the cornea tissue from the base region.

[0013]

As a consequence, in the case of the conventional means based on such relation, the lens depth of the region related to the cornea correction will be deep when intended degree of correction is small, and sufficient pushing of the central part of the cornea may not be accomplished since amount of pushing of the cornea in the axial direction of the eye may be insufficient or the cornea may not be contacted by the lens. In such case, the effect of correction may become inconsistent, and the intended degree of correction may not be achieved or an excessive time may be required to realize the desired correction of the eyesight.

On the other hand, when the depth of the cornea pushed in the axial direction of the eye is deep, there have been the risks of damaging the cornea, increasing probability of suffering from complication because of the reduced intraocular pressure, and roughening of the eye surface due to the forceful pushing of the cornea surface. In other words, the conventional method wherein the value of the radius of curvature of the reverse region is derived solely from the radius of curvature of the base region to be corrected suffered from the risks of inconsistent correction as well as damaging of the cornea.

[0014]

In view of such situation, it has been found in the present disclosure that the radius of curvature of the reverse region is more preferably derived from the radius of curvature of the base region and the radius of curvature of the alignment region.

[0015]

The present disclosure provides an orthokeratology contact lens wherein, even if the intended degree of correction is different, the lens depth of the region related to the cornea correction can be kept constant by changing radius of curvature of the reverse region as long as the radius of curvature of the alignment region is the same.

Means for Solving the Problems

[0016]

In order to solve the problems as described above, the present disclosure has the constitution as described below.

[0016a]

In an aspect, there is provided an orthokeratology contact lens for correcting eyesight by changing shape of the cornea wherein

lens surface contacting the cornea comprises

central area called base region at the center of the lens which pushes the cornea,

an annular area called reverse region outside the periphery of the base region,

an annular area called alignment region outside the periphery of the reverse region, and

an annular area called peripheral region outside the periphery of the alignment region, and characterized in that

lens depth (S_K) related to the correction of the cornea is kept constant by changing the radius of curvature of the reverse region even when radius of curvature and width of the base region, width of the reverse region, radius of curvature and width of the alignment region, and radius of curvature and width of the peripheral region, and intended degree of eyesight after the correction are changed, wherein, when the width of the base region is W_B, the width of the reverse region is W_R, the radius of curvature of the base region is R_B, the radius of curvature of the reverse region is R_R, the radius of curvature of the alignment region is R_A, lens depth of the base region is T_B, lens depth of the reverse region is T_R, and linear distance between point where the curve of the base region intersects the central axis of the contact lens and point where the extension of the curve of the alignment region intersects the central axis of the contact lens is S_P,

the lens depth T_R of the reverse region is derived from the following equation (1):

$$T_R = R_A - \sqrt{{R_A}^2 - F^2} - R_B + \sqrt{{R_B}^2 - E^2} - S_P$$

$\cdots(1)$

wherein in equation (1), E represents $W_B/2$ and F represents $W_B/2+W_R$, and

the radius of curvature R_R of the reverse region is derived by using T_R from the following equation (2):

$$R_R = \sqrt{\left(\frac{F^2 - E^2 - {T_R}^2}{2 \cdot T_R}\right)^2 + F^2} \qquad \cdots(2)$$

wherein in equation (2), E represents $W_B/2$ and F represents $W_B/2+W_R$.
[0017]

(1) An orthokeratology contact lens for correcting eyesight by changing shape of the cornea wherein lens surface contacting the cornea comprises central area called base region at the center of the lens which pushes the cornea, an annular area called reverse region outside the periphery of the base region, an annular area called alignment region outside the periphery of the reverse region, and an annular area called peripheral region outside the periphery of the alignment region; and lens depth necessary for the correction of the cornea is kept constant by changing the radius of curvature of the reverse region even when radius of curvature and width of the base region, width of the reverse region, radius of curvature and width of the alignment region, and radius of curvature and width of the peripheral region, and intended degree of eyesight after the correction are changed.

(2) An orthokeratology contact lens according to (1) wherein the lens depth necessary for correcting the cornea is constant as long as the radius of curvature of the alignment region is the same.

(3) An orthokeratology contact lens according to (1) or (2) wherein the radius of curvature of the reverse region is derived from the radius of curvature and the width of the base region, the width of the reverse region, the radius of curvature and the width of the alignment region, and the radius of curvature and the width of the peripheral region.

