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Datasheet for the decision of 5 October 2007

Case Number: T 0824/07 - 3.3.03

Application Number: 03754419.4

Publication Number: 1558676

IPC: C08K 5/42

Language of the proceedings: EN

Title of invention:
Method for making fire-retarded polycarbonate and related compositions

Applicant:
GENERAL ELECTRIC COMPANY

Headword:
-

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

Keyword:
"Main request - not allowable (inventive step)"
"Auxiliary request - not admitted into the proceedings (late-filed and clearly not allowable)"

Decisions cited:
G 0001/03, T 0153/85, T 0292/85, T 0626/90, T 0741/91, T 0939/92, T 0092/93, T 0583/93, T 0962/94

Catchword:
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Case Number: T 0824/07 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 5 October 2007

Appellant: GENERAL ELECTRIC COMPANY
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 11 December 2006 refusing European application No. 03754419.4 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. Idez
Members: W. Sieber
E. Dufrasne

Summary of Facts and Submissions

I. European patent application No. 03 754 419.4, based on International application PCT/US2003/027048, filed on 27 August 2003, claiming a US priority of 29 October 2002 (US 10/065 545), and published under number WO 2004/039879, was refused by a decision of the Examining Division issued on 11 December 2006. The decision was based on Claims 1-10 filed with a letter dated 10 April 2006, whereby Claims 1 and 7 read as follows:

"1. A method for making a flame-retarded polycarbonate resin comprising the step of adding to a high melt strength polycarbonate resin an effective flame-retardant amount of a combination of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid, wherein the potassium salt of a perfluoroalkane sulfonate is added in an amount of 0.004 to 0.05 weight % and the sodium salt of toluene sulfonic acid is present in an amount of 0.001 to 0.1 weight %.

7. A composition comprising a high melt strength polycarbonate resin and an effective flame-retardant amount of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid, wherein the potassium salt of a perfluoroalkane sulfonate is added in an amount of 0.004 to 0.05 weight % and the sodium salt of toluene sulfonic acid is present in an amount of 0.001 to 0.1 weight %."

Claims 2-6 and 8-10 were dependent claims directed to preferred embodiments of the method of Claim 1 and the composition of Claim 7, respectively.

II. According to the decision, the claimed subject-matter was novel over D1 (US-A-4 104 253), D2 (US-A-3 775 367) and D3 (US-B-6 462 111) but was obvious in view of D1 alone or in combination with D2 and D3.

III. On 13 February 2007, the Appellant (Applicant) filed a notice of appeal against the above decision with simultaneous payment of the prescribed fee.

A statement setting out the grounds of appeal and including an auxiliary claim set was filed on 23 April 2007. The arguments presented may be summarized as follows:

The claimed subject-matter related to a method for imparting fire-retardant properties to polycarbonate resins which could be used to make moulded articles, particularly thin walled articles. There was no specific disclosure in D1 of a combination of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid. Further, the amounts of flame-retardant used in D1 were greater than those used in the application in suit. The claimed compositions achieved the V0 flame-retardancy for much thinner samples than those used in D1. It was well acknowledged that it was much more difficult to get V0 flame-retardancy for thinner samples. Thus, the claimed subject-matter was inventive over the teaching of D1. Nor were D2 and D3 relevant with respect to inventive step.

IV. In a communication issued on 26 July 2007, the Board gave its preliminary opinion that, taking into account the inconsistent results achieved by the examples in the application in suit, there was no general superior synergism over D1 attributable to the specific combination of the two flame-retardants. Consequently, the objective technical problem could only be seen in the provision of further polycarbonate compositions comprising low levels of flame-retardants. The solution to this problem was obvious in view of D1. Furthermore, nothing inventive could be seen in the subject-matter of the auxiliary request.

V. With a letter dated 5 September 2007, the Appellant filed further observations and pointed out that the claimed subject-matter was associated with a surprising technical effect, namely the synergy obtainable in the flame-retardant properties of polycarbonate articles with very reduced wall thicknesses of less than 1.5 mm, in particular 1-1.5 mm as stated at page 5 of the application as originally filed. It was not possible to predict the flammability performance of thinner samples based on the flammability performance of the thicker samples of D1. In this context, the Appellant filed the following document:

D4: White Paper, "UL Certification - What Does it Signify?", ≡R&M, dated 16 February 2004.

