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**Datasheet for the decision
of 30 November 2022**

Case Number: T 1945/19 - 3.2.08

Application Number: 13766783.8

Publication Number: 2901030

IPC: F16C33/10

Language of the proceedings: EN

Title of invention:

JOURNAL BEARING AND METHOD OF FACILITATING HYDRODYNAMIC OIL
FLOW, LOAD CAPACITY AND OPTIMIZATION OF BEARING PERFORMANCE

Patent Proprietor:

General Electric Company

Opponent:

Raytheon Technologies Corporation

Headword:

Relevant legal provisions:

EPC Art. 54, 83, 56

RPBA 2020 Art. 13(2)

Keyword:

Novelty - main request (no)

Sufficiency of disclosure - (no)

Inventive step - auxiliary request 9 (no)

Amendment after summons - taken into account (no)

Decisions cited:

Catchword:



Beschwerdekammern

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Case Number: T 1945/19 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 30 November 2022

Appellant: General Electric Company
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
24 April 2019 concerning maintenance of the
European Patent No. 2901030 in amended form.**

Composition of the Board:

Chairman C. Schmidt
Members: M. Foulger
A. Björklund

Summary of Facts and Submissions

I. The opposition decision decided that the patent could be maintained in amended form on the basis of auxiliary request 4 filed during the oral proceedings before the opposition division.

The division found that:

- the subject-matter of claim 10 of the main request was not new in view of D2 (US 5,391,125 A),
- claim 1 of auxiliary request 1 was not clear,
- the subject-matter of claims 9 and 14 of auxiliary request 2 was not new in view of D2,
- the subject-matter of claim 1 of auxiliary request 3 was not new (Article 54(3) EPC) in view of D11 (WO 2013/032610 A1).

II. The patent proprietor and the opponent filed appeals against this decision.

III. Oral proceedings took place before the Board on 30 November 2022.

IV. Appellant I (proprietor) requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of one of auxiliary requests 1 - 8, auxiliary request 8a, 9, 9a or to the 10th to 12th auxiliary request, filed during the oral proceedings before the Board (auxiliary requests 8a, 9 and 9a) or with letter dated 4 September 2019 (all other auxiliary requests).

V. Appellant II (opponent) requested that the decision under appeal be set aside and that the patent be

revoked in its entirety.

VI. The independent claims of the main request (patent as granted) read as follows:

"1. A journal bearing (71, 92, 122, 150, 160) for use in an epicyclical gearbox (70, 90, 120), the journal bearing, comprising:

a journal bearing body (72, 94, 124) having a fixed arc shaped and subject to deformation under a high pressure event;

a journal pin (74, 96, 126, 152, 162) disposed in the journal bearing body; and

at least one lubricating fluid inlet (82, 106, 134, 154, 164), wherein the fluid inlet is configured to provide for an input of a lubricating fluid (80, 104, 136) in a loaded arc portion (84, 108, 138) proximate at least one high pressure point (78, 79, 100, 102, 132) exerted upon the journal bearing body during a high pressure event, thereby permitting a free flow of a lubricating fluid (80) there between the journal pin and the journal bearing body during the high pressure event."

"10. An epicyclical gearbox, comprising:

a sun gear (26),

a plurality of planet gears (16) positioned about the sun gear and in meshing relationship therewith;

a plurality of journal bearings (71, 11, 92, 122), each rotatably supporting one of the plurality of planet gears (16), each of the plurality of journal bearings configured to include a journal bearing body (25, 72, 94, 124) having a fixed arc shape and subject to deformation under a high pressure event, a journal pin (14, 74, 94, 124) disposed at least partially within the journal bearing body, and at least one lubricating

fluid inlet (82, 106, 134); and
a planet carrier (12) configured in fixed relationship
with each of the plurality of journal pins (14, 74, 96,
126),
wherein the at least one lubricating fluid inlet (82,
106, 134) of each of the plurality of journal bearings
is configured to provide for an input of a lubricating
fluid in a loaded arc portion (84, 108, 138) of the
journal bearing body, proximate a high pressure point
(78, 79, 102, 132) exerted upon the journal bearing
body during a high pressure event, thereby permitting a
free flow of a lubricating fluid (80, 104, 136) there
between the journal pin and the journal bearing body
during the high pressure event."

