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D E C I S I O N
of 5 February 1997

Case Number: T 0504/93 - 3.3.1

Application Number: 88310138.8

Publication Number: 0314485

IPC: C09D 11/00

Language of the proceedings: EN

Title of invention:
Low glycol inks for plain paper printing

Patentee:
HEWLETT-PACKARD COMPANY

Opponent:
Pelikan GmbH

Headword:
Ink/HEWLETT-PACKARD

Relevant legal provisions:
EPC Art. 54(1), 54(2), 56

Keyword:
"Novelty (yes) - disclosure of a document does not extend to matter which may be rendered obvious by it"
"Inventive step (yes) - unobvious alternative"

Decisions cited:
T 0565/90, T 0332/87, T 0426/86, T 0739/93

Catchword:
-



Case Number: T 0504/93 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 5 February 1997

Appellant:
(Opponent)

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 8 April 1993
rejecting the opposition filed against European
patent No. 0 314 485 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: A. J. Nuss
Members: R. K. Spangenberg
W. Moser

Summary of Facts and Submissions

- I. The appeal lies from a decision of the Opposition Division of the EPO dated 8 April 1993, which was announced orally on 2 March 1993. By this decision an opposition against European patent No. 0 314 485 was rejected.

The patent in suit was granted in response to European Patent Application No. 88 310 138.8 on the basis of 10 claims. Claim 1 read as follows:

"1. An ink composition for use in inkjet printers for printing on plain paper and other media comprising:

- (a) from 5 to 10 wt% of ethylene glycol or diethylene glycol or a mixture thereof
- (b) from 1 to 4 wt% of a soluble dye; and
- (c) the balance water."

Claims 2 to 9 depended on Claim 1 and related to specific embodiments thereof, whereas Claim 10 related to a printed plain paper or sheet media printed with an ink composition according to any of Claims 1 to 9.

In the decision under appeal the following document was considered:

- (1) EP-A-187 404

- II. The Opposition Division held that the subject-matter of the patent in suit was novel and involved an inventive step. In particular, it was held that document (1) concerned an ink for an ink-jet printing device consisting of water and a hydrolytic salt, which

mixture was combined with a dyestuff and optionally, as further additives, with water-soluble polymers such as polyethylene glycols of high molecular weight (200) as thickeners and with glycolic derivatives, such as N-methyl pyrrolidone, glycerine, ethanolamine and its derivatives, as moistening agents or humectants. The mention of "ethylene glycol" in examples 3, 4, 6-9, was considered to relate to the said polyethylene glycols of high molecular weight, which were described as giving the desired viscosity and stability to the ink and in addition some advantages on the paper, and, in any case, concerned the use of "ethylene glycol" as a component of the vehicle in amounts outside the range claimed in the patent in suit.

In the light of this prior art the technical problem underlying the patent in suit was found to be to propose improved ink compositions typically used in ink-jet printing which show less smearing of the ink when employed on plain paper. The Opposition Division considered that this problem had been credibly solved by observing the narrow range of the proportions of glycol and dye in the ink composition according to the patent in suit. Inventive step was also acknowledged, since, inter alia, this citation contained no hint towards the criticality of the choice of the glycolic agent nor of the importance of the proportions of the combination of glycol and dye for the solution of the present technical problem.

III. Oral proceedings took place on 5 February 1997.

IV. The Appellant (the Opponent) submitted that, in addition to the disclosure of document (1), the common general knowledge represented by

(2) H. Römpp, Chemie-Lexikon, 6th edition (1966),
column 2472

should be taken into account when assessing the information content of document (1). In his opinion, in respect of document (2) it was clear that the Opposition Division had based their assessment of novelty and inventive step on a wrong interpretation of the information content of document (1). In view of the technical teaching derivable from a combination of the amounts of ethylene glycol used in examples 3 and 4 and the amounts of dyestuff indicated in Claim 4 of document (1), so he argued, the subject-matter of the patent in suit lacked novelty. Moreover, in his opinion the technical problems addressed in document (1) and the patent in suit, respectively, were substantially the same and the proposed solutions differed only in that the ranges of the relative amounts of glycol and dyestuff were different, taking into account that by the language of Claim 1 of the patent in suit the presence of further components, such as "hydrolytic salts" was not excluded. He further submitted that, since the maximum dyestuff concentration was defined by the solubility of the dyestuff in the vehicle and since the upper limit of the glycol concentration was uncritical, the suitable limits of these parameters were a matter of choice for the skilled person and could be simply determined by routine tests, so that, even if, from a formalistic point of view, novelty were to be acknowledged, the subject-matter of present Claim 1 would still not be patentable because it did not involve an inventive step.

