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Optical lens assembly and electronic device

Abstract

An optical lens assembly includes a lens barrel and an optical lens group. The lens barrel includes a light entering hole, which is configured for allowing a light to enter the lens barrel. The lens barrel accommodates the optical lens group, and an optical axis passes through the optical lens group. The optical lens group includes a plurality of lens elements and at least one light blocking sheet. The light blocking sheet is an opaque sheet-shaped element and surrounds the optical axis to form a light passing hole. The light blocking sheet includes an object-side surface and an image-side surface, and the object-side surface is located more adjacent to the light entering hole than the image-side surface thereto. A first film layer is disposed on the object-side surface.

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
6950236	12/2004	Hokazono et al.	N/A	N/A
8691351	12/2013	Asakura et al.	N/A	N/A
9638832	12/2016	Su	N/A	N/A
11327299	12/2021	Lai et al.	N/A	N/A
2004/0114248	12/2003	Hokazono et al.	N/A	N/A
2019/0227202	12/2018	Nagahama et al.	N/A	N/A
2020/0088969	12/2019	Nagahama et al.	N/A	N/A
2020/0174167	12/2019	Chu	N/A	N/A
2020/0272030	12/2019	Tsai	N/A	N/A
2021/0072487	12/2020	Cheng	N/A	G03B 30/00
2021/0165136	12/2020	Tsai et al.	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
1502048	12/2003	CN	N/A
106773454	12/2016	CN	N/A
107305259	12/2016	CN	N/A
109791231	12/2018	CN	N/A
209028384	12/2018	CN	N/A
210119624	12/2019	CN	N/A
567338	12/2002	TW	N/A
201339628	12/2012	TW	N/A
201901193	12/2018	TW	N/A
I676852	12/2018	TW	N/A
I707169	12/2019	TW	N/A
2013088836	12/2012	WO	N/A

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Background/Summary

RELATED APPLICATIONS (1) This application claims priority to U.S. Provisional Application Ser. No. 63/275,966, filed Nov. 5, 2021, which is herein incorporated by reference.

BACKGROUND
Technical Field
(1) The present disclosure relates to an optical lens assembly and an electronic device. More particularly, the present disclosure relates to a compact optical lens assembly that is applicable to electronic devices.
Description of Related Art
(2) In recent years, portable electronic devices have developed rapidly. For example, intelligent electronic devices and tablets have been filled in the lives of modern people, and optical lens assemblies thereof mounted on portable electronic devices have also prospered. However, as technology advances, the requirements of the appearance quality of the electronic devices and the optical lens assemblies thereof are becoming higher and higher. Therefore, an electronic device with an optical lens assembly, which can balance the appearance recognition and the image quality, needs to be developed.
SUMMARY
(3) According to one aspect of the present disclosure, an optical lens assembly includes a lens barrel and an optical lens group. The lens barrel includes a light entering hole, which is configured for allowing a light to enter the lens barrel. The lens barrel accommodates the optical lens group, and an optical axis passes through the optical lens group. The optical lens group includes a plurality of lens elements and at least one light blocking sheet. The light blocking sheet is an opaque sheet-shaped element and surrounds the optical axis to form a light passing hole. The light blocking sheet includes an object-side surface and an image-side surface, and the object-side surface is located more adjacent to the light entering hole than the image-side surface thereto. A first film layer is disposed on the object-side surface. A reflected light is obtained from the first film layer irradiated by a standard illuminant D65, a color index of the reflected light is defined according to a CIE 1976 L*a*b* color space, the color index is CI, the reflected light has a maximum reflectivity in a spectrum in a wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is a high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the high reflectivity section is a second reflectivity section, an average reflectivity in the high reflectivity section is R.sub.high, an average reflectivity in the second reflectivity section is R.sub.2, the following conditions are satisfied: CI={(L*)×[(a*).sup.2+(b*).sup.2]}.sup.1/2; 8≤CI≤41; and 1.8≤R.sub.high/R.sub.2≤6.2.
(4) According to another aspect of the present disclosure, an electronic device includes the optical lens assembly according to the foregoing aspect.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The present disclosure can be more fully understood by reading the following detailed description of the embodiment, with reference made to the accompanying drawings as follows:
(2) FIG. **1**A is a three-dimensional view of an optical lens assembly according to the 1st embodiment of the present disclosure.
(3) FIG. **1**B is a top view of the optical lens assembly in FIG. **1**A.
(4) FIG. **10** is a partially cross-sectional view of the optical lens assembly in

(5) FIG. **1**A.
(6) FIG. **1**D is a top view of a first light blocking sheet of the optical lens assembly in FIG. **1**A.
(7) FIG. **1**E is a top view of a second light blocking sheet of the optical lens assembly in FIG. **1**A.
(8) FIG. **1**F is a cross-sectional view along line **1**F-**1**F in FIG. **1**E.
(9) FIG. **1**G is a schematic view of reflectivity of the first light blocking sheet and the second light blocking sheet of the optical lens assembly in FIG. **1**A.
(10) FIG. **1**H is a schematic view of the reflectivity of the first light blocking sheet of the optical lens assembly in FIG. **1**A.
(11) FIG. **1**I is a schematic view of the reflectivity of the second light blocking sheet of the optical lens assembly in FIG. **1**A.
(12) FIG. **2**A is a three-dimensional view of an optical lens assembly according to the 2nd embodiment of the present disclosure.
(13) FIG. **2**B is a top view of the optical lens assembly in FIG. **2**A.
(14) FIG. **2**C is a partially cross-sectional view of the optical lens assembly in
(15) FIG. **2**A.
(16) FIG. **2**D is a top view of a light blocking sheet of the optical lens assembly in FIG. **2**A.
(17) FIG. **2**E is a cross-sectional view along line **2**E-**2**E in FIG. **2**D.
(18) FIG. **2**F is a top view of a light blocking sheet that can be applicable to the optical lens assembly in FIG. **2**A.
(19) FIG. **3**A is a three-dimensional view of an optical lens assembly according to the 3rd embodiment of the present disclosure.
(20) FIG. **3**B is a top view of the optical lens assembly in FIG. **3**A.
(21) FIG. **3**C is a partially cross-sectional view of the optical lens assembly in
(22) FIG. **3**A.
(23) FIG. **3**D is a top view of a lens barrel of the optical lens assembly in FIG. **3**A.
(24) FIG. **3**E is a top view of a first light blocking sheet of the optical lens assembly in FIG. **3**A.
(25) FIG. **3**F is a top view of a second light blocking sheet of the optical lens assembly in FIG. **3**A.
(26) FIG. **3**G is a three-dimensional view of a first lens element of the optical lens assembly in FIG. **3**A.
(27) FIG. **3**H is a schematic view of reflectivity of the first lens element in FIG. **3**G.
(28) FIG. **4**A is a three-dimensional view of an electronic device according to the 4th embodiment of the present disclosure.
(29) FIG. **4**B is a block diagram of the electronic device in FIG. **4**A.

DETAILED DESCRIPTION

(30) According to one aspect of the present disclosure, an optical lens assembly is provided. The optical lens assembly includes a lens barrel and an optical lens group. The lens barrel includes a light entering hole, which is configured for allowing a light to enter the lens barrel, i.e., the light enters the lens barrel via the light entering hole. The lens barrel accommodates the optical lens group, and an optical axis passes through the optical lens group. The optical lens group includes a plurality of lens elements and at least one light blocking sheet. The light blocking sheet is an opaque sheet-shaped element and surrounds the optical axis to form a light passing hole. The light blocking sheet includes an object-side surface and an image-side surface, and the object-side surface is located more adjacent to the light entering hole than the image-side surface thereto. A first film layer is disposed on the object-side surface. A reflected light is obtained (i.e., reflected) from (one point on) the first film layer irradiated by a standard illuminant D65, a color index of the reflected light is defined according to a CIE 1976 L*a*b* color space, the color index is CI, the reflected light has a maximum reflectivity in a spectrum in a wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the maximum reflectivity minus 50 nm to the wavelength corresponding to the maximum reflectivity plus 50 nm is a high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the

high reflectivity section is a second reflectivity section, an average reflectivity in the high reflectivity section is R.sub.high, an average reflectivity in the second reflectivity section is R.sub.2, the following conditions are satisfied: CI={(L*)×[(a*).sup.2+(b*).sup.2]}.sup.1/2; 8≤CI≤41; and 1.8≤R.sub.high/R.sub.2≤6.2. Therefore, the color index satisfying the aforementioned conditions is favorable for the light blocking sheet to have colors other than gray-scale tones, which can improve the appearance recognition of the optical lens assembly, so that the appearance of the optical lens assembly achieves a unique visual experience. Among the wavelength band of visible light, only part of the wavelength band having a high average reflectivity is advantageous in preventing the light blocking sheet from the stray light to affect the image quality. The first film layer may be formed by high and low refractive index layers alternately stacked, and the color of the reflected light from the first film layer can be adjusted by controlling the thicknesses of high and low refractive index layers. Moreover, the surface of the light blocking sheet has a specific wavelength band distribution with high and low reflectivity (about blue of cool color tone), and maintains the coordinates of a specific color space. The coating with the specific high and low reflectivity distribution can also be applied to the lens barrel and the lens element, while maintaining the coordinates of the specific color space. Furthermore, the following conditions may be satisfied by the aforementioned optical lens assembly: 11≤CI≤28; and 2.2 R.sub.high/R.sub.2≤4.8.

(31) Moreover, a color is defined with three values of L*a*b* according to the CIE 1976 L*a*b* color space, L* represents the perceived brightness (L*=0 for black, and L*=100 for white), a* represents green and red (a*=−128 for green, and a*=127 for red), and b* represents blue and yellow (b*=−128 for blue, and b*=127 for yellow). The object under test is placed on the carrying platform of the reflectivity measuring instrument, the standard illuminant D65 is vertically incident on the first film layer at an incident angle of 0 degrees, a measurement is performed at a position of a reflection angle of 0 degrees with a maximum field of view (FOV) of 2 degrees, and a reflectivity and the values of L*a*b* of the reflected light can be measured. In addition, the wavelength range of the wavelength corresponding to the maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is the high reflectivity section. However, if a lower limit or an upper limit of the wavelength range of the wavelength corresponding to the maximum reflectivity minus and plus 50 nm is smaller than 380 nm or greater than 780 nm, the lower limit of the high reflectivity section is set as 380 nm or the upper limit of the high reflectivity section is set as 780 nm.

(32) Furthermore, the outline of the light passing hole observed at the optical axis may be a circular shape or any shape (e.g., the outline of the light passing hole is formed by a plurality of arc shapes connected, as shown in FIG. **2**F), but is not limited thereto. In addition, a diameter of the light passing hole may gradually increase from the image side surface to the object side surface.

(33) In detail, when the wavelength corresponding to the maximum reflectivity is λ.sub.RMax, the following condition may be satisfied: 380 nm≤λ580 nm. Therefore, controlling the wavelength corresponding to the maximum reflectivity is favorable for avoiding the wavelength band that results in more stray light, and thereby improving the image quality.

(34) When the maximum reflectivity is RMax, the following condition may be satisfied: 0.5%≤R.sub.max≤4%. Therefore, controlling the maximum reflectivity of the first film layer is favorable for the first film layer to have color and luster and reduce the stray light, so as to improve the image quality.

