



(12) **United States Design Patent**
Ross, III et al.

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- (54) **ANTENNA**
- (71) Applicant: **Antennas Direct, Inc.**, Ellisville, MO (US)
- (72) Inventors: **John Edwin Ross, III**, Moab, UT (US); **Richard E. Schneider**, Wildwood, MO (US)
- (73) Assignee: **Antennas Direct, Inc.**, Ellisville, MO (US)
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- 7,609,222, and a continuation-in-part of application No. 12/050,133, filed on Mar. 17, 2008, now Pat. No. 7,609,222, and a continuation-in-part of application No. 12/040,464, filed on Feb. 29, 2008, now Pat. No. 7,839,347, and a continuation of application No. 12/040,464, filed on Feb. 29, 2008, and a continuation-in-part of application No. 29/304,423, filed on Feb. 29, 2008, now Pat. No. Des. 598,433.
- (51) **LOC (12) Cl.** **14-03**
- (52) **U.S. Cl.**
USPC **D14/230**
- (58) **Field of Classification Search**
USPC D14/138, 230-238, 299, 358; D12/42, D12/43
CPC H01Q 7/00; H01Q 13/10; H01Q 9/285; H01Q 19/30; H01Q 19/12; H01Q 1/38; H01Q 1/36; H04B 1/0475; H04B 1/034; H05K 11/00

Related U.S. Application Data

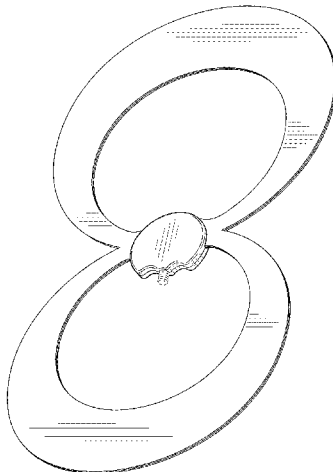
- (60) Division of application No. 29/713,645, filed on Nov. 18, 2019, now Pat. No. Des. 883,264, which is a continuation-in-part of application No. 29/671,595, filed on Nov. 28, 2018, now Pat. No. Des. 867,347, which is a continuation-in-part of application No. 15/685,749, filed on Aug. 24, 2017, now Pat. No. 10,615,501, which is a continuation of application No. 14/308,422, filed on Jun. 18, 2014, now abandoned, which is a continuation-in-part of application No. 13/759,750, filed on Feb. 5, 2013, now Pat. No. 8,994,600, and a continuation-in-part of application No. 29/430,632, filed on Aug. 28, 2012, now abandoned, which is a continuation-in-part of application No. 29/376,791, filed on Oct. 12, 2010, now Pat. No. Des. 666,178, and a continuation-in-part of application No. 12/606,636, filed on Oct. 27, 2009, now Pat. No. 8,368,607, which is a continuation-in-part of application No. PCT/US2008/061908, filed on Apr. 29, 2008, and a continuation-in-part of application No. 29/305,294, filed on Mar. 17, 2008, now Pat. No. Des. 604,276, which is a continuation-in-part of application No. 12/050,133, filed on Mar. 17, 2008, now Pat. No. 7,609,222, and a continuation of application No. 12/050,133, filed on Mar. 17, 2008, now Pat. No.

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,060,098 A	11/1936	Norman
2,220,008 A	10/1940	Woodward et al.
2,437,251 A	3/1948	Frische et al.
2,480,155 A	8/1949	Masters
2,589,578 A	3/1952	Sabins
D170,203 S	8/1953	Leonard
D171,560 S	2/1954	Ritter
D177,200 S	3/1956	Valiulis
D179,111 S	11/1956	Ballan
2,821,710 A	1/1958	Hale
3,015,101 A	12/1961	Turner et al.
3,123,826 A	3/1964	Durham
3,161,975 A	12/1964	McMillan
3,239,838 A	3/1966	Kelleher
3,261,019 A	7/1966	Lundy
3,273,158 A	9/1966	Fouts et al.
D209,402 S	11/1967	Burlingame
D211,025 S	5/1968	Callaghan
3,434,145 A	3/1969	Wells
3,521,284 A	7/1970	Strom et al.
3,560,983 A	2/1971	Willie et al.
3,587,105 A	6/1971	Neilson
3,721,990 A	3/1973	Gibson et al.
3,739,388 A	6/1973	Callaghan



