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(54) Title: OPTICAL CASING PROVIDING EFFECTIVE AND EFFICIENT VENTILATING FEATURES FOR LIGHTING FIXTURES

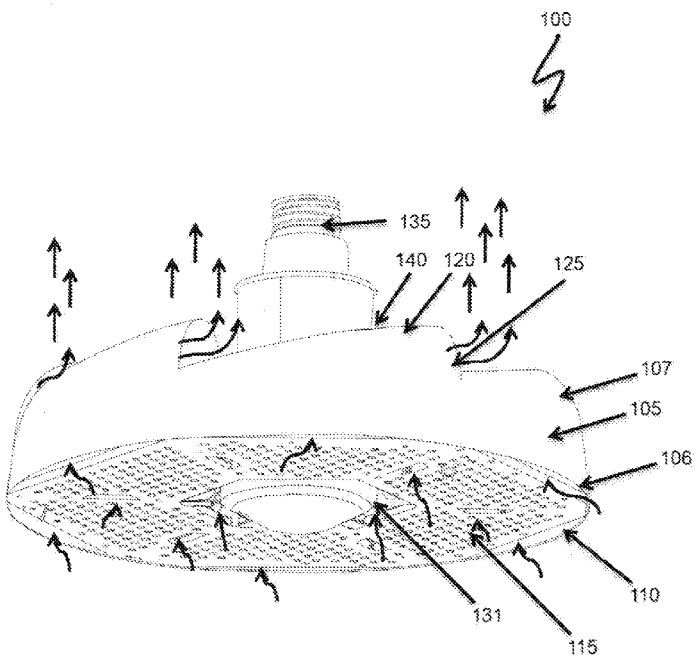

Fig. 1

(57) Abstract: An optical casing providing effective and efficient ventilating features for multiple lighting fixtures includes, a central housing having a first end and a second end, an inlet positioned at the first end of the housing, an outlet positioned at the second end of the housing, and multiple heat sink fins mounted between the inlet and the outlet. In use, the inlet includes multiple inlet holes, the outlet includes multiple outlet holes, and multiple inlet holes and multiple outlet holes are configured in a manner to provide for circular movement of air from the inlet towards the central housing.

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OPTICAL CASING PROVIDING EFFECTIVE AND EFFICIENT VENTILATING FEATURES FOR LIGHTING FIXTURES

BACKGROUND OF THE INVENTION

Field of the Invention

Embodiments of the present invention relate optical casings, and more particularly, to optical casing providing effective and efficient ventilating features for lighting fixtures.

Description of the Related Art

Generally, a protective housing can be used to house any electronic item, electrical circuitry or equipment where heat needs to be dissipated or extracted. An example of an application for the protective housing can be lighting fixtures.

With respect to electronic elements installed in the lighting fixtures, for example, integrated circuit (IC) such as a central processing unit (CPU), etc., a part of the input energy is lost by being converted into heat and generating (emitting) the heat.

However, in lighting fixtures heat generation is a major concern and at the same time heat needs to be dissipated. Moreover, if the heat generation brings about significant temperature rise, the electronic element itself may fail and/or other peripheral components may be adversely affected, so the lifetime and reliability of the electronic apparatus may be impaired.

In addition, the heat generation of the electronic element is undesirable also from the viewpoints of safety and usability by consumer of the electronic lighting fixture. Conventional designs have outlets or chimneys for heat to dissipate. However, typical chimney designs are tall to allow heat or hot air to escape from the top. Even though, it is a known fact that hot air rises up and the tall profile designs is required to prevent the heat build-up, but at the same time, the tall profile is not desired from a design and aesthetic point of view.

Moreover, a low profile will provide greater flexibility for a designer to incorporate it into an overall design. However, a low profile casing would allow for faster heat build-up as the hot air will be trapped and will have less room to rise.

While prior light fixtures have made progress in dissipating the heat generated by core or coils of the electric light fixtures, there remains a continuous need in the prior art for a light fixture which efficiently dissipates heat to extend the useful life of the light fixture's components.

