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(54) **CAMERA MODULE AND ELECTRONIC DEVICE**

(71) Applicant: **LARGAN PRECISION CO., LTD.**, Taichung (TW)

(72) Inventors: **Cheng-Feng Lin**, Taichung (TW); **Lin An Chang**, Taichung (TW); **Ming-Ta Chou**, Taichung (TW)

(73) Assignee: **LARGAN PRECISION CO., LTD.**, Taichung (TW)

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
G03B 17/17 (2021.01)
G02B 5/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G02B 17/008*** (2013.01); ***G02B 5/003*** (2013.01); ***G02B 5/208*** (2013.01); ***G02B 13/02*** (2013.01)

(58) **Field of Classification Search**
CPC G02B 17/008; G02B 5/003; G02B 5/208; G02B 13/02; G02B 13/0065; G02B 23/08;
(Continued)

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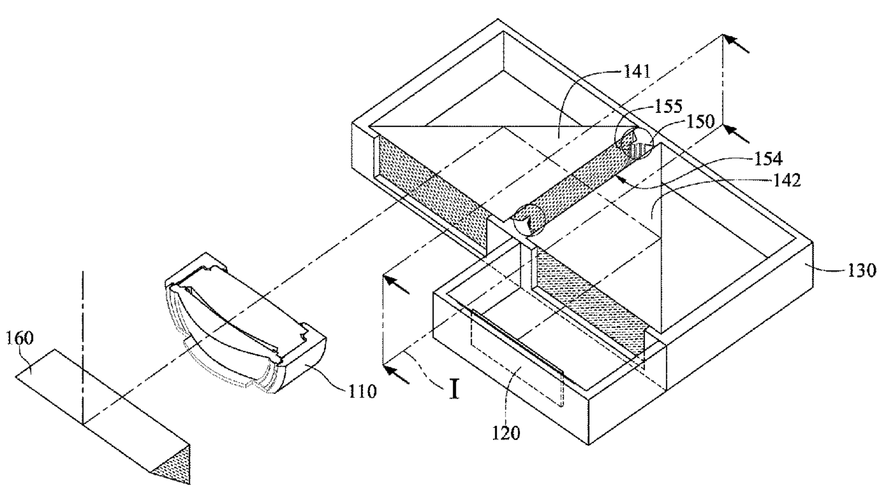
Primary Examiner — Balram T Parbadia
(74) *Attorney, Agent, or Firm* — Maschoff Brennan

(57) **ABSTRACT**

A camera module includes an imaging lens system, an image sensor and a plurality of light-folding elements. The imaging lens system is configured to focus imaging light onto an image surface. The image sensor is disposed on the image surface. The plurality of light-folding elements includes at least one image-side light-folding element disposed on an image side of the imaging lens system, and each of the light-folding elements is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. At least one light-shielding mechanism is arranged on at least one of the entrance light path and the exit light path of the at least one image-side light-folding element. The at least one light-shielding mechanism has a minimal opening, and the minimal opening surrounds the imaging light in the at least one of the entrance optical path and the exit optical path.

7 Claims, 29 Drawing Sheets



(51) **Int. Cl.**
G02B 5/20 (2006.01)
G02B 13/02 (2006.01)
G02B 17/00 (2006.01)

(58) **Field of Classification Search**
CPC . G02B 17/00; G02B 5/00; G02B 5/20; G03B 11/00
See application file for complete search history.

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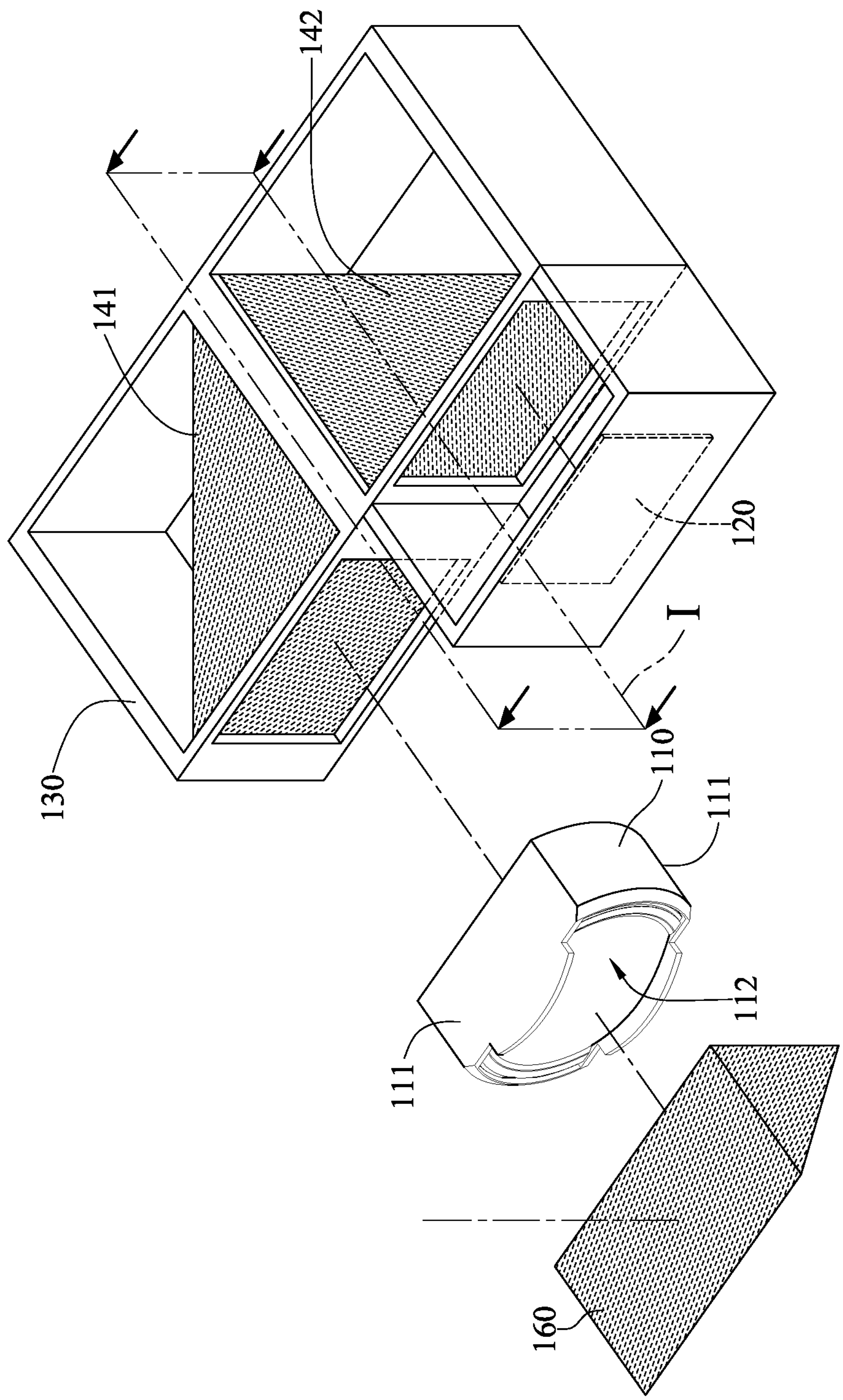


