



(12) **United States Patent**
Van de Velde

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(54) **SCANNING LASER OPHTHALMOSCOPE
OPTIMIZED FOR SELECTIVE RETINAL
MICROPHOTOCOAGULATION**

(56) **References Cited**

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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.

(57) **ABSTRACT**

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A combination of a confocal scanning laser ophthalmoscope and external laser sources is used for microphotocoagulation purposes. An opto-mechanical linkage device and beam-splitter is used to align the pivot point of the Maxwellian view of the scanning laser ophthalmoscope with the pivot point of non-scanning external laser beams. The same pivot point is necessary to minimize wavefront aberrations and to enable precise focussing of a therapeutic laser beam on the retina. An AOM and/or two-dimensional AOD can be inserted in the pathway of the Gaussian therapeutic beam to control intensity and spatial pattern of small and short-duration pulses. The location of the external laser beam on the retina is determined with the help of two synchronized detectors and image processing. One detector is used to localize moving fiducial landmarks of the retina. A second detector is used to locate on the retina the external laser aiming beam. Two different confocal apertures are used. Polarizing the aiming beam is necessary to further reduce unwanted reflections from the anterior corneal surface.

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(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation of application No. 09/118,767, filed on Jul. 18, 1998, now Pat. No. 5,892,569, which is a continuation-in-part of application No. 09/075,239, filed on May 9, 1998, now Pat. No. 5,943,117, which is a continuation-in-part of application No. 08/755,448, filed on Nov. 22, 1996, now Pat. No. 5,923,399.

(51) **Int. Cl.⁷** **A61B 3/10**

(52) **U.S. Cl.** **351/221**

(58) **Field of Search** 351/200, 205,
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606/4, 5

6 Claims, 7 Drawing Sheets

