



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
60/879,177	01/06/2007	Emery A. Sanford	P4672USP1

82427
KRAMER LEVIN NAFTALIS & FRANKEL LLP
1177 Avenue of the Americas
New York, NY 10036

CONFIRMATION NO. 8444
POWER OF ATTORNEY NOTICE



Date Mailed: 09/07/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/28/2016.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/tpetros/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
60/879,177	01/06/2007	Emery A. Sanford	P4672USP1

CONFIRMATION NO. 8444

POA ACCEPTANCE LETTER

65656
KILPATRICK TOWNSEND & STOCKTON LLP/Apple
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309



Date Mailed: 09/07/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/28/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

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/tpetros/

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number: 65656

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number: 65656

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

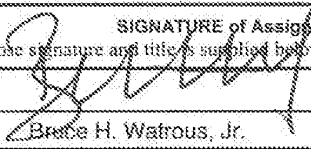
Assignee Name and Address:

Apple Inc.
 1 Infinite Loop
 Cupertino, CA 95014

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	8/25/11
Name	Bruce H. Watrous, Jr.	Telephone	408-974-0015
Title	Vice President and Chief IP Counsel		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO in process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1456, Alexandria, VA 22313-1456.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(b)Applicant/Patent Owner: APPLE INC.Application No./Patent No.: 60/879,177 Filed/Issue Date: 2007-01-06Titled: Wireless headset

APPLE INC., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. the assignee of the entire right, title, and interest in;
2. an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

- A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 020379, Frame 0511, or for which a copy therefore is attached.

OR

- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

- Additional documents in the chain of title are listed on a supplemental sheet(s).

- As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

William L. Shaffer/2016-08-28

Signature

Date

William L. Shaffer, Reg. No. 37,234Attorney for Applicant

Printed or Typed Name

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	26768025
Application Number:	60879177
International Application Number:	
Confirmation Number:	8444
Title of Invention:	Wireless headset
First Named Inventor/Applicant Name:	Emery A. Sanford
Customer Number:	82427
Filer:	William Leland Shaffer/Kimberly M. Ingalsbe
Filer Authorized By:	William Leland Shaffer
Attorney Docket Number:	P4672USP1
Receipt Date:	28-AUG-2016
Filing Date:	06-JAN-2007
Time Stamp:	23:53:03
Application Type:	Provisional

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_PTO_SB_80.pdf	428700 b5e5eb15b6ace186b912c04e2de93296bf557882	no	1

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	1018918_373b.pdf	621210	no	2
			78cf59ca089eee01abe77b2503743c4dd9624fb		
Warnings:					
Information:					
Total Files Size (in bytes):				1049910	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
60/879,177	01/06/2007	Emery A. Sanford	104677-0014-001

82427
KRAMER LEVIN NAFTALIS & FRANKEL LLP
1177 Avenue of the Americas
New York, NY 10036

CONFIRMATION NO. 8444
POA ACCEPTANCE LETTER



Date Mailed: 01/28/2009

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/21/2009.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/s/ureshi/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
60/879,177	01/06/2007	Emery A. Sanford	104677-0014-001

CONFIRMATION NO. 8444

POWER OF ATTORNEY NOTICE

63976
ROPES & GRAY LLP
PATENT DOCKETING 39/361
1211 AVENUE OF THE AMERICAS
NEW YORK, NY 10036-8704



Date Mailed: 01/28/2009

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/21/2009.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/squareshi/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number: 82427

OR
 Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number: 82427

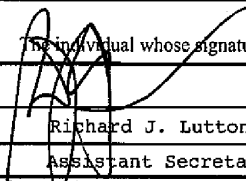
OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

Assignee Name and Address:
 Apple Inc.
 1 Infinite Loop
 Cupertino, CA 95014

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
 The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	August 29, 2008
Name	Richard J. Lutton, Jr.	Telephone	(408) 974-9453
Title	Assistant Secretary and Chief Patent Counsel		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Emery A. Sanford et al.

Application No./Patent No.: 60/879,177

Filed/Issue Date: January 6, 2007

Titled: WIRELESS HEADSET

Apple Inc. _____, a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

- 1. the assignee of the entire right, title, and interest in;
- 2. an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
- 3. the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 020379, Frame 0511, or for which a copy therefore is attached.

OR

B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

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Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Jeffrey C. Aldridge/

January 21, 2009

Signature

Date

Jeffrey C. Aldridge, Registration No. 51,390

Attorney for Applicant

Printed or Typed Name

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	4650797
Application Number:	60879177
International Application Number:	
Confirmation Number:	8444
Title of Invention:	Wireless headset
First Named Inventor/Applicant Name:	Emery A. Sanford
Customer Number:	63976
Filer:	Jeffrey Charles Aldridge/Rose Dhanraj
Filer Authorized By:	Jeffrey Charles Aldridge
Attorney Docket Number:	104677-0014-001
Receipt Date:	21-JAN-2009
Filing Date:	06-JAN-2007
Time Stamp:	17:07:57
Application Type:	Provisional

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	Apple-Inc_- _General_Power_of_Attorney. pdf	45294 42a9cdf994b167e6b778a59ae391cdf80b9 01b4d	no	1

Warnings:

Information:

2	Assignee showing of ownership per 37 CFR 3.73(b).	P4672USP1_- _Stmt_Under_37_CFR_3_73b. pdf	31464 9d03fe10e182fc70f6564dd95e98ff4e142ba 9a7	no	2
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Warnings:

Information:

Total Files Size (in bytes):	76758
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Values: 60/879,177, 01/06/2007, 750, 104677-0014-001

CONFIRMATION NO. 8444

UPDATED FILING RECEIPT

63976
FISH & NEAVE IP GROUP
ROPES & GRAY LLP
1211 AVENUE OF THE AMERICAS
NEW YORK, NY10036-8704

Date Mailed: 05/21/2007

Receipt is acknowledged of this provisional Patent Application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

- Emery A. Sanford, San Francisco, CA;
M. Evans Hankey, San Francisco, CA;
Christopher D. Prest, Mountain View, CA;
Jeffrey J. Terlizzi, San Francisco, CA;
Way Chet Lim, San Jose, CA;
Terry Tikalski, Sunnyvale, CA;
John Tang, San Carlos, CA;
Daniele De Iuliis, San Francisco, CA;
Peter Russell-Clark, San Francisco, CA;

Power of Attorney: The patent practitioners associated with Customer Number 63976

If Required, Foreign Filing License Granted: 02/02/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US60/879,177

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

Wireless headset

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

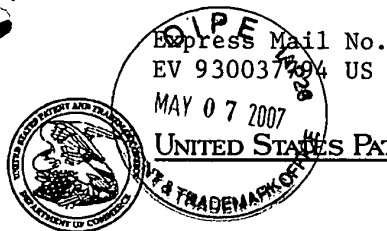
This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of

Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
60/879,177	01/06/2007		104677-0014-001 (P4672P1)

63976
FISH & NEAVE IP GROUP
ROPES & GRAY LLP
1211 AVENUE OF THE AMERICAS
NEW YORK, NY 10036-8704

CONFIRMATION NO. 8444
FORMALITIES
LETTER

Date Mailed: 02/05/2007

NOTICE TO FILE MISSING PARTS OF PROVISIONAL APPLICATION

05/10/2007 HDESTA1 00000010 061075 60879177 FILED UNDER 37 CFR 1.53(c)
01 FC:1052 50.00 DA *Filing Date Granted*

An application number and filing date have been accorded to this provisional application. The items indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The provisional application cover sheet under 37 CFR 1.51(c)(1), which may be an application data sheet (37 CFR 1.76), is required identifying:
 - the name(s) of the inventor(s).
 - either city and state or city and foreign country of the residence of each inventor.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee or cover sheet) as set forth in 37 CFR 1.16(g) of \$50 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **\$50** for a non-small entity

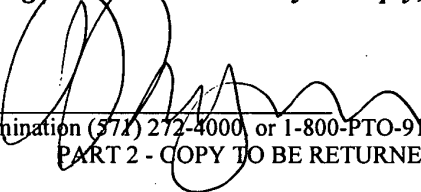
- **\$50** Surcharge.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

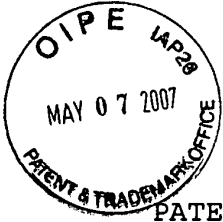
Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.


Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199, or 1-800-972-6382
PART 2 - COPY TO BE RETURNED WITH RESPONSE

EXPRESS MAIL NO. EV 930037794 US
104677-0014-001 (P4672P1)



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

Applicants : Emery Sanford et al.
Application No. : 60/879,177 Confirmation No.: 8444
Filed : January 6, 2007
For : WIRELESS HEADSET

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450 New York, New York 10036
Alexandria, Virginia 22313-1450 May 7, 2007

REPLY TO NOTICE TO FILE MISSING PARTS
OF PROVISIONAL APPLICATION

Sir:

In response to the Notice To File Missing Parts of Provisional Application mailed February 5, 2007 for the above-identified application, the following materials are enclosed:

1. A copy of the February 5, 2007, Notice To File Missing Parts Of Provisional Application;
2. Provisional Application Cover Sheet;
3. Payment in the amount of \$50.00 for the surcharge in accordance with 37 C.F.R. 1.16(g) in the form of a deposit account authorization in the transmittal form; and
4. Payment in the amount of \$120.00 for a one-month extension of time to reply to the Notice to File Missing Parts in the form of a deposit account

authorization in the petition for extension of time form.

Pursuant to 37 C.F.R. §1.45(d)(1), applicants request that the inventorship of the present application be corrected to include Emery A. Sanford, M. Evans Hankey, Christopher D. Prest, Jeffrey J. Terlizzi, Way Chet Lim, Terry Tikalsky, John Tang, Daniele De Iuliis, and Peter Russell-Clark residing, respectively, in San Francisco, CA; San Francisco, CA; Mountain View, CA; San Francisco, CA; San Jose, CA; Sunnyvale, CA; San Carlos, CA; San Francisco, CA; and San Francisco, CA. The inventorship error occurred without deceptive intention on the part of the omitted inventors.

Pursuant to 37 C.F.R. § 1.136(a), applicants hereby petition for a one-month extension of time for response to the Notice to File Missing Parts. The Director is hereby authorized to charge payment of any additional fees due in connection with this Reply, or credit any overpayment of same, to Deposit Account No. 06-1075, Order No. 104677-0014-001, in the attached Fee Transmittal, which is submitted in duplicate.

Respectfully submitted,



Jeffrey Aldridge
Reg. No. 51,390
Agent for Applicants
Fish & Neave IP Group
Ropes & Gray LLP
Customer No. 63976
1211 Avenue of the Americas
New York, New York 10036-8704
Tel.: (212) 596-9000
Fax : (212) 596-9090



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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV 930037794 US Docket No.: 104677-0014-001 (P4672P1)

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Emery A.	Sanford	San Francisco, CA
M. Evans	Hankey	San Francisco, CA
Additional inventors are being named on the <u>1</u> separately numbered sheets attached hereto		
TITLE OF THE INVENTION (500 characters max):		
WIRELESS HEADSET		
Direct all correspondence to: CORRESPONDENCE ADDRESS		
<input checked="" type="checkbox"/> The address corresponding to Customer Number:		63976
OR		
<input type="checkbox"/> Firm or — Individual Name		
Address		
City	State	Zip
Country	Telephone	Email
ENCLOSED APPLICATION PARTS (check all that apply)		
<input checked="" type="checkbox"/> Application Data Sheet. See 37 CFR 1.76		<input type="checkbox"/> CD(s), Number of CDs _____
<input checked="" type="checkbox"/> Drawing(s) Number of Sheets <u>52 (Informal)</u>		<input type="checkbox"/> Other (specify) _____
<input checked="" type="checkbox"/> Specification (e.g. description of the invention) Number of Pages <u>125</u>		
Fees Due: Filing Fee of \$200 (\$100 for small entity). If the specification and drawings exceed 100 sheets of paper, an application size fee is also due, which is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).		
METHOD OF PAYMENT OF THE FILING FEE AND APPLICATION SIZE FEE FOR THIS PROVISIONAL APPLICATION FOR PATENT		
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.		700.00
<input type="checkbox"/> A check or money order is enclosed to cover the filing fee and application size fee (if applicable).		
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached		
<input checked="" type="checkbox"/> The Director is hereby authorized to charge the filing fee and application size fee (if applicable) or credit any overpayment to Deposit		
06-1075(Order No. Account Number: <u>104677-0014-001</u>) . A duplicative copy of this form is enclosed for fee processing.		

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PROVISIONAL APPLICATION COVER SHEET
Page 2 of 2

EXPRESS MAIL NO. EV930037794US

PTO/SB/16(07-06)

Approved for use through 01/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.



No



Yes, the name of the U.S. Government agency and the Government contract number are: _____

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

SIGNATURE _____



Date May 7, 2007

TYPED or PRINTED NAME Jeffrey Aldridge

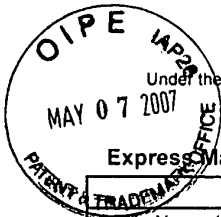
REGISTRATION NO. 51,390
(if appropriate)

TELEPHONE 212.596.9000

Docket Number: 104677-0014-001

EXPRESS MAIL NO. EV930037794US

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Christopher D.	Prest	Mountain View, CA
Jeffrey J.	Terlizzi	San Francisco, CA
Way Chet	Lim	San Jose, CA
Terry	Tikalski	Sunnyvale, CA
John	Tang	San Carlos, CA
Daniele	De Iuliis	San Francisco, CA
Peter	Russell-Clark	San Francisco, CA



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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV 930037794 US Docket No.: 104677-0014-001 (P4672P1)

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Emery A.	Sanford	San Francisco, CA
M. Evans	Hankey	San Francisco, CA

Additional inventors are being named on the 1 separately numbered sheets attached hereto

TITLE OF THE INVENTION (500 characters max):

WIRELESS HEADSET

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

The address corresponding to Customer Number: 63976

OR

Firm or —
Individual Name

Address

City	State	Zip
Country	Telephone	Email

ENCLOSED APPLICATION PARTS (check all that apply)

Application Data Sheet. See 37 CFR 1.76 CD(s), Number of CDs _____

Drawing(s) Number of Sheets 52 (Informal) Other (specify) _____

Specification (e.g. description of the invention) Number of Pages 125

Fees Due: Filing Fee of \$200 (\$100 for small entity). If the specification and drawings exceed 100 sheets of paper, an application size fee is also due, which is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

METHOD OF PAYMENT OF THE FILING FEE AND APPLICATION SIZE FEE FOR THIS PROVISIONAL APPLICATION FOR PATENT

Applicant claims small entity status. See 37 CFR 1.27. 700.00

A check or money order is enclosed to cover the filing fee and application size fee (if applicable).

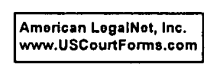
Payment by credit card. Form PTO-2038 is attached **TOTAL FEE AMOUNT (\$)**

The Director is hereby authorized to charge the filing fee and application size fee (if applicable) or credit any overpayment to Deposit
06-1075(Order No.
Account Number: 104677-0014-001) . A duplicative copy of this form is enclosed for fee processing.

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PROVISIONAL APPLICATION COVER SHEET
Page 2 of 2

EXPRESS MAIL NO. EV930037794US

PTO/SB/16(07-06)
Approved for use through 01/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.



No

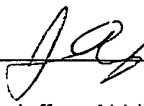


Yes, the name of the U.S. Government agency and the Government contract number are: _____

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SIGNATURE _____



Date May 7, 2007

TYPED or PRINTED NAME Jeffrey Aldridge

REGISTRATION NO. 51,390
(if appropriate)

TELEPHONE 212.596.9000

Docket Number: 104677-0014-001

EXPRESS MAIL NO. EV930037794US

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Christopher D.	Prest	Mountain View, CA
Jeffrey J.	Terlizzi	San Francisco, CA
Way Chet	Lim	San Jose, CA
Terry	Tikalski	Sunnyvale, CA
John	Tang	San Carlos, CA
Daniele	De Iuliis	San Francisco, CA
Peter	Russell-Clark	San Francisco, CA

05-09-07

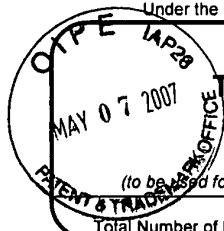
DFW

PTO/SB/21 (09-06)

Approved for use through 3/31/2007. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number	60/879,177
Filing Date	January 6, 2007
First Named Inventor	Emery Sanford
Art Unit	Not Yet Known
Examiner Name	Not Yet Known
Attorney Docket Number	104677-0014-001

ENCLOSURES (Check all that apply)

<input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate)	<input type="checkbox"/> Formal Drawings	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney (EXECUTED)	<input type="checkbox"/> Status Letter
<input checked="" type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Executed Declarations	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Terminal Disclaimer	1) Copy of Missing Parts notice dated February 5, 2007;
<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> Request for Refund	2) Provisional Application Cover Sheet; and
<input type="checkbox"/> Certified Copy of Priority Document(s)	CD, Number of CD(s) _____	3) Postcard.
<input type="checkbox"/> Response to Missing Parts/Incomplete Application	<input type="checkbox"/> Landscape Table on CD	
<input checked="" type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	Remarks	

The Director is hereby authorized to charge any fee(s) that may be due in connection with this submission under 37 CFR 1.16 or 1.17 to Deposit Account Number 06-1075, Order No. 104677-0014-001.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Customer No. 63976		
Signature	Jeffrey Aldridge		
Printed name	<i>Jeffrey Aldridge</i>		
Date	May 7, 2007	Reg. No.	51,390

CERTIFICATE OF TRANSMISSION/EXPRESS MAILING NO. EV930037794US

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and are addressed to Mail Stop Missing Parts, Hon. Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Signature	<i>Isatta B. Smith</i>		
Typed or printed name	Isatta B. Smith	Date	May 7, 2007

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Effective on 12/08/2004.
 Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
for FY 2007

Applicant claims small entity status. See 37 CFR 1.27

Complete If Known	
Application Number	60/879,177
Filing Date	Herewith
First Named Inventor	Emery Sanford
Examiner Name	Not yet assigned
Art Unit	Not yet assigned
Attorney Docket No.	104677-0014-001 (P4672P1)

TOTAL AMOUNT OF PAYMENT (\$)
 (\$)
 50.00

METHOD OF PAYMENT (check all that apply)

Check Credit Card Money Order None Other (please identify): _____

Deposit Account Deposit Account Number: 06-1075(Order No. 104677-0014-001) Deposit Account Name: Fish & Neave

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

Charge fee(s) indicated below Charge fee(s) indicated below, except for the filing fee

Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 Credit any overpayments

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FEE CALCULATION (All the fees below are due upon filing or may be subject to a surcharge.)

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	_____
Design	200	100	100	50	130	65	_____
Plant	200	100	300	150	160	80	_____
Reissue	300	150	500	250	600	300	_____
Provisional	200	100	0	0	0	0	_____

2. EXCESS CLAIM FEES

Fee Description	Small Entity Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims - 20 or HP = _____ x _____ = _____

HP = highest number of total claims paid for, if greater than 20

Indep. Claims - 3 or HP = _____ x _____ = _____

HP = highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____	_____	_____	_____	0

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge): Surcharge Fee in accordance with 37 CFR 1.16(g) **50.00**

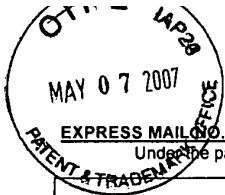
SUBMITTED BY

Signature		Registration No. 51,309 (Attorney/Agent)	Telephone 212.596-9000
Name (Print/Type)	Jeffrey Aldridge		Date May 7, 2007

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PTO/SB/22 (07-07)

Approved for use through 09/30/2006. OMB 0851-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)
FY 2007
(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)

Docket Number (Optional)
104677-0014-001 (P4672P1)

Application Number: 60/879,177

Filed: January 6, 2007

WIRELESS HEADSET

Art Unit: Not yet known

Examiner: Not Yet Assigned

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

Table with 4 columns: Extension Period, Fee, Small Entity Fee, and Amount. Rows include One month, Two months, Three months, Four months, and Five months.

- Applicant claims small entity status. See 37 CFR 1.27.
A check in the amount of the fee is enclosed.
Payment by credit card. Form PTO-2038 is attached.
The Director has already been authorized to charge fees in this application to a Deposit Account.
The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 06-1075, Order No. 104577-0014-001. I have enclosed a duplicate copy of this sheet.

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- I am the applicant/inventor.
assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
attorney or agent of record. Registration Number
attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 51,390.

Signature: Jeffrey Aldridge
Typed or printed name

Date: May 7, 2007
Telephone Number: 212.596.9000

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Table with 8 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, DRAWINGS, TOT CLAIMS, IND CLAIMS. Row 1: 60/879,177, 01/06/2007, 700, 104677-0014-001 (P4672P1), 52

CONFIRMATION NO. 8444

FILING RECEIPT

63976
FISH & NEAVE IP GROUP
ROPES & GRAY LLP
1211 AVENUE OF THE AMERICAS
NEW YORK, NY10036-8704

Date Mailed: 02/05/2007

Receipt is acknowledged of this provisional Patent Application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Power of Attorney: The patent practitioners associated with Customer Number 63976

If Required, Foreign Filing License Granted: 02/02/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US60/879,177

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

Wireless headset

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process simplifies the filing of patent applications on the same invention in member countries, but does not result in a grant of "an international patent" and does not eliminate the need of applicants to file

additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

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under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).


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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
60/879,177	01/06/2007		104677-0014-001 (P4672P1)

63976
 FISH & NEAVE IP GROUP
 ROPES & GRAY LLP
 1211 AVENUE OF THE AMERICAS
 NEW YORK, NY 10036-8704

CONFIRMATION NO. 8444
FORMALITIES
LETTER

Date Mailed: 02/05/2007

NOTICE TO FILE MISSING PARTS OF PROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(c)

Filing Date Granted

An application number and filing date have been accorded to this provisional application. The items indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The provisional application cover sheet under 37 CFR 1.51(c)(1), which may be an application data sheet (37 CFR 1.76), is required identifying:
 - the name(s) of the inventor(s).
 - either city and state or city and foreign country of the residence of each inventor.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee or cover sheet) as set forth in 37 CFR 1.16(g) of \$50 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **\$50** for a non-small entity

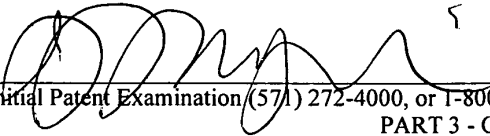
- **\$50** Surcharge.

Replies should be mailed to: Mail Stop Missing Parts
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Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199, or 1-800-972-6382
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14230 U.S. PTO
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PTO/SB/16 (07-06)
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2
 This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV 621276943 US Docket No.: 104677-0014-001 (P4672P1)

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Additional inventors are being named on the _____ separately numbered sheets attached hereto		
TITLE OF THE INVENTION (500 characters max):		
WIRELESS HEADSET		
Direct all correspondence to: CORRESPONDENCE ADDRESS		
<input checked="" type="checkbox"/> The address corresponding to Customer Number:		63976
OR		
<input type="checkbox"/> Firm or — Individual Name		
Address		
City	State	Zip
Country	Telephone	Email
ENCLOSED APPLICATION PARTS (check all that apply)		
<input checked="" type="checkbox"/> Application Data Sheet. See 37 CFR 1.76		<input type="checkbox"/> CD(s), Number of CDs _____
<input checked="" type="checkbox"/> Drawing(s) Number of Sheets <u>52 (Informal)</u>		<input type="checkbox"/> Other (specify) _____
<input checked="" type="checkbox"/> Specification (e.g. description of the invention) Number of Pages <u>125</u>		
Fees Due: Filing Fee of \$200 (\$100 for small entity). If the specification and drawings exceed 100 sheets of paper, an application size fee is also due, which is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).		
METHOD OF PAYMENT OF THE FILING FEE AND APPLICATION SIZE FEE FOR THIS PROVISIONAL APPLICATION FOR PATENT		
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.		700.00
<input type="checkbox"/> A check or money order is enclosed to cover the filing fee and application size fee (if applicable).		
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached		TOTAL FEE AMOUNT (\$)
<input checked="" type="checkbox"/> The Director is hereby authorized to charge the filing fee and application size fee (if applicable) or credit any overpayment to Deposit 06-1075(Order No. Account Number: <u>104677-0014-001</u>). A duplicative copy of this form is enclosed for fee processing.		

112948 U.S. PTO
60/879177

010607

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

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PROVISIONAL APPLICATION COVER SHEET
Page 2 of 2

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.



No

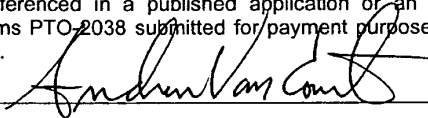


Yes, the name of the U.S. Government agency and the Government contract number are: _____

WARNING:

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SIGNATURE _____



Date January 5, 2007

TYPED or PRINTED NAME Andrew Van Court

REGISTRATION NO. 48,506
(if appropriate)

TELEPHONE 212.596.9000

Docket Number: 104677-0014-001

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104677-0014-001 (P4672P1)

Certificate of Mailing under 37 CFR 1.10

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Date of Deposit: January 5, 2007


I hereby certify that this paper/fee and all enclosures noted below are being deposited with the United States Postal Service "EXPRESS MAIL POST OFFICE TO ADDRESSEE" under 37 C.F.R. §1.10 on the date indicated above and is addressed to :

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

1. Provisional Application for Patent Cover Sheet (in duplicate) (1 pg.)
2. Application (125 pgs.)
3. Informal Drawings (52 sheets)
4. Application Data Sheet
5. Return postcard

on January 5, 2007

Date



Signature

Typed or printed name of person signing Certificate

N/A

Registration Number, if applicable

212.596.9000

Telephone Number

Note: Each paper must have its own certificate of mailing, or this certificate must identify each submitted paper.

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Wireless Headset

Background of the Invention

5 [0001] In one embodiment, the present invention can relate to headsets for communication with an electronic device.

[0002] Headsets for providing hands free communications are well known in the art. Such headsets typically can be used in conjunction with a cellular telephone or a computer (e.g., Voice over IP). Existing
10 headsets can include a microphone, a speaker (also referred to as a receiver), electronics for controlling the headset and communicating with another device (e.g., a cellular telephone), a battery and a connector for re-charging the battery.

15 [0003] There are many aspects involved in the design of headsets. For example, the size and weight of headsets can be key issues because of how they typically mount to a user's ear. A heavy or large headset can pull on a user's ear, creating an

uncomfortable fit. The shape of headset earpieces (e.g.,
earbuds) may also be an important design consideration to
take into account as it is desirable for earpieces to fit
comfortably in, on, or over a wide range of different
5 sizes and shapes of ears.

[0004] Additionally, the acoustic performance of
headsets, such as receiver sound generation quality and
microphone sound reception quality (e.g., ability to pick
up a user's voice without undue background noise), can be
10 important design considerations. Achieving desired
receiver and microphone acoustic performance can become
increasingly difficult as the size of a headset
decreases.

[0005] Another example of an important design issue
15 can be the user interface of a headset. It may be
desirable for a user interface to be intuitive for a
first-time user, yet convenient for an experienced user.

[0006] Aesthetics may be yet another important design
consideration of headsets.

20 **[0007]** Further still, ease of manufacturing headsets
can be another design consideration. For example, it can
be desirable to design a headset that can be mass
produced in an affordable fashion.

[0008] Therefore, in view of the foregoing, there is a
25 need for an improved headset that addresses one or more
of the above-identified and other issues.

