

(19) National Intellectual Property Administration of
the People's Republic of China



(12) Utility Model Patent



(10) Grant Announcement No.: CN 208421455 U

(45) Grant Announcement Date: January 22, 2019

(21) Application No.: 201821155734.7

(22) Application Date: July 20, 2018

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(51) Int. Cl.

G02F 1/095 (January 2006)

G02F 1/09 (January 2006)

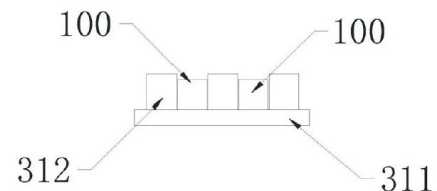
Claims: 1 page Description: 5 pages Drawings: 6 pages

(54) Title of the Utility Model

MULTI-CHANNEL ISOLATOR DEVICE

(57) Abstract

The present utility model relates to the field of isolators, and specifically to a multi-channel isolator device. The isolator device includes a substrate with multiple channels, and a plurality of isolators disposed in the respective channels on the substrate. The isolator includes a polarizer, a Faraday plate and an analyzer disposed in sequence. All or a part of the substrate is made of a magnetic material that can generate a magnetic field. In the present utility model, by designing a multi-channel isolator device and rationally designing a magnetic block, the overall space requirement of the multi-channel isolator is reduced and the spacing accuracy between isolators is improved. The difficulty of assembly for customers is reduced by the overall design form. Further, the spacing of the isolator channels is controlled to improve the accuracy of the channel spacing.



1. A multi-channel isolator device, characterized in that: the isolator device comprises a substrate with multiple channels, and a plurality of isolators disposed in the respective channels on the substrate, the isolator comprises a polarizing polarizer, a Faraday plate and an analyzer disposed in sequence, and all or a part of the substrate is made of a magnetic material that can generate a magnetic field.

2. The isolator device according to claim 1, characterized in that: the isolators are bonded to the substrate by means of an adhesive.

3. The isolator device according to claim 1 or 2, characterized in that: the substrate comprises a base, baffles and isolators that are disposed on the base in sequence, any adjacent ones of the baffles and the base form a channel for accommodating an isolator, and the isolator is separately bonded to the baffles and the base by means of an adhesive.

4. The isolator device according to claim 3, characterized in that: the substrate further comprises a top plate disposed on the top of the isolators, and the top plate is bonded to the isolators by means of an adhesive.

5. The isolator device according to claim 4, characterized in that: the baffles have a height less than that of the isolators.

6. The isolator device according to claim 1 or 2, characterized in that: a plurality of grooves forming channels are disposed on the substrate, the groove has openings at both front and rear ends on the substrate, and the isolators are disposed in the grooves of the substrate by means of an adhesive.

7. The isolator device according to claim 6, characterized in that: a plurality of isolators are disposed in a groove, and all the isolators in the groove are tightly bonded.

8. The isolator device according to claim 1, characterized in that: the Faraday plate is a Faraday rotator, and the Faraday rotator is made of a magnetic material or a non-magnetic material.

9. The isolator device according to claim 1, characterized in that: the material of the substrate can also include one or more of glass and ceramic.

MULTI-CHANNEL ISOLATOR DEVICE

Technical Field

[0001] The present utility model relates to the field of isolators, and specifically to a multi-channel isolator device.

Background Art

[0002] An optical isolator is a passive optical component that only allows one-way light to pass through. Its working principle is based on the non-reciprocity of Faraday rotation. Light echo-reflected by an optical fiber can be well isolated by the optical isolator. The optical isolator mainly uses the Faraday effect of magneto-optical crystals. In particular, a free space isolator has the main function of achieving low-loss forward transmission and high-loss reverse isolation for polarized light. Referring to Fig. 1, an isolator 100 is usually composed of a polarizer 110, a Faraday plate 120, and an analyzer 130.

[0003] The Faraday plate 120 can only realize the function of selecting a specific angle for polarized light under the action of sufficient magnetic field, so an external magnetic block is usually added. Referring to Figs. 2 to 4, it is specifically shown below:

[0004] 1. For the structure of a magnetic ring 210 and an isolator 100, refer to Fig. 2.

[0005] 2. For the structure of ceramic 221, double magnetic blocks (222, 223) and an isolator 100, refer to Fig. 3.

