INTRAOCULAR LENS SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention pertains to an intraocular lens system for implantation after surgery, and more particularly, pertains to an intraocular lens including a hard lens implant, a soft lens over the hard lens and secured thereto, and electromechanical circuitry secured therebetween for adjusting the soft lens over the hard lens.

2. Description of the Prior Art

The currently accepted practice of implantation of intraocular lenses is to replace a normal crystalline human lens of the eye removed at the time of surgery, such as in cataract surgery, with implantation of an intraocular lens such as an anterior chamber lens or posterior chamber lens of PMMA (polymethylmethacrylate). A particular disadvantage of implanting of intraocular lenses is that even with the best medical techniques and sophisticated optical instruments available, the power of the lens implant is not totally accurate for an individual still requiring corrective lenses such as contacts or glasses. Ophthalmologists have never been able to correctly predict for the accommodation of vision from distance to near vision.

The present invention provides for an intraocular lens system including a hard IOL for either the anterior chamber or the posterior chamber, a soft lens disposed thereover, and an electromechanical circuitry disposed therebetween for adjustment of the soft lens with respect to the hard lens through electromechanical circuitry.

SUMMARY OF THE INVENTION

The general purpose of the present invention is to provide an intraocular lens system with a first optical polymethylmethacrylate (PMMA) based in normal hard intraocular lens implant; a second investing coat of a softer but stable plastic, such as hydroxyethylmethacrylate or silicon, which secures the outer perimetry circumference of the first normal hard lens and covers the anterior surface or posterior surface of the hard lens; and an electromechanical circuitry including a storage cell, a microprocessor, a pump, a reservoir for the pump where the intraocular lens system can be fine tuned, in that once the lens is implanted, the electromechanical system can vary the distance between the soft lens and the hard lens allowing for accommodation from distance to near vision.

According to one embodiment of the present invention, there is provided an intraocular lens system including a first optical PMMA based hard normal intraocular lens implant, a second investing coat of stable soft plastic such as silicon secured to and surrounding either the anterior surface or the posterior surface or both of the first lens, and an electromechanical circuitry including a storage cell such as a battery, a microprocessor, a microfluid pump, and a reservoir for fluid for and circuitry for activating the microprocessor to pump fluid from the reservoir about the circumference of the hard-soft lens through a hole between the reservoir and the area of the hard and soft lens for varying the distance between the soft lens and the hard lens, changing the focal point of the lens system, thereby accommodating from distance to near vision. The circuitry for activating the system can be through an external source such as to an implantable switch under the skin or through the more commonly known hand-held radio frequency external device.

One significant aspect and feature of the present invention is an intraocular lens system which allows for varying the focal point of the lens to allow for accommodation from distance to near vision.

Another significant aspect and feature of the present invention is an intraocular lens system which is entirely implantable and can be either turned from an external source acting on an internal implantable component such as a switch or can more commonly be energized and tuned through the commonly available radio frequency system such as that utilized in pacemakers and the like.

A further significant aspect and feature of the present invention is an intraocular lens system which is entirely implantable into the eye, and is self-accommodating to external pressures and movement of the eye. The intraocular lens system can even include micro-solar power cells connected to a direct current storage cell within the intraocular lens providing for continuous power as required.

Having thus described embodiments of the present invention, it is a principal object hereof to provide an implantable intraocular lens system.

An object of the present invention is to provide an intraocular lens system including a first hard lens, a second soft lens disposed over the hard lens, and electromechanical circuitry to vary the distance between the second lens and the first lens to change the focal point of the lens device for accommodating from the distance to near vision.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects of the present invention and many of the attendant advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIG. **1** illustrates a plan view of an intraocular lens system, the present invention:

FIG. **2** illustrates a sectional view taken along line **2—2** of FIG. **1**;

FIG. **3** illustrates a sectional view taken along line **3—3** of FIG. **1**;

FIG. **4** illustrates an alternative embodiment;

FIG. **5** illustrates a partial cross-sectional view taken along the line **5—5** of FIG. **6**, showing a diaphragm pump according to the invention having ball-check valves at the inlet and outlet ports;

FIG. **6** illustrates a top view of the diaphragm pump shown in FIG. **5**;

FIG. **7** illustrates a partial cross-sectional view taken along line **7—7** of FIG. **8**, showing a diaphragm pump according to the invention having diaphragm valves at the inlet and a ball-check valve at the outlet port;

FIG. **8** illustrates a top view of the diaphragm pump shown in FIG. **7**;

FIG. **9** illustrates a partial cross-sectional view taken along lines **9—9** of FIG. **10**, showing a diaphragm pump according to the invention having diaphragm valves at the inlet and outlet ports;

FIG. **10** illustrates a top view of the diaphragm pump of FIG. **9**;