3,828,867	A	8/1974	Elwood	2002/0158798	A1	10/2002	Chiang et al.
3,971,031	A	7/1976	Burke	2003/0071757	A1	4/2003	Yamaki
4,183,027	A	1/1980	Ehrenspeck	2004/0090379	A1	5/2004	Fourdeux et al.
4,184,163	A	1/1980	Woodward	2004/0090385	A1	5/2004	Green
4,418,427	A	11/1983	Muterspaugh	2004/0113841	A1	6/2004	Louzir et al.
D308,521	S	6/1990	Lonczak	2004/0217912	A1	11/2004	Mohammadian
D310,671	S	9/1990	Weiss	2005/0088342	A1	4/2005	Parsche
4,987,424	A	1/1991	Tamura et al.	2005/0162332	A1	7/2005	Schantz
D318,673	S	7/1991	Terk	2005/0259023	A1	11/2005	Wang
D327,690	S	7/1992	Ogawa et al.	2005/0280582	A1	12/2005	Powell et al.
D332,262	S	1/1993	Borchardt	2006/0033665	A1	2/2006	Yang
5,280,645	A	1/1994	Nguyen et al.	2006/0055618	A1	3/2006	Poilasne et al.
D344,731	S	3/1994	Witzky	2006/0077115	A1	4/2006	Oh et al.
D345,982	S	4/1994	Lucey	2006/0103577	A1	5/2006	Lee
5,313,218	A	5/1994	Busking	2006/0164304	A1	7/2006	Huang et al.
5,943,025	A	8/1999	Benham et al.	2007/0069955	A1	3/2007	McCorkle
D414,495	S	9/1999	Heiligenstein et al.	2007/0200769	A1	8/2007	Nakano et al.
5,959,586	A	9/1999	Benham et al.	2008/0040464	A1	2/2008	Chia
D421,610	S	3/2000	Ghalebi	2008/0094291	A1	4/2008	Bystrom et al.
6,054,963	A	4/2000	Muterspaugh	2008/0211720	A1	9/2008	Hansen
6,239,764	B1	5/2001	Timofeev et al.	2008/0258980	A1	10/2008	Chen et al.
D449,593	S	10/2001	Schultz	2008/0291345	A1	11/2008	Schneider
6,590,541	B1	7/2003	Schultze	2009/0058732	A1	3/2009	Nakano et al.
6,593,886	B2	7/2003	Schantz	2009/0073067	A1	3/2009	Soler Castany et al.
D480,714	S	10/2003	Wang	2009/0146899	A1	6/2009	Schneider et al.
6,680,708	B2	1/2004	Yamaki	2010/0085269	A1	4/2010	Sadowski et al.
D501,468	S	2/2005	Wang	2014/0292597	A1	10/2014	Schneider et al.
6,885,352	B2	4/2005	Lee et al.	2016/0322704	A1*	11/2016	Tao H01Q 21/30
6,917,793	B2	7/2005	Wang				
6,922,179	B2	7/2005	McCollum				
7,091,925	B1	8/2006	Wang				
7,126,556	B1	10/2006	Wang				
7,209,089	B2	4/2007	Schantz				
D544,471	S	6/2007	Wang				
7,239,290	B2	7/2007	Poilasne et al.				
7,245,266	B1	7/2007	Szente et al.				
D558,189	S	12/2007	Inoue				
7,356,362	B2	4/2008	Chang et al.				
7,436,973	B2	10/2008	Liao				
D581,931	S	12/2008	Pine				
D585,883	S	2/2009	Kaneko				
D598,433	S	8/2009	Schneider et al.				
D598,434	S	8/2009	Schneider et al.				
D598,469	S	8/2009	Harris, Jr.				
7,609,222	B2	10/2009	Schneider et al.				
D604,276	S	11/2009	Schneider et al.				
D611,460	S	3/2010	Chao				
7,693,570	B2	4/2010	Green et al.				
D624,531	S	9/2010	Fleck et al.				
7,839,347	B2	11/2010	Schneider et al.				
7,839,351	B2	11/2010	Schadler et al.				
7,898,496	B2	3/2011	Olsen et al.				
D638,031	S	5/2011	Lee et al.				
7,936,311	B2	5/2011	Rowser et al.				
7,990,335	B2	8/2011	Schneider et al.				
D655,692	S	3/2012	Silverman et al.				
8,144,069	B2	3/2012	Sadowski et al.				
8,174,457	B1	5/2012	Lam				
D664,564	S	7/2012	Gillett et al.				
D666,178	S	8/2012	Schneider et al.				
8,368,607	B2	2/2013	Schneider et al.				
8,736,500	B1	5/2014	Lam				
D721,737	S	1/2015	Ahn et al.				
8,994,600	B2	3/2015	Schneider et al.				
D809,490	S	2/2018	Feit				
D815,073	S	4/2018	Feit				
D824,884	S	8/2018	Ross, III				
D831,010	S	10/2018	Yang				
10,128,575	B2	11/2018	Ross, III et al.				
D837,769	S	1/2019	Yang				
D838,697	S	1/2019	Yang				
D847,798	S	5/2019	Yang				
D849,722	S	5/2019	Yang				
D850,425	S	6/2019	Yang				
D867,347	S	11/2019	Ross, III et al.				
D868,045	S	11/2019	Ross, III et al.				
D868,720	S	12/2019	Feit et al.				
D872,714	S	1/2020	Yang				
D883,264	S	5/2020	Ross, III et al.				

FOREIGN PATENT DOCUMENTS

CN	201243084	Y	5/2009
CN	ZL2008200072832		5/2009
CN	ZL2008301199963		5/2009
CN	101453057	A	6/2009
CN	ZL2008301199978		7/2009
CN	ZL2008300091398		9/2009
CN	203707328	U	7/2014
EM	000946587		5/2008
EP	1555717	A1	7/2005
EP	1653560	A1	5/2006
EP	1753080	A1	2/2007
GB	2263360	A	7/1993
JP	D1213590		6/2004
TW	M249233	U	11/2004
TW	D112283		8/2006
TW	D119092		9/2007
TW	200926506	A	6/2009
TW	D129744		7/2009
TW	D129745		7/2009
TW	D129746		7/2009
WO	WO-2009073249	A1	6/2009

OTHER PUBLICATIONS

“Analog High-Definition Television System”, Wikipedia: the Free Encyclopedia. Wikimedia Foundation, Inc. Oct. 12, 2016. Web. Mar. 16, 2017, 5 pages.

“Television Antenna”, Wikipedia: the Free encyclopedia. Wikimedia Foundation, Inc. Mar. 13, 2017. Web. Mar. 15, 2017, 6 pages.

A Broadband Eccentric Annular Slot Antenna, Young Hoon Suh and Ikmo Park, Department of Electrical Engineering, Ajou University, pp. 94-97, IEEE copyright notice 2001.

A Printed Crescent Patch Antenna for Ultrawideband Applications, Ntsanderh C. Azenui an H.Y.D. Yang, IEEE Antennas and Wireless Propagation Letters, vol. 6, 2007, pp. 113-116.