- V. The Respondent (the patent proprietor) submitted that the Appellant's line of argument was developed with the benefit of hindsight and was based upon an unrealistic analysis of the cited prior application, and that the analysis of the content of document (1) made by the Opposition Division was correct. More particularly, he argued that document (1) did not even mention thermal ink-jet printing and that, although the claims of the

cited application were a part of the entire disclosure, the skilled worker would not select and combine different and unrelated bits of information contained in that document, and, consequently, would not derive a technical teaching from the purely artificial combination of the content of a particular claim and particular numerical values for the concentration of certain components of the composition found in the description. If the skilled worker had based his understanding of the prior teaching by concentrating on the claims or the general part of the description he would have found no mention whatsoever of ethylene glycol or diethylene glycol therein, but only a reference in claim 6 to "glycolic derivatives and the derivatives of ethylene diamine", the proportions in which the dye and the "glycolic derivatives" may be present in the particular types of printing ink disclosed in the prior application being nowhere generally stated. In the examples, these proportions fell outside the ranges claimed in the patent in suit. The skilled worker would therefore find no suggestion in document (1) concerning the importance of the relationship between dye concentration and specific glycol concentrations in view of solving the technical problem addressed in the patent in suit, namely to obtain high quality prints on plain paper with a thermal ink-jet printer.

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

The Respondent requested that the appeal be dismissed.

At the end of the oral proceedings the Board announced its decision that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

The patent in suit was opposed solely on the grounds of lack of novelty and inventive step. Therefore, these are the only issues to be dealt with in this decision.

2. *Novelty*

- 2.1. It is true that document (1) concerns an ink for an ink-jet printing device. It is stated therein that in view of prior art concerning ink-jet printing devices in which the droplets of ink were expelled from the nozzles by means of pressure impulses generated by piezoelectric elements, "the object of the present invention consists in producing an ink which assists in eliminating blocking of nozzles but promotes rapid drying and an optimum effect of superimposition of the colours" (see description, page 1, third paragraph). However, according to the paragraph bridging pages 2 and 3 of the description this ink is adapted to the use in an ink-jet printing device in which the printing process is performed by the energisation of an electrode, which causes a surface turbulence on the meniscus of ink of the corresponding nozzle due to the discharge of ions, while the passage of ionic and resistive current in the ink in the narrowest section of the nozzle causes a sudden increase in the pressure which produces a spray of ink particles at high speed towards the paper. It is further stated in document (1) that this particular printing process, in which the problem of ink clots and nozzle blocking was not so important, required the formulation and identification of ink compositions in which the electrical and electrochemical characteristics of the ink were critical, the most important characteristics being the

electrical resistivity, the viscosity, the pH, the surface tension and the absence of generation of gas electrochemically at the electrodes (see page 3, second paragraph). Accordingly, the essential components of a suitable ink for this process were water, a dyestuff and a hydrolytic salt, and the ink had to have a specific resistance between 15 and 50 ohm.cm (Claim 1). If the dyestuff was a black one, it could be present in an amount of up to 7% (Claim 2). If the dyestuff was yellow, cyan or magenta it could be present in amounts of 0.5 to 1.5 % (Claim 4).

It is further stated in the description of document (1) that suitable inks had a viscosity of 1.10 cp to 2.5 cp and a high surface tension of 60 to 70 dyne/cm, and that the chemico-physical characteristics of the ink were such as to permit the formation of very small drops which arrived on the paper within a very small area (page 3, second and third paragraph). Further additives, in particular water-soluble polymers such as polyethylene glycols of high molecular weight as thickeners (giving the desired viscosity to the ink and a stability to the liquid phase, while on the paper they give well-defined dots by the formation of a film in the droplet, cf the paragraph bridging pages 3 and 4), and glycolic derivatives as moistening agents or humectants could also be present in these inks (page 3, paragraph 4). Specifically mentioned glycolic derivatives were N-methylpyrrolidone, glycerine, ethanolamine and its derivatives. According to the third full paragraph on page 5 of document (1), "the ink is prepared in successive steps by mixing, in a suitable glass vessel, the constituents of the vehicle (water, glycol, amine, etc.), and there are added under agitation, in various concentrations, the various additives (surface-active, antimicrobial, stabilizing, electrolytic, etc.)".

