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(12) **United States Patent**  
**Smith et al.**

(10) **Patent No.:** **US 6,798,941 B2**  
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(54) **VARIABLE TRANSMISSION MULTI-CHANNEL OPTICAL SWITCH**  
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(73) Assignee: **Movaz Networks, Inc.**, Norcross, GA (US)

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 78 days.

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(21) Appl. No.: **09/957,312**

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(22) Filed: **Sep. 20, 2001**

G. Jeong et al., "Comparison of Wavelength-interchanging and wavelength-selective cross-connects in multiwavelength all-optical networks", *IEEP*, 1996, 156-163 pp.

(65) **Prior Publication Data**

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**Related U.S. Application Data**

(60) Provisional application No. 60/234,683, filed on Sep. 22, 2000, and provisional application No. 60/267,285, filed on Feb. 7, 2001.

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(74) *Attorney, Agent, or Firm*—Charles S. Guenzer

(51) **Int. Cl.**<sup>7</sup> ..... **G02B 6/26**; G02B 6/42

(52) **U.S. Cl.** ..... **385/18**; 385/19

(58) **Field of Search** ..... 385/18, 19, 15, 385/33; 398/156

(57) **ABSTRACT**

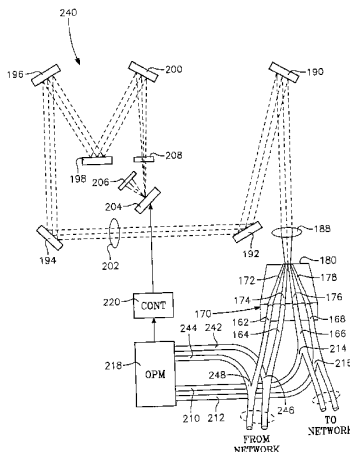
A multi-wavelength or white-light optical switch including an array of mirrors tiltable about two axes, both to control the switching and to provide variable power transmission through the switch, both for optimization and for power equalization between wavelength channels in a multi-wavelength signal. The output power of a channel is monitored, thereby allowing feedback adjustment of the transmitted power. The mirrors are preferably formed in a micro electromechanics system array to be tiltable in orthogonal directions and having electrostatically controlled tilting by two pairs of electrodes beneath the mirrors. Input power of the separate channels may also be monitored.

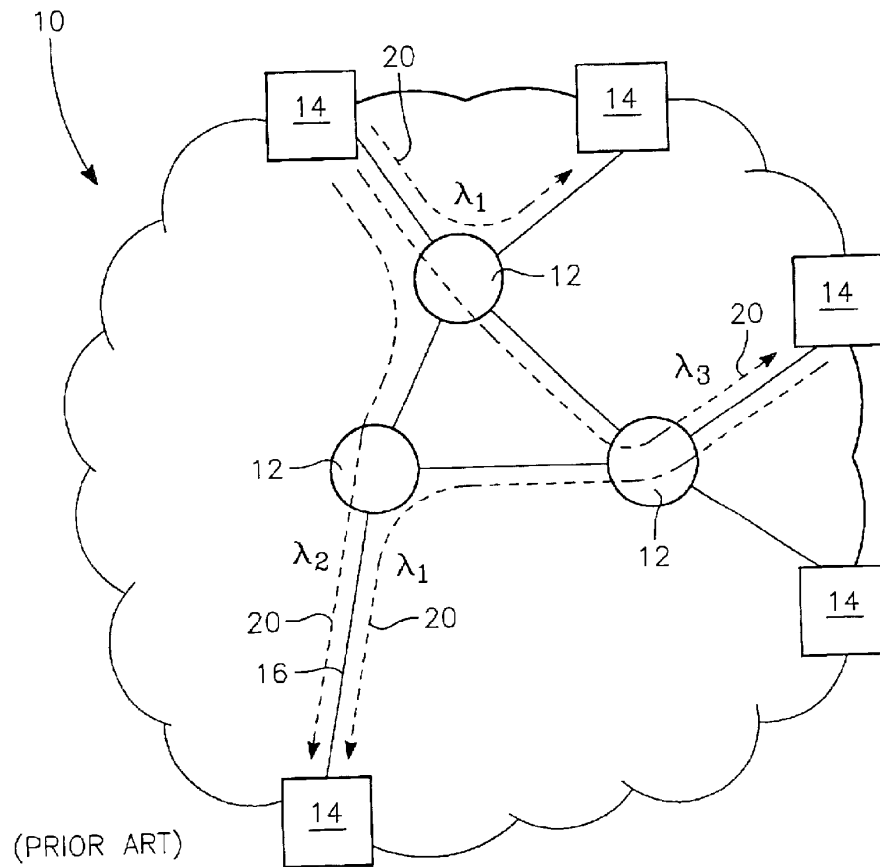
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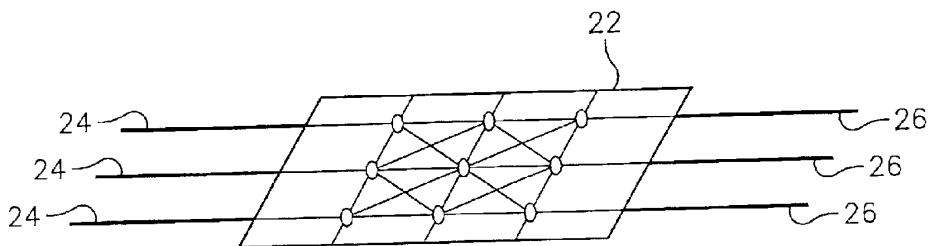
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**37 Claims, 11 Drawing Sheets**





