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The Director

of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this United States

Patent

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Katherine Kelly Vidal

DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

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(12) **United States Patent**
Chung

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(54) **ILLUMINATION DEVICE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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A61L 9/20 (2006.01)
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CPC ***F21V 33/0088*** (2013.01); ***A61L 9/20*** (2013.01); ***F24F 13/078*** (2013.01); *A61L 2209/12* (2013.01); *F21Y 2115/10* (2016.08)

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,763,212	B2 *	7/2010	McEllen	A61L 9/20 422/121
8,080,203	B2 *	12/2011	First	A61L 9/20 422/24
2010/0196214	A1 *	8/2010	Graff	F24F 13/078 422/121
2017/0321877	A1 *	11/2017	Polidoro	F21V 33/0088

* cited by examiner

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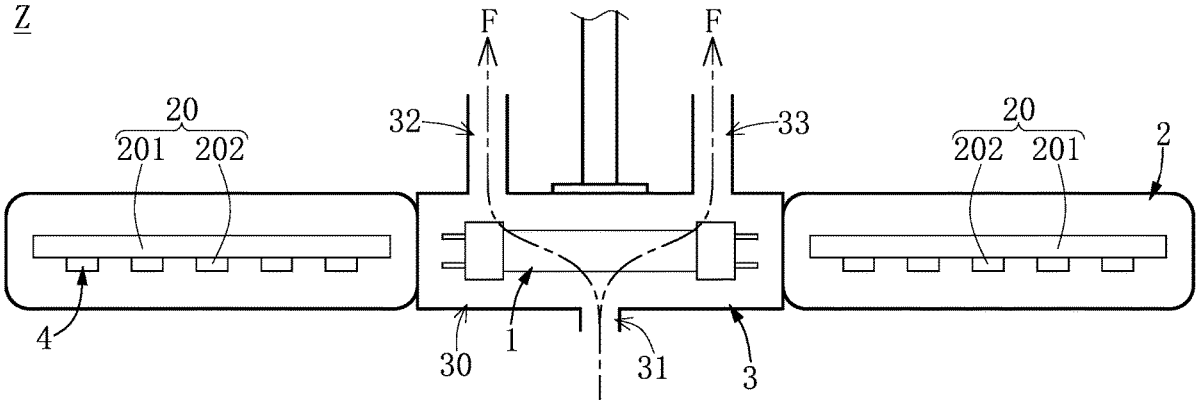
(57) **ABSTRACT**

An illumination device includes a first light-emitting module, a second light-emitting module and an airflow-guiding structure. The second light-emitting module is adjacent to the first light-emitting module. The airflow-guiding structure includes a receiving casing, a first air inlet pipe in air communication with the receiving casing, and a first air outlet pipe in air communication with the receiving casing. The first light-emitting module is received inside the airflow-guiding structure. When external air flows into the receiving casing through the first air inlet pipe by natural convection, the external air inside the receiving casing is sterilized by a sterilization light source provided by the first light-emitting module, and the external air that has been sterilized by the sterilization light source flows out of the receiving casing through the first air outlet pipe by natural convection, and is then discharged out of the illumination device.

9 Claims, 13 Drawing Sheets