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Volodin et al.

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(54) **FIBER OPTIC DEVICES HAVING VOLUME BRAGG GRATING ELEMENTS**

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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 369 days.

Applicant calls to the Office's Attention, Application No. 820/CAL/93, Filed Dec. 28, 1993, Inventors-Victor Leyva and George Rakuljic, "Method for Writing Reflection Mode Gratings in Photorefractive Materials in the Infrared.", and U.S. Appl. No. 08/842,645, filed Apr. 15, 1997, Inventors- Koichi Sayano and F. Zhao, "High Resolution Holographic Image and Data Storage System." Applicant has no Further Information Regarding these References.

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Related U.S. Application Data

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385/16; 385/17; 385/37; 359/15

(58) **Field of Classification Search** None
See application file for complete search history.

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(57) **ABSTRACT**

Apparatus and methods for controlling the spectral shape of a Bragg grating element ("VBG") filter are disclosed. An optical system can be adapted to deliver a recording beam to the front focal plane of a lens. The recording beam may cause to be formed, in the front focal plane of the lens, an optical distribution that represents the desired filter response of the VBG element. A recording medium sample may be placed in the back focal plane of the same lens. The lens creates a true Fourier transform of the distribution in the optical plane directly on the recording medium. Via coherent interference with the plane reference wave, both the amplitude and the phase of the Fourier transform are transferred to the amplitude and phase envelope of the VBG imprinted on the recording material. A mask representing the desired filter shape may be placed in the front focal plane of the lens. The recording beam may be shone through the mask, such that a masked recording beam exits the mask in the front focal plane of the lens. The masked recording beam may represent the desired filter response of the VBG element.

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54 Claims, 18 Drawing Sheets