(PRIOR ART)  
FIG. 1



(PRIOR ART)  
FIG. 2

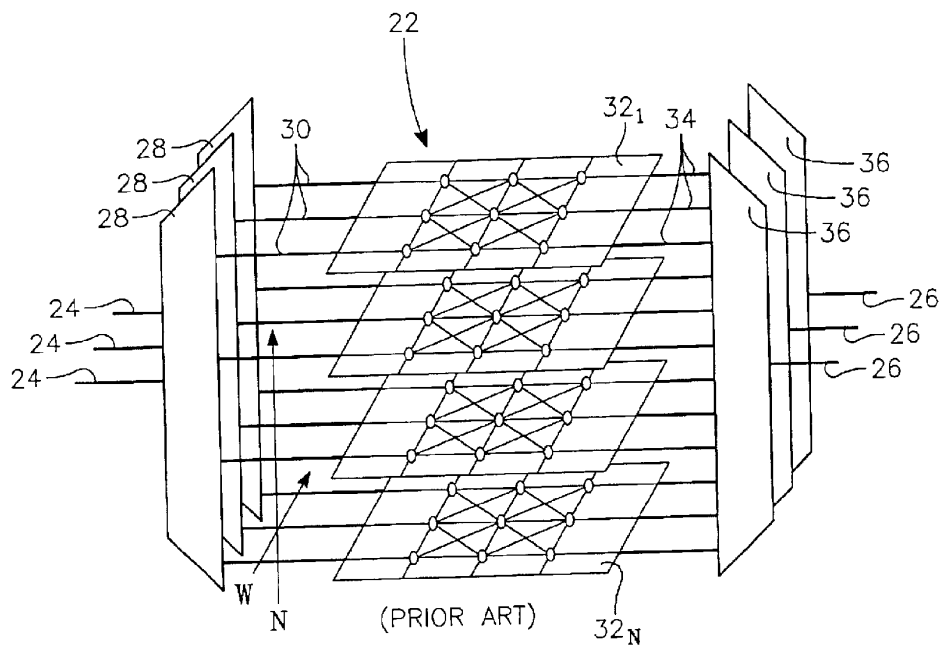
