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**Datasheet for the decision  
of 23 September 2013**

**Case Number:** T 0680/11 - 3.3.09  
**Application Number:** 03746150.6  
**Publication Number:** 1473317  
**IPC:** C08J 3/22, C08L 71/02,  
C08L 77/00, C08K 3/04,  
C08L 77/06, C08L 71/12,  
C08L 77/02

**Language of the proceedings:** EN

**Title of invention:**

Conductive master batch and conductive resin composition

**Patent Proprietor:**

Asahi Kasei Chemicals Corporation

**Former Opponents:**

SABIC Innovative Plastics Holding B.V.  
CLARIANT INTERNATIONAL LTD.

**Headword:**

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**Relevant legal provisions:**

EPC Art. 83, 111

**Keyword:**

"Sufficiency - yes"  
"Remittal for further prosecution"

**Decisions cited:**

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**Catchword:**

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Case Number: T 0680/11 - 3.3.09

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.09  
of 23 September 2013

**Appellant:** Asahi Kasei Chemicals Corporation  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted 23 December 2010  
revoking European patent No. 1473317 pursuant  
to Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman:** W. Sieber  
**Members:** J. Jardón Álvarez  
R. Menapace  
W. Ehrenreich  
K. Garnett

## Summary of Facts and Submissions

I. This decision concerns the appeal filed by the proprietor of European patent No. 1 473 317, Asahi Kasei Chemicals Corporation, against the decision of the opposition division to revoke the patent.

II. The patent was granted with 22 claims, independent claims 1, 12, 15, 16 and 20 reading as follows:

"1. A conductive masterbatch comprising a polyamide and conductive carbon black, said conductive carbon black being present in the form of at least one agglomerated particle having a major axis of 20 to 100  $\mu\text{m}$ , wherein the number of said at least one agglomerated particle is 1 to 100 as observed under an optical microscope with respect to a contiguous area of 3  $\text{mm}^2$ ."

"12. A conductive resin composition comprising a polyamide, a polyphenylene ether and conductive carbon black, which is produced by melt-kneading the conductive masterbatch of any of claims 1 to 11 with the polyphenylene ether and optionally an additional amount of polyamide."

"15. An injection molded article comprising the conductive resin composition of any one of claims 12 to 14."

"16. An automobile outer panel, which comprises the conductive resin composition of any one of claims 12 to 14."

"20. A method for producing a conductive resin composition comprising a polyamide, a polyphenylene ether and conductive carbon black, which comprises the following steps:

- (1) providing a conductive masterbatch comprising a polyamide and conductive carbon black, said conductive carbon black being present in the form of at least one agglomerated particle having a major axis of 20 to 100  $\mu\text{m}$ , and
- (2) adding said conductive masterbatch to a molten polyphenylene ether."

Claims 2 to 11, 13, 14, 17 to 19, 21 and 22 were dependent claims.

III. The opponents General Electric Company (opponent 01), and Clariant International Ltd. (opponent 02) each requested revocation of the patent in its entirety on the grounds that the claimed subject-matter lacked novelty and inventive step (Article 100(a) EPC) and that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC. The opposition status of opponent 01 was later transferred to SABIC Innovative Plastics Holding B.V.

The documents cited during the opposition proceedings included:

D1: JP 2-201811;

D1a: English translation of D1;

D2: "Brochure KETJENBLACK® EC" of AKZO, 1992, pages 1 to 27;

D15: "The ZSK - Twin screw Extruder" Werner & Pfleiderer GmbH, dated prior to 1990; and

D16: Experimental report in the form of a declaration by Mr. K. Terada dated 26<sup>th</sup> August 2010.

IV. With its decision announced orally on 11 November 2010 and issued in writing on 23 December 2010, the opposition division revoked the patent. The decision was based on the patent as granted (main request) and on auxiliary requests 1 to 3.