(4) An orthokeratology contact lens according to (3) wherein, when the width of the base region is W_B, the width of the reverse region is W_R, the radius of curvature of the base region is R_B, the radius of curvature of the reverse region is R_R, the radius of curvature of the alignment region is R_A, the lens depth of the base region is T_B, the lens depth of the reverse region is T_R, and linear distance between point where the curve of the base region intersects the central axis of the contact lens and point where the extension of the curve of the alignment region intersects the central axis of the contact lens is S_P, the lens depth T_R of the reverse region is derived from the following equation (1):

[0018]

[Mathematical formula 1]

$$T_R = R_A - \sqrt{{R_A}^2 - F^2} - R_B + \sqrt{{R_B}^2 - E^2} - S_P \quad \cdots (1)$$

Claims:

[Claim 1]

An orthokeratology contact lens for correcting eyesight by changing shape of the cornea wherein

lens surface contacting the cornea comprises

central area called base region at the center of the lens which pushes the cornea,

an annular area called reverse region outside the periphery of the base region,

an annular area called alignment region outside the periphery of the reverse region, and

an annular area called peripheral region outside the periphery of the alignment region, and characterized in that

lens depth (S_K) related to the correction of the cornea is kept constant by changing the radius of curvature of the reverse region even when radius of curvature and width of the base region, width of the reverse region, radius of curvature and width of the alignment region, and radius of curvature and width of the peripheral region, and intended degree of eyesight after the correction are changed, wherein, when the width of the base region is W_B, the width of the reverse region is W_R, the radius of curvature of the base region is R_B, the radius of curvature of the reverse region is R_R, the radius of curvature of the alignment region is R_A, lens depth of the base region is T_B, lens depth of the reverse region is T_R, and linear distance between point where the curve of the base region intersects the central axis of the contact lens and point where the extension of the curve of the alignment region intersects the central axis of the contact lens is S_P,

the lens depth T_R of the reverse region is derived from the following equation (1):

$$T_R = R_A - \sqrt{R_A{}^2 - F^2} - R_B + \sqrt{R_B{}^2 - E^2} - S_P$$

$$\cdots(1)$$

wherein in equation (1), E represents $W_B/2$ and F represents $W_B/2+W_R$, and

the radius of curvature R_R of the reverse region is derived by using T_R from the following equation (2):

$$R_R = \sqrt{\left(\frac{F^2 - E^2 - T_R{}^2}{2 \cdot T_R}\right)^2 + F^2} \qquad \cdots(2)$$

wherein in equation (2), E represents $W_B/2$ and F represents $W_B/2+W_R$.

[Claim 2]

An orthokeratology contact lens according to claim 1 wherein the lens depth related to the correction of the cornea is constant as long as the radius of curvature of the alignment region does not change.

[Claim 3]

An orthokeratology contact lens according to claim 1 or 2 wherein the radius of curvature of the reverse region is derived from the radius of curvature and the width of the base region, the width of the reverse region, the radius of curvature and the width of the alignment region, and the radius of curvature and the width of the peripheral region.

[Claim 4]

An orthokeratology contact lens according to claim 1 wherein the lens depth T_R and the radius of curvature R_R are respectively within ±10% of the derived lens depth T_R and radius of curvature R_R.

[Claim 5]

An orthokeratology contact lens according to claim 1 wherein the radius of curvature and the width of the alignment region are different in longitudinal direction and transverse direction when seen in the direction of the central axis of the contact lens.

[Claim 6]

An orthokeratology contact lens according to claim 5 wherein the lens depth related to the correction of the cornea is constant as long as the maximum radius of curvature of the alignment region does not change.

[Claim 7]

An orthokeratology contact lens according to claim 5 or 6 wherein the radius of curvature of the reverse region is derived from the radius of curvature and the width of the base region, the width of the reverse region, the maximum

radius of curvature and the maximum width of the alignment region, and the radius of curvature and width of the peripheral region.

[Claim 8]

An orthokeratology contact lens according to any one of claims 5 to 7 wherein, when the width of the base region is W_B, the width of the reverse region is W_R, the radius of curvature of the base region is R_B, the radius of curvature of the reverse region is R_R, the maximum radius of curvature of the alignment region is R_{AV}, the lens depth of the base region is the T_B, the lens depth of the reverse region is the T_R, and linear distance between point where the curve of the base region intersects the central axis of the contact lens and point where the extension of the curve with maximum radius of curvature of the alignment region intersects the central axis of the contact lens is S_{PT},

the lens depth T_R of the reverse region is derived from the following equation (3):

$$T_R = R_{AV} - \sqrt{R_{AV}^2 - F^2} - R_B + \sqrt{R_B^2 - E^2} - S_{PT} \quad \cdots (3)$$

wherein in equation (3), E represents $W_B/2$ and F represents $W_B/2+W_R$, and

the radius of curvature R_R of the reverse region is derived by using T_R from the following equation (2):

$$R_R = \sqrt{\left(\frac{F^2 - E^2 - T_R^2}{2 \cdot T_R}\right)^2 + F^2} \quad \cdots (2)$$

wherein in equation (2), E represents $W_B/2$ and F represents $W_B/2+W_R$.

[Claim 9]

An orthokeratology contact lens according to claim 8 wherein the lens depth T_R and the radius of curvature R_R are respectively within ±10% of the derived lens depth T_R and radius of curvature R_R.