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(12) **United States Design Patent**
Reiherzer et al.

(10) **Patent No.:** **US D790,486 S**

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(54) **LED PACKAGE WITH TRUNCATED
ENCAPSULANT**

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(73) Assignee: **CREE, INC.**, Durham, NC (US)

(*) Notice: This patent is subject to a terminal disclaimer.

(**) Term: **14 Years**

(21) Appl. No.: **29/503,928**

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(51) **LOC (10) Cl.** **13-03**

(52) **U.S. Cl.** **D13/180**
USPC **D13/180**

(58) **Field of Classification Search**
USPC D13/180; D26/1
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,013,916 A 3/1977 Brown
4,946,547 A 8/1990 Palmour
(Continued)

FOREIGN PATENT DOCUMENTS

CN 1417868 A 5/2003
CN 1977399 6/2007
(Continued)

OTHER PUBLICATIONS

Cree® XLamp® MC-E LEDs Product Info Sheets, 14 pages.
(Continued)

Primary Examiner — Selina Sikder

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(57) **CLAIM**

The ornamental design for an LED package with truncated encapsulant, as shown and described.

DESCRIPTION

FIG. 1 is a top, front and right side perspective view of an LED package according to the present invention.

FIG. 2 is a top plan view of the LED package shown in FIG. 1.

FIG. 3 is a bottom plan view of the LED package shown in FIG. 1.

FIG. 4 is a front elevation view of the LED package shown in FIG. 1.

FIG. 5 is a right side elevation view of the LED package as shown in FIG. 1.

FIG. 6 is a rear elevation view of the LED package shown in FIG. 1.

FIG. 7 is a left side elevation view of the LED package shown in FIG. 1.

FIG. 8 is a top, front and right side perspective view of an LED package according to still another embodiment of the present invention.

FIG. 9 is a top plan view of the LED package shown in FIG. 8.

FIG. 10 is a bottom plan view of the LED package shown in FIG. 8.

FIG. 11 is a front elevation view of the LED package shown in FIG. 8.

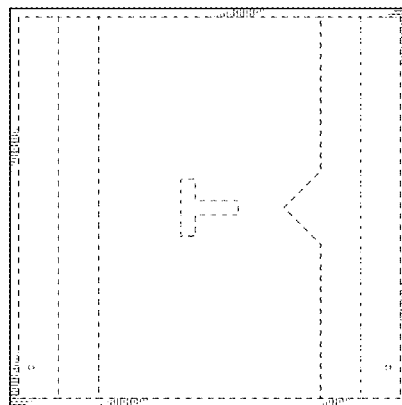
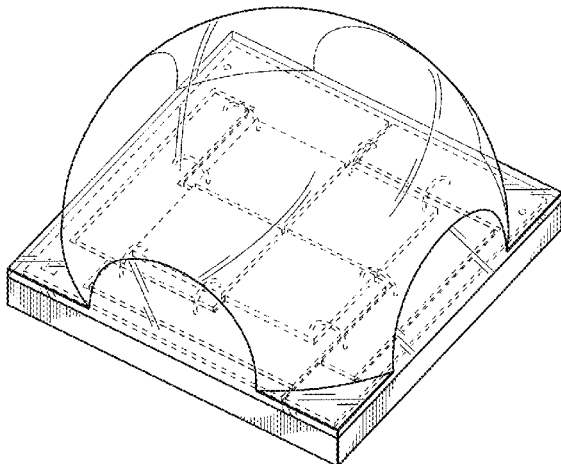
FIG. 12 is a right side elevation view of the LED package as shown in FIG. 8.

FIG. 13 is a rear elevation view of the LED package shown in FIG. 8; and,

FIG. 14 is a left side elevation view of the LED package shown in FIG. 8.

The broken lines shown in the above figures depict environmental subject matter only and form no part of the claimed design in those embodiments.

