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Datasheet for the decision of 16 September 2020

Case Number: T 2778/17 - 3.4.02

Application Number: 12854092.9

Publication Number: 2787336

IPC: G01L1/12, G01L3/10, G01L5/10, G01M5/00

Language of the proceedings: EN

Title of invention:
STRESS MONITORING DEVICE OF MAGNETO-ELASTIC AND MAGNETO-ELECTRIC EFFECT TYPE

Applicant:
Zhejiang University

Headword:

Relevant legal provisions:
EPC Art. 84
RPBA 2020 Art. 13(2)

Keyword:
Claims - clarity (no)
Late-filed request - justification for late filing (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Office européen des brevets

Beschwerdekammern

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Case Number: T 2778/17 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 16 September 2020

Appellant: (Applicant)	Zhejiang University No. 388 Yuhangtang Road Xihu District Hangzhou Zhejiang 310058 (CN)
Representative:	Lang, Christian LangPatent Anwaltskanzlei IP Law Firm Ingolstädter Straße 5 80807 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 19 July 2017 refusing European patent application No. 12854092.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	H. von Gronau
	G. Decker

Summary of Facts and Submissions

I. The appeal of the applicant is directed against the decision of the examining division to refuse the European patent application No. 12854092.9. The examining division refused the application on the ground that independent claim 1 of the main request was not clear and its subject-matter did not involve an inventive step, and independent claim 1 of auxiliary request 1 was not clear, its subject-matter extended beyond the content of the application as filed and it did not involve an inventive step.

II. With the statement setting out the grounds of appeal, the appellant requested that the decision of the examining division be set aside and a patent be granted on the basis of the claims according to the main request or the first auxiliary request both underlying the contested decision and being filed by letter dated 12 May 2017.

III. In a communication according to Article 15(1) RPBA 2020 the board expressed its provisional opinion that *inter alia* claim 1 of the main request and the then first auxiliary request was not clear and violated Article 84 EPC.

IV. With a letter dated 14 August 2020 the appellant filed claims according to a new first auxiliary request and a new third auxiliary request. The former first auxiliary request was maintained as a second auxiliary request. It also put forward arguments as to why *inter alia* claim 1 of the first and third auxiliary requests met the clarity requirements of Article 84 EPC.

V. Oral proceedings took place on 16 September 2020.

The appellant confirmed its final request as follows. It requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request filed by letter dated 12 May 2017 or, as an auxiliary measure, on the basis of the claims according to the first auxiliary request filed by letter dated 14 August 2020, on the basis of the claims according to the second auxiliary request filed as "first auxiliary request" by letter dated 12 May 2017 or on the basis of the claims according to the third auxiliary request filed by letter dated 14 August 2020.

At the end of the oral proceedings the chairman announced the board's decision.

VI. Claim 1 according to the main request reads as follows:

"A stress monitoring device of elasto-magneto-electric effect type, for non-destructive monitoring stress on a cross-section of a ferromagnetic structural component (31) in a real-time way, comprising a magnetic field generating unit, one or more magneto-electric (ME) sensing units (32), one or more support skeletons (33), and a signal controlling and conditioning instrument; said magnetic field generating unit generating a magnetic field in a detected area around the ferromagnetic structural component (31) for magnetizing the ferromagnetic structural component (31); said one or more support skeletons (33) being used to set up said magnetic field generating unit and to fix said one or more ME sensing units (32); said signal controlling and conditioning instrument comprising a drive circuit and a data acquisition and processing device, said

drive circuit controlling said magnetic field generating unit to generate the magnetic field; characterized in that:
said ferromagnetic structural component is subjected to uniaxial load, bending, torsion, or a combination of bending and uniaxial load;
said cross-section has various shapes, such as circular, rectangular, T-type, or irregular; said one or more ME sensing units (32) comprise ME laminated materials;
said one or more ME sensing units (32) are adapted to produce an electrical signal V_{ME} to characterize the magnetic field intensity and magnetic induction intensity without external power supply and signal integration and are adapted to send the electrical signal V_{ME} to said data acquisition and processing device;
said data acquisition and processing device is adapted to process the electrical signal V_{ME} via signal conditioning to obtain a final signal Vst which is a magnetic characteristic value corresponding to the stress of said ferromagnetic structural component (31); and
said data acquisition and processing device is adapted to output the final signal Vst."

Claim 1 of the first auxiliary request reads as follows:

"A stress monitoring device of elasto-magneto-electric effect type, for non-destructive monitoring stress on a cross-section of a ferromagnetic structural component (31) in a real-time way, comprising a magnetic field generating unit generating a magnetic field, one or more magneto-electric (ME) sensing units (32), and a signal controlling and conditioning instrument; ; [sic]

said signal controlling and conditioning instrument comprising a drive circuit and a data acquisition and processing device, said drive circuit controlling said magnetic field generating unit to generate the magnetic field;
characterized in that:
the stress monitoring device comprises further one or more support skeletons (33), said one or more support skeletons (33) being used to set up said magnetic field generating unit and to fix said one or more ME sensing units (32); said one or more ME sensing units (32) comprise ME laminated materials; said one or more ME sensing units (32) are adapted to produce an electrical signal V_{ME} to characterize the magnetic field intensity and magnetic induction intensity without external power supply and are adapted to send the electrical signal V_{ME} to said data acquisition and processing device; said data acquisition and processing device is adapted to process the electrical signal V_{ME} via signal conditioning to obtain a final signal Vst which is a magnetic characteristic value corresponding to the stress of said ferromagnetic structural component (31); and said data acquisition and processing device is adapted to output the final signal Vst."

