INTRAOCULAR LENScl BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an intraocular lens and specifically an intraocular lens which may be implanted in the anterior or posterior chamber or in the lens capsule of the eye after removal of the cataract from the natural lens of an eye as a result of a cataract condition or after removal of the natural lens.

2. Description of the Prior Art

Cataract surgery in general involves the removal of the lens or lens nucleous from the eye of a patient. After removal of the clouded material, a commom procedure is to implant within the eye an artificial lens known as an intraocular lens. The intraocular lens may be supported in either the anterior or posterior chamber of the eye or in the lens capsule. In general, the intraocular lenses currently used have the lens supported by wires or flexible loops which extend from the lens outwardly to contact circumferential groove anterior or posterior portions of the eye adjacent the iris or to contact the inside diameter of the lens capsule.

The current types of intraocular lenses are generally characterized by a central lens or lenticular portion and two or more radially resilient wires or loops which extend outwardly of the lens. These wires or loops theoretically engage the circumferential eye structure gently but elastically so as to centrally locate the lens portion. The disadvantage with these wires or loops is that they continuously exert pressure on the centrifical eye structures which pressure can produce discomfort and potential damage to the eye. The pressure is enhanced since typically the contact is at a limited number of contact points in the circumferential groove portions. Some of the earlier intraocular lenses have contact at only a single point and this has caused particular difficulty. Later designs for intraocular lenses have attempted to increase the number of points at which the lens is supported in the anterior or posterior cylindrical eye portions or in the lens capsule. One difficulty is that the anterior and posterior cylindrical eye portions do not present a pure cylindrical curvature so that no matter what design is proposed for the loops or wires, there can be individual points of great pressure.

Many prior art structures have attempted to overcome the above difficulty by providing for a large variety in loop structures having either closed or open ends and having greater or lesser degrees of flexibility. If the loops are too flexible, the lens may not be maintained properly in a centered position. If the loops are too rigid, then the above problem of creating too much force at a small number of points can occur.

One attempt to overcome the above problems may be seen with reference to Hoffer Pat. No. Re. 31,626. This patent includes a detailed background description discussing in general the genesis of intraocular lenses and describing various types of self centering lenses using flexible loops. In the Hoffer patent, an attempt is made to overcome the problems of the prior art by using a plurality of pliant lens centering filaments extending outwardly to center the lens within the eye structure. It can be seen that although the Hoffer patent does increase the number of contact points by using a large plurality of filaments, still, any one or more individual filaments may exert significantly more pressure at a particular point or points. This is because the filaments operate independently and are preformed to a particular size and shape so that the filaments as a group may not readily adapt to an irregular surface within the eye. Additionally, the Hoffer patent is specifically designed as a posterior chamber lens and may not be useful as an anterior chamber lens.

SUMMARY OF THE INVENTION

The present invention provides for an intraocular lens using a compression spring to support the intraocular lens. Specifically, the compression spring is formed as a helical member which can exactly follow the curvature of the anterior or posterior chambers of the eye. The spring therefore appears as a coil formed of very fine suture material to follow any irregular shape or surface that the spring comes in contact with.

Because the spring is formed of very fine material, the load or weight of the intraocular lens is widely distributed over a large number of points in either the anterior or posterior circumferential portions or inside the lens capsule. Moreover, the load will be evenly distributed since the coil will adjust to any irregular surfaces so that in addition to having the load distributed over a large number of points, it is also evenly distributed within these different points. The structure of the present invention produces the best combination of flexibility and pressure distribution so that the lens will be maintained in the center position and will be maintained in that position with the same even distribution of pressure even if the lens is displaced after insertion. For example, if any rotation of the lens occurs, the same even distribution of the pressure over a large number of points will occur.

As indicated above, the coil may be formed from a plastic suture material. This plastic material may be a polypropylene material. The coil structure of the present invention may be used with any type of intraocular lens currently in use. For example, the coil mounting may be used with a normal lens or a foldable lens which foldable lens enhances the insertability of the lens. Even with a normal lens, the coil spring can adapt its position and the lens will be easy to insert since the surgeon does not have to be concered about distorting the configuration of the coil spring. This is in distinction to the currently used lenses with loops wherein the surgeon must be concerned with not distorting the loop past its elastic limit. It will be appreciated that if a loop is distorted then the lens will then not be properly centered. The present invention overcomes this problem since the coils are very flexible and easily adapt to the necessary shape for insertion and then return to the desired shape to support the lens in the proper position in the eye.

DETAILED DESCRIPTION OF THE DRAWINGS

A clearer understanding of the present invention will be had with reference to the following description and drawings wherein;

FIG. 1A illustrates the coil spring loop of the present invention shown in a free and expanded state;

FIG. 1B illustrates the coil spring adapting to a spherical surface;

FIG. 1C illustrates the coil spring adapting to a flat surface;

FIG. 2 illustrates a first embodiment of the invention showing a first method of attaching the coil spring loops to an intraocular lens;