1 Claim, 4 Drawing Sheets



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(58) Field of Classification Search

CPC ... H01L 25/167; H01L 25/0753; H01L 27/15;
H01L 27/156; H01L 31/02; H01L 33/00;
H01L 33/04; H01L 33/08; H01L 33/10;
H01L 33/20; H01L 33/38; H01L 33/42;
H01L 33/48; H01L 33/483; H01L 33/486

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

5,040,868	A	8/1991	Waitl
5,200,022	A	4/1993	Kong
RE34,861	E	2/1995	Davis
5,951,150	A	9/1999	Helstern
6,061,160	A	5/2000	Maruyama
6,350,041	B1	2/2002	Tersa et al.
6,376,902	B1	4/2002	Arndt
6,521,915	B2	2/2003	Odaki et al.
6,667,451	B1	12/2003	Hart
6,686,676	B2	2/2004	McNulty et al.
6,707,069	B2	3/2004	Song et al.
6,759,733	B2	7/2004	Arndt
D494,550	S	8/2004	Hoshiba et al.
6,900,511	B2	5/2005	Ruhnau et al.
6,940,704	B2	9/2005	Stalions
D511,329	S	11/2005	Suenaga
D511,330	S	11/2005	Suenaga
D517,027	S	3/2006	Suenaga
7,009,343	B2	3/2006	Lim et al.
7,066,626	B2	6/2006	Omata
7,102,215	B2	9/2006	Arndt
7,183,632	B2	2/2007	Arndt
7,213,940	B1	5/2007	Van De Ven
7,224,000	B2	5/2007	Aanegola et al.
7,253,448	B2	8/2007	Roberts et al.
7,271,425	B2	9/2007	Arndt et al.
7,282,785	B2	10/2007	Yoshida
7,317,181	B2	1/2008	Murakami et al.
D572,210	S	7/2008	Lee
D576,574	S	9/2008	Kobayakawa
D591,697	S	5/2009	Andrews et al.
7,614,759	B2	11/2009	Negley
D615,504	S	5/2010	Keller et al.
7,722,220	B2	5/2010	Van de Ven et al.
7,762,692	B2	7/2010	Lai et al.
7,791,061	B2	9/2010	Edmond
7,821,023	B2 *	10/2010	Yuan H05B 33/0821 257/80
D631,020	S	1/2011	Chuang et al.
D633,631	S	3/2011	Shieh et al.
D634,863	S	3/2011	Leung et al.
D646,643	S *	10/2011	Wu D13/180
8,058,088	B2	11/2011	Cannon
D650,342	S *	12/2011	Kuwaharada D13/180
D650,343	S *	12/2011	Andrews D13/180
D656,906	S	4/2012	Leung et al.
D658,139	S *	4/2012	Andrews D13/180
D660,257	S *	5/2012	Andrews D13/180
D662,902	S	7/2012	Shieh et al.
D674,758	S *	1/2013	Wu D13/180
D675,169	S *	1/2013	Chou D13/180
D680,504	S *	4/2013	Noichi D13/180
8,450,147	B2	5/2013	Chandra
8,492,777	B2 *	7/2013	Hsieh H01L 25/0753 257/88
8,523,383	B1	9/2013	Grigore et al.
D691,973	S *	10/2013	Donofrio D13/180
D693,781	S *	11/2013	Kobayashi D13/180
D703,348	S *	4/2014	Reiherzer D26/2
8,696,159	B2 *	4/2014	Andrews H01L 25/0753 257/88
D707,192	S *	6/2014	Hussell D13/180
D709,464	S *	7/2014	Abare D13/180
D710,810	S *	8/2014	Noichi D13/180
D711,841	S *	8/2014	Britt D13/180

