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D E C I S I O N
of 20 July 2004

Case Number: T 0014/00 - 3.3.2

Application Number: 93900781.1

Publication Number: 0623015

IPC: A61K 6/00

Language of the proceedings: EN

Title of invention:
Adhesive composition and method

Patentee:
MINNESOTA MINING AND MANUFACTURING COMPANY

Opponent:
VOCO GmbH

Headword:
Adhesive composition/MINNESOTA MINING

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Main request, claims as granted - novelty (yes), inventive step (no)"
"Auxiliary requests - novelty (yes), inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0014/00 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 20 July 2004

Appellant: (Opponent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 8 December 1999 rejecting the opposition filed against European patent No. 0623015 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: U. Oswald
Members: H. Kellner
P. Mühlens

Summary of Facts and Submissions

I. European Patent No. 0 623 015 based on application No. 93 900 781.1 was granted with 6 claims.

Claim 1 as granted reads as follows:

"An adhesive composition, comprising:

(i) an ethylenically unsaturated phosphorylated compound;

(ii) a carboxylic acid functional polymer in an amount effective to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the carboxylic acid functional polymer; and

(iii)a curing agent in an amount sufficient to effect cure of the composition."

II. Opposition was filed against the granted patent by the appellant. The patent was opposed under Article 100(a) EPC for lack of novelty and inventive step.

The following documents were cited *inter alia* during the proceedings before the opposition division and the board of appeal:

(1) EP-A-0 218 248

(9) EP-A-0 423 430

(14) EP-A-0 058 483

(15) L.D. Zardiackas and G.E. Stoner, "Tensile and shear adhesion of amalgam to tooth structure using selective interfacial amalgamation", Biomaterials 1983, Vol. 4 January, 9-13

III. The opposition division rejected the opposition.

Concerning Article 54 EPC, it was of the opinion that the subject-matter of the patent as granted was new over the state of the art, since none of the documents cited by the opponent disclosed a combination of the special ingredients of the claimed composition, an ethylenically unsaturated phosphorylated compound, a carboxylic acid functional polymer and a curing agent.

As to Article 56 EPC, the opposition division found that the subject-matter of claim 1 was non obvious over the state of the art, because no hint could be seen in the cited documents, especially (1) and (9), to use the adhesives disclosed there in order to solve the problems related to amalgam.

IV. The appellant (opponent) lodged an appeal against said decision.

Its submissions in writing can be summarised as follows:

The subject-matter of the patent in suit did not involve an inventive step, especially with respect to (1).

The opposition division had defined the problem to be solved in a too narrow way. Since the person skilled in the art only had to follow the teaching of claim 22 of (1) and use some of the disclosed ingredients together to provide another adhesive composition in the field of bonding to hard tissue such as bone, dentin, enamel or the like, the subject-matter of the patent in suit did not involve an inventive step.

Additionally the appellant referred to its submissions during the opposition procedure, especially with respect to the seven sets of amended claims the patentee had filed as the 1st to 7th auxiliary requests (letter of the patentee from 28 September 1999 with answer of the opponent from 18 October 1999).

The subject-matter of auxiliary requests 1 to 3 was not patentable because all additional features of the corresponding claims were known from the teaching of (1).

With respect to auxiliary requests 4 and 5, it submitted that the further additional features referred to the use of well-known compounds for the adhesive compositions. The corresponding state of the art documents were especially (1) and (14) including a reference to (14) in (1).

The special features of the claims in auxiliary requests 6 and 7 were also known, e.g. from (1) and (15).

V. With a letter dated 20 March 2001 the respondent introduced the same seven sets of amended claims (originally filed with letter dated 28 September 1999) as auxiliary requests in the appeal proceedings:

The main request refers to maintaining the patent as granted.

Claim 1 of the 1st auxiliary request reads as follows (amendments in relation to claim 1 of the main request in bold):

"An adhesive composition, comprising:

(i) an ethylenically unsaturated phosphorylated compound;

(ii) a carboxylic acid functional polymer **containing ethylenically unsaturated groups** in an amount effective to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the carboxylic acid functional polymer; and

(iii)a curing agent in an amount sufficient to effect cure of the composition."

