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Feit et al.

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(54) **ANTENNA**

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USPC **D14/230**

(58) **Field of Classification Search**

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H01Q 1/36; H04B 1/0475; H04B 1/034;

H05K 11/00

See application file for complete search history.

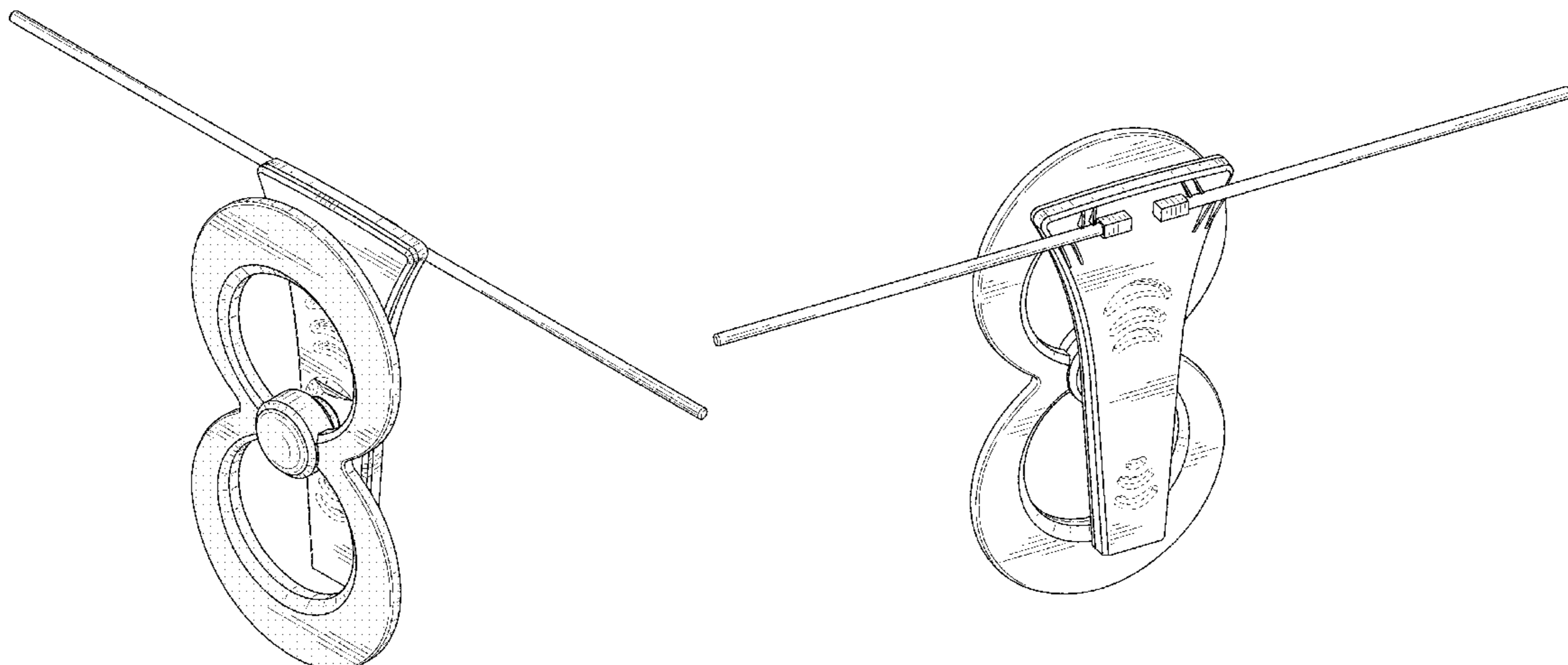
Related U.S. Application Data

(60) Division of application No. 29/732,321, filed on Apr. 23, 2020, now Pat. No. Des. 892,096, which is a division of application No. 29/713,648, filed on Nov. 18, 2019, now Pat. No. Des. 883,265, which is a continuation-in-part of application No. 29/627,951, filed on Nov. 30, 2017, now Pat. No. Des. 868,720, which is a continuation of application No. 29/580,049, filed on Oct. 5, 2016, now Pat. No. Des. 809,490, which is a continuation-in-part 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 of application No.

