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(54) **LIGHT SOURCE MODULE, ASSEMBLY AND LIGHTING AND/OR SIGNALING APPARATUS**

(57) A light source module (100), comprising:
a light source unit (10);
an optical element (20) arranged in an optical path of a
light (60) emitted from the light source unit (10) and ar-
ranged to deviate the light (60) emitted from the light
source unit (10); and

a bracket (30) on which the light source unit (10) and the
optical element (20) are mounted,
wherein the bracket (30) has at least one pair of fitting
portions, and each pair of fitting portions comprises a first
fitting portion (31) and a second fitting portion (32) that
have shapes matched with each other.

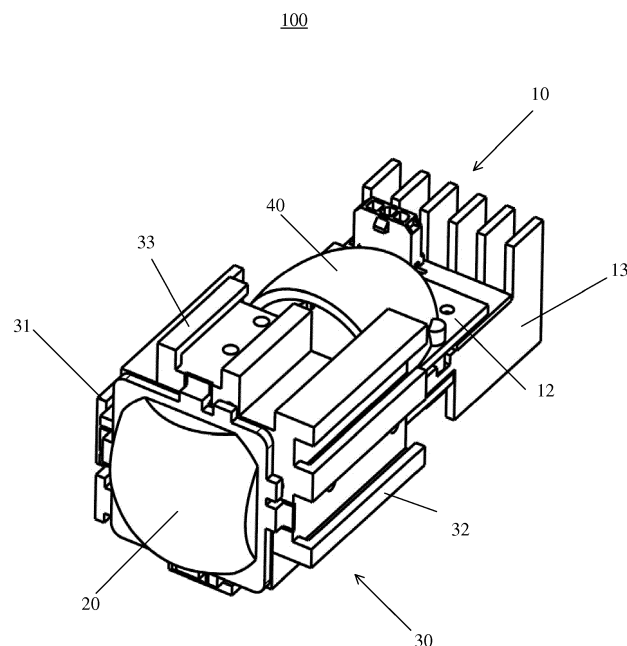


Fig. 1

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No. 201610412935.X filed on June 13, 2016 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

[0002] The present disclosure relates to the lighting and signaling field, and in particular, to a light source module, a light source assembly and a lighting and/or signaling apparatus.

Description of the Related Art

[0003] A light source is a necessary component in various lighting and/or signaling apparatuses. As technology develops and requirements of the customers are enhanced continuously, demands on diversification of the light source also increase. Thus, single light source is often insufficient to meet the requirements of users, and thus a plurality of light sources are generally used in combination in the lighting and/or signaling apparatuses. However, in the conventional lighting and/or signaling apparatuses, there are no devices that can flexibly assemble a plurality of independent light source modules.

SUMMARY OF THE DISCLOSURE

[0004] The present disclosure is intended to provide a light source module, a light source assembly and a lighting and/or signaling apparatus, which can achieve flexible diversified distribution of light sources by freely assembling a plurality of light source modules, so as to meet various requirements of the users.

[0005] An embodiment of the present invention provides a light source module, comprising: a light source unit; an optical element arranged in an optical path of a light emitted from the light source unit and arranged to deviate the light emitted from the light source unit; and a bracket on which the light source unit and the optical element are mounted, wherein the bracket has at least one pair of fitting portions, and each pair of fitting portions comprises a first fitting portion and a second fitting portion that have shapes matched with each other.

[0006] In an embodiment, the light source unit comprises a light emitting element, a printed circuit board bearing the light emitting element and a heat sink on which the printed circuit board is mounted.

[0007] In an embodiment, the light source module further comprises a light reflector mounted on the heat sink or on the bracket and arranged to reflect the light emitted

from the light source unit towards the optical element.

[0008] In an embodiment, the light emitting element is a light emitting diode.

[0009] In an embodiment, one of the first fitting portion and the second fitting portion is a rib, and the other of them is a groove.

[0010] In an embodiment, one of the first fitting portion and the second fitting portion is provided with a first positioning structure, and the other of them is provided with a second positioning structure which is shaped to be matched with the first positioning structure.

[0011] In an embodiment, the first positioning structure is a retractable engaging head and the second positioning structure is an engaging recess or engaging hole.

[0012] In an embodiment, the retractable engaging head is formed by a spring and a pressing ball.

[0013] In an embodiment, the bracket further has at least one third fitting portion which is shaped to match with at least one first fitting portion.

[0014] An embodiment of the present disclosure provides a light source assembly comprising two or more light source modules as described in any one of the above embodiments.

[0015] In an embodiment, the two or more light source modules as described in any one of the above embodiments comprise a first light source module and a second light source module adjacent to each other, and wherein at least one first fitting portion of the first light source module is assembled directly with the at least one corresponding second fitting portion of the second light source module together.

[0016] In an embodiment, one of the first fitting portion and the second fitting portion is provided with a first positioning structure, and the other of them is provided with a second positioning structure which is shaped to be matched with the first positioning structure, and wherein the first positioning structure in the first light source module is fitted to the second positioning structure in the second light source module to determine relative positions of the first light source module and the second light source module.

[0017] In an embodiment, the first positioning structure in the first light source module is a retractable engaging head and the second positioning structure in the second light source module is an engaging recess or engaging hole, and wherein the retractable engaging head has an extension position in which the retractable engaging head is matched with the engaging recess or engaging hole in shape such that the retractable engaging head is engaged into the engaging recess or engaging hole, and a retracted position in which the retractable engaging head is disengaged from the engaging recess or engaging hole.

[0018] In an embodiment, the two or more light source modules as described in any one of the above embodiments comprise a first light source module and a second light source module adjacent to each other, and in at least the first light source module, the bracket further has at

least one third fitting portion which is shaped to match with at least one first fitting portion, and wherein at least one first fitting portion of the second light source module is able to be selectively assembled directly with the at least one corresponding second fitting portion or third fitting portion of the first light source module together.

