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**United States Patent** [19]  
**Maynard**

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[45] **Date of Patent:** **Feb. 16, 1999**

[54] **HYBRID-OPTICAL MULTI-AXIS BEAM STEERING APPARATUS**

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[73] Assignee: **Ronald S. Maynard**, San Jose, Calif.

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[21] Appl. No.: **695,717**

[22] Filed: **Aug. 12, 1996**

[51] Int. Cl.<sup>6</sup> ..... **G02B 6/36**

*Primary Examiner*—Hung N. Ngo

[52] U.S. Cl. .... **385/88**; 385/18; 385/19;  
385/83

*Attorney, Agent, or Firm*—Wilson Sonsini Goodrich & Rosati

[58] Field of Search ..... 385/88-94, 16-23,  
385/25, 83

[57] **ABSTRACT**

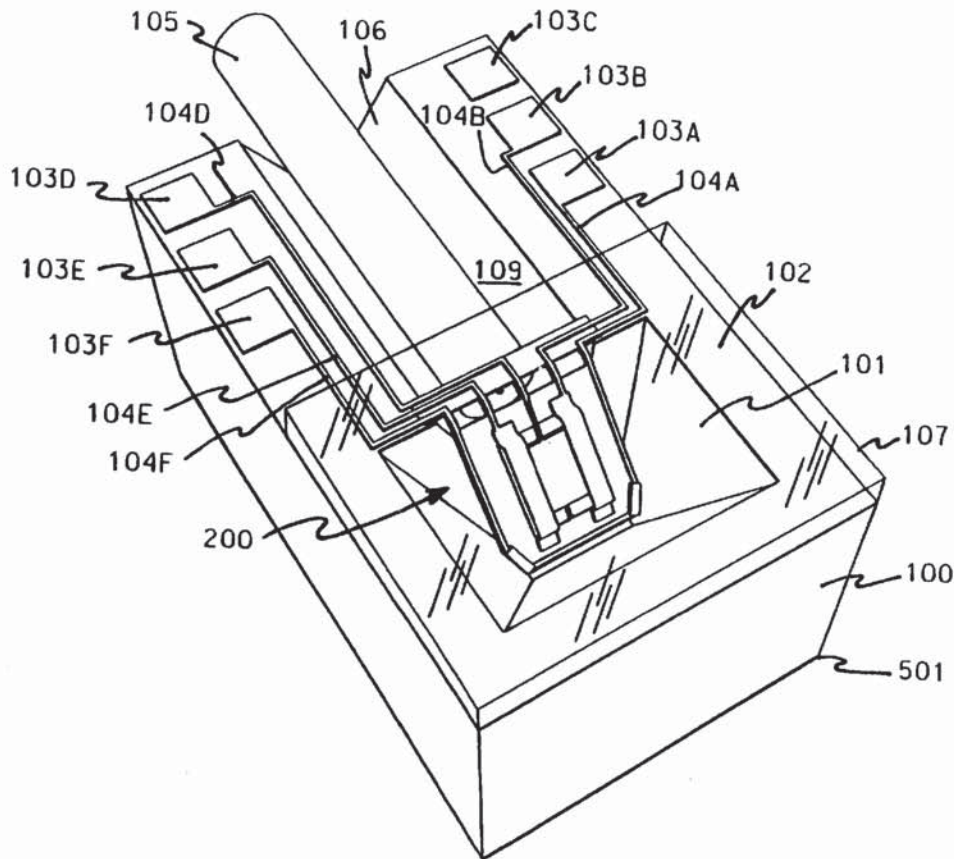
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An apparatus for precisely steering a beam of light by making use of a hybrid inter optical alignment precision which occurs when a beam steering mechanism is micro-machined with respect to a crystallographic orientation of a substrate.

