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D E C I S I O N
of 17 July 2003

Case Number: T 0793/00 - 3.3.3

Application Number: 91102007.1

Publication Number: 0442465

IPC: C08K 13/02

Language of the proceedings: EN

Title of invention:
Thermoplastic resin composition

Patentee:
MITSUI CHEMICALS, INC.

Opponent:
DSM N.V. Patent Department

Headword:
-

Relevant legal provisions:
EPC Art. 56, 84, 123(2), 123(3)
EPC R. 57a

Keyword:
"Amendments - not occasioned by grounds of opposition (main request: not allowable)"
"Claims - clarity (main request: no, first auxiliary request: yes)"
"Claims - interpretation (first auxiliary request)"
"Inventive step - problem and solution (first auxiliary request: yes)"

Decisions cited:
G 0009/91, G 0010/91, T 0127/85, T 0332/87, T 0190/99

Catchword:
-

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Case Number: T 0793/00 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 17 July 2003

Appellant: (Proprietor of the patent)	MITSUI CHEMICALS, INC. 2-5, Kasumigaseki 3-chome Chiyoda-ku Tokyo (JP)
Representative:	Hansen, Bernd, Dr. Dipl.-Chem. Hoffmann Eitle Patent- und Rechtsanwälte Postfach 81 04 20 D-81904 München (DE)
Respondent: (Opponent)	DSM N.V. Patent Department P.O. Box 605 NL-6160 AP Geleen (NL)
Representative:	-
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office dated 22 February 2000 and issued in writing on 4 May 2000 revoking European patent No. 0442465 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: R. Young
Members: A. Däweritz
R. Moufang

Summary of Facts and Submissions

I. The grant of European patent No. 0 442 465 in respect of European patent application No. 91 102 007.1, filed on 13 February 1991 and claiming the priorities of 14 February 1990, 23 February 1990, 14 August 1990 and 26 November 1990 of four earlier applications in Japan (33447/90, 43535/90, 214586/90 and 322198/90), respectively, was announced on 28 August 1996 (Bulletin 1996/35) on the basis of 7 claims.

Claim 1 as granted read as follows:

"1. A thermoplastic resin composition which comprises polyamide, a halogenated organic compound, an antimony-containing compound, a phosphorus-containing compound not being a phosphorus-type stabilizer, and at least one of an amine-type stabilizer and a phosphorus-type stabilizer."

The further claims were dependent claims.

II. On 28 May 1997, a Notice of Opposition was filed in which revocation of the patent in its entirety was requested on the grounds of Article 100 EPC, in particular, lack of novelty and of inventive step, and insufficiency of disclosure. In order to support these objections, the Opponent relied on the following documents:

D1: EP A 0 333 457,

D2: EP A 0 288 269,

D3: US-A-3 644 280,

D4: Encyclopaedia of Polymer Science and Engineering, Wiley-Interscience Publishers, 1985, volume 2, pages 86 to 89,

D5: Product Information on "UV-Chek® AM-595" of Ferro Corporation.

According to the arguments presented in the Notice of Opposition, Documents D1 and D2 were interchanged in the list of documents given on page 2 of that Notice. The corrected numbering as shown above was used in the decision under appeal and will also be adhered to in this decision.

With a letter dated 16 January 1998, the Patent Proprietor filed a new main request.

Claim 1 of the new main request read as follows:

"1. A thermoplastic resin composition which comprises:
(a) a polyamide;
(b) a halogenated organic compound;
(c) an antimony-containing compound;
(d) a phosphorus-containing compound, not being a phosphorus-type stabilizer, and which is at least one of a phosphate, an organic phosphate, a mixture of an inorganic phosphoric acid and an organic phosphoric

acid, and a metal salt synthesized from a mixed acid of an inorganic phosphoric acid and an organic acid; and

(e) an amine-type stabilizer and/or a phosphorus-type stabilizer which is not the phosphorus-containing compound (d)."

With a letter dated 30 November 1999, a first auxiliary request, which contained a list of specific compounds (d), was filed.

III. In the decision of 22 February 2000, issued in writing on 4 May 2000, the Opposition Division held that the requirements of Articles 83, 123(2) and 123(3) EPC were met by both requests and acknowledged novelty of the claimed subject-matter, but revoked the patent in suit for lack of inventive step.

