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Datasheet for the decision of 19 September 2019

Case Number: T 1273/15 - 3.4.02

Application Number: 04794510.0

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Title of invention:
ELECTROPHORETIC MEDIA

Applicant:
E Ink Corporation

Relevant legal provisions:
EPC 1973 Art. 54(1), 56

Keyword:
Novelty (yes)
Inventive step (no)

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Case Number: T 1273/15 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 19 September 2019

Appellant: (Applicant)	E Ink Corporation 1000 Technology Park Drive Billerica, MA 01821-4165 (US)
Representative:	Cole, David John 46 Kirkhill Gardens West Greenlees Estate Cambuslang Glasgow G72 8EZ (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 20 January 2015 refusing European patent application No. 04794510.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	F. J. Narganes-Quijano
	G. Decker

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 04794510.0.

In its decision the examining division held that the subject-matter of claim 1 of the sole request then on file did not involve an inventive step (Article 56 EPC 1973) in view of document

D1: WO 02 093246 A1.

II. With the statement setting out the grounds of appeal the appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the claims of the request underlying the decision under appeal, i.e. on claims 1 to 5 filed with the letter dated 19 March 2008 and claims 6 and 7 filed with the letter dated 28 February 2011.

III. In reply to the summons to oral proceedings the appellant announced by letter dated 15 August 2019 that they would not be attending the oral proceedings and requested that a decision be issued on the basis of the present written record.

IV. Oral proceedings were held before the board on 19 September 2019 in the absence of the appellant.

The chairman noted that the appellant had requested in writing that the decision under appeal be set aside and a patent be granted on the basis of the claims of the request underlying the decision under appeal, i.e. on claims 1 to 5 filed with the letter dated 19 March 2008

and claims 6 and 7 filed with the letter dated 28 February 2011.

At the end of the oral proceedings the chairman announced the decision of the board.

V. Claim 1 of the sole request of the appellant reads as follows:

"An electrophoretic medium comprising an electrically charged particle (706) suspended in a suspending fluid, the particle (706) having a polymeric shell, the polymeric shell having repeating units derived from at least one monomer the homopolymer of which is incompatible with the suspending fluid, and repeating units derived from at least one monomer the homopolymer of which is compatible with the suspending fluid, the medium being characterized in that the at least one monomer forming the compatible homopolymer comprises from 50 to 99 per cent by weight of the polymer shell."

Reasons for the Decision

1. The appeal is admissible.

2. *Claim 1 - Novelty*

2.1 Document D1 discloses an electrophoretic medium comprising electrically charged particles suspended in a hydrocarbon-based suspending fluid (abstract, together with page 33, line 28 to page 34, line 31), and more particularly in an aliphatic hydrocarbon suspending fluid (page 34, lines 6 to 10). In one

specific example, the particles have a polymeric shell having repeating units derived from a first monomer consisting of methyl methacrylate and repeating units derived from a second monomer consisting of lauryl methacrylate (page 34, lines 27 to 31).

In addition, as already acknowledged in the present application (see description of the application as published, page 16, last sentence, and page 17, lines 1 to 12), the homopolymers of methyl methacrylate and the homopolymers of lauryl methacrylate are respectively incompatible and compatible with a suspending fluid constituted of an aliphatic hydrocarbon within the meaning of these terms given in the description of the application (see description of the application as published, paragraphs [0076] to [0081]).

2.2 Document D1 does not explicitly disclose the relative amounts of the first and the second monomers. In particular, according to document D1 (page 34, lines 27 to 31) in the mentioned specific example "it may be desirable to limit the number of side chains" so that in the resulting copolymer "only some of the repeating units bear long side chains", and these statements do not allow the conclusion that the monomer of the compatible type (i.e. of lauryl methacrylate) would comprise from 50 to 99 per cent by weight of the polymer shell as required by present claim 1. In particular, the appellant's submissions in the statement of grounds of appeal (see paragraph bridging pages 3 and 4) indicate that, under the conditions disclosed in document D1, the monomer of methyl methacrylate (molecular weight of about 100 g/mol) would be present in more than 3 moles per mole of lauryl methacrylate (molecular weight of about 254 g/mol), i.e. that the second monomer of lauryl

methacrylate would not comprise more than about 46 per cent by weight of the polymer shell.

2.3 Therefore, as concluded by the examining division in the decision under appeal, the subject-matter of claim 1 is new over the disclosure of document D1, and in particular over the specific example referred to above, in that the monomer of the compatible type comprises from 50 to 99 per cent by weight of the polymer shell (Article 54(1) EPC 1973).

3. *Claim 1 - Inventive step*

3.1 According to the description of the application:

- the use of monomers of the compatible type in the polymer shell provides good steric stability to the particles when suspended in an aliphatic hydrocarbon suspending fluid, thus favouring dispersion of the particles in the suspending fluid (description of the application as published, paragraph [0075], and lines 4 to 21 of paragraph [0086]);

- the use of monomers of the incompatible type in a polymer shell comprising monomers of the compatible type renders the polymer less compatible with the suspending fluid and favours aggregation of the particles, thus improving image stability when the electrophoretic medium is used in an electrophoretic imaging display (description of the application as published, paragraph [0076], and lines 13 to 26 of paragraph [0086]); and

- by adjusting the relative amount in the polymeric shell of the monomers of the compatible and the incompatible type, in particular with the monomer of the compatible type comprising from about 15 per cent, and preferably from about 50 per cent, to about 99 per cent by weight of the polymeric shell (description of

the application as published, paragraphs [0044], [0050] and [0054]), it is possible to adjust the stability of the overall polymer shell with the suspending fluid and the stability of aggregates of the particles and hence the image stability of the resulting display (description of the application as published, line 19 of paragraph [0086] on page 30 to line 4 on page 31).

