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Application No.: 84 301 052.1

Publication No.: 0 121 993

Title of invention: Recording liquid

Classification: C09D 11/00

D E C I S I O N  
of 30 June 1992

Proprietor of the patent: CANON KABUSHIKI KAISHA

Opponent: BASF Aktiengesellschaft, Ludwigshafen

Headword: Recording liquid/CANON

EPC Articles 54 and 56

Keyword: "Novelty (confirmed)"  
"Inventive step (confirmed)"



Case Number : T 761/90 - 3.3.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 30 June 1992

Appellant :  
(Proprietor of the patent)

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Respondent :  
(Opponent)

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Decision under appeal :

Decision of the Opposition Division of the  
European Patent Office of 20 June 1990  
concerning maintenance of European patent  
No. 0 121 993 in amended form.

Composition of the Board :

Chairman : K.J.A. Jahn  
Members : R.W. Andrews  
J.-C. Saisset

Summary of Facts and Submissions

- I. European patent No. 0 121 993 in respect of European patent application No. 84 301 052.1 which was filed on 17 February 1984, was granted on 13 May 1987 (cf. Bulletin 87/20).
- II. On 12 February 1988 a notice of opposition was filed in which the revocation of the patent was requested on the grounds that its subject-matter lacked novelty. The opposition was supported, inter alia, by the following documents:
- (1) DE-A-3 034 486 and
  - (2) DE-A-2 924 861.
- III. By a decision of 20 June 1990, with the corresponding interlocutory decision being issued on 30 July 1990, the Opposition Division held that the claims in accordance with the main request and auxiliary requests 1 to 4 were not allowable since they contained subject-matter which extended beyond the content of the application as filed. The Opposition Division also decided that the subject-matter of Claim 1 of the fifth auxiliary request lacked novelty. However, the subject-matter in accordance with the sixth auxiliary request was considered to be novel and to involve an inventive step.
- IV. An appeal was lodged by the Patentee against this decision on 26 September 1990 with payment of the prescribed fee. In his Statement of Grounds of Appeal filed on 3 December 1990, as well as in a further submission filed on 9 June 1992 and during the oral proceedings held on 30 June 1992, the Appellant contended that the experimental evidence filed on 9 June 1992 demonstrated that the subject-matter of Claim 1 in accordance with his main request was novel

in the light of the disclosure of documents (1) and (2). In answer to the Board's objection raised at the commencement of oral proceedings that the subject-matter of this claim and that of Claim 1 of the auxiliary requests 1 and 3 lacked novelty in the light of the skilled person's common general knowledge in the field of printing inks in view of the fact that the test does not modify known inks, the Appellant argued that the test was a restricting parameter and that the subject-matter represented a selection from the generality of known printing inks. Furthermore, the Appellant contended that the Board's objection was based on a presumption.

With respect to inventive step, the Appellant submitted that the teaching of documents (1) and (2) provided no incentive to the skilled person to carry out the modified Ames test on printing inks.

- V. The Respondent argued that the subject-matter of Claim 1 of the main request lacked novelty with respect to the disclosure of document (2). The Respondent also contended that the term "normal" used to qualify the expression "background lawn" was unclear and could not be used to distinguish the invention from document (2).

The Respondent also contended that the alleged invention was based on the discovery of a new effect which was presumably a side effect which the Appellant had found in a typical "one-way street" situation. Therefore, even the method of predicting the solution stability and flow properties after prolonged storage of an ink jet printing ink was not inventive.

- VI. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or one of four auxiliary requests, all

of which were submitted during the oral proceedings.  
Claims 1 and 5 in accordance with the Appellant's main request read as follows:

"1. A recording liquid particularly, but not exclusively, suitable for ink jet recording comprising, as essential components, a colourant in an amount within the range 1 - 20% by weight necessary to image formation, water, and a water-miscible organic solvent, said recording liquid being characterised in that a normal background lawn is produced by the recording liquid in response to the Ames test and that the total number of colonies produced by the recording liquid in response to the Ames test is not more than 4 times the number in a control test using sterilised water, the said Ames test being carried out by mixing 0.1 ml of the sample recording liquid or of sterilised water, 0.1 ml of a liquid containing the TA98 strain of Salmonella typhimurium, 0.5 ml of a 100 mM sodium phosphate buffer solution and 2 ml of soft agar containing 0.7% by weight of agar, 0.6% by weight of NaCl, 0.05 mM of L-histidine and 0.05 mM of biotin, the mixing being carried out at 45°C, incubating the resulting mixture at 37°C for 20 minutes, pouring the incubated mixture onto an agar plate medium in a petri dish and incubating the medium at 37°C for 48 hours.

5. A method of prognosticating the solution stability and flow properties after prolonged storage of a liquid intended for use in ink jet printing but unknown to be suitable for use in ink jet printing after prolonged storage, characterised in that the recording liquid is subjected to the Ames test as defined in claim 1, and in that the recording liquid is selected to satisfy the conditions that a normal background lawn is produced by the recording liquid in response to the Ames test and that the total number of colonies is not more than 4 times the number in a control test using sterilised water."

