INTRAOCULAR LENSES

This invention relates to intraocular lenses for the human eye and more particularly to an intraocular lens that readily yields to normal distortions of the eye.

The replacement of a natural lens with an artificial intraocular lens implant in the human eye is a well known procedure within the medical profession. Techniques for accomplishing such replacement, as described and referred to in my copending application Ser. No. 791,693, filed Apr. 28, 1977 now U.S. Pat. No. 4,092,743, usually require a corneo-scleral incision through which the natural lens is removed and the artificial lens inserted. The inserted lens can be affixed in position in either the anterior or posterior chamber of the eye in accordance with techniques referred to in my copending patent application.

Intraocular lenses of known design and construction generally include a medial light focusing lens body provided with a support structure that is affixed to natural regions of the eye to align and stabilize the lens body with respect to the pupil. The support structure, depending upon its construction and location in the eye, can be affixed in position by sutures or by engagement with predetermined regions of the eye.

Once the intraocular lens is positioned in the eye it is desirable that the installation be of a permanent nature so that subsequent adjustments will not be necessary. Ideally any further need for vision correction, following an intraocular lens implant, should be accomplished with eyeglasses or any other known non-surgical procedures.

It is well known that activities such as walking, swimming, and jogging, rubbing or touching of the eyelids, and unexpected common physical jolts such as might be due to falls, or impacts upon various parts of the body, can cause the eyeball to distort. Distortion of an eyeball having an intraocular lens implant often produces intermittent stress on the lens support structure and the regions of the eye to which the support structure is affixed. These intermittent stresses can generally cause eye irritation, possible damage to the iris root or ciliary body, or other manifestation of trauma. While such eyeball distortion can be controlled to a certain extent by limiting one's physical activities, such distortion cannot be altogether eliminated.

Intraocular lenses such as shown in the publication entitled "Proceedings of the Royal Society of Medicine, Volume 58, September 1965" at page 731, have been known to allow a relatively stable affixation of an artificial lens in the eye. Such stability is attributable to a support structure having four lobes in paired arrangement, one pair engaging an upper portion of the eye and another pair engaging a lower portion of the eye to provide four point fixation within the anterior chamber of the eye. However since the full extent of the support structure is linked to the lens body it cannot deflect freely of the lens body, and there is a likelihood that stresses on the support structure due to eyeball distortion will irritate the regions of the eye that engage the support structure.

It is thus desirable to provide an intraocular lens having a support structure that readily yields to normal distortions of the eye to minimize any eye trauma attributable to distortion related stresses within the eye.

Among the several objects of the present invention may be noted the provision of an intraocular lens having position fixation means that are freely deflectable with respect to the lens body, an intraocular lens having position fixation means that include two pairs of contact lobes with at least one pair being capable of yielding independently of the other pair in response to normal distortions of the eye, and an intraocular lens that minimizes eye irritation resulting from distortion related stresses within the eye.

Other objects and features will be in part apparent and in part pointed out hereinafter.

The present invention resides in an intraocular lens capable of yielding to normal distortions to the eye to minimize eye irritation and other distortion related eye trauma.

In accordance with the invention, an intraocular insert comprises a medial light focusing lens body with two generally oppositely disposed position fixation elements that are formed integral with the lens body. At least one of the position fixation elements includes a stem portion extending from the periphery of the lens body and a limb portion joined to and extending from the stem portion. The limb portion includes a concave outer seating edge with a pair of contact lobes and an inner edge free from connection with the lens body. The other position fixation element also includes a concave outer seating edge with contact lobes formed at the end portions of the seating edge. The concavity of the seating edges ensure limited edge contact with the eye at the area of the contact lobes.

In several embodiments of the invention the stem and limb portions of the position fixation elements are symmetrically arranged. In other embodiments of the invention the stem and limb portions are of similar configuration but are arranged asymmetrically with respect to each other. In a further embodiment of the invention the second position fixation element has no separately definable stem and limb portions. In still other embodiments the stem portion joins with the limb portion at one end or intermediate the opposite ends of the limb portion.

In each of the foregoing embodiments at least one of the contact lobes on one of the seating edges deflects independently of the contact lobes on the other seating edge in directions toward and away from the lens body in response to normal distortions of the eye.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawing in which various possible embodiments of the invention are illustrated,

FIG. 1 is a simplified schematic sectional view of an eyeball implanted with an intraocular insert incorporating one embodiment of the present invention; and,

FIGS. 2–7 illustrate other embodiments of the invention.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawing.

Referring to the drawing, reference number 10 generally indicates an eyeball as shown in simplified schematic cross-section in FIG. 1. Portions of the eyeball structure which are not believed essential to an understanding of the invention have been omitted for the sake of clarity.

The eyeball 10 includes a cornea 12, a diaphragm or iris 14 having a central opening or pupil 16, a membrane 18 confining a vitreous humor 20 and a retina 22. The natural lens, which normally occupies the area between