[0019] An embodiment of the present disclosure also provides a light source assembly comprising a first light source module and a second light source module, the first light source module comprising: a first light source unit; a first optical element arranged in an optical path of a light emitted from the first light source unit and arranged to deviate the light emitted from the first light source unit; and a first bracket on which the first light source unit and the first optical element are mounted, the first bracket having a first fitting portion; and the second light source module comprising: a second light source unit; a second optical element arranged in an optical path of a light emitted from the second light source unit and arranged to deviate the light emitted from the second light source unit; and a second bracket on which the second light source unit and the second optical element are mounted, the second bracket having a second fitting portion; wherein the first fitting portion and the second fitting portion have shapes matched with each other such that they are able to be assembled directly with each other together.

[0020] In an embodiment, the second bracket further comprises a third fitting portion which is shaped to match with the first fitting portion such that the first fitting portion is able to be selectively assembled directly with one of the second fitting portion and the third fitting portion together.

[0021] An embodiment of the present disclosure provides a lighting and/or signaling apparatus comprising: the light source module as described in any one of the above embodiments or the light source assembly as described in any one of the above embodiments.

[0022] At least one of the above embodiments of the present disclosure can achieve direct assembling of light source modules by providing a bracket with a first fitting portion and a second fitting portion without any additional mounting and fitting frames, so as to simplify the structure and to enhance flexibility of combining the light source modules.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

Fig. 1 is a schematic perspective view showing a light source module according to an embodiment of the present disclosure;

Fig. 2 is a schematic top view showing a light source module according to an embodiment of the present disclosure;

Fig. 3 is a schematic cross sectional view of the light source module shown in Fig. 2 taken along line A-A;

Fig. 4 is a schematic front view showing a light source module according to an embodiment of the present disclosure;

Fig. 5 is a schematic view showing a first positioning structure and a second positioning structure of a light source module according to an embodiment of the present disclosure;

Fig. 6 is a schematic view showing a form of a light source assembly including a plurality of light source modules according to an embodiment of the present disclosure;

Fig. 7 is a schematic view showing another form of a light source assembly including a plurality of light source modules according to an embodiment of the present disclosure; and

Fig. 8 is a schematic view showing a further form of a light source assembly including a plurality of light source modules according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0024] Exemplary embodiments of the present disclosure will be described below in detail with reference to drawings. Throughout the description and drawings, same or similar reference numerals are intended to represent the same or similar components. It should be noted that the embodiments herein are given by ways of examples, instead of limiting the present invention.

[0025] In accordance with a general concept of the present disclosure, it provides a light source module, comprising: a light source unit; an optical element arranged in an optical path of a light emitted from the light source unit and arranged to deviate the light emitted from the light source unit; and a bracket on which the light source unit and the optical element are mounted, wherein the bracket has at least one pair of fitting portions, and each pair of fitting portions comprises a first fitting portion and a second fitting portion that have shapes matched with each other.

[0026] In addition, in the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that one or more embodiments may be practiced without these specific details.

[0027] Fig. 1 to Fig. 4 schematically show a light source module 100 according to an embodiment of the present disclosure. The light source module 100 comprises: a light source unit 10, an optical element 20 and a bracket 30. The optical element 20 is arranged in an optical path of a light 60 emitted from the light source unit 10 and arranged to deviate the light 60 emitted from the light source unit 10. The light source unit 10 and the optical element 20 are mounted on the bracket 30. The bracket 30 has at least one pair of fitting portions, and each pair of fitting portions comprises a first fitting portion 31 and a second fitting portion 32. The first fitting portion 31 and

the second fitting portion 32 have shapes matched with each other, for example, have complementary shapes.

[0028] In an embodiment of the present disclosure, the optical element 20 may for example be a lens arranged to collimate a light, or may be another optical deflection element, such as a light reflector, a light shaping element, a light deflector or the like.

[0029] The first fitting portion 31 and the second fitting portion 32 have shapes matched with each other, thus, when a plurality of light source modules are used in combination, the first fitting portion 31 of one light source module may be fitted to the second fitting portion 32 of another light source module so as to assemble the two light source modules. In a similar manner, the bracket 30 may be used to assemble many light source modules 100 into an entirety. In this way, the plurality of light source modules 100 may be flexibly assembled into a light source assembly 200 with various shapes, for example, the plurality of light source modules 100 may be assembled into a square form (see Fig. 6), a bow-shaped form (see Fig. 7), a strip form (see Fig. 8) or a diagonal form, etc. Such diversified shapes of the light source assembly 200 may be used to satisfy various customized demands from the users. By means of the above structure of the bracket 30, it may prevent any additional structures for fixing frames from being provided in the light source assembly 200, so as to simplify the structures and to improve convenience of assembling the light source modules.

[0030] In addition, because each of the light source modules has the first fitting portion 31 and the second fitting portion 32, respective light source modules may be assembled arbitrarily and the bracket 30 is easy to be produced in normalized mode.

[0031] It should be noted that the light source module 100 may have a plurality of pairs of the first fitting portion 31 and the second fitting portion 32, so as to provide more selections when the plurality of light source modules 100 are assembled together. In an example, as shown in Fig. 1 and Fig. 4, two first fitting portions are provided side by side on one side (the left side in Fig. 4) of the light source module 100 and two second fitting portions are provided side by side on the other side (the right side in Fig. 4) of the light source module 100. This may allow two adjacent light source modules 100 to be positioned at different height levels after they are assembled together. For example, when two light source modules are assembled by the first fitting portion 31 at the middle position on the left side of one light source module 100 and the second fitting portion 32 at the middle position on the right side of the other light source module 100, the two light source modules are positioned substantially at the same height (see Fig. 8). When two light source modules are assembled by the first fitting portion 31 at the lower position on the left side of one light source module 100 and the second fitting portion 32 at the upper position on the right side of the other light source module 100, the height levels at which the two light source modules are positioned have a significant difference (see Fig.

7).

[0032] In an example, the bracket 30 may further have at least one third fitting portion 33 which is shaped to match with at least one first fitting portion 31. It means that, when a plurality of light source modules 100 are assembled, the first fitting portion 31 not only may be fitted to the second fitting portion 32, but also may be fitted to the third fitting portion 33. This may further improve flexibility of assembling the light source modules.