2.2 According to examples 3, 4, and 6 to 9 of document (1) the ink does not contain any one of the thickeners, moistening agents or humectants mentioned above, but, instead, the ink contains ethylene glycol. Therefore, it is not unreasonable to infer, in the Appellant's favour, that the term "glycol" on page 5 of document (1) refers to ethylene glycol (see also document (2)), which compound is thus a component of the vehicle. Nevertheless, none of the inks disclosed in these examples meet all requirements of Claim 1 of the patent in suit, since none of them contain both the glycol and the dye in the proportions claimed in the patent in suit. The Appellant has not disputed the correctness of this finding.

2.3. In the absence of any further explanation of the function of "ethylene glycol" in examples 3, 4 and 6 to 9, the Board concurs with the Opposition Division in their finding in the decision under appeal that these examples are at most to be regarded as individual instances of the use of ethylene glycol. In view of the criticality of the properties of the ink according to document (1) (see point 2.1 above), in particular viscosity and surface tension, the Board cannot agree with the Appellant's statement that document (1) discloses inks in which the concentrations of all components mentioned in different parts of the description or in individual examples can be arbitrarily combined. Therefore, without the benefit of hindsight, there is in the Board's judgment no link between the range of dyestuff concentrations mentioned in e.g. Claim 4 of document (1) and the particular amounts of ethylene glycol used in examples 3 and 4. In the present case, it is thus not possible to derive from the specific examples, referring to individual ethylene glycol concentrations in individual ink compositions, containing specified amounts of dyestuff, a range of suitable ethylene glycol concentrations, and

to combine that range with the range of dyestuff concentrations disclosed in Claim 4 of document (1) in order to arrive in a clear and unambiguous manner at a general technical teaching concerning suitable ranges of concentrations of dyestuffs and ethylene glycol.

2.4. With respect to document (1), the subject-matter of the patent in suit is thus novel for this reason alone, so that there is no need to decide whether present Claim 1 is indeed to be construed, as submitted by the Appellant, so as to relate to ink compositions containing substantial amounts of the "hydrolytic salts" forming part of the ink disclosed in document (1).

2.5. The facts of the present case are quite different from those underlying decisions T 565/90, T 332/87 and T 424/86, relied upon by the Appellant in his letter dated 21 September 1995. In these decisions, clear general technical teachings were applied to certain specific embodiments of the same invention (see decision T 565/90 of 15 September 1992, reasons No. 2.1.1 to 2.1.4; decision T 332/87 of 23 November 1990, reasons No. 2.1 to 2.4 and decision T 424/86 of 11 August 1988, reasons No. 4.1 and 4.2). In all these decisions the assessment of novelty was based on an evaluation of the technical information which was clearly and unambiguously derivable from the document representing the state of the art. These decisions cannot, therefore, support the Appellant's submission that the disclosure of a document should be construed to comprise not only what is clearly and unambiguously disclosed therein but also each technical teaching which a skilled person might derive from that disclosure without "inventive considerations". On the contrary, in the Board's judgment, in the assessment of novelty all considerations concerning solely inventive step must be avoided, so that elements which may merely

be suggested or obvious to the skilled person in respect of the disclosure of a document must not be taken into account (see also T 739/93 of 6 April 1995, reasons No. 4.1).

3. *Inventive step*

3.1. The patent in suit relates to ink compositions used in ink-jet printing, and, more particularly, to glycol-containing ink compositions useful for thermal ink-jet printing (see description, page 2, lines 5 to 16). As set out in the description of the patent in suit, it was difficult to employ "plain" paper, i.e. uncoated paper such as xerography or photocopy paper, bond paper and laser jet paper in such a process, since the ink compositions typically used in thermal ink-jet printing had not provided the high quality print desired. More particularly, the long drying times of water-based inks typically had resulted in smearing of the ink.

The patent in suit therefore proposes an ink composition which is specifically adapted for use in thermal ink-jet printing on "plain" paper.

3.2. It follows from the analysis of the content of document (1) (see point 2.1 above) that this technical object was **not** addressed in that document, because there is neither a reference to a particular paper quality nor a reference to the specific requirements of thermal ink-jet printing. Moreover, the statements in that document are somewhat contradictory, because, on the one hand, it is said on page 1 that the ink should assist in eliminating blocking of nozzles and at the same time promote rapid drying (see lines 20 to 23), and on the other hand it is stated on page 3 that the ink is specifically designed for a printing process in

which clotting of the nozzles is of little importance. Taking into account the filing date of document (1) (4 October 1982) and the fact that the Appellant has not disputed the analysis of the state of the art in the patent in suit, according to which high quality ink-jet printing at that time generally required the use of coated paper, there is nothing in document (1) which may support the Appellant's inference, that the statements on page 1, lines 20 to 23, page 3, lines 15 to 17 and page 3, last line to page 4, line 2 of document (1), related to the printing on plain paper and, hence, to the same technical problem as in the patent in suit.

