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(54) **NECKLACE WITH A BUILT IN GUIDANCE DEVICE**

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CPC .... A44C 5/00; A44C 5/0007; A44C 5/0015; A44C 5/0023; A44C 5/003; A44C 5/0053; A44C 5/0061; A44C 5/0069; A44C 5/0076; A44C 5/0084; A44C 5/0092; A44C 5/02; A44C 5/022; A44C 5/025; A44C 5/027; A44C 5/04; A44C 5/08; A44C 5/10; A44C 5/102; A44C 5/105; A44C 5/107; A44C 11/002; A44C 11/00; A44C 13/00; A44C 7/00; A44C 7/002; A44C 7/003

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,586,827 A 5/1986 Hirsch et al.  
5,129,716 A 7/1992 Holakovszky et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN 201260746 6/2009  
CN 101527093 9/2009

(Continued)

OTHER PUBLICATIONS

The Nex Band; <http://www.mightycast.com/#faq>; May 19, 2015; 4 pages.

(Continued)

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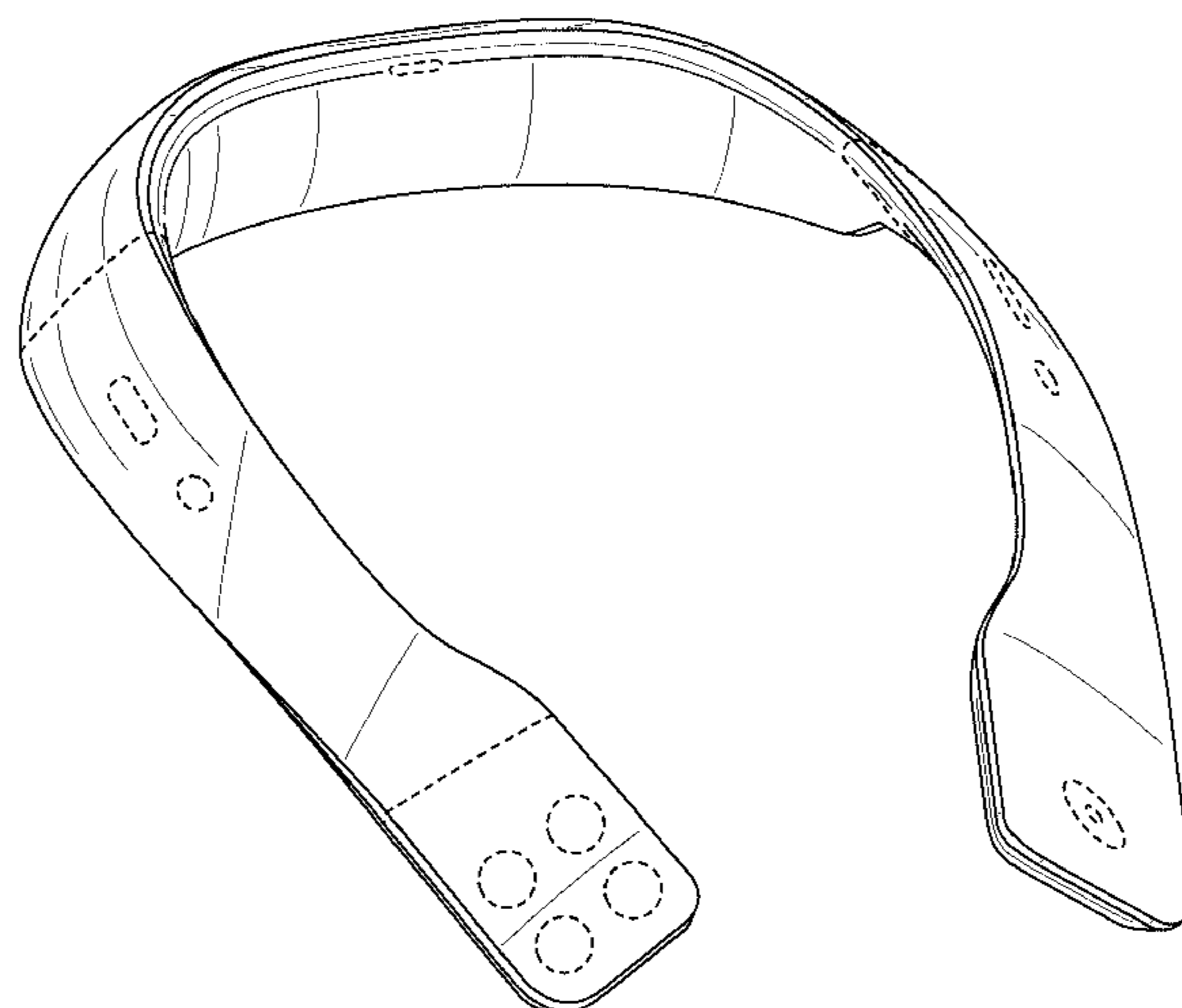
(57) **CLAIM**

We claim the ornamental design for a necklace with a built in guidance device, as shown and described.

**DESCRIPTION**

FIG. 1 is a top perspective view of the necklace with a built in guidance device showing our new design; FIG. 2 is a top plan view thereof; FIG. 3 is a bottom plan view thereof; FIG. 4 is a left side elevation view thereof; FIG. 5 is a right side elevation view thereof; FIG. 6 is a front elevation view thereof; and, FIG. 7 is a rear elevation view thereof. The broken lines shown in FIGS. 1 through 7 illustrate portions of the necklace with a built in guidance device that form no part of the claimed design.

**1 Claim, 6 Drawing Sheets**



(56)

