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File Number: T 659/91 - 3.2.1

Application No.: 84 309 114.1

Publication No.: 0 148 639

Title of invention: Lubrication arrangement in change-speed gearing assembly

Classification: F16H 57/04

D E C I S I O N
of 15 April 1993

Proprietor of the patent: Toyota Jidosha Kabushiki Kaisha

Opponent: Daimler-Benz AG

Headword:

EPC Articles 56 and 123(2)

Keyword: "Amendments - deletion of references to 'in-house' state of the art (not objectionable)"
"Inventive step (yes)"



Case Number : T 659/91 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 15 April 1993

Appellant : Daimler-Benz AG
(Opponent) Postfach 60 02 02
W - 7000 Stuttgart 60 (DE)

Respondent : Toyota Jidosha Kabushiki Kaisha
(Proprietor of the patent) 1, Toyota-cho, Toyota-shi
Aichi-ken 471 (JP)

Representative : Ben-Nathan, Laurence Albert et al
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Decision under appeal : Interlocutory decision of the Opposition Division
of the European Patent Office given on 13 June
1991, and issued in writing on 23 July 1991,
concerning maintenance of European patent
No. 0 148 639 in amended form.

Composition of the Board :

Chairman : F. Gumbel
Members : S. Crane
G. Gall

Summary of Facts and Submissions

- I. European patent No. 0 148 639 was granted on 8 June 1988 on the basis of European patent application No. 84 309 114.1.
- II. The patent was opposed by the Appellants on the grounds that its subject-matter lacked inventive step with regard to the state of the art (Article 100(a) EPC).

Relied upon as state of the art was the prior use by the Appellants of a change-speed gearing assembly as shown in their works drawings No. 307 000 01 26 (U1) and No. 381 261 02 20 (U2).

- III. By its decision given at the oral proceedings on 13 June 1991, and issued in written form on 23 July 1991, the Opposition Division found that the patent was to be maintained in amended form.
- IV. An appeal against this decision was filed on 28 August 1991, the appeal fee being paid on the same day. The appeal was accompanied by a Statement of Grounds.

In this statement the Appellants referred to the standard reference work "Dubbel, Taschenbuch für den Maschinenbau, 14. Auflage", pages 424 and 425 (D2).

The Appellants requested that the patent be revoked in its entirety.

- V. In a communication dated 25 September 1992 pursuant to Article 11(2) RPBA the Board sought clarification as to whether the gearing assembly shown in Figure 4 of the patent specification and designated as "prior art" was to be considered as forming part of the state of the art

according to Article 54(2) EPC. It also gave its provisional opinion that on the basis of the evidence provided by the Appellants the gearing assembly shown in the drawings U1 and U2 had been made available to the public by prior use and thus belonged to this state of the art.

VI. Oral proceedings were held on 15 April 1993.

At the oral proceedings the Respondents (Proprietors of the patent) submitted amended Claims 1 to 5 and an amended description on the basis of which, together with Figures 1 to 3 of the granted patent, maintenance of the patent in amended form was requested.

Claim 1, which apart from the addition of further reference numerals, corresponds to Claim 1 underlying the impugned decision, reads as follows:

"1. A change-speed gearing assembly for a motor vehicle comprising:

a casing (11) formed with an upright partition wall (11b);

a first bearing (13) carried on the upper portion of said partition wall (11b) for rotatably supporting thereon an input shaft (21) of said change-speed gearing assembly, said input shaft being provided thereon with an input gear (21a) adjacent the inside face of said partition wall;

a second bearing (14) carried on the lower portion of said partition wall (11b) for rotatably supporting thereon a countershaft (22) of said change-speed gearing assembly, said countershaft being provided thereon with a counter gear (22a) in mesh with said input gear (21a);

a bearing retainer (12) secured in a fluid-tight manner to the outside face of said partition wall (11b) to retain both said bearings in place, said bearing retainer

being formed with upper and lower cavities (12d;12e) which cooperate with the respective outside faces of said first and second bearings to form upper and lower lubrication chambers (R₁;R₂) and being further formed with a vertical groove (12g) which cooperates with the outside face of said partition wall to form a communication passage (P₂) between said upper and lower lubrication chambers (R₁;R₂), said bearing retainer having therein an opening (12b) coaxial with said first bearing (13) through which said input shaft (21) extends outwardly; and

an annular seal member (15) coupled with the opening (12b) of said bearing retainer (12) in surrounding relationship with said input shaft (21) to seal said upper lubrication chamber (R₁); and in which said partition wall (11b) is formed at its upper portion with an axial hole (11a) opening at its inner end toward the interior of said casing (11) above said input gear (21a) and at its outer end into the upper portion of said upper lubrication chamber (R₁);

characterised in that the bottom portion of said upper lubrication chamber (R₁) is separated from the upper portion of said lower lubrication chamber (R₂), and in that said vertical groove (12g) is arranged at one side of said bearing retainer (12) and opens at its upper end (12g₁) into a side portion of said upper cavity (12d) located substantially at the same level as the axis of said input shaft (21) and at its lower end (12g₂) into the upper portion of said lower lubrication chamber (R₂) and in that said first bearing (13) is a sealed bearing."

