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(54) **A luminaire**

(57) The present invention relates to a luminaire for street lighting, comprising a housing and at least one first lighting module, and the housing bears the at least one lighting module, wherein the emergent light of the first lighting module is at least emitted to the street for ground lighting, characterized in that, the housing is directly mounted on the ground of at least one side of the street, so as to provide lateral lighting from the at least one side of the street.

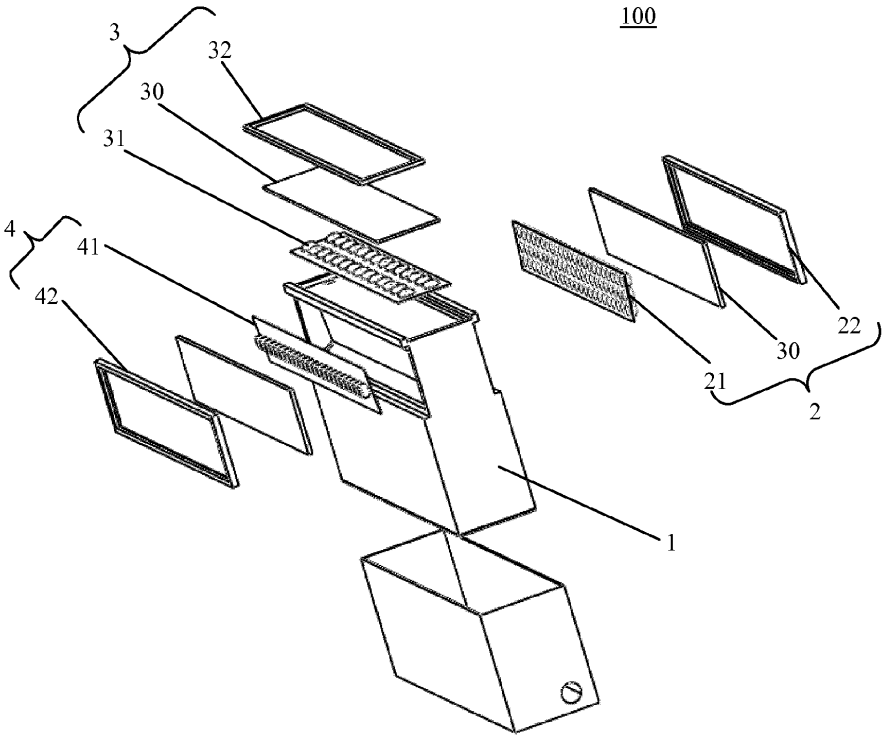

Figure 2

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Description

Technical Field

[0001] The present invention relates to a luminaire.

Background Art

[0002] With fast development of lighting devices, especially the development of high-efficiency and low-power LED lighting devices, various high-brightness lamps have been used widely on various occasions of daily life, for example, indoor lighting or lighting for public sites. Then users have enhanced demands on the electrical performance, mechanical performance and the lighting effects of the LED lighting devices. Currently, in the lighting field of public sites, for example, lighting for street ground, usually the so-called streetlight is used for lighting. The method of using the streetlight can achieve wide-range and persistent lighting effect. Specifically, this streetlight usually has a pole with a length of 6 to 14 meters, and the lighting devices are mounted on the top of the pole for lighting downward. However, as the lighting devices are hung high, stronger lighting effect is necessary, that is, the lighting devices should have a large enough power. Also, in this situation, a pole made of a rigid material such as metal is needed as a support, then the cost of the streetlight will be high, and additional difficulty and cost will be rendered during maintenance. In addition, an LED technology is used for lighting at public sites in the prior art, for example, lighting for street, although this has the advantage of low-power and high-efficiency lighting, due to the heat dissipation of the LED devices, the heat sink needed will have a large volume and a large weight. Therefore, the application range and degree of the streetlight using the pole and the LED as a light source will be greatly affected.

