



US00D676981S

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

(10) **Patent No.:** **US D676,981 S**
(45) **Date of Patent:** **** Feb. 26, 2013**

(54) **HYBRID REFLECTOR SYSTEM FOR A LIGHTING UNIT**

(75) Inventors: **Paul Kenneth Pickard**, Morrisville, NC (US); **James Michael Lay**, Cary, NC (US)

(73) Assignee: **Cree, Inc.**, Durham, NC (US)

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

(21) Appl. No.: **29/384,101**

(22) Filed: **Jan. 26, 2011**

Related U.S. Application Data

(63) Continuation of application No. 12/606,377, filed on Oct. 27, 2009.

(51) **LOC (9) Cl.** **26-04**

(52) **U.S. Cl.** **D26/2**

(58) **Field of Classification Search** D26/1-4;
313/313, 315, 316, 317, 318, 493; 315/52,
315/53, 56, 57, 58

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|-----------|-----|---------|-------------------|---------|
| 4,946,547 | A | 8/1990 | Palmour et al. | 156/643 |
| 5,200,022 | A | 4/1993 | Kong et al. | 156/612 |
| RE34,861 | E | 2/1995 | Davis et al. | 437/100 |
| D435,577 | S * | 12/2000 | McBride | D16/203 |
| 6,657,236 | B1 | 12/2003 | Thibeault et al. | 257/98 |
| 6,812,502 | B1 | 11/2004 | Chien et al. | |
| D532,532 | S * | 11/2006 | Maxik | D26/2 |
| 7,213,940 | B1 | 5/2007 | Van de Ven et al. | 362/231 |
| D544,110 | S * | 6/2007 | Hooker et al. | D26/2 |
| D566,300 | S * | 4/2008 | Lo | D26/2 |
| D581,555 | S * | 11/2008 | To et al. | D26/2 |
| D584,838 | S * | 1/2009 | To et al. | D26/2 |
| 7,573,074 | B2 | 8/2009 | Shum et al. | 257/99 |
| 7,622,746 | B1 | 11/2009 | Lester et al. | |
| D610,722 | S * | 2/2010 | Bi | D26/2 |
| 7,795,623 | B2 | 9/2010 | Emerson et al. | 257/79 |
| 7,821,023 | B2 | 10/2010 | Yuan et al. | 257/98 |
| 7,915,629 | B2 | 3/2011 | Ibbetson et al. | 257/98 |
| D662,627 | S * | 6/2012 | Pan | D26/2 |

| | | | | |
|--------------|----|---------|-----------------|--------|
| 2003/0025212 | A1 | 2/2003 | Bhat et al. | |
| 2004/0217362 | A1 | 11/2004 | Slater et al. | |
| 2005/0211993 | A1 | 9/2005 | Sano et al. | |
| 2005/0242358 | A1 | 11/2005 | Tu et al. | 257/98 |
| 2006/0060874 | A1 | 3/2006 | Edmond et al. | 257/98 |
| 2006/0163586 | A1 | 7/2006 | Denbaars et al. | |
| 2006/0278885 | A1 | 12/2006 | Tain et al. | |
| 2007/0139923 | A1 | 6/2007 | Negley | |
| 2007/0158668 | A1 | 7/2007 | Tarsa et al. | 257/79 |
| 2007/0217193 | A1 | 9/2007 | Lin | |

(Continued)

FOREIGN PATENT DOCUMENTS

| | | | |
|----|----------------|----|---------|
| WO | WO 2000/034709 | A1 | 6/2000 |
| WO | WO2005117152 | | 12/2005 |

(Continued)

OTHER PUBLICATIONS

DOM LED Downlighting, Lithonia Lighting: an Acuity Brands, Company, www.lithonia.com, © 2009.

(Continued)

Primary Examiner — Marcus Jackson

(74) *Attorney, Agent, or Firm* — Koppel, Patrick, Heybl & Philpott

(57)

CLAIM

The ornamental design for a hybrid reflector system for a lighting unit, as shown and described herein.

DESCRIPTION

FIG. 1 is a perspective view of a lighting device according to an embodiment of the present invention.

