

Internal distribution code:

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

**Datasheet for the decision
of 3 December 2024**

Case Number: T 2009/21 - 3.2.08

Application Number: 10162074.8

Publication Number: 2385247

IPC: F16H1/46, F03D80/70, F03D15/00

Language of the proceedings: EN

Title of invention:
An electromechanical device

Patent Proprietor:
The Switch Engineering Oy
Flender Finland Oy

Opponent:
ZF Friedrichshafen AG

Headword:

Relevant legal provisions:
EPC Art. 83, 56

Keyword:
Sufficiency of disclosure - (yes)
Inventive step - (yes)



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

Case Number: T 2009/21 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 3 December 2024

Appellant: ZF Friedrichshafen AG
(Opponent) Löwentaler Strasse 20
88046 Friedrichshafen (DE)

Respondent: The Switch Engineering Oy
(Patent Proprietor 1) Yrittäjänkatu 11
65380 Vaasa (FI)

Respondent: Flender Finland Oy
(Patent Proprietor 2) Vesangatie 1
P.O. Box 158
40101 Jyväskylä (FI)

Representative: Michalski Hüttermann & Partner
Patentanwälte mbB
Kaistraße 16A
40221 Düsseldorf (DE)

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
8 September 2021 concerning maintenance of the
European Patent No. 2385247 in amended form.

Composition of the Board:

Chairwoman P. Acton
Members: M. Foulger
C. Schmidt

Summary of Facts and Submissions

- I. With the decision posted on 8 September 2021, the opposition division came to the conclusion that, taking into account the amendments made by the patent proprietor in the opposition proceedings, the patent and the invention to which it related met the requirements of the EPC.
- II. The opponent filed an appeal against this decision. They request that the decision be set aside and that the patent be revoked.
- III. The respondent (patent proprietor) requests that the appeal be dismissed or in the alternative that the patent be maintained in amended form based on auxiliary requests 1 or 2 filed with the reply to the appeal on 6 April 2022.
- IV. Oral proceedings took place before the Board on 3 December 2024.
- V. Claim 1 reads:

" **(1.1)** An electromechanical device comprising:
(1.2) - a mechanical interface structure (101) for connecting to an external rotating element,
(1.3) - an electrical machine (102-104, 117), and
(1.4) - one or more gear stages (105-112) on a mechanical power transmission path between the mechanical interface structure and a rotor of the electrical machine,
(1.5) - mechanical structures (114-115) constituting a common lubricant oil room for both the one or more gear stages and the electrical machine, and

(1.6) oil channels (116a) for directing at least a part of lubricant oil circulated in the electromechanical device to flow via the one or more gear stages and at least a part of the lubricant oil to flow via bearings (118, 119) of the electrical machine,

(1.7) - wherein the one or more gear stages consists of a first planet-gear stage (105-108) and

(1.8) a second planet-gear stage (109-112),

(1.9) a planet-wheel carrier (105) of the first planet-gear stage constituting a part the mechanical interface structure,

(1.10) a sun gear shaft (108) of the first planet-gear stage being connected to a planet-wheel carrier (109) of the second planet-gear stage, and

(1.11) a sun gear shaft (112) of the second planet-gear stage being connected to the rotor of the electrical machine (103, 104, 117),

(1.12) and wherein the electromechanical device further comprises

connection elements (120) on the outer surface of the electromechanical device for attaching to an external mechanical structure,

(1.13) a first mechanical structure (113) supporting a stator (102) of the electrical machine with respect to the connection elements,

(1.14) a second mechanical structure (114) supporting a gear ring (110) of the second planet-gear stage with respect to the connection elements, and

(1.15) a third mechanical structure (115) supporting the rotor of the electrical machine with respect to the gear ring of the second planet-gear stage,

(1.16) the first mechanical structures being arranged to conduct tensions caused by electromagnetic forces acting on the stator of the electrical machine to the connection elements

(1.17) so that the tensions are arranged to bypass the

second and third mechanical structures,
(1.18) wherein a frame (103) of the rotor has a cupped shape opening towards the one or more gear stages and
(1.19) the third mechanical (115) supporting the rotor of the electrical machine is arranged to extend to the semi-closed space defined by the cupped shape and
(1.20) the bearings (118, 119) of the electrical machine are located in the semi-closed space defined by the cupped shape."

