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**Avivi et al.**

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(54) **BI-DIRECTIONAL STIFFNESS FOR OPTICAL IMAGE STABILIZATION IN A DUAL-APERTURE DIGITAL CAMERA**

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

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(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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(65) **Prior Publication Data**

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**Related U.S. Application Data**

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(63) Continuation of application No. 15/310,887, filed as application No. PCT/IB2016/053026 on May 24, 2016, now Pat. No. 10,036,895.

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(60) Provisional application No. 62/167,571, filed on May 28, 2015.

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**G02B 7/08** (2006.01)

(57) **ABSTRACT**

Mechanisms for providing optical image stabilization in at least one direction as well as auto-focus in a digital camera comprise a plurality of springs mechanically coupled to at least a lens module carrying a lens of the digital camera, wherein the plurality of springs provides overall low stiffness to movement of the lens in two, first and second directions orthogonal to each other, and provides high stiffness to torsion of the lens module.

(52) **U.S. Cl.**  
CPC ..... **G02B 27/64** (2013.01); **G02B 7/04** (2013.01); **G02B 7/08** (2013.01); **G02B 7/09** (2013.01); **G02B 27/646** (2013.01); **H04N 5/2254** (2013.01); **H04N 5/2257** (2013.01); **H04N 5/2258** (2013.01)

**18 Claims, 6 Drawing Sheets**

