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**Datasheet for the decision
of 12 March 2009**

Case Number: T 0097/06 - 3.3.01

Application Number: 98306296.9

Publication Number: 0896963

IPC: C07D 303/32

Language of the proceedings: EN

Title of invention:

Methyl oxirane dibenzoylresorcinol UV absorbers

Applicant:

GENERAL ELECTRIC COMPANY

Opponent:

-

Headword:

UV absorbers/GENERAL ELECTRIC

Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step (yes) - non obvious UV absorbers as alternative compound to known UV absorbers"

Decisions cited:

T 0852/91

Catchword:

-



Case Number: T 0097/06 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 12 March 2009

Appellant:

GENERAL ELECTRIC COMPANY
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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 25 July 2005
refusing European application No. 98306296.9
pursuant to Article 97(1) EPC.

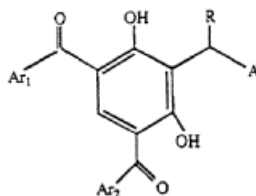
Composition of the Board:

Chairman: P. Ranguis
Members: J.-B. Ousset
R. T. Menapace

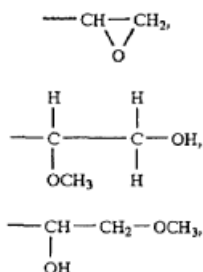
Summary of Facts and Submissions

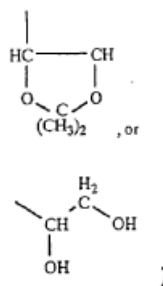
- I. The present appeal lies from the decision of the Examining Division to refuse the European patent application No. 98 306 296.9 (Publication No. 896 963) pursuant to Article 97(1) EPC on the ground that the subject-matter of Claim 1 of the then pending request did not involve an inventive step.
- II. The refused set of claims comprised seven claims, independent Claims 1 and 7 reading as follows:

"1. A compound having the formula:

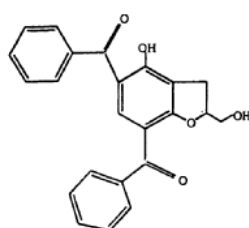


where Ar₁ and Ar₂ are independently substituted or unsubstituted monocyclic or polycyclic aryl groups, R is hydrogen, or an aliphatic group having from 1 to 8 carbon atoms, and A is





or a compound having the formula



"7. A UV absorbing coating composition comprising a transparent matrix material and a UV absorbing compound selected from

- 2-(methyloxirane)-4,6-dibenzoylresorcinol;
- 2-(3-hydroxy-2-methoxypropyl)-4,6-dibenzoylresorcinol;
- 2-(2-hydroxy-3-methoxypropyl)-4,6-dibenzoylresorcinol;

- 2-hydroxymethyl-5-hydroxy-6,8-dibenzoyl-2,3-dihydrobenzofuran;
- 2-(2,3-dihydroxypropyl)-4,6-dibenzoylresorcinol; and
- 2,2-dimethyl-5-[(2,6-dihydroxy-4,5-dibenzoylphenyl)methyl]1,3-dioxolane.

III. The following documents were cited in the examining proceedings:

- (1) EP-A-0 564 981
- (2) EP-A-0 672 732
- (3) EP-A-0 668 313
- (4) US-A-5 574 162
- (5) EP-A-0 693 483
- (6) EP-A-0 854 127 (Article 54(3)(4) EPC 1973)

In its decision the examining division held that the amendments with respect to the originally filed claims were acceptable under Article 123(2) EPC.

In respect to inventive step issue, it was found that documents (1) to (3) already disclosed dibenzoylresorcinol derivatives which might carry a variety of further substitutions to the central ring as UV stabilizers for polymers. Epoxy or epoxy derived groups were, however, not specifically described. Example 3 of document (2) was to be considered as the closest state of the art. The person skilled in the art would have expected that the utility of the compounds of documents (1), (2) or (3) would be maintained in compounds with epoxy functionality or derivatives thereof in view of the wide variety of possible substitutions for the UV-stabilizers known from those documents (1) to (3). Indeed, from those documents, it was evident that the 4,6-di-aroxy resorcinol is the chromophore responsible for UV-absorbency, whereas the 2-substitutions may greatly vary. In view of documents (4) and (5) which relate to the same technical field of UV-absorbing agents and teach that for different chromophores the epoxy functionality is compatible with the desired utility, it would have been obvious for the person skilled in the art to modify the chromophore of documents (1), (2) or (3) so that it comprises such functionality without loss of utility. The alleged advantages of the claimed subject-matter over the prior art (no decomposition, low volatility) were not substantiated. Furthermore, due to the various open definitions such as "substituted" and "polycyclic aryl", the claimed subject-matter comprised compounds

for which it was highly questionable whether any utility was maintained.

