

Publication in the Official Journal ~~Yes~~ / No

File Number: T 743/89 - 3.3.3  
Application No.: 83 104 492.0  
Publication No.: 0 095 078  
Title of invention: Stabilized olefin polymer compositions and their use for  
preparing shaped articles

Classification: C08L 23/02

D E C I S I O N  
of 27 January 1992

Proprietor of the patent: BORG-WARNER CHEMICALS INC.

Opponent: CIBA-GEIGY AG Patentabteilung

Headword:

EPC Article 56

Keyword: "Document available to the public (yes) - balance of  
probabilities"  
"Inventive step (no) - prior art pointing to the solution claimed -  
absence of surprising effect"

Headnote



Europäisches  
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des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Case Number : T 743/89 - 3.3.3

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.3  
of 27 January 1992

**Appellant :**  
(Opponent)

CIBA-GEIGY AG  
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**Respondent :**  
(Proprietor of the patent)

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**Decision under appeal :**

Interlocutory decision of the Opposition Division  
of the European Patent Office dated  
29 September 1989 concerning maintenance of  
European patent No. 0 095 078 in amended form.

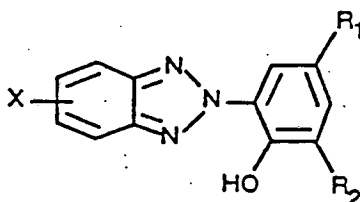
**Composition of the Board :**

**Chairman :** F. Antony  
**Members :** C. Gérardin  
R. Schulte

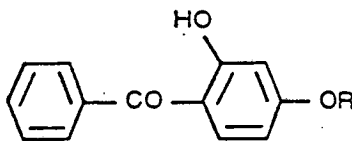
Summary of Facts and Submissions

I. The mention of the grant of the patent No. 0 095 078 in respect of European patent application No. 83 104 492.0 filed on 6 May 1983 and claiming priority of 7 May 1982 of two earlier applications in the United States, was published on the basis of 10 claims, of which Claim 1 read as follows:

"A polymer composition stabilized against deterioration in the presence of ultraviolet radiation comprising an olefin polymer and stabilizing amounts of (1) a hydroxyphenyl-benzotriazole having the structural formula



where R<sub>1</sub> is lower alkyl or halogen, R<sub>2</sub> is lower alkyl, halogen or hydrogen, and X is chlorine or hydrogen or a hydroxybenzophenone having the structure



where R is an alkyl group of 1-10 carbon atoms, and (2) a bis-(dialkylphenyl)pentaerythritol diphosphite where the alkyl groups each contain 3-9 carbon atoms."

Whereas Claims 2 to 7 and 9 were dependent claims directed to preferred compositions according to the main claim, Claim 8 was a formally independent composition claim concerning polypropylene stabilised with the combination of a specific triazole component (1) and a specific diphosphite component (2). Further, Claim 10 dealt with

the use of these polymer compositions for preparing shaped articles.

II. On 28 March 1987 the Opponent filed a Notice of Opposition against the grant of the patent and requested revocation thereof for lack of novelty as well as lack of inventive step under Article 100(a) EPC. These objections, which were emphasised and elaborated in a later submission as well as during oral proceedings, were based essentially on the following documents:

(1) Technical leaflet WESTON MDW 626 of Borg-Warner Chemicals Inc.,

(2) US-A-4 206 111.

Regarding document (1), the Patentee objected that, in spite of the encoded printing date thereon (October 1981), there was no evidence that this commercial brochure had actually been made available to the public before the priority date of the patent in suit.

III. By an interlocutory decision issued on 29 September 1989, the Opposition Division maintained the patent in amended form, the amendments consisting in the deletion of Claim 9, and of the reference to compositions comprising a hydroxybenzophenone as component (1) from Claim 1, as well as in the appropriate modifications in the description. It was first stated in that decision that document (1) was not anticipatory to the remaining alternative, i.e. the polymer compositions comprising a triazole as component (1) and a diphosphite, so that novelty had to be acknowledged. Further, the claimed subject-matter involved an inventive step with regard to the teaching of document (2), considered to be the closest prior art, which disclosed stabilising combinations of a

hydroxyphenylbenzotriazole and dialkylpentaerythritol diphosphites; since nothing in the documents relied upon by the Opponent suggested the use of bis-(dialkylphenyl)pentaerythritol diphosphites in such combinations, the beneficial effects demonstrated in Table III of the patent in suit were regarded as surprising. As far as document (1) was concerned, it was held, on the balance of probabilities, that this citation had actually been made available to the public before the critical date.

