

Publication in the Official Journal Yes / No

File Number: T 576/89 - 3.3.3
Application No.: 83 300 257.9
Publication No.: 0 087 210
Title of invention: A rotational moulding process using polyethylene compositions

Classification: C08L 23/04

D E C I S I O N
of 29 April 1992

Proprietor of the patent: Du Pont Canada Inc.
Opponent: 01 BASF Aktiengesellschaft
02 AKZO N.V.

Headword:

EPC Articles 56, 108, 114(1)

Keyword: "Cross-appeal - no necessity to file"
"Inventive step (no) - promising prior art pointing to the solution claimed - no unexpected effect"



Case Number : T 576/89 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 29 April 1992

Appellant :
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Decision under appeal :

Interlocutory decision of the Opposition Division
of the European Patent Office dated
6 December 1988, posted on 20 July 1989
concerning maintenance of European patent
No. 0 087 210 in amended form.

Composition of the Board :

Chairman : C. Gérardin
Members : R. Lunzer
G. Davies

Summary of Facts and Submissions

- I. The mention of the grant of the patent No. 0 087 210 in respect of European patent application No. 83 300 257.9 filed on 19 January 1983 and claiming the priority of 9 February 1982 from an earlier application in Canada, was published on 13 November 1985 on the basis of 21 claims, of which Claim 1 reads as follows:

"A composition comprising polyethylene having a density of 0.920 -0.970 g/cm³ and a melt index in the range of 10-35 dg/min, 0.3-1.3%, by weight of the polyethylene, of a bis(tert. alkyl peroxyalkyl) benzene, 0.2-1.5%, by weight of the polyethylene, of a co-curing agent selected from the group consisting of triallyl cyanurate, triallyl isocyanurate and 1,2-polybutadiene, 0.01-0.05%, by weight of the polyethylene, of a hindered phenolic antioxidant and 0.01-0.2%, by weight of the polyethylene, of a secondary antioxidant selected from the group consisting of di(stearyl)-pentaerythritol diphosphite, tris di(tert.-butyl phenyl) phosphite, dilauryl thiodipropionate and bis(2,4-di-tert.-butylphenyl) pentaerythritol diphosphite."

Claims 2 to 14 are dependent claims directed to preferred compositions according to the main claim. Claim 15 is a formally independent claim concerning a rotational moulding process for the manufacture of articles of compositions of polyethylene, wherein compositions as defined in Claim 1 are used. As to Claims 16 to 21, they deal with preferred embodiments of the process according to Claim 15.

- II. On 26 June 1986 Opponent 1 filed a Notice of Opposition against the grant of the patent and requested revocation

thereof in entirety for lack of inventive step under Article 100(a) EPC.

On 10 July 1986 Opponent 2 lodged an opposition to the granted patent and requested revocation thereof in entirety on the ground that the requirement of inventive step under Article 100(a) EPC was not met.

These objections, which were emphasised and elaborated in later submissions as well as during oral proceedings, were based essentially on the following documents:

D(a) US-A-4 267 080

D(g) US-A-3 876 613

D(h) DE-A-2 440 597

D(i) Derwent Abstract No. 40612C/23 (JP-A2-55 056 142).

It was agreed between the parties that documents D(a) and D(i), which correspond to parallel applications having the same priority date (19 October 1978), should be regarded as a pair and read together.

III. By an interlocutory decision delivered orally on 6 December 1988, with written reasons posted on 20 July 1989, the Opposition Division held that there were no grounds of opposition to the maintenance of the patent in amended form on the basis of the set of 6 claims submitted on 6 December 1988, which corresponded to the original process Claims 15 to 20 and wherein, additionally, the new main claim had been completed as follows: "... and ensuring in the resultant product a gel content of at least 75% by weight."

It was stated in that decision that the gel content of at least 75% by weight was an inventive feature, since it conferred improved low-temperature impact strength properties to the objects obtained by the rotational

moulding process. That effect, which was regarded as surprising, was thus the basis of a selection invention.