The Respondent requested that the appeal be dismissed.

VII. At the conclusion of the oral proceedings, the Board's decision to maintain the patent on the basis of the main request was announced.

#### Reasons for the Decision

1. The appeal is admissible.
2. There are no objections under Article 123 EPC to the claims in accordance with the main request. In particular, Claim 1 is based on Claims 1, 3 and 6 as filed and granted and page 7, lines 8 to 22 of the published patent application and page 3, lines 21 to 28 of the published patent specification. With respect to the insertion of the expression "that a normal background lawn is produced by the recording liquid" is a necessary and allowable amendment.
  - 2.1 Claim 1 as originally filed and granted required that colonies should be produced in response to a modified Ames test. However, this requirement would not be met in the case of a recording liquid that was bactericidal in the quantities used in the test. Such a recording liquid would result in an invalid Ames test since the bacteria would be killed without surviving to produce colonies. Even if only some of the bacteria were killed the background lawn would be sparse as compared to the control and the result would be misleading. Therefore, in order to obtain a quantitative measurement of mutogenicity by means of an Ames test it is essential to ensure that a normal background lawn is produced. Thus, the skilled person

familiar with the Ames test will routinely examine the background lawn when carrying out the test. This requirement for obtaining valid results using the Ames test is disclosed in the first complete paragraph on page 357 of the article referred to on page 6, lines 8 to 11 of the published patent application (cf. also page 3, lines 3 and 4 of the printed patent specification). Thus, the skilled person in this field would immediately realise that, if an abnormality in the background lawn is noted, the test material was bactericidal or bacteriostatic at the concentration applied and that, even if there are revertants on the plates, the test results would be invalid.

Therefore, in view of the above-mentioned disclosure in the Ames article, which is the leading paper describing the Ames test, the Board is satisfied that there is a clear basis in the originally filed patent application for a reference to a normal background lawn.

- 2.2 With respect to the Respondent's objection to the term "normal", the Board is convinced that this has a well-recognised meaning for the skilled person who is familiar with and routinely carries out the Ames test. It should be emphasised that this is the skilled person for whom this qualifying term should be clear and not the one concerned with the formulation, development and manufacture of recording liquids.
- 2.3 Claims 2 to 5 are based on Claims 2, 4, 5, 8 to 10 as filed and granted Claims 2, 4, 5, 8 and 9.
3. The patent in suit relates to a recording liquid comprising a colourant, water and a water-miscible solvent. Such recording liquids are particularly suitable for use in ink jet recording.

A problem with prior art recording liquids is their storage stability. After prolonged storage there is a tendency for the recording liquid to block the fine orifices used to discharge it and for the images produced by it to be less easy to read due to a low image density.

In the light of this common general knowledge, the technical problem underlying the disputed patent is to be seen in providing a recording liquid which, even after prolonged storage, does not clog the printer and, at the same time, produces printed images having a sufficient image density so as to be legible.

3.1 According to the disputed patent, this technical problem is solved by selecting those recording liquids which meet the requirements that a normal background lawn is produced in response to the modified Ames test defined in the present Claim 1 and that the total number of colonies produced by the recording liquid in response to the said test is not more than four times the number produced in a control test using sterilised water.

3.2 In the light of the results reported in Table 1 of the disputed patent, the Board is satisfied that this technical problem has been solved.

4. The Board finds that, on the evidence available to it, the subject-matter claimed in Claims 1 and 5 of the main request is novel.

4.1 The results in the data sheets 13-18-411 and 18-88-411 in combination with the Statutory Declaration of J. Hayden filed on 9 June 1992 demonstrate that the ink disclosed in Example 16 of document (1) does not satisfy the requirements set forth in the present Claim 1. The results



in the above-mentioned data sheets show that the ink, which contains Aizen Methyl Violent BB as the dye, was bactericidal and inhibited growth at all sample volumes tested. In these circumstances a normal background lawn could not be obtained and a valid Ames test could not be carried out.

- 4.2 Data sheet 14-88-412 filed on 9 June 1992 reports the results of the Ames test carried out on the ink disclosed in Example 4 of document (2). The dye in this ink is Water Red 2 (CI 45380). For the Ames test performed using a sample volume of 0.1 ml (100  $\mu$ l) in accordance with the method laid down in the present Claim 1 bacterial growth inhibition was observed as evidenced by an abnormal background lawn. Although the average number of colonies for the sample was 44 as compared with an average of 49 for the control, nevertheless, in the absence of a normal background lawn, the prior art ink cannot be considered to fall within the scope of the present Claim 1.

Therefore, in view of the above-mentioned experimental evidence, the disclosure of documents (1) and (2) does not destroy the novelty of the Claim 1 in accordance with the main request.

- 4.3 With respect to the Board's objection regarding the lack of novelty of the subject-matter of Claim 1 of the main request, the Board admits that this was based on a presumption. In the absence of any evidence to support this presumption, the Board's objection cannot be maintained.