(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
3,971,031 A	7/1976	Burke



US D902,896 S

4,183,027 A	1/1980	Ehrenspeck		D883,265 S	5/2020	Feit et al.
4,184,163 A	1/1980	Woodward		2002/0158798 A1	10/2002	Chiang et al.
4,418,427 A	11/1983	Muterspaugh		2003/0071757 A1	4/2003	Yamaki
D308,521 S	6/1990	Lonczak		2004/0090379 A1*	5/2004	Fourdeux H01Q 9/0457 343/700 MS
D310,671 S	9/1990	Weiss				
4,987,424 A	1/1991	Tamura et al.		2004/0090385 A1	5/2004	Green
D318,673 S	7/1991	Terk		2004/0113841 A1*	6/2004	Louzir H01Q 9/0457 343/700 MS
D327,690 S	7/1992	Ogawa et al.		2004/0217912 A1	11/2004	Mohammadian
D332,262 S	1/1993	Borchardt		2005/0088342 A1	4/2005	Parsche
5,280,645 A	1/1994	Nguyen et al.		2005/0110689 A1*	5/2005	Masutani H01Q 9/0464 343/700 MS
D344,731 S	3/1994	Witzky				
D345,982 S	4/1994	Lucey				
5,313,218 A	5/1994	Busking		2005/0162332 A1	7/2005	Schantz
5,943,025 A	8/1999	Benham et al.		2005/0259023 A1*	11/2005	Wang H01Q 9/16 343/764
D414,495 S	9/1999	Heiligenstein et al.				
5,959,586 A	9/1999	Benham et al.		2005/0280582 A1*	12/2005	Powell H01Q 5/50 343/700 MS
D421,610 S	3/2000	Ghalebi				
6,054,963 A	4/2000	Muterspaugh		2006/0033665 A1*	2/2006	Yang H01Q 9/0414 343/700 MS
6,239,764 B1	5/2001	Timofeev et al.				
D449,593 S	10/2001	Schultz		2006/0055618 A1	3/2006	Poilasne et al.
6,590,541 B1	7/2003	Schultze		2006/0077115 A1	4/2006	Oh et al.
6,593,886 B2	7/2003	Schantz		2006/0103577 A1*	5/2006	Lee H01Q 9/40 343/700 MS
D480,714 S	10/2003	Wang				
6,680,708 B2	1/2004	Yamaki		2006/0164304 A1*	7/2006	Huang H01Q 9/0414 343/700 MS
D501,468 S	2/2005	Wang				
6,885,352 B2	4/2005	Lee et al.		2007/0069955 A1*	3/2007	McCorkle H01Q 13/106 343/700 MS
6,917,793 B2	7/2005	Wang				
6,922,179 B2	7/2005	McCollum		2007/0200769 A1*	8/2007	Nakano H01Q 1/48 343/700 MS
7,091,925 B1	8/2006	Wang				
7,126,556 B1	10/2006	Wang				
7,209,089 B2	4/2007	Schantz		2008/0040464 A1	2/2008	Chia
D544,471 S	6/2007	Wang		2008/0094291 A1	4/2008	Bystrom et al.
7,239,290 B2	7/2007	Poilasne et al.		2008/0211720 A1	9/2008	Hansen
7,245,266 B1	7/2007	Szente et al.		2008/0258980 A1	10/2008	Chen et al.
D558,189 S	12/2007	Inoue		2008/0291345 A1	11/2008	Schneider
7,356,362 B2	4/2008	Chang et al.		2009/0058732 A1*	3/2009	Nakano H01Q 1/48 343/700 MS
7,436,973 B2	10/2008	Liao				
D581,931 S	12/2008	Pine		2009/0073067 A1	3/2009	Soler Castany et al.
D585,883 S	2/2009	Kaneko		2009/0146899 A1	6/2009	Schneider et al.
D598,433 S	8/2009	Schneider et al.		2010/0085269 A1	4/2010	Sadowski et al.
D598,434 S	8/2009	Schneider et al.		2012/0169553 A1*	7/2012	Nomura H01Q 5/371 343/741
D598,469 S	8/2009	Harris, Jr.				
7,609,222 B2	10/2009	Schneider et al.		2014/0292597 A1*	10/2014	Schneider H01Q 7/00 343/741
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	H01Q 7/00 D14/230			
8,368,607 B2 *	2/2013	Schneider	H01Q 7/00 343/742			
8,736,500 B1 *	5/2014	Lam	H01P 5/10 343/726			
D721,737 S	1/2015	Ahn et al.				
8,994,600 B2	3/2015	Schneider et al.				
D809,490 S *	2/2018	Feit	D14/230			
D815,073 S *	4/2018	Feit	D14/230			
D824,884 S *	8/2018	Ross, III	D14/230			
D831,010 S	10/2018	Yang				
10,128,575 B2 *	11/2018	Ross, III	H01Q 1/36			
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	D14/230			
D867,347 S *	11/2019	Ross, III	D14/230			
D868,045 S *	11/2019	Ross, III	D14/230			
D868,720 S *	12/2019	Feit	D14/135			
D872,714 S	1/2020	Yang				

