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Boards of Appeal

Chambres de recours

Case Number : T 217 /85



D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 17 March 1987

Appellant :
(Opponent)

Pennwalt Corporation
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Pennsylvania 19102
USA

Representative :

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Respondent :
(Proprietor of the patent)

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Representative :

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Decision under appeal :

Decision of Opposition Division of the European
Patent Office dated 28 June 1985 rejecting
the opposition filed against European patent
No. 32 757 pursuant to Article 102(2) EPC.

Composition of the Board :

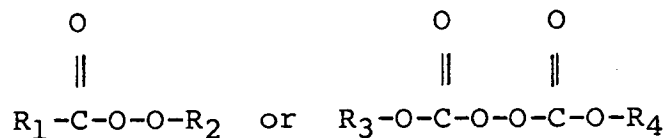
Chairman : K. Jahn
Member : J. Arbouw
Member : P. Ford

Summary of Facts and Submissions

- I. European patent No. 32757 incorporating 5 claims was granted on 23 March 1983 on the basis of European patent application No. 81 200 005.7, filed on 6 January 1981 and claiming a priority of 16 January 1980 (NL-8000260).
- II. The Opponents filed opposition to the grant on 23 December 1983 and a later submission with additional arguments on 1 March 1984 on the basis of new documents and requested that the patent be revoked in its entirety on grounds of not meeting the requirements of Articles 52-57 EPC.
- III. By its decision of 28 June 1985 the Opposition Division rejected the opposition and maintained the patent unamended.

The independent Claims 1 and 4 of the patent as granted read as follows:

"1. An aqueous peroxide emulsion comprising an organic peroxide which is liquid at -5°C , a surfactant and/or a protective colloid, characterised in that the organic peroxide is of the formula



wherein

R_1 = a tert.alkyl group having 4-9 carbon atoms or a phenoxy-methyl group,

R_2 = an alkyl group having 4-8 carbon atoms or a cumyl group and

R₃ and R₄ = a substituted alkyl group having 3-8 carbon atoms, and the emulsion contains 2-20% by weight of an alkanol having 1-4 carbon atoms and/or an alkane diol having 2-4 carbon atoms.

4. A process for the suspension (co-) polymerization of an ethylenically unsaturated compound in the presence of an organic peroxide, characterized in that the organic peroxide is employed in the form of an aqueous emulsion according to any one of the preceding claims".

The decision to maintain the patent was based on the finding that its subject-matter is novel with respect to the closest prior art (1) US-A-3 988 261.

As regards inventive step the Opposition Division found that although peroxide emulsions comprising water-soluble anti-freeze compounds in the aqueous phase are used in polymerization reactions carried out below the normal freezing point of water, the man skilled in the art had no reason to expect that aqueous peroxide emulsions comprising the well-known alcoholic anti-freeze compounds could be stored and transported over a long period of time without decomposition. On the contrary the skilled man is aware of the fact that alcohols and diols have a negative effect on the stability of peroxide solutions and will therefore avoid using such compounds for storing and transporting peroxide emulsions.

The presence of alcohols during polymerization is not harmful, since the peroxide acts in polymerisation reactions as an initiator and should therefore decompose to form radicals.

- IV. A Notice of Appeal was filed by the Appellants against this decision on 14 August 1985 and the appeal fee was paid. A Statement of Grounds was filed on 7 November 1985. The appellants argued that the skilled man could have expected that the presence of the common alcoholic anti-freeze compounds in the aqueous peroxide emulsion has no adverse effect on the stability of the peroxides. The alcohol or glycol will only be present in the aqueous phase of the peroxide emulsion and therefore will have no influence on the stability of the peroxide itself being in the separate peroxide phase.
- V. The respondents submitted that there was a prejudice against the use of the alcoholic anti-freezing compounds since it is known from (16), Industrial and Engineering Chemistry, 56(12), page 33, (1964), and (17), J.A.C.S., vol. 72, page 1254-1262 (1950) that alcohols have a negative influence on the stability of the peroxides. They further argued that the use of the same anti-freezing compounds during the polymerization reaction is irrelevant in the present case since during the polymerization the peroxide should decompose, therefore the presence of a destabilizing anti-freezing compound is not disadvantageous during the polymerization reaction.
- VI. In a communication the Board gave as its provisional opinion that the product claims also include emulsions which do not solve the problem underlying the invention.
- The Board further indicated that the process claims 4 and 5 appear to lack novelty.
- VII. In the oral proceedings on 17 March 1987 the Respondents submitted amended Claims 1 to 5 and an amended description.