Claim 1 of the 2nd auxiliary request reads like claim 1 of the first auxiliary request, with the only difference that it additionally contains the following wording under (ii) after the words "absent the carboxylic acid functional polymer":

"wherein said carboxylic acid functional polymer containing ethylenically unsaturated groups is obtainable by reacting a carboxylic acid functional polymer with an ethylenically unsaturated compound comprising at least one group capable of reacting with the carboxylic acid group of the polymer"

Instead of this additional wording, the 3rd auxiliary request contains the following:

"wherein said carboxylic acid functional polymer containing ethylenically unsaturated groups is obtainable by reacting a carboxylic acid functional polymer with acryloyl chloride, methacryloyl chloride, allyl isocyanate, 2-hydroxyl-ethyl methacrylate or 2-isocyanatoethyl methacrylate,".

In claim 1 of the 4th auxiliary request the single amendment with respect to claim 1 of auxiliary request 3 is the replacement of the semicolon after "(i) an ethylenically unsaturated phosphorylated compound" by the following words:

"comprising a halophosphorus acid ester of diglycidyl methacrylate of Bisphenol A".

Thus the wording of the 4th auxiliary request (the amendments in relation to claim 1 of the 3rd auxiliary request in bold) is as follows:

"An adhesive composition, comprising:

(i) an ethylenically unsaturated phosphorylated compound **comprising a halophosphorus acid ester of diglycidyl methacrylate of Bisphenol A**

(ii) a carboxylic acid functional polymer containing ethylenically unsaturated groups in an amount effective to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the carboxylic acid functional polymer wherein said carboxylic acid functional polymer containing ethylenically unsaturated groups is obtainable by reacting a carboxylic acid functional polymer with acryloyl chloride, methacryloyl chloride, allyl isocyanate, 2-hydroxyl-ethyl methacrylate or 2-isocyanatoethyl methacrylate,; and

(iii)a curing agent in an amount sufficient to effect cure of the composition."

Said additional wording having replaced the semicolon in claim 1 of the 3rd auxiliary request to form the first claim of the 4th auxiliary request, is replaced in the 5th auxiliary request by the words

"comprising a chlorophosphorus acid ester of Bis-GMA".

In the 6th auxiliary request the features of claim 3 as granted are introduced into claim 1, which reads as follows (amendments in relation to claim 1 of the 5th auxiliary request in bold):

"An adhesive composition, comprising:

(i) an ethylenically unsaturated phosphorylated compound comprising a chlorophosphorus acid ester of Bis-GMA

(ii) a carboxylic acid functional polymer containing ethylenically unsaturated groups in an amount effective to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the carboxylic acid functional polymer **wherein said carboxylic acid functional polymer is a methacrylate-functional copolymer of itaconic acid and acrylic acid**; and

(iii)a curing agent in an amount sufficient to effect cure of the composition."

Claim 1 of the 7th auxiliary request is formed by adding the features of claim 4 as granted and has the following wording (amendments in relation to claim 1 of the 6th auxiliary request in bold):

"An adhesive composition, comprising:

(i) an ethylenically unsaturated phosphorylated compound comprising a chlorophosphorus acid ester of Bis-GMA

(ii) a carboxylic acid functional polymer containing ethylenically unsaturated groups in an amount effective

to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the carboxylic acid functional polymer wherein said carboxylic acid functional polymer is a methacrylate-functional copolymer of itaconic acid and acrylic acid; and

(iii)a curing agent in an amount sufficient to effect cure of the composition **and further comprising a particulate metallic filler in an amount effective to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the particulate metallic filler**."

VI. On 20 July 2004, oral proceedings took place before the board, in the presence of the representative of the proprietor (respondent). The duly summoned appellant (opponent) had informed the board in advance that it did not wish to attend the hearings.

VII. The respondent's arguments in written form and during the oral proceedings may be summarised as follows:

(a) Main request

In its view, the claimed subject-matter was new and inventive, since in the closest state of the art (1) neither the dental material used according to the patent in suit, namely amalgam, nor the adhesive composition was described or suggested and since no

example in (1) actually combined an ethylenically unsaturated phosphorylated compound and a carboxylic acid functional polymer. Additionally the other cited documents gave no hints to such a combination either.

(b) Auxiliary requests

The claimed subject-matter was reduced in several steps by filing the auxiliary requests 1 to 7. The result should be an increasing difference to the cited documents of the state of the art.