The Board accepts the Appellant's argument that the modified Ames test, which can be easily carried out, introduces a new element and restricts the scope of the claimed inks. Thus the present recording liquids represent

a selection from the generality of known recording liquids. This is clearly not an arbitrary selection since the selected compositions have the desirable property of storage stability. Also it can be seen by comparing Examples 1 to 12 with Comparative Examples 10, 11 and 14 in Table 1 of the patent specification that the requirement that the total number of colonies produced by the sample in response to the modified Ames test is not more than four times the number in the control test using sterilised water is of significance, since the printing inks of the above-mentioned comparative examples, in which the sample produces 4.5, 4.2 and 4.6 times more colonies than the control, do not perform satisfactorily after prolonged storage. Moreover, the inks of the other eleven Comparative Examples, for which this ratio is much greater than four, perform even more unsatisfactorily.

- 4.4 With respect to this parameter, the Respondent did not argue that the selected inks could be more precisely defined by means of structural features without unduly restricting the scope of the invention.
- 4.5 The Board also concludes that subject-matter of Claim 5 of the main request which relates to a method of predicting the solution stability and flow properties of a liquid intended for use in ink jet printing after prolonged storage by means of the modified Ames test is novel. Since the novelty of this subject-matter was not disputed it is not necessary to give detailed reasons for this finding.
- 5. The Board also finds that the subject-matter claimed in accordance with the main request involves an inventive step.
- 5.1 Document (1) relates to a liquid composition which is capable of repetitively forming a coating film during its

flow through a liquid flow passage (cf. first paragraph on page 4). Such a liquid is used in a recording method in which the recording liquid is discharged from the orifice of a recording head in the form of flying droplets by heating of a heating zone in the recording head (cf. Claim 5).

The problem addressed and solved by this earlier patent is to improve the service life of the recording heads used in such a recording process (cf. paragraph bridging pages 10 and 11). Thus, this technical problem bears no relationship to the one underlying the disputed patent. In these circumstances, the mere listing of suitable water-soluble dyes on pages 18 and 19 of this document and the exemplification of ink jet printing inks comprising some of the dyes and of coating film forming compounds would not provide the skilled person with an information relevant to the solution of the technical problem of providing storage stable recording liquids.

- 5.2 Document (2) discloses a storage stable recording liquid comprising a carbonic acid ester having an aliphatic radical and conventionally known dyes and pigments (cf. Claim 1 in combination with the paragraphs bridging pages 12 and 13, and 27 and 28). The recording liquids may also contain water and water-soluble organic solvents (cf. second paragraph on page 22). According to the paragraph bridging pages 12 and 13 of this document, one of the technical problems underlying this earlier patent was also to provide recording liquid having excellent storage stability. However, the solution proposed in this document was to include a carbonic acid ester in the recording liquid. In the Board's judgment, this solution would not lead the skilled person in the direction of the entirely different solution to the same technical problem disclosed in the disputed patent.

5.3 The mere knowledge of the Ames test as described in the document referred to on page 3, lines 3 and 4 of the patent specification and its widespread use to detect carcinogens and mutagens would not have induced the skilled person to apply it with a view to solving the present technical problem. This was acknowledged by the Respondent. Nevertheless, he alleged there was a "one-way street" situation since health regulations relating to compositions used in industry call for such a test. However, in the routine application of the Ames test to, for example, an ink jet printing ink, the ink would be tested at a variety of sample sizes and/or dilution so as to exclude conditions where the ink exhibited a bactericidal action. This usually involves carrying out the test over a dose range per plate of 0.2 to 500  $\mu\text{g}$ . Moreover, when testing for mutagenicity, the skilled person on observing that a particular sample is bactericidal would use a smaller sample or would dilute the sample, so as to apply a progressively lower dose of the active substance to the agar plate until bactericidal activity is not present.

Therefore, in the normal course of events, the skilled person employing the standard Ames test for the routine testing of recording liquids with respect to their mutagenicity would not use 0.1 ml sample of the fully formulated recording liquid. Thus, in the Board's judgment the alleged "one-way street" situation does not exist.

5.4 Therefore, the proposed solution to the above-defined technical problem is inventive. Claim 1 and Claims 2 to 4, which relate to preferred embodiments of the recording liquid according to Claim 1, are allowable.

5.5 Claim 5 concerns a method of predicting the solution stability and flow properties after prolonged storage of a liquid intended for use in ink jet printing by means of the modified Ames test. In view of the results in Table I of the patent specification, the Board finds that the technical problem of providing an easy and rapid method of determining whether a recording liquid possesses the necessary stability as set out above has been solved.

In the Board's judgment, for the above-mentioned reasons the teaching of the documents (1) and (2) either alone or combined with common general knowledge regarding the standard Ames test would not provide the skilled person with the slightest indication that a correlation exists between the results of the modified Ames test as described in the patent in suit and the storage stability of a recording liquid.

Therefore, the subject-matter of Claim 5 also involves an inventive step and the Appellant's main request is allowable.

6. In view of the above finding, it is not necessary to consider the Appellant's auxiliary requests.


**Order**

For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 5


according to the main request submitted during oral proceedings.

The Registrar:



E. Gorgmayer

The Chairman:



K.J.A. Jahn