D713,804	S *	9/2014	Britt D13/180
D718,725	S *	12/2014	Reiherzer D13/180
D725,613	S *	3/2015	Lowes D13/180
D735,683	S *	8/2015	Reiherzer D13/180
D746,240	S *	12/2015	Bergmann D13/180
2002/0123163	A1	9/2002	Fujii
2002/0163001	A1	11/2002	Shaddock et al.
2003/0008431	A1	1/2003	Matsubara et al.
2004/0041222	A1	3/2004	Loh
2004/0079957	A1	4/2004	Andrews et al.
2004/0126913	A1	7/2004	Loh
2004/0130880	A1	7/2004	Min et al.
2004/0218390	A1	11/2004	Holman et al.
2004/0238930	A1	12/2004	Arndt
2005/0073244	A1	4/2005	Chou et al.
2005/0073840	A1	4/2005	Chou et al.
2005/0173708	A1	8/2005	Suehiro et al.
2006/0049477	A1	3/2006	Arndt et al.
2006/0060882	A1	3/2006	Ohe et al.
2006/0102917	A1	5/2006	Oyama et al.
2006/0186431	A1	8/2006	Miki et al.
2006/0278886	A1	12/2006	Tomoda et al.
2007/0085107	A1	4/2007	Nitta et al.
2007/0108463	A1	5/2007	Chua et al.
2007/0158668	A1	7/2007	Tarsa
2007/0252250	A1	11/2007	Hui et al.
2007/0278934	A1	12/2007	Van de Ven et al.
2008/0130285	A1	6/2008	Negley et al.
2008/0173884	A1	7/2008	Chitnis et al.
2008/0258130	A1	10/2008	Bergmann
2009/0057699	A1	3/2009	Basin
2009/0091045	A1	4/2009	Tanikawa et al.
2009/0108281	A1 *	4/2009	Keller H01L 33/62 257/98
2009/0166655	A1 *	7/2009	Lin H01L 33/62 257/98
2009/0272995	A1	11/2009	Ito et al.
2009/0283781	A1	11/2009	Chan et al.
2009/0290345	A1	11/2009	Shaner
2009/0296381	A1	12/2009	Dubord
2010/0079059	A1	4/2010	Roberts et al.
2010/0121331	A1	5/2010	Sharp et al.
2010/0142205	A1	6/2010	Bishop
2010/0155763	A1	6/2010	Donofrio et al.
2011/0031527	A1	2/2011	Kotani et al.
2011/0140289	A1	6/2011	Shiobara et al.
2011/0149604	A1	6/2011	Hussell et al.
2011/0156061	A1	6/2011	Wang et al.
2011/0163683	A1	7/2011	Steele et al.
2011/0221330	A1	9/2011	Negley et al.
2011/0316006	A1	12/2011	Xu
2012/0061703	A1	3/2012	Kobayashi
2012/0062821	A1	3/2012	Takeuchi et al.
2012/0120666	A1	5/2012	Moeller
2012/0235190	A1	9/2012	Keller et al.
2013/0271979	A1	10/2013	Pearson et al.
2014/0209938	A1 *	7/2014	Emura H01L 27/156 257/88

FOREIGN PATENT DOCUMENTS

EP	0441622	A1	8/1991
EP	1187227		3/2002
EP	1529807	A2	11/2005
EP	2042528	A1	9/2007
EP	1953834	A1	8/2008
EP	2149920	A1	2/2010
EP	2196501	A1	8/2010
EP	2336230	A1	6/2011
JP	H0545812		6/1993
JP	2000188358		7/2000
JP	1171204	S	4/2003
JP	2003197974		7/2003
JP	1218888	S	9/2004
JP	2000223752		3/2006
JP	2006165029	A	6/2006
JP	2007287981		11/2007
JP	2007299905		11/2007
KR	300258101		5/2000

(56)

References Cited

FOREIGN PATENT DOCUMENTS

KR	300414267	5/2006
KR	300756220	10/2014
TW	D112798	5/1989
TW	D1110647	10/2004
TW	3003875582	9/2005
TW	3003875583	9/2005
TW	D117563	6/2007
TW	D109313	2/2008
TW	D123860	8/2008
TW	D158571	1/2014
WO	WO 2004053933	6/2004
WO	WO-2012128966 A3	2/2006
WO	WO-2006060141 A2	6/2006
WO	WO-2011061650 A1	5/2011

OTHER PUBLICATIONS

Nichia Corporation LEDs, Models NSSM016G, NSSM227, NESM026X, NSSM026BB, NESM005A, 9 pages.

