

ing a circular shape, such as the Shearing lense, may have some tendency to go off center during insertion, as their maximum diameter clears the incision internally.

To implant the device of the present invention, an air bubble (or other substance to form the anterior chamber) is usually placed in the anterior chamber and the device slid into the chamber behind the bubble through a cornealscleral incision. The device is then moved inferiorly so that the lower loop compresses in the inferior (lower) ciliary sulcus. Inferior movement can then be continued with the lower loop compressed until the upper loop clears the pupillary margin. If necessary to clear the margin, the upper loop can also be compressed using a second instrument, or the upper iris can be retracted. When the implant is released, the device springs into place and will be held without suturing, (though a suture can be used through the upper loop). An angulated bore is preferably provided in the lens for permitting ready manipulation of the lens within the eye with a fine spatula or other instrument. The device of the present invention can be implanted with relative ease by either a right or a left-handed surgeon.

Other objects and purposes of the invention will become clear from the following detailed description of the drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a front view of the device of the present invention.

FIG. 2 shows a side view of the device of the present invention.

FIG. 3 shows a schematic view of the device of the present invention being inserted into the anterior chamber through an appropriate incision, after an extracapsular cataract extraction.

FIG. 4 shows a further schematic view of the present invention with the lower haptic loop being compressed in the inferior ciliary sulcus by a spatula or similar instrument engaging the upper angulated bore.

FIG. 5 shows a schematic view of the present invention with the implant moved inferiorly behind the pupillary margin.

FIG. 6 shows a schematic view of the present invention with the implant sprung into the desired position behind the iris with the loops in the ciliary sulcus and the discission being carried out behind the lens.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Reference is now made to FIG. 1 and to FIG. 2 which show respectively front and side views of the present invention. The device of the present invention is comprised of an ovoid shaped lens 20 of suitable material, upper haptic loop 22 attached to lens 20 and lower haptic loop 24 also attached to lens 20. The two haptic loops may be inserted into drill holes or molded with the optic and are fixed in place at the periphery of lens 20 opposite each other. The edge of the lens between the two loops includes straight lines portions 26 and 28 which, as noted above, aid in guiding the lens into position through a small incision. The lower haptic loop 24 acts like a spring during insertion of the device as explained in detail below. Angulated bores 30 and 32 are provided in the front surface of lens 20 for fixating the device to a fine spatula or other similar instrument to properly insert and position the lens, avoiding trauma to the corneal endothelium. An angle of 15° to 20° to the vertical is believed satisfactory.

The lower loop 24 has a greater stiffness than upper loop 22 to ensure the lens centers after insertion. This differential stiffness can, for example, be provided by making the upper loop of 5-0 polypropylene or nylon and the lower loop of 4-0 polypropylene or nylon or other bio-acceptable material. Since displacement after implantation when it occurs is usually vertical, acceptable optical function is also enhanced by making the lens ovoid with a vertical dimension greater than its horizontal dimension, thus occupying the pupillary aperture with the lens optic.

Upper loop 22 is preferably closed by being fixed at both ends, unlike the Shearing device, to have the greater strength which results from two points of fixation. In addition, closed upper loop 22 can be sutured in place, if the surgeon desires.

To aid in discission, the rear optic surface of the lens 20 which contacts the capsule which is the rear surface of the natural lens of the eye is convex rather than plano. The front surface of the optic is essentially plano and this plano-convex configuration is believed to have superior optical characteristics.

Lens 20 is preferably formed of a suitable plastic such as polymethylmethacrylate or glass and may be made either by injection or compression molding or lathe cutting or any other techniques (or a combination) using conventional techniques for making lenses for intra-ocular implantation.

FIGS. 3 through 6 show schematically the surgical procedure for inserting the present device. Referring to the FIG. 3, the device of the present invention is slipped through the incision into the anterior chamber by a suitable forceps under an air bubble which has been previously provided. Referring to FIG. 4, the implant is then fixated at the upper angulated bore hole 30 with a fine spatula or other similar instrument and maneuvered inferiorly until the lower loop 24 compresses against the inferior ciliary sulcus in the posterior chamber. The lower bore hole permits insertion upside down from the illustrated and preferred technique if desired by the surgeon. As shown in FIG. 4, lower loop 24 is compressed until the upper loop 22 clears the pupillary margin. If necessary, the upper loop can also be compressed by a second instrument to clear the pupillary margin and/or the iris can be retracted. The implant can then be released as shown in FIG. 5 to spring behind the iris due to the resiliency inherent in the lower loop 24, the forces applied by the spatula and the ballooning effect of the air bubble. The spatula can then be withdrawn. After the implant has sprung into the desired position behind the iris and in the ciliary sulcus, the pupil can be constricted by suitable means and a peripheral iridectomy (removal of part of the iris) may be performed. If desired, the upper loop can be sutured to provide a fixed anchor. At this point as shown in FIG. 6 a discission may be performed to obviate late opacification of the posterior capsule. The wound can now be sutured and the procedure terminated.

Many changes in modification in the above described embodiment of the invention can, of course, be carried out without departing from the scope thereof. Accordingly, that scope is intended to be limited only by the scope of the appended claims.

What is claimed is:

1. An intra-ocular device for implantation in the posterior chamber of an eye comprising: