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D E C I S I O N
of 14 August 1995

Case Number: T 0213/92 - 3.3.3

Application Number: 85101380.5

Publication Number: 0154197

IPC: D01F 6/30

Language of the proceedings: EN

Title of invention:
Fine denier fibers of olefin polymers

Patentee:
THE DOW CHEMICAL COMPANY

Opponent:
NESTE OY

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84, 123(3)

Keyword:
"Clarity (no) - ambiguous wording in an independent claim becoming clear by reference to a dependent claim - extension of protection"
"Novelty (yes) - no explicit disclosure in individualised form - preference not amounting to implicit disclosure - selection"
"Inventive step (yes) - no incentive"

Decisions cited:
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Catchword:
-

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Case Number: T 0213/92 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 14 August 1995

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 15 January 1992 revoking European patent No. 0 154 197 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: C. Gérardin
Members: B. ter Laan
J. A. Stephens-Ofner

Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 154 197 in respect of European patent application No. 85 101 380.5, filed on 8 February 1985, claiming priority from two earlier applications in the United States (581 480 of 17 February 1984 and 672 009 of 16 November 1984), was announced on 30 November 1988, on the basis of ten claims, Claim 1 reading:

"A fiber or multi-filament being less than about 1.7 tex (=about 15 denier) and comprised of linear low density copolymers of ethylene with at least one alpha-olefin of C_3 to C_{12}."

II. On 28 August 1989 a Notice of Opposition against the granted patent was filed, in which the revocation of the patent in its entirety was requested on the grounds set out in Article 100(a) EPC.

A second opposition was lodged on 30 August 1989. This opposition was later withdrawn by letter of 16 December 1991.

III. By a decision announced orally on 26 November 1991, issued in writing on 15 January 1992, the Opposition Division revoked the patent on the grounds that the subject-matter of all independent product claims was not novel and the subject-matter of all independent process claims was not inventive. These objections were based essentially on the following documents:

D7: GB-A-2 121 423, and

D8: B. Dolezel: Die Beständigkeit von Kunststoffen und Gummi, published by C.-M. von Meysenburg, Carl Hanser Verlag, Munich, Vienna, 1978, pages 313 to 315.

The decision was based upon four amended sets of claims.

(i) **Main request:**

The main request contained three independent claims, of which Claims 1 and 4 read as follows:

Claim 1:

"Use of an olefinic fiber or multi-filament being less than about 1.7 tex (about 15 d.p.f.) and comprised of a linear low density copolymer of ethylene with one or more C_3 to C_{12} alpha-olefins, as a constituent of a fabric, non-woven web, or filament bundle, in applications subject to ionizing radiations."

Claim 4:

"Fiber, or multi-filament being less than about 1.7 tex (about 15 d.p.f.) and comprised of a linear low density (=LLD) copolymer of ethylene with one or more C_3 to C_{12} alpha-olefins, one of the said alpha-olefins being 1-octene."

Claim 9 was a dependent product claim and read:

"Fiber or multi-filament corresponding to any of Claims 4 to 8 which is a homofilament or a multi-homofilament."

Independent Claim 12 referred to a process for the preparation of the fibre or multi-filament specified in dependent Claim 8.

(ii) **Subsidiary request "1":**

Claim 1 of subsidiary request "1", the only independent claim, corresponded to Claim 4 of the main request. Dependent Claim 6 corresponded in substance to Claim 9 of the main request.

(iii) **Subsidiary request "2":**

Claim 1 of subsidiary request "2", the only independent claim, corresponded to Claim 1 of the main request, whilst dependent Claim 6 read as follows:

"Use of an olefinic fiber or multi-filament according to any of Claims 1 to 5 which is a homofilament or a multi-homofilament."

(iv) **Subsidiary request "3":**

Claim 1 of subsidiary request "3", the only independent claim, read as follows:

"A homofilament consisting of a fiber, a filament or multi-filament being less than about 1.7 tex (about 15 d.p.f.) and comprised of a linear low density (=LLD) copolymer of ethylene with an alpha-olefin characterized in that the alpha-olefin is one or more alpha-olefins comprising 1-octene."

Claims 2 to 7 of subsidiary request "3" were dependent and referred to preferred embodiments of Claim 1.

IV. The Opposition Division held, in essence, that:

(i) The requirements of Articles 123 and 84 EPC were met for the four sets of claims.