[0006] 3. For the structure of a magnetic block 230 and an isolator 100, the magnetic block 230 including a through groove 231 for accommodating the isolator 100, refer to Fig. 4.

[0007] However, the above-mentioned free space isolator has the following disadvantages:

[0008] 1. When a customer needs to assemble free space isolators for multiple channels, the overall required space is large due to the processing requirements of magnetic blocks and other structural members.

[0009] 2. When the customer uses multiple free space isolators for assembly separately, the magnetic repulsion or attraction of the magnetic blocks increases the difficulty of assembly.

[0010] 3. The spacing of multiple free space isolators is determined by the customer's assembly process, which further increases the difficulty of assembly at the customer end.

Summary of the Utility Model

[0011] In view of the above defects of the prior art, a technical problem to be solved by the present utility model is to provide a multi-channel isolator device, which solves the space limitation and high assembly difficulty problems when a multi-channel structure is adopted and free space isolators need to be used.

[0012] A technical solution adopted by the present utility model to solve the technical problem thereof is as follows: A multi-channel isolator device is provided, wherein the isolator device comprises a substrate with multiple channels and a plurality of isolators disposed in the respective channels on the substrate, the isolator comprises a polarizing polarizer, a Faraday plate, and an

analyzer disposed in sequence, and all or a part of the substrate is made of a magnetic material that can generate a magnetic field.

[0013] In the present utility model, a preferred solution is that: the isolators are bonded to the substrate by means of an adhesive.

[0014] In the present utility model, a preferred solution is that: the substrate comprises a base, and baffles and isolators that are disposed on the base in sequence, any adjacent ones of the baffles and the base form a channel for accommodating an isolator, and the isolator is separately bonded to the baffles and the base by means of an adhesive.

[0015] In the present utility model, a preferred solution is that: the substrate further comprises a top plate disposed on the top of the isolators, and the top plate is bonded to the isolators by means of an adhesive.

[0016] In the present utility model, a preferred solution is that: the baffles have a height less than that of the isolators.

[0017] In the present utility model, a preferred solution is that: a plurality of grooves forming channels are disposed on the substrate, the groove has openings at both front and rear ends on the substrate, and the isolators are disposed in the grooves of the substrate by means of an adhesive.

[0018] In the present utility model, a preferred solution is that: a plurality of isolators are disposed in a groove, and all the isolators in the groove are tightly bonded.

[0019] In the present utility model, a preferred solution is that: the Faraday plate is a Faraday rotator, and the Faraday rotator is made of a magnetic material or a non-magnetic material.

[0020] In the present utility model, a preferred solution is that: the material of the substrate can also include one or more of glass and ceramic.

[0021] The beneficial effect of the present utility model is that: compared with the prior art, in the present utility model, by designing a multi-channel isolator device and rationally designing a magnetic block, the overall space requirement of the multi-channel isolator is reduced and the spacing accuracy between isolators is improved; the difficulty of assembly for customers is reduced by the overall design form; and further, the spacing of the isolator channels is controlled to improve the accuracy of the channel spacing.

Brief Description of the Drawings

[0022] The present utility model will be further described below with reference to the accompanying drawings and embodiments. In the accompanying drawings:

[0023] Fig. 1 is a schematic structural view of an existing isolator;

[0024] Fig. 2 is a schematic structural view of Embodiment 1 of the existing isolator device;

[0025] Fig. 3 is a schematic structural view of Embodiment 2 of the existing isolator device;

[0026] Fig. 4 is a schematic structural view of Embodiment 3 of the existing isolator device;

[0027] Fig. 5 is a front schematic structural view of Embodiment 1 of an isolator device of the present utility model;

[0028] Fig. 6 is a perspective schematic structural view of Embodiment 1 of the isolator device of the present utility model;

[0029] Fig. 7 is a front schematic structural view of Embodiment 2 of the isolator device of the present utility model;

[0030] Fig. 8 is a perspective schematic structural view of Embodiment 2 of the isolator device of the present utility model;

[0031] Fig. 9 is a front schematic structural view of Embodiment 3 of the isolator device of the present utility model;

[0032] Fig. 10 is a perspective schematic structural view of Embodiment 3 of the isolator device of the present utility model;

[0033] Fig. 11 is a front schematic structural view of Fig. 6 with a top plate; and

[0034] Fig. 12 is a perspective schematic structural view of Fig. 7 with a top plate.

