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**Datasheet for the decision
of 28 April 2023**

Case Number: T 0791/19 - 3.2.02

Application Number: 14723042.9

Publication Number: 2994048

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G01N29/024, G01N29/07,
G01S7/52, G01N29/032, A61B5/00

Language of the proceedings: EN

Title of invention:

DEVICE AND METHOD FOR CONTINUOUS DETECTION OF CHANGES OF
DENSITY IN FLUIDS AND SOLIDS AS WELL AS USE OF THE DEVICE

Applicant:

Mecsense AS

Headword:

Relevant legal provisions:

EPC Art. 83
RPBA 2020 Art. 13(2)

Keyword:

Sufficiency of disclosure - (no)
Amendment after summons - exceptional circumstances (no)

Decisions cited:

Catchword:



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Case Number: T 0791/19 - 3.2.02

D E C I S I O N
of Technical Board of Appeal 3.2.02
of 28 April 2023

Appellant: Mecsense AS
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Representative: Zacco Norway AS
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 2 November 2018
refusing European patent application No.
14723042.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair M. Alvazzi Delfrate
Members: A. Martinez Möller
N. Obrovski

Summary of Facts and Submissions

- I. The appeal was filed by the applicant against the examining division's decision refusing European patent application No. 14723042.9.

In that decision, the examining division found, *inter alia*, that the invention as defined in the independent claims of each of the requests then on file was not sufficiently disclosed within the meaning of Article 83 EPC.

- II. Oral proceedings before the board took place by videoconference on 28 April 2023.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request as filed on 21 March 2023 or, in the alternative, on the basis of one of auxiliary requests 1 to 5 filed with the statement of grounds of appeal or auxiliary request 6 filed at the oral proceedings before the board (labelled "(Auxiliary Request)").

- III. The following claims of each of the requests under consideration are relevant to the present decision.

Main request

1. "Device for continuous detection of minute changes of density in fluids or solids, characterized [sic] in that it comprises a PZT (piezo electric) transducer (2) generating pulse trains applied to the surface of a body or liquid, a pulse

transmitter (3) sending electrical pulses to the PZT transducer (2), a power input (4), a signal analyzer (5) and a read out unit (6) showing results either as digest, graphs or a combination of these, wherein the PZT transducer (2) is used to register change of density as change of phase shift between excited pulse train and its reflection in addition to amplitude difference between ingoing pulse train and reflected pulse train."

4. "Method for continuous detection of changes of density of fluids or solids, characterized [sic] in that it comprises

- applying an ingoing fixed pulse train generated by a PZT (piezo electric) transducer (2) to the surface of a body or liquid (1);
- reflecting the pulse train from the body or liquid to produce a reflected pulse train by sending electrical pulses to the transducer (2) by a pulse transmitter (3) connected to a power input (4) which excites the transducer (2) to experience a response voltage from the PZT element when the excitation force is stopped;
- receiving the reflected pulse train by the PZT (piezo electric) transducer (2); and
- monitoring change in phase shift and amplitudes between the ingoing fixed pulse train and the reflected pulse train;
- analysing response signal in a signal analyzer (5); and
- showing results either as digest, graphs or a combination of these in a read out unit (6)."

Auxiliary requests 1 and 2

1. "Device for continuous detection of minute changes of density in fluids or solids, characterized [sic] in that it comprises a PZT (piezo electric) transducer (2) generating pulse trains applied to the surface of a body or liquid, to register change of density as change of phase shift between excited pulse train and its reflection in addition to amplitude difference between ingoing pulse train and reflected pulse train, a pulse transmitter (3) sending electrical pulses to the PZT transducer (2), a power input (4), a signal analyzer (5) and a read out unit (6) showing results."

Auxiliary request 3

Claim 1 of auxiliary request 3 corresponds to claim 4 of the main request except that the wording "either as digest, graphs or a combination of these" has been deleted in claim 1 of auxiliary request 3.

Auxiliary request 4

Compared with claim 1 of auxiliary request 3, the wording "in a signal analyzer (5)" has been deleted in claim 1 of auxiliary request 4.

Auxiliary request 5

Compared with claim 1 of auxiliary request 3, the last two features, which read:

"- analysing response signal in a signal analyzer (5);
and
- showing results in a read out unit (6).",
have been deleted in claim 1 of auxiliary request 5.

Auxiliary request 6

Compared with claim 1 of the main request, the wording "in addition to amplitude difference between ingoing pulse train and reflected pulse train" has been deleted in claim 1 of auxiliary request 6.

- IV. The appellant's arguments, where relevant to the present decision, can be summarised as follows.

Main request - sufficiency of disclosure

The inventions as defined in independent claims 1 and 4 were directed to detecting changes of density based on the changes of phase shift and amplitude between the pulse trains. The inventions were sufficiently disclosed.

The functional relationship between the density of a material and its viscosity was accessible via amplitude measurements, as indicated by Stokes's law of sound attenuation in Newtonian fluids. The combined effect of density and viscosity could be determined using Stokes's law. This combined effect caused a change of phase shift and amplitude.

Figure 2 showed that there was a substantially linear relationship between density and phase shift. Figure 9 showed the effect of varying density on phase shift and amplitude change.

The results of the invention shown in Figures 10-18 were not obtained by applying Stokes's law but by polynomial regression analysis.