IV. The arguments of the appellant may be summarised as follows:

The present invention provides 4,6-dibenzoylresorcinol compounds coupled with an epoxy group on a methylene and derivatives thereof as UV absorbers characterized by photo stability and effectiveness with low volatility.

The cited prior art did not teach that the provision of compounds having an epoxy group or ring opened as defined in Claim 1 would overcome the problem of low molecular weight and low volatility.

Regarding the objection to the use of "substituted" and "polycyclic aryl", the skilled person would easily recognize the aryl group as being suitable for use in the claimed invention in order to maintain the UV absorbency. The examining division had provided no basis as to why this would not be the case.

V. In response to a communication of the Board, the appellant filed with letter dated 16 December 2008 a set of claims identical to the previous one (see point II above), except the correction of two clerical errors, namely

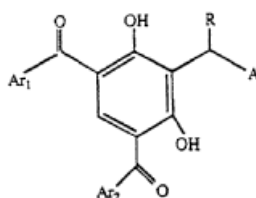
- in claim 1: according to the meaning of A the carbon atom at position 4 is linked to two hydrogen atoms (see page 5 of the application as filed),

- in claim 7: the letter "d" in the last compound was replaced by "3" (see page 6, lines 1-2 of the application as filed).

VI. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the set of seven claims filed with letter dated 16 December 2008.

Reasons for the Decision

1. The appeal is admissible.
2. Amendments
 - 2.1 The application as originally filed discloses compounds of the general formula



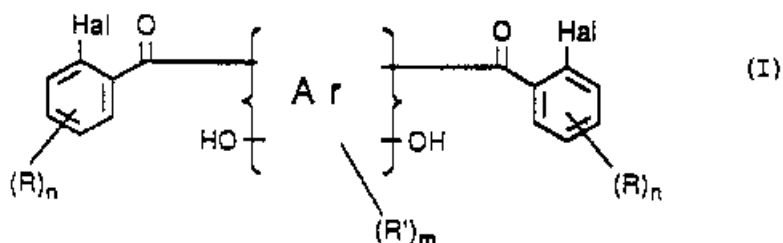
where A is an oxirane (epoxide) group and the oxirane can be ring opened to provide derivatives as described therein (see page 4, lines 9-11 of the description). The skilled reader understands immediately that this sentence refers to the rests indicated in formulae IIA, IIB, III, IV and V (see pages 4 and 5 of the description). The subject-matter of claim 1 is, therefore, supported by the content of the application as filed.

2.2 The subject-matter of Claims 2 to 7 corresponds to the subject-matter of Claims 3, 4, 5, 7, 8 and 11, each as originally filed.

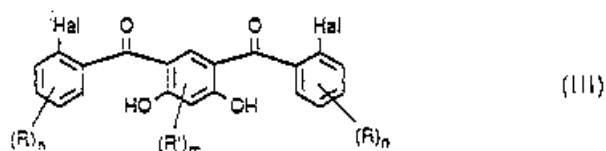
2.3 Therefore, the claims comply with Article 123(2) EPC.

3. Novelty

3.1 Document (1) discloses compounds useful as UV absorbers in polymers and having the formula



in particular



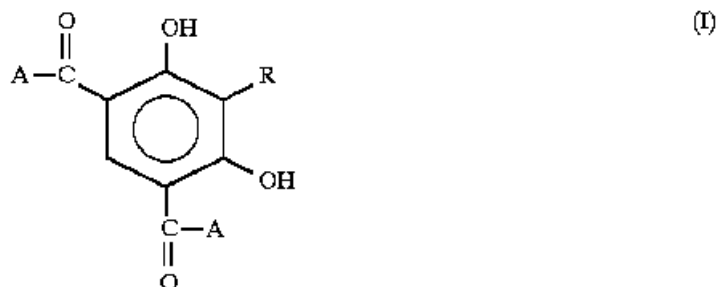
wherein R' is selected from H, alkyl, alkoxy, aryl, aryloxy, halogen, cyano, nitro, hydroxyl, amino, amido, N-alkylamino, N,N-dialkylamino, carboxyl, sulfonic, alkylsulfonyl, arylsulfonyl, thio, benzyl (see pages 2, bottom; page 3, lines 2-4 and page 16, top of the page).

