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**Datasheet for the decision  
of 21 October 2024**

**Case Number:** T 1610/22 - 3.3.05

**Application Number:** 16813899.8

**Publication Number:** 3316375

**IPC:** H01M8/18, H01M8/02

**Language of the proceedings:** EN

**Title of invention:**

REDOX FLOW CELL

**Patent Proprietor:**

Panasonic Intellectual Property  
Management Co., Ltd.

**Opponent:**

Maiwald GmbH

**Headword:**

Redox flow cell/Panasonic

**Relevant legal provisions:**

EPC Art. 56

RPBA 2020 Art. 13(2)

**Keyword:**

Inventive step - (no)

Amendment after notification of Art. 15(1) RPBA communication  
- exceptional circumstances (no)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 1610/22 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 21 October 2024**

**Appellant:**

(Opponent)

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**Representative:**

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**Respondent:**

(Patent Proprietor)

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**Representative:**

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**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 17 June 2022  
rejecting the opposition filed against European  
patent No. 3316375 pursuant to Article 101(2)  
EPC.**

**Composition of the Board:**

**Chair**

R. Winkelhofer

**Members:**

G. Glod

T. Burkhardt

## Summary of Facts and Submissions

I. The opponent's (appellant's) appeal lies from the opposition division's decision rejecting the opposition against European patent No. 3 316 375.

II. The following document cited in the impugned decision is of relevance here:

D2: Qizhao, H., Thesis, National University of Singapore, 2014

III. The appellant-opponent requests that the decision under appeal be set aside and amended such that the patent is revoked.

The respondent-proprietor requests that the appeal be dismissed or that the patent be maintained as amended on the basis of auxiliary request 1 or 2 (submitted before the opposition division on 27 May 2021 and 4 March 2022) or auxiliary request 3 (submitted before the board on 9 July 2024, erroneously also named "auxiliary request 2" in that submission).

IV. Claim 1 of the main request (patent as granted) reads as follows:

*"1. A redox flow battery (1000, 1100, 2000, 2100) comprising  
a first electrode (101),  
a second electrode (102),  
a separator (103) separating the first electrode (101) and the second electrode (102),  
a first active material (104);  
a first electrolytic solution (105) containing a first redox species (106), and*

*a first circulation mechanism (107), wherein the first active material (104) is insoluble in the first electrolytic solution (105), the first circulation mechanism (107) circulates the first electrolytic solution (105) between the first electrode (101) and the first active material (104), the first redox species (106) performs oxidation and reduction at the first electrode (101), the first redox species (106) is oxidized and reduced by the first active material (104), the first circulation mechanism (107) includes a first electrolytic solution (105) container and a first permeation preventing unit (116), the first active material (104) is contained in the first electrolytic solution container (113); the first electrolytic solution (105) is brought into contact with the first active material (104) in the first electrolytic solution container (113) to oxidize and reduce the first redox species (106) by the first active material (104), the first permeation preventing unit (116) is disposed adjacent [sic] an outlet for the first electrolytic solution (105) of the first electrolytic solution container (113), and the first permeation preventing unit (116) prevents permeation of the first active material (104)"*

Claim 1 of auxiliary request 1 additionally includes the features underlined below:

*"1. [...] the first circulation mechanism (107) includes a first electrolytic solution (105) container, a pipe (110), and a first permeation preventing unit (116);*  
*[...] the first permeation preventing unit (116) is disposed adjacent an outlet for the first electrolytic*

solution (105) of the first electrolytic solution container (113);  
the first permeation preventing unit (116) is disposed at a junction of the first electrolytic solution container (113) and the pipe (110); and  
the first permeation preventing unit (116) prevents permeation of the first active material (104)."

Claim 1 of auxiliary request 2 further includes the features underlined below:

"1. [...] the first circulation mechanism (107) includes a first electrolytic solution (105) container, a first pipe (109), a second pipe (110), a valve (114), a pump (115) and a first permeation preventing unit (116);  
the first active material (104) is contained in the first electrolytic solution container (113);  
the first pipe (109) is connected to an inlet for the first electrolytic solution (105) of the first electrolytic solution container (113), [...]  
the first permeation preventing unit (116) is disposed adjacent an outlet for the first electrolytic solution (105) of the first electrolytic solution container (113);  
the first permeation preventing unit (116) is disposed at a junction of the first electrolytic solution container (113) and the second pipe (110); and  
the first permeation preventing unit (116) prevents permeation of the first active material (104)."

Claim 1 of auxiliary request 3 further includes the features underlined below:

*"1. [...] the first active material (104) is an active material powder contained in the first electrolytic solution container (113); [...]."*

- V. The respondent's arguments relevant to the present decision can be summarised as follows.

The skilled person was not prompted to provide a permeation preventing unit disposed adjacent to the outlet of the reservoir in document D2. The active material was stored in the form of interconnected particles that were immobile in the reservoir. Even a filter at the outlet would make the redox flow lithium-ion battery more complex and expensive without any benefit.

The presence of a permeation preventing unit improved the long-term reliability of the redox flow battery. There was no motivation to provide the permeation preventing unit in the set-up of D2.

Auxiliary request 3 should be taken into consideration. The communication under Article 15(1) RPBA introduced a distinction between active material in powder and in pellet form for the first time. The amendment was minor. Given that active material in powder form had been a central discussion point throughout the proceedings, no party had been surprised by this amendment.

- VI. The appellant's arguments are reflected in the Reasons given below.

