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Pickard et al.

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

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

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(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)

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(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.

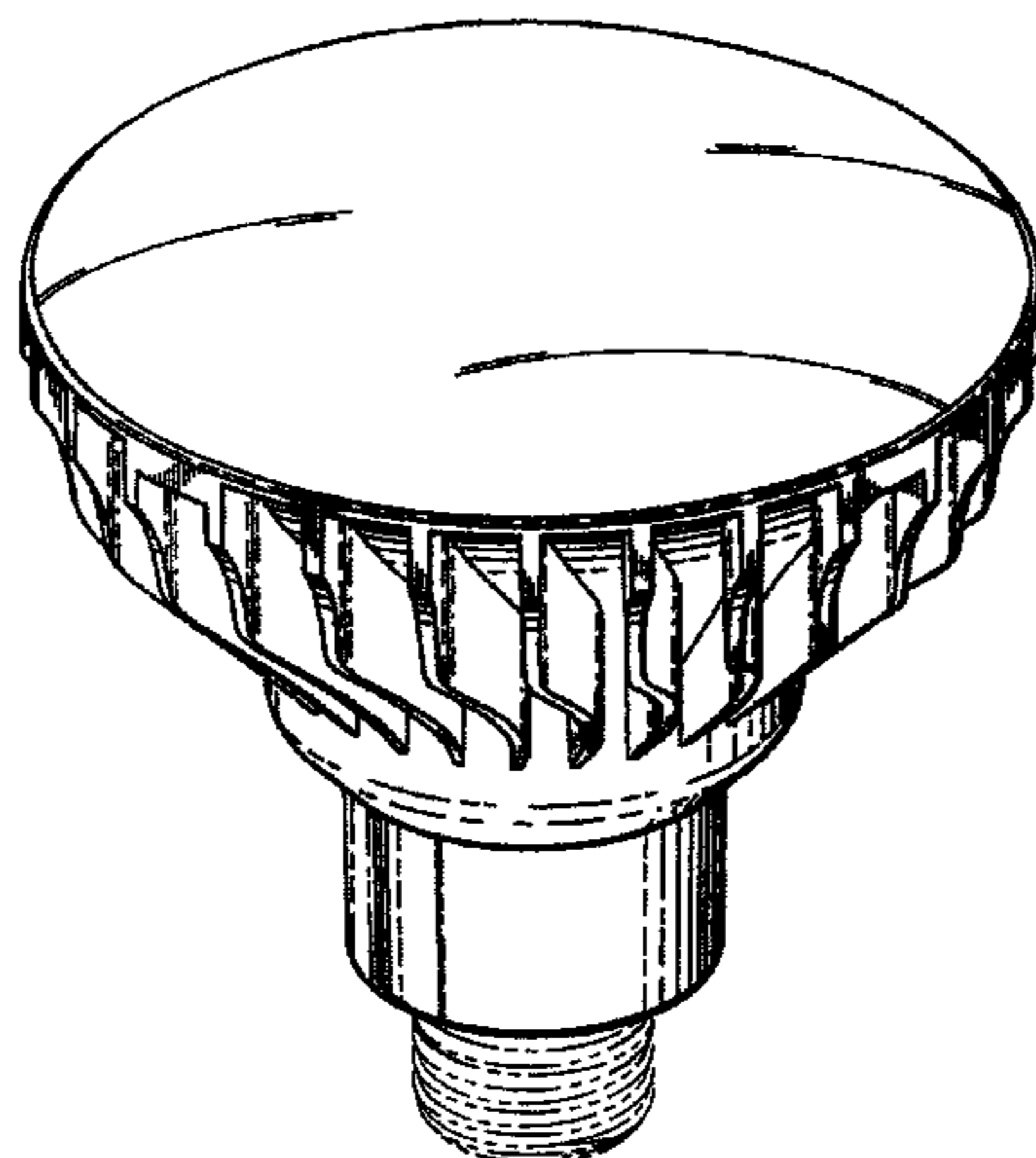
FIG. 3 is a right side view of a lighting device according to an embodiment of the present invention, with the left side view being substantially identical in ornamental appearance.