Reasons for Rejection from Japanese Design Patent Appl. No. 2013-004502, dated Aug. 6, 2013.

Examination Report from Taiwanese Patent Appl. No. 102301478, dated Sep. 6, 2013.

Letter of Examination Report from Taiwanese Patent appl. No. 101307391, dated Jun. 5, 2013.

Notice to Submit a Response from Korean Patent Appl. No. 30-2012-0059744, dated Nov. 26, 2013.

Notice of Allowance and Search Report for Taiwanese Patent Appl. No. 101307391, dated Oct. 15, 2013.

Design of Registration Notice from Japanese Patent Appl. No. 2012-030304, dated Jan. 21, 2014.

First Office Action from Chinese Patent Appl. No. 201330052393.7, dated Jan. 9, 2014.

U.S. Appl. No. 29/412,854, filed Mar. 2012, Leung, et al.

Decision of Registration from Japanese Design Patent Application No. 2013-025955, dated Jun. 24, 2014.

Decision of Registration from Japanese Design Patent Application No. 2013-004502, dated Jun. 24, 2014.

Office Action from Korean Patent Design Appl. No. 30-2013-0010610, dated Jul. 8, 2014.

Examination and Search Report from Taiwanese Patent Appl. No. 103300731, dated Jul. 21, 2014.

Examination Report from Taiwanese Patent appl. No. 102308472, dated May 14, 2014.

Notice of Issuance of Chinese Patent Appl. No. 201430021459.0, dated May 21, 2014.

Notice to Submit a Response from Korean Design Appl. No. 30-2012-0059744 dated Apr. 28, 2014.

First Office Action from Chinese Design Patent appl. No. 201330524820.7, dated Feb. 20, 2014.

Notice of Allowance from Korean Patent Appl. No. 30-2013-0010610, dated Oct. 17, 2014.

Notice to Submit a Response from Korean Design Appl. No. 30-2014-0016126, dated Nov. 7, 2014.

Patent Certificate from Chinese Design Patent Appl. No. ZL 2013 3 0524820.7, dated Nov. 4, 2013.

Office Action from Korean Patent Appl. No. 30-2014-0006603, dated Nov. 12, 2014.

Office Action from U.S. Appl. No. 29/424,353, dated Dec. 26, 2013.

Notice of Allowance of Taiwanese Appl. No. 103300731, dated Jan. 21, 2015.

Office Action from Korean Patent Appl. No. 30-2014-0016126, dated Feb. 23, 2015.

Notice of Allowance from Korean Patent Appl. No. 30-2014-0006603, dated Apr. 2, 2015.

Patent Issue Notice from Taiwanese Design Patent No. D-166931, dated Apr. 1, 2015.

Office Action from Japanese Patent appl. No. 2007-228699, dated May 22, 2015.

Office Action from Taiwanese Patent appl. No. 099145035, dated Apr. 22, 2015.

U.S. Appl. No. 11/473,089, filed Jun. 21, 2006, Tarsa et al.

U.S. Appl. No. 11/656,759, filed Jan. 22, 2007, Chitnis et al.

U.S. Appl. No. 11/818,818, filed Jun. 2007, Chakraborty et al.

U.S. Appl. No. 11/895,573, filed Aug. 2007, Chakraborty et al.

U.S. Appl. No. 11/899,790, filed Sep. 7, 2007, Chitnis et al.

U.S. Appl. No. 12/002,429, filed Dec. 2007, Loh et al.

U.S. Appl. No. 12/463,709, filed May 11, 2009, Donofrio.

