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D E C I S I O N
of 23 January 2003

Case Number: T 0260/98 - 3.3.7

Application Number: 92925223.7

Publication Number: 0613490

IPC: C09D 11/02

Language of the proceedings: EN

Title of invention:
Abrasion resistant printing inks

Patentee:
SUN CHEMICAL CORPORATION

Opponent:
Siegwerk Druckfarben GmbH & Co. KG

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 83, 123

Keyword:
"Amendments - added subject-matter (no)"
"Disclosure - sufficiency (yes)"
"Novelty (yes)"
"Inventive step - (yes) after amendment"

Decisions cited:
T 0507/99, T 0281/86, T 0939/92

Catchword:
-



Case Number: T 0260/98 - 3.3.7

D E C I S I O N
of the Technical Board of Appeal 3.3.7
of 23 January 2003

Appellant:
(Opponent)

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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

Interlocutory decision of the Opposition Division
of the European Patent Office posted 20 January
1998 concerning maintenance of European patent
No. 0 613 490 in amended form.

Composition of the Board:

Chairman: R. E. Teschemacher
Members: G. Santavicca
P. A. Gryczka

Summary of Facts and Submissions

I. The mention of the grant of European patent 0 613 490, in respect of European patent application 92 925 223.7, which is based on international patent application PCT/US92/09824, filed on 10 November 1992, claiming a priority in the USA of 18 November 1991 (US 793745) and published on 27 May 1993 under No. WO 93/10198, was published on 2 August 1995. The patent as granted had 8 claims, independent Claim 1 reading as follows:

"1. A printing ink comprising a pigment and an aqueous or non-aqueous solvent or a mixture of such solvents and having reduced abrasiveness towards printing surfaces characterized in that the ink contains an alkoxyated dibasic phosphate ester and at least one alkali metal salt of a dialkylsulfosuccinic ester."

Claims 2 to 8 concerned preferred embodiments.

II. A notice of opposition was received on 26 April 1996. The opponent requested revocation of the patent on the grounds of Articles 100(b) and (a) EPC, that the claimed-subject matter lacked novelty and an inventive step having regard, *inter alia*, to documents:

D1: WO-A-92/10548

D2: FR-A-2 436 170

D3: GB-A-716 458

D4: US-A-4 385 901

D6: US-A-4 872 916

D7: US-A-4 427 810

D9: Reports of tests carried out by the opponent,
dated 5 March 1996 and 19 April 1996.

III. By decision of the Opposition Division, posted on 20 January 1998, the amended patent was found to meet the requirements of the European Patent Convention. That decision was based on a set of claims submitted during the oral proceedings held on 18 December 1997, as the sole request. With respect to the granted claims, Claim 1 had been modified by incorporation of a disclaimer.

In its decision, the Opposition Division held that:

- (a) The disclaimer corresponded literally with Example 1 of D1, did not add novel subject-matter and thus fulfilled the requirements of Article 123(2) EPC.
- (b) The two components necessary for the printing ink were clearly defined in the claims and the preparation of the ink was without any difficulty by using common general knowledge. Therefore, the claimed printing ink was sufficiently disclosed.
- (c) Example 1 of D1, a document pursuant to Article 54(3) EPC, disclosed a printing ink composition containing a sodium dialkyl sulfosuccinate and a phosphate ester surfactant, which forcibly contained an alkoxyated dibasic phosphate ester from the reaction between a polyphosphoric acid and a polyalkylether. Due to the exclusion of that printing ink, the subject-matter of Claim 1 was however sufficiently delimited from D1.

- (d) As to inventive step, none of D2 to D8 addressed the problem of reducing the abrasiveness of printing inks. D2 concerned an erasable ink and could not be considered as the closest prior art document, D3 to D8 dealt with the dispersion of pigments in printing inks. The picture resulting from that prior art was that dialkyl sulfosuccinates and polyetherphosphates were already used as dispersant for pigments.

The closest prior art was described in D4, the compositions of which, in addition to a dialkyl sulfosuccinate, could contain a condensation product of cresol, formaldehyde and polyphosphates. The technical problem underlying the patent in suit was to enhance the compositions of D4. According to the tests on file, the combination of dialkylsulfosuccinates and alkoxyated dibasic phosphate esters as defined in Claim 1 in suit led to reduced abrasiveness. Therefore, the problem had been solved and there was no need to prove any synergistic effect.

Since the prior art did not suggest that the addition of alkoxyated dibasic phosphate esters would reduce the abrasiveness of the existing printing inks containing sulfosuccinates, the combination of these additives for reducing the abrasiveness of the inks was not obvious and involved an inventive step.

