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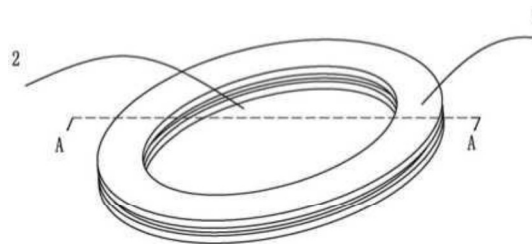
Claims: 1 page Specification: 3 pages Drawings: 1 page

(54) Title of Invention

SHADING SHEET PROCESSING METHOD AND SHADING SHEET

(57) Abstract

The present invention discloses a shading sheet processing method and a shading sheet. The shading sheet is suitable for optical imaging. The method comprises the following steps: providing a shading sheet, wherein the shading sheet comprises a substrate and a black coating applied on two opposite surfaces of the substrate; stripping the shading sheet to form a light-through hole; and etching the substrate on a wall enclosing the light-through hole to form a depression. The structure can suppress stray light in an optical lens from diffusing or reflecting onto an imaging surface, thereby ensuring a shooting effect and improving quality of a camera product.



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MOTOROLA MOBILITY
EXHIBIT 1015

1. A shading sheet processing method, comprising the following steps:
providing a shading sheet, wherein the shading sheet comprises a substrate and a black coating applied on two opposite surfaces of the substrate;
stripping the shading sheet to form a light-through hole; and
etching the substrate on a wall enclosing the light-through hole to form a depression, wherein the black coating extends beyond the substrate in a direction toward an optical axis.
2. The shading sheet processing method according to claim 1, wherein the etching comprises the following steps:
providing an etching solution, and placing the etching solution in a heatable container;
placing the shading sheet into the etching solution, and heating and stirring the same;
etching the substrate on the wall of the light-through hole with the etching solution; and
removing the shading sheet, and placing it in an oven for drying.
3. The shading sheet processing method according to claim 1, wherein the substrate comprises a plastic material.
4. The shading sheet processing method according to claim 3, wherein the substrate is made of a PET material.
5. The shading sheet processing method according to claim 1, wherein the black coating is a carbon material.
6. A shading sheet, wherein the shading sheet comprises a substrate and a black coating applied on two surfaces of the substrate; the shading sheet further comprises a light-through hole formed by stripping; and the substrate on a wall enclosing the light-through hole is etched to form a depression, wherein the black coating extends beyond the substrate in a direction toward an optical axis.
7. The shading sheet according to claim 6, wherein the substrate comprises a plastic material.
8. The shading sheet according to claim 7, wherein the substrate comprises a PET material.
9. The shading sheet according to claim 6, wherein a depth of the depression of the substrate is equal to a thickness of the substrate.
10. The shading sheet according to claim 6, wherein the black coating is a carbon material.

SHADING SHEET PROCESSING METHOD AND SHADING SHEET

[TECHNICAL FIELD]

[0001] The present invention relates to an optical imaging part, and in particular, to a shading sheet processing method and a shading sheet.

[BACKGROUND]

[0002] The shading sheet is an optical element used to control the amount of light in an optical system. When external light enters lens, the shading sheet arranged between the lenses can block unwanted light from entering. Although the use of shading sheet in the optical system achieves a light control effect, when light is irradiated on a wall of a light-through hole of the shading sheet, the light reflected and diffused by the shading sheet from the wall also causes interference to the optical system. A shading sheet in early times is processed by means of oxidation and blackening after being stamped with metal, so as to achieve the purpose of complete matting. However, the cost of such shading sheet is several times more expensive than that of the plastic shading sheet. In recent years, as the cost has dropped significantly, a polyethyleneglycol terephthalate (PET) material with an anti-static and highly shading coating on its surface is used instead after being subject to direct die cutting. However, as the pixels become increasingly higher, the wall of the light-through hole will expose a bright PET cutting surface after the plastic material is die-cut. Since the plastic material cannot go through traditional blackening and matting processing like a metal, when it is used in a thin lens, ghosting and flare phenomena are particularly noticeable on the imaging surface. Therefore, how to deal with the wall of the light-through hole of the shading sheet is particularly important.

