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**Datasheet for the decision
of 5 October 2017**

Case Number: T 243/14 - 3.3.03

Application Number: 05105542.4

Publication Number: 1674499

IPC: C08G83/00, C09D11/10, C09D11/00

Language of the proceedings: EN

Title of invention:
Radiation curable compositions

Patent Proprietor:
Agfa Graphics N.V.

Opponent:
BASF SE

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes) Claim 3
Extent of scrutiny - limited to claim 3 of main request



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Case Number: T 0243/14 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 5 October 2017

Appellant: Agfa Graphics N.V.
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Respondent: BASF SE
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Representative: BASF IP Association
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
19 November 2013 concerning maintenance of the
European Patent No. 1674499 in amended form.

Composition of the Board:

Chairman D. Semino
Members: M. C. Gordon
J. Geschwind

Summary of Facts and Submissions

I. The appeal of the patent proprietor lies against the interlocutory decision of the opposition division according to which it was held that European patent No. 1 674 499 could be maintained in amended form on the basis of auxiliary request 2, filed during the oral proceedings.

II. The patent was granted with a set of 16 claims, whereby claim 1 read as follows:

"A radiation curable composition containing a photoreactive polymer comprising a dendritic polymer core with at least one initiating functional group and at least one co-initiating functional group."

Claim 7 specified that at least three initiating functional groups were present on the dendritic polymer core.

III. An opposition was filed.

The following documents, *inter alia* were cited:

D4: Dietliker, K.K., "Chemistry and Technology of UV- and EB-Formulation for Coatings, Ink and Paints, Vol. 3; Photoinitiators for Free Radical and Cationic Polymerization", P.K.T. Oldring (Ed), SITA Technology Ltd, London 1997.

D10: WO-A-2002/22700.

IV. The decision was based on the claims of the patent as granted as main request and two auxiliary requests.

The differences in auxiliary request 1 compared to the main request, insofar as relevant to the present decision were that:

- Claim 1 specified the chemical nature of the initiating functional groups;
- Claim 3 - newly introduced as a further independent claim - differed from granted claim 1 by specifying that:

"said photoreactive polymer has at least five initiating functional groups on the dendritic polymer core".

Auxiliary request 2 differed from auxiliary request 1 in deletion of claim 3 with consequential renumbering of the remaining claims.

- V. According to the decision the main request did not meet the requirements of Article 56 EPC. The closest prior art was D4, which disclosed linear polymers bearing both initiating (benzophenone) and co-initiating (amine) groups. The distinguishing feature was that the polymer bearing the initiating and co-initiating groups was a dendrimer. The technical effect of lower viscosity was however obvious in view of D10.

Auxiliary request 1, which had been filed during the oral proceedings was not admitted on the grounds that the amendment represented by claim 3 thereof, relying on features of the description, could not have been expected by the opponent.

Auxiliary request 2 also filed in the oral proceedings, but lacking claim 3 of the first auxiliary request was

held to meet the requirements of Article 56 EPC since there was no incentive in the prior art to provide a photoreactive polymer having the defined initiator groups and co-initiators bound to a hyperbranched polymer core.

- VI. The patent proprietor filed an appeal against the decision.

As main request a set of claims corresponding to auxiliary request 1 as presented before the opposition division was submitted. In the version as initially submitted clerical errors in claim 7 were present which were addressed following the communication of the Board.

- VII. The respondent in its reply presented arguments on the inventive step of claim 3 of the main request.

A decision on the basis of the state of the file was requested.

- VIII. The Board issued a summons to oral proceedings and a communication.

- IX. The appellant responded filing a set of claims as main request in which claim 7 had been amended (see section VI above).

- X. The respondent confirmed that it would not attend the oral proceedings and reaffirmed its request for a decision based on the state of the file.

- XI. Oral proceedings were held before the Board on 5 October 2017 in the absence of the respondent.

XII. The arguments of the appellant can be summarised as follows.

The closest prior art was D4, the disclosure of which differed from the subject-matter of claim 3 in that the polymer core was linear and the number of initiating groups was not known. The technical problem to be solved was the provision of low viscosity compositions having high curing activity, suitable for use e.g. in food packaging. That this problem was solved by the subject-matter of claim 3 was demonstrated by examples of the patent. In particular, example 2 of the patent showed three compositions. Comp-1 employed monomeric initiators/co-initiators whereas INV-1 and INV-2 both employed dendritic polymeric systems bearing the initiator and co-initiator groups, but differing in the number of initiator groups on the molecule. The proportions of components in the exemplified compositions was adjusted so that - approximately - the same total number of initiating groups was present in all three examples. The results showed that INV-2 which employed a polymeric system having more than 5 initiating functional groups on the molecule had higher activity than either the system INV-1 wherein the molecules had less than 5 initiating groups, and the system of Comp-1 employing monomeric initiating/co-initiating groups.