3.3. In the patent in suit, the need to provide an ink composition suitable for **printing on plain paper using a thermal ink-jet printer** is clearly addressed. There is no evidence in the file that this problem has been previously addressed in the state of the art. Therefore, any known ink composition, including the one known from document (1), may serve as "closest state of the art" and starting point for the assessment of inventive step. In addition, even if one were to accept the Appellant's submission that document (1) would indeed relate to the same technical problem, the remaining technical problem to be solved would still be to provide a further (alternative) solution to this problem. Thus, in any case, in view of document (1) the technical problem consists in the provision of a (further) ink composition specifically adapted for printing on plain paper using a thermal ink-jet printing device.

3.4. The patent in suit proposes to solve this problem by an ink composition comprising at least one member selected from the group consisting of ethylene glycol and diethylene glycol, present in an amount ranging from 5

to 10 wt%; dye, ranging from 1 to 4 wt%; and the balance water. It can be seen from examples 1 to 5 and is, moreover, not disputed by the Appellant that this technical problem is thereby effectively solved. In particular, the Appellant, who carries the burden of proof, has not even argued, let alone proven, that by an ink according to present Claim 1, but containing further components not specified in the patent in suit, such as the "hydrolytic salts" being essential components of the ink disclosed in document (1), the stated technical problem would not have been solved.

- 3.5. The solution to the present technical problem proposed by the patent in suit is not rendered obvious by the content of document (1), since the proportions in which the glycol and dye are to be combined according to the patent in suit in order to solve this problem are not even suggested therein in the context of solving **any** technical problem, let alone the one to be considered here. Document (1) specifically relates to the formulation and identification of ink compositions in which the **electrical and electrochemical** characteristics of the ink are critical (see point 2.1 above). No general technical information is, however, given as to the limits within which the amounts of "ethylene glycol" employed in examples 3,4 and 6 to 9 (see point 2.2 above) may be modified without impairing these relevant electrical or electrochemical characteristics, since all general information relating to this issue concern components different from the "ethylene glycol" used in these examples, in which either the glycol content or the dye content is well outside the range required according to the patent in suit.

3.6. Moreover, it is clear from the analysis of the information content of document (1) under point 2.1 above that "ethylene glycol" is **not** an **essential**, but only an **optional** component of the ink disclosed in that document. In the Board's judgment, in the absence of any information about its intended function it does not even follow from the fact that this compound is used in the majority of the working examples that it is a preferred component of an ink according to that document. Therefore, the mere fact that in document (1) ink compositions are described which may, inter alia, contain ethylene glycol, may not be considered to constitute a pointer as to the criticality of the proportions of glycol and dye in achieving the desired balance of properties for satisfactory printing on plain paper with any printing device. In these circumstances it is clear that this document cannot help the skilled person looking for a solution to the even more specific technical problem of finding a suitable ink for producing high quality prints on plain paper using **thermal** ink-jet printing.

3.7. Furthermore, in view of the facts that according to the Respondent's undisputed calculations in examples 3 and 4 of document (1) dye concentrations of 6.8 and 10.7 % are used, and that the comparative example 6 in the patent in suit shows that in the presence 12 weight % diethylene glycol, i.e. a concentration not far outside the claimed range, the desired properties of the ink are no longer obtained, the Board is unable to agree with the Appellant's submission that the concentration ranges which, according to present Claim 1, are essential technical features of the claimed ink, are in fact meaningless consequences of limited dye solubilities or merely the result of routine experimentation.

3.8. For these reasons, the Board holds that the subject-matter of present Claim 1 involves an inventive step.

4. Since Claims 2 to 9 merely relate to specific embodiments of allowable Claim 1, and since it was not disputed that Claim 10 derives its patentability from Claim 1, the patent in suit can be maintained as granted.

Order

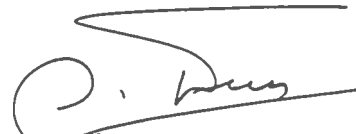
For these reasons it is decided that:

The appeal is dismissed.

The Registrar:


E. Görgmaier

The Chairman:


A. Nuss

