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(21) International application number: PCT/IB99/00014 (22) International filing date: 8 January 1999 (08.01.99) (30) Data relating to the priority: 98/00,117 8 January 1998 (08.01.98) FR (71) Applicant (for all designated States except US): BAUSCH & LOMB SURGICAL, INC. [US/US]; 555 West Arrow Highway, Claremont, CA 91711 (US). (72) Inventors; and (75) Inventors/Applicants (US only): BAIKOFF, Georges [FR/FR]; 122, rue du Commandant Rolland, F-13008 Marseille (FR). HOFFMANN, Laurent [FR/FR]; 50, rue du Dauphiné, F-69003 Lyon (FR). (74) Representative: CABINET GERMAIN & MAUREAU; 12, rue Boileau, F-69006 Lyon (FR).		(81) Designated states: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO Patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With the International Search Report.

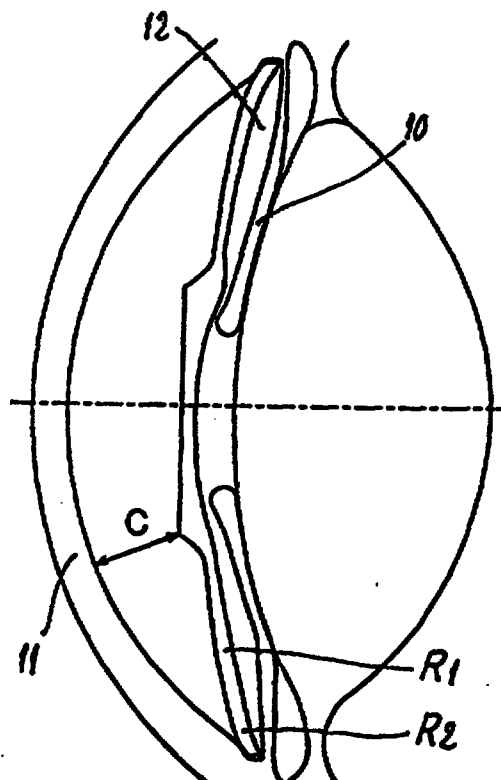
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(54) Title: ANTERIOR CHAMBER IMPLANT FOR TREATING THE PHAKIC EYE**(54) Titre:** IMPLANT DE CHAMBRE ANTERIEURE POUR LE TRAITEMENT DE L'OEIL PHAQUE**(57) Abstract**

The invention concerns an anterior chamber implant for treating the phakic eye comprising an optical part (1) connected to loops (3, 4). Viewed in profile each loop has an arc-shaped profile with double radius of curvature, the radius of curvature (R1) of the proximal part being greater than that (R2) of the distal part.

(57) Abrégé

Un implant de chambre antérieure pour le traitement de l'oeil phaqué du type comportant une partie optique (1) se raccordant à des anses (3, 4). Vue de profil chaque anse présente un profil en arche à double rayon de courbure, le rayon de courbure (R1) de la partie proximale étant plus grand que celui (R2) de la partie distale.



ANTERIOR CHAMBER IMPLANT FOR TREATING THE PHAKIC EYE

The present invention relates to an anterior chamber ocular implant for treating conditions of the phakic eye, in particular myopia, astigmatism and hypermetropia.

Such an implant consists, in a known manner, of an optical part (lens), generally of circular contour and with a section appropriate for the planned correction (plane, planoconvex, biconvex, planoconcave, biconcave, meniscus, toric); connected to this optical part there is a haptic part which is intended to fix the position of the optical part in the anterior chamber. The haptic part consists of fine and deformable loops which, in use, lodge in the iridocorneal angle.

An implant of the above type, intended for correction of myopia, is shown diagrammatically in Figures 1, 2 and 5 appended to the present description, Figure 1 being a plan view, Figure 2 a side view, and Figure 5 a diagrammatic view of the implant according to Figures 1 and 2 in position in an eye.

Figure 1 shows the optical part 1, the connection zone 2 between this optical part and the two loops 3 and 4 which have the general shape of an S, the distal part of each loop having two support feet 5 and 6.

It will be seen in Figure 2 that the optical part 1 is of the concave type and that the loops 3, 4 are angulated from their proximal part for connection with the optical part 1 towards their distal support part, relative to a vertical support plane A.