In particular, with reference to decision T 332/87 of 23 November 1990, the subject-matter claimed according to the main and auxiliary requests as submitted during the opposition proceedings was novel over D1, because the particular composition in Reference Example 1 forming part of Comparative Example 6 of D1 could not be combined with the general teaching in the description (page 5, lines 48/49), as submitted by the Patent Proprietor.

However, the subject-matter of the patent in suit according to both requests lacked an inventive step in view of D2 which disclosed a composition comprising (a) a polyamide, (b) a halogenated polystyrene, (c) sodium antimonate and (d) a hydrotalcite phosphate compound. The subject-matter of Claim 1 differed from D2 by the

presence of an amine-type and/or phosphorus-type stabiliser as component (e).

In view of the fact that by the addition of this further component mould staining could be diminished, the technical problem was seen in the provision of a composition which exhibited reduced mould staining.

However, D2 mentioned that further additives such as heat stabilisers could be incorporated in the composition. Such an addition was, furthermore, common practice in the art in order to prevent decomposition of the resin which caused colouration and mould staining. To demonstrate that phenols, amines and phosphorus-containing compounds were known to be such heat stabilisers, reference was made to D1, D3 and D4.

As regards the auxiliary request, which contained a list of specific compounds (d), no evidence was on file which would have shown that the selection of these compounds gave rise to any technical effect other than what was to be expected from a phosphorus-containing stabiliser. Hence, the technical problem and the conclusions to be drawn on this basis were the same as for the main request.

Consequently, the patent was revoked for lack of inventive step.

IV. On 4 July 2000, a Notice of Appeal was lodged by the Patent Proprietor/Appellant against this decision with simultaneous payment of the prescribed fee.

In the Statement of Grounds of Appeal, received on 7 September 2000, the Appellant disputed the reasons given in the decision under appeal and filed a main request and three auxiliary requests. The main request was identical to the previous main request forming the basis for the decision under appeal (section II, above).

It was submitted that the purpose of including component (d) was to enhance the granulation and colour shade properties of the resulting resin composition, and that stabiliser (e) was to prevent thermal decomposition of the resin which in turn reduced staining the mould, which effects had been demonstrated by a number of examples in Table 1 as originally filed and in the examples and comparative examples of the patent in suit.

With respect to the closest state of the art, D2, it was argued that the document contained no example including an inorganic phosphate, but that it referred to a hydrotalcite-type complex hydroxide or its calcination product added to a blend of a heat resistant polyamide, a halogenated organic compound, sodium antimonate and optional additives such as other heat stabilisers, in order to provide a fire-retardant polyamide composition. As regards D3 and D4, the use of anti-oxidants, such as phenols, amines and phosphorus-containing compounds, eg phosphites, was acknowledged to be common general knowledge.

One problem tackled by the claimed subject-matter was to provide a flame-retardant polyamide composition which did not cause mould staining (page 2, lines 44 to 54). The solution of this problem in comparison with D2 was to supplement the composition of D2 by the further addition of an amine- or phosphorus-type stabiliser (patent in suit: page 3, lines 33/34 and page 9, lines 30 to 34; Examples 1, 2, 5 and 6; Comparative Examples 1 to 3). The mould-staining properties of the compositions according to the claims were much better than those of the comparative examples. Hence, the above problem was solved.

The use of hydrotalcite-type complexes as taught by D2 would result in resin compositions having relatively poor granulation properties due to the occurrence of strand-blowing (foaming) caused by the halogenated organic compound (b). However, contrary to hydrotalcite complexes which did not suppress strand-blowing, the presence of the phosphorus-containing compound (d) reduced this phenomenon and thus enhanced the granulation properties of the resulting resin composition (patent in suit: page 3, lines 44/45).

In support of this argument, further experimental data based on the addition of a synthetic hydrotalcite as used in D2 (DHT-4C) were submitted (Statement of Grounds of Appeal: page 5).

In Document D3, a tris(alkyl phenyl) phosphite was used in combination with a derivative of para-phenylenedi-amine in Nylon-6. It did not, however, teach a polyamide composition including any of a halogenated organic compound, an antimony-containing compound or a

phosphate derivative to enhance granulation. D4 merely listed various compounds as being useful as anti-oxidants in various types of resin compositions.