FIG. 2 is a front view of a lighting device according to an embodiment of the present invention, with the rear view being substantially identical in ornamental appearance.

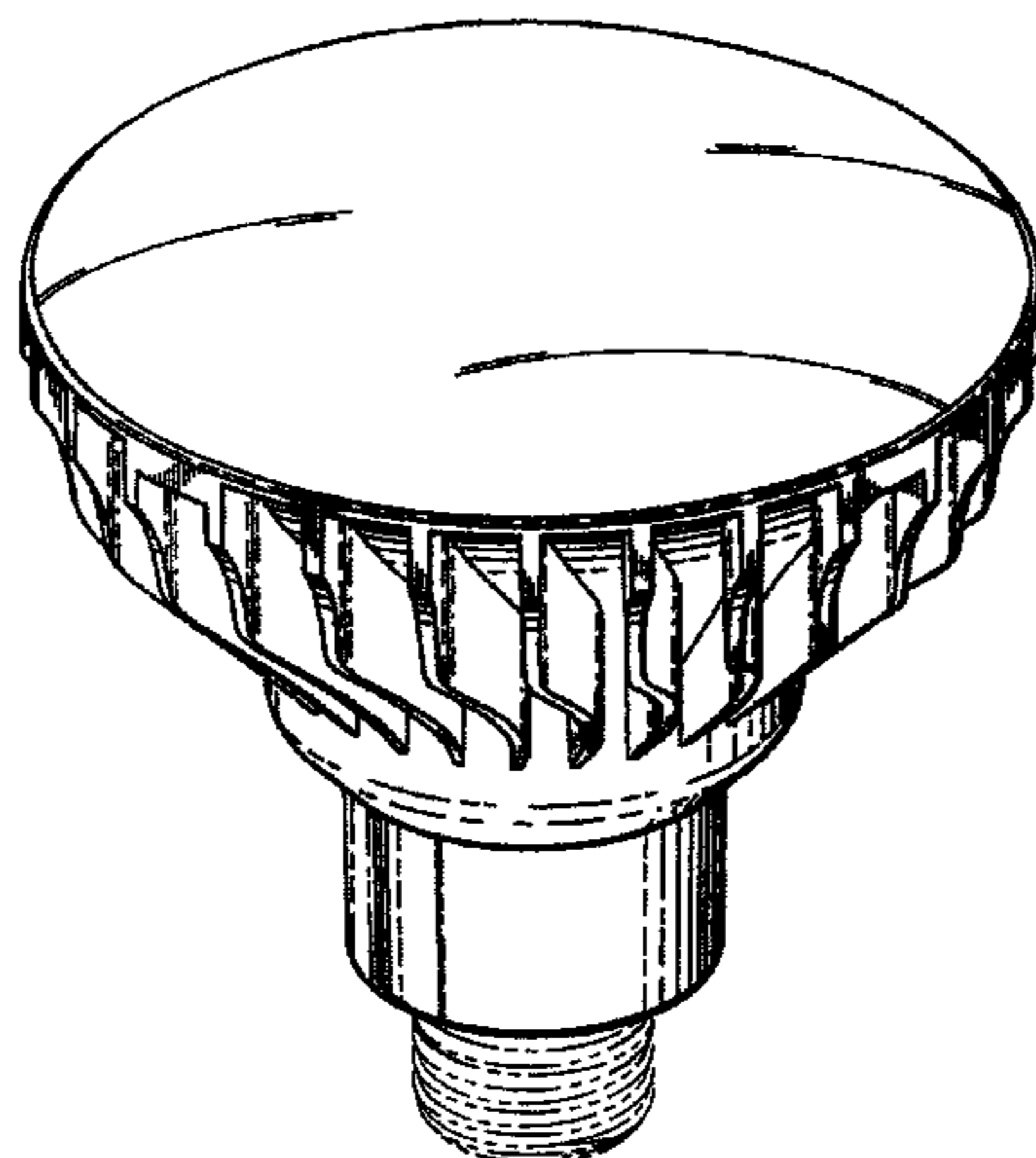
FIG. 3 is a right side view of a lighting device according to an embodiment of the present invention, with the left side view being substantially identical in ornamental appearance.