- (e) The dependent claims similarly fulfilled the requirements of Article 52(1) EPC.
- (f) Therefore, the amended patent fulfilled the requirements of the EPC in accordance with Article 102(3) EPC.

- IV. The opponent lodged an appeal against that decision, which was received on 14 March 1998, the prescribed fee being paid on the same day. With the statement of the grounds of appeal, received on 20 May 1998, the appellant *inter alia* referred to the further documents:
- D12: Römpps Chemielexikon, "Phosphorsäureester",
page 3393
- D13: H. Waldmann & G. H. Seidel, Kraft- und
Schmierstoffe, Walter de Gruyter, Berlin, 1979,
pages 1248 to 1249
- D14: D. Klamann, Schmierstoffe und verwandte Produkte,
Verlag Chemie, Weinheim, 1982, pages 64 and 96
- V. By letter dated 11 August 1999, the proprietor
(respondent) referred to document:
- D15: Wenske Chemistry Dictionary, "dibasic", page 341
- VI. In a communication in preparation for the oral
proceedings, the points to be discussed were indicated.
- VII. With a letter dated 7 January 2003, the respondent
submitted new claims as 1. and 2. auxiliary requests
and, due to contradictory decisions of the Technical
Boards of Appeal with respect to the allowability of
disclaimers under Article 123(2) EPC, requested that
two questions of law related to that issue be referred
to the Enlarged Board of Appeal.
- VIII. With a communication dated 15 January 2003, a copy of
decision T 507/99 dated 20 December 2002, which refers
questions of law on the allowability of disclaimers to
the Enlarged Board of Appeal, was sent to the parties.

IX. Oral proceedings were held on 22 and 23 January 2003. The respondent submitted three sets of claims as 2. to 4. auxiliary requests, the 2. auxiliary request replacing that filed with letter dated 7 January 2003, and withdrew the main and 1. auxiliary requests on file, both containing a disclaimer in Claim 1. Consequently, also the request that two questions of law be referred to the Enlarged Board of Appeal was withdrawn. The 2. to 4. auxiliary requests filed at the oral proceedings became the main, 1. and 2. auxiliary requests, respectively.

Claims 1 of these requests are a combination of the granted claims, as follows:

Main request

Claim 1 with the restriction of Claim 4 that:

"the alkoxyated dibasic phosphate ester is present in an amount of about 2 - 6 wt.%, based on the weight of the printing ink".

1. Auxiliary request

Claim 1 with the restriction of Claim 4 and the further restriction of Claim 8 that:

"the alkali metal salt of the dialkylsulfosuccinic ester is present in an amount of about 0.5 - 3 wt.%, based on the weight of the printing ink".

2. Auxiliary request

Claim 1 with the restrictions of Claims 5 and 6 that:

"the alkali metal comprises sodium and the alkyl moiety of the dialkylsulfosuccinic ester contains 8 - 16

carbon atoms, and wherein the dialkylsulfosuccinic ester comprises a mixture of two different dialkylsulfosuccinic esters".

X. The arguments of the appellant in support of the appeal can be summarised as follows:

- (a) No formal objections were raised against the requests filed at the oral proceedings.
- (b) The "laboratory slang" used in the patent did not provide any legal certainty for third parties. Hence, if not the IUPAC, at least a clearer nomenclature should have been used, eg as in D6.
- (c) That unclear nomenclature resulted in several contradictions. Since the skilled person could not resolve them on the basis of the common general knowledge, he would not arrive at the explanations and formulae for the claimed compounds submitted by the respondent.

Since the term "dibasic" meant the number of negatively charged oxo-groups present in the phosphoric moiety and, consequently, designated a monoester, a phosphate diester could not fall under the terms of Claim 1 in suit.

Contrary to Claim 1, which mentioned the presence of an alkoxyated dibasic phosphate ester and a dialkylsulfosuccinate, the examples always concerned mixtures of two phosphate esters together with a sulfosuccinate, in some cases two sulfosuccinates.

- (d) The nomenclature of the compounds in the examples did not enable the identification of the relevant structure, hence the additives used there.

Furthermore, a mixed phosphate diester, as exemplified by the respondent, was difficult to manufacture. Hence, the patent in suit neither disclosed whether or not these compounds were commercially available, nor how they were prepared. Consequently the examples could not be repeated.

- (e) Even if additives falling under the definition in Claim 1 were used, the reduced abrasiveness required by Claim 1 would not be achieved. The inks obtained in the comparative tests of the appellant were unsuitable for the purpose they were intended and did not produce that effect. Consequently, a reworking of the invention along the definition of Claim 1 in suit did not lead to any reduced abrasiveness.
- (f) Therefore, the patent specification was not sufficiently clear and complete.
- (g) The claimed subject-matter of the main and the 1. auxiliary requests was not novel having regard to the composition of Example 1 of D1, in which the phosphate ester surfactant had been obtained as mentioned in the description.
- (h) As to inventive step, since none of the documents which concerned ink dispersions mentioned the problem of reduction of ink's abrasion, the closest state of the art was that described in the introductory portion of the patent in suit, which mentioned that the ink's abrasion was related to the pigment's characteristics and the lubricity of the solvents.