[0003] Regarding inventions of reflection and diffusion processing of stray light of a shading sheet, the patent TWI400551 disclosed on November 1, 2011 performs oblique processing on an end face of an edge of a light-through hole diameter of a shading sheet. In that invention, a material near a light-through hole of the shading sheet is pressed into an oblique surface, and at the same time, an edge end face of the shading sheet is thinned, so that a thickness of the end face is thinned to reduce reflection and diffusion generated from a cross-section of the shading sheet.

[0004] According to patent CN104460182A disclosed on March 25, 2015, for an end face of an edge of a light-through hole diameter of a shading sheet, the shading sheet is processed in an ultrasonic generator by using an alkali solution, so that a matte structure is formed on a wall of a light-through hole of the shading sheet to avoid occurrence of undesirable situations such glare, halation, and ghosting caused by reflection of the wall of the light-through hole.

[0005] Although the technologies disclosed in the foregoing patents can reduce the reflection or diffusion of stray light to a certain extent, there is still an obvious phenomenon of stray light. Therefore, it is necessary to propose a new processing method and structure of a shading sheet.

[SUMMARY]

[0006] The main purpose of the present invention is to provide a shading sheet processing method and a light shielding sheet, aiming to solve the technical problems of defects such as glare, halation, and ghosting caused by reflection and diffusion of a PET material exposed by a light-through wall of an existing plastic shading sheet.

[0007] To realize the foregoing purpose, the present invention provides a shading sheet processing method, comprising the following steps:

[0008] providing a shading sheet, wherein the shading sheet comprises a substrate and a black coating applied on two opposite surfaces of the substrate;

[0009] stripping the shading sheet to form a light-through hole; and

[0010] etching the substrate on a wall enclosing the light-through hole to form a depression.

[0011] According to the foregoing shading sheet processing method, the etching comprises the following steps:

[0012] providing an etching solution, and placing the etching solution in a heatable container;

[0013] placing the shading sheet into the etching solution, and heating and stirring the same;

[0014] etching the substrate on the wall of the light-through hole with the etching solution; and

[0015] removing the shading sheet, and placing it in an oven for drying.

[0016] According to the foregoing shading sheet processing method, the substrate comprises a plastic material.

[0017] According to the foregoing shading sheet processing method, the substrate is made of a PET material.

[0018] According to the foregoing shading sheet processing method, the black coating is a carbon material.

[0019] The present invention further provides a shading sheet, wherein the shading sheet comprises a substrate and a black coating applied on two surfaces of the substrate; the shading sheet further comprises a light-through hole formed by stripping; and the substrate on a wall enclosing the light-through hole is etched to form a depression.

[0020] According to the foregoing shading sheet, the substrate comprises a plastic material.

[0021] According to the foregoing shading sheet, the substrate comprises a PET material.

[0022] According to the foregoing shading sheet, a depth of the depression of the substrate is equal to a thickness of the substrate.

[0023] According to the foregoing shading sheet, the black coating is a carbon material.

[0024] According to a shading sheet processing method and a shading sheet of the present invention, a substrate of the shading sheet is etched with an etching solution, so that the substrate of a wall of a light-through hole forms a depression, which can suppress stray light in an optical lens from diffusing or reflecting to an imaging surface, thereby ensuring a shooting effect and improving quality of a camera product.

【BRIEF DESCRIPTION OF THE DRAWINGS】

[0025] FIG. 1 is a schematic diagram of a three-dimensional structure of a shading sheet according to the present invention;

[0026] FIG. 2 is a cross-sectional view along line A - A in FIG. 1; and

[0027] FIG 3 is an enlarged view of part B in FIG 2.

【DESCRIPTION OF EMBODIMENTS】

[0028] The following describes the present invention in detail with reference to FIG. 1 to FIG. 3.