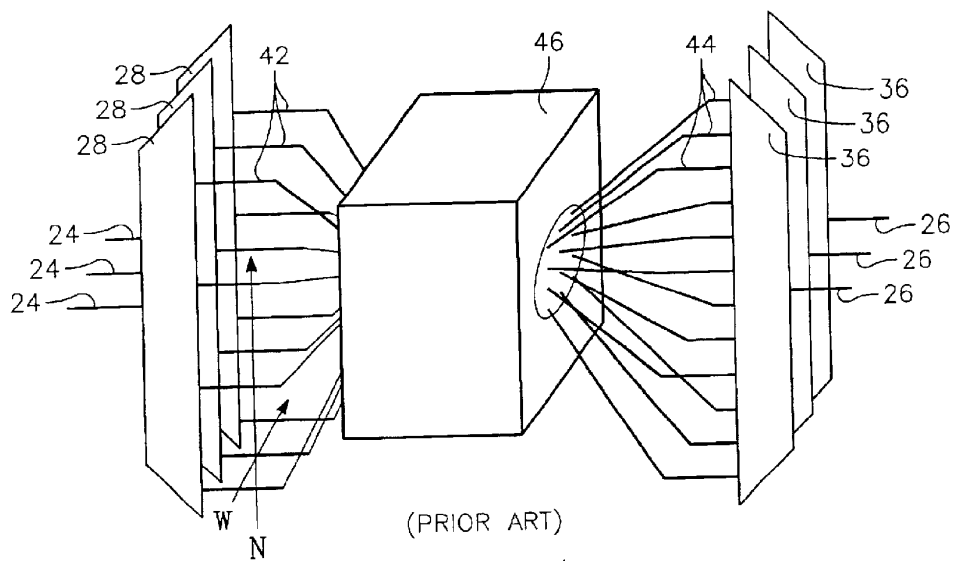
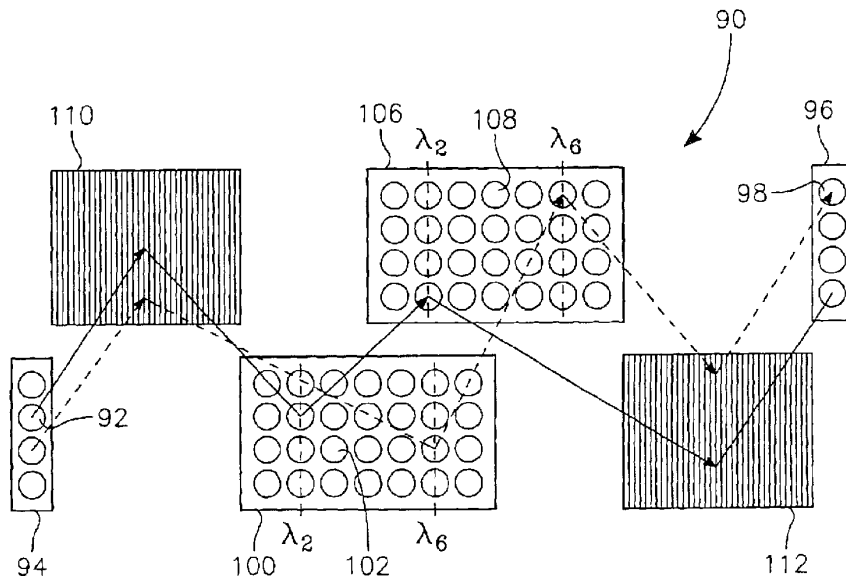
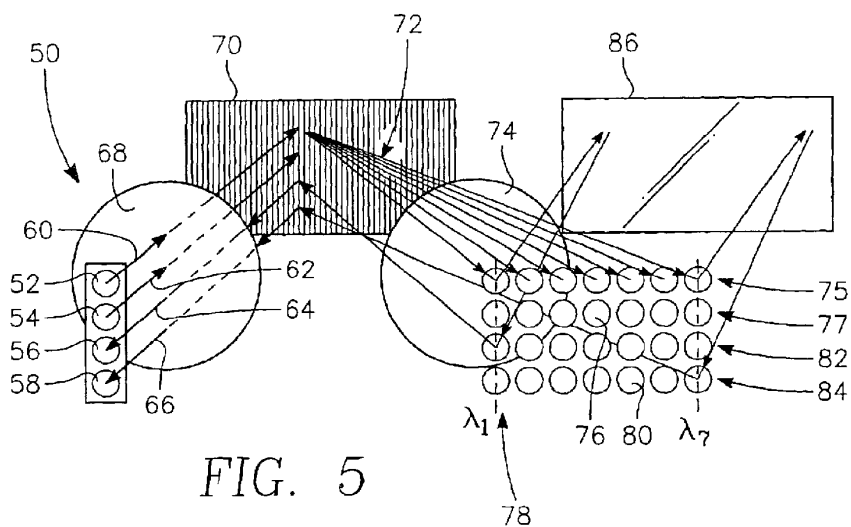


