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**Volodin**

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(54) **HIGH-POWER, PHASED-LOCKED, LASER ARRAYS**

(58) **Field of Classification Search**  
CPC ..... H01S 5/4012; H01S 5/065; H01S 5/141;  
H01S 3/1305

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See application file for complete search history.

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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 0 days.

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This patent is subject to a terminal disclaimer.

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(65) **Prior Publication Data**  
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**Related U.S. Application Data**

(63) Continuation of application No. 14/278,479, filed on May 15, 2014, now Pat. No. 9,130,349, which is a continuation of application No. 13/682,849, filed on Nov. 21, 2012, now Pat. No. 8,755,421, which is a  
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(57) **ABSTRACT**

High-power, phased-locked, laser arrays as disclosed herein utilize a system of optical elements that may be external to the laser oscillator array. Such an external optical system may achieve mutually coherent operation of all the emitters in a laser array, and coherent combination of the output of all the lasers in the array into a single beam. Such an "external gain harness" system may include: an optical lens/mirror system that mixes the output of all the emitters in the array; a holographic optical element that combines the output of all the lasers in the array, and an output coupler that selects a single path for the combined output and also selects a common operating frequency for all the coupled gain regions.

(52) **U.S. Cl.**  
CPC ..... **H01S 3/1305** (2013.01); **H01S 5/065** (2013.01); **H01S 5/141** (2013.01); **H01S 5/4012** (2013.01); **H01S 5/4062** (2013.01); **H01S 5/4068** (2013.01); **H01S 5/005** (2013.01); **H01S 5/0654** (2013.01); **H01S 5/148** (2013.01)

**9 Claims, 9 Drawing Sheets**

