~ the wall of the bore, whereby the protrusions are compressed to exert a radial spring force between the shaft and the wall of the bore." (claim 2)

VI. Reference is made to the following documents:

E2: US -A- 4,828,423;
E4: DD -A- 50166;
E5: WO -A- 01/59314;
E6: US -A- 3,838,928; and
E7: DE -A- 100 27 513.

VII. The arguments of the appellant can be summarised as follows:

Main request - Article 123(2) EPC

The application as originally filed disclosed a tolerance ring with a band that comprised annular portions without radial protrusions and axially flanking the protrusions solely in connection with prior-art rings. It was true that the rings depicted in the drawings referring to the claimed methods, such as Figure 4, were similar to those shown in the drawings

relating to the prior art tolerance rings, which exhibited said annular portions. However, these drawings, in particular Figure 4, showed the rings in cross section, so that it could not be excluded that the tolerance ring exhibited protrusion also in the portions flanking axially the corrugated protrusions 2. Hence, the application as originally filed did not disclose as part of the invention a method which used a tolerance ring with a band that comprised annular portions without radial protrusions and axially flanking the protrusions. Therefore, claims 1 and 2 had been amended contrary to Article 123(2) EPC.

Moreover, the feature according to which the annular portions of the band engaged the shaft or the wall of the bore was not even disclosed for the prior-art tolerance rings. In particular, the drawings could not clearly and unambiguously disclose this feature, since they were merely schematic representations. Also for this reason, claims 1 and 2 of the main request were contrary to Article 123(2) EPC.

Admission of auxiliary request 1 into the proceedings

Auxiliary request 1 had been filed at a very late stage of the proceedings for no good reason. Moreover, it was complex and a feature which was present in the version of the patent maintained by the opposition division had been deleted. Therefore, it should not be admitted into the proceedings.

Admission of E7 into the proceedings

E7 had already been submitted at the oral proceedings before the opposition division but not admitted into the proceedings. However, the opposition division had

erred in assessing the relevance of this document. E7 disclosed that bevelled portions, whose function as a guiding surface would be immediately recognised by the person skilled in the art, were commonly used in tolerance rings. Hence, it showed that it was common practice to provide tolerance rings with guiding portions. Therefore, the claimed methods did not involve an inventive step when starting from the prior art disclosed in E4 or E5, corresponding to the prior art acknowledged in the patent in suit, and considering the teaching of E7. Therefore, E7 was *prima facie* highly relevant and should be admitted into the proceedings.

Auxiliary request 1 - Novelty

In any event, the subject-matter of claims 1 and 2 of auxiliary request 1 lacked novelty in view of each of E6 and E2.

E6 disclosed a method of assembling an apparatus comprising a shaft and a bore, which used a tolerance ring comprising a band of resilient material having corrugated protrusions extending radially outwards and inwards from the band. Moreover, the ring exhibited at its ends inclined surfaces, corresponding to the indication i in Figure 6. Since these inclined surfaces had the same geometry as the guiding portions of the patent in suit, they were also to be considered as guiding portions. Therefore, the subject-matter of claims 1 and 2 of auxiliary request 1 lacked novelty in view of the methods illustrated by Figures 7 and 8 of E6.

Figures 10 to 13 of E2 showed a tolerance ring which comprised a band of resilient material with corrugated

protrusions extending radially inwards towards the axis of the band. During the assembly of the apparatus the tolerance ring was mounted on a shaft, and the shaft and tolerance ring were moved axially into the bore such that the band engaged the wall of the bore. As shown in Figure 11, the ring had a convex-shaped portion 82 contiguous with, and extending axially from, the whole circumference of the band, with a surface inclined relative to the axis of the band. Since the convex-shaped portion contacted the wall of the bore during insertion, it acted as a guiding portion. The configuration of the ring could also be reversed and the ring first engaged with the wall bore. Therefore, the subject-matter of claims 1 and 2 of auxiliary request 1 lacked novelty also in view of E2.

Auxiliary request 1 - Inventive step

If E7 were not admitted into the proceedings and novelty in view of E6 and E2 were acknowledged, each of the latter two documents could be considered to represent the closest prior art.

Starting from this prior art, it was obvious to try to reduce the formation of particles, caused by the interference of the ring with the shaft or the wall of the bore, by either modifying the tolerance ring's geometry or reducing the diameter of the shaft in a way which reduced this interference. In this way a ring with a geometry in accordance with claim 1 or claim 2 would be obtained in an obvious way. Therefore, the method of these claims did not involve an inventive step.

VIII. The arguments of the respondent can be summarised as follows:

Main request - Article 123(2) EPC

The application as originally filed disclosed on page 2, lines 20 to 23 and page 14, lines 23 to 25 and in Figures 1, 2 and 5 that the band of the tolerance ring comprised annular portions which had no radial protrusions and were axially flanking the protrusions.

