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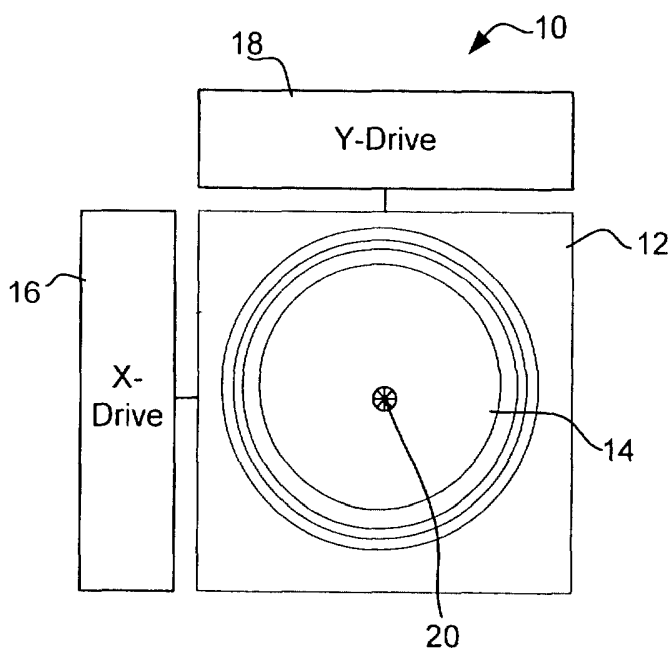
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[Continued on next page]

(54) Title: MICRO-POSITIONING OPTICAL ELEMENT



(57) Abstract: A micro-positioning system for accurately positioning an optical element relative to an optical device such as a laser diode, Vertical Cavity Surface Emitting Laser (VCSEL), Resonant Cavity Photo Detector (RCPD), or some other type of optical device. The micro-positioning system is adapted to move the optical element independently in both the X and Y directions. The optical element preferably has at least two regions where the optical characteristics are different. In operation, the optical element is selectively moved so that a light beam intersects a selected region of the optical element. Because the optical characteristics of the optical element are different in different regions, the optical element produces a different optical result as the light beam is moved between regions. This may be useful in a number of applications including, for example, optical alignment, optical switching including Space Division Multiplexing (SDM), Wavelength Division Multiplexing (WDM), and Polarization Division Multiplexing (PDM).



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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/US 01/31834A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G02B7/00 G02B6/35 B81B3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G02B B81B G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 726 073 A (ZHANG Z LISA ET AL) 10 March 1998 (1998-03-10) column 2, line 34-52 column 5, line 56 -column 6, line 15 column 6, line 31-44 column 7, line 13-29 column 8, line 38 -column 11, line 3 figure 1	1-6
Y	---	10-12,17
Y	US 6 091 537 A (SUN DECAI ET AL) 18 July 2000 (2000-07-18) column 2, line 7-23 column 3, line 22-52 column 4, line 28-46 figure 1	10-12,17

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 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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.

"&" document member of the same patent family

Date of the actual completion of the international search

25 March 2003

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/31834

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 903 606 A (LUCENT TECHNOLOGIES INC) 24 March 1999 (1999-03-24) paragraphs [0011]-[0014],[0038] figures 1,3	1-6
X	--- US 5 801 472 A (HEIKE SEIJI ET AL) 1 September 1998 (1998-09-01) column 4, line 14-20 column 6, line 48-14 figure 15	1-6
A	--- US 5 235 187 A (YAO JUN J ET AL) 10 August 1993 (1993-08-10) column 5, line 63 -column 7, line 10 figures 4,14	1-8
A	--- PACHECO S P ET AL: "Design of low actuation voltage RF MEMS switch" MICROWAVE SYMPOSIUM DIGEST. 2000 IEEE MTT-S INTERNATIONAL BOSTON, MA, USA 11-16 JUNE 2000, PISCATAWAY, NJ, USA, IEEE, US, 11 June 2000 (2000-06-11), pages 165-168, XP010505947 ISBN: 0-7803-5687-X abstract page 165, column 2 figure 1	7,8
A	--- CHEN E ET AL: "A NOVEL DEVICE FOR DETECTING THE POLARIZATION DIRECTION OF LINEAR POLARIZED LIGHT USING INTEGRATED SUBWAVELENGTH GRATINGS AND PHOTODETECTORS" IEEE PHOTONICS TECHNOLOGY LETTERS, IEEE INC. NEW YORK, US, vol. 9, no. 9, 1 September 1997 (1997-09-01), pages 1259-1261, XP000721228 ISSN: 1041-1135 the whole document -----	13-22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/31834

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional 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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

1-22

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-22

Claims 1-22 refer to means for moving an optical element selectively in the X and the y directions.

2. Claims: 23-27,29-33

Claims 23-27,29-33 refer to an optical system comprising an optical source or receiver, an optical element with two different grating regions and a driver for moving said optical element.

3. Claim : 28

Claim 28 refers to an optical sytem comprising an array of optical sources or receivers, an array of optical elements each having two different filter regions and one or more drivers to move said optical elements.

4. Claims: 34-41

Claims 34-41 refer to a manufacturing method for optical elements characterised by different process steps not all related to devices according to one of the previous claims.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/31834

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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