BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Publication in the Official Journal ~~Yes~~ / No

File Number: T 93/90

Application No.: 83 107 454.7

Publication No.: 0 100 530

Title of invention: Fuel cell using organic high-molecular electrolyte

Classification: H01M 8/00

D E C I S I O N
of 3 June 1992

Applicant: Hitachi Ltd

Headword:

EPC Article 84, Rule 27

Keyword: "Clarity of claims - (yes)"
"Remittal to Examination Division"

Headnote

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 93/90

D E C I S I O N
of the Technical Board of Appeal
of 3 June 1992

Appellant : Hitachi Ltd
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Decision under appeal : Decision of Examining Division 019 of the European Patent Office dated 31 August 1989 refusing European patent application No. 83 107 454.7 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : E. Turrini
Members : C. Black
C.V. Payraudeau

Summary of Facts and Submissions

I. European patent application No. 83 107 454.7 (publication No. 0 100 530) was refused by a decision of the Examining Division.

II. The reason for the refusal was that the application did not meet the requirements of Article 84 and Rule 27(1)(c) and 27(1)(d) EPC. In view of the amendment to the Rules, the latter will be referred to by their current equivalents, i.e. Rules 27(1)(b) and 27(1)(c) respectively.

III. The applicant lodged an appeal against the decision and submitted amended claims and description seeking to overcome the objections raised by the Examining Division.

IV. In a communication pursuant to Article 110(2) EPC the Board drew attention to certain defects in the amended documents, as regards the above-mentioned Article and Rule, and indicated how these might be rectified.

V. In response, the Appellant filed further amended claims and description, and in effect now requests that the decision under appeal be set aside and a patent granted on the basis of the following documents:

Claims 1 to 14 filed with the letter dated 6 April 1992 (received on 7 April 1992)
Pages 2, 3, 6, 7, 8, 13 to 21, 24 to 29 of the description as originally filed
Pages 1, 4, 5, 9 to 12, 22, 23 and 30 filed with the letter dated 6 April 1992 (received 7 April 1992)
Sheets 1/4 to 4/4 of the drawings as originally filed.

VI. Claim 1, the only independent claim of the set now under consideration, reads as follows:

"A fuel cell to be operated in a temperature range from room temperature to about 100°C, said fuel cell using a liquid fuel (5), and comprising

- a fuel electrode (2, 28) located so that the liquid fuel supplied from a fuel chamber (6, 54) is in contact therewith,
- an oxidant electrode (3, 21) located so that an oxidant (7) in an oxidant chamber (8, 29) is in contact therewith,
- an ion-exchange membrane (22, 43) interposed between said fuel electrode and said oxidant electrode, and
- an electrolyte (4, 23) interposed between said fuel electrode and said oxidant electrode, said electrodes facing each other via said electrolyte and said membrane,
- characterised in that said electrolyte (4, 23) is an organic, high-molecular-weight electrolyte having a molecular weight of at least 1000 and being at least partially soluble in water to generate high-molecular-weight ions (15) and ionized radicals (14) being separated from each other in water, wherein said high-molecular-weight ions are substantially incapable of permeating said fuel and oxidant electrodes (2, 28; 3, 21)".

Claims 2 to 14 are dependent claims referring back to Claim 1, of which claims only Claim 14 requires to be reproduced here, and reads as follows:

"A fuel cell according to Claim 1, wherein said organic electrolyte (4, 23) is in the form of a cross-linked gel".

Reasons for the Decision

1. The appeal is admissible.

2. Claim 1 now under consideration corresponds closely to what is described with reference to Figures 1, 2 and 8 and no objection arises under Article 123(2) EPC. In the decision refusing the application, the Examining Division commented that the claim corresponding to present Claim 14 gave rise to objection under Article 123(2) because the combination of a fuel cell containing an ion-exchange membrane and an electrolyte in the form of a cross-linked gel was not originally disclosed. The Board does not share this opinion. The description with reference to Figure 2 discloses a fuel cell in which the electrolyte is in the form of a paste (page 15, lines 5 and 6) and which includes an ion exchange membrane (lines 4 to 5). According to page 21, lines 19 to 23, the paste disclosed thus far may be replaced by an electrolyte in the form of a cross-linked gel, at least in the case of acid electrolytes. Page 23, lines 8 to 12 extends the use of cross-linked gels to basic electrolytes. Thus no objection under Article 123(2) applies to Claim 14.

