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D E C I S I O N
of 22 January 1997

Case Number: T 0544/94 - 3.3.2

Application Number: 87304425.9

Publication Number: 0291590

IPC: C04B 24/16

Language of the proceedings: EN

Title of invention:
Cement dispersant

Patentee:
NIPPON SHOKUBAI CO., LTD.

Opponent:
HOECHST Aktiengesellschaft Werk Kalle-Albert

Headword:
Cement dispersant/NIPPON SHOKUBAI

Relevant legal provisions:
EPC Art. 54, 56, 104(1), 123(2)
EPC R. 88

Keyword:
"Amendments - allowed"
"Novelty - yes"
"Inventive step - yes"
"Apportionment of costs - no"

Decisions cited:
T 0012/81, T 0176/84, T 0112/92, T 0170/83

Catchword:
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Case Number: T 0544/94 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 22 January 1997

Appellant: (Opponent)
HOECHST Aktiengesellshaft
Werk Kalle-Albert
Zentrale Patenabteilung KA
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Respondent: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 18 May 1994 rejecting the opposition filed against European patent No. 0 291 590 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: P. A. M. Lançon
Members: G. J. Wassenaar
J. Van Moer

Summary of Facts and Submissions

I. European patent No. 0 291 590 was granted with 12 claims on the basis of European patent application No. 87 304 425.9.

II. A notice of opposition was filed by the appellants, requesting revocation of the patent in its entirety on the grounds of lack of novelty, lack of inventive step and unallowable amendments (Articles 100(a) and 100(c) EPC).

Five documents were cited during the opposition proceedings, of which the following remain relevant to this decision:

(1) DE-A-3123732
(2) DE-A-3244989
(3) DE-C-2644776

III. The opposition division rejected the opposition and maintained the patent as granted.

Claim 1 as granted reads as follows:

1. The use of a material including a main component comprising at least one water-soluble polymer selected from the group consisting of polymers obtained from (A) 0.1 to 100 mol% of a sulphonic acid type monomer represented by the formula I:

$$(CH_2 = \underset{\displaystyle R}{\underset{|}{C}}-CO_2--(AO)_m-B-SO_3)nX \qquad (I)$$

wherein: R stands for a hydrogen atom or a methyl group; n = 1 or 2, when n = 1 X stands for a hydrogen atom, a monovalent metallic atom, an ammonium group, or an organic amine group and when n = 2 X stands for a divalent metallic atom; A and B independently stand for an alkylene group of 2 to 4 carbon atoms; m stands for 0 or an integer of the value of 1 to 100; and the alkylene oxide group of 2 to 4 carbon atoms in the portion, (AO)m may be bound in any desired sequence; and (B) 99.9 to 0 mol% of another monomer copolymerisable with the sulphonic acid type monomer, and polymers obtained by neutralising the polymers with an alkaline substance, as a cement dispersant.

The opposition division held that the amendment in granted claim 1, made during the examination procedure, was an obvious correction under Rule 88 EPC and therefore did not contravene Article 123(2) EPC. With regard to novelty, the division considered that D1 and D2, on which the appellants had based their novelty objection, did not mention the use of the polymers disclosed therein as cement dispersants. With regard to inventive step, the division took the view that D1 was not concerned with the problem underlying the patent in suit and related to a remote technical field, and that the polymer emulsion disclosed in D3 differed from the polymer used according to the patent in suit. The division also considered that there was no direct hint or suggestion that the emulsions of D3 or similar intermediate products such as those disclosed in D1 were useful as cement dispersants.

IV. In the statement of grounds for appeal, the appellants maintained the grounds for opposition. With regard to the objection of unallowable extension, they argued that it was not immediately evident that nothing else would have been intended than what was offered as the correction.

No arguments were advanced with regard to novelty.