Summary of the Invention

[0009] In one embodiment of the present invention, a
headset and methods for manufacturing the same are
30 provided. The electronics of the headset can be based on

a wireless protocol, e.g., Bluetooth® System-on-a-Chip (SoC). The SoC can include circuitry for performing functions other than wireless communications. For example, in some embodiments, circuitry for communicating using wired Universal Serial Bus (USB) interfaces and conventional serial interfaces can be integrated into the SoC.

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[0010] Increased functionality can be provided by electronics external to the SoC. For example, the headset can include power distribution circuitry which can operate the headset according to several different modes depending, for example, on the charge level of the battery. In one mode, the power distribution circuitry can supply power to limited parts of the SoC while simultaneously charging the battery. The battery charging process can be further improved by using temperature detection circuitry (e.g., a thermistor) to monitor the battery temperature. This process can extend the battery life by charging it only when the monitored temperature is at, or below, a predetermined threshold. In another mode, the power distribution circuitry can selectively power various electronic components ON and OFF to conserve battery power when operating, for example, in a standby mode.

[0011] The headset can include an earpiece (e.g., earbud) and a primary housing. The electronics of the headset can be divided between the earbud and the primary housing so as to reduce the headset's total size. The wireless (e.g., Bluetooth) processor and its auxiliary circuitry can be located in the earbud. In order to

control the flow of air through the earbud, acoustic ports can be integrated into one or more electronic components disposed therein and/or the earbud housing.

5 In one embodiment of the present invention, the wireless (e.g., Bluetooth) antenna, user interface button, LEDs, battery, microphone, connector and accompanying circuitry can be located in the headset's primary housing.

[0012] The headset can include a hollow neck that allows electrical wires to connect the two sets of
10 electronics. Dual threaded inserts can be used to structurally reinforce the hollow neck without adding size to the device.

[0013] The headset's primary housing can include a tube. This tube can be manufactured using one of several
15 processes in order to reduce costs and increase speed and efficiency. In one embodiment, the tube can be manufactured to include features on the inner surface of the tube for supporting electronic components of the headset. Processes for creating such a tube can include
20 applying a die and stamp to an extruded tube, single or double impact extrusion, or a progressive deep draw process.

[0014] Once formed, micrometer sized holes, called microperforations, can be drilled into the tube. Through
25 these holes, light sources on the inside of the tube can create visual indicators for a user. A light diffuser can be used in combination with such microperforations so that the indicator can be illuminated with evenly distributed light.

- 5 -

5 [0015] A button can be located on one end of the primary housing. A user can interface with this button to perform various functions (e.g., terminating calls). The button can be integrated with the antenna in order to save space.

[0016] The headset also can have a connector, which can include contacts for the transfer of power and data. The connector can be located on the end of the primary housing opposite the user interface button. The
10 connector can have a symmetrical configuration so that it can be coupled with complementary connectors in more than one physical orientation. In order to accommodate this symmetry, switching circuitry can be included that routes both data and power lines appropriately.

15 [0017] The connector can be at least partially made of a ferromagnetic material which can serve as an attraction plate for one or more magnets on a complementary connector in another device (e.g., headset charger).

20 [0018] In one embodiment of the present invention, a microphone can be integrated into the connector.

Brief Description of the Drawings

[0019] The above and other advantages of the present invention will be apparent upon consideration of the following detailed description, taken in conjunction with
25 accompanying drawings, in which like reference characters refer to like parts throughout, and in which:

[0020] FIGS. 1A and 1B are illustrations of a headset in accordance with an embodiment of the present invention;

[0021] FIG. 2A is an exploded view of a headset in accordance with an embodiment of the present invention;

[0022] FIG. 2B is an exploded view of a headset in accordance with another embodiment of the present

5 invention;

[0023] FIG. 3 is a simplified diagram showing how software in a Bluetooth device is organized in accordance with an embodiment of the present invention;

[0024] FIG. 4 is a simplified block diagram of the electrical system of a headset in accordance with an
10 embodiment of the present invention;

[0025] FIG. 5 is a simplified block diagram of the core processor of a headset in accordance with an embodiment of the present invention;

15 [0026] FIG. 6 is a simplified schematic diagram of a power distribution system in accordance with an embodiment of the present invention;

[0027] FIGS. 7A-7C are illustrations of a traditional circuit board and distribution of electrical components
20 in a headset;

[0028] FIG. 8 is a simplified block diagram of a circuit board with an improved distribution of electrical components in a headset in accordance with an embodiment of the present invention;

25 [0029] FIG. 9A and 9B are illustrations comparing the traditional circuit board of FIGS. 7A-7C to a circuit board with an improved distribution of electrical components in a headset in accordance with an embodiment of the present invention;

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- [0030] FIG. 10A-10C are illustrations of an improved distribution of electrical components in a headset in accordance with an embodiment of the present invention;
- 5 [0031] FIG. 11A is an illustration of a headset earbud in accordance with an embodiment of the present invention;
- [0032] FIG. 11B is a simplified exploded view of a headset earbud in accordance with an embodiment of the present invention;
- 10 [0033] FIGS. 12-15 and FIG. 16A are simplified illustrations of a headset earbud in various states of assembly in accordance with some embodiments of the present invention;
- [0034] FIG. 16B is a simplified illustration of a headset earbud in accordance with another embodiment of the present invention;
- 15 [0035] FIG. 16C is a simplified cross-sectional view of an audio receiver in accordance with an embodiment of the present invention;
- 20 [0036] FIG. 17 is a simplified cross-section of a fully assembled headset earbud in accordance with an embodiment of the present invention;
- [0037] FIG. 18 is an exploded view of an attachment system in accordance with an embodiment of the present invention;
- 25 [0038] FIG. 19 is a flowchart of an illustrative process for assembling a portion of a headset in accordance with an embodiment of the present invention.
- [0039] FIGS. 20A and 20B are illustrations of a tool that can be used to assist in assembly of a portion of a
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headset in accordance with an embodiment of the present invention;

[0040] FIG. 20C is an illustration of the tool of FIGS. 20A and 20B being used in accordance with an embodiment of the present invention;

5 [0041] FIG. 21 is a cross-section of a "finished" tube in accordance with an embodiment of the present invention;

[0042] FIG. 22 is a cross-section of an initially manufactured tube in accordance with an embodiment of the present invention;

10 [0043] FIG. 23 is a perspective view of a cross-section of the tube of FIG. 21 in accordance with an embodiment of the present invention;

15 [0044] FIG. 24 is an illustrative die and stamper for modifying the initially manufactured tube of FIG. 22 in accordance with an embodiment of the present invention;

[0045] FIG. 25 is a cross-sectional view of the tube of FIG. 24 once the stamper and die are removed from the tube in accordance with an embodiment of the present invention;

20 [0046] FIG. 26 is a perspective view of the tube of FIG. 25 once the tube is machined to create an internal wall in accordance with an embodiment of the present invention;

25 [0047] FIG. 27 is a cross-section of an illustrative tube formed using a single impact extrusion in accordance with an embodiment of the present invention;

[0048] FIG. 28 is a perspective view of the tube of FIG. 27 once the tube is machined to create an internal

30

wall in accordance with an embodiment of the present invention;

[0049] FIG. 29 is a cross-section of an illustrative tube formed using a double impact extrusion in accordance with an embodiment of the present invention;

[0050] FIG. 30 is a perspective view of the tube of FIG. 29 once the tube is machined to create an internal wall in accordance with an embodiment of the present invention;

[0051] FIG. 31 is a cross-section of an illustrative tube formed using a progressive deep draw process in accordance with an embodiment of the present invention;

[0052] FIG. 32 is a perspective view of a cross-section of the tube of FIG. 31 in accordance with an embodiment of the present invention;

[0053] FIG. 33 is a perspective view of the tube of FIGS. 31 and 32 once the tube is machined to create an internal wall in accordance with an embodiment of the present invention;

[0054] FIG. 34 is a flow chart of an illustrative process for forming an extruded tube with a feature on the internal surface of the tube with using a die and stamper in accordance with an embodiment of the present invention;

[0055] FIG. 35 is a flow chart of an illustrative process for forming a tube with a feature on the internal surface of the tube using a single impact extrusion in accordance with an embodiment of the present invention;

[0056] FIG. 36 is a flow chart of an illustrative process for forming a tube with a feature on the internal

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surface of the tube using a impact extrusion on both ends of the tube in accordance with an embodiment of the present invention;

5 [0057] FIG. 37 is a flow chart of an illustrative process for forming a tube with a feature on the internal surface of the tube using a progressive deep draw process in accordance with an embodiment of the present invention;

10 [0058] FIG. 38 is a cross-section of a visual indicator system in accordance with an embodiment of the present invention;

[0059] FIG. 39 is an illustration of a visual indicator system of a headset in accordance with an embodiment of the present invention;

15 [0060] FIGS. 40A and 40B are illustrations of a headset in accordance with an embodiment of the present invention;

[0061] FIG. 41 is an illustration of a connector in accordance with an embodiment of the present invention;

20 [0062] FIG. 42 is an exploded view of a connector in accordance with an embodiment of the present invention;

[0063] FIG. 43 is an illustration of a microphone boot in accordance with an embodiment of the present invention;

25 [0064] FIG. 44 is a cross-section of a connector in accordance with an embodiment of the present invention;

[0065] FIGS. 45A-45D are illustrations of a headset in accordance with an embodiment of the present invention;

[0066] FIG. 46 is a cross-section of an electrical contact assembly coupled to a circuit board in accordance with an embodiment of the present invention;

5 [0067] FIGS. 47A and 47B are illustrations of an electrical contact assembly in accordance with an embodiment of the present invention;

[0068] FIGS. 48A-48C are illustrations of an electrical contact assembly in accordance with an embodiment of the present invention;

10 [0069] FIGS. 49A and 49B are illustrations of electrical contacts in accordance with an embodiment of the present invention;

[0070] FIGS. 50A and 50B are illustrations of a connector plate in accordance with an embodiment of the present invention;

15 [0071] FIGS. 51A and 51B are illustrations of magnetic components of a connector in accordance with an embodiment of the present invention;

[0072] FIGS. 52A and 52B are illustrations of a connector in accordance with an embodiment of the present invention;

[0073] FIGS. 53A and 53B are illustrations of a connector in accordance with an embodiment of the present invention;

25 [0074] FIG. 54 is an illustration of a headset coupling with a complementary connector in accordance with an embodiment of the present invention;

[0075] FIG. 55 is a simplified graph of magnetic and spring forces involved in the coupling of a headset with

a complementary connector in accordance with an embodiment of the present invention;

[0076] FIG. 56 is an illustration of a docking device that can receive a headset in accordance with an embodiment of the present invention;

[0077] FIG. 57A is an illustration of a connector in accordance with an embodiment of the present invention; and

[0078] FIG. 57B is an illustration of a headset coupling with a complementary connector in accordance with an embodiment of the present invention.

Detailed Description of the Invention

[0079] Commonly assigned DiFonzo et al. U.S. Patent Application No. 11/235,873, filed September 26, 2005 (Attorney Docket No. P3794US1 / 119-0060US.1), entitled "Electromagnetic Connector for Electronic Device" is hereby incorporated by reference in its entirety.

[0080] Commonly assigned Rohrbach et al. U.S. Patent Application No. 11/235,875, filed September 26, 2005 (Attorney Docket No. P3593US1 / 119-0060US), entitled "Magnetic Connector for Electronic Device" is hereby incorporated by reference in its entirety.

[0081] Commonly assigned Andre et al. U.S. Patent Application No. 11/456,833, filed July 11, 2006 (Attorney Docket No. P3981US1), entitled "Invisible, Light-Transmissive Display System" is hereby incorporated by reference in its entirety.

[0082] Commonly assigned Andre et al. U.S. Patent Application No. 11/551,988, filed October 23, 2006 (Attorney Docket No. P4246USX1), entitled "Invisible,

Light-Transmissive Display System" is hereby incorporated by reference in its entirety.

[0083] Commonly assigned Sanford et al. U.S. Patent Application No. _____, filed _____
5 (Attorney Docket No. P4983US1), entitled "Antenna and Button Assembly for Wireless Devices" is hereby incorporated by reference in its entirety.

[0084] Commonly assigned Terlizzi et al. U.S. Patent Application No. _____, filed _____
10 (Attorney Docket No. 104677-0065-101 (P4997US1)), entitled "Systems and Methods for Compact Multi-State Switch Networks" is hereby incorporated by reference in its entirety.

[0085] Commonly assigned Terlizzi et al. U.S. Patent Application No. _____, filed _____
15 (Attorney Docket No. 104677-0015-101 (P4630US1)), entitled "Systems and Methods for Determining the Configuration of Electronic Connections" is hereby incorporated by reference in its entirety.

[0086] Commonly assigned Rabu et al. U.S. Patent Application No. _____, filed _____
20 (Attorney Docket No. 104677-0011-101 (P4628US1)), entitled "Apparatuses and Methods that Facilitate the Transfer of Power and Information Among Electrical
25 Devices" is hereby incorporated by reference in its entirety.

[0087] Commonly assigned U.S. Provisional Patent Application No. _____, filed _____
(Attorney Docket No. 104677-0014-003 (P4672P3)), entitled

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"Acoustic design for Earbud in a Headset" is hereby incorporated by reference in its entirety.

[0088] Commonly assigned U.S. Provisional Patent Application No. _____; filed _____
5 (Attorney Docket No. 104677-0014-002 (P4672P2)), entitled "Connector with Magnetic Detent" is hereby incorporated by reference in its entirety.

[0089] FIGS. 1A and 1B show perspective views of an illustrative headset in accordance with an embodiment of the present invention. Headset 1000 can include a
10 housing that encloses the electronic and other elements of the headset. The housing can be incorporate several pieces that are assembled using any suitable process (e.g., adhesive, screws, or press fit). In the example
15 of FIG. 1, headset 1000 can include earbud body 1100, neck 1110, tube 1200, antenna cap 1300 and connector 1401. Earbud body 1100 can include perforations (e.g., acoustic ports) 1102 and 1104 for allowing air to pass into and out of the earbud
20 body 1100. Front port 1104 can allow sound waves from a receiver (not shown) located in earbud body 1100 to reach a user's ear and/or the outside environment. Side ports 1102 can provide a path for acoustic pressure to vent to the outside environment. Earbud body 1100 can be
25 attached to tube 1200 by neck 1110.

[0090] Attached to one end of tube 1200 is antenna cap 1300. The combination of tube 1200 and antenna cap 1300 may be referred to herein as the primary housing. Antenna cap 1300 can have button 1310 disposed
30 at least partially therethrough. A user can interface

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with button 1310 to control the headset. Tube 1200 can include microperforations 1202, e.g., discussed in more detail below in connection with FIGS. 38 and 39. Located at the connector end of tube 1200, connector 1401

5 includes at least one port (not shown) for enabling a microphone (not shown) to receive acoustic signals (e.g., a user's voice), and at least one contact 1410 for receiving power, data, or both from an external source.

[0091] Earbud body 1100, neck 1110, tube 1200,

10 antenna cap 1300 and connector 1401 can be constructed from any suitable material including, for example, metal, plastic, silicone, rubber, foam, or combinations thereof. For example, earbud body 1100 can be formed from a plastic element surrounded by a silicone seal and

15 tube 1200 can be formed from aluminum. Earbud body 1100, neck 1110, tube 1200, antenna cap 1300 and connector 1401 can be manufactured using any suitable process (e.g., molding, casting or extrusion). In some embodiments, earbud body 1100, neck 1110, tube 1200, antenna cap 1300

20 and connector 1401 can be post processed to provide texture and other features on the inner or outer surfaces of the bodies. For example, a bead blast and anodization process can be used to apply a desired surface texture to tube 1200.

25 **[0092]** FIG. 2A is an exploded view of headset 2000 which shows components and circuitry that can be included within headset 1000 of FIGS. 1A and 1B in accordance with an embodiment of the present invention. It should be noted that, for clarity, similar components of different

30 embodiments and figures may be similarly numbered. For

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example, the earbud body of FIG. 1 is numbered 1100 (where 1XXX generally refers to components identified in FIG. 1), while the earbud body of FIG. 2A is numbered 2100. It is further noted that the discussion
5 related to FIG. 2A is meant to be a relatively high level discussion of various portions of the headset according to the invention and that more detailed discussions of those portions can be provided elsewhere herein.

[0093] In one embodiment of the present invention,
10 earbud body 2100 can contain earbud circuit board 2120. Earbud circuit board 2120 can be a flexible circuit board on which one or more of the following components are electrically and/or mechanically mounted: processor 2122 (which can be used to control the functions of
15 headset 2000), receiver 2124, and other circuitry and components (not shown). The flexible nature of earbud circuit board 2120 can enable it to be folded onto itself, providing layers of circuitry that can be packed into earbud body 2100, thereby occupying space within
20 earbud body 2100 that may otherwise be empty and unused. The flexible portions of earbud circuit board 2120 can replace the need for separate wires connecting different circuit boards, which might cause a substantial increase in size because, for example, each wire might involve a
25 pair of connectors. Additionally, the flexible nature of circuit board 2120 advantageously can reduce the area or footprint required by board 2120. That is, compared to another circuit board having similar circuitry and components disposed thereon but in an unfolded layout,
30 circuit board 2120 can occupy less area. In addition,

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circuit board 2120 further can reduce the footprint or size requirements of other components of headset 2000, such as tube 2200 and antenna cap 2300, by incorporating within earbud body 2100 electronics and other components that traditionally are located elsewhere within a headset. Earbud body 2100 and the circuitry and components contained therein are discussed in more detail below in connection with FIGS. 8-17.

[0094] Earbud body 2100 can be coupled to headset tube 2200 by neck 2110. Neck 2110 can be constructed with a double threaded screw insert to receive screw member 2112 (associated with earbud body 2100) and screw member 2114 (associated with tube 2200). Neck 2110 can connect earbud body 2100 and tube 2200 in a manner that can reduce the likelihood of earbud 2100 and tube 2200 rotating independently of each other. That is, when headset 2000 is in use and the user adjusts its position by, for example, pulling tube 2200 down, the earbud body 2100 can rotate in conjunction with tube 2200. A more detailed discussion of neck 2110 is described below in connection with FIGS. 17-21.

[0095] In addition to earbud circuit board 2120, headset 2000 also can include tube circuit board 2210 on which additional electronic components 2212 can be electrically and/or mechanically mounted. Tube circuit board 2210 can be electrically coupled with the earbud circuit board by one or more wires, e.g., cables, flexible circuit boards, individual wires, etc. (not shown). The arrangement of electronic components in both earbud circuit board 2120 and tube circuit board 2210 can

advantageously reduce the size of headset 2000. The arrangement of the electronic components in headset 2000 will be discussed in more detail below in connection with FIGS. 8-10.

- 5 **[0096]** A user can control the functions of headset 2000 using button 2310, which can be electrically coupled with tube circuit board 2210. Button 2310 can extend from antenna cap 2300 such that it appears as a discrete user interface easily activated by a user.
- 10 Button 2310 can be configured to move in any suitable manner including, for example, bending with respect to tube 2200, translating in and out of antenna cap 2300, rotating around an axis passing through connector plate 2400 and button 2310, or any combination thereof.
- 15 **[0097]** In one embodiment, button 2310 can include a switch such as a dome switch, which can be activated when a user depresses button 2310. Button 2310 can have a button guide structure. The button guide structure can have one or more guide channels to facilitate user
- 20 actuation of the button with respect to the rest of headset 2000. In one embodiment of the present invention, the guide channel(s) can be provided in the form of a hole through the button guide structure. The switch actuation member can have a stem that is supported
- 25 and guided by the guide channel. When pressed by a user, the switch actuation member moves along the guide channel towards the switch. Raised structures (e.g., ribs) can be used to ensure that the switch actuation member reciprocates smoothly within the guide channel.

[0098] Button 2310 and antenna cap 2300 can be constructed from a dielectric material such as plastic. Antenna 2214 can be formed by mounting an antenna resonating element within antenna cap 2300 (e.g., along
5 an inner surface of antenna cap 2300) or on a portion of the button guide structure. Constructing button 2310 and antenna cap 2300 from a dielectric material can reduce or eliminate potential signal interference that can disrupt the proper operation of antenna 2214. In addition, a
10 dielectric button 2310 can allow for smaller clearance between the antenna resonating element and conductive structures (e.g., tube circuit board 2210) in headset 2000.

[0099] Antenna 2214 can be electrically coupled with
15 tube circuit board 2210 so that it can send and receive wireless (e.g., radio) signals. Antenna 2214 can include any suitable antenna resonating element for communicating between headset 2000 and an electronic device (e.g., a cellular telephone or a personal media device). The
20 antenna resonating element can be formed from a flex circuit containing a strip of conductor. The flex circuit can be attached to the button guide structure using, e.g., adhesive. For example, the flex circuit can contain registration holes that mate with corresponding
25 registration bosses on the button guide structure. One or more of the bosses can be heat staked to the flex circuit.

[0100] Details about the operation and design of an antenna and button system similar to antenna 2214 and
30 button 2310 can be found, e.g., in the U.S. Patent

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Application entitled "Antenna and Button Assembly for Wireless Devices," which is incorporated herein.

[0101] Appendages 2302 can be incorporated into antenna cap 2214 in order to mount the antenna cap to headset 2000. Appendages 2302 can, for example, fasten to tube 2200 or one or more brackets 2230 which will be discussed in more detail below.

[0102] Battery pack 2220 can be located within tube 2200. Battery pack 2220 can contain one or more suitable batteries including, for example, lithium ion, lithium ion polymer (Li-Poly), nickel metal hydride, or any other type of battery. Battery pack 2220 can be electrically coupled with circuit board 2210 for powering electronic components in headset 2000. Additionally, circuitry that is typically packaged within standard battery packs can be moved to tube circuit board 2210. Advantageously, the distribution of circuitry into earbud body 2100 and the layout of circuit board 2210 can permit battery pack 2220 to occupy a substantial portion of the internal space of tube 2200. This can increase the energy storage capacity of headset 2000 (e.g., allow headset 2000 to operate for longer period of time in between charges) without increasing the size of tube 2200 and headset 2000.

[0103] Headset 2000 can include connector 2401 for enabling headset 2000 to electrically connect to other devices. An opening or port (not shown) can be included in connector 2401 so that acoustic signals (e.g., speech from a user) can reach the microphone (not shown). The microphone (not shown) can be located inside microphone

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boot 2420 and can be electrically coupled with circuit board 2210 in any suitable manner. Microphone boot 2420 can be placed inside the end of tube 2200 that is farthest from earbud housing 2100. This end may be referred to herein as the microphone and or connector end of headset 2000, and is also the portion of headset 2000 that is closest to the user's mouth when in use. The arrangement of the microphone boot 2420 with respect to connector 2401 and accompanying parts is discussed in more detail below in connection with the description accompanying FIGS. 40-44.

[0104] Connector 2401 can include connector plate 2400, contacts 2410 and accompanying casing 2412 (not shown in FIG. 2) can reside. As such, contacts 2410 can facilitate the electrical coupling of headset 2000 with another device. Casing 2412 can be made from a non-conductive material (e.g., a polymeric material) in order to prevent contacts 2410 from electrically coupling with connector plate 2400. Contacts 2410 and casing 2412 can be substantially flush with the surface of connector plate 2400 so that the combination of the contacts, casing and plate creates a substantially flat surface for mating with other connectors. Connector plate 2400 can be made of a ferromagnetic material so that it is biased to magnetic connectors, such as those shown in FIGS. 52A and 52B, for example. The design of connector plate 2400, contacts 2410, casing 2412 and complementary magnetic connectors will be described in more detail below in connection with the discussion of FIGS. 45-57.

[0105] Headset 2000 can include one or more brackets 2230 to couple connector 2401 with appendages 2302 of antenna cap 2300. Brackets 2230 can prevent connector plate 2400 and antenna cap 2300 from moving axially away from each other or separating from tube 2200. Alternatively, plate 2400 and antenna cap 2300 can be coupled to one or more brackets that are secured to the inner surface of tube 2200.

[0106] As a matter of design choice, a seam can be included in between the peripheral surface of connector plate 2400 and the inner surface of tube 2200. That is, in addition to the predefined port for providing an acoustic pathway between the microphone and the outside environment, gaps can exist. These gaps can advantageously enable the microphone to receive acoustic signals in the event the predefined acoustic pathway is blocked (e.g., by a foreign object such as dirt). In other embodiments, an adhesive may be applied to provide a substantially airtight seal between plate 2400 and tube 2200. In yet another embodiment, a gasket may be used to provide a seal.

[0107] FIG. 2B shows a view of headset 2900 in accordance with another embodiment of the present invention. In headset 2900, a different attachment, with respect to headset 2000, can be used to couple connector 2940 to tube 2920. For example, connector 2940 can include tabs 2902 which can be used to couple with features 2904 on an interior surface of tube 2920. Such a method might be advantageous to using the brackets 2230 in headset 2000. For example, the tabs 2902 can attach

to the near end of tube 2920 which might provide connector 2940 with higher structural integrity than, for example, the method of using brackets to attach to a housing (e.g., antenna cap) on the other end of the tube.
5 Headset 2900 can also include light diffuser 2906 which can be used in conjunction with a visual indicator system as discussed in connection with FIGS. 38 and 39. Additionally, headset 2900 can include antenna 2908 which can wrap around button guide 2910 in one embodiment.

10 **[0108]** The fundamental basics of the Bluetooth protocol are well known in the art, and discussed briefly below. For a more detailed discussion, please see Bluetooth Specification Version 2.0+EDR, Vol. 0, November 4, 2004, which is incorporated by reference
15 herein its entirety. Bluetooth wireless technology is based on an international, open standard for allowing intelligent devices to communicate with each other through wireless, low power, short-range communications. This technology allows any sort of electronic equipment,
20 from computers and cell phones to keyboards and headphones, to make its own connections, without wires or any direct action from a user. Bluetooth is incorporated into numerous commercial products including laptop computers, PDAs, cell phones and printers, and is likely
25 to be used in future products.

[0109] Bluetooth can be referred to as a frequency hopping spread spectrum (FHSS) radio system that operates in the 2.4 GHz unlicensed band. Bluetooth transmissions change frequencies based on a sequence which is known to
30 both the transmitter and the receiver. According to one

known standard, Bluetooth transmissions use 79 different frequencies ranging from 2.404 GHz to 2.480 GHz.

Bluetooth's low power transmissions allow a typical range of about 10 meters or roughly 30-40 feet. This range can vary from about 1 meter to 100 meters depending on the amount of power used by the device for Bluetooth transmissions.

[0110] Bluetooth devices connect to each other to form networks known as piconets. A piconet includes two or more devices which are synchronized to a common clock signal and hopping sequence. Thus, for any device to connect to a given piconet, that device may need to have the same clock signal and hopping sequence. The synchronized clock and hopping sequence can be derived using the clock signal of one of the devices on the piconet. This device is often referred to as the "master" device while all other devices on the piconet are referred to as "slave" devices. Each piconet can include one master device and up to seven or more slave devices. Moreover, Bluetooth devices can belong to more than one piconet. The term "scatternet" is used to define Bluetooth networks which are made up of multiple, overlapping piconets. In the case where one Bluetooth device is on two or more piconets, all of the devices are on a single scatternet. Devices from one of the piconets can communicate with devices from another piconet by using the shared device to relay the signals.

[0111] When two Bluetooth devices initially connect, they first share some general information (e.g., device name, device type) with each other. In order to enhance

the connection, the devices can establish a trusted relationship by using a secret passkey. This passkey is typically provided by a user or stored on memory in a device. According to a known Bluetooth standard, the process of establishing this trusted relationship is called pairing. Once two devices are paired, they typically share information and accept instructions from one another.