Dependent Claims 2 to 5 relate to preferred embodiments of the gearing assembly according to Claim 1.

The Appellants sought to refer at the oral proceedings to a new document, FR-A-2 433 687, which had been cited in the Search Report, arguing that its relevance had become

apparent as a result of the amendments made to the patent specification.

After deliberation the Board decided that pursuant to Article 114(2) EPC the Board intended to disregard this document. Firstly it did not describe a gearing assembly of the basic configuration set out in the preamble of Claim 1 and related to the solution of a different technical problem, and secondly, even if the skilled person could derive from it some general teaching relevant to the solution of the problem with which the patent was concerned, he would not be led to the construction claimed.

VII. The arguments put forward by the Appellants in support of their request for revocation of the patent can be summarised as follows:

According to the original application and the granted patent specification the use of a sealed upper bearing in a gearing assembly corresponding to the preamble of Claim 1 belonged to the state of the art. There was nowhere to be found an indication that the use of such a bearing contributed to the solution of the stated problem of improving oil seal lubrication, or that this bearing interacted with the feature of upwardly displacing the outlet from the upper lubrication chamber to produce an advantageous effect. Accordingly, the amendments of the patent specification to remove the corresponding statement of prior art and to introduce the feature of the sealed upper bearing into the characterising clause of Claim 1 had created a new teaching and was inadmissible under Article 123(2) EPC.

In any case, both of these features now stated in the characterising clause of Claim 1 were trivial and did not

go beyond the normal considerations of the skilled person. Thus, sealed bearings were well known per se, as could be seen from document (D2), and their use in any situation where it was required to prevent oil flow across the bearing was self-evident. As clear from the prior used gearing assembly shown in drawings U1 and U2, it was also known to raise the outlet point of a communication passage joining two lubrication chambers formed in a bearing retainer so as to secure a minimum oil level in the upper chamber. The degree to which the outlet was raised depended solely on how high the oil level should be, in other words on what it was required to lubricate. If in this known gearing assembly practice had shown early wear of the oil seal due to insufficient lubrication then the skilled person would have immediately recognised the necessity for increasing the height of the oil level maintained in the upper chamber.

VIII. The arguments of the Respondents in reply were essentially as follows:

What was shown in Figure 4 of the granted patent specification was an "in-house" development that had not been made available to the public before the priority date of the contested patent. It must therefore be open to the Respondents to delete this matter from the patent specification.

The starting point for evaluating inventive step was therefore to be seen in the gearing assembly according to US-A-4 359 909 (D1). That document had proposed a particular form of bearing retainer to provide lubrication for the oil seal member and bearing of the input shaft of the gearing assembly. The skilled person would have no reason for thinking that this teaching was not adequate in its own right. The Respondents had however discovered that

by maintaining a significant oil level in the lubrication chamber the seal service life could be further enhanced. Neither the fact that it could be beneficial to do this nor the specific means by which it was achieved were suggested by the state of the art.

Clearly, both the higher outlet from the lubrication chamber and the use of a sealed bearing as stated in Claim 1 contributed to the maintenance of the desired lubricant level and neither of these measures by itself would be sufficient.

It could be seen from the drawing U1 that the position of the outlet from the upper lubrication chamber was not such as could maintain an oil level even up to the lowermost region of the sealing lip of the seal member so it could not be seen how the skilled person could derive any teaching therefrom with respect to enhancing seal service life. In any case, the upper bearing provided in the prior used gearing assembly was not sealed.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC; it is therefore admissible.
2. Admissibility of the amended documents

In the original application, and the granted patent specification, Figure 4 is designated "prior art" and is stated in the description to show a "conventional change speed gearing assembly". It can be seen from the figure that the bearing for the input shaft is a sealed bearing and mention of this possibility is made in the relevant

description of the figure at lines 47 to 50, column 1 of the patent specification.

The Respondents have now clarified that the use of a sealed bearing in this context was an "in-house" development that had not been made available to the public at the relevant priority date and, with their letter dated 3 February 1993, provided supporting evidence for this contention. They have accordingly deleted Figure 4 and amended the description appropriately. Since it belongs to the established jurisprudence of the Boards of Appeal that the examination for novelty and inventive step has to be based on the objective facts, in this case the objectively determined state of the art, the Board can find no objection to the amendments mentioned above (see Decision T 006/81, OJ EPO 1982, 183).

The argument of the Appellants that the amendments effectively create a new teaching concerning the use of the sealed bearing as part of the means for solving the stated problem cannot be accepted by the Board since original dependent Claim 5 clearly states that the effect of using a sealed upper bearing is to store lubricant in the upper lubrication chamber. The relevance of this teaching to the solution of the stated problem would be immediately apparent to the person skilled in the art.

Present Claim 1 contains all of the features of granted Claim 1 together with the features that the vertical groove opens into a side portion of the upper cavity substantially at the same level as the axis of the input shaft, derived from page 7, lines 3 to 6, of the original description and that the first (upper) bearing is a sealed bearing (see the preceding paragraphs). Granted Claim 1, apart from amendment to meet the requirements of Rules 29(1) and (7) EPC corresponded to original Claim 1.