The solution claimed was not obvious in view of D4. Indeed, D4 did not attach any significance to the number of functional groups on the polymer and gave no indication of the effect demonstrated in the patent. On the contrary D4 suggested that the polymeric systems were no more reactive than the monomeric systems. The evidence of the examples, showing higher activity for the polymeric systems, demonstrated instead that the

hyperbranched systems as claimed were more effective than the linear polymer systems of D4.

D10, although it referred to dendritic polymers, could not provide any pointers to the claimed solution since it related to different polymers and the emphasis of D10 was to avoid photoinitiating groups or to minimise these as far as possible.

XIII. The arguments of the respondent can be summarised as follows.

Claim 3 was distinguished from the disclosure of closest prior art D4 by two features, namely the number of initiating groups and the presence of a dendritic polymer core.

The first of these distinguishing features was merely the result of routine modifications to determine a suitable level of initiating groups whereby it would be evident that the reactivity of the polymer would increase with the number of initiating groups, meaning that less polymer would be required which in turn would result in a lower viscosity. In particular, no unexpected effect had been shown to result from the lower limit of 5 initiating groups. The examples of the patent invoked by the appellant could not demonstrate any effect, since multiple factors had been varied, meaning that no meaningful comparison was provided.

The effect of the second distinguishing feature - namely lower viscosity as a result of the use of a dendritic polymer rather than a linear polymer - was known from D10.

- XIV. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims filed as main request with letter of 12 September 2017.
- XV. The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. Admissibility of the main request.

The set of claims forming the present main request was submitted during the oral proceedings before the opposition division as auxiliary request 1. According to the appellant this request had been submitted in reaction to a letter of the opponent including new documents, in which submission matters raised by the opposition division in its communication had been addressed.

The Board is satisfied that the amendments made in the newly filed request were prompted by and directed to addressing the new submissions of the opponent and consequently that it is appropriate to admit this request to the proceedings.

2. Scope of the appeal proceedings

The main request differs from the set of claims (auxiliary request 2 in opposition proceedings) on the basis of which the opposition division held that the patent could be maintained solely by the insertion of independent claim 3, with consequential renumbering of subsequent claims.

Since the opponent has not filed an appeal, the set of claims as maintained by the opposition division has not been challenged. Consequently scrutiny in the appeal proceedings is restricted to claim 3 of the main request. Since the respondent has only challenged the presence of an inventive step for claim 3 and the Board sees no reason to deal with any other issue, the analysis will be limited to the objection of lack of inventive step.

3. Inventive step

3.1 Closest prior art

Both parties considered document D4 which relates to linear polymers bearing initiating and co-initiating groups - specifically benzophenone and amine groups (figure 81) - as the closest prior art.

The Board sees no reason to consider a different starting point.

3.2 Distinguishing features

It is also not disputed and agreed by the Board that the subject-matter of claim 3 is distinguished from this disclosure by two features, namely the minimum number of initiating functional groups is defined as 5 (no value is given in D4) and the polymer has a dendritic polymer core.

