BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Publication in the Official Journal ~~Yes~~ / No

File Number: T 597/90

Application No.: 85 201 078.4

Publication No.: 0 171 833

Title of invention: Passive display device

Classification: G09F 9/37

D E C I S I O N
of 26 February 1991

Applicant: N.V. Philips' Gloeilampenfabrieken

Proprietor of the patent:

Opponent:

Headword:

EPC Art. 56

Keyword: "Inventive step (yes)" - "Non-obvious use of per se known technical means for solving a diverging technical problem"

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 597/90

D E C I S I O N
of the Technical Board of Appeal
of 26 February 1991

Appellant : N.V. Philips' Gloeilampenfabrieken
Groenewoudseweg 1
NL-5621 BA Eindhoven (NL)

Representative : Raap, Adrian Yde
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Decision under appeal : **Decision of Examining Division 063 of the European Patent Office dated 22 March 1990 refusing European patent application No. 85 201 078.4 pursuant to Article 97(1) EPC.**

Composition of the Board :

Chairman : G.D. Paterson
Members : H.J. Reich
Y. van Henden

Summary of Facts and Submissions

I. European patent application No. 85 201 078.4 (publication number 0 171 833) was refused by decision of the Examining Division.

II. The reason given for the refusal was that the subject-matter of originally filed independent Claims 1 and 9 did not satisfy the requirements of Articles 52 and 56 EPC having regard to documents:

D1: US-A-4 420 896, and
D2: US-A-3 989 357.

The Examining Division took the view that it would be obvious for a person skilled in the art to use the irregularities in the engaging surface as claimed in the characterising part of device Claim 1, which irregularities would be known from document D2 to reduce the resistance at the engaging surface of a movable electrode and thus to speed up its response, for the same purpose in the display device disclosed in document D1 which has the features defined by the wording of the pre-characterising part of Claim 1. A skilled person would furthermore arrive at the subject-matter of independent method Claim 9 by combining in an obvious way method steps disclosed in document D1 with measures which represent standard techniques widely used in device fabrication.

III. The Appellant lodged an appeal against the decision.

IV. In the Grounds of Appeal the Appellant requested that the contested decision be set aside. In supporting Claim 1, the Appellant argued mainly that in the prior art disclosed in document D2 the engaging surface irregularities in the form of a permanent pattern of

undulations serve to prevent pneumatic sticking and only enhance the detaching of the unwinding of the known movable electrode from its engaging surface. However, in the invention claimed in Claim 1 an intermediate space is obtained determined by the dimensions of the discrete points, reducing the hydrodynamic or aerodynamic resistance of the movable electrode. Hence, the known and the claimed solutions would not be equivalent.

V. In response to a communication of the Board of Appeal, inviting the Appellant mainly to amend independent Claims 1 and 9, in particular in order to use a consistent terminology throughout the whole set of claims and to express clearly the aim of step (d) of Claim 9, the Appellant filed a request for the grant of a patent on the basis of the following documents.

Claims: 1 to 14, and line 1 of Claim 15 received 18 October 1990 with letter dated 17 October 1990;
lines 2-4 of Claim 15 and Claims 16 to 18 according to EP-A-0 171 833.

Description: pages 1, 3, 5 and 8 received 18 October with letter dated 17 October 1990;
pages 2, 4, 6, 7 and 9 to 15 according to EP-A-0 171 833.

Drawings: Pages 1/5 to 5/5 according to EP-A-0 171 833.

Auxiliarily the Appellant requested oral proceedings.

IV. Independent Claims 1 and 9 read as follows:

"1. A passive display device comprising a first and a second supporting plate, at least one of which is transparent, a number of display elements each having at

least one fixed electrode and an electrode which is arranged so as to be movable with respect to said fixed electrode by electrostatic forces and which is kept separated from the fixed electrode by means of an electrically insulating layer, said movable electrode having a pattern of apertures and being movable between two final positions determined by engaging surfaces, characterized in that in at least one of the final positions the movable electrode engages an engaging surface whose surface structure is not congruent with that of the adjoining surface of the movable electrode so that a finite number of discrete engaging points in a structured surface is formed between which points the surface of the movable electrode is spaced from the adjoining surface of the engaging surface.

9. A method of manufacturing a passive display device as claimed in any preceding Claim characterized in that the method to form the structured surface comprises the following steps:

a) providing a layer of a first material on a substrate,
b) providing on said layer a layer of a second material,
c) etching a pattern of apertures out of the layer of the second material by means of a photo-etching method,
d) removing at least parts of the layer of the first material to form the structured surface with said discrete engaging points by undercutting through the apertures in the layer of the second material."

Claims 2 to 8 are dependent on Claim 1 and Claims 10 to 18 are dependent on Claim 9.

Reasons for the Decision

1. The appeal is admissible.

2. The subject-matter of the present and the originally filed set of claims is identical, the added amendments being linguistic clarifications. The same applies to the requested adaptations of the description. The text on page 8, line 37, was amended in order to be consistent with Figure 1b. There is, therefore, no objection under Article 123(2) EPC to the current set of application documents.

