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JENTZSCH et al.(10) **Pub. No.: US 2023/0231362 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **SEMICONDUCTOR LASER WITH A
HORIZONTAL LASER ELEMENT AND A
VERTICAL LASER ELEMENT, LIDAR
SYSTEM AND PRODUCTION METHOD***H01S 5/343* (2006.01)*H01S 5/183* (2006.01)*H01S 5/185* (2006.01)*H01S 5/02255* (2006.01)*H01S 5/026* (2006.01)(71) Applicant: **ams-OSRAM International GmbH,**
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(57)

ABSTRACT

A semiconductor laser includes a horizontal laser element including a first semiconductor layer arrangement having a first active zone for generating radiation. The horizontal laser element furthermore includes a first optical resonator extending in a direction parallel to a first main surface of the first semiconductor layer arrangement. Lateral boundaries of the first semiconductor layer arrangement run obliquely, such that electromagnetic radiation generated is reflectable in a direction of the first main surface of the first semiconductor layer arrangement. The semiconductor laser furthermore includes a vertical laser element having a second optical resonator extending in a direction perpendicular to the first main surface of the first semiconductor layer arrangement. The vertical laser element is arranged above the first semiconductor layer arrangement on the side of the first main surface in a beam path of electromagnetic radiation reflected at one of the lateral boundaries of the first semiconductor layer arrangement (112).

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