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**Datasheet for the decision
of 11 September 2013**

Case Number: T 2260/11 - 3.3.03

Application Number: 01973279.1

Publication Number: 1448632

IPC: C08F210/16

Language of the proceedings: EN

Title of invention:

Linear Low Density Polyethylenes With High Melt Strength And High Melt Index Ratio

Patent Proprietor:

Univation Technologies LLC

Opponent:

Total Research & Technology Feluy

Headword:

Relevant legal provisions:

EPC Art. 100(c), 100(b), 54, 56

Keyword:

Grounds for opposition - late-filed ground for opposition -
A100(c) and (b) - Not admitted
Novelty - (yes) All Requests
Inventive step - (no) All Requests

Decisions cited:

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 2260/11 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 11 September 2013

Appellant: Total Research & Technology Feluy
(Opponent) Zone Industrielle C
7181 Seneffe (BE)

Representative: Julie Desrois
Chaillot, Geneviève
Cabinet Chaillot
16-20 Avenue de l'Agent Sarre
B.P. 74
92703 Colombes Cedex (FR)

Respondent: Univation Technologies LLC
(Patent Proprietor) Suite 1950,
5555 San Felipe
Houston, TX 77056 (US)

Representative: Adrian Hayes
Boult Wade Tennant
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT (GB)

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 9 August 2011
rejecting the opposition filed against European
patent No. 1448632 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman: B. ter Laan
Members: D. Marquis
C. Vallet

Summary of Facts and Submissions

I. The appeal by the opponent lies from the decision of the opposition division of 23 June 2011 posted on 9 August 2011 rejecting the opposition to European patent N° 1 448 632 (application number 01 973 279.1).

II. The patent was granted with a set of three claims of which independent claims 1 and 3 read as follows:

"1. A substantially unblended polyethylene having less than 10 weight percent of a separate, branched polymer, said substantially unblended polyethylene comprising an ethylene α -olefin copolymer:

wherein said copolymer has a density in the range of from 0.915-0.950 g/cm³;

wherein said copolymer has a weight average molecular weight (Mw) in the range of 60,000 to 200,000, a melt index ratio I₂₁/I₂ (MIR), as determined by ASTM D-1238, in the range of from 50-80, at an MI in the range of from 0.1 to 10 g/10 min;

wherein said copolymer has a melt strength (MS) in the range of from 7-20 cN;

wherein said copolymer has a CDBI of greater than 60%; and wherein said copolymer has a Mw/Mn of less than or equal to 4,5."

"3. A gas phase polymerization process for producing the polyethylene of any one of the preceding claims."

Claim 2 was directed to a preferred embodiment of claim 1.

III. An opposition against the patent was filed in which it was requested that the patent be revoked based on the grounds according to Article 100(a) EPC (lack of

novelty and lack of inventive step), Article 100(b) EPC and Article 100(c) EPC.

IV. The decision of the opposition division relied *inter alia* on the following documents:

D1: WO 01/40324

D2: EP 1114831

D3: WO 99/60032

D5: "Encyclopedia of Polymer Science and Technology"
Vol 2, 2003, pp 444-445.

The decision was based on the patent as granted as the main request and on one auxiliary request. The ground of opposition under Article 100(b) EPC was not admitted to the proceedings as it was held that it had not been substantiated in the notice of opposition. Further to that ground of opposition the late filed document D5 was not admitted to the proceedings as it was not considered to be *prima facie* relevant. The ground of opposition under Article 100(c) was not substantiated. The subject-matter of the main request was held to be novel over D1 and D2 and inventive over either D1 or D3 as the closest prior art.

V. On 17 October 2011, the opponent lodged an appeal against the decision and paid the prescribed appeal fee on the same day. The statement setting out the grounds of appeal was filed on 19 December 2011. The opponent requested that the patent be revoked on the grounds of Article 100(a) EPC (lack of novelty and lack of inventive step), Article 100(b) EPC and Article 100(c) EPC.

The statement of grounds of the appeal relied *inter alia* on D1, D2, D3 and D5 filed before the opposition division as well as on the following documents:

D6: WO 99/35 174

D7: WO 00/68279

D8: WO 01/34664

D9: "PE: massgeschneidert", Everaert J., *Kunststoffe*, 87(1997), 1, published in 1997, and its English translation "PE: tailor-made", also published in 1997.

