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D E C I S I O N
of 19 January 2000

Case Number: T 1166/98 - 3.4.2

Application Number: 87115988.5

Publication Number: 0266697

IPC: G03G 9/08

Language of the proceedings: EN

Title of invention:
Polymer for toner, process for preparation thereof and toner composition

Patentee:
MITSUBISHI RAYON CO., LTD.

Opponent:
Canon Kabushiki Kaisha

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1166/98 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 19 January 2000

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 16 October 1998 revoking European patent No. 0 266 697 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: M. A. Rayner
B. J. Schachenmann

Summary of Facts and Submissions

I. The present appeal is made by the patent proprietor (=appellant) against the decision of the opposition division revoking European patent No. 266 697 (application No. 87 115 988.5).

II. In the decision reference was made inter alia to the following documents:

D1: JP-A-60-044505

D1a: English Translation of document D1

D3: JP-A-55-155362

D3a: English Translation of document D3

The opposition division reasoned that document D3 reflected the closest prior art, dealing with the problem of reducing residual monomer to less than 1000 ppm to improve toner characteristics. The skilled person would inevitably have considered the process defined by document D1 consisting of distilling water from polymer slurry to reduce further the residual monomer content as therein disclosed, thus arriving without any inventive step at the subject matter claimed.

III. In the statement of appeal, the appellant requested maintenance of the patent based on a set of claims according to a main or a first or second auxiliary request and on an auxiliary basis oral proceedings. In the reply to the statement of appeal the respondent

(=opponent) requested dismissal of the appeal and on an auxiliary basis oral proceedings.

IV. The appeal board issued a summons to oral proceedings taking place on 19 January 2000 and indicating that further observations of the parties should be filed at least one month before the oral proceedings. The appellant submitted the results of comparative tests in a letter dated 27 December 1999. During the oral proceedings, the appellant presented a further set of claims according to a third auxiliary request. The wording of the independent claims according to the requests of the appellant is as follows:-

Main request

1. A process for the preparation of a toner polymer binder, which comprises preparing a polymer suspension by suspension polymerization of at least one monomer selected from the group consisting of aromatic vinyl compounds, acrylic acid esters, methacrylic acid esters, vinyl esters and vinyl cyanide compounds, or a monomer mixture predominantly composed of said selected monomer, characterised in that the polymer suspension wherein the polymer in the suspension has a glass transition temperature of 50 to 100°C is maintained at a temperature of not lower than the glass transition temperature of the polymer, and distilling water in an amount of 5 to 50% by weight based on the amount of water present at the time of termination of the polymerization to reduce the content of a residual monomer in the polymer to not more than 200 ppm.

3. A toner polymer binder having a content of a

residual monomer in the polymer of not more than 200 ppm and wherein the polymer has a glass transition temperature of 50 to 100°C obtainable by the process of claim 1.

5. A toner composition comprising 80 to 95 parts by weight of a toner polymer binder according to claims 3 and 5 to 20 parts by weight of a pigment.

First auxiliary request

The claims of this request differ from those of the main request by substitution of the range "50 to 80°C" for the range "50 to 100°C" in claims 1 and 3.

Second auxiliary request

1. A toner polymer binder obtainable by a process which comprises preparing a polymer suspension by suspension polymerization of at least one monomer selected from the group consisting of aromatic vinyl compounds, acrylic acid esters, methacrylic acid esters, vinyl esters and vinyl cyanide compounds, or a monomer mixture predominantly composed of said selected monomer, characterised in that the polymer suspension wherein the polymer in the suspension has a glass transition temperature of 50 to 80°C is maintained at a temperature of not lower than the glass transition temperature of the polymer, and distilling water in an amount of 5 to 50% by weight based on the amount of water present at the time of termination of the polymerization to reduce the content of a residual monomer in the polymer to not more than 200 ppm.

3. A toner composition comprising 80 to 95 parts by weight of the toner polymer binder according to claims 1 and 2 and 5 to 20 parts by weight of a pigment.

Third auxiliary request

Claim 1 of this request substantially corresponds to claim 1 of the second auxiliary request in the form of a process for the preparation of the toner.

V. The arguments of the appellant can be summarised as follows.

Document D3 does not disclose that the toner binder must be treated in such a way that it has a residual monomer content of less than 200 ppm. Example 5 of document D3, which is an embodiment of the invention taught by this document, discloses a 5500 ppm residual monomer content. There is no reference whatsoever in document D3 that could direct the person skilled in the art to the method specifically used according to the invention, i.e. taking the reaction mixture of the suspension polymerisation and distilling water in an amount of 5 to 50% by weight based on the amount of water present at a temperature not lower than the glass transition temperature of the polymer. Comparative example 1 of the patent shows that excessive treatment by distillation leads to agglomeration, so that minimisation in the sense of "as far as possible" cannot be derived from the second paragraph on page 7 of document D3. The presence of solvents and monomers is presented as less important than controlling melting characteristics, secondary transition point, weight

average molecular weight and melt viscosity. The drying step used is not useful for reducing residual monomer. There is moreover no reason for the person skilled in the art to expect that this treatment would provide a toner polymer binder yielding a toner with superior properties in respect of blocking resistance, resistance against plasticizer for vinyl chloride polymers.