References Cited

U.S. PATENT DOCUMENTS

5,265,272 A	11/1993	Kurcbart	8,583,282 B2	11/2013	Angle et al.
5,463,428 A	10/1995	Lipton et al.	8,588,464 B2	11/2013	Albertson et al.
5,508,699 A	4/1996	Silverman	8,588,972 B2	11/2013	Fung
5,543,802 A	8/1996	Villevieille	8,594,935 B2	11/2013	Cioffi et al.
5,568,127 A	10/1996	Bang	8,610,879 B2	12/2013	Ben-Moshe et al.
5,701,356 A	12/1997	Stanford et al.	8,630,633 B1	1/2014	Tedesco et al.
5,733,127 A	3/1998	Mecum	8,676,623 B2	3/2014	Gale et al.
5,807,111 A	9/1998	Schrader	8,694,251 B2	4/2014	Janardhanan et al.
5,872,744 A	2/1999	Taylor	8,743,145 B1	6/2014	Price
5,956,630 A	9/1999	Mackey	8,750,898 B2	6/2014	Haney
5,982,286 A	11/1999	Vanmoor	8,768,071 B2	7/2014	Tsuchinaga et al.
6,009,577 A *	1/2000	Day ..... A47C 7/383 5/636	8,786,680 B2	7/2014	Shiratori
6,055,048 A	4/2000	Langevin et al.	8,797,141 B2	8/2014	Best et al.
6,199,010 B1	3/2001	Richton	8,814,019 B2	8/2014	Dyster et al.
6,229,901 B1	5/2001	Mickelson et al.	8,825,398 B2	9/2014	Alexandre
6,230,349 B1 *	5/2001	Silver ..... A47C 7/383 297/393	D721,673 S *	1/2015	Park ..... D14/205
6,285,757 B1	9/2001	Carroll et al.	8,926,330 B2	1/2015	Taghavi
6,307,526 B1	10/2001	Mann	D727,194 S *	4/2015	Wilson ..... D11/3
6,323,807 B1	11/2001	Golding et al.	9,004,330 B2	4/2015	White
6,349,001 B1	2/2002	Spitzer	9,081,385 B1	7/2015	Ferguson
6,466,232 B1	10/2002	Newell	D736,741 S *	8/2015	Katz ..... D14/205
6,580,999 B2	6/2003	Maruyama et al.	D738,238 S *	9/2015	Pede ..... D10/70
6,594,370 B1	7/2003	Anderson	9,140,554 B2	9/2015	Jerauld
6,603,863 B1	8/2003	Nagayoshi	9,158,378 B2	10/2015	Hirukawa
6,619,836 B1	9/2003	Silvant et al.	D742,535 S *	11/2015	Wu ..... D24/215
6,774,788 B1	8/2004	Balfe	D743,933 S *	11/2015	Park ..... D14/205
6,825,875 B1	11/2004	Strub et al.	9,269,015 B2	2/2016	Boncyk
6,826,477 B2	11/2004	Ladetto et al.	D756,958 S *	5/2016	Lee ..... D14/205
6,834,373 B2	12/2004	Dieberger	D756,959 S *	5/2016	Lee ..... D14/205
6,857,775 B1 *	2/2005	Wilson ..... G04B 37/1486 224/164	2001/0023387 A1	9/2001	Rollo
6,920,229 B2	7/2005	Boesen	2002/0067282 A1	6/2002	Moskowitz et al.
D513,997 S *	1/2006	Wilson ..... D10/30	2002/0071277 A1	6/2002	Starner et al.
7,027,874 B1	4/2006	Sawan et al.	2002/0075323 A1	6/2002	O'Dell
D522,300 S *	6/2006	Roberts ..... D6/601	2002/0173346 A1	11/2002	Wang
7,106,220 B2	9/2006	Gourgey et al.	2003/0026461 A1	2/2003	Hunter
7,299,034 B2	11/2007	Kates	2003/0179133 A1	9/2003	Pepin et al.
7,336,226 B2	2/2008	Jung et al.	2004/0232179 A1	11/2004	Chauhan
7,356,473 B2	4/2008	Kates	2004/0267442 A1	12/2004	Fehr et al.
7,413,554 B2	8/2008	Kobayashi et al.	2005/0208457 A1	9/2005	Fink et al.
7,417,592 B1	8/2008	Hsiao et al.	2006/0004512 A1	1/2006	Herbst
7,428,429 B2	9/2008	Gantz et al.	2006/0028550 A1	2/2006	Palmer
7,496,445 B2	2/2009	Mohsini	2006/0029256 A1	2/2006	Miyoshi
7,564,469 B2	7/2009	Cohen	2006/0129308 A1	6/2006	Kates
7,598,976 B2	10/2009	Sofer et al.	2006/0184318 A1	8/2006	Yoshimine
7,618,260 B2	11/2009	Daniel et al.	2006/0292533 A1	12/2006	Selod
D609,818 S *	2/2010	Tsang ..... D24/215	2007/0001904 A1	1/2007	Mendelson
7,656,290 B2	2/2010	Fein et al.	2007/0052672 A1	3/2007	Ritter et al.
7,659,915 B2	2/2010	Kurzweil et al.	2007/0173688 A1	7/2007	Kim
7,743,996 B2	6/2010	Maciver	2007/0296572 A1	12/2007	Fein
D625,427 S *	10/2010	Lee ..... D24/214	2008/0024594 A1	1/2008	Ritchey
7,848,512 B2	12/2010	Eldracher	2008/0068559 A1	3/2008	Howell
7,864,991 B2	1/2011	Espenlaub et al.	2008/0120029 A1	5/2008	Zelek et al.
7,938,756 B2	5/2011	Rodetsky et al.	2008/0198222 A1	8/2008	Gowda
7,991,576 B2	8/2011	Roumeliotis	2008/0251110 A1	10/2008	Pede
D649,655 S *	11/2011	Petersen ..... D24/215	2009/0118652 A1 *	5/2009	Carlucci ..... A61H 7/007 601/134
8,123,660 B2	2/2012	Kruse et al.	2009/0122648 A1	5/2009	Mountain et al.
D656,480 S *	3/2012	McManigal ..... D14/205	2009/0189974 A1	7/2009	Deering
8,138,907 B2	3/2012	Barbeau et al.	2010/0041378 A1	2/2010	Aceves
8,150,107 B2	4/2012	Kurzweil et al.	2010/0109918 A1	5/2010	Liebermann
8,177,705 B2	5/2012	Abolfathi	2010/0110368 A1	5/2010	Chaum
8,239,032 B2	8/2012	Dewhurst	2010/0182242 A1	7/2010	Fields et al.
8,253,760 B2	8/2012	Sako et al.	2010/0182450 A1	7/2010	Kumar
8,300,862 B2	10/2012	Newton et al.	2010/0198494 A1	8/2010	Chao
8,325,263 B2	12/2012	Kato et al.	2010/0199232 A1	8/2010	Mistry et al.
D674,501 S *	1/2013	Petersen ..... D24/215	2010/0245585 A1	9/2010	Fisher et al.
8,359,122 B2	1/2013	Koselka et al.	2010/0267276 A1	10/2010	Wu
8,395,968 B2	3/2013	Vartanian et al.	2010/0292917 A1	11/2010	Emam et al.
8,401,785 B2	3/2013	Cho et al.	2010/0298976 A1	11/2010	Sugihara et al.
8,414,246 B2	4/2013	Tobey	2010/0305845 A1	12/2010	Alexandre et al.
8,418,705 B2	4/2013	Ota et al.	2010/0308999 A1	12/2010	Chornenky
8,494,507 B1	7/2013	Tedesco et al.	2011/0066383 A1	3/2011	Jangle
8,538,687 B2	9/2013	Plocher et al.	2011/0092249 A1	4/2011	Evanitsky
			2011/0181422 A1	7/2011	Tran
			2011/0187640 A1	8/2011	Jacobsen
			2011/0211760 A1	9/2011	Boncyk
			2011/0216006 A1	9/2011	Litschel
			2011/0221670 A1	9/2011	King, III et al.
			2011/0260681 A1	10/2011	Guccione



(56)

