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Datasheet for the decision of 28 February 2012

Case Number: T 0181/10 - 3.2.08

Application Number: 03701762.1

Publication Number: 1394430

IPC: F16D 3/41, F16D 3/38

Language of the proceedings: EN

Title of invention:
Cross coupling

Applicant:
NSK LTD.

Opponents:
Schaeffler Technologies GmbH & Co. KG
Schildberg, Peter

Headword:
-

Relevant legal provisions:
EPC R. 103(1)(a)

Relevant legal provisions (EPC 1973):
EPC Art. 56, 84, 111(1)

Keyword:
"Clarity - yes"
"Inventive step - yes"
"Reimbursement of appeal fee - no"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0181/10 - 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 28 February 2012

Appellant: (Opponent 1)
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Respondent: (Patent Proprietor)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 30 November 2009 concerning maintenance of the European patent No. 1394430 in amended form.

Composition of the Board:

Chairman: T. Kriner
Members: P. Acton
U. Tronser

Summary of Facts and Submissions

I. The appellant (opponent 1) filed a notice of appeal, received at the EPO on 29 January 2010, against the opposition division's interlocutory decision, posted on 30 November 2009 by which European patent No. EP 1 394 430 was maintained in amended form. The appeal fee was paid on the same day and the statement of grounds was filed together with the notice of appeal.

The opposition division held that auxiliary request 6 then on file met the requirements of the EPC.

II. The appellant requested that the decision under appeal be set aside, that the European patent be revoked and that the appeal fee be reimbursed.

The respondent requested that the appeal be dismissed or the patent be maintained on the basis of one of auxiliary requests 2 to 4 submitted with letter dated 18 January 2012.

III. Independent claim 1 according to the main request reads:

"A cross-shaped joint (1) for a steering apparatus, comprising:

a pair of yokes (7, 8) each of which is integrally provided with forked arms (7b, 8b) on which opposed circular holes (18) are formed;

a spider (2) having end shaft portions;

bearings (3, 22) that rotatably support said end shaft portions of the spider (2) respectively in the circular holes (18) of said yokes (7, 8), each of said bearings (3, 22) including a cup (11, 26) fitted in the circular hole (18) of the yoke (7, 8) and a plurality of rolling elements (12, 121, 122) provided between an inner circumferential surface of said cup (11, 26) and said end shaft portion of the spider (2); and

said end shaft portions of the spider (2) being interference fitted in said bearings (3, 22) via said rolling elements (12, 121, 122) (feature A),

said end shaft portions each having a cylindrical outer peripheral surface portion with which said rolling elements are in contact;

each said rolling element (12, 121, 122) is a roller shaped in such a way that its diameter decreases from a vicinity of its central portion toward both end portions in its longitudinal direction (feature B); and

a total movable amount in the axial direction of said spider shaft portion of the roller type rolling elements (12) within said bearing cup (11) is at least 0.6 mm (feature C); and

an axial hole (16) is formed on the central axis of the end shape portion of the spider; and

a pin made of a synthetic resin (17) is inserted in the hole (16) so that an end portion of the pin projects beyond an end face of the end shaft portion of the spider and engages with the bottom surface of the cup,

the pin thereby being elastically-plastically deformed."

IV. The following documents filed within the opposition period were relevant for this decision:

F2: US-A-4 129 016
F10: US-A-3 628 836.

Moreover, following documents filed together with the grounds of appeal and with the letter of 25 November 2010, respectively, played a role:

F20: JP-A-8 135 674
F20.1: translation of F20.

V. The appellant's arguments can be summarised as follows:

(a) Admissibility of the late filed document

F20 was filed together with the grounds of appeal and hence at the earliest point in time of the appeal procedure. Moreover, it represents a reaction to the introduction of the word "plastically" in claim 1 according to the sixth auxiliary request. Since this request was filed during the oral proceedings of the opposition proceedings, the appellant did not have any opportunity to react to this amendment during the opposition procedure. Hence F20 should be admitted into the appeal proceedings.

(b) Admissibility of objections filed after the grounds of appeal

The new objections introduced by letter of 25 November 2010 (lack of clarity and lack of inventive step with respect to F20 and F10) represented a reaction to the respondent's arguments and should also be admitted into the proceedings.

(c) Clarity

Claim 1 was not clear since the expression "elastically-plastically" introduced into its last feature in the context of the pin's deformation could be interpreted in two different ways. The feature could be understood to mean that the deformation takes place either elastically or plastically, or elastically and plastically.

(d) Inventive step

F20 represented the closest prior art and disclosed all the features of claim 1 apart from features A, B and C.

Starting from the joint according to F20, the problem to be solved by the alleged invention was the reduction of the generation of noise. This corresponded to the reduction of the wear and to the prolongation of the life of the joint's bearings.

Feature C did not contribute to the solution of this problem. F20 already disclosed roller type elements being able to move in the axial direction as in feature C of claim 1. The value of 0.6 mm claimed in

this feature was chosen arbitrarily and could not lead to any inventive step.

