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Aktenzeichen / Case Number / N° du recours : T 387/86 - 3.4.1

Anmeldenummer / Filing No / N° de la demande : 83 400 311.3

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 087 995

Bezeichnung der Erfindung: Copolymer of acrylamide and polysaccharide resin
Title of invention: as electrophoretic gel medium
Titre de l'invention :

Klassifikation / Classification / Classement : G01N 27/26

ENTSCHEIDUNG / DECISION

vom / of / du 14 November 1988

Anmelder / Applicant / Demandeur : FMC Corporation

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPO / EPC / CBE Articles 54(2) and 56

Schlagwort / Keyword / Mot clé : Novelty (yes); Inventive step (yes)

Leitsatz / Headnote / Sommaire



Case Number : T 387 /86 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 14 November 1988

Appellant : FMC Corporation
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Representative : Mongrédién, André
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Decision under appeal : Decision of Examining Division 061 of the European Patent Office dated 21 May 1986 refusing European patent application No. 83 400 311.3 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : J. Roscoe
Members : H. Reich
G.D. Paterson

Summary of Facts and Submissions

I. European patent application No. 83 400 311.3 (publication number 0 087 995) was refused by decision of the Examining Division.

II. The essential reason given for the refusal was that the subject-matter of Claim 1 received on 28 November 1985 lacks novelty having regard to document:

US-A-4 094 832 (D1).

III. The Appellant lodged an appeal against this decision.

IV. In the Grounds of Appeal the Appellant requested that the contested decision be set aside and that a patent be granted on the basis of either the set of claims underlying the appealed decision as main request or a second set of claims with Claim 1, based on originally filed Claims 1 and 3 and filed with the Grounds of Appeal as auxiliary request. In supporting the independent claim of the main request, the Appellant argued, that the features in Claim 1 concerning the form of the claimed composition as a "coating" and its property of being "resistant to cracking and shrinking" could not be derived from document D1 so that Claim 1 should be regarded as novel.

V. In response to a communication of the Board of Appeal, expressing the provisional view, that the Appellant's submissions could not be followed because of the lack of distinctive character of the above-mentioned two features, which would add no subject-matter to the technical content of Claim 1, the Appellant filed, on 19 May 1988, a single request for the grant of a patent on

the basis of the following documents:

Claims: 1 to 5 received, 19.05.88;
Description: pages: 1-3bis, 5 to 8 and 10, received
19.05.88;
and pages 4 and 9 as originally filed.

VI. Independent Claim 1 reads as follows:

"1. An electrophoretic gel composition comprising a copolymer of acrylamide and an agarose having a weight average molecular weight of from about 5000 to about 10^6 daltons and wherein at least some of the hydroxyl hydrogens in said agarose have been substituted by an ethylenically unsaturated group of from 2 to 12 carbon atoms capable of cross-linking with acrylamide in the presence of a catalyst to form a cross-linked polyacrylamide."

Claims 2-5 are referred back to Claim 1.

Reasons for the Decision

1. The Appeal is admissible.
2. The subject-matter of the set of claims does not extend beyond the content of the application as originally filed. In particular, the subject-matter of Claim 1 comprises only features contained in originally filed Claims 1 and 3. The amendments of the description mainly concern deletions adapting the description from the originally claimed copolymer of acrylamide and "polysaccharide resin" to the present claimed copolymer of acrylamide and an "agarose".

There is, therefore, no objection under Article 123(2) EPC to the current set of application documents.

3. Novelty

- 3.1 From document D1 there is known an electrophoretic gel composition comprising a copolymer of acrylamide and a dextran (see D1, Claim 1, column 8, lines 40-42, and column 3, line 40) having a weight average molecular weight of from about 5000 to about 10^6 daltons (column 2, lines 56-58) and wherein at least some of the hydroxyl hydrogens in said dextran have been substituted by an ethylenically unsaturated group of from 2 to 12 carbon atoms (Claim 1 and column 3, lines 22-29) capable of cross-linking with acrylamide in the presence of a catalyst to form a cross-linked polyacrylamide (column 3, lines 40 and 46 to 51); cf. as well example 14 of D1.

The composition according to Claim 1 differs from this prior art in that the dextran derivative is replaced by a corresponding agarose derivative.

- 3.2 Document FR-A-2 334 691 (D4), considered by the Examining Division, describes as document D1 a copolymer of a dextran derivative and acrylamides (see example 2).
- 3.3 Documents DE-A-2 826 895 (D2) and DE-A-2 600 891 (D3) only describe mechanical mixtures of agarose and a polymer or copolymer of an acrylamide, but no copolymer of agarose and an acrylamide, i.e. no cross-linking of these two monomers. In document D2 the cross-linking function is explicitly ascribed to a bifunctional allyl or acryl compound incorporated in the polymerisation mixture (page 10, lines 8-11), the added agarose consisting of only carboxylic groups (page 9, lines 7-8).