[0029] To achieve the above purpose, the present invention provides a shading sheet processing method, and the shading sheet processing method comprises the following steps:

[0030] Step S1: provide a shading sheet 1, wherein the shading sheet comprises a substrate 4 and a black coating 3 and 5 applied on two opposite surfaces of the substrate 4. Specifically, the substrate 4 can be made of a plastic material, such as a PET material. The black coating 3 and 5 can be a carbon material or other materials with shading and matting functions.

[0031] Step S2: strip the shading sheet 1 to form a light-through hole 2. The light-through hole 2 is usually made by a die-cut process.

[0032] Step S3: etch the substrate 4 on a wall enclosing the light-through hole 2 to form a depression 6, so as to suppress stray light in an optical lens from diffusing or reflecting to an imaging surface, thereby ensuring a shooting effect and improving quality of a camera product. Specifically, a chemical etching method can be used for etching.

[0033] For example, the specific steps of forming the depression 6 by etching the substrate 4 on a wall of the light-through hole 2 with an etching solution comprises:

[0034] providing the etching solution, and placing the etching solution in a heatable container; and the selected etching solution being easy to corrode the substrate while having no corrosion effect on black coatings, or the corrosion rate of the etching solution on the substrate being higher than that on the black coating, wherein the etching solution can be a solution such as an aqueous solution of sodium bicarbonate that has the corrosion effect on a plastic material;

[0035] placing the shading sheet into the etching solution, and heating and stirring the same, wherein in this embodiment, a heating method and a stirring method commonly used in this field are adopted;

[0036] etching the substrate 4 with the etching solution to form a depression 6; and

[0037] removing the shading sheet when the etching is completed, and placing it in an oven for drying.

[0038] Preferably, in the present invention, a depth of the depression 6 of the substrate 4 is equal to a thickness of the substrate 4.

[0039] The present invention further provides a shading sheet 1, and the shading sheet 1 comprises a substrate 4 and a black coating 3 and 5 applied on two opposite surfaces of the substrate 4. The substrate 4 comprises a plastic material, for example, it can be made of a PET material. The black coating 3 and 5 can be a carbon material or other materials with shading and matting functions. The shading sheet 1 is substantially ring-shaped, and is stripped at a center position thereof to form a circular light-through hole 2. Preferably, the light-through hole 2 is made by die-cutting. The shading sheet 1 comprises an inner sidewall (i.e., a wall) enclosing the light-through hole 2 and an outer sidewall disposed opposite to the inner sidewall. The substrate 4 on the inner sidewall forms a depression 6 by etching, that is, the surfaces of the substrate 4 and the black coating 3 and 5 at the inner sidewall are not flush. Preferably, the depression 6 is formed by etching with an etching solution. Due to being immersed in the etching solution, the etching solution also etches the substrate on the outer sidewall to form the depression 6.

[0040] Preferably, a depth of the depression 6 of the substrate is equal to a thickness of the substrate.

[0041] According to a shading sheet processing method and a shading sheet of the present invention, the shading sheet is etched with an etching solution, so that a depression is formed on a substrate on a wall enclosing a light-through hole of the shading sheet, which can suppress stray light in an optical lens from diffusing or reflecting to an imaging surface, thereby ensuring a shooting effect and improving quality of a camera product.

[0042] The foregoing descriptions are merely implementations of the present invention. It should be noted herein that persons of ordinary skill in the art may make improvements without departing from the inventive concept of the present invention, but these are all within the protection scope of the present invention.

