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Datasheet for the decision of 6 July 2010

Case Number: T 0293/08 - 3.3.03

Application Number: 98307149.9

Publication Number: 0900827

IPC: C08L 69/00

Language of the proceedings: EN

Title of invention:
Impact modified carbonate polymer composition

Patentee:
GENERAL ELECTRIC COMPANY

Opponent:
Bayer MaterialScience AG

Headword:
-

Relevant legal provisions:
EPC Art. 56, 83, 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Maintenance in amended form - (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0293/08 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 6 July 2010

Appellant: (Patent Proprietor)
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Representative:
-

Decision under appeal:
Decision of the Opposition Division of the European Patent Office dated 19 November 2007 and posted 20 December 2007 revoking European patent No. 0900827 pursuant to Article 102(1) EPC 1973.

Composition of the Board:

Chairman: R. Young
Members: M. C. Gordon
H. Preglau

Summary of Facts and Submissions

I. Mention of the grant of European Patent No. 0 900 827 in the name of General Electric Company in respect of European patent application No. 98307149.9 filed on 4 September 1998 and claiming a priority date of 4 September 1997 from US 923650 was announced on 23 February 2005 (Bulletin 2005/08) on the basis of 9 claims.

Claim 1 read as follows:

> 1. An impact resistant carbonate polymer composition having improved thermal stability and improved resistance to polymer degradation comprising in admixture an aromatic polycarbonate and an impact modifier prepared by an emulsion polymerization process wherein the impact modifier is essentially free of basic compounds from the emulsion polymerisation, that catalytically degrade the aromatic polycarbonate, wherein the impact modifier has a shell-core structure said impact modifier being prepared employing a surfactant selected from the group consisting of alkyl sulfonates, alkylaryl sulfonates, alkyl sulfates, alkylaryl sulfates, alkyl phosphate, and alkylaryl phosphates, and mixtures thereof and wherein the core is a diene rubber polymer selected from the group consisting essentially of conjugated dienes, copolymers containing at least about 50 weight % of a conjugated diene, an olefin rubber, a silicone rubber, an alkyl acrylate of C1 to C8 carbon atoms in the alkyl group, copolymers of alkyl acrylates with a styrene or butadiene, and mixtures thereof, and the shell is a thermoplastic polymer which readily wets the polycarbonate.

Claims 2 to 7 were dependent claims, directed to preferred embodiments of the composition of claim 1.

Claim 8 was an independent claim directed to a shell-core impact modifier.
Claim 9 was dependent on claim 8.

II. A notice of opposition to the patent was filed on 23 November 2005 by Bayer MaterialScience AG.
The opponent invoked the grounds of opposition pursuant to Art. 100(a) EPC (lack of novelty, lack of inventive step) and Art. 100(b) EPC (insufficiency of disclosure).

Eleven documents (designated D1 - D11) were cited in support of the opposition, *inter alia*:
D1: JP-A-50-085651 (in the form of an English language translation).

III. By a decision announced at the conclusion of oral proceedings held on 19 November 2007 and issued in writing on 20 December 2007 the opposition division revoked the patent.

The decision was based on a main request and three auxiliary requests. As is apparent from section 1.1 of the minutes of the oral proceedings and the recitation of the text of claim 1 of the main request in section 2.1 of the decision, the main request had been filed with a letter dated 13 November 2007 and not, as erroneously stated in the decision, submitted at the oral proceedings.

The three auxiliary requests were submitted at the oral proceedings.

(a) With regard to the main request the decision held:

Art. 83 EPC:

- there was no indication of the extent to which basic compounds had to be absent;
- there was no indication how basic compounds could be avoided in the different process steps;
- it was not disclosed how the impact modifiers employed in the examples could be prepared or from where these could be obtained (i.e. no brand names were given);
- the information, given in the letter of 27 June 2006 (response to the notice of opposition) that the alkali metal salt of a fatty acid used in the preparation of (comparative) impact modifier IM1 in the examples of the patent in suit was not the primary emulsifier but was an adjunct employed in the isolation of the impact

modifier was not evident from the patent in suit;

– consequently the main request did not meet the requiemnts of Art. 83 EPC.

Art. 54 EPC:

– The subject matter of claims 1 and 8 was anticipated by the disclosure *inter alia* of D1 and consequently did not meet the requirements of Art. 54 EPC.

(b) The first auxiliary request differed from the main request *inter alia* in that the particle size of the impact modifier was specified in claims 1 and 8.

The decision held:

– the requirements of Art. 83 EPC were not satisfied because the patent contained no information how to arrive at impact modifiers of the required particle size;

– The requirements of Art. 54 EPC were satisfied;

Art. 56 EPC:

– D1 was the closest prior art. An argument by the patent proprietor that the patent in suit related to melt stability whereas D1 related to thermal stability and consequently D1 was not the closest prior art was dismissed since melt stability was a consequence of heat or thermal stability.