The technical problem was the reduction of the abrasion caused by inks after long printing runs.

The proposed solution to that problem, ie the incorporation of an alkoxyated dibasic phosphate ester and a dialkylsulfosuccinate into the ink composition, did not solve the technical problem however. No synergistic effect due to the presence of both additives could be derived from the examples of the patent in suit, nor from the additional tests carried out by the respondent. Hence, the technical problem was only the provision of an alternative printing ink composition.

Since the claimed additives were known as dispersant for pigments in printing inks and as friction reducer, the subject-matter was obvious.

- (i) The above arguments similarly applied to the 1. auxiliary request.
- (j) Claim 1 of the 2. auxiliary request did not specify the two dialkylsulfosuccinic esters exemplified in the patent in suit, ie the claim was open to any combination of two different dialkylsulfosuccinic esters. Hence, it was not apparent either that the problem had been solved.

Moreover, since D7 disclosed sodium dioctyl and sodium tridecyl sulfosuccinates, the claimed subject-matter was obvious.

XI. The respondent argued in essence as follows:

- (a) The amended claims were based on the granted claims.
- (b) Part of the objections raised by the appellant related to clarity under Article 84 EPC, not to

insufficiency under Article 83 EPC, eg the argument that the chemical nomenclature was not usual.

Although the compound's nomenclature was not in compliance with the IUPAC rules, it was nevertheless clear to a person skilled in the art, which additives were envisaged in claim 1. Moreover, these additives were known, as shown by any of D2, D3, D6 and D7.

In accordance with the nomenclature described in D14, the term "dibasic" of claim 1 meant a phosphate containing two ester moieties.

- (c) The skilled person knew how to prepare the esters of the orthophosphoric acid and mixtures thereof. No method of preparation had explicitly been described in the patent in suit, because this was not the core of the invention. The preparation of these esters might present difficulties, but was however within the capabilities of a chemist.

Even if the compound nonyloxy phenoxy ethoxylated phosphate ester was not commercially available or could be prepared with difficulties, this would only demonstrate that a particular example is difficult to reproduce, not the invention however.

- (d) The examples in the patent in suit showed that the use of a combination of an alkoxyated dibasic phosphate ester and an alkali metal salt of a dialkylsulfosuccinic ester led to a reduced abrasiveness. Contrary to the assertion of the appellant, a reduced abrasiveness could be derived also from the comparative tests reported in D9.
- (e) Hence, the disclosure was sufficient.

- (f) As to novelty, D1 mentioned a list of compounds as solubilizing agent, eg phosphate ester surfactants and dialkyl sulfosuccinic esters. However, there was no direct and unambiguous disclosure that they were used together as solubilizing agents, nor that the phosphate ester surfactant in Example 1 resulted from the reaction between polyphosphoric acid and polyalkylethers mentioned in the description of D1. Furthermore, the concentration of the phosphate ester surfactant in Example 1 of D1 did not correspond to the concentration mentioned in Claim 1 in suit. Therefore, the claimed subject-matter was novel.
- (g) As to inventive step, only D13 and D14 addressed the reduction of abrasion, but they concerned lubricants for steel parts. Hence, the technical problem of the patent in suit was not derivable from the cited state of the art. The examples in the patent in suit showed that the problem had been solved. The use of the additives did not derive from the previous solutions with waxes and stearates, as mentioned in the patent in suit. Hence, the claimed subject-matter of the main and 1. auxiliary request involved an inventive step.
- (h) As regards the 2. auxiliary request, the burden of proof that a combination of two different sulfosuccinates did not achieve an improved effect had not been discharged by the appellant. Neither D7, which disclosed two sulfosuccinic esters for solving a different problem, nor D3, which disclosed a mixed sulfosuccinate, hinted at the combination of two different sulfosuccinates for reducing the abrasiveness of printing inks. Hence, the claimed subject-matter of the 2. auxiliary request was not obvious either.

- XII. The appellant requested that the decision under appeal be set aside and that the patent be revoked.
- XIII. The respondent requested that the appeal be dismissed and that the patent be maintained on the basis of the main request or, alternatively, the 1. or 2. auxiliary requests filed during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

Claim 1 results from the combination of granted claims 1 and 4. Claims 2, 3 and 4 to 7 correspond to claims 2, 3 and 5 to 8 as granted, respectively.