[0033] In an example, the light source unit 10 comprises a light emitting element 11, a printed circuit board 12 and a heat sink 13. The printed circuit board 12 bears the light emitting element 11. The printed circuit board 12 is mounted on the heat sink 13. For example, the light emitting element 11 may be a light emitting device such as a light emitting diode. As an example, the light source unit 10 may be fixed onto the bracket 30 by the heat sink 13.

[0034] As an example, the light source module 100 may further comprise a light reflector 40. The light reflector 40 is mounted on the heat sink 13 or the bracket 30. The light reflector 40, such as a curved surface reflector (for example, a parabolic reflector, a hyperboloidal reflector, an ellipsoidal reflector, or the like), may be arranged to reflect the light 60 emitted from the light source unit 10 towards the optical element 20.

[0035] In an example, one of the first fitting portion 31 and the second fitting portion 32 is a rib, while the other of them is a groove. As shown in Fig. 1 and Fig. 4, by means of the rib and the groove cooperating with each other, the first fitting portion 31 of one light source module may be engaged stably with the second fitting portion 32 of the other light source module to enhance the assembling stability. For example, a stop may be arranged at an end of the groove (for example, the end of the second fitting portion 32 close to the optical element shown in Fig. 1), so as to prevent the rib from sliding out from the end of the groove when the rib is fitted to the groove.

[0036] As an example, all of components in the optical module 100 may be mounted onto the bracket 30, so as to reduce the tolerance chain and to enhance the assembling accuracy.

[0037] In an example, one of the first fitting portion 31 and the second fitting portion 32 may be provided with a first positioning structure 51, and the other of them may be provided with a second positioning structure 52 which is shaped to be matched with the first positioning structure 51. Such arrangement of the first positioning structure 51 and the second positioning structure 52 may improve the relative positioning of the light source modules.

[0038] Fig. 5 shows examples of the first positioning structure 51 and the second positioning structure 52. In the examples, the first positioning structure 51 is a retractable engaging head 53 and the second positioning structure 52 is an engaging recess or engaging hole 54. The retractable engaging head 53 may have an extension position and a retracted position. In the extension position, the shape of the retractable engaging head 53

is matched to the shape of the engaging recess or engaging hole 54 such that the retractable engaging head 53 is engaged in the engaging recess or engaging hole 54 to keep constant positions of the adjacent optical modules. In the retracted position, the retractable engaging head 53 is disengaged from the engaging recess or engaging hole 54 such that the adjacent optical modules can move with respect to each other.

[0039] As an example, the retractable engaging head 53 may be formed by a spring 55 and a pressing ball 56. By means of elastic force effects of the spring 55, the pressing ball 56 may move between the extension position and the retracted position. When the spring 55 is pressed to retract, the pressing ball 56 will be located at the retracted position and the adjacent optical modules may move with respect to each other to adjust relative positions thereamong. When the position of the pressing ball 56 is aligned with the position of the engaging recess or the engaging hole 54, the spring 55 will extend such that the pressing ball 56 is engaged into the engaging recess or engaging hole 54, so as to achieve the positioning of the light source modules.

[0040] An embodiment of the present disclosure also provides a light source assembly 200. The light source assembly 200 may comprise two or more light source modules 100 as described in any one of the above embodiments. As an example, the two or more light source modules 100 may comprise a first light source module and a second light source module adjacent to each other. At least one first fitting portion 31 of the first light source module is assembled directly with the at least one corresponding second fitting portion 32 of the second light source module together.

[0041] In case that the first fitting portion 31 and the second fitting portion 32 are provided with the first positioning structure 51 and the second positioning structure 52 respectively, the first positioning structure 51 in the first light source module may be fitted to the second positioning structure 52 in the second light source module to determine relative positions of the first light source module and the second light source module. As discussed above, the engagement between the first positioning structure 51 of the first light source module and the second positioning structure 52 of the second light source module may be achieved by the retractable engaging head 53 and the engaging recess or engaging hole 54.

[0042] As an example, in case that the first light source module has the third fitting portion 33, at least one first fitting portion 31 of the second light source module is able to be selectively assembled directly with the at least one corresponding second fitting portion 32 or third fitting portion 33 of the first light source module together. Similarly, in case that the second light source module has the third fitting portion 33, at least one first fitting portion 31 of the first light source module is able to be selectively assembled directly with the at least one corresponding second fitting portion 32 or third fitting portion 33 of the second

light source module together. In this way, the first light source module and the second light source module may be assembled more flexibly such that the light source assembly 200 can have more forms. As an example, in the same light source assembly, different light source modules may have different structures, for example, the first fitting portion, the second fitting portion or the third fitting portion may have different shapes or arrangements.

[0043] As an example, the bracket 30 of single light source module 100 may be formed integrally, so as to simplify the process for producing the light source module.

[0044] In the above embodiment, single light source module 100 may both have the first fitting portion 31 and the second fitting portion 32. In this way, any two light source modules 100 may be assembled together, to improve compatibility of assembling the light source modules. Even more, only one same type of the light source modules may be combined to achieve light source assemblies with various shapes. This may provide convenience for standard production, so as to improve throughput and reduce the costs.

[0045] However, the embodiments are not limited to this. In one light source assembly 200, a certain light source module 100 may only have the first fitting portion 31, but not have the second fitting portion 32, while another light source module 100 may only have the second fitting portion 32, but not have the first fitting portion 31. This may also achieve mutual assembling of the light source modules 100.

[0046] For example, an embodiment of the present disclosure provides a light source assembly comprising a first light source module and a second light source module. The first light source module comprises: a first light source unit; a first optical element arranged in an optical path of a light emitted from the first light source unit and arranged to deviate the light emitted from the first light source unit; and a first bracket on which the first light source unit and the first optical element are mounted, the first bracket having a first fitting portion 31. And the second light source module comprises: a second light source unit; a second optical element arranged in an optical path of a light emitted from the second light source unit and arranged to deviate the light emitted from the second light source unit; and a second bracket on which the second light source unit and the second optical element are mounted, the second bracket having a second fitting portion 32. The first fitting portion 31 and the second fitting portion 32 have shapes matched with each other such that the first fitting portion 31 and the second fitting portion 32 can be assembled directly with each other together.

