BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 0861/91 - 3.2.5

Application No.: 87 109 316.7

Publication No.: 0 254 079

Title of invention: A dot matrix print head

Classification: B41J 3/12

D E C I S I O N
of 14 June 1993

Applicant: MICROLYS S.p.A.

Headword:

EPC Article 56

Keyword: "Inventive step (yes)"

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 0861/91 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 14 June 1993

Appellant : (Applicant)
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Decision under appeal :
Decision of the Examining Division of the European Patent Office dated 18 June 1991 refusing European application No. 87 109 316.7 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : C.V. Payraudeau
Members : A. Burkhart
H.J. Seidenschwarz

Summary of Facts and Submissions

I. European patent application No. 87 109 316.7 was refused by a decision of the Examining Division on the ground that the claimed subject-matter did not involve an inventive step having regard to the disclosure in the prior art documents:

D3: EP-A-0 139 238
D4: EP-A-0 150 607.

II. The Examining Division took the view that the subject-matter of the claimed invention only differs from the device according to document D3 by the features that each of the striker elements presents an intermediate portion in correspondence of which it is engaged on a fulcrum constituted by an edge of a flat front delimitation surface of the second pole of the electromagnet and that the biasing element is elastomeric. Since these features were already described in document D4 as providing the same advantages as in the invention, the skilled person would regard it as a normal design option to include those features in the device described in document D3 in order to solve the problem posed.

III. The Appellant lodged an appeal against the decision of the Examining Division and submitted new claims annexed to his Statement of Grounds of Appeal.

IV. In a communication pursuant to Article 110(2) EPC the Board raised objections under Article 84 EPC against the new claims.

V. In reply to this communication, the Appellant requested that the impugned decision be set aside and a patent be granted on the basis of the following documents:

Claims 1 (page 7) and 5, filed on 29 March 1993,
Claims 1 (page 8) and 2, 3, 4, filed on 15 May 1993,
description, pages 1, 2, filed on 29 March 1993, and
pages 3 to 6 as originally filed,
drawings, Figures 1 to 4, as originally filed.

VI. Claim 1 reads as follows:

"1. A dot matrix print head (1) comprising an elongated support body (3) slidably carrying a plurality of print needles (4); a cover (10) for said needle support body (3) rigidly connected thereto; respective drive electromagnets (5) for actuating said print needles, the electromagnets being disposed in a radial configuration and each having a first (14) and a second (15) pole of opposite sign adjacent to each other and disposed in such a manner that said first poles (14) are radially inward of their said second poles (15); a plurality of striker elements (6) disposed in a ring and made of ferromagnetic material, each able to be attracted by the first pole (14) of a respective said electromagnet (5) to strike with its first end (7) the head of an associated said needle (4) in such a way to produce translation thereof; and means for resiliently supporting a second end (16) of said striker elements, opposite to the first end, and for urging said striker elements (6), when said electromagnets (5) are de-energized, in a rest position; wherein

(i) each of said striker elements (6) presents an intermediate portion (18) by which it is engaged on a fulcrum constituted by an edge (19) of a flat

front delimitation surface (20) of the second pole (15) of the associated said electromagnet; and

(ii) said support and urging means comprise an elastomeric biasing element (24) disposed between said second end (16) of said striker element and said cover (10), in such a way as to oppose separation of each said second end (16) from the associated second pole (15) of the respective electromagnet and to urge said striker elements (6) towards said rest position;

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(iii) said support and urging means further comprise a support pin (22) for the second end (16) of each of said striker elements (6), said pin (22) being formed integrally with and perpendicularly projecting from said cover (10), said pin (22) being housed with clearance within the interior of a hole (23) formed through said second end (16) of each striker element, immediately adjacent said intermediate portion (18) thereof;

(iv) said second end (16) of each said striker element being shaped on the side facing the corresponding second pole (15) of the associated said electromagnet in such a manner to be disposed, in said rest position, offset with respect to the front flat surface (20) of the second pole (15), so as to determine, between the second end (16) and said frontal flat surface (20) of the associated said second pole (15), an axial clearance."