Even if the disclosure of document D1 relating to considerably reduced monomer content is taken into account, document D1 does not provide any hint towards this being specifically useful as the binder for a toner material having an excellent balance combination of properties. Moreover, a person skilled in the art of preparing toner materials would not have considered applying the method of document D1 because distilling takes place in the presence of a suspension dispersant and a non-ionic surface active agent, which is difficult to remove and leads to a deterioration in chargeability and flowability of the toner.

In relation to document D1 the comparative tests show that neither a resin prepared according to example 2 of document D1 nor a resin prepared according to the procedures described in document D1 using the composition of examples 1 to 3 of the patent in issue achieve in a toner practical values for chargeability, flowability and blocking resistance. In relation to document D3, an accurate repetition of the procedures for the preparation of resin A-1 leads to a result of total residual monomer content of butyl methacrylate and styrene of 18004 ppm.

VI. The respondent requested dismissal of the appeal and submitted arguments, which can be summarised as follows.

The reason why example 5 of document D3 leads to a higher residual monomer content is that synthesis is by solution polymerisation and not suspension polymerisation as in the case of examples 1 to 4. Example 5 meets claim 1 of document D3 but need not meet claim 2, which applies to the suspension polymerisation case.

The use of dispersants and surfactants is not excluded by the wording of the claims at issue and in any case the patent itself teaches use of dispersant. Moreover, resistance against a plasticizer for a vinyl chloride polymer amounts to no more than a bonus effect.

The comparative tests were filed late and should not be admitted and are in any case not relevant because they do not accurately follow the procedure of the prior art documents D1 and D3 concerned.

VII. At the end of the oral proceedings, the appeal board gave its decision.

Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

Main request

Article 54 EPC - Novelty

2.1 Document D1 (reference being made to the English translation D1a) discloses:

A method of decreasing residual monomers in polymer comprising distilling aqueous slurry of vinyl-type polymer granules in the presence of a suspension dispersant and a non-ionic surface active agent (see claim 1). The examples show residual monomer content values under 200 ppm and the amount of water distilled in the range of 5 to 50% (see e.g. example 1 with a residual monomer content of 150 ppm where water distilled is about 21%).

Document D1 makes no reference to polymer suspension wherein the polymer in the suspension has a glass transition temperature of 50 to 100°C being maintained at a temperature of not lower than the glass transition temperature of the polymer.

2.2 Document D3 (reference being made to the English translation D3a) discloses:

A magnetic toner for developing an electrostatic latent image comprising a magnetic powder and a fixing resin with vinyl type polymer as main component (see claim 4) that has a secondary transition point of 60 to 80°C (this term means the same as glass transition temperature), a weight average molecular weight of 100000 to 600000 and a melt viscosity at 150°C of 5000 to 30000 P and wherein the content of a monomer used to prepare the fixing resin is less than 0.1 wt% of the total weight of the resin (see for example claims 1 and

2, the last paragraph on page 5 and the complete paragraph on page 8).

Document D3 makes no reference to distilling water in an amount of 5 to 50% by weight based on the amount of water present at the time of termination of the polymerisation to reduce the content of a residual monomer in the polymer to not more than 200 ppm.

2.3 The subject matter of claim 1 according to the main request is therefore novel in the sense of Article 54 EPC over the disclosure either of document D1 or D3.

Article 56 EPC - Inventive step

Main request

3.1 Since document D3a relates to a toner polymer binder (i.e. the fixing resin), the board considers it to represent the closest prior art.

3.2 According to document D3, especially lines 18 to 20 on page 8, the low-molecular substances (solvent and monomer) **must** be minimised, i.e. their content must be decreased to the smallest practicable level. Minimisation of residual monomers is thus obligatory for the skilled person wishing correctly and effectively to produce the toner polymer disclosed by document D3, the toner otherwise being stated to encounter offset and deterioration of its preservation characteristic, fluidity and printing resistance. An explicit upper limit of 1000 ppm is taught by document D3, although no lower limit is given.

The teaching of document D1 relates to decreasing residual monomers in polymer (see the title). While no specific reference is made in document D1 to toner, its teaching does amongst other things mention particles (see line 7 on page 2). The skilled person starting from D3 and, as instructed, seeking for a way to minimise residual monomer in preparation of a toner binder would not have excluded document D1 from consideration simply because of absence from this document of a specific reference to a toner, because reduction of residual monomer according to document D1 corresponds to what is being sought following the teaching of document D3, i.e. a minimisation of residual monomers.

