

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



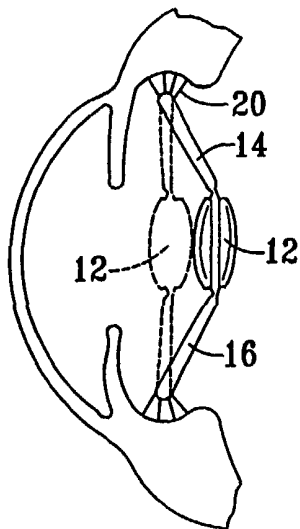
(43) International Publication Date
12 July 2001 (12.07.2001)

PCT

(10) International Publication Number
WO 01/49216 A1

- (51) International Patent Classification⁷: **A61F 2/16**
- (21) International Application Number: PCT/US00/34809
- (22) International Filing Date:
21 December 2000 (21.12.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
09/474,861 30 December 1999 (30.12.1999) US
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— With international search report.
— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: INTRAOCULAR LENS FOR POSTERIOR VAULTING



(57) Abstract: An intraocular lens (10) has an optic (12) of lesser dimension longitudinally of haptics (14, 16) attached thereto than in the transverse direction to provide increased posterior vaulting for accommodation.

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INTRAOCULAR LENS FOR POSTERIOR VAULTING

BACKGROUND OF THE INVENTION

The natural human lens effects accommodation, as between near and far vision, by ciliary muscle contraction and relaxation under brain control to dispose the lens in varying thicknesses at various locations along the axis of the eye.

The present invention provides improved, increased posterior vaulting of a lens optic by elongation of haptics disposed oppositely of the optic, while reducing the optic dimension in the longitudinal direction of the haptics.

Referring to Figure 2 of the drawings, wherein the natural capsular bag is omitted for clarity, it will be understood from the geometrical relations of the ciliary muscle, the haptics and the optic, that the more elongated the haptics, the greater the posterior vaulting of lens haptics for accommodation.

The present invention provides an intraocular accommodating lens wherein an asymmetrical optic is of substantially greater dimension transversely of the longitudinal direction of haptics extending therefrom, and is of lesser dimension in the longitudinal direction of the haptics. With each haptic elongated to extend between the capsular bag equator and the optic, increased posterior vaulting of the optic is provided.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an elevational view of a preferred form of accommodating lens according to the invention;

Figure 2 is a sectional view of the lens of Figure 1 disposed in an eye, showing the lens optic in a generally anterior position and in a posteriorly vaulted position;

Figure 3 is an elevational view of another preferred embodiment;

Figure 4 is an elevational view of another embodiment; and

Figure 5 is an elevational view of another embodiment wherein a generally annular glare - reducing component is disposed about an optic.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, particularly Figures 1 and 2, a preferred embodiment 10 of the accommodating lens of the invention is shown as comprising an optic 12 and haptics 14, 16 extending oppositely therefrom and having loops 18 extending transversely thereof for engagement in the equator or rim of a capsular bag of an eye.

As shown, the lens is shortened in the longitudinal direction of haptics 14, 16 extension and elongated in the transverse direction, and the haptics are elongated in the longitudinal direction. From the geometry of the features and components, including the ciliary muscle 20, the haptics and the optic, it will be understood that the elongated haptics provide increased posterior vaulting of the optic, as indicated in Figure 2.

The optic thus has a somewhat oval configuration, with flat straight portions 21, 22 hinged to the haptics.

The lens of the invention provides improved, enhanced accommodation by increased posterior vaulting of the optic, while maintaining a maximal optical zone for accurate vision.

The optic 12, while relatively wide and enlarged in the direction transverse to the longitudinal direction of the haptics, and relatively short in the longitudinal direction, nevertheless has a full optical zone to provide full optical effect transmitted to the retina of the eye.

Whereas artificial intraocular lenses typically have optical zones of less than 5.0 mm in diameter, particularly lenses with haptics staked into optics, the present invention provides optical zones of about 6.0 mm transversely and about 4.5 mm longitudinally.

Figures 3 and 4 show embodiments of the invention wherein generally circular optics have indented linear portions 28, to which haptics 24, 25 are hingedly connected.

Figure 4 shows a lens with indentations 28 at which are hingedly mounted haptics of generally rectilinear rod-like configuration, the haptics having plate elements 32 hingedly mounted to the optic.