The amendment restricts the protection conferred by Claim 1 as granted, hence the requirements of Article 123(3) EPC are fulfilled.

Since the granted claims correspond to the claims as filed, the requirements of Article 123(2) EPC are also fulfilled.

The amendment aims at overcoming the grounds of opposition under Article 100(a) EPC and thus fulfils the requirements of Rule 57a EPC.

3. *Disclosure of the invention*

- 3.1 An invention is sufficiently disclosed within the meaning of Article 83 EPC if a person skilled in the

art can carry it out on the basis of the information provided in the patent's specification as filed in the light of the common general knowledge.

3.2 The patent in suit contains eight examples:

Example 1 (comparative) concerns a water-based printing ink, formulated from the materials in the table, the abrasiveness of which, determined in an abrasion tester, was rated 7 on a scale of 1 to 10;

Example 2 (comparative) concerns the reformulation of the above ink by the addition of 4% of a phosphate ester composition consisting of a mixture of a nonyloxy phenoxy ethoxylated phosphate and a heptyl ethoxylated phosphate in about an 80:20 ratio. The ink was rated 4.

Example 3 (comparative) concerns the reformulation of the ink of Example 1 by the addition of 2% of sodium 2-ethylhexyl sulfosuccinate, which ink was rated 6.

Example 4 (comparative) repeated Example 3 but using 2% of sodium tridecyl sulfosuccinate. The ink was rated 6.

Example 5 (comparative) repeated Example 3 but using a mixture of 1% of sodium 2-ethylhexyl sulfosuccinate and 1% of sodium tridecyl sulfosuccinate. The rating was 4.

Example 6 concerns a reformulation of the ink of Example 1 by the addition of 4% of a phosphate ester composition according to Example 2 and 2% of a sulfosuccinate according to Example 3. The ink rated 3.

Example 7 concerns a reformulation of the ink of Example 1 by the addition of 4% of a phosphate ester composition according to Example 2 and of a sulfosuccinate composition according to Example 5. The rating was 1.

Example 8 concerns three inks:

- A toluene-based printing ink (ink 1) containing 3% of a standard oleic acid ester wetting agent ("Soleate DO") and having a chrome wear of 0.3 μ ;
- A second ink, in which the wetting agent was replaced with 3% of sodium 2-ethylhexyl sulfosuccinate, having a chrome wear 0.1 μ .
- A third ink, in which the wetting agent was replaced with 3% of sodium 2-ethylhexyl sulfosuccinate and 1% of a phosphate ester composition consisting of a mixture of a nonyloxy phenoxy ethoxylated phosphate and a heptyl ethoxylated phosphate in about an 80:20 ratio, having a chrome wear of 0.05 μ .

3.3 As regards the appellant's argument that the compounds "sodium 2-ethyl hexyl sulfosuccinate" and "sodium tridecyl sulfosuccinate", present in examples 3 to 7, were monoalkyl esters, which did not fall under the terms of Claim 1, the Board considers that this concerns Article 84 EPC, which is not a ground of opposition.

Further, the alleged implications on the requirements of Article 83 EPC, as brought forward by the appellant, cannot be followed. Claim 1 requires that a dialkyl sulfosuccinate be present and the examples did not mention a monoalkyl sulfosuccinate, eg a "di-sodium tridecyl sulfosuccinate". Therefore, the skilled person would assume that the definition should be supplemented by insertion of the prefix "bis" before "2-ethyl hexyl" and "tridecyl", to have the required dialkyl sulfosuccinate under the terms of Claim 1.

3.4 The appellant, on the basis of the tests carried out as detailed in D9, has argued that:

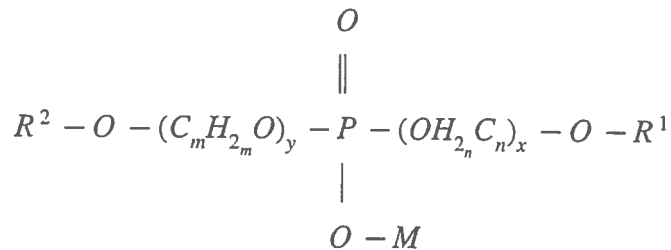
(a) Since the definition "nonyloxy phenoxy ethoxylated phosphate" was unclear, and that starting compound was not available to the skilled person, the examples were not repeatable;

(b) A printing ink prepared from the information in Claim 1, did not show any reduced abrasiveness, let alone any synergy from the combined use of alkoxyated phosphate esters and sulfosuccinates.

3.5 The first line of argument concerns the repeatability of the examples, ie whether or not the skilled person can reproduce them on the basis of the information in the specification as filed and the common general knowledge.