"15. A method of facilitating a hydrodynamic oil flow
in a planet gear journal bearing (11, 71, 92, 122, 150,
160), the method comprising:
providing a fixed arc journal bearing body (25, 72, 94,
124);
disposing a journal pin (14, 74, 96, 126, 152, 162)
proximate the fixed arc journal bearing body; and
providing an input lubricating fluid flow (80, 104,
136) within the fixed arc journal bearing body at a
lubricating fluid inlet (82, 106, 134, 154, 164), the
lubricating fluid inlet configured to provide for the
input of a lubricating fluid (80, 104, 136) in a loaded
arc portion (84, 108, 138) of the journal bearing body,
proximate a high pressure point (78, 79, 102, 132)
exerted upon the journal bearing body during a high
pressure event, thereby permitting a free flow of a
lubricating fluid (80, 104, 136) there between the
journal pin and the journal bearing body during the
high pressure event."

VII. Auxiliary requests:

In the auxiliary requests as set out below, the following features have been added to the independent claims:

"wherein the journal pin comprises at least one lubricating fluid inlet.." (Feature A)

"wherein the fluid inlet is positioned within the loaded arc portion." (Feature B)

"wherein the journal pin (74) comprises a non-circular journal pin (96) configured to mimic the fixed arc shape of each journal bearing body (72) thereby permitting a free flow of a lubricating fluid (80) there between during the high pressure event." (Feature C)

"wherein the journal pin (74) comprises a fixed, non-rotatable, non-circular journal pin (96) configured to mimic the fixed arc shape of each journal bearing body (72) thereby permitting a free flow of a lubricating fluid (80) there between during the high pressure event." (Feature C')

Auxiliary request 1:

Dependent claim 12 reads:

"The epicyclical gearbox of claim 10, wherein the journal pin (74) comprises a non-circular journal pin (96) configured to mimic the fixed arc shape of each journal bearing body (72) thereby permitting a free flow of a lubricating fluid (80) there between during the high pressure event." (Feature C)

Auxiliary request 2:

Claim 9 corresponds to independent claim 10 of the main request. Dependent claim 11 is the same as dependent claim 12 in auxiliary request 1.

Auxiliary request 3:

Independent claim 9 has features A and B added to claim 10 of the main request. Dependent claim 11 is the same as dependent claim 12 in auxiliary request 1.

Auxiliary request 4:

Independent claim 9 is the same as claim 9 in auxiliary request 3. Dependent claim 11 is the same as dependent claim 12 in auxiliary request 1.

Auxiliary request 5:

Independent claim 9 is claim 1 of the main request with feature C added.

Auxiliary request 6:

Independent claim 9 has features A, B and C added to claim 10 of the main request.

Auxiliary request 7:

Independent claim 9 has features A, B and C' added to claim 10 of the main request.

Auxiliary request 8:

Independent claim 1 corresponds to claim 10 of the main request. Dependent claim 3 is the same as dependent claim 12 in auxiliary request 1.

Auxiliary request 9:

Claim 1 of the 9th auxiliary request comprises claim 10 of the main request with the addition of features A and B. Moreover, dependent claim 3 has been deleted.

Auxiliary request 8A

The final part of claim 1 of the main request is modified as follows:

"wherein the at least one lubricating fluid inlet (82,

106, 134) of each of the plurality of journal bearings is ~~configured to provide for an input of a lubricating fluid~~ positioned in a loaded arc portion (84, 108, 138) of the journal bearing body, proximate a high pressure point (78, 79, 102, 132) exerted upon the journal bearing body during a high pressure event, and is configured to provide for an input of a lubricating fluid at that position, thereby permitting a free flow of a lubricating fluid (80, 104, 136) there between the journal pin and the journal bearing body during the high pressure event."

Auxiliary request 9A

Claim 1 of auxiliary request 8A is further modified as follows:

"and a journal pin (14, 74, 94, 124) disposed at least partially within the journal bearing body, the journal pin comprising ~~and~~ at least one lubricating fluid inlet (82, 106, 134); and"

Auxiliary request 10

Claim 1 corresponds to independent claim 9 of auxiliary request 5.

Auxiliary request 11

Claim 1 corresponds to independent claim 9 of auxiliary request 6.

Auxiliary request 12

Claim 1 corresponds to independent claim 9 of auxiliary request 7.