## Reasons for the Decision

### Main request (patent as granted)

1. Article 100(a) EPC and Article 56 EPC
  - 1.1 The invention relates to a redox flow battery.
  - 1.2 As agreed by the parties, D2 is a possible starting point for assessing inventive step. In particular, Figure 4-1 (page 60) discloses all the features of claim 1 except for a "permeation preventing unit" adjacent to the outlet of the first electrolytic solution container. D2 discloses that the active electrode materials, which are interconnected, immobile and in the form of pellets, as is evident from the text and Figure 4-1 on page 60, "do not flow with the circulation of the electrolyte" (see the paragraph below the cited figure). Under these circumstances, a permeation preventing unit is not necessary.
  - 1.3 According to the patent in suit, the problem to be solved is to provide a redox flow battery having a long cycle life (paragraph [0006]).
  - 1.4 It is proposed to solve the problem using a redox flow battery characterised in that a first permeation preventing unit is disposed adjacent to an outlet for the first electrolytic solution of the first electrolytic solution container.
  - 1.5 It has not been credibly shown that the problem is solved by the feature distinguishing claim 1 from D2. Page 60 of D2 clearly discloses that the pellets are immobile and hence do not leave the reservoir. It is

thus impossible for them to clog up the porous carbon felt electrode.

The respondent's argument that powder can be prevented from exiting the electrolytic tank is irrelevant since powder is neither disclosed in D2 nor part of claim 1.

In addition, the patent lacks any evidence that the presence of a permeation preventing unit in a set-up as shown in D2 would provide any benefit in the long run. Even if it were accepted that the pellets of D2 would degrade over time, there is still no evidence that the degradation would be such as to clog the porous carbon felt electrode. As indicated by the respondent, the degradation of materials in batteries over time is only now becoming the subject of intense research, so this phenomenon was not described and corroborated by evidence in the patent. Therefore, no benefit of a permeation preventing unit in D2 can be discerned.

Consequently, the board agrees with the respondent in so far as the skilled person would not have had any motivation to provide a permeation preventing unit in the set-up of D2 since it does not bring any benefit (see respondent's reply to the appeal, page 17, first full paragraph).

- 1.6 Therefore - as even the respondent acknowledges - including such a unit is a disadvantageous modification which cannot justify an inventive step (Case Law of the Boards of Appeal of the EPO, 10th edition, 2022, I.D. 9.21.1).
- 1.7 The requirements of Article 56 EPC are not met, and so the main request must fail.

Auxiliary request 1

2. Article 56 EPC

According to the respondent, the arrangement of the units has been more clearly defined in this request. A pipe is now part of the first circulation mechanism, and the position of the first permeation preventing unit has been specified.

This amendment does not overcome the objection under Article 56 EPC applying to the main request. D2 discloses a pipe of this kind in Figure 4-1. Including the permeation preventing unit is a disadvantageous modification, as set out above, regardless of its position in the circuit.

This request is not allowable either.

Auxiliary request 2

3. Article 56 EPC

The additional features included in claim 1 were added to overcome a potential Article 123(2) EPC problem in auxiliary request 1. Consequently, they do not really contribute to an improvement of the position with respect to inventive step. In fact, these features are also disclosed in Figure 4-1 of D2, except for the valve. However, a valve is commonly used for adjusting fluid flows. Under these circumstances, an inventive step cannot be based on the presence of a valve.

Therefore, the requirements of Article 56 EPC are not met for auxiliary request 2 either.

Auxiliary request 3

4. Article 13(2) RPBA 2020

Under Article 13(2) RPBA, any amendment to a party's appeal case made after notification of a communication under Article 15(1) is, in principle, not to be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

In the case in hand there are no exceptional circumstances, for the following reasons.

The request was submitted after the board's communication pursuant to Article 15(1) RPBA, which stated that the requirements of Article 56 EPC did not appear to be met.

This objection was based, among other things, on the fact that in claim 1 the first active material had not been limited to a particular form. As rightly pointed out by the respondent, this had been debated previously. This understanding was not surprising since it was completely in line with the description (paragraphs [0055] to [0062]) of the patent. In addition, the appellant had already raised this point in their grounds of appeal in the discussion of inventive step based on D2 (paragraph 95, page 49, point b)). It had also been mentioned when dealing with the impugned decision and D2 (grounds of appeal, page 15, last paragraph and page 16, first full paragraph). Yet the respondent did not file any request addressing this concern with their reply to the appeal.

In the communication pursuant to Article 15(1) RPBA 2020, the board based its analysis on the appellant's submission in the context of the inventive step discussion. Consequently, the communication did not contain any new facts which would have triggered the filing of a new request at such a late stage of the proceedings. The communication cannot per se be regarded as creating exceptional circumstances (Case Law of the Boards of Appeal of the EPO, 10th edition, 2022, V.A.4.5.6(c)).

Generally, patent proprietors have to anticipate that the board might evaluate a case differently from what they might have expected. Therefore, the respondent should have reacted to the appellant's objections immediately, even if they considered them to be completely without merit.

Lastly, the communication pursuant to Article 15(1) RPBA 2020 is not an invitation to make new submissions (Case Law of the Boards of Appeal of the EPO, 10th edition, 2022, V.A.4.5.6(a)).

Notwithstanding the question of whether the new request is *prima facie* allowable, *prima facie* allowability is not a criterion justifying exceptional circumstances (Case Law of the Boards of Appeal of the EPO, 10th edition, 2022, V.A.4.5.6(k)), particularly if the new request includes a feature from the description.

Therefore, auxiliary request 3 cannot be taken into account and is thus not part of 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 Chair:



A. Wille

R. Winkelhofer

Decision electronically authenticated