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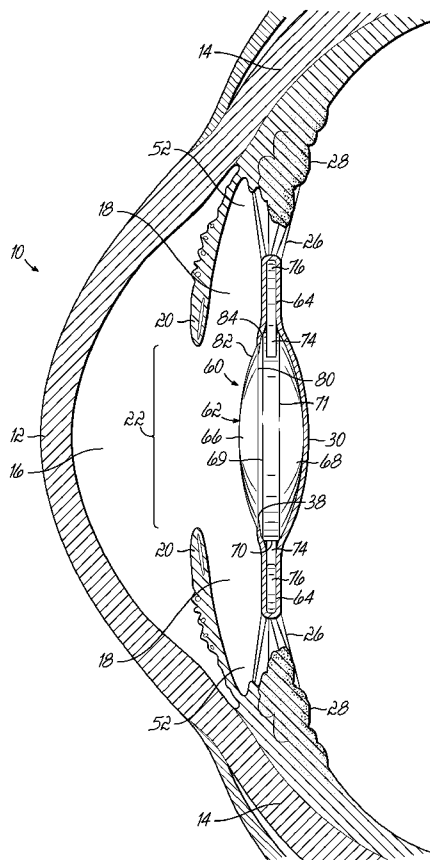


FIG. 8

(57) Abstract: An intraocular lens implant (60) includes a lens (62) having an anterior portion (66), a posterior portion (68), and a circumferential edge (70) located therebetween. An annular notch (80) is formed in the anterior portion (66) and oriented in an anteriorly-directed orientation.



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ANTI-DYSPHOTOPIC INTRAOCULAR LENS AND METHOD

FIELD OF THE INVENTION

[0001] This present invention relates generally to intraocular lens implants and, more particularly, to intraocular lens implants and surgical methods for reducing negative dysphotopsia.

BACKGROUND OF THE INVENTION

[0002] The human eye is the sensory organ for reacting to light. As shown in FIG. 1, the anatomical structure of an anterior segment of the eye 10 is shown and includes a transparent outer layer, the cornea 12, that is continuous with an opaque sclera 14 forming the lateral white portion of the eye 10. The cornea 12 encloses an anterior chamber 16 and posterior chamber 18, both filled with aqueous humor. The anterior and posterior chambers 16, 18 are separated by the iris 20, which is a circular, muscular structure that controls the diameter of the centrally-disposed pupil 22 and provides the color portion of the eye 10.

[0003] Light enters the eye 10 through the cornea 12, passes through the aqueous humor of the anterior chamber 16 and the pupil 22 to the lens 24. The lens 24 is a transparent, biconvex structure that focuses incoming light onto the retina (not shown). Suspensory ligaments, or zonules 26, suspend the lens 24 from ciliary bodies 28, which are muscular structures that contract to affect the convexity, i.e., shape, of the lens 24 and thereby adjust the focal distance of the eye 10. The lens 24 itself is comprised of an outer membrane, the capsular bag 30, surrounding a group of compressed cells, the nucleus 32, and a less dense compression of cells, the cortex 34.

[0004] Cataracts are a medical condition that is manifested as decreased transparency, or clouding, of the lens 24 within the eye 10. The clouding may occur to any portion of the lens 24, including the nucleus 32, the cortex 34 and/or the capsular bag 30. Cataracts generally develop bilaterally, i.e., affecting both eyes, and to varying degrees ranging from a slight clouding to complete opacity and greatly reduce the transmission of light through the lens 24 to the retina (not shown). If left untreated, cataracts may result in blindness.

[0005] One surgical procedure for the treatment of cataracts, illustrated in FIGS. 2-4, is an Extra-Capsular ("ECCE") surgery that includes capsulorrhexis, or a

partial removal of an anterior portion of the capsular bag 30. While not limiting, the capsulorrhexis may be created by cutting and may have a diameter of approximately 5 mm. The cortex 34 (FIG. 1) and the nucleus 32 (FIG. 1) portions of the lens 24 are removed through the opening, defined by a capsulorrhexis edge 38, while the remaining portion of the capsular bag 30 is retained. An intraocular lens ("IOL") 40 then replaces the cortex 34 (FIG. 1) and the nucleus 32 (FIG. 1).

[0006] The IOL 40, illustrated in greater detail in FIGS. 4A and 4B according to one embodiment, includes a transparent, biconvex structure 42 (though other lens structures may be used) constructed from a plastic, silicone, or acrylic material selected to replicate the refractive index and accommodation, or adjustable optical power, of the native lens 24 (FIG. 1). The biconvex structure 42 includes an anterior portion 44 and a posterior portion 46 that converge at a circumferential, lateral edge 48. While the circumferential edge 48 is specifically illustrated as a lateral wall, it would be understood that the length of the lateral wall may vary and may in fact be an edge of minimal thickness.

[0007] Two diametrically opposed haptic members 50 extend radially outwardly from the biconvex structure 42 and are generally oriented to be planar; however, angulated haptic members are also known and may be used if desired. The haptic members 50 are configured to engage the capsular bag 30 (FIG. 2) and to suspend the IOL 40 at a desired position. While the haptic members 50 are illustrated as radially extending projections, or arms, other embodiments and structures are known to those of ordinary skill in the art.

[0008] During cataract surgery, the placement of the IOL 40 may vary. For example, one conventional surgical method, shown in FIG. 2, positions the IOL 40 within the capsular bag 30 such that the haptic members 50 engage an inner surface of the wall of the capsular bag 30 and the IOL 40 is located generally centrally within the capsular bag 30. FIG. 3 illustrates an alternative position for the IOL 40, wherein the IOL 40 is positioned within the posterior chamber 18 with the haptic members 50 extending into the ciliary sulcus 52.

[0009] Positioning the IOL 40 anterior to the capsular bag 30 within the posterior chamber 18 has several potential disadvantages, including possible decentralization of the IOL and/or posterior iris chafing. Thus, placement of the IOL 40 within the capsular bag 30 may be preferred. However, capsular bag fixation may result in negative dysphotopsia ("ND"), which is a visual phenomenon that occurs

after an uncomplicated cataract surgery. Symptoms include a shadowing in the temporal field of vision.

[0010] The etiology of ND is unknown, but symptoms may be relieved with a second surgery, known as the piggyback method, which is illustrated in FIG. 4. As shown, the conventional piggyback method includes the first IOL, which was previously positioned within the capsular bag 30, and a second, later positioned IOL, which is placed anterior to the capsular bag 30 as shown in FIG. 4. This approach, while improving the symptoms of ND, may again lead to posterior iris chafing. Also, the alternative approach of placing both IOLs within the capsular bag may lead to interlenticular opacification ("ILO").

[0011] Thus, there exist a need for an IOL and surgical method that provides the benefits of a capsular bag fixation but does not result in ND.