[0112] Bluetooth devices can operate with a maximum data throughput of approximately 2.1 Mbit/s (Megabits-per-second), but it is understood that such limitations change as technology advances, and that embodiments of the present invention may operate at other rates. This maximum throughput is shared among all devices on a piconet, meaning that if more than one slave device is communicating with the master, the sum of all communications is less than the maximum data throughput.

[0113] The Bluetooth standard includes a published software framework. The shared framework is called the Bluetooth Protocol Stack and includes different software applications to implement Bluetooth communications. FIG. 3 is a simplified schematic diagram of an exemplary Bluetooth Protocol Stack 3000 in accordance with an embodiment of the present invention. Low-level software is included in Lower Stack 3002. This section includes code to generate/receive radio signals, correct transmission errors and encrypt/decrypt transmissions, among other things. The Host Controller Interface (HCI) 3004 is a standardized interface between the low-level Bluetooth functions and applications. The HCI

layer represents a division between the Lower Stack 3002 functions handled by a dedicated Bluetooth processor and the rest of the functions handled by an application-specific processor.

5 [0114] The Extended Synchronous Connection-Oriented (eSCO) 3006 layer is used to implement dedicated communication channels, commonly used for voice data, in between the Lower Stack 3002 and high-level applications. The Logical Link Control and Adaptation Protocol
10 (L2CAP) 3008 layer combines and repackages the data transmitted and received by the multiple higher-level applications. The L2CAP 3008 layer combines all of these different communications into one data stream that can interface with Lower Stack 3002. The RFCOMM 3010 layer
15 emulates the protocol used by serial connections. This allows software designers to easily integrate Bluetooth into existing applications which previously used a serial connection. The Service Discovery Protocol (SDP) 3012 layer is used by devices to provide information about
20 what services (or functions) each device offers and how other devices can access those services through Bluetooth.

[0115] The Profiles 3014 layer allows a device to identify itself as a member of a generic group of devices
25 with a predefined set of functions. For example, a device complying with the headset profile may support predefined methods relating to audio communications. The Application Layer 3016 contains programs that implement the useful tools created by all of the other layers. By
30 writing different programs for Application Layer 3016,

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software developers can focus on new uses of the Bluetooth functionality without having to rewrite the code which controls the underlying communication tasks.

5 [0116] FIG. 4 shows a simplified block diagram of exemplary electronic system 4000 of a headset in accordance with an embodiment of the present invention. The system of 4000 can be, for example, implemented in headset 1000 of FIGS. 1A and 1B. System 4000 can include processor circuitry 4100, interface circuitry 4200, power
10 distribution circuitry 4300, switching circuitry 4400 and 4-pin symmetrical magnetic connector 4500.

[0117] Processor circuitry 4100 can include processor 4110 and auxiliary circuitry that operates in connection with processor 4110. Processor 4110 can
15 coordinate all of the operations in system 4000, including, for example, Bluetooth transmissions, battery charging and processing (e.g., encoding and decoding) of acoustic signals. Processor 4110 can drive receiver 4120 to provide acoustic signals that may be heard by a user.
20 Reset circuit 4130 can detect when system 4000 is connected to another device and subsequently instruct processor 4110 to reset. Power FET 4140 can be used with the power supply circuitry inside processor 4110 and will be discussed in more detail below in connection with the
25 discussion of FIG. 5. Antenna 4150 can be used to send wireless signals to and receive wireless signals from another device (e.g., a phone or portable media device). UART multiplexer 4160 can be electrically coupled with processor 4110 and can route data signals to different
30 parts of processor 4110. This routing can reduce

unwanted effects, such as inductance, in unused data lines.

[0118] Interface circuitry 4200 can include a microphone isolation LDO 4210, a micro-electro-mechanical (MEMs) microphone 4220, LED driver 4240 and switch 4230. 5
Microphone isolation LDO 4210 can be electrically coupled with MEMs microphone 4220. Microphone isolation techniques and MEMs microphones are well known, and a person of ordinary skill in the art will appreciate that 10
these elements can be replaced by other equivalent microphone configurations without deviating from the spirit of the present invention. LED driver 4240 can be configured to drive a LED display unit based on one or more outputs of processor 4110. Details about the design and function of circuitry similar to LED driver 4240 can 15
be found in the U.S. Patent Application entitled "Systems and Methods for Compact Multi-State Switch Networks," which is incorporated herein. Switch 4230 can represent the electrical behavior of switch 1310 of FIG. 1B. A 20
user can interface with this switch to input commands to the headset. For example, a user can depress switch 4230 to initiate a telephone call, terminate a call, or both. In one embodiment, switch 4230 can be a single-pole, single-throw switch with a spring to bias it to an open 25
position.

[0119] Power distribution circuitry 4300 can include over-voltage protection and fuse 4310, battery protection 4320 and thermistor 4330. Over-voltage protection and fuse 4310 can protect system 4000 in the 30
event that an unsafe amount of voltage is applied to one

or more inputs. The fuse in the protection circuitry can be an over-current protection device which disconnects the inputs of the headset if an over-current condition is detected. Battery protection circuitry 4320 can include
5 circuitry to prevent the malfunction of a battery (e.g., a li-poly battery) which could result in a dangerous overheating situation. Battery protection circuitry 4320, in contrast to conventional headsets which has such circuitry integrated into the battery
10 pack, can be separated from the battery pack and located elsewhere within a headset according to the invention. Thermistor 4330 can be located in the proximity of a battery (not shown) and may change its resistance based on the battery's temperature. One or more inputs of
15 processor 4110 can be electrically coupled with thermistor 4330 to monitor the temperature of the battery. Processor 4110 can be programmed to charge the battery differently depending on the detected battery temperature. For example, processor 4110 may charge the
20 battery at a faster rate when the monitored battery temperature is low than when the temperature is high. By regulating the charging in this manner, the time required to completely charge a battery can be decreased without damaging the battery.

25 **[0120]** Symmetrical magnetic connector 4500 can allow system 4000 to connect to other devices and systems for communicating data or transmitting power. Connector 4500 represents the electrical behavior of connector 1401 of FIG. 1.

[0121] Switching circuitry 4400 can enable connector 4500 to connect and communicate with many different types of devices. Switching circuitry 4400 can include power polarity switch circuit 4410 and data polarity switch circuit 4420. The two circuits can, for example, sense the configuration of a connection and route the corresponding data/power lines to the correct internal wires depending on the sensed configuration. A detailed description of the design and function exemplary circuits similar to switch circuits 4410 and 4420 can be found in the U.S. Patent Application entitled "Systems and Methods for Determining the Configuration of Electronic Connections," which is incorporated herein.

[0122] FIG. 5 shows processor 5000 which can be used as the core processor or application processor of a headset in accordance with an embodiment of the present invention. Processor 5000 can also be referred to as a System on a Chip (SoC) because it can be a single integrated circuit capable of a diverse range of functions. Processor 5000 can be a CSR BC04 Audio Processor with integrated Flash Memory that fully supports the Bluetooth v2.0+EDR specification. An oscillator 5100 and clock generation circuitry 5110 can be used in conjunction with a timing crystal to establish a timing signal (or clock) which processor 5000 can use to coordinate its activities. RF circuitry 5200 can be used to input and output RF signals for wireless communications. Baseband and logic circuitry 5300 can coordinate communications so that they conform with the communications protocol (e.g., a Bluetooth protocol).

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Flash memory 5310 can store, for example, software and configuration information for processor 5000. Random access memory (RAM) 5320 can temporarily store data for Baseband circuitry 5300 and microprocessor 5330. RISC
5 microprocessor 5330 can be programmed to perform various functions, such as for example, monitoring a thermistor (not shown) and coordinating battery charging as previously described.

[0123] Full speed USB controller 5400 and UART
10 circuitry 5410 can facilitate wired communication interfaces so that processor 5000 can share data with another device through a physical interface (e.g., connector contacts 1410 of FIG. 1A). In one embodiment, processor 5000 can support both full speed USB and
15 simplified RS-232 serial interfaces. A simplified RS-232 interface can include, for example, three lines: transmit data, receive data, and ground. In order to accommodate more than one interface over a limited number of data lines, USB controller 5400 and UART circuitry 5410 can be
20 coupled to a switch (e.g., UART Mux 4160 of FIG. 4). This switch can route data lines to the circuitry, within processor 5000, that corresponds to the communication interface being used. A more detailed discussion of systems and methods for using more than one
25 communications interface over a limited number of data lines can be found in the U.S. Patent Application entitled "Systems and Methods for Determining the Configuration of Electronic Connections," which is incorporated herein. Processor 5000 can also support
30 other interfaces in addition to those discussed above

without deviating from the spirit of the present invention. For example, processor 5000 can include circuitry for supporting a proprietary communications interface.

5 [0124] Processor 5000 can include differential microphone input amplifier 5510 and differential speaker output amplifier 5520. Both the input 5510 and output 5520 amplifiers can be electrically coupled with Audio CODEC 5500 to process (e.g., encode and decode)
10 audio signals. Power control and regulation circuitry 5600 can include low-dropout regulator (LDO) 5610, battery charger 5620 and switch mode power supply (SMPS) 5630. The power needed for the various subsystems of processor 5000 can be regulated by LDO 5610
15 or SMPS 5630 depending on both the charge level of the battery and any external power sources that might be connected. This will be described in more detail below in connection with the discussion of FIG. 6. Battery charger 5620 can output a controllable current between 25
20 and 100 milliamps to charge a battery (not shown). In accordance with an embodiment of the present invention, this controllable current can vary based on various factors (e.g., the detected temperature of the battery).

[0125] Programmable I/O 5700 can include LED
25 driver 5710 and analog-to-digital converter (ADC) 5720. LED driver 5710 can use signals from other circuitry in processor 5000 to generate signals with sufficient current to illuminate one or more indicator LEDs. The design and operation of exemplary circuitry similar to
30 LED driver circuitry 5710 can be found in the U.S. Patent

Application entitled "Systems and Methods for Compact Multi-State Switch Networks," which is incorporated herein. Analog-to-Digital Converter (ADC) 5720 can accept inputs from analog circuitry and convert them to digital signals to be used by other circuitry in processor 5000. For example, ADC 5720 can monitor the current running through a thermistor (not shown) to determine the temperature of a battery. Circuitry in processor 5000 can use this temperature information to determine an appropriate charging current for battery charger 5620 to provide. Moreover, it should be noted than ADC 5720 can process multiple analog signals concurrently. For example, in addition to the temperature information above, ADC 5720 can also process voltage information about the current charge level of a headset's battery.

[0126] While the processor described above and shown in FIG. 5 is a CSR BC04 Audio Processor, other processors with other configurations and functionality can be used in a headset without deviating from the spirit of the present invention.

[0127] FIG. 6 shows a simplified schematic of power distribution system 6000 for the subsystems of processor 6050 in accordance with an embodiment of the present invention. Processor 6050 can be similar to processor 5000 of FIG. 5. Processor 6050 can include both low-dropout regulator (LDO) 6200 and switch mode power supply (SMPS) 6250 as options for regulating power for processor 6050. SMPS 6250 can output power with a higher efficiency than LDO 6200, but can require the

installation of several additional components, such as a relatively large capacitor and inductor, which can increase the cost (and size) of system 6000. In addition, SMPS 6250 may require an input voltage that
5 meets, or exceeds, a predetermined voltage level to operate. Therefore, it may be a matter of design choice as to which power supply is used. For example, in low voltage applications, it may be advantageous to use LDO 6200. In other embodiments, such as the one shown in
10 FIG. 6, LDO 6200 and SMPS 6250 can both be used to provide functionality over a wide range of input voltages and high power efficiency.

[0128] FIG. 6 shows processor 6050 which includes core circuitry 6100 and radio circuitry 6200 in accordance
15 with an embodiment of the present invention. Radio circuitry 6200 can include, for example, circuitry related to RF communications. Additional functions (e.g., low-level system functions, firmware updates) can be executed by core circuitry 6100. Additionally, core
20 circuitry 6100 can monitor and control other circuitry in system 6000 using, for example, input line 6120 and output lines 6110, 6112 and 6114.

[0129] Power distribution system 6000 can include circuitry for interfacing with two power sources. In
25 FIG. 6, an internal battery is represented by BAT 6550, and an external power supply is represented as BUS 6500. From herein, the voltage of BAT 6550 will be referred to as VBAT. BUS 6500 can, for example, represent the power provided by a battery charger that is connected to
30 system 6000. BUS 6500 can be electrically coupled with

LDO 6200 such that the LDO draws power from an external source through BUS. Therefore, LDO 6200 operates when an external power supply is connected to system 6000.

Similarly, SMPS 6250 can be electrically coupled with
5 BAT 6550 so that it draws power from battery 6550.

[0130] Other circuitry in power distribution system 6000 can include Power FET 6400, Analog-to-Digital Converter (ADC) 6300 and logic gates 6610, 6310 and 6320. Button 6600 can represent, for example, a signal from an
10 on/off switch or other circuitry that can signal processor 6050.

[0131] An illustrative operation of system 6000, in which BAT 6550 is the only source of power, is now discussed. An absence of power on BUS 6500 prevents
15 LDO 6200 from supplying power and causes FET 6400 to turn on, thereby effectively coupling nodes 6401 and 6402. System 6000 may be turned on when button 6600 is activated and outputs a high voltage. Activation of button 6600 can cause the button input of gate 6610 to go
20 HIGH, which can cause the output of the gate 6610 to go HIGH. This HIGH signal can cause gate 6320 to assert a HIGH signal on its output. When gate 6320 outputs a high voltage, SMPS 6250 is activated and can begin providing power, if VBAT is at or above the predetermined voltage
25 level (e.g., battery 6550 has sufficient power to run SMPS 6250). Because power FET 6400 is on, the power provided by SMPS 6250 can be transmitted to radio circuitry 6150 and core circuitry 6100. As core circuitry 6100 begins to boot up, it can output a HIGH
30 signal on line 6114 so that gate 6320 continues to output

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a HIGH signal after button 6600 is released. System 6000 can operate with full functionality at this point because both core circuitry 6100 and radio circuitry 6150 are receiving power. However, when VBAT drops below the
5 predetermined voltage level (e.g., battery 6550 is dead), SMPS may no longer be able to produce reliable power and system 6000 may begin to shut down.

[0132] An illustrative operation of system 6000 receiving power from an external power source on BUS 6500
10 is now discussed. The power on BUS 6500 can provide supply power to LDO 6200 and cause power FET 6400 to turn OFF or remain turned OFF, effectively decoupling nodes 6401 and 6402. Additionally, the power on BUS 6500 can cause gates 6610, 6310 and 6320 to output HIGH
15 signals. When gate 6310 generates a HIGH signal, LDO 6200 can begin supplying power. Power from LDO 6200 may be provided to core circuitry 6100, but not to radio circuitry 6150, because power FET 6400 is not conducting. When core circuitry 6100 receives power, it can output a
20 HIGH signal on line 6110 which causes the output of gate 6310 to maintain a HIGH signal so that LDO 6200 can continue operating.

[0133] SMPS 6250 may not be able to operate until VBAT has risen to or above the predetermined voltage level.
25 Core circuitry 6100 can instruct battery charging circuitry (not shown) to begin using power from BUS 6500 to charge the battery. It should be noted that the circuit arrangement for charging battery 6550 is not shown in FIG 6. Core circuitry 6100 can receive signals
30 (e.g., digital signals) from ADC 6300 over line 6120.

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ADC 6300 can be electrically coupled with BAT 6550. ADC 6300 can convert a signal with a varying voltage (e.g., VBAT) into a digital signal that can be processed by core circuitry 6100. When VBAT has met or exceeded
5 the predetermined voltage level, SMPS 6250 may now be able to operate and provide radio circuitry 6150 with power. Note that in some embodiments, SMPS 6250 may be powered ON substantially immediately when an external power service is connected to BUS 6500. Using ADC 6300,
10 core circuitry 6100 can detect when SMPS turns on and coordinate the functions of processor 6050 accordingly. For example, when radio circuitry 6150 is powered, core circuitry 6100 can begin sending communications data to radio circuitry 6150. In this manner, processor 6050 can
15 operate with full functionality before BAT 6550 is fully charged.

[0134] While BAT 6550 is charging, core circuitry 6100 can perform various other functions, regardless of whether VBAT has met or exceeded the predetermined
20 voltage level. For example, core circuitry 6100 can run boot up processes, communicate over wired interfaces and run user interfaces. In this manner, core circuitry 6100 can, for example, handle auxiliary processes (e.g., downloading firmware updates via a wired interface and
25 installing the updates) before processor 6050 has full functionality.

[0135] Several benefits may be realized in powering circuitry 6000 in the manner discussed above. For example, the core circuitry 6100 can turn ON before the
30 battery has reached a minimum charge threshold. This

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enables core circuitry 6100 to handle boot up processes in advance, thereby enabling headset to begin working immediately once the battery is charged to the minimum level. In effect, certain components may be powered
5 independent of BAT 6550 when an external power supply is connected to BUS 6500.

[0136] Additionally, System 6000 limits the unnecessary use of BAT 6550. Traditionally, known headset circuitry is powered through a battery even if an
10 external power supply is present. The power drained from the battery is then recharged using power from the external power supply. This charging and recharging can shorten a battery's lifespan. System 6000 allows core circuitry 6100 to draw power independent of BAT 6550 and
15 directly from an external supply (if present), extending the life of BAT 6550.

[0137] To provide additional functionality, output line 6112 can be included in core circuitry 6100 so that the core circuitry can shut down system 6000. Line 6112
20 can be coupled with node 6330 such that line 6112 can drive node 6330 to a LOW signal. Therefore, if core circuitry outputs LOW signals to lines 6110, 6112 and 6114, the output of gates 6310 and 6320 go LOW, turning off both LDO 6200 and SMPS 6250, which causes
25 core circuitry 6100 and radio circuitry 6150 to turn off.

[0138] While the previous discussion described a method and system for separately powering on core and RF radio circuitries, the same techniques can be applied to other electronic subsystems which, for example, might be
30 unrelated to RF communications.

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[0139] FIGS. 7A-7C show different views of known headset circuit boards, with particular emphasis on how circuitry and components are distributed therein. Electrical components 7926, including processor 7922, may be mounted on two sides of circuit board 7920. The assembled circuit board 7920 can then be inserted into a headset housing (not shown). As can be appreciated by one of skill in the art, circuit board 7920 may occupy a relatively large, undistributed area, even though circuitry inside the headset is mounted on both sides of the board. Such circuit boards can limit the amount that other components (e.g., batteries, buttons, antennas) are spatially integrated with the electronics. Thus, known headsets have to be relatively large to accommodate such boards and other components.

[0140] FIG. 8 is a simplified schematic system diagram of a headset showing a circuit board arrangement in accordance with an embodiment of the present invention. System 8000 can be divided into two independent and separately arranged circuit boards 8100 and 8200. That is, when boards 8100 and 8200 are installed in a headset according to an embodiment of the present invention, the boards may be electronically coupled to each other, but the boards themselves are discrete. Circuit board 8100 is similar to earbud circuit board 2120 of FIG. 2A and can include, for example, Bluetooth processor 8102, circuitry that requires placement close to the processor, balance RF filter circuitry 8104 and coaxial connector (not shown). Examples of circuitry required close proximity to processor 8102 can include a timing crystal,

charging inductors, capacitors, field effect transistors and resistors.

[0141] Circuit board 8200 is similar to tube circuit board 2210 of FIG. 2A and can include RF Antenna 8202,
5 interface circuitry 8204, power distribution circuitry 8206, switching circuitry 8208, 4-pin symmetrical magnetic connector 8210, RF matching circuitry 8212 and coaxial connector (not shown).

[0142] Circuit boards 8100 and 8200 can be
10 electrically coupled using, for example, co-ax cable 8300 and bus 8302. In the embodiment shown in FIG. 8, bus 8302 includes ten lines, but one of ordinary skill in the art will appreciate that the number of lines in the bus can vary.

[0143] Balance RF filter circuitry 8104 and RF
15 matching circuitry 8212 can adjust RF signals to compensate for the specific effects of circuit board 8100, co-ax cable 8300, circuit board 8200 and antenna 8202. The functions of elements of additional
20 circuitry in circuit board 8100 and 8200 have been described in more detail in the above discussion relating to FIG. 4.

[0144] FIGS. 9A and 9B compare respective top and
bottom views of earbud circuit board 9120 according to an
25 embodiment of the present invention to respective top and bottom views of the known circuit boards shown in FIGS. 7A-7C. In addition, FIGS. 9A and 9B show that selected components of known circuit board 9900 can be arranged on earbud circuit board 9120. For example, as
30 shown, the encircled circuit and components such as

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components 9926 and processor 9922 can be placed on one or more sides of earbud circuit board 9120. The remaining electronic components such as 9912 can be placed on tube circuit board (not shown) which may be located inside the headset tube.

5 [0145] Earbud circuit board 9120 can include a layer made from a flexible substrate that enables board 9120 to bend onto itself, thereby effectively reducing the area needed to install board 9120 into a headset according to the invention. The flexible layer of circuit board 9120 can include one or more layers of electrical traces for electrically coupling electronic components 9122 and 9126. The flexible layer of circuit board 9120 can, for example, extend over the entire footprint of the circuit board, or be limited to predetermined portions of board 9120.

15 [0146] Circuit board 9120 can include relatively rigid sections 9123, 9125 and 9127 which have increased structural strength and are easier to mount electrical components to. Rigid circuit board sections 9123, 9125, and 9127 can be fabricated by attaching rigid circuit board pieces to one or more outer surfaces of the flexible layer of circuit board 9120. Rigid pieces can be attached to a flexible layer using any suitable process, such as applying an adhesive, for example. Contacts can be included on complementary surfaces of the rigid pieces and the flex layer so that electrical traces can be routed across the different layers. One or more layers of electrical traces can be included in the rigid circuit board pieces so that the combination of rigid and

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flex layers can provide two or more layers of electrical traces. In the embodiment shown in FIGS. 9A and 9B, a flex circuit layer with two levels of traces can be located in between two rigid, single-trace layers such that the resulting rigid sections of circuit board 9120 include four layers of traces. In flexible sections of circuit board 9120, such as connector lead 9121, the absence of rigid pieces can result in two levels of traces.

10 **[0147]** Rigid sections 9125 and 9127 can have substantially circular footprints with different radii. Various electrical components, such as capacitors and resistors, for example, can be mounted on both sides of rigid section 9125. Rigid section 9127 can have a larger footprint than section 9125 in order to accommodate the mounting of processor 9122 on a first side and receiver 9124 on a second side of section 9125. Connector 9128 can be mounted to rigid section 9123 to enable earbud circuit board 9120 to be electrically connected to a tube circuit board (not shown).

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30 **[0148]** FIGS. 10A and 10B show side and perspective views of earbud circuit board 10121 in a folded configuration in accordance with an embodiment of the present invention. The folded configuration may resemble the configuration taken when installed within a headset, or more particularly, the earbud of the headset, as shown in FIG. 10C. Circuit board 10121 is substantially similar to circuit board 9121 disclosed in FIGS. 9A and 9B, as indicated by similar use of numerals. Top rigid section 10127 can be folded over middle rigid

section 10125 so that both sections can fit in the earbud of a headset.

[0149] Referring now to FIG. 10C, which shows earbud circuit board 10120 and tube circuit board 10210
5 installed in a possible configuration within headset 10000 in accordance with an embodiment of the present invention. Circuit board 10120 can be folded in a configuration similar to that of FIGS. 10A and 10B and inserted into earbud 10100. Tube circuit board 10210 can
10 include a combination of rigid and flexible sections that are similar, in composition but not necessarily shape, to the rigid and flexible sections of circuit board 10120. Circuit board 10210 can be folded to provide a cavity 10220 for a battery (not shown). Circuit
15 board 10210 can include connector 10218 which may connect to connector 10128 of earbud circuit board 10120. During installation, circuit board 10210 can be inserted through one of the open ends of tube 10200. Connector lead 10121 can be fed through headset neck 10110 so connector 10128
20 can mate with connector 10218 when circuit board 10210 has been inserted into tube 10200.

[0150] This distribution of electronics, where processor 10122 and other circuitry is located inside earbud housing 10100, advantageously allows for a
25 generally smaller and more comfortable headset. Although the discussion above is related to an embodiment in which a certain distribution of electronic components is used, other distributions can be used without deviating from the spirit of the present invention. For example, a

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battery can be placed inside the earbud and a processor can be placed in the tube.

[0151] FIG. 11A shows a perspective view of earbud body 11100 and neck 11110 in accordance with an embodiment of the present invention. Bezel 11130 can cover the top of earbud 11100. One or more acoustic ports 11102 can be located in the wall of the earbud to allow pressure to vent out of earbud body 11100.

[0152] FIG. 11B shows an exploded view of earbud body 11100 of FIG. 11A in accordance with an embodiment of the present invention. Screens 11131 and 11132 can be located on top of bezel 11130. Screens 11131 and 11132 can, for example, provide dust protection and acoustic resistance. Top gasket 11134 can be attached to the underside of bezel 11130 to create a seal with receiver 11124, and bottom gasket 11123 can be attached to section 11127 (a rigid section) of circuit board 11120. Bracket 11135 can be used to mount circuit board 11120 inside earbud 11100. Mesh 11500 can cover acoustic ports 11102 and can, for example, impose acoustic resistance on air passing through those ports. Screw 11112 can be used to mount earbud housing 11100 to neck 11110. Gaskets 11134 and 11123 can be made of, for example, foam, rubber, or any other compressible material so that the gaskets can form acoustic (e.g., substantially air-tight) seals with surrounding parts.

[0153] FIG. 12 shows an interior view of empty earbud housing 12100 in accordance with an embodiment of the present invention. Mesh 12500 can be located on the inner wall of housing 12100 to control the flow of air

through one or more acoustic ports 12102 and prevent foreign objects (e.g., dirt) from entering housing 12100. Mesh 12500 can, for example, be affixed to housing 12100 using an adhesive. Mesh 12500 can be made of nylon,
5 plastic, or any other suitable material. Mesh 12500 can provide acoustic resistance to the passage of air between the space inside housing 12100 and the outside environment when the earbud is assembled. Even though only one acoustic port is shown in FIG. 12, any number of
10 acoustic ports can be used in accordance with the principles of the present invention.

[0154] FIG. 13 shows rigid section 13127 of an earbud circuit board mounted inside earbud housing 13100 in accordance with an embodiment of the present invention.
15 Acoustic port 13502 can be provided in circuit board section 13127 to permit air flow through the circuit board. The size, shape and location of acoustic port 13502 can vary depending on, for example, the acoustic properties of the earbud and the desired sound
20 output. If desired, more than one acoustic port may be provided. Although not shown in FIG. 13, a second rigid portion of the earbud circuit board (such as rigid portion 10125 of FIG. 10) may too include at least one acoustic port. Though such a port or ports may not be
25 necessary if sufficient air gaps exist between the inside wall of housing 13100 and the second rigid portion.

[0155] FIG. 14 shows bottom gasket 14506 mounted onto circuit board section 14127 in accordance with an embodiment of the present invention. Bottom gasket 14506
30 can include an combination of, for example, acoustic

mesh 14504, adhesive, and foam 14505. Foam 14505 of
gasket can be shaped to fit around receiver (not shown)
and acoustic port 14502. Unlike foam 14505, the
mesh 14504 can be shaped to cover port 12502. In this
5 manner, audio mesh 14504 can cover acoustic port 14502
even though the foam 14505 does not. Mesh 14504 can be
made of nylon, plastic, or any other suitable material
that can provide acoustic resistance to the passage of
air between the space under circuit board section 14127
10 and the space where the receiver (not shown) is located.
[0156] FIG. 15 shows the underside of bezel 15130 in
accordance with an embodiment of the present invention.
Bezel 15130 can include rim 15136 which extends from the
bottom of bezel 15130. Rim 15136 can be of sufficient
15 height to compress bottom gasket 14506 of FIG. 14 against
circuit board section 14127 of FIG. 14 when bezel 15130
is mounted to the top of the earbud housing, thereby
creating an acoustic seal between the rim and the circuit
board. Gasket 15134 can be, for example, a layer of foam
20 that is affixed to the underside of bezel 15130 using
adhesive. Gasket 15134 can be shaped so that it can form
a seal with the top of the receiver (not shown) when
bezel 15130 is mounted to the earbud. Bezel 15130
includes acoustic port 15133 for sound to exit an earbud.
25 Screen 15131 can be located on the topside of bezel 15130
so that the screen completely covers acoustic port 15133.
Screen 15131 can apply an acoustic resistance to air
passing through acoustic port 15133.