Moreover, it was clear from Figure 2 that the inner diameter of the annular portions corresponded to the outer diameter of the shaft, so that the shaft was engaged by the annular portions. Hence, the drawings also disclosed that the annular portions of the band engaged the shaft or the wall of the bore.

It was true that the cited passages and Figures 1-3 and 5 related to the prior art. However, as made clear on page 17 and apparent from Figures 3 to 4 and 6, the tolerance rings used in the invention differed from the prior-art ones solely by the provision of a guide portions. Hence, they also comprised annular portions without protrusions which engaged the shaft or the wall of the bore.

Accordingly, the amendments of claims 1 and complied with Article 123(2) EPC.

Admission of auxiliary request 1 into the proceedings

Auxiliary request 1 had been filed as reaction to the discussion of the objections under Article 123(2) EPC during the oral proceedings. Moreover, it was not complex. Finally, the omission of a feature from the

claim maintained by the opposition division was in accordance with the principles established in decision G1/99. Therefore, auxiliary request 1 should be admitted into the proceedings.

Admission of E7 into the proceedings

The opposition division was correct in considering E7 as not relevant. Although this patent document mentioned tolerance rings with an inclined surface, it was completely silent on the purpose of this surface. For instance, in the rings shown in E6 inclined surfaces were provided for the purpose of engaging the shaft or the wall of the bore. E7 did not teach the provision of a guide portion. Accordingly, it was not prima facie highly relevant and should be disregarded.

Auxiliary request 1 - Novelty

Although the tolerance ring described in E6 exhibited at its ends inclined surfaces, these surfaces were provided to fix the tolerance ring by compressive stress to the shaft or the wall of the bore and not to guide the insertion of the shaft. Therefore, E6 did not disclose a method of assembling an apparatus making use of a tolerance ring with at least one guide surface.

E2 did not disclose a ring with guiding portions either. In this case the convex portion 82 served to compensate material loss due to wear, and not to guide its insertion.

Accordingly, neither E6 nor E2 was detrimental to the novelty of the subject-matter of claims 1 and 2 of auxiliary request 1.

Auxiliary request - Inventive step

Starting from each of E2 or E6, the object underlying the claimed invention was to provide a method of assembly which minimised particle production. This object was achieved by a tolerance ring provided with a guide portion for the shaft insertion.

There was no reason, starting from E2 or E6, to change the interference of the ring with the bore to achieve this object, since this interference was essential to the function of the tolerance ring and did not influence particle production. Hence, it was not obvious to arrive at methods according to claim 1 or claim 2 starting from E6 or E2. Therefore, the subject-matter of these claims involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.
2. Main request - Article 123(2) EPC
- 2.1 The features according to which:

(i) the band of the tolerance ring comprises annular portions, which have no radial protrusions and are axially flanking the protrusions; and

(ii) the annular portions of the band engage the shaft (claim 1) or the wall of the bore (claim 2)

were added to claims 1 and 2 during the opposition proceedings.

2.2 In the application as originally filed the section of the description relating to the claimed invention does not expressly mention these features. However, the section describing the prior art stipulates that typically the band of protrusions is axially flanked by annular regions of the tolerance ring that have no formations, known in the art as "unformed regions" (see page 2, lines 20 to 23). Furthermore, the text referring to Figure 1, which shows a prior-art tolerance ring, states that unformed, annular portions 7 of tolerance ring 1, which have no radial protrusions, axially flank the waves 2 (see page 14, lines 23 to 25). Therefore, the application as originally filed discloses that the prior-art tolerance rings depicted in Figures 1-3 and 5 have annular portions, which have no radial protrusions, axially flanking the protrusions.

Additionally it discloses on page 17, lines 20 to 24, that some features of the embodiment of Figure 4, which relates to the claimed invention, are the same in the previously described tolerance rings. Indeed when the tolerance ring shown in Figure 4, relating to the method of claim 1, is compared to the prior-art ring of Figures 1 and 2, the sole visible difference is the provision of a guide portion, the zone which is indicated as annular portion in Figure 1 being unchanged. The same applies when considering the ring shown Figure 6, which relates to the method of claim 2, in comparison to the prior-art ring of Figures 3 and 5.