The amendments to the dependent claims and description, apart from those considered above, do not go beyond those necessary to adapt these to the terms of Claim 1.

There are, therefore, no objections to the amended documents under Articles 123(2) and (3) EPC.

3. State of the art

3.1 Document D1 discloses a change-speed gearing assembly with the features set out in the preamble of present Claim 1. As explained there the purpose of providing lubrication chambers in the bearing retainer is to improve lubrication of the first (upper) and second (lower) bearings and the seal member for the input shaft. The upper lubrication chamber receives oil from the casing via a hole in the partition wall and communicates it to the lower lubrication passage via a passage defined between a vertical groove in the bearing retainer and the partition wall.

In operation, the bearings therefore receive oil from both sides, instead of as in earlier assemblies only from the side located within the casing, and the oil seal is no longer reliant for lubrication on oil passing through the upper bearing.

3.2 On the basis of the documentary evidence furnished by the Appellants, the Board is satisfied that the change-speed gearing assembly shown in drawings U1 and U2 was made available to the public by prior use. This was no longer contested by the Respondents at the oral proceedings.

As can be seen in particular from drawing U2 the gearing assembly comprises a bearing retainer for the bearings of the output shaft and a countershaft of the gearing, which

retainer defines, together with a partition wall of the gearing casing, upper and lower lubrication chambers for the bearings and a communication passage between these chambers. Within the upper lubrication chamber there is arranged a tachometric gear. Both of the bearings are unsealed. The point at which the communication passage enters the upper lubrication chamber is above the bottom of the drive pinion of the tachometric gear carried by the output shaft but below the level of the sealing lip of the seal member arranged between the bearing retainer and the output shaft.

3.3 The cited passages of document D2 are concerned generally with seals for rolling bearings.

4. Novelty

The novelty of the gearing assembly according to present Claim 1 is not in dispute. It is distinguished from the closest state of the art disclosed in document D1 by the features set out in the characterising clause of the claim.

5. Inventive step

In relation to the state of the art according to document D3 the technical problem to be solved is the provision of a lubrication arrangement in the change-speed gearing assembly capable of effecting sufficient lubrication of the oil seal member during low speed rotation of the gears to enhance durability of the seal member.

This problem is solved by the features set out in the characterising clause of Claim 1. By virtue of the upper bearing being sealed oil flow through it back into the casing is no longer possible so that the oil level in the

upper lubrication chamber must build up until it reaches the point in the side of the chamber where the communication passage between the chambers enters it. If the upper bearing were not sealed this could not be guaranteed, so that it is clear that these two features have a combinatory effect.

For the skilled person faced with the problem stated above there are, in principle, numerous options. There is however nothing in the state of the art to suggest either that the durability of the seal member could be enhanced by sustaining the level of the oil in the lubrication chambers substantially up to the axis of the input shaft or how this sustained level is to be obtained in practice.

Even on the assumption that the skilled person would recognise from the prior art used gearing assembly shown in documents U1 and U2 that the location of the entry point of the communication passage between the chambers somewhat above the bottom of the upper chamber was intended to maintain a certain minimum oil level for lubrication of the tachometric gear, and, despite the fact that this level is below the lowermost region of the sealing lip of the seal member for the output shaft, could nevertheless derive therefrom some general teaching applicable to the lubrication of the input shaft oil seal in a gearing assembly as shown in document D1, then this teaching would not have led him to adopt the measures stated in the characterising clause of Claim 1 (entry point of communication passage and sealed bearing) to increase that level not merely such that it is somewhat above the lowermost region of the sealing lip but instead substantially up to the axis of the input shaft. In this respect, it is to be noted that although sealed bearings are well known per se, as evidenced by document D2, their

use in a gearing assembly as defined in the preamble of Claim 1, where conventionally the bearings are lubricated by the oil in the gear casing, is not a measure that the skilled person would normally adopt. Thus, this feature has to be seen in the context of the solution of the technical problem stated above and not as a routine consideration.

Accordingly, the Board comes to the conclusion that the subject-matter of present Claim 1 cannot be derived in an obvious manner from the state of the art and is therefore patentable (Article 56 EPC). Thus, this claim, together with dependent Claims 2 to 5 and the description submitted at the oral proceedings, and Figures 1 to 3 of the drawings as granted, are a suitable basis for maintenance of the patent in amended form.

Order

For these reasons, it is decided that:

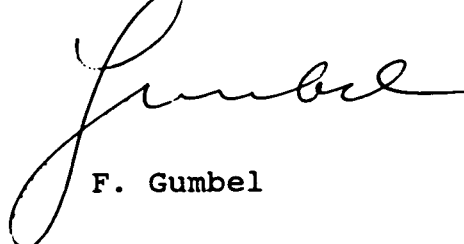
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the description and Claims 1 to 5 submitted at the oral proceedings with Figures 1 to 3 as granted.

The Registrar:



S. Fabiani

The Chairman:



F. Gumbel