3.5.1 The compound named "nonyloxy phenoxy ethoxylated phosphate" has been used in examples 2, 6 and 7.

3.5.2 The respondent has brought forward that the term "dibasic alkoxyated phosphate ester" in Claim 1 in suit corresponds to the following formula:



wherein, for the contested ester used in examples 2, 6 and 7: R¹ and R² are nonyl- and Phenyl- radicals, respectively; m = n = 2; x equals y (but no value has ever been given); and M is H or a metal like Na (page 2 of the letter dated 11 August 1999).

- 3.5.3 This information is not present in the patent specification. Furthermore, even if the representation was what the skilled person takes as meant by reading the term "nonyloxy phenoxy ethoxylated phosphate", the contested term, whose formula does not specify eg the degree of ethoxylation, would still refer to a class of compounds and could not define which specific substance has actually been tested.
- 3.5.4 The respondent, questioned on this point raised in the written submissions of the appellant and addressed in the communication accompanying the summons, has not established whether or not the compounds falling under the definition "nonyloxy phenoxy ethoxylated phosphate" are commercially available, nor whether or not they can be prepared by known methods without undue burden. Hence, it has not been shown that this starting component for preparing the exemplified printing inks was available to the skilled person.
- 3.5.5 Therefore, as far as the contested compound is concerned, examples 2, 6 and 7 of the patent in suit are not sufficiently clear and complete so that the skilled person may repeat them without undue burden.
- 3.5.6 However, the exact repeatability of the examples is not a requirement of the EPC (T 281/86, OJ 1989, 202, point 6 of the Reasons). Consequently, such a failure alone does not necessarily lead to insufficiency of disclosure.
- 3.6 Rather, the decisive question is whether or not the invention can be reproduced without undue burden on the basis of the information in the whole specification, in particular in Claim 1, and common general knowledge.

- 3.6.1 In the present case the skilled person is faced with the problem of the meaning of the term "dibasic", used to define the alkoxyated phosphate ester in Claim 1. This term is not in compliance with the usual nomenclature for the esters of orthophosphoric acid (mono-, di- or triesters, according to eg the Römpps Chemielexikon, ie D12). A different interpretation is given to it by the parties: a monoester for the appellant; a diester for the respondent. The skilled person is consequently confronted with two possibilities when selecting an alkoxyated phosphate ester under the terms of Claim 1, a mono or a diester. If necessary, he would try any of them or, as done in the examples, a mixture of both of them. This does not require undue burden. The ambiguity of the term, in the present case, does not lead to insufficiency.
- 3.6.2 Furthermore, compounds falling under the definition in Claim 1 were commercially available at the date of the patent, as exemplified in:
- (a) D2 and D6 (alkoxyated phosphate esters); and
 - (b) D3, D4 and D7 (alkali metal salt of a dialkylsulfosuccinic ester).
- 3.6.3 Also the appellant has used commercially available products in the experiments described in D9 (page 4, "Ester 1" and "Ester 2", ie mixtures of phosphate esters, and sodium-bis(2-ethyl-hexyl)-sulfosuccinate) and was able to rework the invention by using a mixture of mono- and diesters of tributylphenoxy-tetraethoxy-phosphate ("Ester 1") and dodecanoxy-tetraethoxy-phosphate ("Ester 2").

- 3.6.4 Therefore, the skilled person can select compounds falling under the definitions in Claim 1, form a mixture therefrom and incorporate it in a formulation for a printing ink.
- 3.6.5 Once a printing ink has been formulated, it is not disputed that the skilled person can determine whether or not it presents any reduced abrasion of the printing surfaces. This can be done for example by the method as defined in the patent in suit.
- 3.6.6 In its second line of argument, to back the ground of insufficiency of disclosure, the appellant argued that no reduced abrasiveness could be obtained when reworking examples 1, 2, 3 and 6 of the patent in suit along the lines of D9. The appellant in particular stressed that no synergy resulted from the combination of the two components mentioned in Claim 1 in suit.

However, since the claims only specify a reduced abrasiveness and do not require any synergistic activity of the components, the question as to whether or not such a synergic effect is achieved by the claimed printing inks is not relevant to the issue of sufficiency, although it may properly arise under Article 56 EPC, if this technical result turns out to be the sole reason for the alleged inventiveness of the printing inks (T 939/92 of 12 September 1995, Headnote point 2 and Reasons Nos. 2.4 to 2.6, OJ EPO 1996,309).

The results of the experiments carried out by the appellant in D9 show that:

- The printing ink reworked according to Example 6 (sulfosuccinate + phosphate ester) produces a reduced abrasiveness (Rating 2 and no surface abrasion) in comparison to the printing ink along Example 1 (no phosphate ester, no sulfosuccinate)

(Rating 3) and any of the compositions along Examples 2 (phosphate ester but no sulfosuccinate) (Rating 2, but visible surface abrasion) and 3 (sulfosuccinate but no phosphate ester) (Rating 3) (page 5).

