



US00D782686S

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

(10) **Patent No.:** **US D782,686 S**
(45) **Date of Patent:** **** Mar. 28, 2017**

- (54) **TRANSDUCER-ELECTRODE PAIR FOR A CATHETER**
- (71) Applicant: **Acutus Medical, Inc.**, San Diego, CA (US)
- (72) Inventors: **Randell L. Werneth**, Boise, ID (US);
Christoph Scharf, Horgen (CH);
Ricardo David Roman, Chula Vista, CA (US)
- (73) Assignee: **ACUTUS MEDICAL, INC.**, Carlsbad, CA (US)
- (**) Term: **14 Years**
- (21) Appl. No.: **29/475,273**
- (22) Filed: **Dec. 2, 2013**

Related U.S. Application Data

- (63) Continuation-in-part of application No. PCT/US2013/057579, filed on Aug. 30, 2013.
- (51) **LOC (10) Cl.** **24-01**
- (52) **U.S. Cl.**
USPC **D24/187**
- (58) **Field of Classification Search**
USPC D24/164, 167, 186-187, 200, 211, 215;
D10/32, 80, 104.2; D11/3-5, 16, 38, 27;
(Continued)

References Cited

U.S. PATENT DOCUMENTS

- 4,173,201 A * 11/1979 Chao A01K 27/006
119/859
- 5,555,883 A 9/1996 Avitall
(Continued)

FOREIGN PATENT DOCUMENTS

- EP 1166714 1/2002
- EP 1760661 3/2007
- (Continued)

OTHER PUBLICATIONS

International Search Report and Written Opinion dated Mar. 5, 2013, issued in related International Application No. PCT/US2012/028593.

(Continued)

Primary Examiner — Ian Simmons
Assistant Examiner — Mark Cavanna
(74) *Attorney, Agent, or Firm* — Onello & Mello, LLP

(57) **CLAIM**

An ornamental design for a transducer-electrode pair for a catheter, as shown and described.

DESCRIPTION

FIG. 1 is a perspective view of a first embodiment of a transducer-electrode pair for a catheter, showing my new design;

FIG. 2 is a top view of the transducer-electrode pair for a catheter of FIG. 1;

FIG. 3 is a front view of the transducer-electrode pair for a catheter of FIG. 1;

FIG. 4 is a side view of the transducer-electrode pair for a catheter of FIG. 1;

FIG. 5 is a rear view of the transducer-electrode pair for a catheter of FIG. 1;

FIG. 6 is an enlarged partial perspective view of the transducer-electrode pair for a catheter of FIG. 1;

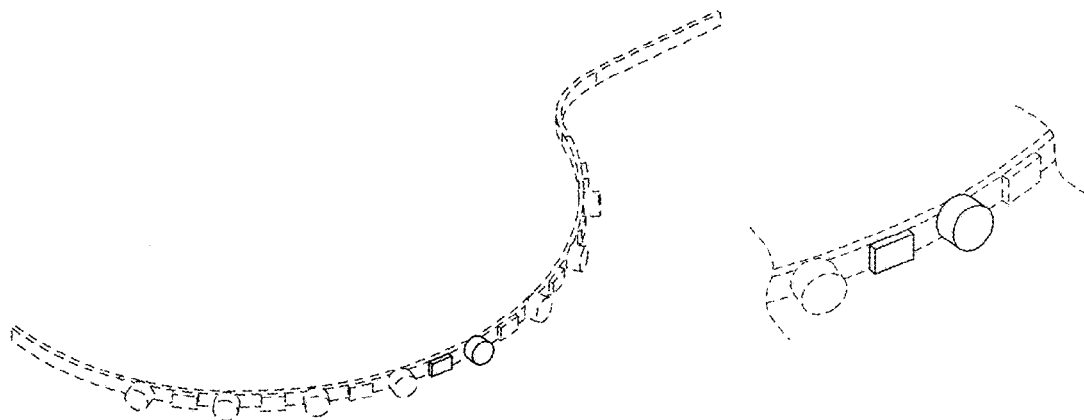
FIG. 7 is an enlarged partial front view of the transducer-electrode pair for a catheter of FIG. 1;

FIG. 8 is an enlarged partial side view of the transducer-electrode pair for a catheter of FIG. 1; and,

FIG. 9 is an enlarged partial rear view of the transducer-electrode pair for a catheter of FIG. 1.

The broken lines are included for the purpose of illustrating portions of the transducer-electrode pair for a catheter that form no part of the claimed design.