FIG. 4 is a top view of a lighting device according to an embodiment of the present invention; and,

FIG. 5 is a bottom view of a lighting device according to an embodiment of the present invention.

The broken line showing of the bottom portion is included for the purpose of illustrating only and forms no part of the claimed design.

1 Claim, 4 Drawing Sheets



U.S. PATENT DOCUMENTS

| | | | | |
|--------------|----|---------|----------------------|---------|
| 2008/0173884 | A1 | 7/2008 | Chitnis et al. | 438/22 |
| 2008/0179611 | A1 | 7/2008 | Chitnis et al. | 257/98 |
| 2008/0185609 | A1 | 8/2008 | Kozawa et al. | |
| 2008/0310158 | A1 | 12/2008 | Harbers et al. | 362/294 |
| 2009/0050908 | A1 | 2/2009 | Yuan et al. | 257/88 |
| 2009/0121241 | A1 | 5/2009 | Keller et al. | 257/94 |
| 2009/0152583 | A1 | 6/2009 | Chen et al. | 257/98 |
| 2009/0283779 | A1 | 11/2009 | Negley et al. | 257/88 |
| 2009/0283787 | A1 | 11/2009 | Donofrio et al. | |
| 2010/0051995 | A1 | 3/2010 | Katsuno et al. | |
| 2010/0059785 | A1 | 3/2010 | Lin et al. | |
| 2010/0065881 | A1 | 3/2010 | Kim | |
| 2010/0140636 | A1 | 6/2010 | Donofrio et al. | 257/98 |
| 2011/0049546 | A1 | 3/2011 | Heikman et al. | 257/98 |

FOREIGN PATENT DOCUMENTS

| | | | |
|----|----------------|----|---------|
| WO | WO 2007/130536 | A2 | 11/2007 |
| WO | WO 2010/029475 | A1 | 3/2010 |