FIG. 3



(PRIOR ART)

FIG. 4



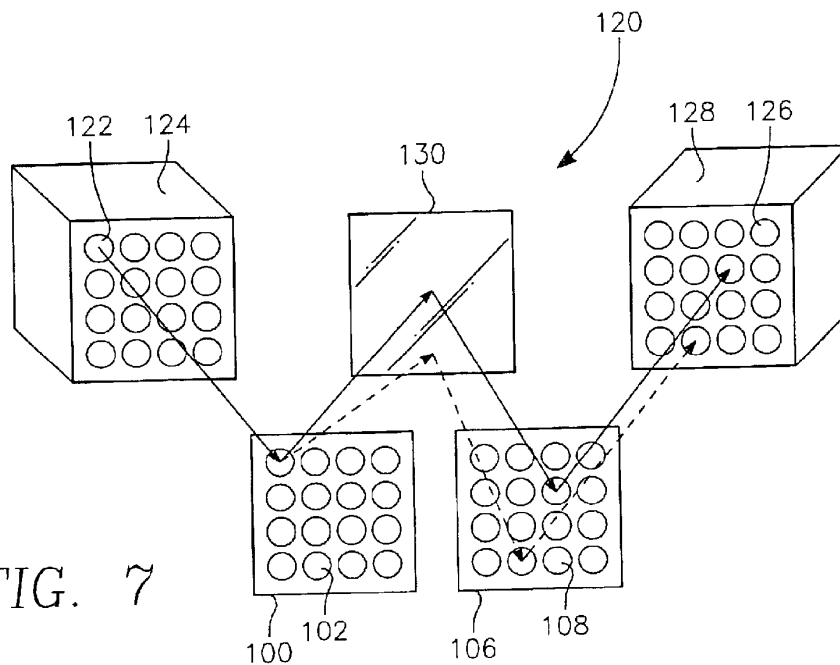


FIG. 7

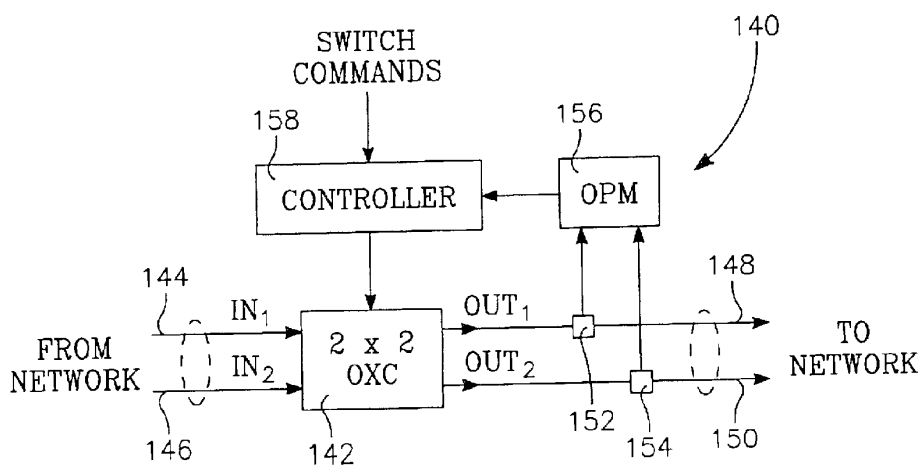


FIG. 8

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