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Aktenzeichen / Case Number / N° du recours : T 113/86

Anmeldenummer / Filing No / N° de la demande : 79 100 514.3

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Bezeichnung der Erfindung: Continuous process for the recovery of polycarbonate  
Title of invention: from solutions of it, and polycarbonate powders  
Titre de l'invention : thus obtained

Klassifikation / Classification / Classement : C08G 63/72

**ENTSCHEIDUNG / DECISION**  
vom / of / du 28 October 1987

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent / Montedison S.p.A.  
Titulaire du brevet :

Einsprechender / Opponent / Opposant : Bayer AG

Stichwort / Headword / Référence : Polycarbonate/Montedison

EPO/EPC/CBE Articles 54, 56, 123(2) and (3)

Kennwort / Keyword / Mot clé : "Allowable amendment of claim and  
description"  
"Inventive step"

Leitsatz / Headnote / Sommaire

Europäisches  
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European Patent  
Office

Boards of Appeal

Office européen  
des brevets

Chambres de recours



Case Number.: T 113 /86

**DECISION**  
of the Technical Board of Appeal 3.3.1  
of 28 October 1987

**Appellant :**  
(Opponent)

Bayer AG  
Konzernverwaltung RP  
Patentabteilung  
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**Representative :**

**Respondent :**  
(Proprietor of the patent)

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**Decision under appeal :**

Interlocutory decision of the Opposition Division of  
the European Patent Office dated 14 February 1986  
concerning maintenance of European Patent  
No. 0 003 996 in amended form.

**Composition of the Board :**

**Chairman :** K. Jahn

**Members :** R. Andrews

C. Payraudeau

## Summary of Facts and Submissions

- I. The mention of the grant of the patent No. 0 003 996 in respect of European patent application No. 79 100 514.3, filed on 21 February 1979 and claiming priority of 22 February 1978 from a prior application filed in Italy, was published on 9 March 1983 (cf. Bulletin 83/10).
- II. On 8 December 1983 the Appellant filed a notice of opposition requesting the revocation of the patent on the ground that its subject-matter was not patentable within the terms of Articles 52 to 57 EPC. The opposition was supported by, *inter alia*, the following documents:
- (1) DE-A-1 604 900
  - (2) US-A-2 297 726
  - (4) Fluidization Engineering (Kunii und Levenspiel) Wiley and Sons, Inc., New York, (1969) pages 30 and 31.
- III. By an interlocutory decision of 14 February 1986, the Opposition Division maintained the patent in amended form on the basis of Claim 1 and columns 2 and 4 of the description submitted in the oral proceedings held on 15 July 1985 and Claims 2 to 4, columns 1, 3 and 5 to 8 of the description and Figures 1 to 4 as granted. The independent Claims 1 and 4 read as follows:
- "1. Continuous process for the recovery of a polycarbonate from its solution in organic solvent(s) by the use of steam, characterised in that said process consists of the following stages:
- (a) feeding the polycarbonate solution possibly containing dispersed mineral fillers and/or inorganic pigments, at a temperature between 0° and 120°C, through one or more feeding ducts into the restricted zone or the divergent

stretch of a convergent-divergent nozzle of the De Laval type through which water vapour passes at respectively sonic or ultrasonic speed, maintaining feeding weight ratios vapour/polycarbonate solution of 1/1 to 1/5 with formation of a dispersion of particles of solution in the vapour;

- (b) continuously feeding the dispersion resulting from stage (a) to a pipe-in-pipe heat exchanger, directly connected to the diverging stretch of the nozzle, said heat exchanger having a mean thermal exchange coefficient of 500 to 1500 kcal/hr.sq.m°C, and an increasing cross-section along its length, and in which exchanger the dispersion, maintained at 100-140°C for dwell times of between 0.05 and 5 seconds, has a flow rate of at least 90m/sec in the initial stretch and from 10 to 50m/sec in the final stretch; thereby obtaining solid minute polycarbonate particles dispersed in the vapour phase consisting of the vapours of the solvent and of water vapour;
- (c) separating the solid particles from the vapours in a cyclone;
- (d) drying of the solid in a superheated water vapour fluid bed.

4. Polycarbonate powders obtained according to the process as claimed in the above preceding claims."

IV. The Opposition Division concluded that there was no formal objection to the amendments proposed by the proprietor of the patent since they met the requirements of Articles 123(2) and (3). The Opposition Division also considered

that the teaching of the disputed patent departed from the closest prior art as represented by document (1) in three respects and that these changes were not obvious in the light of the disclosure in the cited documents.

