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Bandhauer et al.

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(54) **OPHTHALMIC LENS WITH MULTIPLE PHASE PLATES**

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This patent is subject to a terminal disclaimer.

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351/159.35; 359/565; 359/571; 623/6.3; 623/6.31

(58) **Field of Classification Search**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,722,986 A 3/1973 Tagnon
4,340,283 A 7/1982 Cohen

(Continued)

FOREIGN PATENT DOCUMENTS

EP 37529 A1 10/1981
EP 335731 A2 10/1989

(Continued)

OTHER PUBLICATIONS

Albert D.M., "(Book Review) Intraocular Lenses: Evolution, Designs, Complications, and Pathology, by David Apple et al.," *Archives of Ophthalmology*, 1990, vol. 108, pp. 650.

(Continued)

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(57) **ABSTRACT**

An ophthalmic lens for providing a plurality of foci includes an optic having an anterior surface, a posterior surface, and an optical axis. The ophthalmic lens has a first region and a second region. The first region has a first refractive optical power and includes a first base curvature having a finite radius of curvature and a first phase plate having at least one diffraction order with a diffractive optical power. The first region is configured for forming a first focus and a second focus. The second region has a second refractive optical power and includes a second base curvature having a finite second radius of curvature that is different from the first radius of curvature and a second phase plate having at least one diffraction order with a diffractive optical power.

13 Claims, 9 Drawing Sheets