[0157] FIG. 16A shows the underside of bezel 16130
30 with receiver 16124 installed in accordance with an

embodiment of the present invention. Receiver 16124 can be placed inside rim 16136 so that the front output of receiver 16124 is encircled by the seal formed between the top of the receiver housing and the top gasket (not shown) such as top gasket 11134 of FIG. 11B.

5 [0158] FIG. 16B shows the underside of bezel 16910 with receiver 16912 installed in accordance with another embodiment of the present invention. Receiver 16912 can include spring contacts 16902 and 16904. Spring contacts 10 16902 and 16904 can, for example, be made from a metal or an alloy. Springs contact 16902 and 16904 can electrically couple with circuitry in a headset in order to input audio signals to receiver 16912.

[0159] FIG. 16C shows a cross-sectional view of 15 receiver 16124 in accordance with an embodiment of the invention. Receiver 16912 can include spring contacts 16902 and 16904 which can connect receiver 16912 with a source of electrical signals (not shown). Contacts 16902 and 16904 can include tips 16903 and 16905 to facilitate 20 the physical contact with a contact on a circuit (e.g. a flex circuit board).

[0160] FIG. 17 shows a cross-sectional view of earbud 17100 with receiver 17124 installed in accordance with an embodiment of the present invention. Bezel 17130 25 is mounted on top of earbud housing 17100. Bezel 17130 can be attached to housing 17100 using a notch and rib configuration 17138 or any other suitable method of attachment, such as adhesive, for example. In an alternative embodiment of the present invention, bezel 30 17130 can be integrally formed with earbud housing 17100.

Neck 17110 can be coupled to the bottom of earbud housing 17100. Earbud circuit board 17120 can be located inside the earbud and extend through lumen 17116 of neck 17110.

5 **[0161]** Located on the top of bezel 17130, screens 17131 and 17132 can cover audio port 17133. Audio port 17133 can allow air to pass between the external environment 17608 and front volume 17602 of receiver 17124. Top and bottom gaskets 17134 and 17506
10 can create acoustic seals around receiver 17124 so that receiver rear volume 17604 is created. Acoustic port 17502 can allow air to pass through top rigid section 17127 of circuit board 17120 so that a port between receiver rear volume 17604 and rear earbud
15 volume 17606 is created. Acoustic port 17102 can be located in earbud body 17100 so that air can pass between rear earbud volume 17606 and the external environment 17608. Mesh 17500 can be applied to the inner wall of earbud housing 17100 to cover acoustic
20 port 17102.

[0162] In one embodiment of the present invention, receiver 17124 can form at least part of a wall defining front volume 17602 and at least part of a wall defining receiver rear volume 17604. Rim 17136 of bezel 17130 can
25 extend from the bezel into the interior of the earbud and compress against bottom gasket 17506, thereby also forming at least part of a wall defining receiver rear volume 17604. In one embodiment of the present invention, top rigid section 17127 of circuit board 17120
30 can be disposed between receiver rear volume 17604 and

rear earbud volume 17606, thereby forming at least part of a wall defining receiver rear volume 17604 and at least part of a wall defining rear earbud volume 17606. To ensure the desired acoustic seal between receiver rear
5 volume 17604 and rear earbud volume 17606, top rigid section 17127 of circuit board 17120 can be rigidly coupled to earbud housing 17100, directly or indirectly. In contrast, in one embodiment of the present invention, middle rigid section 17125 of circuit board 17120, which
10 can be disposed within rear earbud volume 17606, can be flexibly coupled to the earbud housing, directly or indirectly (e.g., via top rigid section 17127 and flexible section 17129 of circuit board 17120). As used herein, when a component forms part of a wall defining an
15 acoustic volume, the component can do so directly or indirectly. For example, the component can directly form part of a wall defining an acoustic volume when part of the component is open to the acoustic volume. The component can indirectly form part of a wall defining an
20 acoustic volume when the component is incorporated into another component open to the acoustic volume.

[0163] In order to prevent sound from exiting rear earbud volume 17606 through lumen 17116, a substance, such as silicon glue, can be used to fill the inside of
25 neck 17110. It is advantageous to prevent sound from receiver 17124 leaking into the headset tube (not shown) because the headset microphone (not shown) is located inside the tube. If sound from the receiver is picked up by the microphone, a potentially undesirable echo may be
30 created.

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[0164] FIG. 18 shows a view of unassembled pieces that can be used to attach earbud housing 18100 to tube 18200 in accordance with an embodiment of the present invention. The configuration described below can allow
5 for a mechanically robust connection which prevents housing 18100 from rotating with respect to tube 18200. An additional benefit of this design is the open lumen (or tunnel) that can be used to run wires (or flexible printed circuit) between the earbud and tube.

10 [0165] Attachment system 18000 can include insert 18112, earbud housing 18100, neck 18110, insert 18114 and tube 18200. In order to simplify manufacturing, inserts 18112 and 18114 can be substantially similar and can both include features
15 (e.g., notches) 18118 and threads 18119. Features 18118 can be arranged in a pattern to promote proper interface with certain tools. A custom tool which can interface with inserts 18112 and 18114 is described in more detail in the discussion below corresponding to FIGS 20A, 20B
20 and 20C.

[0166] Tube 18200 can include aperture 18204. Insert 18114 can be located in tube 18200 so that the threaded part of insert 18114 protrudes through aperture 18204. The interior of neck 18110 can be
25 threaded so it can couple with inserts 18114 and 18112. Earbud housing 18100 can include an aperture (not shown) through which insert 18112 can pass to couple with neck 18110.

[0167] The top surface of neck 18110 can include one
30 or more tabs 18116 which can interface with one or more

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notches (not shown) in the bottom of housing 18100 to prevent the two parts from rotating independently of each other when coupled together. Corresponding tabs (not shown) can be located on the bottom surface of neck 18110 in order to interface with one or more notches 18206 in the aperture 18204 through tube 18200. Tube 18200 can include step 18208 so that the bottom surface of neck 18116 can be recessed below the primary exterior surface of the tube. Moreover, the exterior of neck 18110 can be shaped to provide a nearly seamless transition from earbud housing 18100 to headset tube 18200.

[0168] Neck 18110 and inserts 18112 and 18114 can be made from any suitable material (e.g., metals or polycarbonates). For example, neck 18110 can be made from aluminum and inserts 18112 and 18114 can be made from steel. The choice of materials for neck 18110 and inserts 18112 and 18114 can depend on factors such as structural strength, weight, price, ability to be machined, and cosmetic appearance.

[0169] FIG. 19 shows a flowchart of process 19000 for connecting a headset earbud with a headset tube in accordance with an embodiment of the present invention. At step 19010, a bottom insert (such as insert 18114 of FIG. 18) can be inserted into a tube. The bottom insert can be inserted from either side of the tube and manipulated so that the threaded end is protruding through an aperture in the wall of the tube. At step 19020, thread-locking glue can be applied to the threads of the bottom insert. The glue can be applied so

that it covers a complete circular path around the threads of the insert. Alternatively, the glue can be applied to just one section of the threads. The glue can be selected in order to prevent the insert from
5 unscrewing itself due to external forces (e.g., vibration). In one embodiment, a sufficient quantity of glue may be applied to the threads of the insert to prevent moisture and other harmful elements from entering the inside of a headset through a seam which may exist
10 between the neck and the tube. At step 19030, a neck (such as neck 18110 of FIG. 18) can be screwed onto the insert to a predetermined level. At step 19040, the neck can be aligned to the tube so that one or more tabs (e.g., tabs 18116) on the neck fit within one or more
15 notches on the tube. At step 19050, a custom tool can be used to turn the bottom insert while the neck is rotationally fixed to the tube. At step 19060, the bottom insert can be tightened to a predetermined torque. This torque measurement can be estimated by hand or
20 performed with a calibrated torque wrench. At step 19070, an earbud housing can be mounted to the neck so that one or more tabs on the neck fit within one or more notches on the earbud housing. At step 19080, thread-locking glue can be applied to the top insert
25 threads. The glue used on the threads of the top insert can be the same as the glue used on the threads of the bottom insert and can be applied in a similar manner. At step 19090, the top insert can be screwed into the neck. At step 19100, the top insert can be tightened to a
30 predetermined torque.

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[0170] FIGS. 20A and 20B show custom tool 20000 that can be used to manipulate an insert (e.g., insert 18112) with respect to a neck (e.g., neck 18110) in accordance with an embodiment of the present invention. Tool 20000
5 can include two members 20100 and 20200 which can be coupled together by fastener 20300. Fastener 20300 can allow members 20100 and 20200 to rotate (or pivot) independently around the faster.

[0171] Members 20100 and 20200 can include
10 appendages 20110 and 20210 which can be used by a user to control tool 20000. Appendages 20110 and 20210 can be an ergonomic size and shape. For example, appendages 20210 can be curved to accommodate an average human hand. Appendages 20110 and 20210 can include plastic
15 covers 20112 and 20212 with ridges 20114 and 20214 such that a user can easily grip the appendages with his/her hands. A spring 20400 can be coupled with appendages 20110 and 20210 such that the appendages are biased to separate from each other.

[0172] Members 20100 and 20200 may control the
20 movement of manipulators 20130 and 20230, which can interface with a part, such as an insert. For example, when appendages 20110 and 20210 are squeezed together, manipulators 20130 and 20230 may be forced apart.
25 Manipulators 20130 and 20230 can include narrow sections 20132 and 20232 and tips 20134 and 20234.

[0173] FIG. 20B shows a detailed view of the shape of
tips 20134 and 20234 in accordance with an embodiment of the present invention. Tips 20134 and 20234 can include
30 outward facing tabs 20136 and 20236 which can interface

with features, such as notches 18118 of FIG. 18, of inserts in order to manipulate (e.g., screw into place) the inserts. Tabs 20136 and 20236 can form the outer surface of narrow sections 20132 and 20232.

5 [0174] FIG. 20C shows custom tool 20900 coupling neck 20110 with tube 20200 in accordance with step 19050 of FIG. 19 according to an embodiment of the present invention. FIG. 20 illustrates how the narrow section of the manipulators can be of sufficient length so that tabs
10 (not shown) can interface with features (not shown) on the insert (not shown). Note that to preserve the structural strength of the manipulators, the narrow section may not be constructed to be substantially longer than necessary.

15 [0175] Extruded tubes with internal features for securing elements are useful for electronic devices. The following discussion describes different processes for creating a tube having an internal wall, for example, for supporting circuitry or electronic components. It will
20 be understood, however that the processes and devices described can be used to create any suitable feature on the inner surface of a tubular structure.

[0176] FIG. 21 is a cross-section of a tube having an internal wall 2104 in accordance with an embodiment of
25 the present invention. Tube 2100 has a wall thickness 2102, and includes internal wall 2104 that extends inward perpendicular from the elongated axis of the tube. Internal wall 2104 has a thickness 2106 and a height 2108 (as measured from the outer surface of the
30 tube). The discussion accompanying FIGS. 22-23, 24-26,

27-28, 29-30, and 31-33 respectively relate to various methods for creating tube 2100 in accordance with some embodiments of the present invention.

[0177] Known extrusion processes are unable to extrude
5 tubes with internal features such as an internal wall
(e.g., internal wall 2104). For example, known extrusion
processes involve forcing a molten material through an
aperture in order to create an object with a cross-
sectional shape that is similar to the shape of the
10 aperture. This type of process is incapable of producing
tubes with discreet internal features because such a tube
will have a cross-sectional shape that varies along the
length of the tube. To overcome this limitation,
existing processes require manufacturing a tube having a
15 wall thickness equal to the required height of the
feature (e.g., height 2108), and subsequently removing
excess material around the feature using a machining
process so that the final wall thickness meets the
desired specification (e.g., thickness 2102). FIG. 22 is
20 a cross-section of an illustrative tube manufactured with
a wall thickness that is thicker than the desired end
product wall thickness in accordance with an embodiment
of the present invention. Tube 2200 may be formed from
any material (e.g., metal, plastic, or composite) using
25 any suitable process (e.g., extrusion, impact extrusion,
or progressive deep draw). Wall thickness 2202 may be
selected based on the features that will be carved into
tube 2200.

[0178] FIG. 23 is a perspective view of a cross-
30 section of the illustrative tube of FIG. 22 once the tube

has been machined to include an internal wall in accordance with an embodiment of the present invention. To form internal wall 2204 in tube 2200, the entire inner surface 2201 of tube 2200 is machined to remove excess material around the internal wall and to reduce tube thickness 2202 to a desired wall thickness. This machining step may be time consuming, expensive, and difficult to implement, as it requires an experienced machinist and expensive tools. Furthermore, machining may also leave marks on the part, which may be undesired (e.g., for aesthetic reasons). Also, some features may include geometry or aspects that cannot be manufactured by machining (e.g., sharp angles not directly accessible from either end of the tube) or features that cannot be manufactured within the required tolerances (e.g., due to the inherent size of the machining tools).

[0179] To overcome the limitations of an entirely machined tube, a number of approaches may be used. FIG. 24 is an illustrative die and stamper for modifying the internal aspect of a tube in accordance with an embodiment of the present invention. Tube 2400 is extruded with the desired final thickness 2402 required for the tube. Tube 2400 is extruded to a slightly longer length 2403 than required for the final product, as the longer portion may be part of a cold-worked process that is used to create the internal wall. A die 2410 may be inserted in a first end of tube 2400 and inserted such that die end 2412 is aligned with a desired location of internal wall 2404 (not shown in FIG. 24, but shown in FIG. 26). Die 2410 may fit flush against the inside wall

of tube 2400 and may be operative to maintain wall thickness 2402 when stamper 2420 is be used to cold-work the tubing not in contact with die 2410. Stamper 2420 is then inserted into the second end of tube 2400, and a
5 stamping force is applied to cold work the portion of tube 2400 located between the second end and die 2410. Stamper 2420 causes the wall thickness 2422 of tube 2400 to increase in the cold worked portion of tube 2400 by forcing the excess tube length to be cold-worked into the
10 internal wall. The shape of stamper 2420 and the distance between the second end of tube 2400 and die end 2412 may be set to obtain the desired thickness for internal wall 2404.

[0180] FIG. 25 is an cross-sectional view of the tube
15 of FIG. 24 after stamper 2420 and die 2410 are removed from tube 2400 in accordance with an embodiment of the present invention. After stamping, tube 2400 includes two thicknesses, thickness 2402 which is the expected final thickness of the tube, and thickness 2422, which
20 corresponds a maximum possible height of any internal wall internal wall that may be machined from thickness portion 2422.

[0181] To create internal wall 2404, portions of inner surface 2401 of tube 2400 may be machined. FIG. 26 is a
25 perspective view of the tube of FIG. 25 when the tube is machined to create an internal wall in accordance with an embodiment of the present invention. The portions of inner surface 2401 having thickness 2422 may be machined to thickness 2402 such that internal wall 2404 remains in
30 tube 2400. Surface 2430 of FIG. 26 can identify the

surfaces that are machined to complete tube 2400. An advantage of this process over the process described in FIGS. 22 and 23 is that the amount of machining required for the tube can be greatly reduced, as are costs.

5 [0182] Another approach for forming features in a tube may include impact extrusion of one end of the tube. FIG. 27 is a cross-section of an illustrative tube formed using impact extrusion in accordance with an embodiment of the present invention. Tube 2700 having wall
10 thickness 2702 is formed using impact extrusion. Impact extrusion creates an indentation that extends to surface 2710, which corresponds to the surface of internal wall 2704 (FIG. 28) of tube 2700. The end of tube 2700 remains closed by material 2722.

15 [0183] To complete tube 2700 and construct internal wall 2704, material 2722 may be machined. FIG. 28 is a perspective view of the tube of FIG. 27 when tube 2700 is machined to create an internal wall in accordance with an embodiment of the present invention. Material 2722 may
20 be machined to leave inner surface 2701 of tube 2700 with thickness 2702, and with internal wall 2704 extending from inner surface 2701. Surface 2730 of FIG. 28 identifies the surfaces that are machined to complete tube 2700. Similar to the process of FIGS. 25-26, this
25 process is advantageous over the process described in FIGS. 22 and 23 because the amount of machining required for the tube can be greatly reduced.

[0184] Another approach for forming features in a tube may include impact extrusion of both ends of a tube.
30 FIG. 29 is a cross-section of an illustrative tube 2900

formed using impact extrusion in accordance with an embodiment of the present invention. Tube 2900 having wall thickness 2902 is formed using impact extrusion. The impact extrusions create a first indentation 2910
5 that extends to surface 2912 and a second indentation 2914 that extends to surface 2916. The distance between surfaces 2912 and 2916 may correspond to the thickness 2906 of internal wall 2904. The thickness of tube 2900 left by first indentation 2910 is
10 thickness 2902, which may be the expected final thickness of the tube. The thickness of tube 2900 left by second indentation 2914 is thickness 2922, which may correspond to height 2908 of internal wall 2904. In some embodiments, if internal wall 2904 is configured to be
15 constrained between surfaces 2912 and 2914, thickness 2908 may be the same as thickness 2902 (i.e., substantially the expected final thickness) because internal wall 2904 having height 2908 (as shown in FIG. 30) may be machined from the material left between
20 surfaces 2912 and 2916.

[0185] To complete tube 2900 and construct internal wall 2904, material 2924 may be machined. FIG. 30 is a perspective view of the tube of FIG. 29 once the tube is machined to create an internal wall in accordance with an
25 embodiment of the present invention. Material 2924 may be machined to leave inner surface 2901 of tube 2900 with thickness 2902, and with internal wall 2904 extending from inner surface 2901. Surface 2930 of FIG. 30 identifies the surfaces that are machined to complete
30 tube 2900. Similar to the processes of FIGS. 25-26

and 27-28, this process is advantageous over the process described in FIGS. 22 and 23 because the amount of machining required for the tube can be greatly reduced.

[0186] Yet another approach for forming features in a tube may include a progressive deep draw process. FIG. 31 is a cross-section of an illustrative tube formed using a progressive deep draw process in accordance with an embodiment of the present invention. Tube 3100 is constructed to have two consecutive indentations 3110 and 3114 having distinct wall thicknesses. Indentation 3110 has thickness 3102, which may be the expected final thickness of tube 3100, and indentation 3114 has wall thickness 3122. Tube 3100 may transition from indentation 3110 to indentation 3114 at plane 3112, which may correspond to the location of internal wall 3104 (FIG. 33) configured to be constructed in inner surface 3101 (FIG. 33) of tube 3100.

[0187] FIG. 32 is a perspective view of a cross-section of the tube of FIG. 31 in accordance with an embodiment of the present invention. As shown in FIG. 32, tube 3100 is closed at the end of indentation 3114 by material 3124. To complete tube 3100 and construct internal wall 3104, material 3122 may be machined to open tube 3100, and indentation 3114 may be machined to reduce thickness 3122 to the thickness 3102 (e.g., the final expected thickness) while leaving internal wall 3104.

[0188] FIG. 33 is a perspective view of the tube of FIGS. 31 and 32 after the tube is machined to create an internal wall in accordance with an embodiment of the

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present invention. Surface 3130 of FIG. 33 identifies the surfaces that are machined to complete tube 3100. Similarly to the process of FIGS. 25-26, this process is advantageous over the process described in FIGS. 22 and 23 because the amount of machining required for the tube can be greatly reduced.

5 [0189] The following flow charts illustrate methods for forming a tube with a feature on the internal surface of the tube using embodiments of the invention described above. Internal features may include, for example, a wall, a protrusion, an aperture, a snap, a shelf, or any other suitable feature. FIG. 34 is a flow chart of an illustrative process for forming an extruded tube with a feature on the internal surface of the tube using a die and stamper in accordance with an embodiment of the present invention. Process 3400 begins at step 3410. At step 3410, a tube is extruded and cut to a length that is slightly longer than the desired finished length. At step 3420, a die is inserted in one end of the tube, such that the end of the die placed in the tube extends to a desired location where the feature is intended to exist in the tube.

15 20 25 [0190] At step 3430, a stamper is inserted in the second end of the tube. At step 3440, a force is applied to the stamper to force excess material into the tube, thus cold working the tube to increase the thickness of the tube in the region adjacent the stamper. At step 3450, the tube is machined to form the feature. Process 3400 then ends at step 3450.

[0191] FIG. 35 is a flow chart of an illustrative process for forming a tube with a feature on the internal surface of the tube using a single impact extrusion in accordance with an embodiment of the present invention.

5 Process 3500 begins at step 3510. At step 3510, an indentation is formed in the material of the tube by impact extrusion such that the end of the indentation aligns with a desired location of the feature in the tube. At step 3520, the closed end of the material is

10 machined to form the tube and the feature. Process 3500 then ends a step 3520.

[0192] FIG. 36 is a flow chart of an illustrative process for forming a tube with a feature on the internal surface of the tube using a impact extrusion on both ends

15 of the tube in accordance with an embodiment of the present invention. Process 3600 begins at step 3610. At step 3610, a first indentation is formed in the material of the tube using a first impact extrusion. At step 3620, a second indentation opposing the first

20 indentation is formed in the material using a second impact extrusion. The ends of the first and second indentations may be configured to align with the boundaries of the feature. At step 3630, the feature is machined in the material remaining between the first and

25 second indentations. Process 3600 then ends at step 3630.

[0193] In an alternative embodiment of the present invention, steps 3610 and 3620 can be combined into one step, as indicated by the dotted line around steps 3610

30 and 3620 in FIG. 36. That is, the first and second

indentations can be formed using a single impact. Advantageously, this can be more efficient than forming first and second indentations from two impacts.

[0194] FIG. 37 is a flow chart of an illustrative process for forming a tube with a feature on the internal surface of the tube using a progressive deep draw process in accordance with an embodiment of the present invention. Process 3700 begins at step 3710. At step 3710, first and second indentations are formed consecutively using a progressive deep draw process. The interface between the first and second indentations may be configured such that the feature is located at the interface. At step 3720, the material closing the tube (i.e., not removed by the progressive deep draw process) is removed. At step 3730, the feature is machined in the inner surface of the tube. Process 3700 then ends at step 3730.

[0195] It will be understood that any of the processes described above in connection with providing a wall in the inner surfaces of a tube may be used to form any other suitable feature on the inner surface of a tube. In addition, it will be understood that these processes may be used for non-extruded and non-tubular components.

[0196] In order to convey information, such as device status, visual indicator systems can be included in a headset. One type of indicator system can emit different colors of light to indicate what a device is doing. For example, a system in a headset can emit a green light if it is in a telephone conversation and a blinking red light if the battery power is low.

[0197] FIG. 38 shows a simplified cross-sectional view of a visual indicator system 38000 for a headset in accordance with an embodiment of the present invention. One or more light sources 38100 and 38102 can be
5 integrated into system 38000. Light sources 38100 and 38102 can be, for example, LEDs that each emit a different color of light. Each color or combinations of colors can be used to signify different information. Light sources 38100 and 38102 can be mounted onto circuit
10 board 38200. Through circuit board 38200, the light sources can be electrically coupled with driver circuitry (not shown) that is operable to activate each source individually or in combination. A detailed description of circuitry with this functionality can be found in U.S.
15 Patent Application entitled "Systems and Methods for Compact Multi-State Switch Networks," which is incorporated herein.

[0198] Microperforations 38402 can be provided in housing 38400 so that light sources 38100 and 38102 are
20 visible to a user. Outer apertures 38404 of microperforations can have a small diameter so that they are imperceptible to a user when light sources 38100 and 38102 are off. The diameter of inner apertures can be of a larger size so that they can guide more light
25 through the microperforations. A detailed description of microperforations and their fabrication can be found in two U.S. Patent Applications which are both entitled "Invisible, Light-Transmissive Display System," and which are both incorporated herein. For the purposes of
30 illustration, only three microperforations are shown in

FIG. 38, however a much larger number of microperforations can be used without deviating from the spirit of the present invention. It should also be noted that none of the elements of FIG. 38, including microperforations 2402, are drawn to scale.

5 [0199] Light diffuser 38300 can be located between circuit board 38200 and an inner wall of housing 38400. Light diffuser 38300 can, for example, be made of a polycarbonate with sections of varying opacity. Outer
10 core 38302 of diffuser 38300 can be made from an opaque material such that light from light sources 38100 cannot pass through the core. An inner core 38304 can be located within the inner wall of outer core 38302. The inner core 38304 of diffuser 38300 can be made from, for
15 example, a combination of transparent material 38305 and diffusing particles 38306 such that the particles are suspended in the transparent material. Both transparent material 38305 and particles 38306 can be, for example, made from polycarbonate materials of different opacities.
20 Particles 38306 can be made from an opaque or translucent material that alters the path of light through inner core 38304. This combination of materials can thoroughly diffuse light from the light sources when it exits the top of inner core 38304. That is, the light from light
25 sources 38100 and 38102 can be evenly spread across the top surface of inner core 38304 so that a user cannot detect the source of the light.

[0200] Inner core 38304 can have a sufficient width 38500 so that it surrounds the footprint of light
30 sources 38100 and 38102. In one embodiment, inner core

width 38500 can be approximately 1.2 millimeters, and the width 38502 of outer core 38302 can be approximately 2 millimeters. The bottom surface of outer core 38302 can extend below the bottom surface of inner core 38304 so
5 that the outer core can be mounted to circuit board 38200 without the inner core damaging light sources 38100 and 38102. The outer core 38302 can be attached to circuit board 38200 using, for example, an adhesive or any other suitable material.

10 **[0201]** In FIG. 38, LED 38102 is activated and emitting light 38900. Because of the effect of light diffuser 38300, light 38902 can be evenly distributed as it exits the diffuser, thereby making it difficult for a person to discern whether the light is being generated by
15 light source 38100 or light source 38102.

[0202] FIG. 39 shows the exterior of an embodiment of headset 39000 that includes visual indicator 39202 in accordance with an embodiment of the present invention. The embodiment shown in FIG. 39 uses LEDs 39100 and 39102
20 as light sources and includes a cylindrical light diffuser. Visual indicator 39202 can include microperforations 39402 which allow a user to see light being emitted from LEDs 39100 and 39102. A light diffuser can be included between the LEDs and
25 microperforations 39402 so that the diffused light seen by a user is equally distributed over the microperforations. The diameter 39900 of the microperforated area can be substantially similar to the diameter of the inner core. Diameter 39900 can be, for
30 example, approximately 1.2 millimeters.

[0203] Alternatively, the size and shape of the microperforated area could be different from that of the light diffuser. For example, a microperforated area with a noncircular shape can be placed over a light diffuser so that a noncircular indicator is generated. Similarly, the shape of the light diffuser can be non-cylindrical. Moreover, the light diffuser can be larger than the microperforated area so that it can cover the footprint of any other light sources that might be included.

5
10 **[0204]** Numerous light sources of different colors can be used in conjunction with a light diffuser as described above in order to present a visual indicator to a user. Because of the effect of the material in the light diffuser, light from each different source may appear evenly distributed over an area. In this manner, the entire indicator can appear to change colors as different light sources are activated.