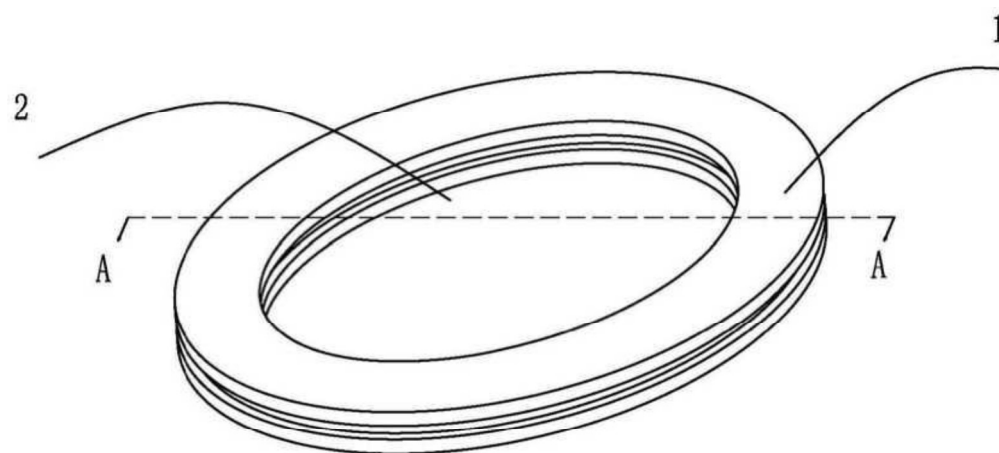


FIG. 1

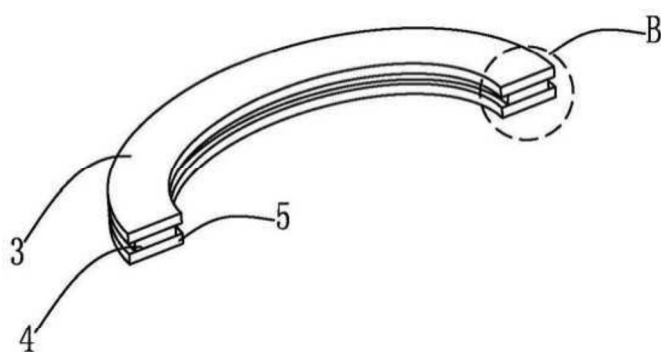


FIG. 2

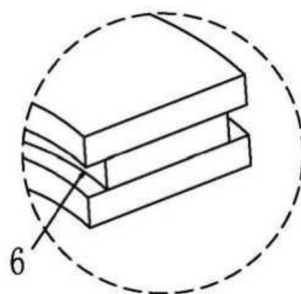


FIG. 3



(12)发明专利

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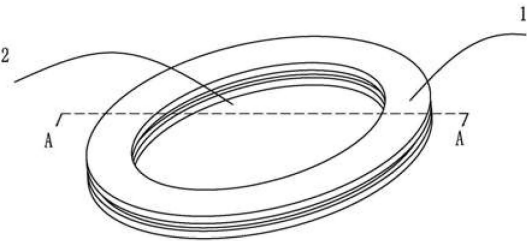
权利要求书1页 说明书3页 附图1页

(54)发明名称

遮光片的处理方法及遮光片

(57)摘要

本发明公开一种遮光片的处理方法及遮光片,该遮光片适用于光学成像;所述方法包括如下步骤:提供遮光片,所述遮光片包括基材、涂覆于所述基材的相对两表面的黑色涂层;对所述遮光片去料形成通光孔;对围成所述通光孔的孔壁上的基材进行刻蚀以使其形成凹陷。该结构能抑制光学镜头中杂散光漫射或反射至成像面,进而保证拍摄效果,提升摄像产品的品质。



1. 一种遮光片的处理方法,其特征在于,包括如下步骤:
提供遮光片,所述遮光片包括基材、涂覆于所述基材的相对两表面的黑色涂层;
对所述遮光片去料形成通光孔;
对围成所述通光孔的孔壁上的基材进行刻蚀以使其形成凹陷,所述黑色涂层在朝向光轴的方向上延伸并超出所述基材。
2. 根据权利要求1所述的遮光片的处理方法,其特征在于:所述刻蚀包括以下步骤:
提供刻蚀液,并将刻蚀液置于可加热的容器内;
将遮光片置于所述刻蚀液中,加热并搅拌;
刻蚀液对通光孔的孔壁上的基材进行刻蚀;
将遮光片取出,置于烘箱中干燥。
3. 根据权利要求1所述的遮光片的处理方法,其特征在于:所述基材包括塑胶材质。
4. 根据权利要求3所述的遮光片的处理方法,其特征在于:所述基材由PET材料制成。
5. 根据权利要求1所述的遮光片的处理方法,其特征在于:所述黑色涂层为碳材料。
6. 一种遮光片,其特征在于,所述遮光片包括基材和涂覆于所述基材两面的黑色涂层;
所述遮光片还包括去料形成的通光孔;围成所述通光孔的孔壁上的所述基材刻蚀形成凹陷,所述黑色涂层在朝向光轴的方向上延伸并超出所述基材。
7. 根据权利要求6所述的遮光片,其特征在于:所述基材包括塑胶材质。
8. 根据权利要求7所述的遮光片,其特征在于:所述基材包括PET材料。
9. 根据权利要求6所述的遮光片,其特征在于:所述基材凹陷的深度与基材的厚度相等。
10. 根据权利要求6所述的遮光片,其特征在于:所述黑色涂层为碳材料。