1 Claim, 3 Drawing Sheets



(58) **Field of Classification Search**

USPC D30/152, 199, 160, 155, 121; D2/865,
D2/887; D29/122, 106; 600/301, 372,
600/382-386, 481, 529, 396; 381/182;
439/909; D21/707, 712; D32/29.1;
D12/608
CPC ... A61B 5/0002; A61B 5/0004; A61B 5/0006;
A61B 5/0205; A61B 5/02055; A61B
5/0404; A61B 5/08; A61B 5/082; A61B
5/085; A61B 5/087; A61B 5/0816; A61B
5/0878; A61B 5/0826; A61B 5/113; A61B
5/0416; A61B 5/0422; A61B 5/0084;
A61B 18/1492; A61B 18/1482; A01K
27/006; A61N 1/06; A42B 3/069

See application file for complete search history.

(56)

References Cited

U.S. PATENT DOCUMENTS

5,595,183 A * 1/1997 Swanson A61B 5/0422
600/374
5,740,808 A 4/1998 Panescu et al.
D394,411 S * 5/1998 Gozlan D11/4
5,795,298 A 8/1998 Vesely et al.
5,876,336 A * 3/1999 Swanson A61N 1/06
600/374
5,904,651 A * 5/1999 Swanson A61B 5/0084
600/342
5,910,129 A * 6/1999 Koblish A61B 18/1492
604/159
5,928,228 A * 7/1999 Kordis A61B 5/0422
600/374
5,968,040 A * 10/1999 Swanson A61N 1/00
600/374
6,014,590 A * 1/2000 Whayne 600/374
6,066,096 A 5/2000 Smith et al.
D428,218 S * 7/2000 Dehart D30/152
6,086,532 A * 7/2000 Panescu A61B 5/0422
600/437
6,107,699 A * 8/2000 Swanson A61B 18/1492
307/112
D437,472 S * 2/2001 Ruscitti D2/867
6,216,043 B1 * 4/2001 Swanson A61B 5/0422
600/374
6,240,307 B1 5/2001 Beatty et al.
6,301,496 B1 10/2001 Reisfeld
6,314,586 B1 * 11/2001 Duguid A42B 3/069
2/411
6,400,981 B1 6/2002 Govari
D468,492 S * 1/2003 Wilhelm D30/152
6,557,498 B1 * 5/2003 Smierciak A01K 27/006
119/858
6,640,119 B1 10/2003 Budd et al.
D481,525 S * 11/2003 Kirnon D2/885
6,728,562 B1 4/2004 Budd et al.
D495,267 S * 8/2004 Pachachi D11/5
6,826,420 B1 11/2004 Beatty et al.
6,826,421 B1 11/2004 Beatty et al.
6,939,309 B1 * 9/2005 Beatty A61B 5/0422
600/508
6,990,370 B1 1/2006 Beatty et al.
D520,894 S * 5/2006 Zakharyan D30/199
D521,191 S * 5/2006 Berger D29/122
D526,590 S * 8/2006 So D10/104.1
D533,085 S * 12/2006 Mourgue D10/32
D543,127 S * 5/2007 Daas D11/16
D552,004 S * 10/2007 Varon D11/3
7,289,843 B2 10/2007 Beatty et al.
7,291,146 B2 * 11/2007 Steinke A61B 18/1492
606/41
D563,818 S * 3/2008 Varon D11/3
D570,055 S * 5/2008 Ferrara D29/122
D581,765 S * 12/2008 Lane D21/707