U.S. Appl. No. 12/475,261, filed May 2009, Nagley et al.

U.S. Appl. No. 12/498,253, filed Jul. 2009, Le Toquin et al.

U.S. Appl. No. 12/717,048, filed Jun. 24, 2010, Donofrio.

U.S. Appl. No. 12/873,303, filed Aug. 31, 2010, Edmond et al.

U.S. Appl. No. 13/034,501, filed Feb. 24, 2011, Le et al.

U.S. Appl. No. 13/028,946, filed Feb. 16, 2011, Le et al.

U.S. Appl. No. 13/219,486, filed Aug. 2011, Ibbetson et al.

U.S. Appl. No. 13/306,589, filed Nov. 2011, Tarsa et al.

U.S. Appl. No. 13/345,2215, filed Jan. 2012, Lu et al.

U.S. Appl. No. 13/368,217, filed Feb. 7, 2012, Pickard et al.

U.S. Appl. No. 13/544,662, filed Jul. 2012, Tarsa et al.

U.S. Appl. No. 13/770,389, filed Feb. 2013, Lowes et al.

U.S. Appl. No. 13/804,309, filed Mar. 2013, Castillo et al.

U.S. Appl. No. 13/842,307, filed Mar. 2013, Ibbetson et al.

Citizen Micro HumanTech. "COB-High-wattage Series and Low-wattage Series." Short Form Lighting LED Catalog 2012. Citizen Electronics Co. Ltd. Japan. 12 pages.

Cree family of LED chips. DA, EZ, GaN, MB, RT, TR UT, and XT. Printout from cree.com. 2 pages.

Cree XLampC family product info printout, from cree.com, 20 pages.

Cree XLampXM product info printout, from cree.com, 13 pages.

Non-Final OA for U.S. Appl. No. 13/051,894 dated Jan. 14, 2013.

Definition of 'composite', Oxford American English Dictionar, 2 pages, http://oxforddictionaries.com/us/definitions/american_english/composite?q=composite.

International Search Report for PCT Patent Application No. PCT/US2012/028327 dated Nov. 23, 2012.

Final Office Action from U.S. Appl. No. 13/040,088 dated May 7, 2013.

Chinese Office Action for Patent Application No. 201210031021.0 dated Dec. 30, 2013.

Final Office Action for U.S. Appl. No. 13/051,894 dated Aug. 19, 2013.

Non-Final Office Action from U.S. Appl. No. 13/040,088 dated Sep. 13, 2013.

International Report on Patentability and Written Opinion for Application No. Application No. PCT/US2012/028327 dated Sep. 24, 2013.

Second Office Action from Chinese Patent Appl. No. 201210031021.0 dated Jun. 4, 2014.

International Search Report and Written Opinion from PCT/US2013/062640 dated May 22, 2014.

Office Action from U.S. Appl. No. 13/051,894 dated Jun. 18, 2014.

Office Action from U.S. Appl. No. 13/649,067 dated Jul. 7, 2014.

Office Action from U.S. Appl. No. 13/649,052 dated Jul. 24, 2014.

International Search Report for Application No. PCT/US20141045888 dated Sep. 11, 2014.

Non-Final Office Action for U.S. Appl. No. 13/672,592 dated Jan. 7, 2015.

Non-Final Office Action for U.S. Appl. No. 13/899,314 dated Jan. 15, 2015.

Non-Final Office Action for U.S. Appl. No. 13/958,461 dated Mar. 10, 2015.

Final Office Action for U.S. Appl. No. 13/842,150 dated Jan. 22, 2015.

Final Office Action for U.S. Appl. No. 13/829,558 dated Mar. 9, 2016.

Notice of Allowance from Korean Patent Appl. No. 30-2014-0016126, dated Jun. 1, 2015.

Office Action from U.S. Appl. No. 29/462,795, dated Oct. 7, 2015.