Inventive step was disputed on the basis of D1 and D3. The appellants argued that it was the teaching of D3 that the emulsions disclosed therein were a cement dispersant and that such emulsions were equivalently useful to disperse other particles such as those used in paper coatings or paintings. D1, relating to pigment dispersions, was therefore not to be regarded as belonging to a remote technical field, and would be taken into consideration by the skilled person seeking new cement dispersants. Reference was made to T 0176/84 (OJ EPO 1986, 50) to underline that the state of the art to be considered when examining inventive step includes any technical field in which the same problem or one similar to it arises.

Later in the proceedings, the appellants indicated that D3 destroyed the novelty of the claimed use of a material comprising the polymer defined in claim 1. They contended that D3 disclosed the use of an emulsion containing a water-soluble polymer as defined by the present claim 1 as an additive in cement compositions, and that the added copolymer acted therein as a cement dispersant. With reference to the article "Dispergiermittel" in *Römpps Chemie-Lexikon*, 7th ed. 1976, pages 874-875 (D6) it was argued that a dispersant is a surfactant and that emulsifiers are dispersants.

Referring to decision T 0112/92 (OJ EPO 1994, 192) the appellants argued that, in view of the well-established link between the claimed use of the water-soluble polymers as a cement dispersant, the function disclosed in D3 of the said polymers as a dispersant in polymer emulsions and the use of these emulsions as hardening and strengthening agent for concrete, the claimed use lacked an inventive step.

With regard to inventive step, D1 was said to indicate the polymers disclosed therein as dispersants in general. The teaching of D1 was thereof not limited to pigment dispersants.

V. The respondents contested the appellants' arguments, submitting that D3 did not disclose the use of the water soluble polymer as a dispersant for cement but only as a dispersing agent for the emulsion particles. During the polymerisation reaction in the preparation of the emulsion, the water-soluble polymer was grafted (graft-polymerised) so that it would not be present in the aqueous phase of the emulsion or in such a small amount that it would not act as a cement dispersant. It was further submitted, with reference to *Pigment Handbook*, Vol. 1,1973, John Wiley & Sons, Inc., pp. vii - xix, that in contrast to cement, pigments are essentially unaffected, physically and chemically, by the media into which they are dispersed, so that a dispersant suitable for pigments is generally not suitable for cement.

VI. In a letter dated 15 November 1996, the appellants withdrew the request for oral proceedings and informed the board that they would not be represented at the oral proceedings on 22 January 1997. Oral proceedings took place in the appellants' absence. No new documents or essentially new arguments were presented. With regard to the meaning of "main component" in claims 1 and 12, the respondents said that "main" did not indicate a relative proportion but a quantity related to the desired effect. The quantity of the polymer should be such that it acted as a cement dispersant.

The respondents also argued that, since the appellants had requested oral proceedings but were not represented at the hearing, the board should order an apportionment of costs in the respondents' favour if the patent was maintained without amendment.

VII. The appellants requested that the decision under appeal be set aside and the patent be revoked.

The respondents requested as a main request that the appeal be dismissed and the patent be maintained as granted. As a first auxiliary request, they requested that the patent be maintained on the basis of claims 1 to 11 as they stood and that claim 12 be deleted. Furthermore they requested an apportionment of costs in the respondents' favour if the patent were maintained without amendment.

Reasons for the Decision

1. The appeal is admissible.

2. *Allowability of amendments*

Granted claim 1 differs from claim 1 as originally filed, in that the formula includes the symbol "n", which can have the value 1 or 2, to indicate that the ratio between the cationic and the anionic part of the copolymer may be 1 or 2. In the original claim 1, this ratio was not explicitly mentioned. Since the valency of the anion can only be 1 and the cation is either a monovalent or a divalent metallic atom, the present correction is the only meaningful one which makes claim 1 self-consistent. The appellants' allegation that it was not immediately evident that nothing else could have been intended than what was offered as the

correction cannot be accepted. The allegation in the notice of opposition that in case of a divalent metal cation two different anions could be present has no basis in the application as originally filed. The theoretical possibility of two different anions was indeed not excluded by the formula as originally disclosed, but there is no indication that this could have been intended. The present formula is in agreement with the examples and represents components which were certainly intended to be covered by the application as originally filed. The amendment is therefore regarded as an obvious correction within the meaning of Rule 88 EPC, which does not extend the subject-matter of the patent beyond the content of the application as originally filed. The amendment in claim 1 and the corresponding amendment in claim 12 are therefore allowable under Article 123(2) EPC.