Whatever suggestion may have been perceivable from D1 the same could not have been extendable in any obvious manner to a synergistic flame-retardant performance in

very thin walled articles as shown in the examples of the application in suit.

Although D1 claimed a very broad concentration range of 0.01-5 parts per 100 parts for the respective additives, it was not giving in practice (ie in the examples) a real technical teaching to the skilled person towards the much lower concentration *de facto* used and claimed in the application in suit. In fact, the lowest value of 0.01 parts per hundred was obviously for legal protection purposes rather than a technical teaching for achieving the disclosed effect. The inconsistencies noted by the Board in the examples might be equated to some non-working embodiments which however, according to the case law, were of no harm. In this context, the Appellant cited G 1/03 (OJ EPO 2004, 413, reasons point 2.5.2) and T 292/85 (OJ EPO 1989, 275, Headnote I). The specification contained sufficient information about the presence of further ingredients of the composition and of their possible ranges of variations so that, with routine tests, the composition might be adjusted, still by complying with the claimed features, so as to achieve the stated high flame-retardant performance.

VI. With a letter dated 7 September 2007, the Appellant submitted amended pages of the specification, namely pages 2, 2A, 3 and 7-11.

VII. On 5 October 2007, oral proceedings were held before the Board. The discussion focussed on the question whether the alleged effect, namely synergy obtainable in flame-retardant properties of polycarbonate articles in general and in particular with respect to

polycarbonate articles having reduced wall thicknesses, was achieved over the whole range claimed. It was pointed out by the Board that this question related to inventive step and not to sufficiency of disclosure. Following the discussion of the main request, the Appellant withdrew the auxiliary request filed with the letter dated 23 April 2007 and submitted a new auxiliary request (Claims 1-3). The Appellant explained the amendments and their basis in the application as originally filed.

Claim 1 of the auxiliary request read as follows:

"A method for making a flame-retarded polycarbonate resin comprising the step of adding to a high melt strength polycarbonate resin an effective flame-retardant amount of a combination of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid, wherein the potassium salt is perfluorobutane sulfonate and is used in concentrations with respect to the concentrations of the sodium salt of toluene sulfonic acid selected from the following:

(i) 0.009% by weight of the potassium salt to 0.05 to 0.02% by weight of the sodium salt;

(ii) 0.006% by weight of the potassium salt to 0.015 or 0.025% by weight of the sodium salt

(iii) 0.01 to 0.015% by weight of the potassium salt to 0.015 or 0.025% by weight of the sodium salt"

The remaining claims of the auxiliary request are not relevant to this decision and will therefore not be discussed in further detail.

VIII. The Appellant requested that the decision under appeal be set aside and that a patent be granted

- on the basis of the main request (Claims 1-10) filed with the letter dated 10 April 2006, or in the alternative,

- on the basis of the auxiliary request (Claims 1-3) filed at the oral proceedings of 5 October 2007.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 EPC and Rule 64 EPC and is therefore admissible.

Main request

2. The Board agrees with the finding in the decision under appeal that the claims of the main request meet the requirements of Article 123(2) EPC and that the claimed subject-matter is novel over the cited prior art, namely D1-D3. Thus, the decisive question with respect to the main request is whether the claimed subject-matter is based on an inventive step.

3. *Problem and solution (main request)*

3.1 To assess inventive step, the boards normally apply the "problem and solution approach". This consists

essentially of (a) identifying the "closest prior art", (b) assessing the technical results (or effects) achieved by the claimed invention when compared with the "closest state of the art" established, (c) defining the technical problem to be solved as the object of the invention to achieve these results, and (d) examining whether or not a skilled person, having regard to the state of the art within the meaning of Article 54(2) EPC, would have suggested the claimed technical features in order to obtain the results achieved by the claimed invention (see Case Law of the Boards of Appeal of the European Patent Office, I.D.2, 5th edition 2006).