IV. The Appellant (Opponent 2) thereafter filed a Notice of Appeal against that decision on 4 September 1989 and paid the prescribed fee at the same time. In the Statement of Grounds of Appeal filed on 17 November 1989 as well as during oral proceedings held on 29 April 1992 the Appellant essentially argued that the identification of the desired gel content on its own could not confer an inventive step on a composition suggested by the combination of two teachings. The determination of the appropriate gel content resulted from the mere optimisation of a process and could have been made by anyone of ordinary skill in the art; it was nothing more than the known and accepted method of expressing the degree of cross-linking of polyethylene, as evident from the additional documents:

Journal of Applied Polymer Science, Vol. 12, pp. 1355 to 1364 (1968), "Gel in Polyethylene" by G.A. Mortimer, and,

Journal of Polymer Science, Vol. XXXI, pp. 127 to 153 (1958), "Peroxide Crosslinked Carbon Black Polyethylene Compositions" by E.M. Dannenberg,

filed together with the Statement of Grounds of Appeal. Moreover, the requirement in the main claim that the gel content should be at least 75% raised the issue of insufficient disclosure, since nowhere in the specification was it specified how one went about ensuring that minimum.

V. In its written submission filed on 5 March 1990 as well as during oral proceedings, the Respondent (Patentee) sought the maintenance of the patent in suit in the form granted,

with the exception of Claim 21, the features of which had been incorporated into Claim 15, as its main request, and in the amended form, i.e. limited to the process Claims 1 to 6, as its auxiliary request. The Respondent submitted also that the Opposition Division had been incorrect in rejecting the patent on the basis of the main request submitted at the oral proceedings before the Opposition Division. To support the patentability of the claimed subject-matter as defined in the independent claims, the Respondent put forward, first, that the teaching of documents D(i) and D(g) would not even be considered by the skilled man since there was no reference to impact resistance properties, secondly, that there was no reason to suppose that the antioxidants or antioxidant mixtures mentioned in document D(g) would be effective when used with a different curing agent, and, thirdly, that the claimed compositions ignored the clear teaching of document D(a) that large amounts of elastomer were necessary to achieve desirable properties. Regarding the requirement of a gel content of at least 75%, the Respondent added that this lower limit, the achievement of which posed no difficulty to the skilled man, was in fact critical if the drop test was to be satisfactory.

- VI. In its reply filed on 29 June 1990 to the Respondent's statement requesting the Board of Appeal to consider both the main request and the auxiliary request as they both had been before the Opposition Division, the Appellant raised a procedural point, objecting that it was not open to the Respondent, itself not having filed any appeal, to raise the issue of the allowability of the main request in the present appeal.

VII. By letter received on 11 November 1991, Opponent 1 informed the Board that it would not attend the oral hearing to which, as a party to the proceedings, it had been duly summoned.

VIII. The Appellant requested that the decision under appeal be set aside and that the patent be revoked entirely.

The Respondent requested that the decision under appeal be set aside and the patent be maintained on the basis of Claims 1 to 20 filed on 5 March 1990 as its main request, or, alternatively, that the appeal be dismissed.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is admissible.

Procedural matters

2. As set out in point III above, the decision of the Opposition Division did not deal with the main request, but was confined to what it described as "the final request of the Applicant during the oral proceedings". At the oral proceedings before the Board the Respondent's representative pointed out that he had not formally abandoned its main request, but had simply pursued the auxiliary request after the Opposition Division had stated orally that it would not grant the main request. The minutes of the oral proceedings before the Opposition Division confirm that, after an interruption of half an hour for deliberation, it rejected the main request, but regarded the auxiliary request as embodying an inventive step; however, whether subsequently the main request was formally abandoned or not is not specified. The Appellant

could not provide any information in that respect either, since it did not attend the oral proceedings before the Opposition Division.

The Board is thus not in a position to decide exactly what took place at the oral proceedings before the Opposition Division. However, beside the fact that the Respondent agreed with the text sent with the communication of 2 March 1989 pursuant to Rule 58(4) EPC (cf. reply of 30 March 1990) and did not itself file an appeal against the decision of the first instance, it did not raise any complaint against the procedure adopted by the Opposition Division. If it had objected that the Opposition Division had failed to comply with the requirements of Rule 68 EPC, by not giving reasons for its rejection of the main request, the Board would have had to consider referring the issue back to the Opposition Division. However, in the circumstances of the present case, it is clear from the reasoning given in paragraph 4 of its decision why it regarded features A to F of the main claim under consideration, i.e. the combination of features of Claim 1 of the main request, as being non-inventive, and that it was only feature (G), i.e. a gel content of at least 75% by weight, which distinguished the auxiliary request from the main request, which it regarded as inventive. Moreover, nothing suggests that the Opposition Division required the Respondent to choose between (a) revocation of the patent on the basis of the main request, and (b) withdrawal of the main request and prosecution on the basis of the auxiliary request. Consequently, in the view of the Board, the requirements of Rule 68 EPC are met.

3. The Appellant raised the procedural issue whether the non-appealing party, i.e. the party to the appeal by virtue of the provisions of Article 107 EPC, is entitled nonetheless to challenge that part of the decision against which he could have appealed, but did not.

3.1 The first matter which the Board needs to consider is the effect on an appeal of proposals for amendments made by a Patentee in the course of an opposition procedure, in particular whether a Patentee may support broader claims on appeal than were accepted by the Opposition Division. This topic is already the subject of a number of earlier decisions.

In the Decision T 123/85 "Incrustation inhibitors/BASF" published in OJ EPO 1989, 336, the Board took the view that in requesting that his patent be maintained in a limited form the Patentee was merely trying to delimit his patent to meet objections expressed by the EPO or the Opponents. However, by virtue of such limitation the Patentee did not irrevocably surrender subject-matter covered by the patent as granted. It followed that a Patentee, having offered a restrictive amendment in order to overcome an opposition, was entitled to reintroduce into his claims subject-matter which it had previously offered to delete, provided that such amendments did not constitute an abuse of procedure (Reasons for the Decision, points 3.1.1 and 3.1.2).

In the present case, the request that the patent be maintained as granted having been made by the Respondent at the first opportunity, i.e. in reply to the Statement of Grounds of Appeal, it cannot be regarded as an abuse of procedure.

The same line was explicitly followed in two later decisions, T 155/88 of 14 July 1989 (cf. point 2) and T 506/91 of 3 April 1992 (cf. point 2.4). In both, the right of a Patentee to revert to the subject-matter of the broader claims was confirmed, unless the circumstances make it absolutely clear that it was the real and

unambiguous intention of the Patentee to abandon the broader subject-matter of the previous claims.

- 3.2 The next matter for consideration is whether it makes any difference if the Patentee, seeking a broader claim on appeal, has not itself appealed, despite the fact that as the main request was refused, and the patent maintained on the basis of an auxiliary request, it was entitled to do so.

In the present case, the Board took the view that there was no requirement for the Respondent to have filed a cross-appeal and considered the issue of the inventiveness of the subject-matter of both the main and auxiliary requests in the appeal.

It has come to the attention of the Board, however, that a decision, which although later in date was issued in writing earlier, took an opposite view on the need for a cross-appeal (T 369/91 of 15 May 1992). The Board relies on the case law and reasoning set out below in support of its decision on this issue.

In the decision T 89/84 "Reimbursement of appeal fees/TORRINGTON" published in OJ EPO 1984, 562 the Board came to the conclusion that there was in fact no "procedural necessity" for a party to file an appeal against an adverse finding in a decision which, in its overall result, was favourable, since a Board of Appeal is required to examine the facts of its own motion and may consequently re-open any matter decided by the first instance (Reasons for the Decision, point 5).

That approach was confirmed in the decision T 73/88 of 7 November 1989 (to be published). According to point 1 of the Reasons for the Decision, if a Patentee in opposition

proceedings has had his request that the patent be maintained upheld by the decision of the Opposition Division, he may not file an appeal against reasoning in the decision which was adverse to him, because he is not adversely affected by the decision within the meaning of Article 107 EPC. If, however, an appeal is filed by an Opponent and the Patentee wishes to contend that such adverse reasoning was wrong, it should set out its grounds for so contending in its observations under Rule 57(1) EPC in reply to the Statement of Grounds of Appeal, by way of cross-appeal (cf. as well Headnote III, published in OJ EPO 5/1990).

- 3.3 Apart from existing case law, the fact that a Respondent to an appeal can raise issues in the appeal other than those raised by the Appellant is justified by reference to the provisions of the EPC.

Article 108 EPC imposes a stringent time limit for the filing of an appeal, without there being any provision in the Convention or the Rules thereunder for the filing of cross-appeals, or time limits for filing cross-appeals. This suggests that those who formulated the EPC took the view that the only procedural matter which needed to be regulated was whether or not an appeal was in being.