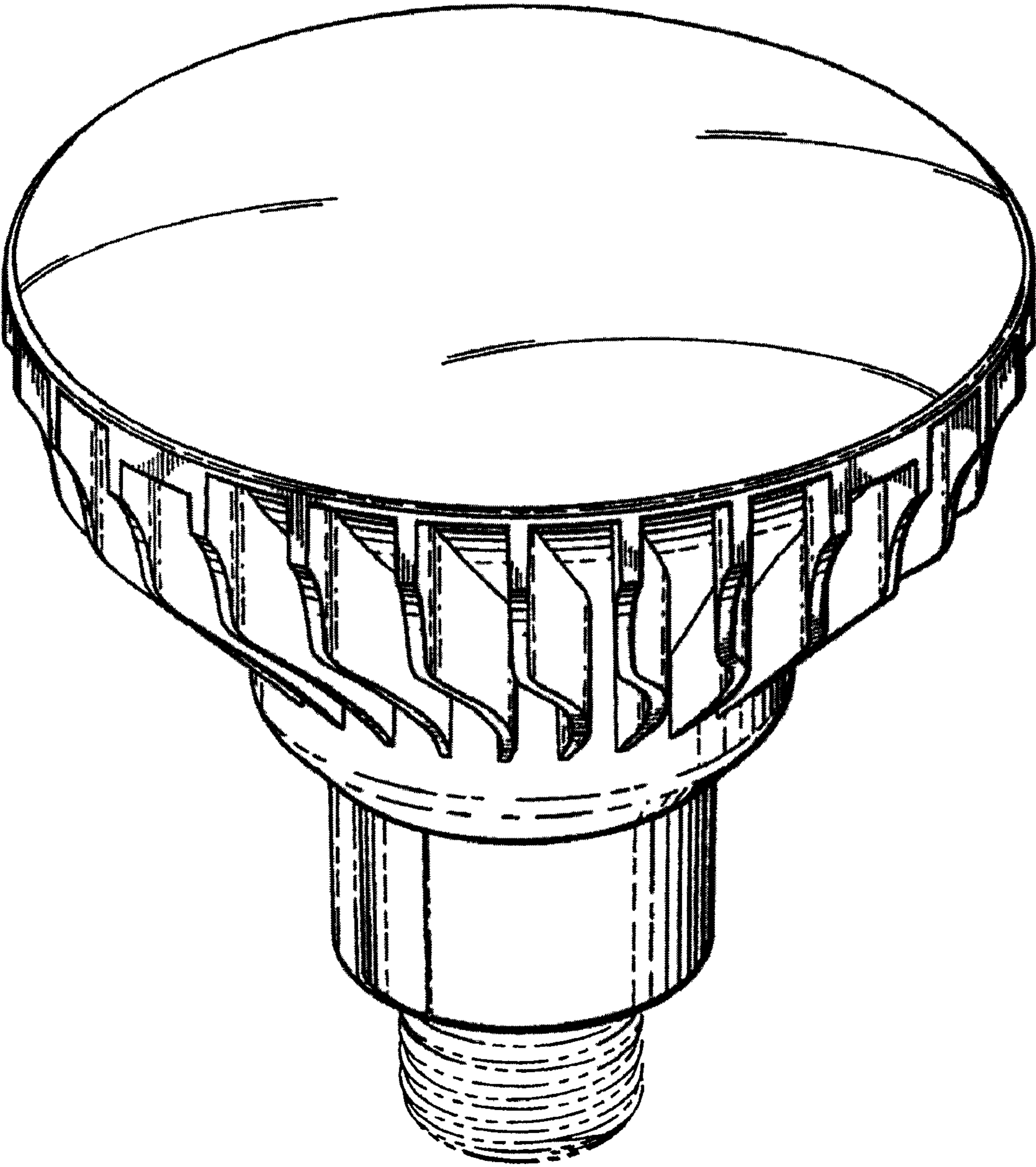
OTHER PUBLICATIONS

Ecos, Lighting the Next Generation, gothan: a division of Acuity Brands Lighting Inc., © 2008.
 Renaissance Lighting brochure. © 2010.
 C.H. Lin et al., "Enhancement of InGaN-GaN Indium-Tin-Oxide Flip-Chip Light-Emitting Diodes with TiO₂-SiO₂ Multilayer Stack Omnidirectional Reflector," IEEE Photonics Technology Letters, vol. 18, No. 19, Oct. 1, 2006, pp. 2050-2052.
 Windisch et al. "Impact of Texture-Enhanced Transmission on High-Efficiency Surface-Textured Light-Emitting Diodes," Applied Physics Letters, vol. 79, No. 15, Oct. 2001, pp. 2315-2317.

Schnitzer et al. "30% External Quantum Efficiency From Surface Textured, Thin-Film Light-Emitting Diodes," Applied Physics Letters, Oct. 18, 1993, vol. 64, No. 16, pp. 2174-2176.
 Windisch et al. "Light-Extraction Mechanisms in High-Efficiency Surface-Textured Light-Emitting Diodes," IEEE Journal on Selected Topics in Quantum Electronics, vol. 8, No. 2, Mar./Apr. 2002, pp. 248-255.
 Streubel, et al. "High Brightness AlGaInP Light-Emitting Diodes," IEEE Journal on Selected Topics In Quantum Electronics, vol. 8, No. 2, Mar./Apr. 2002, pp. 321-332.
 Cree EZ400 LED Data Sheet, 2007 EZBright LEDs.
 Cree EZ700 LED Data Sheet, 2007 EZBright LEDs.
 Cree EZ1000 LED Data Sheet, 2007 EZBright LEDs.
 Cree EZBright290 LED Data Sheet, 2007 EZBright LEDs.
 International Preliminary Report on Patentability from Application No. PCT/US09/66938. dated Apr. 3, 2012.
 "High-Performance GaN-Based Vertical-Injection Light-Emitting Diodes With TiO₂-SiO₂ Omnidirectional Reflector and n-GaN Roughness" by H. W. Huang, et al. IEEE Photonics Technology Letters, vol. 19. No. 8, Apr. 15, 2007, pp. 565-567.
 International Search Report and Written Opinion for PCT Application No. PCT/US2011/001394 mailed Nov. 3, 2011.
 Office Action from U.S. Appl. No. 12/418,796, Dated: Jul. 20, 2011.
 Office Action from U.S. Appl. No. 12/329,722, Dated: Oct. 27, 2010.
 International Search Report and Written Opinion for Application No. PCT/US2012/034564, dated Sep. 5, 2012.

