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D E C I S I O N
of 21 August 2001

Case Number: T 0003/99 - 3.2.3

Application Number: 94 305 549.1

Publication Number: 0 638 379

IPC: B22C 1/18

Language of the proceedings: EN

Title of invention:
Fast processing water based binder system

Applicant:
REMET CORPORATION

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - additional effect"

Decisions cited:
-

Catchword:
-

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Case Number: T 0003/99 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 21 August 2001

Appellant: Remet Corporation
210 Commons Road
Utica, NY 13502 (US)

Representative: Chung, Hsu Min
BP International Limited
Patents & Agreements
Chertsey Road
Sunbury-on-Thames
Middlesex TW16 7LN (GB)

Decision under appeal: **Decision of the Examining Division 2.1.13.092 of the European Patent Office dated 4 May 1998 refusing European patent application No. 94 305 549.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
M. Aúz Castro

Summary of Facts and Submissions

I. With the decision of 4 May 1998 the examining division refused European patent application No. 94 305 549.1 according to Article 97(1) EPC since the subject-matter of claim 1 dated 27 March 1997 in the light of

(D1) US-A-4 996 084 and
(D3) US-A-3 011 986

is "neither novel nor inventive (Articles 52(1), 54 and 56 EPC)".

II. Claim 1 underlying the above decision reads as follows:

"1. Use of a latex polymer in a water-based binder comprising colloidal sol for binding a refractory powder to form a slurry for making a shell mold suitable for use in investment casting, said latex polymer being present in an amount of from 2% to 20% by weight based on the binder weight, said use being for the purpose of reducing the processing time between dips during the shell mold-making process."

III. Against the above decision of the examining division the applicant - appellant in the following - appealed on 1 July 1998 paying the appeal fee on the same day and filing the statement of grounds of appeal on 10 September 1998.

IV. In his statement of grounds of appeal the appellant essentially argued as follows:

- in investment casting organic solvent-based binders should be replaced by water-based binders

comprising colloidal silica; the serious drawback of water-based binders is seen in the longer drying times;

- appellant's solution to this problem is based on the inclusion of a latex polymer since then the processing time between dips during the shell-mold making process could substantially be reduced;

- contrary to the findings of the examining division there is no direct correlation between increasing green strength and decreasing the processing time and there is no evidence that the skilled person would imply such a correlation; material added to increase strength or green strength may cause stronger bonds, but will not necessarily cause these bonds to be formed quickly; addition of strength-enhancing material can cause faster or slower processing times or can have no effect at all on the processing time so that the alleged interrelationship according to the impugned decision is not supported by the facts.

V. The appellant requested to set aside the impugned decision and to grant the patent on the basis of claims 1 to 9 submitted on 9 August 2001 (being identical with claims 1 to 9 dated 27 March 1997, received on 1 April 1997) and an amended description with pages 2 to 4, 4A, 4B and 5 to 15 submitted on 9 August 2001 (**main request**), oral proceedings in case the main request could not be allowed and by way of an **auxiliary request** the grant of the patent on the basis of claims 1 to 12 filed with the statement of grounds of appeal.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

2.1 Claim 1 is based on originally filed claims 1, 4 and 8.

2.2 Claims 2 to 6 and 8/9 correspond to originally filed claims 2 to 7 and 9/10 whereas claim 7 is based on features of originally filed claim 8.

2.3 Under these circumstances the requirements of Article 123(2) EPC are met.

3. *Novelty*

3.1 Claim 1 is worded as a use-claim of a water-based binder comprising a colloidal sol and a latex polymer for binding a refractory powder to form a slurry for making a shell mold suitable for use in investment casting (= lost wax-process). The content of latex polymer of 2 to 20% by weight based on the binder weight should lead to a quicker setting/curing of the binder "for the purpose of reducing the processing time between dips during the shell mold-making process."

3.2 (D1) and (D3) disclose all features of claim 1 except

(a) the provision of 2 to 20% by weight of latex polymer, and

(b) its purpose of "reducing the processing time

between dips...".

The examining division in its decision to refuse the application in suit accepted that feature (b) is not "expressis verbis" derivable from (D1) or (D3) but came to the conclusion that it is an implicit property of latex polymers that they accelerate the bonding between particles or setting of the coating. As explained below this conclusion was not justified.