Summary of the Invention

[0003] To solve the above problems, the present invention provides a new luminaire. As the pole design is abandoned while the LED technology is kept, this luminaire will have a simple structure and low-power and high-efficiency lighting effect. In addition, as the luminaire uses a design without the pole, its maintenance becomes simple due to its improved structure and its production cost is lowered greatly, and users' economic burden is lowered. Furthermore, this design avoids hanging the lighting devices with a large weight high, thus better safety standards are met. Also, there are not special restrictions on design size, and the volume of the luminaire can be changed reasonably according to users' demands to realize wider application range.

[0004] The luminaire according to the present invention comprises a housing and at least one first lighting module, and the housing bears the at least one first lighting module, wherein the emergent light of the first lighting module is at least emitted to the street for ground lighting, characterized in that, the housing is directly mounted on the ground of at least one side of the street, so as to provide lateral lighting from the at least one side of the street. This luminaire just uses one housing to bear at least one lighting module, and there can be multiple lighting modules, thus the design can be improved in various aspects such as lighting angle and lighting distance. In addition, the luminaire is provided on the ground at the side of the street, its structure has a small height, which, for example, can be half of the height of an ordinary person. Based on this reason, the luminaire according to the present invention avoids using an additional fixing device with a large height, for example, the cost and maintenance of the pole, and the street and the area near the street can be lighted without affecting the use of the street.

[0005] In a preferable design solution according to the present invention, the housing is at least partially embedded into the ground. As a part of the luminaire is embedded into the ground, finely fixed connection between the luminaire and the ground can be achieved, which can not only resist the influences of bad weather or environment to a certain extent, but also use the other part of the luminaire to light the area above the ground. In addition, the mounting process can be simplified using the fixing manner of the housing, and this helps bury a power part for supplying power to the luminaire below the ground.

[0006] Preferably, the length of the first lighting module in the extending direction of the street is greater than the height of the housing exposed above the ground. Then, for example, the height of the housing exposed above the ground is only 0.5m, and the lighting module has a length of, for example, 0.8m or more extending parallel to the street. Thus, the luminaire can generate a sufficiently long lighting range in the extending direction of the street, and it is ensured that the luminaire has a height as small as possible with respect to the ground and has a small volume and weight, thereby meeting the safety standard and saving materials and economic cost.

[0007] Preferably, the height of the housing exposed above the ground is 1m or less. The luminaire defined based on the preferable height can keep a small distance with respect to the ground, thereby achieving wide lighting for the other area above the ground in the situation of being close to the ground.

[0008] Preferably, the housing bears the first lighting module which provides the ground lighting and a second lighting module which provides lighting above the luminaire. As the first lighting module and the second lighting module can respectively provide lighting in different directions and ranges, the luminaire can achieve target lighting for different objects or articles. Thus, a wide lighting range and multiple-direction applications of the luminaire can be achieved.

[0009] Preferably, the first lighting module comprises a first lighting unit and a first optical unit provided on a

first side surface of the housing, and the first optical unit deflects the emergent light of the first lighting unit toward the ground. Using the optical unit can control the projection direction of the light from the lighting unit, thus the integrated lighting for the ground of the street can be achieved, or lighting the other area of the street is also made possible.

[0010] Preferably, the first optical unit is designed as an asymmetric lens covering the first lighting unit. By means of the asymmetric lens, different expected light distribution can be achieved according to users' needs, for example, a light distribution in a shape of a bat wing, in this way, targeted lighting effect in a wide range can be achieved.

[0011] Preferably, the first optical unit is a reflector. The first optical unit designed to be a reflector can be, for example, a reflective cup, then the lighting effect of the light from a light source can be adjusted at a light exit point, thereby ensuring the lighting possibility in different ranges and directions.

[0012] Preferably, a sealing element is provided between the asymmetric lens and the first lighting unit. This sealing element can effectively seal a light emitting unit within the housing of the luminaire, and then prevents the light emitting unit from influences from humidity and weather in outdoor environments, thereby ensures the application possibility of the luminaire in different environments and prolonging its service life.

