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Chen et al.

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- (54) **RECONFIGURABLE OPTICAL ADD-DROP MULTIPLEXERS WITH SERVO CONTROL AND DYNAMIC SPECTRAL POWER MANAGEMENT CAPABILITIES**
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- (21) Appl. No.: **12/816,084**
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Related U.S. Patent Documents

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- (64) Patent No.: **6,879,750**
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 - Appl. No.: **10/745,364**
 - Filed: **Dec. 22, 2003**
- U.S. Applications:
- (63) Continuation of application No. 10/005,714, filed on Nov. 7, 2001, now Pat. No. 6,687,431, which is a continuation of application No. 09/938,426, filed on Aug. 23, 2001, now Pat. No. 6,625,346.
 - (60) Provisional application No. 60/277,217, filed on Mar. 19, 2001.
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G02B 6/28 (2006.01)
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 - (52) **U.S. Cl.** **385/24; 385/10; 385/33; 385/37; 398/83**
 - (58) **Field of Classification Search** **385/24, 385/11, 10, 37, 34, 33; 398/79, 82, 83, 84, 398/88, 87**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,414,540	A	5/1995	Patel et al.
5,629,790	A	5/1997	Neukermans et al.
5,745,271	A	4/1998	Ford et al.
5,835,458	A	11/1998	Bischel et al.
5,960,133	A	9/1999	Tomlinson
5,974,207	A	10/1999	Aksyuk et al.
6,028,689	A	2/2000	Michalick et al.
6,204,946	B1	3/2001	Aksyuk et al.
6,205,269	B1	3/2001	Morton
6,222,954	B1	4/2001	Riza
6,256,430	B1	7/2001	Jin et al.
6,263,135	B1	7/2001	Wade
6,289,155	B1	9/2001	Wade
6,307,657	B1	10/2001	Ford
6,418,250	B1	7/2002	Corbosiero et al.
6,498,872	B2	12/2002	Bouevitch et al.

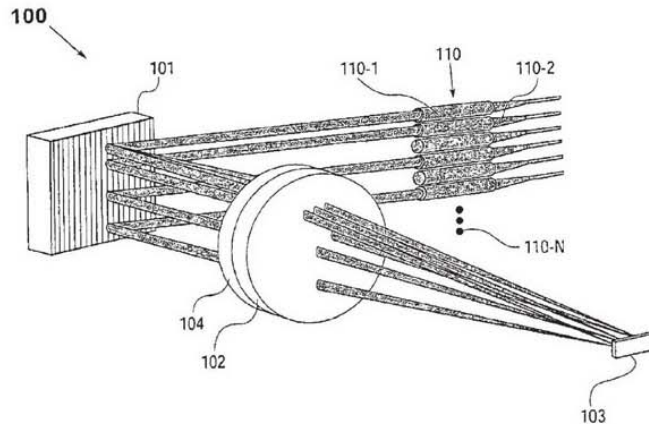
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(57) **ABSTRACT**

This invention provides a novel wavelength-separating-routing (WSR) apparatus that uses a diffraction grating to separate a multi-wavelength optical signal by wavelength into multiple spectral channels, which are then focused onto an array of corresponding channel micromirrors. The channel micromirrors are individually controllable and continuously pivotable to reflect the spectral channels into selected output ports. As such, the inventive WSR apparatus is capable of routing the spectral channels on a channel-by-channel basis and coupling any spectral channel into any one of the output ports. The WSR apparatus of the present invention may be further equipped with servo-control and spectral power-management capabilities, thereby maintaining the coupling efficiencies of the spectral channels into the output ports at desired values. The WSR apparatus of the present invention can be used to construct a novel class of dynamically reconfigurable optical add-drop multiplexers (OADMs) for WDM optical networking applications.

22 Claims, 12 Drawing Sheets



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U.S. PATENT DOCUMENTS							
6,567,574	B1	5/2003	Ma et al.	6,879,750	B2 *	4/2005	Chen et al. 385/24
6,600,851	B2	7/2003	Aksyuk et al.	6,898,348	B2	5/2005	Morozov et al.
6,625,346	B2	9/2003	Wilde et al.	6,989,921	B2	1/2006	Bernstein et al.
6,631,222	B1	10/2003	Wagener et al.	7,183,633	B2	2/2007	Daneman et al.
6,634,810	B1	10/2003	Ford et al.	2002/0131691	A1	9/2002	Garrett et al.
6,687,431	B2 *	2/2004	Chen et al. 385/24	2003/0043471	A1	3/2003	Belser et al.
6,810,169	B2	10/2004	Bouevitch et al.				