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

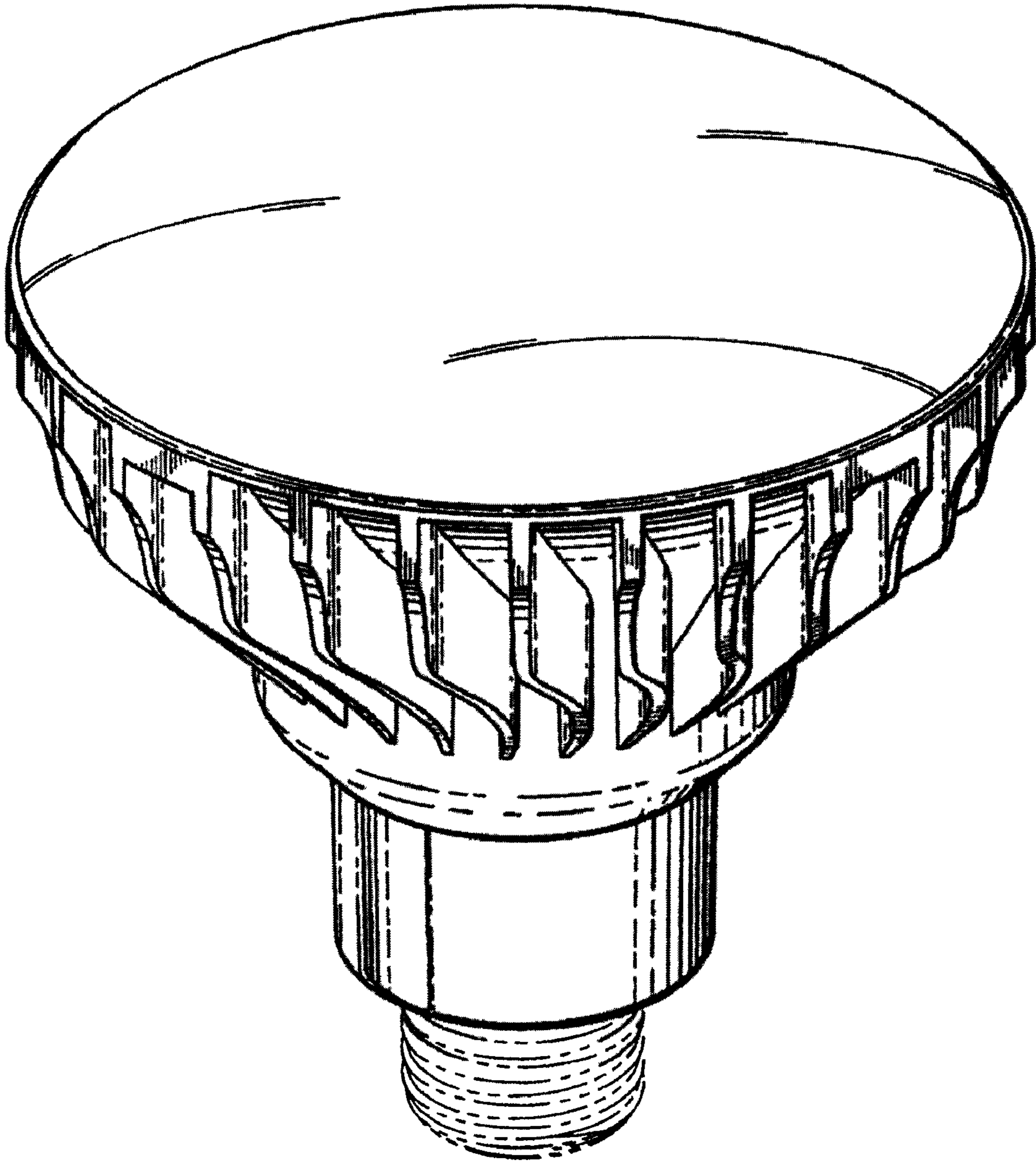
OTHER PUBLICATIONS

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