Claim 1 of the second auxiliary request reads as follows:

"A stress monitoring device of elasto-magneto-electric effect type, for non-destructive monitoring stress on a cross-section of a ferromagnetic structural component (31) in a real-time way, comprising a magnetic field generating unit, one or more magneto-electric (ME) sensing units (32), one or more support skeletons (33), and a signal controlling and conditioning instrument;

said magnetic field generating unit generating a magnetic field in a detected area around the ferromagnetic structural component (31) for magnetizing the ferromagnetic structural component (31); said one or more support skeletons (33) being used to set up said magnetic field generating unit and to fix said one or more ME sensing units (32); said signal controlling and conditioning instrument comprising a drive circuit and a data acquisition and processing device, said drive circuit controlling said magnetic field generating unit to generate the magnetic field;
characterized in that:
said ferromagnetic structural component is subjected to uniaxial load, bending, torsion, or a combination of bending and uniaxial load;
said cross-section has various shapes, such as circular, rectangular, T-type, or irregular; said one or more ME sensing units (32) are adapted to be fixed on a surface of said ferromagnetic structural component (31) and be disposed at edges of said cross-section such that a stress distribution on said cross-section is detected by said one or more ME sensing units (32);
said one or more ME sensing units (32) comprise ME laminated materials;
said one or more ME sensing units (32) are adapted to produce an electrical signal V_{ME} to characterize the magnetic field intensity and magnetic induction intensity without external power supply and signal integration and are adapted to send the electrical signal V_{ME} to said data acquisition and processing device;
said data acquisition and processing device is adapted to process the electrical signal V_{ME} via signal conditioning to obtain a final signal Vst which is a magnetic characteristic value corresponding to the

stress of said ferromagnetic structural component (31); and
said data acquisition and processing device is adapted to output the final signal Vst."

Claim 1 of the third auxiliary request reads as follows:

"A stress monitoring device of elasto-magneto-electric effect type, for non-destructive monitoring stress on a cross-section of a ferromagnetic structural component (31) in a real-time way, comprising a magnetic field generating unit generating a magnetic field, a magneto-electric (ME) sensing unit (32), and a signal controlling and conditioning instrument; ; [sic] said signal controlling and conditioning instrument comprising a drive circuit and a data acquisition and processing device, said drive circuit controlling said magnetic field generating unit to generate the magnetic field;
characterized in that:
the stress monitoring device comprises several magneto-electric (ME) sensing units (32) and further one or more support skeletons (33), said one or more support skeletons (33) being used to set up said magnetic field generating unit and to fix said several ME sensing units (32); said one or more ME sensing units (32) comprise ME laminated materials; said one or more ME sensing units (32) are adapted to produce an electrical signal V_{ME} to characterize the magnetic field intensity and magnetic induction intensity without external power supply and are adapted to send the electrical signal V_{ME} to said data acquisition and processing device; said data acquisition and processing device is adapted to process the electrical signal V_{ME} via signal conditioning to obtain a final signal Vst

which is a magnetic characteristic value corresponding to the stress of said ferromagnetic structural component (31); and said data acquisition and processing device is adapted to output the final signal Vst and the
several magneto-electric (ME) sensing units (32) are placed in multiple locations around the cross section of a ferromagnetic structural component (31) to be monitored."

Reasons for the Decision

1. The appeal is admissible.

2. Main request - claim 1 - clarity (Article 84 EPC)

2.1 The examining division was of the opinion that the definitions "cross-section has various shapes" and "signal integration" were vague and unclear (see reasons of the decision, 6.1.1).

2.2 The appellant was of the opinion that the wording of the claim left no doubt as to the technical teaching. It was obvious that the cross-section had either one of the shapes explicitly listed in the claim but not various shapes at the same time. Furthermore, for the person skilled in the art the term "signal integration" was clear in view of the description (see statement of grounds of appeal, 1.1).

At the oral proceedings before the board the appellant emphasised that the wording of claim 1 was clear from the overall context. The feature that the cross-section had various shapes defined different ferromagnetic structural components with various shapes. The

interpretation that the component could have various shapes at the same time was formalistic and did not correspond to the understanding of the person skilled in the art. With respect to the signal integration it was usual practice for the person skilled in the art to integrate measured signals over time to obtain a final result.

2.3 The board shares the view of the examining division that claim 1 is not clear. The wording of the claim implies that the cross-section of the ferromagnetic structural component has various shapes at the same time and that the cross-section of the ferromagnetic structural component does not have one single shape as suggested by the description. However, it is not clear how the cross-section of the ferromagnetic structural component may vary. Furthermore, it is not clear from the claim itself what kind of signal integration is meant when the sensing units are adapted to produce an electrical signal without signal integration.

