Claims

1. An ophthalmic lens comprising a central portion, multiple first refractive regions, and multiple second refractive regions, wherein:

the multiple first refractive regions are arranged in a first zone surrounding the central portion, the first zone includes one or multiple first patterns, the first refractive regions are arranged in the one or multiple first patterns,

the multiple second refractive regions are arranged in a second zone farther away from the central portion than the first zone, the second zone includes multiple second patterns, the second refractive regions are arranged in the multiple second patterns,

the first patterns and second patterns are annular patterns which are centered on the center of ophthalmic lens,

part or whole of the central portion has prescription power based on a human eye prescription,

the multiple first refractive regions and the multiple second refractive regions have different dioptric powers from the prescription power, and

within each of the multiple first patterns, the spacing of any two adjacent first refractive regions is less than 0.5 mm, within each of the multiple second patterns, the spacing of any two adjacent second refractive regions is greater than the spacing of any two adjacent first refractive regions, and the multiple second refractive regions are arranged on multiple rays or multiple curves which start from the ophthalmic lens center.

2. The ophthalmic lens according to claim 1, wherein:

the density of the multiple first refractive regions in the first zone is greater than the density of the multiple second refractive regions in the second zone.

3. The ophthalmic lens according to claim 1 or 2, wherein the multiple first refractive regions are configured such that, when the ophthalmic lens is worn by a wearer, a part or all of the incoming light beams passing through the multiple first refractive regions refractive region are projected onto an area between 10 to 20 degrees from the fovea of the wearer's retina.

4. The ophthalmic lens according to any one of claims 1 to 3, wherein:

the multiple first refractive regions are at least partially arranged in an annular zone with an inner diameter of 9.0 mm to an outer diameter of 15.0 mm centered on the center of the ophthalmic lens, or the multiple first refractive regions are at least partially arranged in an annular zone with an inner diameter of 9.5 mm to an outer diameter of 14.0 mm centered on the center of the ophthalmic lens, or the multiple first refractive regions are at least partially arranged in an annular zone with an inner diameter of 11.0 mm to an outer diameter of 14.0 mm centered on the center of the ophthalmic lens.

5. The ophthalmic lens according to any one of claims 1 to 4, wherein:

the maximum size of the projection of each of the multiple first refractive regions and the multiple second refractive regions on the ophthalmic lens is independently selected from the range of 0.8 mm to 2.2 mm, and/or

the projection of each of the multiple first refractive regions and the multiple second refractive regions on the ophthalmic lens has a circular shape, and/or

the multiple first refractive regions and the multiple second refractive regions each have a surface shape selected from spherical, aspherical, or toroidal shapes, and/or

the multiple second refractive regions have equal areas on the projection on the ophthalmic lens.

6. The ophthalmic lens according to any one of claims 1 to 5, wherein:

each of the multiple first refractive regions has a dioptric power obtained by adding a positive dioptric power to the prescription power, and/or each of the multiple second refractive regions has a dioptric power obtained by adding a positive dioptric power to the prescription power, or

the dioptric power of the multiple first refractive regions is the same as the dioptric power of the multiple second refractive regions, or

along the radial direction of the ophthalmic lens, the dioptric power of the multiple first refractive regions and the multiple second refractive regions increases gradually or increases in a stepped manner with radial distance increasing, and/or the size of the multiple first refractive regions and the multiple second refractive regions decreases gradually or decreases in a stepped manner with radial distance increasing, or

along the radial direction of the ophthalmic lens, the dioptric power of the multiple first refractive regions and the multiple second refractive regions decreases gradually or decreases in a stepped manner with radial distance increasing, and/or the size of the multiple first refractive regions and the multiple second refractive regions increases gradually or increases in a stepped manner with radial distance increasing.

7. The ophthalmic lens according to any one of claims 1 to 6, wherein:

the maximum size of the central portion is selected from 3.0 to 11.0 mm, and/or

the central portion is a circular zone centered on the center of the ophthalmic lens, and the diameter of the circular zone is selected from 3.0 to 11.0 mm

8. The ophthalmic lens according to any one of claims 1 to 7, wherein:

the total area ratio of the multiple first refractive regions in the first zone is greater than

or equal to 60% and less than or equal to 78.5%, or greater than 63% and less than or equal to 78.5%, or greater than 66% and less than or equal to 78.5%, and/or

the total area ratio of the multiple second refractive regions in the second zone is less than 60%, or less than 57%, or less than 54%.

9. The ophthalmic lens according to any one of claims 1 to 8, wherein:

the first zone includes one or more first patterns, and a part or all of the first zone is a first annular zone centered on the center of the ophthalmic lens, with an inner diameter of 9 mm and an outer diameter of 15 mm, and the total area ratio of the multiple first refractive regions in any individual first pattern within the first annular zone is greater than 70% and less than 78.5%, or greater than 72% and less than 78.5%.