References Cited

U.S. PATENT DOCUMENTS

2011/0307172 A1 12/2011 Jadhav et al.  
 2012/0016578 A1 1/2012 Coppens  
 2012/0053826 A1 3/2012 Slamka  
 2012/0062357 A1 3/2012 Slamka  
 2012/0069511 A1 3/2012 Azera  
 2012/0075168 A1 3/2012 Osterhout et al.  
 2012/0085377 A1 4/2012 Trout  
 2012/0092161 A1 4/2012 West  
 2012/0092460 A1 4/2012 Mahoney  
 2012/0123784 A1 5/2012 Baker et al.  
 2012/0136666 A1 5/2012 Corpier et al.  
 2012/0143495 A1 6/2012 Dantu  
 2012/0162423 A1 6/2012 Xiao et al.  
 2012/0194552 A1 8/2012 Osterhout et al.  
 2012/0206335 A1 8/2012 Osterhout et al.  
 2012/0206607 A1 8/2012 Morioka  
 2012/0214418 A1 8/2012 Lee  
 2012/0232430 A1 9/2012 Boissy et al.  
 2012/0249797 A1 10/2012 Haddick et al.  
 2012/0252483 A1 10/2012 Farmer et al.  
 2012/0316884 A1 12/2012 Rozaieski et al.  
 2012/0323485 A1 12/2012 Mutoh  
 2013/0002452 A1 1/2013 Lauren  
 2013/0044005 A1 2/2013 Foshee et al.  
 2013/0046541 A1 2/2013 Klein et al.  
 2013/0066636 A1 3/2013 Singhal  
 2013/0115579 A1 5/2013 Taghavi  
 2013/0116559 A1 5/2013 Levin  
 2013/0127980 A1 5/2013 Haddick  
 2013/0128051 A1 5/2013 Velipasalar et al.  
 2013/0131985 A1 5/2013 Weiland et al.  
 2013/0141576 A1 6/2013 Lord et al.  
 2013/0157230 A1 6/2013 Morgan  
 2013/0184982 A1 7/2013 DeLuca  
 2013/0202274 A1 8/2013 Chan  
 2013/0211718 A1 8/2013 Yoo et al.  
 2013/0218456 A1 8/2013 Zelek et al.  
 2013/0228615 A1 9/2013 Gates et al.  
 2013/0229669 A1 9/2013 Smits  
 2013/0245396 A1 9/2013 Berman et al.  
 2013/0250078 A1 9/2013 Levy  
 2013/0253818 A1 9/2013 Sanders et al.  
 2013/0271584 A1 10/2013 Wexler et al.  
 2013/0307842 A1 11/2013 Grinberg et al.  
 2013/0328683 A1 12/2013 Sitbon et al.  
 2013/0332452 A1 12/2013 Jarvis  
 2014/0009561 A1 1/2014 Sutherland  
 2014/0031081 A1 1/2014 Vossoughi  
 2014/0031977 A1 1/2014 Goldenberg et al.  
 2014/0032596 A1 1/2014 Fish et al.  
 2014/0037149 A1 2/2014 Zetune  
 2014/0071234 A1 3/2014 Millett  
 2014/0085446 A1 3/2014 Hicks  
 2014/0098018 A1 4/2014 Kim et al.  
 2014/0100773 A1 4/2014 Cunningham et al.  
 2014/0125700 A1 5/2014 Ramachandran  
 2014/0184384 A1 7/2014 Zhu et al.  
 2014/0222023 A1 8/2014 Kim et al.  
 2014/0251396 A1 9/2014 Subhashrao et al.  
 2014/0253702 A1 9/2014 Wexler  
 2014/0278070 A1 9/2014 McGavran  
 2014/0345956 A1 11/2014 Kojina  
 2014/0368412 A1 12/2014 Jacobsen  
 2014/0369541 A1 12/2014 Miskin  
 2015/0002808 A1 1/2015 Rizzo, III et al.  
 2015/0016035 A1 1/2015 Tussy  
 2015/0109107 A1 4/2015 Gomez et al.  
 2015/0142891 A1 5/2015 Haque  
 2015/0196101 A1 7/2015 Dayal et al.  
 2015/0198454 A1 7/2015 Moore et al.  
 2015/0198455 A1 7/2015 Chen  
 2015/0199566 A1 7/2015 Moore et al.  
 2015/0201181 A1 7/2015 Moore et al.  
 2015/0211858 A1 7/2015 Jerauld

2015/0257555 A1\* 9/2015 Wong ..... A47C 7/383  
 5/636

2015/0260474 A1 9/2015 Rublowsky  
 2015/0336276 A1 11/2015 Song  
 2015/0356837 A1 12/2015 Pajestka  
 2015/0364943 A1 12/2015 Vick  
 2015/0375395 A1 12/2015 Kwon

FOREIGN PATENT DOCUMENTS

CN 101803988 8/2010  
 CN 101647745 1/2011  
 CN 102316193 1/2012  
 CN 102631280 8/2012  
 CN 202547659 11/2012  
 CN 202722736 2/2013  
 CN 103445920 12/2013  
 DE 102011080056 1/2013  
 DE 102012000587 7/2013  
 DE 102012202614 8/2013  
 EP 2368455 9/2011  
 EP 2371339 10/2011  
 EP 2581856 4/2013  
 FR 2885251 11/2006  
 JP 10069539 3/1998  
 JP 2001304908 10/2001  
 JP 2010012529 1/2010  
 JP 2010182193 8/2010  
 JP 2013169611 9/2013  
 KR 100405636 11/2003  
 KR 20080080688 9/2008  
 KR 20120020212 3/2012  
 WO WO 0010073 2/2000  
 WO WO 0038393 6/2000  
 WO WO 0179956 10/2001  
 WO WO 2004/076974 9/2004  
 WO WO 2006/028354 3/2006  
 WO WO 2006/045819 5/2006  
 WO WO 2007/031782 3/2007  
 WO WO 2008/008791 1/2008  
 WO WO 2008/035993 3/2008  
 WO WO 2008/096134 8/2008  
 WO WO 2010/062481 6/2010  
 WO WO 2010/109313 9/2010  
 WO WO 2012/040703 3/2012  
 WO WO 2013/045557 4/2013  
 WO WO 2013/054257 4/2013  
 WO WO 2013/067539 5/2013  
 WO WO 2013/147704 10/2013  
 WO WO 2014/104531 7/2014  
 WO WO 2014/138123 9/2014  
 WO WO 2014/172378 10/2014

OTHER PUBLICATIONS

Cardonha et al.; "A Crowdsourcing Platform for the Construction of Accessibility Maps"; W4A'13 Proceedings of the 10<sup>th</sup> International Cross-Disciplinary Conference on Web Accessibility; Article No. 26; 2013; 5 pages.  
 Bujacz et al.; "Remote Guidance for the Blind—A Proposed Teleassistance System and Navigation Trials"; Conference on Human System Interactions; May 25-27, 2008; 6 pages.  
 Rodriguez et al.; "CrowdSight: Rapidly Prototyping Intelligent Visual Processing Apps"; AAAI Human Computation Workshop (HCOMP); 2011; 6 pages.  
 Chaudary et al.; "Alternative Navigation Assistance Aids for Visually Impaired Blind Persons"; Proceedings of ICEAPVI; Feb. 12-14, 2015; 5 pages.  
 Garaj et al.; "A System for Remote Sighted Guidance of Visually Impaired Pedestrians"; The British Journal of Visual Impairment; vol. 21, No. 2, 2003; 9 pages.  
 Coughlan et al.; "Crosswatch: A System for Providing Guidance to Visually Impaired Travelers at Traffic Intersections"; Journal of Assistive Technologies 7.2; 2013; 17 pages.  
 Sudol et al.; "LookTel—A Comprehensive Platform for Computer-Aided Visual Assistance"; Computer Vision and Pattern Recognition Workshops (CVPRW), 2010 IEEE Computer Society Conference; Jun. 13-18, 2010; 8 pages.