This angle α is of the order of 15° and is intended to ensure that the optical part 1 is placed in the anterior chamber of the eye without risk of contact either with the cornea on its front face or with the iris on its rear face.

It will also be seen in Figure 2 that the distal end of the loops 3 and 4 coincides with the vertical plane A along a relatively important length.

The implant has a width of about 5.5 mm (reference L in Figure 1) and is inscribed in an envelope curve having a diameter of between 12 mm and 13.5 mm (reference D in Figure 1). Such an implant is adapted to most shapes and sizes of eyes encountered in patients recovering from refractive surgery.

However, with the earlier models, irritation was found in a not inconsiderable number of cases due to the fact that the distal part of the loops bears on the periphery of the iris.

The object of the present invention is to overcome this disadvantage by very greatly reducing the risk of this distal part of the loops bearing on the periphery of the iris, irrespective of the size of the eye in which it is implanted.

According to the invention, each loop, viewed in profile, has an arc-shaped profile with double radius of curvature in order to place the bearing surface in the iridocorneal angle.

The invention will be better understood with the help of the following description of a nonlimiting embodiment, with reference to Figures 3, 4 and 6.

Figure 3 is a diagrammatic plan view of an anterior chamber myopia implant according to the invention.

Figure 4 is a diagrammatic side view of the implant shown in Figure 3.

And Figure 6 is a diagrammatic view of the implant according to Figures 3 and 4 in position in the eye.

The references for parts which correspond to those of the implant illustrated in Figures 1 and 2 are identical. There is an optical part 1, a peripheral connection part 2 and two loops 3 and 4 in the general shape of an S (plan views), of which the distal part has support feet 5 and 6.

Each loop has, in side view according to Figure 4, an arc-shaped profile with double curvature. The radius of curvature (R1) of the proximal part is greater than that of the distal part (R2). The point of passage from one radius of curvature to the other is situated (cf. reference P in Figure 4) at a distance from the distal end of the loop in question, approximately equal to quarter the height of the said loop, in a direction parallel to the support plane A.

The general angulation of the loop relative to the support plane A is between 13.5° and 16° and is preferably 15.12° (angle α in Figure 4) for an implant with an envelope curve of 12.5 mm.

The value of the radii of curvature is between 10 and 35 mm for the proximal part (R1) and 2.5 mm for the distal part (R2).

With these configurations, the head of the loop (reference F in Figure 4) will be situated approximately 1 mm from the support plane A, and the point of the optical part nearest to the cornea will be situated at 1.62 mm (reference c in Figure 6). This guarantees that the deformations of the loops, secondary to those of the eyeball, do not risk causing contact of the implant with the cornea or with the iris.

The arc shape with double radius of curvature ensures that the loops will bear only on the relatively strong structures of the iridocorneal angle (scleral spur, trabecula).

More precisely, according to Figure 6, and in contrast to Figure 5:

- the proximal part of each loop, with large radius of curvature (R1), is almost parallel to the optical plane; it is situated as far as possible from the iris, in order to allow pupillary movement without contact between the loop and the iris;

- the distal part of each loop, with small radius of curvature (R2), joins the proximal part

practically in the site of implantation of the loops, corresponding to the angle of the anterior chamber;

- each loop is thus placed in a mid position between the iris 10 and the corneal endothelium 11;

5 - the support surface of each loop in the iridocorneal angle remains limited; practically all contact between the distal part of each loop and the iris is prevented, thereby limiting any inflammatory reaction of the latter.

10 An embodiment of an implant has been described above in which the haptic part comprises two loops, but it goes without saying that the present invention is applicable to any anterior chamber implant for treating the phakic eye, irrespective of the number of loops of
15 its haptic part.