(35) When an average reflectivity of the reflected light in the wavelength range of 380 nm to 780 nm is R.sub.3878, the following condition may be satisfied: 0.1%≤R.sub.3878≤2%. Therefore, the visible light band of the overall reflected light maintaining a low reflectivity is advantages in preventing the image quality from being affected by the stray light.

(36) A difference appears between two color indexes of any two points, respectively, on the first film layer. When an absolute value of the difference is |ΔCI|, the following condition may be satisfied: 0≤|ΔCI|≤4.7. Therefore, a smaller difference between the color indexes of the first film

layer indicates a more uniform distribution of color and luster and a better appearance quality.
(37) The first film layer may be disposed from the light passing hole along a direction being away from the optical axis, and a coverage area of the first film layer is smaller than an area of the object-side surface. Therefore, the first film layer not completely covering the object-side surface of the light blocking sheet is beneficial to mass production.
(38) A number of the at least one light blocking sheet may be at least two, and the first film layer is disposed on the object-side surface of each of the light blocking sheets. Diameters of the light passing holes of the at least two light blocking sheets, respectively, may be different, and the diameter of the light passing hole of one of the at least two light blocking sheets closer to an object side is greater than the diameter of the light passing hole of the other of the at least two light blocking sheets. Therefore, the two light blocking sheets can be observed from the outside the lens barrel at the same time. Colors of the first film layers of the two light-blocking sheets may be the same, so that the appearance of the optical lens assembly is consistent. Alternately, the colors of the first film layers of the two light-blocking sheets may be slightly different, so that the optical lens assembly has a gradient effect in the visual appearance, but is not limited thereto.
(39) When a thickness in a direction along the optical axis of the light blocking sheet is Ts, the following condition may be satisfied: 7 μm<Ts<50 μm. In detail, the light blocking sheet may include a base layer and two covering layers, an object-side surface of the base layer is in physical contact with one of the covering layers, an object-side surface of the one of the covering layers is in physical contact with the first film layer, and an image side surface of the base layer is in physical contact with the other of the covering layers. Alternately, the light blocking sheet may include a base layer and a covering layer, an object-side surface of the base layer is in physical contact with the first film layer, and an image side surface of the base layer is in physical contact with the covering layer. A material of the base layer can be plastic, e.g., PI or PET, and the material of the base layer can be metal, e.g., free-cutting brass or copper alloy, but is not limited thereto.
(40) When a diameter of the light entering hole is φb, and a diameter of the light passing hole is φs, the following condition may be satisfied: φs<φb. Furthermore, the following condition may be satisfied: $0.31 \leq (\varphi b - \varphi s)/\varphi b \leq 0.95$. Therefore, when any of the aforementioned conditions is satisfied, there is a higher proportion that the light blocking sheet can be observed by the naked eyes from the outside of the lens barrel, so as to improve the appearance consistency of the optical lens assembly.
(41) When a maximum field of view of the optical lens assembly is FOV, the following condition may be satisfied: 93 degrees≤FOV≤175 degrees. Therefore, for the optical lens assembly satisfying the aforementioned condition, the light blocking sheet is favorable for significantly improving the appearance of the optical lens assembly.
(42) In a direction along the optical axis, when a distance between a most object-side end of the lens barrel and a most image-side end of the lens barrel is Db, and a distance between the most object-side end of the lens barrel and the first film layer is Ds, the following condition may be satisfied: $0.05 \leq Ds/Db \leq 0.41$. Therefore, the light blocking sheet disposed close to the light entering hole of the lens barrel is beneficial to observe the light blocking sheet from the outside of the lens barrel.
(43) An object-side portion of the lens barrel may include a top wall surrounding the optical axis to form the light entering hole, and a second film layer is disposed on the top wall. Another reflected light is obtained from the second film layer irradiated by the standard illuminant D65, another color index of the another reflected light is defined according to the CIE 1976 L*a*b* color space, the another color index is CI2, the another reflected light has another maximum reflectivity in another spectrum in the wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the another maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is another high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the another high reflectivity section is another second reflectivity section,

an average reflectivity in the another high reflectivity section is R2.sub.high, an average reflectivity in the another second reflectivity section is R2.sub.2, and the following conditions may be satisfied: CI2={(L*)×[(a*).sup.2+(b*).sup.2]}.sup.1/2, 11≤CI2≤41; and 1.8≤R2.sub.high/R2.sub.2≤6.2. Therefore, the top wall of the lens barrel with the second film layer disposed thereon is favorable for having a sense of visual extension of the color and luster so as to improve the appearance consistency of the optical lens assembly.

(44) One of the lens elements may be disposed on an object side of the light blocking sheet, and the one of the lens elements includes an optical effective region and a peripheral region. The optical effective region is configured for being passed through by the light. The peripheral region is located farther from the optical axis than the optical effective region therefrom, and a third film layer is disposed on at least one of a peripheral object-side surface and a peripheral image-side surface of the peripheral region. Further another reflected light is obtained from the third film layer irradiated by the standard illuminant D65, further another color index of the further another reflected light is defined according to the CIE 1976 L*a*b* color space, the further another color index is CI3, and the following conditions may be satisfied: CI3={(L*)×[(a*).sup.2+(b*)]}.sup.1/2; and 11≤CI3≤75. Therefore, the peripheral region of the lens element with the third film layer disposed thereon is favorable for improving the appearance consistency of the optical lens assembly. In addition, the optical effective region of the lens element may have another third film layer disposed thereon. Furthermore, a material of the lens element enables the third film layer to present a brighter color and luster, and thereby the higher color index CI3 is obtained.

(45) Continuing from the previous paragraph, the further another reflected light is obtained from the third film layer irradiated by the standard illuminant D65, the further another reflected light has further another maximum reflectivity in further another spectrum in the wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the further another maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is further another high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the further another high reflectivity section is further another second reflectivity section, an average reflectivity in the further another high reflectivity section is R3.sub.high, an average reflectivity in the further another second reflectivity section is R3.sub.2, and the following conditions are satisfied: 2.5 R3.sub.high/R3.sub.2≤34. Therefore, it is favorable for improving the appearance consistency of the optical lens assembly.

(46) According to another aspect of the present disclosure, an electronic device is provided. The electronic device includes the aforementioned optical lens assembly. Therefore, the optical lens assembly of the present disclosure is favorable for improving the appearance and the visual experience of the electronic device, and can be applied to the electronic devices such as smart phones (with dual lens assemblies or multiple lens assemblies), tablet computers, portable video recorders, wearable devices, etc., but is not limited thereto. Furthermore, the light blocking sheet in the present disclosure is favorable for applying in an ultra-wide-angle lens assembly to have a better effect, but is not limited thereto.

(47) Each of the aforementioned features can be utilized in various combinations for achieving the corresponding effects. According to the aforementioned aspects, specific embodiments are provided, and illustrated via figures.

1st Embodiment

(48) FIG. **1**A is a three-dimensional view observed from an object side of an optical lens assembly **100** according to the 1st embodiment of the present disclosure, FIG. **1**B is a top view observed from the object side of the optical lens assembly **100** in FIG. **1**A, and FIG. **10** is a partially cross-sectional view of the optical lens assembly **100** in FIG. **1**A. With reference to FIG. **1**A to FIG. **10**, the optical lens assembly **100** includes a lens barrel **110** and an optical lens group **130**. The lens barrel **110** includes a light entering hole **111**, which is configured for allowing a light to enter the lens barrel **110**. The lens barrel **110** accommodates the optical lens group **130**, and an optical axis z

passes through the optical lens group **130** (as shown in FIG. **10**). The optical lens group **130** includes a first lens element **171**, a second lens element **172**, a third lens element **173**, a fourth lens element **174**, a fifth lens element **175** and a sixth lens element **176** in order from the object side (i.e., a left side in FIG. **10**) to an image side (i.e., a right side in FIG. **10**) along the optical axis z. A total number of lens elements in the optical lens group **130** is six. The reference numerals of the transparent lens elements such as the first lens element **171**, etc. are omitted in FIG. **1**A and FIG. **1**B. Partial surface shapes of the lens elements are omitted in FIG. **10**. It should be understood that the total number and the surface shapes of the lens elements in the optical lens assembly of the present disclosure are not limited thereto. A number of the light blocking sheet of the optical lens group **130** is at least two, and the optical lens group **130** specifically further includes annular optical elements such as a first light blocking sheet **140**, a second light blocking sheet **150**, another light blocking sheet, a spacer, a retainer, etc. The first light blocking sheet **140** is disposed and connected between the first lens element **171** and the second lens element **172**, and the second light blocking sheet **150** is disposed and connected between the second lens element **172** and third lens element **173**.

(49) FIG. **1**D is a top view of the first light blocking sheet **140** of the optical lens assembly **100** in FIG. **1**A, and FIG. **1**E is a top view of the second light blocking sheet **150** of the optical lens assembly **100** in FIG. **1**A. With reference to FIG. **10** to FIG. **1**E, the first light blocking sheet **140** is an opaque sheet-shaped element and surrounds the optical axis z to form a light passing hole **141**. The first light blocking sheet **140** includes an object-side surface **145** and an image-side surface **146**, and the object-side surface **145** is located more adjacent to the light entering hole **111** than the image-side surface **146** thereto. A first film layer **149** is disposed on the object-side surface **145**. The second light blocking sheet **150** is an opaque sheet-shaped element and surrounds the optical axis z to form a light passing hole **151**. The second light blocking sheet **150** includes an object-side surface **155** and an image-side surface **156**, and the object-side surface **155** is located more adjacent to the light entering hole **111** than the image-side surface **156** thereto. A first film layer **159** is disposed on the object-side surface **155**. Furthermore, it should be understood that the dotted parts in the related drawings of the present disclosure are only intended to clearly represent the areas covered by the film layers, and not intended to represent the actual colors or color shades of the film layers.

(50) The first film layer **149** is disposed from the light passing hole **141** along a direction being away from the optical axis z, and a coverage area of the first film layer **149** is smaller than an area of the object-side surface **145**. The first film layer **159** is disposed from the light passing hole **151** along the direction being away from the optical axis z, and a coverage area of the first film layer **159** is smaller than an area of the object-side surface **155**.

(51) Diameters of the light passing holes **141**, **151** of the first light blocking sheet **140** and the second light blocking sheet **150**, respectively, are different. The diameter of the light passing hole **141** of the first light blocking sheet **140** closer to the object side is greater than the diameter of the light passing hole **151** of the second light blocking sheet **150**.

(52) FIG. **1**F is a cross-sectional view along line **1**F-**1**F in FIG. **1**E (not drawn with an actual scale). With reference to FIG. **1**F, the second light blocking sheet **150** specifically includes a base layer **162** and two covering layers **161**, **163**. An object-side surface of the base layer **162** is in physical contact with the covering layer **161**, an image side surface of the base layer **162** is in physical contact with the covering layer **163**, and the first film layer **159** is disposed on an object-side surface of the covering layer **161**. In addition, the structure of the first light blocking sheet **140** may be the same as the structure of the second light blocking sheet **150** described in this paragraph.

