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METHOD OF MAKING A BIFOCAL CONTACT LENS WITH AN EMBEDDED METAL WEIGHT

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ABSTRACT OF THE DISCLOSURE

A contact lens unit having a nonconcentrically disposed bifocal segment therein, in which said bifocal segment lies at least partially near an outer edge portion of the lens, and in which a dense metal insert portion is held in place inside said lens unit near a radially outer edge portion thereof, said insert being completely surrounded by the material comprising the contact lens unit, and held in place thereby without the use of adhesives or the like. A process for making such units is described, wherein a lens blank is prepared, a bifocal segment portion hollowed out, the metal insert placed in position, and the liquid plastic bifocal segment material poured in place covering the metal insert. The blank thus formed is then ground into a contact lens, and the metal insert, which serves to orient the lens in position on the eye, is disposed immediately adjacent the interface between the principal lens portion and the bifocal segment portion.

The present invention relates to contact lenses for the human eye, and in particular to a novel bifocal lens unit.

By the term bifocal contact lens is meant a lens in which different portions of a lens are designed to have differing indices of refraction. By a bifocal lens blank is means a blank or portion of starting material from which bifocal lenses can readily be made.

In the art of eyeglass fitting, bifocal lenses are universally acknowledged to have a number of advantages, insofar as a person wearing such eyeglasses may readily see distant as well as close objects with excellent acuity and without changing glasses, even when his accommodation is poor. Accordingly, there has been a great demand for bifocal lenses, especially among older eye patients who desire the versatility of such glasses. As a result of this demand, there is a substantial industry which is based on the construction and fitting of bifocal lenses.

Likewise, there has been an increasingly great demand for contact lenses. These lenses, which cover a portion of the eyeball of the wearer, ride in virtually direct contact with the eye, separated therefrom only by a thin film of fluid which covers the eyeball. These lenses, may be somewhat rotatable in use and the rear faces thereof are ground to correspond approximately with the curvature or contour of the cornea portion of the eyeball, while the front faces thereof are curved as is desired by the person fitting the glasses to give the desired optical effect.

Typical modern contact lenses, and the types which are almost universally preferred, cover an area somewhat smaller than the cornea of the eye but an area considerably larger than the pupil of the eye, and are kept in close overlying relation thereto.

Contact lenses have a number of advantages, the principal one being the close contact with the eye and relatively fixed position in use relative to the center of the lens, which naturally results in better optics than is the case where the lenses are held in frames and the eyes look through different portion thereof. In other words, in contact lenses, the line of sight more nearly follows the optical center of the lens.

Another advantage of contact lenses is their desirability from a cosmetic standpoint. In addition, contact lenses are much safer in use than are ordinary eyeglasses, especially for use in sporting activities, etc. Contact lenses have other desirable advantages, known to those familiar with the art, but which are not detailed here.

In recent years, many persons have tried contact lenses and have come to prefer them greatly over other and ordinary eyeglass. However, until now, it has not been practical to provide a satisfactory contact lens for those who desire or need a bifocal lens, for reasons which will be explained in greater detail herein.

Therefore, there exists a great need and a great demand for satisfactory bifocal contact lenses, but this demand has been unfulfilled until now.

The reasons for the difficulties with prior known bifocal contact lens units lies in the heretofore known and used construction thereof and with the methods of making such lenses. The present invention provides a lens of a different construction, and provides a simple method of making such an improved lens, thereby overcoming prior difficulties and providing, for the first time, a completely satisfactory bifocal contact lens.

In general, bifocal contact lenses are of two types, the so-called concentric and the so-called nonconcentric type.

A concentric lens is characterized in that a concentric ring of a material of a different I.R. than that of the principal material surrounds the geometric center of the lens in a generally concentric ring. A lens is also considered concentric when a portion thereof is ground away in a generally concentric pattern relative to the geometric center of the lens. Further characteristics of such lenses will be referred to in greater detail herein.

A nonconcentric bifocal lens is characterized in that the element with the differing optical density or refractive index, commonly known in the art as and sometimes referred to as the bifocal segment of the lens, is located in one sector or portion of the lens, away from the geometric center thereof, as described in greater detail herein. The term index of refraction, or refractive index, is sometimes referred to and abbreviated as "I.R.," and may be so abbreviated herein.

The ordinary bifocal noncontact lens is of this type, ordinarily, inasmuch as the wearer only wishes the higher index or more highly refractive amterial to be near the bottom of the lens, where the glance will be when reading or doing other fine work. Thus, ordinarily, a person wearing a bifocal lens wishes to use the long range vision portion of the lens most of the time, and the reading or close up portion thereof only when he is looking down. If ordinary, noncontact lenses were of the concentric type, the wearer thereof would be unable to look to the side or relatively upwardly at distant objects, and see them clearly at a distance. Therefore, unless some special reason therefor appears, ordinary contact lenses are of the nonconcentric type.

With ordinary spectacles, however, the higher index portion may be made by leaving the outside contour or curvature of the lens fixed, and utilizing a different curvature on the inside surface of the lens or fusing a bifocal segment thereto. Because a contact lens fits directly over the eye, however, treatment resulting in differing rear curvatures is impractical and unsafe with contact lenses.

Unlike ordinary eyeglasses, contact lens have no satisfactory method of preserving their orientation while in contact with the eye. Thus, if a portion of a contact lens is more highly refractive, and the lens is a non-concentric lens, there is no satisfactory method of keeping the higher index portion near the bottom in its desired position. If a concentric bifocal unit is provided, the higher index portion undesirably surrounds the lower index portion entirely, resulting in the disadvantages referred to above.