7,505,810 B2 3/2009 Harlev et al.
D597,881 S * 8/2009 Hou D11/3
D600,867 S * 9/2009 Howe D32/29.1
D603,744 S * 11/2009 Larsen D11/38
D613,349 S * 4/2010 Metti D24/211
D618,128 S * 6/2010 Clark D11/3
D626,706 S * 11/2010 Ragonetti D30/160
7,841,986 B2 11/2010 He et al.
7,918,793 B2 4/2011 Altmann et al.
7,953,475 B2 5/2011 Harlev et al.
D646,448 S * 10/2011 Cheng D32/29.1
D651,931 S * 1/2012 Molik D11/3
D651,932 S * 1/2012 Molik D11/3
D657,098 S * 4/2012 So D30/155
8,147,486 B2 4/2012 Honour et al.
8,221,310 B2 * 7/2012 Saadat A61B 1/0008
600/104
D677,191 S * 3/2013 Benjamin D11/4
8,417,313 B2 4/2013 Scharf et al.
D688,583 S * 8/2013 Bhang D11/3
8,512,255 B2 8/2013 Scharf et al.
D694,421 S * 11/2013 Anderson D24/215
D695,370 S * 12/2013 Hedeem, Jr. D21/712
8,700,119 B2 4/2014 Scharf et al.
D705,111 S * 5/2014 Namazy D11/27
D706,883 S * 6/2014 Hedeem, Jr. D21/707
D710,058 S * 7/2014 Johnson D29/106
D710,236 S * 8/2014 Lee D10/104.2
D714,178 S * 9/2014 Sabbioni D11/3
D717,684 S * 11/2014 Delaney D11/3
D728,408 S * 5/2015 Murphy D11/3
D731,964 S * 6/2015 Williams D12/608
D734,685 S * 7/2015 Barresi D11/3
D742,601 S * 11/2015 Holterhaus D30/121
D744,890 S * 12/2015 Murphy D11/3
D758,596 S 6/2016 Perryman et al.
2002/0128565 A1 9/2002 Rudy
2002/0165441 A1 11/2002 Coleman et al.
2002/0198520 A1 * 12/2002 Coen A61B 18/1492
606/41
2003/0158477 A1 * 8/2003 Panescu A61B 5/0422
600/424
2003/0231789 A1 12/2003 Willis et al.
2003/0236466 A1 12/2003 Tarjan et al.
2004/0225285 A1 * 11/2004 Gibson A61B 18/14
606/41
2006/0025762 A1 * 2/2006 Mohan A61B 18/1482
606/41
2007/0083194 A1 * 4/2007 Kunis A61B 18/1492
606/41
2007/0106146 A1 5/2007 Altmann et al.
2008/0009758 A1 1/2008 Voth
2009/0024086 A1 1/2009 Zhang et al.
2009/0131930 A1 5/2009 Gelbart et al.
2009/0264781 A1 10/2009 Scharf
2010/0076426 A1 * 3/2010 de la Rama A61B 18/1492
606/41
2010/0298690 A1 11/2010 Scharf
2011/0172658 A1 7/2011 Gelbart et al.
2011/0213231 A1 * 9/2011 Hall A61B 5/0422
600/373
2011/0270237 A1 11/2011 Werneth et al.
2011/0282343 A1 * 11/2011 Kunis A61F 2/95
606/41
2012/0143298 A1 6/2012 Just et al.
2013/0006238 A1 * 1/2013 Ditter A61B 18/1492
606/41
2013/0226017 A1 8/2013 Scharf et al.
2014/0180150 A1 6/2014 Scharf et al.
2014/0266235 A1 * 9/2014 Mathur G01R 31/025
324/509
2014/0276733 A1 * 9/2014 VanScoy A61B 18/1492
606/33

(56)

References Cited

U.S. PATENT DOCUMENTS

2015/0374252	A1*	12/2015	de la Rama	A61B 5/0422	600/374
2016/0051321	A1*	2/2016	Salahieh	A61B 18/1492	600/439
2016/0128772	A1*	5/2016	Reinders	A61B 5/0422	606/34

FOREIGN PATENT DOCUMENTS

EP	1779787	5/2007
WO	94/06349	3/1994
WO	99/05971	2/1999
WO	00/07501	2/2000
WO	2008/014629	2/2008
WO	2009090547	7/2009
WO	2011136867	11/2011
WO	2012100185	7/2012
WO	2012122517	9/2012
WO	2014036439	3/2014

OTHER PUBLICATIONS

Scharf et al., Declaration under 37 C.F.R. 1.132, Nov. 15, 2012.
 Pullan et al., "The Inverse Problem of Electrocardiography," North-eastern University Electrical and Computer Engineering, Feb. 23, 2007.
 He et al., "An Equivalent Body Surface Charge Model Representing Three-Dimensional Bioelectrical Activity," IEEE Transactions on Biomedical Engineering, 42.7 (1995), pp. 637-646.
 International Search Report issued in related International Application No. PCT/CH2007/000380.

International Search Report dated Oct. 7, 2009 issued in corresponding International Application No. PCT/IB2009/000071.
 International Search Report and Written Opinion issued Jun. 5, 2014, in corresponding International Application No. PCT/US2013/057579.
 Partial European Search Report issued Apr. 29, 2014, in corresponding European Application No. 13176658.
 Della Bella et al., "Non-contact mapping to guide catheter ablation of intolerated ventricular tachycardia" European Heart Journal; 23(9):742-752 (2002).
 Article 94(3) Communication dated Apr. 28, 2014 in corresponding European Application No. 09702094.
 International Search Report dated Sep. 10, 2014 issued in corresponding International Application No. PCT/US14/54942.
 Office Action issued on Oct. 4, 2013 in corresponding Canadian Patent Application No. 2,659,898.
 Invitation to Pay Additional Fees issued on Jan. 8, 2014 in corresponding International Application No. PCT/US2013/057579.
 ISRWO issued on May 20, 2014 in International application No. PCT/US14/15261.
 Gupta, et al., "Point of View Cardiac Mapping: Utility or Futility?," Indian Pacing and Electrophysiology Journal, vol. 2, No. 1, Jan. 1, 2002, pp. 20-32.
 P. Della Bella, Non-Contact Mapping to Guide Catheter Ablation of Untolerated Ventricular Tachycardia, European Heart Journal (2002) 23, p. 742-752.
 European Search Report dated Sep. 29, 2014, issued in European Application No. 13176658.6.
 International Search Report and Written Opinion dated Jun. 26, 2015 issued in International Application No. PCT/US2015/022187.