15
20 **[0205]** FIG. 40A includes a side view of headset 40000 in accordance with an embodiment of the present invention. Connector 40401 can include tube 40200, connector plate 40400, contacts 40410, casing 40412 and microphone port 40430. Connector plate 40400 can include recessed groove 40402 which runs around the perimeter of connector plate 40400. Groove 40402 can also be referred to as a recessed step in connector plate 40400. At the top of connector plate 40400, a microphone port 40430 can be located in step 40402.

25
30 **[0206]** There are many benefits associated with placing microphone port 40430 along the edge of connector plate 40400. By including the microphone port near the

connector plate, the microphone can be embedded in the connector which saves space inside the headset housing. The space that is saved can be used to incorporate other functionality or decrease the overall size of the headset. Moreover, locating the microphone port in the groove around the edge of the connector can hide it from view which increases the overall aesthetic appearance of the headset

[0207] FIG. 40B shows a detailed view of the microphone port area of a connector in accordance with an embodiment of the present invention. The dimensions of port 40430 can include, for example, a width 40432 of approximately 2.5 millimeters and a height 40434 of approximately 0.3 millimeters. These dimensions are merely illustrative and it is understood that other dimensions may be practiced.

[0208] FIG. 41 shows a view of connector 41401 with the headset tube removed in accordance with an embodiment of the present invention. Connector 41401 can include connector plate 41400, contacts 41410 and accompanying casing 41412 to prevent the contacts from electrically coupling with the connector plate. Microphone port 41430 can be included in the top of connector plate 41400 to allow sound to reach microphone boot 41420. Microphone boot 41420 and microphone (not shown) can be located behind connector plate 41400. Microphone (not shown) can be housed within microphone boot 41420 to, for example, protect the microphone from damage and control the flow of air into the microphone.

[0209] FIG. 42 shows an exploded view of connector 42401 which can include, for example, connector plate 42400, microphone boot 42420, microphone 42422, contacts 42410, casing 42412, bracket 42408 and screws 42409 in accordance with an embodiment of the present invention. Microphone 42422 can be a MEMS microphone and can be electrically coupled with circuit board 42210. Circuit board 42210 is similar to tube circuit board 2210 of FIG. 2. Microphone boot 42420 can mount over microphone 42422. Microphone boot 42420 can, for example, be made of silicon so that it can seal with surrounding parts when connector 42401 is assembled. Contacts 42410 can be included in casing 42412. Casing 42412 can be made of a non-conductive material (e.g., polymeric) so that contacts can not be electrically coupled with connector plate 42400. Casing 42412 can be mounted onto circuit board 42210 and include conductive elements (not shown) which can electrically couple contacts 42410 with circuit board 42210. Bracket 42408 can couple with connector plate 42400 in order to hold connector 42401 together. Upward pressure from bracket 42408 can compress microphone boot in order to create an acoustic (e.g., substantially air-tight) seal for the passage of air into and out of microphone 42422. Circuit board 42210, casing 42412 and bracket 42401 can include one or more apertures for mounting to connector plate 42400. Screws 42409 can be inserted through these apertures and screwed into threaded cavities (not shown) on the back of connector plate 42400.

[0210] FIG. 43 shows a view of microphone boot 43420 which can include input aperture 43424 in accordance with an embodiment of the present invention. Air that flows into a headset by going around microphone boot 43420 can
5 cause a noticeable loss in the quality of the audio signals picked up by a microphone (not shown). Therefore, microphone boot 43420 can include sealing surface 43426 in order to prevent air from leaking through any seams along the edge of the microphone boot.
10 Sealing surface 43426 can be a horizontal surface of boot 43240 that extends to the perimeter of the boot's footprint. Sealing seams in this manner can direct the flow of air into aperture 43424 which can result in higher sound quality being received by the microphone.

[0211] Traditionally, the roof of a microphone boot creates a seal with the surfaces of surrounding parts. This can require a thicker roof which is structurally robust enough to support the pressure required to make an adequate seal. In the embodiment shown in FIG. 43,
20 horizontal sealing surface 43426 can be lower than roof 43427. Because of this, roof 43427 does not need to be very thick. This reduced thickness saves space in a housing and can result in a generally smaller or thinner headset.

[0212] FIG. 44 shows a perspective, cross-sectional view of connector plate 44400 which includes microphone boot 44420 and microphone 44422 in accordance with an embodiment of the present invention. Connector plate 44400, boot 44420 and microphone 44422 can fit
30 together so that air can pass through microphone

port 44430, into boot aperture 44424 and reach microphone
input 44423. Because of the other elements (not shown)
in the connector assembly, microphone 44422 and
microphone boot 44420 can be pushed up against connector
5 plate 44400 when installed in a headset. The pressure
from this force can cause surface 44426 to form a seal
with surface 44404 of connector plate 44400. This seal
can prevent air from passing through seam 44900 in
between connector plate 44400 and microphone boot 44420.
10 **[0213]** FIGS. 45A and 45B show views of the connector
of headset 45000 in accordance with an embodiment of the
present invention. Four contacts 45415, 45416, 45417
and 45418 can be integrated into the connector. The
contacts can be of a substantially flat shape so that
15 they are flush with the face of connector plate 45400.
The contacts can, for example, be of an oval shape. The
outer contacts 45415 and 45418 can be configured for
coupling to either a power supply line or a ground line.
The remaining inner contacts 45416 and 45417 can be
20 configured for receiving and transmitting data.
[0214] Connector plate 45400 can be located within
tube 45200 and can include recessed groove 45402.
Height 45900 of tube 45200 can be approximately 5
millimeters, and height 45902 of the interior cavity of
25 tube 45200 can be approximately 4 millimeters.
Height 45904 of the raised face of connector plate 45400
can be approximately 3.3 millimeters. Note that these
dimensions are merely illustrative. It is also noted
that the aperture in tube 45200 and connector plate 45400
30 are angled with respect to the axis of tube 45200, and

heights 45900, 45902 and 45904 reference the radial heights of the corresponding elements.

[0215] Connector plate can include four contacts 45415, 45416, 45417 and 45418 which can be separated by pitch 45906 of approximately 2 millimeters or other predetermined dimension. Pitch can be defined as the distance from the centerline of a contact to the centerline of the nearest contact. Each contact can have a width 45908 of approximately 0.7 millimeters, and the ring of exposed casing 45412 can have a width 45910 of approximately 0.2 millimeters. The contacts can be arranged on the face of connector plate 45400 so that they are symmetrical about the centerline of headset 45000. Dimension 45912, which represents the distance from the centerline of each contact to the centerline of the headset, can be approximately 1 millimeter.

[0216] FIG. 45C includes a side view of headset 45000 in accordance with an embodiment of the present invention. The angle between the face of connector plate 45400 and the axis of tube 45200 can be represented by dimension 45914 and can be approximately 65 degrees. The height 45916 of each contact can be approximately 1.5 millimeters. The raised face of connector plate 45400 can be recessed in headset tube 45800 by a depth 45918 of approximately 0.25 to 0.3 millimeters.

[0217] FIG. 45d includes a top view of headset 45000 in accordance with an embodiment of the present invention. Width 45920 of tube 45200 can be approximately 12.3 millimeters and width 45922 of the

interior cavity of tube 45200 can be approximately 11.1 millimeters. Width 45924 of the raised face of connector plate 45400 can be approximately 10.3 millimeters. The dimensions given above apply to the embodiments shown
5 in 45A, 45B, 45C and 45d and should not be used to limit the scope of the present invention.

[0218] FIG. 46 illustrates an assembly of electrical contacts for connector 1401 in accordance with an embodiment of the present invention. Assembly 46001 can
10 include plurality of electrical contacts 46002 disposed in non-conductive (e.g., polymeric) casing 46003. Electrical contacts 46001 can extend through at least a portion of depth 46900. When headset 1000 is assembled, each electrical contact 46002 can have a portion disposed
15 in electrical contact with electrical contact 46004 of circuit board 46005, which can be flexible or rigid.

[0219] FIGS. 47A and 47B illustrate an assembly of electrical contacts in accordance with one embodiment of the present invention. Assembly 47001 can include
20 plurality of electrical contacts 47002 disposed in non-conductive casing 47003. Each electrical contact 47002 can have first portion 47005 and second portion 47004, each of which are manufactured independently and assembled together thereafter.

[0220] First portion 47005 can have head 47006 and shank 47007. Head 47006 can have an exposed surface for engagement with an external electrical contact of, for example, a connector on a charging dock or cable. In one
25 embodiment of the present invention, the exposed surface on head 47006 can have a conductive, durable finish that
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also is aesthetically appealing, for example, nickel, tin cobalt, or a blackened finish. Shank 47007 can be integrally formed with head 47006 or formed independently and then attached to head 47006 using adhesive material
5 (e.g., glue, solder, weld, surface mount adhesion material, etc.). For example, during manufacturing, first portion 47005 can be formed from a cylindrical block of conductive material, turned to create shank 47007, and stamped or milled to shape head 47006,
10 for example, into an oval shape.

[0221] Second portion 47004 can have engagement segment 47009 and contact segment 47008. Engagement portion 47009 can have a hole configured for accepting shank 47005 of first portion 48005 during assembly of
15 electrical contact 47002 to casing 47003. Conductive adhesive material can be applied during manufacturing to mechanically and electrically couple first portion 47005 and second portion 47004 of electrical contact 47002. Contact segment 47008 can have an internal surface for
20 engagement with electrical contact 46004 on circuit board 46005 (see FIG. 46) when headset 1000 is fully assembled. The engagement surface of contact segment 47008 also can have a finish (e.g., gold-plating) that has good properties for adhering electrical
25 contact 47002 to circuit board 46005, storage, and corrosion-resistance.

[0222] In one embodiment of the present invention, the center of the internal contact surface of second portion 47004 can be offset from the center of the
30 external surface of first portion 47005 when considered

in a plane substantially defined by the external contact surface of first portion 47005. This can be useful when design constraints require electrical contacts 47002 to electrically couple electronic components that are not co-linearly aligned, as in one embodiment of the present invention illustrated in FIG. 46. In one embodiment of the present invention, second portion 47004 can have a hook-shape to position the internal contact surface of second portion 47004 in an offset configuration with respect to shank 47007. In manufacturing, second portion 47004 can be stamped from sheet metal, machined from a solid block of conductive material, molded, or formed using a different method known in the art or otherwise. In one embodiment of the present invention, second portion 47004 can be stamped from sheet metal in high volume production situations to save valuable time and money.

[0223] FIGS. 48A-48C illustrate an assembly of electrical contacts in accordance with another embodiment of the present invention. Assembly 48001 can include plurality of electrical contacts 48002 disposed in non-conductive casing 48003. Similar to the embodiment illustrated in FIGS. 47A-53B, each electrical contact 48002 can have first portion 48005 and second portion 48004, each of which are manufactured independently and assembled together thereafter.

[0224] First portion 48005 can have an exposed surface for engagement with an external electrical contact of, for example, a connector on a charging dock or cable. In one embodiment of the present invention, the exposed

surface on first portion 48005 can have a conductive, durable finish that also is aesthetically appealing.

[0225] Second portion 48004 can have engagement segment 48006, shank 48007, and contact segment 48008.

5 Engagement portion 48006 can be electrically and mechanically coupled to first portion 48005 using, for example, surface mount technology, solder, weld, or another conductive adhesive. Shank 48007 can couple engagement segment 48006 to contact segment 48008.

10 Contact segment 47009 can have an internal surface for engagement with electrical contact 46004 on circuit board 46005 (see FIG. 46) when headset 1000 is fully assembled. The engagement surface of contact segment 48008 also can have a finish that has good
15 properties for soldering, storage, and corrosion-resistance.

[0226] In one embodiment of the present invention, the center of the internal contact surface of contact segment 48008 can be offset from the center of the
20 external surface of first portion 48005 when considered in a plane substantially defined by the external contact surface of first portion 48005. In one embodiment of the present invention, second portion 48004 also can have a hook-shape to position the internal contact surface of
25 second portion 48004 in an offset configuration with respect to the external contact surface of first portion 48005.

[0227] FIG. 48C illustrates how assembly 48001 can be manufactured in accordance with one embodiment of the
30 present invention. Initially, second portions 48004 of

one or more electrical contacts 48002 can be stamped from single piece of sheet metal 48009 and folded into, e.g., a hook-shape as described above. This can create fingers 48010 in sheet metal 48009 that mechanically and electrically couple all electrical contacts 48002. First portions 48005, which also can be stamped in a separate operation, then can be adhered to engagement sections 48006 of each second portion 48004. This assembly then can be placed in an injection molding machine to injection-mold casing 48003 around the assembly. Once the injection molding procedure is complete, a blade can sever second portions 48004 of electrical contacts 48002 from the rest of sheet metal 48009, thereby mechanically and electrically decoupling each electrical contact 48002 from the other electrical contacts. Advantageously, because first portions 48005 and second portions 48004 can be formed from a stamping process, assembly 48001 can be used in high volume production situations by saving valuable time and money.

[0228] FIGS. 49A and 49B illustrate electrical contacts in accordance with further embodiments of the present invention. Electrical contacts 49001 and 49005 can be similar to that described above with respect to FIGS. 47A-48C, except that electrical contacts 49001 and 49005 can be formed as one unitary piece.

[0229] Electrical contact 49001 can have external contact portion 49002, shank 49003, and internal contact portion 49004. External contact portion 49002 can have an external surface for engagement with an external

electrical contact of, for example, a connector on a charging dock or cable. Shank 49003 can couple external contact portion 49002 to internal contact portion 49004. Internal contact portion 49004 can have an internal surface for engagement with electrical contact 46004 on circuit board 46005 (see FIG. 46) when headset 1000 is fully assembled. As in the above-described embodiments, the center of the internal contact surface of internal contact portion 49004 can be offset from the center of external contact portion 49002 when considered in a plane substantially defined by the external contact surface of external contact portion 49002. Electrical contact 49001 also can have a hook-shape to position the internal contact surface of internal contact portion 49004 in an offset configuration with respect to the center of external contact portion 49002. In one embodiment of the present invention, electrical contact 49001 can be machined from a single block of conductive material.

[0230] Similar to electrical contact 49001, electrical contact 49005 also can have external contact portion 49006, shank 49007, and internal contact portion 49008. Rather than being machined from a conductive material, however, electrical contact 49005 can be stamped from sheet metal and folded to form the hook-shape. Again, because the electrical contact can be manufactured using a stamping procedure, it can be used in high volume production situations.

[0231] FIGS. 50A and 50B show two views of connector plate 50400 of a headset connector in accordance with an embodiment of the present invention. Recessed step 50402

can run around the edge of connector plate 50400 in order to create a groove when the plate is installed in a tube (not shown). Microphone port 50430 can be cut out of step 50402 in order to create an opening for sound to reach cavity 50432 where a microphone or microphone boot (not shown) can be located. In FIG. 50B, surface 50404 of plate 50400 can be used to compress the perimeter of a microphone boot so that an airtight seal is made.

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[0232] Tabs 50405 and threaded cavities 50406 can be used to mount other elements onto connector plate 50400. For example, tabs 2405 can mate with a bracket that wraps around the entire connector assembly (not shown). This same bracket can include apertures for use in conjunction with threaded cavities 50406 so that inserts (e.g., screws) can fix the bracket against connector plate 50400. Bracket 42408 of FIG. 42 is an example of a bracket that is suitable for use with connector plate 50400.

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[0233] In accordance with one aspect of the present invention, connector plate 50400 can be made of a material with magnetic properties. By incorporating magnetic properties into plate 50400, magnetic effects can be used to enhance the coupling between connector plate 50400 and a complementary connector (not shown). Plate 50400 can include, for example, a ferromagnetic material such as a steel alloy. In another embodiment, plate 50400 can include a permanent rare-earth magnet that produces a magnetic field. Moreover, an embodiment of plate 50400 can include an electromagnet which produces a magnetic field as a result of the application

of electric current. In the electromagnetic embodiment, the magnetic field can be controlled so that it is only present when necessary.

[0234] FIG. 51A shows array 51810 of magnetic components which can be embedded in a connector in accordance with an embodiment of the present invention. Array 51810 can include components 51811, 51812, 51813, 51814 and 51815 which can be made of, for example, a permanent rare-earth magnetic material. An example of a suitable material for magnetic components 51811-51815 is magnetized Neodymium and, more specifically, N50 magnets. The magnetic components 51811-51815 can be shaped so that a substantially flat mating face 51816 is formed along one side. This mating face 51816 can, for example, be complementary to the angle of a headset's connector plate (not shown).

[0235] FIG. 51B shows a view of how connector plate 51400 can be used in combination with array 51810 of magnetic components in accordance with an embodiment of the present invention. If connector plate 51400 is made of a ferromagnetic material and array 51810 includes permanent magnets, the magnetic fields of array 51810 will generate magnetic forces biasing plate 51400 and array 51810. If array 51810 is embedded within a connector that mates with plate 51400, these magnetic forces can reinforce the connection.

[0236] In order to maximize the magnetic field generated by array 51810, it can be advantageous to arrange components (e.g., magnets) 51811-51815 so that the polarity of each component is in a particular

orientation. For example, the components can be arranged so that the south pole of the outer two magnets are closest to the mating face, and the north pole of the inner three magnets are closest to the mating face. In this configuration, if one were to list the polarities encountered when passing horizontally over the mating face, the list would read south-north-north-north-south. This maximization of the magnetic field is one reason why it might be desirable to use an array of magnets as opposed to one large magnet.

[0237] While the embodiments described above include a ferromagnetic connector plate and an array of permanent magnets embedded in a complementary connector, it is contemplated that any other magnetic configurations can be used without deviating from the spirit of the present invention. For example, an electromagnet element can be included in the connector plate and a ferromagnetic material can be located in a complementary connector. A detailed discussion about the use of electromagnetic and magnetic elements in connectors can be found in the U.S. Patent Applications entitled "Electromagnetic Connector for Electronic Device" and "Magnetic Connector for Electronic Device," which are both incorporated herein.

[0238] FIGS. 52A and 52B show connector 52800 that is complementary to and capable of mating with connector 1401 of FIG. 1A in accordance with an embodiment of the present invention. Connector 52800 can be integrated into, for example, a charger (not shown) which charges a battery in a headset or other apparatus that facilitates the charging of the headset (such as an

apparatus discussed in U.S. Patent Application entitled "Apparatuses and Methods that Facilitate the Transfer of Power and Information Among Electrical Devices" which is incorporated herein).

5 **[0239]** The view of connector 52800 in FIG. 39A does not include connector housing 52870 so that magnetic array 52810 and contacts 52830, 52840, 52850 and 52860 can be seen. Array 52810 of magnetic components can be embedded in connector 52800 so that the surface of
10 components 52812, 52813 and 52814 can be flush with mating face 52816. These exposed components can extended all of the way to the surface of a connector plate so that the strongest magnetic forces are generated. However, a connector with no exposed magnetic elements
15 would not deviate from the spirit of the present invention. For example, it can be desirable to recess magnetic components 52811 and 52815 in order to create a smaller connector.

20 **[0240]** Contacts 52830, 52840, 52850 and 52860 can be included in connector 52800. In order to integrate the contacts with the array 52810 of magnetic components, each contact can be placed in the gaps between magnetic components. In this manner, contact 52830 can be located in between magnetic components 52811 and 52812,
25 contact 52840 can be located between components 52812 and 52813, etc. This integrated distribution of contacts can allow for a smaller connector. This is another example of a reason why it might be desirable to use multiple magnetic components that are spaced apart as
30 opposed to a single, large magnetic component.

[0241] Each contact in array 52800 can include a spring mechanism, such as coil 52862 of contact 52860. Coil 52862 can bias contact tip 52864 to extend out of connector housing 52870. The coils 52862, 52864, 52866 and 52868 included in the contacts can be substantially planar or flat. A flat coil can allow for minimal spacing between magnetic components 52811-48815. This reduced spacing can result in a generally smaller connector. However, other types of coils and contacts can be used in accordance with the principles of the present invention. For example, a cylindrical spring biasing a cylindrical contact, commonly called a "pogo pin," can be used without deviating from the spirit of the present invention.

[0242] Contacts 52830, 52840, 52850 and 52860 can be positioned to electrically couple with, for example, the contacts located on the face of a connector plate of a headset. Connector housing 52870 can include an elevated face 52872 which can, for example, fit into a cavity in a complementary connector. For example, if connector 52800 were to mate with headset 1400 of FIGS. 1A and 1B, the elevated face 52872 can fit against recessed connect plate 1400 while the edge of tube 1200 can fit against the perimeter 52874 of connector 52800. In this mating configuration, contact tips 52834, 52844, 52854 and 52864 can be electrically coupled with contacts 1410 of headset 1400.

[0243] Connector 52800 can include contacts or wires (not shown) on the rear of housing 52870 so that the connector can be electrically coupled with other

circuitry. For example, connector 52800 can be mounted onto a circuit board that includes power supply circuitry (such as a microcontroller discussed in U.S. Patent Application entitled "Apparatuses and Methods that
5 Facilitate the Transfer of Power and Information Among Electrical Devices" which is incorporated herein) that can be used to transmit power to a headset through one or more contacts in array 52820.

[0244] FIGS. 53A and 53B show connector 53800 that is
10 complementary to and capable of mating with connector 1401 of FIG. 1A in accordance with an embodiment of the present invention. Connector 53800 is substantially similar to connector 52800 in FIGS. 52A and 52B such that like numerals indicate similar
15 components between the figures. For example, magnetic component 53812 of FIG. 53A is similar to magnetic component 52812 of FIG. 52A.

[0245] Connector 53800 can include four contact tips 53834, 53844, 53854 and 53864 that can be biased to
20 extend from housing 53810. Each contact tip can have a width 53904 of approximately 0.5 millimeters.

[0246] The centerline of each contact tip can be separated from the centerline of an adjacent contact tip by pitch 53902. Pitch 53902 can be chosen so that the
25 contacts of connector 53800 are capable of electrically coupling with the contacts of a headset connector (e.g., connector 1401 of FIG. 1A). Accordingly, pitch 53902 can be approximately 1.97 millimeters so that it corresponds to pitch 45906 shown in FIG. 45A. Moreover, the
30 centerline of outer contact tips 53834 and 53864 can be

separated by width 53900 of approximately 5.1 millimeters.

[0247] Connector 53800 can have a raised face 53872 that is capable of coupling with a headset connector (e.g., connector 1401 of FIG. 1A). The housing 53810 of connector 53800 can have a total height 53906 of approximately 5.1 millimeters. The raised face 53872 of housing 53810 can have a height 53908 of approximately 3.43 millimeters. Heights 53906 and 53908 can be selected in order to complement heights 45900 and 45902 of FIG. 45B. Thereby allowing headset 45000 to mate with connector 53800. It should be noted that the mating face of connector 53800 is angled with respect to the rest of the connector. This angle can be substantial (e.g., greater than thirty degrees) or slight (e.g. less than ten degrees). Heights 53906 and 53908 reference the radial heights of the corresponding elements. This is similar to the type of dimensions that are shown in FIG. 45B.

[0248] In order to apply pressure to the contacts of a complementary connector, the contact tips 53834, 53844, 53854 and 53864 can be biased to extend from connector housing 53810. When no complementary connector is present, the contact tips can extend from the housing by depth 53910 of approximately 0.7 millimeters.

[0249] Connector 38000 can also include elements (not shown) that allow the connector to couple with a circuit board or wires in order to route electrical signals from contact tips 53834, 53844, 53854 and 53864 to circuitry.

The dimensions given above apply to the embodiments shown in 53A and 53B and should not be used to limit the scope of the present invention.

[0250] FIG. 54 shows a view of headset 54000 coupled with connector 54800 in accordance with an embodiment of the present invention. Headset 54000 can be substantially similar to headset 1400 of FIG. 1A and can include the features shown on connector 1401. Connector 54800 can be installed in, for example, docking station 54900 which can include a cavity 54910 in which a headset can be inserted. Docking stations substantially similar to or the same as docking station 54900 are discussed in U.S. Patent Application entitled "Apparatuses and Methods that Facilitate the Transfer of Power and Information Among Electrical Devices" which is incorporated herein. Cavity 54910 can be shaped to align headset 54000 properly with respect to connector 54800. Connector 54800 can include raised face 54872 and lower perimeter 54874 to further align headset 5400. Raised face 54872 can extend into the cavity created by a recessed headset connector while the headset tube abuts with perimeter 54874.

[0251] This alignment can result in the contacts (not shown) of headset 54000 being approximately centered over tip 54834 of contact 54830. Contact tip 54834 can be biased to extend from housing 54870 by coil 54832. This bias can be represented by a force exerted in direction of arrow 54990. Additionally, arrow 54992 can represent the magnetic force generated by the proximity of the connector plate (not shown) of headset 54000 to the array

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of magnetic components (not shown) of connector 54800. This magnetic force can cause contact 54830 to electrically couple with a contact on headset 54000. Connector 54860 can include additional contacts (not
5 shown) which can couple with the remaining contacts of headset 54000. Connector 54800 can be mounted on circuit board 54920 in dock 54900 such that circuit board 54920 can route signals to and from headset 54000 when it is coupled with connector 54800.

10 **[0252]** FIG. 55 shows graph 55000 which depicts the approximate change of the two forces described above as the separation between the magnetic components and the connector plate varies in accordance with an embodiment of the present invention. In graph 55000, x-axis 55002
15 can represent the approximate force, and y-axis 55004 can represent the distance between the magnetic components and the connector plate. The separation where the x-axis intercepts the y-axis is zero, and this point can represent when the connector plate is in contact with the
20 magnetic components. As the separation increases, approximate force 55008 from spring contacts pushing on a connector plate in a headset can decrease linearly because of the substantially linear nature of coil springs. While the spring force decreases linearly, the
25 approximate magnetic force 55006 can decrease exponentially due to the behavior of magnetic materials.

[0253] It can be desirable to choose magnetic components (e.g., magnets, connector plates) and design spring components (e.g., contact coils) such that the
30 magnetic force biasing a headset's connector plate to a

complementary connector is greater than the force of the spring contacts pushing back on the connector plate at all possible distances of separation between the two parts. If there are situations where the spring force is greater than the magnetic force, it might be necessary to apply an external force in order to properly couple a headset with a complementary connector. Applying this external force might require intervention from a user, and therefore, it can be desirable to design a connection system so that the magnetic force is always greater than the spring force.

[0254] FIG. 56 shows charging device 56900 that can be used in conjunction with a headset in accordance with an embodiment of the present invention. In some embodiments, connector 56800 can be integrated into device 56900, thereby allowing device 56900 to be electrically coupled with a headset. Connector 56800 is similar to the connectors discussed in connection with FIGS. 51-55.

[0255] In some embodiments, auxiliary connector 56910 can be integrated into charging device 56900. As such, auxiliary connector 56910 can be used to couple an additional device, such as a cellular phone which can be used with a headset, to device 56900. In order to connect a headset or additional device to an external power supply (e.g., wall outlet or computer), device 56900 can include cable 56920. Circuitry 56920 can be integrated into device 56900 to facilitate charging of both a headset and an additional device. Circuitry 56920 can also provide a communications

interface for data to be shared between a headset and an additional device. An example of a charging device similar to device 56900 is discussed in detail within the U.S. Patent Application entitled "Apparatuses and Methods that Facilitate the Transfer of Power and Information

5 Among Electrical Devices," which is incorporated herein.

[0256] FIGS. 57A and 57B show an alternative embodiment of connector 57800 in accordance with an embodiment of the present invention. The face of

10 connector 57800 can be shaped to include peak 57880. By incorporating peak 57880 into the connector face, connector 57800 is capable of mating with a headset in two different physical orientations. As seen in

15 FIG. 57B, peak 57880 creates cavities 57882 and 57884 which can each accept the long side 57900 of headset 57000. In the configuration shown in FIG. 57B, end 57900 of headset 57000 is in cavity 57884. However, if headset 57000 were inserted in another orientation, long side 57900 of the headset can be in cavity 57882.