VII. The Appellant's submissions can be summarised as follows:

When considering the problem underlying the invention, namely to provide a print head in which an accurate machining of the pole surface of the electromagnet is not

required, the teaching of document D3 leads away from the invention, because in the construction shown in this document the accurate positioning of the blade 5 can only be obtained by accurately working both the second pole 8b and the yoke plate 9, and such working is to be carried out with narrow tolerances, such that the two elements fit together. Thus, the construction shown in this document is more complex and bulky than that available by directly engaging the second pole of the electromagnet with the blade. Also, the teaching of document D4 leads away from the invention, since in the print head according to this document the blade abuts on the surface of the second pole of the associated electromagnet in the rest position, which necessitates to work the pole with high precision in order to avoid possible interferences with the blade. Furthermore, the print heads according to documents D3 and D4 have structures which are inherently incompatible.

Since the documents D3 and D4 neither address the problem underlying the invention nor disclose the specific combination of features according to Claim 1 for solving this problem, these documents cannot suggest the subject-matter of Claim 1.

Reasons for the Decision

1. Original disclosure of new claims

The features of the new claims are disclosed on the following locations of the original application documents:

As to Claim 1, see original Claims 1 and 2; Figures 1 to 4; page 3, lines 24 to 27; page 3, line 29 to page 4, line 31.

As to Claim 2, see last three lines of the original Claim 2.

As to Claims 3 to 5, see original Claims 3 to 5.

There is therefore no objection under Article 123(2) EPC.

2. Novelty

Document D4 discloses a dot matrix print head comprising the features of the preamble of Claim 1. The print head according to Claim 1 differs from this known print head by the features according to the characterising portion of Claim 1.

In the print head known from document D3 the striker element (blade 5) rests against a yoke plate 9 interposed between blade 5 and the second pole 8b, whereas in the print head according to Claim 1 the striker element is directly engaged on a fulcrum constituted by an edge of a flat delimitation surface of the second pole of the electromagnet.

Therefore, the subject-matter of Claim 1 is new with respect to the prior art known from the documents D3 and D4.

3. Inventive step

The print head known from document D4, which discloses the closest prior art, has the disadvantage that in the rest position of the striker element the second end

thereof abuts against the flat frontal surface of the associated second pole of the electromagnet and therefore the pole surface, as well as the end portion of the striker element, must be worked with high accuracy, in order to avoid interference between the striker element and the pole.

Therefore, the problem to be solved by the invention consists in providing a print head which does not require an accurate working of the pole of the electromagnet on which the striker element rests, ensuring at the same time an optimum print quality (see page 1, lines 15 to 32 of the originally filed description).

This problem is solved according to the invention in that the device known from document D4 is modified in the sense

that the support and urging means comprise a support pin for the second end of each striker element, said pin being formed integrally with and perpendicularly projecting from the cover, said pin being housed with clearance within the interior of a hole formed through the second end of each striker element, immediately adjacent the intermediate portion thereof, and

that the second end of each striker element is shaped on the side facing the corresponding second pole of the electromagnet in such a manner to be disposed, in the rest position, offset with respect to the frontal flat surface of the second pole, so as to determine, between the second end and the frontal flat surface of the second pole, an axial clearance.

Although the print head known from document D3 comprises a striker element 5 (see Figure 1A), the shape of which

is similar to that of the striker element according to the invention, the person skilled in the art would not combine the teachings of documents D4 and D3 in such a way as to arrive at the invention, for the following reasons:

The construction according to document D3 (see Figure 1A) does not solve the problem underlying the invention, namely to avoid accurate working of the poles of the electromagnet; on the contrary, both the second pole 8b and the yoke plate 9 must be accurately machined in order to allow good magnetic flux. Moreover, the proper functioning of the striker element 5 according to document D3 depends on its interaction with a complex arrangement consisting of elastic elements 11a and 11b, fulcrum 11c, spacer 10, yoke 9, movable core 6 and poles 8a and 8b.

Therefore, the person skilled in the art, faced with the problem underlying the invention, would not take into consideration to isolate the striker element 5 from this complex striker arrangement disclosed in document D3 and to install it within the rather different striker arrangement according to document D4.

Therefore, the subject-matter of Claim 1 involves also an inventive step within the meaning of Article 56 EPC.

4. For the foregoing reasons, Claim 1 is allowable under Article 52(1) EPC.

Claims 2 to 5, which are dependent on Claim 1 and relate to specific embodiments of the subject-matter of Claim 1, are also allowable.

5. A patent can thus be granted according to the request of the Appellant.

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 grant a patent on the basis of the documents mentioned under point V of this decision.

The Registrar: The Chairman:

A. Townend C. Payraudeau