(53) FIG. **1**G is a schematic view of reflectivity of the first light blocking sheet **140** and the second light blocking sheet **150** of the optical lens assembly **100** in FIG. **1**A, FIG. **1**H is a schematic view of the reflectivity of the first light blocking sheet **140** of the optical lens assembly **100** in FIG. **1**A, FIG. **1**I is a schematic view of the reflectivity of the second light blocking sheet **150** of the optical

lens assembly **100** in FIG. **1**A, the first film layer **149** is disposed on the object-side surface **145** of the first light blocking sheet **140**, and the first film layer **159** is disposed on the object-side surface **155** of the second light blocking sheet **150**. With reference to FIG. **1**G to FIG. **1**I and further to Table 1.1, Table 1.2, Table 1.3 and Table 1.4 as the following, Table 1.1 to Table 1.4 list parameter values of the optical lens assembly **100** and the first film layers **149**, **159** of the first light blocking sheet **140** and the second light blocking sheet **150**, respectively, thereof in the 1st embodiment of the present disclosure. In Table 1.1 to Table 1.4, the term "A" indicates the wavelength, the term "W/o film layer" indicates the first light blocking sheet **140** without (or not yet having) the first film layer **149** or the second light blocking sheet **150** without (or not yet having) the first film layer **159**, the terms "No. 1" and "No. 2" indicate the first light blocking sheet **140** having one of the different first film layers **149** of No. 1 and No. 2 and the second light blocking sheet **150** having one of the different film layers **159** of No. 1 and No. 2, the term "0 deg." indicates that a measurement point of 0 degrees is measured on the first film layer **149** of the first light blocking sheet **140** or on the first film layer **159** of the second light blocking sheet **150**, the term "180 deg." indicates that a measurement point of 180 degrees is measured on the first film layer **149** of the first light blocking sheet **140** or on the first film layer **159** of the second light blocking sheet **150**, and the measurement point of 180 degrees is rotated with 180 degrees from the measurement point of 0 degrees with respect to the optical axis z (i.e., a central axis of the first light blocking sheet **140** or the second light blocking sheet **150**). In addition, it is noted that the parameter values of the first film layers **149**, **159** of the first light blocking sheet **140** and the second light blocking sheet **150**, respectively, in Table 1.1 to Table 1.3 may be also applicable to the optical lens assembly **300** of the 3rd embodiment, and any one of the first film layers **149**, **159** of the first light blocking sheet **140** and the second light blocking sheet **150**, respectively, in Table 1.1 to Table 1.3 may be also applicable to any of a first film layer, a second film layer and a third film layer of an optical lens assembly in each embodiment of the present disclosure.

(54) In detail, with reference to the following Table 1.1, Table 1.1 lists the reflectivity values of the first film layers **149**, **159** of the first light blocking sheet **140** and the second light blocking sheet **150**, respectively, of the optical lens assembly **100** in the 1st embodiment of the present disclosure. In Table 1.1, the unit of the reflectivity value is %, the maximum reflectivity of each the first film layer in Table 1.1 is marked by the symbol "#" in the right side of the reflectivity value, and wavelengths corresponding to all the maximum reflectivity of the first film layers in Table 1.1 are in a wavelength range of 437 nm to 446 nm. The relationship diagrams between the wavelengths and the corresponding reflectivity values listed in Table 1.1 are shown in FIG. **1**G to FIG. **1**I.

(55) With reference to the following Table 1.2 and Table 1.3, a reflected light is obtained from one of the first film layers **149**, **159** irradiated by a standard illuminant D65, a color index of the reflected light is defined according to a CIE 1976 L*a*b* color space, the color index is CI, the reflected light has a maximum reflectivity in a spectrum in a wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the maximum reflectivity minus 50 nm to the wavelength corresponding to the maximum reflectivity plus 50 nm is a high reflectivity section, and a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the high reflectivity section is a second reflectivity section. An average reflectivity in the high reflectivity section is R.sub.high, an average reflectivity in the second reflectivity section is R.sub.2, the wavelength corresponding to the maximum reflectivity is λ.sub.RMax, the maximum reflectivity is R.sub.Max, and an average reflectivity of the reflected light in the wavelength range of 380 nm to 780 nm is R.sub.3878. A difference appears between two color indexes of two points, respectively, on one of the first film layers **149**, **159**, and an absolute value of the difference is |ΔCI|. The following Table 1.2 and Table 1.3 list the parameter values according to the aforementioned definitions of the optical lens assembly **100** in the 1st embodiment.

(56) With reference to the following Table 1.4, a maximum field of view of the optical lens assembly **100** is FOV. In a direction along the optical axis z, a distance between a most object-side

end **115** of the lens barrel **110** and a most image-side end **116** of the lens barrel **110** is Db, a distance between the most object-side end **115** of the lens barrel **110** and the first film layer **149** is Ds1, and a distance between the most object-side end **115** of the lens barrel **110** and the first film layer **159** is Ds2. A diameter of the light entering hole **111** is φb, a diameter of the light passing hole **141** is φs1, and a diameter of the light passing hole **151** is φs2. A thickness in the direction along the optical axis z of the first light blocking sheet **140** is Ts1, and a thickness in the direction along the optical axis z of the second light blocking sheet **150** is Ts2. The following Table 1.4 lists the parameter values according to the aforementioned definitions of the optical lens assembly **100** in the 1st embodiment.

(57) TABLE-US-00001 TABLE 1.1 1st light 1st light 1st light 1st light 2nd light 2nd light 2nd light 2nd light blocking blocking blocking blocking blocking blocking blocking blocking W/o sheet- sheet- sheet- sheet- sheet- sheet- sheet- sheet- λ film No. 1- No. 1- No. 2- No. 2- No. 1- No. 1- No. 2- No. 2- (nm) layer 0 deg. 180 deg. 0 deg. 180 deg. 0 deg. 180 deg. 0 deg. 180 deg. 380 4.4778 0.5773 0.5121 0.5215 0.5027 0.7355 0.5680 0.6703 0.5680 381 4.3826 0.5591 0.4703 0.5636 0.4703 0.6661 0.5124 0.6148 0.6103 382 4.4438 0.4810 0.5125 0.5125 0.4959 0.6087 0.4810 0.5440 0.5291 383 4.4978 0.5080 0.5080 0.4806 0.5173 0.6533 0.4806 0.5353 0.5260 384 4.4716 0.4725 0.5089 0.5029 0.4784 0.5692 0.5029 0.5149 0.5089 385 4.3868 0.5450 0.5450 0.5106 0.5450 0.6527 0.5106 0.5450 0.5404 386 4.4192 0.5420 0.5009 0.5283 0.5283 0.5650 0.5283 0.5146 0.4778 387 4.4608 0.5314 0.4712 0.5403 0.5186 0.5314 0.5403 0.5057 0.4929 388 4.4228 0.4894 0.4568 0.5221 0.5184 0.5184 0.5221 0.4894 0.4605 389 4.4394 0.5144 0.5144 0.5490 0.5706 0.5187 0.5706 0.5619 0.5447 390 4.4230 0.4889 0.5004 0.5464 0.5521 0.5177 0.5292 0.4831 0.5292 391 4.4369 0.5176 0.5270 0.5543 0.5910 0.5449 0.5722 0.4912 0.5185 392 4.4336 0.5646 0.5410 0.5669 0.6164 0.5432 0.5927 0.5129 0.5151 393 4.4346 0.5718 0.5593 0.5921 0.6166 0.5634 0.6573 0.5186 0.5634 394 4.4409 0.6048 0.5546 0.6148 0.6282 0.5580 0.6681 0.5546 0.5780 395 4.4245 0.6000 0.5626 0.6222 0.6222 0.5556 0.6959 0.5778 0.5848 396 4.4218 0.5751 0.5926 0.6365 0.6365 0.5526 0.7204 0.5939 0.6339 397 4.4191 0.5928 0.5640 0.6337 0.6582 0.5724 0.7071 0.5764 0.6049 398 4.4254 0.5957 0.6065 0.6439 0.6831 0.5939 0.7616 0.5957 0.6457 399 4.4329 0.6316 0.6316 0.6615 0.7127 0.6103 0.7883 0.6182 0.6694 400 4.4297 0.6707 0.6531 0.6888 0.7258 0.6695 0.8336 0.6349 0.6718 401 4.4130 0.6989 0.6718 0.7281 0.7513 0.6718 0.8679 0.6853 0.7203 402 4.4156 0.7001 0.6758 0.7434 0.7427 0.6839 0.8947 0.6920 0.7258 403 4.4046 0.7030 0.6901 0.7555 0.7477 0.6944 0.9190 0.7107 0.7555 404 4.4023 0.7100 0.6786 0.7574 0.7730 0.6943 0.8995 0.7258 0.7731 405 4.4002 0.7161 0.7123 0.7659 0.7813 0.7315 0.9459 0.7353 0.8081 406 4.4055 0.7467 0.7470 0.7909 0.8206 0.7615 0.9760 0.7688 0.8279 407 4.4101 0.7771 0.7695 0.8167 0.8268 0.7914 1.0061 0.7805 0.8487 408 4.3940 0.8016 0.8013 0.8295 0.8560 0.8154 1.0367 0.8019 0.8704 409 4.4051 0.8176 0.8004 0.8541 0.8385 0.8273 1.0557 0.8347 0.8788 410 4.4026 0.8314 0.8054 0.8643 0.8564 0.8453 1.0728 0.8573 0.9092 411 4.3902 0.8349 0.7999 0.8626 0.8673 0.8600 1.0857 0.8798 0.9300 412 4.3978 0.8293 0.8165 0.8768 0.8658 0.8774 1.1080 0.8779 0.9266 413 4.3919 0.8482 0.8318 0.8754 0.8836 0.8908 1.1067 0.8954 0.9462 414 4.3881 0.8638 0.8510 0.8916 0.8916 0.9144 1.1313 0.9094 0.9665 415 4.3908 0.8860 0.8729 0.9081 0.9171 0.9482 1.1669 0.9301 0.9853 416 4.3887 0.8956 0.8741 0.9370 0.9072 0.9602 1.1770 0.9594 1.0032 417 4.3865 0.9030 0.8787 0.9308 0.9169 0.9655 1.1948 0.9620 1.0072 418 4.3785 0.9032 0.8788 0.9318 0.9092 0.9699 1.1987 0.9741 1.0164 419 4.3725 0.9169 0.8973 0.9449 0.9267 1.0023 1.2115 0.9940 1.0348 420 4.3727 0.9153 0.8894 0.9441 0.9345 1.0037 1.2053 0.9921 1.0507 421 4.3877 0.9326 0.9192 0.9573 0.9479 1.0287 1.2249 1.0040 1.0661 422 4.3800 0.9520 0.9267 0.9647 0.9612 1.0511 1.2429 1.0216 1.0708 423 4.3824 0.9686 0.9352 0.9853 0.9620 1.0680 1.2554 1.0400 1.0925 424 4.3717 0.9656 0.9394 0.9789 0.9493 1.0719 1.2646 1.0391 1.0840 425 4.3657 0.9692 0.9435 1.0054 0.9574 1.0806 1.2723 1.0601 1.1082 426 4.3693 0.9733 0.9426 1.0039 0.9619 1.0881 1.2763 1.0737 1.1212 427 4.3676 0.9772 0.9440 0.9955 0.9689 1.1008 1.2833 1.0701 1.1199 428 4.3741 0.9713 0.9536 1.0083 0.9631 1.1090 1.2807 1.0832 1.1322 429 4.3691 0.9921 0.9679 1.0116