VIII. The appellant (opponent) requested that the decision under appeal be set aside and that the patent be revoked.

IX. The respondent (patentee) requested that the appeal be dismissed (main request), or that the patent be maintained in amended form on the basis of one of the auxiliary requests 1 to 7 filed with letter dated 28 September 1999.

Reasons for the Decision

1. The appeal is admissible.

2. *1st to 7th auxiliary requests: admissibility*

In comparison with the claims as granted, the corresponding amendments a priori must be considered to be occasioned by the arguments of the appellant.

Accordingly, these requests fulfil the requirements of Rule 57a EPC and they are admitted into the procedure.

3. *All requests: Article 123(2) and (3) EPC respectively, Article 54 EPC*

3.1 Article 123(2) and (3) EPC

The claims of the patent as granted are identical to the claims as filed. Therefore there is no Article 123 EPC objection with respect to the main request.

The additional features contained in the sets of claims of the 1st, 2nd and 3rd auxiliary requests may be found in the application as filed on page 9, lines 12 to 13 and on page 9, lines 14 to 19 together with lines 22 to 24 respectively.

For the 4th auxiliary request see page 7, lines 6 to 9 and for the 5th auxiliary request see claim 2 of the application as filed.

As for the additional features of the 6th and 7th auxiliary requests see the originally filed claims 3 and 4 respectively.

Moreover, the subject-matter of all the auxiliary requests does not extend the scope of the claims as granted, since only further restricting features from the disclosure of the patent have been added to claim 1 of each request.

3.2 Article 54 EPC

None of the cited documents discloses an adhesive composition comprising an ethylenically unsaturated phosphorylated compound, a carboxylic acid functional polymer and a curing agent in an individualised manner.

Thus, the board in this respect has no reason to depart from the reasoning or the conclusion of the opposition division in the impugned decision.

4. *Inventive step*

4.1 Main request

4.1.1 The patent in suit concerns an "adhesive composition".

The property of this composition, expressed in claim 1 of the main request by defining the amount of carboxylic acid functional polymer to be present

"in an amount effective to increase adhesion of amalgam to tooth structure when the composition is used as an intermediate layer between the amalgam and the tooth structure, compared to the adhesion obtained using a like composition absent the carboxylic acid functional polymer"

has to be regarded as optional, since it applies only "when the composition is used between amalgam and the tooth structure ...". The claimed adhesive composition however is used more generally, as may be seen by lines 46 to 49 on page 5 of the patent in suit. Therefore this possibility of having an adhesive

composition specifically for bonding nothing else than amalgam to the tooth structure does not represent a distinctive feature of the claimed subject-matter.

4.1.2 Document (1) represents the closest state of the art.

According to its claims 22 and 30, the subject-matter of this prior art is a polymerisable mixture for adhering e.g. ceramic, metallic, or biological substrates to other, similar substrates. Thus (1) concerns an adhesive composition in the sense of the patent in suit.

According to claim 22, said mixture comprises one or more of the compounds corresponding to claims 1 to 21 and consequently comprises the compounds of claim 5, namely

- one or more oligomeric or prepolymeric organic compounds that contain
  - (a) several *polymerisable unsaturated* groups and
  - (b) several acid radicals, their salts, or their reactive derivatives, wherein the acid radicals are carboxylic acid radicals or radicals of acidic sulphur or acidic boron or *acidic phosphorus*,

- and a polymerisation catalyst (see claim 27).

Thus at least inter alia an adhesive composition, comprising

(i) an *ethylenically unsaturated phosphorylated* compound,

(ii) a carboxylic acid functional polymer and

(iii)a curing agent (i.e. a polymerisation catalyst)

is disclosed in (1).

4.1.3 In the absence of any comparison referring to a mixture of at least any two of the compounds according to (1), the technical problem underlying the patent in suit can only be seen in the provision of a concrete adhesive composition of the mixtures of compounds disclosed in (1).

The solution to this problem is the provision of adhesive compositions exhibiting the features of claim 1 of the main request.

Having regard to the worked examples of the patent in suit, the board is convinced that the problem has been plausibly solved.