V. In its counterstatement dated 22 March 2001, the Respondent disputed these arguments and maintained its objection of lack of inventive step.

To this effect, it was argued that the Appellant had demonstrated that hydrotalcite phosphates of D2, which were encompassed by the claims of the main request, did not solve the problem underlying the patent in suit. Where, in at least part of the claim, the problem was not solved, the claim lacked inventive step.

The exclusion of certain compounds from a list of compounds, which originally had been presented as equivalent without any preference for whatever reason, would constitute new matter, which had not been within the application as filed, and could therefore not be considered to evaluate inventive step. The mere elimination of known compounds (d) could not create inventive step.

VI. By letter dated 8 November 2001, the previous arguments were further elaborated by the Appellant who also filed further comparative examples to support its submissions, wherein a hydrotalcite carbonate hydrate and the hydrotalcite phosphate, as disclosed in D2 (page 6, line 53), respectively, were used.

VII. On 20 March 2003, the parties were summoned to oral proceedings to be held on 17 July 2003. In an annex to the summons, a preliminary, provisional opinion of the

Rapporteur was communicated to the parties, wherein a number of objections was raised with respect to all requests on file.

In particular, an objection was raised that the application as originally filed had not provided a basis for a disclaimer of the type "which is not the phosphorus-containing compound (d)" at the end of Claim 1 of the main request under consideration (this quoted phrase will be referred to herein below as the "disclaimer").

Moreover, it was expounded that the only "phosphorus-containing compound" (d) used in the examples of the patent in suit, "UV-check AM-595", the composition of which had been explained on page 76 of the application as originally filed, had not been disputed to be identical to "UV-Chek® AM-595". The latter product was explained in D5 to be a "mixed sodium and barium organophosphate" acting as a "stabilizer" (this compound will be referred to below as "AM-595").

It was concluded that, due to the absence of any further limiting definition for the generic term "stabilizer" in the specification, the functional expression "not being a phosphorus-type stabilizer" could not delimit the two components (d) and (e) from each other (the latter quotation will be referred to herein below as the "functional expression").

Furthermore, it was noted in the provisional opinion that the above "functional expression" had been entered in Claim 1 during the examination proceedings, in view of the statement of the Examining Division that "the …

wording of Claim 1 ('phosphor[o]us-containing compound' and 'phosphor[o]us-type stabilizer') does not allow a clear distinction between two compounds, although it is evident from the description that two different compounds are meant" (Consultation by Telephone of 11 July 1995, communicated to the Applicant on 17 July 1995).

It was assumed that this statement had apparently been based on the further details on page 8, lines 3 to 6, and Claim 5 of the patent specification relating to the "phosphorus-containing compound" (d) [page 32, lines 3 to 9, and Claim 12 of the application as filed] and on page 9, lines 23 to 26 and page 11, lines 25 to 28 of the specification concerning the "phosphorus-containing stabilizer" (e) [page 37, line 19 to page 38, line 2, and page 84, lines 1 to 4, of the application as originally filed].

VIII. In reply to the provisional preliminary opinion, all the auxiliary requests were replaced by two new auxiliary requests (letter of 6 May 2003). Additionally, with reference to Decision G 9/91 (OJ EPO 1993, 408), the Appellant pointed out that Article 100(c) EPC had not been invoked in the opposition so that the allowability of the "functional expression" "not being a phosphorus-type stabilizer" was not open to challenge at this stage of the proceedings.

Claim 1 of the new first Auxiliary request reads as follows:

"1. A thermoplastic resin composition which comprises:

(a) a polyamide;

(b) a halogenated organic compound;

(c) an antimony-containing compound;