[0047] As an example, the second bracket further comprises a third fitting portion 33 which is shaped to match with the first fitting portion 31 such that the first fitting portion 31 is able to be selectively assembled directly with one of the second fitting portion 32 and the third

fitting portion 33 together.

[0048] An embodiment of the present disclosure also provides a lighting and/or signaling apparatus comprising: the light source module 100 as described in any one of the above embodiments or the light source assembly

[0049] In embodiments of the present disclosure, the first optical element and the second optical element may for example be lenses arranged to collimate a light, or may be other optical deflection elements, such as light shaping elements, light reflectors, light deflectors or the like.

[0050] The skilled person in the art should understand that, besides the components as described above, mechanical components (for example fasteners such as screws) and electronic components (for example driving circuit for the light emitting element) may also be provided for necessary functions, which are well-known in the art and thus their details are omitted herein.

[0051] The lighting and/or signaling apparatus according to the present disclosure may be used for illumination and signaling of vehicles. It also may be used in other lighting and/or signaling field, for example, a flashlight, or a reflective plate for taking a photograph, and so on.

[0052] Although the embodiments of the present disclosure have been explained with reference to the drawings, the embodiments shown in the drawings are given only by way of examples, instead of being intended to limit the present invention.

[0053] Although several exemplary embodiments have been shown and described, the present invention is not limited to those and it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure. The scope of the present invention is defined by the appended claims and equivalents thereof.

Claims

1. A light source module (100), comprising:

a light source unit (10);
an optical element (20) arranged in an optical path of a light (60) emitted from the light source unit (10) and arranged to deviate the light (60) emitted from the light source unit (10); and
a bracket (30) on which the light source unit (10) and the optical element (20) are mounted, wherein the bracket (30) has at least one pair of fitting portions, and each pair of fitting portions comprises a first fitting portion (31) and a second fitting portion (32) that have shapes matched with each other.

2. The light source module (100) according to claim 1, wherein the light source unit (10) comprises a light

emitting element (11), a printed circuit board (12) bearing the light emitting element (11) and a heat sink (13) on which the printed circuit board (12) is mounted.

3. The light source module (100) according to claim 2, further comprising a light reflector (40) mounted on the heat sink (13) or on the bracket (30) and arranged to reflect the light (60) emitted from the light source unit (10) towards the optical element (20).

4. The light source module (100) according to claim 2, wherein the light emitting element (11) is a light emitting diode.

5. The light source module (100) according to claim 1, wherein one of the first fitting portion (31) and the second fitting portion (32) is a rib, and the other of them is a groove.

6. The light source module (100) according to claim 1, wherein one of the first fitting portion (31) and the second fitting portion (32) is provided with a first positioning structure (51), and the other of them is provided with a second positioning structure (52) which is shaped to be matched with the first positioning structure (51).

7. The light source module (100) according to claim 6, wherein the first positioning structure (51) is a retractable engaging head (53) and the second positioning structure (52) is an engaging recess or engaging hole (54).

8. The light source module (100) according to claim 7, wherein the retractable engaging head (53) is formed by a spring (55) and a pressing ball (56).

9. The light source module (100) according to any one of claims 1 to 8, wherein the bracket (30) further has at least one third fitting portion (33) which is shaped to match with at least one first fitting portion (31).

10. A light source assembly (200) comprising two or more light source modules (100) according to any one of claims 1-9.

11. The light source assembly (200) according to claim 10, wherein the two or more light source modules (100) according to any one of claims 1-9 comprise a first light source module and a second light source module adjacent to each other, and wherein at least one first fitting portion (31) of the first light source module is assembled directly with the at least one corresponding second fitting portion (32) of the second light source module together.

12. The light source assembly (200) according to claim

11, wherein the first light source module and the second light source each are the light source module (100) according to claim 6, and wherein the first positioning structure (51) in the first light source module is fitted to the second positioning structure (52) in the second light source module to determine relative positions of the first light source module and the second light source module.

- 13.** The light source assembly (200) according to claim 12, wherein the first positioning structure (51) in the first light source module is a retractable engaging head (53) and the second positioning structure (52) in the second light source module is an engaging recess or engaging hole (54), and wherein the retractable engaging head (53) has an extension position in which the retractable engaging head (53) is matched with the engaging recess or engaging hole (54) in shape such that the retractable engaging head (53) is engaged into the engaging recess or engaging hole (54), and a retracted position in which the retractable engaging head (53) is disengaged from the engaging recess or engaging hole (54).

- 14.** The light source assembly (200) according to claim 10, wherein the two or more light source modules (100) according to any one of claims 1-9 comprise a first light source module and a second light source module adjacent to each other, and at least the first light source module is the light source module (100) according to claim 9, and wherein at least one first fitting portion (31) of the second light source module is able to be selectively assembled directly with the at least one corresponding second fitting portion (32) or third fitting portion (33) of the first light source module together.

- 15.** A light source assembly comprising a first light source module and a second light source module, the first light source module comprising:

a first light source unit;
a first optical element arranged in an optical path of a light emitted from the first light source unit and arranged to deviate the light emitted from the first light source unit; and
a first bracket on which the first light source unit and the first optical element are mounted, the first bracket having a first fitting portion; and
the second light source module comprising:

a second light source unit;
a second optical element arranged in an optical path of a light emitted from the second light source unit and arranged to deviate the light emitted from the second light source unit; and
a second bracket on which the second light

source unit and the second optical element are mounted, the second bracket having a second fitting portion;
wherein the first fitting portion and the second fitting portion have shapes matched with each other such that they are able to be assembled directly with each other together.

- 16.** The light source assembly according to claim 15, wherein the second bracket further comprises a third fitting portion which is shaped to match with the first fitting portion such that the first fitting portion is able to be selectively assembled directly with one of the second fitting portion and the third fitting portion together.

- 17.** A lighting and/or signaling apparatus comprising:

the light source module according to any one of claims 1-9 or the light source assembly according to any one of claims 10-16.