IV. The Opponent (Appellant) thereafter lodged a Notice of Appeal on 24 November 1989 and paid the prescribed fee at the same time. In the Statement of Grounds of Appeal filed on 26 January 1990 it was first relied on the arguments submitted in the course of the opposition procedure. In support of the objection of lack of inventive step it was further referred to the following additional document:

(5) JP-A-54/25 951 (English translation),

which emphasised the superiority of bis-(dialkylphenyl)pentaerythritol diphosphites over the corresponding dialkyl compounds and even taught that combinations of such aromatic phosphites and benzotriazoles conferred improved light resistance to polymer compositions.

V. By letter of 21 June 1991 confirmed on 30 August 1991 the Respondent (Patentee) informed the Board that no counterstatement would be filed and that he would not participate in any oral hearing which might take place.

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

The Respondent requested 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.
2. As it appears from point IV above, the Appellant relies to a large extent on a new document, i.e. document (5), to support the objection of lack of inventive step. The Board has considered that late-filed citation, which was cited for the first time nearly three years after expiration of the nine-month opposition period, in order to determine its relevance, namely its evidential weight compared with that of the documents filed on time, and has found that it was sufficiently relevant in the above sense to be accepted pursuant to Article 114(2) EPC. The reasons therefor will become apparent in point 7.2 hereinafter.
3. The next point to be examined concerns the public availability of document (1) at the priority date of the patent in suit. Although, in the absence of a counterstatement, no argument has been provided by the Respondent against the Opposition Division's approach and the reasons given in the final paragraph of the decision under appeal, the Board deems it appropriate to deal with this question in view of the importance of that citation for the issue of inventive step.

The objection raised by the Respondent against taking document (1) into account boils down to the argument that it is not appropriate to derive from the printing date of October 1981 that the brochure was actually available before 7 May 1982 (cf. reply of 23 November 1987, point IV(a)(1)). As stated in the decision T 381/87

published in OJ EPO 1990, 213, where the Board was faced with a similar problem of availability of a document to the public, the EPO must decide what happened, having regard to the available evidence, on the balance of probabilities: i.e. it must decide what is more likely than not to have happened (cf. Reasons for the Decision, point 4.4).

In the present case, document (1) is a commercial pamphlet, wherein the advantages in terms of UV stabilisation of polypropylene compositions of bis-(2,4-di-t-butylphenyl)pentaerythritol diphosphite (WESTON MDW 626) over other organic phosphites, especially distearyl pentaerythritol diphosphite (WESTON 618) equally produced by the Respondent's company, and further conventional additives are abundantly illustrated (see in particular page 7, righthand Table). It is self-evident that it was in the Respondent's own interest to ensure wide-spread distribution of the brochure in order to inform as many potential customers as possible of this latest development in a highly competitive field. Even if it cannot be specified now, i.e. 10 years later, how much time elapsed after October 1981 before the actual distribution occurred, it can reasonably be assumed that it took place within less than 7 months and had thus been completed well before the priority date of the patent in suit. The opposite assumption, that the brochure had been kept confidential until at least 7 May 1982, is so little plausible that, in the Board's view, the onus of proof is incumbent on the Respondent who incidentally, being the originator of the pamphlet, should be in the possession of the necessary information. In other words, in the absence of any evidence to the contrary provided by the Respondent, his argument cannot cast sufficient doubts as to the public availability of document (1) before the relevant date.

For these reasons, on the balance of probabilities, the Board concludes that document (1) was available to the public before the priority date of the patent in suit and is, consequently, comprised in the state of the art.

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

More specifically, Claim 1 corresponds to Claim 1 as granted and originally filed, but restricted to the combinations comprising a triazole as component (1). Further, Claims 2 to 8 are identical to Claims 2 to 8 as granted and originally filed. As to Claim 9, it corresponds, after adjustment of the appendancy, to Claim 10 as granted and originally filed.