遮光片的处理方法及遮光片

【技术领域】

[0001] 本发明涉及一种光学成像零件,尤其涉及一种遮光片的处理方法及遮光片。

【背景技术】

[0002] 遮光片在光学系统中是用于调控光量的光学元件,外界光线进入镜头时,在镜片之间设置的遮光片可阻挡不需要的光线进入。在光学系统中使用遮光片虽达到了控制光线的效果,但光线照射在遮光片通光孔的孔壁时,其从孔壁反射和漫射的光线,却也对光学系统造成干扰。早期遮光片用金属冲压后通过氧化发黑的方式处理,以达到全消光的目的,但其成本比塑胶遮光片贵好几倍,近年来随着成本大幅下降,已经改用表面带防静电、高遮光涂层的聚对苯二甲酸乙二醇酯(PET)材料直接冲切后替代,但随着像素越来越高,塑胶冲切后,通光孔的孔壁会暴露出发亮的PET切断面,而塑胶材质又不能像金属一样进行传统的发黑消光处理,当其用在薄型镜头时,在成像面的鬼影及耀光现象就特别显著,因此如何处理遮光片通光孔的孔壁就显得尤为重要。

[0003] 有关遮光片反射和漫射杂散光处理的发明,在2011年11月1日公开的专利TWI400551,针对遮光片通光孔径边缘的端面作斜面化处理,此发明将靠近遮光片通光孔处的材料压成斜面,同时也减薄了遮光片边缘端面,使端面厚度变薄来降低从遮光片断面产生的反射和漫射。

[0004] 2015年3月25日公开的专利CN104460182A,针对遮光片通光孔径边缘的端面,通过碱溶液在超声波发生器内对遮光片进行处理,以在遮光片的通光孔的孔壁上形成哑光结构,来避免由于通光孔的孔壁反光而造成的眩光、光晕及鬼影等不良状况的发生。

[0005] 上述专利所公开的技术虽然可以一定程度上减少杂散光的反射或漫射,但仍然有明显的杂散光现象因此,有必要提出一种新的遮光片的处理方法及结构。

【发明内容】

[0006] 本发明的主要目的在于提供一种遮光片的处理方法及遮光片,旨在解决现有的塑胶遮光片由于通光孔壁暴露的PET材质反射和漫射而造成的眩光、光晕及鬼影等不良的技术问题。

[0007] 为实现上述目的,本发明提供一种遮光片的处理方法,包括如下步骤:

[0008] 提供遮光片,所述遮光片包括基材、涂覆于所述基材的相对两表面的黑色涂层;

[0009] 对所述遮光片去料形成通光孔;

[0010] 对围成所述通光孔的孔壁上的基材进行刻蚀以使其形成凹陷。

[0011] 上述的遮光片的处理方法,所述刻蚀包括以下步骤:

[0012] 提供刻蚀液,并将刻蚀液置于可加热的容器内;

[0013] 将遮光片置于所述刻蚀液中,加热并搅拌;

[0014] 刻蚀液对通光孔的孔壁上的基材进行刻蚀;