* cited by examiner

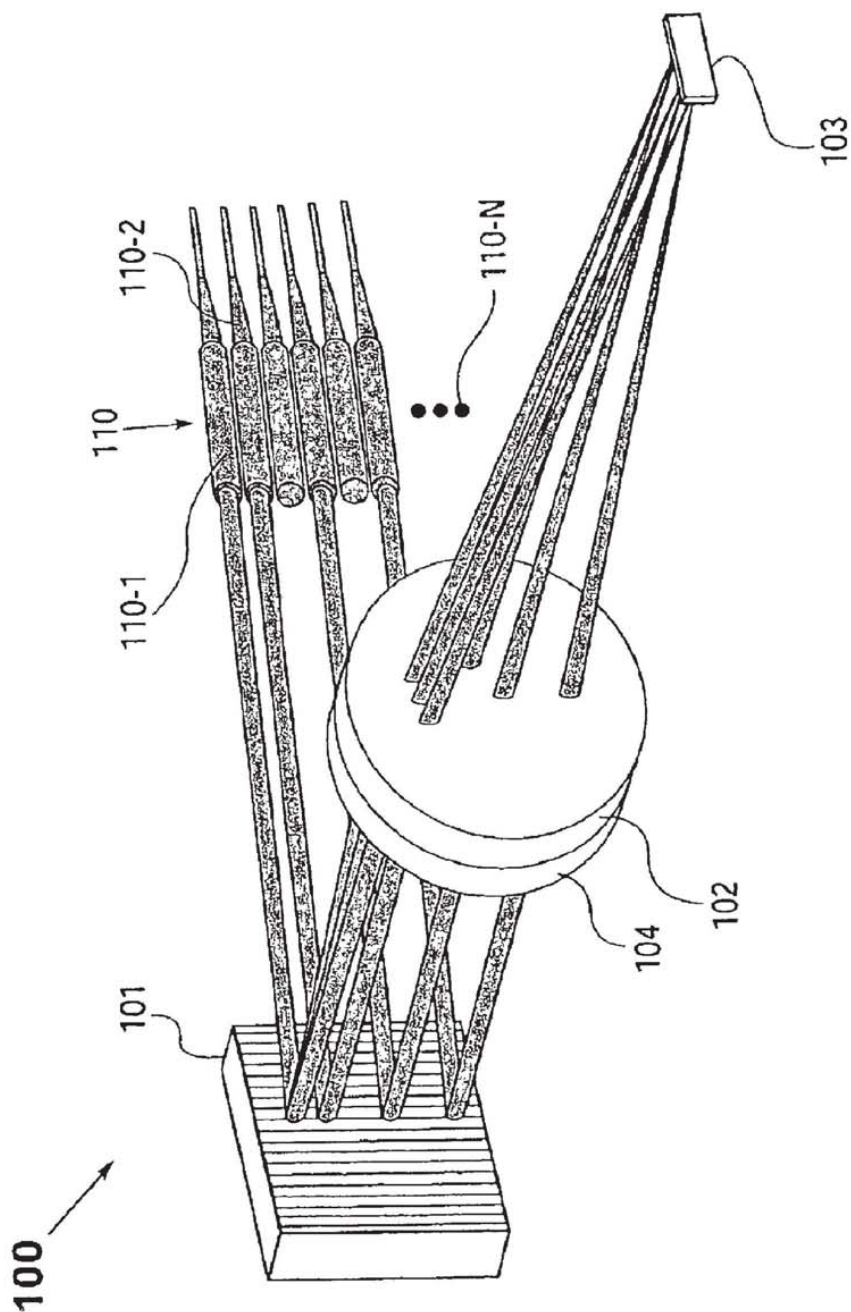


Fig. 1A

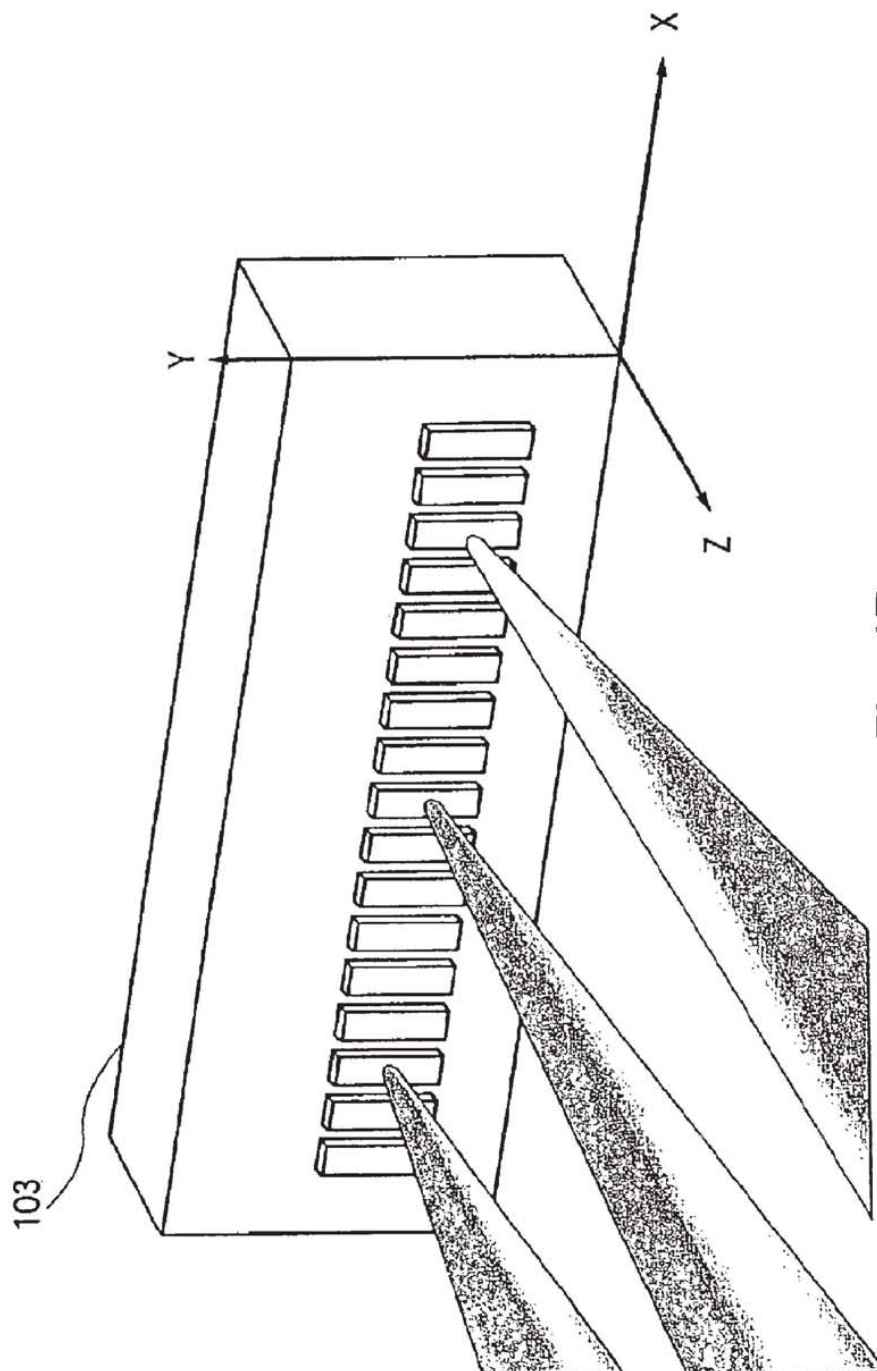