[0013] Preferably, the second lighting module further comprises a second lighting unit and a second optical unit provided on the top surface of the housing. The second lighting unit and the second optical unit provided on the top surface of the housing provide the possibility of lighting in different directions, and specifically, lighting in directions distant from the ground, in this way, the luminaire has functions of lighting objects in different directions.

[0014] Preferably, the second optical unit is designed as a lens covering the second lighting unit, and a sealing element is provided between the lens and the second lighting unit. This sealing element can effectively seal the light emitting unit within the housing of the luminaire, and then prevents the light emitting unit from influences from humidity and weather in outdoor environments, thereby ensures the application possibility of the luminaire in different environments and prolonging its service life.

[0015] Preferably, the second optical unit is a reflector. The second optical unit designed to be a reflector can be, for example, a reflective cup, then the lighting effect of the light from a light source can be adjusted at a light exit point, thereby ensuring the lighting possibility in different ranges and directions.

[0016] Preferably, the power of the second lighting unit is less than that of a first lighting unit of the first lighting module. This design renders integrated lighting of the luminaire toward the street area, while the area other than the street can also be lighted at the same time.

[0017] Preferably, the housing further bears a third lighting module which provides lighting for a side road beside the street, and the ground for mounting the luminaire is located between the street and the side road. As the luminaire is provided between the street and the side road, in this situation, for example, the main street is motorway and the side road is pedestrian lane, the luminaire can also provide lighting for the side road while mainly provides lighting for the main street.

[0018] Preferably, the third lighting module further comprises a third lighting unit and a third optical unit provided on a second side surface of the housing facing away from the first side surface. The third lighting unit and the third optical unit provide the possibility of lighting in a third direction to the luminaire. In this way, the luminaire can not only provide lighting for the main street and the side road, but also provide lighting to other areas, thus a wider application range of the luminaire is ensured.

[0019] Preferably, the power of the third lighting unit is less than that of a first lighting unit of the first lighting module. As the power of the third lighting unit is different from that of the first lighting unit, the luminaire can conduct integrated lighting for a certain area, which can ensure the main object of the luminaire of lighting the main street.

[0020] Preferably, the third optical unit is the same as a first optical unit of the first lighting module. The first optical unit and the third optical unit with the same design can achieve different lighting effects in the same environment in two different directions, and also, as the parts can be used in a large scale, this can effectively lower the production cost of the luminaire and then helps the large-scale application of the luminaire.

[0021] Preferably, the housing accommodates a driver for the at least one first lighting module. The driver provided within the housing can obtain effective industrial protection which isolates the driver from external environment, and then the driver can provide reliable and stable electrical power to at least one lighting module.

[0022] Preferably, the housing has a box-shaped contour. The box-shaped contour ensures the reasonably used structural space of the luminaire and can effectively protect the drive circuit of the luminaire accommodated within the housing, then, as the stable working of the luminaire is ensured, it is also ensured that the luminaire can light a certain range within a limited space.

[0023] Preferably, the light source of the at least one first lighting module is an LED light source. As a low-power and high-efficiency light emitting unit, the LED light source can provide stable lighting effect and keep expected lighting strength while saving cost.

Brief Description of the Drawings

[0024] The accompanying drawings constitute a part of the present Description and are used to provide further understanding of the present invention. Such accompanying drawings illustrate the embodiments of the present invention and are used to describe the principles of the

present invention together with the Description. In the accompanying drawings the same components are represented by the same reference numbers. As shown in the drawings:

Fig. 1 is a diagram of installation of an embodiment of the luminaire according to the present invention;

Fig. 2 is an exploded view of the luminaire shown in Fig. 1; and

Fig. 3 is a side view of the light distribution of the luminaire shown in Fig. 1.

Detailed Description of the Embodiments

[0025] Fig. 1 is a diagram of installation of an embodiment of the luminaire 100 according to the present invention. As shown in Fig. 1, the luminaire 100 for street lighting comprises a housing 1 and at least one first lighting module 2, and the at least one first lighting module 2 uses an LED light source, the housing 1 can have a box-shaped contour, and the housing 1 further accommodates therein a driver for the at least one first lighting module 2, and in addition, the housing 1 bears the at least one first lighting module 2, wherein the emergent light of the first lighting module 2 is at least emitted to the street for ground lighting, the housing 1 is directly mounted on the ground on at least one side of the street, so as to provide lateral lighting from one side of the street.

