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Aktenzeichen / File Number / Numéro du dossier

T 402 / 91-3 3 3

In der Anlage erhalten Sie

- ☐ eine Kopie des Berichtigungsbeschlusses
- ☐ ein korrigiertes Vorblatt (Form 3030)
- ☐ einen Leitsatz / Orientierungsatz (Form 3030)
- ☐ _____

Please find enclosed

- ☐ a copy of the decision correcting errors
- ☒ a corrected covering pages (Form 3030)
- ☐ a headnote / catchword (Form 3030)
- ☐ _____

Veuillez trouver en annexe

- ☐ une copie de la décision rectifiant des erreurs
- ☐ une page de garde (Form 3030) corrigée
- ☐ un sommaire / une phrase vedette (Form 3030)
- ☐ _____

Anmeldung Nr. / Patent Nr.: _____
(soweit nicht aus der Anlage ersichtlich)

Application No. / Patent No.: 83102188P.6
(if not apparent from enclosure)

Demande n° / Brevet n°: _____
(si le n° n'apparaît pas sur l'annexe)

BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

A		B		C	X

File No.: T 0402/91 - 3.3.3

Application No.: 83 102 188.6

Publication No.: 0 088 414

Classification: C08F 214/26

Title of invention: Tetrafluoroethylene/hexafluoropropylene copolymer having improved extrudability

D E C I S I O N
of 26 May 1993

Applicant: Daikin Kogyo Co., Ltd.

Proprietor of the patent:

Opponent: HOECHST AKTIENGESELLSCHAFT

Headword:

EPC: Art. 56

Keyword: "Inventive step (yes)"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0402/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 26 May 1993

Appellant: (Proprietor of the patent)
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Respondent: (Opponent)
HOECHST AKTIENGESELLSCHAFT
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Representative:

Decision under appeal: **Decision of the Opposition Division of the European Patent Office of 1 February 1991, issued on 19 March 1991 revoking European patent No. 0 088 414 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: F. Antony
Members: R.A. Lunzer
M.K.S. Aùz Castro

BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

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Respondent: (Proprietor of the patent)
HOECHST AKTIENGESELLSCHAFT, Frankfurt
-Werk Gendorf-
D - 84508 Burgkirchen (DE)

Representative:

Decision under appeal: **Decision of the Opposition Division of the European Patent Office of 1 February 1991, issued on 19 March 1991 rejecting the opposition filed against European patent No. 0 088 414 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: F. Antony
Members: R.A. Lunzer
M.K.S. Auz Castro

Summary of Facts and Submissions

I. European patent No. 0 088 414 was granted on 22 July 1987 on the basis of application No. 83 102 188.6 filed on 5 March 1983, having a priority date of 8 March 1982 derived from Japanese Application No. 37067/82.

II. On 22 April 1988 an opposition was lodged by the Respondent on the grounds of Article 100(a) and (b) EPC, alleging lack of any inventive step (Article 56 EPC), and the existence of inconsistencies in the description giving rise to insufficiency of disclosure (Article 83 EPC). The Opponent relied in particular on the following documents:

(1) US-A-2 946 763
(2) DE-A-2 613 795
(3) JP-A Sho 49-10290 Derwent Accession No. 35357V/19
(4) DE-B-1 720 611
(5) US-A-2 742 446,

and after the expiry of the time limit for filing an opposition the following documents were referred to in addition:

(7) DE-A-2 641 219 and
(8) Journal of Non-Newtonian Fluid Mechanics 2 (1977) pages 37 to 47.

III. By its decision given orally on 1 February 1991, and issued in writing on 19 March 1991, the Opposition Division revoked the patent, holding that the alleged invention defined by Claim 1 as amended in the course of the opposition procedure lacked any inventive step having regard in particular to documents (1) and (2). It

did not make any finding on the issue of insufficiency of disclosure.

IV. Claims 1 to 4 as filed on 1 February 1991 and as considered by the Opposition Division were in the following form, the words added to Claim 1 by amendment being all following, "60 x 10^4 poise", while the words added to Claim 3 are shown in bold.

