

Publication in the Official Journal Yes / No

File Number: T 238/88 - 3.3.3

Application No.: 84 108 391.8

Publication No.: 0 145 834

Title of invention: Ion-selective compositions containing certain crown
ethers

Classification: G01N 27/30

D E C I S I O N
of 25 April 1991

Applicant: Eastman Kodak Company

Headword: crown ethers/KODAK

EPC Articles 123(2), 83, 84

Keyword: "amendment to claim (allowable)" -
"disclosure sufficient - relevant examples available" -
"clarity - broad technical term of art allowable; interpretation of
terms in claim by description (affirmed)"

Headnote

The clarity of a claim is not diminished by the mere breadth of a term of art (e.g. "alkyl") contained in it, if the meaning of such term - either per se or in the light of the description - is unambiguous for a person skilled in the art.



Case Number : T 238/88 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 25 April 1991

Appellant : Eastman Kodak Company
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Representative : Brandes, Jürgen, Dr.
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Decision under appeal : Decision of Examining Division 061 of the
European Patent Office dated 21 January 1988
refusing European patent application
No. 84 108 391.8 pursuant to Article 97(1) EPC.

Composition of the Board :

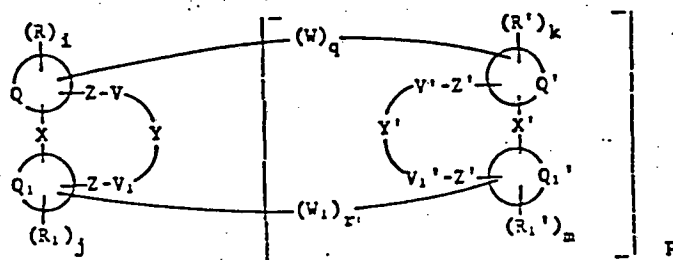
Chairman : F. Antony
Members : S. Schödel
R. Schulte

Summary of Facts and Submissions

I. European patent application No. 84 108 391.8, filed on 17 July 1984 and published on 26 June 1985 under publication No. 145 834, was refused by a decision of the Examining Division dated 21 January 1988. The decision was based on Claims 1 to 4 submitted on 10 April 1987 and Claims 5 to 7 as originally filed. Claim 1 read as follows:

"An ion-selective composition comprising

- (a) an ionophore,
 - (b) a compound capable of solvating the ionophore, and
 - (c) a hydrophobic binder,
- characterized in that said ionophore is a crown ether represented by the structure



wherein p is 0 or 1, when p is 1, q and r are independently 0 or 1,

X and X' are substituted or unsubstituted groups independently selected from azo, azoxy, azomethine, vinylene, sulfoxyl, oxydimethylene, ureylene or iminodicarbonyl,

Y and Y' independently represent a bond or a linking group having the carbon, sulfur, nitrogen or oxygen atoms necessary to complete a crown ring backbone having up to 29 atoms,

V, V' and V₁, V₁' are independently selected from substituted or unsubstituted methylene groups,

Z and Z' are substituted or unsubstituted groups independently selected from oxy, methyleneoxy, imino, amido or oxycarbonyl,

R, R₁, R' and R₁' are independently alkyl, aryl, cycloalkyl, a heterocycle, alkoxy, amino, acylamino, amido, keto, carbamoyl, carboxy, alkoxy-carbonyl, cyano, halo, nitro or sulfo or another substituent group having up to 60 carbon, sulfur, nitrogen or oxygen atoms in total in the backbone,

i, j, k and m are independently zero or a positive integer up to a number such that Q, Q₁, Q' or Q₁' is fully substituted, respectively,

Q, Q₁, Q' and Q₁' are independently the atoms necessary to complete a 5- to 14-membered mono- or polycyclic ring, and

W and W₁ are independently linking groups having up to 60 carbon, sulfur, nitrogen or oxygen atoms in total in the backbone."

Claims 2 to 5 related to specific embodiments of Claim 1, and Claims 6 and 7 concerned ion-selective electrodes including compositions according to any of Claims 1 to 5.

II. The stated grounds for refusal were that Claim 1 did not meet the requirements of Articles 84 and 83, respectively, and contravened Article 123(2) EPC.