D10: Technical analysis, written in 2011, of the resin W2 described in the article "PE: massgeschneidert", Everaert J., *Kunststoffe*, 87(1997).

- VI. In its reply to the statement of the grounds of the appeal, dated 24 April 2012, the patent proprietor requested the dismissal of the appeal or the maintenance of the patent on the basis of an auxiliary request which was however not provided therewith. It was also requested not to admit documents D5 to D10, nor the grounds for opposition under Article 100(b) EPC and Article 100(c) EPC to the proceedings.
- VII. On 14 February 2013, oral proceedings were convened by the Board for 11 September 2013.
- VIII. By letter of 8 August 2013, the patent proprietor maintained the main request and filed a new set of claims as auxiliary request.
- IX. On 13 August 2013, the Board issued a preliminary opinion in which it was *inter alia* pointed out that the Board saw no reason to admit the grounds of opposition under Article 100(b) and 100(c) EPC, nor document D5, to the proceedings.
- X. Oral proceedings were held on 11 September 2013.
- XI. The appellant's arguments may be summarised as follows:

- Admissibility of the grounds of opposition under Article 100(b) EPC and Article 100(c) EPC.

Introduction of the ground of opposition under Article 100(c) EPC was requested. The phrase "*[...]having less than 10 weight percent of a separate, branched polymer, said substantially unblended polyethylene[...]*" in claim 1 had been added by the patentee in the course of the examination proceedings. The description did not provide a support for that modification as the corresponding passage of the description applied only to LLDPE, while claim 1 encompassed all kinds of polymer. Therefore, subject-matter not encompassed in the application as filed had been added, thus contravening Article 123(2) EPC and Article 100(c) EPC.

The ground of opposition under Article 100(b) EPC was relevant because the contested patent did not provide sufficient guidance to arrive at the claimed subject matter. The opposition division had not indicated why that ground was not admitted and had not taken into account that it was filed in reaction to statements of the respondent.

- Novelty

D1 disclosed unblended ethylene copolymers. For each of the properties of the copolymer, D1 disclosed a preferred range with an end-point lying within the range of claim 1. The Mw range from 60,000 to 200,000 g/mol was implicitly disclosed by the melt index range from about 0.1 dg/min to 10 dg/min, as illustrated by D5, which gave the linear relationship for the Mw and MI of LLDPE. Furthermore, the polymer obtained in example 2 in Table 1 of D1 had an Mw of 113200 g/mol which corresponded to the middle of the range of claim

1 of the patent in suit. Each of the claimed ranges was identified as a preferred range in D1. It was not necessary to perform a multiple selection in order to arrive at the subject-matter of claim 1; a combination of the most preferred ranges for each parameter disclosed in D1 was sufficient. Claim 1 lacked novelty over D1.

D2 disclosed ethylene based polymers. In particular, the unblended ethylene based polymers of Examples 7 to 10 (Table 3) had MFR, Mw/Mn and densities all in the ranges now being claimed. As the polymers were obtained through a gas phase process with a combined metallocene catalyst (see Example 4) similar to the one used in the patent in suit, the undisclosed characteristics of the polymers should also be within the claimed range. Claim 1 lacked novelty over D2.

Example 5 of D6 disclosed a gas-phase polymerized ethylene-hexene-1 copolymer with a density, an Mw/Mn, melt strength, melt index and I_{21}/I_2 within the claimed ranges. Based on the molecular weight/melt index correlation established in D5, the polymer of example 5 of D6 with a melt index of 1 had to have a molecular weight of around 100 000. The long chain branching (g') value was less than or equal to 0,9 (D5, claim 1), similar to that disclosed in Figure 1 of the patent in suit, indicating that the polymers had a similar branching distribution. The CDBI was thus expected to be higher than 60%. Accordingly, Example 5 of D6 explicitly or implicitly disclosed all the features of claim 1. Claim 1 was thus not novel over D6.