(56)

References Cited

OTHER PUBLICATIONS

Response to OA from U.S. Appl. No. 29/462,795, filed Nov. 23, 2015.

* cited by examiner

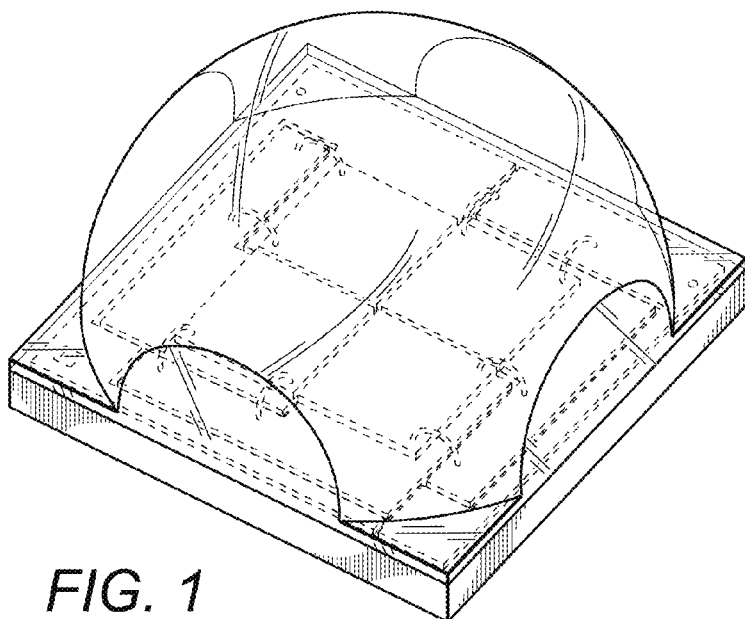


FIG. 2

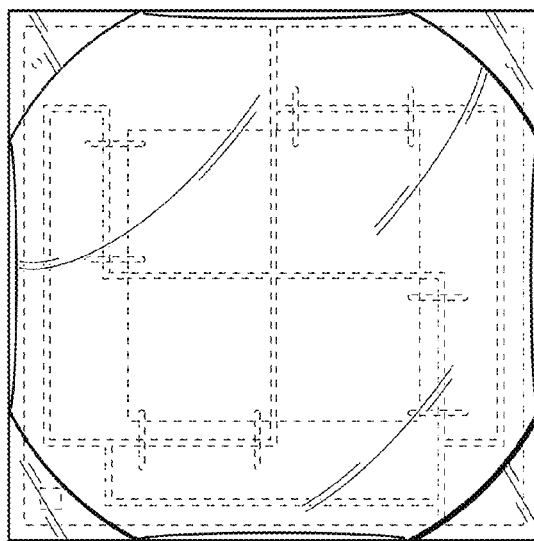
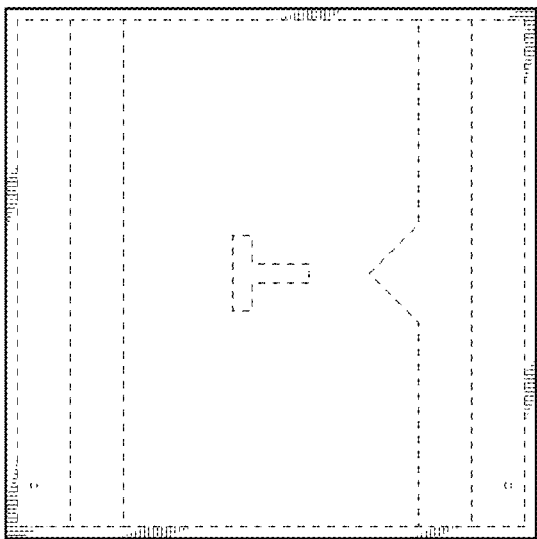