[0026] Also shown in Fig. 1, the housing 1 of the luminaire 100 is at least partially embedded into the ground, the length of the first lighting module 2 in the extending direction of the street is greater than the height of the housing 1 exposed above the ground, and the height of the housing 1 exposed above the ground is 1m or less. This lowers the height of the luminaire 100 with respect to the ground as much as possible, and lights the other area above the ground.

[0027] Fig. 2 is an exploded view of the luminaire 100 shown in Fig. 1. As shown in Fig. 2, the housing 1 bears the first lighting module 2, the second lighting module 3 and the third lighting module 4. The first lighting module 2 provides the ground lighting, and comprises a first lighting unit 21 and a first optical unit 22 provided on the first side of the housing 1, and the first optical unit 22 deflects the emergent light of the first lighting unit 21 toward the ground. The first optical unit 22 is designed as an asymmetric lens to cover the first lighting unit 21, and can also be designed to be, for example, a reflector of the reflective cup (not shown in the figure). In addition, a sealing element 30 is provided between the asymmetric lens and the first lighting unit 21, to ensure the sufficient industrial protection to the lighting unit 21, and prevent water and dust entering the housing, as the water and dust would affect the working environment of the luminaire and then disable the lighting effect.

[0028] Furthermore, as shown in Fig. 2, the second lighting module 3 provides lighting for moving objects above the ground, and further comprises a second lighting unit 31 and a second optical unit 32 provided on the top surface of the housing 1. The second optical unit 32 is designed as a lens to cover the second lighting unit 31, and a sealing element 30 is provided between the lens and the second lighting unit 31, and the second optical unit 32 can be designed to be, for example, the reflector of a reflective cup so as to achieve the function of adjusting the direction and the range of the emergent light. In addition, the power of the second lighting unit 31 is less than that of the first lighting unit 21, so that the luminaire conducts integrated lighting for the street area and can also light areas other than the street at the same time.

[0029] Specifically, as shown in Fig. 2, the housing 1 further bears a third lighting module 4 which provides lighting for the side road beside the street. The third lighting module 4 and the first lighting module 2 are respectively provided at two sides of the housing 1 and conduct lighting toward two opposite areas. The third lighting module 4 further comprises a third lighting unit 41 and a third optical unit 42, the third optical unit 42 is the same as the first optical unit 22, and the ground for mounting the luminaire 100 is located between the street and the side road. In addition, the power of the third lighting unit 41 is less than that of the first lighting unit 21, to provide integrated lighting to the street.

[0030] Fig. 3 is a side view of the light distribution of the luminaire shown in Fig. 1. As shown in Fig. 3, the luminaire 100 provides lighting in different directions. For example, the first lighting module 2 provides the street lighting and displays the situations of the main street to the users; the second lighting module 3 can light the area above the luminaire 100, and can effectively light, for example, trees or traffic signs, so that the street users can better understand the traffic situations; the third lighting module 4 provides lighting for the side road beside the street, thus, in the situation that the side road can be differentiated from the main street by way of the luminaire, for example, the ground situations of the side road are displayed to the bicycle riders or pedestrians.

[0031] In addition, the luminaire according to the present invention can only comprise the first lighting module, or further comprise either or both of the second and the third lighting modules under the precondition of comprising the first lighting module. Preferably, more lighting modules can be provided in other areas of the luminaire to enhance its lighting effect.

[0032] Within the scope of the present invention, the optical units for the respective lighting modules can have flexible structural contours, so as to simplify the production process and the mounting process of the luminaire based on the precondition of user friendliness, and thereby improve the brightness and the lighting comfort of the overall luminaire.