0.9841 1.1245 1.2906 1.0923 1.1407 430 4.3628 1.0005 0.9766 1.0244 0.9926 1.1359 1.3004
1.0987 1.1518 431 4.3686 1.0054 0.9743 1.0218 0.9828 1.1399 1.3062 1.1077 1.1411 432 4.3598
1.0085 0.9693 1.0356 0.9821 1.1404 1.3130 1.1105 1.1561 433 4.3583 1.0087 0.9732 1.0301
0.9801 1.1434 1.3077 1.1166 1.1590 434 4.3568 1.0035 0.9780 1.0313 0.9881 1.1555 1.3097
1.1192 1.1601 435 4.3628 1.0081 0.9776 1.0311 0.9780 1.1546 1.3012 1.1235 1.1693 436 4.3601
1.0154 0.9880 1.0355 0.9940 1.1699 1.3075 1.1272 1.1715 437 4.3596 1.0151 0.9894 1.0426
.sup. 0.9964 # 1.1749 1.3119 1.1340 1.1720 438 4.3664 .sup. 1.0293 # .sup. 1.0022 # 1.0445
0.9903 1.1778 .sup. 1.3143 # 1.1409 1.1788 439 4.3504 1.0255 0.9883 .sup. 1.0551 # 0.9875
1.1833 1.3117 1.1386 1.1763 440 4.3502 1.0241 0.9966 1.0466 0.9789 1.1819 1.3097 .sup.
1.1486 # 1.1819 441 4.3547 1.0252 0.9873 1.0476 0.9803 1.1823 1.3060 1.1444 1.1823 442
4.3480 1.0205 0.9907 1.0535 0.9811 1.1876 1.3014 1.1417 1.1823 443 4.3518 1.0175 0.9878
1.0330 0.9731 1.1811 1.2925 1.1363 1.1737 444 4.3490 1.0159 0.9937 1.0422 0.9789 1.1919
1.2939 1.1327 .sup. 1.1829 # 445 4.3454 1.0200 0.9944 1.0382 0.9796 1.1894 1.2886 1.1340
1.1782 446 4.3373 1.0189 0.9895 1.0408 0.9749 .sup. 1.1928 # 1.2901 1.1361 1.1748 447 4.3464
1.0226 0.9934 1.0374 0.9645 1.1908 1.2786 1.1395 1.1689 448 4.3437 1.0106 0.9798 1.0363
0.9636 1.1834 1.2801 1.1286 1.1632 449 4.3403 1.0039 0.9748 1.0288 0.9566 1.1805 1.2600
1.1267 1.1591 450 4.3321 0.9986 0.9718 1.0240 0.9469 1.1749 1.2486 1.1155 1.1567 451 4.3412
0.9942 0.9726 1.0298 0.9581 1.1870 1.2515 1.1157 1.1516 452 4.3401 0.9962 0.9803 1.0138
0.9519 1.1826 1.2465 1.1207 1.1491 453 4.3353 0.9974 0.9763 1.0222 0.9481 1.1878 1.2443
1.1171 1.1384 454 4.3356 0.9974 0.9713 1.0184 0.9434 1.1861 1.2350 1.1129 1.1320 455 4.3361
0.9937 0.9590 1.0146 0.9381 1.1744 1.2300 1.1118 1.1326 456 4.3243 0.9768 0.9493 1.0060
0.9184 1.1656 1.2120 1.1021 1.1227 457 4.3334 0.9721 0.9449 0.9959 0.9211 1.1624 1.2032
1.0978 1.1216 458 4.3371 0.9573 0.9354 0.9808 0.9135 1.1541 1.1945 1.0784 1.1053 459 4.3240
0.9682 0.9417 0.9815 0.9086 1.1539 1.1805 1.0810 1.1075 460 4.3325 0.9521 0.9324 0.9733
0.9029 1.1471 1.1733 1.0701 1.0881 461 4.3279 0.9610 0.9351 0.9739 0.9029 1.1513 1.1771
1.0738 1.0900 462 4.3280 0.9527 0.9257 0.9718 0.8907 1.1436 1.1642 1.0657 1.0800 463 4.3250
0.9388 0.9137 0.9638 0.8763 1.1266 1.1578 1.0577 1.0703 464 4.3220 0.9279 0.9004 0.9525
0.8742 1.1170 1.1384 1.0478 1.0647 465 4.3162 0.9138 0.8957 0.9410 0.8656 1.1128 1.1249
1.0405 1.0556 466 4.3194 0.9127 0.8905 0.9333 0.8564 1.1079 1.1107 1.0279 1.0502 467 4.3252
0.9056 0.8881 0.9287 0.8589 1.1030 1.1029 1.0217 1.0391 468 4.3206 0.9034 0.8792 0.9163
0.8409 1.0965 1.0924 1.0170 1.0325 469 4.3167 0.9037 0.8760 0.9174 0.8398 1.0921 1.0893
1.0145 1.0256 470 4.3121 0.8926 0.8655 0.9076 0.8276 1.0809 1.0755 1.0051 1.0159 471 4.3137
0.8733 0.8520 0.8943 0.8151 1.0639 1.0584 1.0053 1.0108 472 4.3145 0.8680 0.8437 0.8849
0.8113 1.0589 1.0486 0.9895 1.0036 473 4.3137 0.8576 0.8375 0.8751 0.7997 1.0489 1.0309
0.9806 0.9907 474 4.3115 0.8524 0.8405 0.8747 0.7975 1.0507 1.0225 0.9774 0.9909 475 4.3173
0.8480 0.8289 0.8576 0.7861 1.0432 1.0099 0.9625 0.9766 476 4.3112 0.8375 0.8190 0.8501
0.7760 1.0274 0.9950 0.9566 0.9626 477 4.3072 0.8307 0.8103 0.8421 0.7677 1.0152 0.9861
0.9456 0.9522 478 4.3072 0.8229 0.8011 0.8326 0.7549 1.0021 0.9724 0.9365 0.9409 479 4.3067
0.8083 0.7875 0.8252 0.7488 0.9956 0.9655 0.9274 0.9318 480 4.3052 0.7993 0.7887 0.8105
0.7391 0.9863 0.9480 0.9137 0.9232 481 4.3016 0.7908 0.7769 0.8010 0.7288 0.9731 0.9352
0.9012 0.9133 482 4.3046 0.7884 0.7736 0.7908 0.7237 0.9701 0.9319 0.8945 0.9031 483 4.3011
0.7749 0.7671 0.7861 0.7176 0.9574 0.9157 0.8850 0.8960 484 4.3033 0.7683 0.7572 0.7768
0.7053 0.9511 0.9137 0.8778 0.8815 485 4.2999 0.7617 0.7489 0.7686 0.6965 0.9388 0.9040
0.8696 0.8732 486 4.3055 0.7480 0.7367 0.7600 0.6867 0.9271 0.8940 0.8587 0.8650 487 4.2991
0.7422 0.7287 0.7493 0.6805 0.9176 0.8833 0.8489 0.8527 488 4.2999 0.7281 0.7200 0.7381
0.6709 0.9049 0.8702 0.8366 0.8457 489 4.2994 0.7247 0.7159 0.7309 0.6634 0.9001 0.8622
0.8312 0.8359 490 4.2978 0.7137 0.7087 0.7221 0.6573 0.8892 0.8480 0.8165 0.8249 491 4.2943
0.7150 0.7026 0.7154 0.6462 0.8816 0.8465 0.8126 0.8159 492 4.2969 0.7010 0.6918 0.7053
0.6356 0.8708 0.8288 0.8023 0.8085 493 4.2931 0.6920 0.6813 0.6937 0.6260 0.8600 0.8176
0.7927 0.7970 494 4.2908 0.6790 0.6697 0.6843 0.6144 0.8483 0.8042 0.7813 0.7842 495 4.2946

0.6747 0.6636 0.6802 0.6144 0.8416 0.7928 0.7750 0.7783 496 4.2906 0.6619 0.6544 0.6638
0.6019 0.8306 0.7819 0.7584 0.7659 497 4.2925 0.6563 0.6500 0.6563 0.5958 0.8261 0.7718
0.7526 0.7565 498 4.2913 0.6500 0.6429 0.6478 0.5886 0.8152 0.7653 0.7442 0.7491 499 4.2871
0.6426 0.6367 0.6448 0.5792 0.8106 0.7557 0.7373 0.7371 500 4.2892 0.6354 0.6250 0.6345
0.5718 0.7979 0.7472 0.7291 0.7274 501 4.2867 0.6250 0.6171 0.6261 0.5615 0.7877 0.7376
0.7199 0.7184 502 4.2834 0.6147 0.6069 0.6168 0.5566 0.7769 0.7259 0.7106 0.7102 503 4.2846
0.6060 0.5985 0.6034 0.5432 0.7658 0.7146 0.7002 0.6980 504 4.2850 0.6011 0.5932 0.5971
0.5410 0.7593 0.7047 0.6913 0.6913 505 4.2856 0.5934 0.5860 0.5883 0.5329 0.7529 0.6967
0.6817 0.6817 506 4.2815 0.5868 0.5796 0.5819 0.5238 0.7458 0.6889 0.6733 0.6733 507 4.2821
0.5822 0.5712 0.5736 0.5174 0.7371 0.6790 0.6673 0.6652 508 4.2804 0.5721 0.5626 0.5677
0.5106 0.7281 0.6732 0.6578 0.6571 509 4.2795 0.5622 0.5540 0.5604 0.5019 0.7177 0.6626
0.6505 0.6484 510 4.2802 0.5565 0.5484 0.5512 0.4956 0.7089 0.6540 0.6431 0.6428 511 4.2796
0.5448 0.5387 0.5404 0.4864 0.7006 0.6385 0.6302 0.6324 512 4.2773 0.5408 0.5353 0.5339
0.4815 0.6940 0.6333 0.6252 0.6292 513 4.2751 0.5335 0.5267 0.5267 0.4740 0.6855 0.6256
0.6163 0.6191 514 4.2758 0.5300 0.5208 0.5224 0.4691 0.6801 0.6195 0.6113 0.6116 515 4.2722
0.5192 0.5110 0.5131 0.4587 0.6690 0.6103 0.6010 0.6030 516 4.2768 0.5127 0.5025 0.5063
0.4520 0.6621 0.6021 0.5957 0.5969 517 4.2744 0.5048 0.4961 0.4987 0.4452 0.6508 0.5942
0.5889 0.5889 518 4.2757 0.4954 0.4893 0.4911 0.4390 0.6434 0.5860 0.5807 0.5807 519 4.2735
0.4901 0.4828 0.4812 0.4334 0.6371 0.5747 0.5743 0.5762 520 4.2744 0.4846 0.4780 0.4774
0.4296 0.6313 0.5697 0.5668 0.5679 521 4.2733 0.4789 0.4724 0.4706 0.4234 0.6249 0.5619
0.5601 0.5601 522 4.2691 0.4708 0.4638 0.4635 0.4130 0.6143 0.5552 0.5535 0.5535 523 4.2711
0.4665 0.4564 0.4582 0.4106 0.6081 0.5473 0.5458 0.5455 524 4.2704 0.4593 0.4511 0.4528
0.4033 0.5999 0.5410 0.5410 0.5399 525 4.2694 0.4515 0.4444 0.4461 0.3971 0.5939 0.5323
0.5334 0.5344 526 4.2683 0.4413 0.4347 0.4364 0.3902 0.5866 0.5212 0.5228 0.5245 527 4.2686
0.4390 0.4323 0.4321 0.3885 0.5803 0.5160 0.5197 0.5212 528 4.2675 0.4328 0.4255 0.4245
0.3806 0.5745 0.5076 0.5130 0.5123 529 4.2665 0.4277 0.4205 0.4205 0.3750 0.5680 0.5028
0.5071 0.5065 530 4.2644 0.4214 0.4134 0.4149 0.3706 0.5604 0.4965 0.5000 0.4971 531 4.2666
0.4154 0.4087 0.4103 0.3652 0.5532 0.4915 0.4961 0.4961 532 4.2655 0.4076 0.4008 0.4024
0.3584 0.5452 0.4838 0.4882 0.4876 533 4.2646 0.4015 0.3947 0.3973 0.3536 0.5381 0.4770
0.4814 0.4808 534 4.2640 0.3960 0.3923 0.3926 0.3499 0.5322 0.4746 0.4778 0.4778 535 4.2633
0.3927 0.3866 0.3853 0.3471 0.5277 0.4671 0.4700 0.4716 536 4.2631 0.3868 0.3815 0.3821
0.3415 0.5202 0.4633 0.4643 0.4659 537 4.2622 0.3827 0.3755 0.3781 0.3367 0.5124 0.4599
0.4589 0.4594 538 4.2595 0.3758 0.3709 0.3726 0.3295 0.5066 0.4531 0.4529 0.4529 539 4.2574
0.3700 0.3641 0.3671 0.3256 0.4965 0.4497 0.4486 0.4497 540 4.2593 0.3639 0.3587 0.3623
0.3222 0.4918 0.4425 0.4434 0.4425 541 4.2575 0.3568 0.3536 0.3572 0.3171 0.4852 0.4360
0.4370 0.4380 542 4.2590 0.3540 0.3497 0.3528 0.3159 0.4818 0.4303 0.4318 0.4360 543 4.2573
0.3487 0.3467 0.3469 0.3092 0.4759 0.4245 0.4269 0.4273 544 4.2567 0.3464 0.3418 0.3439
0.3064 0.4709 0.4215 0.4212 0.4236 545 4.2562 0.3424 0.3378 0.3418 0.3035 0.4660 0.4166
0.4181 0.4186 546 4.2552 0.3384 0.3325 0.3357 0.3005 0.4586 0.4127 0.4128 0.4156 547 4.2533
0.3294 0.3261 0.3307 0.2931 0.4519 0.4051 0.4079 0.4083 548 4.2535 0.3260 0.3226 0.3272
0.2916 0.4469 0.4006 0.4028 0.4052 549 4.2531 0.3216 0.3191 0.3227 0.2889 0.4410 0.3955
0.3986 0.4011 550 4.2515 0.3196 0.3165 0.3209 0.2860 0.4391 0.3906 0.3950 0.3967 551 4.2531
0.3146 0.3115 0.3160 0.2832 0.4330 0.3867 0.3896 0.3926 552 4.2490 0.3131 0.3100 0.3131
0.2781 0.4293 0.3834 0.3849 0.3865 553 4.2494 0.3090 0.3058 0.3108 0.2756 0.4248 0.3797
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0.2373 0.2497 0.2478 0.2586 0.2317 0.2723 0.2286 0.2360 760 4.1479 0.2360 0.2494 0.2484
0.2583 0.2323 0.2738 0.2292 0.2376 761 4.1452 0.2362 0.2502 0.2500 0.2607 0.2345 0.2776