3.2 The present application relates to a method for making a flame-retarded polycarbonate resin (Claim 1) and to a composition comprising a polycarbonate resin and flame-retardant additives (Claim 7) whereby a specific combination of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid is used to provide the flame-retardant properties. It is stated at page 2, last paragraph of the application as originally filed that "it has now been surprisingly found that a combination of a potassium salt of a perfluoroalkane sulfonate and a sodium salt of toluene sulfonic acid act synergistically at low levels in polycabobnate [*sic*] compositions with high melt strength to provide flame-retarded polycarbonate compositions". Furthermore, it is stated at page 5, last paragraph, that "the polycarbonate is particularly suitable for making thin walled articles, for example articles having a wall thickness of less than 1.5 mm, i.e., 1 mm to 1.5 mm, because of its ability to achieve good fire-retardance even for thin pieces of material".

3.3 D1 relates likewise to the preparation of flame-retarded polycarbonate compositions comprising a combination of two flame-retardant additives. D1 discloses in Claim 1 a flame-retardant polycarbonate composition comprising (i) 0.01 to about 5.0 parts per hundred parts of the aromatic carbonate polymer of an additive selected from the group consisting of organic alkali metal salts, organic alkaline earth metal salts, and mixtures thereof and (ii) 0.01 to about 5.0 parts per hundred parts of the aromatic carbonate polymer of an additive selected from the group consisting of halogenated organic alkali metal salts, halogenated organic alkaline earth metal salts of aromatic sulfonic acids, or mixtures thereof. Sodium toluene-4-sulfonate is mentioned in column 3, line 8 in a list of preferred additives (i) and is used in Example V. Potassium trifluoromethane sulfonate is mentioned in column 4, lines 36-37 in a list of preferred additives (ii) and is used in Examples R and S.

Furthermore, it is stated in column 1, lines 55-61 of D1 that "the combination of the organic salt and halogenated organic salt not only results in improved flame retardancy but allows the use of even lower concentrations of each of the salts than is possible in the individual formulations. The fact that the effect of the combined salts on flame retardancy is larger than the sum of the two separate results suggests a **synergistic interaction**" (emphasis by the Board).

It follows from the above that the general teaching of D1 encompasses the combination of the two additives required in Claims 1 and 7 of the main request.

However, this specific combination is not explicitly mentioned or exemplified in D1. Nevertheless, D1 not only has the most technical features in common with the claimed subject-matter, but it also discloses effects and intended use most similar to the claimed subject-matter. Consequently, D1 is regarded to represent the closest prior art.

3.4 The next step in the "problem and solution approach" is an objective assessment of the technical results achieved by the claimed subject-matter, compared with the results according to the closest state of the art in order to define the objective technical problem.

3.4.1 The Appellant argued that there was no suggestion in D1 that the combination of the two specific flame-retardants required in Claims 1 and 7, respectively, could act synergistically such that a much lower amount of flame-retardant additive could be used than was used in D1, and that the synergy was surprisingly obtainable in polycarbonate articles with very reduced wall thicknesses of less than 1.5 mm.

3.4.2 However, when defining the objective technical problem an effect cannot be retained if it is not credible that the promised result is attainable throughout the entire range covered by a claim (see for example T 741/91 of 22 September 1992, reasons points 4.2 and 4.3; T 626/90 of 2 December 1993, reasons point 4.3.2 (none of these decisions published in OJ EPO), T 0939/92, OJ EPO 1996, 309, reasons points 2.4-2.6 or T 583/93, OJ EPO 1996, 496, reasons point 7.5).