The opposition division revoked the patent because in its opinion the patent as granted did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, the reason being essentially "the absence of any details about the melt-kneading conditions, which are essential in order to be able to carry out the invention" (point 2.4.4.2 of the decision).

The opposition division also rejected the first and the third auxiliary requests of the patent proprietor on the grounds of lack of sufficiency of disclosure, essentially for the same reasons as for the main request, and the second auxiliary request because in its view the subject-matter of claim 19 did not comply with Article 123(2) EPC.

The opposition division did not deal with the issues of novelty and inventive step.

V. On 22 February 2011 the patent proprietor (in the following: the appellant) filed an appeal and on the same day paid the prescribed fee. The statement setting out the grounds of appeal was filed on 28 April 2011 together with the following fresh documents:

- D19: "Plastics", Vol. 53, No. 9 (2002), Japan Plastics Association, pages 48 to 56, and a partial English translation thereof;
- D20: "Handbook of Carbon Black" (1995), Published by Carbon Black Association, Japan, 17 pages and a partial English translation thereof;
- D21: "Poriamido Jushi Handobukku (Polyamide Resin Handbook)" (1988), THE NIKKAN KOGYO SHIMBUN, LTD, pages 211 to 216 and a partial translation thereof;
- D22: Experimental report in the form of a declaration by Mr. M. Maeda dated 27<sup>th</sup> April 2011 (10 pages);
- D23: "Continuous compounding of engineering plastics and masterbatch", Werner & Pfleiderer GmbH, Stuttgart (not dated); and
- D24: "Twin-screw extrusion systems for continuous chemical and reactive processing", Werner & Pfleiderer Corporation (not dated).

The appellant maintained its requests before the opposition division, namely a main request (claims as

granted) and auxiliary requests 1 to 3 (see point IV above).

VI. By letter dated 9 September 2011 opponent 01 filed a reply to the appeal. Opponent 01 disputed all the arguments submitted by the appellant and requested the maintenance of the opposition division's decision (revocation of the patent).

By letter dated 12 September 2011 opponent 02 also filed a reply to the appeal requesting that the appeal be dismissed.

Both opponents requested that the newly filed documents of the appellant be not admitted into the proceedings.

VII. With letter dated 13 January 2012 the appellant replied to the submissions of both opponents and filed the following further documents:

D26: "Twin-screw compounder ZSK, development and processing technology". Werner & Pfleiderer GmbH (not dated);

D27: Engineering. Plastics. Cost-Effective Compounding of Engineering Plastics. Coperion Holding GmbH (not dated);

D28: Graphical presentation of experiments from D22 with a screw revolution rate of 280 rpm (1 page); and

D29: Twin-screw reactor for polymer processing, Werner & Pfleiderer (not dated).

- VIII. Opponent 01 withdrew its opposition by letter dated 23 August 2012 and thereby ceased to be a party to the proceedings insofar as the substantive issues were concerned.
- IX. On 31 January 2013 the board dispatched the summons to oral proceedings scheduled to take place on 26 September 2013. In a communication dated 28 February 2013, the board indicated that the main point to be discussed during the oral proceedings would be the sufficiency of disclosure. The board also indicated that if the subject-matter of any of the requests was found to fulfil the requirements of sufficiency of disclosure, remittal of the case to the opposition division for the further patentability issues to be dealt with appeared to be appropriate, as novelty and inventive step had not been dealt with by the opposition division and none of the parties had addressed these issues in appeal.
- X. Opponent 02 withdrew its opposition by letter dated 23 July 2013 and thereby ceased to be a party to the proceedings.
- XI. Further arguments in support of its requests were filed by the appellant on 21 August 2013.
- XII. The oral proceedings scheduled to take place on 26 September 2013 were cancelled by the board.
- XIII. The arguments presented by the appellant, insofar as they are relevant for the present decision, may be summarised as follows:



- The patent, supplemented by common general knowledge, contained sufficient information for a skilled person to carry out the invention without undue burden. The starting point as regards carbon black was known to a skilled person from the information in the patent. Carbon black was commercially available in the form of "powder" or "pellets" with particle sizes of about 100  $\mu\text{m}$  to a few millimetres and it was common general knowledge that only a little shear force was needed to separate such commercially available products into agglomerates of from 10  $\mu\text{m}$  up to 100  $\mu\text{m}$ . The patent specification in paragraphs [0020] to [0039] also included enough information concerning the other starting material, namely the polyamide.
  