FIG. 1

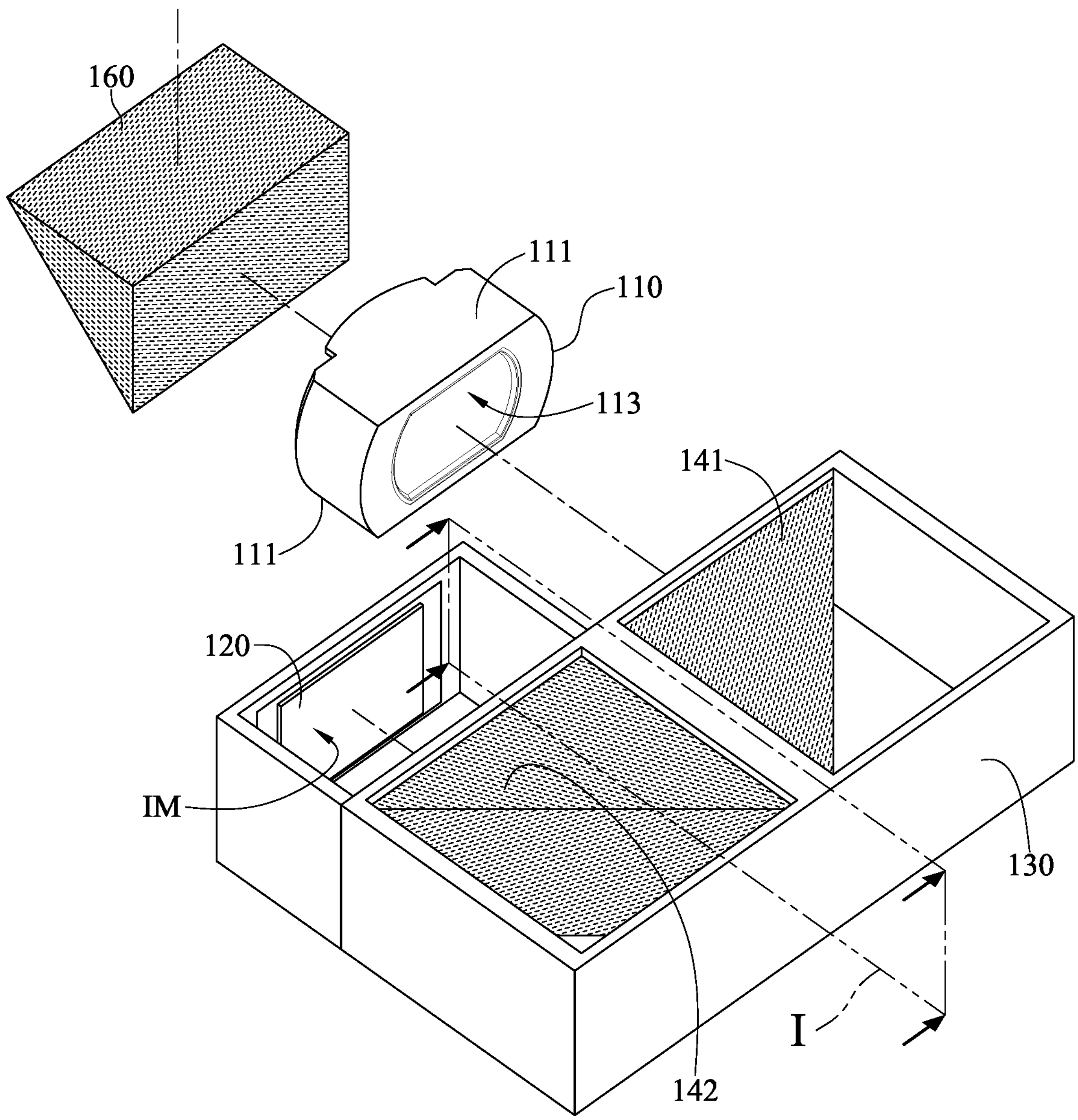


FIG. 2

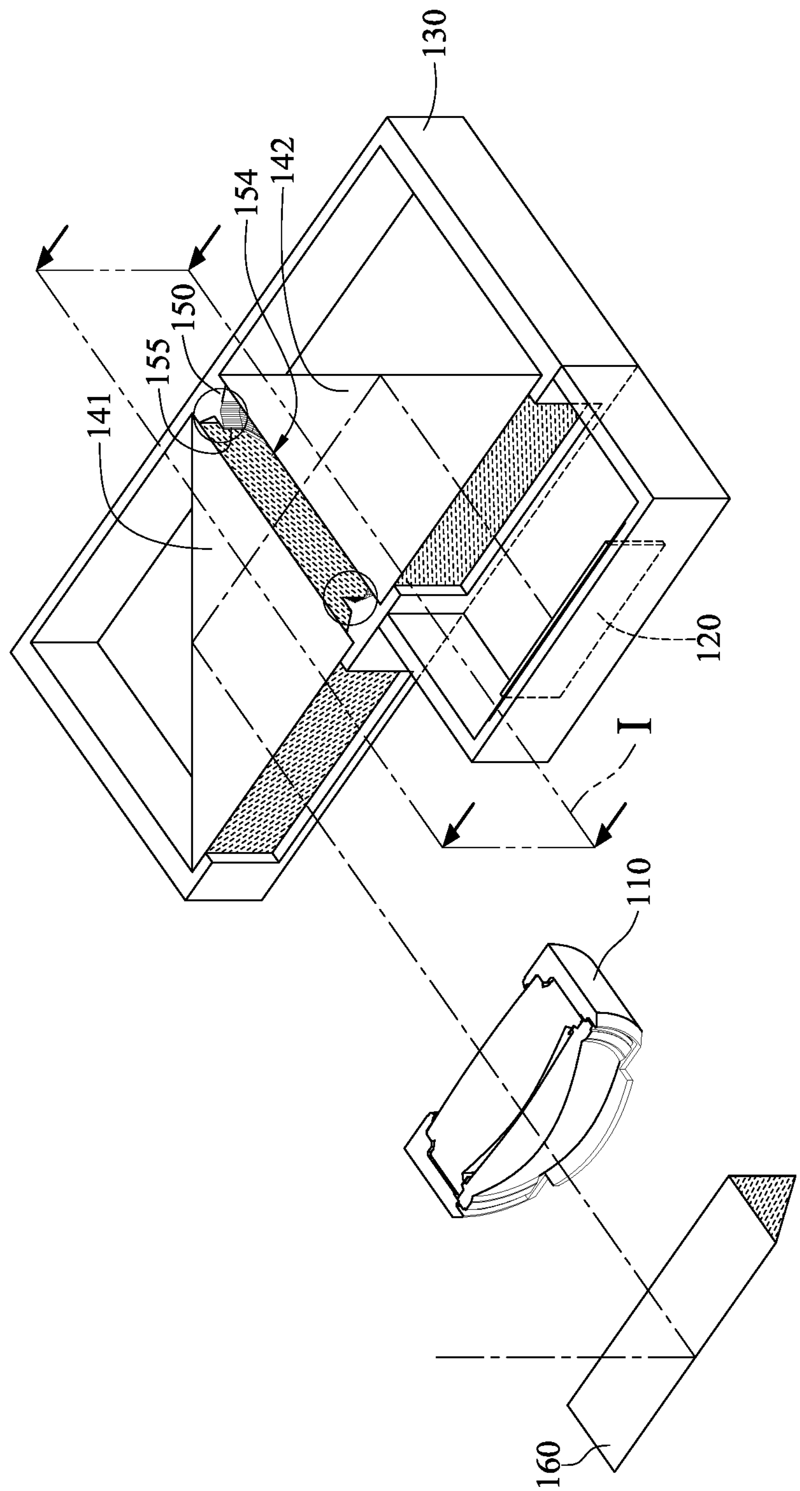


FIG. 3

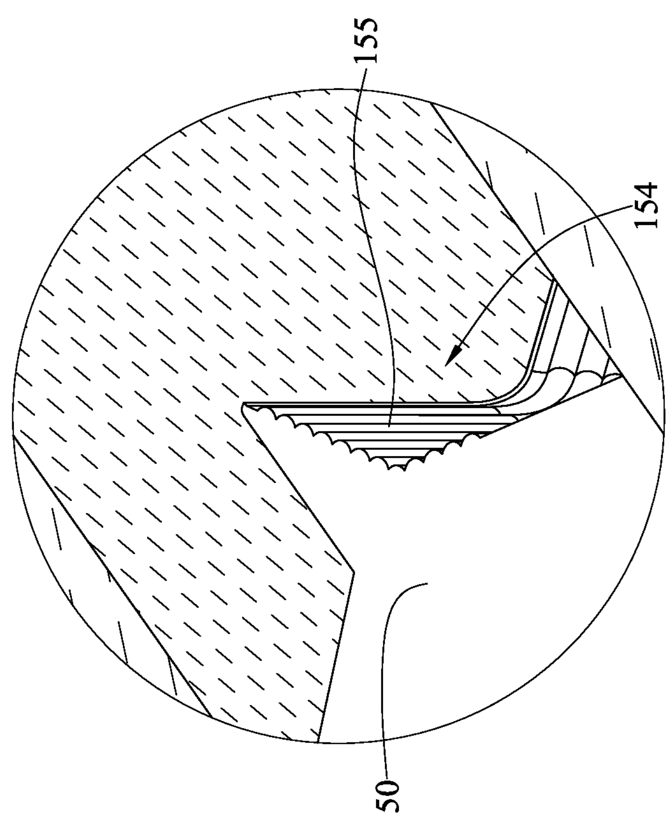


FIG. 4

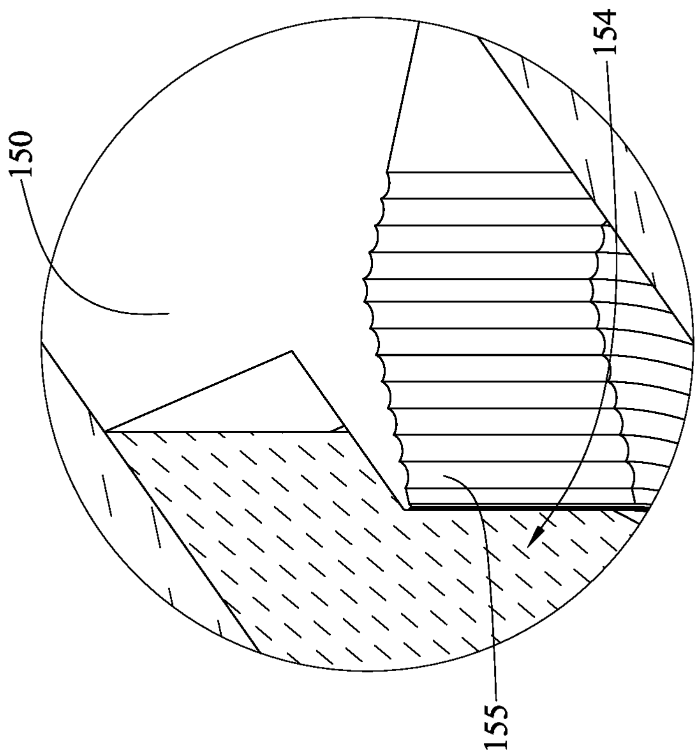


FIG. 5

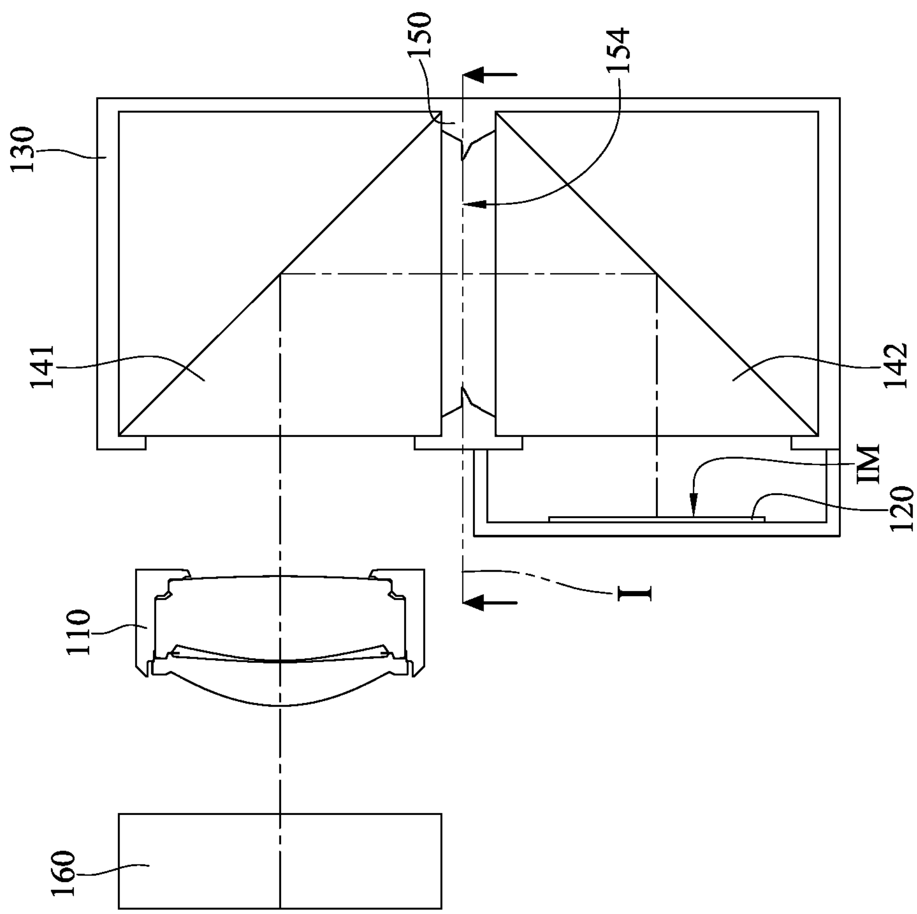


FIG. 6

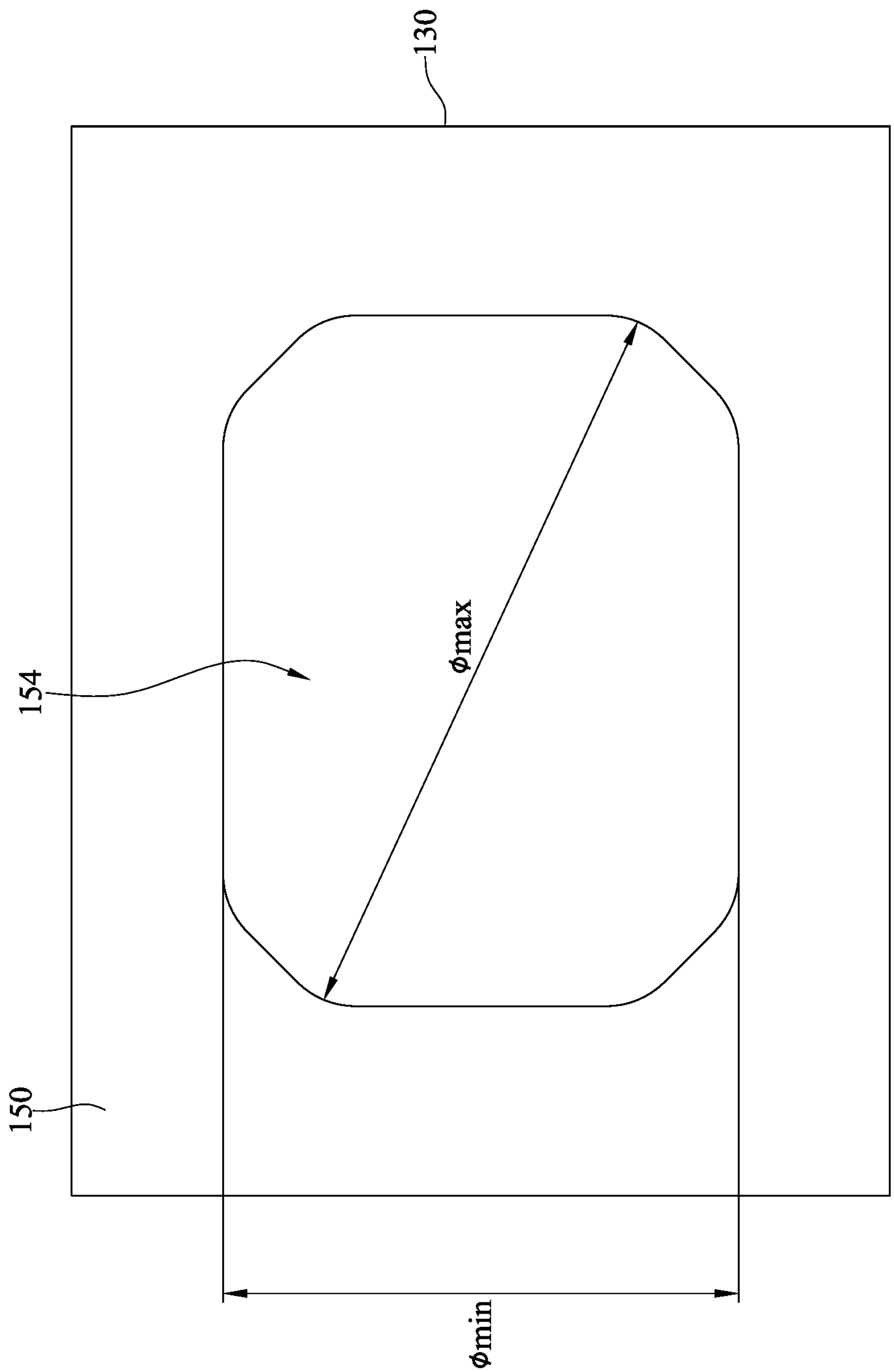


FIG. 7

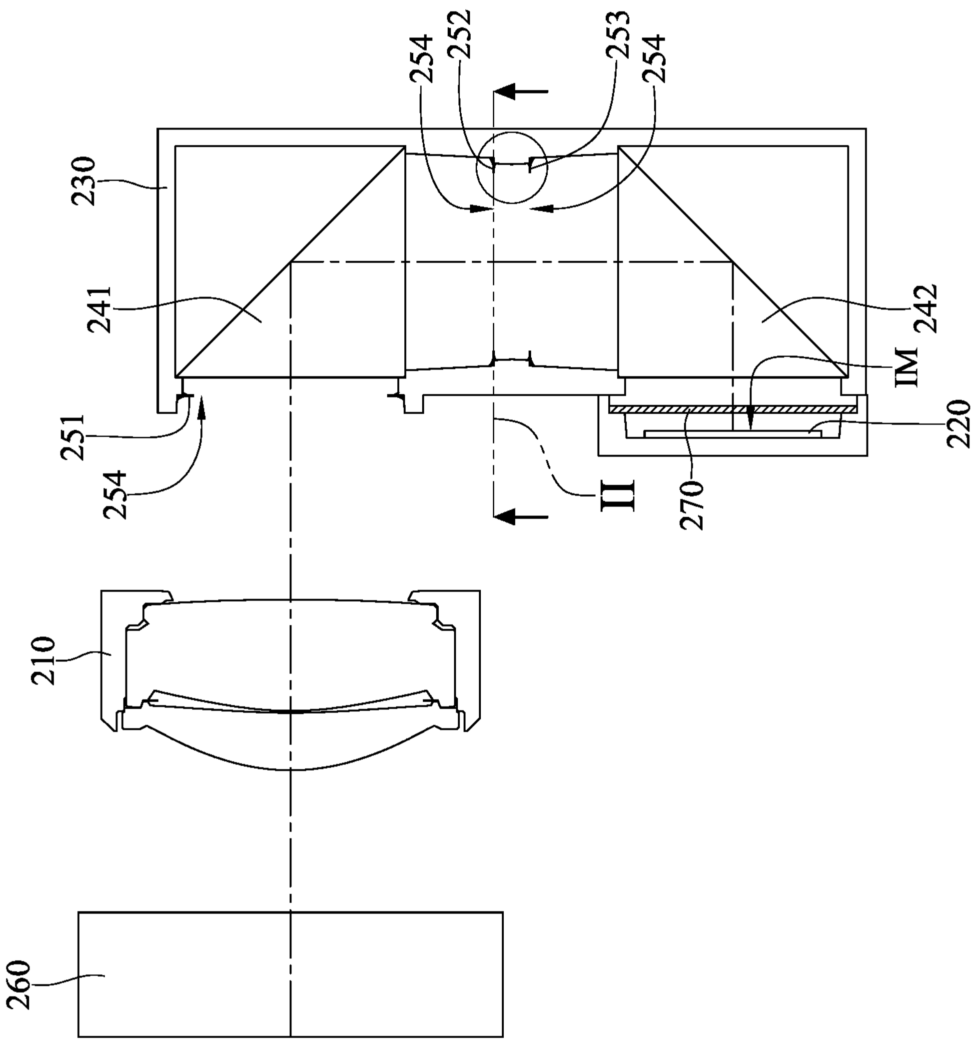


FIG. 8

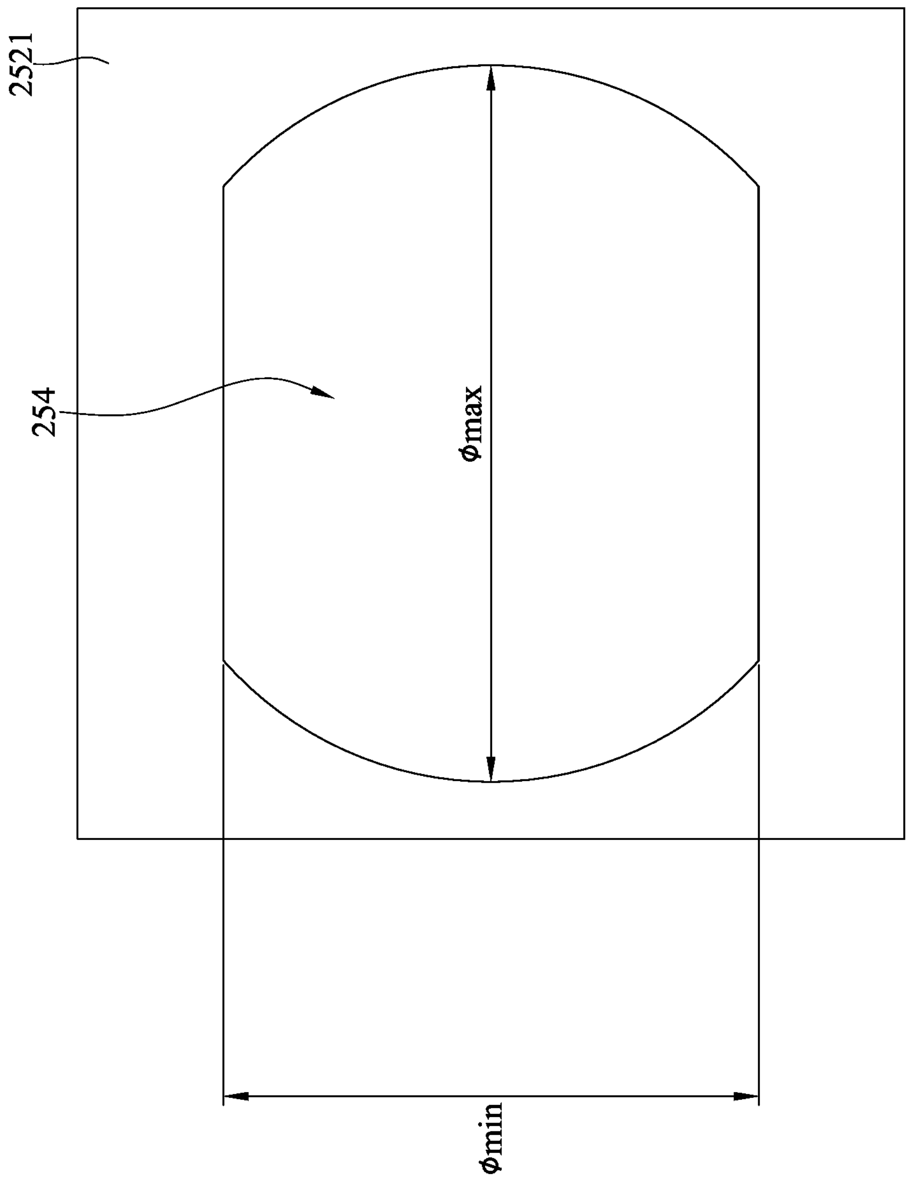


FIG. 9

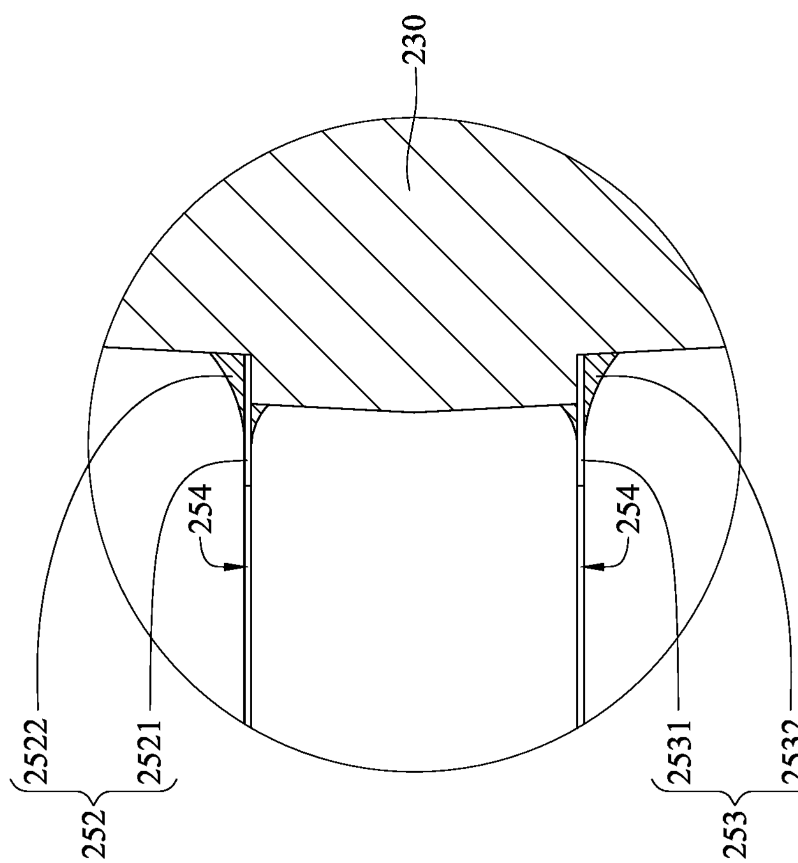
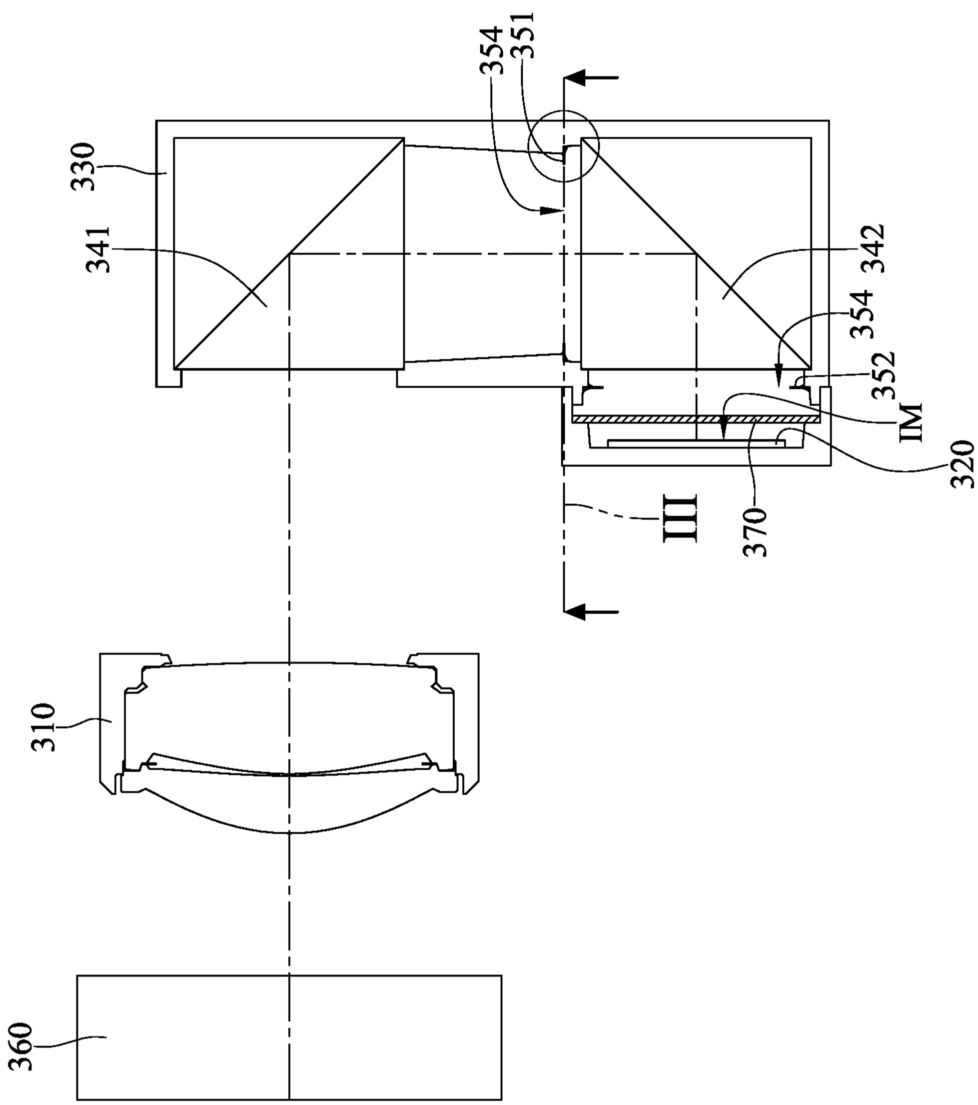


