

Veröffentlichung im Amtsblatt	Ja/Nein
Publication in the Official Journal	Yes/No
Publication au Journal Officiel	Oui/Non



Aktenzeichen / Case Number / N° du recours : T 93/83

Anmeldenummer / Filing No / N° de la demande : 79 102 780.8

Veröffentlichungs-Nr. / Publication No / N° de la publication : 76 47

Bezeichnung der Erfindung:

Title of invention:

Titre de l'invention :

Ethylene polymers and process for preparing same

Klassifikation / Classification / Classement : CO8F210/16

ENTSCHEIDUNG / DECISION

vom / of / du 25 November 1986

Anmelder / Applicant / Demandeur : Montedison S.p.A.

Patentinhaber / Proprietor of the patent /

Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 54, 84

Kennwort / Keyword / Mot clé : "Novelty - Clarity of Claim"

Leitsatz / Headnote / Sommaire



Case Number : T 93 /83

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 25 November 1986

Appellant : Montedison S.p.A.
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Decision under appeal : Decision of Examining Division 011 of the European Patent Office dated 20 October 1982, posted on 11 January 1983 refusing European patent application No. 79 102 780.8 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : K. Jahn
Member : J. Arbouw
Member : G. D. Paterson

Summary of Facts and Submissions

- I. European patent application No. 79 102 780.8 filed on 2 August 1979 and published on 6 February 1980 with publication number 7647 claiming the priority of a prior application filed on 2 August 1978 (IT 2 639 878) was refused by the decision of the Examining Division of the European Patent Office dated 20 October 1982 posted on 11 January 1983. The decision was based on 4 claims of which Claim 1 was worded as follows:

"Crystalline copolymers of ethylene with 1-butene having a density comprised between 0.945 and 0.910 g/cc, an alpha-olefin content ranging from 0.5 to 3% by moles, a ratio R between the molar percentage of polymerized alpha-olefin and the polymer density comprised between 0.5 and 3.5, a melting point comprised between 110 and 130°C, characterised in that the ratio R is 0.5 for a density of 0.945 and 3.5 for a density of 0.910 and increases for density values decreasing from 0.945 to 0.910, the melting point of the copolymers is 110°C for a density of 0.910 and 130°C for a density of 0.945 and increases as the density increases from 0.910 to 0.945, and in that for a density of 0.931 R is 0.75 and the melting point is 127°C; for a density of 0.9268 R is 1.46 and the melting point is 125°C; and for a density of 0.921 R is 2.45 and the melting point is 121.5°C."

- II. The reasons of the above decision were essentially as follows:

The subject-matter of the claim is related to ethylene alpha-olefin copolymers defined by ranges for density, melting point and a ratio R of the molar percentage of polymerised alpha-olefin and the density. The claim is further defined by three discrete values for density

within the specified range with corresponding discrete values for R and the melting point, said discrete values indicating a relationship between the parameters. The Examining Division took the view that the mere indication of three discrete values inside a range does not give the skilled man a direction as to the relationship between the parameters, and that therefore Claim 1 is unclear and unallowable pursuant to Article 84 EPC.

III. The Appellant filed an appeal on 10 March 1983, and enclosed payment of the fee for appeal. The Statement of Grounds was filed on 18 May 1983 together with an amended Claim 1. In view of objections raised by the Board, in a communication dated 20 April 1986, against the amended version of Claim 1 filed with the Statement, the Appellant filed observations and a further amended Claim 1 on 5 September 1986.

IV. During oral proceedings on 25 November 1986 the Board expressed its opinion that the subject-matter of Claim 1 filed on 5 September 1986 is not novel in view of GB-A-1 355 245 - document (1).

The Appellant filed a still further Claim 1 and argued that comparison of Examples 2 and 3 of the application with the examples 13 and 10 (or 8) of (1) show that the products according to the application are different from those according to (1).

Claim 1 filed during the oral proceedings reads as follows:

"Crystalline copolymers of ethylene with at least an alpha-olefin $\text{CH}_2=\text{CHR}$, in which R is an alkyl radical with 2 to 8 C, having an alpha-olefin content ranging from 0.5 to 3% by moles, in which the ratio between the molar

percentage of polymerized alpha-olefin and the polymer density is comprised between 0.5 and 3.5 for density values decreasing from 0.945 to 0.910 g/cm³, and in which the melting point of the copolymers is comprised between 110° and 130°C and increases as the density increases, obtainable by copolymerization of mixtures of ethylene and the alpha-olefin in the gas phase in the presence of a catalyst obtained by reacting:

A) an Al-alkyl compound

with

B) the solid product of the reaction among:

- a) a Ti-alcoholate comprising at least a Ti-OR bond, in which R is an alkyl, aryl or cyclo-alkyl radical having 1 to 18 C;
- b) a compound X_nMg(OR)_{2-n}, in which X is a halogen, R has the meaning specified hereinabove, and 0 ≤ n ≤ 2;
- c) an Al-halide of formula X_pAlR_{3-p}, in which X and R have the meaning already indicated and 1 ≤ p ≤ 3."

