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**Datasheet for the decision  
of 25 May 2021**

**Case Number:** T 2472/19 - 3.3.05

**Application Number:** 15152014.5

**Publication Number:** 2897189

**IPC:** H01M2/02, H01M2/04, H01M4/485,  
H01M10/0569, H01M10/0525,  
H01M10/42

**Language of the proceedings:** EN

**Title of invention:**  
Nonaqueous electrolyte secondary battery

**Applicant:**  
Seiko Instruments Inc.

**Headword:**  
Nonaqueous electrolyte secondary battery / Seiko

**Relevant legal provisions:**  
EPC Art. 123(2), 56  
RPBA 2020 Art. 13(1), 13(2)

**Keyword:**  
Amendments - allowable (no) - intermediate generalisation  
Inventive step - (no) - effect not made credible within the  
whole scope of claim  
Amendment after summons - exceptional circumstances (yes)

**Decisions cited:**

T 0211/01, G 0010/93

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 2472/19 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 25 May 2021**

**Appellant:** Seiko Instruments Inc.  
(Applicant) 8, Nakase 1-chome,  
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Chiba-shi, Chiba (JP)

**Representative:** Miller Sturt Kenyon  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 8 April 2019  
refusing European patent application No.  
15152014.5 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** E. Bendl  
**Members:** J. Roider  
A. Bacchin

## Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division to refuse the patent application.
- II. The following documents are cited in the decision under appeal:

D1            JPH 09-283102 A  
D1a          English machine translation of D1, provided  
              by the EPO.

The references used in this decision apply to the English machine translation.

- III. The examining division held that the main request and auxiliary requests 1 to 3 did not comply with the requirements of Article 83 EPC and one or more of Article 56 EPC, Article 123(2) EPC and Article 84 EPC.
- IV. With the statement of grounds of appeal, the appellant filed a main request and auxiliary requests 1 to 4 as well as replacement pages for the description.
- V. Claim 1 of the main request reads as follows:

*"1. A nonaqueous electrolyte secondary battery (1), comprising:  
a bottomed cylindrical positive electrode casing (12);  
and a negative electrode casing (22) which is fixed to  
an opening (12a) of the positive electrode casing  
through a gasket (40), and forms an accommodation space  
between the positive electrode casing and the negative*

*electrode casing, wherein the opening of the positive electrode casing is caulked to the negative electrode casing side to seal the accommodation space, characterized in that:*

*a shortest distance L1 between a caulking tip end (12b) of the positive electrode casing and the negative electrode casing in the opening of the positive electrode casing is in a range of equal to or greater than 43.0% and equal to or less than 46.5% of an average sheet thickness (t) of the positive electrode casing, a shortest distance L2 between a tip end (22a) of the negative electrode casing and the positive electrode casing is in a range of equal to or greater than 37.5% and equal to or less than 46.5% of the average sheet thickness of the positive electrode casing, and a distance L3 between the tip end of the negative electrode casing and the bottom of the positive electrode casing is in a range of equal to or greater than 52.0% and equal to or less than 57% of the average sheet thickness of the positive electrode casing, wherein a compression ratio of the gasket at each site between the positive electrode casing and the negative electrode casing that are separated from each other with the distances L1 to L3 is equal to or more than 50%, and the upper limit of the compression ratio of the gasket is set to be equal to or less than 95%."*

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the following feature has been inserted at the end of the claim:

*"wherein the nonaqueous electrolyte secondary battery (1) has an outer diameter of 9 mm and a height of 2.0 mm".*

The difference between claim 1 of the main request and claim 1 of auxiliary request 2 is the addition of the following feature at the end of the claim:

*"and wherein the gasket is formed from a material which is obtained by mixing glass fiber, mica whiskers, ceramic fine powders, and the like to any one of a polypropylene resin, polyphenyl sulfide, PPS, and a polyether ether ketone, PEEK, resin in an added amount of 30 mass% or less".*

In claim 1 of auxiliary request 3, the above list of gasket-forming materials has been defined as follows:

*"wherein the gasket is formed from a material which is obtained by mixing glass fiber, mica whiskers or ceramic fine powders to any one of a polypropylene resin, polyphenyl sulfide, PPS, and a polyether ether ketone, PEEK, resin in an added amount of 30 mass% or less".*

In comparison with claim 1 of the main request, the following features were added to claim 1 of auxiliary request 4:

Prior to "characterised in that":

*"wherein the gasket (40) is formed in an annular ring shape along the inner peripheral surface of the positive electrode casing (12), and a tip end (22a) of the negative electrode casing (22) is disposed inside an annular groove (41) of the gasket (40)," ,*

and at the end of the claim:

*"and a sealing agent is applied onto an inner side surface of the annular groove (41) of the gasket (40)".*

VI. In the communication under Article 15(1) RPBA 2020, new objections under Article 123(2) EPC and Article 84 EPC against all requests were raised for the first time. It was also stated that the subject-matter of claim 1 of the main request and auxiliary requests 1 to 4 lacked an inventive step over D1.

