

Internal distribution code:

- (A) [] Publication in OJ
(B) [] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 10 February 1994

Case Number: T 0106/91 - 3.3.3

Application Number: 83301281.8

Publication Number: 0088633

IPC: C08J 3/20

Language of the proceedings: EN

Title of invention:

Use of iron oxide pigments in a polymethyl methacrylate article

Patentee:

E.I. du Pont de Nemours and Company

Opponent:

Imperial Chemical Industries PLC

Headword:

-

Relevant legal norms:

EPC Art. 56

Keyword:

"New effect - reformulation of problem (allowed) - further evidence of general knowledge - patent revoked"

Decisions cited:

T 0184/82, T 0732/89

Catchword:

-



Case Number: T 0106/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 10 February 1994

Appellant: Imperial Chemical Industries PLC
(Opponent) Legal Department Patents
PO Box 6
Bessemer Road
Welwyn Garden City
Hertfordshire AL7 1HD (GB)

Representative: Nevard, Edward John
ICI Group Patents Services Dept.
PO Box 6
Bessemer Road
Welwyn Garden City
Hertfordshire AL7 1HD (GB)

Respondent: E.I. du Pont de Nemours and Company
(Proprietor of the patent) 1007 Market Street
Wilmington
Delaware 19898 (US)

Representative: Jones, Alan John
Carpmaels & Ransford
43 Bloomsbury Square
London WC1A 2RA (GB)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office dated 20 December 1990
rejecting the opposition filed against European
patent No. 0 088 633 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: F. Antony
Members: R. Young
J.A. Stephens-Ofner

Summary of Facts and Submissions.

I. The mention of the grant of European patent No. 0 088 633 in respect of European patent application No. 83 301 281.8, filed on 9 March 1983 and claiming a US priority of 10 March 1982 (Application No. 0 356 717) was announced on 7 January 1988 (cf. Bulletin 88/01).

The independent Claims 1, 3 and 5 read, respectively, as follows:

"1. A process for preparing a filled polymethyl methacrylate article, said article comprising 20 to 85% by weight alumina trihydrate and 15 to 80% by weight polymethyl methacrylate, said process comprising curing a polymerizable composition consisting essentially of polymerizable methyl methacrylate and alumina trihydrate, characterised in that a measured amount of a dispersion of iron oxide pigments in a vehicle compatible with the acrylic composition is added to said polymerizable composition prior to curing, said iron oxide pigments having a particle size of 10 μm or less.

3. A polymerizable composition comprising 15 to 80% by weight polymerizable methyl methacrylate and 20 to 85% by weight alumina trihydrate, characterised in that said composition additionally contains a dispersion of iron oxide pigments in a vehicle compatible with the acrylic composition, said iron oxide pigments having a particle size of 10 μm or less.

5. A filled polymethyl methacrylate article consisting essentially of 20 to 85% by weight alumina trihydrate, 15 to 80% by weight polymethyl methacrylate, and a quantity of iron oxide pigments, having a particle size of 10 μm or less, sufficient to impart to said article a

desired color, said article being translucent and having an appearance of visual depth."

II. Notice of Opposition was filed on 30 September 1988, alleging lack of inventive step. The Opposition was supported *inter alia* by the documents:

D1: US-A-3 847 865, and the later cited, but admitted

D3: Brochure of Bayer "Inorganic White and Colour Pigments for the Colouring of Plastics" (1976).

III. By a decision which was issued on 20 December 1990, the Opposition Division rejected the opposition.

According to the decision, it was held that the correct statement of the technical problem arising from the closest prior art document D1, which disclosed a filled polymethylmethacrylate article according to the precharacterising part of Claim 1 and having translucency, resistance to scratch-white and good machinability, could be seen as the provision of a pleasing, uniform colour, filled polymethyl methacrylate showing improved UV resistance as compared with an unpigmented polymethylmethacrylate structure (cf. section II/3.3 of decision under appeal). The solution claimed - addition of iron oxide pigments - was novel (which was not in dispute). While no other unexpected effect had been proved to exist, an inventive step could be recognised in respect of the improved resistance to UV exposure as compared with an unpigmented polymethylmethacrylate.

IV. On 29 January 1991 a Notice of Appeal against the above decision was filed, together with payment of the prescribed fee.