In view of these considerations and of the features of the electrophoretic medium of the specific example disclosed in document D1 and referred to in points 2.1 and 2.2 above, the electrophoretic medium of document D1 already presents implicitly a relatively good balance between, on the one hand, the stability of the polymer shell with the suspending fluid and, on the other hand, the stability of aggregates of the particles. In addition, the technical effect associated with a shift from the relatively low value of the content of the monomer of the compatible type of the example of document D1 (see point 2.2 above) to a value within the relative broad claimed range from 50 to 99 per cent would run from a relatively small improvement in the stability with the suspending fluid (see claimed value of 50 per cent) to a relatively large improvement in the stability with the suspending fluid, but with a significant deterioration in the stability of the aggregates of the particles (see claimed value 99 per cent).

Therefore, the objective problem solved by the distinguishing feature identified above can be seen in improving the stability of the polymer shell with the suspending fluid, and therefore improving the dispersion of the particles in the suspending fluid, while maintaining, at least to some relatively low

degree, the stability of the aggregates of the particles.

3.2 According to the passages of document D1 relating to the specific example referred to above, the main purpose of the provision of monomers of the compatible type in the polymeric shell is the improvement of the stability of the suspension of the particles in the suspending fluid and therefore the improvement of the dispersion of the particles in the suspending fluid. Document D1 proposes in this respect that the polymer comprises a major proportion of hydrocarbon chains (page 33, line 21 to page 34, line 20).

In view of this teaching, the skilled person confronted with the objective problem formulated above would consider increasing the relative amount of the monomer of the compatible type in the polymeric shell in order to solve the mentioned problem. In addition, in view of the teaching of document D1, he would be aware that the higher the relative content of the monomer of the compatible type, the better the stability of the suspension and also the better the dispersion of the particles in the suspending fluid. He would therefore consider relative amounts of the monomer of the compatible type within the broad claimed range of values of 50 to 99 per cent, and in any case he would consider amounts higher than those suggested in document D1 and therefore amounts of at least 50 per cent by weight.

3.3 As noted by the appellant, the specific example relating to the use of lauryl and methyl methacrylates is disclosed on page 34, lines 27 to 31 of document D1 with the introductory sentence "In some cases, it may be desirable to limit the number of side chains formed

in such processes" and with the proposal "to form a random copolymer in which only some of the repeating units bear long side chains." While this disclosure supports the conclusion in point 2 above that claim 1 is novel over the specific example of document D1, the board sees in this disclosure no adverse technical disclosure that would dissuade the skilled person from increasing, at least to some extent, the amount of the monomer of the compatible type, i.e. the amount of lauryl methacrylate, in order to solve the objective problem because

- in the mentioned passage on page 34, lines 27 to 31 the document fails to specify for which specific technical purpose it might be desirable to limit the number of side chains, and

- the document emphasizes in the previous paragraph that "it is important that the polymer [...] be highly compatible with the hydrocarbon suspending fluid, and thus that the polymer itself comprise a major proportion of hydrocarbon chains" (page 33, line 31 to page 34, line 6), that "it is advantageous for the polymer to have a branched or 'brush' structure, with a main chain and a plurality of side chains [...] [with] at least about four, and preferably at least about six, carbon atoms", and that "[s]ubstantially longer side chains may be advantageous; for example [...] lauryl (C12) side chains." (page 34, lines 6 to 14) [*emphasis added*].

More particularly, even assuming that - as submitted by the appellant - the skilled person would interpret the aforementioned sentence "In some cases, it may be desirable to limit the number of side chains ..." of document D1 as a "warning" suggesting that the side chains should not be entangled, but be free to spread themselves out into the suspending fluid in order to

produce a desired brush, the skilled person confronted with the objective problem would not refrain from exploring the possibility of increasing the relative amount of the monomer of the compatible type at least to a predetermined extent, and in any case above the limit of 1 mole of lauryl methacrylate per 3 moles of methyl methacrylate assumed by the appellant in the statement of grounds of appeal on the basis of a spacing between side chains of at least a substantial fraction of the length of the side chains themselves. The fact that the claimed invention includes as a particular embodiment the same compatible and incompatible monomers (see dependent claims 3 to 5) of the specific example disclosed in document D1 and that it requires a relative proportion of the monomer of the compatible type between 50 per cent and a high value of 99 per cent by weight shows that the skilled person would not meet any problem not only when reaching the lower value of the claimed range, but also values well beyond this value.

3.4 Therefore, the subject-matter of claim 1 does not involve an inventive step over the disclosure of document D1 (Article 56 EPC 1973).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Kiehl R. Bekkering

Decision electronically authenticated