5. The patent in suit concerns stabilised olefin polymer compositions and their use for preparing shaped articles. Similar polyolefin compositions are disclosed in document (2), which the Board, like the Opposition Division, regards as the closest state of the art. More specifically, that citation describes an ultraviolet stabiliser for olefin polymers, comprising a combination of a 2-hydroxyphenylbenzotriazole, a dialkylpentaerythritol diphosphite wherein the alkyl groups each contain 8 to 20 carbon atoms, and a phenolic ester oxidation inhibitor (Claim 1). The olefin polymers which are benefitted by the above combination of stabilising additives include homopolymers and copolymers of monoolefins having preferably 1 to 4 carbon atoms, in particular polypropylene (column 5, lines 19 to 27). The general definition (column 2, lines 17 to 32) of the 2-hydroxyphenylbenzotriazoles, including the meaning of the radicals  $R_1$ ,  $R_2$  and X, corresponds to that of component (1) in Claim 1 of the patent in suit; there is even



identity between the triazoles explicitly exemplified (column 2, lines 33 to 47), with the exception of the fourth one, and the nine compounds quoted in the patent in suit (compare page 2, line 64 to page 3, line 6). The dialkylpentaerythritol diphosphite component, which may be either the spiro or the cage isomer, or a mixture, in any proportion, of the two, is said to enhance the effectiveness of the triazole ultraviolet stabiliser (column 2, lines 5 to 10; column 3, lines 26 to 38). However, in spite of the spectacular improvement observed in the Table in column 5, where test samples containing a triazole alone (test sample 3) and a combination of triazole and diphosphite (test sample 5) are compared by analysis of carbonyl content formed, the degree of stabilisation achieved still cannot be regarded as optimal.

In the light of this shortcoming the technical problem underlying the patent in suit can thus be seen in providing olefin polymer compositions having improved stabilisation against deterioration and degradation resulting from prolonged exposure to ultraviolet light.

According to the patent in suit this problem is solved by replacing the dialkylpentaerythritol diphosphite by a bis-(dialkylphenyl)pentaerythritol diphosphite in the above compositions.

In view of the experimental data in Table III of the patent in suit, which show the improved resistance to the deteriorative influence of ultraviolet light on polypropylene multifilament (compare test sample (3) according to the patent in suit and test sample (2) according to document (2)), the Board is satisfied that the above-defined technical problem is effectively solved.

6. After examination of the cited documents the Board has come to the conclusion that a ternary composition as claimed is not disclosed in any one of them and that the subject-matter of the patent in suit according to Claim 1 is, therefore, novel. Since the issue of novelty is no longer raised by the Appellant, it is not necessary to consider this matter in detail.
  
7. It still remains to be decided whether the subject-matter of the patent in suit as defined in Claim 1 involves an inventive step with regard to the teaching of the documents relied upon by the Appellant.
  
- 7.1 A direct comparison between dialkylpentaerythritol diphosphite and bis-(dialkylphenyl)pentaerythritol diphosphite, more specifically between distearyl pentaerythritol diphosphite or WESTON 618 and bis-(2,4-ditertiarybutylphenyl)pentaerythritol diphosphite or WESTON MDW 626, is to be found in document (1). This comparison is not limited to stabilisation against ultraviolet light, but extends to various properties related thereto, in particular thermal stability and colour stability, which reflect various forms of degradation caused by the breaking of carbon-to-carbon bonds in the polymer chain followed by immediate oxidation of the chain fragments, as explained in document (2) (column 1, lines 15 to 24).

The first element of comparison is provided by the changes in colour during injection moulding and thermal ageing of high density polyethylene, when the latter is stabilised by compositions comprising WESTON 618 or WESTON MDW 626 (page 4, righthand diagrams). In the three cases allowing

a direct comparison - namely compositions 3 and 4, 6 and 7, 8 and 9 - the results clearly demonstrate that WESTON MDW 626 improves the processing stability of the polymer.

Similarly, the experimental data on page 6 show that WESTON MDW 626 improves the lifetime of thermally aged polypropylene (Table "Thermal Stability", comparison between stabilised formulations 1 and 3, 2 and 4) as well as the colour stability during processing and thermal ageing of polypropylene (Table "Color Stability", comparison between stabilised formulations 1 and 3, 2 and 4).