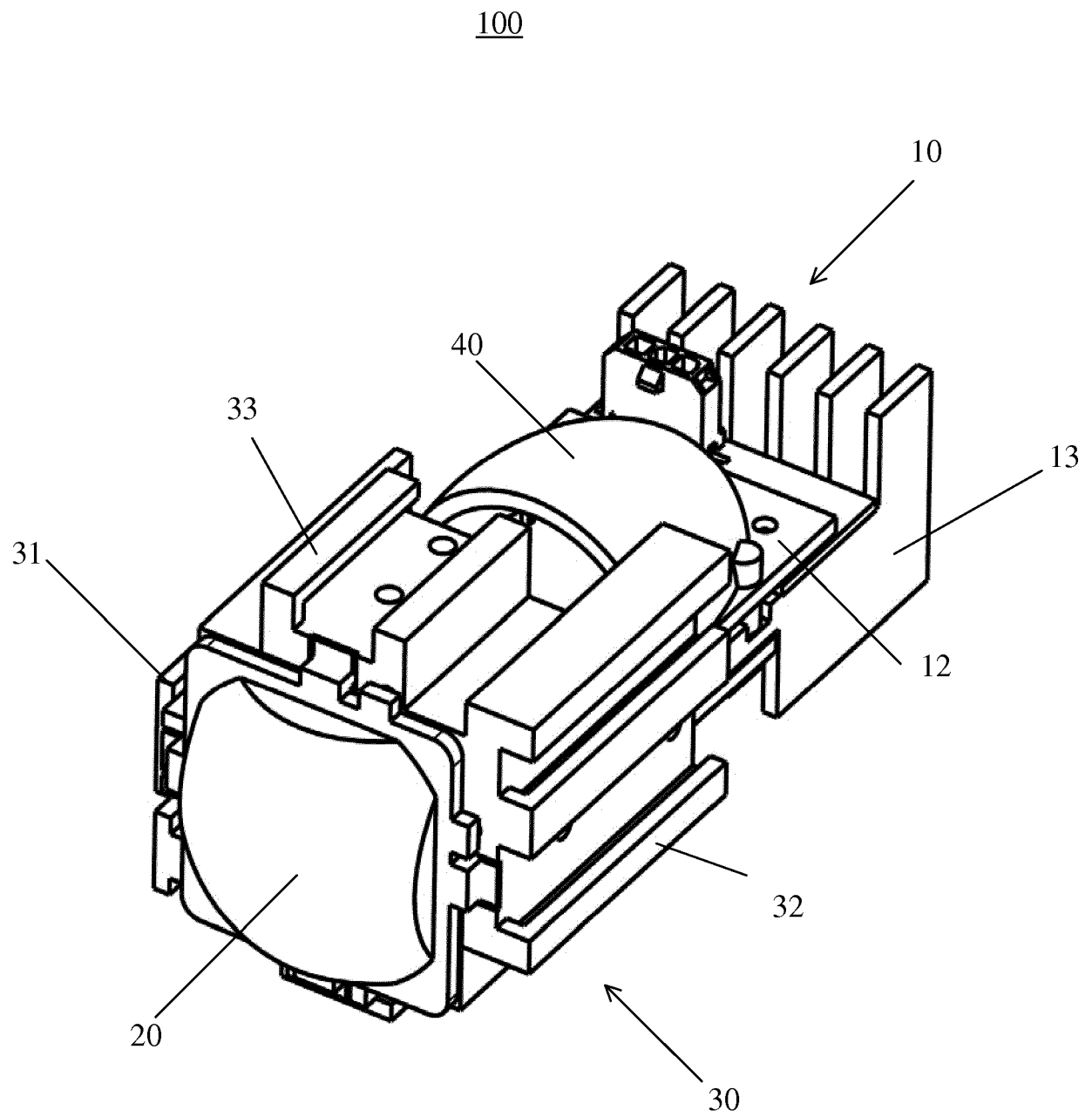


Fig. 1

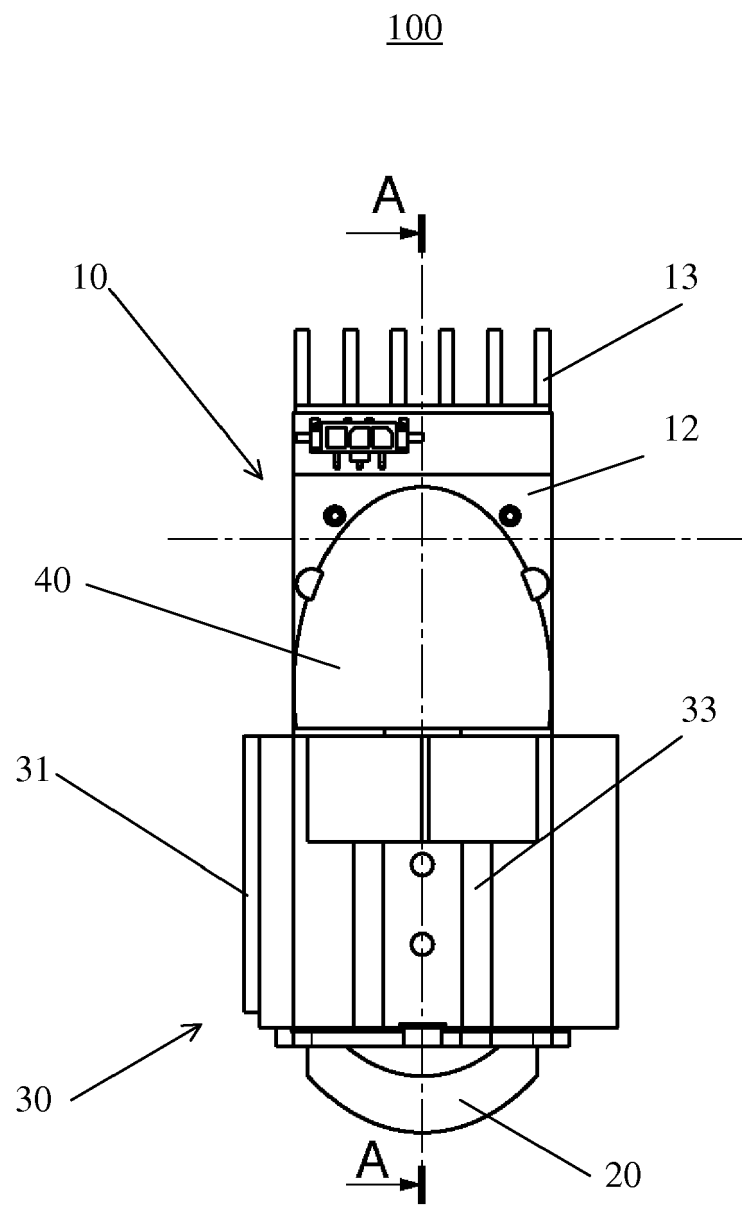


Fig. 2

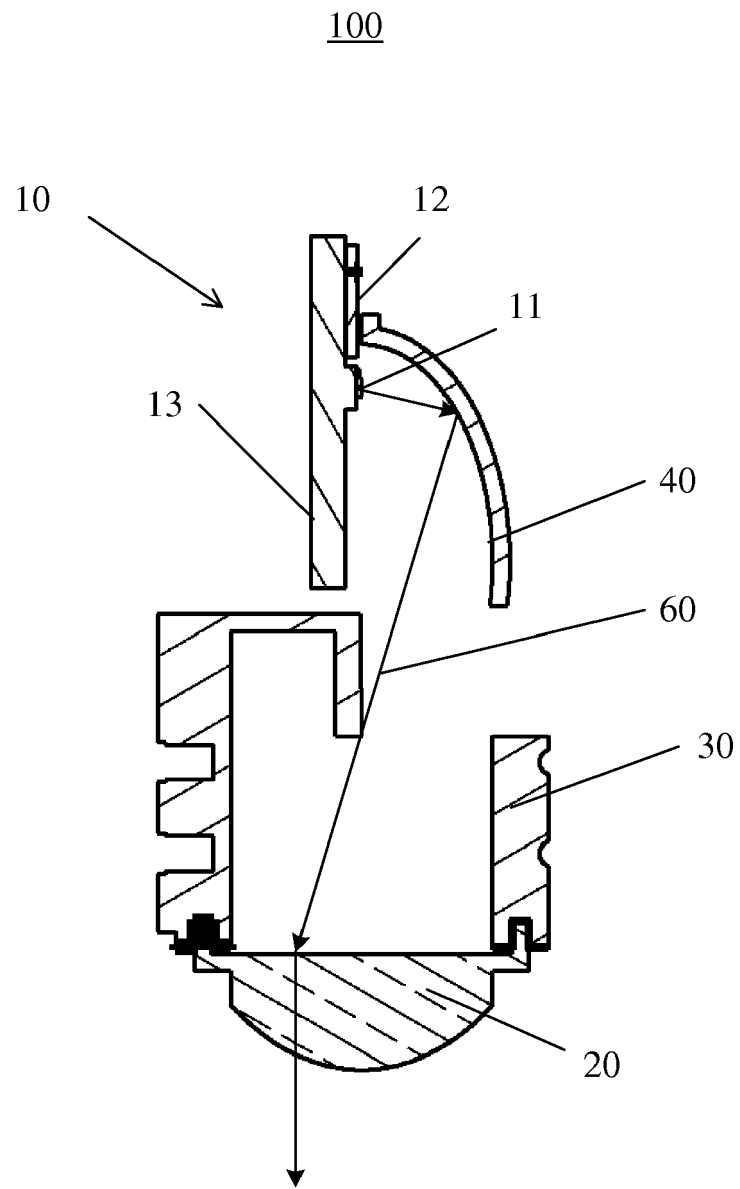


Fig. 3

100

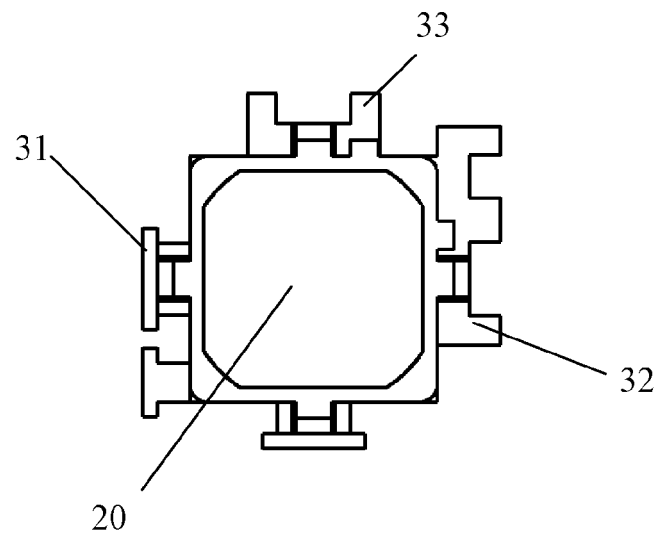


Fig. 4

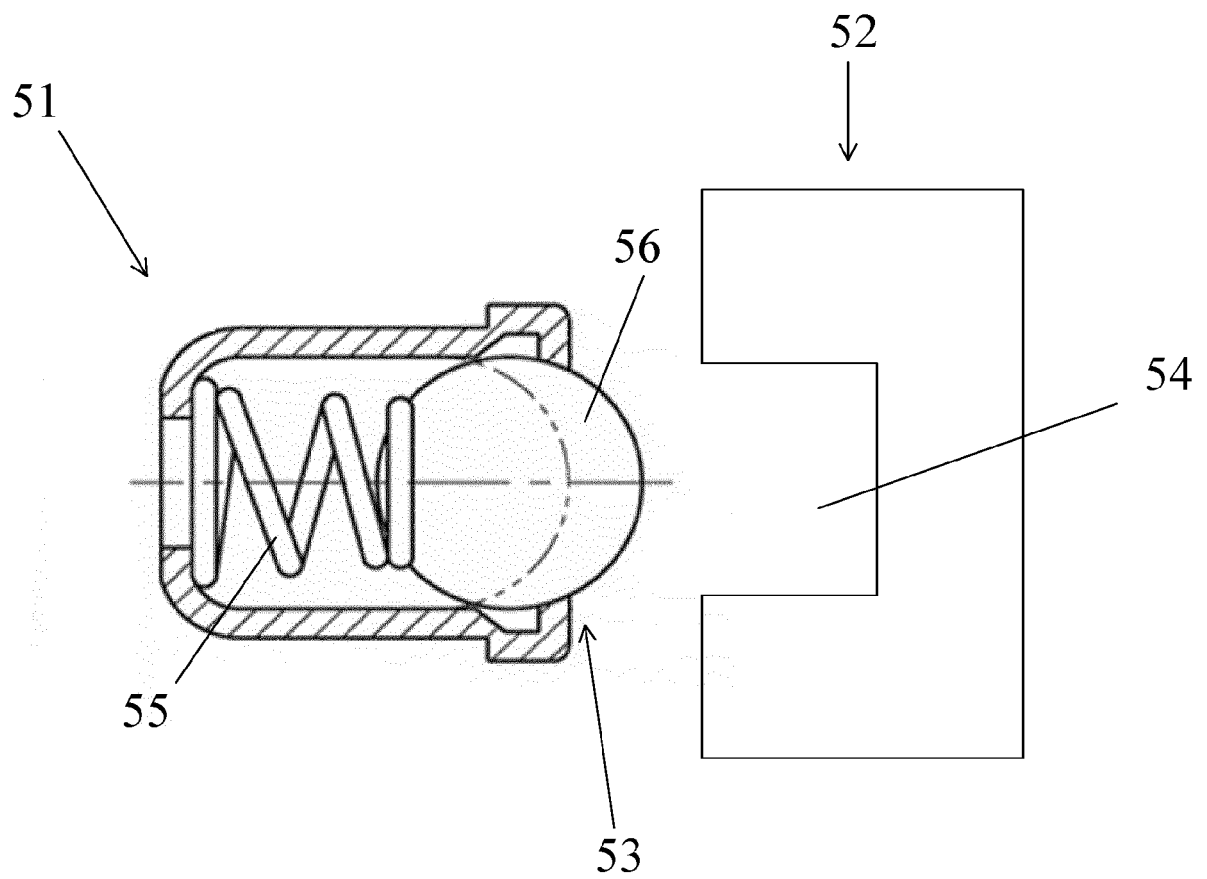


Fig. 5

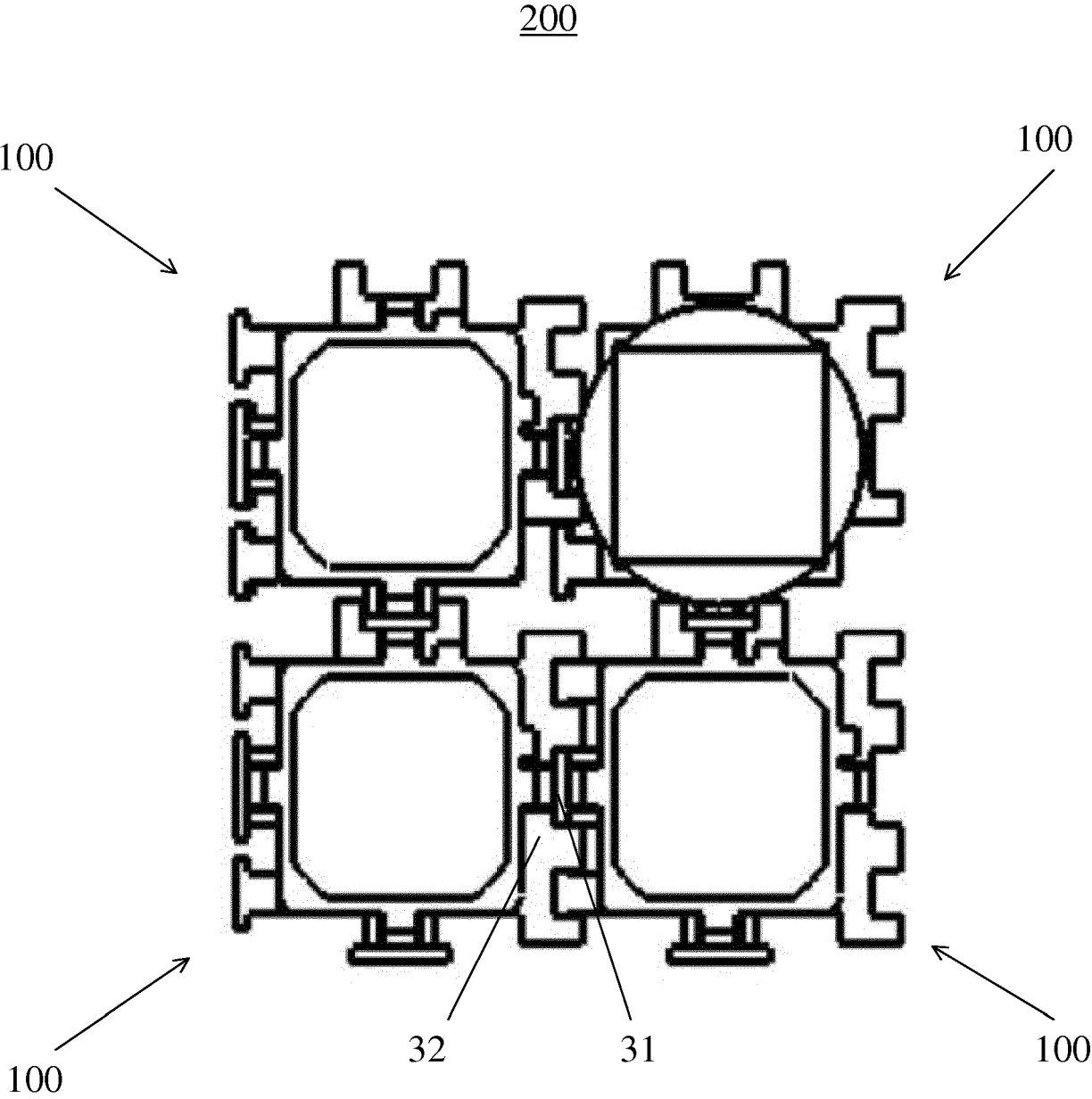