Antenna Engineering Handbook, 3rd Edition, Edited by Richard C. Johnson, McGraw Hill, 1993, pp. 5-13 to 5-16.

Antenna Theory: a. Review, Balanis, Proc. IEEE vol. 80 No. 1 Jan. 1992, 17 pages.

Antennas Direct. PF7 Picture Frame Antenna, Oct. 1. 2005, Antennas Direct, <http://web.archive.org/web/2005100102653/http://antennasdirect.com/PF7.su-b--antenna.html>, 1 page.

C. M. Shah, S. Siriam, M. Bhaskaran and A. Mitchell, “Large area metal-silicone flexible electronic structures,” 2010 Conference on Optoelectronic and Microelectronic Materials and Devices, Canberra, ACT, 2010, pp. 187-188.

Chinese office action dated Nov. 4, 2015 for Chinese application No. 2014101113505 filed Feb. 7, 2014, published as CN103972657 on Aug. 6, 2014, which names the same inventors, Richard E. Schneider and John Edwin Ross III, as the instant application but is not related through a priority claim; 7 pages.

Clearstream.TM. 2V; <http://www.antennasdirect.com/cmss.sub.--files/attachementlibrary/pdf/C2--V.sub.--QS.sub.--FINAL.sub.--20120702.pdf>; Jul. 2, 2012; 2 pgs.

Design of Compact Components for Ultra Wideband Communication Front Ends. Marek Bialkowski, Amin Abbosh, and Hing Kan, School of Information Technology and Electrical Engineering, The University of Queensland, four pages.

European Search Report dated Apr. 24, 2014 for EP application No. 14153878.5 which claims priority to the instant application; 9 pages.

European Search Report dated Jan. 17, 2011, issued by the European Patent Office for European Patent Application No. EP 10193159.0 which is related to the instant application through a priority claim; (5 pages).

European Supplementary Search Report and Opinion dated Oct. 7, 2010, issued by the European Patent Office for European Patent Application No. EP 08747115 (6 pages).

Frequency-and Time-Domain Modeling of Tapered Loop Antennas in Ultra-Wideband Radio Systems, Shiou-Li Chen and Shau-Gang Mao, Graduate Institute of Computer and Communication Engineer, pp. 179-182, IEEE copyright notice 2006.

IEEE Spectrum: Antennas for the New Airwaves, <http://www.spectrum.ieee.org/print/7328>, Published Feb. 2009, 9 pages, Authors Richard Schneider and John Ross.

Mao S-G et al., "Time-domain characteristics of ultra-wideband tapered loop antennas", Electronics Letters, IEE Stevenage, GB, vol. 42, No. 22, Oct. 26, 2006; 1262-1264; 2 pages.

One-Element Loop Antenna with Finite Reflector, B. Rojarayanont and T. Sekiguchi, Electronics & Communications in Japan, vol. 59-B, No. 5, May 1976, p. 68.

Planar Miniature Tapered-Slot-Fed Annular Slot Antennas for Ultrawide-Band Radios, Tzyh-Ghuang Ma, Student Member, and Shyh-Kang Jeng, Senior Member, IEEE, IEEE Transactions on Antennas and Propagation, vol. 53, No. 3, Mar. 2005, pp. 1194-1202.

Self-Mutual Admittances of Two Identical Circular Loop Antennas in a Conducting Medium and in Air, K. Iizuka, Senior Member, IEEE, R. W. P. King, Fellow, IEEE, and C. W. Harrison, Jr., Senior Member, IEEE, IEEE Transactions on Antennas and Propagation, vol. AP014, No. 4, Jul. 1966, pp. 440-450.

Tofel, Kevin C., HD Picture frame antenna, Aug. 11, 2005, <http://hd.engadget.com/2005/08/11/hd-picture-frame-antenna>, 1 page.

* cited by examiner

Primary Examiner — John Windmuller

(74) *Attorney, Agent, or Firm* — Harness, Dickey & Pierce, P.L.C.; Anthony G. Fussner

(57)

CLAIM

The ornamental designs for an antenna, as shown and described.

DESCRIPTION

FIG. 1 is a perspective view of a first embodiment of an antenna, showing our new design;

FIG. 2 is a back perspective view of the antenna shown in FIG. 1;

FIG. 3 is a front elevation view of the antenna shown in FIG. 1;

FIG. 4 is a back elevation of the antenna shown in FIG. 1;

FIG. 5 is a right elevation view of the antenna shown in FIG. 1;

FIG. 6 is a left elevation view of the antenna shown in FIG. 1;

FIG. 7 is a top plan view of the antenna shown in FIG. 1;

FIG. 8 is a bottom plan view of the antenna shown in FIG. 1;

FIG. 9 is a perspective view of a second embodiment of an antenna, showing our new design;

FIG. 10 is a back perspective view of the antenna shown in FIG. 9;

FIG. 11 is a front elevation view of the antenna shown in FIG. 9;

FIG. 12 is a back elevation of the antenna shown in FIG. 9;

FIG. 13 is a right elevation view of the antenna shown in FIG. 9;

FIG. 14 is a left elevation view of the antenna shown in FIG. 9;

FIG. 15 is a top plan view of the antenna shown in FIG. 9;

and, FIG. 16 is a bottom plan view of the antenna shown in FIG. 9.

In the drawings, the details shown in broken lines depict environmental subject matter only and form no part of the claimed design.