3. *Novelty (main request)*

Novelty was disputed on the basis of D3, which discloses a process for the preparation of a stable polymer emulsion, whereby the polymerisation reaction is performed in an aqueous medium in the presence of a water-soluble copolymer. The copolymer comprises monomer units A, consisting of unsaturated carboxylic acids or salts thereof, and monomer units B consisting of unsaturated sulphonic acids or salts thereof. The weight ratio between components A and B is in the range of 30 to 80. As an example of component B, the document mentions, amongst many others, the ethylsulphonic ester of methacrylic acid (column 4, lines 9-58). Copolymers used according to the present claim 1 are thus disclosed in D3. The amount of water-soluble copolymer used in the emulsion polymerisation reaction is between 0.1% and 10% by weight on the basis of the amount of monomers (column 5, lines 12-13). During the emulsion polymerisation, at least a part of the

sulphonated copolymer is polymerized with the monomer (claim 1 and column 6, lines 10-25). The emulsions of D3 have various uses. Specific mention is made of their use as a fibre modifier, as an additive in the manufacture of paper, in water based paints, in glues and as an additive in cement and mortar to increase the strength of concrete (column 2, lines 1-6 and column 6, lines 5-9). There is no specific disclosure of any combination showing the use of an emulsion containing a polymer according to the present claim 1 together with cement.

Given that the group of claimed polymers is a part of the group of the water soluble polymers mentioned in D3, and that the use as cement dispersant is one of various uses mentioned in D3, the combination of both characteristics in the use claim 1 and the process claim 12 must be considered to be novel in the same way as a combination of individual entities from two lists of some length (see T 12/81(OJ EPO 1982, 296)). Even if D3 had disclosed the use of emulsions prepared from a mixture containing polymers based on the unsaturated sulphonic esters mentioned in column 4, lines 56-58 as cement additives, claims 1 and 12 should still be regarded as novel. Indeed, if, after its preparation, such an emulsion contained unreacted soluble sulphonated polymer at all, it could only be present in a minor proportion. However, according to claims 1 and 12, the polymer should be present as a main component of the additive, which implies that it should be present to such an extent that its effect as a dispersant is observable. Since D3 says nothing about the amount of the water soluble polymer eventually added to the cement, the feature that the polymer should be present as a main component having the effect of a cement dispersant is neither implicitly nor explicitly disclosed.

None of the other documents on file discloses the addition to cement of a copolymer according to claim 1. The subject-matter of claims 1 and 12 must, therefore, be regarded as new.

4. *Inventive step (main request)*

4.1 The invention relates to the technical field of cement dispersants. It has been shown in the foregoing that neither D1 nor D3 disclose cement dispersants and, therefore, that in the present case, they cannot be viewed as representing the closest prior art. According to the introductory part of the description of the patent in suit, cement dispersants such as salts of lignin sulphonates and naphthalene sulphonic acid-formaldehyde condensation products belong to the prior art, and their use is discussed in relation to their properties. During the oral proceedings, the respondents confirmed that these products form part of the state of the art. The chemically most closely related cement dispersants, with which the dispersant of the invention is actually compared, are cement dispersants of the naphthalene sulphonic acid-formaldehyde condensates salt type (page 2, lines 18-31, and Table 2). The closest prior art is, therefore, considered to be represented by the use of naphthalene sulphonic acid-formaldehyde condensate salts as cement dispersants.

4.2 According to the patent in suit, these naphthalene sulphonic acid-formaldehyde condensate salts show excellent efficiency in water reduction and allow high flowability without entailing any considerable retardation of hardening, but they suffer from the disadvantage that their water reducing effects are observed for only a short period. After 20 to 30 minutes the flowability decreases, which limits the operation time. The object of the invention was

defined as the provision of a cement dispersant which allows high flowability without entailing any appreciable retardation of hardening, which permits high flowability over a long period of time, which ensures stable workability, and which excels in the ability to curb the phenomenon of slump loss (see page 2, lines 18 to 42). In agreement therewith, and starting from the closest prior art defined in point 4.1 above, the problem underlying the invention can be seen in increasing for a cement composition the length of the high flowability phase without retardation of hardening.