0.2314 0.2405 762 4.1484 0.2357 0.2509 0.2493 0.2606 0.2341 0.2762 0.2337 0.2405 763 4.1452 0.2381 0.2523 0.2496 0.2625 0.2371 0.2793 0.2340 0.2444 764 4.1479 0.2395 0.2548 0.2491 0.2629 0.2395 0.2817 0.2354 0.2448 765 4.1456 0.2419 0.2573 0.2536 0.2654 0.2445 0.2854 0.2398 0.2492 766 4.1477 0.2427 0.2569 0.2538 0.2647 0.2458 0.2868 0.2383 0.2491 767 4.1439 0.2428 0.2575 0.2553 0.2654 0.2464 0.2913 0.2428 0.2506 768 4.1442 0.2429 0.2562 0.2554 0.2640 0.2476 0.2914 0.2437 0.2523 769 4.1459 0.2430 0.2571 0.2556 0.2650 0.2489 0.2928 0.2446 0.2540 770 4.1438 0.2431 0.2572 0.2541 0.2681 0.2494 0.2948 0.2431 0.2571 771 4.1428 0.2458 0.2611 0.2583 0.2696 0.2549 0.2966 0.2486 0.2589 772 4.1456 0.2467 0.2615 0.2592 0.2711 0.2559 0.2993 0.2489 0.2617 773 4.1455 0.2495 0.2631 0.2600 0.2720 0.2594 0.3023 0.2506 0.2636 774 4.1416 0.2493 0.2647 0.2615 0.2713 0.2615 0.3040 0.2535 0.2648 775 4.1439 0.2506 0.2634 0.2618 0.2726 0.2618 0.3088 0.2543 0.2681 776 4.1431 0.2491 0.2632 0.2622 0.2711 0.2622 0.3088 0.2569 0.2679 777 4.1418 0.2503 0.2644 0.2626 0.2723 0.2635 0.3099 0.2581 0.2700 778 4.1415 0.2510 0.2664 0.2645 0.2742 0.2673 0.3132 0.2588 0.2739 779 4.1444 0.2531 0.2673 0.2642 0.2751 0.2674 0.3144 0.2610 0.2751 780 4.1437 0.2551 0.2716 0.2689 0.2771 0.2736 0.3180 0.2641 0.2783

(58) TABLE-US-00002 TABLE 1.2 1st light 1st light 1st light 1st light 2nd light 2nd light 2nd light 2nd light blocking blocking blocking blocking blocking blocking blocking blocking W/o sheet- sheet- sheet- sheet- sheet- sheet- sheet- film No. 1- No. 1- No. 2- No. 2- No. 1- No. 1- No. 2- No. 2- layer 0 deg. 180 deg. 0 deg. 180 deg. 0 deg. 180 deg. 0 deg. 180 deg. R.sub.Max (%) N/A 1.0293 1.0022 1.0551 0.9964 1.1928 1.3143 1.1486 1.1829 λ.sub.RMax (nm) N/A 438 438 439 437 446 438 440 444 R.sub.high (%) N/A 0.86 0.84 0.89 0.85 1.01 1.08 0.95 0.99 R.sub.2 (%) N/A 0.28 0.28 0.29 0.27 0.32 0.31 0.30 0.30 R.sub.high/R.sub.2 N/A 3.10 2.99 3.11 3.10 3.17 3.45 3.14 3.31 R.sub.3878 (%) 4.25 0.43 0.42 0.44 0.42 0.49 0.51 0.47 0.47

(59) TABLE-US-00003 TABLE 1.3 CI = {(L*) × [(a*){circumflex over ( )}2 + Measurement items L* a* b* (b*){circumflex over ( )}2]}{circumflex over ( )}1/2 |ΔCI| W/o film layer 7.80 3.10 −0.47 8.76 1st light blocking 4.17 −0.24 −9.51 19.42 2.07 sheet-No. 1-0 deg. 1st light blocking 3.81 1.03 −10.96 21.49 sheet-No. 1-180 deg. 1st light blocking 3.78 0.21 −9.41 18.29 0.75 sheet-No. 2-0 deg. 1st light blocking 3.79 0.41 −9.77 19.04 sheet-No. 2-180 deg. 2nd light blocking 3.17 0.58 −8.85 15.80 0.60 sheet-No. 1-0 deg. 2nd light blocking 3.14 0.55 −8.56 15.20 sheet-No. 1-180 deg. 2nd light blocking 3.21 0.89 −9.08 16.35 1.50 sheet-No. 2-0 deg. 2nd light blocking 2.90 1.13 −8.64 14.85 sheet-No. 2-180 deg.

(60) TABLE-US-00004 TABLE 1.4 FOV (deg.) 120 φs2 (mm) 1.22 Db (mm) 6.21 Ts1 (μm) 23 Ds1 (mm) 1.14 Ts2 (μm) 16 Ds2 (mm) 1.82 Ds1/Db 0.18 φb (mm) 4.54 Ds2/Db 0.29 φs1 (mm) 2.64

2nd Embodiment

(61) FIG. **2**A is a three-dimensional view observed from an object side of an optical lens assembly **200** according to the 2nd embodiment of the present disclosure, FIG. **2**B is a top view observed from the object side of the optical lens assembly **200** in FIG. **2**A, and FIG. **2**C is a partially cross-sectional view of the optical lens assembly **200** in FIG. **2**A. With reference to FIG. **2**A to FIG. **2**C, the optical lens assembly **200** includes a lens barrel **210** and an optical lens group **230**. The lens barrel **210** includes a light entering hole **211**, which is configured for allowing a light to enter the lens barrel **210**. The lens barrel **210** accommodates the optical lens group **230**, and an optical axis z passes through the optical lens group **230** (as shown in FIG. **2**C). The optical lens group **230** includes a first lens element **271**, a second lens element **272**, a third lens element **273**, a fourth lens element **274**, a fifth lens element **275** and a sixth lens element **276** in order from the object side (i.e., a left side in FIG. **2**C) to an image side (i.e., a right side in FIG. **2**C) along the optical axis z. A total number of lens elements in the optical lens group **230** is six. The reference numerals of the transparent lens elements such as the first lens element **271**, etc. are omitted in FIG. **2**A and FIG. **2**B. Partial surface shapes of the lens elements are omitted in FIG. **2**C. A number of the light blocking sheet of the optical lens group **230** is at least one, and the optical lens group **230**

specifically further includes annular optical elements such as a light blocking sheet **240**, another light blocking sheet, a spacer, a retainer, etc. The light blocking sheet **240** is disposed and connected between the first lens element **271** and the second lens element **272**.

(62) FIG. **2**D is a top view of the light blocking sheet **240** of the optical lens assembly **200** in FIG. **2**A. With reference to FIG. **2**C and FIG. **2**D, the light blocking sheet **240** is an opaque sheet-shaped element and surrounds the optical axis z to form a light passing hole **241**, which is in a circular shape. The light blocking sheet **240** includes an object-side surface **245** and an image-side surface **246**, and the object-side surface **245** is located more adjacent to the light entering hole **211** than the image-side surface **246** thereto. A first film layer **249** is disposed on the object-side surface **245**. The first film layer **249** is disposed from the light passing hole **241** along a direction being away from the optical axis z, and a coverage area of the first film layer **249** is smaller than an area of the object-side surface **245**.

(63) FIG. **2**E is a cross-sectional view along line **2**E-**2**E in FIG. **2**D (not drawn with an actual scale). With reference to FIG. **2**E, the light blocking sheet **240** specifically includes a base layer **262** and a covering layer **263**, the first film layer **249** is disposed on and in physical contact with an object-side surface of the base layer **262**, and an image side surface of the base layer **262** is in physical contact with the covering layer **263**.

