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(54) **LED traffic signal and optical element therefor**

(57) A lighting device includes a housing (28,68) having an open end and a geometrical axis and at least one light source (12,52) disposed along an optical axis. The lighting device further includes an outer optical element (10,50) having a focal point and closing the open end of the housing, the optical element comprising a converging outer surface and a diverging inner surface that cooper-

ates with the light coming from the inner optical element. Additionally, the lighting device includes an inner optical element between the light source and the outer optical element, the inner optical element redirecting light from a light source that is offset from the focal point toward the outer optical element.

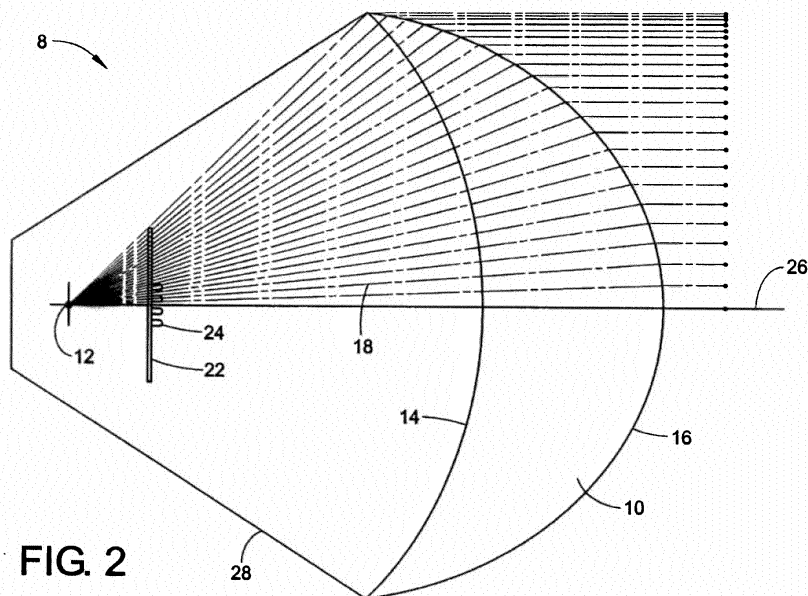


FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 7934

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2010/028239 A2 (LUMINATION LLC [US]; DUBUC EDEN [CA]) 11 March 2010 (2010-03-11) * paragraph [0016] - paragraph [0021]; figures 2,3 *	1-5	INV. F21V5/04 G08G1/095
X	DE 43 29 332 A1 (KOITO MFG CO LTD [JP]) 3 March 1994 (1994-03-03)	1-3	
Y	* column 4, line 25 - column 14, line 25; figures 17,18 *	4,5	
X	EP 1 302 719 A1 (HONDA MOTOR CO LTD [JP]; STANLEY ELECTRIC CO LTD [JP]) 16 April 2003 (2003-04-16) * paragraph [0008] - paragraph [0021]; figures 3,4 *	1-3	
Y	US 2002/034081 A1 (SERIZAWA TOMOAKI [JP]) 21 March 2002 (2002-03-21) * paragraph [0024] - paragraph [0050]; figures 1-7 *	4,5	
X	GB 157 070 A (MCKENZIE HOLLAND AND WESTINGHO) 22 December 1921 (1921-12-22)	6-10	TECHNICAL FIELDS SEARCHED (IPC) F21V G08G G02B
Y	* column 1 - column 4; figures 1,2 *	11	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 April 2014	Examiner Arboreanu, Antoniu
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- 1-11
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
- The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5

Lighting device with one refractive element and one light source

2. claims: 6-11

Lighting device with two light sources and inner and outer optical elements

3. claims: 12, 13

Lighting device with two converging lenses and only one light source

4. claims: 14, 15

Lighting device with only one lens with a complex structure

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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23-04-2014

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82