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**D E C I S I O N**  
of 9 August 2002

**Case Number:** T 0370/99 - 3.2.5

**Application Number:** 93305064.3

**Publication Number:** 0577383

**IPC:** B41J 2/16

**Language of the proceedings:** EN

**Title of invention:**

Thin film resistor printhead for thermal ink jet printers

**Applicant:**

Hewlett-Packard Company, A Delaware Corporation

**Opponent:**

-

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 54, 111(1), 123(2)

**Keyword:**

"Novelty - yes (after amendment)"

**Decisions cited:**

-

**Catchword:**

-



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Boards of Appeal

Chambres de recours

Case Number: T 0370/99 - 3.2.5

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.5  
of 9 August 2002

**Appellant:** Hewlett-Packard Company  
A Delaware Corporation  
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Palo Alto  
CA 94304 (US)

**Representative:** Jehan, Robert  
Williams, Powell & Associates  
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London EC4M 8AY (GB)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 29 October 1998  
refusing European patent application  
No. 93 305 064.3 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** W. Moser  
**Members:** H. M. Schram  
P. E. Michel

## Summary of Facts and Submissions

- I. The appeal is against the decision of the Examining Division dated 29 October 1998 refusing European patent application No. 93 305 064.3 (publication number EP-A-0 577 383) on the ground that the subject-matter of claim 1 lacked novelty vis-à-vis document EP-A-0 454 155 (D1).

A decisive issue in the decision under appeal was whether the printhead shown in Figure 17 of document D1 comprised a resistor having right angled corners or a resistor having rounded-off corners. In the former case, the projection of the wall of the firing chamber would intersect with the perimeter of the resistor, and the claimed invention would not be new. The Examining Division held that the resistor depicted in Figure 17 only seemingly had rounded-off corners, because the circular firing opening shown in said Figure - a top plan view of the printhead - obstructed the view of the whole resistor. Since the size of the resistor was indicated as  $40 \times 40 \text{ } [\mu\text{m}]^2$  in Table 1 of document D1, and the diameter of the firing opening was  $50 \text{ } \mu\text{m}$ , portions of the wall of the firing opening were inside the perimeter of the associated "square" resistor. Consequently, the printhead shown in Figure 17 of document D1 fell within the ambit of claim 1.

- II. The appellant (applicant) requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims that were refused by the Examining Division. Oral proceedings were requested on an auxiliary basis.

In support of his request, the appellant argued that Figure 17 of document D1 must be assumed to be correct. Had the corners of the resistor extended beyond the

wall of the circular firing opening, then this should have been shown by dashed lines. The appellant referred to the following documents:

D2: Drafting manual, Genium Publishing, September 28, 1984, Section K6.1, p. 11.

D3: Letter of Mr Ford dated 9 December 1998

III. In a communication accompanying the summons to attend oral proceedings dated 30 April 2002, the Board made the following provisional observations. It appeared that nowhere in the text of document D1 was there any mention of rounded-off corners. From Figures 9 to 16 and 18 to 20 of the drawings, it clearly followed that, for eleven out of twelve embodiments, the resistors were rectangular. For only one embodiment (No. 12), the corresponding Figure 17 appeared to be slightly inaccurate or ambiguous. The Board agreed with the appellant that standard drafting practice required that elements which are not directly visible in a drawing must be distinguished from elements that are visible, e.g. by using dashed lines. The Board was not convinced however that, according to an interpretation *argumentum e contrario*, the absence of dashed lines implied in the present case that the resistor had rounded-off corners, for the simple reason that the drawing may be flawed. In the provisional opinion of the Board, the skilled reader of document D1 would thus have interpreted Figure 17 as showing a square resistor beneath a circular firing chamber. For this embodiment, the inner wall of the firing opening included portions that were inside the perimeter of the resistor.

IV. The appellant filed further observations on 5 July 2002. He maintained that Figure 17 of document D1 was correct, i.e. that the resistor had rounded-off corners.

V. In a further communication dated 10 July 2002, the Board noted that the printhead according to the present invention seemed to differ from the printhead known from document D1 in that the firing chamber of the printhead formed by a wall extending upwardly from the resistor had a continuously arcuate concave wall, whereas the firing chambers of the printheads known from Figures 9 and 17 of document D1, i.e. the firing chamber immediately above the resistor, were formed by three-sided barrier layers. The Board indicated that if suitable amendments to claim 1 which reflect this difference were to be filed, the case was likely to be remitted for further prosecution to the Examining Division without it being necessary to hold oral proceedings.