VII. In an attempt to address these new objections, the appellant filed auxiliary request 5.

VIII. Claim 1 of auxiliary request 5 differs from claim 1 of the main request in that the gasket is defined as being formed from polypropylene and in that the distance L1 is defined as follows:

*"a shortest distance L1 between a caulking tip end (12b) of the positive electrode casing, being a tip end of the positive electrode casing which defines a peripheral edge of the opening of the positive electrode casing which is caulked to the negative electrode casing side, and the negative electrode casing in the opening of the positive electrode casing is in a range of equal to or greater than 43.0% and equal to or less than 46.5% of an average sheet thickness (t) of the positive electrode casing".*

IX. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or one of auxiliary requests 1 to 4, all submitted with the statement of grounds of appeal.

In the alternative, it requested that the decision under appeal be set aside and that a patent be granted on the basis of auxiliary request 5, filed with the letter of 22 April 2021.

## **Reasons for the Decision**

1. Main request
- 1.1 Added Subject-Matter, Article 123(2) EPC
  - 1.1.1 The limits for the quotients of the gaps L1, L2, L3 between the positive and the negative electrode casing at the three specified locations of the battery divided by the thickness of the gasket, i.e.  $L1/t$ ,  $L2/t$  and  $L3/t$  in claim 1, originate from examples 1 and 2, table 1 of the application as originally filed.
  - 1.1.2 Both examples were prepared with a gasket made from polypropylene (PP: page 36, line 5). In the gasketed joint of the coin cell in the present case, the geometry of the gap between the positive and the negative electrode casing and the gasket material have a close functional interrelation in order to provide the required leak-tightness.
  - 1.1.3 In contrast with the said examples, apart from very general characteristics and the quotients, claim 1 specifies neither the overall form of the battery nor the gasket material to be used.
  - 1.1.4 The appellant argued that page 16, lines 13-18, of the description as originally filed indicated the interchangeability of polyphenyl sulfide (PPS) and polyether ether ketone resin (PEEK) with PP resin. If



the gasket were made of a material other than PP, when observing the ratios  $L1/t$ ,  $L2/t$  and  $L3/t$  according to the subject-matter of claim 1, the same improvement would be observable with respect to different ratios for  $L1/t$ ,  $L2/t$  and  $L3/t$ . A generalisation to other gasket materials was thus justified.

- 1.1.5 The subject-matter of claim 1 as originally filed defined broad, open-ended ranges for the said quotients ( $L1/t \leq 70\%$ ,  $L2/t \leq 60\%$  and  $L3/t \leq 110\%$ ). Contrary to that, the ranges contained in the subject-matter of claim 1 are particularly narrow ( $43\% \leq L1/t \leq 46.5\%$ ,  $37.5\% \leq L2/t \leq 46.5\%$  and  $52\% \leq L3/t \leq 57\%$ ). It is not apparent from the original disclosure that any properties or improvements shown for these specific ranges in combination with PP used in the examples are also observable with other gasket materials. Indeed, different gasket materials exhibit different compression and recovery behaviour. This behaviour is important for ensuring the tightness when the size of the gap between the casing of the electrodes changes, e.g. due to changing temperature, which is important in the present application.

Although the original disclosure also mentions other gasket materials, the specific ranges for  $L1/t$ ,  $L2/t$  and  $L3/t$  were originally only disclosed in combination with PP as the gasket material, but not with any other material covered by the wording of claim 1.

- 1.1.6 Therefore, the subject-matter of claim 1 of the main request does not comply with Article 123(2) EPC.

2. Auxiliary requests 1 to 4 - Article 123(2) EPC

2.1 Claim 1 is not limited in any of auxiliary requests 1 to 4 to the use of PP as the gasket material. On the contrary, auxiliary requests 2 and 3 even explicitly refer to other materials.

Thus, the conclusions drawn above with regard to added subject-matter for the main request apply *mutatis mutandis* also to auxiliary requests 1 to 4.

3. Auxiliary request 5

3.1 Admittance

3.1.1 The summons to oral proceedings in appeal proceedings was dated 14 January 2021. In the subsequent communication under Article 15(1) RPBA 2020, objections under Article 123(2) EPC and Article 84 EPC were raised for the first time (G 10/93, OJ EPO 1995, 172).

3.1.2 Auxiliary request 5 was filed on 22 April 2021, thus after the notification of the summons to oral proceedings. In the justification for this late filing, the appellant submitted that auxiliary request 5 was filed in an attempt to address the new objections.

3.1.3 The board considers auxiliary request 5 to be an amendment to the appellant's appeal case. However, the board also agrees with the appellant that the newly raised objections in the board's communication under Article 15(1) RPBA 2020 constitute exceptional circumstances within the meaning of Article 13(2) RPBA 2020. Since the new claim request clearly addresses these objections and does not *prima facie* give rise to new ones, the board exercises its discretion to admit auxiliary request 5 into the

proceedings.