Accordingly, there remains a need in the prior art for a protective casing with effective heat dissipative and efficient ventilating feature. The present invention provides such a protective low profile casing which has effective and efficient ventilating feature.

SUMMARY OF THE INVENTION

Embodiments of the present disclosure disclose an optical casing providing effective and efficient ventilating features for multiple lighting fixtures. In one embodiment, the optical casing includes, a central housing having a first end and a second end, an inlet positioned at the first end of the housing, an outlet positioned at the second end of the housing, and multiple heat sink fins mounted between the inlet and the outlet. In use, the inlet includes multiple inlet holes, the outlet includes multiple outlet holes, and multiple inlet holes and multiple outlet holes are configured in a manner to provide for circular movement of air from the inlet towards the central housing.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this

invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Fig.1 illustrates isometric view of an optical casing providing effective and efficient ventilating features for multiple lighting fixtures, in accordance with one embodiment of the present invention;

Fig.2 illustrates an expanded sectional view of the optical casing providing effective and efficient ventilating features for multiple lighting fixtures, in accordance with one embodiment of the present invention;

Fig.3 illustrates an air flow velocity diagram showing air coming out of multiple outlet vents, in accordance with one embodiment of the present invention; and

Fig.4 illustrates a thermal diagram showing hot spots at a top and cool spots at rest of the optical casing, in accordance with one embodiment of the present invention.

While the present systems and methods have been described herein by way of example for several embodiments and illustrative drawings, those skilled in the art will recognize that the multiple embodiments disclosed herein below are not limited to the embodiments or drawings described. It should be understood, that the drawings and detailed description thereto are not intended to limit embodiments to the particular form disclosed. Rather, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the invention as defined by the appended claims. Any headings used

herein are for organizational purposes only and are not meant to limit the scope of the description or the claims. As used herein, the word “can” and "may" is used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense (i.e., meaning must). Similarly, the words "include", "including", and "includes" mean including, but not limited to.

DETAILED DESCRIPTION

Various embodiments of the present invention relate to optical casing providing effective and efficient ventilating features for lighting fixtures. In the following detailed description, numerous specific details are set forth to provide a thorough understanding of claimed subject matter. However, it will be understood by those skilled in the art that claimed subject matter may be practiced without these specific details. In other instances, methods, apparatuses or systems that would be known by one of ordinary skill have not been described in detail so as not to obscure claimed subject matter.

Fig.1 illustrates isometric view of an optical casing 100 providing effective and efficient ventilating features for multiple lighting fixtures, in accordance with one embodiment of the present invention. In accordance with an embodiment of the present invention, the optical casing 100 providing effective and efficient ventilating features for multiple lighting fixtures includes, a central housing 105 having a first end 106 and a second end 107, and an inlet

110 positioned at the first end 106 of the housing 105. In use, the inlet 110 includes multiple inlet holes 115.

In accordance with an embodiment of the present invention, the optical casing 100 further includes an outlet 120 positioned at the second end 107 of the housing 105. In use, the outlet 120 includes multiple outlet holes 125.

In accordance with an embodiment of the present invention, the optical casing 100 further includes multiple heat fins 130 mounted between the inlet 110 and the outlet 120. In use, multiple inlet holes 115 and multiple outlet holes 125 are configured in a manner to provide for circular movement of air from the inlet 110 towards the central housing 105. Subsequently, circular movement of air results in longer airflow path, thereby providing greater period for the air to cool down and extract the heat from the circuit, heat sink fins 130 or source of heat. More specifically, the air flows in from the bottom, and then flows to the side, before exiting from the top of the casing 100.

In accordance with an embodiment of the present invention, the inlet 110 includes a first opening 131 for holding at least a portion an optical fixture 135 of multiple lighting fixtures, and the outlet 120 includes a second opening 140 for holding at least a portion of the optical fixture 135 of multiple lighting fixtures. In use, at least a portion of the optical fixture 135 extends through the outlet 120.