(56)

## References Cited

## OTHER PUBLICATIONS

- Paladugu et al.; “GoingEasy® with Crowdsourcing in the Web 2.0 World for Visually Impaired Users: Design and User Study”; Arizona State University; 8 pages.
- Kammoun et al.; “Towards a Geographic Information System Facilitating Navigation of Visually Impaired Users”; Springer Berlin Heidelberg; 2012; 8 pages.
- Bigham et al.; “VizWiz: Nearly Real-Time Answers to Visual Questions” Proceedings of the 23rd annual ACM symposium on User interface software and technology; 2010; 2 pages.
- Guy et al.; “CrossingGuard: Exploring Information Content in Navigation Aids for Visually Impaired Pedestrians” Proceedings of the SIGCHI Conference on Human Factors in Computing Systems; May 5-10, 2012; 10 pages.
- Zhang et al.; “A Multiple Sensor-Based Shoe-Mounted User Interface Designed for Navigation Systems for the Visually Impaired”; 5<sup>th</sup> Annual ICST Wireless Internet Conference (WICON); Mar. 1-3, 2010; 9 pages.
- Shoval et al.; “Navbelt and the GuideCane—Robotics-Based Obstacle-Avoidance Systems for the Blind and Visually Impaired”; IEEE Robotics & Automation Magazine, vol. 10, Issue 1; Mar. 2003; 12 pages.
- Dowling et al.; “Intelligent Image Processing Constraints for Blind Mobility Facilitated Through Artificial Vision”; 8<sup>th</sup> Australian and NewZealand Intelligent Information Systems Conference (ANZIIS); Dec. 10-12, 2003; 7 pages.
- Heyes, Tony; “The Sonic Pathfinder an Electronic Travel Aid for the Vision Impaired”; [http://members.optuszo.com.au/aheyew40/pf\\_blerf.html](http://members.optuszo.com.au/aheyew40/pf_blerf.html); Dec. 11, 2014; 7 pages.
- Lee et al.; “Adaptive Power Control of Obstacle Avoidance System Using Via Motion Context for Visually Impaired Person.” International Conference on Cloud Computing and Social Networking (ICCCSN), Apr. 26-27, 2012 4 pages.
- Wilson, Jeff, et al. “Swan: System for Wearable Audio Navigation”; 11th IEEE International Symposium on Wearable Computers; Oct. 11-13, 2007; 8 pages.
- Borenstein et al.; “The GuideCane—A Computerized Travel Aid for the Active Guidance of Blind Pedestrians”; IEEE International Conference on Robotics and Automation; Apr. 21-27, 1997; 6 pages.
- Bhatlawande et al.; “Way-finding Electronic Bracelet for Visually Impaired People”; IEEE Point-of-Care Healthcare Technologies (PHT), Jan. 16-18, 2013; 4 pages.
- Blenkhorn et al.; “An Ultrasonic Mobility Device with Minimal Audio Feedback”; Center on Disabilities Technology and Persons with Disabilities Conference; Nov. 22, 1997; 5 pages.
- Mann et al.; “Blind Navigation with a Wearable Range Camera and Vibrotactile Helmet”; 19<sup>th</sup> ACM International Conference on Multimedia; Nov. 28, 2011; 4 pages.
- Shoval et al.; “The Navbelt—A Computerized Travel Aid for the Blind”; RESNA Conference, Jun. 12-17, 1993; 6 pages.
- Kumar et al.; “An Electronic Travel Aid for Navigation of Visually Impaired Persons”; Communications Systems and Networks (COMSNETS), 2011 Third International Conference; Jan. 2011; 5 pages.
- Pawar et al.; “Multitasking Stick for Indicating Safe Path to Visually Disable People”; IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), vol. 10, Issue 3, Ver. II; May-Jun. 2015; 5 pages.
- Pagliarini et al.; “Robotic Art for Wearable”; Proceedings of EUROSAM: European Conference for the Applied Mathematics and Informatics 2010; 10 pages.
- Greenberg et al.; “Finding Your Way: A Curriculum for Teaching and Using the Brailnote with Sendero GPS 2011”; California School for the Blind; 2011; 190 pages.
- Helal et al.; “Drishti: An Integrated Navigation System for Visually Impaired and Disabled”; Fifth International Symposium on Wearable Computers; Oct. 8-9, 2001; 8 pages.
- Parkes, Don; “Audio Tactile Systems for Designing and Learning Complex Environments as a Vision Impaired Person: Static and Dynamic Spatial Information Access”; EdTech-94 Proceedings; 1994; 8 pages.
- Zeng et al.; “Audio-Haptic Browser for a Geographical Information System”; ICCHP 2010, Part II, LNCS 6180; Jul. 14-16, 2010; 8 pages.
- AlZuhair et al.; “NFC Based Applications for Visually Impaired People—A Review”; IEEE International Conference on Multimedia and Expo Workshops (ICMEW), Jul. 14, 2014; 7 pages.
- Graf, Christian; “Verbally Annotated Tactile Maps—Challenges and Approaches”; Spatial Cognition VII, vol. 6222; Aug. 15-19, 2010; 16 pages.
- Hamid, Nazatul Naquiah Abd; “Facilitating Route Learning Using Interactive Audio-Tactile Maps for Blind and Visually Impaired People”; CHI 2013 Extended Abstracts; Apr. 27, 2013; 6 pages.
- Ramya, et al.; “Voice Assisted Embedded Navigation System for the Visually Impaired”; International Journal of Computer Applications; vol. 64, No. 13, Feb. 2013; 7 pages.
- Caperna et al.; “A Navigation and Object Location Device for the Blind”; Tech. rep. University of Maryland College Park; May 2009; 129 pages.
- Burbey et al.; “Human Information Processing with the Personal Memex”; ISE 5604 Fall 2005; Dec. 6, 2005; 88 pages.
- Ghiani, et al.; “Vibrotactile Feedback to Aid Blind Users of Mobile Guides”; Journal of Visual Languages and Computing 20; 2009; 13 pages.
- Guerrero et al.; “An Indoor Navigation System for the Visually Impaired”; Sensors vol. 12, Issue 6; Jun. 13, 2012; 23 pages.
- Nordin et al.; “Indoor Navigation and Localization for Visually Impaired People Using Weighted Topological Map”; Journal of Computer Science vol. 5, Issue 11; 2009; 7 pages.
- Hesch et al.; “Design and Analysis of a Portable Indoor Localization Aid for the Visually Impaired”; International Journal of Robotics Research; vol. 29; Issue 11; Sep. 2010; 15 pgs.
- Joseph et al.; “Visual Semantic Parameterization—To Enhance Blind User Perception for Indoor Navigation”; Multimedia and Expo Workshops (ICMEW), 2013 IEEE International Conference; Jul. 15, 2013; 7 pages.
- Katz et al.; “NAVIG: Augmented Reality Guidance System for the Visually Impaired”; Virtual Reality (2012) vol. 16; 2012; 17 pages.
- Rodríguez et al.; “Assisting the Visually Impaired: Obstacle Detection and Warning System by Acoustic Feedback”; Sensors 2012; vol. 12; 21 pages.
- Treuillet; “Outdoor/Indoor Vision-Based Localization for Blind Pedestrian Navigation Assistance”; WSPC/Instruction File; May 23, 2010; 16 pages.
- Ran et al.; “Drishti: An Integrated Indoor/Outdoor Blind Navigation System and Service”; Proceeding PERCOM '04 Proceedings of the Second IEEE International Conference on Pervasive Computing and Communications (PerCom'04); 2004; 9 pages.
- Wang, et al.; “Camera-Based Signage Detection and Recognition for Blind Persons”; 13<sup>th</sup> International Conference (ICCHP) Part 2 Proceedings; Jul. 11-13, 2012; 9 pages.
- Krishna et al.; “A Systematic Requirements Analysis and Development of an Assistive Device to Enhance the Social Interaction of People Who are Blind or Visually Impaired”; Workshop on Computer Vision Applications for the Visually Impaired; Marseille, France; 2008; 12 pages.
- Lee et al.; “A Walking Guidance System for the Visually Impaired”; International Journal of Pattern Recognition and Artificial Intelligence; vol. 22; No. 6; 2008; 16 pages.
- Ward et al.; “Visual Experiences in the Blind Induced by an Auditory Sensory Substitution Device”; Journal of Consciousness and Cognition; Oct. 2009; 30 pages.
- Merino-Garcia, et al.; “A Head-Mounted Device for Recognizing Text in Natural Sciences”; CBDAR'11 Proceedings of the 4<sup>th</sup> International Conference on Camera-Based Document Analysis and Recognition; Sep. 22, 2011; 7 pages.
- Yi, Chucai; “Assistive Text Reading from Complex Background for Blind Persons”; CBDAR'11 Proceedings of the 4<sup>th</sup> International Conference on Camera-Based Document Analysis and Recognition; Sep. 22, 2011; 7 pages.