(64) FIG. **2**F is a top view of a light blocking sheet **250** that can be applicable to the optical lens assembly **200** in FIG. **2**A, and an object-side surface **255** of the light blocking sheet **250** is observed in FIG. **2**F. With reference to FIG. **2**F, the light blocking sheet **240** of the optical lens group **230** may be replaced by the light blocking sheet **250**, and the light blocking sheet **250** may be disposed and connected between the first lens element **271** and the second lens element **272**. The light blocking sheet **250** is an opaque sheet-shaped element and surrounds the optical axis z to form a light passing hole **251**, which is in a circular shape. An annular wall forming the light passing hole **251** includes a plurality of arc-shaped convex portions, and each of the arc-shaped convex portions protrudes toward the optical axis z, and the arc-shaped convex portions are connected in sequence. A shape of a light passing hole of a light blocking sheet of an optical lens assembly according to the present disclosure can be in any shape, and is not limited thereto.

(65) With reference to the following Table 2, a maximum field of view of the optical lens assembly **200** is FOV. In a direction along the optical axis z, a distance between a most object-side end **215** of the lens barrel **210** and a most image-side end **216** of the lens barrel **210** is Db, and a distance between the most object-side end **215** of the lens barrel **210** and the first film layer **249** is Ds. A diameter of the light entering hole **211** is φb, a diameter of the light passing hole **241** is φs, and a thickness in the direction along the optical axis z of the light blocking sheet **240** is Ts. The following Table 2 lists the parameter values according to the aforementioned definitions of the optical lens assembly **200** in the 2nd embodiment. In addition, regarding other details of the light blocking sheet **240** in the 2nd embodiment, the contents of the first light blocking sheet **140** and the second light blocking sheet **150** in the 1st embodiment can be referred, but the light blocking sheet **240** is not limited thereto.

(66) TABLE-US-00005 TABLE 2 FOV (deg.) 117.3 φs (mm) 1.29 Db (mm) 5.2 Ts (μm) 23 Ds (mm) 0.9798 Ds/Db 0.19 φb (mm) 2.9

3rd Embodiment

(67) FIG. **3**A is a three-dimensional view observed from an object side of an optical lens assembly **300** according to the 3rd embodiment of the present disclosure, FIG. **3**B is a top view observed from the object side of the optical lens assembly **300** in FIG. **3**A, and FIG. **3**C is a partially cross-sectional view of the optical lens assembly **300** in FIG. **3**A. With reference to FIG. **3**A to FIG. **3**C, the optical lens assembly **300** includes a lens barrel **310** and an optical lens group **330**. The lens barrel **310** includes a light entering hole **311**, which is configured for allowing a light to enter the lens barrel **310**. The lens barrel **310** accommodates the optical lens group **330**, and an optical axis z passes through the optical lens group **330** (as shown in FIG. **3**C). The optical lens group **330**

includes a first lens element **371**, a second lens element **372**, a third lens element **373**, a fourth lens element **374**, a fifth lens element **375** and a sixth lens element **376** in order from the object side (i.e., a left side in FIG. **3**C) to an image side (i.e., a right side in FIG. **3**C) along the optical axis z. A total number of lens elements in the optical lens group **330** is six. The reference numerals of the transparent lens elements such as the first lens element **371**, etc. are omitted in FIG. **3**A and FIG. **3**B. Partial surface shapes of the lens elements are omitted in FIG. **3**C. A number of the light blocking sheet of the optical lens group **330** is at least two, and the optical lens group **330** specifically further includes annular optical elements such as a first light blocking sheet **340**, a second light blocking sheet **350**, another light blocking sheet, a spacer, a retainer, etc. The first light blocking sheet **340** is disposed and connected between the first lens element **371** and the second lens element **372**, and the second light blocking sheet **350** is disposed and connected between the second lens element **372** and third lens element **373**.

(68) FIG. **3**D is a top view of the lens barrel **310** of the optical lens assembly **300** in FIG. **3**A. With reference to FIG. **3**A to FIG. **3**D, an object-side portion **313** of the lens barrel **310** may include a top wall **314** surrounding the optical axis z to form the light entering hole **311**, and a second film layer **319** is disposed on an outer surface facing the object side of the top wall **314**.

(69) A reflected light is obtained from the second film layer **319** irradiated by the standard illuminant D65, a color index of the reflected light is defined according to the CIE 1976 L*a*b* color space, the color index is CI2, the reflected light has a maximum reflectivity in a spectrum in the wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is a high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the high reflectivity section is a second reflectivity section, an average reflectivity in the high reflectivity section is R2.sub.high, an average reflectivity in the second reflectivity section is R2.sub.2, and the following conditions are satisfied: CI2={(L*)×[(a*).sup.2+(b*).sup.2]}.sup.1/2, 11≤CI2≤41; and 1.8≤R2.sub.high/R2.sub.2≤6.2.

(70) FIG. **3**E is a top view of the first light blocking sheet **340** of the optical lens assembly **300** in FIG. **3**A, and FIG. **3**F is a top view of the second light blocking sheet **350** of the optical lens assembly **300** in FIG. **3**A. With reference to FIG. **3**C, FIG. **3**E and FIG. **3**F, the first light blocking sheet **340** is an opaque sheet-shaped element and surrounds the optical axis z to form a light passing hole **341**. The first light blocking sheet **340** includes an object-side surface **345** and an image-side surface **346**, and the object-side surface **345** is located more adjacent to the light entering hole **311** than the image-side surface **346** thereto. A first film layer **349** is disposed on the object-side surface **345**. The second light blocking sheet **350** is an opaque sheet-shaped element and surrounds the optical axis z to form a light passing hole **351**. The second light blocking sheet **350** includes an object-side surface **355** and an image-side surface **356**, and the object-side surface **355** is located more adjacent to the light entering hole **311** than the image-side surface **356** thereto. A first film layer **359** is disposed on the object-side surface **355**.

(71) The first film layer **349** is disposed from the light passing hole **341** along a direction being away from the optical axis z, and a coverage area of the first film layer **349** is smaller than an area of the object-side surface **345**. The first film layer **359** is disposed from the light passing hole **351** along the direction being away from the optical axis z, and a coverage area of the first film layer **359** is smaller than an area of the object-side surface **355**.

(72) Diameters of the light passing holes **341**, **351** of the first light blocking sheet **340** and the second light blocking sheet **350**, respectively, are different. The diameter of the light passing hole **341** of the first light blocking sheet **340** closer to the object side is greater than the diameter of the light passing hole **351** of the second light blocking sheet **350**. Regarding other details of the first light blocking sheet **340** and the second light blocking sheet **350** in the 3rd embodiment, the contents of the first light blocking sheet **140** and the second light blocking sheet **150** in the 1st embodiment can be referred, but the first light blocking sheet **340** and the second light blocking

sheet **350** are not limited thereto.
(73) FIG. **3**G is a three-dimensional view observed from the image side of the first lens element **371** of the optical lens assembly **300** in FIG. **3**A. With reference to FIG. **3**C and FIG. **3**G, the first lens element **371** is disposed on an object side of the first light blocking sheet **340** and the second light blocking sheet **350**. The first lens element **371** includes an optical effective region **383** and a peripheral region **384**. The optical effective region **383** is configured for being passed through by the light. The peripheral region **384** is located farther from the optical axis z than the optical effective region **383** therefrom, and a third film layer **389** is disposed on at least one of a peripheral object-side surface **385** and a peripheral image-side surface **386** (at least the peripheral image-side surface **386**, specifically) of the peripheral region **384**.
(74) FIG. **3**H is a schematic view of reflectivity of the first lens element **371** in FIG. **3**G, the third film layer **389** is disposed on the peripheral image-side surface **386** of the first lens element **371**, and third film layers may be disposed on an optical effective object-side surface and an optical effective image-side surface (reference numerals omitted), respectively, of the optical effective region **383** of the first lens element **371**. With reference to FIG. **3**H and further to Table 3.1, Table 3.2, Table 3.3 and Table 3.4 as the following, Table 3.1 to Table 3.4 list parameter values of the optical lens assembly **300** and the third film layer **389** of the first lens element **371** thereof in the 3rd embodiment of the present disclosure.
(75) In detail, with reference to the following Table 3.1, Table 3.1 lists the reflectivity values of the third film layer **389** of the peripheral image-side surface **386** and the third film layer of the optical effective object-side surface of the first lens element **371** of the optical lens assembly **300** in the 3rd embodiment of the present disclosure. In Table 3.1, the unit of the reflectivity value is %. The relationship diagram between the wavelengths and the corresponding reflectivity values listed in Table 3.1 is shown in FIG. **3**H.
(76) With reference to the following Table 3.2 and Table 3.3, another reflected light is obtained from the third film layer **389** irradiated by the standard illuminant D65, another color index of the another reflected light is defined according to the CIE 1976 L*a*b* color space, the another color index is CI3, the another reflected light has another maximum reflectivity in another spectrum in the wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the another maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is another high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the another high reflectivity section is another second reflectivity section, an average reflectivity in the another high reflectivity section is R3.sub.high, an average reflectivity in the another second reflectivity section is R3.sub.2, the wavelength corresponding to the another maximum reflectivity is λ.sub.RMax, the another maximum reflectivity is R.sub.Max, and an average reflectivity of the another reflected light in the wavelength range of 380 nm to 780 nm is R.sub.3878. The following Table 3.2 and Table 3.3 list the parameter values according to the aforementioned definitions of the optical lens assembly **300** in the 3rd embodiment.
(77) With reference to the following Table 3.4, a maximum field of view of the optical lens assembly **300** is FOV. In a direction along the optical axis z, a distance between a most object-side end **315** of the lens barrel **310** and a most image-side end **316** of the lens barrel **310** is Db, a distance between the most object-side end **315** of the lens barrel **310** and the first film layer **349** is Ds1, and a distance between the most object-side end **315** of the lens barrel **310** and the first film layer **359** is Ds2. A diameter of the light entering hole **311** is φb, a diameter of the light passing hole **341** is φs1, and a diameter of the light passing hole **351** is φS2. A thickness in the direction along the optical axis z of the first light blocking sheet **340** is Ts1, and a thickness in the direction along the optical axis z of the second light blocking sheet **350** is Ts2. The following Table 3.4 lists the parameter values according to the aforementioned definitions of the optical lens assembly **300** in the 1st embodiment.
(78) TABLE-US-00006 TABLE 3.1 Wavelength 1st lens element-peripheral 1st lens element-