"1. A tetrafluoroethylene/hexafluoropropylene copolymer, which comprises

(a) 10 to 70% by weight of a tetrafluoroethylene/hexafluoropropylene copolymer comprising 5 to 20% by weight of hexafluoropropylene, the specific melt viscosity at 380°C being from 100 x 10^4 to 1,000 x 10^4 poise, and

(b) 90 to 30% by weight of a tetrafluoroethylene/hexafluoropropylene copolymer comprising 5 to 20% by weight of hexafluoropropylene, the specific melt viscosity at 380°C being from 0.1 x 10^4 to 60 x 10^4 poise, the melt flow ratio being at least 3.5 and the zero strength time (ZST, second) at 380°C satisfying the following equation:

$$ZST \geq \frac{1}{8}x^2 \div 17x \div 107$$

wherein x is (specific melt viscosity) x 10^{-4}.

2. The copolymer according to claim 1, wherein the specific melt viscosity at 380°C of the copolymer (a) is from 150 x 10^4 to 600 x 10^4 poise, and that of the copolymer (b) is from 0.5 x 10^4 to 20 x 10^4 poise.

3. A process for preparing tetrafluoroethylene/hexafluoropropylene copolymer according to claim 1, which comprises (a) polymerizing **tetrafluoroethylene and hexafluoropropylene to obtain** 10 to 70% by weight of a tetrafluoroethylene/hexafluoropropylene copolymer comprising 5 to 20% by weight of hexafluoropropylene and having the specific melt viscosity at 380°C of from

100 x 10^4 to 1,000 x 10^4 poise and (b) polymerizing **tetrafluoroethylene and hexafluoropropylene to obtain** 90 to 30% by weight of a tetrafluoroethylene/hexafluoropropylene copolymer comprising 5 to 20% by weight of hexafluoropropylene and having specific melt viscosity of from 0.1 x 10^4 to 60 x 10^4 poise, and c) adding the chain transfer agent or accelerating the decomposition rate of the initiator **to obtain the copolymer in the step (a) or (b) as desired**, steps (a) and (b) being effected in any order or alternately.

4. A process for preparing a tetrafluoroethylene/hexafluoropropylene copolymer according to claim 1, which comprises mixing 10 to 70% by weight of a tetrafluoroethylene/hexafluoropropylene copolymer comprising 5 to 20% by weight of hexafluoropropylene and having the specific melt viscosity at 380°C of from 100 x 10^4 to 1,000 x 10^4 poise and 90 to 30% by weight of a tetrafluoroethylene/hexafluoropropylene copolymer comprising 5 to 20% by weight of hexafluoropropylene and having a specific melt viscosity of from 0.1 x 10^4 to 60 x 10^4 poise."

V. An appeal against that decision was lodged on 18 May 1991, the appeal fee was paid on the same day, and the Grounds of Appeal were filed on 23 July 1991. In the Statement of Grounds of Appeal, and during oral proceedings held on 26 June 1993, the Appellant argued that despite the fact that document (1), like the patent in suit, was concerned with FEP copolymers (i.e. copolymers of TFE, tetrafluoroethylene, and HFP, hexafluoropropylene), which in common with the copolymers of the patent in suit are composed of at least two FEP copolymers, one having a higher and the other having a lower specific melt viscosity, nonetheless document (1) did not in any way suggest the use of a high specific melt viscosity component having a

specific melt viscosity as high as that required by Claim 1 of the patent in suit.

In fact at column 3, lines 53 to 67 document (1) warned of the sensitivity of the specific melt viscosity *inter alia* to the initiator concentration, which made it difficult to predict what properties would be obtained. Example VI of document (1) (column 6, line 74 to column 7, line 45) concerned a copolymer mixture having a specific melt viscosity of 11.5 x 10^4 poise, which viscosity was comparable to that of Example 2, and Comparative Example 2, of the patent in suit. Nonetheless, the composition in accordance with the said Example 2 had nearly double the rate of coating of Comparative Example 2, confirming that it was necessary to comply with all the conditions specified in Claim 1 in order to achieve the desired improvement in rate of coating and ease of extrusion.

Document (2) pointed away from the alleged invention, insofar as it contained a warning at page 8, first paragraph that gel problems might be expected from a mixture of FEP copolymers if the specific melt viscosity of the more viscous copolymer were more than five times the specific melt viscosity of the desired copolymer mixture.