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**45 Claims, 17 Drawing Sheets**



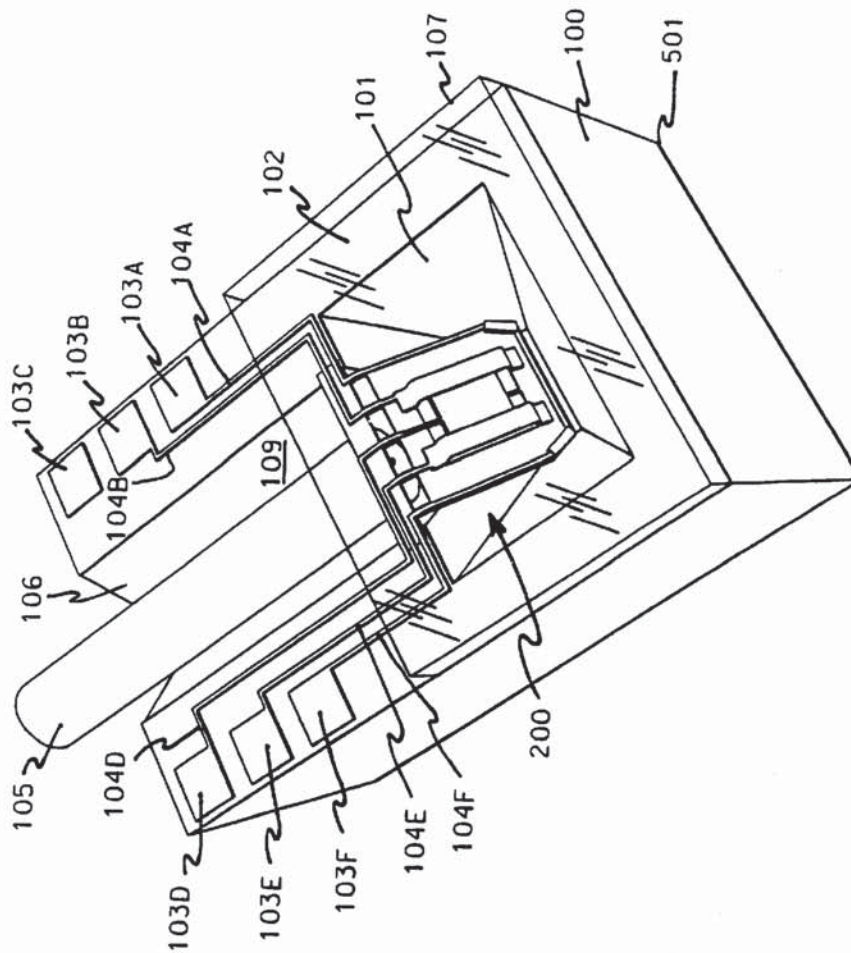