VI. On 22 July 2002, the appellant filed a new set of claims 1 to 5, and withdrew his auxiliary request for oral proceedings on condition that the Board was prepared to allow the appeal and to remit the case to the Examining Division for further prosecution.

VII. The independent claim 1 on file reads as follows:

"1. A thermal ink jet printhead comprising: a thin film substrate (12) with a plurality of thin film resistors (26) each substantially polygon shaped in plan view; a barrier layer (14) overlying the substrate; and respective firing chambers (18) being formed in said barrier layer for each of the resistors; each firing chamber being formed by a continuously arcuate concave barrier wall (16) that extends upwardly from the resistor and that is within the boundary of an area defined by the resistor and a 10 micrometer margin (M)

around the resistor, said barrier wall including portions which are inside the perimeter of the associated resistor and forming a single opening into said firing chamber."

### Reasons for the Decision

1. The claimed invention is based on the finding that a particular geometry of the firing chamber wall, viz. a continuously curved concave wall, aligned with respect to the geometry of the heater resistor, viz. a polygon shaped resistor in plan view, produces a significant improvement in the uniformity and consistency of ink drop volumes being ejected from these firing chambers and associated orifice openings. This in turn results in uniformity of drop volume and an improvement in overall print quality. Unwanted variations in printed dot size and drop volume produced by thermal ink jet printheads based on two-sided and three-sided barrier layer designs are thought to be caused by residual air from the vaporized fluid being unnecessarily accumulated in both the rectangular corners and in the gaps between the barrier layer walls and the resistor edges.

2. *Allowability of the amendments (Article 123(2) EPC)*

Claim 1 now specifies that the barrier wall forming the firing chamber "extends upwardly from the resistor". A basis for this amendment can be found in the passage on page 7, lines 3 to 6, of the description of the application as filed (cf. column 4, lines 42 to 45, of the published application EP-A2-0 577 383). The feature "said barrier wall having ends adjacent the perimeter of the associated resistor" in claim 1 as filed was hence superfluous and was deleted. The word "formed"

was twice replaced by "being formed". The feature "said barrier wall including portions which are inside the perimeter of the associated resistor" is based on claim 2 as filed and has been included in claim 1. Dependent claims 2 to 5 now on file correspond to claims 4 to 7 as filed, respectively.

Consequently, the new claims 1 to 5 now on file meet the requirements of Article 123(2) EPC.

3. *Novelty (Article 54 EPC)*

The sole ground for the refusal was that the subject-matter of the main claim then on file lacked novelty with respect to document D1. The main issue to be decided in this appeal is thus whether the new claim 1 is novel with respect to document D1.

The firing chamber of the printhead according to claim 1 is defined by a continuously curved or arcuate concave (inner) wall of a barrier layer, which wall extends upwardly from the resistor. This definition makes it clear that the "chamber" formed by the associated contoured orifice opening through which the ink drop is expelled is not part of the firing chamber. Claim 1 further requires that the barrier wall includes portions which are inside the perimeter of the associated resistor.

The main argument for the finding of lack of novelty in the decision under appeal was that the projection of the wall of the "firing chamber" formed by the orifice plate shown in Figure 17 of document D1 onto the plane of the resistor intersected with the resistor.

In the printheads known from document D1 (see e.g. Figures 9 and 17, which show printheads having resistors aligned with the outlet orifice) three-sided barrier layers form the firing chambers. The wall of the firing chamber is thus neither "continuously arcuate concave", nor "inside the perimeter of the associated resistor", irrespective of whether or not the associated resistor has rounded-off corners. The subject-matter of claim 1 is thus new with respect to document D1.

Examination by the Board of the other documents cited in the Search Report has shown that also none of these documents discloses a thermal ink jet printhead with all the features of claim 1.

The subject-matter of claim 1 is thus new within the meaning of Article 54 EPC.

4. The decision under appeal is a so-called "decision on the state of the file as it stands", and merely refers to the reasons given in earlier communications, why the application did not meet the requirements of the invention. The sole objection raised in the (three) earlier communications was lack of novelty. This objection has now been overcome by the amendments to the claims filed on 22 July 2002.
5. Since the issue of inventive step has not yet been examined, and in order to maintain the appellant's right to appeal to a department of second instance, the Board exercises its discretion given to it under Article 111(1) EPC and remits the case to the Examination Division for further prosecution.



Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examination Division for further prosecution.

The Registrar:

*M. Dainese*

M. Dainese

The Chairman:

*W. Moser*

W. Moser

*of* P.P. 02  
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