optical (nm) image-side surface effective object-side surface 380 22.8855 24.9187 381 21.4447 24.4597 382 20.4477 23.7284 383 19.1480 22.9525 384 18.0618 21.8881 385 17.0734 21.4246 386 16.0328 20.8750 387 15.0127 20.1195 388 14.1026 19.4997 389 13.1253 18.7424 390 12.1780 17.9810 391 11.3753 17.2883 392 10.5274 16.5558 393 9.7866 15.9688 394 9.0401 15.2542 395 8.3521 14.6754 396 7.6550 13.9682 397 7.0576 13.3030 398 6.5004 12.6523 399 5.9813 12.0081 400 5.5252 11.5072 401 5.0935 10.9106 402 4.6776 10.4070 403 4.2876 9.8733 404 3.9525 9.3069 405 3.6269 8.7913 406 3.3530 8.3095 407 3.1225 7.8481 408 2.9209 7.4307 409 2.7302 7.0076 410 2.5666 6.5921 411 2.4255 6.2186 412 2.2858 5.8507 413 2.2110 5.4716 414 2.1438 5.1371 415 2.0678 4.8215 416 2.0489 4.5278 417 2.0102 4.2656 418 1.9864 3.9956 419 1.9869 3.7413 420 1.9880 3.4996 421 2.0070 3.2712 422 2.0359 3.0681 423 2.0811 2.8706 424 2.1106 2.6983 425 2.1597 2.5224 426 2.2067 2.3647 427 2.2538 2.2148 428 2.3172 2.0660 429 2.3711 1.9463 430 2.4389 1.8250 431 2.5098 1.7127 432 2.5653 1.6112 433 2.6322 1.5173 434 2.6906 1.4305 435 2.7527 1.3558 436 2.8104 1.2828 437 2.8768 1.2097 438 2.9470 1.1492 439 2.9996 1.1066 440 3.0684 1.0516 441 3.1116 1.0149 442 3.1670 0.9606 443 3.2064 0.9308 444 3.2620 0.9010 445 3.3125 0.8715 446 3.3527 0.8562 447 3.3832 0.8303 448 3.4229 0.8100 449 3.4519 0.7914 450 3.4811 0.7715 451 3.4993 0.7704 452 3.5343 0.7554 453 3.5584 0.7501 454 3.5834 0.7442 455 3.5870 0.7481 456 3.5962 0.7320 457 3.6013 0.7314 458 3.6105 0.7308 459 3.6184 0.7227 460 3.6171 0.7233 461 3.6163 0.7290 462 3.6116 0.7338 463 3.6039 0.7389 464 3.5902 0.7337 465 3.5708 0.7383 466 3.5578 0.7362 467 3.5393 0.7430 468 3.5249 0.7422 469 3.5106 0.7506 470 3.4904 0.7510 471 3.4493 0.7491 472 3.4273 0.7593 473 3.3955 0.7588 474 3.3657 0.7589 475 3.3377 0.7603 476 3.3043 0.7657 477 3.2676 0.7668 478 3.2304 0.7675 479 3.1919 0.7665 480 3.1508 0.7690 481 3.1096 0.7696 482 3.0737 0.7724 483 3.0283 0.7624 484 2.9933 0.7688 485 2.9441 0.7700 486 2.8990 0.7658 487 2.8602 0.7673 488 2.8070 0.7621 489 2.7584 0.7604 490 2.7129 0.7595 491 2.6706 0.7548 492 2.6225 0.7572 493 2.5720 0.7523 494 2.5233 0.7494 495 2.4734 0.7424 496 2.4247 0.7408 497 2.3752 0.7342 498 2.3268 0.7311 499 2.2853 0.7281 500 2.2315 0.7238 501 2.1815 0.7186 502 2.1338 0.7106 503 2.0822 0.7067 504 2.0370 0.7007 505 1.9901 0.6934 506 1.9436 0.6908 507 1.9002 0.6841 508 1.8498 0.6791 509 1.8026 0.6700 510 1.7557 0.6600 511 1.7120 0.6586 512 1.6682 0.6489 513 1.6256 0.6429 514 1.5827 0.6369 515 1.5403 0.6288 516 1.4963 0.6219 517 1.4545 0.6137 518 1.4126 0.6054 519 1.3745 0.5978 520 1.3315 0.5910 521 1.2942 0.5836 522 1.2571 0.5772 523 1.2186 0.5707 524 1.1830 0.5621 525 1.1447 0.5534 526 1.1103 0.5467 527 1.0772 0.5379 528 1.0439 0.5328 529 1.0123 0.5232 530 0.9793 0.5156 531 0.9480 0.5084 532 0.9171 0.5025 533 0.8857 0.4933 534 0.8560 0.4851 535 0.8273 0.4777 536 0.8011 0.4713 537 0.7748 0.4640 538 0.7480 0.4568 539 0.7235 0.4487 540 0.6967 0.4399 541 0.6716 0.4337 542 0.6493 0.4282 543 0.6267 0.4184 544 0.6054 0.4130 545 0.5846 0.4068 546 0.5640 0.4002 547 0.5421 0.3928 548 0.5237 0.3850 549 0.5043 0.3798 550 0.4887 0.3726 551 0.4710 0.3640 552 0.4566 0.3596 553 0.4408 0.3532 554 0.4230 0.3469 555 0.4101 0.3402 556 0.3933 0.3333 557 0.3803 0.3278 558 0.3682 0.3211 559 0.3555 0.3164 560 0.3436 0.3098 561 0.3315 0.3041 562 0.3201 0.2985 563 0.3094 0.2940 564 0.2987 0.2850 565 0.2888 0.2787 566 0.2797 0.2733 567 0.2724 0.2691 568 0.2623 0.2661 569 0.2548 0.2580 570 0.2467 0.2524 571 0.2363 0.2450 572 0.2328 0.2398 573 0.2251 0.2353 574 0.2183 0.2303 575 0.2147 0.2261 576 0.2060 0.2204 577 0.2014 0.2160 578 0.1958 0.2106 579 0.1894 0.2044 580 0.1870 0.1987 581 0.1813 0.1945 582 0.1795 0.1926 583 0.1759 0.1865 584 0.1737 0.1825 585 0.1686 0.1782 586 0.1624 0.1708 587 0.1590 0.1652 588 0.1562 0.1598 589 0.1563 0.1582 590 0.1543 0.1534 591 0.1491 0.1487 592 0.1499 0.1453 593 0.1443 0.1398 594 0.1425 0.1362 595 0.1420 0.1330 596 0.1385 0.1274 597 0.1410 0.1240 598 0.1396 0.1197 599 0.1382 0.1158 600 0.1346 0.1111 601 0.1346 0.1079 602 0.1317 0.1030 603 0.1319 0.0995 604 0.1337 0.0965 605 0.1295 0.0924 606 0.1313 0.0886 607 0.1297 0.0862 608 0.1279 0.0823 609 0.1277 0.0778 610 0.1252 0.0739 611 0.1250 0.0713 612 0.1271 0.0676 613 0.1253 0.0663 614 0.1261 0.0638 615 0.1240 0.0606 616 0.1228 0.0564 617 0.1216 0.0512 618 0.1210 0.0498 619 0.1224 0.0483 620 0.1227 0.0451 621 0.1204 0.0438 622 0.1200 0.0400 623 0.1195 0.0386

624 0.1192 0.0354 625 0.1163 0.0336 626 0.1182 0.0315 627 0.1168 0.0281 628 0.1166 0.0286 629 0.1164 0.0254 630 0.1146 0.0236 631 0.1140 0.0220 632 0.1138 0.0194 633 0.1121 0.0186 634 0.1121 0.0173 635 0.1122 0.0167 636 0.1114 0.0169 637 0.1087 0.0149 638 0.1074 0.0145 639 0.1077 0.0129 640 0.1063 0.0121 641 0.1041 0.0109 642 0.1039 0.0121 643 0.1035 0.0121 644 0.1031 0.0122 645 0.1034 0.0122 646 0.0986 0.0110 647 0.0980 0.0119 648 0.0957 0.0125 649 0.0955 0.0127 650 0.0970 0.0139 651 0.0947 0.0153 652 0.0935 0.0161 653 0.0923 0.0167 654 0.0883 0.0182 655 0.0880 0.0189 656 0.0849 0.0210 657 0.0838 0.0231 658 0.0828 0.0238 659 0.0846 0.0269 660 0.0819 0.0299 661 0.0777 0.0312 662 0.0782 0.0347 663 0.0735 0.0357 664 0.0750 0.0391 665 0.0745 0.0428 666 0.0716 0.0459 667 0.0719 0.0494 668 0.0689 0.0541 669 0.0671 0.0575 670 0.0643 0.0610 671 0.0652 0.0645 672 0.0633 0.0685 673 0.0625 0.0737 674 0.0627 0.0801 675 0.0602 0.0831 676 0.0593 0.0905 677 0.0575 0.0949 678 0.0541 0.1002 679 0.0560 0.1044 680 0.0534 0.1120 681 0.0533 0.1180 682 0.0531 0.1237 683 0.0510 0.1316 684 0.0512 0.1385 685 0.0475 0.1454 686 0.0468 0.1511 687 0.0454 0.1603 688 0.0469 0.1664 689 0.0469 0.1755 690 0.0459 0.1833 691 0.0455 0.1917 692 0.0429 0.1988 693 0.0427 0.2070 694 0.0430 0.2163 695 0.0425 0.2273 696 0.0445 0.2360 697 0.0426 0.2455 698 0.0432 0.2557 699 0.0460 0.2667 700 0.0411 0.2770 701 0.0430 0.2867 702 0.0438 0.2969 703 0.0437 0.3079 704 0.0464 0.3209 705 0.0477 0.3313 706 0.0477 0.3431 707 0.0466 0.3555 708 0.0491 0.3657 709 0.0487 0.3793 710 0.0507 0.3935 711 0.0530 0.4065 712 0.0538 0.4193 713 0.0576 0.4327 714 0.0589 0.4466 715 0.0590 0.4621 716 0.0613 0.4744 717 0.0618 0.4881 718 0.0650 0.5028 719 0.0684 0.5188 720 0.0717 0.5356 721 0.0751 0.5496 722 0.0764 0.5651 723 0.0785 0.5807 724 0.0795 0.5974 725 0.0847 0.6153 726 0.0902 0.6294 727 0.0939 0.6467 728 0.0958 0.6667 729 0.1008 0.6829 730 0.1039 0.7004 731 0.1068 0.7186 732 0.1118 0.7353 733 0.1174 0.7537 734 0.1211 0.7707 735 0.1268 0.7917 736 0.1308 0.8103 737 0.1370 0.8313 738 0.1416 0.8508 739 0.1474 0.8703 740 0.1536 0.8908 741 0.1584 0.9103 742 0.1660 0.9319 743 0.1722 0.9539 744 0.1775 0.9737 745 0.1835 0.9967 746 0.1897 1.0176 747 0.1949 1.0396 748 0.2035 1.0608 749 0.2108 1.0837 750 0.2204 1.1066 751 0.2286 1.1297 752 0.2358 1.1556 753 0.2420 1.1755 754 0.2516 1.1995 755 0.2600 1.2231 756 0.2682 1.2473 757 0.2767 1.2730 758 0.2871 1.2949 759 0.2974 1.3226 760 0.3059 1.3482 761 0.3135 1.3739 762 0.3242 1.3989 763 0.3316 1.4223 764 0.3428 1.4481 765 0.3519 1.4742 766 0.3665 1.5030 767 0.3764 1.5281 768 0.3861 1.5551 769 0.3970 1.5806 770 0.4054 1.6076 771 0.4209 1.6349 772 0.4312 1.6623 773 0.4426 1.6894 774 0.4561 1.7193 775 0.4680 1.7461 776 0.4792 1.7768 777 0.4908 1.8044 778 0.5023 1.8322 779 0.5179 1.8608 780 0.5302 1.8896

(79) TABLE-US-00007 TABLE 3.2 1st lens element-peripheral 1st lens element-optical image-side surface effective object-side surface R.sub.Max (%) 22.8855 24.9187 λ.sub.RMax (nm) 380 380 R3.sub.high (%) 6.88 10.56 R3.sub.2 (%) 0.90 0.52 R3.sub.high/R3.sub.2 7.61 20.17 R.sub.3878 (%) 1.66 1.80

