

(12) United States Patent

Ford et al.

US006178033B1

US 6,178,033 B1 (10) Patent No.: Jan. 23, 2001 (45) Date of Patent:

(54) MICROMECHANICAL MEMBRANE TILT-MIRROR SWITCH

- (75) Inventors: Joseph E. Ford; James A. Walker, both of Monmouth, NJ (US)
- (73)Assignce: Lucent Technologies, Murray Hill, NJ (US)
- Under 35 U.S.C. 154(b), the term of this (*) Notice: patent shall be extended for 0 days.
- (21) Appl. No.: 09/271,577
- (22) Filed: Mar. 28, 1999
- (51) Int. Cl.⁷ G02F 1/03
- 359/291 (58) Field of Search 359/290, 291, 359/295, 298, 246, 251, 254, 247

(56)**References** Cited

U.S. PATENT DOCUMENTS

5,579,151	*	11/1996	Cho .	 359/291
5,917,647		6/1999	Yoon	 359/298
5 978 128	۰	11/1999	Yoon	359/298

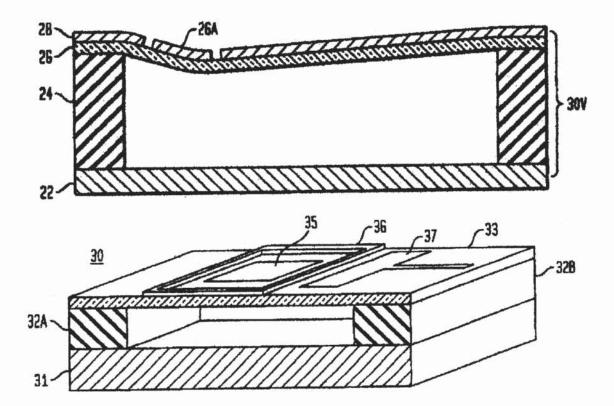
* cited by examiner

Primary Examiner-Huy Mai

(57)ABSTRACT

A micromechanical tilt mirror device that includes a membrane suspended by its ends over a substrate such that a mirror area of the membrane is asymmetrically positioned on the membrane whereby it is tilted when the membrane is deformed by electrostatic forces. This mirror tilt is used to steer an incident light beam in a prescribed direction. The mirror can be supported to provide tilt in either of two orthogonal directions with respect to a rest direction.

14 Claims, 4 Drawing Sheets



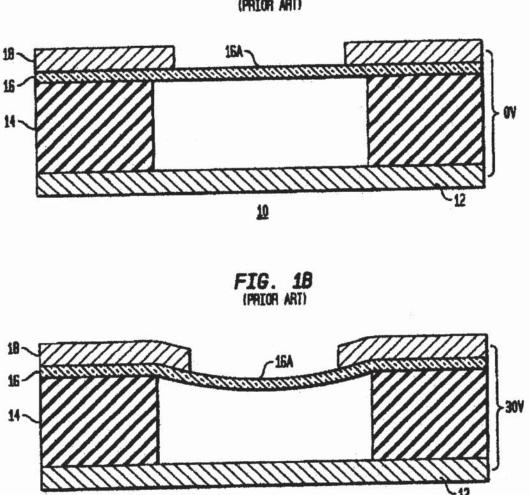


FIG. 1A (PRIOR ART)

10

DOCKET RM Α A Find authenticated court documents without watermarks at <u>docketalarm.com</u>.



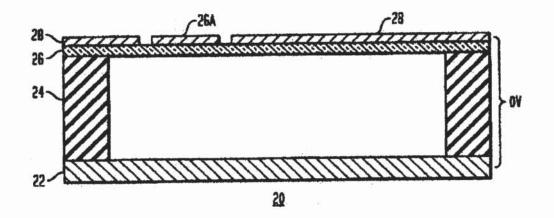
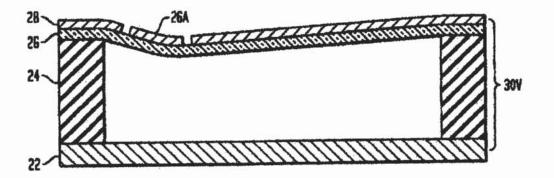
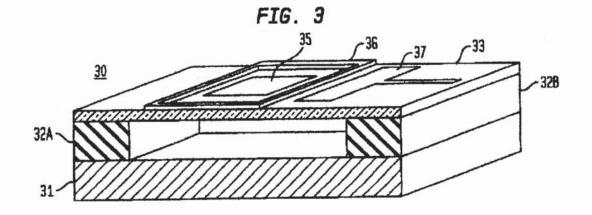
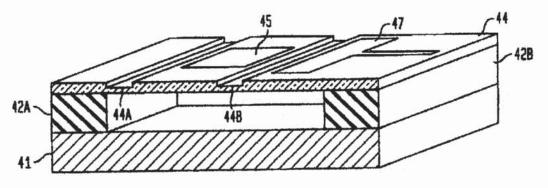


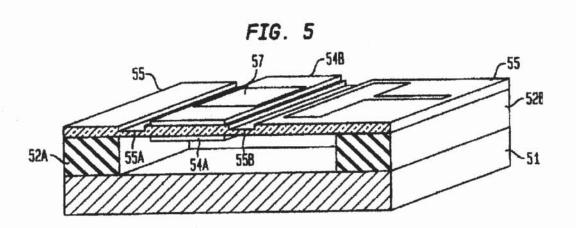
FIG. 28



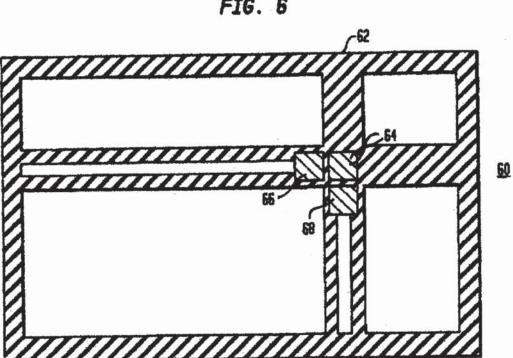








D ΟСКЕТ Α RM Α Find authenticated court documents without watermarks at <u>docketalarm.com</u>.



DOCKET LARM Α Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

DOCKET A L A R M



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.