F10 addressed the issue of reducing the wear of the rollers of a bearing (see column 1, line 13). Since this document related generally to roller bearings and only in particular to their use in high speed applications (see column 1, line 5), the skilled person working in the field of joints for steering apparatuses would take this document into consideration for solving the problem posed.

F10 suggested the provision of features A and B for the reduction of wear and consequently also of the reduction of noise. Feature B was disclosed in the figures and in column 2, lines 29 to 32 and feature A was disclosed in column 1, line 14 and lines 71 to 73. It was true that F10 additionally suggested the use of a thin, flexible inner or outer race. However, since the cup used in the present invention was also flexible, the skilled person would not need to take over all the features of the bearing according to F10 but would apply only the general teaching of interference fit of the convex rolling elements of F10 to the bearing according to F20, thereby arriving in an obvious way at the subject matter of claim 1.

F2 related to a joint for a steering apparatus and would anyway be taken into consideration when the problem underlying the patent in suit was addressed.

This document disclosed rollers with convex surfaces and hence feature B. F2 did not explicitly disclose end shaft portions being interference fitted in the

bearings in the sense of feature A. However, it was well known to the skilled person that rollers were frequently interference fitted in bearings, as for example described in column 1, lines 49 to 52 of the patent in suit. Therefore, mounting the rollers of F2 in the joint according to F20 using an interference fit would be obvious.

VI. The respondent's arguments can be summarised as follows:

(a) Admissibility of the late filed documents

The 6th auxiliary request underlying the contested decision was filed during the oral proceedings before the opposition division as a reaction to the appellant's objection with respect to Article 123(2) EPC. It overlapped largely with the 4th auxiliary request, which had been known to the appellant since the beginning of the opposition proceedings. Therefore, the appellant could not have been surprised by the new request and could have submitted F20 already during the opposition proceedings.

(b) Remittal to the first instance

If F20 was admitted into the proceedings, the case should be remitted to the first instance in order to give the respondent the opportunity of having the issue considered by two instances.

(c) Admissibility of objections filed after the grounds of appeal

The statement of grounds of appeal must contain a party's complete case, and should inter alia specify expressly all the facts, arguments and evidence. The objections relating to clarity and to lack of inventive step in the light of the combination of F20 with F10 were filed later than the grounds of appeal and should hence be disregarded.

(d) Clarity

The term "elastically-plastically" was a current expression in the field of material science and unambiguously referred to an elastic and plastic deformation. Therefore, the subject matter of claim 1 was clear.

(e) Inventive step

The subject matter of claim 1 differed from the joint according to F20 by features A, B and C.

The problem underlying the invention according to claim 1 was the reduction of abnormal noise of the joint in case of vibrations of the steering apparatus. This represented a different problem from the reduction of wear and the prolongation of the bearing's life.

The skilled person would not take the teaching of F10 into consideration since it related to a completely different technical area, namely that of high speed bearings underlying high loads (see column 1, lines 46 to 49). Moreover, even if the skilled person took F10 into consideration, he would not extract the interference fit of the rollers in isolation from the

remaining features of the bearing but would transfer the complete bearing disclosed in F10 (with two races, one of which is thin and flexible and with a gap towards the housing) to the joint according to F20, thereby arriving at a bearing construction different from the one required by claim 1.

F2 belonged to the same technical area as the patent in suit; however, it did not disclose an interference fit of the rolling elements. Since it was not obvious for the skilled person to apply an interference fit to the rollers of bearings, let alone in order to reduce noise, the use of the teaching of F2 in the joint according to F20 did not lead in an obvious way to a joint according to claim 1.

Reasons for the Decision

1. The appeal is admissible.

2. Admissibility of late filed document

F20 was filed together with the grounds of appeal and hence filed late. However, filing new documents together with the grounds of appeal reinforcing the line of attack made before the department of first instance represents a normal course of action by a losing party. Hence, this document is admitted into the proceedings.

3. Remittal to the first instance

Article 111(1) EPC leaves the remittal of a case to the first instances to the Board's discretion. In the present case, taking into account the aspect of procedural efficiency, the Board decided not to remit the case to the first instance but to examine the matter of the case itself.

4. Admissibility of new objections filed after the grounds of appeal

The arguments brought forward by the appellant in its letter of 25 November 2010 was a reaction to the respondent's arguments filed as a reply to the grounds of appeal. Since this behaviour has to be considered as a normal reaction by a party in inter partes proceedings, the lines of argument filed after the grounds of appeal are also admitted into the proceedings.

5. Clarity

The wording "elastically-plastically" is a current term in connection with the deformation of a body. A substance is defined as being in the elastoplastic state if it is subjected to stress greater than its elastic limit but not so great as to reach its rupture, in this process exhibiting both elastic and plastic deformation. Therefore, the skilled person can understand the last feature of claim 1 only in the sense that the pin - when mounted between the shaft's end portion and the cup - is deformed both elastically and plastically.