3.4.3 In the present case, it is evident from the data on file that the technical effects relied upon by the Appellant, namely lower amounts of flame retardants and synergy in thin walled articles, are not attainable throughout the entire range covered by Claim 1 of the main request. In fact, the examples in the application as filed demonstrate that the claimed combination of a potassium salt of the perfluoroalkane sulfonate and a sodium salt of the toluene sulfonic acid does not always provide a higher degree of synergism than D1. In the present application, the probability of a first time pass "p(FTP) value" is used to evaluate flammability. The examples in the application as originally filed show that the flame performance at loading levels within the claimed ranges is inconsistent. Thus, Table 2 shows that a composition (Batch 2-2) with 0.009 weight % Rimar (potassium perfluorobutane sulfonate) and 0.05 weight % NaTS (sodium toluene sulfonic acid) has a robust p(FTP) value of 0.93. On the other hand, the same table shows that a similar composition (Batch 2-3) with a different level of flame-retardant additives, but still within the claimed range, has a p(FTP) value of only 0.13 (namely a composition with 0.006 weight % Rimar and 0.08 weight % NaTS). The same phenomenon can be seen in Table 3 (Batches 3-3 to 3-5) and Table 6 (Batch 6-2 to 6-5). It is apparent from these data that some individual optimal loading levels for a specific combination of the two additives may exist but there is no general superior synergism attributable to the specific combination of the two flame-retardants in the entire ranges claimed.

Furthermore, the above mentioned examples in the application as originally filed show that the alleged synergy for articles with reduced wall thicknesses is also not achieved in all examples, ie the alleged effect is not achieved over the whole range claimed. Hence, the effect relating to thin walled articles can also not be taken into account when defining the objective technical problem.

3.4.4 The Appellant argued that the "inconsistencies" with respect to the examples noted by the Board may be equated to some non-working embodiments which however, according to the case law of the EPO, are of no harm. In this context, the Appellant cited G 1/03 (OJ EPO 2004, 413, reasons point 2.5.2) and T 292/85 (OJ EPO 1989, 275, Headnote I). However, the question as to whether or not an alleged technical effect is plausibly demonstrated over the whole range claimed arises under Article 56 EPC and not Article 83. These two different aspects are even expressed in the passage of G 1/03 (supra) relied upon by the Appellant: "If an effect is expressed in a claim, there is lack of sufficient disclosure. Otherwise, ie if the effect is not expressed in a claim but is part of the problem to be solved, there is a problem of inventive step … ." Therefore the Appellant's argument must fail.

3.4.5 In view of the above, the objective technical problem solved by the claimed subject-matter vis-à-vis the closest prior art represented by D1 has to be restated to meet a less ambitious objective, namely the provision of further polycarbonate compositions comprising low levels of flame retardants.

The Board is satisfied that this problem is solved by the features set out in Claims 1 and 7 of the main request.

4. *Inventive step (main request)*

Starting from D1 and trying to solve the posed problem, ie providing further polycarbonate compositions comprising low levels of flame retardants, the person skilled in the art would of course not only consider the exemplified combinations of additives in D1 but also other combinations falling within the general disclosure of D1 and thereby **inevitably** arrive at something falling within the scope of Claim 1 and Claim 7 of the main request because the two additives are not necessarily used at a much lower amount than in D1. In fact, the amounts now indicated in Claims 1 and 7, respectively, overlap with the ranges indicated in D1. Thus, the lower limit for additive (i) in D1 is 0.01 parts per hundred parts of the aromatic carbonate polymer which is clearly within the range given for the sodium salt of the toluene sulfonic acid, namely 0.001-0.1 weight %. The same applies to the amount of additive (ii) with a lower limit of 0.01 parts per hundred parts of the aromatic carbonate polymer. Again, this value falls within the range of 0.004-0.05 weight % required for the potassium salt of the perfluoroalkane sulfonate. In other words, D1 already suggests the use of very low amounts of additives. The Appellant argued that the real technical teaching of D1 did not encompass low amounts of flame-retardants as required in the claims of the main request because D1 generally used higher amounts of flame-retardants as could be seen from the examples in D1. This argument

is, however, not convincing because the teaching of a document is not restricted to its examples.

Thus, the subject-matter of Claims 1 and 7 is obvious from D1 alone.

5. Since the subject-matter of Claims 1 and 7 of the main request does not meet the requirements of Article 56 EPC, the main request has to be refused.

6. *Auxiliary request*

6.1 The Appellant submitted an auxiliary request at the very last stage of the appeal proceedings, namely towards the end of the oral proceedings before the Board. The auxiliary request comprised substantial amendments: Basically Claim 1 (point VII, above) was restricted to three alternatives comprising potassium perfluorobutane sulfonate and the sodium salt of toluene sulfonic acid in further specified amounts. Therefore the issue arises whether or not the late filed auxiliary request is to be admitted into the proceedings.