[0033] The above are merely preferred embodiments of the present invention and are not intended to limit the

present invention. For the person skilled in the art, the present invention may have various alterations and changes. Any alterations, equivalent substitutions, improvements, within the spirit and principle of the present invention, should be covered in the protection scope of the present invention.

[0034] Reference signs

1	housing
2	first lighting module
3	second lighting module
4	third lighting module
21	first lighting unit
22	first optical unit
30	sealing element
31	second lighting unit
32	second optical unit
41	third lighting unit
42	third optical unit
100	luminaire

Claims

1. A luminaire (100) for street lighting comprising a housing (1) and at least one first lighting module (2), and the housing (1) bears the at least one first lighting module (2), wherein the emergent light of the first lighting module (2) is at least emitted to the street for ground lighting, **characterized in that**, the housing (1) is directly mounted on the ground of at least one side of the street, so as to provide lateral lighting from the at least one side of the street.

2. The luminaire (100) according to claim 1, **characterized in that**, the housing (1) is at least partially embedded into the ground.

3. The luminaire (100) according to claim 1, **characterized in that**, the length of the first lighting module (2) in the extending direction of the street is greater than the height of the housing (1) exposed above the ground.

4. The luminaire (100) according to claim 1, **characterized in that**, the height of the housing (1) exposed above the ground is 1m or less.

5. The luminaire (100) according to any of claims 1 to 4, **characterized in that**, the housing (1) bears the first lighting module (2) which provides the ground lighting and a second lighting module (3) which provides lighting above the luminaire.

6. The luminaire (100) according to any of claims 1 to 4, **characterized in that**, the first lighting module (2) comprises a first lighting unit (21) and a first optical unit (22) provided on a first side surface of the housing (1), and the first optical unit (22) deflects the emergent light of the first lighting unit (21) toward the ground.

7. The luminaire (100) according to claim 6, **characterized in that**, the first optical unit (22) is designed as an asymmetric lens covering the first lighting unit (21).

8. The luminaire (100) according to claim 6, **characterized in that**, the first optical unit (22) is a reflector.

9. The luminaire (100) according to claim 7, **characterized in that**, a sealing element (30) is provided between the asymmetric lens and the first lighting unit (21).

10. The luminaire (100) according to claim 5, **characterized in that**, the second lighting module (3) further comprises a second lighting unit (31) and a second optical unit (32) provided on the top surface of the housing (1).

11. The luminaire (100) according to claim 10, **characterized in that**, the second optical unit (32) is designed as a lens covering the second lighting unit (31), and a sealing element (30) is provided between the lens and the second lighting unit (31).

12. The luminaire (100) according to claim 10, **characterized in that**, the second optical unit (32) is a reflector.

13. The luminaire (100) according to claim 10, **characterized in that**, the power of the second lighting unit (31) is less than that of a first lighting unit (21) of the first lighting module (2).

14. The luminaire (100) according to claim 5, **characterized in that**, the housing (1) further bears a third lighting module (4) which provides lighting for a side road beside the street, and the ground for mounting the luminaire (100) is located between the street and the side road.

15. The luminaire (100) according to claim 14, **characterized in that**, the third lighting module (4) further comprises a third lighting unit (41) and a third optical unit (42) provided on a second side surface of the housing (1) facing away from the first side surface.

16. The luminaire (100) according to claim 15, **characterized in that**, the power of the third lighting unit (41) is less than that of a first lighting unit (21) of the first lighting module (2).

17. The luminaire (100) according to claim 15, **characterized in that**, the third optical unit (42) is the same

as a first optical unit (22) of the first lighting module (2).

18. The luminaire (100) according to any of claims 1 to 4, **characterized in that**, the housing (1) accommodates a driver for the at least one first lighting module (2).

19. The luminaire (100) according to any of claims 1 to 4, **characterized in that**, the housing (1) has a box-shaped contour.

20. The luminaire (100) according to any of claims 1 to 4, **characterized in that**, the light source of the at least one first lighting module (2) is an LED light source.