- The printing ink reworked along Example 6 achieves less total abrasion than the composition along Example 2 (see Footnote 1) and a surface abrasion as the printing ink along Example 1 (page 6).

Hence, these experiments do not convincingly prove that a reduced abrasiveness has not been achieved.

- 3.6.7 All in all, the skilled person, although being confronted with some difficulty, in view of the unusual nomenclature used especially in the examples, can nevertheless reproduce the invention within the terms of Claim 1 in suit.
- 3.6.8 Therefore, the arguments brought forward by the appellant do not convince the Board that the specification of the patent in suit is insufficient.
- 3.6.9 Consequently, the ground of opposition under Article 100(b) EPC cannot prejudice the maintenance of the patent in suit.

4. *Novelty*

- 4.1 The appellant argued lack of novelty on the basis of D1, which was filed on 7 October 1991, ie before the priority date of the patent in suit, but published only on 25 June 1992, ie after the filing of the patent in suit. Therefore, D1 is a document pursuant to Articles 54(3)(4) EPC for all the designated contracting states but IE and MC, for which no separate sets of claims have been filed.

4.2 D1 discloses a water-based ink comprising:

- (a) water;
- (b) a pigment;
- (c) a nonionic surfactant having a solubility in water of less than about 0.5 wt.% and being present in an amount effective to lower the dynamic surface tension of the ink composition to a level in the range of about 25 to 40 dynes/cm; and
- (d) a solubilizing agent sufficient to solubilize substantially all of the nonionic surfactant (claim 1).

The nonionic surfactant is present in an amount of about 1 to 4 wt.% and is selected from the group consisting of acetylenic diols containing 8 to 14 carbon atoms, acetylenic carbinols containing 8 to 14 carbon atoms and block copolymers of propylene oxide and ethylene oxide having a HLB Value in the range of about 3 to 8 and a propylene oxide to ethylene oxide ratio in the range of 8:1 to 3:1 (claims 3 and 4).

The solubilizing agent is present in an amount of 0.1 to 5 wt.% and is selected from the group consisting of the ammonium, potassium or sodium salt of 8(5-carboxy-4-hexyl-cyclohex-2-enyl)octanoic acid, the ammonium, potassium or sodium salt of a C₈-C₁₃ dialkyl sulfosuccinic acid having a critical micellar concentration in the range of about 0.08 to 0.12, phosphate ester surfactants, and mixtures thereof (claims 5 and 6).

As far as the phosphate ester surfactants used as solubilizing agent are concerned, the description mentions that they can be the condensation products

resulting from the reaction of polyphosphoric acid and a compound having the formula $R(CH_2CH_2O)_xH$, wherein x is an integer of 1 to 20 and R is either an alkylphenoxy group, the alkyl radical of which contains 5 to 10 carbon atoms, or is a C_{10} - C_{18} alkoxy group (page 4, lines 4 to 9).

Example 1, which was mentioned by the appellant, concerns a water-based flexographic ink formulated from the following components:

<u>Component</u>	<u>Wt. %</u>
Carbon Black	13
Lignin	5
Acrylic Emulsion Resin	8
Dipropylene glycol	3
Urea	3
Phosphate Ester Surfactant	0.5
Clay	2
Anti Foam	1
Solubilizing Agent + Nonionic surfactant*	0.5
Water	64

* The solubilizing agent employed in this example was sodium diethylhexyl sulfosuccinate and the nonionic surfactant was 2-4-7-9-tetramethyl-5-decyn-4,7-diol, the ratio of agent to surfactant was 1:4 by weight.

This example discloses the presence of sodium diethylhexyl sulfosuccinate, which falls under the terms of claim 1 in suit. However, an **alkoxylated dibasic** (emphasis added) phosphate ester, as defined in Claim 1 in suit, is not mentioned. The exact nature of the "phosphate ester surfactant" component is not specified in Example 1, which does not disclose either

that this component acts as a solubilizing agent. Therefore, any reference to the passage on page 4 of D1, lines 4 to 9, where the solubilizing agents are defined, and according to which the phosphate ester surfactant can be an alkoxyated phosphate ester, does not directly and unambiguously apply to the "phosphate ester surfactant" of Example 1. Furthermore, the exemplified amount for the phosphate ester surfactant (0.5%) is lower than the minimum amount required by Claim 1 in suit.

It results from the above that the composition of Example 1 of D1, in itself or in the light of the description of D1, does not take away the novelty of the printing ink defined in Claim 1 in suit.