20 In either of these orientations, the contacts of connector 57800 can be electrically coupled with the contacts on headset 57000. To compensate for these different orientations, switching circuitry can be included in headset 57000. A detailed discussion of

25 similar switching circuitry can be found in the U.S. Patent Application entitled "Systems and Methods for Determining the Configuration of Electronic Connections," which is incorporated herein.

[0257] Similar to the raised face 52872 and

30 perimeter 52874 shown in FIG. 52B, raised face 57872 and

perimeter 57874 can assist with coupling a recessed headset connector to connector 57800.

[0258] Although particular embodiments of the present invention have been described above in detail, it will be understood that this description is merely for purposes of illustration. Alternative embodiments of those described hereinabove also are within the scope of the present invention. For example, while one embodiment can include a Bluetooth headset, one or more features of the present invention also can be incorporated in headsets employing other wired and/or wireless communication protocols. Also, while some embodiments of the present invention can include headsets configured for communication with a cellular phone and/or personal media device (e.g., a portable media player similar to that sold under the trademark iPod® by Apple Computer, Inc. of Cupertino, California), one or more features of the present invention also can be incorporated with headsets configured for communication with any electronic device. Furthermore, while one embodiment illustratively described above can include a headset and methods for fabricating the same, one or more features of the present invention also can be incorporated in other electronic devices that require, e.g., circuit boards distributed within small acoustic volumes, symmetric connectors, extruded housings having one or more internal indentations, microperforations, co-located microphones and connectors, magnetic connectors, or any combination thereof..

[0259] Various configurations described herein may be combined without departing from the present invention. The above described embodiments of the present invention are presented for purposes of illustration and not of
5 limitation. The present invention also can take many forms other than those explicitly described herein. Accordingly, it is emphasized that the invention is not limited to the explicitly disclosed methods, systems and apparatuses, but is intended to include variations to and
10 modifications thereof which are within the spirit of the following claims.

What is Claimed is:

1. For use with a headset engaging connector including at least two headset engaging contact regions to provide at least one of power and data, a headset connector system, for interfacing with the headset
5 engaging connector, comprising:

a plurality of headset connector contact regions disposed within a face of a mating surface, the headset connector contact regions are operative to engage the at least one headset engaging contact region and are
10 electrically coupled to switching circuitry,

the switching circuitry operative to determine an interface configuration between the headset connector and headset engaging contact regions and selectively routing signals received on the headset
15 connector contact regions based on the determined interface configuration.

2. The headset connector system of claim 1, wherein each of the plurality of headset connector regions include a magnetic element for magnetically attracting one of the headset engaging contact regions.

3. The system of claim 2, wherein the magnetic element is an electromagnetic element.

4. The headset connector system of claim 2, the magnetic elements is constructed from a ferromagnetic or rare-earth magnet material.

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5. The headset connector system of claim 1, wherein the headset connector engaging regions include four of such regions, wherein a first pair of regions is operative to receive power and a second pair of regions
5 is operative to receive data.

6. The system of claim 5, wherein each region of each pair has a different polarity.

7. The system of claim 6, wherein the switching circuitry is operative to detect a polarity arrangement of the first and second pairs.

8. The system of claim 1, wherein the switching circuitry comprises power polarity switch circuitry.

9. The system of claim 1, wherein the switching circuitry comprises data polarity switch circuitry.

10. The system of claim 1, wherein the face plate is magnetically biased to attract the headset engaging connector.

11. The system of claim 1, wherein the determined interface configuration indicates a bias arrangement of the at least two headset engaging contact regions.

12. A method for interfacing a headset engaging connector including at least two headset engaging contact regions with a headset connector system comprising a plurality of headset connector contact
5 regions, the method comprising:

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interfacing the at least two headset engaging contact regions with at least two of the headset connector contact regions;

10 determining a bias orientation of the at least two headset engaging contact regions interfacing with the headset connector system; and

selectively coupling the at least two headset engaging contact regions to predetermined pathways based on the determined bias orientation.

13. The method of claim 12, wherein interfacing comprises magnetically attracting the at least two headset engaging contact regions to at least two of the headset connector contact regions.

14. The method of claim 12, wherein the at least two headset engaging contact regions conduct dual polarity power signals.

15. The method of claim 12, wherein the at least two headset engaging contact regions conduct dual polarity data signals.

16. A headset engaging connector system for interfacing with a headset connector comprising at least two headset connector contact regions, the headset engaging connector system comprising:

5 a housing;

at least two headset engaging contact regions biased to protrude from the housing and are magnetically attractive, the headset engaging contact

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regions operative to interface with the at least two
10 headset connector contact regions; and

electronic circuitry electronically
coupled to the at least two headset engaging contact
regions.

17. The system of claim 16, wherein the at
least two headset engaging contact regions provide biased
power signals.

18. The system of claim 16, wherein the at
least two headset engaging contact regions provide biased
data signals.

19. The system of claim 16, wherein the at
least two headset engaging contact regions are biased by
a spring member.

20. The system of claim 16, wherein the
5 housing is a non-symmetrical housing constructed to
receive the headset connector oriented in only one
direction.

21. The system of claim 16, wherein the
housing is a symmetrical housing constructed to receive
the headset connector oriented in one of at least two
directions.

22. The system of claim 16, wherein the at
least two headset engaging contact regions magnetically
attract and secure the headset connector to the housing.

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23. The system of claim 16, wherein the electronic circuitry is operative to:

5 determine an interface configuration between the at least two headset engaging contact regions and the at least two headset connector contact regions; and

 selectively route signals to the at least two headset engaging contact regions based on the determined interface configuration.

24. The system of claim 23, wherein the determined interface configuration indicates a bias arrangement of the at least two headset connector contact regions.

25. A method for interfacing a headset engaging system including at least two headset engaging contact regions with a headset connector system comprising at least two headset connector contact regions, the method comprising:

5 receiving the headset connector system oriented in at least one interfacing orientation; determining a bias orientation of the at least two headset connector contact regions; and
10 selectively electrically coupling the at least two headset engaging contact regions to predetermined pathways based on the determined bias orientation.

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26. The method of claim 25, further comprising magnetically securing the received headset connector system.

27. The method of claim 25, wherein the receiving comprises receiving the headset connector system oriented in one of at least two interfacing orientations.

5 28. The method of claim 25, further comprising transmitting power from the headset engaging system to the headset connector system.

29. The method of claim 25, further comprising transmitting data from the headset engaging system to the headset connector system.

30. The method of claim 25, further comprising transmitting data from the headset connector system to the headset engaging system.

31. An electronic device comprising:
a housing;
a connector assembly coupled to the housing, the connector assembly comprising a port;
5 a microphone mounted within the housing;
and
a channel that fluidically couples the microphone to the port.

32. The device of claim 31, wherein the microphone is mounted within the connector assembly.

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33. The device of claim 31, wherein the connector assembly comprises:

a connector plate constructed to receive the microphone and include the port.

5 34. The device of claim 33, wherein the microphone port is located on the periphery of the connector plate.

35. The device of claim 34, wherein the housing the covers the port.

36. The device of claim 33, further comprising:

a microphone boot, wherein the microphone is coupled to the microphone boot.

37. The device of claim 36, wherein the microphone boot acoustically seals the microphone.

38. The device of claim 33, wherein the microphone boot comprises:

a sealing portion that forms an acoustic seal with the connector plate; and

5 a roof portion constructed to form a portion of the channel.

39. The device of claim 36, wherein the microphone boot is constructed substantially of silicone.

40. The device of claim 39, wherein the boot includes at least a portion of the channel.

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41. The device of claim 31, further comprising a circuit board electrically coupled to the connector assembly and the microphone.

42. The device of claim 31, wherein the port is recessed within the housing.

43. The device of claim 31, wherein a relatively air tight seal exists between the connector assembly and the housing.

44. The device of claim 31, wherein the port is exposed to an atmospheric environment.

45. A joint connector and microphone assembly, comprising:

a microphone including a top surface and side surfaces, the top surface comprising a microphone port;

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a microphone boot mounted to the microphone such that the boot interfaces a portion of the top surface and the side surfaces to form a seal around the microphone port, the microphone boot comprising a connector sealing portion and an aperture for fluidically connecting the microphone port to a connector port; and

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a connector plate mounted to the connector sealing portion.

46. The assembly of claim 45, wherein the connector plate comprises a recessed step, wherein a groove is cut out the recessed step to form the connector port.

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47. The assembly of claim 45, wherein the connector plate comprises at least one aperture.

48. The assembly of claim 47, further comprising:

5 at least one contact that fits into the at least one aperture.

49. The assembly of claim 45, further comprising:

 a circuit board;
 a casing mounted to the connector plate
5 and electrically coupled to the circuit board;
 at least one contact that fits into the at least one aperture; and
 a bracket that fixes the at least one
10 contact to the connector plate and enables the connector plate to exert acoustic sealing pressure to at least the boot.

50. The assembly of claim 49, further comprising at least one screw to secure the bracket to the casing.

51. The assembly of claim 49, wherein the circuit board is a tube circuit board.

52. An electronic circuit device comprising:
 an earbud assembly;
 a tube assembly fixed to the earbud
assembly, the tube assembly comprising an integrated

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5 connector and microphone assembly, the integrated assembly comprising:

a port; and

a microphone operative to receive acoustic signals transmitted through the port.

53. The device of claim of claim 52, further comprising a neck assembly for mounting the earbud assembly to the tube assembly.

54. The device of claim 52, wherein the device is a headset.

55. The device of claim 52, wherein the device is a Bluetooth headset.

56. The device of claim 52, wherein the integrated assembly comprises:

a microphone boot for acoustically sealing the microphone.

57. The device of claim 52, wherein the integrated assembly comprises:

a cavity extending from the microphone to the port.

58. The device of claim 52, wherein the tube assembly comprises a circuit board coupled to the integrated assembly.

59. The device of claim 52, wherein the port comprises a width of about 2.5mm and a height of about 0.3mm.

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60. The device of claim 52, wherein the integrated assembly is recessed a predetermined distance within the tube assembly.

61. The device of claim 52, wherein a connector end of the tube portion includes a planer region that is angled to a first predetermined angle with respect to a central axis passing lengthwise through the tube assembly.

62. The device of claim 52, wherein the first predetermined angle is a non-perpendicular angle.

63. The device of claim 61, wherein the integrated assembly includes an assembly planer region that is angled to a second predetermined angle with respect to the central axis passing lengthwise through the tube assembly.

64. The device of claim 63, wherein the first and second predetermined angles are substantially the same.

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65. Wireless headset electronic device comprising:

an earbud assembly comprising an earbud flexible circuit board having mounted thereon a receiver and processing circuitry; and

a tube assembly fixed to the earbud assembly, the tube assembly comprising a microphone and a tube flexible circuit board electrically coupled to the earbud circuit board and the microphone.

66. The device of claim 65, further comprising a neck assembly that fixes the earbud assembly to the tube assembly.

67. The device of claim 66, the neck assembly comprising a through-hole through which a portion of the earbud flexible circuit board passes through to electrically connect to the tube circuit board.

68. The device of claim 65, wherein the earbud circuit board comprises traces for electrically coupling at least the receiver and the processing circuitry.

69. The device of claim 65, wherein the processing circuitry is operative to execute wireless communication processes.

70. The device of claim 65, wherein the processing circuitry is operative to process Bluetooth communication processes.

71. The device of claim 65, wherein the tube assembly comprises:

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an antenna electrically coupled to the tube circuit board.

72. The device of claim 65, wherein the tube assembly comprises:

a switch electrically coupled to the tube circuit board.

73. The device of claim 65, wherein the tube assembly comprises:

a connector assembly electrically coupled to the tube circuit board, the connector assembly operative to interface with a device other than the wireless headset electronic device.

74. The device of claim 65, wherein the connector assembly comprises a multiple-pin symmetrical magnetic connector.

75. The device of claim 65, wherein the tube assembly comprises a battery electrically coupled to the tube circuit board.

76. The device of claim 65, further comprising:

a thermistor in communication with and operative to provide the processor circuitry with a battery temperature signal.

77. The device of claim 75, wherein the processor circuitry is operative to adjust a battery charging rate based on the battery temperature signal.

78. The device of claim 65, wherein the tube circuit board comprises circuitry mounted thereon.

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79. The device of claim 78, wherein the circuitry mounted on the tube circuit board comprises switching circuitry.

80. The device of claim 78, wherein the circuitry mounted on the tube circuit board comprises adaptive battery charging circuitry.

81. Wireless headset electronic device comprising:

an earbud assembly comprising an earbud flexible circuit board; and

5 a tube assembly fixed to the earbud assembly, the tube assembly comprising a battery retaining region and a tube flexible circuit board, wherein circuit board components and circuitry are selectively mounted on the earbud and
10 tube circuit boards to maximize a size of the battery retaining region.

82. The device of claim 81, wherein the earbud flexible circuit board is electrically coupled to the tube flexible circuit board.

83. Wireless headset electronic device comprising:

an earbud assembly; and

5 a primary housing having predetermined dimensions fixed to the earbud assembly,

wherein the earbud assembly and the primary housing each have mounted therein a flexible circuit board comprising circuitry.

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84. The device of claim 83, wherein a distribution of circuitry among each flexible circuit board minimizes the predetermined dimensions.

85. The device of claim 83, wherein the wireless headset is a Bluetooth wireless headset.

86. An electronic headset device comprising:
an earbud assembly;
a primary housing fixed to the earbud assembly, the primary housing comprising a connector
5 assembly; and
at least one flexible circuit board electrically coupled to the connector assembly, the at least one flexible circuit board comprising:
USB circuitry operative to process
10 Universal Serial Bus (USB) protocol communications; and
serial circuitry operative to process serial protocol communications.

87. The device of claim 86, wherein the connector assembly is operative to interface with a device other than the wireless headset electronic device.

88. A headset device comprising:
an earbud housing including an earbud through-hole and a first neck engaging surface;
a primary housing including a housing
5 through-hole located and a second neck engaging surface;
a threaded neck including first and second neck surfaces, wherein the first neck surface is

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10 mated to the first neck surface and the second neck
surface is mated to the second neck engaging surface;
an earbud screw that fits through the
earbud through-hole and is interlocked with the
threaded neck to fix the earbud housing to the threaded
neck; and

15 a primary housing screw that fits
through the housing through-hole and is interlocked
with the threaded neck to fix the primary housing to
the threaded neck.

89. The device of claim 88, wherein the
earbud housing includes at least one slot in the first
neck engaging surface, and wherein the threaded neck
includes at least one protrusion extending away from
5 the first neck surface and constructed to fit into the
at least one slot.

90. The device of claim 88, wherein the
primary housing includes at least one slot in the
second neck surface, and wherein the threaded neck
includes at least one protrusion extending away from
5 the second neck surface and constructed to fit into the
least one slot.

91. The device of claim 88, wherein the
threaded neck comprises internal threading extending
from the first to the second neck surfaces.

92. The device of claim 88, wherein the
threaded neck comprises a through-hole.

93. The device of claim 88, wherein the
earbud screw and primary housing screw each comprise a
through-hole.

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94. The device of claim 88, wherein the earbud screw comprises at least one notch constructed to receive an installation tool.

95. The device of claim 88, wherein the primary housing screw comprises at least one notch constructed to receive an installation tool.

96. The device of claim 88, wherein the earbud housing includes a curved surface and the threaded neck includes a curved surface that substantially aligns to the earbud curved surface when
5 the earbud housing and threaded neck are fixed together.

97. The device of claim 96, wherein the alignment of the curved surfaces forms a substantially seamless transition between the earbud housing and the threaded neck.

98. The device of claim 88, wherein the primary housing comprises a recessed region on the second neck engaging surface, and wherein the second neck surface is mated with the recessed region.

99. The device of claim 98, wherein the mating of the second neck engaging surface with the recessed region forms a substantially seamless transition between the earbud housing and the threaded
5 neck.

100. The device of claim 88, further comprising an adhesive for fixing the screws to the threaded neck.

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101. A method for attaching a earbud housing to a primary housing with a threaded neck, the method comprising:

5 placing a bottom insert into the primary housing;

securing the threaded neck to the bottom insert to secure the primary housing to the threaded neck;

10 placing a top insert into the earbud housing; and

securing the threaded neck to the top insert to secure the earbud housing to the threaded neck.

102. The method of claim 101, wherein securing the threaded neck to the bottom insert comprises:

5 screwing the bottom insert to a predetermined depth within the threaded neck;

aligning at least one tab on the neck with at least one notch on the primary housing; and

tightening the bottom insert to a predetermined torque.

103. The method of claim 101, further comprising applying an adhesive to at least one of the bottom insert, top insert, and threaded neck.

104. The method of claim 101, wherein securing the threaded neck to the top insert comprises:

aligning at least one tab on the neck with at least one notch on the earbud housing;

5 screwing the top insert into the neck; and

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tightening the top insert to a predetermined torque.

105. The method of claim 101, further comprising using a customized tool to attach the threaded neck to the primary housing.

106. A headset device comprising:
an earbud housing;
a primary housing;
a threaded neck coupled to the earbud
5 and primary housings comprising a through-hole for enabling circuitry housed in the earbud housing to be electrically coupled to circuitry housed in the primary housing.

107. The headset device of claim 106, wherein the earbud housing is constructed from a polymer.

108. The headset device of claim 106, wherein the primary housing and the threaded neck are constructed from a metal or an alloy.

109. A display system comprising:
a housing having an internal wall and a signal indicator region;
at least one light source located within
5 the housing;
a diffuser disposed between the at least one light source and the internal wall; and
control circuitry electrically coupled to and operable to cause the at least one light source
10 to emit light that passes through the diffuser to the signal indicator region.

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110. The system of claim 109, wherein the diffuser comprises at least two types of particles.

111. The system of claim 110, wherein a first of the at least two types of particles is substantially transparent.

112. The system of claim 110, wherein a second of the two types of particles is substantially translucent.

113. The system of claim 110, wherein the at least two types of particles are sufficiently interspersed to substantially evenly diffuse the light passing through the diffuser.

114. The system of claim 109, wherein the diffuser has a substantially cylindrical shape and further comprises:

5 a substantially flat first surface adjacent to the at least one light source;
a substantially flat second surface adjacent to the signal indicator region; and
a substantially curved third surface connecting the first and second surfaces.

115. The system of claim 114, wherein the third surface is substantially opaque.

116. The system of claim 109, wherein the at least one light source comprises:

5 at least two light sources wherein a first light source is operable to emit a first color and a second light source is operable to emit a second color.

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117. The system of claim 109, wherein the at least one light source comprises:
at least one LED.

118. The system of claim 109, wherein the signal indicator region comprises:
at least one aperture extending from an external wall of the housing to the internal wall.

119. The system of claim 109, wherein the signal indicator region comprises:
a plurality of microperforations.

120. The system of claim 119, wherein the plurality of microperforations form a circular shape.

121. A method for displaying signals in a headset including a signal indicator region, the method comprising:

emitting light from at least one LED
5 selectively;
diffusing the light emitted from the at least one LED; and
transmitting the diffused light through the signal indicator region.

122. The method of claim 121, wherein diffusing the light emitted from the at least one LED comprises:

5 passing the light through a light diffuser.

123. The method of claim 121, wherein emitting light from at least one LED comprises emitting

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light of different colors from a plurality of LEDs selectively.

124. The method of claim 123, wherein diffusing the light comprises:

mixing the light of different colors.

125. The method of claim 121, wherein emitting light from at least one LED selectively comprises:

indicating a signal.

126. The method of claim 121, wherein emitting light from at least one LED selectively comprises:

blinking at least one LED.

127. A wireless headset comprising:

a primary housing having a plurality of microperforations;

5 a circuit board located within the primary housing;

at least one LED mounted to the circuit board, wherein the at least one LED is disposed beneath the microperforations; wherein

10 a light diffuser disposed between the LEDs and the plurality of microperforations.

128. The headset of claim 127, wherein, the diffuser is mounted to the circuit board such that the at least one LED is arranged within a diffuser cavity region.

129. The headset of claim 127, wherein the light diffuser comprises:

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a first type of particle that is transparent;

5 a second type of particle that is translucent and is substantially interspersed with the transparent particles;

10 a third type of particle that is opaque and substantially covers at least one surface of the light diffuser.

130. A system comprising:

a bus coupled to receive power from a source external to the system;

a battery;

5 core processing circuitry and radio frequency (RF) processing circuitry selectively coupled to each other via a switch, the operative to turn ON and OFF based on a signal level received on the bus;

10 first power regulating circuitry electrically coupled to the bus, the core processing circuitry and the switch;

second power regulating circuitry electrically coupled to the battery, the RF processing circuitry, and the switch; and

15 control circuitry operative to selectively turn ON and OFF the first and second power regulating circuitry based on a number of monitored conditions.

131. The system of claim 130, further comprising battery monitoring circuitry electrically coupled to the battery and the core processing circuitry.

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132. The system of claim 130, wherein the first power regulating circuitry is low-dropout regulator circuitry.

133. The system of claim 130, wherein the second power regulating circuitry is switch mode power supply circuitry.

134. The system of claim 130, wherein when the bus receives power from the external power source, the control circuitry is operative to enable the first power regulating circuitry to provide power to the core processing circuitry.

135. The system of claim 130, wherein when the bus receives power from the external power source, the control circuitry is operative to:

enable the first power regulating circuitry to provide power to the core processing circuitry; and

enable the second power regulating circuitry to provide power to the RF processing circuitry when a battery power level is at, or above, a predetermined power level.

136. The system of claim 130, wherein when the bus receives power from the external power source, the control circuitry is operative to:

enable the first power regulating circuitry to provide power to the core processing circuitry; and

enable the second power regulating circuitry to provide power to the RF processing

- 116 -

10 circuitry when a battery power level is at, or above, a predetermined power level.

137. The system of claim 130, wherein when the bus receives power from the external power source, selectively charging the battery with the received power.

138. The system of claim 130, wherein when the battery is the only source of power and provides power at a power level at, or above, a predetermined power level, the control circuitry is operative to:
5 enable the second power regulating circuitry to provide power to the RF processing circuitry and core processing circuitry.

139. The system of claim 130, wherein the control circuitry includes the core processor circuitry.

140. The system of claim 130, wherein the control circuitry comprises a plurality of logic gates operative to provide HIGH and LOW signals to the first and second power regulating circuitry.

141. The system of claim 130, wherein the switch is CLOSED when no power is received on the bus.

142. The system of claim 130, wherein the system is a wireless headset.

143. A method for regulating power in a headset comprising first and second power circuitry, core processing circuitry, and radio frequency (RF) processing circuitry, comprising:
5 monitoring a bus power level;

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monitoring a battery charge level;
selectively powering the core processing
circuitry using the first power circuitry based on the
monitored bus power level and battery charge level; and
10 selectively powering the RF processing
circuitry using the second power circuitry based on the
monitored bus power level and battery charge level.

144. The method of claim 143, further
comprising:

selectively powering the RF processing
circuitry and the core processing circuitry using the
5 second circuitry.

145. The method of claim 143, further
comprising:

providing power received from a power
source external to the headset to the first power
5 circuitry.

146. The method of claim 143, further
comprising:

providing power received from a power
source external to the headset to a battery when the
5 monitored battery charge level is below a predetermined
charge level.

147. The method of claim 143, further
comprising:

providing power from a battery to the
second power circuitry.

148. The method of claim 143, further
comprising:

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instructing the first power circuitry to power the core processing circuitry when the monitored
5 bus power level is at, or above, a predetermined battery charge level.

149. The method of claim 143, further comprising:

instructing the first power circuitry to power the core processing circuitry when the monitored
5 bus power level is at, or above, a predetermined bus power level;

instructing the second power circuitry to power the RF processing circuitry when the monitored
10 battery power level is at, or above, a predetermined battery charge level.

150. The method of claim 143, further comprising:

instructing the second power circuitry to power the core processing circuitry and the RF
5 processing circuitry when the monitored bus power level is below a predetermined bus power level and the monitored battery power level is at, or above, a predetermined battery charge level.

151. The method of claim 143, further comprising:

electrically coupling and decoupling the core processing circuitry to the second power circuitry
5 based on the monitored bus power level.

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152. The method of claim 143, further comprising:

5 activating the first power circuitry bus when the monitored bus power level is at, or above, a predetermined bus power level.

153. The method of claim 152, further comprising:

5 activating the second power circuitry bus when the monitored battery charge level is at, or above, a predetermined battery charge level.

154. The method of claim 143, further comprising:

using the core processing circuitry to instruct the first power circuitry to remain turned ON.

155. The method of claim 143, further comprising:

using the core processing circuitry to instruct the second power circuitry to remain turned ON.

156. The method of claim 143, further comprising:

5 using the core processing circuitry to instruct the first and second power circuitry to turn OFF.

157. The method of claim 143, wherein the monitored bus power level is below a predetermined power level, the method further comprising:

receiving a power ON activation signal;

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5 activating the second power circuitry; and
 using the second power circuitry to power
the RF processing circuitry and the core processing
circuitry.

158. The method of claim 143, further
comprising:

 enabling the core processing circuitry to
operate independent of whether the RF processing
5 circuitry can operate.

159. A wireless headset system, comprising:
 processor circuitry comprising a first
power consumption portion and second power consumption
portion; and

5 power distribution circuitry operative to
selectively power the first power consumption portion
independent of whether the second power consumption
portion is powered.

160. The system of claim 159, further
comprising:

 a local power source; and
 a bus coupled to receive power from an
5 external power source, wherein the local power source and
the bus are electrically coupled to the power
distribution facility.

161. The system of claim 160, wherein the power
distribution facility is operative to:

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provide power received from the bus to the first portion; and

5 provide power from the local power to the second portion.

162. The system of claim 160, wherein the power distribution facility is operative to:

provide power received from the bus to the first portion; and

5 prevent power from the local power source to be provided to the second portion.

163. The system of claim 160, wherein the power distribution facility is operative to:

provide power from the local power source to first and second portions.

164. A method for forming a tube including a feature extending from an inner surface of the tube, comprising:

5 extruding material to form a tube having a first thickness;

inserting a die into a first end of the tube;

inserting a stamper into a second end of the tube;

10 applying a force to the stamper to cold-work a portion of the tube located near the second end, the cold-worked portion having a second thickness that is greater than the first thickness; and

15 machining the cold-worked portion to create the feature.

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165. The method of claim 164, wherein the die is inserted to a predetermined location within the tube, wherein the predetermined location is a desired location of the feature.

166. The method of claim 164, wherein extruding material to form a tube comprises extruding material to form a tube having a length that exceeds a finished tube length.

167. The method of claim 164, wherein the first thickness is substantially equal to a finished tube thickness.

168. The method of claim 164, wherein the feature is selected from the group consisting of a wall, a protrusion, an aperture, a snap, a shelf, and any combination thereof.

169. The method of claim 164, wherein at least one of the die and stamper are constructed to form a predetermined feature.

170. The method of claim 164, wherein the material is at least one of metal and plastic.

171. A method for forming from a material a tube including a feature extending from an inner surface of the tube, comprising:

using impact extrusion to form an indentation in the material, wherein the indentation provides a cavity extending from a first end of the

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material to a predetermined location within the material, the cavity providing tube portion having a wall thickness; and

machining the material located at a second end of the material to provide the feature and the tube.

172. The method of claim 171, wherein the feature is selected from the group consisting of a wall, a protrusion, an aperture, a snap, a shelf, and any combination thereof.