Once an appeal is in being, the Boards of Appeal have a discretion under Article 114(1) EPC to consider issues other than those raised by the parties. Thus, a party, whether Patentee or Opponent, faced with a decision from an Opposition Division upholding a patent on the basis of an auxiliary request, is fully entitled to take the view that it is satisfied with the decision, to the extent that it does not wish to be troubled with an appeal. If, however, the opposing party puts it to the trouble of re-arguing the case on appeal, it is then entitled to

challenge that part of the first instance decision which was adverse to it.

This interpretation is consistent with the general policy of the EPC, which avoids, as far as possible, deciding issues bearing on the substantive rights of the parties on the basis of procedural technicalities.

If the issues open to argument on appeal were to be limited to those raised in the Grounds of Appeal, subject to the opposing party having a right to argue other matters if, but only if, a cross-appeal had been filed within the basic time limit set by Article 108 EPC, there would be an incentive to file an appeal on the last day of the two-month time limit, so as to deny the opposing party the opportunity of filing a cross-appeal. The notion of allowing procedural tactics to have a decisive effect on the substantive rights of the parties is alien to the whole system of the EPC.

Taking as an example the common situation which arises when an opposition results in the patent being upheld as amended and an appeal is then filed by the Patentee, but no cross-appeal is filed by the Opponent, it is clear that the Board still has a discretion, if appropriate, to take a different view of the case from the Opposition Division, and to revoke the patent in its entirety. It would be anomalous if the Board, contemplating revoking the patent, had to exclude any argument on that issue by an Opponent (Respondent), a party to the appeal by virtue of Article 107 EPC, solely because there was no cross-appeal, while at the same time dealing with precisely that issue of its own motion.

3.4 In the present case, the Board, therefore, felt it had every justification for dealing with the main request

having regard to the fact that any decision on the auxiliary request had implicitly to deal with the issue of the inventiveness of Claim 1 according to the main request. In fact, although it was necessary for the Board to give its ruling on the procedural position at the beginning of the oral proceedings, the ultimate decision was not affected by that ruling.

4. As noted above (point IV), the Appellant relied on additional documents to support his arguments of lack of inventive step, in particular to illustrate, on the one hand, the correlation between the degree of cross-linking of polyethylene and gel content, as well as, on the other hand, the direct relationship between the degree of cross-linking of polyethylene and the mechanical properties of the composition.

The Board has considered these documents, which were obviously cited after expiration of the nine-month opposition period, in order to determine their relevance, namely their evidential weight compared with that of the documents filed in time, and has found that none of them was relevant in the above sense. It has, therefore, decided to disregard them pursuant to Article 114(2) EPC.

Main request

5. The wording of the claims does not give rise to any objections under Article 123 EPC.

Claims 1 to 14 and 16 to 20 correspond to the version of these claims as granted and originally filed. As to Claim 15, it can be regarded as the combination of Claim 15 and 21 as granted and originally filed.

6. The patent in suit concerns polyethylene compositions for rotational moulding processes. Such compositions are disclosed in document D(i), which the Board, like the Opposition Division, regards as the closest state of the art. More specifically, that citation describes particular combinations of cross-linking agents and cross-linking assistants for polyethylene compositions. The former are defined as being bis(tert.-alkyl peroxy) alkanes or bis(tert.-alkyl peroxyalkyl) benzenes, in particular α , α' -bis(tert.-butyl peroxyisopropyl) benzene, incorporated in an amount of 0.1 to 5% by weight of polyethylene; the latter are selected from the group consisting of triallyl cyanurate, triallyl isocyanurate and 1,2-polybutadiene, and are incorporated in an amount of 0.5 to 5 times the weight of the cross-linking agents. Although the articles produced by rotational moulding processes of these compositions exhibit a desirable combination of advantageous properties, in particular excellent mould-parting properties, surface gloss and size stability, their low-temperature impact strength properties cannot be regarded as satisfactory.

In the light of this shortcoming, the technical problem underlying the patent in suit can thus be seen to be the provision of polyethylene compositions suitable for rotational moulding processes having improved low-temperature impact strength properties.

According to Claim 1 of the main request this problem is to be solved by incorporating an antioxidant system consisting of a hindered phenol as main antioxidant and of di(stearyl)-pentaerythritol diphosphite, tris di(tert.-butyl phenyl) phosphite, dilauryl thiodipropionate or bis(2,4-di-tert.-butylphenyl) pentaerythritol diphosphite as secondary antioxidant, these compounds being added

respectively in the proportions of 0.01 to 0.05 and 0.01 to 0.2% by weight of polyethylene.