(d) a phosphorus-containing compound not being a phosphorus-type stabilizer, and which is at least one of:

an organic phosphate;

a mixture of an inorganic phosphoric acid and an organic phosphoric acid,

a metal salt synthesized from a mixed acid of an inorganic phosphoric acid and an organic acid, and

a phosphate selected from sodium dihydrogen-phosphate, disodium hydrogenphosphate, sodium phosphate, sodium hydrogenphosphite, sodium phosphite, sodium hypophosphite, potassium dihydrogenphosphate, dipotassium hydrogenphosphate, potassium phosphate, potassium hydrogenphosphite, potassium phosphite, potassium hypophosphite, lithium dihydrogenphosphate, dilithium hydrogen-phosphate, lithium phosphate, lithium hydrogenphosphite, lithium phosphite, lithium hypophosphite, barium dihydrogen-phosphate, dibarium hydrogenphosphate, barium phosphate, barium hypophosphite, magnesium hydrogenphosphate, magnesium dihydrogenphosphate, magnesium phosphate, magnesium hypophosphite, calcium dihydrogen-phosphate, calcium hydrogenphosphite, calcium phosphate, calcium hypophosphite, zinc phosphite, zinc hypophosphite,

aluminium phosphite and aluminium hypophosphite; and

(e) (i) an amine-type stabilizer, and/or

(ii) a phosphorus-type stabilizer selected from bis(2,6-di-t-butyl-4-methylphenyl)-pentaerythritol-diphosphite, bis(2,4-di-t-butylphenyl)pentaerythritol-di-phosphite, tris(2,4-di-t-butylphenyl)-phosphite and tetrakis(2,4-di-t-butyl-phenyl)-4,4'-biphenylenediphosphonite."

Claims 2 to 5 are dependent claims.

In Claim 1 of the second auxiliary request the definition of component (d) was further limited by exclusion of the whole generic class of (inorganic) "phosphates".

IX. By letter dated 24 April 2003, the Board was informed by the Respondent that it would not attend the oral proceedings.

X. In view of the fact that the parties had been duly summoned, the oral proceedings were held on 17 July 2003 in the absence of the Respondent (Rule 71(2) EPC).

(a) The first issue discussed concerned the wording of Claim 1 of the main request with respect to the "functional expression" and the "disclaimer" intended to distinguish components (d) and (e) from each other as addressed in the annex to the summons (section VII, above).

(i) The Appellant asserted that the "functional expression" had been entered before grant because of the objection under Article 84 EPC that components (d) and (e) had not been clearly delimited from each other although it had been evident that different compounds were meant. In order to exclude overlap between the two components and in view of the latter said to be "a phosphorus-type stabilizer", the specific wording of the "functional expression" in the definition of component (d) had been chosen.

(ii) Consequently, the "disclaimer", at the end of Claim 1, referred to "the other side of the same coin" and found its basis on page 12, lines 15 to 18 of the A-document (page 36, lines 7 to 13 of the application as originally filed) in a statement that the stabilisers of component (e) were used "in addition to the same thermoplastic resin, halogenated organic compound, antimony-containing compound and the phosphorus-containing compound …", thus, indicating the difference between components (d) and (e).

(iii) In the further discussion on this point, the Appellant conceded that the "disclaimer" could be understood in two ways: (i) it required that the individual compounds within the generic group of phosphorus-containing compounds, which were present as components (d) and (e), were different from each other, or (ii) it was to exclude from

component (e) the whole class of compounds covered by the definition of component (d).

(b) With respect to the 1st auxiliary request, wherein the difference between components (d) and (e) was evident due to the two lists of individual compounds inserted in Claim 1, the Appellant was of the opinion that the "functional expression" was technically superfluous, but it did not want to touch this passage in the definition of component (d) in order to avoid any objections under Article 84 or 123(2) EPC which might be raised against an amendment thereof and to avoid a possible "Article 123(2) and (3) trap".

(c) In view of this statement, the wording of Claim 1 was discussed with regard to the fact that in all the examples on file which were to support the patentability of the claimed subject-matter, "AM-595" was used as component (d). According to D5, the contents of which were not disputed by the Appellant, this compound was a stabiliser. Consequently, it appeared *prima facie* as if none of these examples was in accordance with the claimed subject-matter or could, therefore, support acknowledgement of an inventive step.

(d) The Appellant argued that the file history (as referred to above in section VII) showed that the "functional expression" had been entered into the claim only, because it had been required by the Examining Division to establish the non-identity of components (d) and (e). On the basis of the wording in Claim 1, a wording was chosen for the

required delimitation which, retrospectively, was not optimal. Since, however, in the 1st auxiliary request, the previously potentially overlapping components (d) and (e) were clearly delimited from each other, the "functional expression" had no limiting significance any more, in particular, the intention of this phrase had never been to define or limit the purpose and technical effect of component (d). It was therefore technically superfluous, but should be maintained in its present form in the claim for the above procedural reasons only (section X(b), above).

