FIG. 61 shows an alternate positioning of the lens 47 shown in FIGS. 19 and 20 positioned in the anterior chamber 17 of the eye with the natural crystalline lens still intact and in place.

Typically, the inventive intraocular lens structure will have a total length of from about 9 millimeters to about 14 millimeters, a width of from about 4 millimeters to about 14 millimeters and can be fabricated having a wide range of index of refraction. The deformable optical zone portion will typically have a thickness of from about 0.1 millimeters to about 1.0 millimeters and a diameter in the range of from about 4 millimeters to about 6 millimeters.

Any conventional method for manufacture of the inventive lens can be utilized in accordance with the present invention to insure that the lens has an elongation to break within the prescribed range as aforementioned herein. For instance, compression molding, transfer molding, injection molding, casting, machining, or combination of these techniques may be utilized to produce the inventive lens.

The deformable intraocular lens structures in accordance with the present invention also facilitate removal of the lens from the eye atraumatically should a complication arise arise after implant, necessitating its removal from the eye.

Those skilled in the art will readily appreciate that other less preferred procedures could be utilized to effect deformation of the lens during implantation. For instance, a lens fabricated from hydrophilic material could be implanted in a dry state and hydrated once in position to return to its desired configuration and fixed focal length. Alternatively, the lens could be implanted in a plurality of separate components which are built up in the eye and suitably attached to one another, for instance by a medical grade adhesive.

The lens holding chamber and lens holding compartment of the implantation devices depicted in FIGS. 37 through 49 can, of course, be fabricated having a wide variety of suitable configurations for containing the deformable intraocular lens therein. In this respect, the chamber and compartment having pre-deformed lenses contained therein can be conveniently dispensed separately from the injection type devices.

Additionally, the intraocular lens structure in accordance with the present invention may comprise a base member having at least one surface layer thereon. For instance, a base member composed of an elastomer can be encased within a surface layer of hydrophilic material to enhance tissue compatability.

Accordingly, the present invention offers a unique implantation system for correction of or replacement of human crystalline lens after, for instance, cataract removal by way of small incision techniques. The system therefore provides an implantation technique with attendant surgical safety, convenience and a comfortable fit for the eye.

The described lens implant procedure and devices, thus minimize the principle disadvantages attendant with conventional rigid intraocular lens implantation which requires a relatively large incision in the ocular tissue which, among other disadvantages, leads to a relatively high complication rate and longer recovery times.

It will be apparent from the foregoing that, while particular forms of the invention have been illustrated and described, various modifications can be made without departing from the spirit and scope of the invention. Accordingly, it is not intended that the invention be limited, except as by the appended claims.

I claim:

1. A surgical device for implantation of an artificial intraocular lens in the eye through a relatively small incision made in the ocular tissue, said device comprising a chamber in a forward end of said device; means for containing said intraocular lens in an unstressed state and for orienting said intraocular lens in a prescribed orientation to facilitate anterior or posterior chamber lens placement substantially perpendicular to the optical axis, said lens having a deformable optical zone portion; means for exerting a force on said lens sufficient to deform said lens such that said optical zone portion is deformed to a diameter of 80% or less than the cross-sectional diameter of said optical zone portion in an unstressed state and to expel said lens from said device for placement of said lens in the eye.

2. The surgical device as defined in claim 1 wherein said force on said lens sufficient to deform said lens is a hydraulic deforming force.

3. The surgical device as defined in claim 1 wherein said force on said lens sufficient to deform said lens is a pneumatic deforming force.

4. The surgical device as defined in claim 1 wherein said force on said lens sufficient to deform said lens is mechanical deforming force.

5. The surgical device as defined in claim 1 wherein said means for containing said intraocular lens comprises a lens holding chamber having an inlet opening and an outlet opening and said force exerted on said lens is applied through said inlet opening to cause said lens to be expelled from said outlet opening and through a cannula intermediately disposed between said inlet opening and said outlet opening.

6. The surgical device as defined in claim 5 wherein said lens holding chamber is fabricated from a sterile, transparent material.

7. The surgical device as defined in claim 5 wherein said intraocular lens is pre-deformed and contained within said lens holding chamber.

8. The surgical device as defined in claim 5 and further comprising a relatively short nozzle disposed on the forward end of said cannula.

9. The surgical device as defined in claim 5 and further comprising a relatively long nozzle disposed at the forward end of said cannula.

10. The surgical device as defined in claim 1 wherein said means for exerting a force on said lens sufficient to deform said lens comprises a manual syringe.

11. The surgical device as defined in claim 5 wherein said lens holding chamber is detachable from said device.

12. The surgical device as defined in claim 11 wherein said lens holding chamber comprises an outlet adapted to snugly engage a nozzle of the device wherein said intraocular lens is transferred from said lens holding chamber to said cannula and said lens holding chamber is detached from said device, said nozzle is utilized for placement within said incision made in the ocular tissue.

* * * * *