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# United States Patent [19]

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- [54] **STABLE NONLINEAR MACH-ZEHNDER FIBER SWITCH**
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### Related U.S. Application Data

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- [51] Int. Cl.<sup>6</sup> ..... **G02B 6/26**
- [52] U.S. Cl. .... **385/16; 385/14; 372/6**
- [58] Field of Search ..... 385/42, 96, 2, 385/3, 4, 8, 9, 14, 10, 16, 17, 20, 21, 24, 132, 141, 142, 122; 372/6

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### ABSTRACT

[57] An all-optical fiber switch is implemented within a short Mach-Zehnder interferometer configuration. The Mach-Zehnder switch is constructed to have a high temperature stability so as to minimize temperature gradients and other thermal effects which result in undesirable instability at the output of the switch. The Mach-Zehnder switch of the preferred embodiment is advantageously less than 2 cm in length between couplers to be sufficiently short to be thermally stable, and full switching is accomplished by heavily doping one or both of the arms between the couplers so as to provide a highly nonlinear region within one or both of the arms. A pump input source is used to affect the propagation characteristics of one of the arms to control the output coupling ratio of the switch. Because of the high nonlinearity of the pump input arm, low pump powers can be used, thereby alleviating difficulties and high cost associated with high pump input powers.

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34 Claims, 5 Drawing Sheets