V. The Appellant requests that the decision to refuse the application be set aside and the application be remitted to the Examining Division, for further prosecution on the basis of Claim 1 filed during oral proceedings.

Reasons for the Decision

- 1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is therefore admissible.
- 2. There can be no formal objection to the present version of Claim 1. Claim 1 comprises a combination of the features mentioned in the original Claim 1 with measures which in combination therewith are disclosed in original Claim 4, the dimension for the density range 0.945 to 0.910 being

supplemented from the now deleted line 3 of the original Claim 1.

Hence the subject-matter of Claim 1 does not extend beyond the content of the application as originally filed (Article 123(2) EPC).

3. Claim 1 also complies with Article 84 EPC. It clearly defines the matter for which protection is sought in that it indicates parameters (melting point, density and ratio R between the molar percentage of polymerized alpha-olefin and the polymer density) which the crystalline copolymer shall possess, and further in that it states a method for preparing said copolymers. It is not clear for the Board, how - without a limitation of the teaching of the Application - a different and more precisely drafted claim should be formulated.

Therefore the sole ground for refusal which was relied upon in the decision of the Examining Division has been removed.

4. The Board also raised the question of the novelty of the subject-matter of Claim 1.
 - 4.1 Document (1) (see e.g. Claim 1, page 1, lines 65-67 and page 2, lines 12 to 16) discloses crystalline copolymers of ethylene with at least an alpha-olefin having 3 to 8 carbon atoms and an alpha-olefin content of from 0.5 to 20%. The copolymers are obtained by copolymerization of mixtures of ethylene and the alpha-olefin in a hydrocarbon solvent in the presence of a catalyst comprising an organoaluminium compound and a titanium compound supported on a magnesium-containing compound which is insoluble in the hydrocarbon solvent. The values for the melting point, the alpha-olefin content, the density and R for some of

the Examples of (1) fall well within the ranges claimed in the application (see (1), Example 8 to 14). At first sight it therefore appears that the products according to Claim 1 are not novel.

4.2 However, the process according to the application is a gas phase polymerization whereas the polymerization according to (1) is performed in a hydrocarbon solvent (see page 2, lines 106-111).

4.3 It further appears that the catalyst used in (1) is different. Document (1) (see e.g. page 2, lines 17-105, particularly lines 85-88, Example 8 and Claim 1 and 8) uses as catalyst the combination of:

A) an Al-alkyl compound (e.g. triethyl aluminum) with

B) the solid product of the reaction among:

a) a halogen or oxyhalogen compound of Titanium (e.g. $TiCl_4$)

b) a magnesium-containing compound (e.g. MgO).

The catalyst according to the application differs therefrom that component B further comprises:

c) an Al-halide of formula X_pAlR_{3-p} , in which X is a halogen, R is an alkyl, aryl or cyclo-alkyl radical having 1 to 18 C and $1 \leq p \leq 3$.

4.4 A closer comparison of Examples 8 and 10 of (1) with Example 3 of the application further shows that for copolymers of ethylene and butene-1 having about the same density (0.920 g/cm^3 for Examples 8 and 10 and 0.921 g/cm^3

for Example 3), the melting point of the compounds according to the state of the art is lower (116 and 117°C compared to 121.5°C) and that also the values for R are different (3.48 according to (1) and 2.45 according to the application).

A further comparison of Example 2 of the application with Example 13 of (1) gives an indication that for copolymers of ethylene and butene-1 having the same melting point (125°C) and about the same values for R (1.46 and 1.48 respectively), those prepared according to the application have a lower density (0.9268 g/cm³ and 0.945 g/cm³ respectively).

It therefore cannot be excluded the copolymers prepared according to Claim 1 - at least for those in which butene-1 is used as the alpha-olefin - are novel.

4.5 The test report, filed on 4 February 1982, comparing some mechanical properties of a copolymer according to (1) (Example 8) and a copolymer according to the application (Example 3), cannot be accepted as proof for the novelty of the copolymers according to the application since a real comparison of the data without giving the accuracy (standard deviation) is impossible. It further turns out that the mechanical properties of the copolymer of Example 8 of (1) (see page 11, table 4) are different from those indicated in the test report for the same compound.

4.6 For a final assessment of the novelty - and the inventiveness - of the copolymers according to the application, further comparative tests are required, particularly for those copolymers with other alpha-olefins than butene-1, to prove that the copolymerization under the conditions (catalyst) of Claim 1 yields a novel (and inventive) product.

5. Since the Examining Division stated in its Decision that novelty and inventive step were not the subject of its decision, the Board finds it inappropriate to decide these issues, because this would cause loss of an instance and therefore makes use of its power under Article 111(1) EPC to remit the case to the Examining Division for further prosecution.

Order

For these reasons,

it has been decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division for further prosecution on the basis of Claim 1 as filed during oral proceedings on 25 November 1986.

The Registrar

The Chairman