(ii) As regards novelty, D7 disclosed fibres comprised of LLDPE (linear low density polyethylene) copolymers. In particular, fibres of 1.5 to 6 deniers comprising a polyethylene resin composition (C) consisting of 50 to 100% by weight of a polyethylene (A) having a density of 0.910 to 0.940 g/cm^3 and which could be obtained by subjecting ethylene together with an α-olefin of 4 to 8 carbon atoms to polymerization and could be chosen from among those which are commercially available under the name of L-LDPE (page 1, lines 52 to 55), were described. In the context of the technical term "LLDPE" the skilled person would read 1-octene in the α-olefin of 8 carbon atoms. Hence all the features of the independent product claims (main request: Claim 4, subsidiary request "1": Claim 1 and subsidiary request "3": Claim 1) were disclosed by D7.

(iii) Regarding inventive step, the definition of the technical problem to be solved by the independent use claims (main request: Claim 1 and subsidiary request "2": Claim 1) as stated by the Proprietor, that is the use of fibres having an improved resistance to ionising radiation, was not accepted to be correct, as many other improved properties were also mentioned in the patent in suit. However, even if one accepted that definition as

being correct, the solution was obvious in view of the disclosure of D8 (page 315), which taught that the resistance against ionising radiation of polypropylene was inferior to that of polyethylene. The test results filed by the Proprietor on 7 November 1991 did not adequately follow the description of the patent in suit, so that they could not be accepted as relevant to supporting the presence of an inventive step.

V. The Appellant (Proprietor) lodged an appeal against the above decision on 13 March 1992 and paid the prescribed fee at the same time. The Statement of Grounds of Appeal filed on 15 May 1992 referred to the four sets of claims upon which the decision of the Opposition Division was based.

The Appellant argued essentially as follows:

(i) Concerning the product claims, the compounds defined in D7, page 1, lines 52 to 55: "an α-olefin of 4 to 8 carbon atoms", did not specifically refer to 1-octene as a comonomer in the production of LLDPE. Many other compounds having 8 carbon atoms were suitable as comonomers in LLDPE, as shown especially in US-A-4 076 698 (D9).

Therefore, the use of C_8 α-olefins with 8 carbon atoms other than 1-octene as a comonomer in LLDPE was at least as likely as that of 1-octene, which meant that D7 did not disclose any α-olefin in individualised form. In fact, by lack of further specification, it was not clear what kind of polyethylene was actually used in D7. Hence, the subject-matter of the product claims was novel.

(ii) In view of the lack of specific disclosure of the LLDPE used in D7, this document did not mention any preference for any α-olefin. Hence there was no incentive for a skilled person to prepare a fibre from an LLDPE having 1-octene as a comonomer, so that the subject-matter of the product claims was also inventive.

(iii) Concerning the use claims, D7 was silent as regards the use of a fiber or multi-filament comprised of a linear low density copolymer with one or more α-olefins with 3 to 12 carbon atoms as a constituent of a fabric, non-woven web or a filament bundle in applications subject to ionizing radiation.

D8 disclosed improved properties of polyethylene compared to polypropylene in general. However, polyethylene was not equivalent to LLDPE, nor did the Opponent provide any evidence that polyethylene and LLDPE were interchangeable. Moreover, since the fine fibres as claimed had a very high surface area to volume ratio, a general teaching of improved ionic radiation stability of polyethylene as compared to polypropylene, referring to the polymer as such, could not serve to predict the behaviour of very fine fibres under ionic radiation conditions. In Example 4 of the patent in suit it had been shown that LLDPE had an improved ionic radiation stability compared to HDPE, which showed that even within the family of polyethylenes there were differences. From the teaching of D8, generally comparing ethylene polymer with propylene polymer and not making any reference to fibres, it could not be learned that the specific fibres as presently claimed would have an improved resistance to ionic radiation.

Furthermore, the tests filed on 7 November 1991 showed better ionic radiation stability for fibres made of 1-octene LLDPE as compared to those made of 1-butene LLDPE. This effect could not have been expected in view of the teaching of D8. Therefore, the combination of D7 and D8 could not destroy the inventiveness of the use claims.