SUMMARY OF THE INVENTION

[0012] The present invention overcomes the foregoing problems and other shortcomings, drawbacks, and challenges of conventional IOL designs and surgical methods associated with reducing the occurrence of ND. While the invention will be described in connection with certain embodiments, it will be understood that the invention is not limited to these embodiments. To the contrary, this invention includes all alternatives, modifications, and equivalents as may be included within the spirit and scope of the present invention.

[0013] In one embodiment of the present invention, an intraocular lens implant is provided including a lens having an anterior portion, a posterior portion, and a circumferential edge located between the anterior and posterior portions. An annular notch is formed in the anterior portion of the IOL and is oriented in an anteriorly-directed orientation.

[0014] According to another embodiment of the present invention, the IOL includes a lens having an anterior portion, a posterior portion, and a circumferential edge located between the anterior and posterior portions. At least two haptic members extend radially away from the lens and lie within a common plane. An annular notch is formed in the anterior portion of the IOL and is oriented in an anteriorly-directed orientation.

[0015] In yet another embodiment of the present invention, the IOL includes a posterior portion that is configured to reside within the capsular bag within an eye of

a patient. An anterior portion of the IOL includes a first portion that is configured to be anterior to the capsular bag and within the ciliary sulcus. A second portion of the anterior portion is configured to reside within the capsular bag. An annular notch is formed in the IOL, between the first and second portions of the anterior portion, and is configured to receive a capsulorrhexis edge of the capsular bag within the annular notch.

[0016] According to yet another embodiment of the present invention, an IOL is provided having a lens with an anterior portion, a posterior portion, and a circumferential edge between the anterior and posterior portions. An annular notch is formed in the anterior portion of the lens and is configured to capture a capsulorrhexis edge of the capsular bag within the annular notch.

[0017] According to another aspect of the present invention, a method of implanting an intraocular lens within an eye of a patient is provided. The method includes creating a capsulorrhexis within the capsular bag within an eye of a patient. The cortex and the nucleus of the lens are removed from the capsular bag. The intraocular lens is inserted into the capsular bag such that a posterior portion of the lens resides within the capsular bag, a first portion of an anterior portion is located anterior to the capsular bag and resides within the ciliary sulcus, a second portion of the anterior portion is located within the capsular bag, and an annular notch that is formed in the between the first and second portions of the anterior portion captures an edge of the capsulorrhexis within the annular notch.

[0018] The above and other objects and advantages of the present invention shall be made apparent from the accompanying drawings and the description thereof.

BRIEF DESCRIPTION OF THE FIGURES

[0019] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with a general description of the invention given above, and the detailed description of the embodiments given below, serve to explain the principles of the invention.

[0020] FIG. 1 is a cross-sectional view, in the sagittal plane, through an anterior segment of a healthy human eye.

[0021] FIG. 2 is a cross-sectional view, in the sagittal plane, through an anterior segment of a human eye having an IOL implanted within the capsular bag.

- [0022] FIG. 3 is a cross-sectional view, in the sagittal plane, through an anterior segment of a human eye having an IOL implanted within the posterior chamber.
- [0023] FIG. 4 is a cross-sectional view, in the sagittal plane, through an anterior segment of a human eye having a piggybacked IOL implant.
- [0024] FIG. 5A is a side-elevational view of one embodiment of a conventional IOL.
- [0025] FIG. 5B is a top view of the IOL of FIG. 5A.
- [0026] FIG. 6A is a side-elevational view of one embodiment of an IOL in accordance with the present invention.
- [0027] FIG. 6B is a top view of the IOL of FIG. 6A.
- [0028] FIG. 6C is an enlarged, side-elevational view of the encircled area 6A of the IOL in FIG. 6A.
- [0029] FIG. 6D is a cross-sectional view that is similar to FIG. 6C and showing an IOL according to an alternative embodiment of the present invention.
- [0030] FIG. 7A is a side-elevational view of another embodiment of an IOL in accordance with the present invention.
- [0031] FIG. 7B is a side-elevational view of yet another embodiment of an IOL in accordance with the present invention.
- [0032] FIG. 8 is a cross-sectional view, in the sagittal plane, through an anterior segment of a human eye having the IOL of FIG. 6 implanted within the capsular bag.

DETAILED DESCRIPTION

[0033] Turning now to the figures, and to FIGS. 6A and 6B in particular, one embodiment of an IOL 60 in accordance with the present invention is shown. While the IOL 60 of FIGS. 6A and 6B is shown as a biconvex lens 62 having at least two diametrically opposed haptic members 64, other lens designs may also be used, including, for example, a convex-concave IOL 60a (FIG. 7A), a convex-planar IOL 60b (FIG. 7B), or other designs as desired. The biconvex lens 62 comprises a transparent structure constructed from a polymeric, silicone, acrylic, or other suitable moldable material having a refractive index similar to the native lens 24 (FIG. 1). Anterior and posterior portions 66, 68 of the biconvex lens 62 converge at a lateral, circumferential edge 70 of the IOL 60. As shown, the circumferential edge 70 may

be a wall having a length of about 1 mm with an anterior edge 69 and a posterior edge 71. However, in some embodiments, the anterior and posterior portions 66, 68 may converge at a common edge (not shown). When the IOL 60 is biconvex and the anterior portion 66 and the posterior portion 68 converge at this common edge and are substantially similar in size and shape (a symmetric biconvex lens), the circumferential edge 70 may coincide with an equatorial plane; however, the biconvex lens may also be asymmetric, for example, where the anterior portion 66 has a convexity that is greater than a convexity of the posterior portion 68.

[0034] In some embodiments, the surface of either portion 66, 68 of the biconvex lens 62 may be constructed to have uniform optical properties across its diametric surface or it may be constructed as a multi-focal or accommodating lens having two or more zones of differing optical properties.

[0035] The two or more haptic members 64 may extend radially outwardly from the biconvex lens 62 and are generally positioned to lie within a common plane 72 (i.e., are planar) extending through the biconvex lens 62 as shown in FIG. 6A. Although not shown, the haptic members 64 may also be angulated relative to the common plane 72. In some embodiments, the common plane 72 is coincident with the circumferential edge 70 of the biconvex lens 62. That is, the common plane 72 may be substantially co-planar with a diameter of the IOL 60 and positioned between the anterior and posterior edges 69, 71. When the IOL 60 is a symmetric biconvex lens and the anterior and posterior portions 66, 68 are similar in size and shape, the biconvex lens 62 is symmetric about the equatorial plane and the common plane 72 may be positioned equidistant from the anterior and posterior edges 69, 71 (or at the converged edges of the anterior and posterior portions 66, 68) at the equatorial plane.