D9, in Table 1B, disclosed several properties of a number of products. W2 was a polyethylene resin produced using the catalysts EBI (ethylene-bis(indenyl))

zirconium dichloride) and nBuCP (bis(n-butylcyclopentadienyl) zirconium dichloride). According to D9, W2 had an MI₂, density, MIR and Mw/Mn falling within the ranges now being claimed. D10 was a report of tests carried out on an old sample of polymer W2 which had been kept. As described in D10, the Mw, the melt strength and the CDBI of W2 were also all within the range of present claim 1. Accordingly, D9 disclosed a polyethylene with all the properties of claim 1 of the patent in suit. Moreover, as indicated in D10, samples of the resin W2 were sent abroad in 1998. Accordingly, W2 had been available to the public before the filing date of the patent in suit and therefore present claim 1 lacked novelty.

- Inventive step

D1 was in the same field as the patent in suit and since it contained only small differences, if at all, with present claim 1, it was the closest prior art. The problem solved over D1 was to provide an alternative polyethylene. The person skilled in the art had only to select the polyethylenes within the preferred ranges of D1 in order to arrive at the subject matter claimed in the patent in suit. The subject-matter of claim 1 lacked therefore an inventive step over D1.

Starting from Example 6 of D3, that disclosed an ethylene/hexene polymer prepared by gas phase polymerization, having a density, MI and MIR all falling within the claimed range. Although the Mw was not measured, D5 showed that the melt index was inversely proportional to the weight-average molecular weight for various different polyethylenes (LDPE, LLDPE) produced using a variety of processes and catalysts (Ziegler-Natta or metallocenes). Thus, an MI

of 0,87 dg/min corresponded with certainty to an Mw within the range of 60 000 to 200 000. The CDBI was not measured, but the CDBI of the polymers of D3 was preferably from 60% to 80%. Moreover, the CDBI of all other examples of D3 was over 68,9%. As Example 6 was produced using comparable polymerization conditions, the CDBI of Example 6 was also expected to be over 60%. Accordingly, the difference between Example 6 and claim 1 of the patent in suit was that the Mw/Mn (4,55) was slightly higher and the melt strength (6,1) was slightly lower than that of present claim 1. The technical effect of a slightly higher melt strength was to modify a little the processability of the polymer. Regarding Mw/Mn, no specific technical effect had been shown for the claimed value and moreover the small difference fell within the margin of measurement error. Therefore, the objective problem to be solved over D3 was to provide alternative processable polyethylenes, especially for end-use applications such as films. It was obvious to the skilled person to increase the melt strength for improving processability of the polymer, as it was well known that those properties were related. Moreover, since the difference was very small, the skilled person would have easily obtained a slightly higher melt strength, perhaps even only as a result of the variations between several runs within the conditions of example 6. This is shown by Example 12, produced under the same conditions as Example 6, resulting in a higher melt strength. Accordingly, claim 1 was not inventive over D3.

The auxiliary request lacked an inventive step for the same reasons as the main request.

XII. The respondent's arguments may be summarised as follows:

- Admissibility of the grounds of opposition under Article 100(c) EPC and Article 100(b) EPC.

Consent to admit the new ground of opposition under Article 100(c) EPC to the proceedings was not given. The ground under Article 100(b) EPC had been considered by the opposition division which had used its discretion not to admit it to the proceedings.

- Novelty

D1 did not directly and unambiguously disclose a polyethylene falling within the scope of the present claims. Document D1 was not restricted to polyethylenes but referred to polyolefins in general. Additionally there was no disclosure of the molecular weight range in D1. Nor was there any evidence that the relationship between molecular weight and melt index established in D5 was also valid for the specific polymers disclosed in D1.

The appellant had not shown that the polymers disclosed in Examples 7 to 10 of D2 fell under present claim 1. D6 was late filed and should not be admitted to the proceedings. The various properties of the ethylene copolymer disclosed in example 5 referred to different products and could not be combined. Additionally, the melt strength (MS) value given in D6 could not be compared with the requirement in claim 1 of the patent in suit because the values were obtained by different measurements, which had a significant effect on the result obtained. Nor was there any link between g' and CDBI as suggested by the appellant. Therefore, D6 did

not anticipate claim 1 of the patent in suit.

D9 should not be admitted to the proceedings. In D9 no preparation method for the polymers was disclosed. For the preparation of the polymer, test report D10 referred to a document published eight years after the filing date of the patent in suit. Therefore, D10 could not be taken into account for establishing the polymer properties. Since D9 did not give any preparation details for polymer W2, the properties of W2 that were not described in D9 were unknown. Moreover, D10 contained insufficient information regarding the test carried out on the W2 material. Furthermore, during the long storage of the sample of W2, a change in its properties would be expected, in particular properties such as those tested in D10. There was no corroborative evidence in D10 that the resin properties had remained unchanged and the conditions under which it had been kept were not given.

