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Datasheet for the decision of 30 November 2016

Case Number: T 1457/13 - 3.3.03

Application Number: 05747591.5

Publication Number: 1753791

IPC: C08F10/02

Language of the proceedings: EN

Title of invention:
POLYETHYLENE FOR INJECTION MOLDINGS

Patent Proprietor:
Basell Polyolefine GmbH

Opponents:
Chevron Phillips Chemical Company LP
Total Research & Technology Feluy

Relevant legal provisions:
EPC Art. 56
RPBA Art. 13(3)

Keyword:
Inventive step - main and first auxiliary request (no)
Late-filed second auxiliary request - admitted (no)

Decisions cited:
T 0197/86

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Case Number: T 1457/13 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 30 November 2016

Appellant: (Patent Proprietor)	Basell Polyolefine GmbH Brühler Strasse 60 50389 Wesseling (DE)
Representative:	Basell Polyolefine GmbH Intellectual Property Bldg. C657, 2nd floor Industriepark Höchst 65926 Frankfurt/Main (DE)
Respondent: (Opponent 1)	Chevron Phillips Chemical Company LP 10001 Six Pines Drive The Woodlands, Texas 77380 (US)
Representative:	Potter Clarkson LLP The Belgrave Centre Talbot Street Nottingham NG1 5GG (GB)
Respondent: (Opponent 2)	Total Research & Technology Feluy Zone Industrielle C 7181 Seneffe (BE)
Representative:	Raboin, Jean-Christophe Total Research & Technology Feluy Zone Industrielle C 7181 Seneffe (BE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 29 April 2013 revoking European patent No. 1753791 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	D. Marquis
	R. Cramer

Summary of Facts and Submissions

I. European Patent No. 1 753 791 was granted on the basis of 14 claims, claim 1 reading as follows:

"1. A polyethylene which comprises ethylene homopolymers and/or copolymers of ethylene with 1-alkenes and has a molar mass distribution width M_w/M_n of from 3 to 30, a density of from 0.945 to 0.965 g/cm^3, a weight average molar mass M_w of from 50 000 g/mol to 200 000 g/mol, a high load melt index HLMI determined at 190°C under a load of 21.6 kg according to ISO 1133 of from 10 to 300 g/10 min, at least 0.2 vinyl groups /1000 carbon atoms, and has from 0.1 to 15 branches/1000 carbon atoms, wherein the 1 to 15 % by weight of the polyethylene having the highest molar masses have a degree of branching of more than 1 branch of side chains larger than CH_3/1000 carbon atoms."

II. Two notices of opposition were filed in which revocation of the patent in its entirety was requested.

III. During opposition proceedings, the following documents inter alia were cited:
D2: WO-A-2005/103100
D7: WO-A-00/71615
D8: EP-A2-1 489 112
D15: US-A-5 480 852

IV. The decision of the opposition division to revoke the patent was announced at the oral proceedings on 10 April 2013. It was based on claims of a main request filed with letter of 12 February 2013 and an amended set of claims filed during oral proceedings as auxiliary request.

The decision of the opposition division, as far as relevant to the present decision, can be summarised as follows:

The main and auxiliary requests satisfied the requirements of Article 123(2) EPC. The main request was however not sufficiently disclosed in the patent in suit. Although the auxiliary request was sufficiently disclosed and was novel over document D2, it was not inventive over document D7 as closest prior art.

V. The proprietor (appellant) lodged an appeal against that decision. With the statement setting out the grounds of appeal the appellant requested that the decision of the opposition division be set aside and that the patent be maintained on the basis of one of the three sets of claims filed as main request, first auxiliary request and second auxiliary request.

VI. In their replies to the statement of grounds of appeal, opponents 1 and 2 (respondents) requested that the appeal be dismissed. The respondents also provided *inter alia* arguments relating to inventive step for all requests in view of D7 or alternatively D8 as the document representing the closest prior art.

VII. In a communication sent in preparation of oral proceedings, the Board summarised the points to be dealt with and provided a preliminary view on the disputed issues. It was in particular indicated that D7 or D8 could be seen as the document representing the closest prior art.