The terms giving rise to objections "according to Articles 84, 83 EPC" were
 "...substituted groups .." in the definitions of substituents X and X', V to V'₁ and Z and Z';
 ".. alkyl, aryl, cycloalkyl, a heterocycle, alkoxy, acylamino, alkoxy carbonyl or another substituted (correct: substituent) group .." in the definitions of substituents R to R'₁; and
 ".. atoms necessary to complete .. ring, .." under the definitions of substituents Q to Q'₁.

The vague definitions of the ionophores by these features did not enable the skilled person to easily determine which compositions would provide the required ion-selectivity. He would have to select by an unjustifiable large number of tests those compositions which were actually suitable. Although generalisation of an inventive concept in an independent claim was allowable under the EPC, this principle was "limited by the clarity and completeness requirements of Article 84 EPC". An exact definition of the subject-matter to be patented was required because substituents of groups or, for example, alkyls having a different number of C atoms would dramatically influence the properties of the crown ethers. It was not credible that all the compounds covered by Claim 1 having any kind of substituents could be used for the intended purpose.

Incorporating the term "in total" before the words "... in the backbone" under the definitions for R to R'₁ and W and W₁ meant that Article 123(2) EPC was infringed. The original wording read: "... the group(s) having up to 60 C, S, N or O atoms in the backbone". This version covered three interpretations, namely:

- (a) each element might be present in such a number;

- (b) only one C, S, N, or O might be present up to 60 atoms;
- (c) all mentioned elements in total must not exceed this number.

It was true that the proposed amendment might be the narrowest possible interpretation, nevertheless it was not directly and unambiguously derivable from the application as filed.

III. Notice of Appeal was lodged by the Appellant on 14 March 1988, the appeal fee being paid on the same day. In his Statement of Grounds, which was submitted on 17 May 1988, the Appellant argued essentially as follows:

The invention was characterised by a particular class of crown ethers which were useful ionophores in ion-selective compositions. Based on a large number of representative compounds that had been prepared and tested, a generalised chemical scheme had been developed for defining these compounds. In this scheme the important "X" group connecting the two typical ring structures of the crown ethers ("Q") was narrowly identified, while the non-important groups ("-Z-V-Y-V-Z") were defined in broad terms.

By objecting to certain terms of Claim 1 as being "vague" the Examining Division seemed to have confused vagueness with breadth. Nothing in the EPC prevented a broad claim from being accepted; it had not been disputed that the skilled reader was in fact unable to arrive at the invention. Apparently the real problem was that the Examining Division found it not credible that all compounds covered by Claim 1 were suitable as ion-selective ionophores; e.g. alkyl groups, not being part of the crown ether ring structure, did not play a role in

forming the cavity that surrounds the specific ions. The Examining Division's reasoning was not supported by any reference to the prior art and there was no reason to suspect that variations in this portion of the crown ether molecule would produce a compound that would not solve the problem. The definition of the non-critical "R" groups, which was also objected to under Article 84 EPC, was limited so that the total number of the C, S, N, or O atoms was 60. As to the amendments to Claim 1, the Appellant had safely kept the content of the application within the bounds as filed by selecting the narrowest of the possible interpretations. Claim 1 in its present form, therefore, did not contravene Article 123(2) EPC.

- IV. The Appellant requests that the contested decision be set aside and in substance that the patent be granted on the basis of Claims 1 to 7 on file.

Reasons for the Decision

1. The appeal is admissible.
2. The application in suit relates to ion-selective compositions containing crown ethers, and ion-selective electrodes including such compositions as ion-selective membranes. The term crown ethers is ascribed to cyclic polyethers which, according to the statements in the description, in general contain from 9 to 60 atoms in the ring backbone, including from 3 to 20 oxygen or other Group VIA atoms in the ring backbone (cf. page 6, penultimate paragraph). To be useful as ionophores or ion-carriers, the crown ethers must be capable not only of selectively complexing a specific ion from the solution, but also of transporting the ion into the solution on the other side of the membrane. The size of the ring must be

sufficiently large so that an ion can be complexed in the centre of the ring.

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3.

The issue initially to be decided in this appeal is whether the amendment to Claim 1 extends beyond the content of the application as filed in contravention of Article 123(2) EPC.