VI. The Respondent (Opponent) argued essentially as follows:

(i) The disclosure of D7, page 1, lines 52 to 55, should be interpreted in the light of the technical meaning of "LLDPE". The man skilled in the art would thus read in the expression "α-olefins of 4 to 8 carbon atoms" 1-butene, 1-hexene, 4-methyl-1-pentene and 1-octene, so that the other possibilities mentioned by the Appellant were not as obvious and plausible as it had alleged. In support of this statement, the Respondent relied on 1 document already on file and on 17 further documents not previously mentioned during the proceedings. It was concluded that fibres of 1-octene LLDPE were directly and unambiguously derivable from D7 so that the product claims were not novel.

(ii) Although, in view of the lack of novelty no arguments against an inventive step needed to be provided, in case the Board would decide otherwise on this point, it was pointed out that in the light of the 18 documents referred to in the arguments against novelty, and one other document presented during the opposition proceedings, it was obvious to interpret the α-olefin of 8 carbon atoms as disclosed by D7, page 1, line 53, as referring to 1-octene only, also since the patent

in suit regarded 1-octene LLDPE as a particularly preferred embodiment. Hence the product claims were not inventive.

(iii) The use claims lacked an inventive step since, in view of the teaching of D8, in particular page 315 and Tables 2.5 and 2.6, it was not surprising that LLDPE, being a type of polyethylene, was more stable against ionising radiation than polypropylene. Therefore, it was obvious to use LLDPE instead of polypropylene in ionic radiation applications.

VII. The Appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request, or, alternatively, on the basis of one of the subsidiary requests "1" to "3".

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Amendments

2. As it appears from point I above, the subject-mater of the patent as granted was a fibre or multi-filament defined by its denier as well as by its chemical composition; regarding the latter feature Claim 1 required the fibre or multi-filament to be "comprised of a linear low density copolymer of ethylene with one ore more C_3 to C_{12} alpha-olefins." All the dependent product claims were directed to fibres or filaments characterised by features which were more narrowly

defined, either in quantitative or in qualitative terms. From the description of the patent specification as well as from the application as originally filed it was clear that the expression "comprised of" had to be interpreted as "consisting of"; the wording of the claims translated into German and French, where the expressions "bestehend aus" and "constitué de" respectively are used, lends credence to this interpretation.

2.1 The situation in the amended set of claims according to the main request is different. Comparison of the wording of the main product Claim 4 and of dependent Claim 9, the scope of which should be more restricted than that of Claim 4, shows that this can only be the case if the fibre or multi-filament as defined in Claim 4 must not be a homofilament, in other words, if the fibre or multi-filament may "comprise" at least one other polymer. The expression "comprised of" can thus no longer be regarded as the equivalent to "consisting of", but must be equated with "containing", which implicitly results in a broader definition of the claimed subject-matter.

The protection conferred by the claims according to the main request has thus been extended by the amendments made during the opposition proceedings, which contravenes Article 123(3) EPC. For this reason the main request has to be rejected.

2.2 The same objection is valid for subsidiary request "1" as regards Claim 1 and dependent product Claim 6 as well as for subsidiary request "2" as regards Claim 1 and dependent use Claim 6. In both cases the scope of the dependent claim can only be narrower than that of the independent claim to which it relates if the independent claim allows for the additional presence of polymers

other than LLDPE, i.e. if the expression "comprised of" has a broader meaning than it had in the granted version of the claims.

It follows that, for the same reasons as in the case of the main request, subsidiary requests "1" and "2" have to be rejected.

2.3 The above objection does not occur in the case of the claims of subsidiary request "3" since Claim 1, although still containing the expression "comprised of", is directed to a **homo**filament (emphasis added by the Board), which by definition excludes the presence of other polymers than LLDPE.

Apart from this, the wording of the claims is adequately supported by the application as originally filed (Article 123(2) EPC). In particular, the description constantly and consistently refers to LLDPE fibres and filaments (e.g. on page 2, line 42; page 3 lines 7, 27, 29, 31 to 32 and 35). Although the possibility of composite spinning is mentioned in a general way on page 3, line 54, in all the examples according to the invention fibres consisting solely of LLDPE are prepared. There is no indication that any other fibre could be meant than one **consisting of** LLDPE, or, in other words, than a homofilament of LLDPE.

As far as the claims according to subsidiary request "3" are concerned, all the requirements of Article 123 EPC are thus met.