FIG. 1

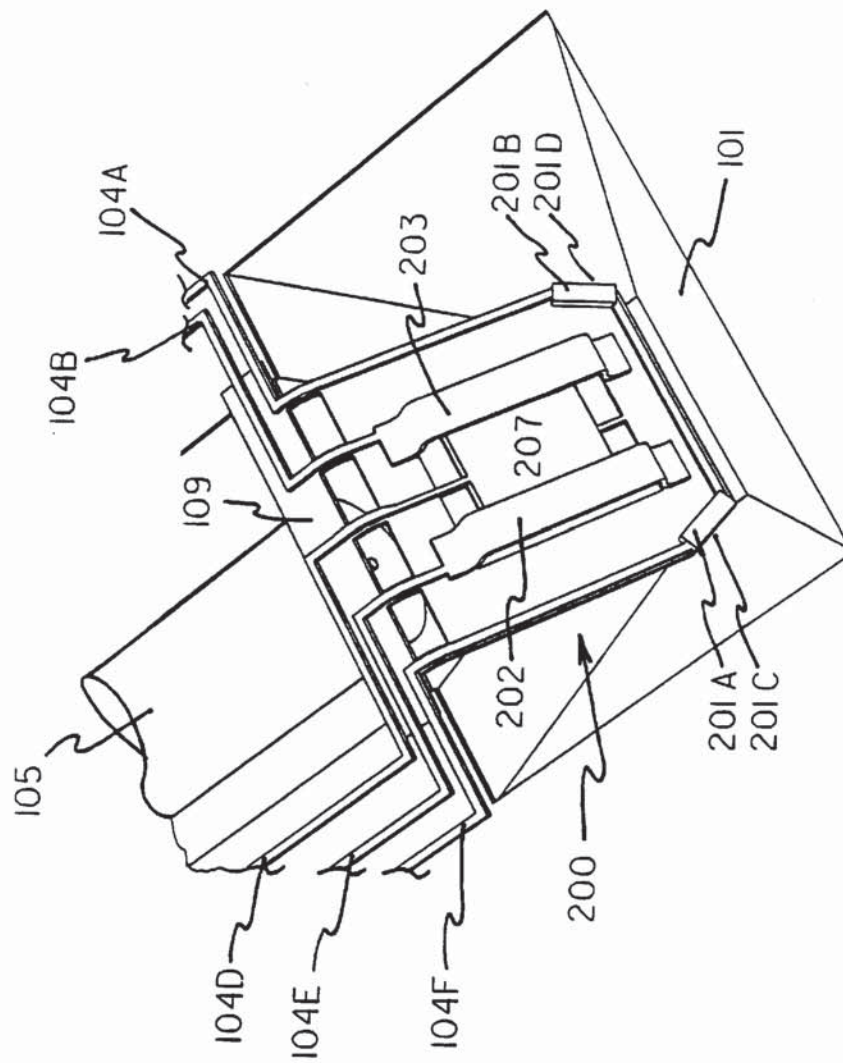


FIG. 2

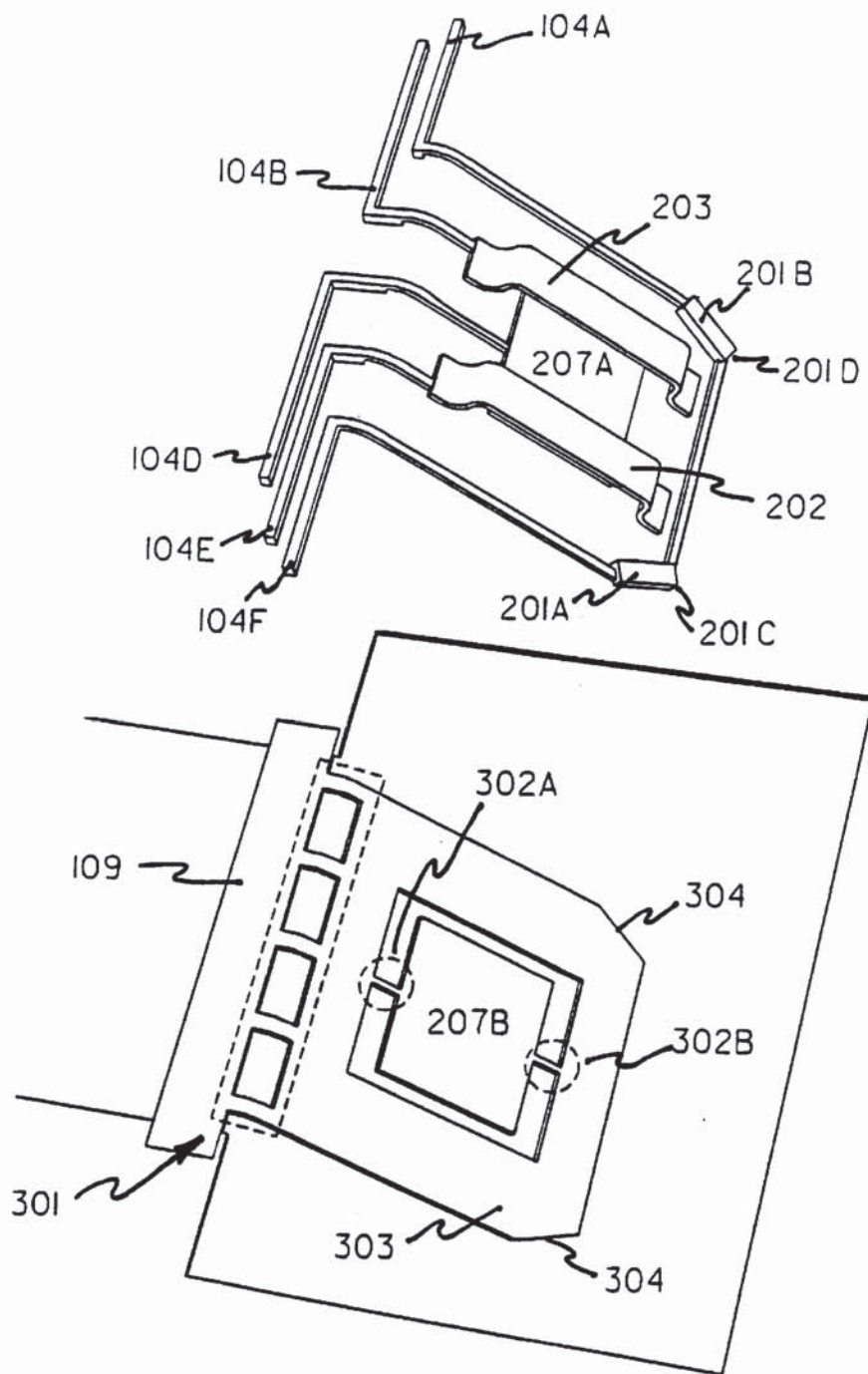