Furthermore, in the second part of the righthand Table on page 7, it is shown that WESTON MDW 626 improves the polymer performance while reducing formulation costs (compare results for formulations 3 and 4).

From the foregoing it can be concluded that WESTON MDW 626 has a higher stabilising effect than WESTON 618, in particular against deterioration caused by ultraviolet radiation, in polyolefin compositions.

7.2 A similar conclusion arises from document (5). Starting with general considerations about the stabilisation of synthetic resins, this citation first mentions the drawbacks of conventional phosphite compounds, in particular distearyl-pentaerythritol diphosphite referred to as WESTON 618 hereinabove, both in terms of water-resistance and effectiveness (page 2, lines 2 to 25). According to the general teaching of document (5), these shortcomings can be overcome by using a diaryl-pentaerythritol diphosphite of formula (I), wherein each of the aromatic nuclei bears a tertiary butyl group or a tertiary amyl group in one of the o-positions (cf.

page 1, Claim). The compound identified as A4 in Table 1 on page 3 is bis-(2,4-ditertiarybutylphenyl)-pentaerythritol diphosphate referred to as WESTON MDW 626 in document (1). The compounds of formula (I) are said to improve both the heat resistance and the light resistance of polymers, such as polyolefins (page 2, line 26 to page 3, line 2; page 4, lines 24 to 28); the latter effect can even be enhanced by adding a light stabiliser, especially benzotriazoles falling under the formula of component (1) in Claim 1 of the patent in suit (page 6, lines 17 to 24).

These improvements can be appreciated quantitatively by means of the comparative data in Table 2 on page 12, which illustrate the results of the tests carried out in Example 1, wherein test pieces of compression moulded polypropylene compositions are subjected to heat treatment in a Geer oven at 160°C or to irradiation with a fluorescent lamp for 72 hours. Both the heat stability and the degree of yellowing of these compositions are improved by replacing WESTON 618 according to the prior art (Comparative Example 1-2) by a diphosphate of formula (I) (Examples 1-1 to 1-8). Likewise, as shown in Table 4 on page 13, the oxidation deterioration process of compression moulded polybutene test pieces, when these are subjected to a heat deterioration test, starts later when the polybutene composition contains a compound according to formula (I) (Examples 3-1 to 3-7) than when the stabiliser is diisodecylpentaerythritol diphosphate (Comparative Example 3-3).

This shows that the teaching of document (5) fully confirms the conclusion which arises from document (1). This means as well that, even if, for the sake of argument, one followed the Respondent's contention regarding the non-availability of document (1) at the

priority date of the patent in suit and, consequently, disregarded this brochure, the technical information made available to the skilled man would remain the same.

- 7.3 That information provides thus a strong incentive for the skilled man to replace WESTON 618 in the compositions described in document (2) by WESTON MDW 626, whose intrinsic stabilising activity against degradation caused by ultraviolet radiation is known to be higher and which is said to be compatible with benzotriazoles; as such, the solution claimed by the Respondent is thus obvious. The advantages demonstrated in the patent in suit are not disputed; however, they cannot be regarded as surprising and, thereby, support an inventive step, since they correspond in essence to what was actually to be expected.

As to the exact definition of components (2) according to the patent in suit, i.e. in particular the condition for the aromatic nuclei to be substituted each by one alkyl radical having 3 to 9 carbon atoms, it can be regarded as mere optimisation based on routine experiments and, further, on the experimental data in document (5), which show the influence of substitution as such (see Tables 2 and 7, wherein unsubstituted compounds are used) as well as the influence of the type of radical and the number thereof (see Tables 2 to 7).

For these various reasons, the subject-matter of Claim 1 does not involve an inventive step.

8. In the absence of a separate request directed to the specific features mentioned in the dependent Claims 2 to 9, the latter must fall with the main claim, since a request can only be considered as a whole. Besides, no

argument in favour of the inventiveness of any of these features has been provided by the Respondent.

**Order**


For these reasons, it is decided that:

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

The Registrar:

  
E. Görgmaier

The Chairman:

  
F. Antony