Detailed Description of the Preferred Embodiments

[0035] Now, with reference to the accompanying drawings, preferred embodiments of the present utility model are described in detail.

[0036] As shown in Fig. 1, the present utility model provides a preferred embodiment of a multi-channel isolator device.

[0037] As a multi-channel isolator device, the isolator device includes a substrate with multiple channels, and a plurality of isolators 100 disposed in the respective channels on the substrate. The isolator 100 includes a polarizer 110, a Faraday plate 120 and an analyzer 130 disposed in sequence. All or a part of the substrate is made of a magnetic material that can generate a magnetic field.

[0038] Specifically, the isolator 100 includes a polarizer 110, a Faraday plate 120 and an analyzer 130 disposed in sequence, wherein the polarizer 110 refers to a component for obtaining polarized light from natural light, which is emitted by an ordinary light source; the analyzer 130 is composed of a polarizer and is used to check whether a beam of light is polarized; and the Faraday plate 120 uses the non-reciprocity of magneto-optical materials, that is, it can rotate the polarization planes of forward incident light and reverse incident light of the same wavelength in the same direction at the same angle.

[0039] Moreover, a plurality of channels for accommodating the isolators 100 are provided on a substrate. The isolator 100 is disposed along the direction of the polarizer 110, the Faraday plate 120 and the analyzer 130 as a positive direction, the positive direction of the isolator 100 is the same as a channel direction, and openings are provided at both ends of a channel to facilitate the incidence and emergence of light.

[0040] All or a part of the substrate is made of a magnetic material that can generate a magnetic field. On the one hand, the magnetic material provides a magnetic field for the Faraday plate 120, and on the other hand, the use of other non-magnetic materials (the material of the substrate may also include one or more of glass and ceramics) not only reduces the cost, but also improves the stability of the substrate and makes it more robust.

[0041] In this embodiment, the isolator 100 is bonded to the substrate by means of an adhesive. The adhesive is not only used to fix the isolator 100 to the substrate, but also fills a gap between the isolator 100 and the substrate to improve the installation accuracy of the isolator 100. Generally

speaking, the surfaces where the isolator 100 is bonded to the substrate are bonded by means of an adhesive.

[0042] In this embodiment, the Faraday plate 120 is a Faraday rotator, and the Faraday rotator is made of a magnetic material or a non-magnetic material.

[0043] As shown in Figs. 5 and 6, the present utility model provides Preferred Embodiment 1 of the substrate.

[0044] The substrate includes a base 311, and baffles 312 and isolators 100 sequentially disposed on the base 311. Any adjacent ones of the baffles 312 and the base 311 form a channel for accommodating the isolator 100. The isolator 100 is separately bonded to the baffles 312 and the base 311 by means of an adhesive.

[0045] Specific installation steps are as follows: Prepare a specific substrate with a flat surface; use the flat surface of the substrate as an installation surface; and sequentially dispose the baffles 312 and the isolators 100 on the installation surface of the substrate. There are two arrangements here. One is that baffles 312 are on the outermost side, and baffles 312 and isolators 100 are sequentially disposed on the inner side. The other is that isolators 100 are on the outermost side, and baffles 312 and isolators 100 are sequentially disposed on the inner side. Moreover, the isolators 100 and the baffles 312 are fixed to the base 311 by means of an adhesive, and the isolators 100 and the baffles 312 are also bonded together by means of an adhesive. Further, the baffles 312 may be disposed on the base 311 by other means, such as setting a connection structure, such as welding connection.

[0046] By setting the distance between the baffles 312, the spacing of the channel formed between the baffles 312 can be effectively controlled.

[0047] Preferably, the baffles 312 may be made of a magnetic material, and the substrate may be made of a non-magnetic material, such as glass, ceramic or the like.

[0048] In this embodiment, with reference to Figs. 11 and 12, the substrate further includes a top plate 313 disposed on the top of the isolators 100, and the top plate 313 is bonded to the isolators 100 by means of an adhesive to achieve an annular seal of the isolators 100, so as to obtain an annular magnetic field or an annular space. Preferably, the height of the baffles 312 is less than the height of the isolators 100.