* cited by examiner

FIG. 1



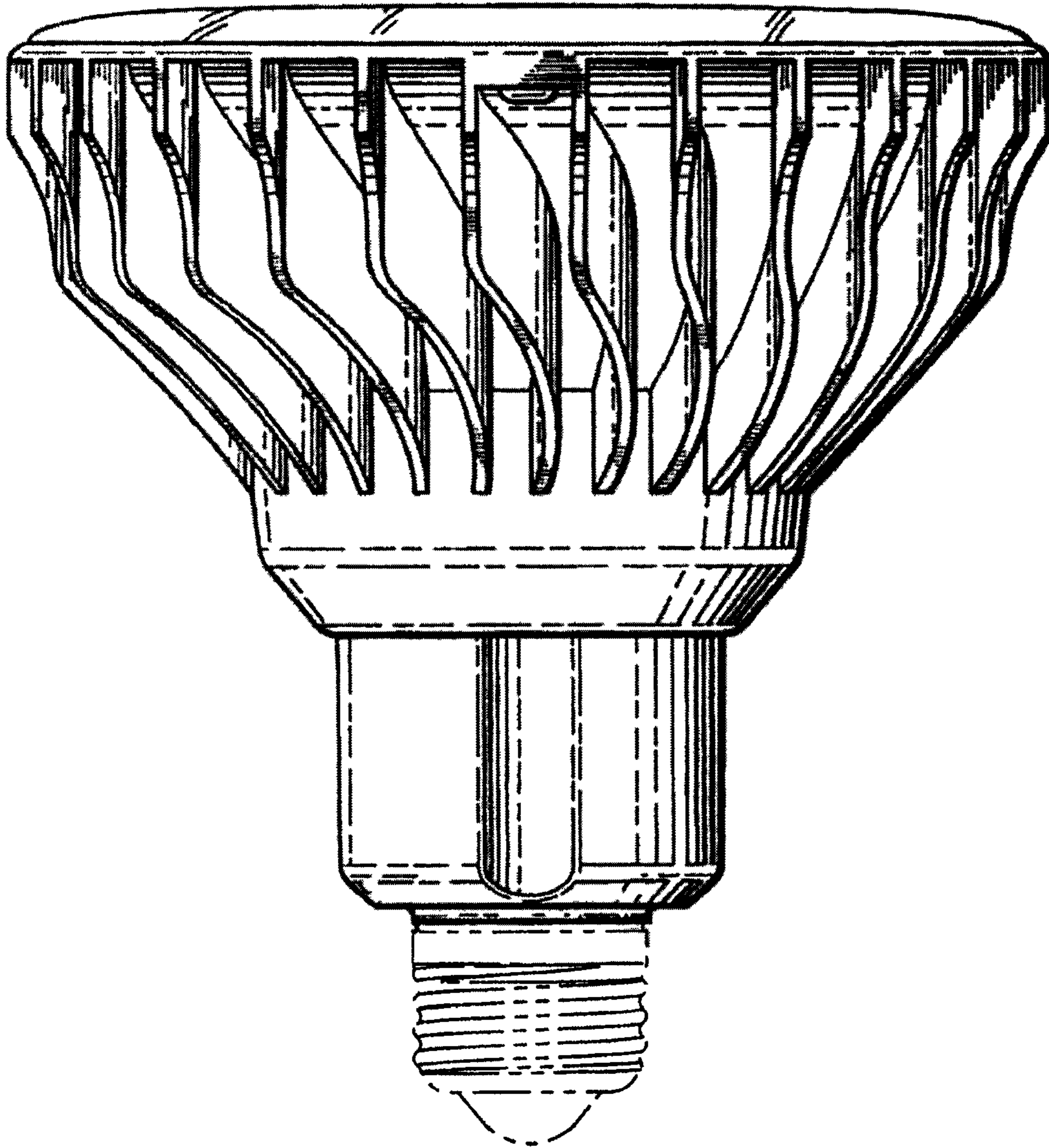