FIG. 3



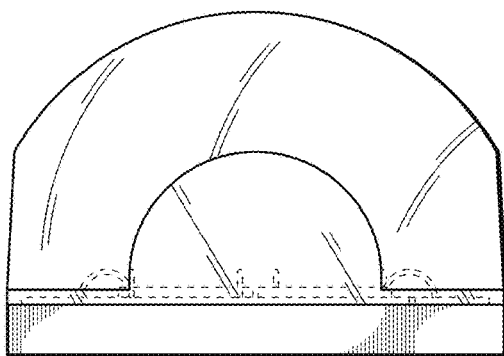


FIG. 4

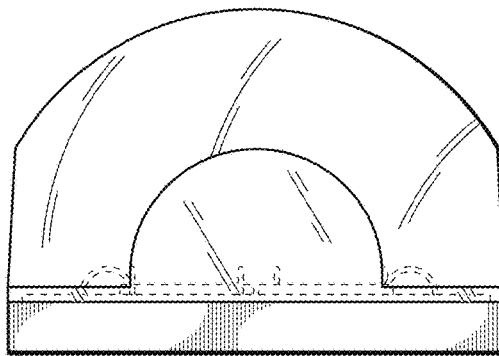


FIG. 5

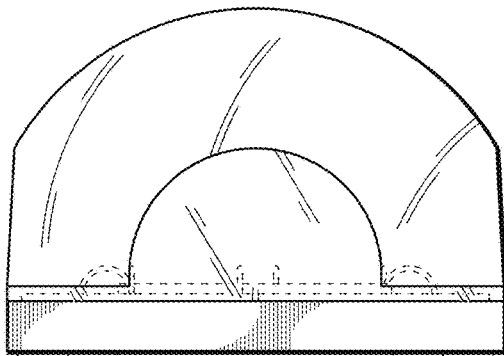


FIG. 6

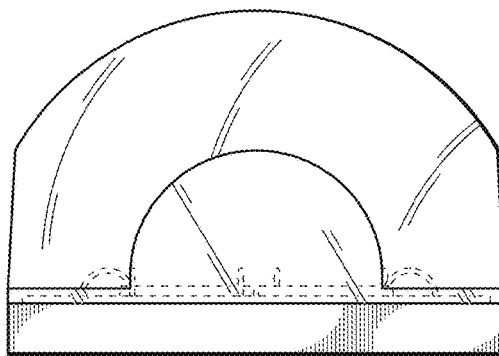


FIG. 7

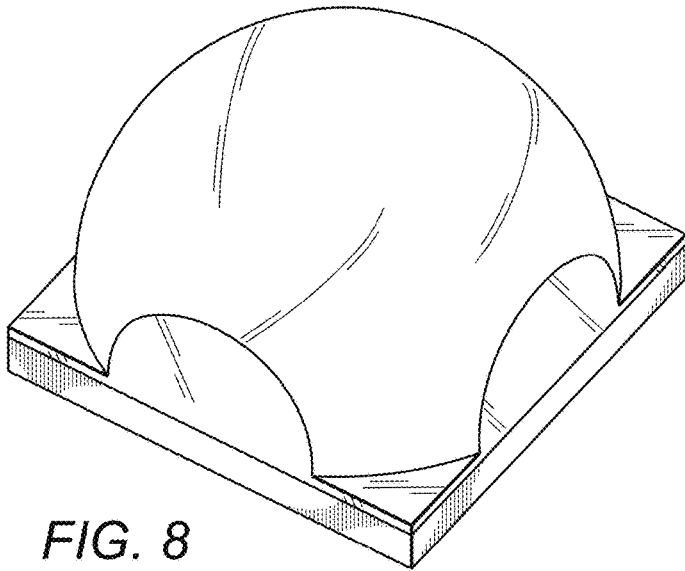


FIG. 8

FIG. 9

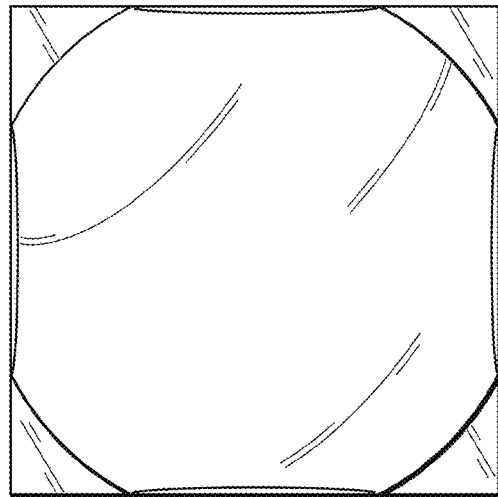