1 Claim, 10 Drawing Sheets

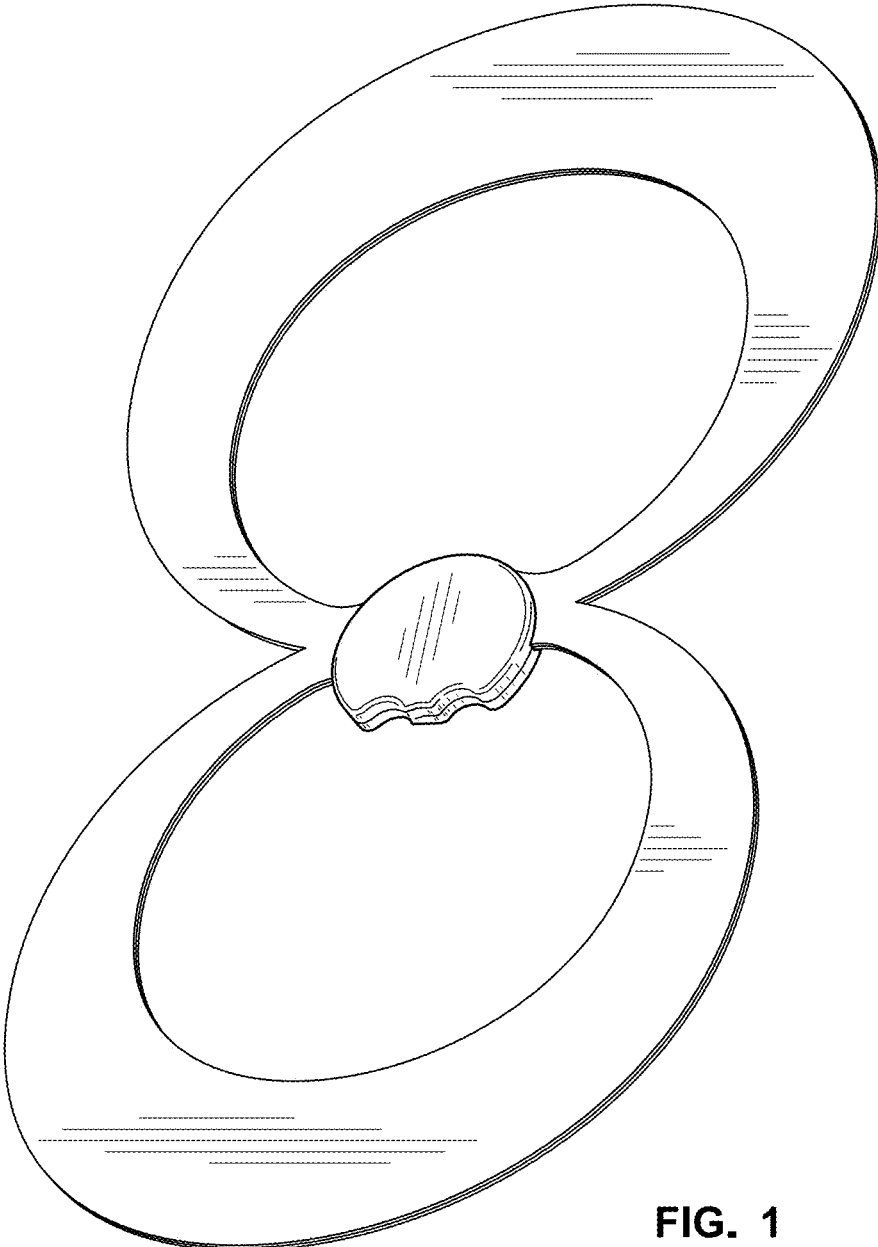


FIG. 1

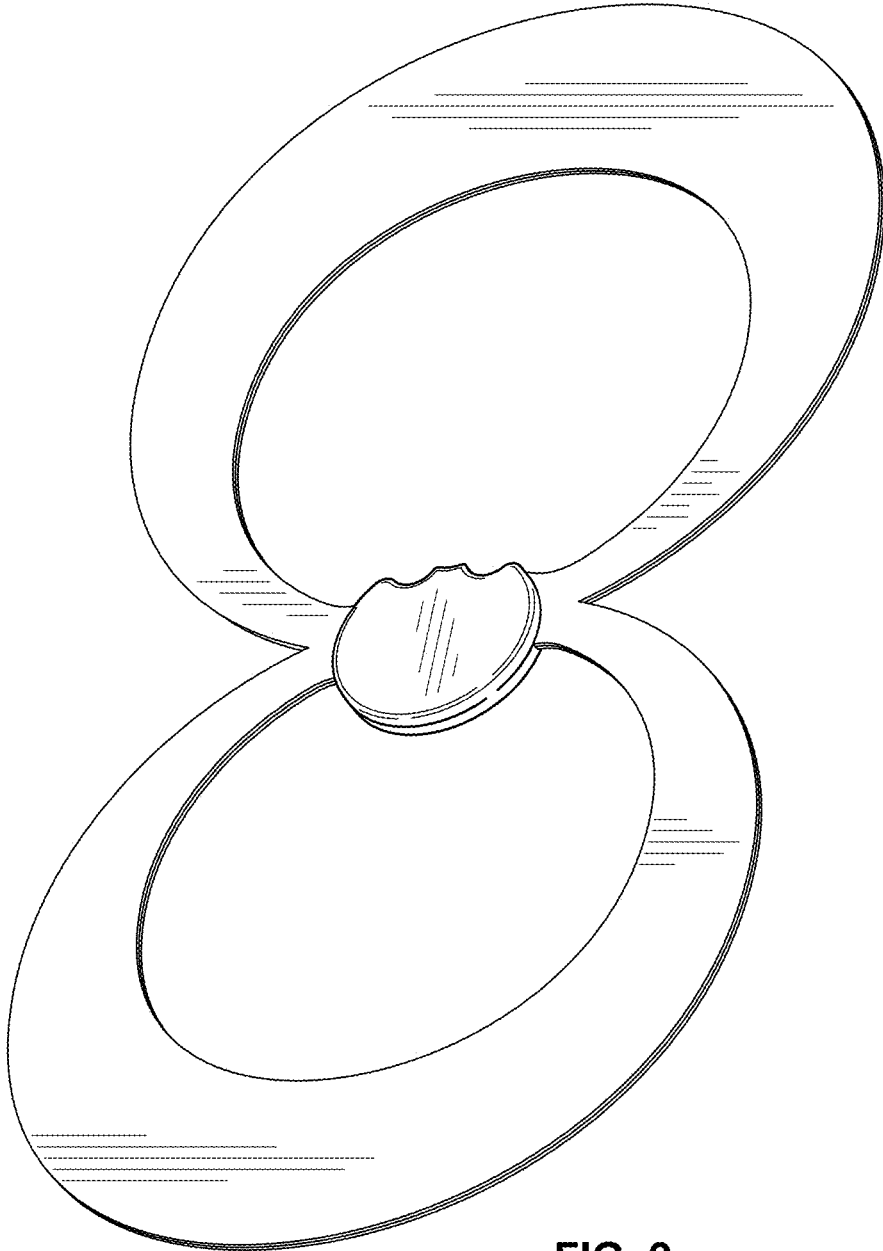


FIG. 2