VIII. Oral proceedings were held on 30 November 2016. The appellant withdrew the claims of the main request filed

with the statement of grounds of appeal. In replacement, the first and second auxiliary requests filed with the statement of grounds of appeal were filed again and renamed as new main and new auxiliary request. A set of claims corresponding to a new second auxiliary request was additionally filed in the course of the oral proceedings before the Board.

Claim 1 of the main request corresponded to granted claim 1 with the deletion of the option that the polyethylene comprised only ethylene homopolymer, so that the polyethylene was defined as comprising copolymers of ethylene with 1-alkenes or ethylene homopolymers and copolymers of ethylene, and the amendment of the lower limit for HLMI to 70 g/10 min.

In claim 1 of the first auxiliary request, the degree of branching in the last feature was further limited to "from 2 to 20 branches".

In claim 1 of the second auxiliary request, the same feature was further limited to "from 5 to 15 branches".

IX. The arguments provided by the appellant, as far as relevant to the present decision, can be summarised as follows:

Main and first auxiliary requests

Inventive step

From the two documents D7 and D8 cited in the procedure, D7 was more relevant than D8 as the closest prior art. In any case, even if starting from D8 as closest prior art, the claimed subject matter was characterized by its amount in vinyl groups and its

degree of branching. The comparative example of the patent in suit was comparable to the spirit of D8 since it was produced with a similar process and catalyst. The nature of the monomer used in the comparative example was less relevant since D8 also required a monomer that was not 1-hexene. In any case, even if the technical problem was formulated as the provision of alternative polyethylene compositions, an inventive step should be acknowledged, as it was not obvious to replace the high molecular weight fraction of the composition of example 8 of D8 according to that disclosed in D15. It was questionable whether the skilled person would apply the teachings of D15 to D8 since the compositions of D15 were prepared with a different catalyst. Also, the high load melt index of the polyethylene that was disclosed in D15 was much lower than that of D8. Introducing a block according to the teaching of D15 in the composition of D8 would result in a shift of the high load melt index of the polyethylene outside the claimed range. Also, there was no indication that the resulting degree of branching would then be in the range of claim 1 of the main request. In addition, D8 and D15 did not suggest the profile of properties of the patent in suit. The main request was therefore inventive over the cited prior art.

The same arguments essentially applied to the first auxiliary request. The definition of the branches provided a further distinguishing feature over the cited prior art. There was no pointer towards that particular branching. The first auxiliary request therefore involved an inventive step.

Second auxiliary request - Admittance

The arguments in favour of inventive step were even stronger for the second auxiliary request, which therefore should be admitted into the proceedings in spite of having been filed only at the oral proceedings before the Board.

X. The arguments of the respondents, as far as relevant to the present decision, can be summarised as follows:

Main and first auxiliary requests

Inventive step

D8 was the closest prior art. Claim 1 of the main request differed from example 8 of D8 in that the amount in vinyl groups and the degree of branching of the polyethylene were limited to specific ranges not disclosed therein. The patent in suit did not provide evidence that these features solved a particular technical problem over D8. Also, the feature relating to the degree of branching lacked clarity as it was not defined in the patent in suit. The problem was therefore the provision of further polyethylene compositions. The ranges claimed for the characterizing features of claim 1 were arbitrary and could not provide an inventive step. In addition, D15 taught that it was advantageous to increase the short chain branching of the high molecular weight fraction of the polyethylene produced. As a result, claim 1 did not involve an inventive step.

In claim 1 of the first auxiliary request, the range defining the number of branches on the polyethylene was further limited. The limitations of this range did not

solve any additional technical problem. The first auxiliary request therefore lacked an inventive step for the same reasons.

Second auxiliary request - Admittance

The second auxiliary should not be admitted into the proceedings as it was filed late and it still lacked an inventive step for the same reasons as argued for the main and first auxiliary requests.

XI. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or on the basis of the first or second auxiliary request, all filed during the oral proceedings.

XII. The respondents requested that the appeal be dismissed.

Reasons for the Decision

Main request

1. Inventive step

1.1 Closest prior art

1.1.1 The patent in suit deals with polyethylene for injection mouldings, in particular for making screw caps (paragraph 3; claims 9-14). The compositions should have good mechanical properties (stress crack resistance, impact resistance), good processability

(flowability) and good optical properties (low haze) (paragraphs 6, 220, Table 2).