According to claim 1, this problem is solved by using, as a cement dispersant, a water soluble, sulphonic acid group containing polymers as defined in claim 1.

The patent specification contains examples 1 to 10 and control examples 1 to 3. Examples 1 to 10 have been performed with polymers according to the invention, whereas control examples 1 to 3 have been carried out with known dispersants. In control example 1, naphthalene sulphonic acid-formaldehyde condensate (NSF) was used. Although the amount of NSF added to the cement composition in control example 1 (0.40%) was larger than the amount of polymer used in the examples according to the invention (between 0.20 and 0.30 %), the residual ratio of slump after 60 minutes standing was at least 76% for the examples according to the invention, whereas for control example 1 with NSF the ratio was only 50%. The slump is a measure of flowability and is positively related to it. If the ratio of slump after a certain period of time is not substantially below 100%, the flowability has not been substantially reduced over the period in question. The

start-setting times for the examples according to the invention varied from 5h45' to 6h26' and the end-setting times varied from 8h01' to 8h30'. For the control example 1, these setting times were 5h49' and 8h03' respectively (Table 2). This means that, compared with naphthalene sulphonic acid-formaldehyde, the dispersants according to the invention extend the high flowability phase over a longer period without reducing the setting time.

The board is, therefore, satisfied that the said problem is actually solved by the use of the polymers according to claim 1 as a cement dispersant and the process for dispersing cement according to claim 12.

4.3 It therefore remains to be decided if the present solution was obvious in view of the available prior art.

D1 discloses the use of copolymers according to the present claim 1 as a milling aid and/or dispersant for concentrated aqueous pigment dispersions for paper coatings. According to D1 aqueous pigment dispersions containing this sulphonated copolymer have the advantage that their viscosity is less reduced at higher temperatures than dispersions containing conventional dispersants (claim 1 and page 1, line 33 to page 3, line 4 of the description). The problem of reduced viscosity at higher temperatures plays no part in cement dispersants. The requirements for a cement dispersant, acting in a reactive environment, are quite different from those of a dispersant for an aqueous suspension of pigments, where the solid particles do not react with water. The essential requirement for a cement dispersant is its ability to increase the flowability of a cement composition at a given water content in the short period - a matter of a few hours - between the addition of water and the setting of the

cement, whereas the essential requirement for a pigment dispersant is its ability to increase shelf life - a matter of months or years. For the skilled person seeking a new cement dispersant which provides high flowability over a longer period of time without retardation of hardening, there is thus no obvious reason to consider pigment dispersants such as those disclosed by D1. The appellants' contention that D1 discloses the use of the polymers as dispersants in general, without limitation to pigments, cannot be accepted. In the sentence on the original page 7 of D1, to which the appellants referred, it is indicated that the copolymers are used as a milling aid and dispersant or as a dispersant for concentrated aqueous pigment dispersions. In the board's view, this sentence should be understood, in agreement with the claims and the examples of D1, as meaning that the copolymers can be used as a milling aid and dispersant in the preparation of pigment dispersions or as a dispersant for pigment dispersions without first milling the pigment in the presence of the copolymer. D1 provides no indication that the dispersants disclosed therein may also be useful outside the field of pigment dispersions. The board sees no conflict with the decision in T 176/84, according to which the state of the art to be considered when examining inventive step includes technical fields in which the same problem or one similar to it arises (headnote). As explained above, the problem underlying the invention is not related or similar to the problems in the relatively remote field of pigment dispersions.