- Inventive step

D3 represented the closest prior art. D3 referred to the properties of the resulting polymer, though not all of the properties were mentioned. In particular the CDBI was not measured. But there were at least two further differences, namely the melt strength and the Mw/Mn. It had not been shown how one skilled in the art would increase the melt strength to improve the processability of the polymer. As indicated in the background of the invention, the MIR and melt strength were generally inversely related. Therefore, if it were possible to increase the melt strength, the MIR would be decreased. This could be seen, for instance, by comparing Example 6 with Comparative Example 5 in Table 3 of D3. When the melt strength was increased to 8,0 cN

(within the scope of claim 1 of the main request) the MIR was reduced to 46,6 (outside the scope of claim 1 of the main request). Furthermore other unwanted changes took place, for example an increase in the Mw/Mn value to 6,18 rather than a reduction, so that it would not be less than or equal to 4,5 as required in claim 1 of the main request. The precise reaction conditions of Example 12 had not been given so there was no teaching in D3 how to obtain simultaneously the high melt strength and high MIR values as claimed in the main request.

Starting from D1 as the closest prior art was a substantial change of approach that surprised the respondent, for which he would have required the assistance of a technical expert and for which he was not prepared. A decision revoking the patent on the basis of D1 infringed his right to be heard (Article 113 EPC). Therefore, he reserved his right to file a petition for revision under Article 112(a) EPC.

The problem solved over D1 by the subject-matter of the patent in suit was to provide unblended polyethylenes with improved processability, melt strength and melt index ratio. Not all properties of the polyethylenes of D1 were disclosed and there was no guidance in D1 about how to arrive at the claimed polyethylenes. There was no incentive in D1 to prepare the subject-matter of present claim 1.

Claim 1 of the auxiliary request was explicitly limited to LLDPE. There were no additional arguments to those put forward for the main request.

XIII. The appellant requested the revocation of the patent.

The respondent requested that the appeal be dismissed or alternatively that the patent be maintained in amended form on the basis of the auxiliary request filed on 8 August 2013. Should D1 be considered to be relevant for the assessment of inventive step, the respondent also requested that the oral proceedings be postponed or that the case be remitted to the first instance.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Article 100(c) EPC

2.1 The ground of opposition under Article 100(c) EPC had been mentioned in the notice of opposition but it had not been substantiated - which was pointed out in the decision under appeal - and had not been discussed during the oral proceedings before the opposition division. Consequently, that ground was not part of the contested decision.

2.2 The statement of grounds of appeal did not contain any argument on why the opposition ground pursuant to Article 100(c) EPC should be admitted to the appeal proceedings, nor were any such arguments presented during the oral proceedings before the Board. It was not contested that Article 100(c) EPC constituted a new

ground of opposition.

2.3 A new ground of opposition can be admitted in appeal only with the agreement of the patent proprietor. As the patent proprietor did not give his consent to the introduction of the ground under Article 100(c) EPC, that ground is not admitted to the proceedings.

3. Article 100(b) EPC

3.1 In its decision, the opposition division took the view that the ground of opposition under Article 100(b) EPC had not been sufficiently substantiated. As a result, the opposition division did not admit this ground to the proceedings.

3.2 Neither in the statement of grounds of appeal nor during oral proceedings before the Board did the appellant submit any argument challenging the decision of the opposition division not to admit the ground of opposition pursuant to Article 100(b) EPC to the proceedings. As the appellant has not shown that the opposition division had used its discretion not to admit a ground of opposition in an incorrect way, the Board sees no reason admit the ground of opposition under Article 100(b) EPC at this late stage of the proceedings.