V. An appeal was lodged by the Appellant against this decision on 8 April 1986 with the payment of the appropriate fee. In the statement of grounds filed on 12 June 1986 the Appellant based his arguments on the previously cited documents (1), (2) and (4) and US-A-2 467 769 (5). The Appellant was also of the opinion that the amendment to Claim 1 of the patent-in-suit is not allowable since it infringes Article 123(3) EPC. With respect to the problem of producing particles of polycarbonate with high apparent densities the Appellant alleged that an investigation has revealed that the applicant of DE-A-1 604 900 (1) had supplied particles of polycarbonate of a certain particle size with an apparent density of  $0.2 \text{ kg/dm}^3$  before the application date of the disputed patent. With regard to the Opposition Division's view that the teaching of the disputed patent differed from that of document (1) in three respects the Appellant has argued that:

- (a) a comparison of the individual features of both processes before entry to the heat exchanger demonstrates that both processes take place in the same way;
- (b) nozzles similar to the present one are disclosed in Figures 3 and 4 in document (2) in connection with a vaporisation processes;
- (c) heat exchangers with increasing cross-sections along their length are disclosed in Figure 1 of document (5);

(d) the drying step (d) is a simple technical measure (cf. document (4));

(e) an inventive step cannot be recognised in providing specific numerical values for carrying out the process known from document (1) since all the measures taken are obvious to the skilled person.

VI. The Respondent has contended that the amended Claim 1 is formally allowable. The Respondent is also of the opinion that it is not a question of whether the process of the disputed patent is better than the one disclosed in document (1), but whether the proposed solution to the problem confronting the patentee would have been obvious to the skilled person in the light of the cited prior art.

VII. The Appellant requested that the decision under appeal be set aside and the patent-in-suit revoked. The Respondent requested that the appeal be dismissed.

#### Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is, therefore, allowable.
2. The Board shares the view of the Opposition Division that there are no formal objections to the amendments to Claim 1, Col. 2, lines 29 and 30 and Col. 4, line 4. The amendment to Claim 1 and Col. 2, lines 29 and 30 involve the feeding weight ratios of water vapour to polycarbonate solution. In Claim 1 and the statement of invention as filed and granted the range of these ratios was specified as being from 1 to 5kg of water vapour per kg of polycarbonate solution. The amended Claim 1 and statement

of invention now specify that this range should be from 1 to 5kg of polycarbonate vapour per kg of water vapour. The ratio of polycarbonate solution to water vapour of 1:1 was disclosed in Claim 1 as filed and granted and page 3, lines 15 and 16 of the published patent application (cf. also Col. 2, lines 29 and 30 of the published patent). The ratio of polycarbonate solution to water vapour of 5:1 was disclosed in Example 2 of the application as filed and granted. Since the end-points of the amended range were specifically mentioned in the application as filed, this amendment is allowable under Article 123(2) EPC. The amendment to Col. 4, line 4, viz. the deletion of the expression "even up to" before "1/7 kg/kg", is also allowable, since this merely clarifies the meaning of this particular passage. Thus, as claimed in Claim 3 and as illustrated by Example 3, by introducing a further quantity of polycarbonate solution via a convergent-divergent nozzle of the De Laval type into the heat exchanger it is possible to attain a feeding ratio of polycarbonate solution to water vapour of greater than 5:1; specifically this ratio may reach a value of 7:1.

- 2.1 The Appellant has alleged that the amendment to Claim 1 infringes the provision of Article 123(3) EPC. However, for the following reason the Board cannot share this opinion.
- 2.2 In the Board's opinion voluntary amendments requested by the patentee which are not necessitated by any of the grounds for opposition specified in Article 100 EPC raised by the opponent or by the Board under Article 114 EPC should, in principle, not be allowed if there is the slightest doubt that the unamended patent could be construed differently to the patent as amended. Otherwise there is a definite risk that the protection conferred by

the patent would actually be extended if, as a result of amendments to clarify the granted claims, the claims may be more widely construed than a court would have construed them by the application of Article 69 EPC.

However, in the Board's opinion the removal of an inconsistency between a claim and the description should be allowed if the inconsistency arises from an error, provided that the error is so obvious to a skilled person in the light of the patent specification as a whole that an interested third party could have anticipated the extent of protection conferred by the amended claim.

