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D E C I S I O N
of 9 April 1997

Case Number: T 0483/93 - 3.2.5

Application Number: 86201379.4

Publication Number: 0255560

IPC: B41J 2/175

Language of the proceedings: EN

Title of invention:
Multi-nozzle ink jet printer

Patentee:
Océ-Nederland B.V.

Opponent:
Stork Colourproofing B.V.

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-



Case Number: T 0483/93 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 9 April 1997

Appellant: Stork Colourproofing B.V.
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 30 March
1993 concerning maintenance of European patent
No. 0 255 560 in amended form.

Composition of the Board:

Chairman: G. O. J. Gall
Members: A. Burkhart
H. P. Ostertag

Summary of Facts and Submissions

1. The appellant (opponent) lodged an appeal against the interlocutory decision of the Opposition Division on the amended form in which the patent No. 0 255 560 can be maintained.

Opposition was filed against the patent as a whole and based on Article 100(a) EPC, in conjunction with Articles 54 and 56 EPC (lack of novelty and inventive step).

The Opposition Division held that the grounds for opposition mentioned in Article 100(a) EPC did not prejudice the maintenance of the patent as amended, having regard to the following documents:

D1: EP-A-0 232 318,

D3: K. Bladh, "Three-color ink-jet plotter", Dept. of Elec. Measurements, Lund Institute of Technology, 1982,

D4: DE-A-3 248 364, and

D7: C. Kerhoven "Verbrandingsmotoren", Leerboek voor Hogere Technische Scholen, De Technische Uitgeverij H. Stam N.V., 1962, pages 113-117.

- II. In its statement of grounds of appeal the appellant referred to the further documents

D11: US-A-4 020 760,

D12: DE-A-2 626 006,

D13: DE-A-2 706 539, and

D14: CA-A-996 407.

III. Oral proceedings were held on 9 April 1997.

- (i) The appellant (opponent) requested that the decision under appeal be set aside and the European patent be revoked.
- (ii) The respondent (patent proprietor) requested that the appeal be dismissed and the patent be maintained as amended by the decision under appeal, i.e. on the basis of a new claim 1 comprising the features of claims 1 and 2 of the granted patent and the claims 3 to 7 of the granted patent, renumbered as new claims 2 to 6.
- (iii) Claim 1 reads as follows:

1. An ink jet printer having a plurality of printing nozzles (20) and an ink liquid supply system (22, 30), characterized in that said ink liquid supply system comprises a plurality of constant flow rate pumps (22), each individual nozzle (20) being connected to an associated one of said pumps (22), wherein the pumps (22) are coupled to a common drive mechanism (30, 32)."

- (iv) The appellant argued essentially as follows:

Claim 1 as granted did not involve an inventive step having regard to the disclosure of the documents D3 and D4 for the reasons set out in the decision of the Opposition Division. The feature of the amended claim 1 "common drive mechanism for the pumps", which had been added to claim 1 as granted, was obvious for a person skilled in the art using his general knowledge. The person skilled in the art had only two

options when choosing an appropriate drive means for the plurality of pumps, namely either a common drive for all pumps or individual drives for the pumps. The person skilled in the art would prefer the first option for the reasons of economy and space saving. Moreover, this first option was suggested to the person skilled in the art by the documents D11 to D14, which documents belonged to the same technical field as the patent in suit and demonstrated that the use of a common drive mechanism for driving a plurality of constant flow rate ink metering pumps was normal practice.

Therefore, the amended claim 1 according to the interlocutory decision of the Opposition Division did not involve an inventive step.

(v) The respondent argued essentially as follows:

The invention of claim 1 consisted of a combination of three essential features, namely (a) a plurality of ink jet nozzles, (b) constant flow rate pumps for each of the nozzles and (c) a common drive mechanism for all pumps.

The state of the art referred to by the appellant did not suggest such a combination of features. The documents D1, D2 (US-A-4 346 387) and D3 were the only documents dealing with multi-nozzle ink jet printers. However, these documents all disclosed individual drives for the pumps. This pertinent technical background demonstrated that the contention was wrong that the person skilled in the art would choose as a first and obvious option the use of a common drive mechanism for all pumps.

Document D3 disclosed a very specific three-nozzle ink jet printer comprising a special type of constant pressure pumps each having a specific motor drive system. There could be seen no reason, why the person skilled in the art would consider to modify this very specific pump drive system of document D3 in the sense that the constant pressure type pumps were replaced by constant flow rate pumps and the individual motor drives for each pumps were replaced by a common drive mechanism.

The documents D11 to D14 were not in the field of ink jet printers and there was not the slightest hint in the prior art referred to by the appellant, why a person skilled in the art would apply the teachings of these documents concerning a common drive mechanism for a plurality of pumps to a multi-nozzle ink jet printer as disclosed for example in document D3.

Reasons for the Decision

1. *Amendments*

The amended claim 1 comprises the features of claims 1 and 2 as granted which are identical with the originally filed claims 1 and 2.

By the incorporation of the features of claim 2 into claim 1 the scope of protection of claim 1 as granted has been restricted.