Further, in the amended set of claims, the appendancies of Claims 3 to 7 and 9 to 13 have been amplified. These claims previously referred only to Claim 1, but in the Board's view no previously undisclosed combination has been created by the amendments.

3. As regards clarity, the expression "to be operated in temperature range from room temperature to about 100°C", to which the Examining Division raised objection, in Claim 1 identifies the claimed fuel cell as belonging to the third type of fuel cell referred to on page 2, lines 5

to 12 and is therefore considered to be clear to the average skilled person.

The Examining Division also took exception to the expression "wherein said high-molecular-weight ions etc." as a definition in terms of a result to be achieved. The Board is of the view that this part of the claim serves to define the claimed fuel cell, because the electrolyte is part of the fuel cell and its molecular weight, as well as being above 1000, has to be chosen, dependent on the porosity of the electrodes, such that it is substantially incapable of permeating these.

The Board has also considered whether the wording on lines 4 and 5 should read "supplied to a fuel chamber" (i.e. from a fuel source). However a valid interpretation is that the fuel is supplied from the fuel chamber to the fuel electrode so that no amendment is required. Any confusion arose from an incorrect reference numeral which has now been corrected.

Other amendments to the claim are cosmetic in nature and the claim is considered to meet the requirements of Article 84 EPC.

4. Page 4 of the description incorporates a reference to US-A-3 013 098 which corresponds to the first part of claim 1 and page 5 to GB-A-1 027 683 which is pertinent in disclosing the use of a high molecular weight organic electrolyte. The objection of non-compliance with Rule 27(1)(b) has therefore been met.

5. From the description, page 2, line 22 to page 5, line 13 the problems to be overcome by the claimed invention can be understood, as can the solution sought to be provided

by the disclosed embodiments. An objection under Rule 27(1)(c) can therefore not be sustained.

6. In the decision under appeal, the Examining Division referred to previously raised objections on the Grounds of lack of novelty or inventive step, without going into these in detail, this being unnecessary in the circumstances.

Of the thirteen documents mentioned in the European Search Report, five were referred to by the Examining Division during the examination proceedings. Of these, only US-A-3 013 098 discloses a fuel cell using a liquid fuel. However in this document the electrolyte and the ion-exchange membrane are one and the same, whereas in Claim 1 they are separate entities. Therefore in the opinion of the Board, the amended Claim 1 would be novel over the said five documents. Further, although the Examining Division expressed doubts as to whether any claim could be formulated whose subject-matter could be seen as involving an inventive step, it only went into detail in this respect in its communication dated 24 August 1988. However Claim 1 then under consideration did not require the presence of an ion-exchange membrane and moreover the main citation used as the basis for the attack on the claim, GB-A-1 027 683, discloses neither an ion-exchange membrane or a liquid fuel.

7. In the circumstances, since the current Claim 1, although not differing substantially from that on which the decision refusing the application was based, differs from the ones in respect of which the Examining Division argued lack of novelty and inventive step, the Board considers it necessary to re-examine these questions. In the Board's view moreover, it is proper that this re-examination should be carried out by the Examining Division, so that

the applicant is not denied the opportunity of having patentability examined by two instances. The Board therefore makes use of its power under Article 111(1) EPC to remit the case to the Examining Division for further prosecution.

8. In connection with the said further prosecution, the Board notes that the Appellant has made amendments to the description to bring it into conformity with the claims. The Board has not checked the description exhaustively in this respect, but points out that on page 1 the insertion "according to the first part of Claim 1" has been incorrectly placed after "high molecular electrolyte", that line 4 contains a dubious reference to a novel electrolyte and that lines 7 to 10 are not in accordance with the claims which define the invention as relating solely to the fuel cell.

The Board further notes that the reference to phosphine groups on page 9 and in Claim 9 appears to be an error, since phosphine is the gas of formula PH_3. The Examining Division should investigate how, if at all, this may be corrected.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance for further prosecution of the application on the basis of the documents set out in paragraph V above.

The Registrar: The Chairman

E. Görgmaier E. Turrini