

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 19 June 2018**

Case Number: T 2296/15 - 3.2.08

Application Number: 05783315.4

Publication Number: 1795770

IPC: F16C33/58, F16C19/26, F16C33/34

Language of the proceedings: EN

Title of invention:
CYLINDRICAL ROLLER BEARING

Patent Proprietor:
NTN Corporation

Opponent:
SKF GmbH

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2296/15 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 19 June 2018

Appellant: SKF GmbH
(Opponent) Gunnar-Wester-Strasse 12
D-97421 Schweinfurt (DE)

Respondent: NTN Corporation
(Patent Proprietor) 3-17, Kyomachibori 1-chome,
Nishi-ku,
Osaka-shi, Osaka 550-0003 (JP)

Representative: Grosse Schumacher Knauer von Hirschhausen
Patent- und Rechtsanwälte
Nymphenburger Strasse 14
80335 München (DE)

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 26 October 2015
rejecting the opposition filed against European
patent No. 1795770 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairwoman P. Acton
Members: M. Alvazzi Delfrate
C. Schmidt

Summary of Facts and Submissions

- I. By its decision posted on 26 October 2015 the opposition division rejected the opposition against European patent No. 1 795 770.
- II. The appellant (opponent) lodged an appeal against this decision in the prescribed form and within the prescribed time limits.
- III. Oral proceedings before the board of appeal were held on 19 June 2018.
- 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 as granted or on the basis of one of auxiliary requests 1-3 filed with letter of 30 June 2016.

- V. Claim 1 of the main request reads as follows:

"A cylindrical roller bearing (10) comprising:

a track ring (20) having flanges (22) on both sides of its track surface (21), and provided with a relief groove (23) at a corner in which at least one of said flanges (22) intersects with the track surface (21);
and

a cylindrical roller (40) arranged so that it can freely roll on said track surface (21) and provided with a chamfer (42) at a corner part in which its rolling surface (41) intersects with each end surface (43),

wherein when it is assumed that the height of the chamfer (42) from said rolling surface (41) is "h" and the curvature radius of the chamfer (42) is "R", the relation such that $1.0 \leq R/h \leq 1.5$ is satisfied, and

the height "h" of said chamfer (42) is smaller than the height "H" of the relief groove (23) from said track surface (21) and

characterized in that

the relationship between the diameter of said cylindrical roller (40) and the height of said relief groove (23) satisfies one of the following conditions:

- the diameter of said cylindrical roller (40) is more than 24 mm but not more than 30 mm, and the height of said relief groove (23) is 1.2 mm or less; or
- the diameter of said cylindrical roller(40) is more than 30 mm but not more than 40 mm, and the height of said relief groove (23) is 1.4 mm or less; or
- the diameter of said cylindrical roller(40) is more than 40 mm but not more than 50 mm, and the height of said relief groove (23) is 1.6 mm or less."

The auxiliary requests are not relevant for the present decision.

VI. The following documents played a role for the present decision:

E5: US -B- 6,379,049; and

E9: JP -A- 2004-11821 (and translation E9a).

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

Figures 10-13 of E9 represented the closest prior art. They disclosed all the features of the preamble of claim 1. In respect of the condition $1.0 \leq R/h \leq 1.5$, it was clear from Figure 11, which showed no edges between the chamfer and the rolling surface and the end surfaces, that R was about the same as h or at most slightly smaller, so that said condition was satisfied.

In any event, in view of the common general knowledge of the person skilled in the art, it was implicit or at least obvious to provide said geometry because it was known that edges between the chamfer and the end surfaces and the rolling surface were to be avoided.

As to the features of the characterising portion of claim 1, they solved the problem of providing concrete dimensions for the bearing of E9. E5, the teaching of which was also applicable to cylindrical bearings, taught to keep the dimensions of the relief groove small, with a concrete example of 0.3-1.0 mm in section "(3) Workability of Flange Undercut", in column 9, lines 50-53. Hence, it was obvious to provide a bearing with the dimensions of the characterising portion of claim 1.

Therefore, the subject-matter of claim 1 did not involve an inventive step.