Therefore, this ground of opposition under Article 100(a) EPC does not prejudice the maintenance of the patent amended according to the main request.

5. *Inventive step*

5.1 The patent in suit relates to abrasion resistant printing inks, more particularly, to inks which exhibit reduced abrasiveness towards printing surfaces such as gravure cylinders (page 2, lines 5 to 6).

D2 concerns a **writing** (emphasis added) ink, which is erasable. D3 to D8 deal with dispersions of pigments for printing inks. D13 and D14 mention the properties of phosphate esters in synthetic lubricants. Therefore, none of cited documents mentions the problem of reducing the abrasiveness of the inks for gravure printing.

However, that problem was known before the priority date of the patent, as also acknowledged under the heading "Background of the invention" in the patent in suit (page 2, lines 13 to 21). The solution proposed in that prior art was the incorporation of materials thought to provide lubricity (page 2, lines 22 to 23).

Hence, in the present case, the closest prior art is represented by the prior art acknowledged in the background of the invention in the patent specification.

- 5.2 Although incorporation of waxes or stearates reduced the abrasion caused by water-based printing inks, little effect was achievable (page 2, lines 22 to 23).

Since it was desirable to provide a greater incentive to printers to utilize water-based inks, the solutions proposed in the prior art left room for improvement.

Thus, the problem underlying the patent in suit can be seen in the preparation of printing inks capable of achieving a further reduction of the abrasiveness towards the printing surfaces, in line with the patent in suit (page 2, lines 28 and 41 to 46).

- 5.3 According to the patent in suit, the problem is solved by incorporation of an alkoxyated dibasic phosphate ester and at least one alkali metal salt of a dialkylsulfosuccinic ester in the ink, as defined in Claim 1 in suit (page 2, lines 27 to 29).

- 5.4 The examples of the patent in suit which relate to the use of two compounds defined in Claim 1, ie examples 1, 2, 3 and 6, apart from the fact that some of them are not reproducible, do not show that the reduced abrasion goes beyond the expected contribution of the individual components.

The effects of the components are merely additive: the phosphate ester mixture of Example 2 causes a reduction of 3 points on the scale; the sulfosuccinate of Example 3 causes a reduction of 1 point on the scale; the presence of both of them, as in Example 6, causes a reduction of 4 points, ie the sum of 3+1. Hence, there is no proof of any synergistic effect.

Also the tests provided by the appellant (D9) tend to show that a certain reduction of abrasion may be obtained. They do not, however, demonstrate that any synergy has been achieved.

Added to this, the contribution of the individual components is not dealt with as an invention in the patent in suit (see examples 2 to 4).

In fact, the use of any of the single components in printing inks was indisputably known, eg from D3, D4 and D6, where they acted as dispersants, and a good dispersion also leads to reduced abrasion, as brought forward by the appellant, which is plausible. Therefore, the additive effect of the single compounds was to be expected.

In summary, though no comparison is available that this solution achieves better effects than the solutions of the prior art which used waxes and stearates, the tests provided by the parties can make it plausible that the problem has been solved in comparison to the closest prior art as defined above. However, the person skilled in the art could expect that both components exhibited an abrasion reducing effect. In the absence of any proof of a synergistic effect, it was obvious to make use of the advantages of the individual components in a printing ink.

5.5 Hence, the subject-matter of Claim 1 according to the main request does not involve an inventive step.

5.6 Therefore, this ground of opposition under Article 100(a) EPC prejudices the maintenance of the patent in the form of the main request.

1. *auxiliary request*

6. *Amendments*

Claim 1 results from the combination of granted claims 1, 4 and 8. Claims 2, 3 and 4 to 6 correspond to claims 2, 3 and 5 to 7 as granted, respectively.

Therefore, this request fulfils the requirements of Articles 123(2) and (3) EPC and Rule 57a EPC for the same reasons as the main request (point 2, *supra*).

7. *Sufficiency of disclosure*

For the reasons given under point 3 for the main request, this ground of opposition does not prejudice either the maintenance of the patent amended according to the 1. auxiliary request.

8. *Novelty*

Added to the reasons given under point 4, *supra*, for the main request, neither the examples, nor the description of D1 mention the use of a combination of an alkoxyated dibasic phosphate ester and an alkali metal salt of a dialkylsulfosuccinic ester with the proportions now defined in Claim 1.

Therefore, D1 cannot prejudice the novelty of the subject-matter according to the 1. auxiliary request.

9. *Inventive step*

- 9.1 It has not been shown that the further specification of the amount of the dialkyl sulfosuccinate in Claim 1 does result in any new or enhanced effect. Consequently, it does not change the problem to be solved. Hence, the arguments and the consequence established for the main request (point 5 *supra*) apply *mutatis mutandis* to the present request.

