US005260727A

United States Patent [19]

Oksman et al.

[11] Patent Number: 5,260,727

[45] Date of Patent: Nov. 9, 1993

[54] WIDE DEPTH OF FOCUS INTRAOCULAR AND CONTACT LENSES

[76] Inventors: **Henry C. Oksman**, 20 Wagon Wheel Rd., Mamaroneck, N.Y. 10543; **Joseph Eisner**, 185 East 85th St., New York, N.Y. 10028

[21] Appl. No.: **601,853**

[22] Filed: **Oct. 22, 1990**

[51] **Int. Cl.**[5] **G02C 7/04**

[52] **U.S. Cl.** **351/162**; 351/161

[58] **Field of Search** ..... 351/160 R, 160 H, 161, 351/162, 177; 623/6

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,339,997	9/1967	Wesley	351/161
3,794,414	2/1974	Wesley	351/161
4,576,453	3/1986	Borowsky	351/162
4,637,697	1/1987	Freeman	351/161
4,666,640	5/1987	Neefe	351/162 X
4,778,462	10/1988	Grendahl	351/161 X
4,795,462	1/1989	Grendahl	351/161 X
4,798,608	1/1989	Grendahl	351/161 X
4,798,609	1/1989	Grendahl	351/161 X
4,840,477	6/1989	Neefe	351/162
4,955,904	9/1990	Atebara et al.	623/6

OTHER PUBLICATIONS

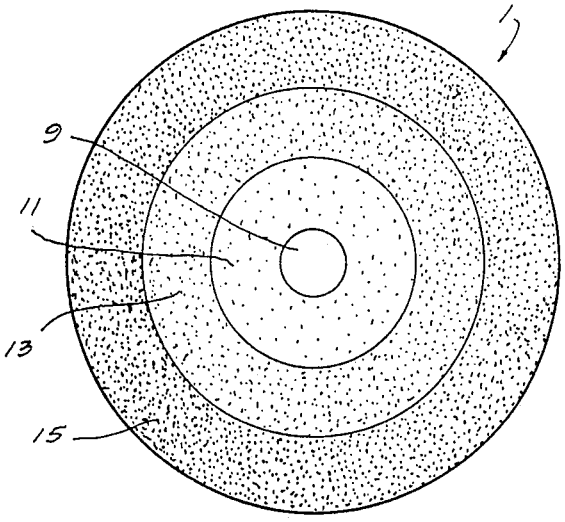
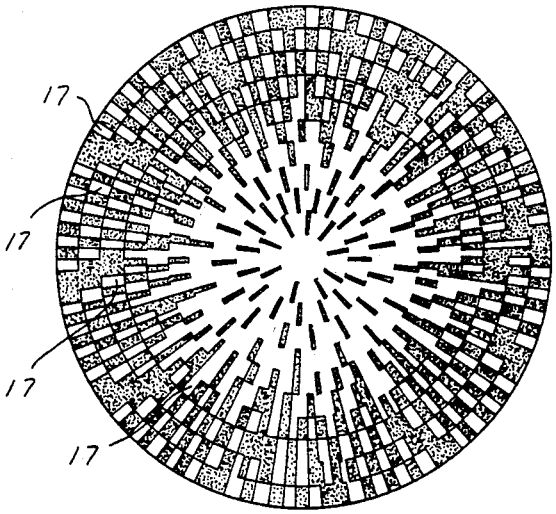
Shannon & Wtatt, Applied Optics and Optical Engineering, vol. VIII (1980).

Mino & Okano, Improvement in the OTF of a Defocused Optical System through the use of Shaded Apertures, Applied Optics, Oct. 1971, vol. 10, No. 10, pp. 2219-2225.

Primary Examiner—Scott J. Sugarman

Attorney, Agent, or Firm—Fiddler Levine & Mandelbaum

[57] **ABSTRACT**

A lens and method of fabrication thereof for increasing depth of focus where the lens power can be a constant but the amplitude and phase of the wave across the pupillary aperture are variables. The lens can be constructed by shading regions thereof in accordance with a mathematical function, e.g., a Gaussian distribution or Bessel function over a predetermined geometry, such as e.g., concentric, parallel or radial. The lens may be of single power or multiple power, e.g., of the bi-focal type.

19 Claims, 4 Drawing Sheets