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Datasheet for the decision of 29 October 2013

Case Number: T 1181/09 - 3.4.02

Application Number: 05255862.4

Publication Number: 1643289

IPC: G02B26/08

Language of the proceedings: EN

Title of invention:
Micromirror array with improved in-plane rotation tolerance

Applicant:
Alcatel-Lucent USA Inc.

Headword:

Relevant legal provisions:
EPC Art. 54

Keyword:
Novelty - (no)

Decisions cited:

Catchword:

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Case Number: T 1181/09 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 29 October 2013

Appellant: (Applicant)	Alcatel-Lucent USA Inc. 600-700 Mountain Avenue Murray Hill, NJ 07974 (US)
Representative:	Dreiss Patentanwälte Postfach 10 37 62 70032 Stuttgart (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 1 December 2008 refusing European patent application No. 05255862.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: A. Klein
Members: H. von Gronau
D. Rogers

Summary of Facts and Submissions

I. The appeal is directed against the decision of the examining division to refuse the European patent application. The examining division refused the application because it considered the subject-matter of independent apparatus claim 1 and independent method claim 7 to lack novelty with respect to document D1.

II. The appellant requested with letter dated 27 September 2013 that the decision under appeal be set aside and that a patent be granted according to claims 1-6 of the Main Request, or alternatively, according to the claims of any of the Auxiliary Requests 1 - 3, all requests filed with this letter.

III. The independent claim 1 of the Main Request reads as follows:

"A dense micromirror array apparatus (400) comprising: a plurality of micromirrors (402—A—1, .., 402—F—6), wherein at least one edge portion (520-A) of at least one of the plurality of micromirrors (402-A-1, .., 402-F—6) is at least partially tapered to allow in-plane rotation of the at least one micromirror (500) without contact with an adjacent micromirror."

IV. The independent claim 1 of the Auxiliary Request 1 reads as follows:

"A dense micromirror array apparatus (400) comprising: a plurality of micromirrors (402—A—1, .., 402—F—6), wherein at least one edge portion (520—A) of at least one of the plurality of micromirrors (402—A—1, .., 402—F—6) is at least partially tapered to allow in—plane rotation of the at least one micromirror (500) without

contact with an adjacent micromirror, wherein the amount or angle of the taper and a width of an intermirror gap determines the amount of in—plane rotation that can occur without contact between adjacent mirrors."

V. The independent claim 1 of the Auxiliary Request 2 reads as follows:

"A dense micromirror array apparatus (400) comprising: a plurality of micromirrors (402—A—l, .., 402—F—6), wherein at least one edge portion (520—A) of at least one of the plurality of micromirrors (402—A—l, .., 402—F—6) is at least partially tapered, wherein the tapering is applied to mirrors having a shape that provides high fill ratios, to allow in—plane rotation of the at least one micromirror (500) without contact with an adjacent micromirror."

VI. Independent claim 1 of the Auxiliary Request 3 has the following wording:

"A dense micromirror array apparatus (400) comprising: a plurality of micromirrors (402—A—1, .., 402—F—6), wherein said micromirrors (402—A—l, .., 402—F—6) comprise a shape that provides a high fill ratio, wherein at least one edge portion (520—A) of at least one of the plurality of micromirrors (402—A—l, .., 402—F—6) is at least partially tapered to allow in—plane rotation of the at least one micromirror (500) without contact with an adjacent micromirror, wherein the at least one edge portion is tapered from a point (540-A) closest to a center of rotation (510) on the at least one edge of the at least one micromirror (500), to an adjacent edge."

VII. Oral proceedings were arranged for 29 October 2013. With letter dated 27 September 2013 the appellant informed the board that it would not attend the oral proceedings.

VIII. Oral proceedings were held in the appellant's absence. The board's decision was announced at the end of the oral proceedings.

IX. The following document is relevant for the decision:

D1: KOLESAR E S ET AL: "Implementation of micromirror arrays as optical binary switches and amplitude modulators" THIN SOLID FILMS, ELSEVIER-SEQUOIA S.A. LAUSANNE, CH, vol. 332, no. 1-2, 2 November 1998 (1998-11-02), pages 1-9.