3.2 Inventive Step, Article 56 EPC

3.2.1 The application in the present case is directed to the caulking of nonaqueous electrolyte secondary batteries.

3.2.2 Document D1 is directed to the caulking of coin cells (paragraph [0003]) and is thus suitable to be considered as the starting point for an inventive-step objection.

3.2.3 The problem allegedly solved by the application is the provision of an improved high-temperature capacity retention rate of nonaqueous electrolyte secondary batteries by preventing the volatilisation of the electrolytic solution or inclusion of moisture such that high-temperature characteristics can be maintained (description, page 4, penultimate paragraph, examples 1 and 2).

3.2.4 As the solution to this problem the batteries according to claim 1 are proposed, which are in particular characterised by the specific ranges for the distances between the casings of the positive and the negative electrode L1, L2, L3, expressed in terms of the ratio to the average sheet thickness t.

3.2.5 Examples 1 and 2 of the patent application show an improvement for the specific cell battery geometry shown in Figure 1 including L1, L2, L3 and the sheet thickness of the positive electrode casing of 0.2 mm in comparison with batteries of the same type and form, but with different ratios  $L1/t$ ,  $L2/t$ ,  $L3/t$ .

3.2.6 However, the subject-matter of claim 1 covers a broad range of battery shapes including the sealing geometry and sealing gap. It is not limited to standardised battery cells. In particular, it is not limited to the coin-type cells used in the examples of the application at issue or in D1. However, as even conceded by the appellant, any alleged effect achieved can only be compared for identical shapes of the batteries. For this reason alone, no technical effect can, on the basis of the examples on file, be attributed to all the embodiments encompassed by claim 1.

3.6.7 Therefore, the problem is not proven to be credibly solved over the entire scope claimed and must be reformulated to the provision of alternative nonaqueous electrolyte secondary batteries (see *Case Law of the Boards of Appeal of the European Patent Office*, 9th edition 2019, I.D.4.4.1).

3.6.8 The arbitrary selection of distances L1, L2 and L3, already known from D1, and the indication of their correlation with sheet thickness without demonstrating any effect cannot be considered to be inventive.

3.6.9 The appellant argued that, in D1, the description and the examples were inconsistent. According to D1, controlling the compression ratio at the positions A, B and C (corresponding to the positions 1, 2 and 3 according to the present application) was the key for success, whereby the compression ratio at position A must be the highest.

Also, in the general description and the claims the compression ratio at position A was disclosed as 60%-80%, whereas in the tables of the examples a zero leakage occurred only in the range of 70%-90%.

For this reason, the skilled person would have disregarded the disclosure of D1 in line with T0211/01. Here, the board held that a document which is obviously defective, as would be readily recognised by those skilled in the art when trying to reproduce its disclosure, cannot be taken as the most promising and appropriate starting point for the assessment of inventive step (T0211/01, Catchword).

- 3.6.10 In T0211/01, a cited prior-art document disclosed a supposed chemical reaction having starting materials which obviously do not chemically react in the desired way.

This situation is thus not applicable to the present case. There is no doubt that the battery cell in D1 could actually be produced. Assuming that the teaching of D1 was actually defective in some way, the defect would thus not be comparable with the defect in the disclosure of the document cited in T0211/01.

D1 contains a contradiction insofar as it discloses a compression ratio in the range of 60%-80% for the position A, while the obviously better choice seems to be 70%-90%. Although the range 60%-80% does not only contain the most preferred embodiments (number of failures being "1" instead of "0"), this is still among the best results of the list. Thus, this would not prompt the skilled person to disregard that document.

- 3.6.11 The appellant argues, moreover, that the compression ratios for the position A must be between 70% and 90% if leakage is to be reliably avoided. The skilled person would thus not consider 60%.

- 3.6.12 It is noted that the appellant alleges merely an improvement in the sealing properties, but not the avoidance of any gap (see statement of grounds of appeal, paragraphs 7-9).
- 3.6.13 D1 discloses only one leaking battery out of 50 for compression ratios at the positions A/B/C of 60%/ 60%/ 50% (see table 2). Obviously, even under these circumstances, D1 discloses an improved caulking when comparing the compression ratio of 30% with the compression ratio of 60% at the position A.
- 3.6.14 Considering only perfectly impermeable battery cells in the light of D1, whereas the appellant appears to accept certain leakage for the battery cell according to the patent application, does not put the comparison on a level playing field and seems unjustified.
- 3.6.15 It is noted, moreover, that for the embodiment with compression ratios at the positions A/B/C of 60%/ 60%/ 50%, D1 shows only one leaking battery out of 50. However, the present application shows only two specific examples, which, once again, does not put the comparison on a level playing field.
- 3.6.16 Therefore, there is no reason to exclude the embodiment with compression ratios at the positions A/B/C of 60%/ 60%/ 50% as a promising springboard.

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

E. Bendl

Decision electronically authenticated