k=conic constant to yield either an ellipse or a hyperbola;

A, B, C, and D=coefficients for varying the curvature from the apex to the edge; and

Y=distance normal to the optical axis of the lens through the apex as shown in FIG. 6.

For example, an aspheric intraocular lens having 18.0 diopter power in the eye in accordance with this invention has an apical curvature of 0.11628 mm., a conic constant of 0.000119 and coefficients A through D of -0.276075×10^{-3}; -0.324511×10^{-5}; 0.268191×10^{-7}; and -0.145071×10^{-9}, respectively.

The following is a chart of the conic constants and coefficient found to produce a complete family of effective aspheric lens.

Diopter (Eye)	Ca × 10^{-2}	K × 10^{-3}	A × 10^{-3}	B × 10^{-5}	C × 10^{-9}	D × 10^{-10}
10	6.447	.265	−.192807	−.10861	−.203377	.507039
10.5	6.77	.299	−.194550	−.115792	−.869791	.522880
11	7.092	.314	−.196336	−.123124	−1.58687	.520648
11.5	7.415	.318	−.198817	−.131235	−2.36760	.509791
12	7.737	.320	−.201688	−.139867	−3.21878	.489171
12.5	8.059	.307	−.205027	−.149196	−4.16882	.462950
13	8.382	.298	−.208396	−.158830	−5.22122	.424082
13.5	8.705	.299	−.212971	−.170045	−6.41432	.381238
14	9.027	.307	−.217322	−.181376	−7.72415	.316264
14.5	9.349	.304	−.222617	−.194216	−9.19654	.226656
15	9.671	.288	−.228381	−.208100	−10.8498	.113574
15.5	1.000	.131	−.234722	−.223455	−12.7517	−.0361902
16	1.0317	.116	−.241366	−.239526	−14.8455	−.0194536
16.5	10.627	.118	−.249590	−.258260	−17.2455	−.380321
17	10.965	.120	−.257318	−.277884	−20.0191	−.676902
17.5	11.287	.138	−.265935	−.299238	−23.1081	−.997463
18	11.628	.119	−.276075	−.324511	−26.8191	−1.45071
18.5	11.933	.115	−.286278	−.349943	−30.6623	−1.92666
19	12.255	.093	−.297730	−.379195	−35.2485	−2.54846
19.5	12.579	−209.862	−.257701	−.337117	−30.9202	−1.58611
20	12.903	−209.861	−.266800	−.362553	−34.8611	−2.19214
20.5	13.288	−216.035	−.274240	−.386696	−39.2435	−2.62190
21	13.55	−23.2098	−.280288	−.410766	−43.3719	−3.28125
21.5	13.87	−23.2093	−.290679	−.441681	−48.8705	−4.06198
22	14.184	−23.2094	−.302648	−.476935	−55.1714	−4.98135
22.5	14.514	−23.2095	−.315256	−.515630	−62.4471	−6.11013
23	14.837	−23.2145	−.332809	−.566820	−71.6961	−7.46951
23.5	15.155	−24.2738	−.338602	−.595568	−78.2638	−8.73609
24	15.48	−24.2737	−.355016	−.648247	−88.88159	
					−10.5606	
24.5	15.798	−24.2745	−.371194	−.702356	−100.112	−12.6698
25.	16.129	−25.7839	−.381465	−.749158	−110.796	−14.5862

The visual acuity of aspheric intraocular lenses is significantly better than spherical intraocular lenses above 3 mm of pupil opening as shown by a modulation transfer function (MTF) analysis using the MIL-SPEC eye model (MIL-HDBK-141; 1962). MTF describes the loss of visual contrast caused by an optical system for various spatial frequencies and pupil diameters.

Such an analysis was performed by using a monochromatic light source of 550 nm (green light) at which the peak sensitivity of the human eye in normal daylight is realized. The following are the comparative results in line pairs per millimeter for a 50% MTF which have been computed for an on-axis image of a target placed 20 feet in front of the eye model.

Entrance Pupil Diameter Or Iris Opening	Spherical Intraocular Lens	Aspherical Intraocular Lens
2 mm	85 lp/mm	82 lp/mm
3 mm	110	122
4 mm	70	164
5 mm	32	205

-continued

Entrance Pupil Diameter Or Iris Opening	Spherical Intraocular Lens	Aspherical Intraocular Lens
6 mm	17	248

Thus, the advantages of aspheric intraocular lenses over spheric intraocular lenses is evident. Further, an aspheric intraocular lens is, in general, thinner in thickness than a spheric intraocular lens, and consequently is lighter.

Although this invention has been described in detail with reference to certain versions thereof, it will be understood that variations and modifications can be effected within the spirit and scope of this invention described above and defined in the following claims.

What is claimed:

1. An intraocular lens for implantation in the human eye comprising a lens having at least one curved surface with a radius of curvature that is longer at the edge than at the apex, wherein the radius of curvature in the area up to 1.5 mm from the apex is constant.

2. An intraocular lens for implantation in the human eye comprising a lens having at least one curved surface with a radius of curvature that varies from the apex to the edge according to the equation for the sag value Z of

$$Z = \frac{Ca\,Y^2}{1 + [1 - (i + k)(Ca)^2\,Y^2]^{\frac{1}{2}}} + AY^4 + BY^6 + CY^8 + DY^{10}$$

where Ca is the apical curvature; k is a conic constant; A, B, C, and D are coefficients and Y is the distance normal to the optical axis of the lens through the apex