In view of the experimental results in the patent in suit, in particular the report in Examples III to V of impact tests carried out at -21°C and -40°C , the Board is satisfied that the above-defined technical problem has been effectively solved.

7. After examination of the documents relied upon by the Appellant and Opponent 1, the Board has come to the conclusion that this technical teaching is not disclosed in any of them and that the subject-matter of the patent in suit as defined in the main request is, therefore, novel. Since the issue of novelty has not been raised at any stage, it is not necessary to consider this matter in detail.
8. It still remains to be decided whether that subject-matter involves an inventive step having regard to the teaching of the documents relied upon by the Appellant and Opponent 1.
 - 8.1 Document D(g) describes ethylene polymer compositions suitable for the production of hollow articles by rotational moulding having high impact strength at low temperature (column 1, lines 5 to 50). These compositions are formed by incorporating into an ethylene polymer a hexyne or octyne diperoxy compound as cross-linking agent as well as between 0.02 and 0.1 weight percent, based on the weight of polyethylene, of an ester of thiodipropionic acid; the polymer of ethylene, which may be an ethylene homopolymer and/or a copolymer of ethylene and at least one acyclic straight or branched chain α -olefin hydrocarbon having 3 to 8 carbon atoms, has a melt index

of at least 10 dg/min and a density in the range of 0.920 to 0.970 g/cm³ (Claim 1; column 1, lines 52 to 60). The ester of thiodipropionic acid may be used alone or in combination with 2,6-di-t-butyl-4-methylphenol (column 4, lines 34 to 41 and lines 60 to 67).

It is first stated in general terms that high values of impact strength at low temperatures are obtained in those samples made with dilaurylthiodipropionate alone and with the combination thereof with 2,6-di-t-butyl-4-methylphenol, but not with conventional antioxidants (column 4, lines 60 to 67). The experimental data in the Table in columns 5/6 confirm that dilaurylthiodipropionate (antioxidant F) is overall a more effective antioxidant than any other conventional additive, even if in run 15 comparable results are obtained with such additives at -20°F; at the temperature of -80°F, however, the combination of dilaurylthiodipropionate and 2,6-di-t-butyl-4-methylphenol (antioxidant E) gives even better results than dilaurylthiodipropionate alone (compare runs 3 to 5). In the Board's view, that teaching looks so promising that it would represent an incentive for the skilled man to adopt a solution along the same lines in order to solve the above-defined problem.

In fact, the temperatures to be considered for the outdoor applications envisaged by the Respondent being somewhat lower than -20°F, the skilled man is more likely to choose the antioxidant known to be the most effective at the hardest testing conditions, i.e. antioxidant combination E, than to follow a teaching which gives good results at sub-minimal temperatures, i.e. antioxidant F. For this reason, the choice of the antioxidant combination E must be regarded as obvious.

8.2 This conclusion becomes all the more evident if one considers the teaching of document D(a), which deals in its introductory section with the difficulties associated with the use of organic peroxides in polyethylene compositions for rotational moulding applications.

The first difficulty is the adhesion of the organic peroxide to the mould which increases as cross-linking of polyethylene advances, so that the resulting solidified moulded article cannot be removed from the mould without using a release agent, which in turn gives rise to several difficulties in practice (column 2, lines 5 to 26). The second difficulty is that the organic peroxide decomposes to produce low molecular weight radicals which take hydrogen from the polyethylene to form low boiling point substances, which causes bubble formation in the moulded articles (column 2, lines 27 to 34). When, according to a later development in the art, acetylenic peroxides are used, this can be overcome by incorporating a diolefin polymer; when reacting with the latter, the low molecular weight radicals will form high molecular weight radicals, which do not cause bubble formation in the moulded articles (column 2, lines 35 to 49). Beside the fact that the use of a release agent is still unavoidable, a potential health hazard to operators is still involved in the manipulation of hexyne peroxides.