In the Grounds of Appeal filed on 16 April 1991, the Appellant (Opponent) argued that it was common general knowledge that iron oxide pigments were pre-eminent as pigments which screened out UV radiation and prevented the breakdown of polymers, and to prove this referred in the Grounds of Appeal to:

D5: excerpts from a "Pigment Handbook", Vol. 1,
Temple C. Patton (Ed.), John Wiley and Sons, 1973.

Furthermore, as additional evidence for this and with respect to maintenance of transparency, reference was made - in a submission dated 10 December 1993 - to:

D8: J. Oil Col. Chem. Assoc. 1978, 61, 79-85,
P. Marvuglio et al., "The ultraviolet screening
behaviour of pigments".

The Appellant also alleged that most pigments had some protective effect with respect to UV light (as compared to no pigment), so that iron oxide pigments could not be regarded as exclusive in this respect.

V. The Respondent (Patentee), on the other hand, argued, in written submissions and at the oral proceedings held on 10 February 1994, essentially as follows:

- (i) The true mechanism of polymer breakdown was more complex than suggested by the Appellant, involving both direct photochemical degradation of the polymer by UV radiation and photo-activation of the pigment by the UV radiation, followed by degradation of the polymer by the photoactivated pigment. This latter aspect was illustrated with reference to certain documents.

- (ii) There was no suggestion in the prior art that the problems of masking of translucency and loss of mechanical properties could be overcome, and relative stability of translucency maintained, compared with, say, anatase titania, by the use of iron oxide pigments.
- (iii) D5 only mentioned iron oxide pigments and therefore did not permit any conclusions regarding the effects relative to other pigments. The implication in it that the life of any binder would be prolonged by including a UV-absorbing pigment was directly contrary to experience.
- (iv) D8 referred to UV screening behaviour but stated that the absorption varied for each particular polymer; polymethylmethacrylate differed, however, in its UV absorption behaviour, from the styrene polymers principally dealt with, as could be seen from the data in Table 1; this reference therefore gave no guidance for plastics based on polymethylmethacrylate.

VI. Although an amended set of claims had been filed with the Respondent's submission dated 23 April 1993, at the oral proceedings, the Respondent cancelled the request based on the amended set of claims and reverted to the claims of the patent as granted as his sole request.

VII. The Appellant requests that the decision under appeal be set aside and that the European patent No. 0 088 633 be revoked.

The Respondent requests that the appeal be dismissed and the patent be maintained as granted.

Reasons for the Decision

1. The appeal is admissible.
2. With regard to the documents referred to by the Respondent for the first time in the appeal (see submission filed on 29 December 1991), these were excluded by the Board under Article 114(2) EPC, since their subject-matter was regarded as irrelevant to the presence or absence of an inventive step. Furthermore, one of them had a publication date of 1988 and therefore could not be regarded as illustrating the common general knowledge at the filing date.

On the other hand D5 cited with the appeal grounds was evidence for such common general knowledge and hence was admitted; and D8, although filed in unnecessarily late response to the Respondent's submission dated 23 April 1993, was sufficiently relevant for the Board to admit it as well.

3. There are no formal objections under Article 123(2) and (3) EPC to the patent in suit, since the main and sole request of the Respondent is in respect of the claims of the patent in suit as granted, and no formal objections have been raised by the parties against these claims.
4. The patent in suit, in its product aspect, relates to a pigmented, alumina trihydrate-filled polymethyl methacrylate. Such products are known, for instance from D1, which is considered to be the closest state of the art.
 - 4.1 According to D1, the use of alumina trihydrate as a filler in acrylic polymers gives rise to a structure with a translucency that far exceeds that of acrylic

structures filled with other materials such as calcium carbonate or (anhydrous) alumina (column 2, lines 6 to 9).

- 4.2 A simulated marble article is formed *inter alia* from a polymer of methyl methacrylate having a pigmentation, and between 20-85% by weight of alumina trihydrate additive, the article being translucent (cf. Claim 1).

Thus, when alumina trihydrate is incorporated, the internal pigmentation as well as the surface pigmentation contributes to the "marbleized effect", even in highly filled and thin sections. The structure is resistant to staining and thus useful in kitchen and bathroom countertops (column 2, lines 12 to 25).

