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D E C I S I O N
of 18 February 1999

Case Number: T 0056/94 - 3.3.6

Application Number: 87304963.9

Publication Number: 0253487

IPC: C11D 3/39

Language of the proceedings: EN

Title of invention:
Activated bleaching composition

Patentee:
The Clorox Company

Opponent:
Unilever N.V. / Unilever Plc

Headword:
-

Relevant legal provisions:
EPC Art. 83, 87, 88, 54(3), 56

Keyword:
"Sufficiency of disclosure (yes)"
"Priority validly claimed (yes)"
"Novelty (Article 54(3)) (no; set B of claims)"
"Inventive step (no; set A of claims)"

Decisions cited:
T 0184/84, T 0495/91, T 0020/81

Catchword:
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Case Number: T 0056/94 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 18 February 1999

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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 29 November 1993 concerning maintenance of European patent No. 0 253 487 in amended form.**

Composition of the Board:

Chairman: P. Krasa
Members: G. N. C. Raths
J. P. B. Seitz

Summary of Facts and Submissions

I. This appeal lies from the Opposition Division's decision maintaining European patent No. 0 253 487 in amended form according to a set of 14 claims as far as the countries AT, BE, ES, GR and LU were concerned and according to another set of 12 claims as far as the countries CH, DE, FR, GB, IT, LI, NL and SE were concerned. The patent was granted with respect to European patent application No. 87 304 963.9 which had been filed on 4 June 1987 claiming priority from US application No. 872 252 filed on 9 June 1986.

In the notice of opposition, based on insufficiency of disclosure, lack of novelty and inventive step, inter alia the following documents were cited:

(1) EP-A-0 206 390

(2) US-A-3 974 082

(3) Lipolytic Enzymes, Academic Press, New York 1974, pages 49 to 64

(7) GB-A-0 836 988.

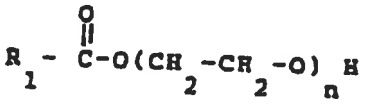
II. Claim 1 of the set of claims for designated states AT, BE, ES, GR, LU (hereinafter referred to as "set A") as maintained by the Opposition Division read as follows:

"An activated oxidant system for in situ generation of peracid comprising
(a) an enzyme having lipase and/or esterase activity;
(b) a substrate being an ester of a carboxylic acid;

(c) a source of peroxygen which will react with (a) and (b) to produce the peracid characterized in that the ester substrate (b) comprises at least one selected from the group consisting essentially of

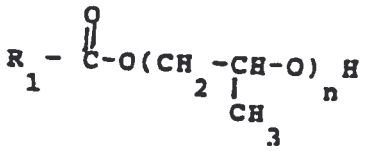
(i) mono-, di-, and triglycerides;

(ii) ethylene glycol derivatives having the structure



wherein n=1-10 and R_1 is defined as C_1-C_{12}

(iii) propylene glycol derivatives having the structure



wherein R_1 and n are defined as above".

In claim 1 of the set of claims for the designated states CH, DE, FR, GB, IT, LI, NL, SE (hereinafter referred to as "set B") as maintained by the Opposition Division "An activated oxidant system for in situ generation of peracid comprising" (set A) was replaced by "Use of an activated oxidant system for in situ generation of peracid by enzymatic perhydrolysis in aqueous solutions, comprising".

III. In the appealed decision the Opposition Division held that the patent in suit disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a skilled person and that the subject-matter of the claims of both set A and set B were novel and involved an inventive step.

The Opposition Division held in essence

- that the subject-matter of the claims as amended was new because document (1) was silent about the formation of a peracid by an enzymatic perhydrolysis and,

- that the claims involved an inventive step over document (2) because the use of the substrate as specified by the proprietor led to an oxidant system which could be used in a broader temperature range and at a variety of pH levels, especially at pH values as low as 7.5.

IV. An appeal was lodged against this decision.

V. The Appellant (Opponent) based his appeal on insufficiency of disclosure, lack of novelty and lack of inventive step of the patent as maintained by the Opposition Division. In his letter dated 8 February 1999 (i.e. 10 days before the date of oral proceedings), the Appellant contested without any substantiation the validity of the priority right claimed for the patent in suit.

VI. The Respondent (Proprietor) submitted by letter dated 18 October 1994 an auxiliary request (in which the designated states of set A had been reduced to AT, ES; the designated states of set B to DE, FR, GB, IT)

which differed from the main request in that the expression "an activated oxidant system" was replaced by "a bleaching composition", and the expression "consisting essentially of" by "consisting of".