(56)

## References Cited

## OTHER PUBLICATIONS

Yang, et al.; “Towards Automatic Sign Translation”; The Interactive Systems Lab, Carnegie Mellon University; 2001; 5 pages.

Meijer, Dr. Peter B.L.; “Mobile OCR, Face and Object Recognition for the Blind”; The vOICe, [www.seeingwithsound.com/ocr.htm](http://www.seeingwithsound.com/ocr.htm); Apr. 18, 2014; 7 pages.

OMRON; Optical Character Recognition Sensor User’s Manual; 2012; 450 pages.

Park, Sungwoo; “Voice Stick”; [www.yankodesign.com/2008/08/21/voice-stick](http://www.yankodesign.com/2008/08/21/voice-stick); Aug. 21, 2008; 4 pages.

Rentschler et al.; “Intelligent Walkers for the Elderly: Performance and Safety Testing of VA-PAMAID Robotic Walker”; Department of Veterans Affairs Journal of Rehabilitation Research and Development; vol. 40, No. 5; Sep./Oct. 2013; 9 pages.

Science Daily; “Intelligent Walker Designed to Assist the Elderly and People Undergoing Medical Rehabilitation”; <http://www.sciencedaily.com/releases/2008/11/081107072015.htm>; Jul. 22, 2014; 4 pages.

Glover et al.; “A Robotically-Augmented Walker for Older Adults”; Carnegie Mellon University, School of Computer Science; Aug. 1, 2003; 13 pages.

OrCam; [www.orcam.com](http://www.orcam.com); Jul. 22, 2014; 3 pages.

Eccles, Lisa; “Smart Walker Detects Obstacles”; Electronic Design; <http://electronicdesign.com/electromechanical/smart-walker-detects-obstacles>; Aug. 20, 2001; 2 pages.

Graft, Birgit; “An Adaptive Guidance System for Robotic Walking Aids”; Journal of Computing and Information Technology—CIT 17; 2009; 12 pages.

Frizera et al.; “The Smart Walkers as Geriatric Assistive Device. The SIMBIOSIS Purpose”; Gerontechnology, vol. 7, No. 2; Jan. 30, 2008; 6 pages.

Rodriguez-Losada et al.; “Guido, The Robotic Smart Walker for the Frail Visually Impaired”; IEEE International Conference on Robotics and Automation (ICRA); Apr. 18-22, 2005; 15 pages.

Kayama et al.; “Outdoor Environment Recognition and Semi-Autonomous Mobile Vehicle for Supporting Mobility of the Elderly and Disabled People”; National Institute of Information and Communications Technology, vol. 54, No. 3; Aug. 2007; 11 pages.

Kalra et al.; “A Braille Writing Tutor to Combat Illiteracy in Developing Communities”; Carnegie Mellon University Research Showcase, Robotics Institute; 2007; 10 pages.

AppleVis; *An Introduction to Braille Screen Input on iOS 8*; <http://www.applevis.com/guides/braille-ios/introduction-braille-screen-input-ios-8>, Nov. 16, 2014; 7 pages.

Dias et al.; “Enhancing an Automated Braille Writing Tutor”; IEEE/RSJ International Conference on Intelligent Robots and Systems; Oct. 11-15, 2009; 7 pages.

D’Andrea, Frances Mary; “More than a Perkins Braille: A Review of the Mountbatten Braille, Part I”; AFB AccessWorld Magazine; vol. 6, No. 1, Jan. 2005; 9 pages.

Trinh et al.; “Phoneme-based Predictive Text Entry Interface”; Proceedings of the 16th International ACM SIGACCESS Conference on Computers & Accessibility; Oct. 2014; 2 pgs.

Merri et al.; “The Instruments for a Blind Teacher of English: The challenge of the board”; European Journal of Psychology of Education, vol. 20, No. 4 (Dec. 2005), 15 pages.

Kirinic et al.; “Computers in Education of Children with Intellectual and Related Developmental Disorders”; International Journal of Emerging Technologies in Learning, vol. 5, 2010, 5 pages.

Campos et al.; “Design and Evaluation of a Spoken-Feedback Keyboard”; Department of Information Systems and Computer Science, INESC-ID/IST/Universidade Tecnica de Lisboa, Jul. 2004; 6 pages.

Ebay; Matin (Made in Korea) Neoprene Canon DSLR Camera Curved Neck Strap #6782; <http://www.ebay.com/itm/MATIN-Made-in-Korea-Neoprene-Canon-DSLR-Camera-Curved-Neck-Strap-6782/>

281608526018?hash=item41912d18c2:g:~pMAAOSwe-Fu6zDa ; 4 pages.