4.4 As explained above under point 3, D3 discloses a process in which an emulsion, which could contain minor amounts of sulphonated water-soluble polymer, is added to cement to increase the strength of concrete. The water-soluble polymer was used together with an anionic surfactant in the preparation of the emulsion in order

to stabilise the emulsion and to reduce foaming (column 3, lines 23-36). There is no indication that the water-soluble polymer in the emulsion acts as a cement dispersant. The board cannot accept the appellants' contention that, from the disclosure in D3 that the water soluble polymer is a dispersant (column 4, line 5) and the use of the said polymer in an emulsion for strengthening concrete, it follows that the said polymer is also a cement dispersant. A dispersing activity is disclosed only for a combination of the water soluble polymer with the anionic surfactant and only for dispersing the insoluble polymer in the emulsion. From this, it can only be deduced with hindsight that the water-soluble polymer is also a cement dispersant. The fact that, according to D6, dispersants are surfactants and emulsifiers are dispersants, does not imply that surfactants and emulsifiers are cement dispersants. As explained above under point 4.3, cement dispersants are a special kind of dispersant which has to fulfil very specific requirements. There is no evidence in D3 that the water-soluble polymer is present as a free polymer in the emulsion added to the cement, or that the emulsion or the water-soluble polymer increases the flowability of cement compositions, let alone that it could extend flowability over a longer period of time. Nor is it possible to accept the appellants' further contention that, from the disclosure in D3 that the emulsion is also stable in the presence of cement without the addition of non ionic surfactants (column 3, lines 41-45), it follows that the dispersive action of the water-soluble polymer with regard to the water-insoluble polymer in the emulsion is also maintained in cement, and that, with the knowledge from D1 that the said water-soluble polymers are pigment dispersants, it was obvious that the said water-soluble polymers would be suitable cement dispersants (see page 2 of the appellants' letter dated

8 June 1995). The stability of the emulsion in the presence of cement can be attributed to the presence of the anionic surfactant also added in the preparation of the emulsion. From the stability of the emulsion in the presence of cement, it can be deduced that the emulsifying properties of the sulphonated polymer transformed during the preparation of the emulsion are not disrupted by the presence of cement, but not that the original sulphonated, water-soluble polymer, used in the preparation of the emulsion, is a cement dispersant. There was also no obvious reason for the skilled person to combine D1, relating to dispersants for pigments, with D3, relating to the production of stable polymer emulsions.

It follows from the above considerations that there is no well-established link between the uses of the water soluble sulphonated polymers disclosed in D1 and D3, and the use as a cement dispersant claimed in the patent in suit, so that the inventive step argument used in T 112/92 does not apply to the present case. Moreover, T 112/92 relates to the so called second non-medical use situation, in which a new use has been discovered for a substance already used under the same conditions for another purpose. The use claimed in the present claim 1 is, however, the first use of a substance, including the sulphonated water-soluble polymer defined therein as a main component, as an additive to a cement composition to such an extent that the polymer acts as a cement dispersant.

4.5 Prior art citations mentioned during the opposition proceedings, but not discussed above, were not presented for consideration at the appeal stage. They are more remote from the subject-matter of claims 1 and 12 and cannot provide the skilled person with any incentive to adopt the claimed solution of the above-mentioned technical problem. For these reasons,

the subject-matter of claims 1 and 12 involves an inventive step within the meaning of Article 56 EPC.

The remaining claims 2 to 11 are dependent upon claim 1. Novelty and inventive step should be acknowledged on the same grounds as for the latter claim.

5. *Apportionment of costs*

As a rule, Article 104(1) EPC provides that each party to the proceedings shall bear its own costs. To deviate from this principle requires special circumstances such as improper behaviour which make it equitable to award costs against one of the parties (T 170/83, OJ EPO 1984, 605).

In the present case the respondents have not shown that such circumstances are involved. Oral proceedings were requested by both parties. There is, however, no obligation for a party requesting oral proceedings to be represented at these proceedings. Its duly announced absence cannot be considered as improper behaviour. Moreover, the non-appearance of a party generally does not adversely affect the party which did attend the oral proceedings. In the present case, the respondents have neither shown nor claimed that they incurred additional costs because the appellants were not present.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

2. The request for apportionment of costs is refused.

The Registrar:

P. Martorana

The Chairman:

P. A. M. Lançon

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