- 2.3 In the present case it would be immediately clear to the informed reader of the present published patent specification that Claim 1 as granted, insofar as it relates to a feeding ratio of 5kg of water vapour per kg of polycarbonate solution, is at variance with Examples 1 to 3 which exemplify initial feeding weight ratios of water vapour to polycarbonate solution of 1:2, 1:5 and 1:4.28 respectively. Moreover, in view of the emphasis placed on the low consumption of steam in the process according to the patent-in-suit (cf. page 2, line 17 and page 8, line 14 of the published patent application and Col. 1, line 60 and Col. 4, lines 64 and 65 of the printed patent specification), it would be readily apparent to an interested third party that an error in the drafting of Claim 1 (and the corresponding statement of invention) had occurred. The assumption that the original Claim 1 contained a clerical error is additionally supported by the statement that feeding ratios of steam to polycarbonate solution may attain 1/7 kg/kg if further amounts of polycarbonate solution are introduced into the heat-exchanger (cf. page 6, lines 14 to 19 of the published patent application and Col. 3, line 33 to Col. 4, line 5 of the printed patent specification).



In the light of the disclosure of the patent specification as a whole the skilled person to whom it is addressed would immediately conclude that an error had occurred in the drafting of Claim 1 and that the protection conferred by the patent should really extend to feeding weight ratios of water vapour to polycarbonate solution of from 1:1 to 1:5. Therefore the Board considers that the extent of protection conferred by Claim 1 as granted, when properly construed in the light of the description, is identical with that conferred by the amended Claim 1. The same applies to the amendment to column 2, lines 29 and 30 of the description. This amendment, which ensures that the granted patent cannot be misconstrued, is, therefore, allowable.

- 2.4 This view of the Board is not in contradiction to the principle laid down in the decision of the Enlarged Board of Appeal Gr 01/84 that opposition procedure is not designed to be, and is not to be misused as, an extension of examination procedure (OJ 1985, 299, 304). Since the present opposition procedure was validly initiated by the advancement of legitimate grounds for opposition and, in any case, a decision on the patentability of the subject-matter of the patent has to be reached, the request for the correction of a misleading error does not represent an abuse of this procedure.

This view of the Board also does not depart from the decision of another Technical Board of Appeal T 23/86 (cf. OJ 1987, 316, 318). In the reasoning of this decision it was pointed out that an opposition cannot be based on the assertion that a patent claim is unclear.

The removal of an inconsistency between a claim and the description is in the legitimate interest of the patentee, whose patent should be maintained in a form in which it can be best successfully defended. It is also in the interest of any concerned competitor that a patent is granted in such a form that it can be correctly understood free from any possible misconceptions. However it is the patentee's responsibility to decide whether he accepts an indicated unclarity and requests the rejection of the opposition and the maintenance of the patent unamended (Article 102(2) EPC) or whether he prefers to remove the inconsistency and to request the maintenance of the patent in amended form (Article 102(3) EPC).

3. The patent-in-suit relates to a continuous process for the recovery of polycarbonate from its solutions in organic solvents and the particulate polycarbonate thus obtained. Such a process is known from document (1). However, a disadvantage of this prior art process lay in the fact that it was not possible to obtain polycarbonate particles with high apparent densities. It is considered desirable that polycarbonate particles have high apparent densities, a low water content and be substantially free of organic solvent (less than 10 ppm), since such particles may be fed directly into standard extrusion equipment without clogging or pulsing.
4. In the light of prior document (1) the technical problem underlying the patent-in-suit may be seen in providing a continuous process for the recovery of polycarbonate particles which are substantially free of organic solvent and have a low water content and which have higher apparent densities than those particles obtained by the process disclosed in document (1).

According to the disputed patent this technical problem is solved by subjecting the polycarbonate solution to a process consisting of the stages (a) to (d) referred to in Claim 1.

In view of the Examples of the disputed patent in which polycarbonate particles having apparent densities of  $0.35 \text{ kg/dm}^3$  and  $0.25 \text{ kg/dm}^3$ , a water content of between 0.3 and 0.5% by weight and a residual solvent content of less than 10 ppm and the unchallenged Respondent's repetition of the process according to document (1) which yielded polycarbonate particles with apparent densities of  $0.1 \text{ kg/dm}^3$ ,  $0.11 \text{ kg/dm}^3$  and  $0.12 \text{ kg/dm}^3$ , the Board is satisfied that the technical problem as defined above is plausibly solved (see the Experimental Report filed on 21 June 1985).