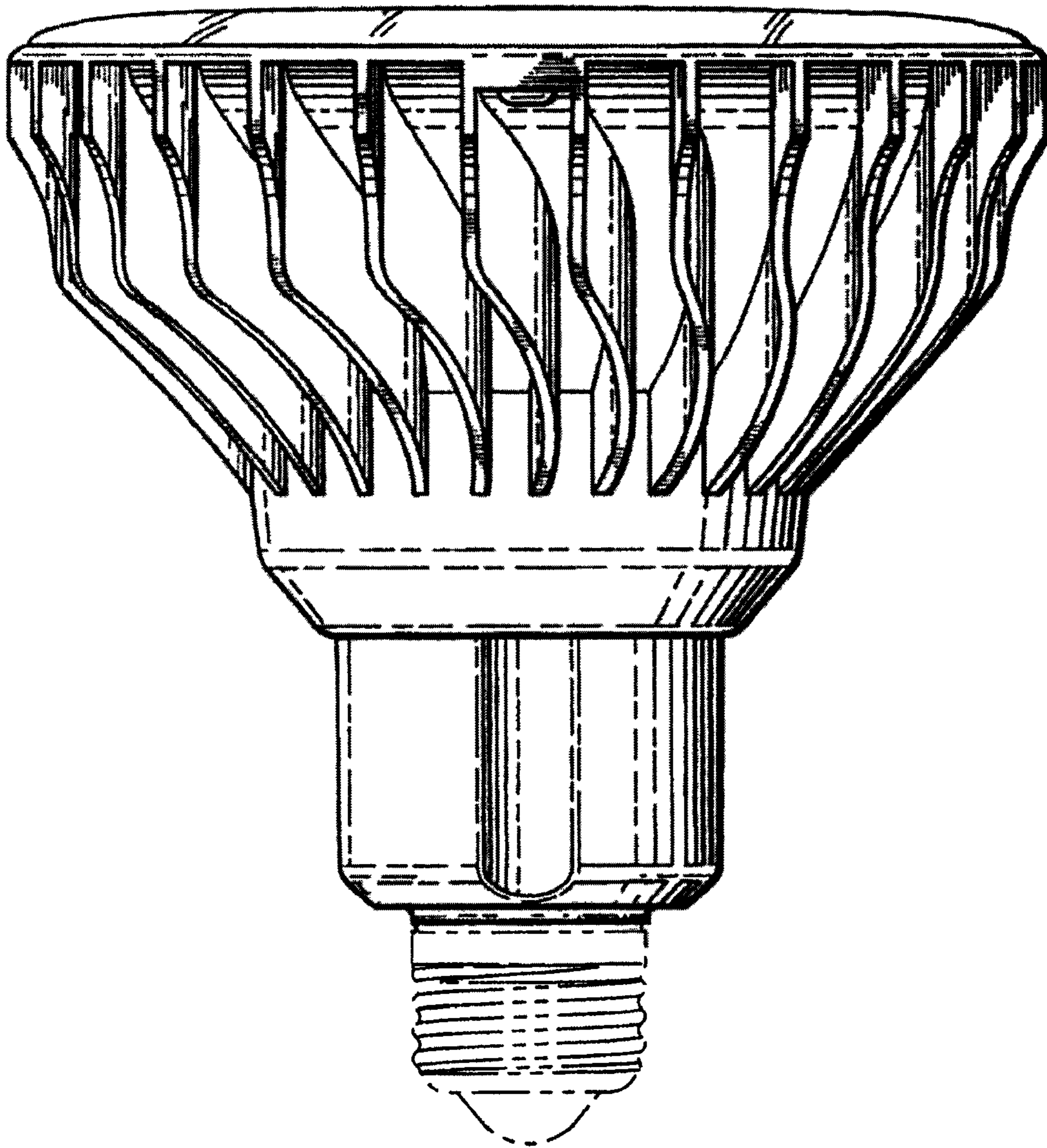


FIG. 2