[0036] The haptic members 64 may be constructed from a pliable material, such as a polymer, extruded poly(methyl methacrylate) ("PMMA"), polypropylene, silicone, or acrylic. The pliable material allows the haptic members 64 to be folded for insertion through the capsulorrhexis edge 38 (FIG. 2) and deployment within the capsular bag 30 (FIG. 1). In some embodiments, the haptic members 64 may be constructed from the same material as the biconvex lens 62, and indeed the IOL 60 may be a unitary structure; however, this is not necessary. In still other embodiments, the haptic members 64 may alternatively be constructed from sturdy

treads or filaments that are attached to, or embedded within, the biconvex lens 62 and extend outwardly along the common plane 72.

[0037] In the specific illustrated embodiment, the haptic members 64 include an enlarged base 74, adjacent the biconvex lens 62, with radially extending projections or arms 76. The radially outward construction of the haptic members 64 is configured to accommodate anatomical size differences of different patients. That is, the inside walls of a capsular bag 30 having a diameter that is smaller than the larger dimension of the IOL (i.e., the diameter extending along the common plane 72 and across the haptic members 64) will cause the arms 76 to be deflected radially inwardly. Thus, a larger diameter capsular bag 30 would cause less radially inward deflection of the arms 76 than the smaller diameter capsular bag 30.

[0038] The biconvex lens 62 in accordance with one embodiment of the present invention includes an annular groove 80 that is positioned anterior to the common plane 72 defined by the haptic members 64. The annular groove 80 may be positioned anteriorly of the circumferential edge 70, for example about 0.2 mm to about 1 mm, or alternatively between about 0.25 mm and about 0.75 mm, of the anterior edge 69 of the circumferential edge 70.

[0039] Furthermore, and as more specifically shown in FIGS. 6C and 6D, the annular groove 80 includes a posterior wall 80a and an anterior wall 80b. In one embodiment, the posterior wall 80a of the annular groove 80 may lie, in cross-section, on a plane that is disposed at a first angle, θ , relative to a horizontal plane (represented by "P"), which may range from about 10° to about 25° . The anterior wall 80b of the annular groove 80 may lie, in cross-section, in a plane that is disposed at an angle, ϕ , relative to the horizontal plane, P, which may range from about 0° (e.g., substantially horizontal) to about 10° .

[0040] While the groove 80 may be specifically configured to the particular anatomical shape as appropriate in order to capture and secure the capsulorrhexis edge 38 (FIG. 2), the particular groove 80 illustrated in FIG. 6A extends inwardly into the lens 62 about 0.5 mm. Other dimensions are possible and may depend on the dimensions of the capsulorrhexis preferred by the surgeon. The annular groove 80 may be machined, such as by laser cutting, into the previously molded biconvex lens 62 or may be included during the molding process.

[0041] In use, and with reference now to FIG. 8, the surgeon creates the capsulorrhexis within the capsular bag 30 using a punch, a laser, or another

appropriate cutting device. While the shape and the diameter of the capsulorrhexis may vary, generally the capsulorrhexis is circular or semi-circular in shape and has a diameter of approximately 5 mm. The surgeon then removes the cortex 34 (FIG. 1) and the nucleus 32 (FIG. 1) of the native lens 24 (FIG. 1) through the capsulorrhexis. The native lens may include a cataract or may be crystalline; however, the method described herein generally refers to cataract surgeries. The IOL 60 is then inserted through the capsulorrhexis and into the capsular bag 30. Inserting may include deployment of the IOL 60 from a folded state contained within a delivery device, such as a cannula. Otherwise, during insertion, the IOL 60 may capture the capsulorrhexis edge 38. Alternatively, insertion of the IOL 38 may occur within the volume contained by the capsular bag 30, and the anterior portion 66 of the IOL 60 having the annular groove 80 therein may be partially retracted through the capsulorrhexis such that the capsulorrhexis edge 38 is captured and retained by the annular groove 80. The haptic members 64 extend radially within the capsular bag 30 and engage the inner surface of the capsular bag 30.

[0042] With the surgical process complete, the capsulorrhexis edge 38 is captured by the groove 80 such that a first portion 82 of the anterior portion 66 of the IOL 60 is external to the capsular bag 30 and within the posterior chamber 18 and a second portion 84 of the anterior portion 66 is within the capsular bag 30. The posterior portion 68 of the IOL and the haptic members 64 are also within the capsular bag 30. Thus, the patient having cataract surgery in accordance with an embodiment of this invention, would receive the benefits generally achievable by capsular bag placement of the IOL, i.e., reduced occurrence of iris chafing and/or decentralization associated placement of the entire IOL, or a large portion of the IOL, with a posterior chamber 18. Furthermore, the patient would receive the benefit of reduced of ND. While not wishing to be bound by theory, it is believed that the reduction in ND may be attributed to having an optic edge of the lens cover the capsulorrhexis edge.

[0043] While the present invention has been illustrated by a description of various embodiments, and while these embodiments have been described in some detail, they are not intended to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. The various features of the invention may be used alone or in any combination depending on the needs and preferences of the user. This has

been a description of the present invention, along with methods of practicing the present invention as currently known. However, the invention itself should only be defined by the appended claims.

[0044] What is claimed is:

1. An intraocular lens implant, comprising:
a lens having an anterior portion, a posterior portion, and a circumferential edge located therebetween; and
an annular notch formed in the anterior portion and oriented in an anteriorly-directed orientation.
2. The intraocular lens implant of claim 1, wherein the anterior and posterior portions are one of symmetric or asymmetric.
3. The intraocular lens implant of claim 1, further comprising:
at least two haptic members extending radially away from the lens.
4. The intraocular lens implant of claim 3, wherein the at least two haptic members radially extend from the circumferential edge and lie in a common plane.
5. The intraocular lens implant of claim 4, wherein the common plane resides along the circumferential edge.
6. The intraocular lens implant of claim 1, wherein the annular groove is positioned about 0.2 mm to about 1 mm anteriorly of the circumferential edge.
7. The intraocular lens implant of claim 1, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the posterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 10° to about 25°.
8. The intraocular lens implant of claim 1, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the anterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 0° to about 10°.
9. The intraocular lens implant of claim 1, wherein the lens is one of biconvex, convex-planar, or convex-concave.

10. An intraocular lens implant, comprising:
 - a lens having an anterior portion, a posterior portion, and a circumferential edge located therebetween;
 - at least two haptic members extending radially away from the lens and configured to lie within a common plane; and
 - an annular notch formed in the anterior portion and oriented in an anteriorly-directed orientation.
11. The intraocular lens implant of claim 10, wherein the anterior and posterior portions are one of symmetric or asymmetric.
12. The intraocular lens implant of claim 10, wherein the common plane lies along the circumferential edge.
13. The intraocular lens implant of claim 10, wherein the annular groove is positioned about 0.2 mm to about 1 mm anteriorly of the circumferential edge.
14. The intraocular lens implant of claim 10, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the posterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 10° to about 25°.
15. The intraocular lens implant of claim 10, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the anterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 0° to about 10°.
16. The intraocular lens implant of claim 10, wherein the lens is one of biconvex, convex-planar, or convex-concave.
17. An intraocular lens implant, comprising:
 - a posterior portion configured to reside within a capsular bag within an eye of a patient;

an anterior portion having a first portion configured to reside anterior to the capsular bag and within the ciliary sulcus and a second portion configured to reside within the capsular bag; and

an annular notch formed in the anterior portion between the first and second portions and configured to receive a capsulorrhexis edge of the capsular bag within the annular notch.