Figure 4 also illustrates a loop haptic portion 34 extending transversely from an outer edge portion of a haptic 36 to aid in centering the lens within the capsular bag of the natural human lens.

Figure 5 shows an embodiment wherein haptics are hingedly mounted relative to an optic, and disposed about an optic 36 is a thin, annular transparent or translucent light—transmitting member 40 which reduces edge glare imposed on the retina.

It will be understood that various changes and modifications may be made from the preferred embodiment discussed above without departing from the scope of the present invention, which is established by the following claims and equivalents thereof.

CLAIMS:

1. An intraocular accommodating lens having haptics extending in a longitudinal direction between opposite portions of the equator of a capsular bag of an eye, said lens comprising:

an asymmetrical optic of substantially greater dimension transversely of said longitudinal direction and of lesser dimension in said longitudinal direction, and

haptics extending oppositely longitudinally from the optic to engage the equator of the capsular bag, said haptics having such lengths as to extend from respective capsular bag equator portions to attachment at opposite portions of the optic,

whereby increased posterior vaulting of the optic is provided by elongated haptics.

2. An intraocular accommodating lens according to Claim 1, wherein the optic comprises a full optical zone provided by the transverse extension of the optic.

3. A lens according to Claim 1, wherein said optic has a longitudinal dimension of about 4.5 mm and a transverse dimension of about 6.0 mm.

4. A lens according to Claim 1, wherein the optic has linear edge portions at longitudinally opposite sides thereof, and said haptics are hinged relative to said opposite linear portions.

5. A lens according to Claim 4, wherein said linear edge portions are indented from the periphery of the optic to enable elongation of the haptics.

6. A lens according to Claim 4, wherein the haptics are hingedly mounted to the optic by flexible portions thereof adjacent to the optic.

7. A lens according to Claim 4, wherein the haptics are hinged to the optic by grooved hinged portions of the haptics adjacent the optic.

8. A lens according to Claim 3, wherein said haptics have transversely extending peripheral loop portions for engagement in the capsular bag equator.
9. A lens according to Claim 1, wherein said optic is formed of one of (a) silicone, (b) acrylic, (c) hydrogel, (d) PMMA, (e) other optically clear material.
10. A lens according to Claim 1, wherein said loops are formed of one of (a) polyimide, (b) prolene, (c) polymethyl methacrylate.
11. An optic according to claim 1, and further including:
 - a light—transmitting skirt disposed about at least a portion of the periphery of the optics for reduction of glare impinging upon the retina of the eye.
12. An intraocular accommodating lens having haptics extending in a longitudinal direction between opposite portions of the equator of a capsular bag of an eye, said lens comprising:
 - an asymmetrical optic of substantially greater dimension transversely of said longitudinal direction than in said longitudinal direction,
 - said optic being sized to provide a full optical zone,
 - said optic having generally linear opposite edge portions extending transversely at opposite edges thereof, and
 - plate haptics joined to the optic at said linear edge portions, and extending oppositely longitudinally of the optic to engage opposite capsular bag equator portions,
 - whereby enhanced posterior vaulting of the optic is provided by elongated haptics.
13. A lens according to Claim 12, wherein said optic has a longitudinal dimension of about 4.5 mm and a transverse dimension of about 6.0 mm.
14. A lens according to claim 12, wherein said linear edge portions are indented from the periphery of the optic to enable elongation of the haptics.

15. A lens according to Claim 12, wherein the haptics are hingedly mounted to the optic by flexible portions thereof adjacent to the optic.
16. A lens according to Claim 12, wherein the haptics are hinged to the optic by grooved hinged portions of the haptics adjacent the optic.
17. A lens according to Claim 13, wherein said haptics have transversely extending peripheral loop portions for engagement in the capsular bag equator.
18. A lens according to Claim 12, wherein said optic is formed of one of (a) silicone, (b) acrylic, (c) hydrogel, (d) PMMA, (e) other optically clear material.
19. A lens according to Claim 17, wherein said loops are formed of one of (a) polyimide, (b) prolene, (c) polymethyl methacrylate.
20. An optic according to Claim 12, and further including:
 - a light-transmitting skirt disposed about at least a portion of the periphery of the optics for reduction of glare impinging upon the retina of the eye.