VIII. Appellant II argued essentially as follows:

a) Main request

The subject-matter of claim 10 was not new with respect to D2. The claim had to be read such that the inlet was merely suitable to provide for an input of a lubricating fluid in a loaded arc portion. It was clear that oil input through the conduit 53 and 54 would be distributed around the periphery of the bearing and would at some point arrive at the loaded arc portion.

b) Auxiliary request 1 - Claim 12 - sufficiency of disclosure

The patent did not teach the skilled person how to carry out feature C of dependent claim 12. It was not clear how a pin could mimic a shape of the journal bearing body. Moreover, Figs. 6 and 7 of the patent showed different loading conditions and different positions of the high pressure event which should logically lead to a different extent of the loaded arc portion. Thus, the invention was not described in a manner sufficiently clear and complete for it to be carried out by the skilled person.

c) Auxiliary requests 2 - 8, 10 - 12

These also contained feature C or feature C' and were therefore also not sufficiently disclosed.

d) Auxiliary request 9 - Inventive step

Starting from D2 as closest prior art, the skilled person would use trial and error to determine the best input location for the oil feed. It had to be noted that the loaded arc portion shown in Fig. 7 of the patent extended for approximately 120° such that the skilled person would have no difficulty in putting the inlet in this portion.

The subject-matter of claim 1 did not therefore involve an inventive step.

e) Auxiliary requests 8A and 9A

The clarity objection mentioned by the Board in their communication had already been raised by appellant II in their statement setting out the grounds of appeal. This communication did not raise any new issues that could be regarded as exceptional circumstances.

IX. Appellant I argued essentially as follows:

a) Main request - Novelty with respect to D2

D2 did not contain any teaching as to where the loaded arc portion was located. The term "input" in the claim had to be interpreted as meaning "put in". This required more than a mere "suitability for" but rather meant that the oil was fed directly to the loaded arc portion.

b) Auxiliary request 1 - Claim 12 - Sufficiency of disclosure

When the bearing was loaded then it deformed. The skilled person would know how to model this deformation using, for example, finite element analysis. They would then use this information to design the pin, i.e. mimic the fixed arc shape of the journal bearing body.

c) Auxiliary requests 2 - 8, 10 - 12

The above argument regarding features C and C' applied equally to these requests.

d) Auxiliary request 9 - Inventive step

D2 did not mention a loaded arc portion. There was therefore no motivation for the skilled person to arrange the fluid input in the loaded arc portion.

e) Auxiliary request 8A and 9A

These were filed as a response to a clarity objection raised in the Board's communication. This was an exceptional circumstance in the sense of Article 13(2) RPBA 2020 and thus these requests should be admitted into the proceedings.

Reasons for the Decision

1. Main Request - Novelty with respect to D2

1.1 Claim 10

It is common ground that D2 discloses the following features of claim 10 (references in parentheses refer to D2):

An epicyclical gearbox (col. 2, l. 34), comprising:
a sun gear (5),
a plurality of planet gears (7) positioned about the sun gear and in meshing relationship therewith;
a plurality of journal bearings (52), each rotatably supporting one of the plurality of planet gears, each of the plurality of journal bearings configured to include a journal bearing body having a fixed arc shape and subject to deformation under a high pressure event, a journal pin (13) disposed at least partially within the journal bearing body, and at least one lubricating fluid inlet (53, 54); and

a planet carrier (6) configured in fixed relationship with each of the plurality of journal pins, wherein the at least one lubricating fluid inlet of each of the plurality of journal bearings is configured to provide for an input of a lubricating fluid in a portion of the journal bearing body.

Appellant 1 did however dispute that the feature whereby the fluid inlet was configured to provide for an input of the lubricating fluid in a loaded arc portion proximate a high pressure point exerted upon the journal bearing body during a high pressure event, thereby permitting a free flow of a lubricating fluid there between the journal pin and the journal bearing body during the high pressure event. D2 did not mention a loaded arc portion nor did it give any indication where this might be. Appellant 1 emphasised that "input" must be understood as meaning "put in". Thus, the claim should be understood such that the input was indeed located in the loaded arc portion.

The Board considers that the language of the claim, "configured to provide for", merely requires that the input be suitable for oil being fed into the bearing which at some point would arrive at the "loaded arc portion", on the principles of the interpretation of a statement of the purpose of a claimed device (or product) see Case Law of the Boards of Appeal, 10th edition, 2022, I.C.8.1.5. The oil input into the bearing through the input 53, 54 will inevitably distribute itself around the circumference of the journal bearing body and, hence, arrive at the loaded arc portion. As the gearbox disclosed in D2 arrives at the claimed technical effect of providing a fluid input in the loaded arc portion then this feature is known from D2.

The subject-matter of claim 10 is therefore not new.

2. Auxiliary request 1 - sufficiency of disclosure of dependent claim 12

Feature C was objected to. This feature reads "wherein the journal pin (74) comprises a non-circular journal pin (96) configured to mimic the fixed arc shape of each journal bearing body (72) thereby permitting a free flow of a lubricating fluid (80) there between during the high pressure event."

