hologram 2, then the lens 1 can be of zero refractive power.

The ophthalmic lens 1 may take the form of a spectacle lens, or may be a contact lens, or could be an implant lens which is surgically inserted in the eye to replace a defective natural lens L.

In the case of a contact lens (or an implant lens) the hologram 2 would generally extend over the full visually used area of the lens. With a spectacle lens, the hologram 2 may be provided only over a reading portion or near portion, as in a bifocal or progressive lens.

The hologram 2 may be optically generated in or on the lens 1, or may be mechanically generated as a surface relief hologram on or in the lens 1. The hologram may take a form, and/or be generated in a manner, as described in U.K. patent application No. GB 2 101 764A, the relevant teachings of which are incorporated herein by reference.

The refractive power of the lens 1 is provided by refracting faces which are curved when viewed in axial-section (as in FIG. 2 which shows curved anterior and posterior refracting faces 3 and 4) and which may be of spherical curvature. It will be understood that any longitudinal chromatic aberration of the basic refractive lens is very small and has only a slight effect on that of the holographic element.

It will further be understood that the present invention makes particular use of change of power with colour (wavelength), and that references herein to power (whether refractive, diffractive, residual, overall, corrective, etc.) which are not qualified by colour or wavelength are to be understood as applying to green light of wavelength 555 nonometers unless the context indicates otherwise. However, it is required that the introduction of longitudinal chromatic aberration with the diffractive power should occur substantially uniformly across the full continuum of the visible spectrum and with high efficiency. A hologram 2 of as uniformly high efficiency as possible is therefore called for, e.g. an efficiency of more than 50%, and preferably at least 80%, at all wavelengths, and preferably with less than 20% difference between the maximum and minimum efficiencies, across the visible spectrum. The maximum efficiency should preferably be greater than 70%. A particular example of hologram may have a minimum efficiency of about 85% or more at the extremes of the visible spectrum and a maximum efficiency of about 99% or higher at the centre for green light.

It will be appreciated that an ophthalmic lens in accordance with the present invention can be thin, at least at its central portion, since it does not need to provide a high positive refractive power. Even when a high positive corrective power is required by the patient, the positive diffractive power of the lens can generally enable the requirement to be met with a relatively modest positive refractive power. Thinness of the lens is an advantage, particularly in the case of a contact lens, from the aspects of wearer comfort and, where relevant, oxygen transmission. However, the residual longitudinal chromatic aberration, whose extent may be greater than that of the natural chromatic aberration, can enable the eye to perform a variety of tasks without needing to adjust its focus (accommodate).

I claim:

1. An ophthalmic lens having positive diffractive power which introduces negative longitudinal chromatic aberration to an extent that more than counteracts the natural positive longitudinal chromatic aberration of the eye so as to provide in use a residual negative longitudinal chromatic aberration.

2. A lens according to claim 1 whose positive diffractive power is of a magnitude such that the introduced negative longitudinal chromatic aberration has an absolute value greater than twice that of the natural positive longitudinal chromatic aberration of the eye.

3. A lens according to claim 1 whose diffractive power is about +3.4D dioptres where −D is the extent of negative longitudinal chromatic aberration required to be introduced.

4. A lens according to claim 1 having zero refractive power.

5. A lens according to claim 1 having refractive power so that the overall or residual power of the lens is determined by the algebraic sum of the diffractive and refractive powers.

6. A lens according to claim 5 whose refractive power is negative and of a magnitude such as to balance or cancel the diffractive power so that the overall or residual power is substantially zero.

7. A lens according to claim 5 whose refractive power is provided by faces which are curved as viewed in axial section.

8. A lens according to claim 7 in which said faces are of spherical curvature.

9. A contact lens according to claim 1.

10. An implant lens according to claim 1.

11. A lens according to claim 9 having the diffractive power over its full visually used area.

12. A lens according to claim 10 having the diffractive power over its full visually used area.

13. A spectacle lens according to claim 1.

14. A lens according to claim 13 having the diffractive power over part only of the visually used area.

15. A lens according to claim 1 having an efficiency of diffraction of more than 50% at all wavelengths across the visible spectrum.

16. A lens according to claim 15 having a maximum efficiency of diffraction of more than 70%.

17. A lens according to claim 16 having a difference between the maximum and minimum efficiencies of diffraction of less than 20%.

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