The claimed subject-matter differs from the disclosure of document (1) in that the substituent R' of this document cannot take one of the values given for the

group -CH(R)-A in Claim 1 of the main request.

Moreover, the specific compound described in Claim 1 of the main request falls clearly outside the scope of document (1), since the central phenyl ring in the compounds of document (1) cannot be condensed with another ring.

3.2 Document (2) discloses polybenzoylresorcinols UV-absorbers to be incorporated into coatings of formula

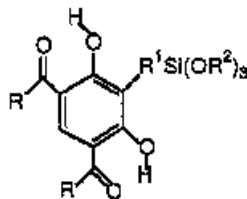


wherein A is an aromatic radical and R is H, linear or branched aliphatic chain having less than 10 carbon atoms (see page 2, lines 33 to 35 and page 3, lines 4 to 26).

The claimed subject-matter differs from the disclosure of document (2) in that the substituent R of this document cannot take one of the values given for the group -CH(R)-A in Claim 1 of the main request.

Moreover, the specific compound described in Claim 1 of the main request falls clearly outside the scope of document (2), since the central phenyl ring in the compounds of document (2) cannot be condensed with another ring.

3.3 Document (3) discloses a silylated agent useful for absorbing ultraviolet light of formula



wherein R is an aromatic radical. The claimed subject-matter differs from the disclosure of document (2) in that the radical in position-2 is an alkoxy silane.

3.4 Document (4) disclosing piperidine derivatives UV-absorbers and document (5) disclosing 2-hydroxy-4-glycidyoxy benzophenone having ultra-violet absorption properties cannot anticipate the claimed subject-matter.

3.5 Document (6) is state of the art under Article 54(3) EPC 1973 and shows the same general formula as the one defined in claim 1. However, the group A differs from the latter in that A is a radical deriving from an alcohol or a carboxylic acid, or a substituted or unsubstituted aryl group which does not include a pendent hydroxyl group (see page 3, lines 37 to 56 and page 6, lines 19-20).

3.6 The claimed subject-matter is, thus, novel (Article 54 EPC) over the cited prior art.

4. Inventive step

4.1 The subject-matter of Claim 1 relates to methyl oxirane dibenzoylresorcinol (see point II above). According to the patent application, these compounds may be used as UV absorbers characterized by photostability and

effectiveness with low volatility (see page 2, lines 26 to 28).

4.2 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures assessment of inventive step on an objective basis and avoids an ex post facto analysis.

4.3 The "closest state of the art" is normally a prior art document disclosing subject-matter aiming at the same objectives as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications (see the Case Law of the Boards of Appeal of the EPO, 4th edition 2001, Section I. D. 3.1., "Determination of the closest prior art", page 102).

The Board concurs with the examining division that document (2), in particular example 3 disclosing 4,6-dibenzoyl-2-propylresorcinol, is the closest prior art within this meaning, because the 4,6-dibenzoyl-2-propylresorcinol mentioned in example 3 differs from the claimed compounds in that the radical propyl is not substituted.

- 4.4 Thus, for defining the objective technical problem to be solved in view of document (2), the technical results or effects successfully achieved by the claimed subject-matter are to be determined.

As the appellant did not submit any evidence showing an improvement of the claimed compounds vis-à-vis document (2), in particular example 3, in terms of photostability, efficiency or low volatility, the technical problem to be solved is to be seen in the provision of further UV-absorbers useful in coating compositions. In view of the examples of the description and in the absence of evidence to the contrary, the Board considers it plausible that the technical problem has been successfully solved within the whole claimed area.

- 4.5 It remains to be decided whether or not the claimed solution (see Claim 1, point II above) is obvious in view of the prior art cited.