Although the specific melt viscosity of copolymers in accordance with document (2) could be in the range of 5 to 25 x 10^4 poise, suggesting that the higher specific melt viscosity component could in theory have a maximum specific melt viscosity of 125 x 10^4 poise, in fact the highest exemplified in a copolymer mixture was 39.7 x 10^4 poise. In contrast, the alleged invention required the presence of copolymer (a) with a specific melt viscosity of 100 to 1,000 x 10^4 poise, which did not overlap any specific disclosure in documents (1) or

(2). As specific melt viscosity is temperature dependent, and decreases with increased temperature, the viscosities in document (2) measured at 372°C would be still lower if measured at 380°C.

Furthermore there was no disclosure in document (1) or (2) of the other two essential features of Claim 1 in suit, the melt flow ratio (defined in the patent in suit at page 4, lines 20 to 28) of 3.5 or above, and the zero strength time, ZST (defined on page 4, lines 30 to 36).

VI. The Respondent argued in its counterstatement, filed on 29 January 1992, and at the oral proceedings, that document (1) showed that it was known to improve the extrusion qualities of FEP copolymers by combining two or more copolymers having different molecular weights. The alleged invention differed from what was disclosed in document (1) only in that component A according to Claim 1 in suit was required to have an even higher specific melt viscosity. However, an FEP copolymer with such higher specific melt viscosity was disclosed in document (3). Documents (4), (5), (7), and (8) all confirmed that an improvement of speeds of extrusion was to be expected from the utilisation of a combination of polymer components having a higher and a lower specific melt viscosity. That was common knowledge in the art.

Given that general knowledge, it was no more than a matter of trial and error to select copolymers having the most suitable viscosities for use in a given situation. If a skilled worker found that with a given spread of viscosities the maximum rate of extrusion attainable was below a desired level, it would be natural to increase the differential, and in particular to employ a viscous component having a higher specific melt viscosity.

The further features added by way of amendment specifying minimum values for melt flow ratio and ZST were inherent in polymers which satisfied the parameters (a) and (b) of Claim 1.

VII. The Appellant (patentee) requested that the decision under appeal be set aside, and that the patent be maintained on the basis of Claims 1 to 4 and the description, both filed on 1 February 1991. The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of Amendments*

2.1 As was correctly observed by the Opposition Division, the proposed amendment to Claim 1 essentially involves combining Claims 1 and 2 of the application as filed, and including information from original page 3, lines 13 to 17 (cf. granted patent page 2, lines 39 to 44). The amendment is therefore admissible for the purposes of Article 123(2) EPC. As the scope of Claim 1 as granted has been limited by such information, the scope of the claim has been restricted in comparison with Claim 1 of the patent as granted. Thus the requirements of Article 123(3) EPC are also met.

2.2 The amendments to Claim 3 are shown underscored in paragraph III. above. They are admissible for the purposes of Articles 123(2) and 123(3) EPC, as they do no more than clarify the claim, while not in any way extending its scope.

3. *Novelty*

Novelty was not in issue. Having reviewed all the cited documents, the Board is satisfied that none of them discloses an FEP copolymer having all the features defined in Claim 1. Therefore the subject matter of Claim 1 is considered to be novel within the meaning of Article 54 EPC.

4. *Closest Prior Art*

The Board regards document (1) as being the closest prior art. Like the patent in suit, it is concerned with FEP copolymers, and with improving the rates of extrusion of these copolymers by mixing products having different viscosities (column 1, lines 23 to 29; column 3, line 68 to column 4, line 7). In Example VI product A, having a specific melt viscosity of 4.2×10^4 poise, is combined with product B, with a specific melt viscosity of 16.6×10^4 poise, and a blend in the proportions of 1/3 had a specific melt viscosity of 11.5×10^4 poise, and could be extruded as a thin film at a high rate.

5. *Problem*

The alleged invention aims at an improvement in rates of coating or extrusion without loss of surface quality (page 1, lines 6 to 26). The attainment of such an improvement is regarded by the Board as being the relevant problem.

