BIFOCAL CONTACT LENS

BACKGROUND OF THE INVENTION

The present invention relates to contact lenses to correct vision and more particularly to bifocal contact lenses.

There have been efforts to make bifocal contact lenses which provide both for reading and for more remote viewing, for eyes having limited muscular range of focus. Such efforts generally involved, in the past, attempts to permit the contact lens wearer to shift focus by looking through a smaller part of the lens having a greater magnifying effect. The magnifying effect was obtained by using a material of higher refractive index than the rest of the lens or by using a radius of external curvature of a part of the lens different from the radius of curvature of the remainder of the lens.

In U.S. Pat. No. 3,726,587 entitled "Bifocal Corneal Contact Lens And Method Of Making Same", a bifocal corneal contact lens consists of a curved disk-like segment having one index of refraction which is fused into an indentation in the surface of the contact lens body having a different index of fefraction. The fused segment has both inside and outside curvatures which are formed to correct the wearer's vision. In U.S. Pat. No. Re. 25,286 entitled "Bifocal Corneal Contact Lens", one zone of the lens is adapted to correct for distance vision and the other zone for reading vision. The distance vision zone is a small zone in the center which is one-half of the size of the pupil and has a slightly smaller radius of curvature than the remainder of the lens. A fused bifocal contact lens is shown in U.S. Pat. No. 3,472,581 entitled "Fused Multifocal Corneal Contact Lenses". The two materials that are employed have different refractive indexes and specifically the anterior has a high refractive index and the posterior portion has a lower refractive index, so that the distance portion of the lens is located at the center of the lens.

It is practically impossible to provide, in a contact lens, for a bifocal effect dependent upon shift of the line of vision (as in the case of bifocal glasses), because the cornea moves with the pupil in looking up and down. In order to present a differently made portion of the lens to the pupil when looking away from the center, the lens would have to slide over the cornea in response to eyelid friction. However, a contact lens is adapted to remain in one centered location on the cornea and cannot slide over the cornea in response to desired changes in focus.

OBJECTIVES AND FEATURES OF THE INVENTION

It is an objective of the present invention to provide a bifocal contact lens which enables the wearer to have good vision at near, intermediate and far distances and is as convenient to wear as a monofocal contact lens.

It is a further objective of the present invention to correct the vision of a person with presbyopia so that the person may see both far, intermediate and near distances without changing lenses.

It is a further objective of the present invention to provide such a contact lens which is compatible with the wearer's eye so that the lens may be worn all day without replacement or cleaning.

It is a further objective of the present invention to provide such a contact lens which is not tight-fitting, so that the corneal integrity and metabolism of the wearer is not disturbed.

It is a still further objective of the present invention that the lens may be adapted to correct for a variety of vision problems.

It is a feature of the present invention to utilize the layer of tear liquid, which has a refractive index of about 1.3375, between the cornea and the contact lens, as part of the lens system of the contact lens. The anterior (outside) curvature of the lens may be the appropriate contact lens curvature for near vision. The posterior surface (interior wall) of the contact lens is concave and curved to match the surface of the wearer's cornea. The posterior surface, at its center, has a concave "seg" (segment) in the form of a curved depression (dimple). The radius of curvature of the seg is smaller than the radius of curvature of the posterior lens surface. The seg is filled with tear liquid and not with air. The periphery (rim) of the seg is very well blended, preferably with a surface of velveteen cloth, to provide a very smooth curved transition zone which forms a blur circle. The blur circle zone is transparent and without a visible image.

It is found, using the contact lens of the present invention, that the wearer can shift his attention to the near-focused image, or intermediate image, or remote-focused image at will when the seg and its blur circle is suitably located and dimensioned, without interruption or impairment of vision.

The present invention has, through testing, been found to be practical. The theory behind the invention, although not essential to its practice, is believed to be as follows: The blur circle (smooth and clear zone) formed at the rim of the seg (depression) disperses divergent rays of light through the tear layer and through the pupil and onto the retina. The brain selects the rays so that the view appears normal.

The fit of the lens of the present invention is not tight against the cornea, as suggested in certain prior art bifocal contact lens systems. Instead, the lens is fitted with the same fit as a conventional monofocal lens, which permits a liquid tear flow under the lens. Such tear flow retains the eyes' normal metabolism and permits all-day wearing of the bifocal lens.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objectives and features of the present invention will be apparent from the following detailed description and its accompanying drawings.

In the drawings:

FIG. **1** is a vertical cross-sectional view showing a contact lens of the present invention positioned on the wearer's cornea;

FIGS. **2** and **3** are cross-sectional views on an enlarged scale, compared to FIG. **1**, of the central portion of the contact lens of the present invention, before polishing and after polishing, respectively; and

FIG. **4** is a cross-section of a mold showing the method of casting a contact lens of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIG. **1**, a contact lens **10**, preferably made of a suitable contact lens transparent material, such as optical glass or plastic, has its posterior (inside) surface curvature **11** formed to correspond with the curvature of the outside surface **13** of the user's cornea