– The subject matter of claims 1 and 8 of the first auxiliary request was distinguished from the teaching of D1 by the particle size. According to page 7 lines 39-40 of the patent in suit this was however not critical to the invention. The patent proprietor had

advanced no evidence of any technical effect associated with the particle size. Hence the subject matter of claims 1 and 8 did not meet the requirements of Art. 56 EPC.

(c) The second auxiliary request was amended, compared to the main request *inter alia* by specifying the pH of the impact modifier in claim 1. As a consequence claim 2 had been deleted and the subsequent claims renumbered. Claim 7 (formerly claim 8) had been amended analogously to claim 1. The decision held:

- Art. 83 EPC: The specification of pH in claims 1 and 7 overcame the objection as the skilled person now had a tool to select the proper ingredients to meet the requirement that basic compounds should be avoided;
- Art. 54 EPC: This subject matter was not novel. The process disclosed in D1 did not employ strong acids or bases. Thus the pH of the impact modifier therein prepared "must be" in the range specified by operative claim 1.

(d) The third auxiliary request was amended compared to the main request *inter alia* in that claim 1 included the features of particle size and pH. Due to the absence of a technical effect associated with the particle size, the requirements of Art. 56 EPC were not satisfied (cf first auxiliary request discussed in section (b) above).

(e) Accordingly the patent was revoked.

IV. A notice of appeal against the decision was filed on 31 January 2008 by the patent proprietor, the prescribed fee being paid on the same day.

V. The statement of grounds of appeal was received on 21 April 2008.

Four sets of claims, forming a main request and first to third auxiliary requests were submitted.

Common to all requests was the insertion of the feature that the compositions displayed improved "melt and thermal stability", rather than only "thermal stability" as in the claims on which the decision under appeal was based.

The arguments of the appellant/patent proprietor can be summarised as follows:

(a) Art. 83 EPC: the objection had been met by insertion of the pH values;

(b) Art. 54 EPC:

- D1 did not disclose the feature of thermal stability of the composition at the melt temperature but related to durability, i.e. stability to thermal stress at 100 or 105°C.;
- The information given in D1 did not allow it to be concluded that the impact modifier had a core/shell structure;
- D1 did not disclose the requirement of the absence of basic materials or the pH.

(c) Art. 56 EPC:

- D1 did not relate to the task of improving the melt stability;
- Instead D1 was concerned with the improvement of the lifetime [of moulded parts] in accelerated heat degradation tests.

VI. By letter dated 23 September 2008 the respondent/opponent stated that it did not intend to file a response to the statement of grounds of appeal.

VII. On 23 April 2010 the Board issued a summons to attend oral proceedings.
In a communication, dated 28 April 2010 the Board *inter alia* raised objections pursuant to Art. 123(2) EPC in respect of the amended claims as submitted together with the statement of grounds of appeal.

VIII. In a letter dated 20 May 2010 the respondent/opponent stated that it would not be represented at the oral proceedings.

IX. Together with a letter dated 4 June 2010 the appellant filed four sets of claims forming a main request and first, second and third auxiliary requests.
(a) The main request consisted of five claims whereby claim 1 read as follows:

> 1. An impact resistant carbonate polymer composition having improved melt and thermal stability and improved resistance to polymer degradation comprising in admixture
> an aromatic polycarbonate and
> an impact modifier prepared by an emulsion polymerization process, the polymer composition comprising in admixture 85-95 weight% of the polycarbonate and, correspondingly, 15 to 5 weight % of impact modifier, said weight % being based on the total weight of the polycarbonate and impact modifier, wherein the impact modifier is
> essentially free of basic compounds from the emulsion polymerisation, that catalytically degrade the aromatic polycarbonate, the pH of such impact modifier being 3-7, wherein the
> impact modifier has a shell-core structure said impact modifier being prepared employing
> a surfactant selected from the group consisting of
> -alkyl sulfonates,
> -alkylaryl sulfonates,
> -alkyl sulfates,
> -alkylaryl sulfates,
> -alkyl phosphate, and
> -alkylaryl phosphates,
> and mixtures thereof
> and wherein
> the core is a diene rubber polymer selected from the group consisting essentially of
> conjugated dienes,
> copolymers containing at least about 50 weight % of a conjugated diene,
> an olefin rubber,
> and mixtures thereof, and
> the shell is a thermoplastic polymer which readily wets the polycarbonate.

Claims 2 to 5 were dependent claims. There were

accordingly no claims directed to the impact modifier itself.