18. The intraocular lens implant of claim 17, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the posterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 10° to about 25°.

19. The intraocular lens implant of claim 17, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the anterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 0° to about 10°.

20. The intraocular lens implant of claim 17 further comprising:
a circumferential edge located between the anterior and posterior portions;
and
at least two haptic members extending radially away from one of the circumferential edge or the posterior portion and configured to reside within the capsular bag.

21. An intraocular lens implant, comprising:
a lens having an anterior portion, a posterior portion, and a circumferential edge located therebetween; and
an annular notch formed in the anterior portion and configured to capture a capsulorrhexis edge of the capsular bag within the annular notch.

22. The intraocular lens implant of claim 21, wherein the annular groove is positioned about 0.2 mm to about 1 mm anteriorly of the circumferential edge.

23. The intraocular lens implant of claim 21, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the posterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 10° to about 25°.

24. The intraocular lens implant of claim 21, wherein the annular groove includes an anterior wall and a posterior wall, and further wherein the anterior wall of the annular groove lies, in cross-section, on a plane that is disposed at an angle relative to a horizontal plane from about 0° to about 10°.

25. The intraocular lens implant of claim 21, further comprising:
at least two haptic members extending radially away from one of the circumferential edge or the posterior portion and configured to reside within the capsular bag.

26. A method of implanting an intraocular lens within an eye of a patient having a capsular bag and a lens having a cortex and a nucleus within the capsular bag, the method comprising:

creating a capsulorrhexis in the capsular bag of the eye of the patient;
removing the cortex and the nucleus of the lens from the capsular bag; and
inserting the intraocular lens into the capsular bag such that a posterior portion of the lens resides within the capsular bag, a first portion of an anterior portion of the lens is located anterior to the capsular bag and resides within the ciliary sulcus, a second portion of the anterior portion of the lens is located within the capsular bag, and an annular notch that is formed between the first and second portions of the anterior portion receives a capsulorrhexis edge of the capsular bag within the annular notch.

27. The method of claim 26, further comprising:
inserting the lens within a volume contained by the capsular bag; and
orienting the anterior portion of the lens anteriorly of the capsular bag and into the ciliary sulcus.

28. The method of claim 26, further comprising:
inserting the lens such that the anterior portion of the intraocular lens is anterior to the capsular bag.
29. The method of claim 26 further comprising:
inserting at least two haptic members extending radially from the intraocular lens within the volume contained by the capsular bag.