FIG. 10



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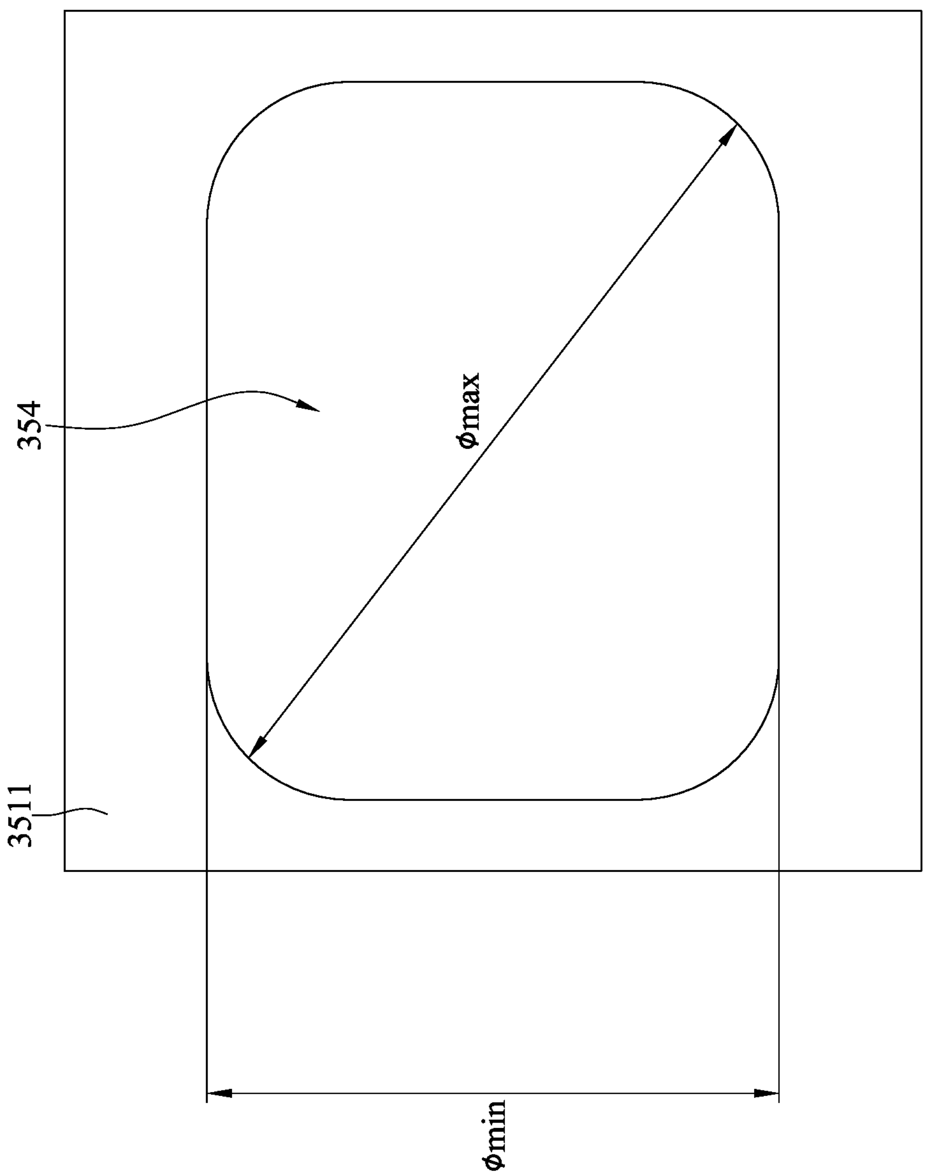


FIG. 12

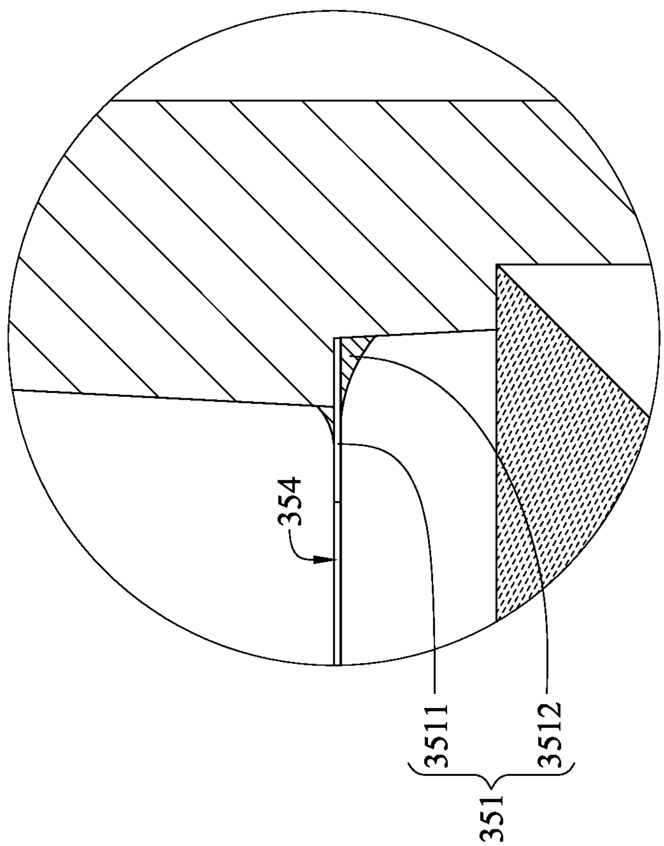


FIG. 13

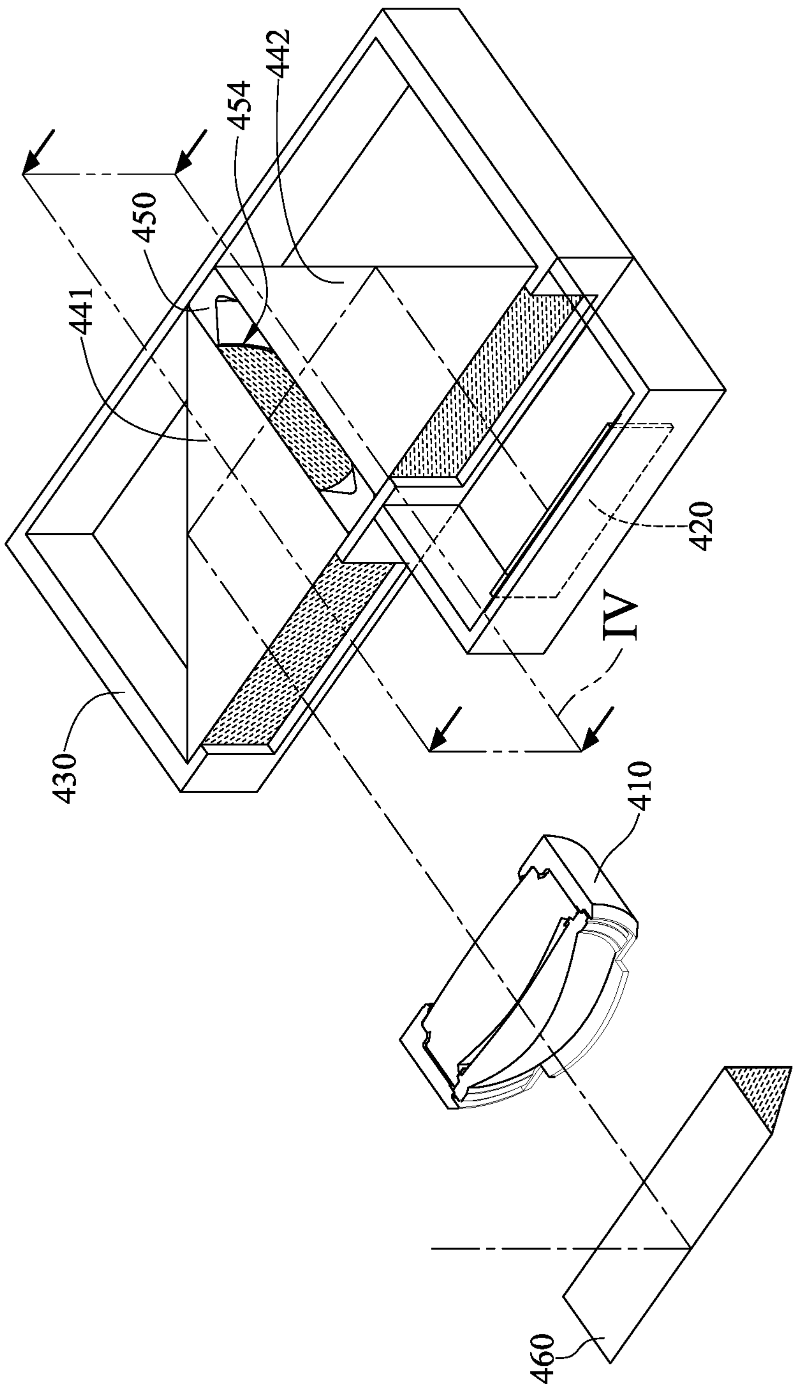
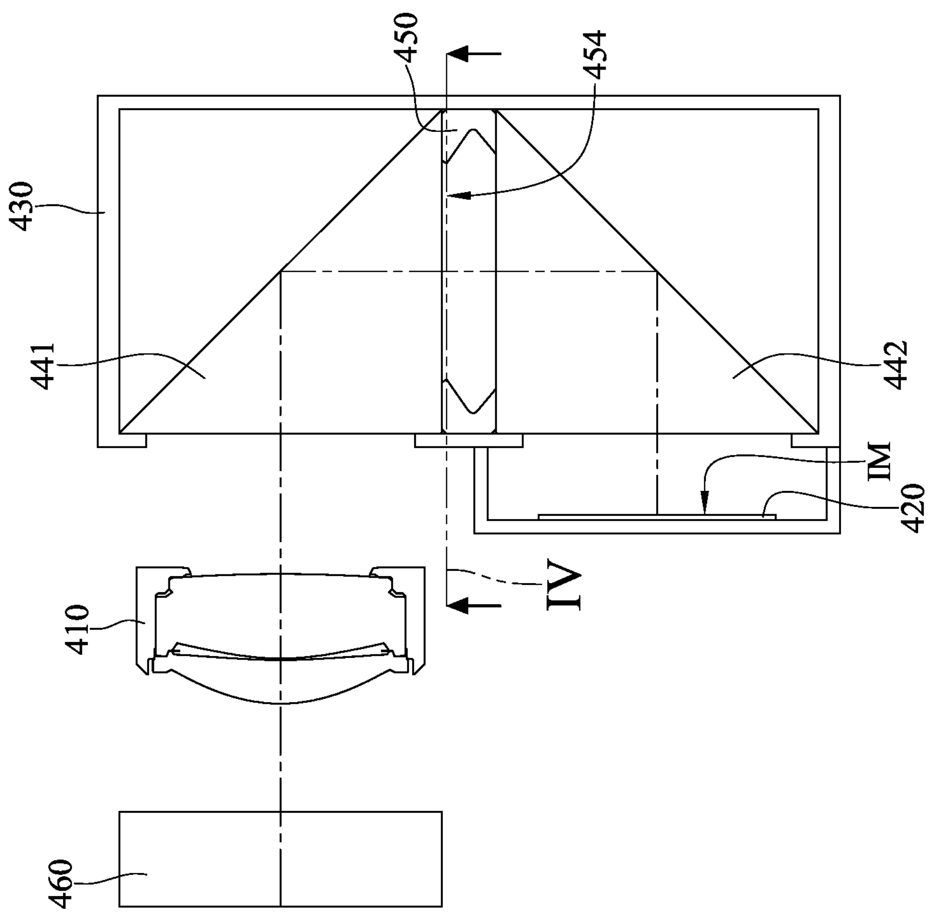


FIG. 14



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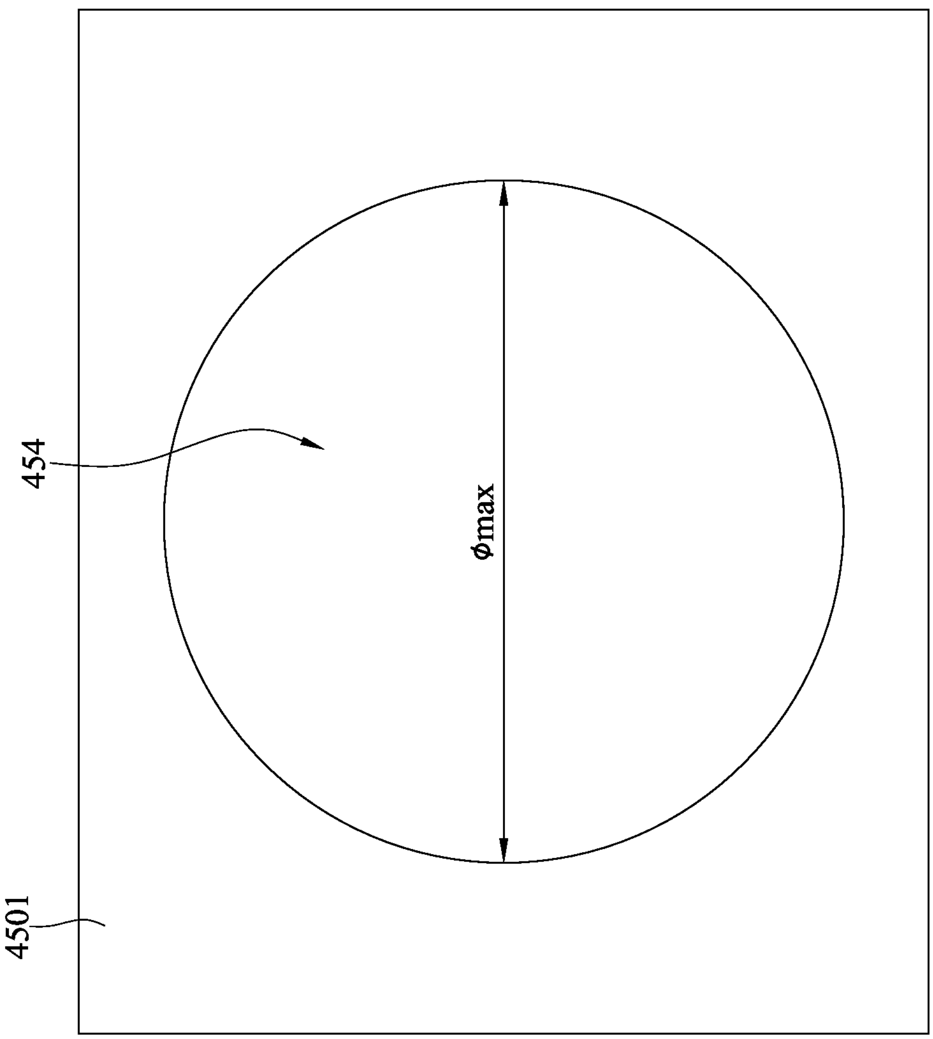