4. Article 54 EPC

4.1 D1 discloses polymers including low density polyethylene, elastomers, plastomers, high density polyethylenes, low density polyethylenes, polypropylene and polypropylene copolymers (page 22, lines 13 to 17). Those polymers, typically ethylene based polymers, have a density of 0,86 to 0,97 g/cc, preferred ranges being

0,88 to 0,965 g/cc, 0,900 to 0,96 g/cc, 0,905 to 0,95 g/cc, 0,910 to 0,940 g/cc, 0,915 to 0,930 g/cc (page 22, lines 18-23). The melt index ratio I_{21}/I_2 is from 30 to less than 200, preferred ranges being from about 35 to less than 100, 40 to 95, preferably greater than 30, or 35 or even 50 or greater than 60 (page 23, line 33 to page 24, line 4). The melt index (indicated as MI or I_2) is 0,01-1000 dg/min, preferred ranges being 0,01-100 dg/min, 0,1-50 dg/min, 0,1-10 dg/min (page 23, lines 28-32). The polymers have a melt strength greater than 6 cN, preferably greater than 7 cN, and most preferably 8 cN or higher (page 22, lines 24-26). The CDBI can be in the range of greater than 50 to 100%, preferably 99%, preferably in the range of 55 to 85%, and more preferably 60 to 80%, greater than 60% or even greater than 65%, but the CDBI can also be less than 50%, 40% or, most preferably, less than 30% (page 23, lines 13 to 24). The M_w/M_n is greater than 1,5 to about 15, greater than 2 to about 10, greater than 2,5 to less than about 8 and most preferably from 3,0 to 8 (page 23, lines 3-7).

The polymers of D1 have a density, melt index ratio, melt index, melt strength, CDBI and M_w/M_n varying within ranges that overlap the ranges defined in claim 1 of the main request. D1 does however not disclose a range of weight average molecular weights (M_w) for the polymers.

According to D5, the melt index can often be used as an estimator of polymer molecular weight as it is inversely proportional to weight-average molecular weight (page 444, last paragraph). An approximate correlation of weight-average molecular weight and melt index for LLDPE is shown in Figure 4. Table 2 of D5 discloses the molecular weight (M_w) as measured for

HP-LDPE, LLDPE and mLLDPE at nominal 1 g/10 min melt index. However, no details regarding the exact nature of the LLDPEs used in D5 (such as the comonomer) are given and the appellant has not shown that the correlation between the melt index value and the measured molecular weight described in D5 could readily be applied to any other olefin polymers, such as those defined on pages 22 to 23 of D1. Therefore, the molecular weights of the polymers of D1 cannot be determined on the basis of D5 only so that it cannot be concluded that the claims of the main request lack novelty in view of the ethylene based polymers disclosed on pages 22 and 23 of D1.

- 4.1.1 Table 1 of D1 discloses a process for polymerizing ethylene with hexene in the presence of a catalyst system as obtained in example 2, comprising $[\text{C}_6\text{H}_4(\text{CH}_2)_2\text{Ge}(\text{Me}_4\text{C}_5)_2]\text{ZrCl}_2$ and methylalumoxane as an activator. The copolymer so obtained is described in table 2; it has a density of 0,923 g/cc, a molecular weight Mw of 113200 g/mol, a melt index of 1,2 g/10 min, a melt strength of 9,5 cN, an Mn of 30900 and an Mw/Mn of 3,67. However, the CDBI of the copolymer was not determined and the melt index ratio of 37 is outside the claimed range (50-80). Therefore, it cannot be concluded that the copolymer of example 2 falls within the scope of present claim 1.

As a consequence, D1 does not anticipate the subject-matter of present claim 1.

- 4.2 D2 discloses ethylene/alpha-olefin copolymers with a density in the range of 0,850 to 0,908 g/cm³, a melt index (MFR) of 0,01 to 200 g/10 min, an Mw/Mn of 1,5 to 4 and a number of further features (claim 1). In Examples 7 to 9 of D2, copolymers of ethylene and 1-

butene are prepared and in example 10 a copolymer of ethylene and 1-hexene. The densities are 0,922, 0,925, 0,922 and 0,923 g/cm³, respectively, and the Mw/Mn 2,1, 2,4, 2,8 and 2,6, respectively (Table 3). D2 does not disclose the weight average molecular weight, the melt index ratios, the melt strengths and the CDBI of these copolymers, which was not contested by the appellant. Therefore, D2 does not anticipate the subject-matter of claim 1 of the main request.