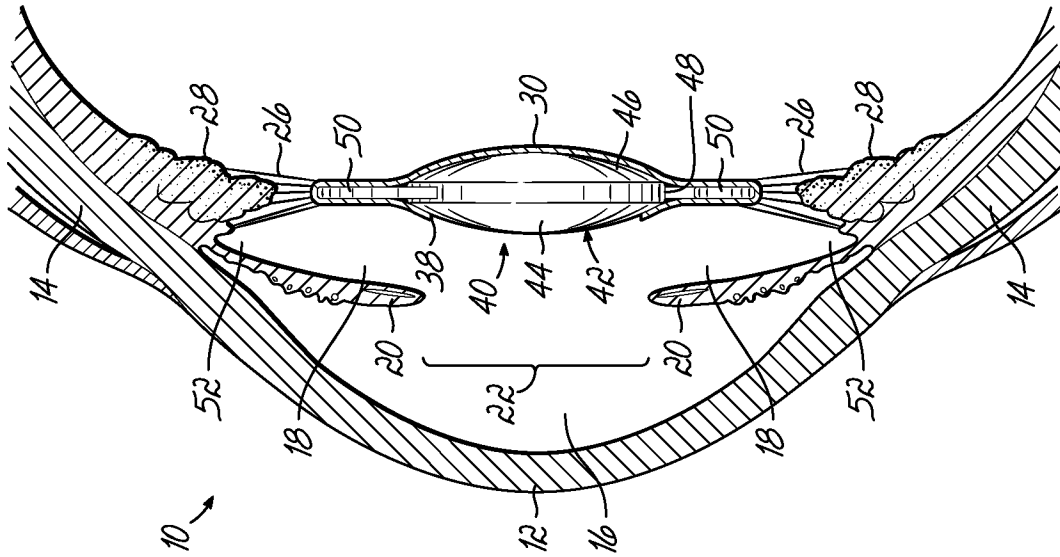


FIG. 1
PRIOR ART

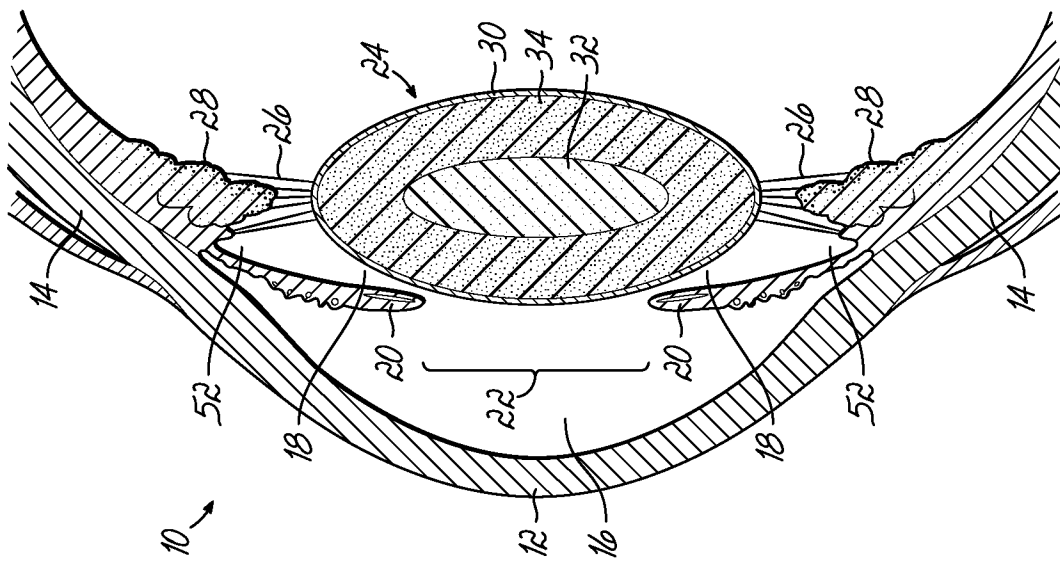


FIG. 2
PRIOR ART

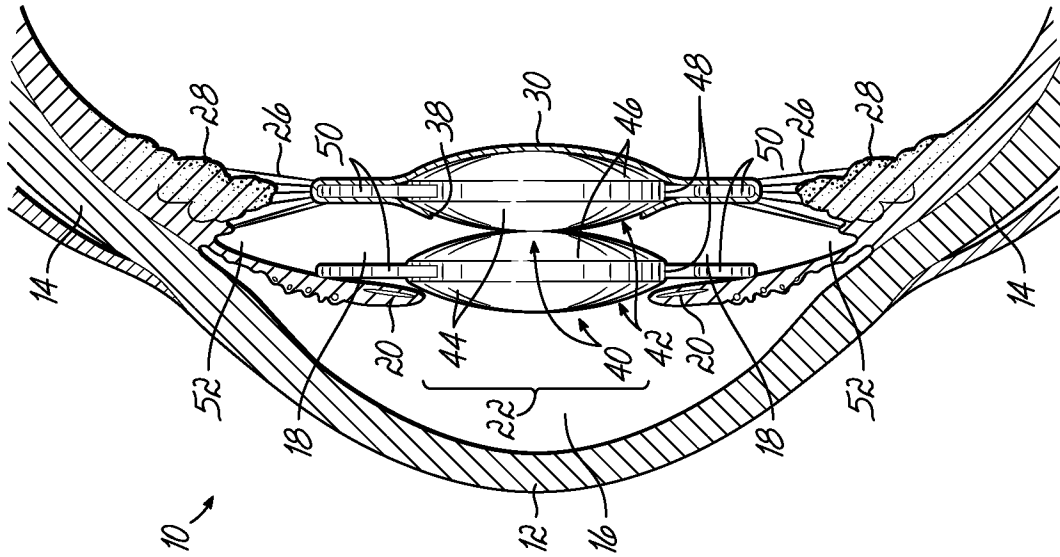


FIG. 3
PRIOR ART

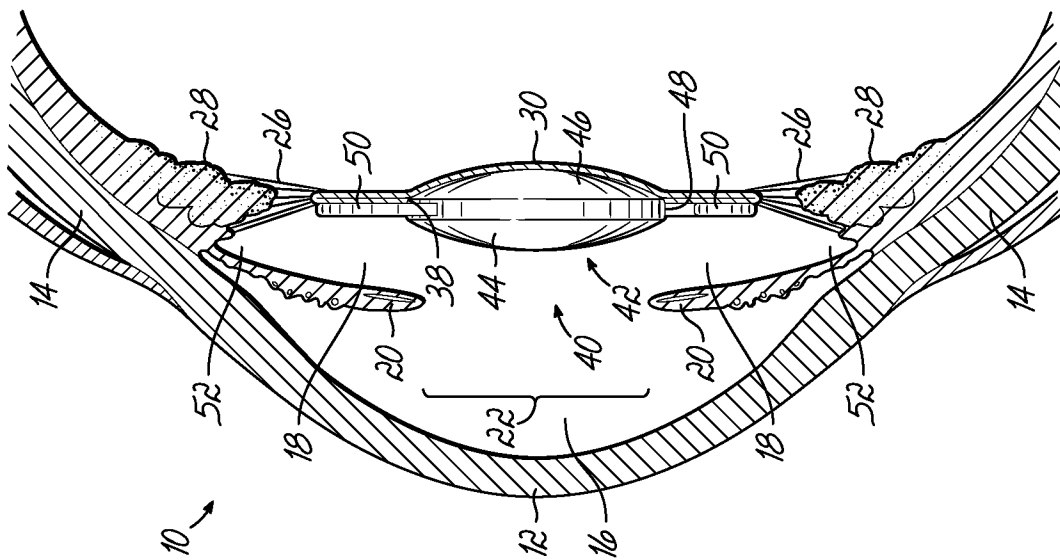


FIG. 4
PRIOR ART

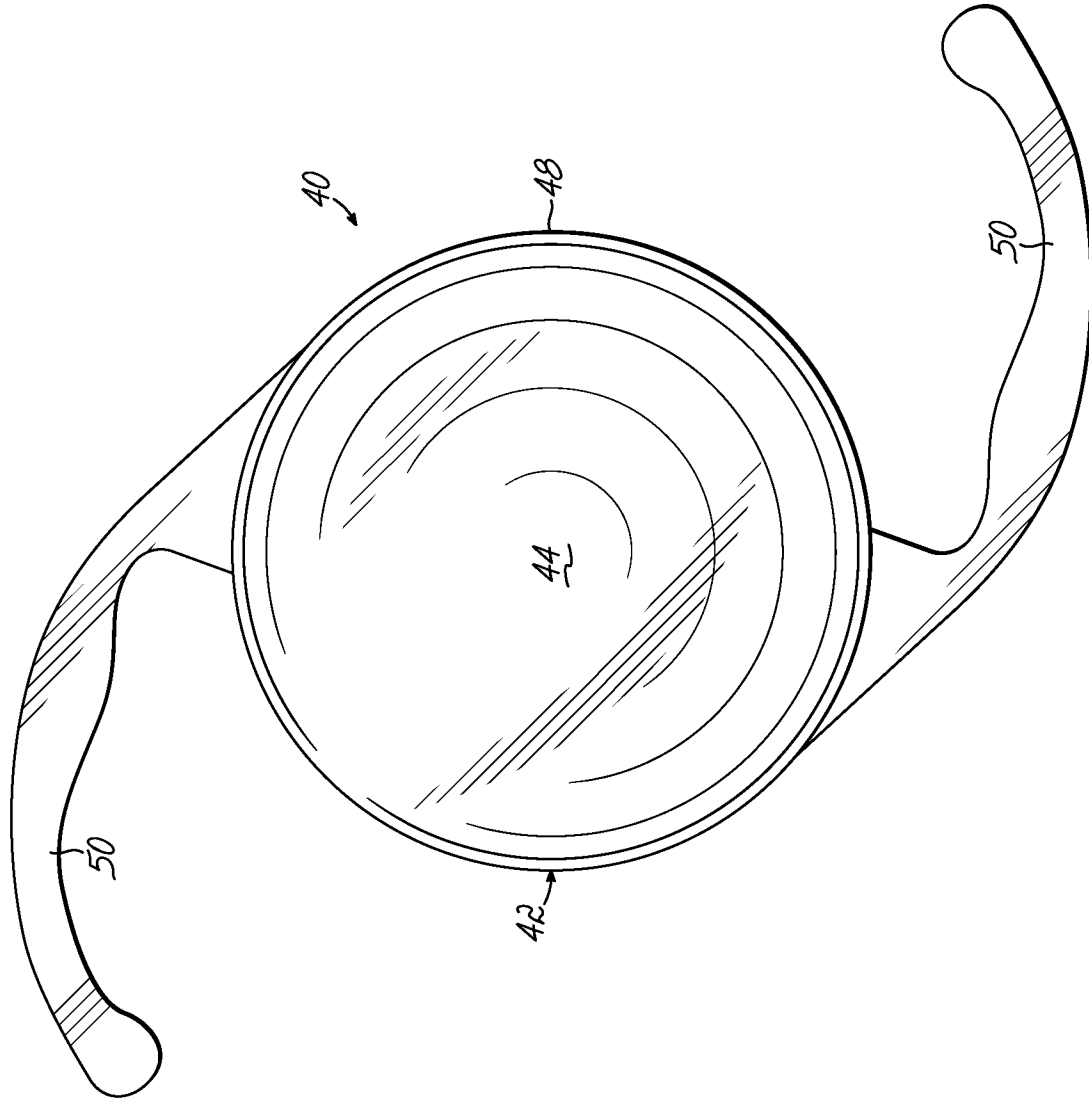


FIG. 5A
PRIOR ART

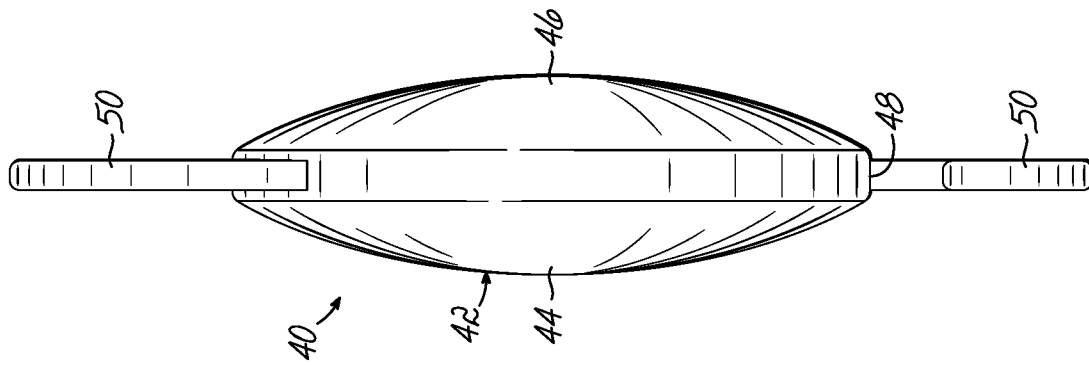


FIG. 5B
PRIOR ART

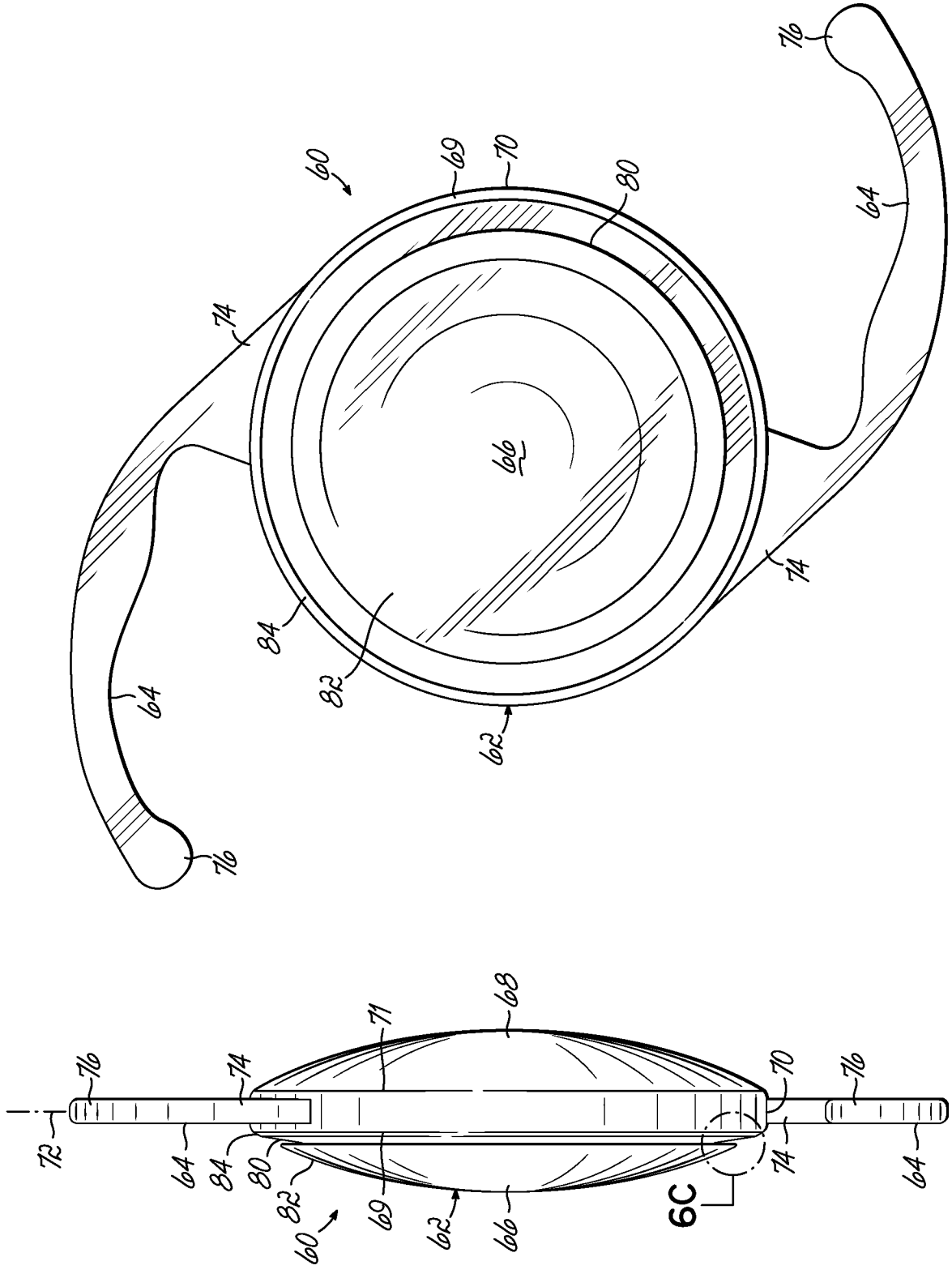


FIG. 6B

FIG. 6A

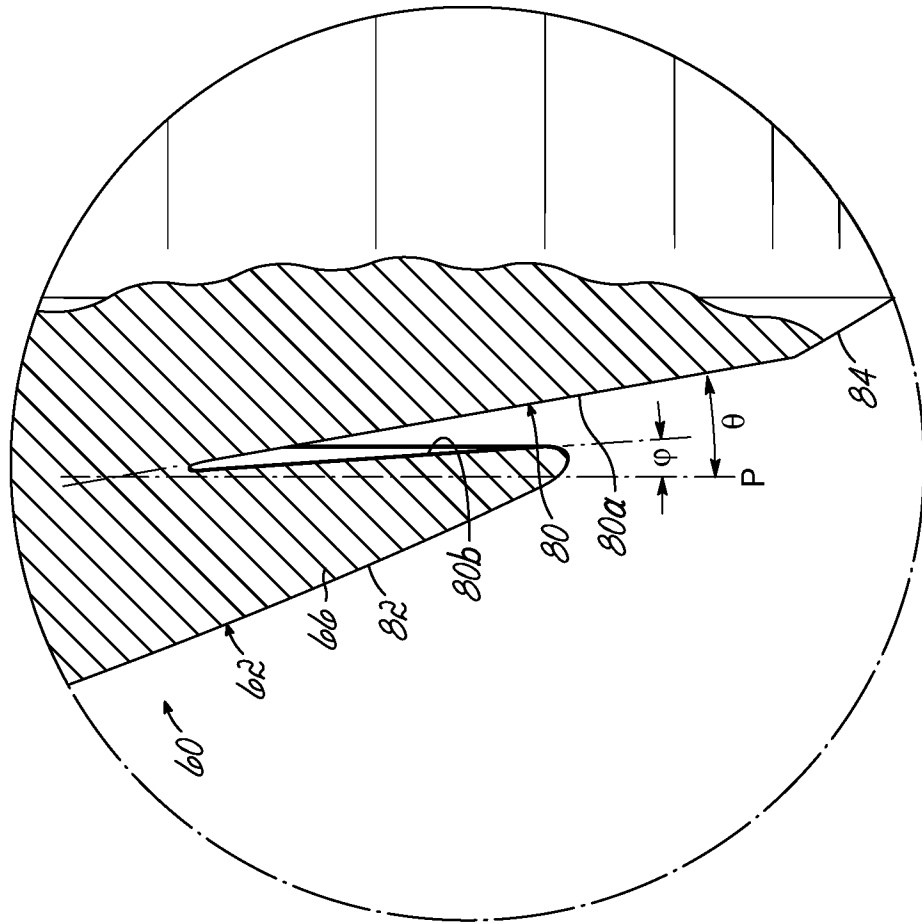


FIG. 6D

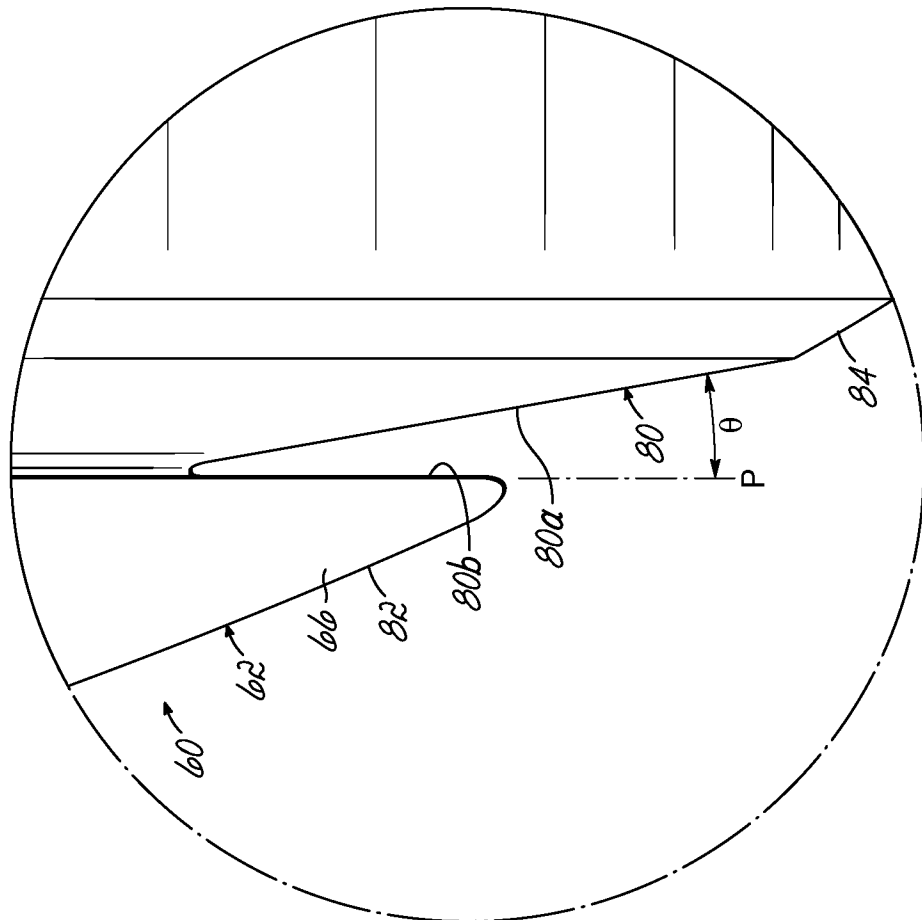


FIG. 6C

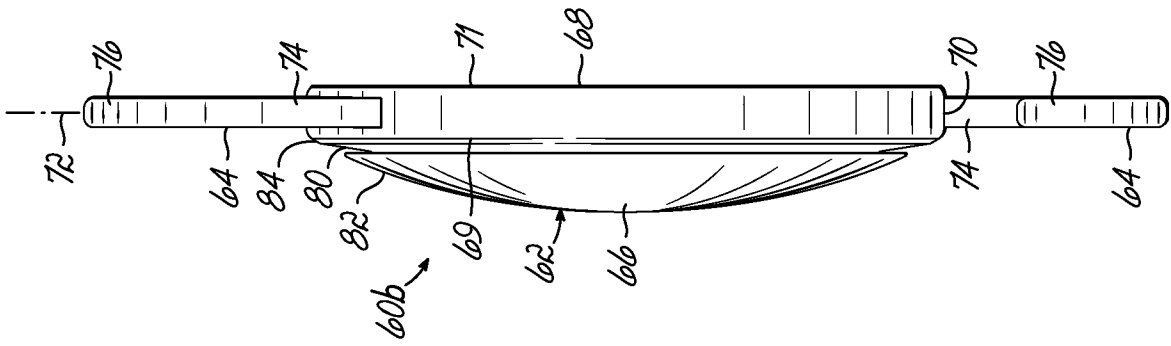


FIG. 7A

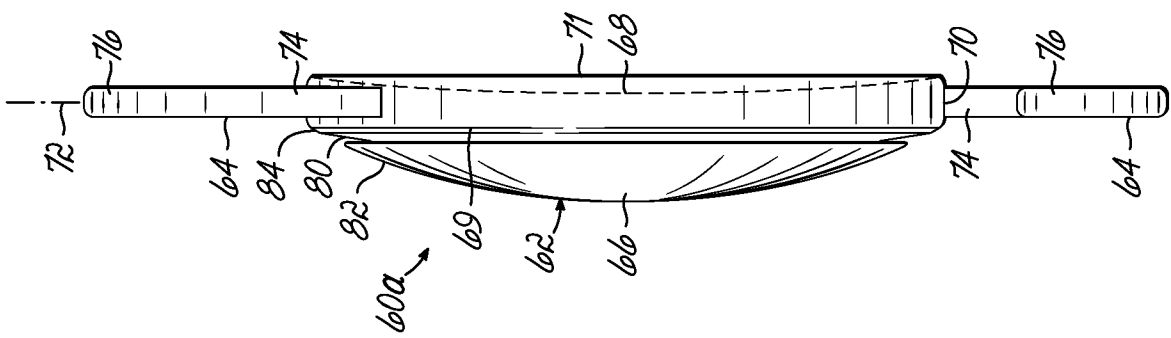


FIG. 7B

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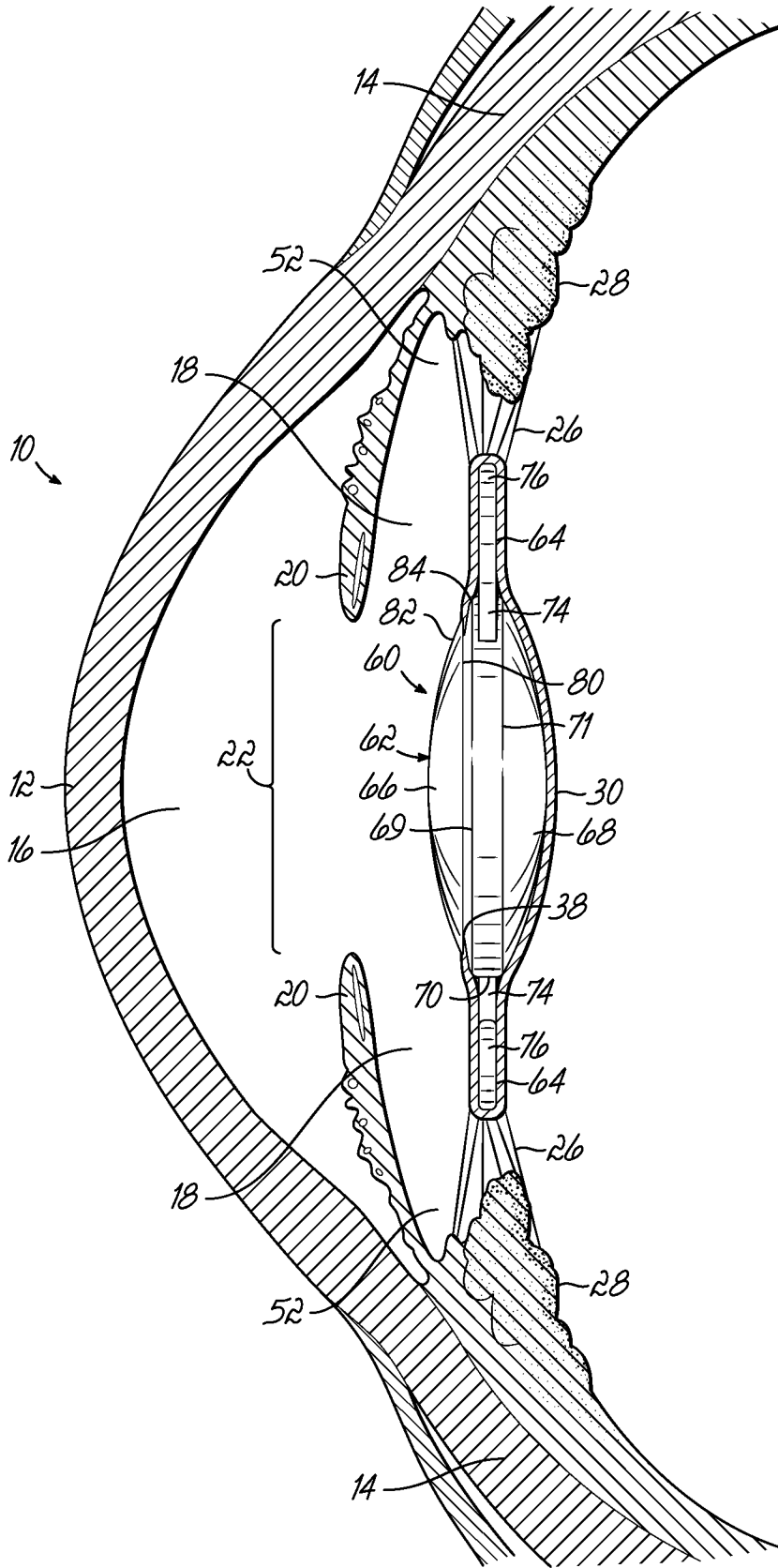