[0049] As shown in Figs. 7 and 8, the present utility model provides Preferred Embodiment 2 of the substrate.

[0050] The substrate 320 is provided with a plurality of grooves 321 forming channels. The grooves 321 have openings at both the front and rear ends on the substrate 320, and the isolators 100 are disposed in the grooves 321 of the substrate 320 by means of an adhesive.

[0051] It is applicable to the needs of different isolators 100 with very close channel spacing, and the isolators 100 are close to each other.

[0052] As shown in Figs. 9 and 10, the present utility model provides Preferred Embodiment 3 of the substrate.

[0053] On the basis of Preferred Embodiment 2 of the substrate 320 described above, a plurality of isolators 100 are disposed in a groove 321, and all the isolators 100 in the groove 321 are tightly bonded.

[0054] In the above two embodiments, a top plate may also be used to seal the groove 321.

[0055] Only the preferred embodiments of the present utility model are described above, and are not used to limit the scope of the present utility model. All equivalent changes or modifications made according to the scope of the patent application of the present utility model are covered by the present utility model.

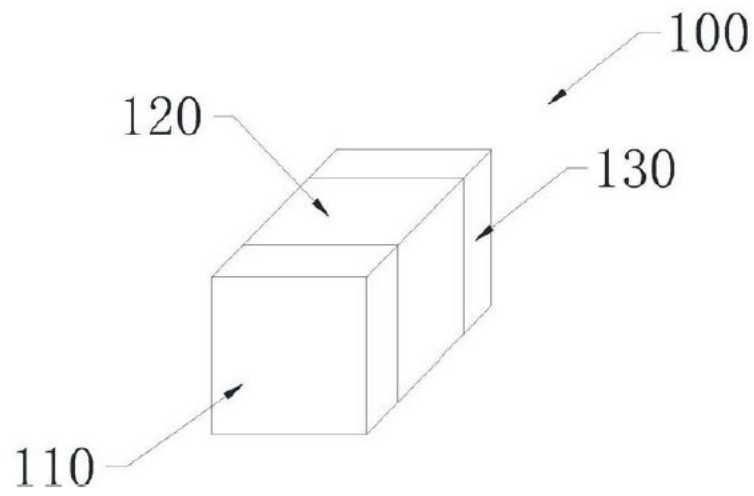


Fig. 1

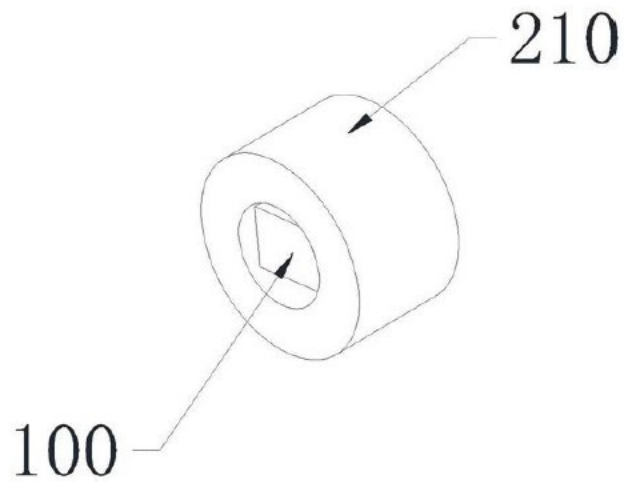


Fig. 2

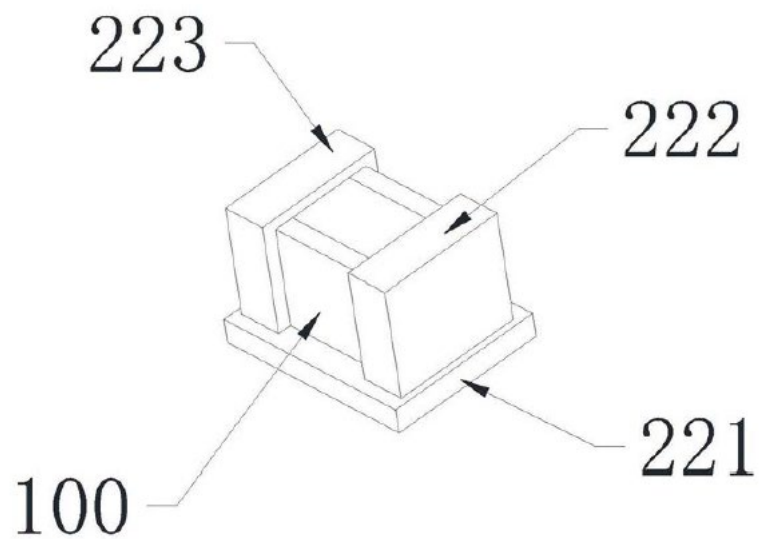