Moreover, the examining division appears to have overlooked that claim 1 prescribes a range from 2 to 20 **weight** percents of the latex polymer whereas (D1), see Table 2 and its "Colloidal Silica Binder (Dupont)" and "Polyco 117H (Latex Glue)", is based on **volume** parameters (= volume percents). In the absence of further indications in (D1) with respect to the binder and latex glue it is not possible to calculate the weight ratio between these components.

3.3 The subject-matter of claim 1 is accordingly novel.

4. *Inventive step*

4.1 The prior art to be considered with respect to the issue of inventive step is (D1), (D3) and possibly

(D4) US-A-3 727 666.

4.2 As set out in the opening of the application in suit, see EP-A2-0 638 379, page 2, line 56 to page 3, line 14, in the technical field of investment casting - also known as lost wax process - two main types of binders are used in shell making, namely ethyl silicate being **solvent based** and colloidal silica being **water**

based.

4.3 (D1) as the nearest prior art document is based on a **water** based binder, on a latex glue and on refractory powders. The objects to be solved in (D1) have to be seen in providing a slurry that can be used as a backup coat in investment casting replacing ethyl silicate while maintaining the drying time of the process based on ethyl silicate, see (D1), column 1, lines 42 to 54.

4.4 In (D1) the latex glue such as "Polyco 117H" is not dealt with in detail with respect to its effect; from the denomination "latex **glue**" it must be derived that it adds strength or green strength to the coat.

4.5 The examining division derived from the latex content of (D1) that adding strength or green strength is in direct correlation to decreasing the processing time i.e. the possibility to carry out dips in shorter time intervals, without, however, presenting any clear evidence for this supposition.

4.6 The problem to be solved by the claimed invention when starting from (D1) has to be seen in avoiding excess drying times of subsequent coatings in combination with investment casting.

4.7 This objectively remaining problem to be solved by the invention is achieved with the features laid down in claim 1 recited in above remark II. The effect of this combination of features is set out in EP-A2-0 638 379, see page 4, lines 23 to 30, namely to significantly shorten the time necessary to produce a ceramic shell whereby the latex polymer helps prevent washing out of bonds during subsequent dipping so that the processing

time over all is decreased.

4.8 Since the reduction of the processing time is not dealt with in (D1) and (D3) inventive endeavour was necessary to achieve the teaching according to claim 1.

4.9 The appellant in his statement of grounds of appeal filed further evidence that addition of strength-enhancing material as such can cause faster or slower processing times or can have no effect at all on the processing time so that the allegation to the contrary by the examining division is not supported by the facts but is an unfounded allegation.

4.10 Appellant's argument that there is nothing whatsoever in the published literature to connect green strength with processing time and nothing to suggest to the skilled person such a connection is convincing to the board for the following reasons. Reference is made to a recently published book "Investment Casting" (P.R. Bealy and R.F. Smart, 1995, the Institute of Materials) pages 81 and 94, setting out the use of some latex additives as a means to produce green strength without, however, dealing with the reduction of processing time. In the absence of contrary evidence the board accepts the content of the above handbook as technical knowledge in the field of investment casting, so that the teaching of claim 1 is not rendered obvious by (D1) and (D3).

4.11 In a completely different context, see (D4), it is per se known that a "latex component .. functions primarily as an interim binder ... until the inorganic binder component is activated", see column 3, lines 36 to 46. It could be that thereby green strength/curing/setting

of the slurry or coating can be enhanced.

The board, however, cannot see how the use as an interim binder speeds up things there and why a person skilled in the art - not knowing the claimed invention - should think it would speed things up in investment casting i.e. in a technical field quite different from the technical field dealt with in (D4), namely coating a casting mold made of steel and the aspects to avoid contamination and to improve release between the cast product and the mold.

4.12 Summarizing, the subject-matter of claim 1 in the light of the above considerations is not rendered obvious by the prior art to be considered so that claim 1 of the main request is allowable.

4.13 Present claims 2 to 9 are dependent claims and are also allowable.

Auxiliary Request

5. The main request being allowable there is no requirement for discussing the merits of the auxiliary request and no requirement for oral proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant the patent on the basis of claims 1 to 9 submitted on 9 August 2001 and an amended description with pages 2 to 4, 4A, 4B and 5 to 15 submitted 9 August 2001.

The Registrar: The Chairman:

A. Counillon C. T. Wilson