(80) TABLE-US-00008 TABLE 3.3 CI3 = {(L*) × Measurement items L* a* b* [(a*){circumflex over ( )}2 + (b*){circumflex over ( )}2]}{circumflex over ( )}1/2 1st lens element- 6.76 1.46 −23.62 61.51 peripheral image- side surface 1st lens element- 3.27 1.10 −12.84 23.30 optical effective object-side surface

(81) TABLE-US-00009 TABLE 3.4 FOV (deg.) 157.8 φs2 (mm) 1.15 Db (mm) 4.87 Ts1 (μm) 40 Ds1 (mm) 1.01 Ts2 (μm) 23 Ds2 (mm) 1.36 Ds1/Db 0.21 φb (mm) 4.92 Ds2/Db 0.28 φs1 (mm) 1.9

4th Embodiment

(82) FIG. **4**A is a three-dimensional view of an electronic device **40** according to the 4th embodiment of the present disclosure, and FIG. **4**B is a block diagram of the electronic device **40** in FIG. **4**A. With reference to FIG. **4**A and FIG. **4**B, the electronic device **40** includes at least one optical lens assembly **400**, which includes a lens barrel **410** and an optical lens group **430**. The optical lens assembly **400** may be the aforementioned optical lens assembly **100** of the 1st embodiment, the aforementioned optical lens assembly **200** of the 2nd embodiment, the aforementioned optical lens assembly **300** of the 3rd embodiment, or another optical lens assembly

according to present disclosure.
(83) Specifically, the electronic device **40** is a smart phone and includes four optical lens assemblies **400**. From a left side to a right side in FIG. **4**A, the four optical lens assemblies **400** may be an ultra-wide-angle lens assembly (e.g., the maximum field of view in a range of 93 degrees to 175 degrees), a wide-angle main lens assembly (e.g., the maximum field of view in a range of 65 degrees to 90 degrees), a telephoto lens assembly (e.g., the maximum field of view in a range of 20 degrees to 50 degrees) and an ultra telephoto lens assembly (e.g., the maximum field of view in a range of 5 degrees to 20 degrees) in order, and the maximum field of view of each of the optical lens assemblies **400** is not limited thereto. The four optical lens assemblies **400** are disposed in an inner space **43** of the electronic device **40**, and the light enters the four optical lens assemblies **400** via four light entering holes on a lens cover **42** of a housing **41** of the electronic device **40**. It should be understood that FIG. **4**A is only an exploded schematic view of the lens cover **42** and the inner space **43**, and does not mean that the lens cover **42** is separated from the electronic device **40** during a user's operation.
(84) In addition, the electronic device **40** can further include but not be limited to a control unit, a storage unit, a random access memory, a read-only memory, or a combination thereof.
(85) Furthermore, the user activates the capturing mode via the user interface **45** of the electronic device **40**. At this moment, the imaging light of the optical lens group **430** is converged on the image sensor **460**, and the electronic signal associated with image is output to an image signal processor (ISP) **44**.
(86) To meet a specification of a camera of the electronic device **40**, the electronic device **40** can further include an optical anti-shake mechanism **490**, which can be an optical image stabilization (**01**S). Furthermore, the electronic device **40** can further include at least one auxiliary optical element (its reference numeral is omitted) and at least one sensing element **46**. According to the 4th embodiment, the auxiliary optical elements are a flash module **47** and a focusing assisting module **48**. The flash module **47** can be configured to compensate a color temperature, and the focusing assisting module **48** can be an infrared distance measurement component, a laser focus module, etc. The sensing element **46** can have functions for sensing physical momentum and kinetic energy, such as an accelerator, a gyroscope, a Hall Effect Element, to sense shaking or jitters applied by hands of the user or external environments. Accordingly, the optical lens assembly **400** of the electronic device **40** equipped with an auto-focusing mechanism and the optical anti-shake mechanism **490** can be enhanced to achieve the superior image quality. Furthermore, the electronic device **40** according to the present disclosure can have a capturing function with multiple modes, such as taking optimized selfies, high dynamic range (HDR) under a low light condition, 4K resolution recording, etc. Furthermore, the users can visually see the captured image through the user interface **45** (i.e., the display screen, the touch screen) and manually operate the view finding range on the user interface **45** to achieve the autofocus function of what you see is what you get.
(87) The foregoing description, for purpose of explanation, has been described with reference to specific embodiments. It is to be noted that Tables show different data of the different embodiments; however, the data of the different embodiments are obtained from experiments. The embodiments were chosen and described in order to best explain the principles of the disclosure and its practical applications, to thereby enable others skilled in the art to best utilize the disclosure and various embodiments with various modifications as are suited to the particular use contemplated. The embodiments depicted above and the appended drawings are exemplary and are not intended to be exhaustive or to limit the scope of the present disclosure to the precise forms disclosed. Many modifications and variations are possible in view of the above teachings.

Claims

1. An optical lens assembly, comprising: a lens barrel comprising a light entering hole, which is configured for allowing a light to enter the lens barrel; and an optical lens group, wherein the lens barrel accommodates the optical lens group, and an optical axis passes through the optical lens group; wherein the optical lens group comprises: a plurality of lens elements; and at least one light blocking sheet being an opaque sheet-shaped element and surrounding the optical axis to form a light passing hole, wherein the light blocking sheet comprises an object-side surface and an image-side surface, the object-side surface is located more adjacent to the light entering hole than the image-side surface thereto, and a first film layer is disposed on the object-side surface; wherein a reflected light is obtained from the first film layer irradiated by a standard illuminant D65, a color index of the reflected light is defined according to a CIE 1976 L*a*b* color space, the color index is CI, the reflected light has a maximum reflectivity in a spectrum in a wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is a high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the high reflectivity section is a second reflectivity section, an average reflectivity in the high reflectivity section is R.sub.high, an average reflectivity in the second reflectivity section is R.sub.2, and the following conditions are satisfied:

$CI=\{(L^*)\times[(a^*).sup.2+(b^*).sup.2]\}.sup.1/2;$

$8\leq CI\leq 41$; and

$1.8\leq R.sub.high R.sub.2\leq 6.2$.

2. The optical lens assembly of claim 1, wherein the color index is CI, the average reflectivity in the high reflectivity section is R.sub.high, the average reflectivity in the second reflectivity section is R.sub.2, and the following conditions are satisfied:

$11\leq CI\leq 28$; and

$2.2\leq R.sub.high/R.sub.2\leq 4.8$.

3. The optical lens assembly of claim 1, wherein the wavelength corresponding to the maximum reflectivity is λ.sub.RMax, and the following condition is satisfied:

$380\ nm\leq \lambda.sub.RMax\leq 580\ nm$.

4. The optical lens assembly of claim 3, wherein the maximum reflectivity is R.sub.Max, and the following condition is satisfied:

$0.5\%\leq R.sub.max\leq 4\%$.

5. The optical lens assembly of claim 1, wherein an average reflectivity of the reflected light in the wavelength range of 380 nm to 780 nm is R.sub.3878, and the following condition is satisfied:

$0.1\%\leq R.sub.3878\leq 2\%$.

6. The optical lens assembly of claim 1, wherein a difference appears between two color indexes of any two points, respectively, on the first film layer, an absolute value of the difference is |ΔCI|, and the following condition is satisfied:

$0\leq|\Delta CI|\leq 4.7$.

7. The optical lens assembly of claim 1, wherein the first film layer is disposed from the light passing hole along a direction being away from the optical axis, and a coverage area of the first film layer is smaller than an area of the object-side surface.

8. The optical lens assembly of claim 1, wherein a number of the at least one light blocking sheet is at least two, and the first film layer is disposed on the object-side surface of each of the light blocking sheets.

9. The optical lens assembly of claim 8, wherein diameters of the light passing holes of the at least two light blocking sheets, respectively, are different, and the diameter of the light passing hole of one of the at least two light blocking sheets closer to an object side is greater than the diameter of the light passing hole of the other of the at least two light blocking sheets.

10. The optical lens assembly of claim 1, wherein a thickness in a direction along the optical axis of

the light blocking sheet is Ts, and the following condition is satisfied:
7 μm<*Ts*<50 μm.
11. The optical lens assembly of claim 1, wherein a diameter of the light entering hole is φb, a diameter of the light passing hole is φs, and the following condition is satisfied:
φ*s*<*φb*.
12. The optical lens assembly of claim 11, wherein the diameter of the light entering hole is φb, the diameter of the light passing hole is φs, and the following condition is satisfied:
0.31≤(φ*b*−*φs*)/φ*b*≤0.95.
13. The optical lens assembly of claim 12, wherein a maximum field of view of the optical lens assembly is FOV, and the following condition is satisfied:
93 degrees≤FOV≤175 degrees.
14. The optical lens assembly of claim 12, wherein in a direction along the optical axis, a distance between a most object-side end of the lens barrel and a most image-side end of the lens barrel is Db, a distance between the most object-side end of the lens barrel and the first film layer is Ds, and the following condition is satisfied:
0.05≤*Ds/Db*≤0.41.
15. The optical lens assembly of claim 1, wherein an object-side portion of the lens barrel comprises: a top wall surrounding the optical axis to form the light entering hole, wherein a second film layer is disposed on the top wall; wherein another reflected light is obtained from the second film layer irradiated by the standard illuminant D65, another color index of the another reflected light is defined according to the CIE 1976 L*a*b* color space, the another color index is CI2, the another reflected light has another maximum reflectivity in another spectrum in the wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the another maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is another high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the another high reflectivity section is another second reflectivity section, an average reflectivity in the another high reflectivity section is R2.sub.high, an average reflectivity in the another second reflectivity section is R2.sub.2, and the following conditions are satisfied:
CI2={(*L**)×[(*a**).sup.2+(*b**).sup.2]}.sup.1/2;
11≤CI2≤41; and
1.8≤*R*2.sub.high/*R*2.sub.2≤6.2.
16. The optical lens assembly of claim 1, wherein one of the lens elements is disposed on an object side of the light blocking sheet, and the one of the lens elements comprises: an optical effective region configured for being passed through by the light; and a peripheral region located farther from the optical axis than the optical effective region therefrom, wherein a third film layer is disposed on at least one of a peripheral object-side surface and a peripheral image-side surface of the peripheral region; wherein further another reflected light is obtained from the third film layer irradiated by the standard illuminant D65, further another color index of the further another reflected light is defined according to the CIE 1976 L*a*b* color space, the further another color index is CI3, and the following conditions are satisfied:
CI3={(*L**)×[(*a**).sup.2+(*d**).sup.2]}.sup.1/2; and
11≤CI3≤75.
17. The optical lens assembly of claim 16, wherein the further another reflected light has further another maximum reflectivity in further another spectrum in the wavelength range of 380 nm to 780 nm, a wavelength range of a wavelength corresponding to the further another maximum reflectivity minus 50 nm to the wavelength thereto plus 50 nm is further another high reflectivity section, a wavelength range remained in a wavelength range of 380 nm to 780 nm excluding the further another high reflectivity section is further another second reflectivity section, an average reflectivity in the further another high reflectivity section is R3.sub.high, an average reflectivity in the further another second reflectivity section is R3.sub.2, and the following condition is satisfied:

2.5*R*3.sub.high/*R*3.sub.2≤34.

18. An electronic device, comprising: the optical lens assembly of claim 1.