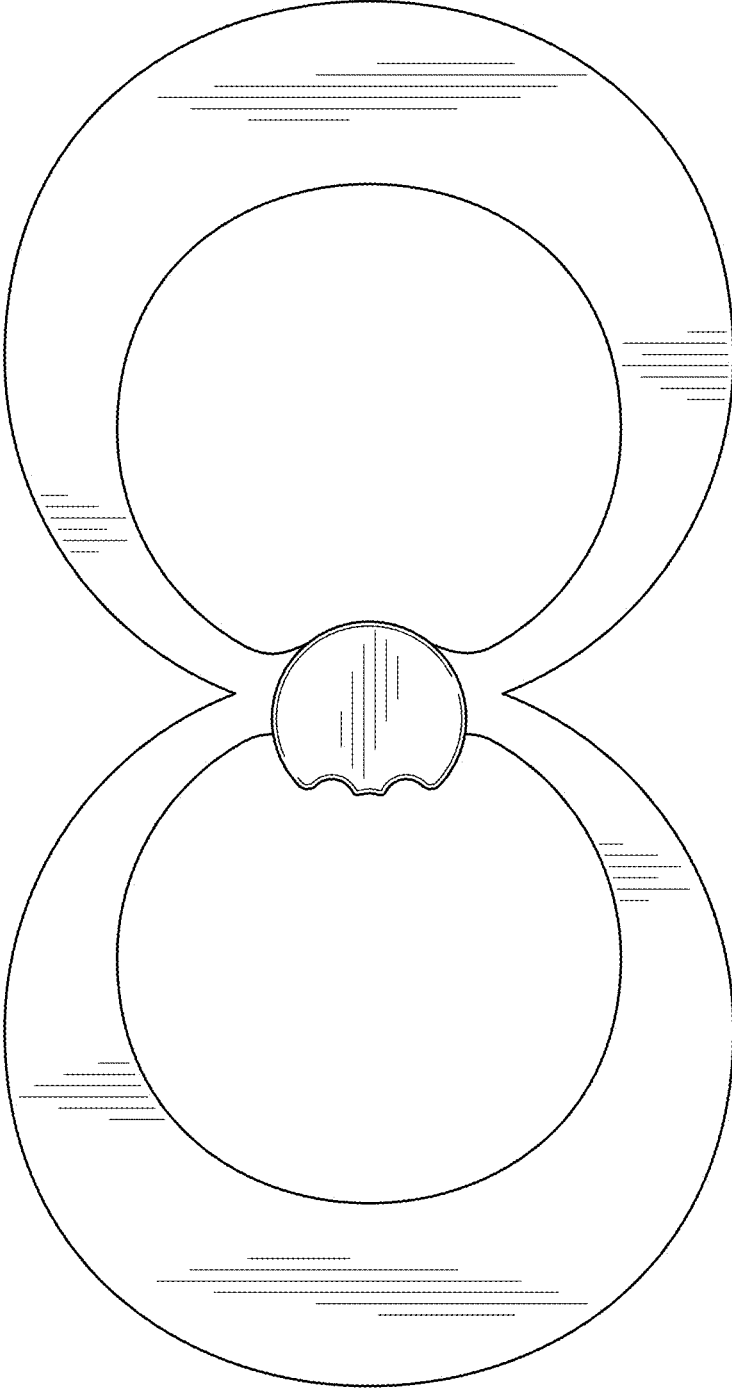


FIG. 3

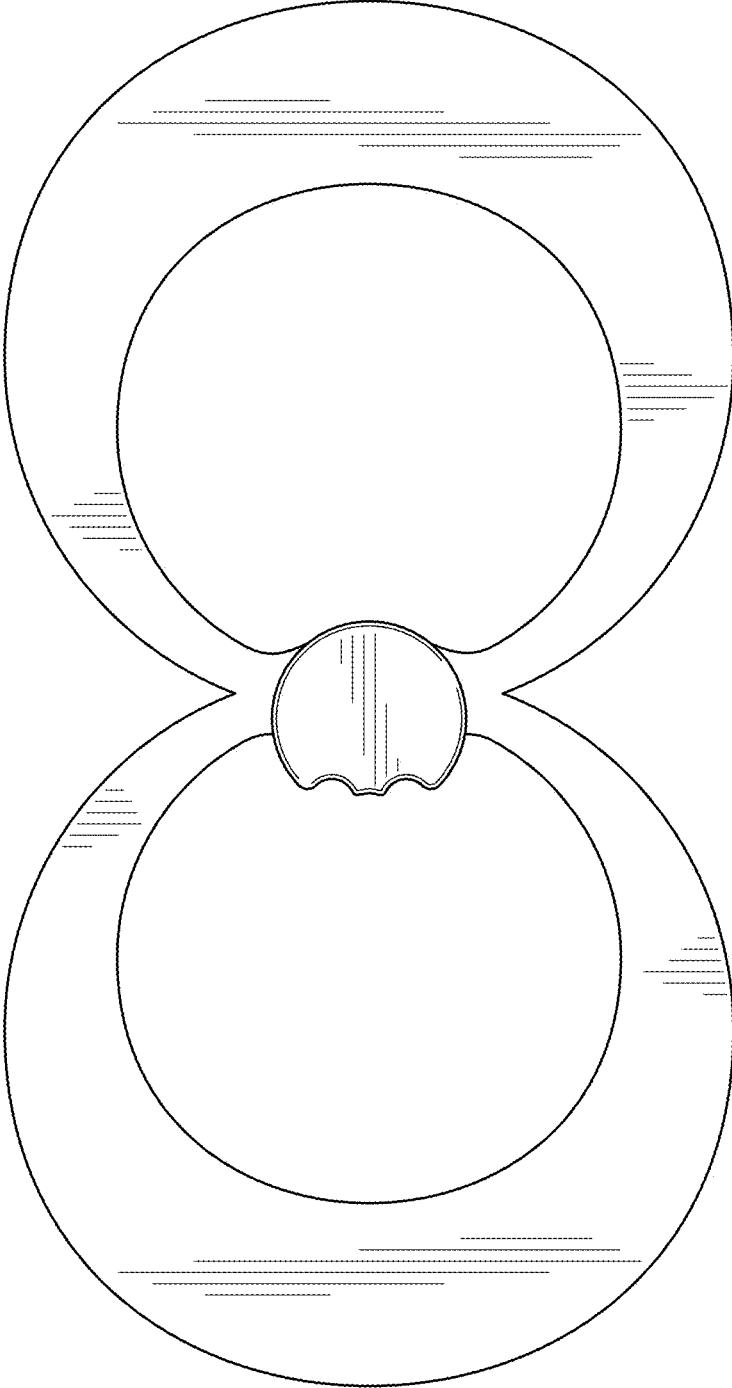


FIG. 4



FIG. 5



FIG. 6

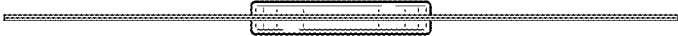