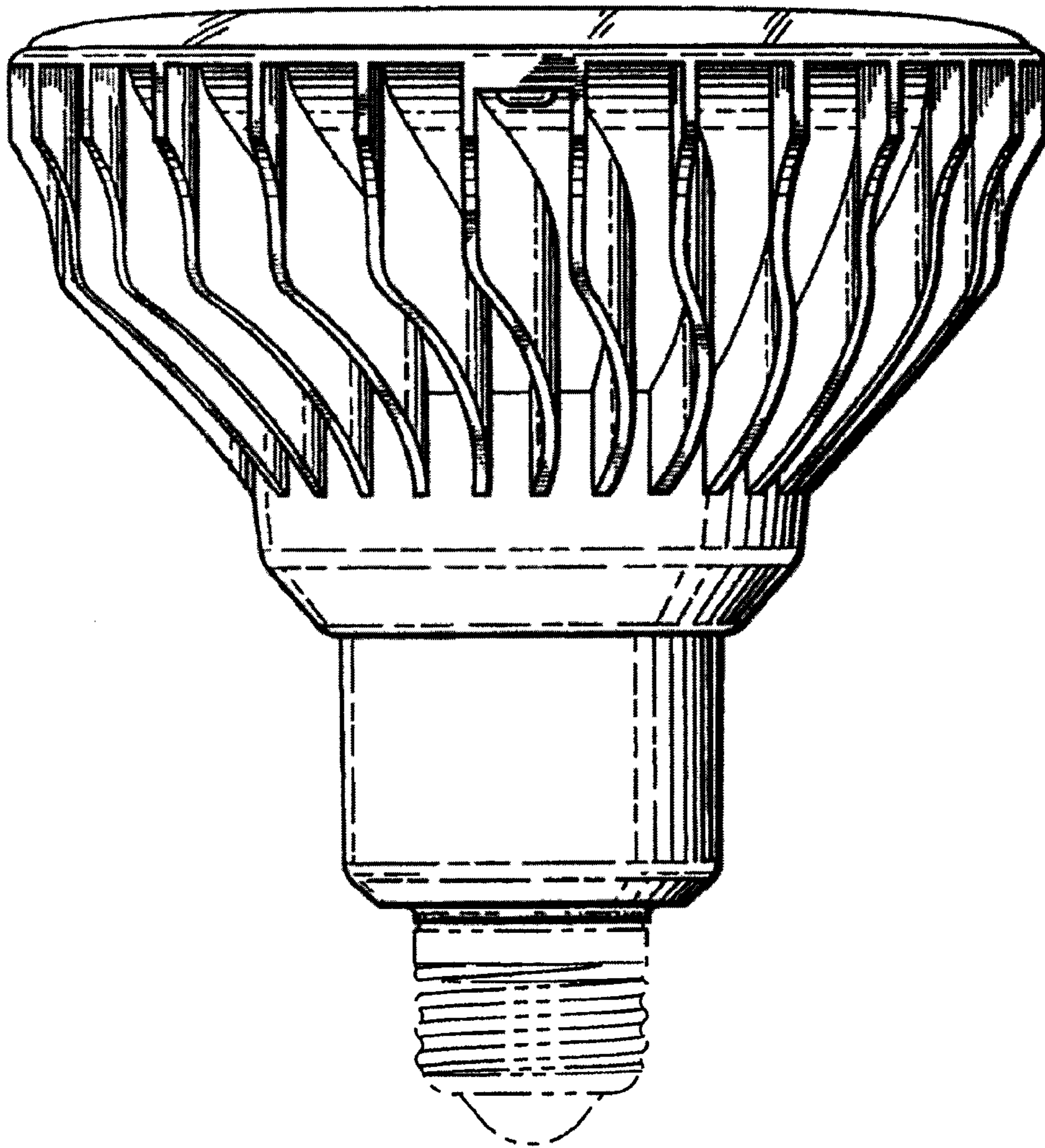


FIG. 3

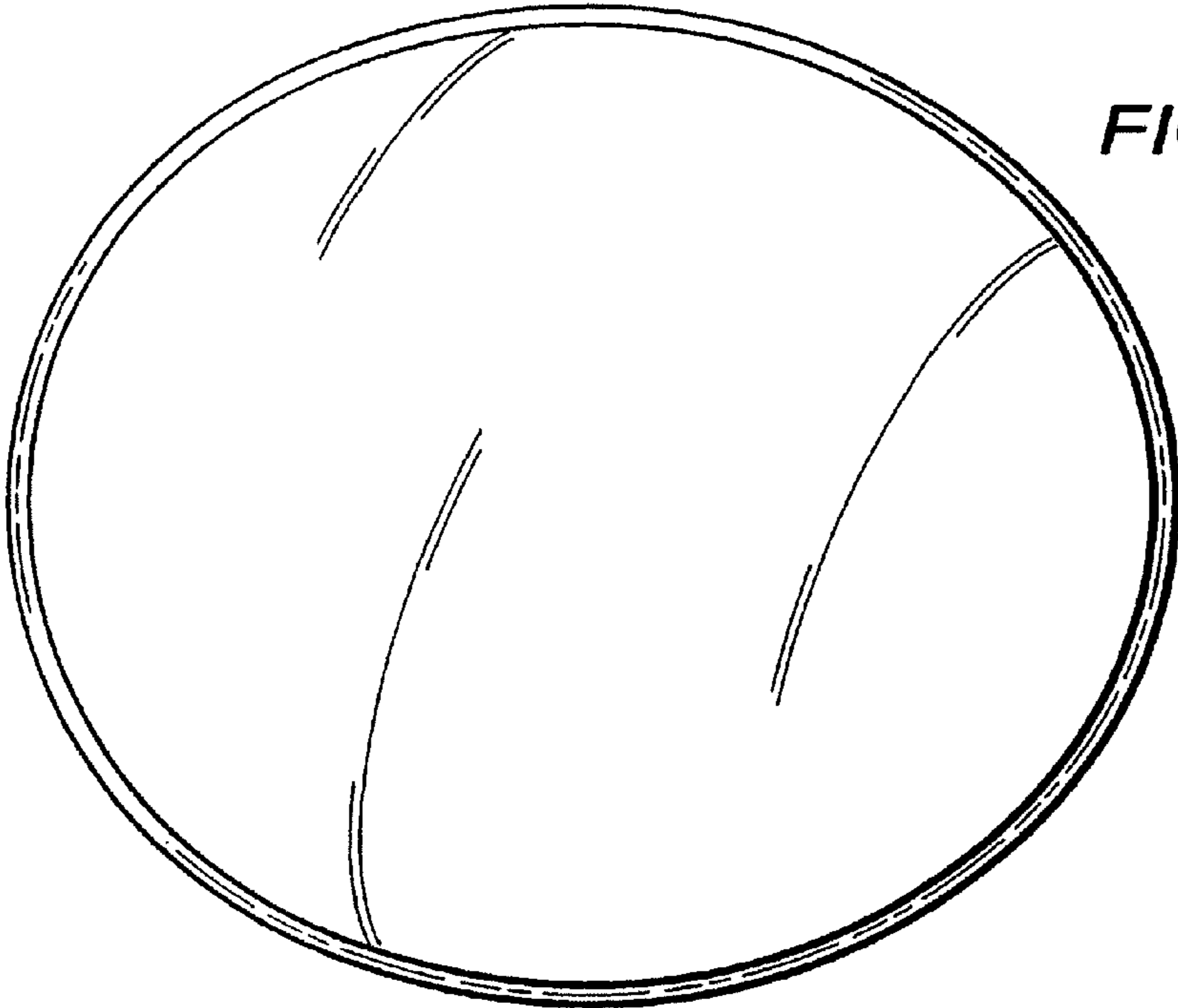