FIG. 16

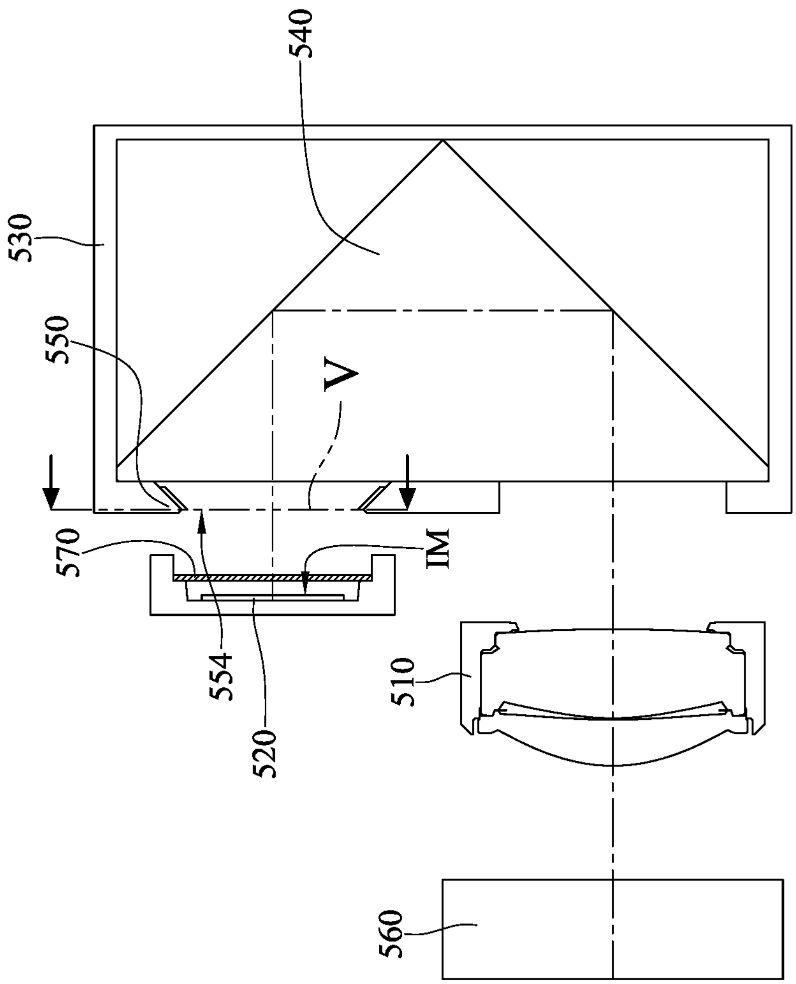
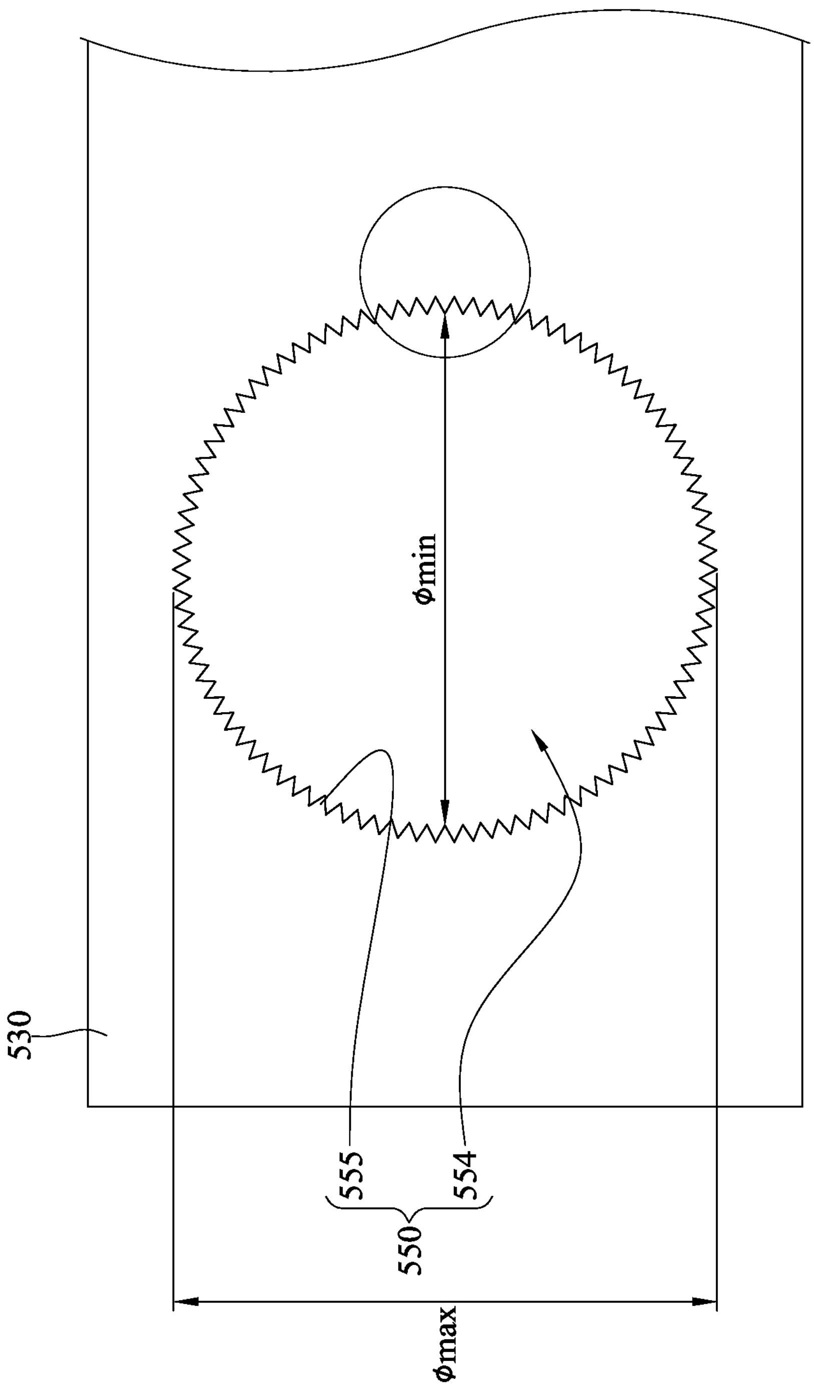


FIG. 17



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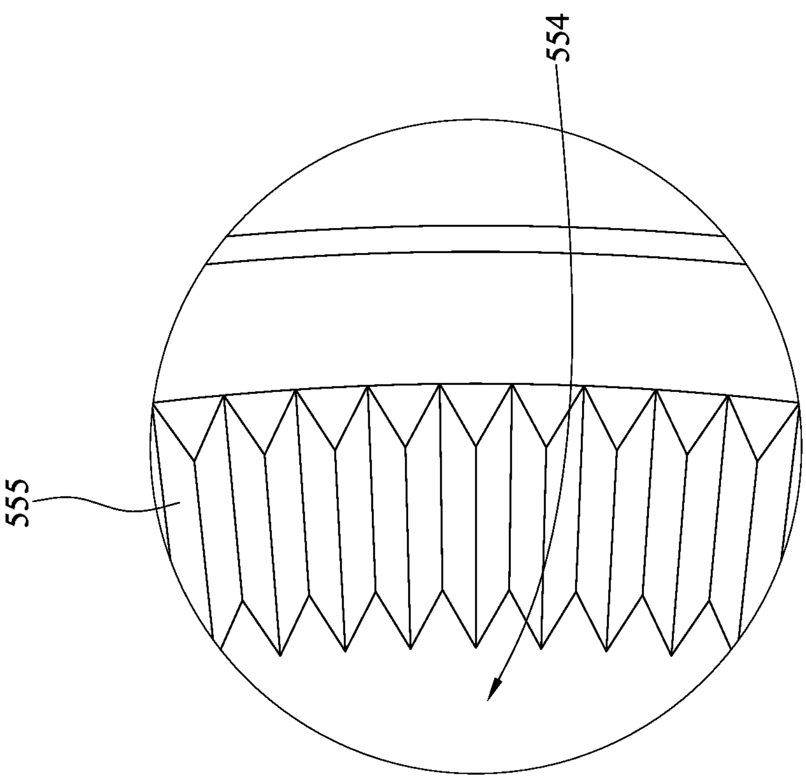

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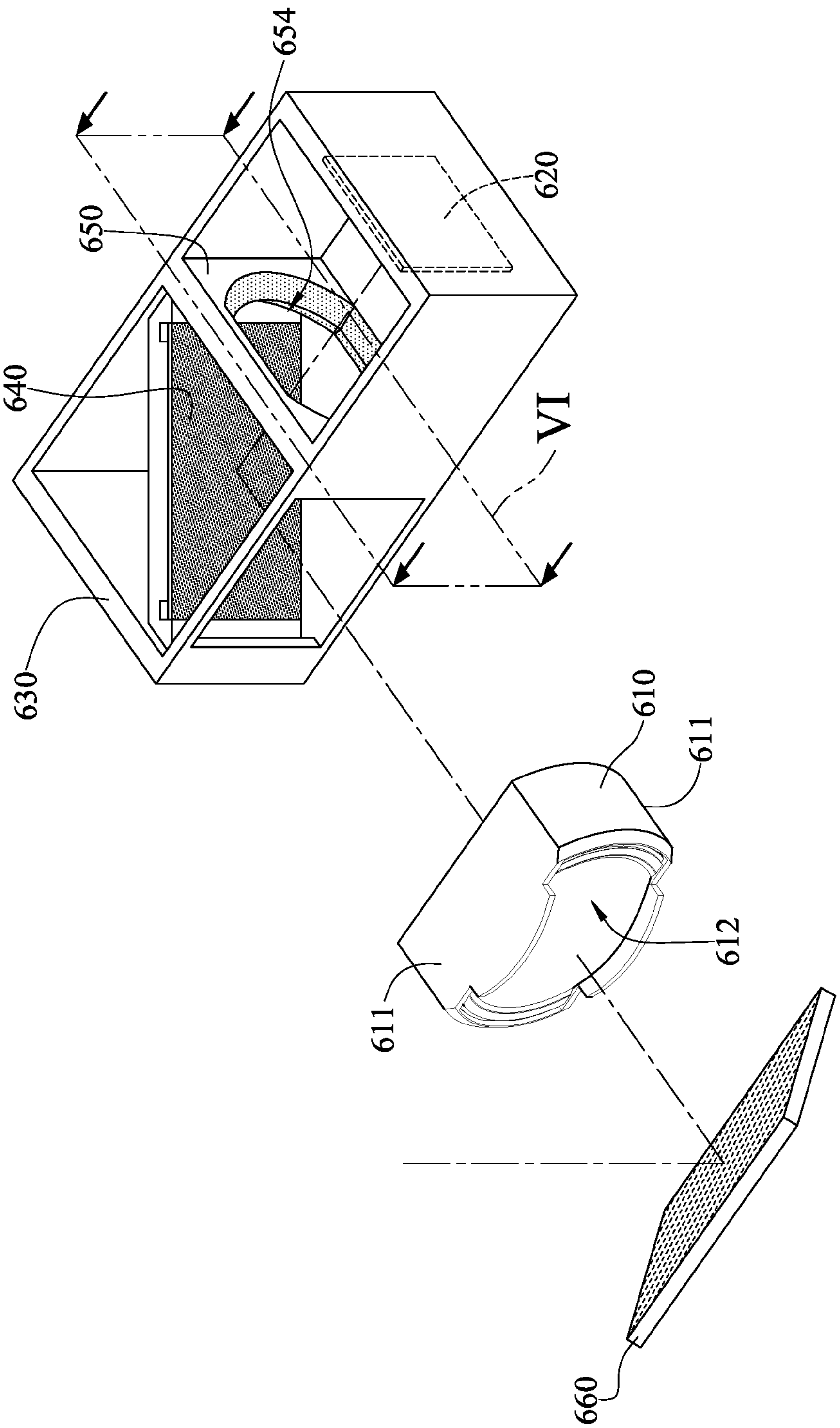