Fig. 1B

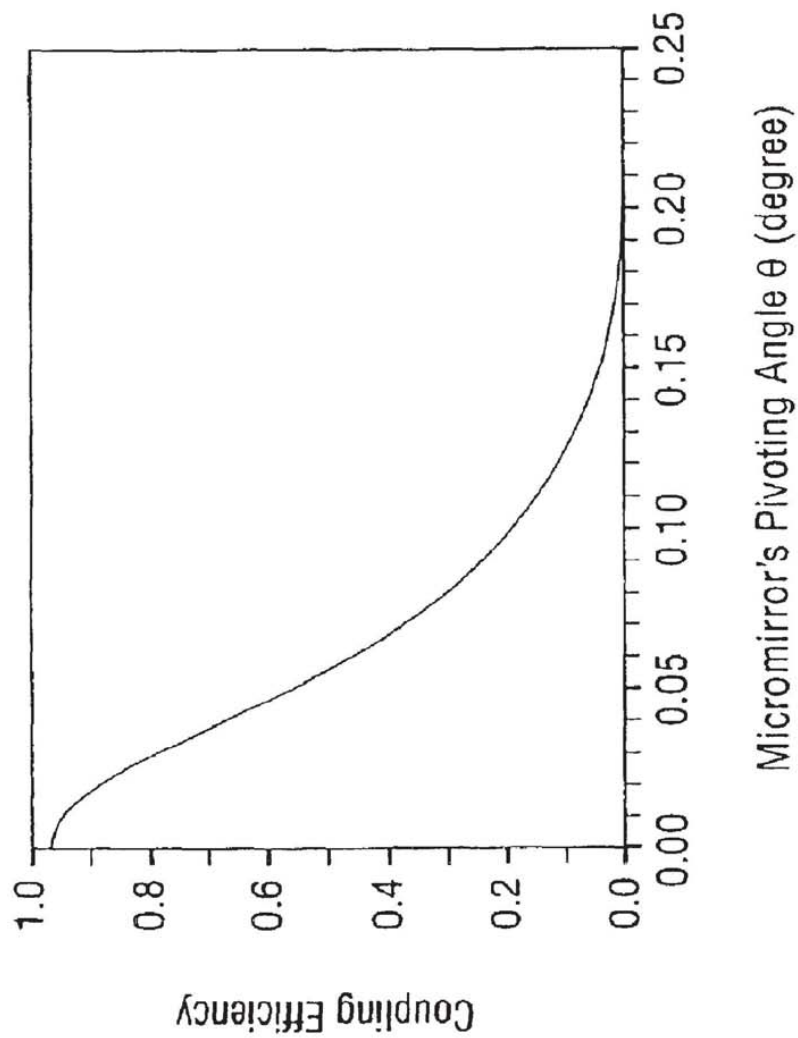


Fig. 1C

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