FIG. 2

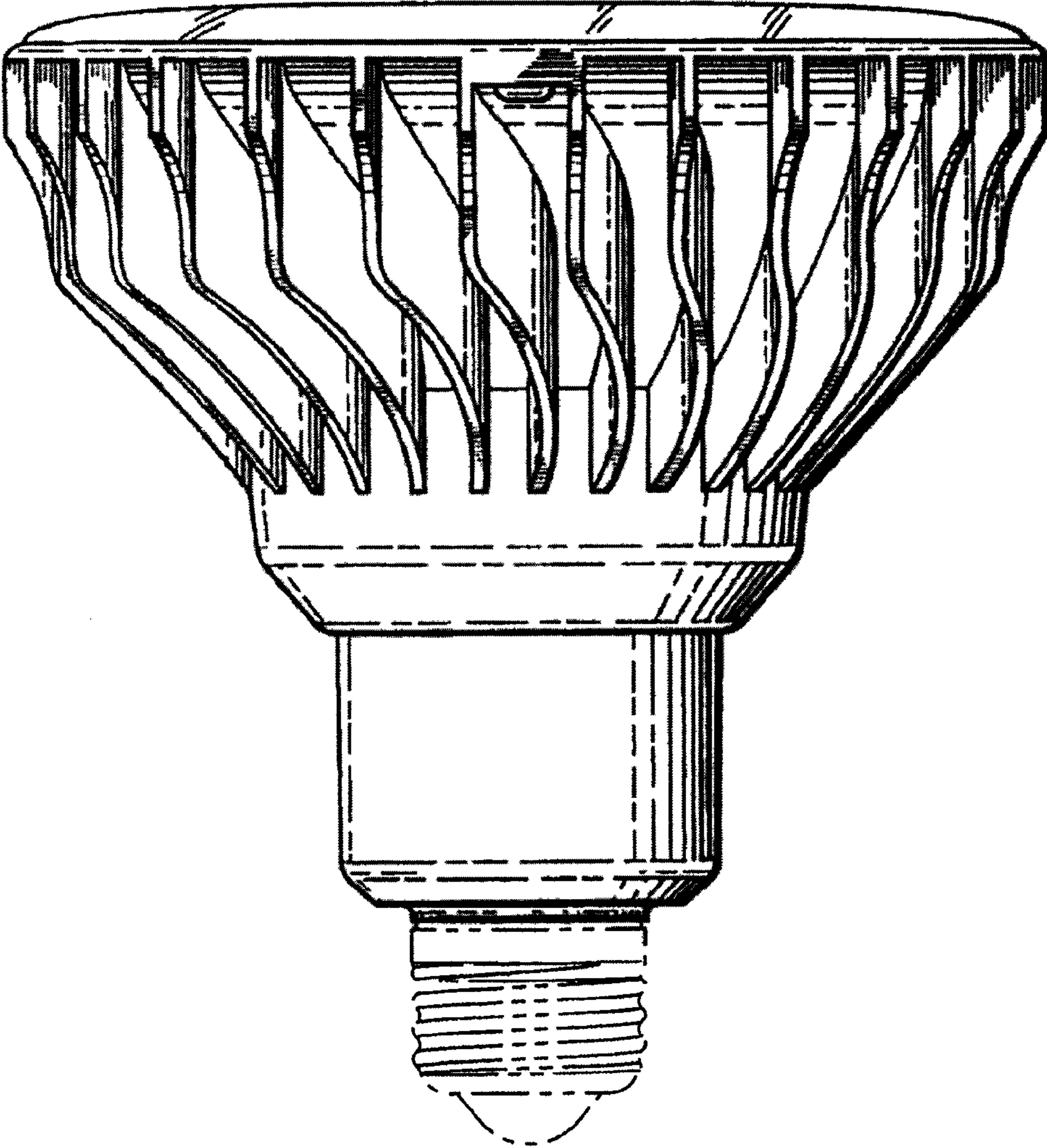