FIG. 20

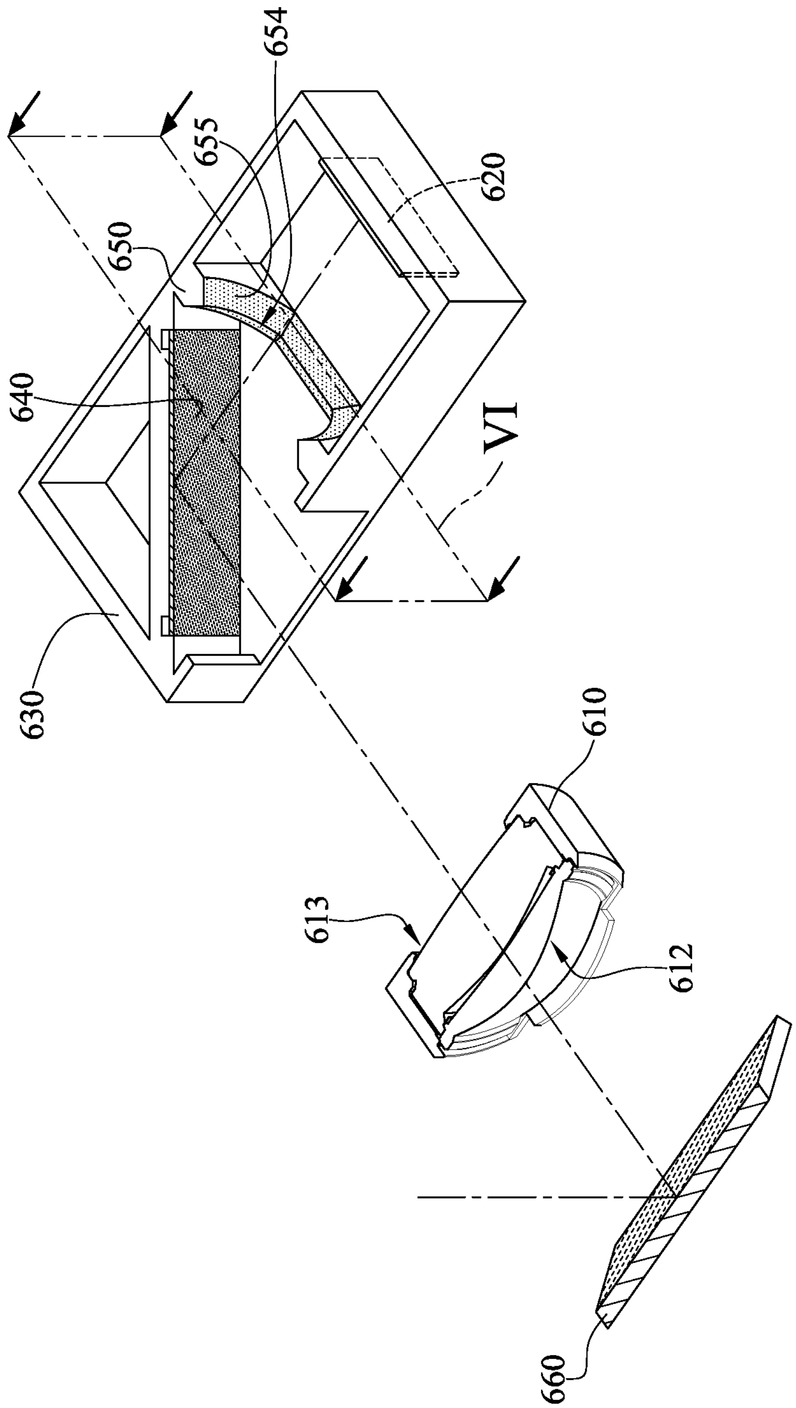

FIG. 21

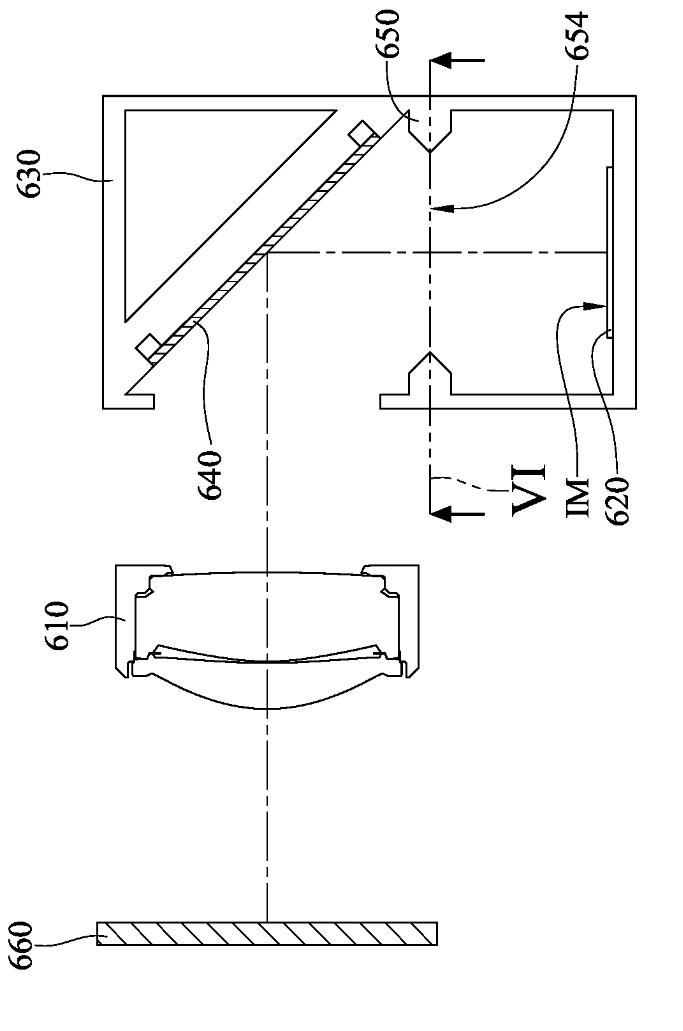

FIG. 22

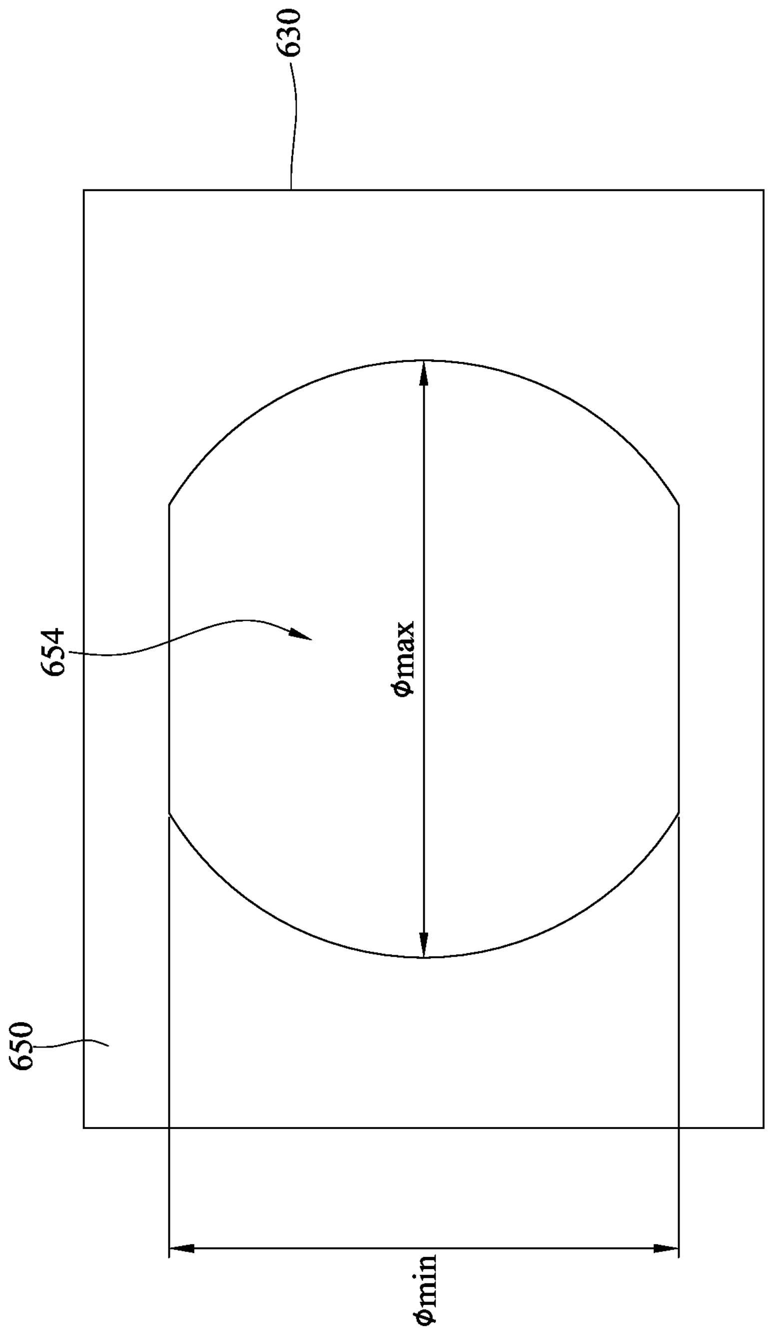

FIG. 23

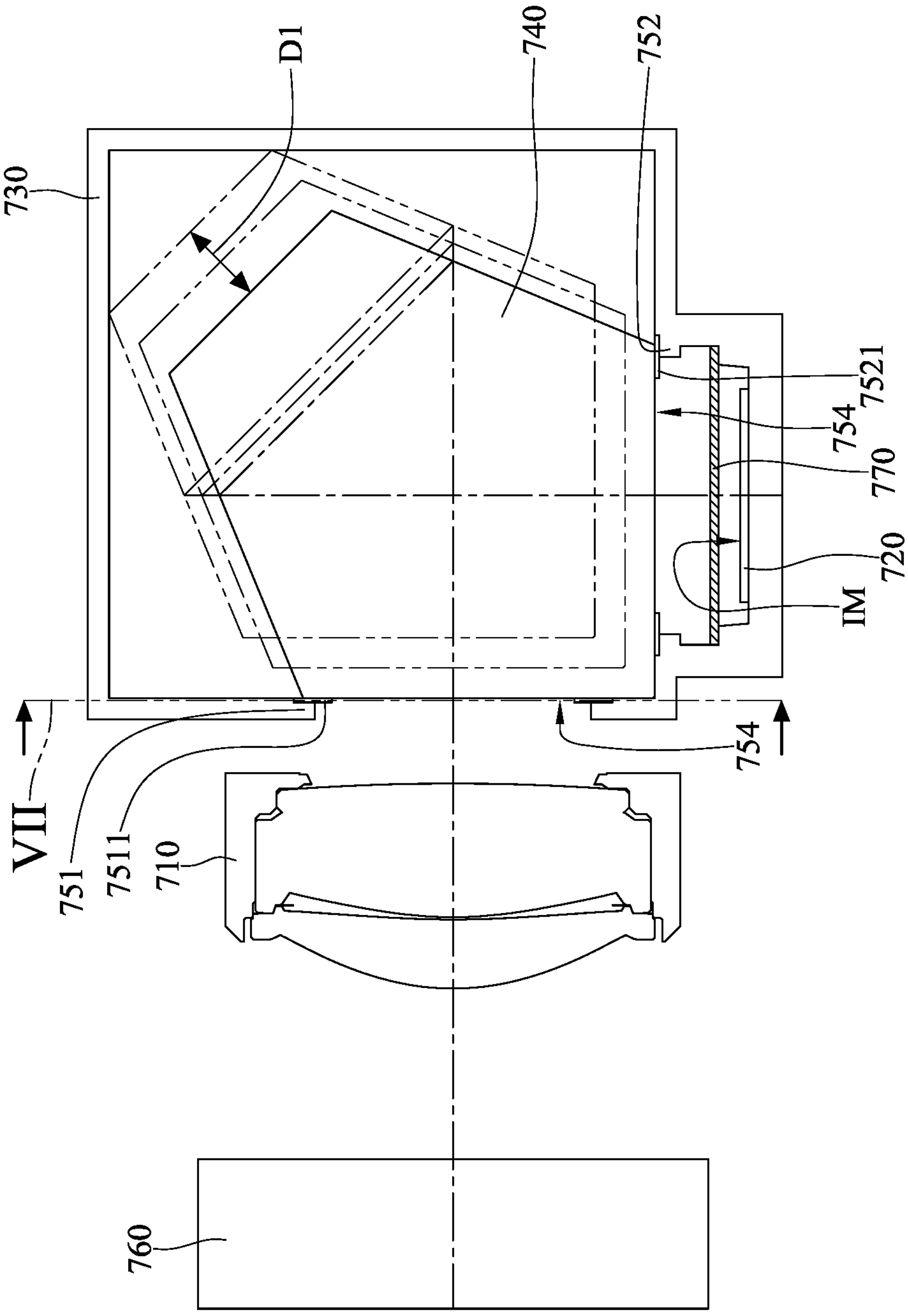

FIG. 24

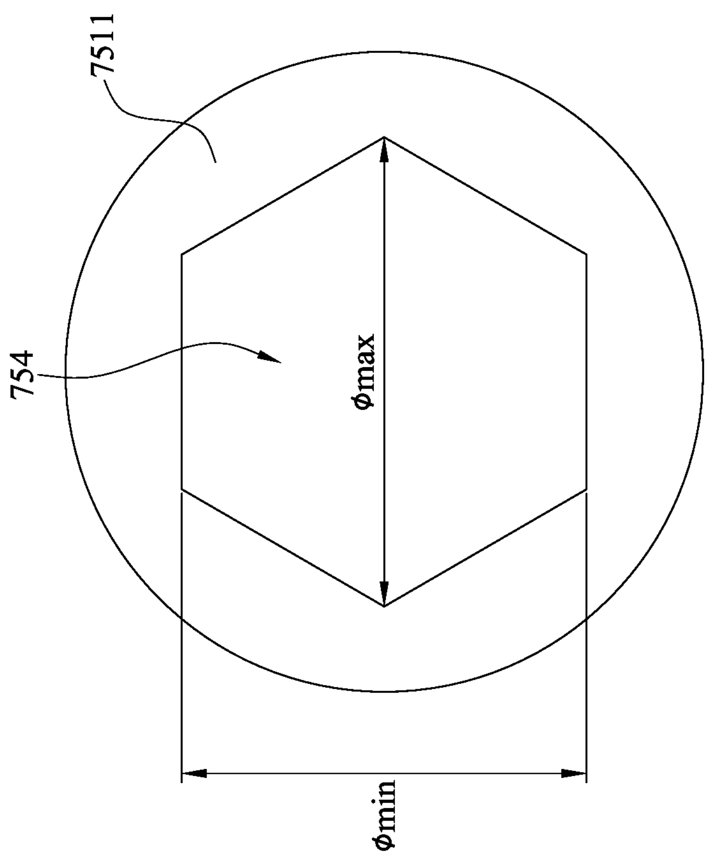

FIG. 25

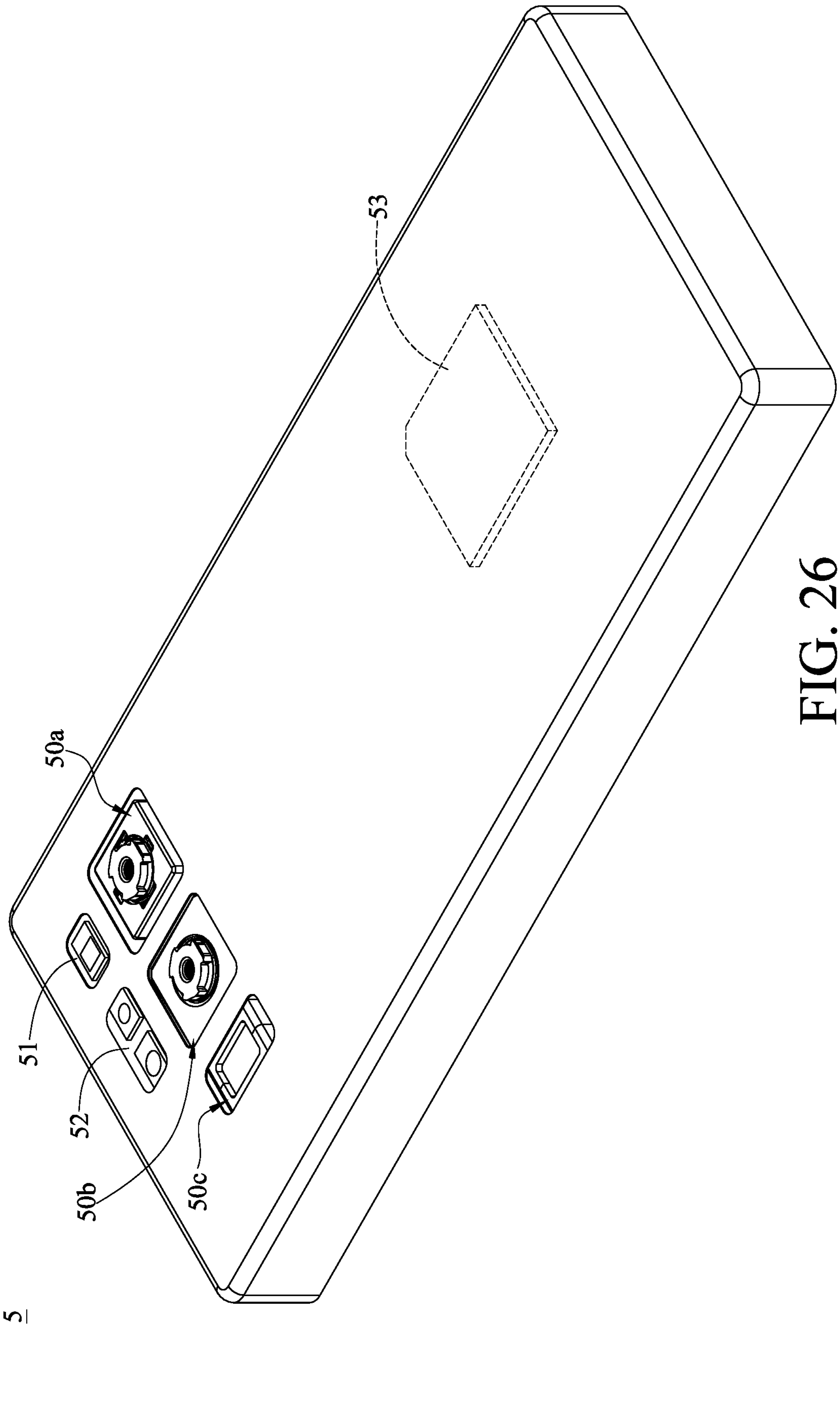

FIG. 26

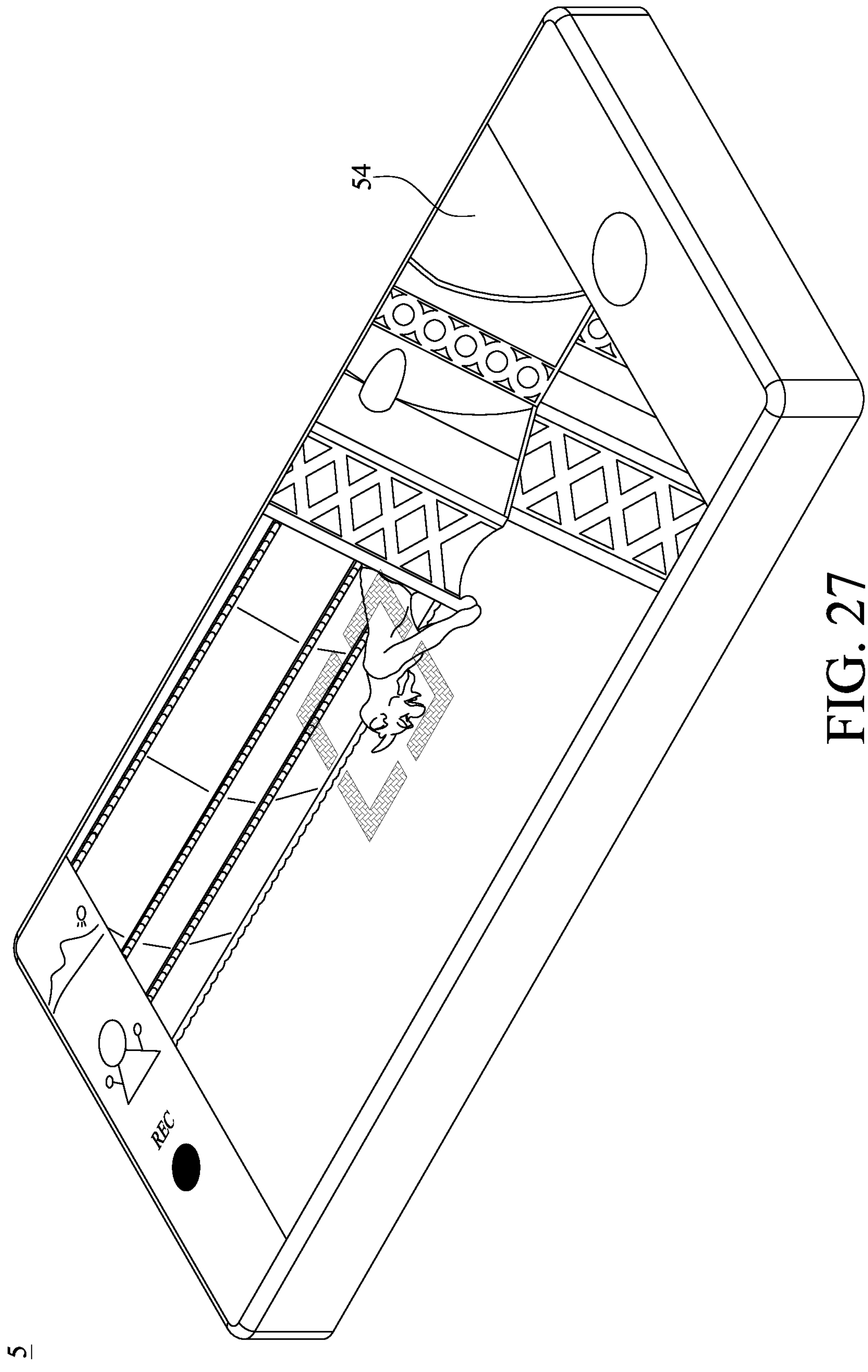

FIG. 27

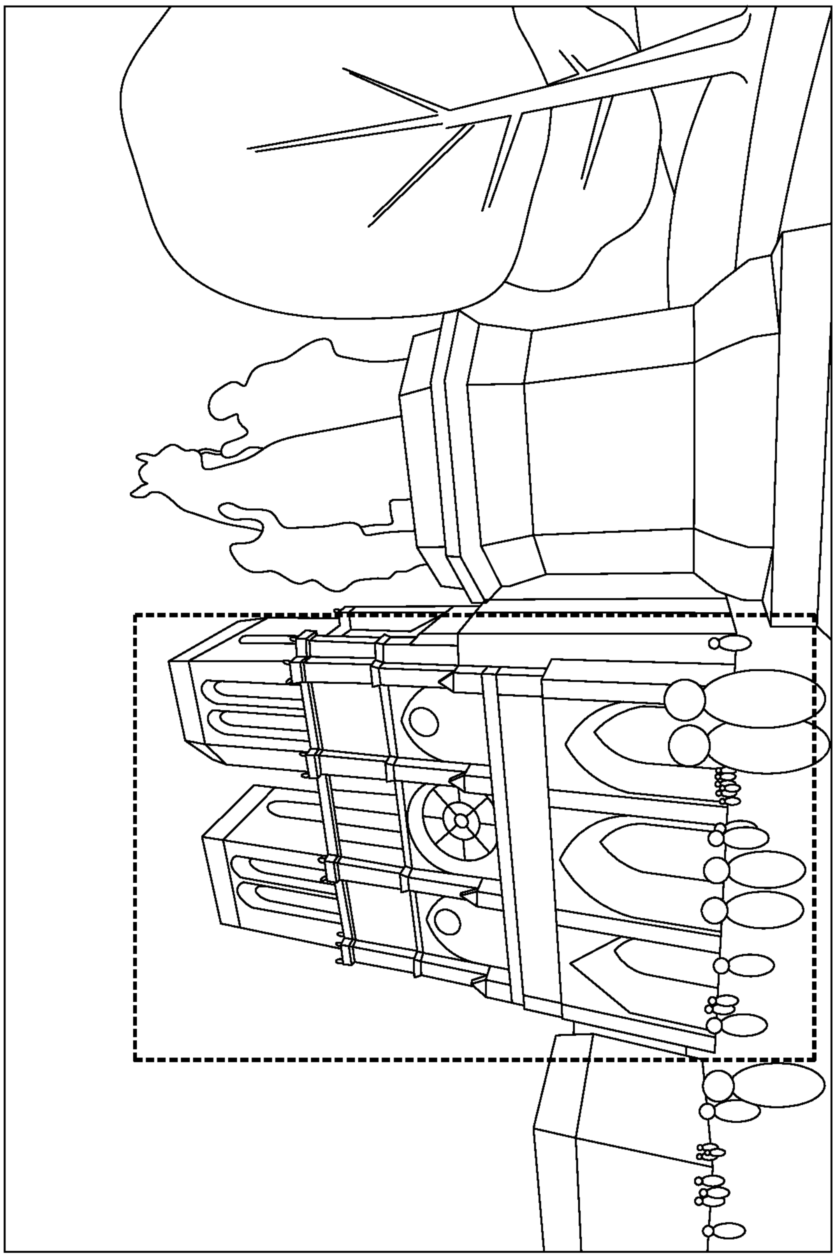

FIG. 28

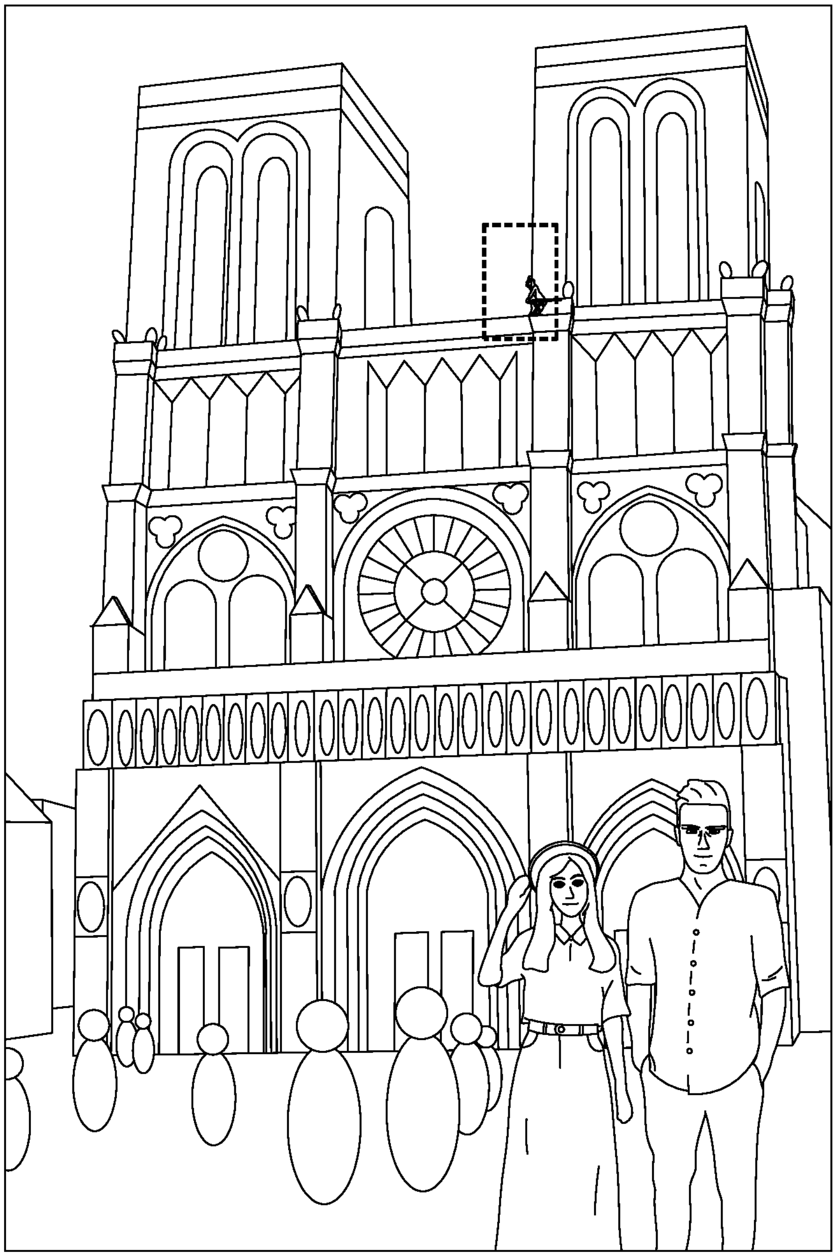

FIG. 29

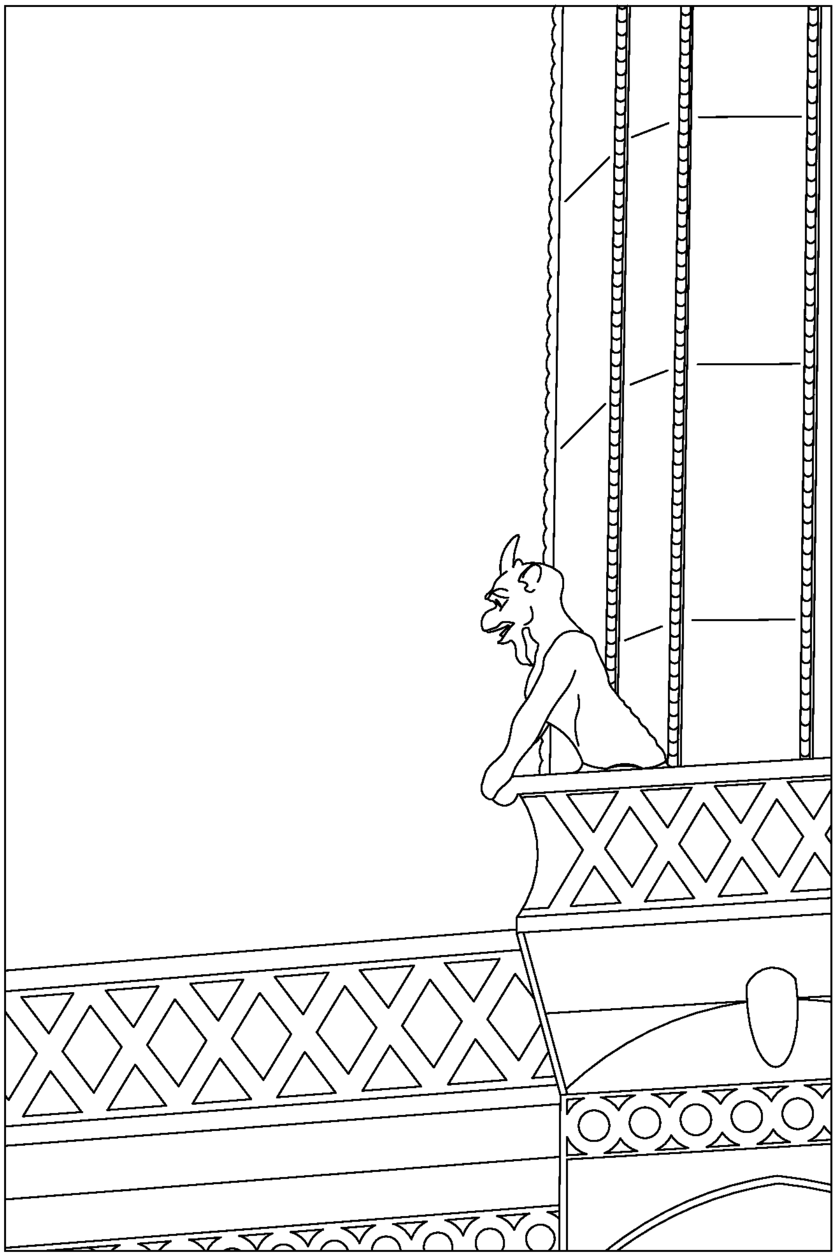

FIG. 30

CAMERA MODULE AND ELECTRONIC DEVICE

RELATED APPLICATIONS

This application is a continuation patent application of U.S. application Ser. No. 16/719,508, filed on Dec. 18, 2019, which claims priority to Taiwan Application 108133574, filed on Sep. 18, 2019, which is incorporated by reference herein in its entirety.

BACKGROUND

Technical Field

The present disclosure relates to a camera module and an electronic device, more particularly to a camera module applicable to an electronic device.

Description of Related Art

With the development of semiconductor manufacturing technology, the performance of image sensors has improved, and the pixel size thereof has been scaled down. Therefore, featuring high image quality becomes one of the indispensable features of an optical system nowadays. Furthermore, due to the rapid changes in technology, electronic devices equipped with optical systems are trending towards multi-functionality for various applications, and therefore the functionality requirements for the optical systems have been increasing.

In recent years, there is an increasing demand for electronic devices featuring compact size, but conventional optical systems, especially the telephoto optical systems with a long focal length, are difficult to meet both the requirements of high image quality and compactness. Conventional telephoto optical systems usually have shortcomings of overly long total length, poor image quality or overly large in size, thereby unable to meet the requirements of the current technology trends. To achieve compactness, the optical systems may be configured to have a folded optical axis so as to reduce the dimension of the optical systems in a specific direction, thereby reducing the total system size. However, the stray light generated inside the optical systems at the diffraction limit thereof has a significant impact on the imaging quality, which limits the resolution of the optical systems. One way to reduce stray light is to equip a lens assembly with additional optical components to block stray light. However, the additional optical components may increase the overall size of the optical systems such that it is unfavorable for the compactness requirement.

Accordingly, how to improve the optical systems for achieving a compact size and blocking stray light so as to meet the requirement of high-end-specification electronic devices is an important topic in this field nowadays.

SUMMARY

According to one aspect of the present disclosure, a camera module includes an imaging lens system, an image sensor and a plurality of light-folding elements. The imaging lens system is configured to focus imaging light onto an image surface. The image sensor is disposed on the image surface. The plurality of light-folding elements includes at least one image-side light-folding element disposed on an image side of the imaging lens system. Each of the light-folding elements has an entrance optical path and an exit optical path and is configured to fold the imaging light from the entrance optical path thereof to the exit optical path thereof. At least one light-shielding mechanism is arranged on at least one of the entrance light path and the exit light path of the at least one image-side light-folding element. The at least one light-shielding mechanism has a minimal opening, and the minimal opening surrounds the imaging light in the at least one of the entrance optical path and the exit optical path of the at least one image-side light-folding element.

When a maximum diameter of the minimal opening is ϕmax, and a total path length from the imaging lens system to the image sensor is BF, the following condition is satisfied:

$$0.14<\phi max/BFL<0.42.$$

According to another aspect of the present disclosure, a camera module includes an imaging lens system, an image sensor and at least one light-folding element. The imaging lens system is configured to focus imaging light onto an image surface. The image sensor is disposed on the image surface. The at least one light-folding element is disposed on an image side of the imaging lens system. The at least one light-folding element has an entrance optical path and an exit optical path, and the at least one light-folding element is configured to fold the imaging light from the entrance optical path thereof to the exit optical path thereof. At least one light-shielding mechanism is arranged on at least one of the entrance optical path and the exit optical path of the at least one light-folding element. The at least one light-shielding mechanism has a minimal opening, and the minimal opening surrounds the imaging light in the at least one of the entrance optical path and the exit optical path of the at least one light-folding element.

When a focal length of the imaging lens system is EFL, the following condition is satisfied:

$$15\ [mm]<EFL<40\ [mm].$$

According to another aspect of the present disclosure, an electronic device includes a driving unit and one of the aforementioned camera modules, wherein the driving unit is disposed on the camera module.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure can be better understood by reading the following detailed description of the embodiments, with reference made to the accompanying drawings as follows:

FIG. **1** is one perspective view of a camera module according to the 1st embodiment of the present disclosure;

FIG. **2** is another perspective view of the camera module in FIG. **1**;

FIG. **3** is a cross-sectional view of the camera module in FIG. **1**;

FIG. **4** and FIG. **5** are partial enlarged views of the camera module in FIG. **3**;

FIG. **6** is a top view of the camera module in FIG. **3**;

FIG. **7** is a cross-sectional view of a holding member in FIG. **1** along reference plane I;

FIG. **8** is a cross-sectional and top view of a camera module according to the 2nd embodiment of the present disclosure;

FIG. **9** is a cross-sectional view of a light-shielding member in FIG. **8** along reference plane II;

FIG. **10** is a partial enlarged view of the camera module in FIG. **8**;

FIG. **11** is a cross-sectional and top view of a camera module according to the 3rd embodiment of the present disclosure;