Auxiliary request 6 - admittance

Auxiliary request 6 addressed the objection of insufficient disclosure. Its subject-matter was disclosed in the application as filed (claim 1, page 1, 1st paragraph, last sentence, and Figures 2, 5 and 7).

Reasons for the Decision

1. The application

Detecting minute changes of density of a liquid or body may be important in certain cases. Possible applications include monitoring blood glucose, monitoring bacterial growth in fresh food and monitoring the moisture in wood.

The patent application deals with the continuous detection of minute changes of density in fluids or solids. A piezoelectric transducer is used to generate a pulse train and to apply it to the surface of a body or liquid. The transducer is then used to receive the reflected pulse train. The change of density is detected based on the changes of phase shift and amplitude between the ingoing pulse train and the reflected pulse train.

2. Main request - sufficiency of disclosure

2.1 In independent claims 1 and 4, the changes of phase shift and amplitude between the ingoing pulse train and the reflected pulse train are used to detect minute changes of density in fluids or solids.

2.2 In the appealed decision, the examining division found that the person skilled in the art could understand how

changes of density could be detected based on changes of phase shift between the pulse trains, but that the application would not enable the person skilled in the art to detect changes of density based on changes of amplitude (and thus based on changes of phase shift and amplitude) between the pulse trains.

- 2.3 The appellant submitted that a change of density would lead to both a phase shift and an amplitude difference between the pulse trains. The appellant referred to the figures and corresponding passages of the description, which showed the impact of a change of density on the reflected pulse trains, and also to the substantially linear relationship between the phase delay and the density.

The board sees no reason to question the submission that a change of density would indeed have an impact on phase shift and change of amplitude between the pulses.

- 2.4 The appellant further submitted that:
- the invention was directed to the detection of changes of density in Newtonian fluids
 - Stokes's law of sound attenuation in a Newtonian fluid described the attenuation in the fluid (and thus the amplitude change) as being dependent on the density of the fluid and its dynamic viscosity coefficient.
- There was thus a functional relationship between the fluid's density and its viscosity, meaning that the change of amplitude could be used to determine the density.

- 2.5 This submission does not correspond to the content of the application.

The application does not mention the term "Newtonian fluids", let alone any limitation of the invention to those fluids. In fact, independent claims 1 and 4 of the main request are directed to detecting changes of density in "fluids or solids", thereby contradicting the alleged limitation to Newtonian fluids.

Furthermore, monitoring the change of density of wood or wood materials (i.e. solids) is explicitly mentioned in the claims and description (see dependent claim 12 as well as page 3, lines 9-10 and 40-42).

Since the invention is not limited to Newtonian fluids and no reference is made to Stokes's law of sound attenuation in a Newtonian fluid in the application, it is not apparent why the person skilled in the art wanting to carry out the invention as defined in claims 1 and 4 would have considered using Stokes's law of sound attenuation.

2.6 For the sake of argument, even if the application were explicitly directed to Newtonian fluids, the person skilled in the art would still not be able to carry it out.

As the appellant submitted in its statement of grounds of appeal, although density and viscosity (of relevance here is the dynamic viscosity) are not directly related, a change of density will result in a change of viscosity.

However, as also submitted by the appellant, it is only the combined effect of density and viscosity that can be determined from the change of amplitude by using Stokes's law of sound attenuation. In other words, based on the change of amplitude it is not possible to

determine the individual influences of the change of density and of the change of viscosity.

It follows that, by measuring a change of amplitude and using Stokes's law, the person skilled in the art would not be able to detect a change of density, but only a combined change of density and viscosity. Moreover, in a situation in which the effects of a change of density and a change of viscosity cancel each other out in Stokes's formula, no change of amplitude would be detected despite the change of density.

2.7 At the oral proceedings, the appellant indicated that "the experimental results of the present invention" referred to on page 8, lines 18-20 and labelled "MECSENSE" in Figures 10-18 were not obtained using Stokes's law. Instead, they relied on polynomial regression analysis. However, the application as filed does not disclose this, let alone provide enough information so that it is possible for a person skilled in the art to reproduce the invention.

2.8 It follows from the above that the application does not disclose the inventions defined by independent claims 1 and 4 in a manner sufficiently clear and complete for them to be carried out by a person skilled in the art. Hence, the main request does not meet the requirements of Article 83 EPC.

3. Auxiliary requests 1 to 5 - sufficiency of disclosure

The appellant did not submit any reasons supporting why auxiliary requests 1 to 5 would overcome the finding of lack of compliance with Article 83 EPC for the main request. For the same reasons as set out above for the

main request, auxiliary requests 1 to 5 do not meet the requirements of Article 83 EPC.

4. Auxiliary request 6 - admittance

Auxiliary request 6 was filed at the oral proceedings before the board. Its admittance is thus subject to Article 13(2) RPBA 2020.

There were no exceptional circumstances leading to this amendment of the appellant's appeal case at such a late stage of the proceedings. The lack of compliance with Article 83 EPC was identified in the appealed decision, indicated in the board's preliminary opinion, and eventually confirmed at the oral proceedings before the board.

Moreover, the amendment gives rise, prima facie, to a new objection of added subject-matter. The passages of the application as originally filed referred to by the appellant (claim 1 + page 1, 1st paragraph, last sentence + Figures 2, 5 and 7) do not disclose detecting a change of density based on a change of phase shift without the detection also being based on a change of amplitude.

The board thus decided not to admit auxiliary request 6.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



A. Chavinier-Tomsic

M. Alvazzi Delfrate

Decision electronically authenticated