4.3 The same applies to D6 and D9, both filed on appeal, neither of which discloses all the features of the claimed polymers, in particular the CDBI and the weight average molecular weight. D10 is neither dated nor signed and it does not establish that the sample used to perform the analysis was the same as that described in D9, so that no conclusions can be drawn on that basis.

4.4 In view of the above, the polymer according to claim 1 of the main request and for the same reasons dependent claim 2 and the process for producing such a polymer (claim 3) are novel. The claimed subject-matter complies with the requirements of Article 54 EPC.

5. Article 56 EPC

5.1 The patent in suit relates to substantially unblended linear low density polyethylenes with high melt index, high melt index ratio and high melt strength, leading to improved processability (paragraphs [0001] and [0006]). The unblended linear low density polyethylenes disclosed in the examples of the patent in suit were in particular obtained by gas phase copolymerisation in the presence of a silicon bridged zirconocene catalyst

combination disclosed in paragraph [0007].

5.2 D1 and D3 also disclose linear low density polyethylenes with improved processability (D1 and D3, both on page 1, line 11). The question has to be answered which of D1 or D3 is the closest prior art for the patent in suit.

5.2.1 D1 discloses a process for polymerizing olefin(s) to produce a polymer product in the presence of a catalyst system comprising a cyclic germanium bridged bulky ligand metallocene-type catalyst compound and an activator (claim 1).

In Table 2, the properties of the two unblended copolymers of ethylene and hexene obtained by gas phase polymerisation in the presence of the germanium bridged metallocene catalyst according to D1 are listed. The polymer of example 2 has a density of 0,923 g/cm³, a melt index of 1,2 dg/min, a melt index ratio of 37, a melt strength of 9,5 cN, an Mw of 113200 and an Mw/Mn of 3,67. CDBI is not measured. The polymer of example 5 has a density of 0,9187 g/cm³, a melt index of 0,96 dg/min, a melt index ratio of 60,0 and a melt strength of 8,8 cN. Neither the Mw, Mw/Mn nor the CDBI of the polymer of example 5 are disclosed.

5.2.2 D3 discloses a process for polymerizing olefin(s) in the presence of a mixed catalyst comprising a bridged, bulky ligand metallocene-type catalyst compound and a bridged, asymmetrically substituted, bulky ligand metallocene-type catalyst compound and at least one activator. The polymers produced using that catalyst system are said to be easier to process into end-use applications such as films or moulded articles (page 1, lines 10 to 12, page 3 lines 34 to 37).

In examples 6 to 8 of D3 unblended copolymers of ethylene and 1-hexene are obtained by gas phase polymerization using a combination of two silicon bridged zirconocene catalysts. The copolymers have densities (0,9209; 0,9229 and 0,9195 g/cc, resp.), molecular weights (104600; 114100 and 123600 g/mol, resp.), melt index ratios (65,5; 60,8 and 50,9, resp.) and melt indices (0,87; 0,95 and 1,29 dg/min, resp.) falling within the ranges claimed in the main request. The values of the melt strength (6,1; 6,4 and 6,4 resp.) and Mw/Mn (4,55; 5,59 and 7,54, resp.) are however outside the ranges of present claim 1 and the CDBIs are not disclosed.

5.2.3 As in the patent in suit, both D1 and D3 relate to the same problem of producing processable polyolefins, in particular LLDPE. However, examples 6 to 8 of D3 describe a gas phase polymerisation in the presence of a silicon bridged zirconocene catalyst combination close to those used in the patent in suit, whereas D1 describes the use of a germanium bridged metallocene catalyst. Therefore D3, in particular example 6, the polymer of which is the closest to the polymers of the patent in suit, is considered to represent the closest prior art.

5.3 The patent in suit aims at providing an unblended linear low density polyethylene having relatively narrow molecular weight distribution, high melt strength, high melt index and a high melt index ratio and improved shear thinning in response to applied shear while maintaining important physical and mechanical properties (paragraphs [0005] and [0006]). The question to be answered is whether that problem has been solved vis-à-vis the closest prior art document

D3.