FIG. **12** is a cross-sectional view of a light-shielding member in FIG. **11** along reference plane III;

FIG. **13** is a partial enlarged view of the camera module in FIG. **11**;

FIG. **14** is a cross-sectional view of a camera module according to the 4th embodiment of the present disclosure;

FIG. **15** is a top view of the camera module in FIG. **14**;

FIG. **16** is a cross-sectional view of a light-shielding member in FIG. **14** along reference plane IV;

FIG. **17** is a cross-sectional and top view of a camera module according to the 5th embodiment of the present disclosure;

FIG. **18** is a cross-sectional view of a holding member in FIG. **17** along reference plane V;

FIG. **19** is a partial enlarged view of the holding member in FIG. **18**;

FIG. **20** is a perspective view of a camera module according to the 6th embodiment of the present disclosure;

FIG. **21** is a cross-sectional view of the camera module in FIG. **20**;

FIG. **22** is a top view of the camera module in FIG. **21**;

FIG. **23** is a cross-sectional view of a holding member in FIG. **20** along reference plane VI;

FIG. **24** is a cross-sectional and top view of an electronic device according to the 7th embodiment of the present disclosure;

FIG. **25** is a cross-sectional view of a light-shielding member in FIG. **24** along reference plane VII;

FIG. **26** is one perspective view of an electronic device according to the 8th embodiment of the present disclosure;

FIG. **27** is another perspective view of the electronic device in FIG. **26**;

FIG. **28** is an image captured by an ultra wide angle camera module;

FIG. **29** is an image captured by a high pixel camera module; and

FIG. **30** is an image captured by a telephoto camera module.

DETAILED DESCRIPTION

A camera module of the present disclosure has a configuration of relatively long back focal length for capturing distant landscapes. The camera module includes an imaging lens system, an image sensor and at least one image-side light-folding element. The imaging lens system is configured to focus imaging light onto an image surface, and the image sensor is disposed on the image surface.

The image-side light-folding element is disposed on an image side of the imaging lens system, and the image-side light-folding element has an entrance optical path and an exit optical path and is configured fold the imaging light from the entrance optical path thereof to the exit optical path thereof. Specifically, in one embodiment, the imaging light travels in the entrance optical path to approach the light-folding element, and the imaging light reflected by the light-folding element travels in the exit optical path to be away from the light-folding element. Therefore, it is favorable for reducing the overall module space and effectively utilizing the space by bending imaging light in a way to make the optical path much longer than the size of the optical system, thereby providing the feasibility of a miniaturized lens.

The imaging light is reflected at least once in each light-folding element, and according to various design requirements, each light-folding element can be configured to have its exit optical path being substantially perpendicular or parallel to its entrance optical path. Said "substantially perpendicular" indicates that an angle between the two optical paths can be 90 degrees or near to 90 degrees, and said "substantially parallel" indicates that an angle between the two optical paths can be 0 degrees or neat to 0 degrees. In addition, the light-folding element can be, for example, a triangular prism, a reflection mirror, a pentaprism or a Porro prism, but the present disclosure is not limited thereto.

According to the present disclosure, at least one light-shielding mechanism is arranged on at least one of the entrance optical path and the exit optical path of the image-side light-folding element. The light-shielding mechanism has a minimal opening, and the minimal opening surrounds the imaging light traveling in the optical path where the light-shielding mechanism is located. Therefore, having light-shielding mechanisms arranged on a specific position in the front or back of the light-folding element is favorable for effectively blocking non-imaging light outside the field of view so as to ensure clear images. Moreover, there can be a light-shielding mechanism arranged on each of the entrance optical path and the exit optical path of the image-side light-folding element. Therefore, it is favorable for improving the efficiency of blocking stray light. Moreover, the number of the at least one image-side light-folding element can be at least two, and the at least two image-side light-folding elements can be disposed on the image side of the imaging lens system; the light-shielding mechanism can be located between the at least two image-side light-folding elements and can form a gap between the at least two image-side light-folding elements. Therefore, it is favorable for reducing manufacturing difficulty and increasing design flexibility for assembly; furthermore, it is favorable for improving the efficiency of blocking non-imaging light and even more effectively preventing extra stray light from being generated.

When a maximum diameter of the minimal opening of the light-shielding mechanism is ϕmax, and a total path length from the imaging lens system to the image sensor is BFL, the following condition can be satisfied: $0.14<\phi max/BFL<0.42$. Therefore, it is favorable for ensuring that the imaging lens system has a high resolving power. Moreover, the following condition can also be satisfied: $0.14<\phi max/BFL<0.35$. Therefore, it is favorable for providing a high telephoto ratio with high resolving power. Said total path length from the imaging lens system to the image sensor is the back focal length of the imaging lens system. Please refer to FIG. **7**, which shows a schematic view of ϕmax according to the 1st embodiment of the present disclosure.

When a focal length of the imaging lens system is EFL, the following condition can be satisfied: 15 [mm]<EFL<40 [mm]. Therefore, it is favorable for ensuring the resolving power of the imaging lens system. Moreover, the following condition can also be satisfied: 20 [mm]<EFL<35 [mm]. Therefore, it is favorable for providing a high telephoto ratio with excellent and consistent resolving power.

According to the present disclosure, the camera module can further include at least one object-side light-folding element disposed on an object side of the imaging lens system, and the object-side light-folding element has an entrance optical path being substantially perpendicular to the exit optical path of any one of the image-side light-folding elements. Therefore, it is favorable for providing the feasibility of miniaturized periscope lens.