- 4.3 In addition, the product can be easily machined by conventional techniques (column 3, lines 13 to 15).

5. *The technical problem and its solution*

Compared with this state of the art, the technical problem could be seen in the search for a filled polymethylmethacrylate having (i) a pleasing, uniform colour other than white without diminution in desired properties of translucency (visual depth) and machinability, and (ii) an improved UV resistance as compared with an unpigmented polymethylmethacrylate structure.

- 5.1 In permitting a reformulation of the technical problem as set out in the patent in suit (see column 2, lines 27 to 31) to include requirement (ii), even though neither D1 nor the patent in suit itself makes explicit reference to UV resistance, the Board has followed the approach adopted in the decision under appeal (cf. Reasons for the Decision, paragraph 3.3, last sentence).

This re-definition of the problem is considered to be justified in the light of the relevant jurisprudence, as set out in the decision T 0184/82 (OJ EPO 1984, 261), where the Board allowed the re-definition of the problem regarding the effect of an invention provided that the skilled person "could recognise the same as implied or related to the problem initially suggested". The same approach was followed also in the decision T 0732/89 of 7 October 1992 (not published in full, but to be reviewed in OJ EPO).

- 5.2 In the present case, the statement in the introductory description that the patent in suit relates to "cast slabs, sheets, and article useful in the building arts, more particularly ... construction details and applications such as kitchen counter tops and back splash panels, bathroom vanity tops and bowls, and other molded articles such as towel racks" (column 1, lines 4 to 12) in the Board's view clearly implies a requirement for relatively long term daylight-fastness, and in particular a fastness to UV light.
- 5.3 The solution was to incorporate an iron oxide pigment having a particle size of 10 μm or less.
- 5.4 It is true that the sets of data provided for delta E, the colour difference in various pigmented and unpigmented acrylic products after exposure to UV light in an accelerated aging test, provided by the Appellant, are not numerically entirely consistent with those of the Respondent, in particular as far as the pigments other than iron oxide are concerned. Nevertheless these data are in qualitative agreement that red iron oxide and yellow iron oxide both provide a lower (i.e. improved) value of delta E compared with an unpigmented control (see Appendix I to the Grounds of Appeal and the comparison table in the Annex to the submission dated

28 December 1991). The latest figures provided by the Respondent (see letter dated 23 April 1993, page 3) confirm the above findings for iron oxide pigments. These were, moreover, uncontested as to their accuracy.

Considered together with the results of the Example of the patent in suit, according to which a translucent almond colour was achieved, it is thus credible that the claimed measure provides an effective solution of the technical problem.

6. *Novelty*

None of the documents cited discloses a filled polymethylmethacrylate containing both an alumina trihydrate filler and an iron oxide pigment.

The subject-matter claimed in the patent in suit is thus novel. Novelty was in any case not contested in these proceedings.

7. *Inventive step*

To determine the issue of inventive step, it is necessary to establish whether the skilled person, starting from the pigmented, alumina trihydrate-filled polymethylmethacrylate structure of D1, would have expected that by incorporating, as the pigment, an iron oxide of the stated particle size, a measure of UV resistance could be imparted as well as a pleasing, uniform colour, without diminishing the other desirable qualities of the product.

7.1 The product of D1 has an internal as well as a surface pigmentation (cf. column 2, lines 6 to 19). Furthermore, although the precise nature of the pigment is not specified in D1, it is evident that the resulting

product (a household surface) is intended to have a pleasing appearance, with the marbled mass itself being relatively uniformly pigmented.

- 7.2 It was, moreover, known from D5, a standard compendium on pigments, clearly belonging to the general knowledge of the skilled person, that synthetic red iron oxide pigments were strong absorbers in the UV range which protected the binders in plastic, paint, paper and fibre compositions from sunlight attack. They worked well "in nearly every plastic, rubber or fibre system" without introducing problems of chemical breakdown (pages 337, left-hand column). Similar considerations applied to synthetic yellow and brown iron oxide pigments (pages 342, 346, respectively). Low opacity (transparent) synthetic yellow oxide pigments were furthermore available on the market, and were characterised by a very fine particle size of 0.01 to 0.1 μm (page 343 supplied with the Appellant's letter dated 25 January 1994).