(b) The appellant/patent proprietor argued essentially as follows with respect to the main request:

- the amended claims met the requirements of Art. 123(2) EPC;
- The claimed subject matter was (further) distinguished from the disclosure of D1 by the specified proportions of polycarbonate and impact modifier (85-95/5-15 wt% respectively). In contrast D1 specified that 20-80 wt% of impact modifier be blended with polycarbonate, and all examples employed a proportion of 40:60 impact modifier:polycarbonate;
- In the compositions of D1 the rubber dictated the processing conditions applicable as rubbers were highly susceptible to auto-ignition in extruders under harsh conditions;
- the initial values of flow, tensile strength, Izod and tensile impact strength of the comparative examples and comparative examples of D1 did not appreciably differ;
- D1 employed "bland" melt processing conditions. The behaviour of the initial values showed that in the upstream melt processing no degradation of the material occurred;
- Degradation in D1 was solely the consequence of the later aging treatments imposed on the moulded parts at temperatures well below the melt temperature;
- Thus D1 was not concerned with melt stability;

- In contrast melt stability was an issue for the claimed compositions, having relatively small amounts of rubber modifier;
- Even if the data of D1 were to be analysed in this respect the conclusion would be that the melt stability - in contrast to the long term stability - was not influenced by selection of a base-free impact modifier.

X. Oral proceedings were held before the Board on 6 July 2010, attended only by the appellant/patent proprietor (see section VIII, above).

(a) The requests as submitted with the letter of 4 June 2010 were maintained.

Main Request:

(b) With respect to Art. 83 EPC the appellant/patent proprietor emphasised that the specification of the pH in claim 1 together with the closed list of surfactants constituted sufficient information to enable a bench chemist to prepare the impact modifiers so as to comply with the requirement of being free of basic compounds that would degrade the polycarbonate - this was school chemistry.

(c) With respect to Art. 123(2) EPC the appellant submitted essentially as follows (page references relate to the original typescript of the application):

- The feature "melt and thermal stability" was to be found at page 5 lines 19-22;
- The specified proportions of polycarbonate and impact modifier were disclosed at page 25, lines 20-22;

- The specified pH was disclosed at page 26, first paragraph;
- The specification of ranges having end points originally disclosed in different combinations was in accordance with the pertinent case law.

(d) The Board indicated that it had no objections pursuant to Art. 54 EPC.

(e) With respect to Art. 56 EPC the appellant/patent proprietor argued essentially as follows:

- D1 represented the closest prior art;
- The compositions of D1 could contain up to 80 wt% of impact modifier, i.e. this document related *inter alia* to rubbers modified with polycarbonate as well as to impact modified polycarbonates. In contrast the specified proportions in claim 1 of the main request restricted the subject matter to polycarbonates modified with small amounts of rubber;
- Rubbers could auto-ignite when exposed to conditions of high shear and high temperature. Thus the compositions of D1 had to be processed at lower temperatures;
- The temperature of 250°C employed in the examples of D1 represented the upper limit of what was technically possible bearing in mind safety constraints;
- D1 addressed the problem of durability of the moulded articles under thermal and hydrolytic stress;

- The patent in suit however addressed the problem of reducing deterioration of polycarbonate under "hold up" conditions, i.e. in the molten state and demonstrated *inter alia* that avoiding the presence of basic impurities resulted in an improvement in the initial properties of polycarbonate compositions which had been extruded under extreme conditions;
- D1, in Example 2 and comparative example 3 in contrast showed that following melt processing, i.e. extrusion, there was no appreciable divergence in the initial values of the samples prepared with different contents of basic impurities and thus there was no evidence in D1 of degradation of the compositions when exposed to moulding conditions, i.e. when molten;
- D1 was therefore concerned with an entirely different technical problem from that of the patent in suit and thus could not be considered as representing the closest state of the art.

XI. The appellant/patent proprietor requested that the decision under appeal be set aside and that the patent be maintained on the basis of one of the sets of claims according to the main request or the first to third auxiliary request in that order, submitted with letter dated 4 June 2010.

The respondent/opponent did not present any requests during the appeal proceedings (cf. sections VI and VIII, above).

Reasons for the Decision

1. The appeal is admissible.

2. *Art. 123(2) EPC - main request*

Claim 1 is based in part on claims 1, 5 and 7 as originally filed.
The feature that the composition has improved melt stability is disclosed at page 4 lines 11, 12, 16 and 17 and page 5 lines 19 and 20 of the application as originally filed (reference being made to the typescript).
The specified proportions of polycarbonate and impact modifier are disclosed at page 25 lines 20-24 of the application as originally filed.
Claims 2-5 correspond to originally filed claims 3, 8, 9 and 10 respectively.

Accordingly the main request meets the requirements of Art. 123(2) EPC.

3. *Art. 83 EPC - main request*

3.1 The decision under appeal held that the objection raised pursuant to Art. 100(b)/83 EPC had been successfully addressed by specification of the permissible pH range of the impact modifier (see section III.(c), above).