173. The method of claim 171, wherein the wall thickness is substantially equal to a finished tube wall thickness.

174. The method of claim 171, wherein machining comprises removing material from a non-cavity portion of the material to provide the feature.

175. The method of claim 174, wherein a portion of the non-cavity portion comprises substantially similar wall thickness as the cavity portion.

176. A method for forming from a material a tube including a feature extending from an inner surface of the tube, comprising:

using impact extrusion to form first and second indentations in the material, wherein the first indentation provides a first cavity extending from a first end of the material to a first predetermined location within the material, the first cavity providing tube portion having a first wall thickness, and wherein the second indentation provides a second cavity extending

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from a second end of the material to a second predetermined location within the material, the second cavity providing a machinable tube portion having a second wall thickness; and

removing a portion of the machinable tube portion to form the tube and the feature.

177. The method of claim 176, wherein the first wall thickness is substantially equal to a finished tube wall thickness.

178. The method of claim 176, wherein the first and second predetermined locations do not overlap.

179. The method of claim 176, wherein the first and second predetermined location do overlap.

180. The method of claim 176, wherein removing comprises machining a portion of the second cavity to change the second wall thickness to a first wall thickness.

181. The method of claim 176, wherein the feature is a wall.

182. A method for forming a finished tube including a feature extending from an inner surface of the tube, comprising:

using a progressive deep draw process to provide a workable tube, the workable tube comprising first and second cavities within the tube that are substantially adjacent to each other, the first and second cavities having first and second wall thickness,

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respectively, and wherein the workable tube has an open end and a closed end;

removing the closed end of the workable tube; and

machining the second cavity to form the feature and the finished tube.

183. The method of claim 182, wherein the first wall thickness is substantially equal to a finished tube wall thickness.

184. The method of claim 182, wherein the finished tube is constructed from metal or plastic.

185. The method of claim 182, wherein the feature is selected from the group consisting of a wall, a protrusion, an aperture, a snap, a shelf, and any combination thereof.

186. The method of claim 182, wherein a portion of the second cavity is machined to have a wall thickness substantially equal to the first wall thickness.

Best Available Copy

Docket No.: 104677-0014-001 (P4672P1)

Application No.:

To Be Assigned

Filed: Herewith

Express Mail No. EV621276943US

For:

WIRELESS HEADSET

Agent:

Andrew Van Court, Reg. No. 48,506

Sheet 1 of 52

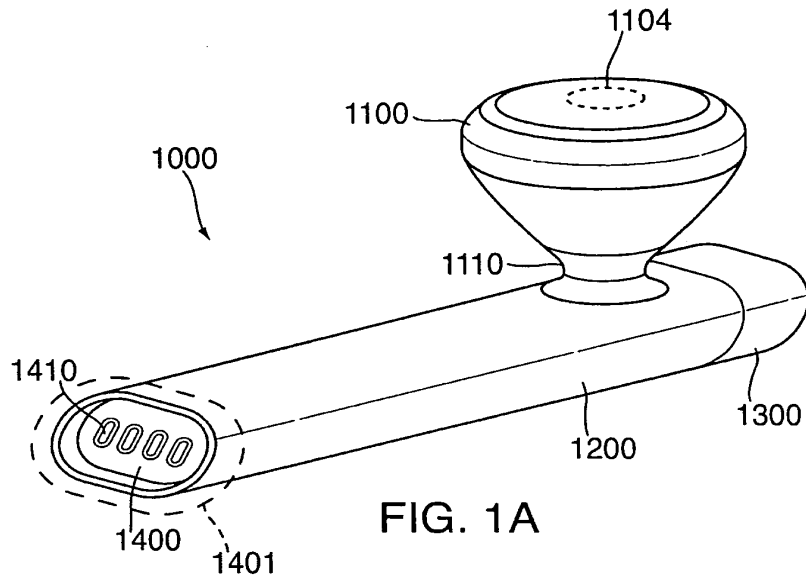


FIG. 1A

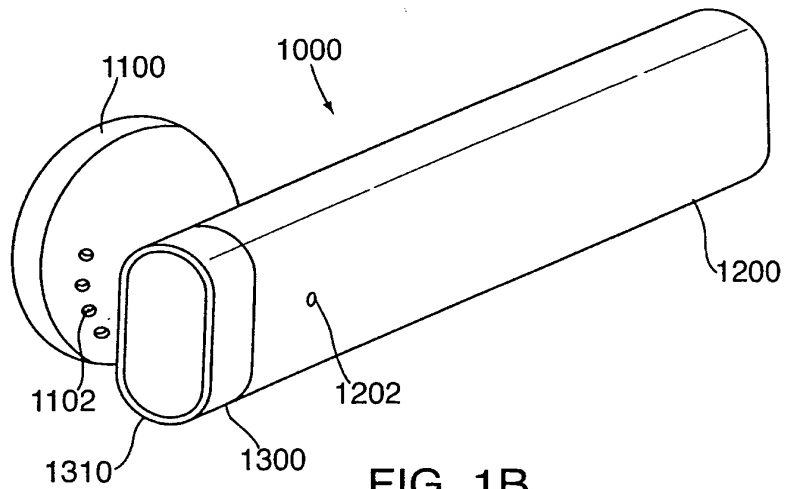


FIG. 1B

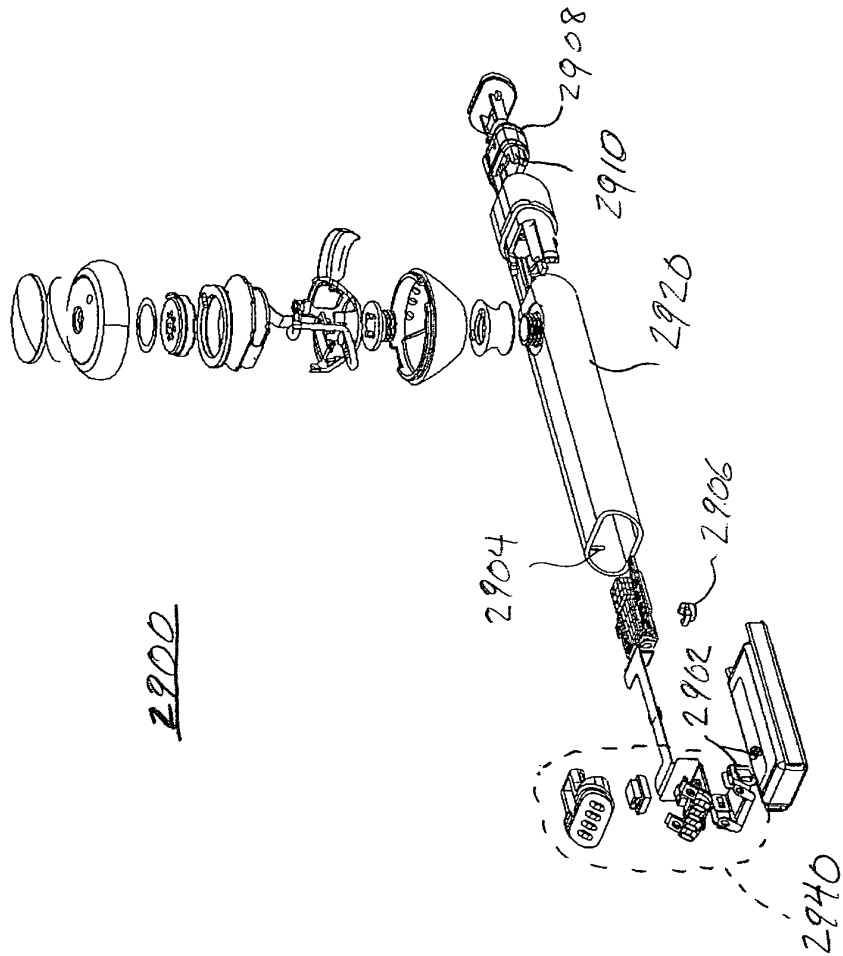


FIG. 2B

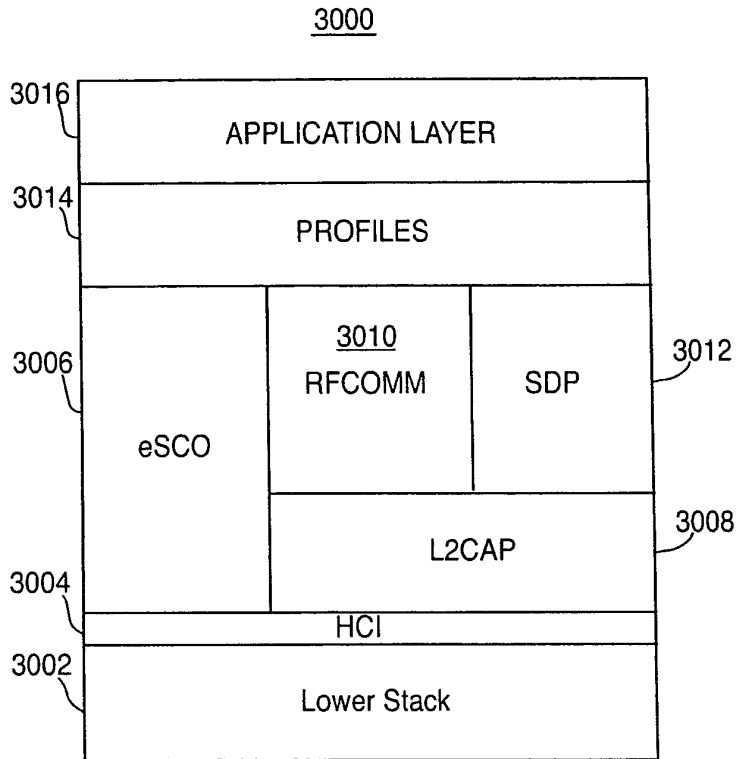


FIG. 3

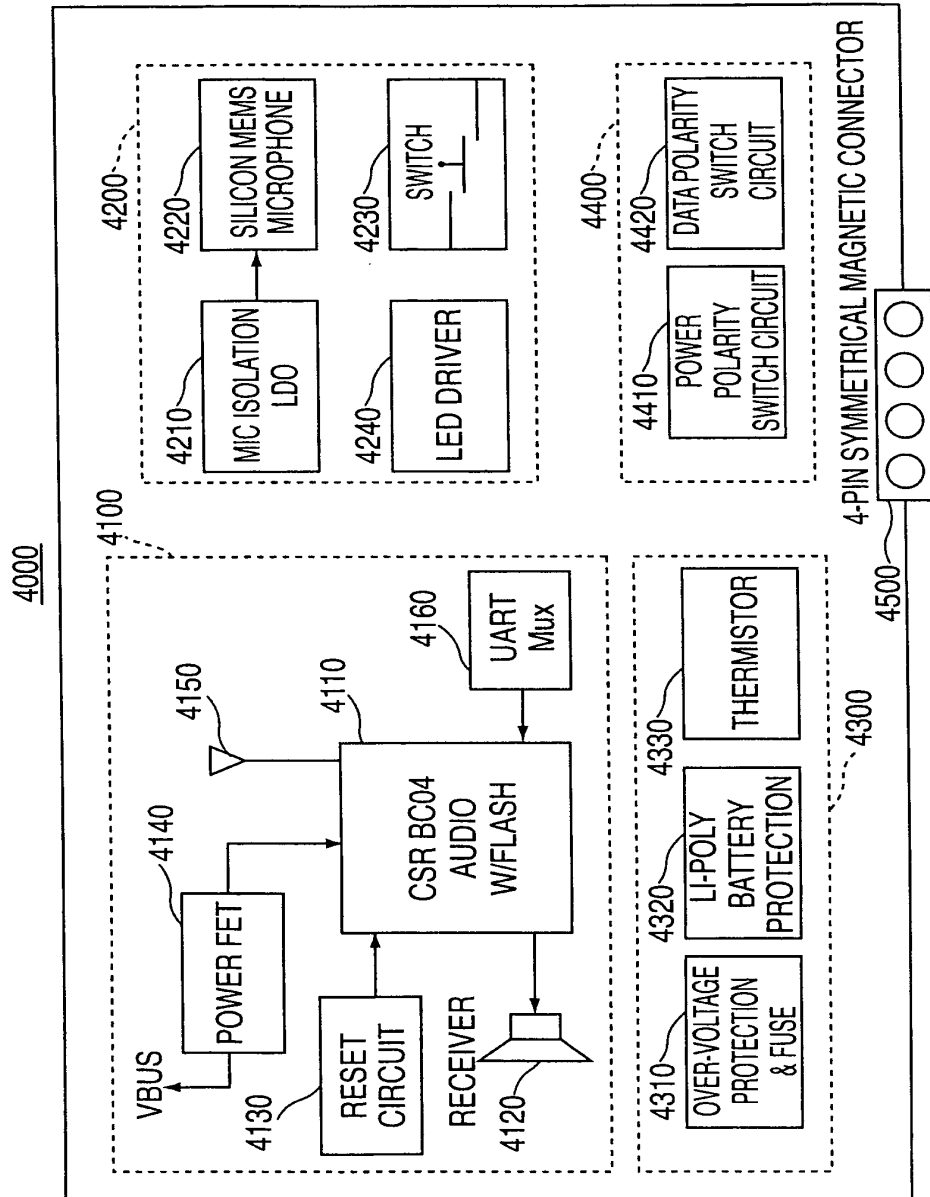


FIG. 4

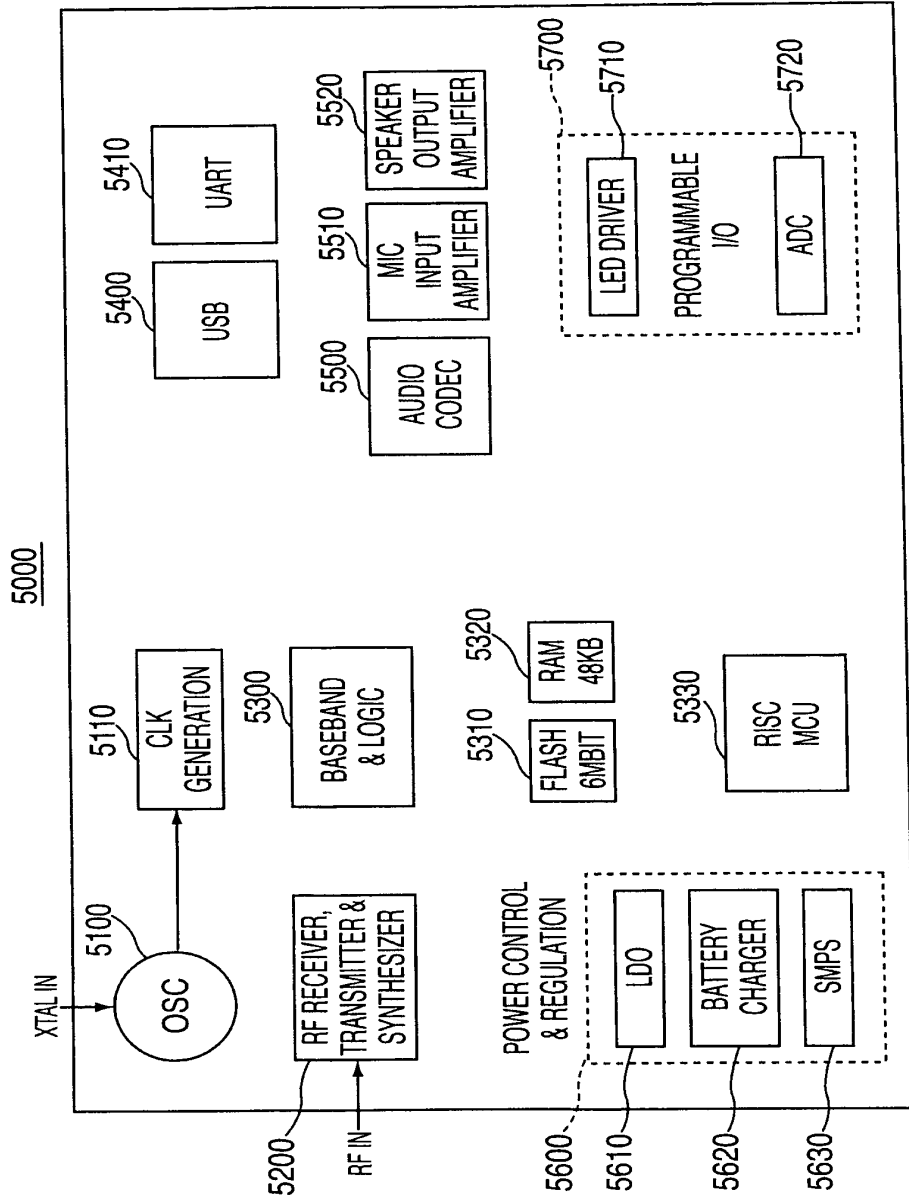


FIG. 5

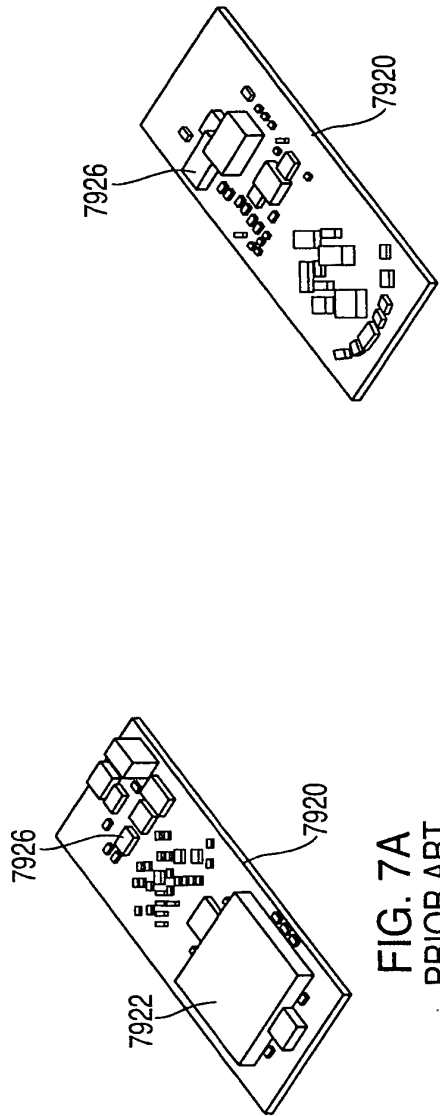


FIG. 7A
PRIOR ART

FIG. 7B
PRIOR ART

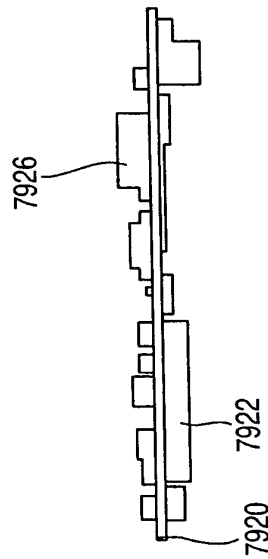


FIG. 7C
PRIOR ART

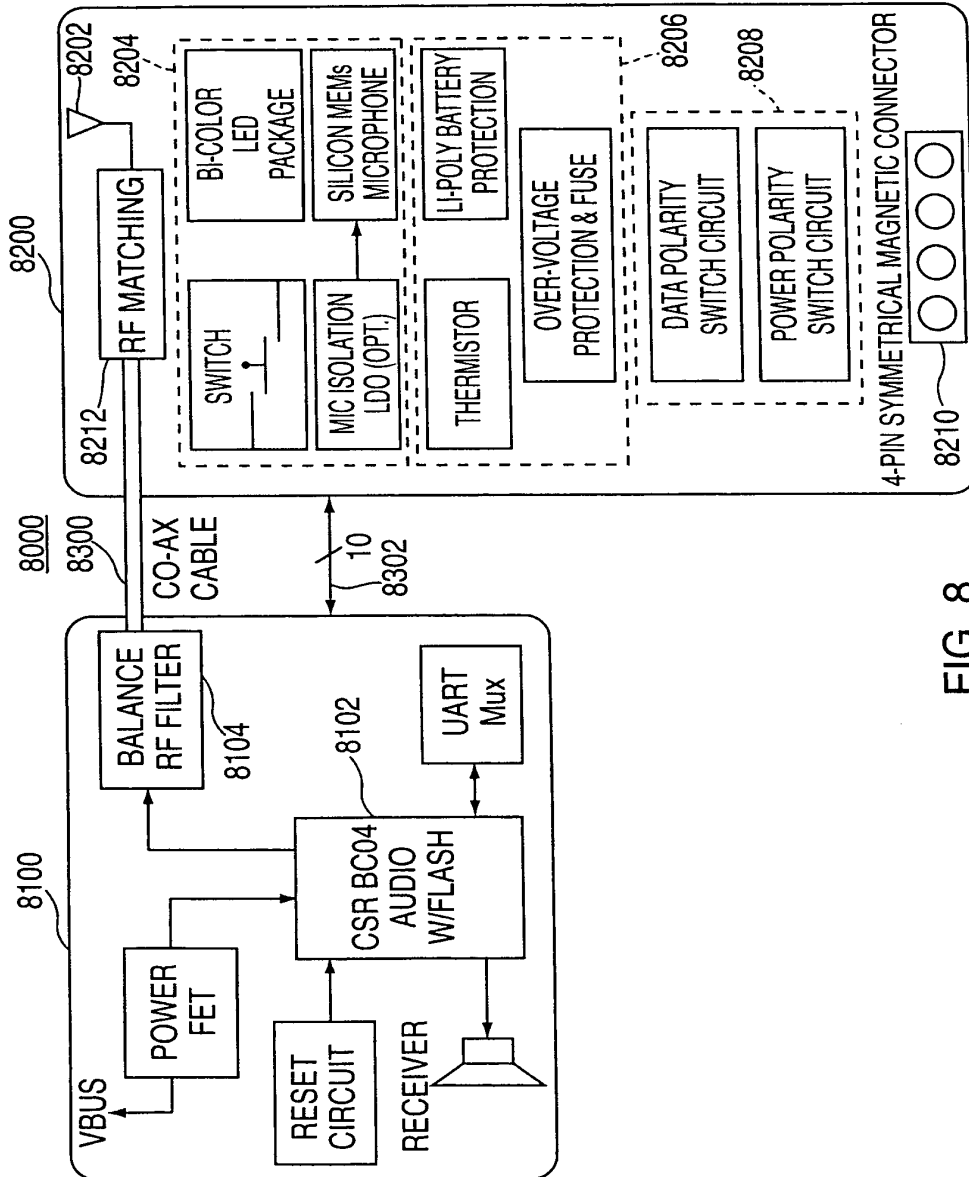
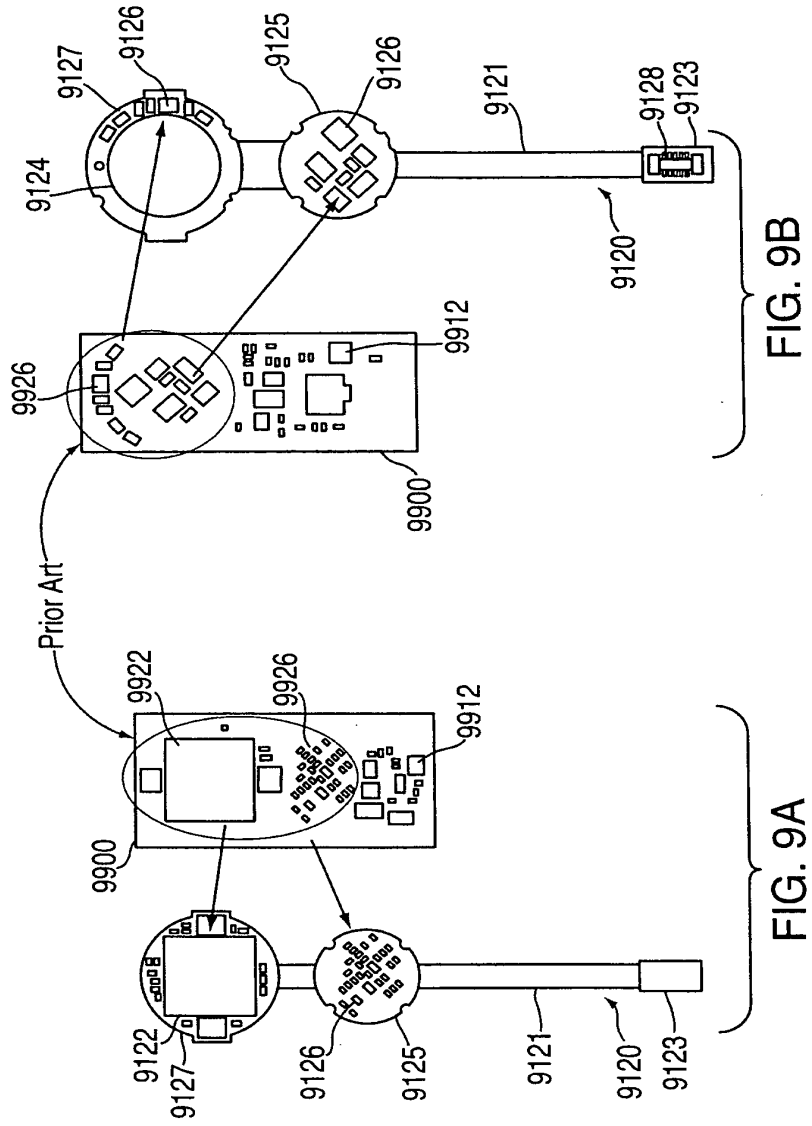