Newegg; Motorola S10-HD Bluetooth Stereo Headphone w/ Comfortable Sweat Proof Design; <http://www.newegg.com/Product/Product.aspx?Item=9SIA0NW2G39901&Tpk=9sia0nw2g39901>; 4 pages.

Newegg; Motorola Behind the Neck Stereo Bluetooth Headphone Black/Red Bulk (S9)—OEM; <http://www.newegg.com/Product/Product.aspx?Item=N82E16875982212&Tpk=n82e16875982212>; 3 pages.

\* cited by examiner

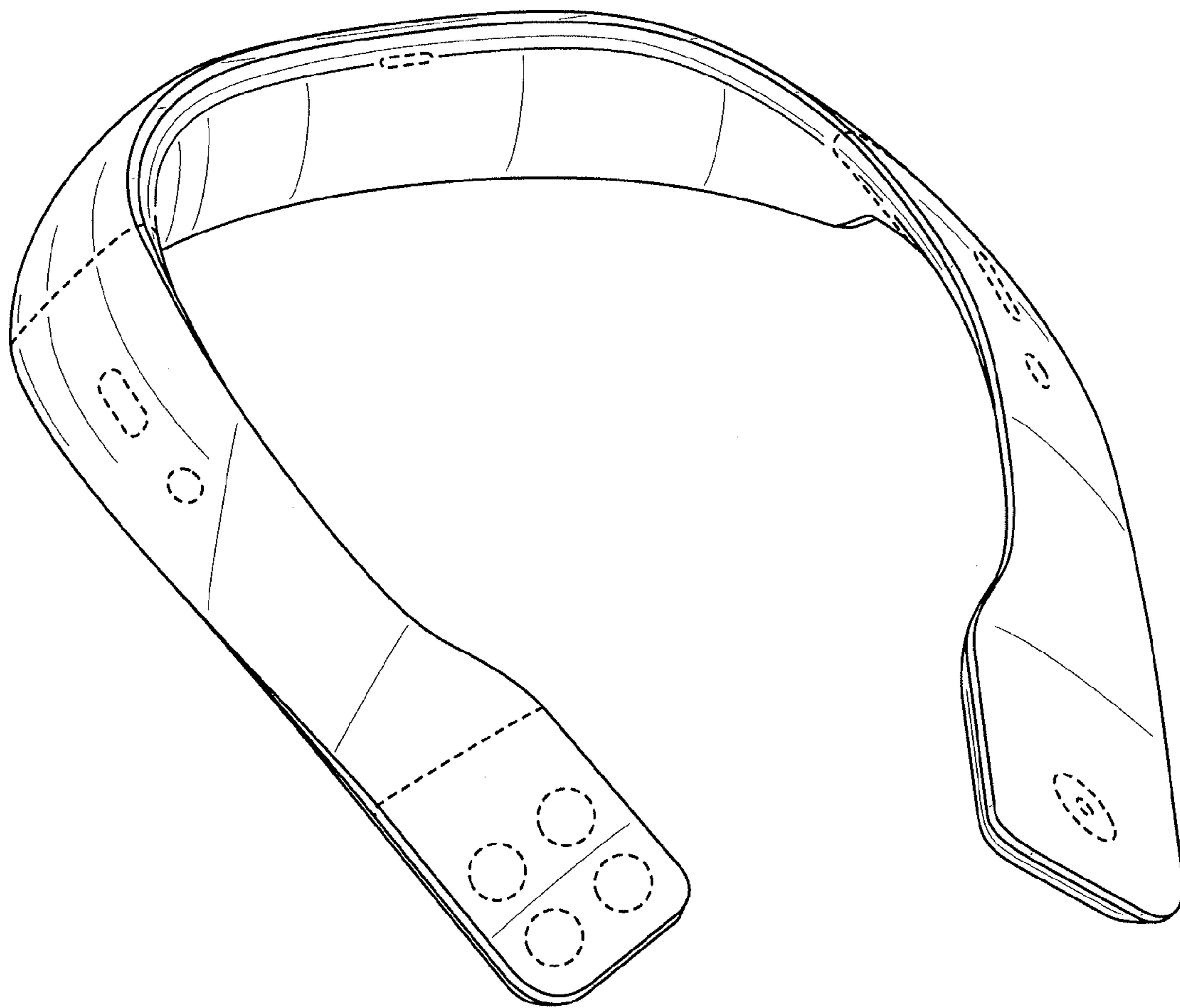


FIG. 1

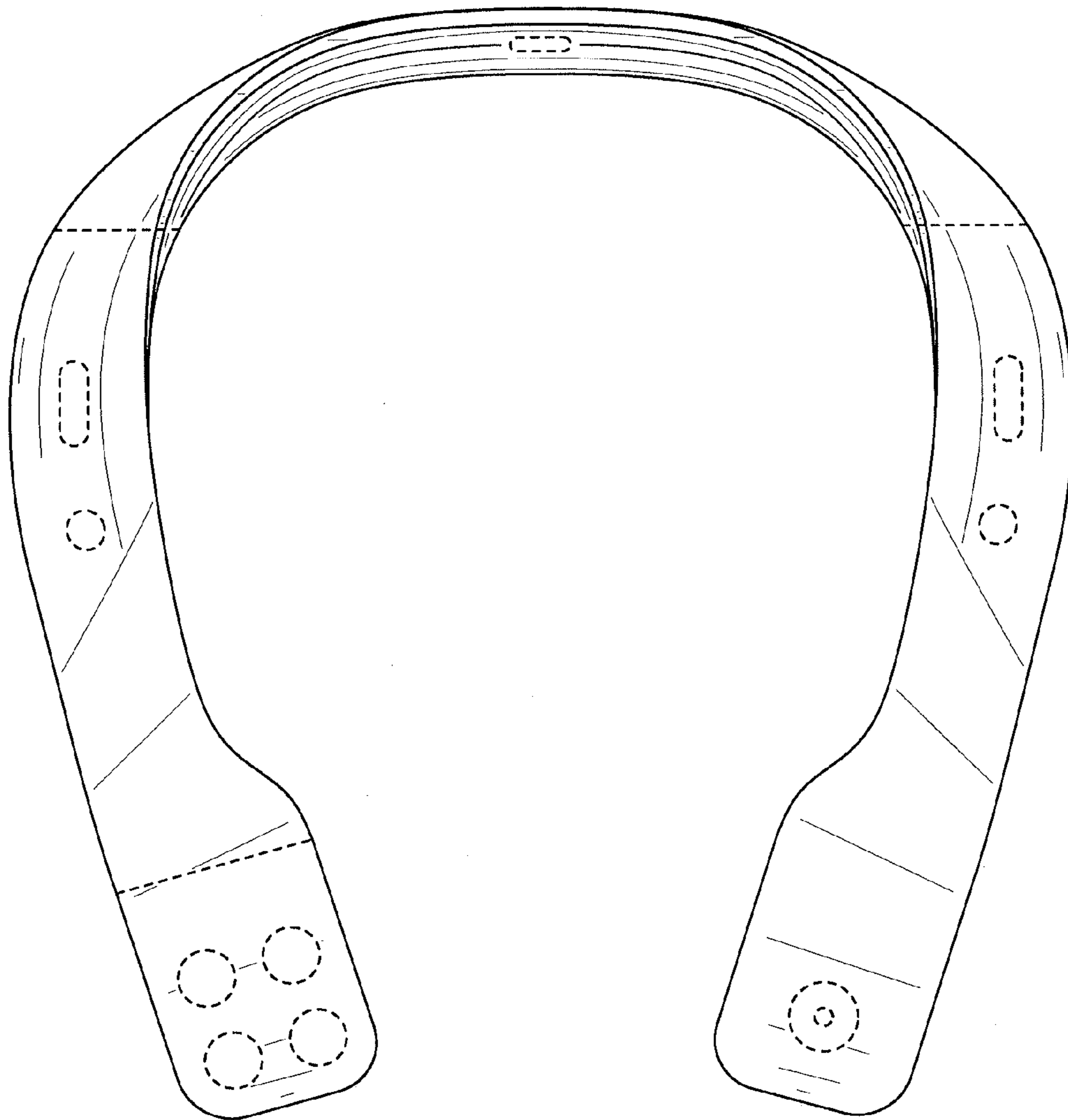


FIG. 2