It is true that, since Figure 4 only shows a cross-section of the tolerance ring, it is theoretically possible that the portion corresponding to the

reference 7 in Figure 1 could exhibit some protrusions not visible in this section. However, Figure 4 should not be considered in isolation but in the context of the whole application, which clearly states that the claimed invention modifies known tolerance rings by providing a guide portion which is inclined relative to the axis of the tolerance ring (see page 17, lines 15 to 18 and page 5, lines 12 to 17). Hence, it is clear that the ring of Figure 4, which relates to the method of claim 1, corresponds, save for the provision of the guide portion, to that of Figures 1 and 2. Accordingly, it is provided with annular portions which have no radial protrusions and are axially flanking the protrusions.

For the same reasons, the ring shown in Figure 6, which relates to the embodiment of claim 2, is also provided with said annular portions.

Accordingly, the Board is satisfied that the application as originally filed discloses that the tolerance rings used in the methods of claims 1 and 2 exhibit feature (i).

- 2.3 The respondent submitted that feature (ii) was disclosed in the drawings. It is true that in Figure 2 the inner diameter of the annular portions seems to correspond to the outer diameter of the shaft, which would imply that the shaft is engaged by the annular portions. However, Figure 2, like the other drawings, is only a schematic representation from which no exact measures can be derived. Accordingly, it does not clearly and unambiguously disclose that these diameters are equal and how the shaft is engaged.

As to the description and the claims, the respondent failed to indicate any passage disclosing feature (ii). On the contrary, the description appears to indicate that the shaft and the wall of the bore are both engaged by the section exhibiting the protrusion (page 2, lines 11 to 17), while the unformed portions serve to prevent changes in the pitch of the waves, allowing only resilient deformation of each wave (see page 15, lines 7 to 10).

Therefore, feature (ii), according to which the annular portions of the band engage the shaft (claim 1) or the wall of the bore (claim 2), cannot be directly and unambiguously derived from the application as originally filed and its introduction into claims 1 and 2 contravenes Article 123(2) EPC.

3. Introduction of auxiliary request 1 into the proceedings

In accordance with Article 13(1) of the Rules of Procedure of the Boards of Appeal (RPBA) any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion, to be exercised in view of inter alia the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

In the present case, the decisive argument for not allowing the main request, namely that the feature according to which the annular portions engage the shaft is not even disclosed in the drawings referring to the prior-art tolerance rings, was raised for the first time at the oral proceedings before the Board. Therefore, the submission at the same oral proceedings

of auxiliary request 1, which addresses this point, is considered to be a reaction to the submission of this argument.

Moreover, auxiliary request 1, which differs from previous auxiliary request 1 filed together with the statement of grounds of appeal merely by the removal of the contested feature from the claims, does not introduce any complexity. Therefore, this request, although filed at a very late stage of the proceedings, can be considered by the other party and by the Board without causing any delay.

Finally, the present situation corresponds to one of the exceptions to the principle of the prohibition of *reformatio in peius* foreseen in decision G1/99 (OJ EPO 2001, 381, see order). Accordingly, the fact that, although the patent proprietor has not appealed the contested decision, a feature present in the version of the patent maintained by the opposition division has been omitted from auxiliary request 1, is also not an obstacle to the admission of this auxiliary request.

Under these circumstances the Board decided to admit it into the proceedings.

4. Admission of E7 into the proceedings

It is common ground among the parties that, although neither the minutes of the oral proceeding before the opposition division nor the decision under appeal mentions this fact, document E7 had already been submitted at the oral proceedings before the opposition division but not admitted into the proceedings. Therefore, it lies within the power of the Board to

hold this document inadmissible (see Article 12(4) RPBA).

The appellant submitted that E7 was prima facie highly relevant because it taught that bevelled portions, whose function as a guiding surface would be immediately recognised by the person skilled in the art, were commonly used in tolerance rings. Hence, it showed that it was common practice to provide tolerance rings with guiding portions.

The Board does not share this view of the relevance of this document. First, E7 is a patent document which cannot represent the common general knowledge of the person skilled in the art. Moreover, it merely discloses that tolerance rings of metal are thin-walled cylindrical elements provided at one end with an inclined surface (see paragraph [0005]). The purpose of this surface is not disclosed. Nor is it apparent to the person skilled in the art that the inclined surface is to be used as a guiding surface, since inclined surfaces may be provided at the end of a tolerance ring for other purposes: for instance in the rings shown in E6 such inclined surfaces are provided for the purpose of engaging the shaft (see Figure 8) or the wall of the bore (see Figure 7). Accordingly, E7 does not immediately render evident the provision of a guide portion, let alone show that this provision was common practice. Hence, it is not prima facie highly relevant.

Under these circumstances, the Board decided not to admit E7 into the proceedings.

5. Auxiliary request 1 - Article 123(2) EPC

In claims 1 and 2 of auxiliary request 1, feature (ii) above has been deleted, so that the requirements of Article 123(2) EPC are complied with.

6. Auxiliary request 1 - Novelty

Novelty has been challenged in view of each of E6 and E2.