CLAIMS

1. Anterior chamber implant for treating the
5 phakic eye, comprising an optical part (1) connected to
loops (3, 4), characterized in that, viewed in profile,
each loop has an arc-shaped profile with double radius
of curvature, the radius of curvature (R1) of the
proximal part being greater than that (R2) of the
10 distal part.
2. Implant according to Claim 1, characterized in
that the point of passage between the two radii of
curvature (R1) and (R2) is situated at a distance from
the distal end of the loop approximately equal to
15 quarter the height of the loop in a direction parallel
to the vertical plane A.
3. Implant according to Claim 1 or 2,
characterized in that the general angulation (α) of a
loop is between 13.5° and 16° relative to the support
20 plane (A).
4. Implant according to Claim 3, characterized in
that the angulation of a loop is 15.12° for an implant
with an envelope curve of 12.5 mm.
5. Implant according to any of Claims 1 to 4,
25 characterized in that the value of the radii of
curvature is:

R1: $\geq 10 \text{ mm} \leq 35 \text{ mm}$

R2: 2.5 mm

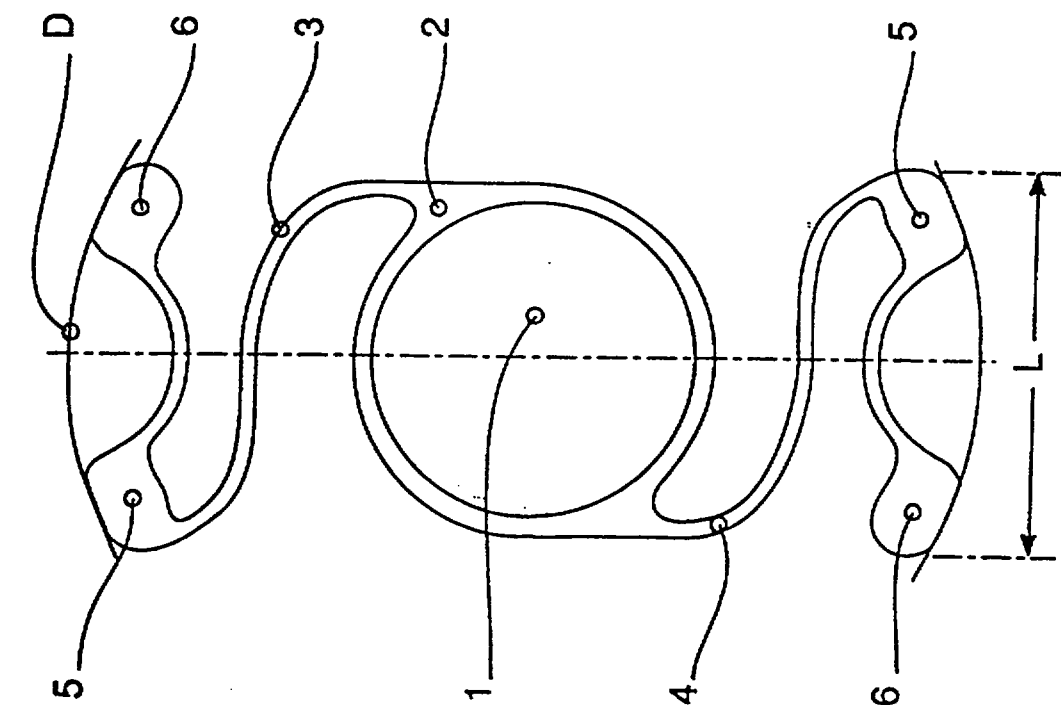


FIG. 1

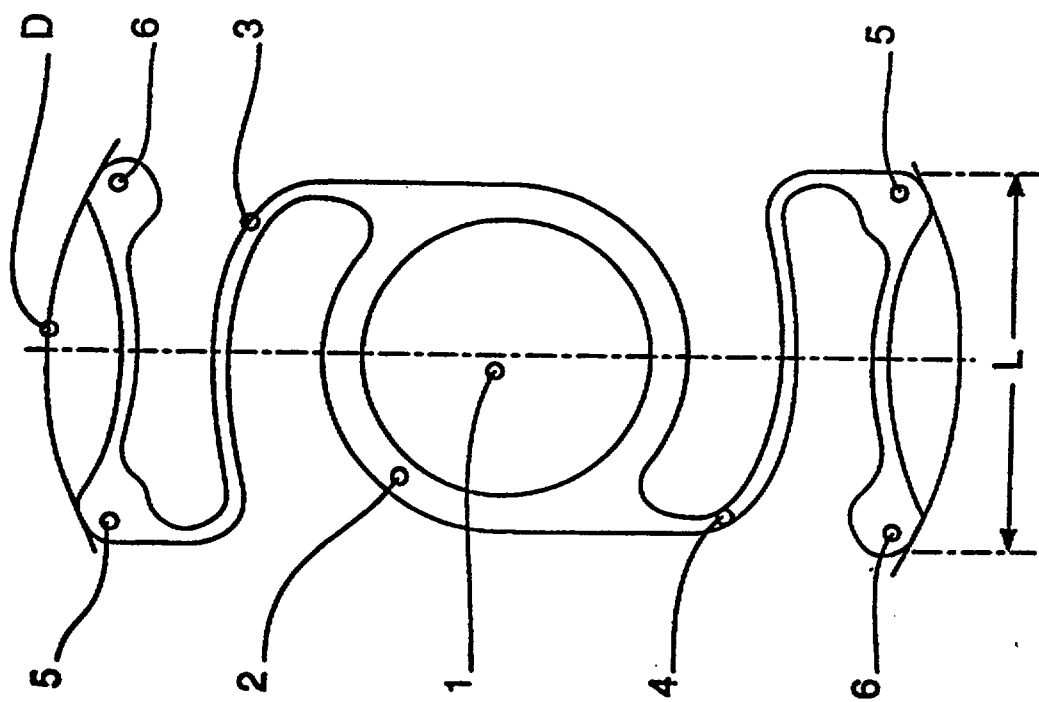
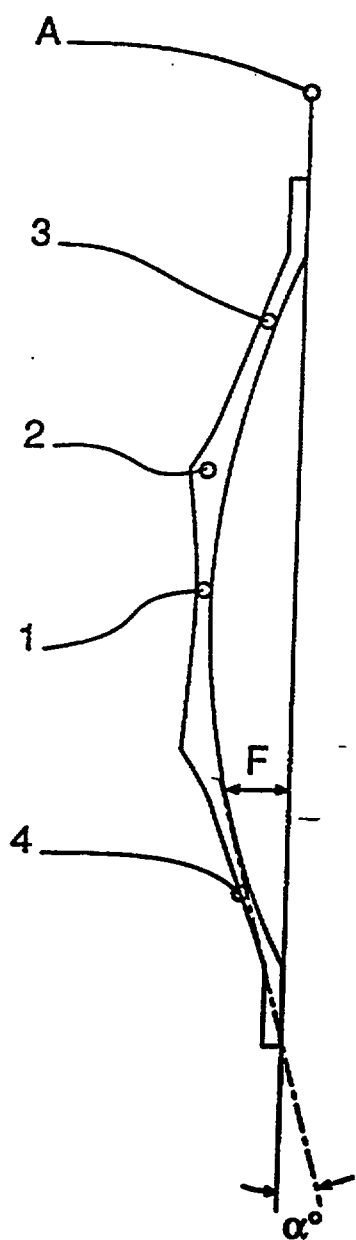
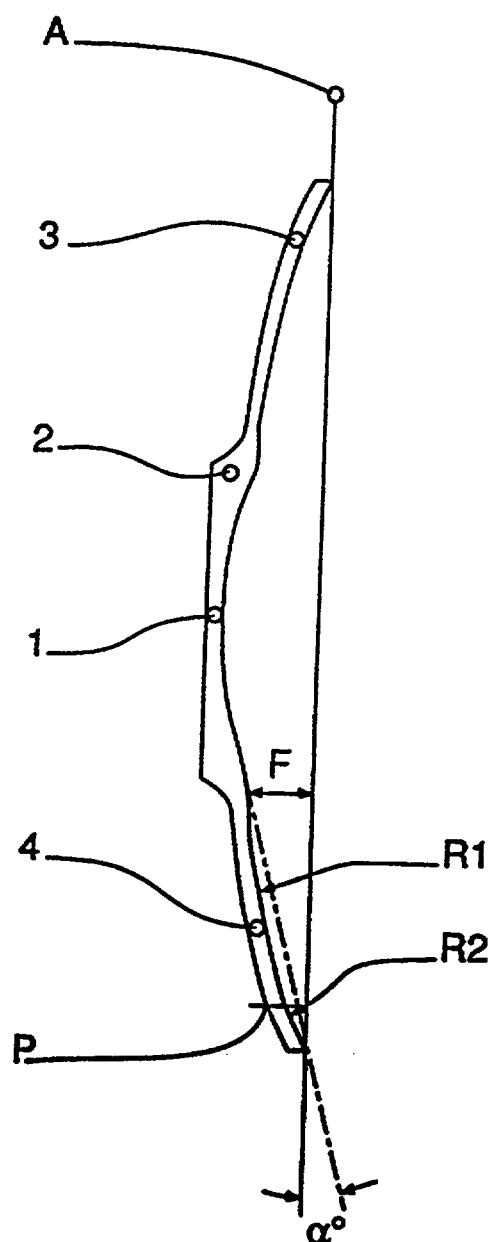