VI. The following documents have been referred to in appeal proceedings:

D1: DE 85 13 219 U1
D2: JP 5300692 A
D3: WO 2004/027260 A1
D5: DE 41 34 553 A1
D7: EP 2 031 273 A2
D8: WO 96/15575 A1

VII. The essential arguments of the parties are summarised below in the "Reasons for the Decision".

Reasons for the Decision

1. Sufficiency of disclosure

The appellant argued that the claimed invention was not disclosed in a manner sufficiently clear and complete for the skilled person to carry it out.

The appellant argued that because the rotor moved subject to the electromagnetic forces generated by the stator, there was inevitably a reaction force due to the action of the satellite gears on the ring gear. This reaction force was transmitted through the second

mechanical structure 114 to the first mechanical structure 113. Hence, in the embodiment shown in Fig. 1 the forces did not bypass the second mechanical structure as claimed. Moreover, it was not explained in the patent how it was possible for these forces to bypass the second mechanical structure. Consequently the skilled person was not able to carry out the claimed invention.

The Board considers that the claim (in particular features 1.16 and 1.17) is to be understood in that the mechanical forces ("tensions" in the language of the claim) which are due to the electromagnetic forces acting on the stator of the electrical machine must not pass through the second and third mechanical structures. This is indeed the case with the arrangement illustrated in Fig. 1 because the forces from the stator are transmitted directly through the first mechanical structure 113. The reaction forces due to the movement of the rotor cannot be considered as being electromagnetic forces acting on the stator within the meaning of feature 1.16.

Hence, the embodiment described is in accordance with the claimed invention and so the skilled person, on the basis of this, could carry it out. The invention is thus disclosed in a manner sufficiently clear and complete for it to be carried out by a skilled person.

2. Inventive step

2.1 Starting from the disclosure of D8 in combination with the teaching of D1

It is common ground that the feature F1.20, whereby the bearings of the electrical machine are located in the

semi-closed space defined by the cupped shape, is not disclosed in D8.

This distinguishing feature allows the components of the device to be nested within each other and hence the device is compacter. Therefore, the objective technical problem to be solved is to provide a more compact electromechanical device.

It is correct, as argued by the appellant, that D1 is also concerned with this problem. The appellant further argued that the skilled person, starting from the arrangement shown in D8, would retain the gearbox of the D8 and simply change the motor. According to the appellant, the skilled person would thereby arrive at the subject-matter of claim 1.

The Board considers however that although the skilled person would recognise that D1 provided an axially compact arrangement, they would not apply the teaching of D1 to the electromechanical device of D8. Simply replacing the motor of D8 with that of D1 would result in a larger arrangement due to the fact that D1 discloses a motor in which the rotor is radially outside the stator.

Therefore, the subject-matter of claim 1 involves an inventive step starting from the disclosure of D8 in combination with the teaching of D1.

2.2 Starting from the disclosure of D8 in combination with the teaching of D2

As argued by the appellant, the above reasoning regarding the combination of the teachings of D8 with those of D1 applies equally to the combination of the

teachings of D8 and D2.

Given the findings above with respect to the combination of the teachings of D8 and D1, the subject-matter of claim 1 also involves an inventive step in view of the teachings of D8 and D2.

- 2.3 Starting from the disclosure of D8 in combination with the teaching of D3

D3 discloses generators for a wind power installation and as such are large machines.

The Board considers that the skilled person when starting from the electromechanical device of D8 as the closest prior art and seeking to solve the problem of providing a more compact device would have no reason to look to D3 for a solution.

There is no hint in D3 that would suggest to the skilled person that a more compact arrangement could be achieved by following its teachings.

The skilled person would therefore not combine the teachings of D8 and D3.

- 2.4 Starting from the disclosure D8 in combination with the teaching of D7

Like D3, D7 also relates to a wind turbine generator which is a large machine. The skilled person would not therefore recognise that the problem posed above could be solved by the teachings of this document.

