

(12) **United States Patent**
Bachar et al.

(10) **Patent No.:** **US 10,558,058 B2**
(45) **Date of Patent:** **Feb. 11, 2020**

(54) **DUAL VOICE COIL MOTOR STRUCTURE IN A DUAL-OPTICAL MODULE CAMERA**

(71) Applicant: **Corephotonics Ltd.**, Tel-Aviv (IL)
(72) Inventors: **Gil Bachar**, Tel-Aviv (IL); **Ephraim Goldenberg**, Ashdod (IL); **Gal Avivi**, Haifa (IL)
(73) Assignee: **Corephotonics Ltd.**, Tel Aviv (IL)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/368,297**
(22) Filed: **Mar. 28, 2019**

(65) **Prior Publication Data**
US 2019/0227338 A1 Jul. 25, 2019

Related U.S. Application Data
(63) Continuation of application No. 15/725,901, filed on Oct. 5, 2017, now Pat. No. 10,288,897, which is a (Continued)

(51) **Int. Cl.**
G02B 27/64 (2006.01)
G02B 7/06 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **G02B 27/646** (2013.01); **G02B 7/06** (2013.01); **G02B 7/08** (2013.01); **G02B 7/09** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G02B 27/646; G02B 13/001; G02B 7/06; G02B 7/08; G02B 13/003; G02B 7/09;
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,199,785 A 4/1980 McCullough et al.
5,005,083 A 4/1991 Grage et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 101276415 A 10/2008
CN 102739949 A 10/2012
(Continued)

OTHER PUBLICATIONS

Statistical Modeling and Performance Characterization of a Real-Time Dual Camera Surveillance System, Greienhagen et al., Publisher: IEEE, 2000, 8 pages.
(Continued)

Primary Examiner — Gevell V Selby
(74) *Attorney, Agent, or Firm* — Nathan & Associates; Menachem Nathan

(57) **ABSTRACT**

Dual-optical module autofocus (AF) or AF plus optical image stabilization (OIS) cameras with reduced footprint and reduced mutual magnetic interference. Some AF+OIS cameras may include a single AF actuation assembly that moves two lens barrels in unison. Some AF cameras or AF+OIS cameras may have two AF actuation sub-assemblies and associated magnets for independent AF operation of each lens barrel, the magnets shared in a manner that cancels magnetic influences of one AF actuation sub-assembly on the other AF actuation sub-assembly, thereby allowing the two lens barrels to be positioned in close proximity, saving parts and fabrication costs.

10 Claims, 12 Drawing Sheets