FIG. 3

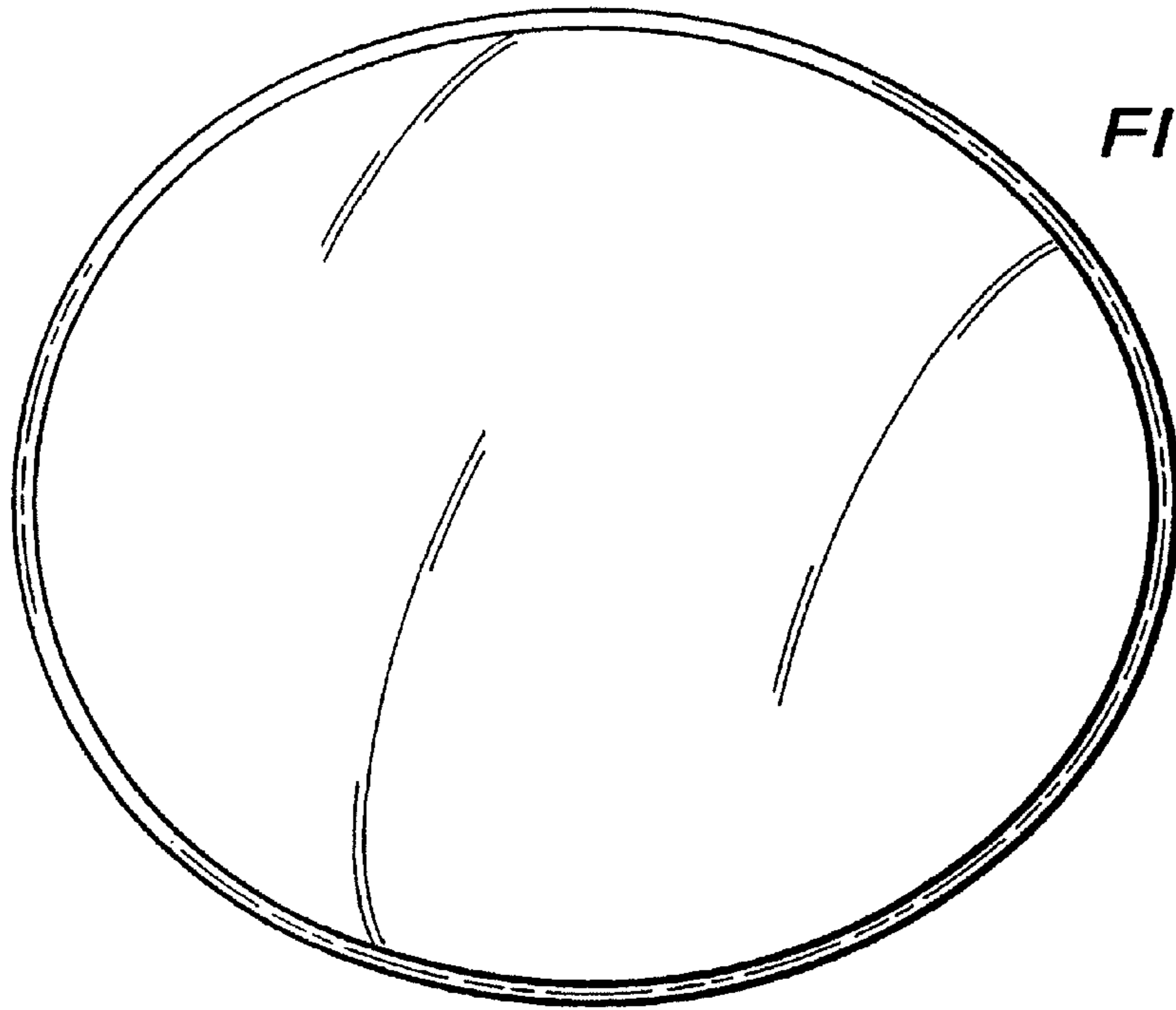