He argued

with respect to insufficiency of disclosure

- that he had sufficiently demonstrated that the enzymatic perhydrolysis took place;
- that the experimental data of the opponent were not sufficient to prove the contrary since the opponent did not follow the examples of the patent in suit;

with respect to novelty

- that in document (1) which was only to be considered for the claims of set B, no hint was given that an enzymatic perhydrolysis for bleaching purposes took place;

with respect to inventive step

- that the substrates of the invention which differed substantially from those of document (2) would allow for lipase systems usable at a variety of temperatures (in particular also near the boiling point of water) and at a variety of pH levels (e.g. at pH = 7.5);
- that the amount of enzyme according to the present invention was substantially lower than that disclosed in document (2).

VII. The Appellant requested that the decision under appeal be set aside and that European patent No. 0 253 487 be revoked. The Respondent requested

1. that the appeal be dismissed and that the patent be maintained as amended by the Opposition Division (main request);

2. that the decision under appeal be set aside and that the patent be maintained on the basis of his auxiliary request (1A and 1B) filed with his letter of 20 October 1994.

VIII. Oral proceedings took place on 18 February 1999, at the end of which the Chairman announced the Board's decision.

Reasons for the Decision

1. The appeal is admissible.

2. Claims 1 to 14 (set A) and claims 1 to 12 (set B) as maintained by the Opposition Division (*Respondent's main request*)

2.1 Amendments

The Board is satisfied that the claims according to set A and set B meet the requirements of Article 123(2) and (3) EPC. As no objections have been raised in this respect, no detailed reasoning needs to be given.

2.2 Sufficiency of disclosure

2.2.1 Claim 1 of set A relates to an activated oxidant system for in situ generation of peracid comprising (a) an enzyme having lipase and/or esterase activity, (b) a substrate being an ester of a carboxylic acid being defined as mentioned above under point II, (c) a source of peroxygen which will react with (a) and (b) to produce the peracid.

Claim 1 of set B relates to the use of a bleaching composition for in situ generation of peracid by enzymatic perhydrolysis in aqueous solutions, comprising the previously mentioned components (a), (b) and (c).

Examples 1 to 20, 34 to 47, 49, 50, 54, 56, 61, 62, 64 to 67, 68, 70, 71, 76 to 78 of the patent in suit disclose the production of peracid measured in "ppm" by combining the components (a), (b) and (c) as claimed; in Examples 21 to 33, 48, 51 to 53, 55, 57, 60, 63, 69, 72 to 75, no peracid had been measured.

2.2.2 The Appellant contended that the patent in suit did not sufficiently disclose the reaction mechanism between the lipase and the peroxygen source; he contested the generation of peracid by enzymatic perhydrolysis. He relied on his experiments (submitted during the opposition procedure) which would show that lipolytic action followed by conventional chemical perhydrolysis would produce peracid. In the absence of relevant information on the details of the modification of the thiosulphate assay (patent in suit, page 4, lines 33 and 34), he was not able to reproduce the examples of the patent in suit and to distinguish between oxygen produced by chemical hydrolysis and oxygen produced by enzymatic hydrolysis.

2.2.3 The Board agrees that the explanations given in the patent in suit do not allow a differentiation to be made between chemical perhydrolysis and enzymatic perhydrolysis. However, the description of the patent in suit sufficiently discloses not only how to manufacture compositions comprising the components (a), (b) and (c) as claimed but also that these compositions can be used to generate peracid in situ (see above point 2.2.1). Taking into account that the peracid will in turn generate activated oxygen for bleaching purposes, it is clear that the mechanism of the peracid generation (i.e. whether "enzymatic" or "chemical") is no distinguishing feature and is in particular irrelevant for the issue of sufficiency of disclosure. Consequently the Board concludes that the requirements of Article 83 EPC are met.

2.3 Priority

2.3.1 In accordance with Article 87 EPC a European patent application is only entitled to priority in respect of the same invention as was disclosed in the previous application. This means that the subject-matter of the claims of the European application must be clearly identifiable in the documents of the previous application as a whole. Identical wording is not required (see T 0184/84, Ferrit crystal/NGK Insulators, 4 April 1986).

In the course of the oral proceedings, the Appellant, on inquiry, stated that the objection of invalidity of the priority right concerned only the respective claim 1 of set A and set B respectively (and the respective dependent claims). These claims enumerate

as ester substrates, inter alia, monoglycerides, diglycerides and triglycerides (see above point II). The relevant passage in this respect is to be found on page 16, lines 7, 8 and 10 to 12 of the priority document and reads as follows:

"The use of glycerides, especially diglycerides and triglycerides is particularly preferred...; each triglyceride molecule is capable of stoechiometrically yielding up to three fatty acid or peracid molecules".