The imaging lens system can have at least one trimmed structure at a peripheral portion thereof, and the trimmed structure is trimmed down from a periphery towards a center of the imaging lens system. Therefore, it is favorable for properly reducing the size of the imaging lens system in accordance with the length-to-width ratio of the image sensor. Moreover, the number of the at least one trimmed structure can be only one. Moreover, the number of the at least one trimmed structure can be at least two, and the at least two trimmed structures can be on opposite sides of the peripheral portion. Moreover, each of the trimmed structures can form a flat cutting surface.

The image-side light-folding element can be disposed in a holding member, and the holding member allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of the image-side light-folding element. In addition, the light-shielding mechanism can be disposed on the holding member. Therefore, it is favorable for stabilizing the relative position between the light-shielding mechanism and the image-side light-folding element so as to reduce assembly tolerance. When the number of the at least one image-side light-folding element is at least two, there can be at least one image-side light-folding element disposed in the holding member, or there can be at least two image-side light-folding elements disposed in the holding member.

The light-shielding mechanism and the holding member can be one-piece formed, and the light-shielding mechanism can have an anti-reflective surface structure at a periphery of the minimal opening. Therefore, it is favorable for reducing assembly processes so as to increase manufacturing efficiency. Moreover, the light-shielding mechanism and the holding member can be made of, for example, plastic material.

The light-shielding mechanism can include at least one light-shielding member, and a light-absorbing layer can be arranged on the light-shielding member. Therefore, it is favorable for enhancing the light diminishing capability of the light-shielding mechanism and fixing the light-shielding member in position to increase assembly strength. Moreover, the light-shielding member can be, for example, an optical shutter, a metallic spacer, a plastic spacer and a light-absorbing layer, but the present disclosure is not limited thereto. Furthermore, the light-absorbing layer can be a black layer including an adhesive material, which provides adhesion after solidifying. In one configuration, the light-shielding member can be directly abutted with the light-folding element.

The minimal opening of the light-shielding mechanism can be non-circular. When a minimum diameter of the minimal opening is ϕmin, and the maximum diameter of the minimal opening is ϕmax, the following condition can be satisfied: $0.55<\phi min/\phi max<0.95$. Therefore, it is favorable for reducing non-imaging light generated due to reflection around the minimal opening. Please refer to FIG. 7, which shows a schematic view of ϕmax and ϕmin according to the 1st embodiment of the present disclosure.

According to the present disclosure, the camera module can further include an IR-cut filter, and the light-shielding mechanism and the IR-cut filter can be not in physical contact with each other. Therefore, the design of the light-shielding mechanism may not affect the assembling of the image sensor and the IR-cut filter. Moreover, the IR-cut filter can be closer to the image sensor than the light-shielding mechanism is to the image sensor. Therefore, it is favorable for increasing the efficiency of the light-shielding mechanism for blocking reflection light from the IR-cut filter.

The imaging lens system can have an object-side opening and an image-side opening being both non-circular. Therefore, it is favorable for the imaging lens system to have an opening shape providing an optimized optical quality within limited interior space in accordance with the shape of the image sensor.

When a refractive index of the image-side light-folding element is Nf, the following condition can be satisfied: $1.7\leq Nf$. Therefore, it is favorable for whole amount of imaging light within the field of view of the imaging lens system suffering total internal reflection to be folded from the entrance optical path to the exit optical path.

According to the present disclosure, said total path length from the imaging lens system to image sensor is the back focal length of the imaging lens system, and it is the travelling length of the imaging light in the optical axis from an image-side surface of a most-image-side lens element in the imaging lens system to the image sensor. More specifically, in the embodiment of FIG. **6**, the total path length from the imaging lens system **110** to the image sensor **120** includes an axial distance between an image-side surface of a most-image-side lens element in the imaging lens system **110** and a reflection surface of the image-side light-folding element **141**, an axial distance between the reflection surface of the image-side light-folding element **141** and a reflection surface of the image-side light-folding element **142**, and an axial distance between the reflection surface of the image-side light-folding element **142** and the image sensor **120**.

According to the present disclosure, the aforementioned features and conditions can be utilized in numerous combinations so as to achieve corresponding effects

According to the above description of the present disclosure, the following specific embodiments are provided for further explanation.

1st Embodiment

FIG. **1** is one perspective view of a camera module according to the 1st embodiment of the present disclosure. FIG. **2** is another perspective view of the camera module in FIG. **1**. FIG. **3** is a cross-sectional view of the camera module in FIG. **1**. FIG. **4** and FIG. **5** are partial enlarged views of the camera module in FIG. **3**. FIG. **6** is a top view of the camera module in FIG. **3**. FIG. **7** is a cross-sectional view of a holding member in FIG. **1** along reference plane I. In this embodiment, the camera module (its reference numeral is omitted) includes an imaging lens system **110**, an image sensor **120**, a holding member **130**, two image-side light-folding elements **141** and **142**, a light-shielding mechanism **150** and an object-side light-folding element **160**.

The imaging lens system **110** is configured to focus imaging light onto the image surface IM, and the image sensor **120** is disposed on the image surface IM. In addition, the imaging lens system **110** has two trimmed structures **111** at a peripheral portion thereof. The trimmed structures **111** are on opposite sides of the peripheral portion, and each trimmed structure **111** is trimmed down from a periphery towards a center of the imaging lens system **110** to form a flat cutting surface. Moreover, the imaging lens system **110** has an object-side opening **112** and an image-side opening **113** being both non-circular.

The holding member **130** is disposed on an image side of the imaging lens system **110**, and the holding member **130** is located between the imaging lens system **110** and the image surface IM in optical path.

The image-side light-folding elements **141** and **142** are disposed on the image side of the imaging lens system **110**, and each of the image-side light-folding elements **141** and **142** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the image-side light-folding element **141** is closer to an object side than the image-side light-folding element **142** is to the object side, and the exit optical path of the image-side light-folding element **141** is also considered as the entrance optical path of the image-side light-folding element **142**. Both of the image-side light-folding elements **141** and **142** are disposed in the holding member **130**, and the holding member **130** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of the image-side light-folding elements **141** and **142**.

The light-shielding mechanism **150** is disposed on the holding member **130**, and the light-shielding mechanism **150** and the holding member **130** are one-piece formed. Furthermore, the light-shielding mechanism **150** is located between the image-side light-folding element **141** and the image-side light-folding element **142**, and the light-shielding mechanism **150** forms a gap between the image-side light-folding elements **141** and **142**. The light-shielding mechanism **150** being located between the image-side light-folding element **141** and the image-side light-folding element **142** indicates that the light-shielding mechanism **150** is located in the exit optical path of the image-side light-folding element **141** and also located in the entrance optical path of the image-side light-folding element **142**. In addition, the light-shielding mechanism **150** has a minimal opening **154**, and the minimal opening **154** is non-circular and surrounds the imaging light in the optical path where the light-shielding mechanism **150** is located. As shown in FIG. **4**, there is an anti-reflective surface structure **155** arranged at a periphery of the minimal opening **154**. The anti-reflective surface structure **155** consists of a plurality of annular protruding structures, and each of the annular protruding structures surrounds the minimal opening **154** and protrudes in the shape of a circular arc.

The object-side light-folding element **160** is disposed on the object side of the imaging lens system **110**, and the object-side light-folding element **160** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **160** is substantially perpendicular to the exit optical path of any one of the image-side light-folding elements **141** and **142**. In this embodiment, each of the light-folding elements **141**, **142** and **160** is, for example, a triangular prism, and the exit optical path and the entrance optical path of each of the light-folding elements **141**, **142** and **160** are substantially perpendicular to each other.

When a maximum diameter of the minimal opening **154** is ϕmax, and a total path length from the imaging lens system **110** to the image sensor **120** is BFL, the following condition is satisfied: ϕmax/BFL=0.266.

When a focal length of the imaging lens system **110** is EFL, the following condition is satisfied: EFL=29.5 [mm].

When a minimum diameter of the minimal opening **154** is ϕmin, and the maximum diameter of the minimal opening **154** is ϕmax, the following condition is satisfied: ϕmin/ϕmax=0.692.

When a refractive index of any one of the image-side light-folding elements **141** and **142** is Nf, the image-side light-folding elements **141** and **142** both satisfy the following condition: Nf=1.77.

2nd Embodiment

FIG. **8** is a cross-sectional and top view of a camera module according to the 2nd embodiment of the present disclosure. FIG. **9** is a cross-sectional view of a light-shielding member in FIG. **8** along reference plane II. FIG. **10** is a partial enlarged view of the camera module in FIG. **8**. In this embodiment, the camera module (its reference numeral is omitted) includes an imaging lens system **210**, an image sensor **220**, a holding member **230**, two image-side light-folding elements **241** and **242**, three light-shielding mechanisms **251**, **252** and **253**, an object-side light-folding element **260** and an IR-cut filter **270**.

The imaging lens system **210** is configured to focus imaging light onto the image surface IM, and the image sensor **220** is disposed on the image surface IM.

The holding member **230** is disposed on an image side of the imaging lens system **210**, and the holding member **230** is located between the imaging lens system **210** and the image surface IM in optical path.

The image-side light-folding elements **241** and **242** are disposed on the image side of the imaging lens system **210**, and each of the image-side light-folding elements **241** and **242** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the image-side light-folding element **241** is closer to an object side than the image-side light-folding element **242** is to the object side, and the exit optical path of the image-side light-folding element **241** is also considered as the entrance optical path of the image-side light-folding element **242**. Both of the image-side light-folding elements **241** and **242** are disposed in the holding member **230**, and the holding member **230** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of each of the image-side light-folding elements **241** and **242**.

The light-shielding mechanisms **251**, **252** and **253** are disposed on the holding member **230**. In addition, the light-shielding mechanism **251** is located in the entrance optical path of the image-side light-folding element **241**, the light-shielding mechanisms **252** and **253** are located between the image-side light-folding element **241** and the image-side light-folding element **242**, and the light-shielding mechanisms **252** and **253** jointly form a gap between the image-side light-folding elements **241** and **242**. The light-shielding mechanisms **252** and **253** being located between the image-side light-folding element **241** and the image-side light-folding element **242** indicates that the light-shielding mechanisms **252** and **253** are located in the exit optical path of the image-side light-folding element **241** and also located in the entrance optical path of the image-side light-folding element **242**. In addition, each of the light-shielding mechanisms **251**, **252** and **253** has a minimal opening **254**, and the minimal openings **254** are non-circular and each surrounds the imaging light in the optical path where the light-shielding mechanisms **251**, **252** and **253** are located, respectively. As shown in FIG. **9** and FIG. **10**, the light-shielding mechanism **252** includes a light-shielding member **2521**, and the light-shielding mechanism **253** includes a light-shielding member **2531**. The minimal openings **254** of the light-shielding mechanisms **252** and **253** are respectively located at the light-shielding members **2521** and **2531**, and there are light-absorbing layers **2522** and **2532** respectively arranged on the light-shielding members **2521** and **2531**. The light-shielding mechanisms **252** and **253** described above are only exemplary, and the light-shielding mechanism **251** in this embodiment can have a configuration the same as that of the light-shielding mechanisms **252** and **253**. In addition, in this embodiment, there are light-shielding mechanisms arranged on both the entrance optical path and the exit optical path of the image-side light-folding element **241**.

The object-side light-folding element **260** is disposed on the object side of the imaging lens system **210**, and the object-side light-folding element **260** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **260** is substantially perpendicular to the exit optical path of any one of the image-side light-folding elements **241** and **242**. In this embodiment, each of the light-folding elements **241**, **242** and **260** is, for example, a triangular prism, and the exit optical path and the entrance optical path of each of the light-folding elements **241**, **242** and **260** are substantially perpendicular to each other.

The IR-cut filter **270** is disposed between the image-side light-folding element **242** and the image surface IM, and will not affect the focal length of the camera module. The IR-cut filter **270** is not in physical contact with any one of the light-shielding mechanisms **251**, **252** and **253**, and the IR-cut filter **270** is closer to the image sensor **220** than the light-shielding mechanisms **251**, **252** and **253** are to the image sensor **220**.

When a maximum diameter of the minimal opening **254** is ϕmax, and a total path length from the imaging lens system **210** to the image sensor **220** is BFL, the following condition is satisfied: ϕmax/BFL=0.178.

When a focal length of the imaging lens system **210** is EFL, the following condition is satisfied: EFL=28.2 [mm].

When a minimum diameter of the minimal opening **254** is ϕmin, and the maximum diameter of the minimal opening **254** is ϕmax, the following condition is satisfied: ϕmin/ϕmax=0.750.

When a refractive index of any one of the image-side light-folding elements **241** and **242** is Nf, the image-side light-folding elements **241** and **242** both satisfy the following condition: Nf=1.77.

3rd Embodiment

FIG. **11** is a cross-sectional and top view of a camera module according to the 3rd embodiment of the present disclosure. FIG. **12** is a cross-sectional view of a light-shielding member in FIG. **11** along reference plane III. FIG. **13** is a partial enlarged view of the camera module in FIG. **11**. In this embodiment, the camera module (its reference numeral is omitted) includes an imaging lens system **310**, an image sensor **320**, a holding member **330**, two image-side light-folding elements **341** and **342**, two light-shielding mechanisms **351** and **352**, an object-side light-folding element **360** and an IR-cut filter **370**.

The imaging lens system **310** is configured to focus imaging light onto the image surface IM, and the image sensor **320** is disposed on the image surface IM.

The holding member **330** is disposed on an image side of the imaging lens system **310**, and the holding member **330** is located between the imaging lens system **310** and the image surface IM in optical path.

The image-side light-folding elements **341** and **342** are disposed on the image side of the imaging lens system **310**, and each of the image-side light-folding elements **341** and **342** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the image-side light-folding element **341** is closer to an object side than the image-side light-folding element **342** is to the object side, and the exit optical path of the image-side light-folding element **341** is also considered as the entrance optical path of the image-side light-folding element **342**. The image-side light-folding elements **341** and **342** are disposed in the holding member **330**, and the holding member **330** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of each of the image-side light-folding elements **341** and **342**.

The light-shielding mechanisms **351** and **352** are disposed on the holding member **330**. In addition, the light-shielding mechanism **351** is located between the image-side light-folding element **341** and the image-side light-folding element **342** and is closer to the image-side light-folding element **342**, and the light-shielding mechanism **351** forms a gap between the image-side light-folding elements **341** and **342**. The light-shielding mechanism **352** is located in the exit optical path of the image-side light-folding element **342**. The light-shielding mechanism **351** being located between the image-side light-folding element **341** and the image-side light-folding element **342** indicates that the light-shielding mechanism **351** is located in the exit optical path of the image-side light-folding element **341** and also located in the entrance optical path of the image-side light-folding element **342**. Furthermore, each of the light-shielding mechanisms **351** and **352** has a minimal opening **354**, and the minimal openings **354** are non-circular and each surrounds the imaging light in the optical path where the light-shielding mechanisms **351** and **352** are located, respectively. As shown in FIG. **12** and FIG. **13**, the light-shielding mechanism **351** includes a light-shielding member **3511**, the minimal opening **354** of the light-shielding mechanism **351** is located at the light-shielding member **3511**, and there is a light-absorbing layer **3512** arranged on the light-shielding member **3511**. The light-shielding mechanism **351** described above is only exemplary, and the light-shielding mechanism **352** in this embodiment can have a configuration the same as that of the light-shielding mechanism **351**. In addition, in this embodiment, there are light-shielding mechanisms arranged on both the entrance optical path and the exit optical path of the image-side light-folding element **342**.

The object-side light-folding element **360** is disposed on the object side of the imaging lens system **310**, and the object-side light-folding element **360** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **360** is substantially perpendicular to the exit optical path of any one of the image-side light-folding elements **341** and **342**. In this embodiment, each of the light-folding elements **341**, **342** and **360** is, for example, a triangular prism, and the exit optical path and the entrance optical path of each of the light-folding elements **341**, **342** and **360** are substantially perpendicular to each other.

The IR-cut filter **370** is disposed between the image-side light-folding element **342** and the image surface IM, and will not affect the focal length of the camera module. The IR-cut filter **370** is not in physical contact with any one of the light-shielding mechanisms **351** and **352**, and the IR-cut filter **370** is closer to the image sensor **320** than the light-shielding mechanisms **351** and **352** are to the image sensor **320**.

When a maximum diameter of the minimal opening **354** is ϕmax, and a total path length from the imaging lens system **310** to the image sensor **320** is BFL, the following condition is satisfied: ϕmax/BFL=0.200.

When a focal length of the imaging lens system **310** is EFL, the following condition is satisfied: EFL=26.9 [mm].

When a minimum diameter of the minimal opening **354** is ϕmin, and the maximum diameter of the minimal opening **354** is ϕmax, the following condition is satisfied: ϕmin/ϕmax=0.713.

When a refractive index of any one of the image-side light-folding elements **341** and **342** is Nf, the image-side light-folding elements **341** and **342** both satisfy the following condition: Nf=2.02.

4th Embodiment

FIG. **14** is a cross-sectional view of a camera module according to the 4th embodiment of the present disclosure. FIG. **15** is a top view of the camera module in FIG. **14**. FIG. **16** is a cross-sectional view of a light-shielding member in FIG. **14** along reference plane IV. In this embodiment, the camera module (its reference numeral is omitted) includes an imaging lens system **410**, an image sensor **420**, a holding member **430**, two image-side light-folding elements **441** and **442**, a light-shielding mechanism **450** and an object-side light-folding element **460**.

The imaging lens system **410** is configured to focus imaging light onto the image surface IM, and the image sensor **420** is disposed on the image surface IM.

The holding member **430** is disposed on an image side of the imaging lens system **410**, and the holding member **430** is located between the imaging lens system **410** and the image surface IM in optical path.