FIG. 7

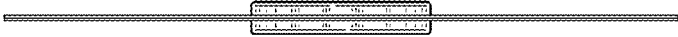


FIG. 8

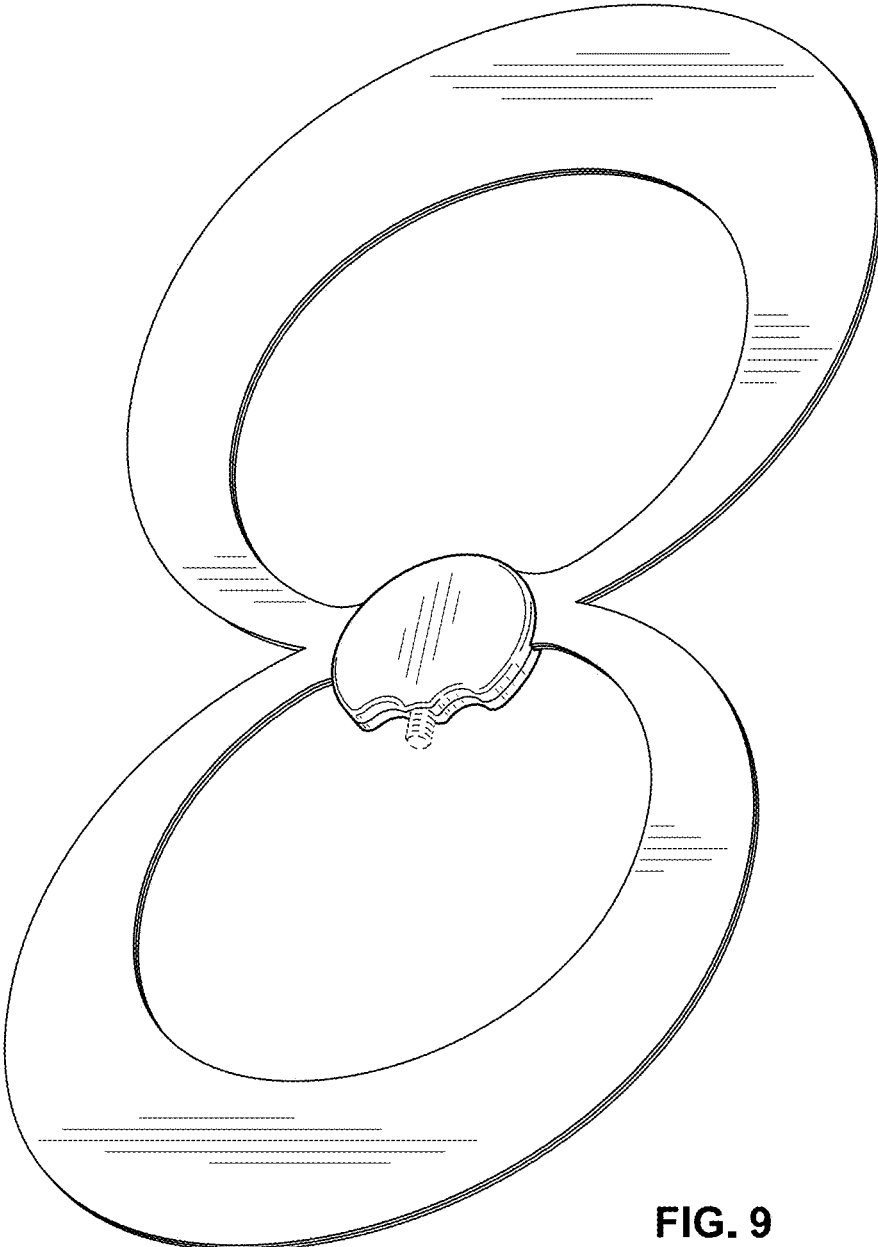


FIG. 9