The compositions described in document D(a) can be regarded as an attempt to overcome the problem of adhesion of the fused polyethylene composition to the mould surface, as well as the problem of bubble formation in the moulded articles without using acetylenic peroxides and release agents (column 2, lines 51 to 57). This is achieved by using a cross-linking agent as defined in document D(i), a cross-linking aid as defined in

document D(i), and an elastomer in an amount of 5 to 50% based on the weight of polyethylene (Claim 1). It is explicitly stated that only this particular combination of cross-linking agent and cross-linking aid is able to fulfil the dual function of suppressing the bubble formation during rotational moulding and enhancing the release characteristics (column 5, lines 16 to 22).

From document D(a) as well as the technical developments analysed therein it appears thus that the choice of a given peroxide is determined less by considerations of efficiency in cross-linking than by the side-effects one seeks to avoid or to obtain. In other words, a major influence of the antioxidant on the cross-linking activity of the peroxide is not to be expected; it follows that no prejudice had to be overcome to combine the antioxidant known from document D(g) with the basic composition disclosed in document D(i).

- 8.3 This is confirmed in document D(h), discussed again by the Respondent in both its written and oral submissions.

That citation relates to the preparation of a cross-linkable polyethylene composition from a polymer of density between 0.940 and 0.965, and a premix comprising an organic peroxide, an antioxidant and optionally an UV stabiliser (Claim 1 in conjunction with page 3, lines 2/3). This composition is suitable for rotational moulding applications (page 1, paragraph 1; page 5, paragraph 4). The only three peroxides mentioned are 2,5-dimethyl-2,5-di(tert.butylperoxy)-hexyne-3; 2,5-dimethyl-2,5-di(tert.butylperoxy)-hexane and 1,3-bis(tert.butylperoxy-isopropyl)-benzene (Claim 2); it is essential to observe, first, that the acetylenic peroxide falls under the general formula of the hexynes envisaged in document D(g) and is even identical with one of the

hexynes exemplified therein (see Column 3, line 25), and, secondly, that the last-mentioned aliphatic and aromatic peroxides correspond to the curing agents used in document D(i).

Thus, the three peroxides according to document D(h), being disclosed in the framework of the same composition, may be regarded as having a broadly comparable curing activity in the presence of the antioxidants mentioned there; conversely, this means that the action of a given antioxidant is more or less the same with these three peroxides. This is supported by the fact that the aliphatic and aromatic peroxides are still described in equivalent terms in document D(a) and D(i), which can only mean that the activity of the other additives in the composition described in these two citations is not substantially affected by the choice of the curing agent. Furthermore, this is in line with the teaching of document D(g) that the low-temperature impact strength is determined by the antioxidant (column 3, lines 52 to 56; column 4, lines 34 to 38 and lines 62 to 67; columns 5/6, Table); even if no alternatives are envisaged to acetylenic peroxides, there is no evidence from that citation or the Respondent's submissions that the efficiency of the antioxidant combination E could be influenced at all by the peroxide.

- 8.4 The Respondent's argument that the elastomer is an essential ingredient of the compositions disclosed in document D(a) to obtain satisfactory mechanical properties and that, consequently, the skilled man would not even consider documents D(i) and D(g), where such compound is not even mentioned, cannot be accepted. In the Board's view, this is a restrictive analysis of document D(a),

which leads to considering the low-temperature impact strength properties in isolation and, thereby, to overlooking other essential properties.

This applies, in the first place, to the luster properties as well as to the release characteristics of the moulded articles. From Table IV it clearly appears that compositions containing 50 parts by weight based on the weight of polyethylene of an ethylene- α -olefin copolymer (elastomer A) or of a styrene-butadiene copolymer (elastomer B), both within the scope of that document, are not satisfactory in terms of their luster properties and release characteristics. This must be regarded as a significant shortcoming, since the ethylene- α -olefin copolymers are supposed to be the preferred additive among all rubbers and elastomers in that respect (column 3, line 66 to column 4, line 13).

This also applies to the mechanical properties tested in Table IV at two different temperatures. It appears that cracks are formed at 20°C as well as at -30°C when the moulded article specimen prepared from a composition containing 5 or 10 parts by weight of ethylene-butene-1 copolymer elastomer per 100 parts by weight of polyethylene is subjected to the hammer impact resistance test at these temperatures; further, even when no cracks are formed when the moulded object is struck five times at 20°C, great distortions are observed at -20°C when 30 parts by weight of ethylene-butene-1 copolymer elastomer are incorporated into 100 parts by weight of polyethylene. The properties are even poorer when a styrene-butadiene elastomer is incorporated, since none of the three compositions tested, which contain respectively 5, 20 and 50 parts by weight of that additive, gives results which are satisfactory both in terms of surface properties, i.e. luster properties and release characteristics, and

mechanical properties, i.e. Izod impact strength and hammer impact resistance.