1.1.2 In its contested decision, the opposition division found that D7 was the document representing the closest prior art rather than D8. The opposition division found that D7 was more relevant than D8 because it related more to mechanical properties close to those disclosed in the patent in suit. D8 was less relevant than D7 because it was more generally directed to the use of a certain monomer in a specific process for the manufacture of resins for pipes.

1.1.3 D7 discloses an injection or extrusion moulded cap or closure, which cap or closure is formed from a HDPE comprising at least two polyethylene components having different molecular weight distributions wherein at least one of said components is an ethylene copolymer (claim 6). The compositions of D7 are said to allow the production of injection moulded products with improved ESCR and warpage (page 2, lines 1 to 4). The compositions of examples 1, 3, 4 in Table 2 are polyethylene compositions for injection molding defined by a molar mass distribution, density and average molar mass M_w as claimed in the main request of the patent in suit. The amount of vinyl groups on the polyethylene, its degree of branching and its high load melt index HLMI are however not disclosed in D7.

1.1.4 D8 relates to a method of making a polymer composition comprising a polymer of ethylene and a copolymer of ethylene and 1-pentene (paragraph 1). D8 seeks a balance of properties between mechanical properties and processing properties (paragraph 21). In particular, the composition of example 8 is suitable for injection moulding (paragraph 34) and the article produced

therefrom can be used as a cap (paragraph 39). Table 1 on page 7 of D8 shows that Example 8 has the following properties: Mw/Mn = 7.66, Density = 0.9527 g/cm^3, M_w = 100,098 Da, HLMI = 93.0 g/10 min, Branches = 2.4 per 1000 C atoms (by NMR).

1.1.5 Thus, Example 8 has all of the features of claim 1 of the main request apart from the vinyl group content and the branching in the high molecular weight end of the copolymer, the value of these two parameters being not disclosed in D8. D8 addresses therefore the same technical problem as the patent in suit and example 8 of D8 shares more common features with the claimed subject matter than the examples of D7. The Board therefore finds that example 8 of D8 and not the examples of D7 is the disclosure representing the closest prior art.

1.2 Technical problem

1.2.1 Claim 1 of the main request requires that the amount of vinyl group on the polyethylene be at least 0.2 vinyl groups /1000 carbon atoms. According to paragraph 19 of the description, the vinyl groups are usually attributed to a polymer termination reaction after an ethylene insertion. It is concluded from that passage that the presence of vinyl groups on the polyethylene results from a common reaction in the course of polymerization and that it is not specific to the polymerization process used in the patent in suit. Also, the description does not provide any further teaching relating to the effect that feature might have on the properties of the polyethylene produced. The amount in vinyl groups on the polyethylenes produced in example 1 (1.3 vinyl groups /1000 carbon atoms) and comparative example 1 (0.12 vinyl groups /1000 carbon

atoms) are reported in Table 1. The polyethylene compositions of these two examples are however different polymeric compositions altogether since the polyethylene composition of example 1 is produced from ethylene and 1-hexene and that of comparative example 1 is produced from ethylene and 1-butene. It is therefore not possible to establish with certainty whether any improvement in the properties of the composition of example 1, which is according to claim 1 of the main request, results from the specific amount of vinyl groups of the polyethylene or from the different monomer used in the preparation of the polyethylene composition. According to the established case law of the Boards of Appeal, for a comparative test to demonstrate an inventive step with an improved effect over a claimed area, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention. For this purpose it may be necessary to modify the elements of comparison so that they differ only by such a distinguishing feature (see T 197/86, point 6.1.3, OJ EPO, 1989, 371). Since the patent in suit did not offer a fair comparison and since the appellant did not provide it either, no effect can be attributed to the choice of an amount in vinyl groups on the polyethylene of at least 0.2 vinyl groups /1000 carbon atoms.