[0015] 将遮光片取出,置于烘箱中干燥。

- [0016] 上述的遮光片的处理方法,所述基材包括塑胶材质。
- [0017] 上述的遮光片的处理方法,所述基材由PET制成。
- [0018] 上述的遮光片的处理方法,所述黑色涂层为碳材料。
- [0019] 还提供一种遮光片,所述遮光片包括基材、涂覆于所述基材两面的黑色涂层;所述遮光片还包括去料形成的通光孔;围成所述通光孔的孔壁上的所述基材刻蚀形成凹陷。
- [0020] 上述的遮光片,所述基材包括塑胶材质。
- [0021] 上述的遮光片,所述基材包括PET材料。
- [0022] 上述的遮光片,所述基材凹陷的深度与基材的厚度相等。
- [0023] 上述的遮光片,所述黑色涂层为碳材料。
- [0024] 本发明的一种遮光片的处理方法及遮光片,通过刻蚀液对遮光片的基材进行刻蚀处理,以使通光孔孔壁的基材形成凹陷,能抑制光学镜头中的杂散光漫射或反射至成像面,进而保证拍摄效果,提升摄像产品的品质。

【附图说明】

- [0025] 图1为本发明遮光片的立体结构示意图;
- [0026] 图2为图1中A-A线的剖视图;
- [0027] 图3为图2中B部分的放大图。

【具体实施方式】

- [0028] 下面结合图1至图3对本发明作出详细描述。
- [0029] 为实现上述目的,本发明提供一种遮光片的处理方法,所述遮光片的处理方法包括如下步骤:
- [0030] 步骤S1,提供遮光片1,所述遮光片包括基材4以及涂覆于所述基材4的相对两表面的黑色涂层3和5。具体地,基材4可以由塑胶材质构成,比如PET材料。所述黑色涂层3和5可以为碳材料或者其它具有遮光、消光功能的材料。
- [0031] 步骤S2,遮光片1去料形成通光孔2。所述通光孔2通常通过冲切工艺制成。
- [0032] 步骤S3,对围成通光孔2的孔壁上的基材4进行刻蚀以使其形成凹陷6,从而抑制光学镜头中的杂散光漫射或反射至成像面,进而保证拍摄效果,提升摄像产品的品质。具体地,可以采用化学刻蚀的方法进行刻蚀。
- [0033] 例如,通过刻蚀液刻蚀在所述通光孔2的孔壁上的基材4形成凹陷6的具体步骤包括:
- [0034] 提供刻蚀液,将刻蚀液置于可加热的容器内;所选择的刻蚀液易于腐蚀基材、而对黑色涂层则不具有腐蚀作用,或者刻蚀液对基材的腐蚀速率比对黑色涂层的腐蚀速率高。刻蚀液可以为碳酸氢钠水溶液等对塑胶材质具有腐蚀性作用的溶液。
- [0035] 将遮光片置于所述刻蚀液中,加热并搅拌,本实施例中采用本领域常用的加热方式和搅拌方式;
- [0036] 刻蚀液对基材4进行刻蚀以形成凹陷6;
- [0037] 刻蚀完成后,将遮光片取出,置于烘箱中干燥。
- [0038] 优选地,本发明中,所述基材4的凹陷6的深度与基材4的厚度相等。

[0039] 本发明还提供一种遮光片1,所述遮光片1包括基材4以及涂覆于所述基材4的相对两表面的黑色涂层3和5。所述基材4包括塑胶材料,例如由PET材料制成。所述黑色涂层3、5为碳材料或其它具有遮光、消光功能的材料。所述遮光片1大致呈圆环形,其中心位置处去料形成圆形的通光孔2。优选地,所述通光孔2通过冲切制成。所述遮光片1包括围成通光孔2的内侧壁(即孔壁)和与内侧壁相对设置的外侧壁。所述内侧壁的基材4通过刻蚀形成凹陷6,即基材4与黑色涂层3、5在内侧壁处的表面不平齐。优选地,所述凹陷6通过刻蚀液刻蚀形成,由于浸泡在刻蚀液中的缘故,刻蚀液也会对外侧壁上的基材进行刻蚀形成凹陷6。