Fig.2 illustrates an expanded sectional view of the optical casing 100 providing effective and efficient ventilating features for multiple lighting fixtures, in accordance with one embodiment of the present invention. In accordance with an embodiment of the present invention, the central housing 105 is configured for holding at least a portion of the optical fixture 135. In use, multiple inlet holes 115 of the inlet 110 are configured to allow vertical airflow into the central housing 105. More specifically, each hole of the multiple outlet holes 125 of the outlet 120 is facing sideways to allow circular airflow from the outlet 120 towards outside of the optical casing 100.

In accordance with an embodiment of the present invention, the optical casing 100 further includes multiple heat sink fins 130 to radiate heat. In use, the heat sink fins 130 are mounted inside the central housing 105, in close proximity to the inlet 110.

In operation, air flows in a circular or turbulent manner around the circuit, multiple heat sink fins 130 or source of heat because after the cool air absorbs heat from the heat sink, circuit or source of heat, the flow or fluid velocity increases (hot air has more energy) and rises. Subsequently, as the hot air rises, it will cool down and cooler air will move down, thereby resulting in the circular airflow, which is more effective in extracting heat as compared to still air or smooth flowing air.

Fig.3 illustrates an air flow velocity diagram showing air coming out of multiple outlet vents, in accordance with one embodiment of the present invention. As seen therein, it highlights the effectiveness in extraction of hot air.

Fig.4 illustrates a thermal diagram showing hot spots at a top and cool spots at rest of the optical casing, in accordance with one embodiment of the present invention. As seen therein, it highlights effectiveness of heat extraction in a manner such that the rest of the optical casing 100 is cooler and only the top portion which is near to the outlet 120 is hot.

In accordance with an embodiment of the present invention, a method for releasing hot air from an optical casing 100 holding at least one optical fixture 135 includes the steps of, allowing cold incoming air to enter from multiple inlet holes 115 positioned on an inlet 110 of the optical casing 100, allowing the incoming air to absorb heat by contacting multiple heat sink fins 130 resulting in hot air, allowing the hot air to move upwards thereby resulting in circular movement of the hot air, and, forcing the hot air to move out of the optical casing 100 through multiple outlet holes 125 of an outlet 120 of the optical casing 100.

Therefore, as may be seen, various embodiments of the present invention disclose optical casing providing effective and efficient ventilating features for multiple lighting fixtures, which has multiple advantages as the casings disclosed herein possess a low profile and still are able to extract heat very effectively and efficiently. The embodiments as disclosed hereinabove

have applications across various areas, such as, for example, but not limited to, electronics, electrical circuitry or equipment where heat needs to be dissipated or extracted. A specific example of such application could be lighting fixtures as heat generation is a major concern in lighting and the heat needs to be dissipated.

In addition, various embodiments of the present invention allow longer airflow path, which results in greater period for the air to cool down and extract the heat from the circuit, heat sink fins, or source of heat. Also, the circular (turbulent) airflow results in more effective and efficient heat extraction.

Furthermore, as multiple outlet holes opens to the side, it prevents dust and foreign objects from falling into the optical casing and damaging the circuit or heat sink fins.

Accordingly, while there has been shown and described the preferred embodiment of the invention is to be appreciated that the invention may be embodied otherwise than is herein specifically shown and described and, within said embodiment, certain changes may be made in the form and arrangement of the parts without departing from the underlying ideas or principles of this invention within the scope of the claims appended herewith.

CLAIMS

1. An optical casing providing effective and efficient ventilating features for a plurality of lighting fixtures, said casing comprising:

a central housing having a first end and a second end;

an inlet positioned at said first end of said housing, said inlet comprising a plurality of inlet holes;

an outlet positioned at said second end of said housing, said outlet comprising a plurality of outlet holes; and,

a plurality of heat sink fins mounted between said inlet and said outlet, wherein said plurality of inlet holes and said plurality of outlet holes are configured in a manner to provide for circular movement of air from said inlet towards said central housing.

2. The optical casing as claimed in Claim 1, wherein said inlet comprises a first opening for holding at least a portion an optical fixture of said plurality of lighting fixtures.

3. The optical casing as claimed in Claim 1, wherein said outlet comprises a second opening for holding at least a portion of said optical fixture of said plurality of lighting fixtures.