XI. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claims 1 to 6 according to the main request submitted with the Statement of Grounds of Appeal or, in the alternative, on the basis of Claims 1 to 5 according to the first or second auxiliary request as submitted with the letter dated 6 May 2003.

According to the written submissions, the Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request*

2.1 Wording of Claim 1

2.1.1 Claim 1 has been amended by incorporation of a list which refers to generic classes of phosphorus-containing compounds as disclosed in Claim 12 as originally filed and corrected (Consultation by Telephone as mentioned in section VII, above; Claim 5 as granted). However, this list does not clearly delimit components (d) and (e) from each other, both of which contain phosphorus groups.

2.1.2 Therefore, Claim 1, as it stands, contains two clauses in the definitions of components (d) and (e) which were inserted with the intention to delimit these two constituents of the claimed composition from each other: on the one hand, component (d) is defined to be a phosphorus-containing compound "not being a phosphorus-containing stabilizer" (the "functional expression") and, on the other, component (e) is an amine-type stabilizer and/or a phosphorus-containing stabilizer "which is not the phosphorus-containing compound (d)" (the "disclaimer"; section VII, above).

Since the "functional expression" had been inserted in the claim before grant and Article 100(c) EPC had not been invoked in the opposition, this amendment is not open to debate in accordance with the Opinion of the Enlarged Board of Appeal G 10/91 (OJ EPO 1993, 420).

However, the "disclaimer" was entered for the first time during the opposition proceedings. Hence, it must be fully examined as to its compatibility with the requirements of the EPC (G 10/91, *ibid.*, point 19 of the reasons).

2.1.3 The Appellant argued that the "disclaimer" referred to "the other side of the same coin" in relation to the "functional expression", which should have better read "not being *the* phosphorus-type stabilizer" (emphasis added), and that it found its support on page 12, lines 15 to 18 of the published application.

As indicated by the hint to "the other side of the same coin", however, the "disclaimer" does not delimit component (e) from component (d) any more than the "functional expression", already contained in Claim 1. On the basis of this argument, its addition can, hence at most, improve the wording of the "functional expression".

This means, however, that the amendment relates to a "tidying up and improving" of the disclosure rather than being occasioned by grounds for opposition specified in Article 100 EPC (T 127/85, OJ EPO 1989, 271), and is, therefore, not allowable (Rule 57a EPC).

2.1.4 Moreover, as pointed out in section X(a)(iii), above, and as conceded by the Appellant, the scope of the definition of component (e), inclusive of the "disclaimer", is not unambiguously clear in comparison to the meaning of the definition of component (d), including the "functional expression", because either (i) the stabiliser (e) may be a phosphorus-containing compound within the ambit of the specified classes of component (d) as long as it is not the same species, or (ii) the "disclaimer" may exclude all the generic groups of compounds encompassed by the definition of component (d).

In view of these two possible interpretations, it is evident that these components are neither delimited from each other, nor is the subject-matter of Claim 1 defined in a clear and unambiguous way.

Consequently, Claim 1 as a whole is unclear and does not meet the requirements of Article 84 EPC.

2.2 Since the claim does not fulfil all the requirements of the EPC, there is no need to consider the question in detail whether the "disclaimer" complied with Article 123(2) EPC.

2.3 Under these circumstances, the main request must fail for non-compliance with Article 84 and Rule 57a EPC (sections 2.1.3 and 2.1.4, above).

3. *First auxiliary request*

3.1 Article 123(2) and (3)

3.1.1 In addition to the amendment mentioned in section 2.1.1, above, the definition of component (d) in Claim 1 has been further specified by incorporation of the list of specific compounds within the meaning of the generic class of "phosphates" which can be found on page 32, line 14 to page 33, line 13 of the application as originally filed (application as published: page 11, lines 17 to 31).

Furthermore, component (e) has also been amended by limiting the phosphorus-type stabilisers to those compounds as disclosed on page 37, lines 19 to 25 as originally filed (application as published: page 12, lines 45 to 49).