[0040] 优选地,所述凹陷6的深度与基材的厚度相等。

[0041] 本发明的一种遮光片的处理方法及遮光片,通过刻蚀液对遮光片进行刻蚀处理,以在围成遮光片的通光孔的孔壁上的基材形成凹陷,能抑制光学镜头中的杂散光漫射或反射至成像面,进而保证拍摄效果,提升摄像产品的品质。

[0042] 以上所述的仅是本发明的实施方式,在此应当指出,对于本领域的普通技术人员来说,在不脱离本发明创造构思的前提下,还可以做出改进,但这些均属于本发明的保护范围。

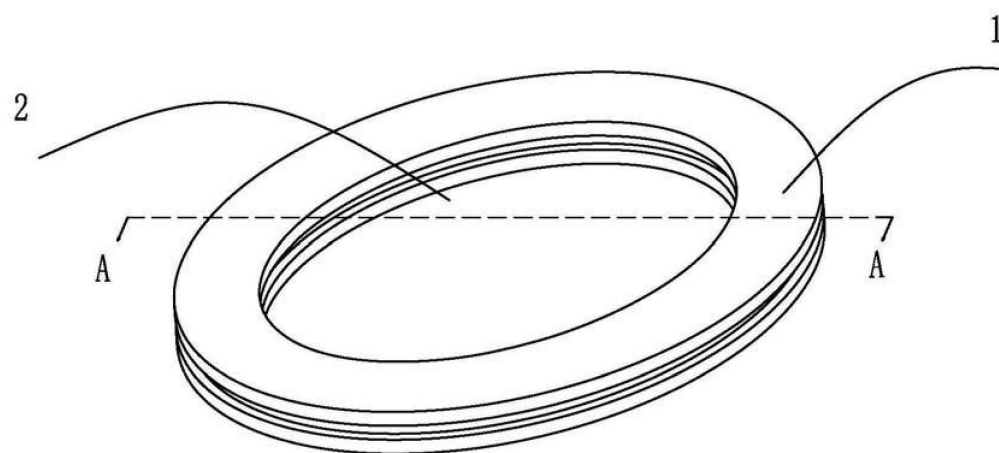


图1

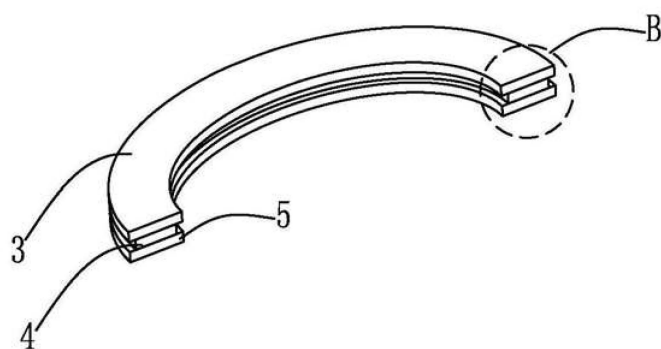


图2

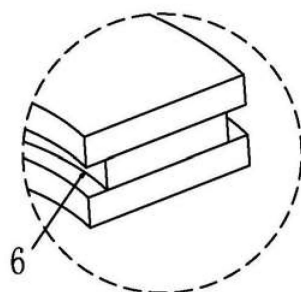


图3

I, Camila Zhang, declare as follows:

1. I am over eighteen years of age and fully competent to make this affidavit. I have personal knowledge of the information contained in this affidavit, and it is true and accurate to the best of my knowledge.
2. I am a translator fluent in the Chinese and English languages.
3. I translated the Chinese patent file CN107045249B into English and the English translation is a true and accurate translation of the Chinese patent file CN107045249B.

I declare under penalty of perjury of the laws of the United States of America that the foregoing information is true and accurate to the best of my knowledge. I understand that willful false statements and the like are punishable by fine or imprisonment, or both {18 U.S.C. § 1001} and may jeopardize the validity of the application or any patent issuing thereon.

Executed on: March 7, 2024, at Room 501, Building 6, Xincheng Science and Technology Park, No. 588 Yuelu West Avenue, Yuelu District, Changsha, Hunan Province, China

Camila Zhang

(sign here) _____

Signed by Camila Zhang