FIG. 3

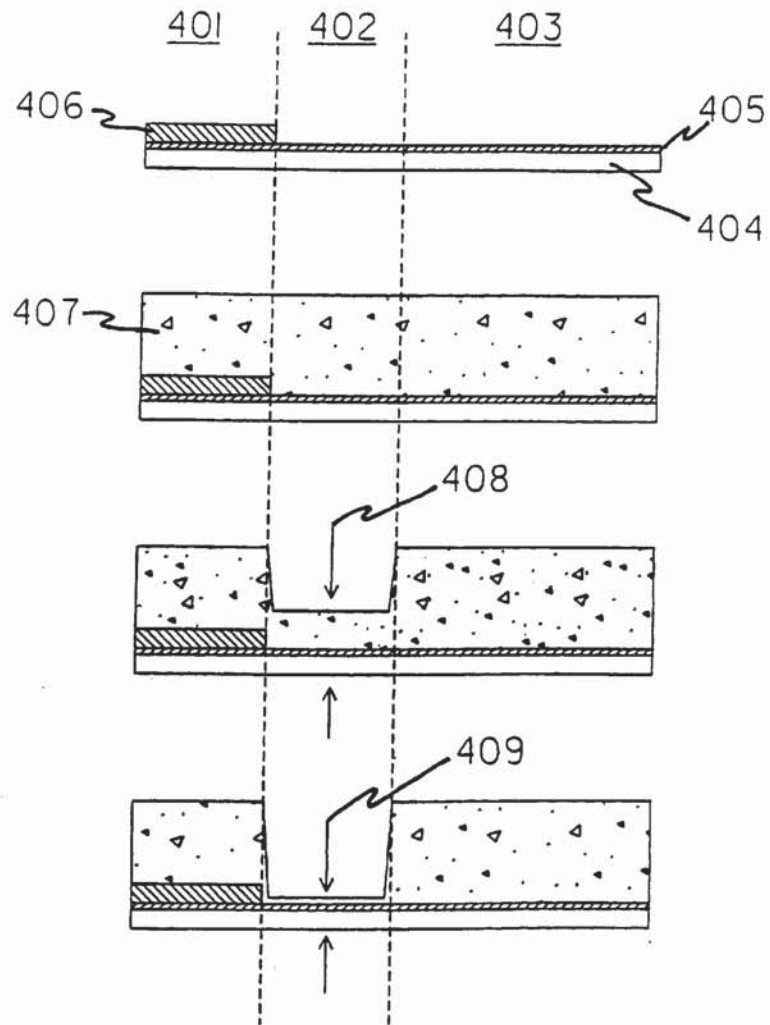


FIG. 4



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