6. *Solution*

The solution proposed by the patent in suit is the use of an FEP copolymer mixture satisfying all the requirements of Claim 1 as amended. Some comparison

between what is achieved by the alleged invention, and what is possible in accordance with document (1), can be made by taking into account the fact that the copolymer mixture of Example VI of document (1) has a specific melt viscosity of 11.5 x 10^4 poise, which is of a similar order to the viscosities of Example 2, and Comparative Example 2, of the patent in suit (14 x 10^4 poise). Example 2 shows an improved rate of coating over Comparative Example 2 (16:9). Thus it could be credible that the teaching of the alleged invention makes it possible to achieve an improvement in the rate of coating in comparison with the rate achievable in accordance with document (1). Any remaining doubts were overcome by the Respondent's acceptance during the oral proceedings that such an improvement, although expectable from the Respondent's point of view, is not disputed.

7. *Inventiveness*

7.1 The issue of inventiveness turns on whether a skilled worker, starting from the disclosure of document (1), and seeking to achieve a faster rate of extrusion of FEP copolymers, such as when coating a wire, without at the same time encountering any deterioration in surface quality, would have foreseen that such an improvement could be attained by increasing the difference in the specific melt viscosity between the low specific melt viscosity and high specific melt viscosity fractions in the manner specified in Claim 1, and in particular, by using a higher specific melt viscosity component with a minimum specific melt viscosity of 100 x 10^4 poise.

7.2 The Board is unable to accept the Respondent's argument that, as it was known in general that a significant difference between the specific melt viscosities of high, and low, viscosity fractions of polymers has the

desired effect of enabling higher extrusion speeds to be attained without loss of surface quality, as is confirmed in each of documents (4), (5), (7), and (8), it would have been self-evident to the skilled worker that a greater degree of difference in specific melt viscosity would have been expected to lead to still further improvements, because it was no more than a move in the same direction as that which was taught by the prior art. Although the four documents mentioned above do indeed teach the use of fractions having different specific melt viscosities as the solution to problems of speeding up extrusion without loss of surface quality, not one of them suggests that never-ending improvements might be attainable by the employment of ever greater differences in specific melt viscosities of the two fractions. In particular, none of them suggests that there is any potential benefit to be derived from turning from the use of the kind of a more viscous component, having a specific melt viscosity at levels commonly encountered, of up to say 50 x 10^4 poise, to one with a specific melt viscosity actually as high as 100 x 10^4 poise as the minimum level.

7.3 In document (2), which also discloses FEP copolymers, albeit being concerned with the problem of avoiding foaming rather than improving extrusion, the highest level of specific melt viscosity disclosed in a copolymer mixture comprising components with high and low specific melt viscosity is 39.7 x 10^4 poise, whilst the highest in document (1) is 20 x 10^4 poise in Example IV.

7.4 Although document (3) discloses an FEP having a specific melt viscosity as high as 840 x 10^4 poise, it does not provide any pointer towards the idea that the FEP copolymer there disclosed could be used as a component

in a multi-component copolymer of the kind here under consideration.

7.5 In addition, none of the cited documents contains any suggestion of a need to meet the further criteria with respect to the claimed lower limits for melt flow ratio and ZST, which are essential features of Claim 1 as amended. A comparison of Comparative Examples 1 and 2 with Examples 1 and 2 of the patent in suit shows that even if all the other parameters of Claim 1 are met, apart from melt flow ratio, the rate of coating is significantly lower. Similarly, a comparison of Comparative Example 3 with Example 3 shows that if the ZST requirement is not met, again there is a lower coating rate. These Examples confirm that the further limitations brought into Claim 1 by amendment are material to the behaviour and properties of mixed FEP copolymers.

7.6 Consequently, the objection of lack of any inventive step in the product defined in Claim 1 has not been established to the Board's satisfaction.

8. *Conclusion*

The subject-matter of Claim 1 of the patent in issue thus involves an inventive step as required by Article 56 EPC. The dependent Claim 2 falls wholly within the scope of Claim 1, and on that ground alone is entitled to be upheld, while the process Claims 3 and 4, being limited to processes for the production of the copolymers of Claim 1 are also entitled to be upheld.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 4 and the description filed on 1 February 1991.

The Registrar: The Chairman:

E. Görgmaier F. Antony