- 5.4 In Table 2 of the patent in suit a number of polymers are disclosed that are obtained by gas phase polymerization of ethylene or ethylene and butene in the presence of a combination of two supported silicon bridged zirconocene catalysts. Only the polymers resulting from Run 104 and Run 113 display molecular weights (Run 104: 80 000 g/mol; Run 113: 69 000 g/mol), melt index ratios (Run 104: 50,5; Run 113: 53,3), melt indices (Run 104: 1,5 g/10 min; Run 113: 1,9 g/10 min), melt strengths (Run 104: 14,5 cN; Run 113: 7,7 cN) and Mw/Mn (Run 104: 4,4; Run 113: 4,3) falling within the claimed ranges. However, the CDBI values of the copolymers of Run 104 and 113 are not disclosed. Furthermore, the patent in suit does not contain any comparison with polyethylenes according to the closest prior art D3. Therefore, it cannot be concluded that the polymers produced in the patent in suit display any improved properties, in particular not an improved processability or shear thinning, due to the differences with D3. Starting from example 6 of D3, the technical problem that can be formulated from the information provided is therefore to provide further substantially unblended polyethylenes comprising an ethylene and α -olefin copolymer and having good processability.
- 5.5 The solution to the above problem resides in the ethylene α -olefin copolymers defined in claim 1 of the main request.
- 5.6 It remains to be decided whether the proposed solution to the technical problem as defined above is obvious in view of the prior art.

5.7 According to D3, the use of a mixed catalyst comprising at least two different bridged, bulky ligand metallocene-type catalyst compounds and at least one activator leads to polymers having better processability and also a higher melt index ratio than the use of a single bridged, bulky ligand metallocene-type catalyst (page 5, lines 4 to 17). The good processability of polymers thus obtained is described on page 1, lines 10 to 12 and page 3, lines 34 to 37. The teaching of D3 is therefore that the use of a catalyst as described in D3 will lead to a polymer having good processing properties. Those polymers are described to have densities of 0,86 to 0,97 g/cm³, Mw/Mn of 1,5 to 10, CDBI of 50 to 99%, melt indices of 0,01 to 1000 dg/min and melt index ratios of greater than 50 (page 21, line 15 to page 22, line 20). Although no general indication is given of the melt strengths of the polymers of D3, the passage regarding the other polymer properties (page 21, line 15 to page 22, line 10) shows that those may vary within quite broad ranges when using the combined bridged, bulky ligand metallocene-type catalyst according to D3. Therefore, it cannot come as a surprise - especially in view of the lack of any unexpected technical effect attributable to the higher melt strength - that, by using the catalyst of D3, i.e. working within the broad framework of D3, the skilled person would also arrive at the - compared with example 6 of D3 - slightly higher values for melt strength now being claimed. That is confirmed by example 12 of D3, in which the use of the same catalyst as in example 6 results in a polymer having a density of 0,9214 g/cm³, a melt index of 0,90 g/10 min, a melt index ratio of 54,9 and a melt strength of 7,5 cN.

- 5.8 Therefore, in view of the general teaching of D3 that using a catalyst of the type described in D3 results in polyethylenes having good processability and the properties of the polymers specified in the examples, it is obvious from D3 to prepare the polyethylenes of claim 1 of the main request.
- 5.9 The respondent's argument that the prior art had not shown how to obtain a polyethylene having a high melt strength as well as a high melt index ratio, two inversely proportional parameters, without raising the M_w/M_n , is based on a comparison of example 6 and comparative example 5 of D3. However, those two polyethylenes were prepared with different types of catalyst and under different polymerisation conditions so that any differences in the resulting product are not necessarily to be attributed to an inverse relationship of the melt index ratio and the melt strength, nor can anything be concluded regarding the M_w/M_n . For that reason the respondent's argument cannot be followed.
- 5.10 Claim 1 of the main request therefore lacks an inventive step.
- 5.11 Since the teaching of D3 alone is sufficient to deny the presence of an inventive step, it is not necessary to analyse the situation starting from D1 or even by combining D1 with D3.

Auxiliary request

6. Claim 1 of the auxiliary request is limited to substantially unblended LLDPE polyethylenes. The polyethylenes exemplified in D3 are also LLDPE polyethylenes as shown by their monomers (ethylene and

hexene) and production processes (catalysts, temperature and pressure of polymerization). Therefore, for the same reasons as for the main request, claim 1 of the auxiliary request lacks an inventive step over D3.

Order

For these reasons it is decided that:

1. The patent is revoked.

The Registrar:

The Chairman:



E. Goergmaier

B. ter Laan

Decision electronically authenticated