- The patent specification also mentioned that the preferred method for producing the claimed masterbatch was a method in which the raw materials were melt-kneaded by using a twin-screw extruder or a kneader and the examples used a specific twin-screw extruder, namely ZSK-25, manufactured by Krupp Werner & Pfleiderer GmbH. The objection of the opposition division that the list of parameters given in the patent in relation to the melt-kneading conditions would be too extensive to allow the skilled person to carry out routine experimentation in order to determine the proper melt-kneading conditions was wrong. In fact, although several parameters have an effect on the shear force experienced by carbon black particles subjected to the melt-kneading process, the

skilled person would use the screw design which exerts the appropriate shear force on the carbon black.

- The new experimental evidence filed with the grounds of appeal confirmed that it was perfectly possible to obtain a masterbatch according to the patent in suit by varying one or more of the parameters "screw revolution rate", "extrusion rate" and "kneading zone length". Moreover the skilled person could transform an initial failure into success merely by adapting the shearing conditions without the exercise of any inventive effort.

XIV. The appellant requested that the decision of the opposition division be set aside and the case be remitted in order to obtain a decision on novelty and/or inventive step.

### **Reasons for the Decision**

1. The appeal is admissible.

MAIN REQUEST (patent as granted)

2. *Admittance of new evidence*

2.1 Both opponents requested the non-admittance of the evidence filed by the appellant during the appeal proceedings.

2.2 Documents D19, D20 and D22

2.2.1 Document D19 gives background information about carbon black in general and also on Ketjen black, which is used in the examples of the patent in suit.

2.2.2 D20 supplements information in D2 about carbon black and further describes production of masterbatches using carbon black.

2.2.3 D22 is an experimental report supplementing the experimental data of D16. It was filed because the opposition division did not consider D16 as sufficient evidence to show that the invention could be carried out without undue burden.

2.2.4 The board sees no reason to hold these documents inadmissible under Article 12(4) RPBA. They were filed at an early stage of the appeal proceedings, namely with the statement of grounds of appeal, to establish the skilled person's general knowledge and/or in support of previous arguments.

2.2.5 Hence, documents D19, D20 and D22 are admitted into the appeal proceedings.

2.3 There is no need to decide on the admissibility of the remaining documents, as they are not used in the present decision.

3. *Sufficiency of disclosure*

3.1 The patent relates to a conductive masterbatch comprising a polyamide and conductive carbon black, the

carbon black being present in the form of at least one agglomerated particle having a major axis of 20 to 100  $\mu\text{m}$ , wherein the number of said at least one agglomerated particle is 1 to 100 as observed under an optical microscope with respect of a contiguous area of 3  $\text{mm}^2$  (see claim 1). The claimed masterbatch is said to enable the production of a conductive resin composition having excellent heat resistance as well as simultaneously excellent conductivity and impact resistance (see [0010]).

- 3.2 The specification gives information about the polyamide (see paragraphs [0020] to [0039]) and the carbon black (see paragraphs [0066] and [0067]) which are used for the preparation of the claimed masterbatch.

Concerning the carbon black, paragraph [0066] describes the preferred carbon black in terms of its dibutyl phthalate oil absorption and paragraph [0067] mentions the commercially available Ketjen black EC and Ketjen black EC-600JD as preferred products.