3. Even if, contrary to the above interpretation, the wording "comprised of" could be broadly interpreted as "comprising" both in the granted version of the claims as well as in the four sets of claims under examination,

so that the objection under Article 123(3) EPC would be overcome, this would result in an objection under Article 84 EPC.

3.1 As stated in point 2 above, the description of the application as originally filed is clearly concerned with the advantages of LLDPE fibres and multi-filaments over conventional polymers such as polypropylene, low and high density polyethylene, polyesters and polyamides (cf. page 3, lines 19 to 26; page 5, line 4 to page 6, line 31; page 8, line 21 to page 9, line 5). Such a specific disclosure does not justify a scope of protection extending to any fibre or multi-filament "comprising" LLDPE, i.e. containing an LLDPE within the meaning of the patent in suit. The broad interpretation of the independent claims would thus create a discrepancy between description and claimed subject-matter, which is objectionable under Article 84 EPC either for lack of support or on the basis of unclarity.

3.2 In this latter respect, the presence of the ambiguous wording "comprised of" in the independent claims, renders the scope of the claims fundamentally unclear in that it allows both a broad and a narrow interpretation. Only upon reading dependent Claim 9 according to the main request and dependent Claim 6 according to subsidiary requests "1" and "2" is the reader made aware that a broad interpretation of independent Claims 4, 1 and 1, respectively, is necessary in order to avoid any inconsistency between the independent and dependent claims. In the Board's view, it is not acceptable that the scope of an independent claim be determined by reference to the features of a dependent claim which is related to it.

3.3 For all these reasons, the sets of claims according to the first three requests offend Article 84 EPC and have thus to be rejected.

Novelty

4. For novelty the only relevant document is D7, which discloses hot-melt adhesive fibres for non-woven fabrics comprising a polyethylene composition (C) alone, consisting of 50 to 100% by weight of a polyethylene (A) having a density of 0.910 to 0.940 g/cm^3 and a ratio Q (=Mw/Mn) of 4.0 or less and 50 to 0% by weight of a polyethylene (B) having a density of 0.910 to 0.940 g/cm^3 and a ratio Mw/Mn of 7.0 or more based on the composition, or composite fibres which contain the composition (C) as one of the composite components of the composite fibres and in which composition (C) forms continuously at least part of the fiber surface of said composite fibre (Claim 1). The fibres have a thickness of 1.5 to 6 d/f (page 1, line 28). Polyethylene (A) can be obtained by copolymerizing ethylene with an α-olefin of 4 to 8 carbon atoms, and can be chosen from those polymers commercially available under the name of L-LDPE (page 1, lines 52 to 55).

4.1 Example 1 describes the preparation of hot-melt adhesive fibres from a polyethylene resin composition (C) which consists solely of a polyethylene (A). The latter is identified by several properties, namely density, MI and Q (Table 1-1), but nothing is said about its chemical composition. In these circumstances the issue of novelty boils down to the question whether the general indications (i) that the comonomer used to produce polyethylene (A) is an α-olefin with 4 to 8 carbon atoms, and (ii) that polyethylene (A) is chosen from among the polymers commercially available under the name

of LLDPE (page 1, lines 52 to 55), can be equated with an implicit disclosure of the use of 1-octene as a comonomer in the LLDPE used in Example 1 of D7.

4.2 The numerous documents referred to by the Respondent in the Counterstatement of Appeal (page 3, last paragraph to page 5, paragraph 2) show that, shortly before the publication of D7, 1-octene was the most preferred α-olefin used as a comonomer of 8 C-atoms in the production of LLDPE. However, as pointed out by the Appellant, it is not enough to consider only the aspect of chemical composition, since the characteristics of polyethylene depend not only on that feature, but also on the method of preparation. In particular, it would appear that the acronym LLDPE refers in general to an ethylene-α-olefin copolymer prepared by a low pressure process in the presence of a Ziegler catalyst and ranging in density from 910 to 940 kg/m^3 (Statement of Grounds of Appeal, page 3, paragraphs 1 to 4).