4. The optical casing as claimed in Claim 3, wherein at least a portion of said optical fixture extends through said outlet.

5. The optical casing as claimed in Claim 1, wherein said central housing is configured for holding at least a portion of said optical fixture.

6. The optical casing as claimed in Claim 1, wherein said plurality of inlet holes of said inlet are configured to allow vertical air flow into said central housing.

7. The optical casing as claimed in Claim 1, wherein each hole of said plurality of outlet holes of said outlet is facing sideways to allow circular air flow from said outlet towards outside of said optical casing.

8. The optical casing as claimed in Claim 1, wherein said optical casing further comprises said plurality of heat sink fins to radiate heat.

9. The optical casing as claimed in Claim 8, wherein said plurality of heat sink fins are mounted inside said central housing, in close proximity to said inlet.

10. A method for releasing hot air from an optical casing holding at least one optical fixture, said method comprising the steps of:

allowing cold incoming air to enter from a plurality of inlet holes positioned on an inlet of said optical casing;

allowing said incoming air to absorb heat by contacting a plurality of heat sink fins resulting in hot air;

allowing said hot air to move upwards thereby resulting in circular movement of said hot air; and,

forcing said hot air to move out of said optical casing through a plurality of outlet holes of an outlet of said optical casing.

11. The method as claimed in Claim 10, wherein each hole of said plurality of outlet holes of said outlet is facing sideways to allow circular air-flow from said outlet towards outside of said optical casing.

12. The method as claimed in Claim 10, wherein said inlet comprises a first opening for holding at least a portion an optical fixture.

13. The method as claimed in Claim 10, wherein said outlet comprises a second opening for holding at least a portion of said optical fixture.

14. The method as claimed in Claim 10, wherein at least a portion of said optical fixture extends through said outlet.

15. The method as claimed in Claim 10, wherein said central housing of said optical casing is configured for holding at least a portion of said optical fixture.

16. The method as claimed in Claim 10, wherein said plurality of inlet holes of said inlet are configured to allow vertical air flow into said central housing.

17. The method as claimed in Claim 10, wherein said plurality of heat sink fins are mounted inside said central housing, in close proximity to said inlet.