It is also known that commercially available carbon black exists in the form of powder or pellets with particle sizes from 100  $\mu\text{m}$  to a few millimetres (D2, page 3, second paragraph; D19, page 2, table 1 of the partial English translation; and D20 chapters 2.3.1 and 2.3.2 of the partial English translation). It is also common general knowledge that only a little shear force is needed to separate these pellets into agglomerates of from 10  $\mu\text{m}$  up to 100  $\mu\text{m}$  in size (D2, page 3, third paragraph). Thus, in order to obtain a masterbatch as required by claim 1 the skilled person knows that the conditions for mixing the carbon black into the

polyamide must be mild as compared to the conditions used to obtain a masterbatch described in D2 containing primary aggregates of carbon black having a smaller size.

- 3.3 The method of determining the number of agglomerated particles having a major axis of 20 to 100  $\mu\text{m}$  as required by claim 1 is disclosed in paragraphs [0073] and [0074] of the patent specification.
- 3.4 The specification also discloses that the claimed masterbatch can be obtained by melt-kneading a polyamide and conductive carbon black using preferably a twin-extruder or a kneader (see [0068]; [0081]). However, the specification is silent about the melt-kneading conditions used for the preparation of the masterbatch.
- 3.5 The opposition division in its decision concluded that this lack of guidance in the specification concerning the melt-kneading conditions did not enable the skilled person to prepare the claimed masterbatch. The opposition division noted that the patent itself indicated that the melt-kneading conditions depended on a non-exhaustive list of parameters such as:
- the resin temperature/melt-kneading temperature/cylinder temperature;
  - revolving/rotation rate of the screw;
  - discharge/extrusion rate;
  - type/design of the screw; and
  - size of the extruder.

In the absence of detailed information concerning these parameters the skilled person could not obtain the claimed masterbatch by routine experimentation.

3.6 It is correct that the information concerning the melt-kneading conditions is incomplete in the patent specification. Although the specification includes six working examples and six comparative examples, the only information given in example 1 concerning the melt-kneading conditions is that "the melt-kneading conditions employed in Example 1 were mild [emphasis by the board] as compared to those employed in Comparative Example 1" (page 18, lines 43 to 44). In comparative example 1 the masterbatch was prepared in accordance with the method described in the single example of Unexamined Japanese Patent Application Laid-Open Specification No. Hei 2-201811 (D1 in the present proceedings) wherein "the screws were so designed as to generate a high shearing force [emphasis by the board], such that the surface roughness (average value of the central line average roughness (Ra) values) of the resultant pellets becomes less than 0.3  $\mu\text{m}$ " (page 18, lines 21 to 23 of the present specification). The same considerations apply to the other examples in the specification.

3.7 It is therefore to be considered whether this lack of information results in an insufficient disclosure of the invention or whether the skilled person on the basis of his common general knowledge could supply this missing information. The key question to be answered in the present case is whether or not the skilled person, after evaluation of a possible initial failure (a masterbatch having a number of agglomerated particles

outside the claimed range) would know from his general common knowledge what measures to apply in order to transform this failure into success without exercise of inventive effort.

3.8 The board is satisfied that this is indeed the case for the following reasons:

3.8.1 According to comparative example 1 of the patent in suit the masterbatch was prepared in a twin-screw extruder wherein the screws were so designated as to generate a high shearing force. In the masterbatch thus obtained the number of agglomerated particles (major axis: 20-100  $\mu\text{m}$ ) was zero and therefore outside the range claimed. In example 1 of the patent the melt kneading conditions for mixing the carbon black into the polyamide "were mild as compared to those employed in comparative example 1" resulting in a masterbatch with 16 agglomerated particles (major axis: 20-100  $\mu\text{m}$ ) and thus within the scope of the invention.

3.8.2 Although there are indeed a number of parameters which can be varied by a skilled person, in practice these parameters mainly have an effect on the shear force experienced by the carbon black particles subjected to the melt-kneading process. The skilled person thus knows that he has to select a screw design which exerts a mild shear force on the carbon black.