Reduction of residual monomers according to document D1 involves distillation of aqueous slurry and while the distillation temperature is not explicitly given in relation to example 1 of document D1, it is taught on page 8 thereof that steam is supplied to the jacket while distillation takes place. Although the possibility of use of reduced pressure during distillation is mentioned in document D1 (see the penultimate paragraph on page 6) before any reference is made to example 1, it is obvious that the skilled person will, rather than rearrange the apparatus, expect steam supply during distillation (page 8) to provide a temperature of 120°C just as specifically recited immediately preceding in the description of example 1 for a first polymerisation step (page 7). Distillation at this temperature satisfies the wording of present claim 1, because the glass transition temperature is known from document D3 to be 60 to 80°C.

Numerical results for residual monomer disclosed in document D1 fall under the upper limit specified in present claim 1. Accordingly, the skilled person following the teaching of document D3, would obviously have turned to the teaching of document D1 and used distillation in order to reduce the monomer content in the polymer. In doing so, not only the advantageous properties explicitly recited in document D3 would be achieved, but also automatically as a bonus effect a property such as resistance against plasticiser for vinyl chloride.

3.3 The value of 5500 ppm arising in connection with example 5 of document D3 results from a solution polymerisation rather than a suspension polymerisation with which preceding examples (and the subject matter of the patent in issue) are concerned, the former having a higher residual monomer content by its very nature. It is therefore obvious to the skilled person that while all the examples of the teaching of document D3 meet the properties required in claim 1 of document D3, nevertheless in the case of solution polymerisation, an example need not satisfy claim 2 requiring a residual monomer content under 1000 ppm.

3.4 The presence of a suspension dispersion and a non-ionic surface agent is not excluded by the wording of claim 1. In fact, the description of the patent makes reference to use of a suspension or dispersion stabiliser and, if necessary, a dispersant (see page 3, lines 41 to 42) and according to example 1 saponified polyvinyl alcohol is used as stabiliser. Document D1 teaches that only a small amount of non-ionic surface agent should be used, so small that contamination by

introduction into the polymer does not arise (last six lines on page 5 to line 6 on page 6). Its function is to assist the operation of the suspension dispersant (page 5, lines 3 to 4). Appropriately using such additives as required in polymerisation and distillation thus fall within the routine knowledge of the skilled person.

3.5 While Article 69(1) EPC envisages use of the description and drawings of the patent in interpreting the claims (as for example in relation to use of stabilisers in preceding point 3.4), there is no reason to use the patent to interpret the prior art. Accordingly, there is no reason for the skilled person to use "excessive distillation" as found detrimental in accordance with comparative example I of the patent, when applying the teaching of document D1 in minimising residual polymer content rather than distillation as actually disclosed in document D1 itself. Similarly, the drying step used in comparative example 4 of the patent has no relevance to the application of the teaching of document D1 to that of document D3.

3.6 The comparative tests were submitted late and are not relevant and in accordance with Article 114(2) EPC are disregarded. The reason the comparative tests are not relevant is that the information presented is too incomplete or diverges too significantly from documents D1 and D3 to allow valid comparison therewith. For example, the type and amount of dispersant used in comparative test I (resin (a)) differs from example 2 of document D1 and no information is given in comparative test II about the glass transition temperature, average molecular weight or melt viscosity

of the vinyl polymer so that the polymer is not identified as necessarily that taught in document D3. Therefore, even had the comparative tests have been taken into account, the present decision would not have been changed thereby.

3.7 Therefore, as a summary of the above considerations, the subject matter of claim 1 of the main request cannot be considered to involve an inventive step within the meaning of Article 56 EPC.

First auxiliary request

4. Since a range of 60 to 80°C is employed according to the teaching of document D3, no feature novel over the disclosure of this document is introduced by the limitation to 50 to 80°C according to first auxiliary request, the subject matter of claim 1 of which cannot be considered to involve an inventive step within the meaning of Article 56 EPC for reasons corresponding to those given in relation to the main request.

Second auxiliary request

5. Since a toner polymer binder is disclosed according to the teaching of document D3, no feature novel over the disclosure of this document is introduced by the amendment according to the second auxiliary request, the subject matter of claim 1 of which cannot be considered to involve an inventive step within the meaning of Article 56 EPC for reasons corresponding to those given in relation to the main request.

Third auxiliary request

6. Since the content of claim 1 is substantially the same as claim 1 of the first auxiliary request, the subject matter of claim 1 of the third auxiliary request cannot be considered to involve an inventive step within the meaning of Article 56 EPC for reasons corresponding to those given in relation to claim 1 of the first auxiliary request.

7. Since each request contains an independent claim directed to subject matter which cannot be considered to involve an inventive step within the meaning of Article 56 EPC, none of these requests can succeed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini