



US009204962B2

(12) **United States Patent**
Silvestrini

(10) **Patent No.:** **US 9,204,962 B2**
(45) **Date of Patent:** **Dec. 8, 2015**

- (54) **IN SITU ADJUSTABLE OPTICAL MASK**
- (71) Applicant: **AcuFocus, Inc.**, Irvine, CA (US)
- (72) Inventor: **Thomas A. Silvestrini**, Alamo, CA (US)
- (73) Assignee: **AcuFocus, Inc.**, Irvine, CA (US)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 71 days.

2,714,721 A	8/1955	Stone, Jr.
3,034,403 A	5/1962	Neefe
3,074,407 A	1/1963	Moon et al.
3,270,099 A	8/1966	Camp
3,339,997 A	9/1967	Wesley
3,392,727 A	7/1968	Hanlon
D212,868 S	12/1968	Olson
3,458,870 A	8/1969	Stone, Jr.
3,507,566 A	4/1970	Knapp

(Continued)

FOREIGN PATENT DOCUMENTS

AR	241 330	12/1992
AR	241 830	12/1992

(Continued)

OTHER PUBLICATIONS

Accommodation and acuity under night-driving illumination levels. Arumi et al. Ophthal. Physiol. Opt. vol. 17, No. 4, pp. 291-299, 1997.

(Continued)

- (21) Appl. No.: **13/802,340**
- (22) Filed: **Mar. 13, 2013**
- (65) **Prior Publication Data**
US 2014/0277432 A1 Sep. 18, 2014
- (51) **Int. Cl.**
A61F 2/16 (2006.01)
A61F 2/14 (2006.01)
G02F 1/15 (2006.01)
G03C 1/73 (2006.01)
- (52) **U.S. Cl.**
CPC **A61F 2/1659** (2013.01); **A61F 2/14** (2013.01); **G02F 1/15** (2013.01); **G03C 1/733** (2013.01)
- (58) **Field of Classification Search**
USPC 623/6.17, 6.58; 351/159.61, 159.24
See application file for complete search history.

Primary Examiner — Thomas J Sweet
Assistant Examiner — Tiffany Shipmon
(74) *Attorney, Agent, or Firm* — Knobbe Martens Olson & Bear LLP

(57) **ABSTRACT**

Implantable corneal and intraocular implants such as a mask are provided. The mask can improve the vision of a patient, such as by being configured to increase the depth of focus of an eye of a patient. The mask can include an aperture configured to transmit along an optical axis substantially all visible incident light. The mask can further include a transition portion that surrounds at least a portion of the aperture. This portion can be configured to switch from one level of opacity to another level of opacity through the use of a controllably variable absorbance feature such as a switchable photochromic chromophore within a polymer matrix.

21 Claims, 12 Drawing Sheets

(56) **References Cited**
U.S. PATENT DOCUMENTS

564,518 A	7/1896	Heilborn
1,034,516 A	8/1912	Samberg
1,206,132 A	11/1916	Otte
1,959,915 A	5/1934	Guthrie
2,129,305 A	9/1938	Feinbloom
2,350,421 A	6/1944	Schoder et al.
2,470,927 A	5/1949	Hale, Jr.