As indicated by the appellant it is routine work to select an optimal screw design from available screw designs for the relevant mixing purpose, here the purpose of carrying out the invention. Parameters which can be varied to adjust the shear force to higher or

lower values are: the screw revolution rate, the extrusion rate and the kneading zone length. As to these:

- a higher screw revolution rate increases the shear force on the carbon black to be admixed;
- a high extrusion rate means short retention time of carbon black particles in the extruder and therefore lower application of shear force on the carbon black; and
- a reduced kneading zone length reduces the shear force applied to the carbon black.

Thus, the skilled person knows how to modify these parameters to increase (or decrease) the shearing force. By varying one or more of these parameters such that the conditions are appropriate, it is not overburdensome to obtain a masterbatch according to the invention.

3.8.3 This conclusion is confirmed by the new experimental evidence filed during the appeal proceedings, D22 applying also the general common knowledge of screw designs of a ZSK twin screw extruder as known, for instance, from D15.

In the examples in D22 three screw designs with different lengths of the kneading block in relation to the total length of the extruder were used. Experiments FM-1 and FM-2, in which a low-shear screw design is used, show that it is possible to prepare a masterbatch as claimed (cf. FM-1), whereas if the conditions are



made very mild a masterbatch with too many agglomerated particles is obtained (cf. FM-2). Experiments FM-3, FM-4, FM-6 and FM-7 show that using a medium-shear screw design, it is possible to prepare a masterbatch as claimed by varying the screw revolution and/or the extrusion rate. Finally, in example FM-5, which applies hard kneading conditions by virtue of the low extrusion rate, and in example FM-8, which uses a high shear force, the number of agglomerated particles was too low.

3.8.4 The skilled person wishing to prepare a masterbatch according to claim 1 needs first to select appropriate "mild" blending conditions (screw revolution rate, extrusion rate and kneading zone length) which are likely to result in the specific amount of agglomerates. If the first trial ends in failure that can be either because:

(i) no agglomerated particles were formed as in examples FM-5 and FM-8 of D22; or

(ii) too many agglomerated particles were formed as in example FM-2 of D22.

In any of these cases the skilled person knows that he has to change the shearing force, namely in the first case to reduce it and in the second case to increase it, to arrive at a masterbatch as claimed. As explained in point 3.8.2 above, in order to reduce the shearing force he can increase the extrusion rate and/or reduce the kneading zone length and in order to increase the shearing force he has to use a higher screw revolution rate or increase the kneading zone length. The skilled person knows how to modify the extruding conditions of

the failure examples FM-5, FM-8 and FM-2 in order to arrive at examples as claimed (FM-3, FM- 4, FM-1 and FM-6).

Thus an initial failure can be easily transformed into success by adjusting one or two parameters towards optimal shear.

As indicated above, the basic principle is simple, appropriate shear conditions can be easily achieved by the skilled person through routine variation of parameters. The skilled person can thus prepare a masterbatch as claimed without undue burden.

3.9 For these reasons the board is satisfied that the requirements of sufficiency of disclosure are satisfied.

3.10 Although both oppositions were eventually withdrawn (points VIII and X above), each opponent had filed a reply to the statement of grounds of appeal (point VI above). However, there are no additional arguments in those replies which inclines the board to pursue the issue of sufficiency further on its own motion.

3.11 The board thus decides that the subject-matter of claims 1 to 17 of the main request fulfils the requirements of Article 83 EPC.

#### 4. *Remittal*

Taken account that the opposition division has not yet taken a decision on novelty and inventive step and that the appellant has requested remittal of the case to the opposition division for further consideration, the

board considers it appropriate to exercise its discretion under Article 111(1) EPC to remit the case for further prosecution on the basis of the claims 1 to 22 of the main request, having regard also to Rule 84(2), last sentence, EPC.

#### FURTHER AUXILIARY REQUESTS

In view of the fact that the board has decided to remit the case for further prosecution, there is no need to deal with these requests.

#### **Order**

#### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division for further consideration on the basis of claims 1 to 22 of the main request (patent as granted).

The Registrar

The Chairman

M. Cañueto Carbajo

W. Sieber