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

The subject-matter of claim 1 differed from the bearing of Figures 10-13 of E9 in relation not only to the features of the characterising portion but also to the condition $1.0 \leq R/h \leq 1.5$. This condition could not be derived from the drawings of E9 which were merely schematic. Nor could it be considered as implicit or obvious for the person skilled in the art in view of his common general knowledge. Indeed, Figure 2 of E5 clearly showed that chamfers with edges were also considered by the person skilled in the art.

By means of the distinguishing features the claimed invention solved the problem of increasing service life.

The prior art E5 did not render it obvious to solve said problem by means of the claimed features. This document related primarily to tapered rollers and not cylindrical rollers. Moreover, the dimensions disclosed in column 9, lines 50-52, related to a specific geometry that was different from that claimed in the patent in suit. Finally, the claimed invention resided in the combination of all conditions on R, h and H, which were all necessary to achieve the desired effect. It was not obvious to provide this combination of features.

Therefore, the subject-matter of claim 1 involved an inventive step.

Reasons for the Decision

1. It is common ground that E9 represents the closest prior art. This document (reference is made to the translation E9a) undisputedly discloses in Figures 10-13, relating to the prior art, a cylindrical roller

bearing comprising a track ring (12) having flanges (18) on both sides of its track surface (12a), and provided with a relief groove (22) at a corner in which at least one of said flanges intersects with the track surface and a cylindrical roller arranged so that it can freely roll on said track surface and provided with a chamfer at a corner part in which its rolling surface intersects with each end surface, wherein the height of said chamfer is smaller than the height of the relief groove from said track surface (see Figure 11).

2. The preamble of claim 1 also stipulates that $1.0 \leq R/h \leq 1.5$, wherein "h" is the height of the chamfer from said rolling surface and "R" is the curvature radius of the chamfer. The appellant argued that it was clear from Figure 11 (reproduced hereafter), which showed no edges between the chamfer and the rolling and end surfaces, that R was about the same as h or at most slightly smaller, so that the relation above was satisfied (Note: in Figure 11 "h1" indicates the height of the relief groove, which is called "H" in the patent in suit).

conditions of the characterising portion of claim 1 but also by the condition $R/h \leq 1.5$.

3. When the cylindrical roller is skewed on the track surface of the track ring, the boundary between the end surface and the chamfer of the cylindrical roller comes into contact with the flange surface of the track ring. In order to reduce the contact surface pressure between the cylindrical roller and the flange surface of the track ring, it is desirable for the edge at the boundary of the cylindrical roller to be reduced as much as possible so that a continuously curved surface is provided. Thus, according to the present invention, in order to reduce the edge at the boundary, the ratio of the curvature radius of the chamfer to the height of the chamfer of the cylindrical roller is set to be within a range of 1.0 to 1.5 (paragraph [00026]).

In the case where the track ring is the inner ring, the higher the relief groove from the track surface, the higher the peripheral velocity of the boundary between the relief groove and the flange surface. As a result, the contact surface pressure between the cylindrical roller and inner ring becomes high. In order to reduce the contact surface pressure, the height of the relief groove is to be reduced. This is obtained by the features of the characterising portion of the claim (paragraph [0029]).

Therefore, the problem solved by the claimed invention is not merely the choice of suitable dimensions for the bearing of E9, but rather the provision of a bearing with increased service life.

4. The prior art E5 does not disclose that the distinguishing features are advantageous for solving said problem.

Moreover, even accepting, for the sake of argument, that it was obvious for the person skilled in the art, in view of his common general knowledge and E5 to avoid edges in connection with the chamfer and to keep the relief groove as small as possible (with the dimension disclosed in column 9, lines 50-52, of E5), the person skilled in the art would have no obvious reason to do it while keeping the other conditions of claim 1 satisfied. This is in particular true in respect of the condition $h < H$ (height of the chamfer smaller than the height of the relief groove), which sets a lower limit to the dimension of the relief groove. Indeed, the examples of the inventive bearing given in E9 (Figures 1-4) of this document all relate to bearings wherein, contrary to the prior art bearings of Figures 11-13, the condition $h < H$ is not satisfied.

Therefore, it was not obvious to provide the features of claim 1 in combination.

5. Thus, the subject-matter of claim 1 involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairwoman:



G. Rauh

P. Acton

Decision electronically authenticated