Document D3 states in particular on page 10, lines 1-8, that agarose is mixed with already polymerised acrylamide. Moreover, in these known mixtures an agarose is used without any substitution of one of its hydroxyl hydrogens by an ethylenically unsaturated group.

- 3.4 EP-A-0 050 389 cited in the European Search Report under Article 54(3) EPC deals with homopolymers of only a derivative of agarose without any addition of acrylamide.
- 3.5 Thus, no document cited by the Examining Division or in the Search Report describes an electrophoretic gel, which comprises a copolymer of acrylamide and a derivative of agarose having a ethylenically unsaturated group, i.e. a hydrocarbon radical containing isolated carbon-carbon double bonds, see the original description of the invention page 3, lines 28-32.

Thus, the subject-matter of Claim 1 is considered novel in the sense of Article 54 EPC.

4. Inventive Step

- 4.1 In the Board's view the nearest prior art is that disclosed in document D1 (see 3.1 above). The objective problem underlying the present invention is to be seen as providing an electrophoretic gel with excellent drying characteristics, i.e. without cracking and shrinkage of the dried film; see e.g. the description, page 3, lines 7-10. Document D1 makes no reference to any such property of the gels it describes.
- 4.2 The solution to this problem is a gel as claimed in Claim 1.
- 4.3 Thus, the question of whether the subject-matter of

Claim 1 involves an inventive step reduces to considering whether a skilled person could be expected to foresee that such a gel would have the requisite drying characteristics.

4.3.1 The cited state of the art concerning dextran (documents D1 and D4) describes the copolymerization of acrylamide and dextran having an ethylenically unsaturated group as a means to provide dextran derivative gels with improved mechanical properties into which an electrophoresis buffer and other functional groups can be introduced directly thus avoiding long diffusion times (D1, column 1, lines 30, 31 and 42-65) or to provide such gels of improved porosity and rigidity (D4, page 1, para. 3). There is no hint in these documents that the gel has good drying characteristics and nothing which might suggest that such characteristics could be achieved by substitution of another saccharide, such as agarose, for the dextran in the copolymer.

4.3.2 The cited state of the art concerning agarose (documents D2 and D3) uses in the gel composition an agarose, which:

- (a) has none of its hydroxyl hydrogens substituted by an ethylenically unsaturated group;
- (b) is not cross-linked with acrylamide to form a copolymer by a chemical bond; and
- (c) is not described as an agent for improving the drying properties of a gel.

In document D2 the admixture of agarose, is directed to promoting the electrophoretic migration in the gel; see D2, page 9, lines 5-10. In document D3 the incorporation of polyacrylamide in an agarose aqueous gel sheet solves

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the problem of making it easy to handle and of keeping the gel in a dry state and subsequently completely rehydrating it (page 3, last para. to page 4, para. 2).

In the Board's opinion therefore neither the use of agarose in the manner proposed in document D2 or D3, nor the disclosure in documents D1 and D4 of gels comprised of polymers of dextran derivatives and acrylamides, nor any combination of these would lead the skilled man seeking a gel with excellent drying characteristics to a composition as claimed in Claim 1.

4.3.3 From document D3 it is also known, that a further admixture of glycerine to the mixture of an agarose and polyacrylamide gives flexibility to the dried gel (page 5 lines 10-16). In the Board's view, this property of the unbonded glycerine also does not render it obvious to use an ethylenically unsaturated agarose for copolymerization with acrylamide in order to achieve a gel film of excellent drying characteristics. The isolated carbon-carbon double bond structure (i.e. the ethylenically unsaturated group) is introduced into the preferred embodiment of the invention, allylglycidylagarose (Claim 3), not via the glycidylic group - i.e. dehydrated glycerine - but with the allylic group. Moreover, the steps of the chemical bond of the single components to allylglycidylagarose and its copolymerization with acrylamide does not allow a skilled person to foresee any effects of the glycidylic group within the copolymer.

4.4 For the reasons set out above in points 4.1 to 4.3.3 the Board does not support the view of the Examining Division in point 8 of the appealed decision but concludes that, having regard to the state of the art as cited in the Search Report, the subject-matter of Claim 1 would not have been obvious to a person skilled in the art and is

therefore to be considered as involving an inventive step within the meaning of Article 56 EPC.

5. Claim 1 and Claims 2 to 5, depending on Claim 1, are therefore allowable.

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 with the order to grant a European patent on the basis of the following documents:

Description: Pages 1-3bis, 5-8 and 10, received 19.05.88;
Pages 4 and 9 as originally filed.

Claims: 1 to 5, received 19.05.88.

The Registrar:

The Chairman:

F. Klein

J. Roscoe