2.5 Considering D5 as closest prior art

The appellant argued that the subject-matter of claim 1 differed from the device disclosed in D5 only by features 1.7 to 1.10. These features related to the provision of a two stage gearbox. This - according to the appellant - was an obvious measure for the skilled person wanting to further increase the speed ratio between input and output of the device.

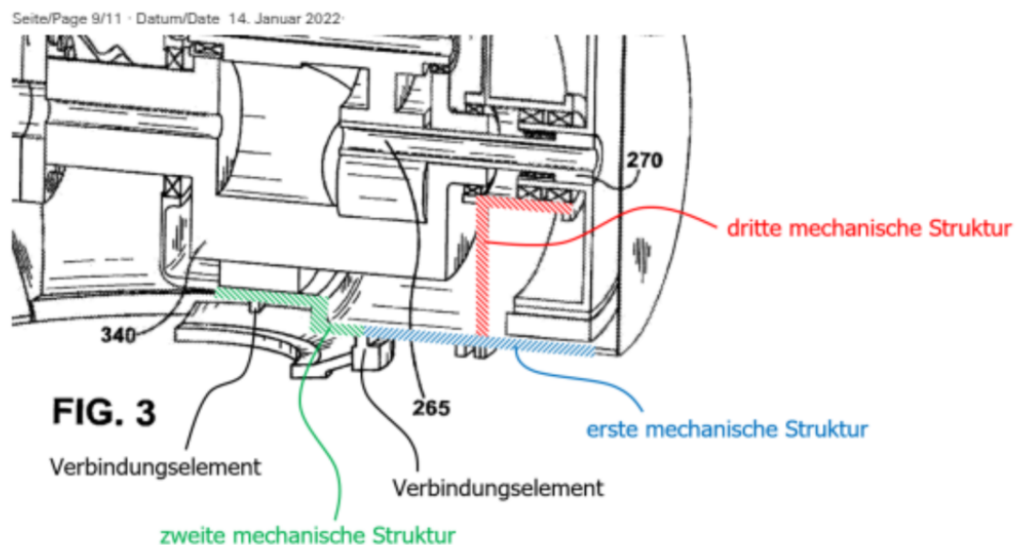
The Board considers that claim 1 differs from the electromechanical device of D5 also in feature M1.5 according to which the planetary gears are separated from the motor by the cover part 10 ("Kappe"). Thus, even if the skilled person had added a gear stage to the arrangement known from D5, they would not have arrived at the subject-matter of claim 1.

2.6 Starting from the disclosure of D7 in combination with common general knowledge or with the teaching of D5

It is common ground that D7 does not disclose the features related to the provision of a two stage gearbox. This according to the appellant was an obvious measure for the skilled person.

However, claim 1 differs from the electromechanical device of D7 by feature M1.17 whereby the "tensions" were arranged to bypass the second and third mechanical structures.

With the statement setting out the grounds of appeal, the appellant filed the following drawing based on Fig. 3 of D7 with further annotations:



From the above sketch it is evident that tensions caused by the electromagnetic forces acting on the stator must pass at least through the second mechanical structure in order to arrive at the connection element.

Whilst a bypass of the third mechanical structure is possible as shown above via the first mechanical structure, it would not be obvious for the skilled person to modify the structure to bypass the second mechanical structure. There are no apparent paths along which the forces could be differently routed in order to bypass the second mechanical structure. Hence, even under consideration of the teachings of D5 or of common general knowledge the skilled person would not have arrived at the subject-matter of claim 1 without an inventive step.

2.7 Considering D3 as the closest prior art

The appellant argued that the provision of a second gear stage in the gearbox shown in D3 would lead the skilled person to the subject-matter of claim 1.

The Board however considers that, as D3 relates to a generator for a wind turbine, the skilled person would have no reason to add a further gear stage. The skilled person would not have arrived at the subject-matter of claim 1 without the exercise of inventive activity.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairwoman:



C. Moser

P. Acton

Decision electronically authenticated