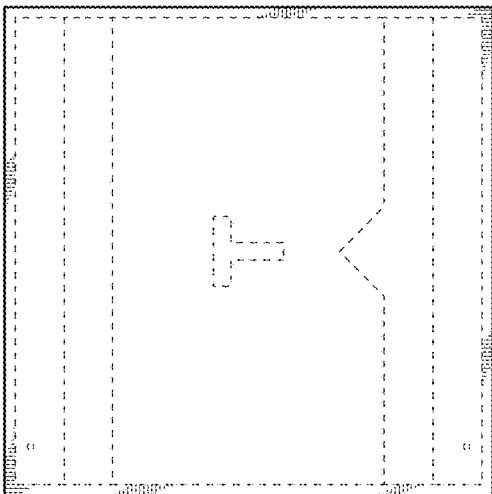


FIG. 10



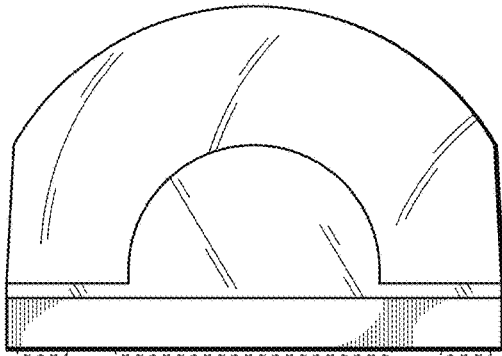


FIG. 11

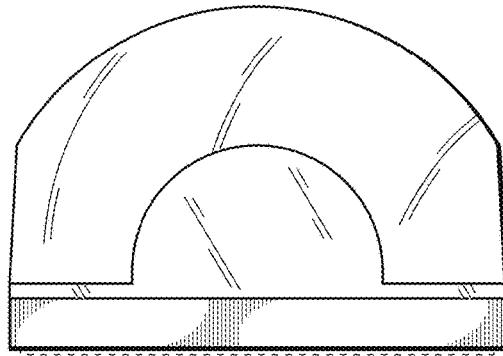


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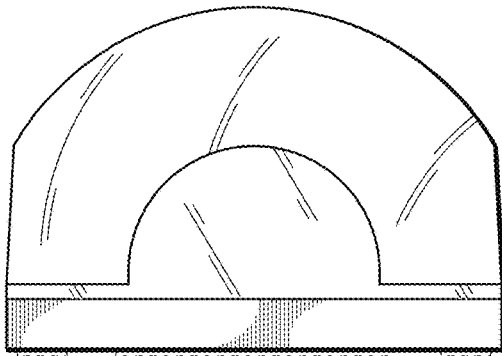


FIG. 13

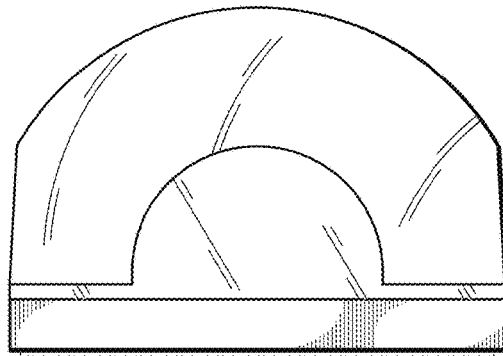


FIG. 14