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D E C I S I O N
of 19 June 1997

Case Number: T 0404/94 - 3.3.2

Application Number: 89100703.1

Publication Number: 0328882

IPC: C04B 24/26

Language of the proceedings: EN

Title of invention:
Hydroxamated polymers as additives for retarding the rate of set of hydraulic cement compositions

Patentee:
AMERICAN CYANAMID COMPANY

Opponent:
S.N.F. S.A.

Headword:
Cement retarder/AMERICAN CYANAMID

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no"

Decisions cited:
-

Catchword:
-

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Case Number: T 0404/94 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 19 June 1997

Appellant: (Opponent)
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Respondent: (Proprietor of the patent)
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Representative:
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 10 March 1994 rejecting the opposition filed against European patent No. 0 328 882 pursuant to Article 102(2) EPC.**

Composition of the Board:

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

Summary of Facts and Submissions

I. The appeal lies from a decision of the Opposition Division to reject the opposition against European patent No. 0 328 882, which was granted with 10 claims in response to European patent application No. 89 100 703.1.

Granted claim 1 reads as follows:

"A method for retarding the setting rate of hydraulic cement slurry comprising addition to a cement slurry of a retarding amount of water soluble polymer having pendant hydroxamic acid groups."

II. A notice of opposition was filed against the European patent by the Appellant. Revocation of the patent was requested in accordance with Article 100(a) EPC on the grounds of lack of inventive step within the meaning of Article 56 EPC.

The opposition was supported, inter alia, by the following documents:

DE-A-2 830 528 (D1)
EP-A-0 104 970 (D2).

III. The Opposition Division held that in the absence of any indication in the state of the art suggesting the use of any product bearing a hydroxamic acid group as a set retarder in a cement slurry, the skilled person would not have found it obvious to use polymers bearing such groups.

IV. With the statement of the grounds of appeal, the Appellant filed additional evidence in the form of an affidavit by Hugo Hendriks and copies of documents cited in the affidavit. Amongst these documents was the publication "SPE Paper 10623" presented at the SPE Sixth International Symposium on Oilfield and Geothermal Chemistry, held in Dallas, Texas, from 25 to 27 January, 1982, hereinafter referred to as D6, and FR-A-2 476 113, hereinafter referred to as D7. The argumentation against an inventive step was essentially as follows:

D1 revealed that a fluid loss additive for drilling muds was also effective as a fluid loss additive in cement slurries and showed excellent retarding properties. Based on this knowledge, the skilled person would use the hydroxamated polymer known as fluid loss additive for drilling muds from D2 as a retarder in cement slurries. Moreover, it was well known to the person skilled in the art that, under the alkaline conditions of a cement slurry, a hydroxamic group hydrolyses into a free carboxylate group (acrylate group) and a free hydroxylamine. The free carboxylic acid groups adsorbed onto the hydration products of the cement, whereby further hydration and therefore setting was prevented. The hydroxamic groups which were not converted into carboxylic groups chelated the calcium ions in the aqueous cement composition, which also prevented the setting. These mechanisms were based on well-established adsorption and complexation theories as discussed in D6 and D7. It was therefore foreseeable for the person skilled in the art, i.e. the expert in the field of cementing chemistry, that polymers having hydroxamic groups had retarding properties in cement slurries.

V. The Respondent did not reply. In a communication from the Board dated 4 October 1996, a reasoned preliminary opinion on inventive step was given with the conclusion that the method according to claim 1 as granted seemed not to involve an inventive step. The reasoning was based on the documents D1, D2, D6 and D7. The parties were invited to file observations within a period of 4 months but they remained silent.

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

The Respondent did not submit any request.

Reasons for the Decision

1. The appeal is admissible.

2. *Inventive step*

2.1 The closest prior art is D1, which discloses the use of alkali salts of copolymers of acrylic acid and/or methacrylic acid with acryl amide as fluid loss additive with set retarding properties in cement slurries (pages 4 and 5).

The process of present claim 1 as granted differs therefrom in that for the same purpose a different but chemically related polymer is used. The properties of the present polymers, having pending hydroxamic groups, have not been compared with said prior art retarding polymers. It has only been demonstrated that the present polymers have set retarding properties so that the only problem underlying the invention can be seen in providing an alternative additive with set

retarding properties for cement slurries. The examples show the set retarding effect so that the Board is satisfied that the claimed method actually solves the above-mentioned problem.

2.2 It remains therefore to be decided if, for solving the above stated problem, the claimed solution would have been obvious to a person skilled in the art. D1 does not explain why the acrylate/acrylamide copolymers act as set retarders. In D6 the retarding properties of the said copolymer are attributed to their ability to complex calcium ions and/or to bind with hydrating cement particle surfaces (page 281, right column). A skilled person would, therefore, expect that related polymers having similar chemical behaviour would also retard the setting of cement.

2.3 Polymers having pendant hydroxamic acid groups, obtained by hydroxamating polyacrylamide, are known in the art as fluid loss additives in drilling muds; see D2 and D7. Since drilling muds and cement slurries for stabilising drilled holes are used at the same spot and polyacrylamide polymers are used as fluid loss additives in both clay slurries (drilling muds) and cement slurries, documents D2 and D7 belong to a technical field closely related to that of D1 and D6. In D7 the property of the hydroxamated polymers to act as a dispersant for clay in the drilling mud is attributed to their ability to form very stable complexes with metal cations such as calcium ions so that they adhere strongly to the clay particles (page 2, lines 28 to 35). Since the removal of free calcium ions from the cement slurry by complexing agents is known to retard the setting of the cement (see D6), the skilled person would recognise that the ability of hydroxamated polymers to form stable complexes, either as such or in the hydrolysed form, provided these polymers with set retarding properties

in cement slurries. Water soluble polymers having pendant hydroxamic acid groups are thus obvious alternatives for the acrylic polymers of D1 as set retarding agents in cement slurries.

2.4 The above-mentioned reasoning is in conformity with the reasoning in the Board's communication of 4 October 1996. The Respondent has had, in accordance with Article 113(1) EPC, an opportunity to present his comments on the detailed inventive step objection raised in said communication, but has not availed himself of this opportunity.

2.5 In view of the preceding considerations, the subject-matter of claim 1 does not involve an inventive step within the meaning of Article 56 EPC.

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:

P.A.M. Lançon

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