2.4 The board concludes therefore that claim 1 of the main request is not clear.

3. First auxiliary request - admittance (Article 13(2) RPBA 2020)

3.1 In the present case, the summons to oral proceedings were notified after 1 January 2020. Thus, in accordance with Article 25(1) and (3) of the revised version of the Rules of Procedure of the Boards of Appeal (RPBA 2020, OJ EPO 2019, A63), Article 13(2) RPBA 2020 applies to any amendment of the appellant's appeal case made after notification of the summons. The amended claims of the first auxiliary request were filed with a letter dated 14 August 2020, i.e. after notification of

the summons to oral proceedings. According to Article 13(2) RPBA 2020, "[a]ny amendment to a party's appeal case made ... after notification of a summons to oral proceedings shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned".

3.2 The appellant argued at the oral proceedings that a reaction in response to the provisional opinion of the board should be possible. When filing the statement setting out the grounds of appeal the provisional opinion of the board that it maintained the clarity objection of the examining division was not yet available. The claims of the first auxiliary request were filed one month prior to the date for oral proceedings and the amendment did not lead to subject-matter developed in a complete new direction. The clarity issues were addressed in claim 1 by deleting the objected expressions. The Board could therefore consider the amended claims without undue burden. For reasons of procedural economy it would not be expedient to file beforehand a plurality of auxiliary requests without knowledge of the opinion of the board. Moreover, it would not be fair to limit the possibility of amendments to the appellant's case after having received the opinion of the board.

3.3 The Rules of Procedure of the Boards of Appeal in the version of 2020 clarify that the primary object of appeal proceedings is to review the decision under appeal in a judicial manner. One of the consequences of the boards' function being above all to review the appealed decision is that, as the appeal proceedings progress, the possibilities for parties to amend their case become increasingly limited. According to the

Explanatory Remarks to Article 13(2) RPBA in document CA/3/19, section VI, Article 13(2) RPBA 2020 implements the third level of the convergent approach applicable in appeal proceedings. The basic principle of the third level of the convergent approach is that, at this stage of the appeal proceedings, amendments to a party's appeal case are not to be taken into consideration. However, a limited exception is provided for: it requires a party to present compelling reasons which justify clearly why the circumstances leading to the amendment are indeed exceptional in the particular appeal ("cogent reasons"). For example, if a party submits that the board raised an objection for the first time in a communication, it must explain precisely why this objection is new and does not fall under objections previously raised by the first-instance division or a party.

3.4 The board carefully considered the arguments brought forward by the appellant. Amended claim 1 represents *inter alia* an attempt to address the clarity objection raised by the examining division by deleting the objected expressions. The board cannot recognise exceptional circumstances leading to the amendment, which have been justified with cogent reasons by the appellant. The appellant merely stated that it considered it desirable and justified to amend its requests after being summoned to the oral proceedings and after having been provided with the provisional opinion of the board on the merits of the case. It did not argue that the clarity objection, raised by the examining division for claim 1 of the main request in the decision under appeal and confirmed by the board in its provisional opinion, was newly raised by the board or that it had not been possible to file the amended claims already with the statement setting out the

grounds of appeal. The board is therefore of the opinion that the appellant could have filed the claims of the first auxiliary request already earlier.

3.5 Accordingly, in the board's judgement, no exceptional circumstances present themselves in the present case leading to the filing of the amendments of the party's case according to the first auxiliary request which are justified by cogent reasons.

Therefore, the board, exercising its discretion under Article 13(2) RPBA 2020, did not admit the first auxiliary request into the appeal proceedings.

4. Second auxiliary request - claim 1 - clarity (Article 84 EPC)

4.1 The objected definitions "cross-section has various shapes" and "signal integration" of claim 1 of the main request are also present in claim 1 of the second auxiliary request. At the oral proceedings the board referred to the same clarity objections as for claim 1 of the main request.

4.2 At the oral proceedings the appellant referred to the corresponding arguments put forward with respect to claim 1 of the main request.

4.3 The board concludes that claim 1 of the second auxiliary request is likewise not clear.

5. Third auxiliary request - admittance (Article 13(2) RPBA 2020)

5.1 The claims of the third auxiliary request were also filed with a letter dated 14 August 2020, i.e. after notification of the summons to oral proceedings.

5.2 In the oral proceedings the appellant put forward the same arguments as to the admittance of the second auxiliary request as those presented with respect to admittance of the first auxiliary request.

5.3 Again, this claim 1 represents *inter alia* an attempt to address the clarity objection raised by the examining division by deleting the objected expressions. As for the first auxiliary request, the board cannot recognise exceptional circumstances leading to the amendment, which have been justified with cogent reasons by the appellant.

5.4 The board, therefore, exercising its discretion under Article 13(2) RPBA 2020, decided not to admit the third auxiliary request into the appeal proceedings.

5.5 Since none of the appellant's requests is allowable, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L.Gabor R. Bekkering

Decision electronically authenticated