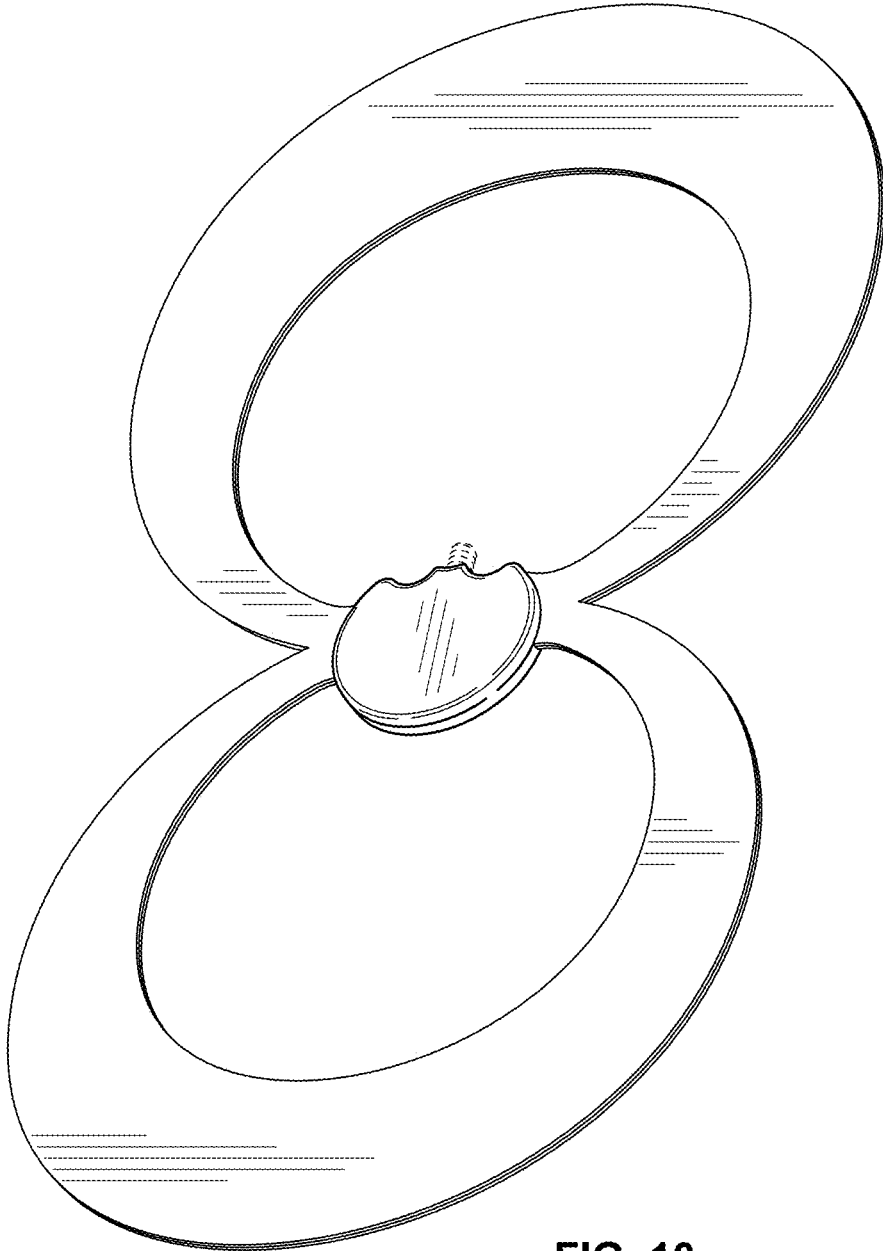


FIG. 10

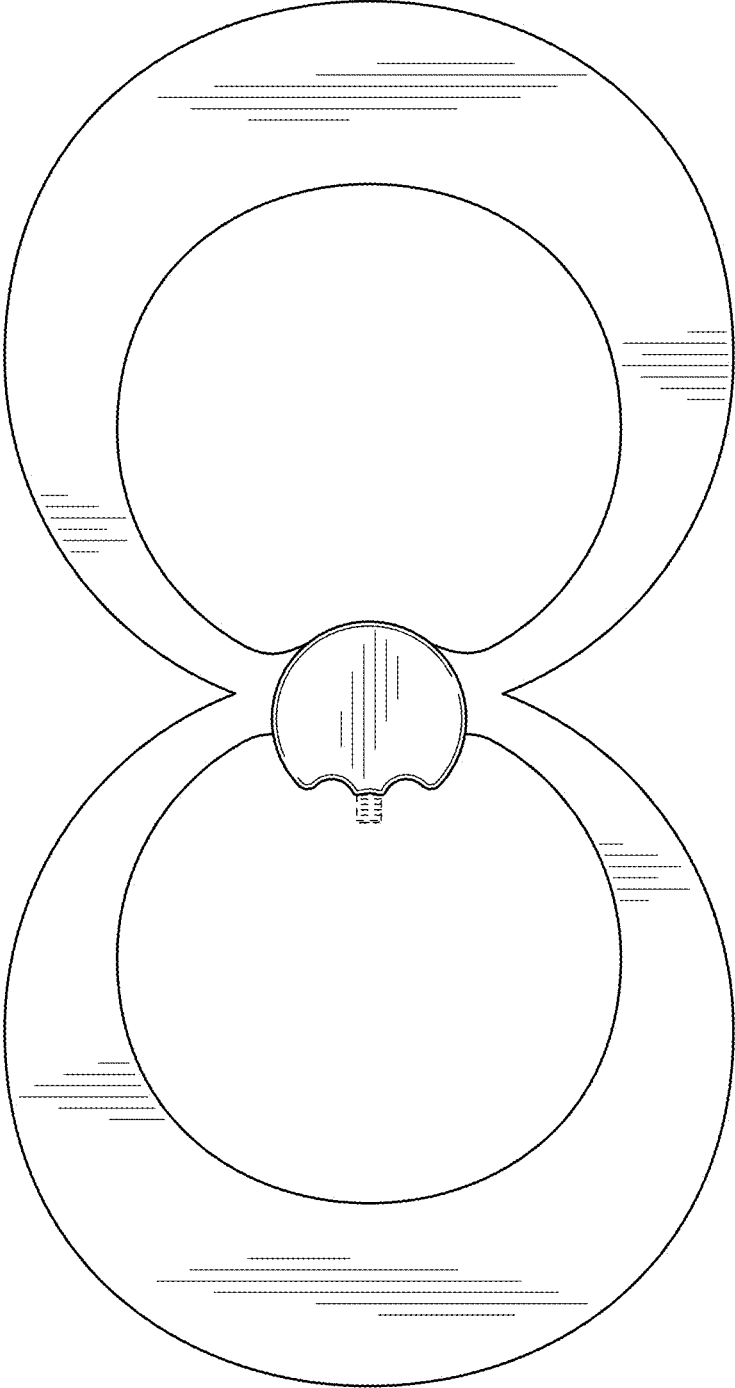


FIG. 11

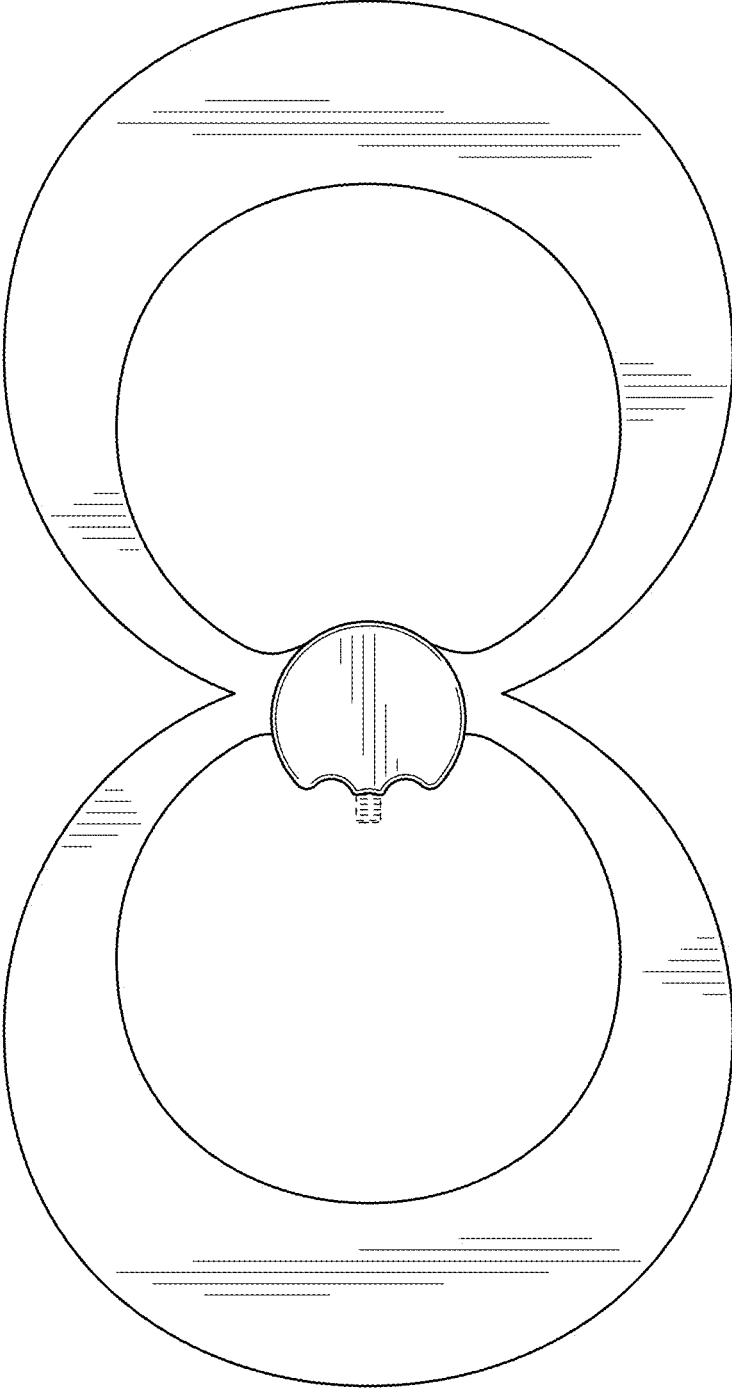


FIG. 12



FIG. 13



FIG. 14

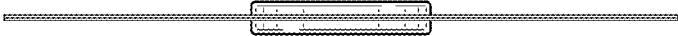


FIG. 15

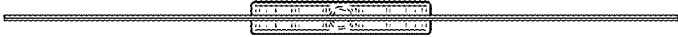


FIG. 16