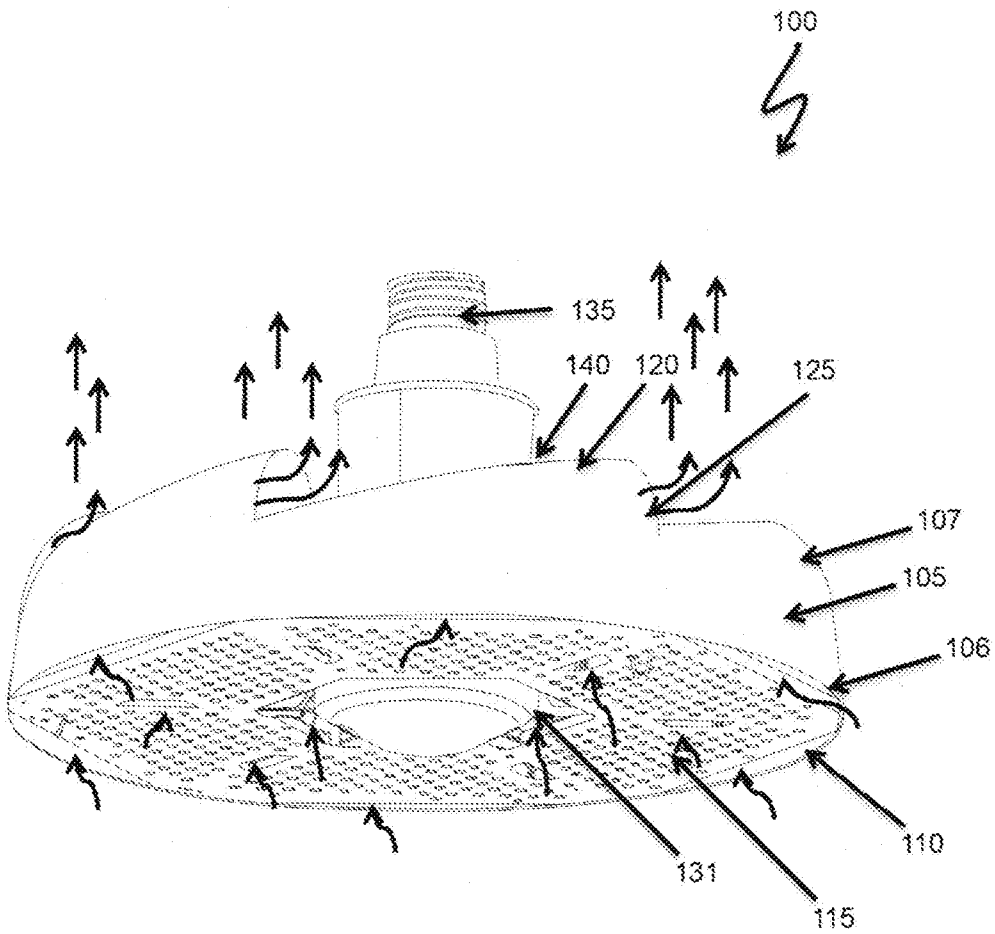

Fig. 1

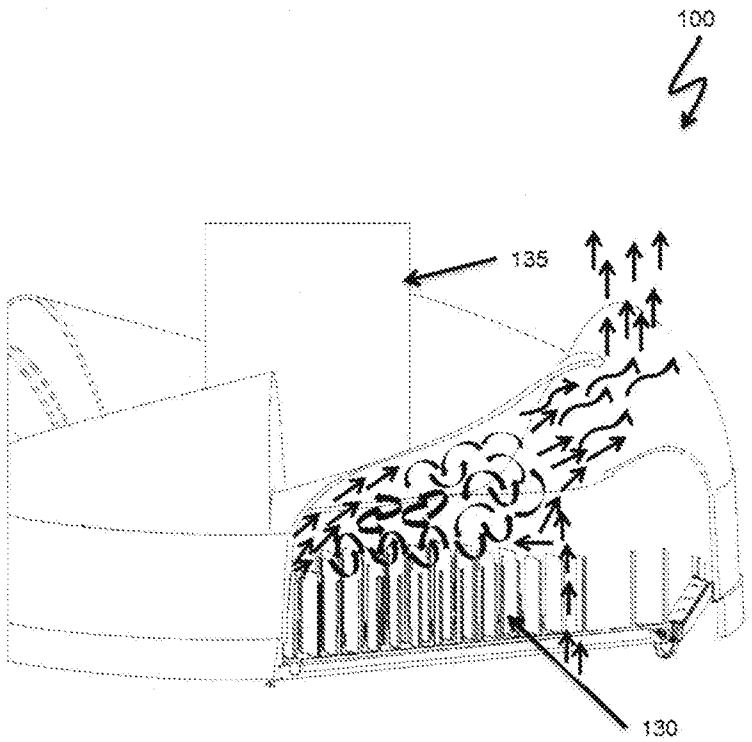

Fig. 2

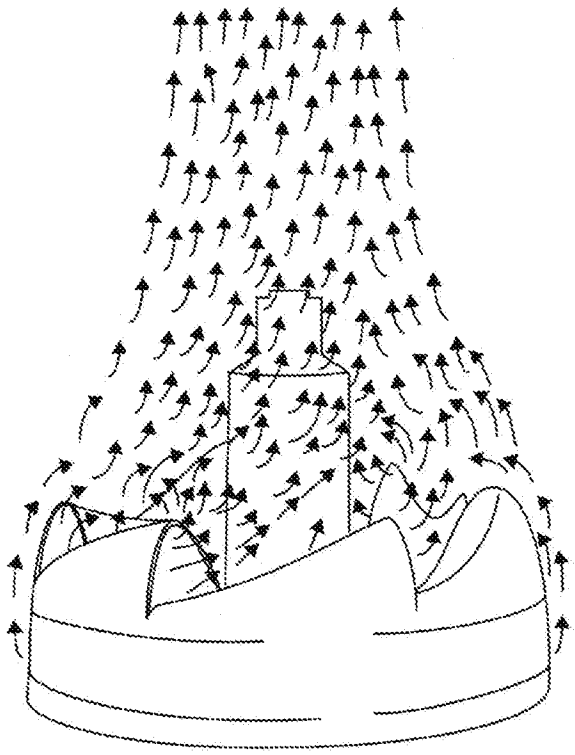

Fig. 3

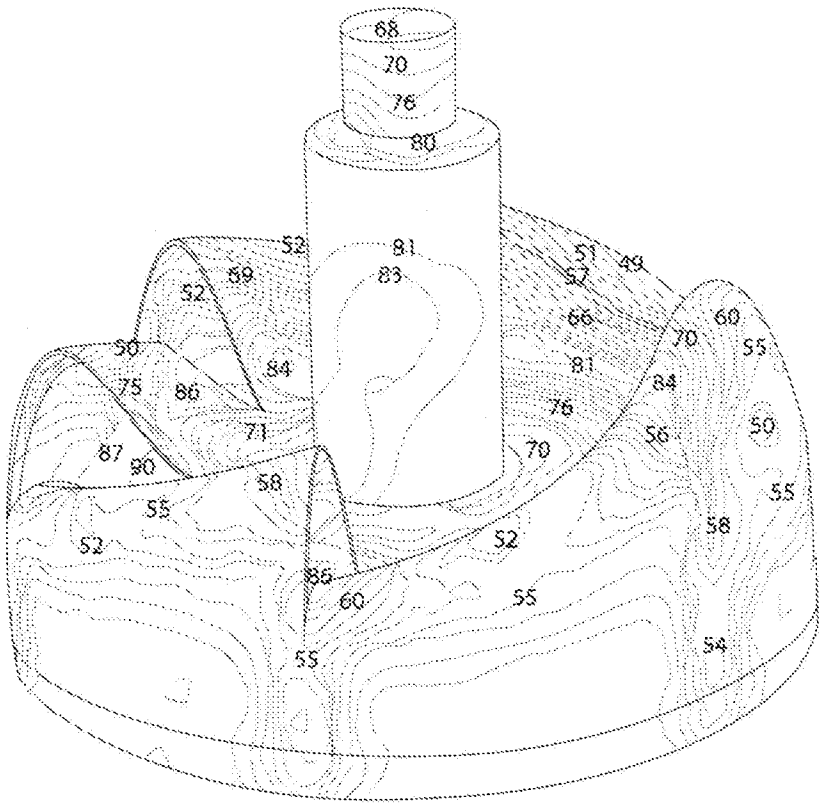
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Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2016/000035

A. CLASSIFICATION OF SUBJECT MATTER

F21V 29/00(2006.01)i, F21V 29/70(2014.01)i, F21V 15/01(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F21V 29/00; F21S 2/00; F21V 9/08; H05K 7/20; F21S 8/06; H01L 33/00; F21V 29/02; H01J 7/44; F21V 29/70; F21V 15/01

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: air, housing, circular, hole, heat sink, ventilate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2014-170675 A (PANASONIC CORP.) 18 September 2014 See paragraphs 17-30, 43-50, claim 1 and figures 1-5.	1-17
Y	JP 2012-009186 A (CCS INC.) 12 January 2012 See paragraphs 20-30, claim 1 and figures 2-4, 8.	1-17
A	US 2012-0223640 A1 (JEFFREY P. KOPLOW) 06 September 2012 See paragraphs 30-40, claim 1 and figure 1.	1-17
A	JP 2013-077470 A (EYE LIGHTING SYST. CORP.) 25 April 2013 See paragraphs 14-29, claim 1 and figures 1-7.	1-17
A	JP 2008-021932 A (NITRIDE SEMICONDUCTOR CO., LTD.) 31 January 2008 See paragraphs 18-28, claim 1 and figures 1-4.	1-17

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 November 2016 (18.11.2016)	**18 November 2016 (18.11.2016)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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