Reasons for the Decision

1. Novelty (Article 54 EPC)

1.1 Main Request

The subject-matter of claim 1 is not new in view of document D1. D1 discloses in particular a dense micromirror array apparatus comprising a plurality of micromirrors arranged close to each other, see Figures 2 and 7, and page 3, right-hand column, point 2, first paragraph. At least one edge portion of at least one of the plurality of micromirrors is at least partially tapered; see in particular the shape designated as "oval" in Figures 2 and 7 with rounded corners . In this respect it is noticed that the expression "tapered edge portion" is a broad definition of the shape of an edge which according to the description of the patent

application explicitly includes "curved segments", or the like, see paragraph 0013. By virtue of the tapered edge portions some additional amount of in-plane rotation of the at least one micromirror without contact with an adjacent micromirror is inherently allowed; see page 6, right-hand column, last sentence of section 3, where it is disclosed that the motion of the micromirrors comprises a rotational mode around the center and in the plane of the mirrors.

Therefore, all the features of claim 1 are known from document D1.

1.2 Auxiliary Request 1

Claim 1 of the Auxiliary Request 1 differs from claim 1 of the Main Request in that it comprises the additional feature "wherein the amount or angle of the taper and a width of an intermirror gap determines the amount of in-plane rotation that can occur without contact between adjacent mirrors". This feature is a mere explanation of the correlation of rotation of a micromirror with the distance between the mirrors and the shape of their tapered portions, which correlation is true for all micromirror arrays, also for those micromirror arrays disclosed in D1 having an "oval" shape as disclosed in Figure 7.

Therefore, the subject-matter of claim 1 of the Auxiliary Request 1 is not new either.

1.3 Auxiliary Request 2

Claim 1 of the Auxiliary Request 2 differs from that of the Main Request in that it comprises the following additional feature: "wherein the tapering is applied to

mirrors having a shape that provides high fill ratios". The relative term "high fill ratio" does not imply any clear limitation. In document D1 the micromirrors are ideally arranged "to completely cover the array surface with no gaps between them" but necessary tradeoffs had to be made, amounting still in a "high fill ratio"; see page 3, right-hand column, point 2, first paragraph of document D1.

Therefore, the additional feature of the Auxiliary Request 2 does not render the subject-matter of claim 1 new over document D1.

1.4 Auxiliary Request 3

Claim 1 of the Auxiliary Request 3 differs from that of the Main Request in that it comprises the following additional features:

(a) "wherein said micromirrors comprise a shape that provides a high fill ratio" and

(b) "wherein the at least one edge portion is tapered from a point closest to a center of rotation on the at least one edge of the at least one micromirror, to an adjacent edge".

As explained under point 1.3 above, additional feature (a) does not render new the subject-matter of claim 1. The shape of the micromirrors of document D1 provides a high fill ratio.

Also feature (b) is known from document D1. In particular for the "oval" mirrors disclosed in Figure 7 The center of rotation of the rotational mode referred to in page 6, right-hand column, last sentence of section 3 is in the center of the mirror. These mirrors are rounded off on at least one edge from a point

closest to a center of rotation (in figure 7 it is on the short sides) to an adjacent edge. Since a tapered edge may include curved portions, as indicated in paragraph 0013 of the published patent application, the micromirror array of claim 1 of Auxiliary Request 3 is also not new in view of document D1.

2. The appellant put forward that a tapering of the mirrors to allow in-plane rotation without contact with an adjacent mirror was not disclosed in document D1. The appellants argument was based on the mirror shape shown in Figures 2 and 4. This shape would not be tapered for the claimed purpose of allowing in-plane rotation.

In the board's view however this is certainly the case for the "oval" shape of the micromirrors shown in figures 2 and 7. The oval shape becomes narrower towards the ends and therefore an increased in-plane rotation is possible in comparison to e.g. a rectangular shape, without increasing the distance between the mirrors. This effect is evident even if not explicitly described in document D1.

3. The examining division's conclusion that the claimed subject-matter lacked novelty over the disclosure of document D1 must therefore be upheld against claim 1 of all of applicant's claim requests.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar: The Chairman:

M. Kiehl A. Klein

Decision electronically authenticated