3. **Novelty**

3.1 Document D1, as well as documents:

D3: EP-A-0 085 459, and
D4: GB-A-1 533 458,

both cited in the application each disclose a display device which only comprises the features defined by the wording of the pre-characterising part of **Claim 1**, i.e. which has no engaging surface wherein "a finite number of discrete engaging **points** in a structured surface is formed between which points the surface of the movable electrode is **spaced** from the adjoining surface". In these prior art devices the surface structure of the movable electrode is congruent with that of the adjoining surface in the final position of the movable electrode.

3.2 The display device disclosed in document D2 differs from the subject-matter of **Claim 1** in that the movable electrode has no pattern of apertures and only **one** final position determined by an engaging surface. This known

movable electrode is resilient and unrolls over its engaging surface upon application of an electrical potential.

3.3 The methods disclosed in documents D3 and D4 differ from the one claimed in Claim 9 in that with regard to claimed step (d) the undercutting through the apertures in the layer of the second material removes parts of the layer of the first material, not to form "discrete engaging points in a structured surface" but either to form the movable electrode itself, so that it remains connected to its supporting plate (D4) or to form a resilient element with one end connected to the movable electrode and the other end connected to the supporting plate (D3). Documents D1 and D2 do not disclose any manufacturing steps of the respective devices.

3.4 The remaining documents cited in the European Search Report or in the application do not come closer to the subject-matter of Claims 1 and 9.

3.5 Thus the subject-matter of independent Claims 1 and 9 is considered novel in the sense of Article 54 EPC.

4. **Inventive step**

4.1 Starting from a prior art passive display device according to the pre-characterising part of Claim 1 such as disclosed in document D1, D3 or D4, the objective problem underlying the present invention is to increase the switching speed of the movable electrode and to manufacture a device with such an electrode, see the description, page 2, lines 32 to 36.

4.2 The problem of increasing the switching speed is solved by spacing the movable electrode in its final position from the adjoining surface of the engaging surface by providing "discrete engaging points in a structured surface" such as claimed in Claim 1. The resulting free space decreases the aerodynamic or hydrodynamic resistance of the movable electrode when moving away or approaching the engaging surface by allowing the light absorbing medium of the display to leave or enter this free space more easily through the apertures in the movable electrode.

4.3 The principle of this solution is nowhere mentioned in the prior art. The only document disclosing "discrete engaging points" between the movable electrode and its adjoining surface is document D2. However, in the device disclosed in document D2 the engaging points (between undulations 39 in Figure 4 of D2) serve to prevent pneumatic sticking and to cause the movable electrode to lie evenly over the insulating layer; see document D2, column 5, lines 49 to 51. Hence, document D2 teaches on the one hand to reduce the adhesion forces between the movable electrode and the adjoining surface by limiting the contact area to a number of discrete engaging points, and on the other hand to avoid distortions of the known resilient movable electrode by residual parts of the medium entrapped in the interface by allowing it to escape laterally beneath a movable electrode without a pattern of apertures.

4.4 The measure of providing discrete engaging points between the movable electrode of a passive display device and its adjoining surface in one of its final positions is no doubt known from document D2. However, in deciding whether an application of this measure known in the same specialist field is obvious, the problems to be respectively solved with this measure in the known case and in the case to be decided must be taken into account,

see also decision T 39/82, published in OJ EPO 1982, 419. In the Board's view, a reduction of the area of an interface in order to reduce adhesion or distortions does not hint at any teaching with regard to the flow resistances of the movable electrode. In particular, the Board regards a skilled person not able to foresee that a structured engaging surface which is only known to form escape channels for a residual medium entrapped under a movable electrode without any apertures, would interact with a pattern of apertures provided in the movable electrode and reduce its effective aerodynamic or hydrodynamic resistance. For this reason, the Board is convinced that it would not be obvious for a skilled person to apply the structuring of the engaging surface of a movable electrode as described in document D2 in one of the passive display devices disclosed in documents D1, D3 or D4.

4.5 Having regard to Claim 9, there is no hint in the prior art to change the etching parameters in the undercutting step disclosed in documents D3 and D4 (see also paragraph 3.3 above) to such an extent that no movable electrodes or resilient interconnections are formed but discrete engaging points in a structured surface, spacing the movable electrode from its adjoining surface in a final position.

4.6 For the reasons indicated above in paragraphs 4.1 to 4.5, the subject-matter of independent Claims 1 and 9 is considered to involve an inventive step in the sense of Article 56 EPC.

5. Thus, Claims 1 and 9 are allowable under Article 52(1) EPC. Dependent Claims 2 to 8 and 10 to 18 concern particular embodiments of the device claimed in Claim 1 and of the method claimed in Claim 9 respectively and are, therefore, likewise allowable.

6. Under these circumstances, the Appellant's auxiliary request for oral proceedings may be disregarded for lack of legal grounds.

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 European patent on the basis of the following documents:

Claims: 1 to 14, and Claim 15, line 1, received 18 October 1990;
Claim 15, lines 2-4, and Claims 16 to 18 according to EP-A-0 171 833.

Description: pages 1, 3, 5 and 8 received 18 October 1990;
pages 2, 4, 6, 7 and 9 to 15 according to EP-A-0 171 833.

Drawings: Pages 1/5 to 5/5 according to EP-A-0 171 833.

The Registrar: The Chairman:

P. Martorana G.D. Paterson