FIG. 4

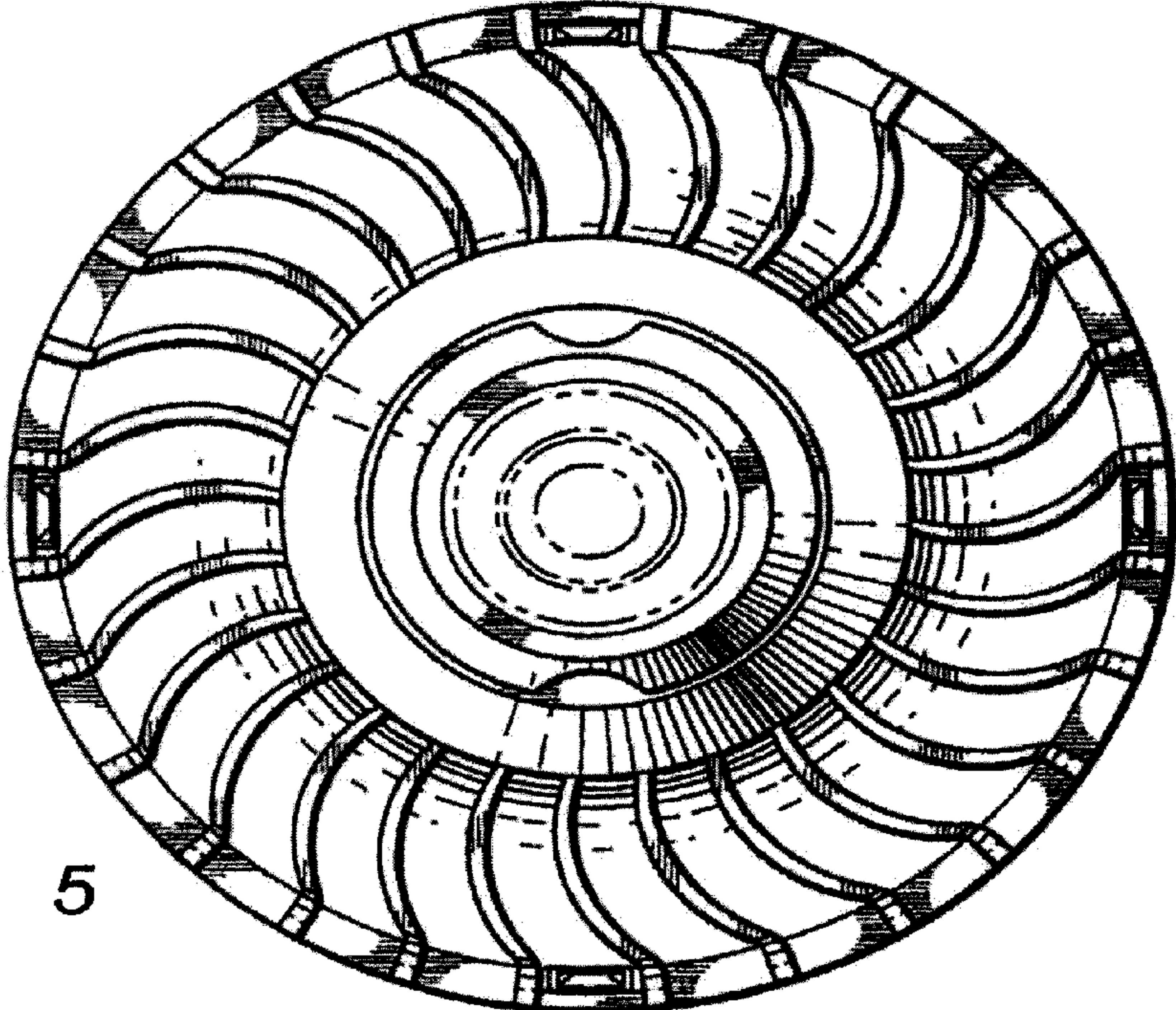


FIG. 5