1.2.2 Claim 1 of the main request further requires that "the 1 to 15 % by weight of the polyethylene having the highest molar masses have a degree of branching of more than 1 branch of side chains larger than CH_3/1000 carbon atoms". That parameter of the polyethylene is disclosed in paragraphs 13, 15 and 20 of the patent in suit. Several preferred ranges as well as methods for the determination of that parameter are disclosed in

these passages of the description. In order to measure that parameter however, the skilled person needs to determine a range of molecular weight that represents the "highest molar masses of the polyethylene". The description does not provide a guidance on how that range may be determined so that the feature lacks a clear definition in the patent in suit. There is also no further teaching in the description as to a technical effect resulting from having short chain branching in a specific fraction of the highest molecular weight of a polyethylene. The degree of branching of the compositions of example 1 and comparative example 1 are reported in Table 1 of the patent in suit. However, any effect observed on the properties of the composition cannot be necessarily attributed to a specific value of the degree of branching of the polyethylene since the compositions reported in Table 1 were prepared from different monomers as seen above.

1.2.3 Since the patent in suit does not show the presence of an effect resulting from the two characterizing features of the claimed subject matter, namely the amount of vinyl group on the polyethylene of at least 0.2 vinyl groups /1000 carbon atoms and the degree of branching of more than 1 branch of side chains larger than CH_3/1000 carbon atoms for the 1 to 15 % by weight of the polyethylene having the highest molar masses, the technical problem that can be formulated is the provision of further polyethylene compositions for injection moulding.

1.3 Obviousness

1.3.1 Starting from the polyethylene composition disclosed in example 8 of D8, the question that remains to be answered is whether the skilled person would consider polyethylene compositions based on example 8 of D8 and having both an amount in vinyl groups and a degree of branching within the range claimed in the main request as obvious further polyethylene compositions.

1.3.2 Paragraph 19 of the patent in suit discloses that the presence of vinyl groups on the polyethylene is the result of the copolymerization reaction. Moreover, it has not been shown that the range in claim 1 is outside of the values normally obtained as a result of the reaction. Therefore, the range claimed for the amount in vinyl groups can only be seen as an arbitrary range, the choice of which does not involve an inventive step.

1.3.3 As to the degree of branching of "the 1 to 15 % by weight of the polyethylene having the highest molar masses", it is again the case that it has not been shown that the range in claim 1 is outside of the values normally obtained as a result of the reaction. Considering in addition that the value given for the whole composition in example 8 of D8 is 2.4, the specific range can thus only be seen as arbitrary. This conclusion is further reinforced by the fact that it is known from D15 (column 2, lines 1-20) that generally increasing the short chain branching of the high molecular weight fraction of ethylene copolymers leads to higher environmental stress cracking resistance and creep rupture strength. That teaching is not limited to the compositions of D15 alone nor to the preparation of a polyethylene composition with the Phillips catalyst

disclosed in that document, but is present in the general part of the description. The choice of the specific range would therefore be an obvious measure for the skilled person looking for further compositions.

1.3.4 It is concluded that the main request does not involve an inventive step.

First auxiliary request

2. Inventive step

2.1 Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the degree of branching of the highest molar masses was limited from more than 1 to the range of 2 to 20 branches of side chains larger than CH_3/1000 carbon atoms. It has not been shown in how far that range makes a difference over the range present in claim 1 of the main request. The technical problem that can be formulated for the first auxiliary request is therefore also the provision of further polyethylene compositions for injection moulding. As such, the definition of the branching as being 2 to 20 branches of side chains larger than CH_3/1000 carbon atoms is arbitrary and cannot be seen as being based on an inventive step over D8 for the same reasons as explained for the main request.

Second auxiliary request

3. Admittance into the proceedings

3.1 The second auxiliary request was filed at the oral proceedings before the Board after the issue of inventive step of the previous requests had been

discussed. It contained a further limitation of the degree of branching of the highest molar masses to "from 5 to 15 branches". The Board does not see any justification for filing a request at such a late stage as there were no new or unexpected elements in the discussion on inventive step compared to the submissions in writing. While the Board does not immediately see any clear possibility of overcoming the objection on inventive step by means of the amendment, if indeed a different line of arguments could be relevant for values above 5, that would put the opposing party in the position of having to face a new line of arguments for the first time at the oral proceedings, which it could not reasonably be expected to do without adjournment.

3.2 In view of this, the Board finds it appropriate to exercise its discretion under Article 13 RPBA by not admitting the second auxiliary request into the proceedings.

4. As all the requests which are in the proceedings do not meet the requirements of Article 56 EPC, the appeal is to be dismissed and there is no need for the Board to decide on any other issue.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Schneider D. Semino

Decision electronically authenticated