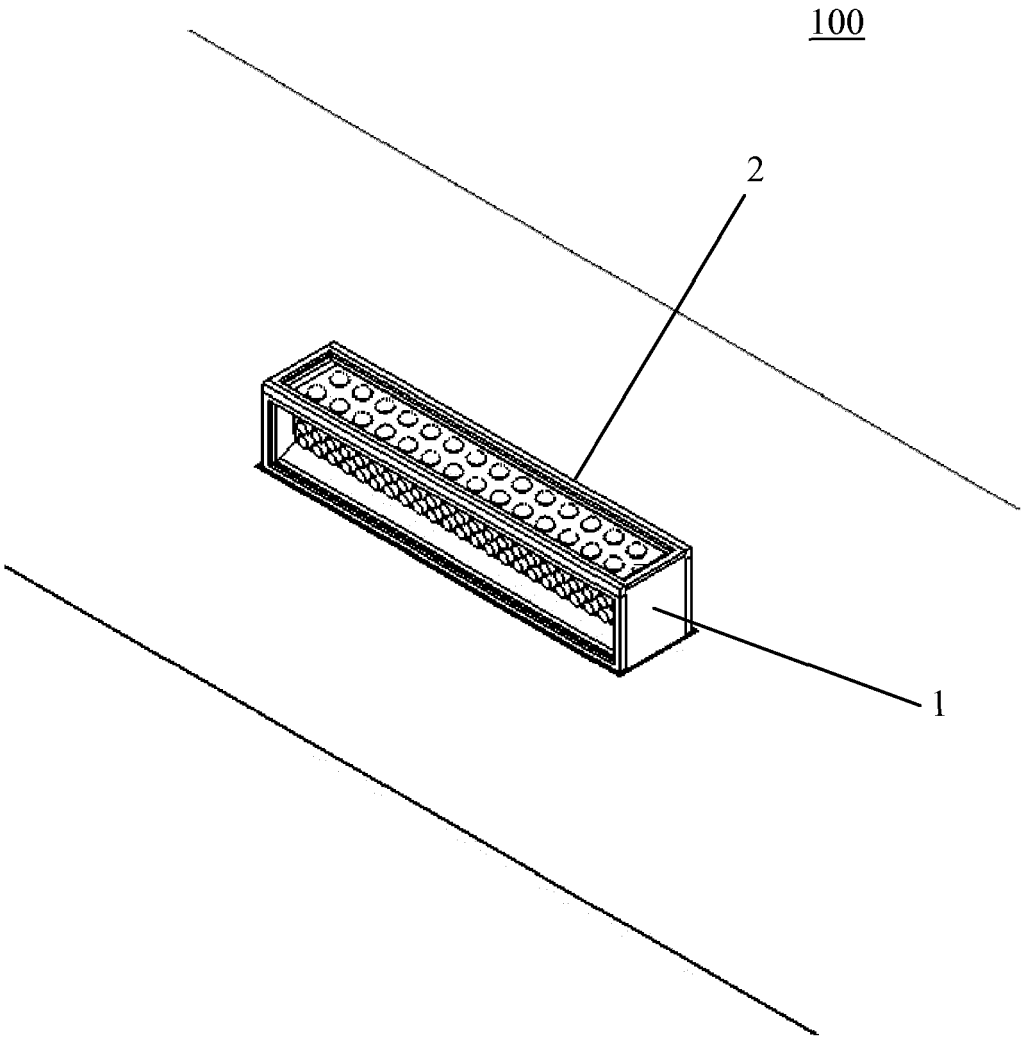

Figure 1

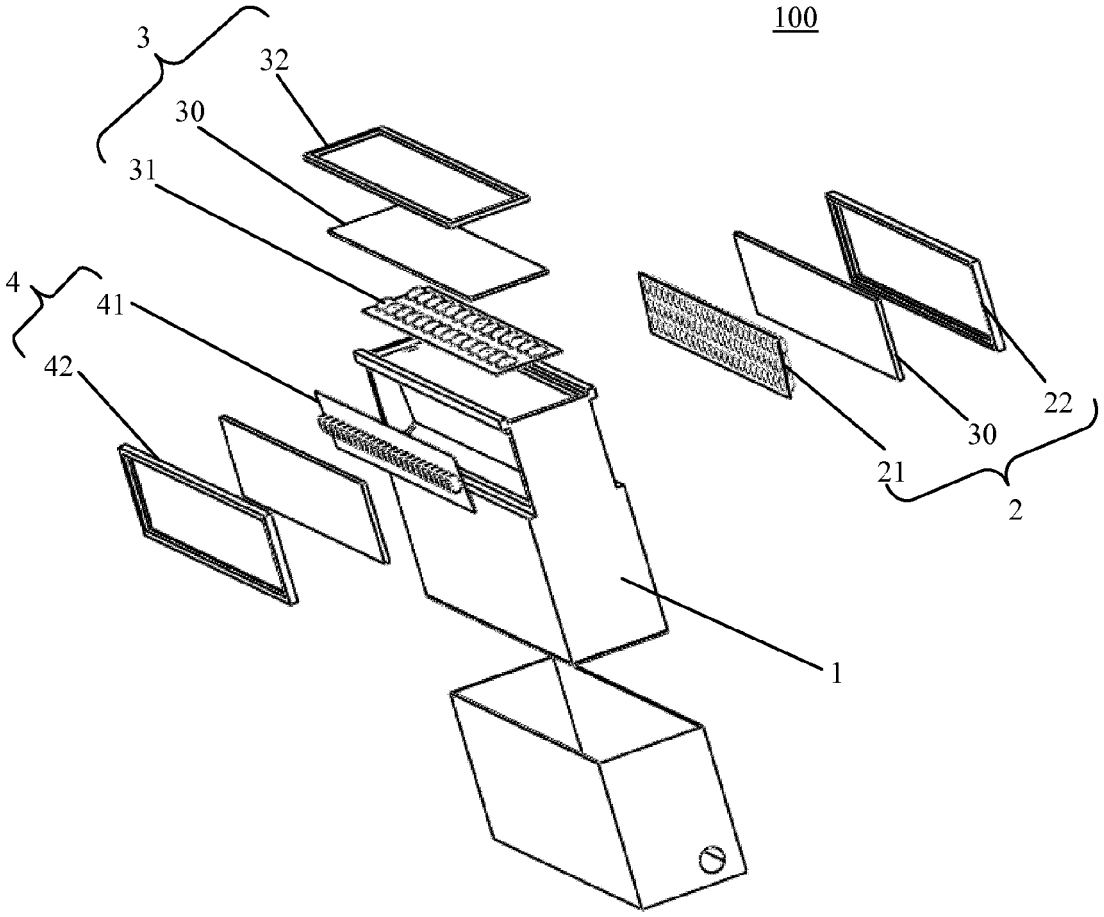

Figure 2

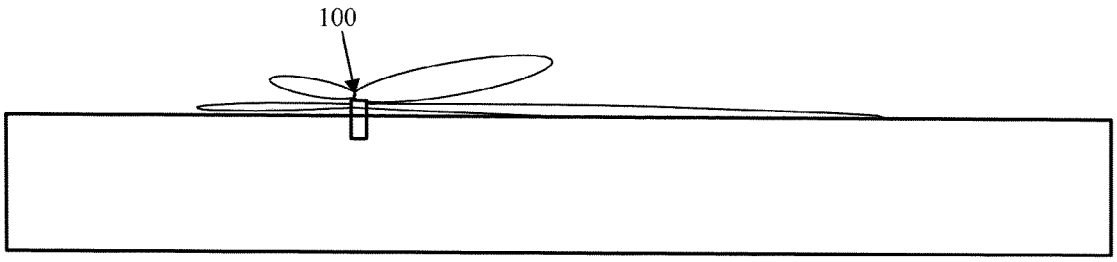

Figure 3

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 April 2014	Sacepe, Nicolas

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EUROPEAN SEARCH REPORT

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