5. After examination of the cited prior art the Board has concluded that the claimed process is not disclosed in any of them and is, therefore, novel. With respect to the novelty of the subject-matter of Claim 4 the Board cannot accept the Appellant's above-mentioned unsubstantiated allegation particularly since a repetition by the Respondent of the process of document (1) yielded polycarbonate particles with apparent densities much lower than  $0.2 \text{ kg/dm}^3$ . In the absence of any evidence indicating that polycarbonate particles having apparent densities of between  $0.2 \text{ kg/dm}^3$  were known before the priority date of the patent-in-suit the Board considers that the subject-matter of Claim 4 is also novel. As the Appellant has not questioned the novelty of the subject-matter of the patent-in-suit during the appeal proceedings, it is not necessary to consider the matter in more detail.

6. Document (1) discloses a continuous process for the recovery of dry feed material in the form of dense, discrete particles comprising passing a stream of a hot gas through a jet nozzle at sonic velocity, angularly projecting a feed material into the stream of hot gas as it discharges from the jet nozzle to form a suspension of feed material in the hot gas, passing said suspension into a confined diffusion zone wherein the suspension is allowed limited expansion while maintaining contact with the walls of the diffusion zone, advancing said suspension through an elongated pipe and separating volatiles from the formed particulate material (cf. Claims 1 and 3).

6.1 The Board agrees with the Appellant that a comparison between the process of the disputed patent and the one disclosed in document (1) reveals the following similarities:

- (1) the stream of steam (hot gas) is passed through a convergent-divergent nozzle at sonic velocity;
- (2) the feed material is fed into the stream of steam (hot gas);
- (3) the dispersion of particles in the steam (hot gas) is passed through a heat exchanger;
- (4) the solid particles are separated from the volatiles, for example, in a cyclone (cf. (1) page 11, line 30).

However, the same comparison reveals the following essential differences:

- (a) in the present process the feed material (polycarbonate solution) is fed into either the convergent or divergent section of the De Laval type nozzle (cf. Claim 1); in the process according to document (1) the feed material is angularly projected into the stream of hot gas (steam) as it discharges from the jet nozzle, i.e. in a mixing chamber as represented in Figures 1 and 3 by 3 and 20 respectively (cf. page 6, lines 11 to 16);
- (b) the divergent section of the nozzle is connected directly to the heat exchanger (cf. Claim 1 of the disputed patent); in document (1) the outlet of the jet nozzle is connected to the heat exchanger via the mixing chamber and a diffusing zone consisting of a diffusion throat and a diffuser (cf. page 6, lines 11 to 13 and 19 to 21 and 4, 5 and 6 of Figure 1);
- (c) in the process of the disputed patent the solvent and moisture content of the particles are reduced to the desired level by means of a fluid bed dryer (cf. Claim 1); in the process according to document (1) this is achieved by repeating the whole process (cf. page 7, lines 4 to 11, Example 6 and Figure 4);
- (d) in the process of the patent-in-suit it is necessary to carry out steps (a) and (b) under specific conditions not disclosed in document (1).

Although the following features which distinguish the process according to the disputed patent from the one described in document (1) are known or can be derived from the prior art:

- (i) drying process in which the feed material is fed into a divergent-convergent nozzle of the De Laval type (cf. document (2), Figure 3 and lines 13 to 28 of the left-hand column of page 6);
- (ii) drying polymer particles in a superheated water vapour fluid-bed (cf. document (4), Figure 13 and page 30);
- (iii) the specific operating conditions for stages (c) and (b) are either conventional or follow automatically from the other conditions;

there are no indications in the prior art which would have led the skilled person to change the process of document (1) in the manner outlined above in order to solve the problem of increasing the apparent density of the polycarbonate particles obtained. Therefore, in the Board's judgement the subject-matter of Claim 1 involves an inventive step.

5.2 Dependent Claims 2 and 3, which relate to preferred embodiments of Claim 1, derive their patentability from this claim.

5.3 In the absence of any concrete evidence showing that polycarbonate particles having apparent densities of between  $0.2 \text{ kg/dm}^3$  and  $0.4 \text{ kg/dm}^3$ , a moisture content of 0.5% by weight or less and which are substantially free from organic solvent were known or available to the skilled person on the basis of his common general knowledge before the priority date of the disputed patent, the Board takes

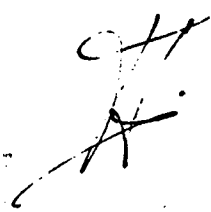
the view that the inventive process has not only advantages associated with the process itself but also yields products whose improvement in quality was not predictable. The subject-matter of Claim 4 is therefore patentable.

**Order**

**For these reasons, it is decided:**

**The appeal is dismissed.**

**The Registrar**



**The Chairman**



RVA.  
CP