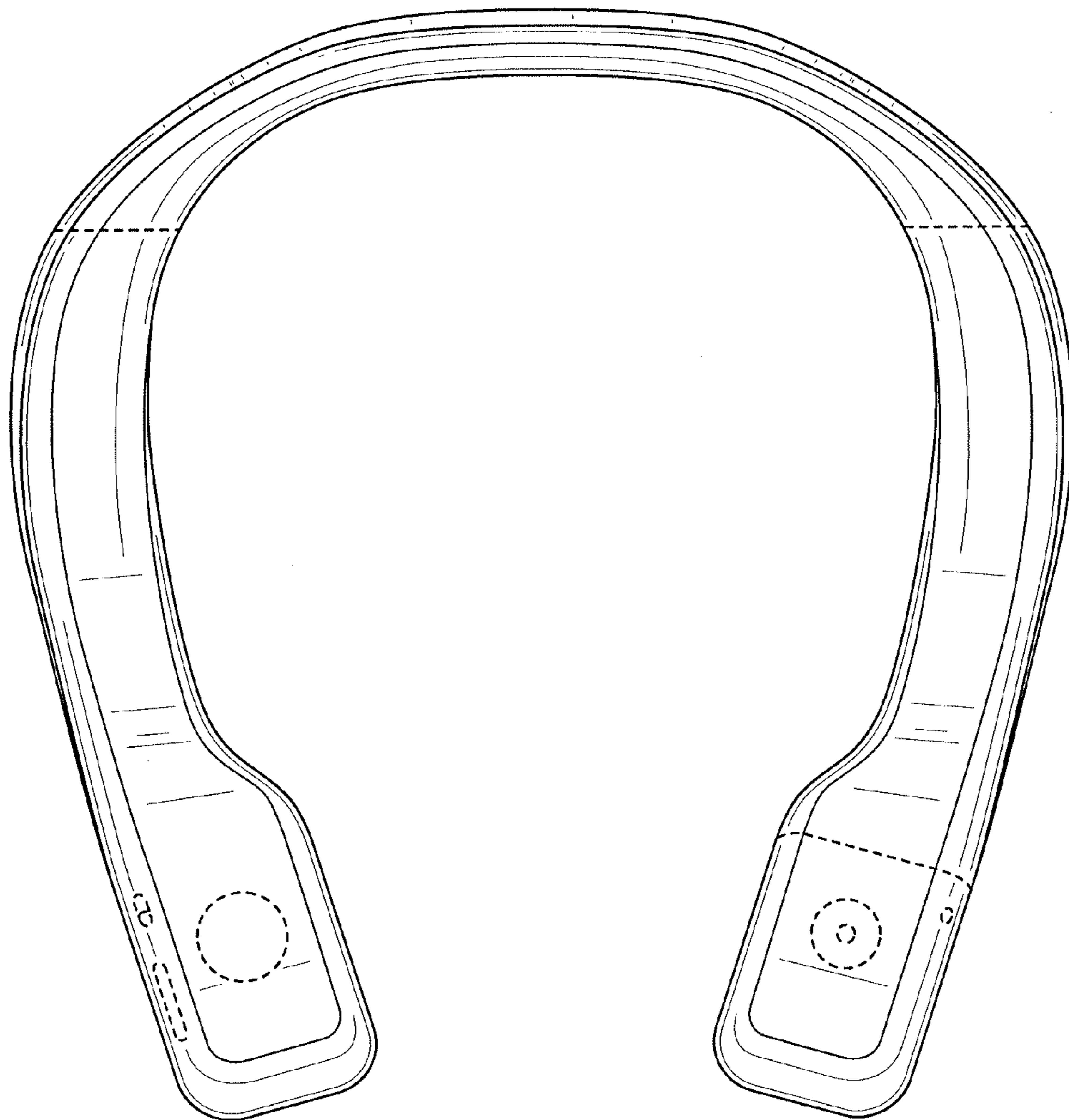


FIG. 3



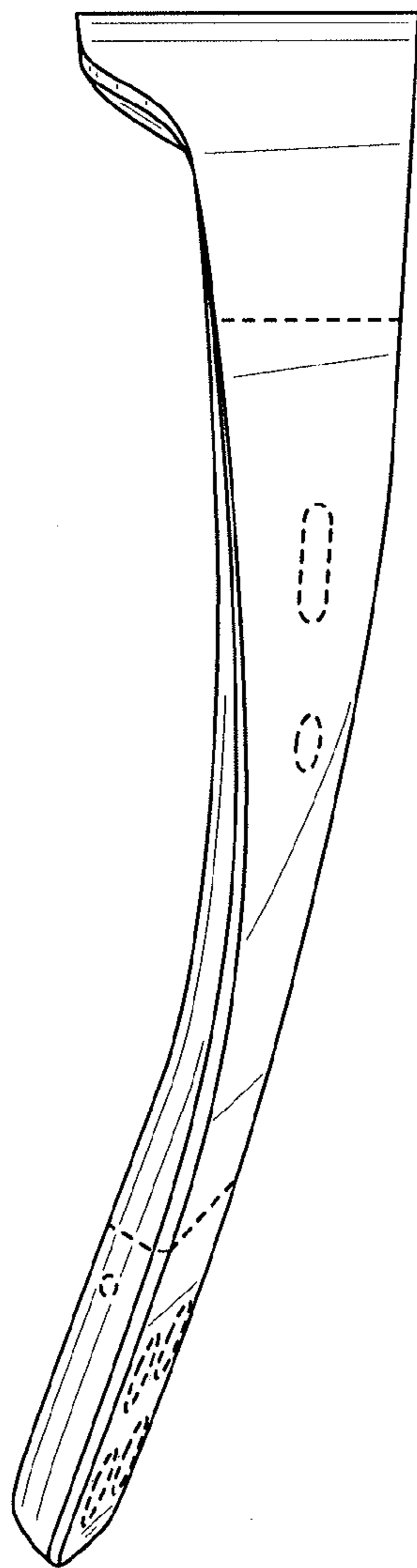


FIG. 4

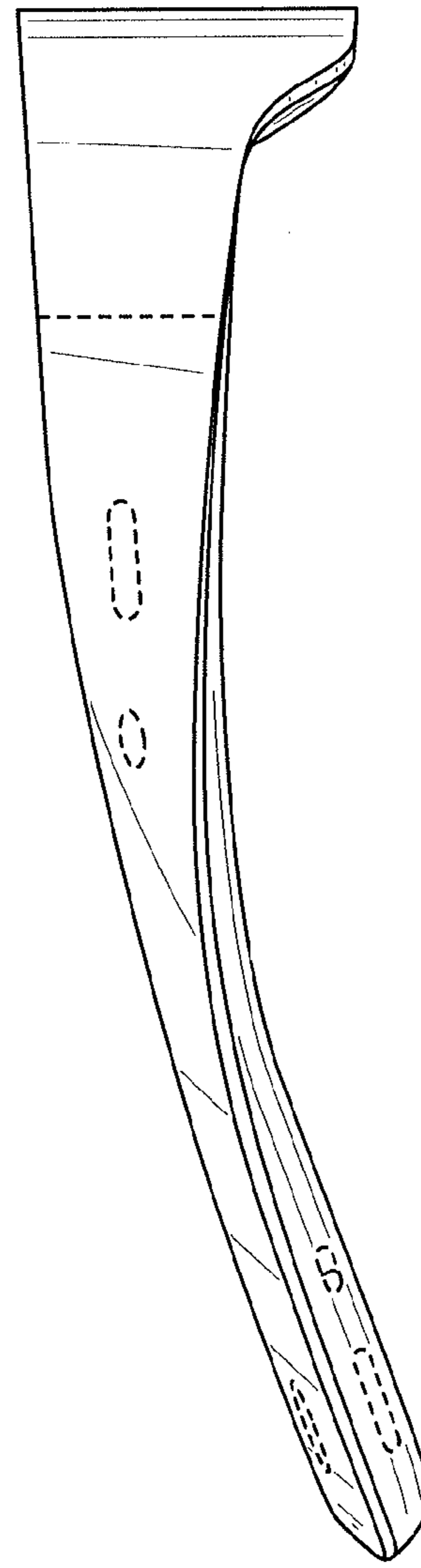


FIG. 5

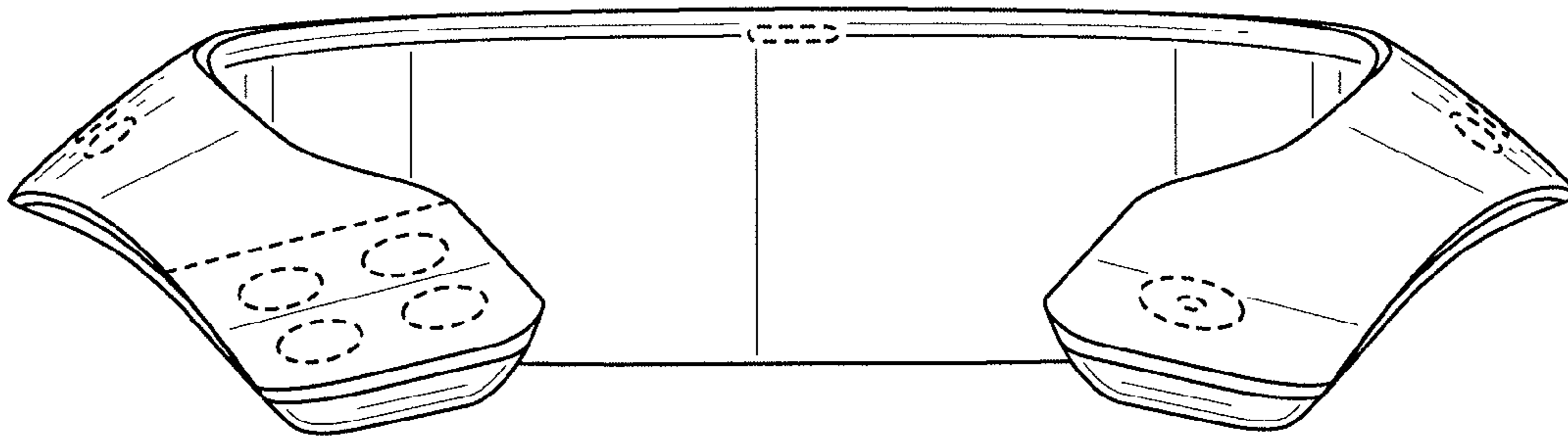


FIG. 6



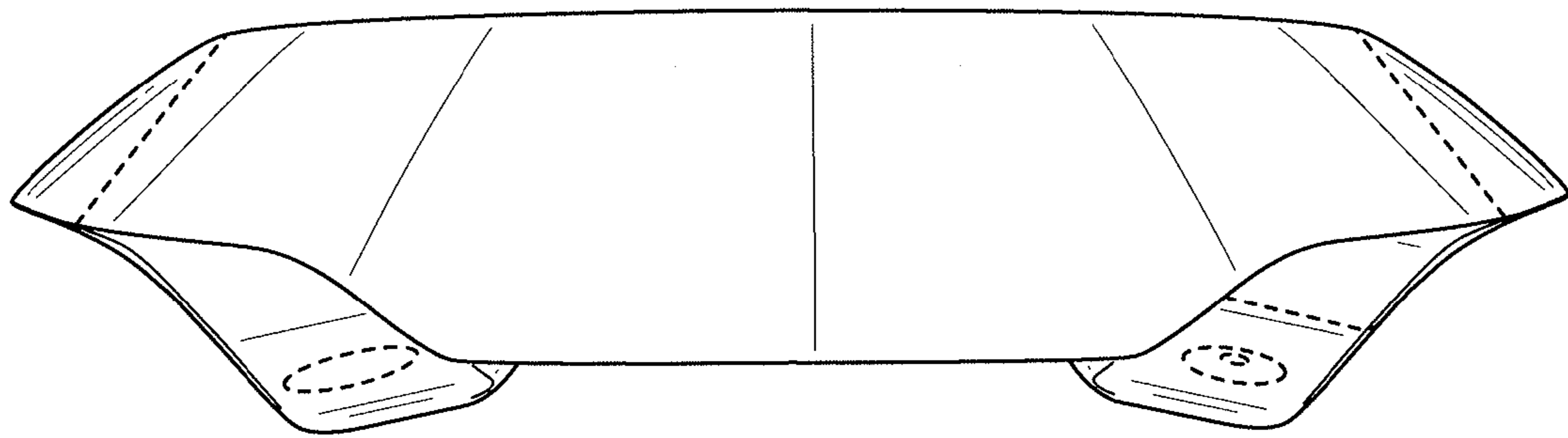


FIG. 7