

INTRAOCULAR INSERT FOR IMPLANTATION IN THE HUMAN EYE

RELATED APPLICATION

The present application is a continuation-in-part of our prior application Ser. No. 08/013,387, filed Feb. 4, 1993.

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to an intraocular insert for implantation in the interior of the human eye to replace the human crystalline lens.

Macular degeneration is a disorder in which the central retinal area (the macula) degenerates, e.g., because of age (age-related macular degeneration, or AMD), diabetic retinopathy, ocular vascular accidents, retinal dystrophies as for example cone dystrophy, central nervous system (CNS) diseases, etc. These disorders in the macular area cause difficulty in vision such that the afflicted person is unable to read without special telescopic or microscopic eyeglasses that create a magnification of the object on the retina. However, when an outside telescope is used, the visual field is very narrowly restricted, and therefore the afflicted person has to move his or her head back and forth to follow the lines being read.

OBJECT AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a novel intraocular insert for implantation in the interior of the human eye particularly for use by persons suffering from macular degeneration diseases.

According to the present invention, there is provided an intraocular insert for implantation in the interior of a human eye, characterized in that the insert includes a positive-power or converging lens carried by the insert to face the anterior side of the eye; and a negative-power or diverging lens carried by the insert in alignment with and spaced behind the converging lens to face the posterior side of the eye.

An intraocular insert constructed in accordance with both the positive lens and negative lens mounted in the interior of the eye increases the visual field that the patient enjoys. Moreover, it obviates the need of using an outside telescope, and therefore the need for the patient to move the head back and forth when scanning lines being read. A further advantage in the above intraocular device to be implanted in the eye, to replace the human crystalline lens, is that it enables the patient also to use outside magnification (e.g., spectacles or contact lenses) in combination with the intraocular insert to achieve higher magnification than possible by using just magnifying spectacles or contact lenses alone.

Further features and advantages of the invention will be apparent from the description below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a horizontal section of an intraocular insert according to a first embodiment of the invention.

FIG. 2 is a horizontal section of an intraocular insert according to a second embodiment of the invention.

FIG. 3 is a horizontal section of an intraocular insert according to a third embodiment of the invention.

FIG. 4 is a horizontal section of an intraocular insert according to a fourth embodiment of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

With reference first to FIG. 1, there is illustrated a horizontal section of a human eye, including one form of intraocular insert, generally designated 10, constructed in accordance with the present invention. The means for fixing the insert 10 in the eye are not described herein, as many such means are known for mounting artificial intraocular lenses and can be used for fixing the intraocular insert 10.

The intraocular insert 10 includes a body member 11, of generally convexo-convex or convexo-plano configuration; that is, its front or anterior face 12 facing the anterior side of the human eye is of convex configuration, and similarly its rear or posterior face 13 facing the posterior side of the human eye is of convex (or planar) configuration.

The body member 11 is formed with a central cylindrical bore 14 extending through its anterior face 12 and its posterior face 13.

A positive lens 15 is fixed within bore 14 at the anterior side of body member 11, and a negative-power or negative lens 16 is fixed within the bore at the posterior side of the body member. The negative lens 16 is thus aligned with the positive lens 15 but is spaced rearwardly of the positive lens by the cavity defined by bore 14. The two lenses 15 and 16 thus define a Galilean telescopic system commonly used in opera glasses.

Such a telescopic system, when incorporated in an intraocular insert implanted into the human eye in place of the natural crystalline lens, increases the visual field that the patient enjoys, thereby enabling the patient to read fine print without the use of an outside telescope. Thus, the normal eye movements in the reading process are preserved, and the patient does not need to move his or her head from one side of the line to the other in order to read, as generally required when using external telescopic spectacles.

The two lenses 15 and 16 may be made of the same material as presently used for making intraocular lenses, such as transparent plastic (e.g., methyl methacrylate), glass, sapphire or the like. The body member 11 may be of the same transparent rigid material. The cavity 14 between the two lenses 15 and 16 may be filled with a fluid, such as air, a gas, or a suitable liquid such as water.

FIG. 2 illustrates an intraocular insert, generally designated 20, similar to insert 10 of FIG. 1, and also including a body member 21 formed with a central cylindrical cavity 24 covered at its front side by a positive lens 25 facing the anterior side of the eye, and at its rear side by a negative lens 26 facing the posterior side of the eye. In FIG. 2, however, the positive lens 25 is integrally formed with the body member 21, whereas the negative lens 26 is formed as a separate element and is fixed, as by an adhesive or a weld, in the rear part of the cylindrical cavity 24 of the body member.

It will be seen that in the constructions of both FIGS. 1 and 2, the outer periphery of the anterior face of the positive lens (15, 25) is substantially flush with the anterior face of the body member 11; and similarly, the outer periphery of the posterior face of the negative lens (16, 26) is substantially flush with the posterior face of the body member 11, 21.

FIG. 3 illustrates an intraocular insert, generally designated 30, also including a body member 31 formed with a central cylindrical bore 34 closed at the anterior end by a positive lens 35 and at the posterior end by a