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV. A61F2/16
ADD.

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)

A61F

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 171 320 A (NISHI OKIHIRO [JP]) 15 December 1992 (1992-12-15)	1-6, 8-13, 15-17, 19-22, 24,25
Y	column 4, line 62 - column 5, line 49 column 6, line 64 - column 7, line 8 column 7, line 20 - line 31 column 8, line 1 - line 18 column 10, line 12 - line 41; figures 1a,1b,6a,6b,7b,8b,9b16a,16b -----	7,14,18, 23
Y	WO 03/077803 A1 (HANITA LENSES LTD [IL]; ASSIA EHUD [IL]) 25 September 2003 (2003-09-25) page 2, line 20 - page 3, line 14; figures 2D,2E3B -----	7,14,18, 23



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"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)

"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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"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.

"&" document member of the same patent family

Date of the actual completion of the international search

29 June 2011

Date of mailing of the international search report

06/07/2011

Name and mailing address of the ISA/

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Authorized officer

Legu, A

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/032054

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: **26-29**
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 26-29

Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery: Claims 26-29 describe a method of implanting an intraocular lens within an eye of a patient having a capsular bag and a lens having a cortex and a nucleus within the capsular bag, the method comprising steps (i.e. "creating a capsulorrhesis in the capsular bag of the eye of the patient") which clearly refer to a method of treatment of the human or animal body by surgery on which the International Searching Authority is not required to carry out a search.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/032054

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5171320	A	15-12-1992 JP 2540879 Y2	09-07-1997
		JP H0483316 U	20-07-1992

WO 03077803	A1	25-09-2003 AU 2003219480 A1	29-09-2003