These amendments result in a clear limitation of the scope of Claim 1 in comparison to Claim 1 as granted.

3.1.2 The remaining claims correspond to Claims 2 to 4 and 6 as granted (Claims 9 to 11 and 13 as originally filed).

3.1.3 It follows that the claims according to the first auxiliary request comply with the requirements of Article 123(2) and (3) EPC.

3.2 Article 84 EPC

3.2.1 Taking the wording of the definition of component (d) as it stands, the wording of the "functional expression" appears to exclude *prima facie* all conceivable compounds from the definition of component (d) which have some stabilising effect, so that Claim 1 would be inconsistent with the examples in the patent in suit and the further experimental data provided, wherein "AM-595" (which, according to D5, has a stabilising effect) was used as component (d).

3.2.2 According to explanations given by the Appellant during the oral proceedings, however, the "functional expression" was introduced in Claim 1 during the examination procedure with the sole intention to remove any overlap between the two components (d) and (e) without any intention of limiting the technical

function of the compound and, by that, to clearly and unambiguously distinguish components (d) and (e) from each other. Furthermore, it was argued that the examples as originally filed and the later filed experimental data clearly showed that the exclusion of a compound such as "AM-595" had never been the intention of the Applicant, Patent Proprietor and Appellant, respectively, since the use of the compound clearly served to demonstrate the effects aimed at by the claimed subject-matter, ie the solution of the relevant technical problem.

Due to the limitations inserted in the definitions of these components in Claim 1 (section 3.1.1, above), however, the "functional expression" no longer served any purpose in, and, hence, had no limiting significance for, the 1st auxiliary request. Therefore, it would be technically superfluous. However, the deletion of the expression was not considered by the Appellant, because of the danger that it might give rise to the question of whether Article 123(3) EPC would still be complied with by the claim amended in such a way (sections X(a) to (d), letter dated 13 October 1995).

3.2.3 A situation, which although concerning Article 123(3) EPC was, nevertheless, quite similar to the present question of how a claim should be read and interpreted, has been decided by another Board (T 190/99 of 6 March 2001) in favour of the Patent Proprietor. The Board found that "the skilled person when considering a claim should rule out interpretations which are illogical or which do not make technical sense. He should try, with synthetical propensity ie building up rather than

tearing down, to arrive at an interpretation of the claim which is technically sensible and takes into account the whole disclosure of the patent (Article 69 EPC). The patent must be construed by a mind willing to understand not a mind desirous of misunderstanding" (point 2.4 of the reasons).

This reasoning, when applied to the present situation, clearly prevents the skilled reader from interpreting the claim in a way which would exclude all those parts of the description which provide clear instructions of how experimentally to achieve the desired result, ie the examples. This is valid all the more as, in general, examples are construed by the skilled persons to represent preferred embodiments of the disclosure, and as, in the present case, they do show that the aim is, in fact, achieved.

3.2.4 Apart from these considerations, it is noteworthy that, in D5, "AM-595" is referred to specifically as a stabiliser effective in halogen containing polymers. Reference is made on all the sheets provided by the producer of the compound, in particular, to its use in PVC (polyvinyl chloride), CPE (chlorinated polyethylene compounds) and polyvinylidene chloride. No such polymer is involved here.

3.2.5 In view of these facts and findings, the Board is satisfied that in the present case the skilled person will read the claims in the light of the description and will realise that the above "functional expression", which had been inserted to serve a single particular purpose, ie to distinguish components (d) and (e) from each other, has lost its technical significance

completely for the interpretation of Claim 1 of the auxiliary request.

3.2.6 Under these circumstances, the Board has come to the conclusion that the amended claim meets the requirements of Article 84 EPC.

