



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application<br>US 08/888,533 (CIP)<br>Filed on 7 July 1997 (07.07.97) |  | Published<br><i>With international search report.<br/>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |
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## (54) Title: HIGH POWER LASER DEVICES

## (57) Abstract

In an apparatus and method for generating high power laser radiation, the geometry of the resonant laser cavity defines a fundamental spatial or transverse cavity mode. A gain medium is disposed within the resonant cavity and an energy source energizes the gain medium within a first volume. This causes spontaneous and stimulated energy emission to propagate in the gain medium in a direction transverse to the fundamental cavity mode. The transverse emission in turn optically pumps a second volume of the gain medium about the first volume. When the intensity of the emission is sufficiently high, inversion and gain are produced in the second volume. By optimizing the geometry of the cavity such that the fundamental cavity mode is coupled to both the first and the second volumes encompassing the first pumped volume, the transversely-directed energy of the first volume which would otherwise be wasted is instead captured by the fundamental beam, improving the overall power efficiency of the laser. When configured in an external cavity, the high-power laser of the present invention is especially amenable to frequency conversion of the output beam, as it provides beam intensities suitable for efficient nonlinear frequency conversion.