Fig. 6

200

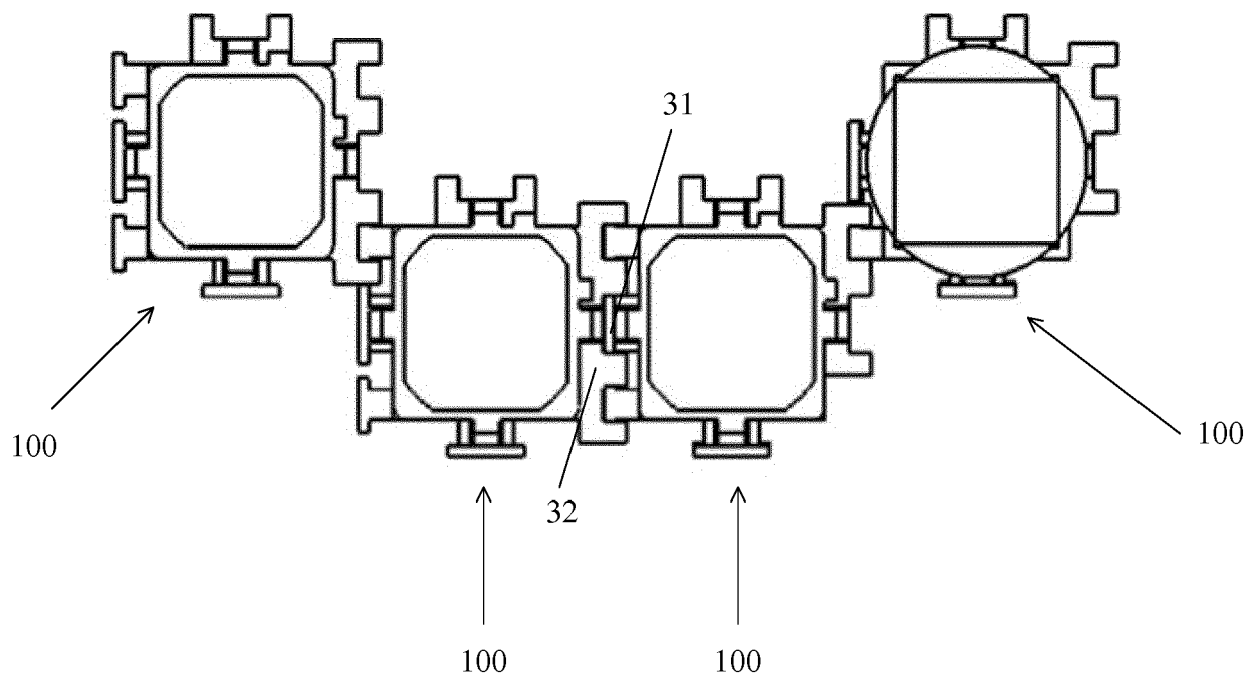


Fig. 7

200

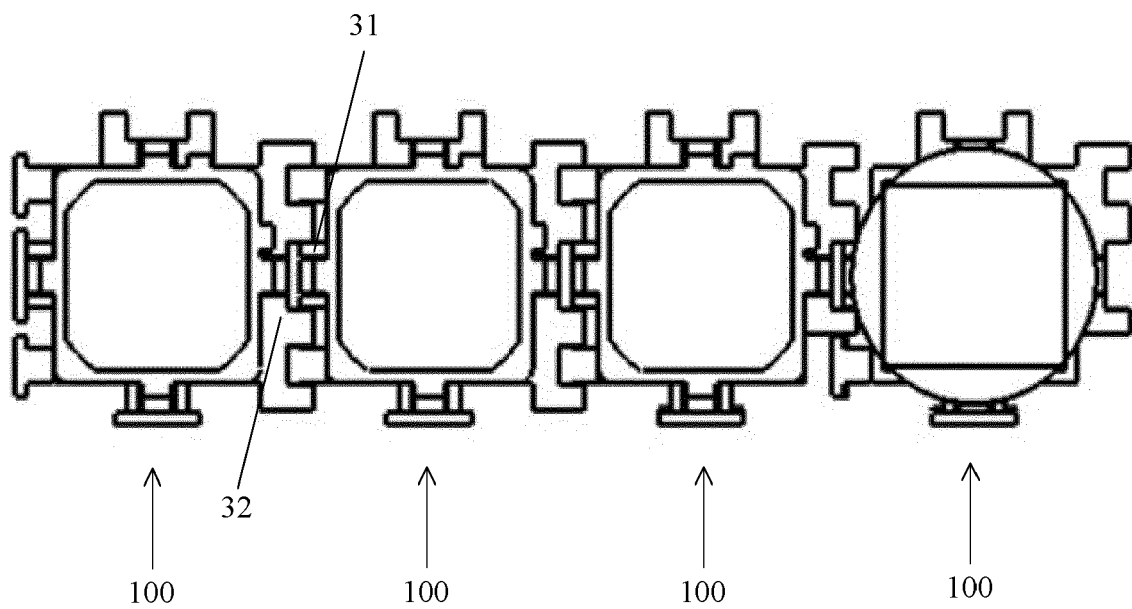


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 17 17 5500

5

10

15

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 2015 0004644 U (AIMAI) 30 December 2015 (2015-12-30) * paragraph [0001] - paragraph [0043] * * figures 1-6 *	1-17	INV. F21S2/00 F21S8/10 F21V13/04
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X	JP 3 159831 U (JUST TOP CORP) 3 June 2010 (2010-06-03) * paragraph [0001] - paragraph [0013] * * figures 1-5 *	1,5, 9-11, 14-17	
X	DE 20 2013 100903 U1 (CHIANG CHUAN HSI [TW]) 14 March 2013 (2013-03-14) * paragraph [0021] - paragraph [0034] * * figures 1-7 *	1,5, 9-11, 14-17	
			TECHNICAL FIELDS SEARCHED (IPC)
			F21S F21V F21Y
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 September 2017	Examiner Blokland, Russell
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