Therefore, claim 1 according to the main request is clear.

6. Inventive step

6.1 F20 represents the closest prior art and discloses:

A cross-shaped joint for a steering apparatus, comprising:

a pair of yokes (7a, 7b) each of which is integrally provided with forked arms on which opposed circular holes are formed;

a spider having end shaft portions;

bearings that rotatably support said end shaft portions of the spider respectively in the circular holes of said yokes, each of said bearings including a cup (10) fitted in the circular hole of the yoke and a plurality of rolling elements (12) provided between an inner circumferential surface of said cup (10) and said end shaft portion of the spider; and

said end shaft portions each having a cylindrical outer peripheral surface portion with which said rolling elements are in contact;

the axial hole is formed on the central axis of the end shape portion of the spider; and

a pin (16) made of a synthetic resin (see [0012] of F20.1) is inserted in the hole so that an end portion

of the pin projects beyond an end face of the end shaft portion of the spider and engages with the bottom surface of the cup, the pin thereby being elastically-plastically deformed (see [0025] of F20.1).

6.2 F20 further discloses rolling elements which are movable in the axial direction of the spider shaft portion within the bearing cup (see Figures 2 and 5). However, this document does not specify by what amount the rolling elements are allowed to move.

6.3 Starting from the state of the art disclosed in F20, the problem to be solved by the joint according to claim 1 is preventing the generation of abnormal noise between shaft and bearing (see column 2, lines 23 to 24).

This problem is solved by the combination of the features of claim 1 of the main request; particularly by the features according to which the shaft portions of the spider are interference fitted in the bearings (feature A) and the rolling elements have a convex shape (feature B).

Since the value of 0.6 mm for the movable amount of the rollers claimed in feature C represents an arbitrary value and does not solve any technical problem, it cannot justify any inventive activity.

6.4 The appellant argued that the problem of reducing the noise of the joint corresponds to that of reducing the wear of the bearings and enhancing their duration and that, therefore, the skilled person would take into consideration any document relating to the reduction of

wear in roller bearings in order to solve the problem posed. However, the reduction of wear of roller bearings is related to the noise caused by wear due to the regular rotation of the bearing, while the problem underlying the patent in suit is the prevention of abnormal noise, e.g. the rattling in the case of an uneven surface of the road and ensuring a smooth steering feeling (see column 2, lines 22 to 24).

6.5 While the patent in suit refers specifically to a cross-shaped joint for a steering wheel where the bearings are subjected to a relatively low load and rotational speed, F10 relates to a bearing for high speed applications (see column 1, lines 5 and 6) and high loads (see column 1, lines 46 to 48). Moreover, F10 does not address the problem of reduction of noise under abnormal conditions but rather the reduction of the rollers' end wear (see column 1, lines 13 and 14).

For this purpose F10 discloses roller bearings interference fitted between two races, one of the races being thin and designed to flex under the load of the bearing. The bending of the race is rendered possible by a space (A) present between the race's outer surface and the inner surface of the housing adjacent thereto (see column 2, lines 12 to 14). The combination of all these features enables the bearing according to F10 to increase its longevity.

With respect to these findings, the skilled person would not take the teaching of F10 into consideration for solving the problem stated above.

Even if the skilled person took F10 into consideration, he would insert the whole bearing disclosed in this document in the joint of F20 (with the two races and the gap towards the housing) and would not extract exclusively the features relating to the interference fit and the convex rollers. He would not thereby arrive at the subject matter of claim 1 since this claim requires that the rolling elements are provided directly between the shaft portion of the spider and the inner surface of the cup.

Therefore, even applying the teaching of F10 to the joint according to F20 would not lead in an obvious way to the subject matter of claim 1.

6.6 F2 refers to a joint for a steering apparatus and hence to the same technical area as the patent in suit.

F2 discloses a joint with convex rolling elements according to feature B. However, it does not disclose that shaft portions are interference fitted in the bearing via the rolling elements. The appellant failed to prove that it is general practice to use interference fit for the different parts of a bearing. Moreover, it could not show that such a fit is used in order to reduce the noise of the joint in abnormal conditions. Paragraph [0006] of the patent in suit - cited by the appellant - does not disclose an interference fit in combination with convex rolling elements in order to solve the problem posed, but on the contrary underlines the drawbacks of interference fit. Therefore, the combination of the teaching of F2 with the joint according to F20 does not lead to the subject matter of claim 1 even taking into

consideration the skilled person's common general knowledge.

6.7 Hence the subject matter of claim 1 involves an inventive step.

7. Reimbursement of appeal fee

Since the appeal was dismissed, the request for reimbursement of the appeal fee cannot be allowed (Rule 103(1)(a) EPC).

Order

For these reasons it is decided that:

1. The appeal is dismissed.

2. The request for reimbursement of the appeal fee is rejected.

The Registrar: The Chairman:

V. Commare T. Kriner