3.2 In its submissions with respect to this aspect the appellant/patent proprietor further drew attention to

the restricted list of permissible surfactants (See section X.(b), above).

3.3 The Board is satisfied that the definition in the claim of this pH range, together with the specification of the surfactants in claim 1 and the explanation in paragraph [0016] of the patent in suit emphasising the necessity that the impact modifier be essentially free of [basic compounds] and other processing aids provides the skilled person with sufficient information and guidance to prepare the claimed composition.

3.4 Accordingly it is concluded that the main request meets the requirements of Art. 83 EPC.

4. *Art. 54 EPC - main request*.

None of the documents cited discloses a composition having the specified proportions of polycarbonate and core-shell impact modifier having a pH in the range of 3-7.
Accordingly the subject matter of claim 1 of the main request satisfies the requirements of Art. 54 EPC.

5. *Art. 56 EPC - main request*

5.1 *The patent in suit - the technical problem*.

According to paragraph [0001] the patent is directed to compositions of polycarbonates and impact modifiers having improved thermal stability, in particular a composition of an aromatic polycarbonate and an impact modifier which does not catalyse transesterification or degradation of the polycarbonate.

According to paragraph [0006] it has been found that melt instability of impact modified polycarbonates arises due to the presence of residual amounts of certain emulsifiers employed in preparing the impact modifiers, especially alkali metal salts of fatty acids and alkali metal carboxylates.
The degradation of polycarbonate is however not observed when employing certain surfactants, in particular sulphonate, sulphate or phosphate type, even though the same alkali metal might be employed.
The examples of the patent in suit report the stability of impact modified polycarbonate compositions by comparing the melt viscosity index after holding samples for 6 or 18 minutes at 300°C. The results show that compositions prepared employing an alkali metal salt of a fatty emulsifier and having residual emulsifier exhibit a greater change in melt viscosity index ("MVI Shift") than compositions prepared using an impact modifier prepared using an alkyl sulphonate surfactant.
The values of (initial) tensile elongation for moulded samples reported in example 1 and comparative example A further show that the initial properties of moulded articles prepared employing the composition according to the claim are superior to those of a composition containing an impact modifier prepared employing a basic compound. This result provides further evidence of an absence of degradation of the composition upon moulding.

The evidence of the patent in suit thus shows that the technical problem set out in the patent in suit of improving the melt stability of the modified polycarbonate compositions has been solved by the claimed measures.

5.2 *The prior art*

D1, which was considered in the decision under appeal to represent the closest state of the art relates, like the patent in suit, to compositions of polycarbonate and rubbery compounds (impact modifiers).
D1 addresses the problem of high melt viscosity and poor mouldability of polycarbonates, and states that it has been found that these issues can be addressed by blending the polycarbonate with impact modifiers (in the final section of page 1 to the top of page 2 - references refer to the translation).
The moulded articles however undergo serious degradation in mechanical properties (impact and tensile strength) after accelerated degradation tests involving exposure to heat (105°C) or boiling water for 100 hours. In other words the compositions have poor durability (page 2, second complete paragraph).
It is this problem which the inventors of D1 addressed and discovered that the type of emulsifier employed to produce the impact modifier exerted a serious influence on the durability of the polycarbonate resin composition.
D1 is not concerned with melt stability and provides no information - even implicit - relating to this aspect of the compositions.
On the contrary, and as emphasised by the appellant/patent proprietor at the oral proceedings (see section X.(e), above) the evidence of D1 is that the initial properties of the moulded samples are not influenced by the nature of the emulsifier present, i.e. the examples of D1 provide no evidence concerning degradation in the melt.

5.3 *Obviousness*

Although both D1 and the patent relate in broad terms to thermal stability of the impact modified polycarbonate compositions, each is concerned with different aspects thereof.
Whilst the patent is directed to improving the stability under **processing** conditions, in particular melt stability of the impact modified polycarbonate under "hold up" conditions, D1 is related to the long term stability of the **moulded** impact modified polycarbonate compositions ("durability) but does not address the aspect of melt stability and does not contain any recognition - even implicit - that there might be any deficiency in this respect
It therefore has to be concluded that D1 does not address - even implicitly or in general terms - the same technical problem as the patent in suit.
Accordingly this document can provide no pointers to a solution to this technical problem.

5.4 The subject matter of claim 1 of the main request therefore meets the requirements of Art. 56 EPC.
Since the remaining claims are dependent on claim 1 this conclusion applies *mutatis mutandis* to the subject matter thereof.

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 the main request (claims 1-5) submitted with the letter dated 4 June 2010 and after any necessary consequential amendment of the description.

The Registrar: The Chairman:

E. Görgmaier R. Young