FIG. 4

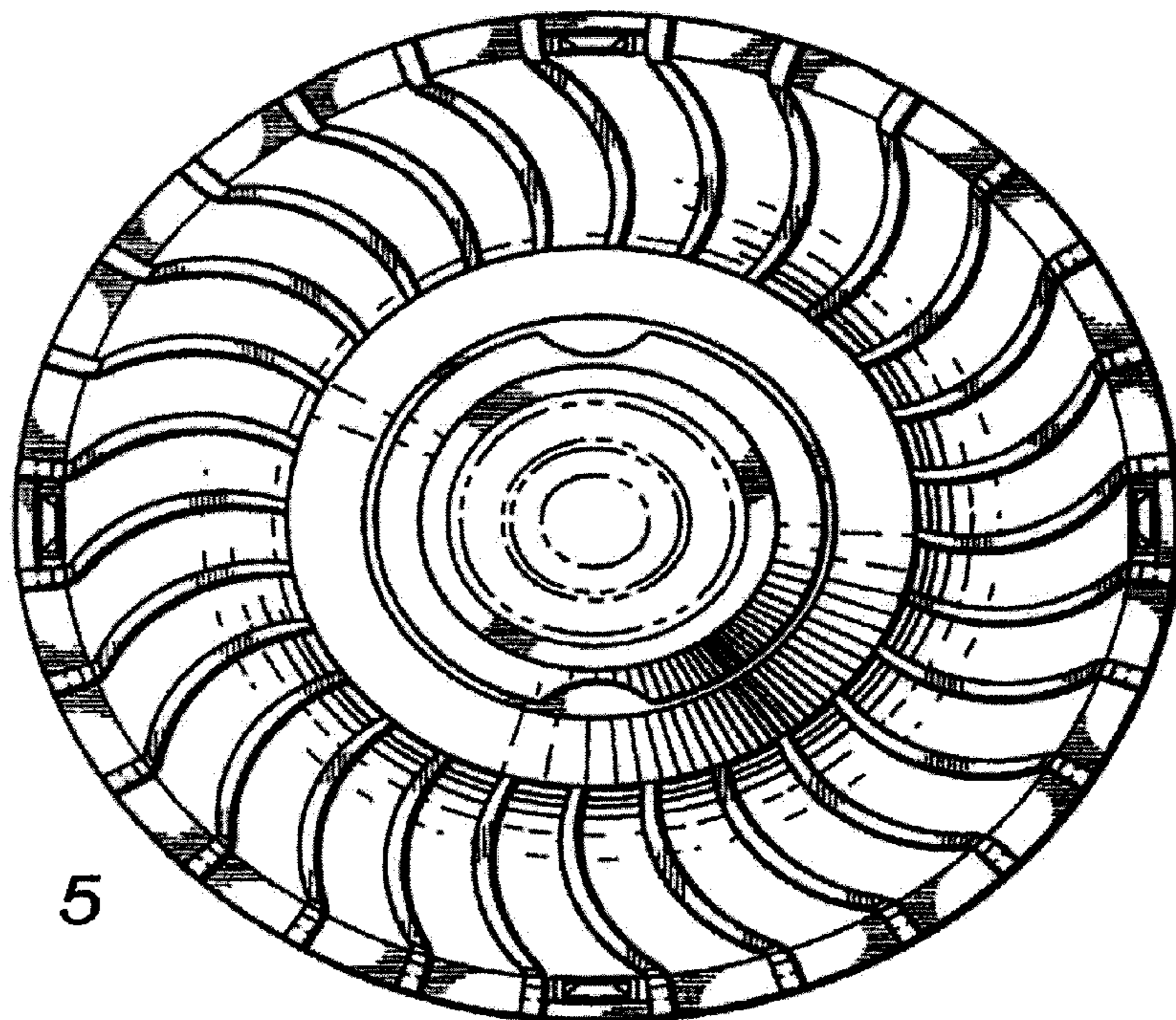


FIG. 5