Claim 1 includes as definitions for linking groups W and W₁ and for substituents R to R'₁ in the crown ether structure the following passages:

".. group(s) having up to 60 carbon, sulphur, nitrogen or oxygen atoms in total in the backbone". The expression "in total" was introduced in the course of the examination procedure as an attempt to overcome a clarity objection and has no direct verbal counterpart in the originally filed application documents.

It may be true that, from a purely linguistic point of view, the passage quoted above can be interpreted in different ways (cf. paragraph II); two of these possible interpretations, however - those referred to by the Examining Division in this context as choice (a) and choice (b) - are deemed technically unrealistic. This leaves choice (c) for consideration, which implies that the maximum number of the various elements forming the backbone of the linking groups and the substituents is 60. This interpretation is in full compliance with the additional information given on this point in the description: the R substituents can include, inter alia, one or more aliphatic, aromatic or heterocyclic units as defined for Y and Y', which units are linked together with oxy, azo, thio, sulfoxyl, oxycarbonyl or other linkages known in the art. Similarly, the W and W₁ linking groups, which only exist if p in the structural scheme is 1, are defined as consisting of independently one or more such

units which can be linked together with the same groups cited before (cf. pages 11 and 12). Formula LXI is given as a typical example for a crown ether having (alternate) carbon and oxygen atoms in the W backbone.

From this it is clear that the change in content of the application in suit resulting from the incorporation of the term "in total" into Claim 1 at the places indicated does not in substance, in the Board's view, change the contents of the original application; nor does it introduce any ambiguity as to the upper limit of the number of elements applicable and to their appearance within the backbone of the respective substituents and linking groups. In other words, Claim 1 was not unduly modified and thus its wording does not give rise to an objection under Article 123(2) EPC. Claims 2 to 7 remained unchanged.

4. As to the objections under Article 83 and Article 84 EPC, the decision under appeal makes no distinction between these two legal provisions, so that it is not quite clear which part of it is related to the first and which one to the second issue.

4.1 Be that as it may, it is established case law that the question whether an invention is disclosed in a sufficiently clear and complete manner within the meaning of Article 83 EPC is not to be decided solely on the basis of the content of the claims, but also of the information contained in the description. At least one way of carrying out the invention should be described in detail. The disclosure need not include specific instructions as to how all possible component variants could be obtained, as long as there are suitable variants known by means of disclosure or from common general knowledge, which also

provide the desired effect (cf. T 14/83, OJ EPO 1984, 105; T 292/85, OJ EPO 1989, 275; Rule 27(f) EPC).

4.2

The application documents are fully in line with these prerequisites: the description indicates two general procedures for preparing the crown ethers which are useful in the practice of the invention. Numerous compounds are represented by their chemical formula followed by adequate instructions on the preparation of individual azo- and azoxy crown ether derivatives. Moreover, ion-selective compositions and electrodes are described which comprise the aforementioned crown ethers. A great number of tests were carried out for ion-selectivity, applying known techniques and using different carrier solvents and cations (such as sodium, potassium, lithium, ammonium, magnesium, calcium); the results thus obtained were shown in Tables I to V. In Example 1, for instance, an electrode based on crown ether I shows a high selectivity for K^+ over Na^+ ; in Example 2 it was determined that an electrode containing crown ether II is extremely selective for Na^+ over K^+ and other cations.

4.3

On the basis of these comprehensive details the practitioner was, in the Board's view, put in a position to carry out the teaching of the patent in suit in all its essential aspects; missing information could be supplied by common general knowledge. Experiments occasionally needed in the search for suitable combinations of substituents and linking groups which have not been explicitly disclosed would neither be unduly onerous nor require an inventive activity.

The Examining Division, however, has ignored the disclosure in the description; in particular it has challenged neither the reproducibility of the experiments nor the correctness of the results.

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The objection of insufficient disclosure is thus unfounded.

5. The appeal is also concerned with Article 84 EPC. According to this Article the claims should clearly define the matter for which protection is sought. Apparently it was the requirement of clarity which made the Examining Division object to the definitions "substituted groups", "alkyl, aryl, or another substituent group having up to 60 carbon, sulphur, nitrogen or oxygen atoms in total in the backbone" and "atoms necessary to complete a .. ring" in Claim 1 of the application in suit (cf. paragraph II).

