VARIABLE POWERED CONTACT LENS

TECHNICAL FIELD

This invention relates generally to contact lenses, and more particularly to soft contact lenses having multiple focal lengths.

BACKGROUND OF THE INVENTION

Contact lenses have been utilized for many years for the correction of various visual disorders. However, contact lenses have been less successful in the treatment of presbyopia. Presbyopia is characterized by loss of elasticity of the crystalline lens, and hence, loss of the ability of the eye to adjust to clearly see objects which are close and also those which are more distant.

Two common methods for correcting presbyopia are the use of bifocal eyeglass lenses and bifocal contact lenses. Eyeglass lenses generally have two portions ground for two viewing distances. Since the eye will move in relation to the lens, the patient can easily view through either lens.

Two types of multi-focal contact lenses are presently known. One type is quite similar to eyeglasses, in that it moves relative to the eye in order to place the correct portion of the lens over the pupil for viewing. Such lenses are generally categorized as translating lenses; one such lens being described in U.S. Pat. No. 4,418,991 to Breger. These lenses have a lower portion which is engaged by the lower eyelid when the patient looks down, causing the lens to move upwards on the cornea relative to the pupil. Translating lenses are difficult to fit because the amount of movement of the lens will vary for each patient, making it difficult to determine the appropriate height of the bifocal segment.

Soft contact lenses are typically of a diameter large enough to extend beyond the cornea and into the scleral area. A thick peripheral portion fits into the natural notch created in the limbal area where the flatter scleral meets the steeper cornea. Such lenses can be of the translating type (described above), or of the simultaneous type. Simultaneous type of lenses, one being described in U.S. Pat. No. 4,199,231 to Evans, utilize a lens which does not move on the cornea, but rather causes the light rays to focus within a specific range forward and behind the retina. Such lenses require an increase in the distance prescription power for normal distance viewing in order to bring the near vision focal point within an acceptable range. This, in affect, will slightly blur the distance vision, since the focal point will be moved from the retina to a point slightly beyond the retina. Obviously, it is much more desirable to have the focal point of light rays from an object at any distance to be focused directly on the retina, and not merely within an "acceptable range" of the retina.

It is therefore an object of the present invention to provide an improved variable power contact lens.

Another object is to provide a variable power contact lens which is neither translational nor simultaneous and therefore suffers none of the problems associated with those lenses.

Yet another object of the present invention is to provide a contact lens which will provide a variety of focal lengths through the same portion of the lens.

These and other objects will be apparent to those skilled in the art.

SUMMARY OF THE INVENTION

A soft contact lens is provided which is comprised of soft, opthalmic plastic material which is resiliently deformable by movement of the eye. The lens is of the scleral-corneal type, and has a base-down prism portion which moves under the lower eyelid. When the eye gazes downwardly and inwardly, pressure of the lower lid on the thickened portion of the lens causes a bulging of the lens near the center, creating an increase in diopter power. A slab-off bevel of the lens sides shapes the bulge into proper spherical condition for clearer vision.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic view of the present invention with a conventional scleral-corneal contact lens shown in broken lines. Structure added to the conventional lens to form the present invention is shown in cross-hatching.

FIG. **2** is a front elevational view of the contact lens of this invention, shaped for the right eye of a person.

FIG. **3** is a diagrammatic view of an eye with the contact lens of the present invention thereon, the eye being focused for distant vision.

FIG. **4** is a diagrammatic view of an eye with the contact lens of the present invention thereon, the eye being focused for near vision.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, in which the reference numerals describe similar or corresponding parts throughout the several views, the improved contact lens of this invention is designated generally at **10** in FIG. **1**, with a prior art contact lens **11** shown in broken lines. Additional structure added to prior art lens **11** to form the lens **10** of this invention, is shown cross-hatched.

Like prior art contact lenses, the lens **10** of this invention is made with a thickened area **14** around its perimeter which fits into the natural notch created in the limbal area **16** where the flatter scleral **18** meets the steeper cornea **20**. The anterior face **10***a* of the contact lens **10** is smooth, for comfort under the upper and lower eyelids **22** and **24**, respectively.

The lower anterior portion of the lens is thicker than conventional lenses, and has a base-down prism **26**, the purpose of which is described in more detail hereinbelow.

The lens is composed of a soft, opthalmic plastic material which is resiliently deformable, and is thereby caused to deform with a slight bulge **28** at the center of the lens when pressure from the lower eyelid is exerted on the lens (see FIG. **4**). One material capable of meeting the desired deformable characteristics is a high water content hydrogel. Other materials, such as a very soft silicone, could also be used with this invention. Bulge **28** creates an increased thickness and smaller radius curve in lens **10**, and thereby increases the diopter of the lens **10** at bulge **28**.

In order to shape bulge **28** into the proper spherical shape, a slab off, or bevel, on both the temporal **30** and nasal **32** sides of the anterior surface **10***a* of the lens **10** are necessary. The temporal bevel **30** must be slightly wider (when viewed in front elevation) than the nasal bevel **32** since the opening in the eye socket is slightly wider on the temporal side. Bevels **30** and **32** begin along the upper perimeter of lens **10**, spaced away from