The claimed compounds comprise as characterizing feature a substituent (A) chosen from those set out in Claim 1, attached on the **aliphatic** chain situated in 2-position of the resorcinol moiety or alternatively the 2-hydroxymethyl-5-hydroxy-6,8-dibenzoyl-2,3-dihydrobenzofuran (see point II above).

The question is whether the person skilled in the art would have found in the cited prior art relevant information to modify the structure of the compounds disclosed therein, so that it would have been prompted to conceive as compounds having the same UV-absorption properties, the present claimed compounds.

In that context, the board considers that

- document (2) relates to 4,6-dibenzoylresorcinol compounds wherein R is H, linear or branched aliphatic chain having less than 10 carbon atoms (see point 3.2 above) excluding, therefore, any functional substitution on the aliphatic chain attached in 2-position of the resorcinol moiety, in particular a substitution such as defined in Claim 1,
- document (1) relates to 4,6-dibenzoylresorcinol compounds wherein when R' is an aliphatic chain, this aliphatic chain comprising no functional substitution (see point 3.1 above).
- document (3) discloses 4,6-dibenzoylresorcinol compounds wherein the aliphatic chain attached in 2-position of the 4,6-dibenzoylresorcinol moiety comprises a triC₁₋₆alkoxysilane attached. It describes the alkoxysilane group as mandatory and does not suggest replacing it, even less with a group A such as defined in Claim 1. Also documents (1) and (2) do not respectively suggest any substitution of the aliphatic chain since they disclose an **unsubstituted** aliphatic chain in 2-position of the 4,6-dibenzoylresorcinol moiety.

It follows that none of the documents (1) to (3) related to 4,6-dibenzoylresorcinol compounds suggests that the substituent attached on the aliphatic chain situated in 2-position of the 4,6-dibenzoylresorcinol moiety be one of the substituents A set out in Claim 1.

2-hydroxymethyl-5-hydroxy-6,8-dibenzoyl-2,3-dihydrobenzofuran is also not suggested.

- 4.6 The Board does not share the finding of the examining division that from documents (1) to (3), it was evident that the 4,6-di-aryl resorcinol was the chromophore responsible for UV-absorbency, whereas the 2-substitutions might greatly vary. This finding relies on the assumption of common general knowledge which is, however, not based on verifiable facts (see T 852/91, not published). However, the interpretation of the content of any prior art must be confined to what it actually discloses and in that context any generalization going beyond the material teaching is to be avoided.
- 4.7 Document (4) would not have been considered by the person skilled in the art in the given context, because it relates to 2,2,6,6-tetraalkylpiperidine or piperazine or piperazinone derivatives as UV-absorbers and none of its substituents on the piperidine, piperazine or piperazinone cycle, corresponds to the substituent A as defined in Claim 1 (-O-glycidyl cited col.2, line 55 or col.3, line 1, cannot be assimilated to glycidyl). The same is true for 2-hydroxymethyl-5-hydroxy-6,8-dibenzoyl-2,3-dihydrobenzofuran.
- 4.8 Likewise, document (5), which teaches 2,4-dihydroxybenzophenone wherein a hydroxy radical was substituted by a glycidyle rest as UV-absorber does not suggest 4,6-dibenzoylresorcinol wherein the 2-position is substituted by a glycidyle radical (see Claim 1 where A is oxirane) since in that case the two hydroxy radicals are free. Document (5) does not suggest 2-

hydroxymethyl-5-hydroxy-6,8-dibenzoy-2,3-dihydrobenzofuran either.

4.9 It follows that the cited prior art does not teach the person skilled in the art to design the claimed compounds for solving the technical problem defined above (see point 4.4 above). Hence, Claim 1 meets the requirement of Article 56 EPC. The same applies to dependent Claims 2 to 6 which represent particular embodiments of the subject-matter of Claim 1. Claim 7 relating to an UV absorbing coating composition comprising some of the UV absorbing compounds encompassed by Claim 1 is based on the same inventive concept and derives its patentability from the same basis as does Claim 1.

5. In conclusion, the request before the board complies with the requirements of the EPC.

6. As the function of the Boards of Appeal is primarily to give a judicial decision upon the correctness of the decision under appeal, it is left to the department of the first instance to deal with the adaptation of the description to the claims allowed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent on the basis of claims 1 to 7 filed on 16 December 2008 and a description yet to be adapted.

The Registrar

The Chairman

M. Schalow

P. Ranguis