The remaining claims 3 to 7 have been renumbered as claims 2 to 6.

In the description of the patent as granted only a clerical error has been corrected.

Therefore, the amendments to the claims and to the description do not contravene Article 123(2) and (3) EPC.

2. *Novelty*

None of the documents referred to by the appellant discloses an ink jet printer comprising all of the features of claim 1.

Novelty has, in fact, no longer been in dispute in the appeal proceedings.

Therefore, the subject-matter of claim 1 is novel.

3. *Inventive step*

3.1 Problem underlying the invention

In ink jet printers comprising a plurality of printing nozzles the problem arises that the different nozzles may become clogged with dried ink to a different degree resulting in deviations in the effective cross-sections of the nozzles and causing non-uniform flow rates of ink through the different nozzles so that the quality of the printed image is impaired (see column 1, lines 34 to 44 of the patent in suit).

3.2 Solution

The afore-mentioned problem is solved by the ink jet printer according to claim 1 comprising in combination the features of

- (a) a plurality of ink jet nozzles,
- (b) each individual nozzle being connected to an associated constant flow rate pump, and
- (c) the pumps being coupled to a common drive mechanism.

The use of constant flow rate pumps has the effect that in case of a nozzle being narrowed by deposits the pressure and the flow velocity within the nozzle is increased so that the tendency of the nozzle to become clogged is reduced. Moreover, due to the common drive mechanism for the pumps a uniform constant flow rate for all pumps is ensured and even if one of the nozzles becomes choked due to the deposition of dried ink or contaminants contained in the liquid the associated pump forcibly maintains the flow rate at a value which equals the flow rate of the other nozzles (see

column 1, line 60 to column 2, line 5 of the patent in suit).

3.3 The ink jet printer of claim 1 is not rendered obvious by the prior art documents referred to by the opponent, for the following reasons.

3.3.1 Document D3 (cf. pages 32 to 34 and 70 to 83) discloses a three-colour ink jet printer comprising three printing nozzles and three pumps, wherein each individual nozzle is connected to an associated one of the pumps. The pumps used in this ink jet printer are so-called constant pressure pumps which provide the ink at a constant pressure to the respective nozzles. Each pump is driven by an individual DC-motor the speed of which - and thus the flow rate of the pump - is controlled and varied by an individual pump control circuit.

The person skilled in the art learns from the disclosure of document D3 that the use of constant pressure pumps and the use of a separate individual motor drive for each pump are essential features in order to obtain a good printing quality. Therefore, in view of this teaching of document D3, the person skilled in the art would not consider to put away these essential features and to replace them by the use of constant flow rate pumps and the use of a common drive mechanism for all pumps.

3.3.2 Document D4 does not refer to an ink jet printer comprising a plurality of printing nozzles, and therefore, D4 does not address the problem of avoiding non-uniform flow rates through different nozzles. Moreover, document D4 teaches that constant flow rate pumps have the disadvantage that, if the nozzle becomes clogged, the ink pressure can rise to such an extent that a leakage of ink occurs (see page 4, second

paragraph). In order to overcome this disadvantage document D3 proposes a specific ink supply system comprising a specific pressure controlled feeding pump which supplies the ink to an accumulator tank (cf. Figures 1 and 2 of document D4).

Therefore, also the teaching of document D4 does not incite the person skilled in the art to provide in a multi-nozzle ink jet printer constant flow rate pumps and a common drive mechanism for all pumps.

3.3.3 Documents D11 to D14 disclose ink metering systems for printing machines. These documents demonstrate that it was known to use in such ink metering systems common drive mechanisms for a plurality of metering pumps.

However, these documents do not refer to ink jet printers and do not address the problem as stated under point 3.1 above. Therefore, the person skilled in the art looking for a solution of the problem underlying the invention was by no means incited to consider these documents.

Moreover, even if it belonged to the general knowledge of the person skilled in the art that a plurality of metering pumps could be driven by a common drive means, the person skilled in the art would not consider such a common pump drive means in the three-nozzle ink jet printer of document D3 for the reasons set out under point 3.3.1 above.

3.4 Therefore, the subject-matter of claim 1 involves an inventive step in the meaning of Article 56 EPC.

4. Consequently, the subject-matter of claim 1 constitutes a patentable invention in the meaning of Article 52(1) EPC, in conjunction with Articles 54 and 56 EPC. Claim 1 being allowable, also dependent claims 2 to 6 claiming further embodiments of the subject-matter of claim 1 are allowable.

Order

For these reasons it is decided that:

1. The appeal is dismissed.
2. The patent is maintained as amended in the version of the interlocutory decision of the Opposition Division, posted on 30 March 1993, i.e. on the basis of the amended claims 1 to 6 as set out in paragraph III(ii) of this decision and in the Annex to the interlocutory decision of the Opposition Division.

The Registrar:

A. Townend



The Chairman:

G. Gall

Geschäftsstelle
 Beglaubigt/Certified Registry/Greffe
 Certifiée conforme:
 München/Munich 22. MAI 1997