The reference to "...glycerides, especially diglycerides and triglycerides..." also implicitly discloses for a skilled person the monoglycerides as the only sub-group of glycerides as remaining part of the explicitly enumerated di- and triglycerides. The reference to "...up to three fatty acids..." further confirms that "glycerides" in the context of the priority application only means fatty acid esters of glycerol and does not refer, as alleged by the Appellant, to e.g. sugar derivatives. Therefore, the Board concludes that "monoglycerides" were clearly disclosed in the prior application as possible substrates and that, consequently claim 1 of the patent in suit relates to the same invention as disclosed in the earlier application. Therefore, the claimed priority right can be acknowledged for the subject-matter of claim 1.

2.4 Novelty

2.4.1 Claims 1 to 14 of set A

The Board is satisfied that the subject-matter claimed according to set A is not disclosed in any of the citations. It is therefore novel. Since novelty has not been contested, no detailed reasoning needs to be given.

2.4.2 Claims 1 to 12 of set B

2.4.2.1 Claim 1 of set B relates to the use of an activated oxidant system for in situ generation of peracid by enzymatic perhydrolysis in aqueous solutions comprising the three components as defined above under point II, namely (a) an enzyme having lipase activity, (b) a substrate and (c) a source of oxygen.

2.4.2.2 Example V of document (1) disclosed a bleach containing detergent composition comprising, inter alia, perborate (i.e. component (c) of claim 1), an enzyme having lipase activity (i.e. component (a) of claim 1), and TAED (tetraacetylethylenediamine); the washing experiments were carried out with cotton test clothes which were soiled with a mixture containing inter alia olive oil and palm oil (column 12, first line); palm oil and olive oil contain triglycerides, i.e. component (b); at a certain moment in the washing process, all the components (a), (b) and (c) required by claim 1 were present.

2.4.2.3 It was known (patent in suit, page 1, lines 12 to 14, referring to the state of the art) that addition of TAED to perborate bleaches leads to in situ formation of peracids. In view of the term "comprising" in claim 1 of set B, TAED can also be present in the compositions which are used according to this claim. It follows that a composition falling within the scope of claim 1 was already disclosed in Example V of document (1) as was the use of this composition for the in situ generation of peracid. Since the feature "by enzymatic perhydrolysis" is not a distinguishing one with respect to "by chemical perhydrolysis" (see above under item 2.2.3), the Board concludes - contrary to the Opposition Division - that the subject-matter of claim 1 is not novel (Article 54(3) EPC).

2.5 Inventive step

2.5.1 The technical problem

2.5.1.1 Set A concerns an activated oxidant system for in situ generation of peracid comprising (a) an enzyme having lipase activity, (b) an ester substrate and (c) a source of peroxygen which will react with (a) and (b) to produce the peracid and a method for using the system in aqueous solution for achieving bleaching (see also claim 11).

Bleaching compositions were already known e.g. from documents (2) and (7).

2.5.1.2 Document (2) discloses bleaching compositions comprising inter alia (a) an ester-hydrolysing enzyme which releases an acyl moiety of 2 to 8 carbon atoms, (b) an acyl-alkyl ester having said acyl group and an alkyl group of 1 to 10 carbon atoms, (c) a percompound of the oxygen releasing type (e.g. column 2, lines 4 to 10).

Document (7) discloses bleaching compositions comprising a hydrogen peroxide and an organic carboxylic ester (e.g. page 1, lines 31 to 35) among which in particular, the triglyceride glyceroltriacetate is mentioned on page 7 (line 15).

Thus the compositions disclosed in document (2) differ in essence from those of claim 1 of set A in the type of the ester substrate, and those of document (7) in that they lack the enzyme.

2.5.1.3 The Board takes document (2) as the starting point for evaluating inventive step. According to the patent in suit, the technical problem to be solved in respect of the compositions of the state of the art, for which

document (2), among others, was said to be representative (patent in suit, page 2, line 27), was to provide improved bleaching or activated oxidant systems capable of enhanced performance in aqueous solutions at low-temperature wash conditions while still maintaining high-temperature performance (page 2, lines 31 to 34).

2.5.1.4 In the patent in suit, the only experimental data referring explicitly to bleaching are those of Table VII indicating the percentage of stain removal achieved with 3 different enzymes, at different concentrations of hydrogen peroxide and at different temperatures; it results from Table VII that the percentage of stain removal was dependent on the enzyme used, its concentration, and the applied temperature.