10. The ophthalmic lens according to any one of claims 1 to 9, wherein:

the spacing between any adjacent two second patterns are equal to the spacing between any adjacent two first patterns, and/or the spacing between any adjacent two second patterns are equal to the spacing between the adjacent first pattern and the second pattern, or

the spacing between any adjacent two second patterns, the spacing between any adjacent two first patterns, and/or the spacing between the adjacent first pattern and the second pattern are all zero, or

the spacing between any adjacent two first patterns are less than or equal to 0.5 mm.

11. The ophthalmic lens according to claim 10, wherein:

the number of first patterns is 1-4, and the number of second patterns is 1-15.

12. The ophthalmic lens according to claim 10 or 11, wherein:

within the multiple second patterns, the spacing between the second refractive regions in the second pattern decreases as the second patterns get closer to the center of the ophthalmic lens, and/or

within the patterns including all the first patterns and all the second patterns, the spacing between the first refractive regions or the second refractive regions in the pattern decreases as the patterns get closer to the center of the ophthalmic lens.

13. The ophthalmic lens according to any one of claims 10 to12, wherein:

the total area ratio of the multiple first refractive regions within at least one first pattern is greater than or equal to 60% and less than or equal to 78.5%, or greater than or equal to 70% and less than or equal to 78.5%, and/or

in the case where the first zone includes multiple first patterns, the total area ratio of the first refractive regions within each first pattern is greater than or equal to 60% and less than or equal to 78.5%, and/or

in the case where the first zone includes multiple first patterns, the total area ratio of the first refractive regions within at least two first patterns is greater than or equal to 70% and less than or equal to 78.5%, and/or

the total area ratio of the multiple second refractive regions within at least one second pattern is less than 60% and greater than or equal to 30%, or less than 60% and greater than or equal to 35%, or less than 60% and greater than or equal to 40%, and/or

in the case where the second zone includes multiple second patterns, the total area ratio of the second refractive regions within each second pattern is less than 60% and greater than or equal to 30%.

14. The ophthalmic lens according to any one of claims 10 to 13, wherein:

in the case where the first zone includes multiple first patterns, the total area ratio of the first refractive regions in the first pattern increases as the first patterns get closer to the center of the ophthalmic lens, and/or

in the case where the second zone includes multiple second patterns, the total area ratio of the second refractive regions in the second pattern increases as the second patterns get closer to the center of the ophthalmic lens, and/or

the total area ratio of the first refractive regions in each first pattern is greater than the total area ratio of the second refractive regions in each second pattern.

15. The ophthalmic lens according to any one of claims 1 to 14, wherein:

the multiple first refractive regions are distributed along multiple rays or curves starting from the center of the ophthalmic lens.

16. The ophthalmic lens according to claim 15, wherein:

on the same ray or curve, the addition power of the first refractive regions is uniform, and/or the addition power of the second refractive regions is uniform, and/or the addition power of the first refractive regions and the second refractive regions is uniform, or

on the same ray or curve, the size of the first refractive regions is uniform, and/or the size of the second refractive regions is uniform, and/or the size of the first refractive regions and the second refractive regions is uniform, or

on the same ray or curve, along the direction away from the center of the ophthalmic lens, the changing trend in addition power of the first refractive regions is opposite to the changing trend in size, and/or the changing trend in addition power of the second refractive regions is opposite to the changing trend in size, or

on the same ray or curve, along the direction away from the center of the ophthalmic lens,

the size of the first refractive regions and second refractive regions increases gradually or increases in a step-wise manner, and/or the addition power of the first refractive regions and second refractive regions decreases gradually or decreases in a step-wise manner.

17. The ophthalmic lens according to any one of claims 1 to 16, wherein:

the multiple first refractive regions and multiple second refractive regions are configured such as to maintain substantially constant image jump throughout the first zone and second zone, and/or

the coefficient of variation of the image jump of the multiple first refractive regions and the multiple second refractive regions is less than 20% throughout the first zone and second zone, and/or

the coefficient of variation of the image jump of the multiple second refractive regions is less than 15%, or less than 12%, or less than 10% throughout the second zone.

18. The ophthalmic lens according to any one of claims 1 to 17, wherein:

the multiple first refractive regions are arranged such that the gaps between multiple first refractive regions form continuous far-vision correction regions; and/or

the multiple second refractive regions are arranged such that the gaps between multiple second refractive regions form continuous far-vision correction regions.

19. The ophthalmic lens according to any one of claims 1 to 18, wherein:

the total area ratio of the first refractive regions set on the temporal side of the first zone is different from the total area ratio of the first refractive regions set on the nasal side of the first zone, and/or

the addition power of the first refractive regions is asymmetrically set on the temporal

side and nasal side of the first zone, and/or

the total area ratio of the second refractive regions set on the temporal side of the second zone is different from the total area ratio of the second refractive regions set on the nasal side of the second zone, and/or

the addition power of the second refractive regions is asymmetrically set on the temporal side and nasal side of the second zone.

20. A frame eyeglass comprising the ophthalmic lens according to any one of claims 1 to 19.