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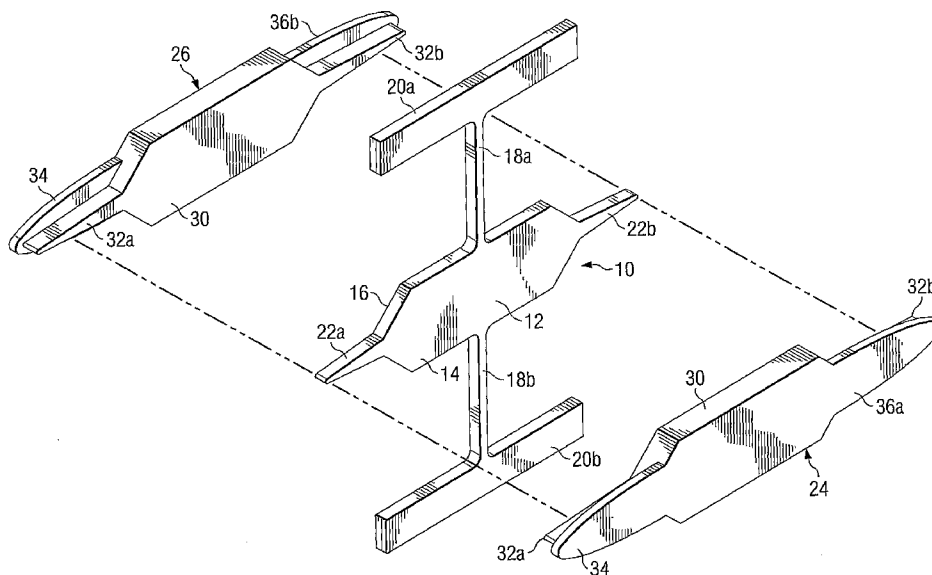
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: TWO-SIDED TORSIONAL HINGED MIRROR



(57) Abstract: A torsional hinged mirror structure having back-to-back reflective surfaces (36a) and (36b) and suitable for use in a laser printer imaging system is disclosed. There is also disclosed an optical layer and a support structure that does not interfere with either of the two incident light beams as the two reflected beam sweeps. A hinge plate structure (10) comprises a center section (12) having a first side (14) and a second side (16), a pair of torsional hinges (18a) and (18b), and a pair of anchor members (20a) and (20b). The anchor members (20a) and (20b) may be replaced by a support frame (20). Preferably, the hinge plate structure (10) is etched, laser milled, or otherwise formed from a silicon substrate to include a pair of support spines (22a) and (22b).



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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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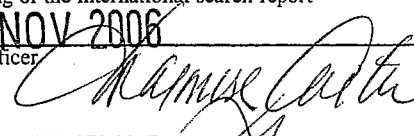
— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/16329

<p>A. CLASSIFICATION OF SUBJECT MATTER</p> <p>IPC: G02B 26/08( 2006.01)</p> <p>USPC: 359/198,199,201,203,224</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>											
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) U.S. : 359/198, 199, 201, 203, 224, 900</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Continuation Sheet</p>											
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 5,629,790 A (NEUKERMANS et al) 13 May 1997 (13.05.1997), Fig. 2d and column 6, lines 35-39.</td> <td>1,2,4,10</td> </tr> <tr> <td>X</td> <td>US 2004/0130765 A1 (GESSNER et al)8 July 2004 (08.07.2004), Fis. 3 and 11 and the accompanying text.</td> <td>1, 2, 4 and 10</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 5,629,790 A (NEUKERMANS et al) 13 May 1997 (13.05.1997), Fig. 2d and column 6, lines 35-39.	1,2,4,10	X	US 2004/0130765 A1 (GESSNER et al)8 July 2004 (08.07.2004), Fis. 3 and 11 and the accompanying text.	1, 2, 4 and 10
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X	US 2004/0130765 A1 (GESSNER et al)8 July 2004 (08.07.2004), Fis. 3 and 11 and the accompanying text.	1, 2, 4 and 10									
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input type="checkbox"/> See patent family annex.									
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>		<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>									
<p>Date of the actual completion of the international search</p> <p>09 August 2006 (09.08.2006)</p>		<p>Date of mailing of the international search report</p> <p>13 NOV 2006</p>									
<p>Name and mailing address of the ISA/US</p> <p>Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450</p> <p>Facsimile No. (571) 273-3201</p>		<p>Authorized officer</p> <p>James Phan </p> <p>Telephone No. (571) 272-2317</p>									

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/16329

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of any additional fees.
  3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
  4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1,2,4 and 10
- Remark on Protest
- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.   |
| <input type="checkbox"/> | The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation. |
| <input type="checkbox"/> | No protest accompanied the payment of additional search fees.   |

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US06/16329

**BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

Group I, claim(s) 2, drawn to a torsional hinged mirror structure having two reflective surfaces, wherein the pair of torsional hinges, the center portion and each of the first and second surfaces are formed from a single layer of silicon.

Group II, claim(s) 3, drawn to a torsional hinged mirror structure having two reflective surfaces, wherein the pair of torsional hinges and the center portion comprises a hinge plate and the first reflective surface comprises a first mirror layer bond to a first side of the hinge plate and the second reflective surface comprises a second mirror layer bond to a second side of the hinge plate.

Group III, claim(s) 5, drawn to a torsional hinged mirror structure having two reflective surfaces, wherein the drive source is an inertia drive source that comprises two pairs of piezoelectric actuators.

Group IV, claim(s) 6-9, drawn to Group I, claim(s) 2, drawn to a torsional hinged mirror structure having two reflective surfaces, wherein the drive source comprises at least an electromagnetic actuator.

Claims 1, 4 and 10 do not contain any special technical features and thus will be examined along with at least the first invention of Group I.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature contained in each of the Groups I-IV above is not contained in the remaining Groups.

Continuation of B. FIELDS SEARCHED Item 3:

EAST

torsion, elastic, oscillating, vibrating, reflecting, mirror, deflecting

Form PCT/ISA/210 (extra sheet) (April 2005)