4. *Problem and solution*

4.1 The patent in suit concerns a thermoplastic polyamide resin composition.

4.2 A composition of this type is known from D2, which was identified by the Opposition Division as the closest state of the art. In particular, the document discloses fire-retardant polyamide compositions having a good heat resistance, which comprise (I) 100 parts by weight of a heat resistant polyamide, (II) 10 to 100 parts by weight of a halogenated polystyrene or halogenated poly(phenylene oxide), and (III) 0.5 to 50 parts by weight of sodium antimonate (Claim 1). According to preferred embodiments, the compositions may additionally contain (IV) 0.1 to 5 parts by weight of hydrotalcite-type complex hydroxide or its calcination product or, in the alternative, (V) 0.05 to 50 parts by weight of magnesium oxide and/or zinc oxide. These latter compounds are referred to as heat stabilisers (page 6, lines 29 and 33). Further optional additives, which must not impair the objects of D2, include eg other heat stabilisers, weatherability stabilisers, plasticizers, thickeners, antistatic agents, mould release agents, pigments, dyes, inorganic and organic fillers, nucleating agents, carbon black, talc, clay, and mica (page 7, lines 3 to 6).

The document aims at removing the disadvantages of previous conventional fire-retardant polyamide compositions, in particular, foaming of the composition and corrosion of the moulding machinery. These phenomena are provoked to occur during the compounding or moulding steps of polyamide compositions by decomposition products, which form during these steps, when carried out at such high temperatures that the fire-retardants contained therein decompose. Hence, it had been necessary to enhance the thermal stability of the previous compositions while retaining their high fire-retardancy and the other advantageous properties of polyamide, and, thus, to prevent foaming and coloration even at high compounding temperatures (page 2, lines 28 to 31).

According to D2, this aim is achieved, in a particularly effective way, by incorporating components (IV) or (V) into the composition which after the mixing of the constituents can be granulated or pulverised (page 3, lines 2 to 11; page 7, lines 13 to 27).

In the examples of D2, a number of compositions have been evaluated with respect to their colouration (as a result of thermal decomposition), combustibility (UL-94 standards), tensile and impact strengths.

In order to demonstrate that compositions according to the teaching of D2 are not yet fully satisfactory with respect to strand-foaming and granulation, and that they do not prevent or at least significantly reduce mould-staining, an effect not addressed at all in the document, the Appellant referred to the comparative

examples in the patent in suit and submitted additional experimental data together with its Statement of Grounds of Appeal and with the letter dated 8 November 2001, the results of which as such have not been disputed.

4.3 In line with the "objects of the invention" defined in the patent in suit (page 3, lines 44 to 52) and in the application (as originally filed: page 8, lines 1 to 19; as published: page 3, line 51 to page 4, line 3) and in line with the above experimental results, the technical problem underlying the patent in suit may be seen as the provision of a thermoplastic composition showing improved granulation properties, reduced or no strand blowing (foaming) and reduced mould-staining.

4.4 According to the patent in suit this problem is solved by a composition comprising (a) a polyamide, (b) a halogenated organic compound, (c) an antimony-containing compound, (d) a phosphorus-containing compound and (e) an amine-type a/or phosphorus-type stabiliser as defined in Claim 1.

In the examples contained in the patent in suit and the further experiments submitted by the Appellant, the criticality of the choice of components (d) and (e) has clearly been demonstrated. In particular, it has been shown that compositions containing hydrotalcite-type compounds (as suggested in D2) as replacement for component (d) show inferior results as to the above properties than the compositions in accordance with Claim 1, even despite the additional presence of phosphorus-type stabilizers in accordance with component (e) of Claim 1 (the presence of which goes

beyond the teaching of D2).

Hence, the technical problem underlying the claimed subject-matter has been credibly solved.

5. *Novelty*

In view of the above findings and, furthermore, the fact that the question of novelty has not been raised by the Respondent during the appeal proceedings, the Board has no reason to take a view with respect to novelty different from the findings in section 4 of the decision under appeal (section III, above).

Hence, the subject-matter claimed is novel in the sense of Articles 54(1) and (2) EPC.

6. *Obviousness*

It remains to be decided whether the solution found was obvious to a person skilled in the art having regard to the state of the art relied upon by the Respondent.

6.1 As shown above (section 4.2), D2 relates to compositions optionally containing hydrotalcite type compounds or at least one of two specific metal oxides (MgO and/or ZnO) which show reduced thermal decomposition, certain degrees of flame resistance and certain mechanical properties. The known compositions can be granulated or pulverised (page 7, line 13).

6.1.1 The document is, however, completely silent with respect to any improvements of granulation and mould-staining. In fact, the latter property has not been

considered at all in D2. Moreover, D2 does not provide any specific information which would allow to conclude that foaming was, indeed, prevented.

