Eye ciliary muscles **112** control contraction toward axis **105**; and in FIG. **3** those muscles have contracted to deflect the periphery **113** of the capsule **99** toward axis **105**. The outermost extents **103***a* and **104***a* of the haptics are deflected radially inwardly, and the haptics main extents **103***b* and **104***b* are sufficiently stiff to push or deflect the lens **101** bodily rightwardly in FIG. **3**. Such deflection is sufficient to cause the lens to refract light rays **115** from an object **116** to again focus at point **111***a* at the wearer's retina. Such controlled lens deflection also corresponds to angle β of the haptics relative to plane **108**, for the particular object location shown, as an example. Also, such lens deflection to obtain proper focusing is made possible by the initial angularity of the haptics, by their stiffness along their main extents **103***b* and **104***b*, and by hinging at haptic extents **103***c* and **104***c* closest to the lens. See for example the construction of the haptics **103**' and **104**' in FIG. **7**, with thickened or widened main extents **103***b*' and **104***b*' for adequate column stiffening to transmit force toward the lens, and reduced thickness or width sections **103***c*' and **104***c*', to provide bendability or hinging relative to the lens, in response to ciliary muscle contraction.

FIG. **4** shows the capsule **99** or "bag" surrounding the lens unit **100**, and also deflected by the lens unit as in FIG. **3** position, due to ciliary muscle contraction. An insertion opening cut in the capsule appears at **99***a*.

FIGS. **7** and **8** show a modified lens that has two opposed peripheral segments **123** and **124** and which are characterized as light blocking. They may be internally darkened, or cloudy, or occluded, or the surfaces of the segments may be treated so as to be irregular, or occluded or darkened, to achieve light blocking effect. See light rays **125** in FIG. **8** blocked by **123** and **124**, whereas light rays **126** incident on the lens light passing and refracting intermediate portion **127** are not blocked, and pass from the lens at **126***a*. Further, the segments **123** and **124** have substantially reduced thickness (de-bulking) over their major extents, relative to the thickness of clear lens **127** over its major extent. Note also that the two segments typically have substantially equal size and shape, and they extend adjacent the intermediate optics portion **127** along substantially linear and parallel borders **130** and **131** as seen in FIG. **7**, such borders extending horizontally, as installed. Also, the segments **123** and **124** have generally convex outer edges **123**' and **124**', in the plane of the lens. Typical dimensions are as follows:

d≅5–8 mm.

e≅2 to 4 mm,

where "d" is the diameter of the intermediate portion **127**, and "e" is the spacing between the segments, borders **130** and **131** as seen in FIG. **7**.

Note initial angularity α of the haptics relative to plane **108** corresponds to that discussed above, in FIG. **2**; also the increased angularity β that corresponds to β in FIG. **3**. It will be noted that the lens is deflectable to an infinite number of positions corresponding to an infinite range of haptics angularities, as referred to, and viewed object locations, under control of the eye muscles, to obtain desired refraction of light rays from objects, to the retina. The angularity α may vary between 15° and 50°.

FIGS. **5** and **6** show tabular haptics **140** and **141**, of the general type disclosed in U.S. Pat. No. 5,203,790 to McDonald. They too have angularities α and β as seen in FIG. **6**, relative to a plane **108** normal to optical axis **105**. See also occluded segments **143** and **144** of the lens **142**, and corresponding to segments **123** and **124** in FIG. **7**. The axis **145** of clear lens **142** is angled at 45° relative to an axis or plane **146** bisecting the tabular haptics. Through openings **147** in the haptics **140** and **141** are adapted and positioned to receive eye tissue, or eye growth tissue, to anchor the lens unit in the capsule **99**. V-shaped slits may be provided at **151** in the haptics, to provide further anchoring, as by reception of eye tissue.

In FIGS. **9** and **10**, the lens unit **200** includes a plastic lens **201**, and tabular haptics **202** and **203** projecting lengthwise oppositely. Each haptic contains a through opening **202***a* and **203***a* sized to receive a tissue flap formed by the surgeon by slitting the wall of the capsule **204**. See flap **205***a* in wall **205**. Not only is lens unit rotation about axis **208** thereby blocked, but the lens **201** is also prevented from extruding in direction **211** through the opening **209** initially cut in capsule wall **205** (that allows insertion of the lens unit into the capsule). Note also the peripheries **213** and **214** of the haptics nested in the inner peripheral grooves **215** and **216** formed by the capsule, to tension the capsule, in directions **217** and **218**, the haptics then assuming angularities α as discussed above.

In FIGS. **11** and **12**, the lens unit **230** includes a lens **231** having a clear transparent medial horizontal portion **232**, and two occluded outer portions **233** and **234**. The lens is elongated lengthwise, between the strand-like or wire-like haptics **235** and **236** angled at angles α as above. The lens can be elongated, as up to 6–8 mm., to resist extrusion through opening **236** formed in the wall **237** of the capsule **238** and through which unit **230** is inserted into the capsule interior. Wire-like haptics **235** and **236** have terminal portions **235***a* and **236***a* that nest in the internal peripheral grooves **240** and **241** formed by the capsule. In-turned protrusions or tangs **242** and **243** on the terminal portions of the haptics are adapted to project and quickly attach to eye tissue, to resist lens unit rotation about optical axis **250**, in unit installed position. Such anchored protrusions also resist extrusion of the lens through the opening **236**'. The closer to the tab periphery or peripheries that the holes **236**' are located, the sooner they will be penetrated by eye tissue, i.e. "scarify".

In FIGS. **9–12**, all haptics are typically angulated, as at angles α referred to above, to be moved axially as eye muscles expand and contract.

I claim:

1. An artificial lens unit including a lens insertible into a capsular eye lens zone from which a natural lens has been removed, comprising, in combination,

a) the lens having a light refracting optical portion defining an axis, and consisting of plastic,

b) said unit including substantially C-shaped, filamentary haptics for positioning said lens in said capsular zone, said haptics extending at angles relative to a plane normal to said axis and passing through said lens, and said haptics' angles characterized in that said lens is displaced in the direction of said axis by said haptics in response to eye muscle constriction of the periphery of said capsular zone toward said axis,

c) said haptics having outwardly convex arcuate outermost extents that define free terminals, and extend inwardly, said haptics having hinge connection to the lens and tangentially merging with the lens, and said haptics extend at angles between 15° and 50° relative to said plane.

2. The lens unit of claim **1** wherein said lens and said haptics, as viewed edgewise in the direction of said plane, have substantially a C-shape.

3. The lens unit of claim **1** wherein said haptics are integral with said lens, at edge portions thereof.

4. The lens unit of claim **1** wherein said lens has oppositely facing convex surfaces.