The washing temperatures in said table vary from 25°C to 38°C; only Example 81 refers to a high-temperature washing process since the wash solution was heated to 70°C and higher, preferably close to the boiling point, but this example is silent on the bleaching effect achieved.

Furthermore, no data are available to the Board comparing the bleaching effect achieved at lower temperatures by the claimed subject-matter in relation to that of the products disclosed in document (2).

For formulating the technical problem only such effects can be taken into account which are supported by evidence (T 0020/81, OJ EPO 1982, 217, point 3, last paragraph of the reasons for the decision). In view of the lack of experimental data in this respect the Board cannot accept that the technical problem as defined in the patent in suit was actually solved.

Therefore the technical problem has to be reformulated (see T 0495/91, Reasons for the decision, point 4.2, not published in the OJ EPO).

2.5.1.5 The Respondent submitted that the subject-matter of claim 1 permitted working with smaller enzyme amounts and at lower pH-values than was disclosed in document (2).

2.5.1.6 Even if the Board were to accept that sufficient bleaching effects could be achieved according to the patent in suit with lower amounts than those used according to document (2) - which in fact was not proved as the enzyme amounts in the examples of the patent in suit vary between e.g. 20 µg/ml and 10 000 µg/ml (e.g. Examples 85 and 54 respectively) - this could not be taken into consideration when defining the technical problem since claim 1 contains no limitation in this respect.

2.5.1.7 As to the pH-values, the Respondent pointed to document (2) according to which "most bleaching is done in alkaline medium" (column 1, line 38) whereas according to Example 4 of the patent in suit peracid was generated at a pH value of 7.5.

However this example makes use of a particular enzyme i.e. Candida Cylindracea lipase, in an amount of 1 mg/ml (i.e 1 000 µg/ml) at room temperature and in the presence of polyvinyl alcohol as an emulsifier; there is no indication in the patent in suit that the pH of 7.5 is independent of the particular combination of technical features of Example 4. Therefore the Board cannot accept this single example as sufficient proof that all the embodiments covered by claim 1 would allow the desired in situ generation of peracid and consequently the desired bleaching at a low pH.

In view of these considerations, the technical problem to be solved is defined as providing a further peracid generating composition and its use for stain removal.

2.5.1.8 From document (2) it was known that peracids are formed in situ by reacting in aqueous solution a percompound, an acyl-alkyl ester and an ester hydrolysing enzyme which liberates said acyl moiety from said ester (see the paragraph bridging columns 1 and 2). The ester (together with the enzyme) acts as a precursor in the formation of peracid in situ. The reactive carboxylic group formed reacts with the percompound to form the peracid (column 2, lines 10 to 14). Thus, a skilled person was informed that the acyl moiety was the important entity in the system for producing the peracid, whereas the alkyl residue of the ester was of minor importance. Therefore, a skilled person looking for further peracid generating compositions would have considered replacing the acylalkyl esters of document (2) by other substrates which would yield the necessary acyl residues, and would have learned from document (7) that glyceroltriacetate (document (7), page 7, line 15) could be used to that end and would produce three reactive carboxylic groups (instead of one carboxylic group in the case of esters of document (2) which had been qualified as "simple" esters by the Respondent). It was therefore obvious for the skilled person to try said triglyceride of document (7), since it would result in acyl residues like those defined in document (2), all the more so as triglycerides were known to undergo hydrolysis, whether enzymatic or chemical, in aqueous solutions (document (3), page 54, lines 10 to 12; page 61, lines 1 to 8).

The Board concludes that in the light of the teaching of document (3), there was an incentive for a skilled person to use the glycerol triacetate of document (7)

instead of the esters of document (2) with the reasonable expectation of achieving a bleaching effect, and thus, solving the underlying technical problem.

2.5.1.9 It follows that the subject-matter of claim 1 does not involve an inventive step and, therefore, does not comply with the requirements of Article 56 EPC.

3. *Auxiliary request*

The auxiliary request differed from the main request essentially in that the expression "an activated oxidant system" was replaced by "a bleaching composition", the replacement of "consisting essentially of" by "consisting of" having no bearing on the present issue.

The mere renaming of the composition used does not change the technical meaning of the claim - the "activated oxidant system" implies the generation of a peracid and hence bleaching which means that the "activated oxidant system" is in fact a "bleaching composition".

Therefore, all the considerations and conclusions given above for claim 1 as maintained by the Opposition Division apply also for claim 1 of this auxiliary request which must fail for the same reasons as the main request.

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:

G. Rauh P. Krasa

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