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 and 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. Jan. 1, 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

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(57)

CLAIM

The ornamental designs for antenna, as shown and described.

DESCRIPTION

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

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

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

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

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

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

In the drawings, the details shown in broken lines depict portions of the antenna that form no part of the claimed design.

1 Claim, 6 Drawing Sheets

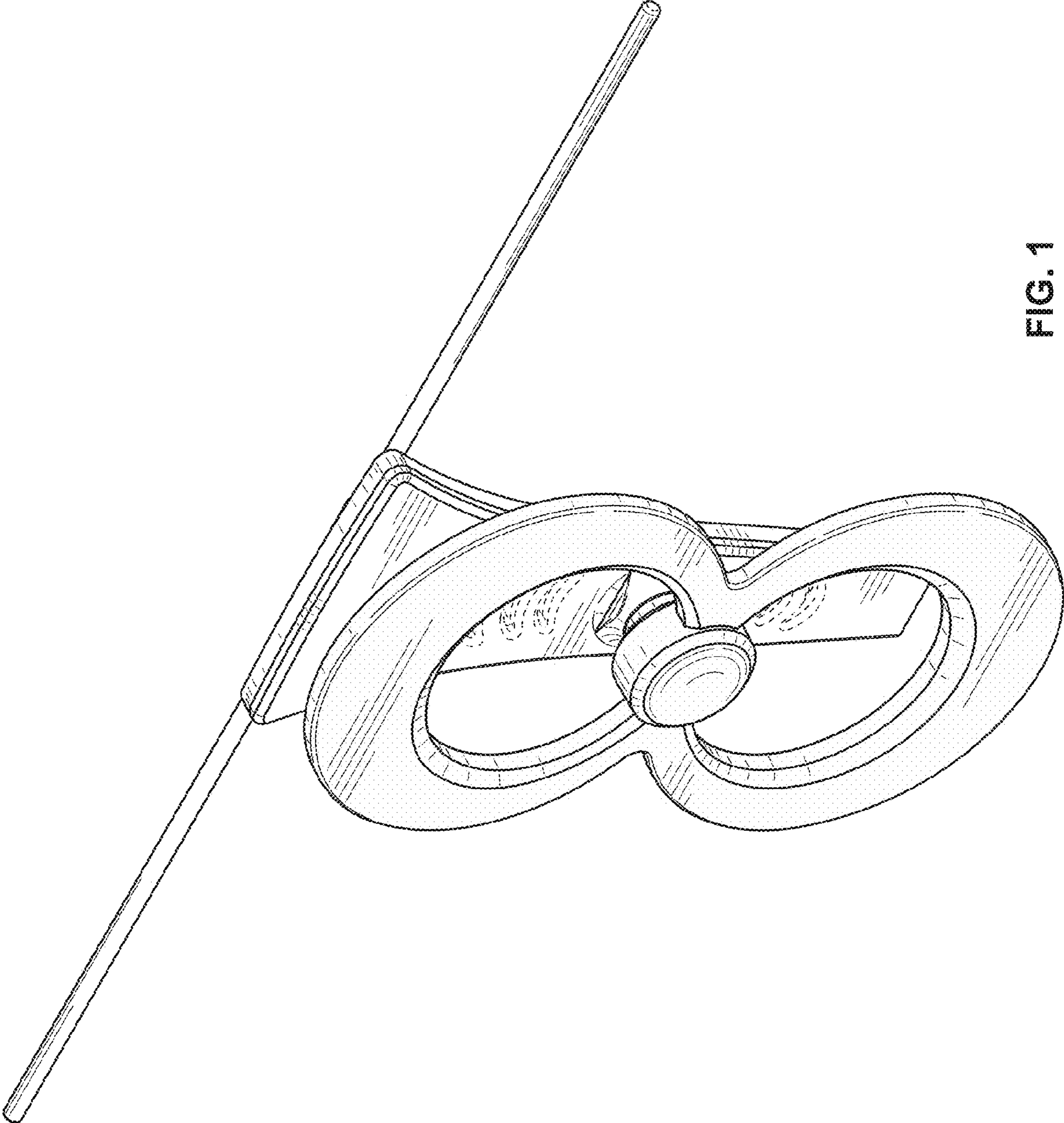


FIG. 1

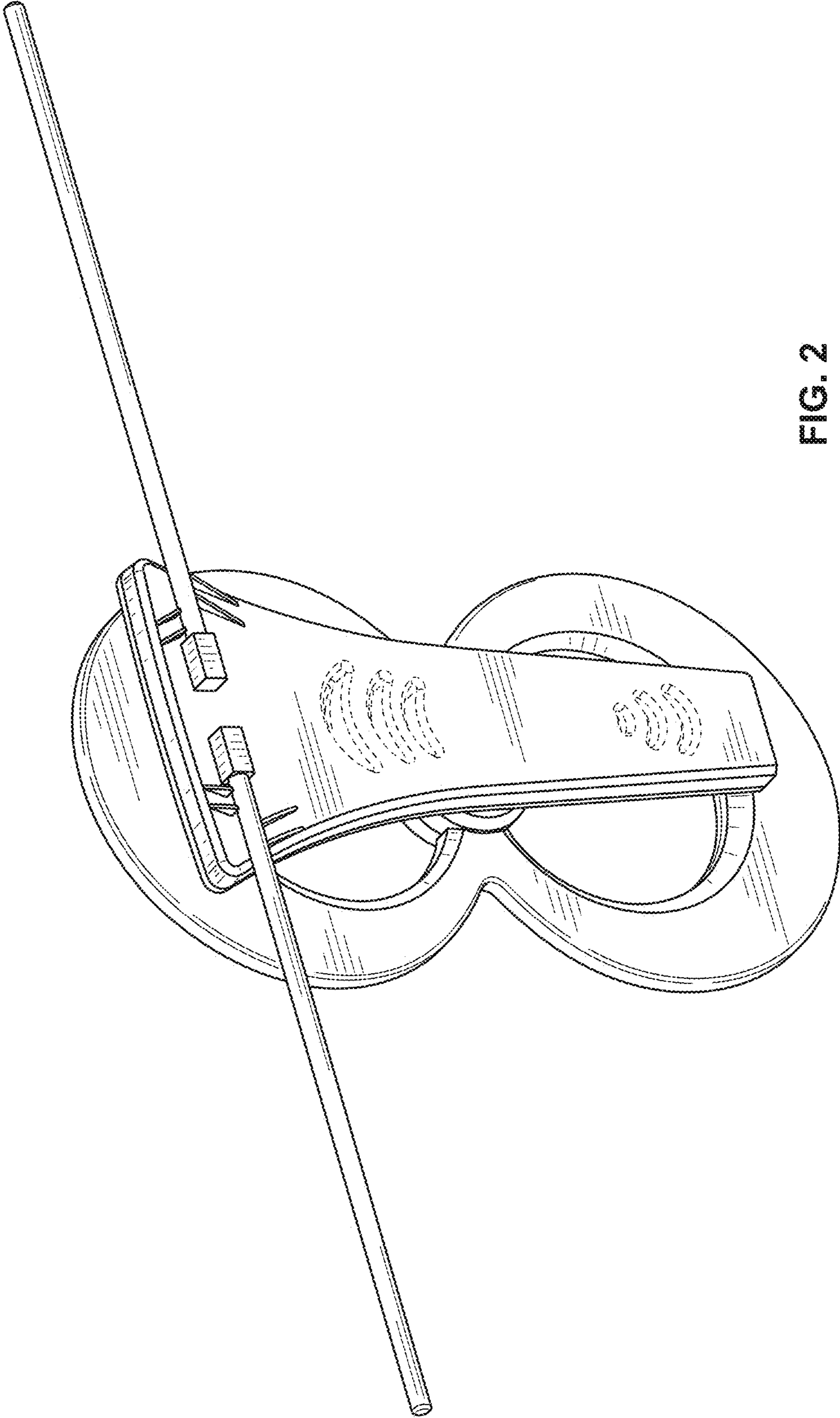


FIG. 2

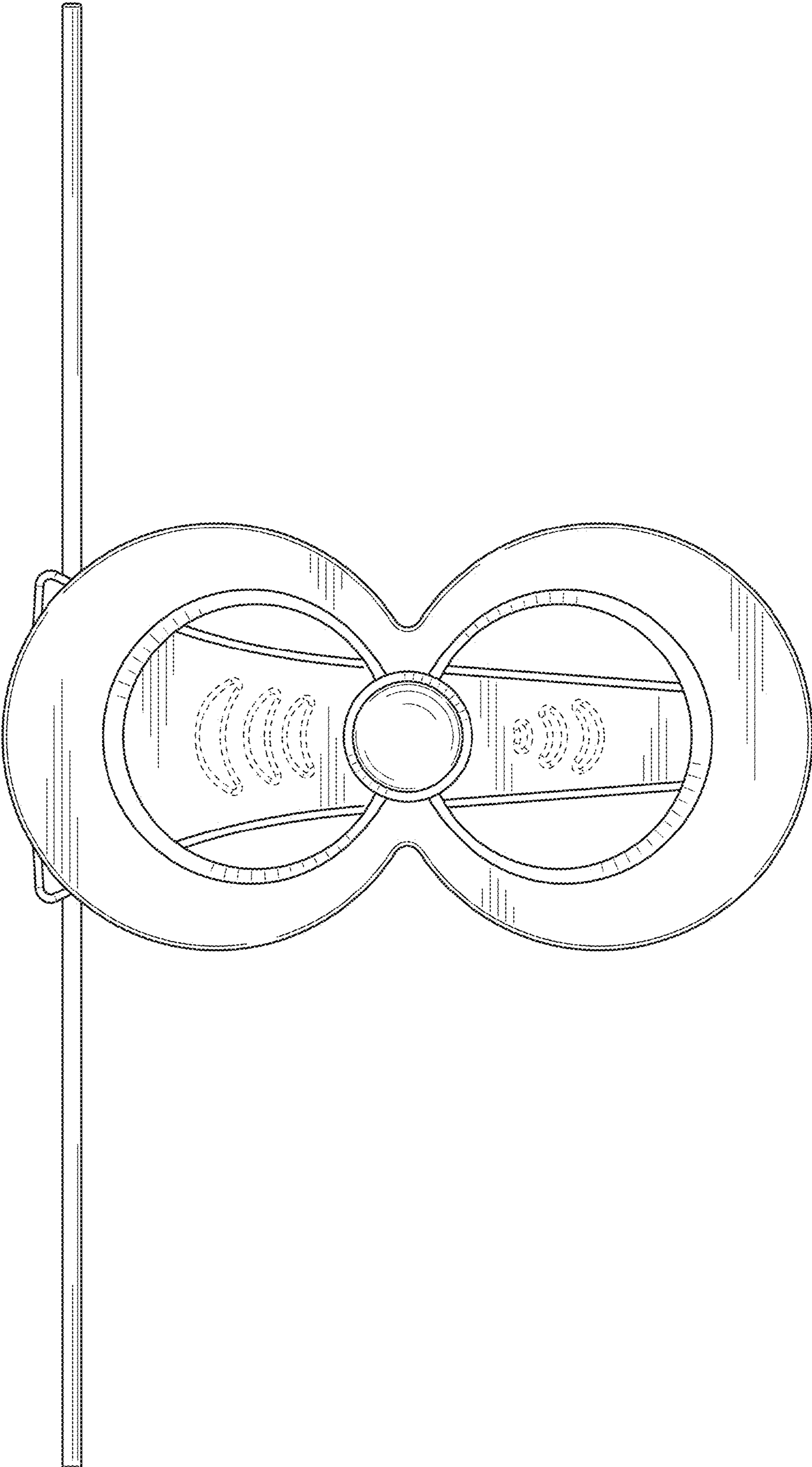


FIG. 3

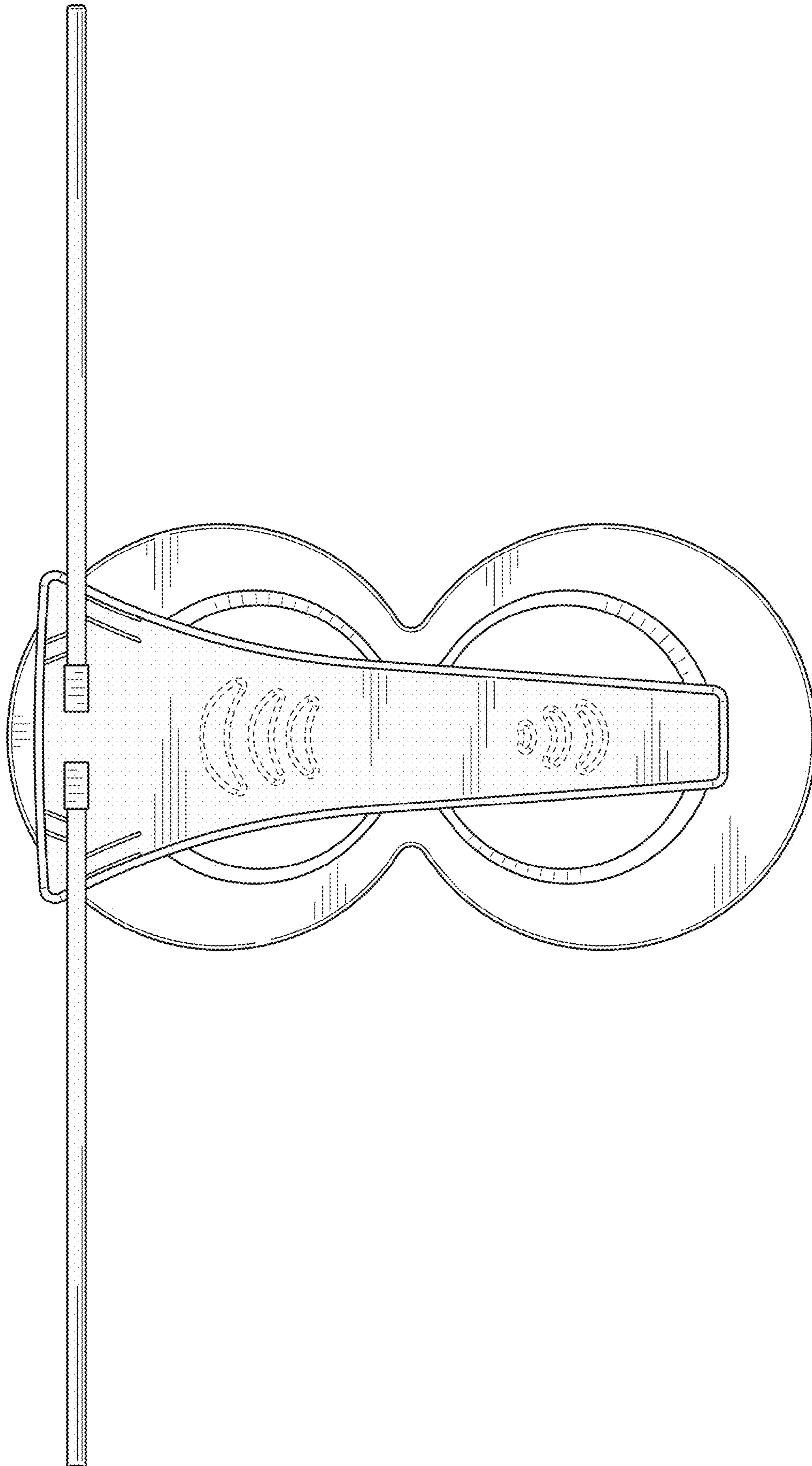


FIG. 4