4.1.4 In order to supply just another type of adhesive compositions containing said compounds, it is obvious for the skilled person to take any two (or more) of the compounds according to the teaching of document (1) (claims 1 to 21), for instance one oligomer or prepolymer containing carboxylic acid groups and one oligomer or prepolymer containing ethylenically unsaturated phosphorylated groups.

Accordingly, the board can only conclude that the subject-matter of claim 1 of the main request does not involve an inventive step.

4.2 1st to 3rd auxiliary requests:

Carboxylic acid functional polymers as compounds according to (1) always contain ethylenically unsaturated groups (see claim 1) and are prepared by reacting a carboxylic acid functional polymer with an ethylenically unsaturated compound comprising at least one group capable of reacting with the carboxylic acid group of the polymer, especially 2-hydroxyl-ethyl methacrylate (see examples 1, 4 and 15 of (1)). Since these are the only additional features characterising the subject-matter of auxiliary requests 1 to 3 over the subject-matter of the main request, they are obvious to the person skilled in the art in the same way as the subject-matter of the main request.

4.3 4th and 5th auxiliary request:

Halophosphorus acid esters, especially chlorophosphorus acid esters of diglycidyl methacrylate of Bisphenol A (Bis-GMA), are well-known components of adhesive compositions in the field of dentin and enamel adhesives (see for instance claim 7 and especially examples 1 to 26 and 31 of (14) with special references to this document in (1) in column 2, lines 20 to 23 and in column 20, lines 12 to 13).

Since these components exhibit precisely the features of the compounds that are defined in claims 1, 5 and 22 of (1), it is obvious to the skilled person to take them as the acidic phosphorus containing component in the compositions according to the teaching of (1), claim 22.

Thus the claims of the 4th and 5th auxiliary request do not comply with the requirements of Article 56 EPC either.

4.4 6th and 7th auxiliary request:

The person skilled in the art knows that itaconic acid and acrylic acid are common components to produce carboxylic acid functional polymers being able to bond polymerisable unsaturated groups according to claim 1 of (1). Even the compound used in the examples of the patent in suit is a product well-known in the market (VITREBOND™ polymer according to page 6, line 48) and published as Example 11 of EP-A-0 323 120 (see subscript no. 3 of table I of the patent in suit).

Equally well-known is the fact that fillers are to be used with adhesive compositions (cementation material) in dental cure. One example for this general knowledge is (15), page 9, left column, last paragraph.

Accordingly, making use of such general knowledge together with the teaching of (1) cannot be regarded as an achievement providing an inventive step. Therefore the subject-matter of claim 1 of the 6th and 7th auxiliary request respectively does not meet the requirements of Article 56 EPC either.

4.5 In these circumstances the arguments of the respondent cannot hold:

First, the disclosure of claim 22 of (1) is not restricted to a composition, consisting of one single active component in the sense of a compound according

to claims 1 to 21 together with any other additional compounds normally being present in an adhesive to be used by the skilled person.

The wording of claim 22 refers to a composition containing "one or more compounds according to the claims 1 to 21" and the alternative "more compounds according ..." clearly means that more than one active compound must be present in the claimed composition. Thus claim 22 of (1) inter alia in fact represents mixtures of two active compounds in the sense of a carboxylic acid functional polymer and an ethylenically unsaturated phosphorylated compound being present in the composition as two different individual compounds.

Inherently acknowledging the claiming of such a mixture of two active compounds in (1), the second submission of the respondent is that the person skilled in the art never would have combined a carboxylic acid based compound with an acidic phosphorus compound. He would have preferred derivatives of boric acid or sulphonate because of their better performance in the examples 11 and 13 of (1).

If the skilled person however has the possibility to combine four different classes of substances for a composition, he would not only try the combination of the two classes showing the best effects being used alone. He would try all combinations in any case and would especially do so if the values in single use are only as close together as the values of 4.5 N/mm^2 (phosphorus-based example 9), 5.8 N/mm^2 (sulphur-based example 13) or 6.8 N/mm^2 (carbonic acid-based

example 16) for adhesiveness and 7.8 N/mm^2 (boron-based example 11) for tensile strength.

Thus there was no prejudice in (1) deterring the skilled person from combining oligomeric or prepolymeric compounds based on acidic phosphorus with such compounds based on carbonic acid groups. Hence the claimed subject-matter does not meet the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

A. Townend U. Oswald