5.1 Looked at more closely, the position taken by the Examining Division cannot be upheld.

The criticised feature "alkyl" in the definition of the R substituents undoubtedly relates to a well-known technical term of art which is commonly used in the chemical field and which does not imply any lack of clarity or ambiguity as alleged by the Examining Division, i.e. it is clear as it stands. Unless sound reasons are given, the breadth of the term cannot be a bar to its incorporation into the claim. The Examining Division's criticism in this respect amounts to no more than a mere allegation not supported by any evidence or reference to the prior art.

The same considerations apply, mutatis mutandis, to the features "aryl, cycloalkyl, a heterocycle .. and alkoxy-carbonyl" which follow in this listing.

5.2 The fact that the features ".. another substituent group having up to 60 .. atoms .. in the backbone" (cf. R substituents) and ".. atoms necessary .. to complete a ring" (cf. under Q linkages) are not in fact usual terms

of art does not rule out clarity and conciseness, since according to Article 69(1) EPC the description should be used to interpret the claims.

Applying this principle to the present case, a closer look at the description reveals that "substituent groups" generally may include "one or more aliphatic, aromatic or heterocyclic units as defined for Y and Y', which units are linked together with oxy, azothio, sulphonyl, oxycarbonyl or other linkages known in the art" (cf. page 11, paragraph 2; regarding Y and Y' see the bottom of page 8 and top of page 9).

As to the ring structures, characterised by Q symbols, detailed information is given on page 10, paragraph 2, where examples for "completed" 5 to 14-membered mono- and polycyclic aromatic and heterocyclic systems, such as pyran or benzothiazole, are indicated.

Finally, the term "substituted groups", which appears in connection with the definitions of linking groups X, V and Z, may require interpretation. Potential substituents, which can replace hydrogen atoms in H-containing, X-linking groups, are listed on page 7; substituents which can modify the V and Z groups are disclosed on page 9, line 35 to page 10, line 3, and in some examples, e.g. XLIV. In the case of the critical X and X' groups this list basically embraces

- 1) an alkyl group, e.g. having 1 to 6 carbon atoms ...,
- 2) an aryl group, e.g. phenyl or naphthyl ...,
- 3) a cycloalkyl group, e.g. of 5 to 7 carbon atoms ...,
- 4) a heterocyclic group having 5 to 7 atoms in the ring, e.g. pyridyl or furyl,
- 5) an alkoxy group or
- 6) an aryloxy group (cf. page 7).

No dispute or discussion involving these aspects took place in the course of the examination procedure.

Thus, on the proper interpretation of that claim in the light of the description there is at present no need to redraft Claim 1 with regard to Article 84 EPC and/or to limit the teaching of the application in suit.

- 6. For the above reasons, the decision under appeal cannot be maintained.

In the said decision (page 1, penultimate paragraph) the substantive examination according to Article 52(1) EPC was formally deferred, although in its communication of 12 December 1986, the Examining Division had raised relevant matters (item 2, pages 2 to 3), and the Appellant had answered this in detail in his submission dated 10 April 1987 (page 2, last paragraph, to page 7), not much having been added on that issue in the Examining Division's further communication dated 31 July 1987.

In the Board's opinion, given the convincing, substantially unrefuted arguments of 10 April 1987, the case would appear to be ready for grant, subject to any outstanding examination under Article 54(3) EPC. However, in view of the above-referred formal deferral, in accordance with Article 111(1) EPC, it is deemed appropriate to remit the case to the Examining Division for further examination. In consideration of the 1984 filing date of this application, it is hoped that such examination can be concluded without too much delay.

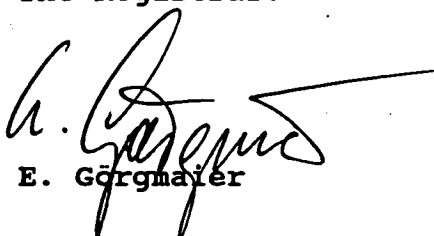
- 7. Oral proceedings before the Board need not be arranged, since they were only requested by the Appellant in the event of a negative decision.

Order


For these reasons, it is decided that:

1. The decision of the Examining Division is set aside.
2. The case is remitted to the department of first instance for further prosecution on the basis of current Claims 1 to 7.

The Registrar:


E. Görgmaier

The Chairman:


F. Antony