FIG. 3



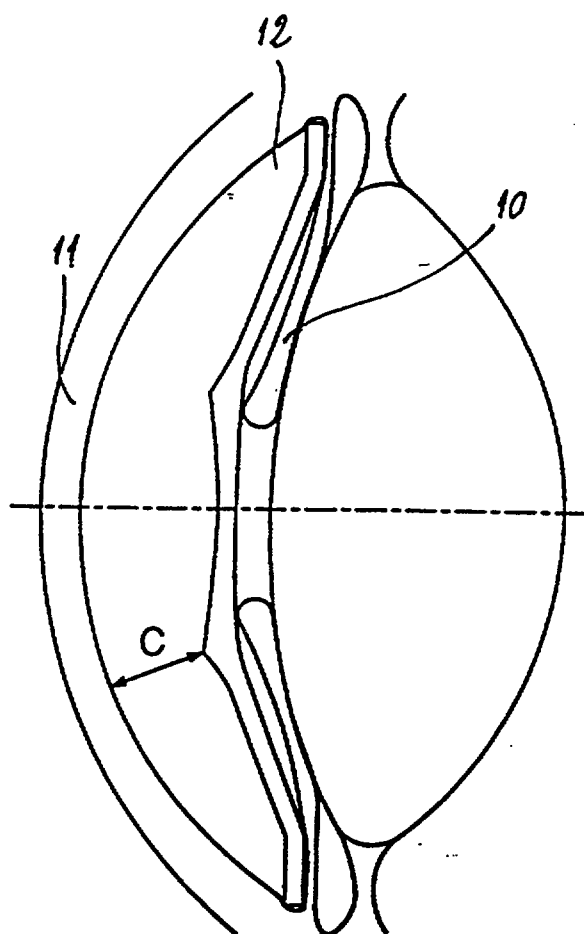


FIG. 5

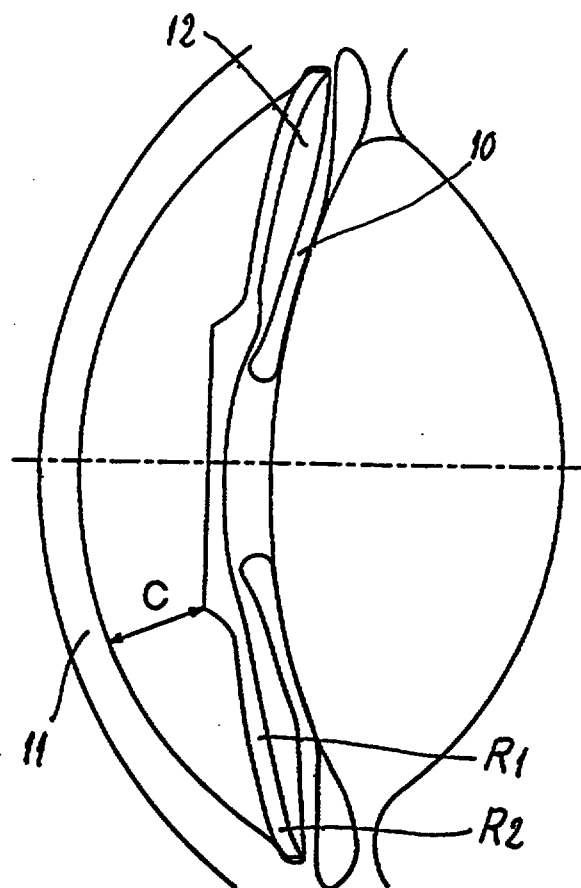


FIG. 6