

## FLEXIBLE INTRAOCULAR LENS

### BACKGROUND OF THE INVENTION

The present application is a continuation-in-part application of application Ser. No. 70,034, filed Aug. 27, 1979, now U.S. Pat. No. 4,257,130.

The present invention relates to a novel intraocular lens mechanism for placement within the eye which is particularly useful for insertion of the same within the posterior chamber of the eye.

Intraocular lens implantation has evolved into the preferred method of remedying the correction of vision, particularly after cataract removal. In this regard, reference is made to U.S. Pat. Nos. 4,134,160 and 4,134,161 to Bayers which describe intraocular lenses having an adjustability factor which aids in the proper fitting of the lenses. A recent development embodied in U.S. Pat. No. 4,159,546 issued to Shearing, describes an intraocular lens having a pair of springy legs which fit into the ciliary sulcus in the posterior chamber of the eye. The Shearing lens, based on the original Choyce lens, requires extra capsular cataract surgery before insertion. It may be seen that the Shearing lens is quite difficult to insert directly into the ciliary sulcus since the surgeon is not able to see the springy arms during insertion. Moreover, earlier lenses such as the lens described in U.S. Pat. No. 3,906,551 issued to Otter, are susceptible to dislocation during inflammation of an eye. Such a condition causes a synache or undesirable adhesion of a portion of the lens generally to the iris surrounding the pupil. Dilatation of the eye is often chemically induced by the surgeon for the purposes of postoperative treatment of the eye. Although posterior chamber fixation of an intraocular lens has many disadvantages, it has been favored since endothelial touch is greatly reduced or eliminated.

An intraocular lens is needed which will obtain visible fixation yet be optically positioned in the posterior chamber without endangering the endothelium and without being susceptible to synache dislocation.

Anterior chamber angle fixation lenses alleviate insertion difficulties and can be used with intra capsular surgery. The angle supported anterior chamber lenses do not depend upon the iris for support and can not dislocate posteriorly into the vitreous cavity. Prior rigid anterior chamber lenses have been accompanied by higher incidences of uveitis, iritis and glaucoma and are sometimes accompanied by a presisting eye tenderness for months to years. The exact dimension of rigid anterior chamber lenses is critical since lenses of too short a diameter dislocate or "propellar" in the anterior chamber. These lenses need to be sized precisely, generally requiring the presence of 3 sterile lenses at the time of surgery.

A flexible anterior chamber lens is needed which will obtain visible fixation and fit all normally sized eyes. The lens should be easily insertable and have looped configurations preventing anterior displacement, causing damage to the corneal endothelium. Full dilation should be possible without dependence upon the iris for fixation.

### SUMMARY OF THE INVENTION

In accordance with the present invention a novel intraocular lens mechanism is provided which solves the problems heretofore described.

The lens of the present application employs a lens portion of optical zone which may be placed in the posterior chamber of the eye immediately following cataract removal. The lens portion is designed to be placed adjacent the iris and includes a pair of appendages, each one of which is fastened to the lens portion. Each appendage includes a first portion which passes through the pupil of the eye and a second portion connected to the first portion which extends along the other side of the iris for contact with the peripheral area of the anterior chamber, namely the angle found between the cornea and iris. Each of the appendages may be formed into a closed loop where the first portion takes the form of a pair of posts which extend through the pupil from the lens portion. The remainder of the loop is fastened to the ends of the posts and extends angularly therefrom to the angle of the eye. The loops may be formed such that one of the same may include an end portion having two areas intended for contact with the periphery of the eye. In this manner, the lens of the present application would obtain three point or four point fixation.

To prevent endothelial touch the loops may be formed as elongated members having an oval cross-sectional configuration. In this manner, any force directed at the end portions of the loops would cause the appendage to spread laterally, generally normal to the optical axis of the lens and pupil rather than vertically inwardly or outwardly in relation to the plane of the iris.

In another embodiment the lens of the present invention may include a lens portion having at least one appendage fastened thereto. The appendage has a loop terminating in an outer end and a first portion fastened to the lens portion. A second portion of the appendage connects to the first portion of the appendage and extends therefrom along a side of the iris. The outer end of the second portion of the appendage contacts the extreme periphery of the eye. Again, means for restricting flexure would be included which may externalize in a flattened or oval cross-sectional configuration of the appendage. Such a lens may be placed in the anterior chamber immediately following cataract surgery or at a later surgery. The embodiment could be also placed in the posterior chamber if an extra capsular surgery were performed. The flexibility of the at least one loop would allow for variation in ocular size. A loop or loops could be formed such that one of the same may include an end portion having two areas intended for contact with the periphery of the eye. In this matter, the lens of the present application would obtain 3 point or 4 point fixation.

In the foregoing summary it may be seen that a novel and useful intraocular lens mechanism has been described.

It is therefore an object of the present invention to provide an intraocular lens mechanism which may have a lens portion positioned in the posterior chamber of the eye without the necessity of extra capsular cataract surgery.

It is another object of the present invention to provide an intraocular lens mechanism which derives fixation from the anterior chamber of the eye which permits the observation of the actual fixation by the surgeon.

It is yet another object of the present invention to provide an intraocular lens mechanism which permits the dilation of the iris postoperatively without endangering the fixation of the intraocular lens.