Although it is not disputed that the incorporation of a rubber and/or elastomer into the polyethylene compositions tends to improve the above-mentioned surface and mechanical properties, these properties overall cannot be regarded as optimal. The definition of the problem underlying the patent in suit on the basis of that teaching would thus involve the improvement of several properties and, therefore, be more complex than on the basis of document D(i), from which it follows that only the improvement of the low-temperature impact strength properties is desired. For that reason, document D(i) represents a closer state of the art than document D(a).

In fact, the approach advocated by the Respondent is based on the assumption that the rubber or elastomer ingredient present in the compositions described in document D(a) is absent from the claimed compositions. In the Board's view, this difference is merely formal and, in any case, is not reflected in the wording of the composition claim; the main claim, on the contrary, is defined as "comprising", which leaves open the possibility of incorporating further additives, thus in particular a rubber or elastomer within the terms of document D(a). For this reason, too, the Respondent's argument cannot be accepted.

- 8.5 In conclusion, the claimed subject-matter as defined in Claim 1 of the main request is nothing more than the modification of the compositions disclosed in document D(i) in accordance with the teaching of document D(g). That step being obvious in view of the technical problem to be solved, no inventive step can be acknowledged.

9. Claim 1 not being allowable, the same applies to the dependent Claims 2 to 14, which are directed to preferred embodiments of the subject-matter of the main composition claim and thus fall with it. The same applies to the process Claims 15 to 20, since a request can only be considered as a whole.

Auxiliary request

10. No objection to the wording of the claims arises having regard to Article 123 EPC.

As stated in point III above, Claims 1 to 6 correspond to the process Claims 15 to 20 as granted and originally filed, with the exception that Claim 1 as the main process claim has been completed as follows "... and ensuring in the resultant product a gel content of at least 75% by weight". This feature is supported by Claim 21 as granted and originally filed.

11. In comparison with Claim 1 of the main request, Claim 1 of the auxiliary request differs by being formulated as a process claim and by the requirement of a minimum gel content of 75%. Since during oral proceedings the Appellant no longer maintained the objection raised in the Statement of Grounds of Appeal (see page 3, paragraph 2) that the skilled man would not know how to obtain such a gel (Article 100(b) EPC), it remains to be examined whether the change of category of claim and/or the condition regarding the gel content involve(s) an inventive step.

From the Respondent's submissions it does not appear that the combination of compositional features known from document D(i) and D(g), i.e. the use of dilaurylthiodipropionate together with 2,6-di-t-butyl-4-

methylphenol as special additives in the basic composition known from document D(i), results in the improvement of properties other than the low-temperature impact strength of the rotationally moulded articles. This effect being expected, the fact that the main claim is now formulated as a process claim does not change the negative conclusion reached by Board regarding the patentability of the composition claim.

Although neither explicit values of gel content, nor even a suitable range for that parameter are to be found in the documents relied upon by the Appellant, document D(a) underlines nevertheless the positive influence of an enhanced degree of cross-linking on the impact resistance properties of rotationally moulded articles (column 2, lines 57 to 65). This statement can only be interpreted as meaning that the gel content should be high enough if the properties of the articles obtained by a rotational moulding process are to be satisfactory. The quantitative feature introduced by the Respondent is no different from that condition expressed for the compositions used in the claimed process. As pointed out by the Board, the existence of such a limit is self-evident and the determination thereof does not give rise to particular difficulties. In a sense, that parameter is even superfluous in that it represents the conditions which the skilled man would self-evidently choose in order to obtain moulded articles having good general properties; as such, it is nothing other than a functional definition of the claimed compositions corresponding to optimal properties. It follows that the lower limit of gel content does not represent an inventive feature and that the argument that there is an inventive selection invention cannot be accepted.

The subject-matter of the main process claim, therefore, does not involve an inventive step.

12. Claim 1 not being allowable, the same applies to the dependent Claims 2 to 6, which are directed to preferred embodiments of the subject-matter of the main process claim and thus fall with it.

Order


For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:


E. Gergmaier

The Chairman:


C. Gérardin