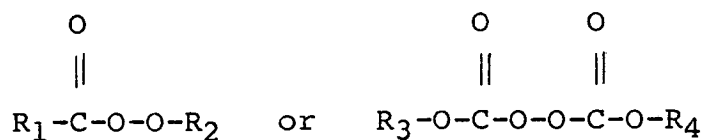
It was not disputed between the parties that the subject-matter of the amended claims is novel over the cited documents.

The appellants further reaffirmed their points as regards inventive step and based their arguments only on the documents (1), (2) US-A-3 067 186, (3) US-A-3 312 678, (4) US-A-2 665 269, (16) and (17).

The Respondents submitted that the subject-matter of the patent is inventive over the prior art since particularly documents (16) and (17) will not stimulate the man skilled in the art to use alcohols as anti-freeze additives.

Independent Claims 1 and 4 filed during oral proceedings read:

"1. A storage stable peroxide emulsion comprising an organic peroxide which is liquid at -5°C , a surfactant and/or a protective colloid, characterized in that the organic peroxide is of the formula



wherein

R_1 = a tert. alkyl group having 4-9 carbon atoms or a phenoxy-methyl group,

R_2 = an alkyl group having 4-8 carbon atoms or a cumyl group and

R₃ and R₄ = a substituted or unsubstituted alkyl group having 3-8 carbon atoms, and the emulsion contains 2-20% by weight of an alkanol having 1-4 carbon atoms and/or an alkane diol having 2-4 carbon atoms, the emulsion being liquid at a temperature in the range of -10°C to 25°C.

4. A process for the suspension (co-)polymerization of an ethylenically unsaturated compound in the presence of an organic peroxide, characterized in that in the preparation of the (co-)polymerization mixture use is made of an aqueous emulsion having previously been prepared and having the composition according to any one of the preceding claims."

VIII. The Appellants (Opponents) request that the decision under appeal be set aside and that the patent be revoked.

The Respondents (Patentees) request that the appeal be dismissed and that the patent be maintained on the basis of Claims 1-5 and the description as submitted during oral proceedings.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.
2. There is no formal objection to the current version of the claims, since it is adequately supported by the original documents and does not extend the protection conferred by the patent as granted. Claim 1 is based on the Claims 1 and 2 and on page 4, line 30-31 as filed and on Claim 1 and page 3, lines 43-44 of the patent. Claim 4 is based on Claim 5 and example 7 as filed and on Claim 4 and example 7

of the patent. The rest of the claims are based on the claims as originally filed. The introduction of the requirement that the emulsion is liquid at a temperature in the range of -10 to -25°C is a limitation to storage stable emulsions.

3. The closest prior art is represented by (1). This document discloses an aqueous peroxide emulsion comprising an organic peroxide which is identical with the peroxide defined in Claim 1 of the patent-in-suit, a surfactant and/or a protective colloid.

This emulsion can be stored and transported at low (-2 to -30°C) temperature in frozen condition (see col. 8, lines 9-13).

Although the emulsions according to (1) can be stored and transported at low temperatures without a great loss of activity these frozen emulsions have certain disadvantages. Thawing of the frozen emulsions will sooner lead to uncontrolled decomposition of the peroxide than heating of corresponding non-frozen emulsions due to the great difference in thermal conductivity of the liquid emulsion and the frozen emulsion leading to overheating and uncontrolled decomposition of the already thawed portion of the emulsion.

4. The technical problem underlying the invention with respect to (1) is, therefore, making available peroxide emulsion which during transport and storage at temperatures from -10 to -25°C has a comparable stability and does not have the disadvantages of overheating and uncontrolled decomposition during the subsequent heating (thawing) before use in polymerization reactions.

In order to solve this technical problem the Patentee proposes to provide a peroxide emulsion which is liquid at -10 to -25°C by adding 2-20% by weight of an alkanol having 1-4 carbon atoms and/or an alkane diol having 2-4 carbon atoms.

The Board is satisfied that the emulsion according to the patent-in-suit solves this technical problem (see the examples). The functional limitation of the claim to a storage-stable emulsion which is liquid at a temperature in the range of -10 to -25°C guarantees that the disadvantages as regards thawing after storage are overcome.

5. Examination of the cited documents has revealed that this technical teaching is not disclosed there. Consequently, the subject-matter of Claim 1 of the patent-in-suit is novel having regard to the prior art. Since the Respondents have finally not challenged this issue, it is not necessary to examine the matter in more detail.