6.1.2 On the other hand, it has been shown in these proceedings that the combination of specific constituents in accordance with the definitions in Claim 1 according to the first auxiliary request has a distinct and significant influence on strand blowing (foaming), granulation and mould-staining. These results were not disputed.

6.1.3 Foaming and corrosion of the processing machinery may in the light of D2, in fact, be considered as the result of thermal degradation of at least one of the components in the thermoplastic composition. However, it has not been convincingly shown that the skilled person could have drawn any direct conclusion from the effects addressed in D2 that there was a possibility by modification of the known polyamide compositions to reduce or prevent mould-staining, let alone which modifications of the known blend were necessary in order to achieve this result.

In other words, the knowledge about the decomposition of a blend causing corrosion of the processing machinery does not provide any information as to the behaviour of another composition with respect to mould-staining, ie an effect impairing the composition itself (patent in suit: page 2, lines 44 to 49).

6.1.4 Furthermore, the further experimental results provided by the Appellant demonstrate that the results of the blends known from D2 were not satisfactory with regard

to strand-blowing and granulation either. However, no information was derivable from D2 that further improvements in this respect would have been possible, let alone in which way they could be achieved.

6.1.5 Consequently, document D2 does not provide a clear teaching in which way the composition of D2 should be modified in order to solve all the aspects of the above technical problem at the same time.

6.2 Document D1 relates to flame-retardant polyamide compositions containing a combination of specific flame retardants in particular amounts. The required flame retardants are, on the one hand, a brominated styrene or styrene derivative polymer containing certain amounts of maleic anhydride groups and, on the other, a brominated polystyrene. The compositions may further contain a metal oxide as an auxiliary flame retardant and "the known additives" for polyamides or styrene or styrene derivative resins, eg thermal stabilisers such as copper compounds, alkali metal halides, hindered phenol compounds and hindered amine compounds, lubricants, mould release agent, colouring agents, plasticizers, UV absorbers, antistatic agents, reinforcing agents etc. (page 5, lines 47 to 52).

These compositions are to show improved weld strength necessary for their use in the electrical and electronic fields. The document does not contemplate the specific aspects of the technical problem underlying the patent in suit.

In particular, the document neither teaches the addition of phosphorus-containing compound (d) as such nor in combination with a specific additive, namely with component (e) as defined in Claim 1.

In comparative Example 6, which is not a part of the teaching of D1, a copolymer of tribromo-styrene and acrylonitrile was used which had been prepared in the presence of hydroxyapatite. This information cannot be combined with any particulars belonging to the disclosure of the subject-matter claimed in that document. Nor could any teaching be derived from the comparative example beyond the finding, which could be expected, that the composition prepared in therein would show poorer results than the examples according to the claims of the document (Table 3). Hence, the document teaches away from the use of hydroxyapatite.

6.3 Document D3 concerns the stabilisation of polycaprolactam (nylon 6) yarns with a synergistic combination of trialkyl phosphite and di-â-naphthyl-para-phenylene-diamine against deterioration of their tenacity upon aging at increased temperatures over the time.

6.4 The cited Table 4 of D4 lists main classes of antioxidants sold in the United States and their applications. The chemical composition of the listed compounds ranges from mono-, di- and polyphenols to (di)hydroquinones, diarylamines, sulphur compounds and trivalent phosphorus compounds.

The table does not provide any information about further effects and properties which may be caused by the addition of these compounds specifically to flame-retardant polyamide compositions.

6.5 Hence, none of these further documents relates to the relevant technical problem, let alone provides an incentive to modify the compositions of D2 in order to solve the relevant technical problem in such a way as to arrive at something within the ambit of Claim 1.

7. Consequently, the subject-matter of Claim 1 is based on an inventive step within the meaning of Article 56 EPC.

8. Claims 2 to 7, which relate to preferred embodiments of the composition according to Claim 1, by the same token also involve an inventive step.

9. In Summary, the Board has come to the conclusion that the first auxiliary request is allowable.

Therefore, there is no need to deal with the second auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The main request is refused.

3. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 5 according to the first auxiliary request submitted with the letter dated 6 May 2003 and after any necessary consequential amendment of the description.

The Registrar: The Chairman:

E. Görgmaier R. Young