6.2 After an applicant's reply to the first communication of the examining division, any subsequent amendment of a European patent application is only admitted as a matter of discretion (Rule 86(3) EPC). Further, in appeal proceedings the admissibility of late-filed requests is always a matter for the boards' discretion. Although the boards of appeal have often been prepared, in particular in *ex parte* proceedings where there is no other party which can be taken by surprise, to exercise that discretion in favour of appellants filing new

requests shortly before or even during oral proceedings, a number of decisions by the boards of appeal have made it clear that a board may justifiably refuse to consider alternative claims which have been filed at a very late stage, if such alternative claims are not clearly allowable (eg T 153/85, OJ EPO 1988, 1; T 92/93 of 31 July 1995 or T 962/94 of 8 December 1999, the latter two decisions not published in OJ EPO).

6.3 Claim 1 of the auxiliary request defines three alternatives directed to the combination of potassium perfluorobutane sulfonate with the sodium salt of toluene sulfonic acid in specific amounts, namely:

(i) 0.009% by weight of the potassium salt to 0.05 to 0.02% by weight of the sodium salt;

(ii) 0.006% by weight of the potassium salt to 0.015 or 0.025% by weight of the sodium salt;

(iii) 0.01 to 0.015% by weight of the potassium salt to 0.015 or 0.025% by weight of the sodium salt.

6.3.1 It is conspicuous to the Board that all values being present in alternatives (ii) and (iii) are only disclosed in particular examples of the application as originally filed. For example, the combinations 0.006/0.015 and 0.006/0.025 in alternative (ii) are based on Batch 3-1 (Table 3) and Batch 5-3 (Table 5). Alternative (iii) is, according to the Appellant, based on Batch 3-2 and Batch 5-5. All these examples were carried out under specific conditions: a specific polycarbonate resin was used in combination with a mould release agent, a heat stabilizer and an antidrip

agent. None of these features has been incorporated into Claim 1 of the auxiliary request. By omitting the originally disclosed context, the amendment has created a level of generality for alternatives (ii) and (iii) that was not present in the application as originally filed. Consequently, the alternatives (ii) and (iii) in Claim 1 of the auxiliary request do not meet the requirements of Article 123(2) EPC.

The fact that the intermediate generalisation of particular values from examples contravenes Article 123(2) EPC in the present case is also apparent from the following considerations. The appellant has pointed out that the now claimed ranges are associated with particularly good fire-retardant properties for thin walled articles. However, these advantageous properties were achieved in the examples under specific conditions. There is no basis in the application as originally filed to assume that the particularly advantageous properties can be achieved, for example, without a heat stabilizer and an antidrip agent. Furthermore, alternative (iii) is, as pointed out above, based on Batch 3-2 and Batch 5-5. These two examples disclose advantageous properties for a composition containing 0.01% Rimar and 0.025% NaTS (Batch 3-2) **and** a composition containing 0.015% Rimar and 0.015% NaTS (Batch 5-5). There is no disclosure in the application as originally filed that these advantageous properties could be achieved by a **range** of 0.01 to 0.015% by weight of the potassium salt. Hence, the amendment which has been carried out to overcome the inventive step objection is contrary to the purpose of Article 123(2) EPC because the Appellant would get

an unwarranted advantage for something it had not properly disclosed.

6.3.2 As regards alternative (i), the lower limit of the range of 0.02 to 0.05% is only disclosed in Batch 4-4 (Table 4). Again, a value disclosed in an individual example has been used to create a more general teaching which is not derivable for the application as originally filed. Therefore, the objection raised under Article 123(2) EPC against alternatives (ii) and (iii) equally applies to alternative (i).

6.4 It is evident form the above that Claim 1 of the auxiliary request is clearly not allowable under the provisions of Article 123(2) EPC. In the Board's view this situation justifies the Board to exercise its discretion not to admit this late filed request. Consequently, the auxiliary request is not admitted into the proceedings for consideration.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier C. Idez