6. It still remains to be examined whether the requirements for inventive step are met by the subject-matter claimed. It was in fact known from (1) that frozen peroxide emulsion at low temperature (-2 to -30°C) are stable under transport and storage conditions (see col. 8, lines 9-13). Document (1) particularly teaches that for storage and transport the frozen (solid) state has certain advantages (see col. 3, line 54-61).

However, frozen peroxide emulsions are disadvantageous in that they require special care during thawing before they can be used.

Although the technical problem underlying the invention is not mentioned in the prior art this problem could have easily been posed by any man skilled in the art.

6.1 The Appellants argued that the idea of adding lower alcohols or diols to the emulsions according to (1) was obvious since alcohols and diols are well-known anti-freeze compounds in the art (see e.g. (2), col. 1, line 30-37); (3), col. 6, lines 6-12 and (4), col. 7, line 21-35). They further argued that the man skilled in the art could have expected a similar stability for the emulsions according to (1) and for such emulsions comprising alcohols or diols since documents (16) (see page 36, Table I) and (17) (see page 1256, line 1-9 and 26-30) teach that temperature is the most important parameter as regards the stability of organic peroxides.

6.2 This line of argument fails to take into account that to begin with lower alcohols and diols are not the only anti-freeze agents which the man skilled in the art could be expected to take into consideration. The cited documents do not only mention lower alcohols and diols but also glycerol (see (2), col. 1, line 37), acetone and inert salts (see (3), col. 6, line 10) and erythritol (see (4), col. 7, line 30). It should further be borne in mind that these documents deal with emulsion polymerization reactions where the decomposition of the peroxides is essential.

The arguments further simplify the teaching of (16) and (17), in that the teaching as regards the influence of solvents, and particularly of alcohols, on the stability of organic peroxides is ignored. Document (16) (see page 36, left-hand column, line 19-23) teaches that "the decomposition rates are shown to be affected by the nature of the solvent" and that 30% diisopropyl-peroxydicarbonate in isopropyl alcohol at 25°C is extremely unstable". This teaching is confirmed by document (17) (see page 1556, left-hand column, line 57 ff.). In interpreting this teaching it should be borne in mind that this solid

peroxide is admittedly more stable than the liquid peroxides according to the patent-in-suit. It should further be borne in mind that diisopropyl-peroxydicarbonate in isopropyl alcohol decomposes within minutes (see 17, page 36, left column, lines 19-23), whereas the peroxide-emulsions according to the invention should be storage stable during month (see e.g. Example 1).

- 6.3 Therefore the man skilled in the art who as a solution of the problem underlying the invention decides to add an anti-freeze agent to the peroxide emulsion will not be induced to choose therefor a lower alcohol or diol, since he would have expected that such an additive only solves one aspect of the problem - i.e. making available a peroxide emulsion which overcomes the disadvantages of the emulsions according to (1) - but not the other part -making available a peroxide emulsion which at temperatures from -10 to -20°C has a similar stability to that of the emulsions according to (1).
- 6.4 The Board is bound to say that in seeking to analyse retrospectively how a skilled person might have been able to arrive at the concept of the invention in two mental stages: firstly adding anti-freeze agent; secondly choosing therefor alcohols and diols, the Appellants are adopting a typical **ex post facto** approach which fails to do justice to the objective standards by which inventive step is to be assessed.
- 6.5 Therefore, in view of the problem underlying the invention, the prior art cited did not suggest for adding lower alcohols or diols to the peroxide emulsions. Thus the emulsion according to Claim 1 has to be considered as involving an inventive step.

- 6.6 Claims 2 and 3 concern particular embodiments of the subject-matter of Claim 1, and thus are supported by the patentability of that claim.
- 6.7 The subject-matter of the Claims 4 and 5 is directed to the use of the novel and inventive peroxide emulsions according to the invention in emulsion polymerization reactions. The peroxide emulsions as such are novel (see point 5 above) therefore the use thereof is also novel.

The arguments given above are also valid for Claims 4 and 5, since the peroxide emulsions according to the invention are especially prepared for the use in emulsion polymerization reactions and since this use is based on the supply of these peroxide emulsions.

Order

For these reasons, it is decided that:

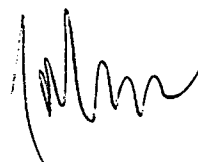
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 5 and description as submitted during oral proceedings on 17 March 1987.

The Registrar

The Chairman



F. Klein



K. Jahn

PF.