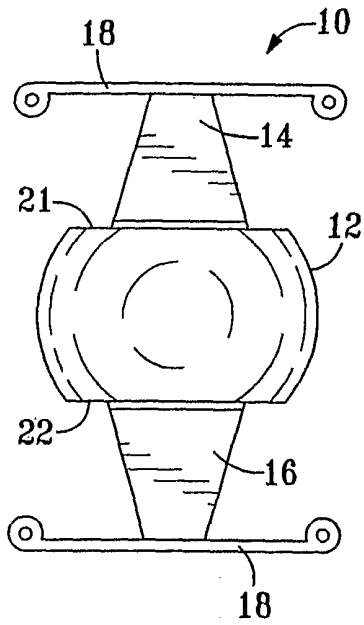


FIG. 1

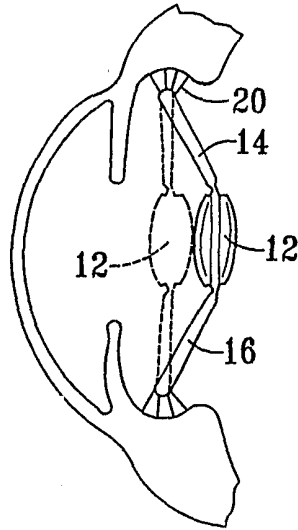


FIG. 2

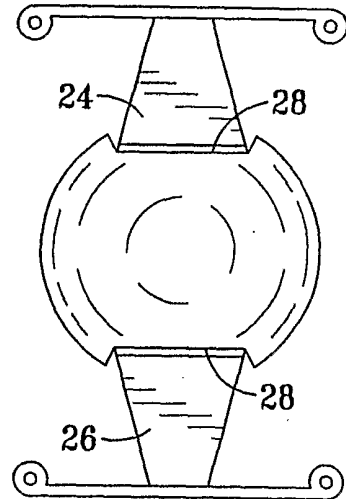


FIG. 3

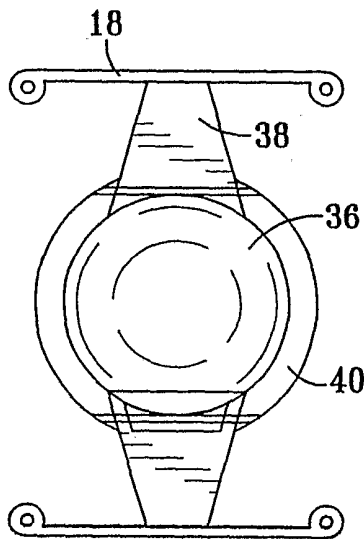


FIG. 5

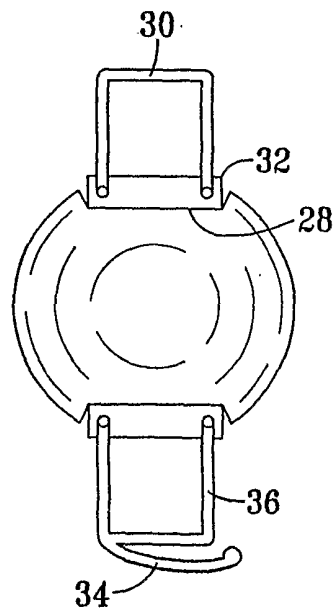


FIG. 4

INTERNATIONAL SEARCH REPORT

Intern application No.
PCT/US00/34809

A. CLASSIFICATION OF SUBJECT MATTER	
IPC(7) : A61F 2/16 US CL : 623/6.39, 6.44, 6.46	
According to International Patent Classification (IPC) or to both national classification and IPC	
B. FIELDS SEARCHED	
Minimum documentation searched (classification system followed by classification symbols) U.S. : 623/6.11, 6.17, 6.22, 6.37-6.39, 6.43, 6.44, 6.46, 6.49, 6.51-6.54	
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched	
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)	
C. DOCUMENTS CONSIDERED TO BE RELEVANT	
Category *	Citation of document, with indication, where appropriate, of the relevant passages
X --- Y	US 5,674,282 A (CUMMING et al.) 07 October 1997: column 4, lines 35-43; column 6, lines 39-44; column 14, lines 7-12; Figures 27, 28, and 30.
	Relevant to claim No. 1, 2, 4, 6, 7, 9, 10, 12, 15, 16, 18 ----- 3, 8, 11, 13, 17, 19, 20
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.	
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"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family
Date of the actual completion of the international search	Date of mailing of the international search report
08 February 2001 (08.02.2001)	MAY 2001
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