The image-side light-folding elements **441** and **442** are disposed on the image side of the imaging lens system **410**, and each of the image-side light-folding elements **441** and **442** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the image-side light-folding element **441** is closer to an object side than the image-side light-folding element **442** is to the object side, and the exit optical path of the image-side light-folding element **441** is also considered as the entrance optical path of the image-side light-folding element **442**. The image-side light-folding elements **441** and **442** are disposed in the holding member **430**, and the holding member **430** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of each of the image-side light-folding elements **441** and **442**.

The light-shielding mechanism **450** is disposed on the holding member **430**. In addition, the light-shielding mechanism **450** is located between the image-side light-folding element **441** and the image-side light-folding element **442**, and the light-shielding mechanism **450** forms a gap between the image-side light-folding elements **441** and **442**. The light-shielding mechanism **451** being located between the image-side light-folding element **441** and the image-side light-folding element **442** indicates that the light-shielding mechanism **451** is located in the exit optical path of the image-side light-folding element **441** and also located in the entrance optical path of the image-side light-folding element **442**. Furthermore, the light-shielding mechanism **450** has a minimal opening **454**, and the minimal opening **454** is circular and surrounds the imaging light in the optical path where the light-shielding mechanism **450** is located. As shown in FIG. **15** and FIG. **16**, the light-shielding mechanism **450** includes a light-shielding member **4501**, and the minimal opening **454** of the light-shielding mechanism **450** is located at the light-shielding member **4501**. The minimal opening **454** is located between the image-side light-folding elements **441** and **442** and is closer to the image-side light-folding element **441**.

The object-side light-folding element **460** is disposed on the object side of the imaging lens system **410**, and the object-side light-folding element **460** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **460** is substantially perpendicular to the exit optical path of any one of the image-side light-folding elements **441** and **442**. In this embodiment, each of the light-folding elements **441**, **442** and **460** is, for example, a triangular prism, and the exit optical path and the entrance optical path of each of the light-folding elements **441**, **442** and **460** are substantially perpendicular to each other.

When a maximum diameter of the minimal opening **454** is ϕmax, and a total path length from the imaging lens system **410** to the image sensor **420** is BFL, the following condition is satisfied: ϕmax/BFL=0.234. In this embodiment, the minimal opening **454** is circular, and the maximum diameter of the minimal opening **454** is equal to the diameter of the minimal opening **454**.

When a focal length of the imaging lens system **410** is EFL, the following condition is satisfied: EFL=29.5 [mm].

When a minimum diameter of the minimal opening **454** is ϕmin, and the maximum diameter of the minimal opening **454** is ϕmax, the following condition is satisfied: ϕmin/ϕmax=1. In this embodiment, the minimal opening **454** is circular, and the minimum diameter and the maximum diameter of the minimal opening **454** are the same.

When a refractive index of any one of the image-side light-folding elements **441** and **442** is Nf, the image-side light-folding elements **441** and **442** both satisfy the following condition: Nf=1.77.

5th Embodiment

FIG. **17** is a cross-sectional and top view of a camera module according to the 5th embodiment of the present disclosure. FIG. **18** is a cross-sectional view of a holding member in FIG. **17** along reference plane V. FIG. **19** is a partial enlarged view of the holding member in FIG. **18**. In this embodiment, the camera module (its reference numeral is omitted) includes an imaging lens system **510**, an image sensor **520**, a holding member **530**, an image-side light-folding element **540**, a light-shielding mechanism **550**, an object-side light-folding element **560** and an IR-cut filter **570**.

The imaging lens system **510** is configured to focus imaging light onto the image surface IM, and the image sensor **520** is disposed on the image surface IM.

The holding member **530** is disposed on an image side of the imaging lens system **510**, and the holding member **530** is located between the imaging lens system **510** and the image surface IM in optical path.

The image-side light-folding element **540** is disposed on the image side of the imaging lens system **510**, and the image-side light-folding element **540** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the imaging light is reflected twice in the image-side light-folding element **540**, and the exit optical path and the entrance optical path of the image-side light-folding element **540** are substantially parallel to each other. The image-side light-folding element **540** is disposed in the holding member **530**, and the holding member **530** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of the image-side light-folding element **540**. In this embodiment, the image-side light-folding element **540** is, for example, a Porro prism.

The light-shielding mechanism **550** is disposed on the holding member **530**, and the light-shielding mechanism **550** and the holding member **530** are one-piece formed. Furthermore, the light-shielding mechanism **550** is located between the image-side light-folding element **540** and the image surface IM. In addition, the light-shielding mechanism **550** has a minimal opening **554**, and the minimal opening **554** is non-circular and surrounds the imaging light in the optical path where the light-shielding mechanism **550** is located. As shown in FIG. **18** and FIG. **19**, there is an anti-reflective surface structure **555** arranged at a periphery of the minimal opening **554**. The anti-reflective surface structure **555** consists of a plurality of wedge strip structures, and the wedge strip structures are arranged in order along a circumferential direction around the periphery of the minimal opening **554**.

The object-side light-folding element **560** is disposed on an object side of the imaging lens system **510**, and the object-side light-folding element **560** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **560** is substantially perpendicular to the exit optical path of the image-side light-folding element **540**. In this embodiment, the object-side light-folding element **560** is, for example, a triangular prism, and the exit optical path and the entrance optical path of the object-side light-folding element **560** are substantially perpendicular to each other.

The IR-cut filter **570** is disposed between the image-side light-folding element **540** and the image surface IM, and will not affect the focal length of the camera module. The IR-cut filter **570** is not in physical contact with the light-shielding mechanism **550**, and the IR-cut filter **570** is closer to the image sensor **520** than the light-shielding mechanism **550** is to the image sensor **520**.

When a maximum diameter of the minimal opening **554** is ϕmax, and a total path length from the imaging lens system **510** to the image sensor **520** is BFL, the following condition is satisfied: $\phi max/BFL=0.192$.

When a focal length of the imaging lens system **510** is EFL, the following condition is satisfied: EFL=28.2 [mm].

When a minimum diameter of the minimal opening **554** is ϕmin, and the maximum diameter of the minimal opening **554** is ϕmax, the following condition is satisfied: $\phi min/\phi max=0.938$.

When a refractive index of the image-side light-folding element **540** is Nf, the following condition is satisfied: Nf=1.77.

6th Embodiment

FIG. **20** is a perspective view of a camera module according to the 6th embodiment of the present disclosure. FIG. **21** is a cross-sectional view of the camera module in FIG. **20**. FIG. **22** is a top view of the camera module in FIG. **21**. FIG. **23** is a cross-sectional view of a holding member in FIG. **20** along reference plane VI. In this embodiment, the camera module (its reference numeral is omitted) includes an imaging lens system **610**, an image sensor **620**, a holding member **630**, an image-side light-folding element **640**, a light-shielding mechanism **650** and an object-side light-folding element **660**.

The imaging lens system **610** is configured to focus imaging light onto the image surface IM, and the image sensor **620** is disposed on the image surface IM. In addition, the imaging lens system **610** has two trimmed structures **611** at a peripheral portion thereof. The trimmed structures **611** are on opposite sides of the peripheral portion, and each trimmed structure **611** is trimmed down from a periphery towards a center of the imaging lens system **610** to form a flat cutting surface. Moreover, the imaging lens system **610** has an object-side opening **612** and an image-side opening **613** being both non-circular.

The holding member **630** is disposed on an image side of the imaging lens system **610**, and the image sensor **620** is disposed in the holding member **630**.

The image-side light-folding element **640** is disposed on the image side of the imaging lens system **610**, and the image-side light-folding element **640** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the image-side light-folding element **640** is disposed in the holding member **630**, and the holding member **630** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of the image-side light-folding element **640**. In this embodiment, the image-side light-folding element **640** is, for example, a reflection mirror, and the image-side light-folding element **640** is located between the imaging lens system **610** and the image surface IM in optical path. The exit optical path and the entrance optical path of the image-side light-folding element **640** are substantially perpendicular to each other.

The light-shielding mechanism **650** is disposed on the holding member **630**, and the light-shielding mechanism **650** and the holding member **630** are one-piece formed. Furthermore, the light-shielding mechanism **650** is located between the image-side light-folding element **640** and the image surface IM. In addition, the light-shielding mechanism **650** has a minimal opening **654**, and the minimal opening **654** is non-circular and surrounds the imaging light in the optical path where the light-shielding mechanism **650** is located. As shown in FIG. **23**, there is an anti-reflective surface structure **655** arranged at a periphery of the minimal opening **654**, and the anti-reflective surface structure **655** is a blackened surface which is formed by roughening a plastic surface.

The object-side light-folding element **660** is disposed on an object side of the imaging lens system **610**, and the object-side light-folding element **660** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **660** is substantially perpendicular to the exit optical path of the image-side light-folding element **640**. In this embodiment, the object-side light-folding element **660** is, for example, a reflection mirror, and the exit optical path and the entrance optical path of the object-side light-folding element **660** are substantially perpendicular to each other.

When a maximum diameter of the minimal opening **654** is ϕmax, and a total path length from the imaging lens system **610** to the image sensor **620** is BFL, the following condition is satisfied: $\phi max/BFL=0.300$.

When a focal length of the imaging lens system **610** is EFL, the following condition is satisfied: EFL=26.9 [mm].

When a minimum diameter of the minimal opening **654** is ϕmin, and the maximum diameter of the minimal opening **654** is ϕmax, the following condition is satisfied: $\phi min/\phi max=0.857$.

7th Embodiment

FIG. **24** is a cross-sectional and top view of an electronic device according to the 7th embodiment of the present disclosure. FIG. **25** is a cross-sectional view of a light-shielding member in FIG. **24** along reference plane VII. In this embodiment, the electronic device (its reference numeral is omitted) includes the camera module (its reference numeral is omitted) and a driving unit (not shown in FIG. **24** or FIG. **25**). The camera module includes an imaging lens system **710**, an image sensor **720**, a holding member **730**, an image-side light-folding element **740**, two light-shielding mechanisms **751** and **752**, an object-side light-folding element **760** and an IR-cut filter **770**.

The imaging lens system **710** is configured to focus imaging light onto the image surface IM, and the image sensor **720** is disposed on the image surface IM.

The holding member **730** is disposed on an image side of the imaging lens system **710**, and the image sensor **720** is disposed in the holding member **730**.

The image-side light-folding element **740** is disposed on the image side of the imaging lens system **710**, and the image-side light-folding element **740** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. In addition, the imaging light is reflected twice in the image-side light-folding element **740**, and the exit optical path and the entrance optical path of the image-side light-folding element **740** are substantially perpendicular to each other. The image-side light-folding element **740** is disposed in the holding member **730**, and the holding member **730** allows the imaging light to pass therethrough along the entrance optical path and the exit optical path of the image-side light-folding element **740**. In this embodiment, the image-side light-folding element **740** is, for example, a pentaprism, and the image-side light-folding element **740** is located between the imaging lens system **710** and the image surface IM in optical path.

The light-shielding mechanisms **751** and **752** are disposed on the holding member **730**, and the light-shielding mechanisms **751** and **752** are respectively located in the entrance optical path and the exit optical path of the image-side light-folding element **740**. In addition, each of the light-shielding mechanisms **751** and **752** has a minimal opening **754**, and the minimal openings **754** are non-circular and each surrounds the imaging light in the optical path where the light-shielding mechanisms **751** and **752** are located, respectively. Furthermore, the light-shielding mechanism **751** includes a light-shielding member **7511**, the light-shielding mechanism **752** includes a light-shielding member **7521**. The minimal openings **754** of the light-shielding mechanisms **751** and **752** are respectively located at the light-shielding members **7511** and **7521**. The light-shielding member **7511** shown in FIG. **25** is only exemplary, and the light-shielding member **7521** in this embodiment can have a configuration the same as that of the light-shielding member **7511**.

The object-side light-folding element **760** is disposed on an object side of the imaging lens system **710**, and the object-side light-folding element **760** is configured to fold the imaging light from an entrance optical path thereof to an exit optical path thereof. The entrance optical path of the object-side light-folding element **760** is substantially perpendicular to the exit optical path of the image-side light-folding element **740**. In this embodiment, the object-side light-folding element **760** is, for example, a triangular prism, and the exit optical path thereof is substantially perpendicular to the entrance optical path thereof.

The IR-cut filter **770** is disposed between the image-side light-folding element **740** and the image surface IM, and will not affect the focal length of the camera module. The IR-cut filter **770** is not in physical contact with any one of the light-shielding mechanisms **751** and **752**, and the IR-cut filter **770** is closer to the image sensor **720** than the light-shielding mechanisms **751** and **752** are to the image sensor **720**.

The driving unit is disposed on the camera module. The driving unit can drive the image-side light-folding element **740** to move in a bisector direction D**1** of an angle between the entrance optical path and the exit optical path so as to achieve auto focusing. In one of various focusing conditions, the light-shielding members **7511** and **7521** are directly abutted with the image-side light-folding element **740**.

When a maximum diameter of the minimal opening **754** is ϕmax, and a total path length from the imaging lens system **710** to the image sensor **720** is BFL, the following condition is satisfied: ϕmax/BFL=0.171.

When a focal length of the imaging lens system **710** is EFL, the following condition is satisfied: EFL=22.1 [mm].

When a minimum diameter of the minimal opening **754** is ϕmin, and the maximum diameter of the minimal opening **754** is ϕmax, the following condition is satisfied: ϕmin/ϕmax=0.865.

When a refractive index of the image-side light-folding element **740** is Nf, the following condition is satisfied: Nf=2.02.

8th Embodiment

FIG. **26** is one perspective view of an electronic device according to the 8th embodiment of the present disclosure. FIG. **27** is another perspective view of the electronic device in FIG. **26**.

In this embodiment, an electronic device **5** is a smartphone including a plurality of camera modules, a flash module **51**, a focus assist module **52**, an image signal processor **53**, a user interface **54** and an image software processor.

The camera modules include an ultra wide angle camera module **50***a*, a high pixel camera module **50***b* and a telephoto camera module **50***c*. The camera module disclosed in the 1st embodiment is taken as the telephoto camera module **50***c*.

The image captured by the ultra wide angle camera module **50***a* enjoys a feature of multiple imaged objects. FIG. **28** is an image captured by an ultra wide angle camera module.

The image captured by the high pixel camera module **50***b* enjoys a feature of high resolution and less distortion, and the high pixel camera module **50***b* can capture part of the image in FIG. **28**. FIG. **29** is an image captured by a high pixel camera module.

The image captured by the telephoto camera module **50***c* enjoys a feature of high optical magnification, and the telephoto camera module **50***c* can capture part of the image in FIG. **29**. FIG. **30** is an image captured by a telephoto camera module. The maximum field of view (FOV) of the camera module corresponds to the field of view in FIG. **30**.

When a user captures images of an object, the light rays converge in the camera modules **50***a*, **50***b* or **50***c* to generate an image(s), and the flash module **51** is activated for light supplement. The focus assist module **52** detects the object distance of the imaged object to achieve fast auto focusing. The image signal processor **53** is configured to optimize the captured image to improve image quality and provided zooming function. The light beam emitted from the focus assist module **52** can be either conventional infrared or laser. The user interface **54** can be a touch screen or a physical button. The user is able to interact with the user interface **54** and the image software processor having multiple functions to capture images and complete image processing. The image processed by the image software processor can be displayed on the user interface **54**.

The smartphone in this embodiment is only exemplary for showing the camera module of the present disclosure installed in an electronic device, and the present disclosure is not limited thereto. The camera module can be optionally applied to optical systems with a movable focus. Furthermore, the camera module features good capability in aberration corrections and high image quality, and can be applied to 3D (three-dimensional) image capturing applications, in products such as digital cameras, mobile devices, digital tablets, smart televisions, network surveillance devices, dashboard cameras, vehicle backup cameras, multi-camera devices, image recognition systems, motion sensing input devices, wearable devices and other electronic imaging devices.

The foregoing description, for the purpose of explanation, has been described with reference to specific embodiments. It is to be noted that the present disclosure shows 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.

What is claimed is:

1. A camera module, comprising:

an imaging lens system, configured to focus an imaging light onto an image surface;

an image sensor, disposed on the image surface; and

at least one light-folding element, disposed on an image side of the imaging lens system, wherein the at least one light-folding element has an entrance optical path and an exit optical path, and the at least one light-folding element is configured to fold the imaging light at least twice from the entrance optical path thereof to the exit optical path thereof;

wherein at least one light-shielding mechanism is arranged between the entrance optical path and the exit optical path of the at least one light-folding element configured for folding the imaging light at least twice from the entrance optical path to the exit optical path;

wherein the at least one light-folding element and the at least one light-shielding mechanism are disposed in a holding member, the imaging light enters the holding member through the entrance optical path, and exits the holding member through the exit optical path, the at least one light-shielding mechanism has an anti-reflective surface structure, and the anti-reflective surface structure is made of plastic material;

wherein the camera module further comprises an IR-cut filter, and none of the at least one light-shielding mechanism is in physical contact with the IR-cut filter; and

wherein a focal length of the imaging lens system is EFL, and the following condition is satisfied:

$15\ \text{mm} < EFL < 40\ \text{mm}$.

2. The camera module of claim **1**, wherein the focal length of the imaging lens system is EFL, and the following condition is satisfied:

$20\ \text{mm} < EFL < 35\ \text{mm}$.

3. The camera module of claim **1**, wherein a number of the at least one light-folding element is at least two, and the at least one light-shielding mechanism is located between the at least two light-folding elements.

4. The camera module of claim **1**, wherein the imaging lens system has an object-side opening and an image-side opening being both non-circular.

5. The camera module of claim **1**, wherein a refractive index of the at least one light-folding element is Nf, and the following condition is satisfied:

$1.7 \leq Nf$.

6. The camera module of claim **1**, wherein the at least one light-shielding mechanism comprises at least one light-shielding member, and a light-absorbing layer is arranged on the at least one light-shielding member.

7. An electronic device, comprising the camera module of claim **1** and a driving unit, wherein the driving unit is disposed on the camera module.

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