4.3 In D9 copolymers of ethylene and various α-olefins of 5 to 18 carbon atoms are described, which, in view of their method of preparation, must be regarded as LLDPE. However, D9 not only makes no reference at all to 1-octene, but it mentions two other monomers having 8 carbon atoms which are suitable for being copolymerized with ethylene, i.e. 4-vinyl-1-cyclohexene and styrene (columns 7 and 8, Table IV, Examples 18 and 19). Even if one takes the view, like the Respondent, that these tests have been carried out to illustrate that the teaching of this citation extends to a wide variety of compounds which an organic chemist would hardly consider as α-olefins, these two examples show that the term "α-olefin with 8 carbon atoms" cannot be reduced to 1-octene alone; on the contrary, it encompasses other compounds which, moreover, are suitable comonomers in the preparation of LLDPE.

4.4 Although the prior art tends to indicate 1-octene as being the most widely used α-olefin with 8 carbon atoms, there is no doubt that other compounds satisfying that definition would also be suitable. This means that the above general indications (i) and (ii) in D7 do not result in an implicit lack of novelty of the claimed subject-matter and that, consequently, the latter is to be regarded as a selection.

Inventive step

5. The patent in suit concerns fine denier fibres of polyolefins. As stated above, such subject-matter is disclosed in D7, in particular in Example 1, which the Board, like the Opposition Division, regards as the closest state of the art. According to that embodiment a fine fibre of an unspecified LLDPE is provided.

Although the fibres obtained in D7 are said to have good softness, spinnability and stretchability, and, when used in non-woven fabric, produce good strength and softness,the level achieved could not be regarded as entirely satisfactory. Moreover, the stability to ionising radiation was capable of improvement.

In view of these shortcomings the technical problem underlying the patent in suit may thus be seen in providing a fibre having not only good softness and good mechanical and spinning properties, but also an improved stability to ionising radiation.

According to the patent in suit this problem is to be solved by a homofilament consisting of LLDPE having 1-octene as a comonomer.

Example 4 of the patent in suit, in the light of the additional information contained in the Appellant's letter filed on 7 November 1991, and also the additional experiments described in the same letter demonstrate that the various aspects of the above-defined problem are effectively solved.

6. It remains to be decided whether the claimed subject-matter is an obvious selection having regard to the documents on file.

6.1 As explained above (point 4), D7 does not consider the influence of the comonomer on the properties of the fibre. In fact, polyethylene (A) is characterised only by its physical parameters, whether it is used alone (as in Example 1) or in combination with a polyethylene (B) (Examples 2 to 4), which would suggest that the chemical composition of polyethylene (A) is not of primary importance to the properties of the fibres as long as the comonomer satisfies the general condition that it should be an α-olefin of 4 to 8 carbon atoms. Moreover, D7 refers to hot-melt fibres and is silent about fibre properties under ionic radiation conditions. For these reasons, D7 does not provide a solution to the above-defined problem.

6.2 D8 describes the properties of polyethylene and polypropylene under ionic radiation conditions and it is stated that polyethylene is much more resistant to such radiation than polypropylene (page 315). Furthermore, a comparison is made of LDPE, filled LDPE and HDPE, but the document is silent about LLDPE. Therefore, though it was known that the use of polyethylene rather than polypropylene for ionic radiation applications would be preferred, D8 contains no teaching as regards the properties under such conditions of LLDPE in general, let alone of 1-octene LLDPE.

6.3 In view of the lack of teaching as regards the properties of fine 1-octene LLDPE fibres in both D7 and D8, the skilled person would have no reason to combine these two documents in order to arrive at a solution of the above defined problem. In fact, even if the teachings of D8 and D7 would be combined, such a combination would not result in the homofilament as defined in Claim 1 of subsidiary request "3".

6.4 The numerous documents relied upon by the Respondent, which demonstrate the commercial importance of 1-octene, are of no relevance to the issue of inventive step since, in the absence of any reference to radiation stability, they cannot be interpreted as pointing at the selection of that comonomer for the solution of the above problem.

6.5 In view of the above, the Board concludes that the homofilament as defined in Claim 1 of subsidiary request "3" is inventive.

7. As Claim 1 is allowable, the same goes for dependent Claims 2 to 7, which are directed to preferred embodiments of the homofilament according to Claim 1, and the patentability of which is supported by that of Claim 1.

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 with the order to maintain the patent on the basis of Claims 1 to 7 of subsidiary request "3" filed on 26 November 1991, after corresponding amendments to the description.

The Registrar: The Chairman:

E. Görgmaier C. Gérardin