Fig. 3

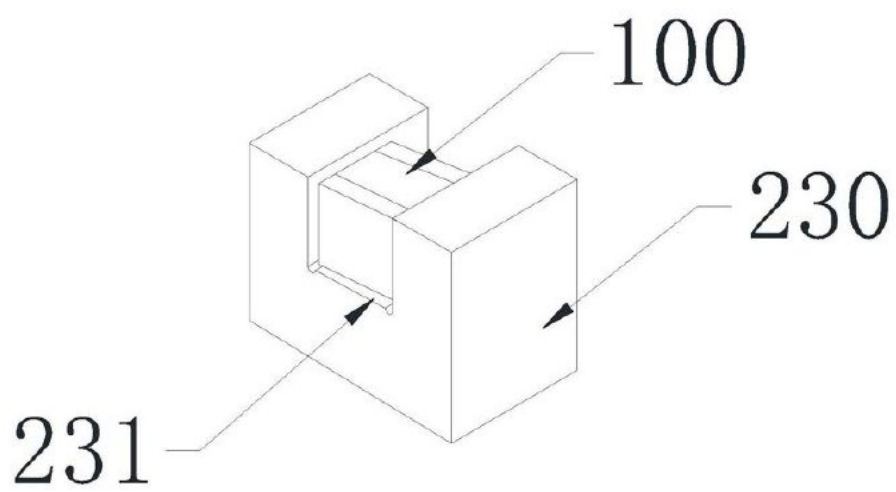


Fig. 4

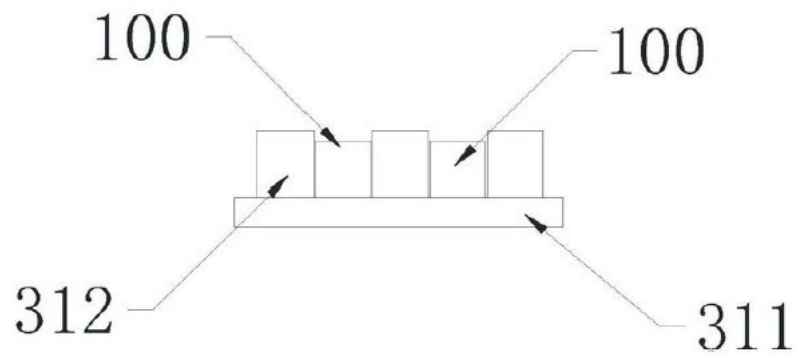


Fig. 5

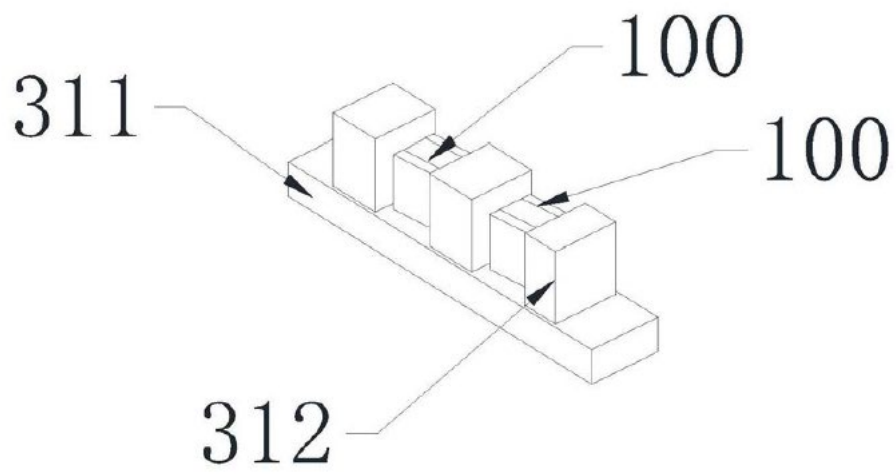


Fig. 6

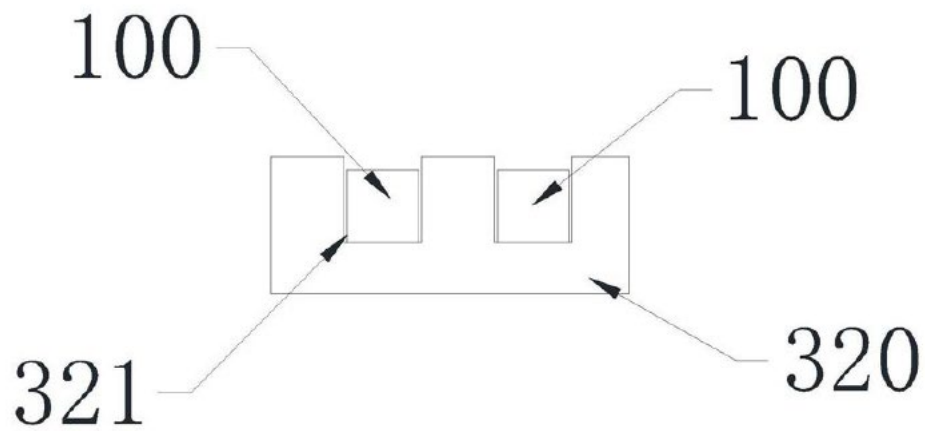


Fig. 7

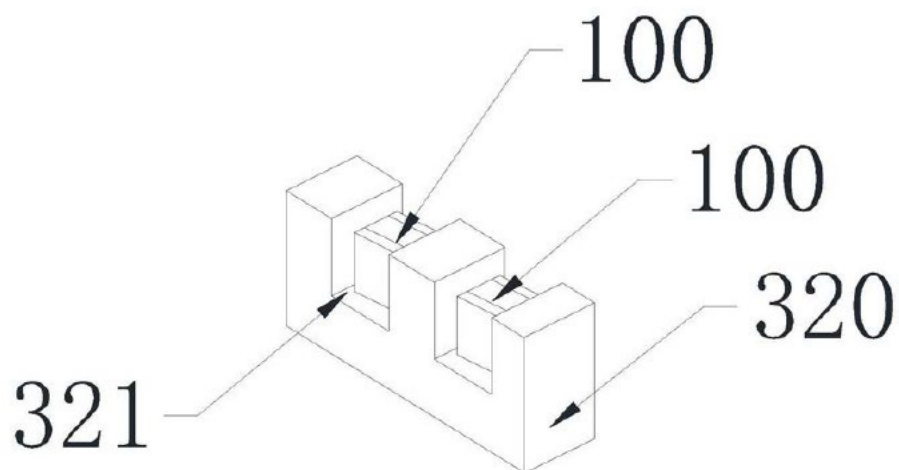


Fig. 8

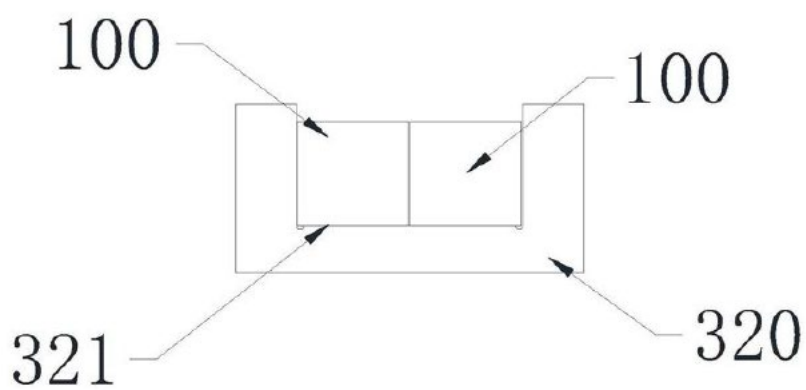


Fig. 9

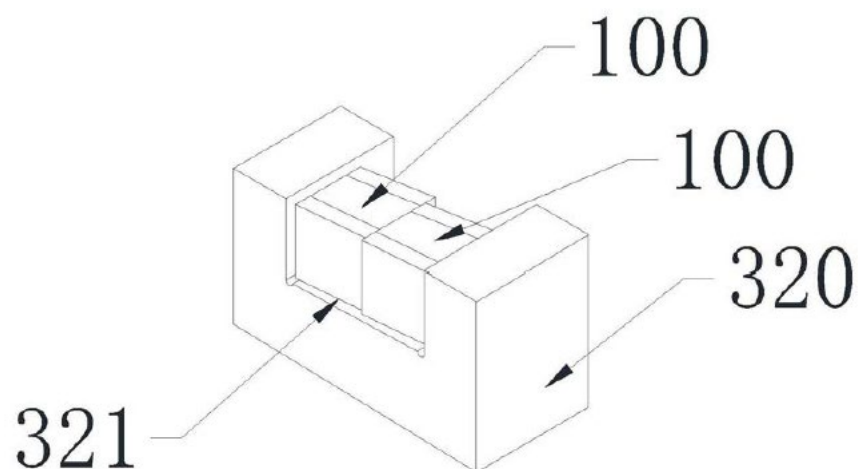


Fig. 10

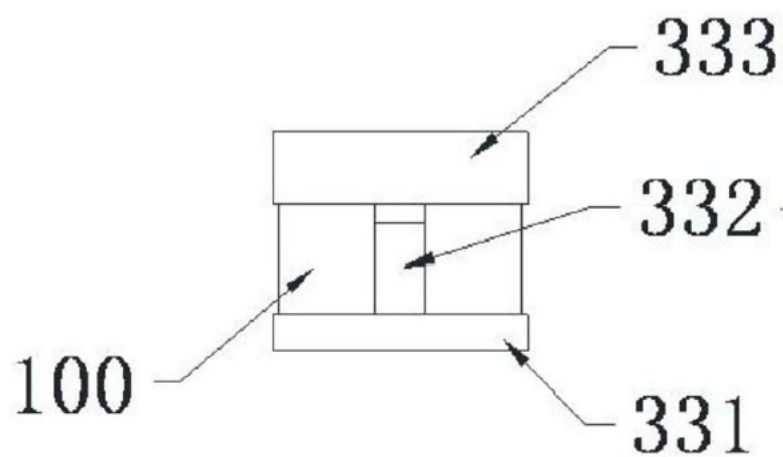


Fig. 11

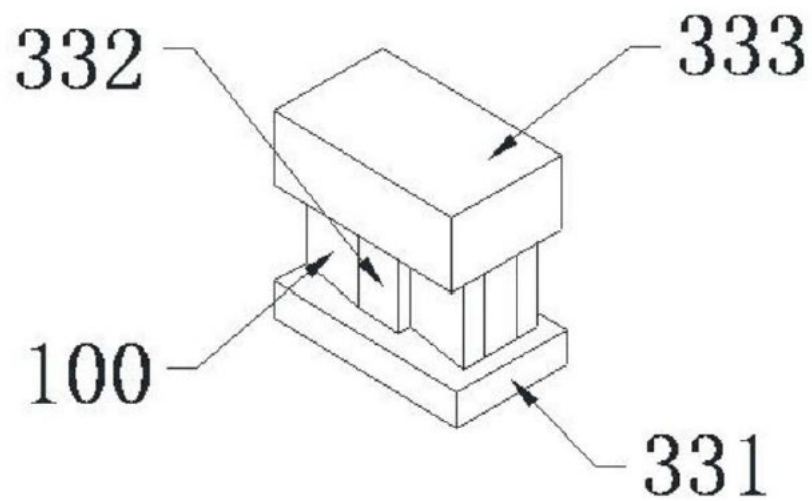


Fig. 12



TRANSLATION CERTIFICATION

Date: January 9, 2025

To whom it may concern:

This is to certify that the attached translation is an accurate representation of the documents received by this office. The translation was completed from:

- Chinese (PRC)

To:

- English (USA)

The documents are designated as:

- CN208421455U - glued array of optoisolators

Emily Paras, Project Manager in this company, attests to the following:

"To the best of my knowledge, all statements contained in the translation are true and correct and the aforementioned documents are a true, full and accurate translation of the specified documents. I acknowledge that these statements are subject to the penalties for perjury."

A handwritten signature in black ink that reads "Emily Paras". The signature is written in a cursive, flowing style.

Signature of Emily Paras

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