

having the optical characteristics of FIGS. 6A and 6B. Similar results can be achieved by using masks of varied density. The vision corrective effect would correspond to that produced by the posterior surface undulations in the lens of FIG. 4.

FIGS. 8A, 8B and 8C show, respectively, a corneal inlay lens, a corneal onlay lens, and an intraocular lens, each incorporating the concepts of the present invention. In the corneal inlay lens 80 of FIG. 8A, and in the corneal onlay lens 82 of FIG. 8B, the illustrated progressive zonal variations are accomplished with the variable refractive index of lens material 84, as described in conjunction with FIG. 7.

In the intraocular lens 86 of FIG. 8C, the posterior surface 88 is shown as an undulating surface having progressive zonal variations comparable to those in FIG. 4.

Any of the three lens implants of FIGS. 8A, 8B or 8C could use either the surface variations or the refractive index variations, and also could use either the anterior or posterior surface as the multifocal surface.

The implanted lenses of FIGS. 8A, 8B and 8C are subject to the same problems as are the contact lenses, e.g., pupil size variations and decentration problems. The pupil size problems are essentially the same. The decentration problems are less pronounced with implanted lenses, but are nevertheless significant because operational procedures do not insure centration, and, in the case of intraocular lenses, postoperative movement can be quite noticeable.

From the foregoing description, it will be apparent that the apparatus and methods disclosed in this application will provide the significant functional benefits summarized in the introductory portion of the specification.

The following claims are intended not only to cover the specific embodiments disclosed, but also to cover the inventive concepts explained herein with the maximum breadth and comprehensiveness permitted by the prior art.

I claim:

1. A multifocal ophthalmic lens adapted for implantation in an eye or to be carried on a surface of the eye, said lens having progressive vision correction powers in first and second at least partially annular regions, said second region at least partially circumscribing the first region, the progressive vision correction powers of one of said first and second regions including progressive vision correction powers which increase in a radial outward direction and the progressive vision correction powers of the other of said first and second regions including progressive vision correction powers which decrease in a radial outward direction.

2. The multifocal ophthalmic lens of claim 1 wherein said first region is substantially completely annular.

3. The multifocal ophthalmic lens of claim 1 wherein said second region substantially completely circumscribes the first region.

4. The multifocal ophthalmic lens of claim 2 wherein said second region substantially completely circumscribes the first region.

5. The multifocal ophthalmic lens of claim 1 wherein the lens is an aspheric intraocular lens and the progressive vision correction power of each of the first and second regions varies between near and far vision correction powers.

6. The multifocal ophthalmic lens of claim 1 wherein the lens is a contact lens.

7. The multifocal ophthalmic lens of claim 1 wherein the lens is an intraocular lens.

8. A multifocal ophthalmic lens adapted for implantation in an eye or to be carried on a surface of the eye, said lens having progressive vision correction powers in first, second, third and fourth at least partially annular regions, said second, third and fourth regions at least partially circumscribing the first, second and third regions, respectively, the first and third regions constituting a first set of regions and the second and fourth regions constituting a second set of regions, the progressive vision correction powers of said first set of regions including progressive vision correction powers which increase in a radial outward direction and the progressive vision correction powers of said second set of regions including progressive vision correction powers which decrease in a radial outward direction.

9. A multifocal ophthalmic lens adapted for implantation in an eye or to be carried on a surface of an eye, said lens having first and second zones with the second zone circumscribing the first zone, said first zone including in radial outwardly extending order a first vision correction power, progressive vision correction powers, a second vision correction power and progressive vision correction powers, said first and second vision correction powers being different and said progressive vision correction powers including progressive vision correction powers between the first and second vision correction powers, said second zone including in radial outwardly extending order a third vision correction power, progressive vision correction powers, a fourth vision correction power and progressive vision correction powers, said third and fourth vision correction powers being different and the progressive vision correction powers of the second zone including vision correction powers between the third and fourth vision correction powers, said lens having a central zone which includes a power intermediate the first and second vision correction powers, said zones being concentric with the first zone circumscribing the central zone.

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