Appellant 1 explained that, in use, the journal bearing body deformed. The feature meant that the pin was designed such that its shape "mimicked" that of the deformed journal body. According to Appellant 1 the skilled person using finite element analysis would have no difficulty in modelling the deformation of the journal body. They would then adapt the shape of the pin, i.e. mimic, accordingly. Appellant 1 referred to paragraphs [0024] and [0029] of the patent and argued that this would allow the skilled person to carry out the invention.

The Board considers that the description does not disclose the invention sufficiently for the skilled person to carry it out. The description does not specify under which loading conditions the deformation is measured. This is problematic because according to the patent Figs. 6 and 7, the wear point changes between a loaded (Fig. 7) and a non loaded condition (Fig. 6). The skilled person is thus not instructed how to arrive at the invention.

Moreover, the patent does not teach how the fixed arc

shape can be "mimicked". If the shape of the journal changes then it is not possible that the shape of the pin copies, i.e. "mimics", it. Nor is there any guidance on how all the different types of bearings listed in paragraph [0024] should be "mimicked".

Hence, contrary to Article 83 EPC, the patent does not describe the invention in a manner sufficiently clear and complete for the skilled person to carry it out.

3. Auxiliary requests 2 - 8, 10 - 12

These requests all contain feature "C" as follows:

Auxiliary request 2 - in independent claim 1 and dependent claim 11.

Auxiliary request 3 - in independent claim 1 and dependent claim 11.

Auxiliary request 4 - in independent claim 1 and dependent claim 11.

Auxiliary request 5 - in independent claim 1 and dependent claim 9.

Auxiliary request 6 - in independent claim 1 and dependent claim 9.

Auxiliary request 7 - in independent claim 1 and dependent claim 9.

Auxiliary request 8 - in dependent claim 3.

Auxiliary request 10 - in independent claim 1.

Auxiliary request 11 - in independent claim 1.

Auxiliary requests 7 and 12 - these contains feature C' in independent claim 1. The argumentation in paragraph 2 above also applies to this feature. This was not disputed by appellant I.

Therefore these requests also do not comply with the requirements of Article 83 EPC and, hence, are also not

allowable.

4. Auxiliary request 9

4.1 Admission

This request was filed during oral proceedings. The amendment was the deletion of dependent claim 3 to overcome the Article 83 EPC objection. This was therefore a reaction to the course of the oral proceedings to which the appellant II did not have any objections. The Board therefore admitted this request into the proceedings.

4.2 Inventive step

D2 is the closest prior art and it is common ground that this document discloses the features identified above (see paragraph 1 - Novelty).

The subject-matter of claim 1 differs from this known epicyclical gearbox in that "the at least one lubricating fluid inlet is positioned within the loaded arc portion."

The problem to be solved may be regarded as being to improve the lubrication and hence the service life of the bearing.

It is undisputed that D2 does not contain any teaching about such a loaded arc portion. The skilled person would try to ensure that the lubricating oil was fed to the part of the bearing which most needed it. This could be determined either through trial and error or finite element analysis. The skilled person would thus investigate the wear of the prior art bearing and place

the lubricating fluid input appropriately. They would do this as part of their daily work and without needing a specific reference in the prior art.

The skilled person would inevitably place the fluid inlet in the loaded arc portion because this is where the most wear takes place.

Moreover, the extent of the loaded arc portion is large - Fig. 7 appears to show an arc of around 120° , if the loaded arc portion is considered as being between pinch points as shown in Fig.3 as argued by appellant II then it is 180° . Thus, the skilled person would have no particular difficulty in selecting an input in this area. The location of the loaded arc portion also depends on the direction of rotation of the gearbox such that the fluid input shown in D2 would be outside the loaded arc portion in one direction but in the opposite direction would fall inside the loaded arc portion.

The subject-matter of claim 1 does not involve an inventive step.

5. Admission of auxiliary requests 8A and 9A

These requests were filed after the Board had summoned the parties to oral proceedings. Their admission is thus subject to Article 13(2) RPBA. Appellant II argued that the Board's communication raised issues which the amendments attempted to resolve.

It is correct that the Board's communication raised issues under Article 84 EPC with respect to the first auxiliary request. This objection was however already contained in the Appellant's statement setting out the

grounds of appeal. Thus, the Board's communication did not raise any new issues which could be regarded as being exceptional circumstances in the sense of Article 13(2) RPBA.

Hence, the Board did not admit auxiliary requests 8A and 9A into the proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



C. Moser

C. Schmidt

Decision electronically authenticated