6.1 E6 relates to a method of assembling an apparatus wherein a shaft is fastened to a housing by means of a tolerance ring (see column 1, lines 8 to 20). The tolerance ring comprises a band of resilient material having corrugated protrusions extending radially outwards and inwards from the band (see claim 1). Both the bore in the housing and the shaft are engaged by these protrusions (see Figures 7 and 8).

It is true that the ring exhibits inclined surfaces at its ends, corresponding to the indication i in Figure 6. However, these inclined surfaces are provided for a purpose which is not to guide the insertion of the shaft but to fix the tolerance ring by compressive stress to the shaft or the wall of the bore (see Figures 7 and 8 and column 4, lines 9 to 12). Indeed, they cannot perform this guiding function because, when the shaft is inserted into the bore, their extremities are below the level of the bore surface (see Figure 7) or the shaft surface (see Figure 8). Therefore, E6 does not disclose a method of assembling an apparatus making use of a tolerance ring with at least one guide surface.

Hence, the subject-matter of claims 1 and 2 is novel over E6.

6.2 E2 relates to tolerance rings. Figures 10 to 13 illustrate an embodiment of a tolerance ring that is used to compensate engagement reduction due to wear and comprises a band of resilient material with corrugated protrusions extending radially inwards towards the axis of the band (see column 6, lines 35 to 49). During assembly of the apparatus the tolerance ring is mounted on a shaft, and the shaft and tolerance ring are moved axially into the bore such that the band engages the wall of the bore (see column 6, lines 64 to 67 and Figure 13). Before the assembly step the ring has a convex-shaped portion 82 contiguous with, and extending axially from, the whole circumference of the band, with a surface inclined relative to the axis of the band (see Figure 11). The ring is then arranged in a stepped groove formed in the shaft, which is engaged by portion 82, that in the assembled state is no longer convex (see Figure 13). The configuration of the ring may be reversed if the stepped groove is formed in the wall of the bore, in which case the ring is first engaged with the wall bore (see column 7, lines 11 to 27).

However, also in E2 the tolerance ring has no guide portion, since portion 82 serves to engage the ring with the stepped groove and, if any contact occurs with the walls of the bore - in the embodiment of column 6, lines 35 to column 7, line 2 - or with the shaft - in the embodiment of column 7, lines 11 to 27 - this contact does not result in any guiding action but merely concludes the compression of portion 82.

Therefore, the subject-matter of claims 1 and 2 of auxiliary request 1 is also novel over E2.

7. Auxiliary request 1 - Inventive step

Starting from each of document E2 (Figures 11 to 13 in combination with column 7, lines 11 to 27) or E6 (Figure 7), the object underlying the invention of claim 1 is to provide a method of assembly which minimises particle production during the insertion of the shaft (see paragraphs [0007] to [0012] of the patent in suit). This object is achieved in accordance with claim 1 by using a tolerance ring provided with a guide portion into which the end of the shaft is inserted.

The appellant submitted that starting from each of E2 and E6 it was obvious to achieve this object by modifying the tolerance ring's geometry to reduce its interference with the shaft, so that a ring with a geometry in accordance with claim 1 would be obtained.

However, in the methods disclosed in E2 and E6 the tolerance ring is placed in a groove of the shaft or of the wall of the bore (see Figures 7 and 8 of E6 and Figure 13 of E2), so that during insertion its rim does not rub against the shaft or the wall of the bore. Therefore, the generation of particles is not caused by the interference of the ring with the shaft or the wall of the bore. Hence, the person skilled in the art would not try to achieve the given object by either modifying the tolerance ring's geometry or reducing the diameter of the shaft in a way which reduces this interference. On the contrary, his common general knowledge would teach him against such modifications, since said interference is paramount to the function of the tolerance ring.

Accordingly, independently of whether or not the modification of the geometry advanced by the appellant actually results in a tolerance ring with a guide

portion in accordance with claim 1, it is not obvious to arrive at the method of claim 1 starting from E2 or E6. Accordingly, the subject-matter of claim 1 involves an inventive step.

For the same reasons, it was not obvious to arrive at the method of claim 2 starting from E2 (Figures 11 to 13 in combination with column 6, line 50 to column 7, line 2) or E6 (Figure 8). Therefore, the subject-matter of claim 2 also involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the first auxiliary request (claims 1 to 3) as filed at the oral proceedings before the Board of Appeal, pages 3, 4 and 5 of the description as granted (published patent specification) and page 2 of the description filed on 18 January 2012 during the oral proceedings before the opposition division, and the drawings as granted.

The Registrar:

The Chairman:



V. Commare

T. Kriner

Decision electronically authenticated