Therefore, this ground of opposition under Article 100(a) EPC also prejudices the maintenance of the patent in the form of 1. auxiliary request.

2. *auxiliary request*

10. *Amendments*

Claim 1 results from the combination of granted claims 1, 5 and 6. Claims 2 to 4 and 5 to 6 correspond to claims 2 to 4 and 7 to 8 as granted, respectively.

Therefore, this request fulfils the requirements of Articles 123(2) and (3) EPC and Rule 57a EPC for the same reasons as the main request (point 2, *supra*).

11. *Sufficiency of disclosure*

For the reasons given for the main request, this ground of opposition does not prejudice the maintenance of the patent amended according to the 2. auxiliary request.

12. *Novelty*

Added to the reasons given under for the main request (point 4, *supra*), neither the examples, nor the description of D1 mention the use of a mixture of two different dialkyl sulfosuccinic acid esters.

Therefore, D1 cannot prejudice the novelty of Claim 1 according to the 2. auxiliary request.

13. *Inventive step*

13.1 Also for the 2. auxiliary request, the closest prior art is acknowledged in the background of the invention in the patent in suit (see point 5.1 *supra*) and the problem underlying the patent in suit can be seen in the preparation of printing inks capable of achieving a further reduction of the abrasiveness towards the printing surfaces (see point 5.2 *supra*).

13.2 The solution to the problem, however, now consists in the incorporation of an alkoxyated dibasic phosphate ester and a mixture of sodium salts of two different dialkylsulfosuccinic esters in the ink, wherein the alkyl moiety of the dialkylsulfosuccinic ester contains 8 to 16 carbon atoms.

13.3 Example 7 of the patent in suit, which relates to the use of the additives defined in Claim 1, shows that the reduction of the abrasiveness goes beyond the expected additive contribution of the individual compounds. In particular, the effects of the single dialkylsulfosuccinic esters are not merely additive:

- The sulfosuccinate of Example 3 causes a reduction of 1 point on the scale;
- The sulfosuccinate of example 4 also causes a reduction of 1 point on the scale;
- The presence of both of them, same total quantity, but half of the individual quantities, as in Example 5, causes a reduction of 3 points, which is more than the sum of 1+1, ie there is now a proof of a synergistic effect.

- That synergistic effect is maintained in Example 7, in comparison to Example 6 (ink of Example 7 ranks 1 instead of 3 for the ink of Example 6).

13.4 The appellant argued that Claim 1 not only included the exemplified dialkylsulfosuccinic esters, but was much broader and also related to all other mixtures of two different dialkylsulfosuccinic acid esters, which would not all solve the problem. In other words, there was no proof that the problem had been solved.

13.5 In the present case, however, where it is plausible that the use of two different sulfosuccinic acid esters achieves an effect which is better than expected (Examples 5 and 7), the onus to prove that the problem has not been solved by any combination of two different sulfosuccinic acid esters is on the appellant and has not been discharged convincingly. As a matter of fact, the appellant has not brought any comparative evidence to support this argument. The experiments reported in D9 do not deal with inks containing a mixture of two different dialkylsulfosuccinic acid esters. Hence, the technical problem is to be considered as having been solved.

13.6 It remains to decide whether this solution was obvious.

D4 requires that the dialkylsulfosuccinic ester contains from 3 to 7 carbon atoms and does not mention any mixture of two different sulfosuccinic esters.

D3 mentions several dialkylsulfosuccinic esters, including a diester containing two different ester moieties, without disclosing or suggesting a mixture of two different sulfosuccinates for solving the problem of reduction of ink's abrasion. Neither does D7.

The other documents have no longer been relied upon by the parties, and the Board has no reason to consider them more relevant than the documents dealt with above.

13.6.1 Hence, the use of a mixture of two different dialkylsulfosuccinic esters in a printing ink is not disclosed in the cited prior art. The appellant has not put forward any plausible reason why the person skilled in the art should have expected superior properties of such a mixture. Consequently, a printing ink formulation with that mixture, in combination with an alkoxyated phosphate ester, is not obvious. The subject-matter of Claim 1 according to the 2. auxiliary request involves an inventive step.

13.7 Therefore, the ground of opposition under Article 100(a) EPC, lack of an inventive step, does not prejudice the maintenance of the patent in the form of the 2. auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.


2. The case is remitted to the department of first instance with the order to maintain the patent on the basis of claims 1 to 6 according to the 2. auxiliary request (previous 4. auxiliary request as submitted during the oral proceedings) and a description yet to be adapted.

The Registrar:




C. Eickhoff

The Chairman:



R. Teschemacher



27/3/2003
PG 27/3/2003