* cited by examiner



FIG. 2



FIG. 3

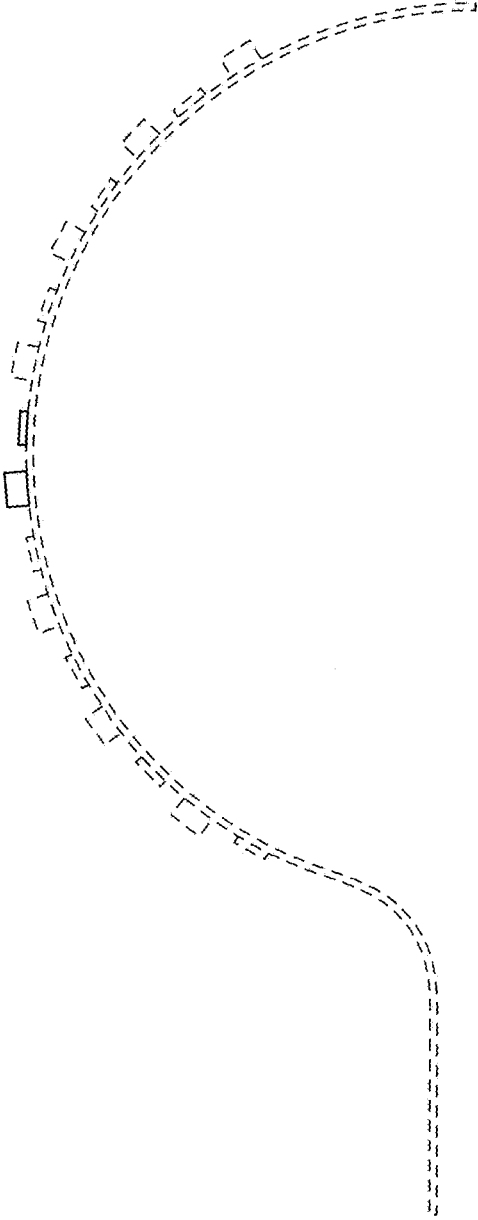


FIG. 4

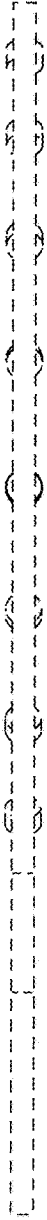


FIG. 5

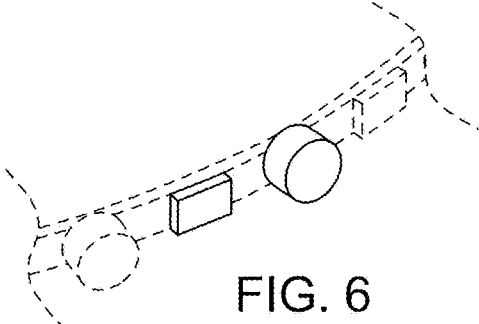


FIG. 6

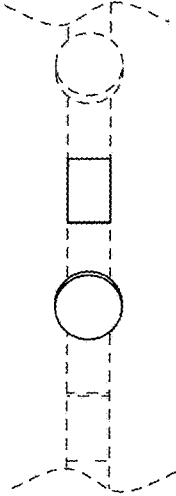


FIG. 7

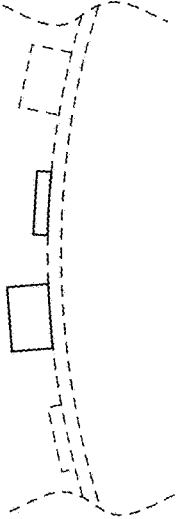


FIG. 8

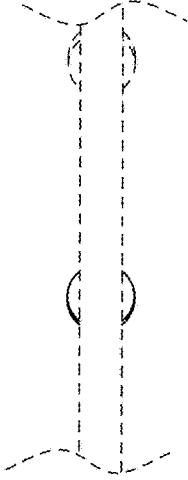


FIG. 9