Clearly, their capability of protection of a wide range of matrices against UV, as well as their qualities of transparency and small particle size, would make the iron oxide pigments, especially the synthetic yellow pigments, obviously suitable candidates offering a solution to all the aspects of the technical problem as stated.

- 7.3 The argument that D5 only deals with iron oxide pigments and that therefore no comparison with other pigments is possible is irrelevant, since the statement of problem requires only a degree of UV resistance compared with the unpigmented structure. The statements in D5 that the pigments "protect the binders", and "work well ...

without problems of ... chemical breakdown" (page 337, left-hand column) clearly identify the pigments as fulfilling this requirement.

7.4 The arguments of the Respondent regarding the mechanism of UV degradation are also irrelevant. In the first place, the phenomenon of photoactivity was only shown in connection with certain titania pigments, and no reason was given why the skilled person should have expected this problem to extend generally to other pigments, let alone specifically to iron oxide pigments. In the second place, titania is in principle a white (colourless) pigment and the problems, such as masking, arising in connection with it would in any case not automatically apply in the same way to a coloured pigment. Finally, and most important, D5 gives a practical instruction, and this must be understood to be valid regardless of the mechanisms involved.

7.5 The uncontested data provided by the Respondent (see letter dated 23 April 1993, page 3) in this connection show that even the highly photoactive anatase titania pigment provides some measure of UV protection compared with the unpigmented material - at least up to a pigment loading of 0.015 wt.%. This is closer to the levels employed in the Example of the patent in suit than the very high level of 0.375 pph canvassed as relevant by the Respondent. The latter level, according to the uncontested argument and sample submitted by the Appellant at the oral proceedings, would, in the case of an iron oxide pigment, have corresponded to complete opacity anyway.

According to the same data, moreover, the rutile titania pigment shows improved delta E values for all the levels of incorporation tested.

Thus it is evident that the behaviour of anatase titania cannot be taken as applying generally to all pigments, or even to other titanias, let alone iron oxides.

7.6 On the contrary, the Respondent's own figures lend support to the argument of the Appellant, that most pigments provide some degree of protection against UV (cf. Grounds of Appeal, fifth paragraph), while refuting the assertion of the Respondent that this was contrary to experience in the art (cf. submission dated 28 December 1991, paragraph 5(i)).

7.7 All in all, it can be concluded that the skilled person had no reason to doubt that iron oxide pigments had exactly the properties ascribed to them in the literature, namely of providing effective protection against UV. Furthermore, the commercial availability of transparent grades of very small particle size would have meant that no loss of translucency would be expected. Finally, the incorporation levels illustrated in the patent in suit, which are of the order of hundredths of a percent by weight of the product, would not have given rise to any fears of a significant change in mechanical properties such as machinability. This latter point was conceded by the Respondent during the oral proceedings.

7.8 Any noticeable difference between these levels and other levels disclosed in the state of the art could not itself form the starting point of a significant effect, however, because the solution of the technical problem as claimed is not limited to any particular level of pigment addition.

Consequently, the solution of the technical problem arises in an obvious way from the closest state of the art D1 in the light of the general knowledge of the skilled person as illustrated by D5.

8. For this reason it is not necessary to consider in detail the contents of D8, nor to go into the arguments of the Respondent as to the extent of its relevance to polymethylmethacrylate, as opposed to other polymer products.
9. For analogous reasons it is not necessary to consider the precise degree of relevance of the document D3, save to note that it contains nothing which could be regarded as contradictory to what is taught in D5.

It must, however, be said in this connection, that if no additional evidence such as that provided by D5 had been available to the Board, it would have been compelled to concur with the conclusions drawn on the basis of D3 alone in the decision under appeal.

10. It is therefore in the light of the further evidence provided by the Appellant that the solution of the technical problem is obvious.

Consequently the subject-matter of Claim 5 at least of the patent in suit, which is directed to the features of this solution, does not involve an inventive step within the meaning of Article 56 EPC.

11. Since no further requests were presented, this deficiency alone must lead to a revocation of the patent in suit as a whole.

Order

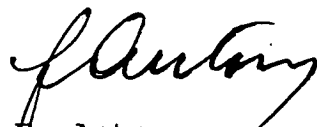
For these reasons, it is decided that:

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

The Registrar:


E. Gorgmaier

The Chairman:


F. Antony