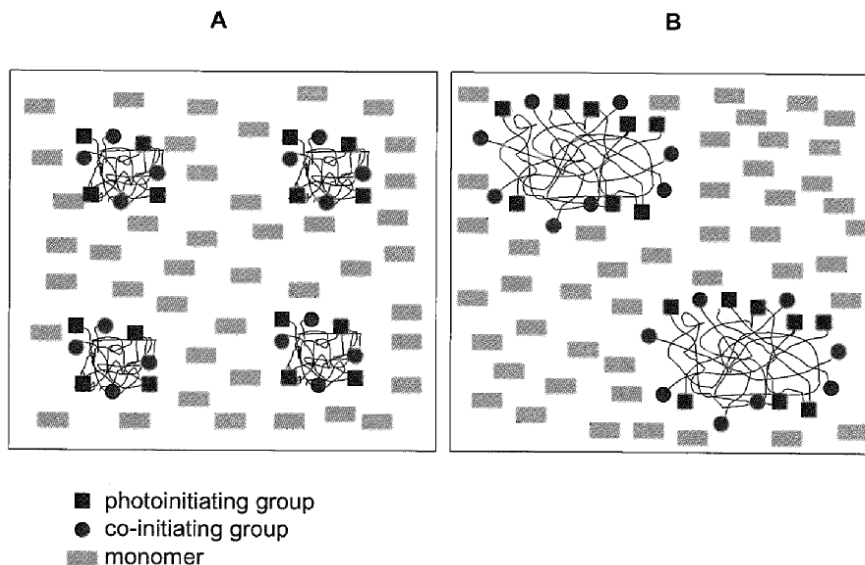
3.3 Technical effects

3.3.1 Number of initiating functional groups

Example 2 of the patent (Tables 10-13) relates to a comparative composition (Comp-1) containing monomeric initiators and co-initiator molecules, and two dendritic polymer systems containing respectively on average 4.3 and 8.2 initiator moieties per molecule and having molecular weights of - respectively - 4176 and 7929 (Photoreactive polymers IS-1 and IS-2 of tables 10 and 11). The second of these polymeric systems corresponds to the subject-matter of operative claim 3.

In the compositions shown in Table 12 the proportions of components are selected so that the total number of photoreactive groups present is - as far as possible - identical.

This was illustrated for the two polymers in the diagrams provided in the statement of grounds of appeal whereby diagram A corresponds to polymer IS-1 and diagram B to polymer IS-2:



Consequently although there are multiple differences between the examples - as correctly observed by the respondent - the purpose of these differences is to maintain at a constant level the absolute number of

initiating and co-initiating groups between the examples.

The examples are therefore suitably designed to demonstrate whether the first of the identified distinguishing features, i.e. the number of initiating groups on the dendritic polymer core is associated with a technical effect.

The evidence provided in Table 13 was that the composition containing polymer IS-2 exhibited higher light sensitivity as demonstrated by faster belt speed (less time of exposure to light needed) with respect to the composition containing polymer IS-1. This result provides evidence of a technical effect associated with the distribution of initiating functional groups, i.e. their number on the polymer core.

3.3.2 Dendritic polymer core

Regarding the presence of a dendritic polymer core as opposed to the linear polymer of D4 there is no direct evidence for a technical effect associated therewith. However it is credible, and not disputed by the parties, that this leads to a lower viscosity of the polymer for a given molecular weight.

3.4 Problem solved

In view of the available evidence the problem effectively solved can be formulated as the provision of a radiation curable composition, starting from that of D4, having a higher light sensitivity and a lower viscosity.

3.5 Obviousness

D4 teaches in the paragraph below the relevant figure (figure 81 on page 223) that initiating efficiency can be improved by linking the aliphatic amine to the polymer backbone by a flexible spacer rather than directly. D4 contains however no discussion on the total number of active groups present on the polymer and ascribes no significance to this. Furthermore D4 at page 222 in the fourth and fifth paragraph reports that incorporation of both initiating groups and co-initiating groups in a polymer leads - contrary to expectations - to lower activity than mixtures of monomeric or polymeric benzophenone groups with amines.

Thus D4 does not provide a teaching to incorporate both initiating and co-initiating groups in a polymer in order to obtain useful (increased) curing activity. There is consequently no indication in D4 that, for a given total number of initiating groups in the system, the distribution of these over the molecules, e.g. having a certain minimum number on a single polymer molecule, would bring any benefit. Indeed if anything the converse is the case in the light of the teachings of D4, i.e. there is a suggestion not to include the initiating groups in a polymeric structure.

Regarding the question of the geometry or structure of the polymer D4 itself provides no incentive to change from linear to hyperbranched geometry.

D10 relates to dendritic polymers which contain either no or only a very low amount of photoinitiating groups. However D10 at page 1 final paragraph and page 2, first paragraph cautions against using photoinitiators due to toxicity and the risk of product degradation post cure.

Thus D10 suggests, instead of using photoinitiators, to employ dendritic polymers with acrylate groups and tertiary amines, with at most a very low amount of photoinitiators. Consequently D10 itself, although relating to dendritic polymers, provides no incentive to include on these a certain minimum amount of photoinitiators. Consequently D10 can provide no incentive to modify the linear polymers of D4 by changing the structure to dendritic at the same time as employing a certain minimum amount of photoinitiators for any reason. On the contrary, following D10 would lead the skilled person to avoid the use of photoinitiators.

The conclusion is that D4 on its own does not provide any incentive to employ a level of photoinitiating groups as now defined in the polymer and even if this were to be done, no indication of the demonstrated effects of higher curing efficiency is derivable from D4.

The above considerations lead to the conclusion that the subject-matter of claim 3 is not obvious in the light of D4, taken singly or in combination with D10.

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 maintain the patent in amended form on the basis of
 - the main request filed with letter of 12 September 2017
 - and after any necessary consequential amendment of the description.

The Registrar:

The Chairman:



L. Malécot-Grob

D. Semino

Decision electronically authenticated