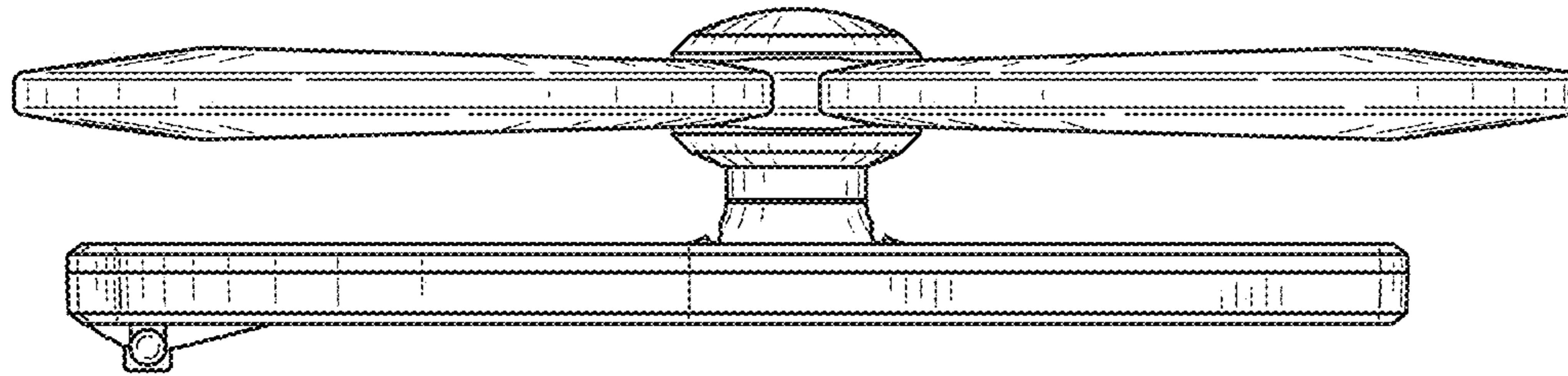


FIG. 6

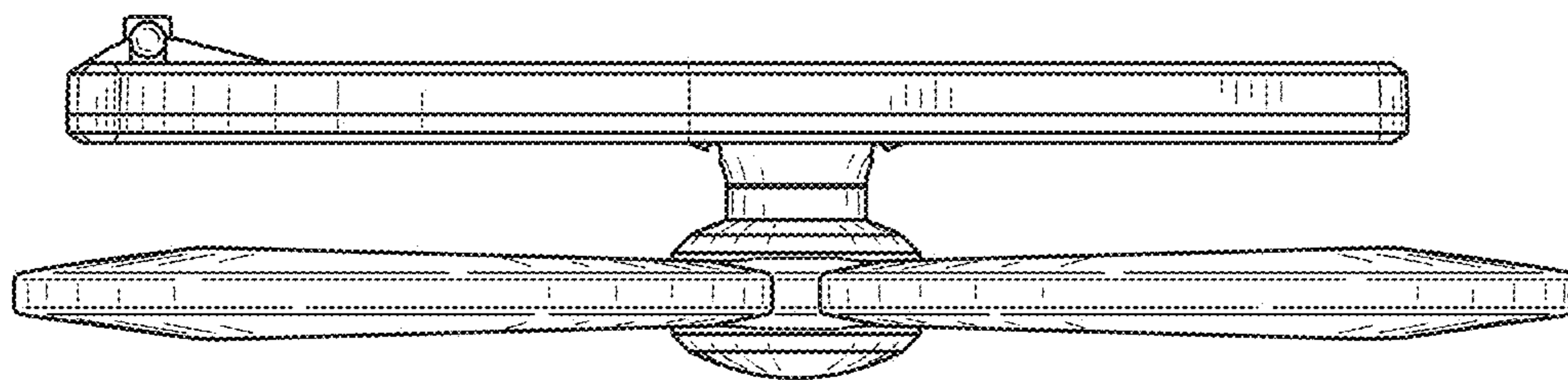


FIG. 5

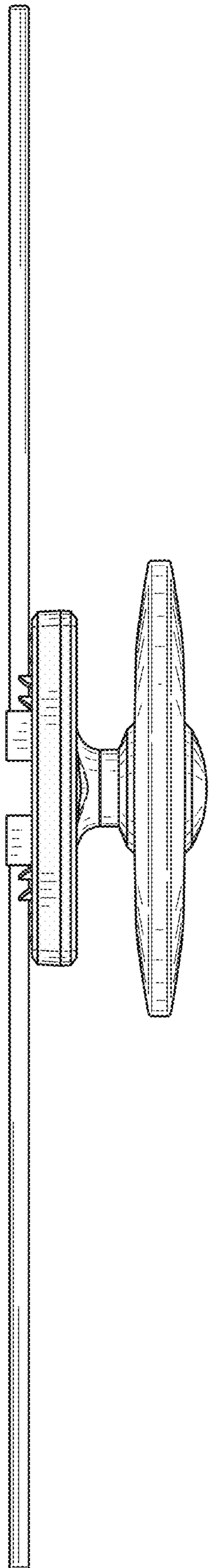


FIG. 7

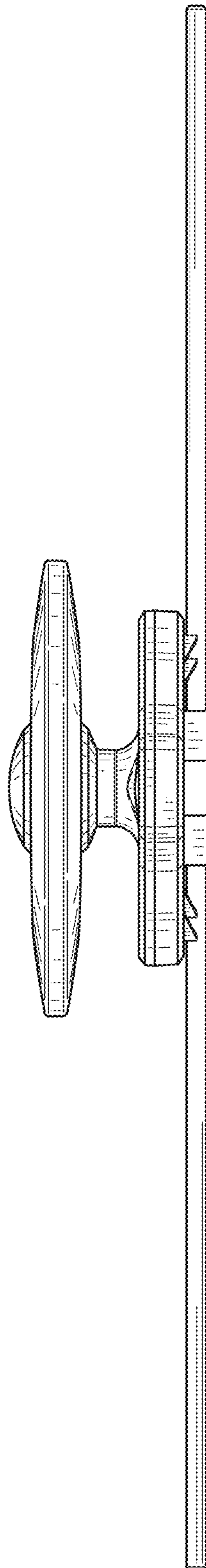


FIG. 8