FIG. 8



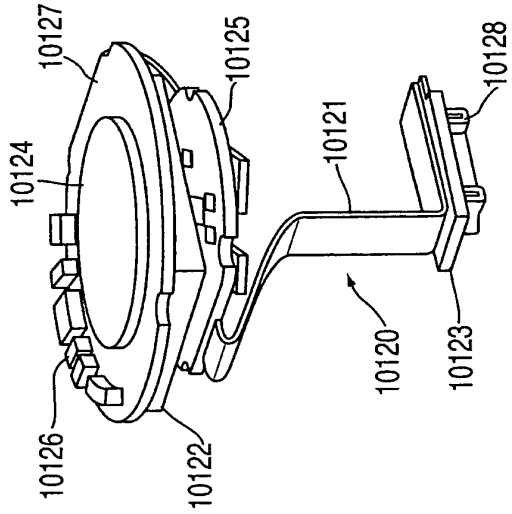


FIG. 10B

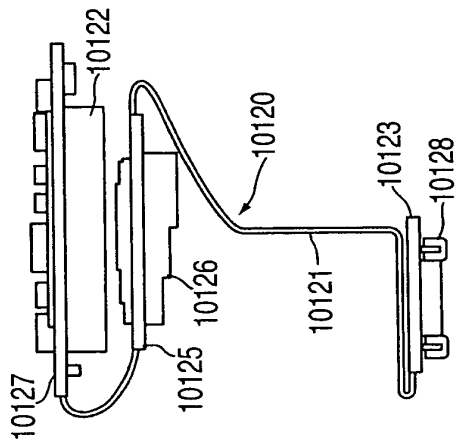


FIG. 10A

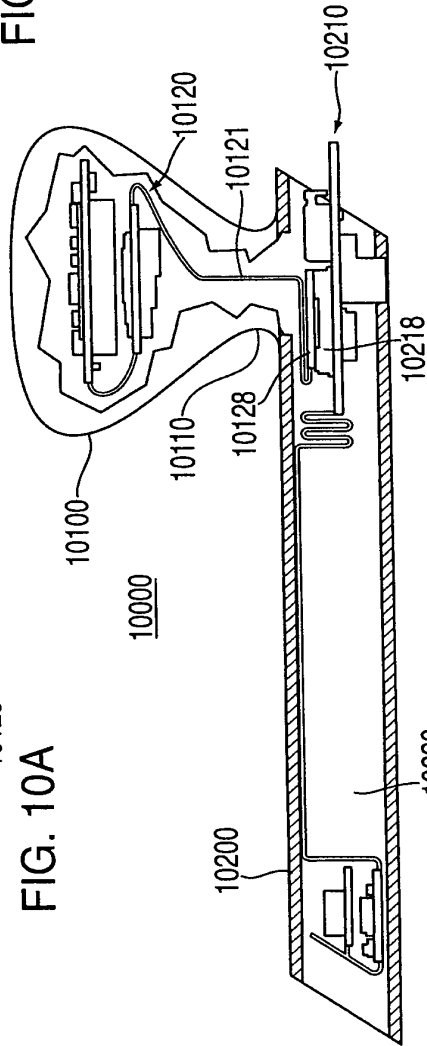


FIG. 10C

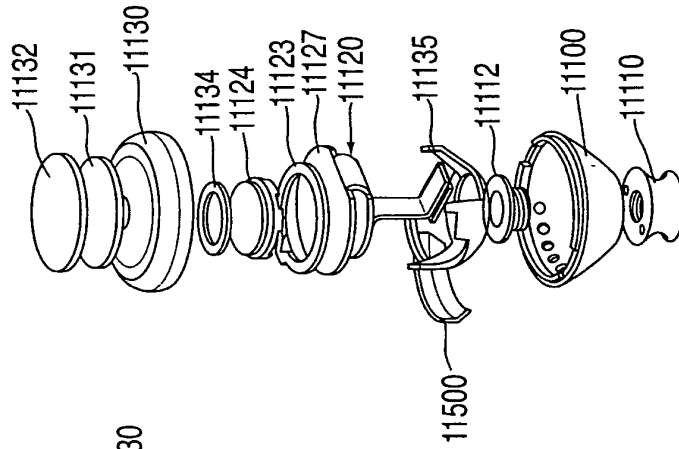


FIG. 11B

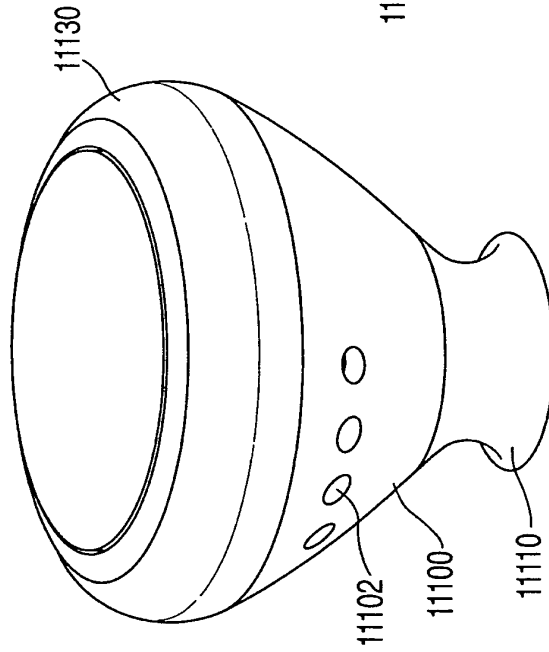


FIG. 11A

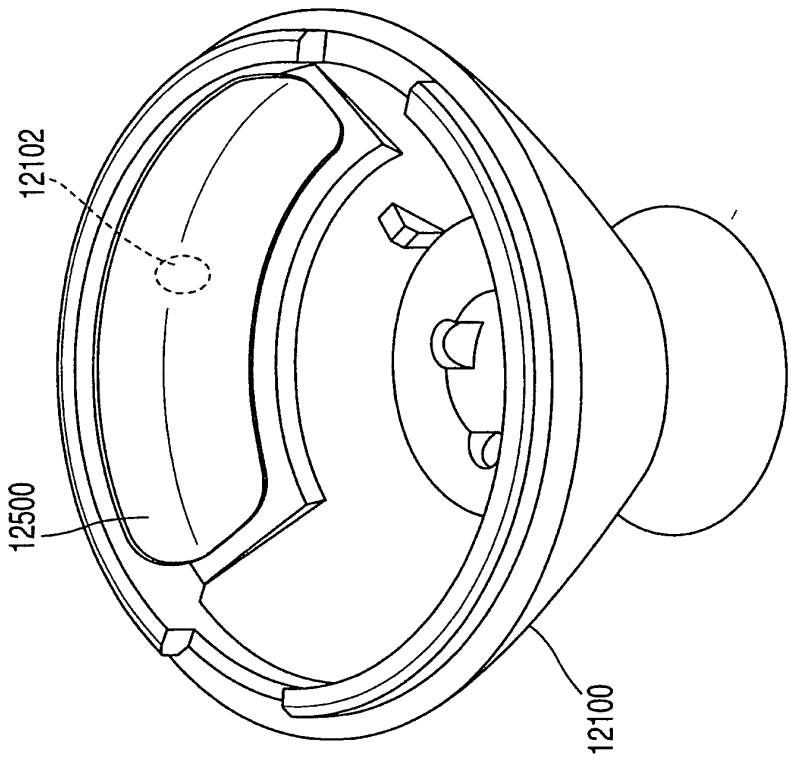


FIG. 12

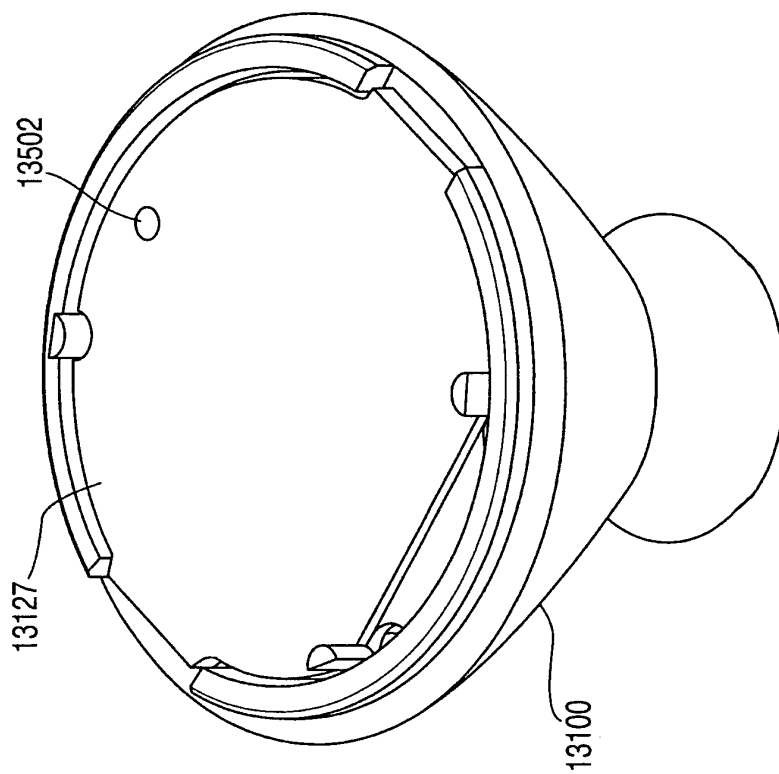


FIG. 13

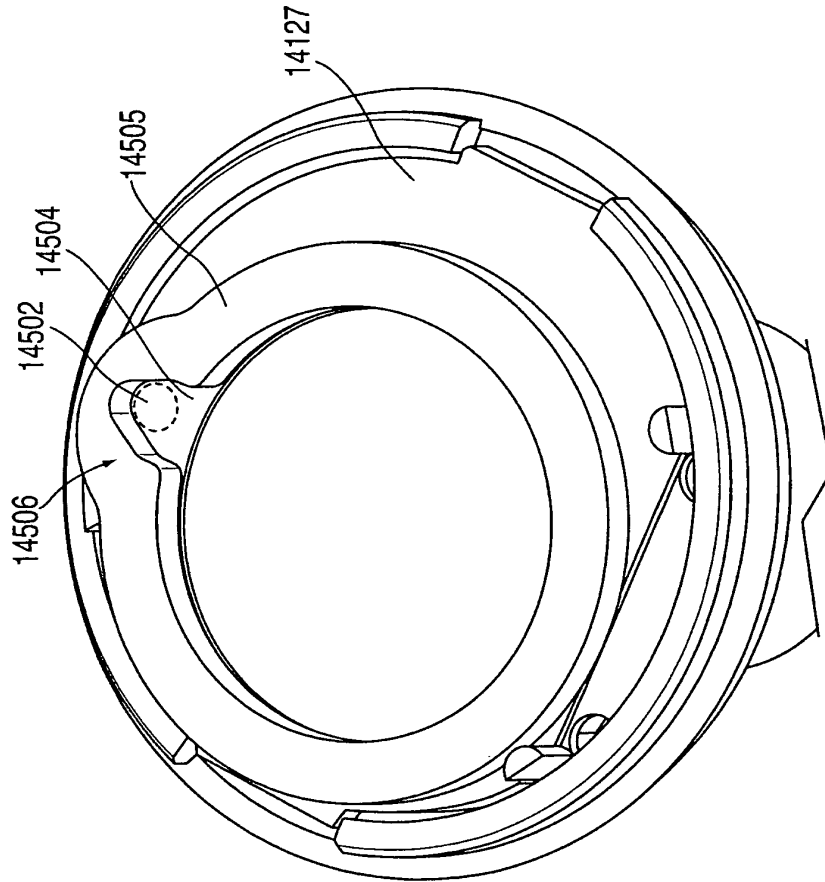


FIG. 14

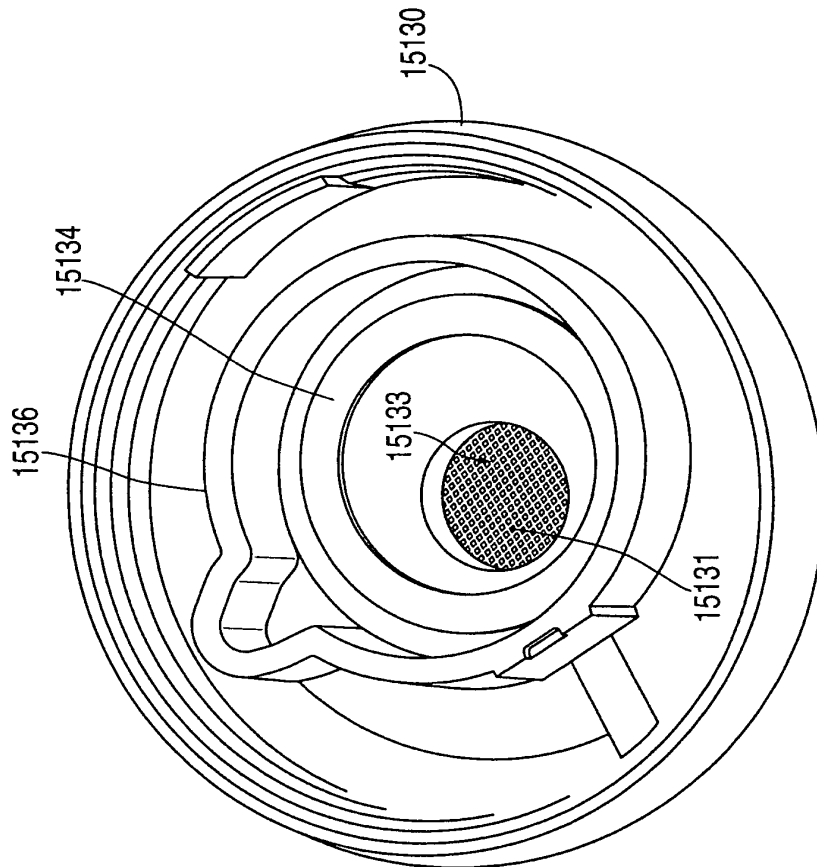


FIG. 15

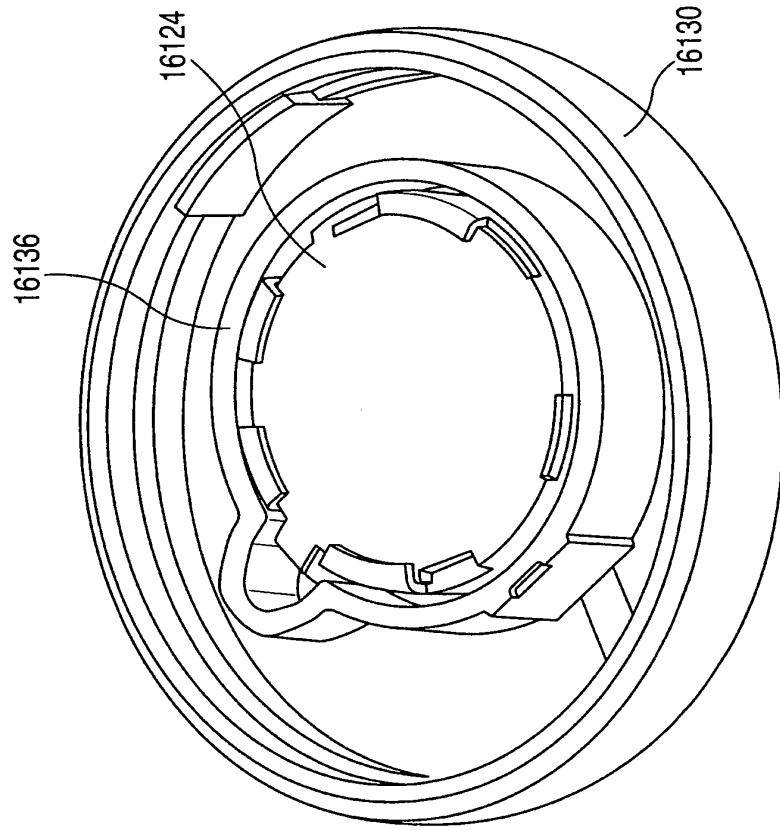


FIG. 16A

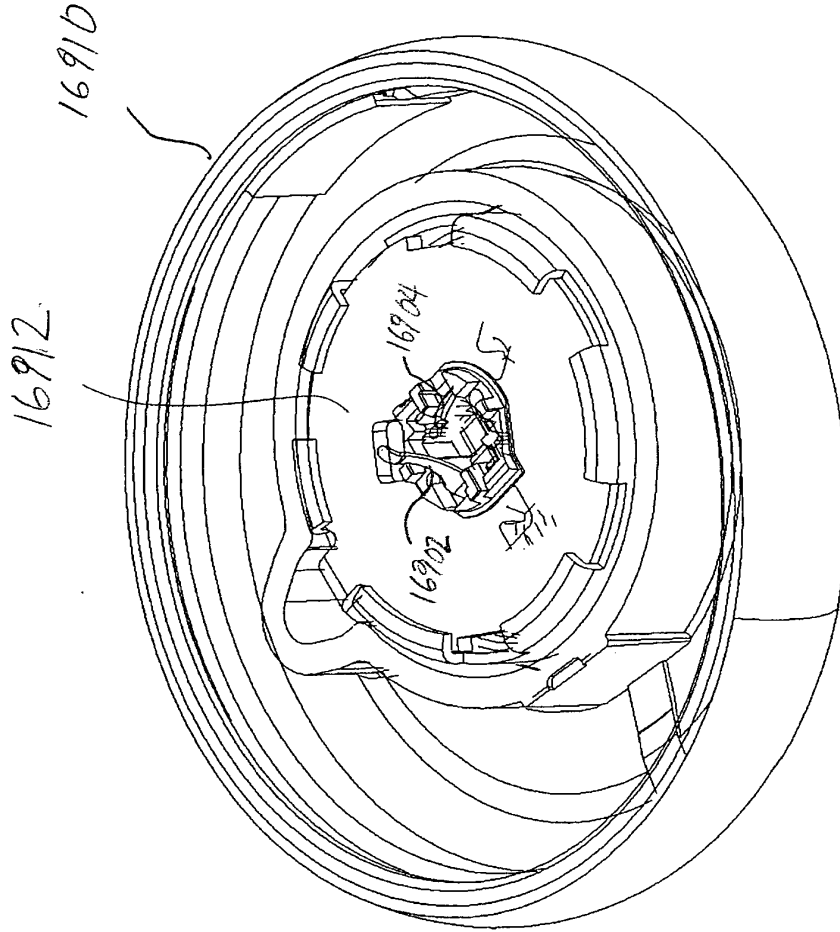


FIG. 16B

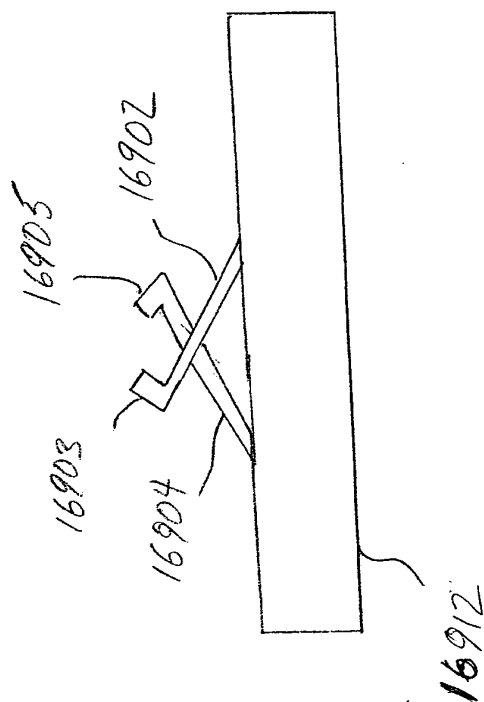


FIG. 16C

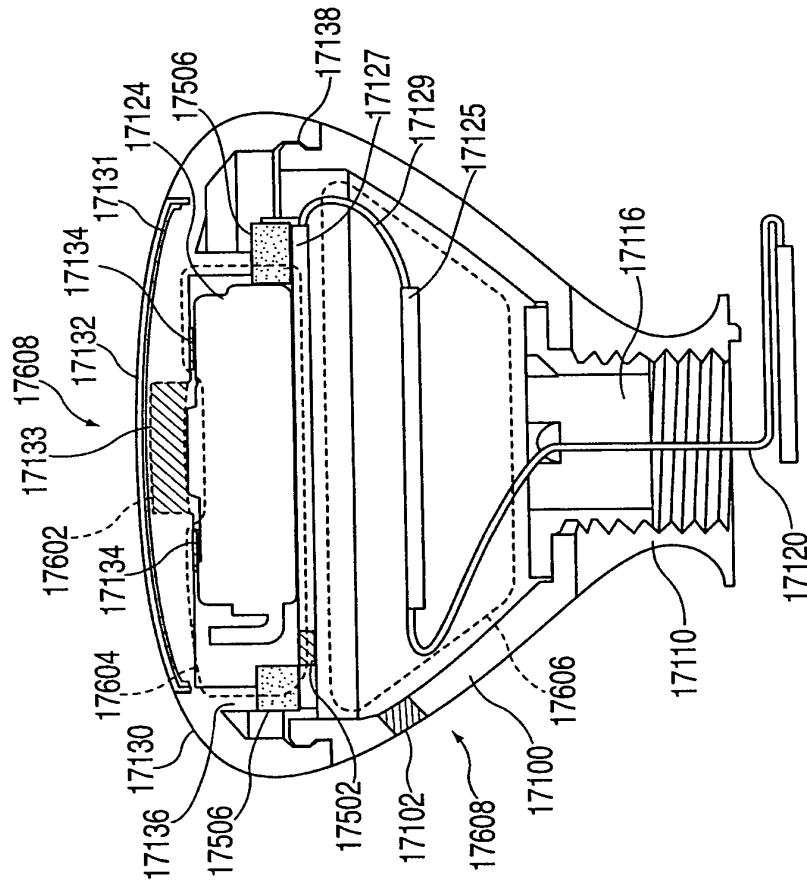
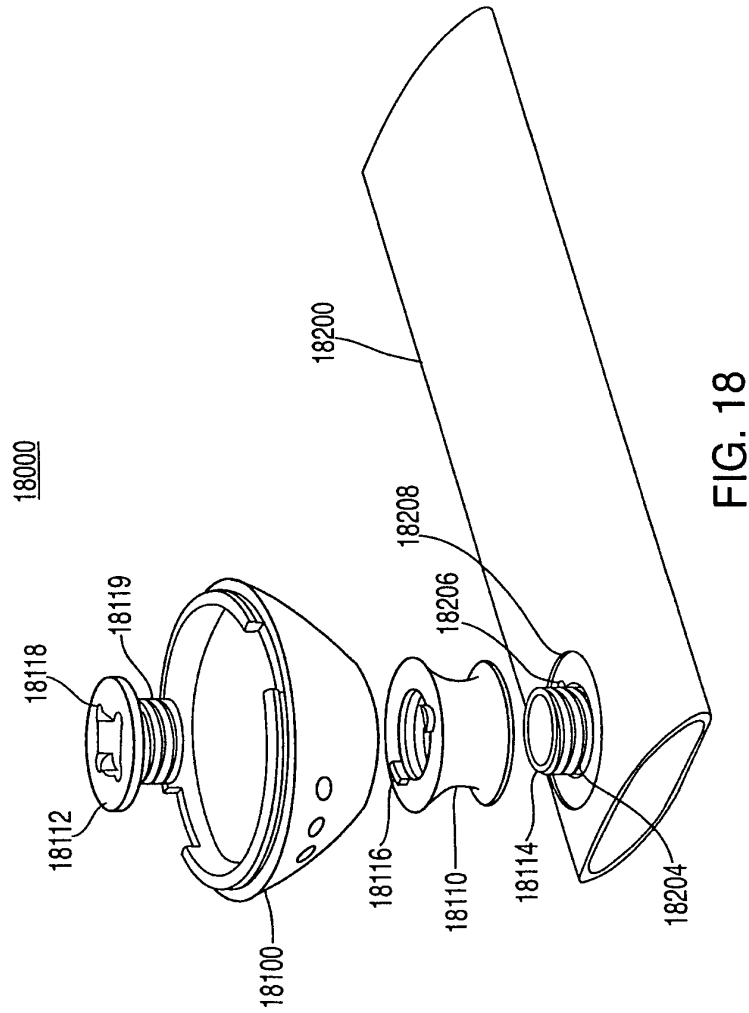


FIG. 17



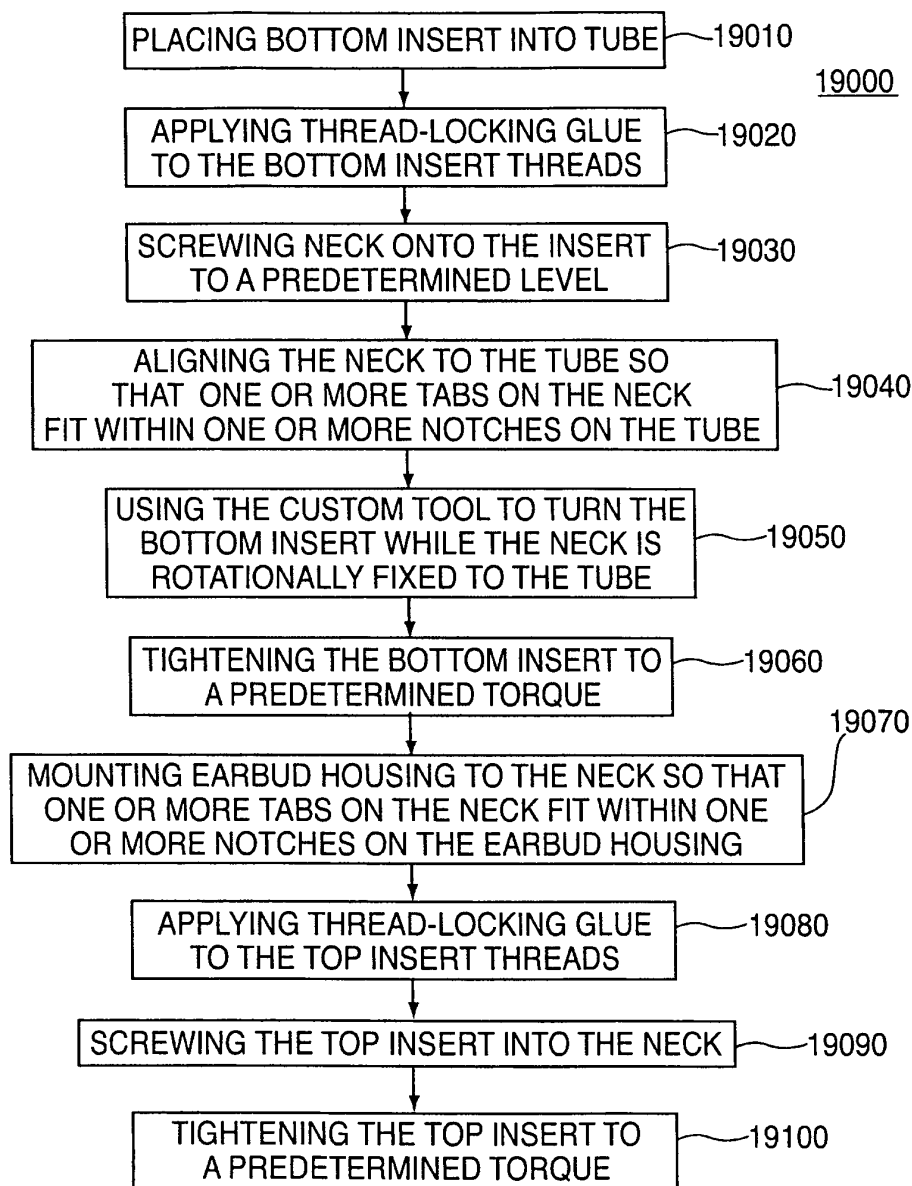


FIG. 19

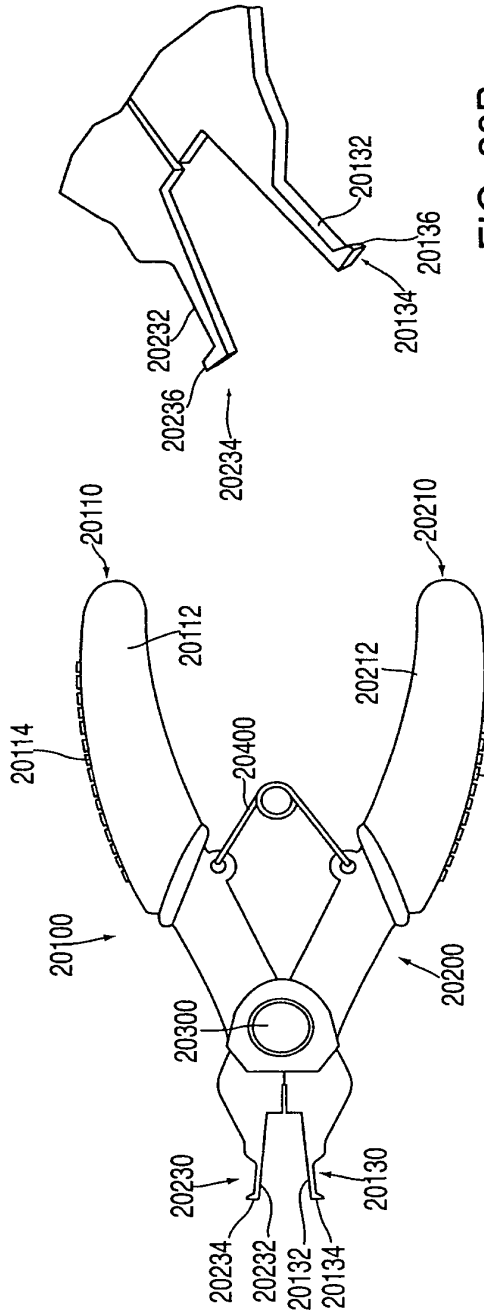


FIG. 20B

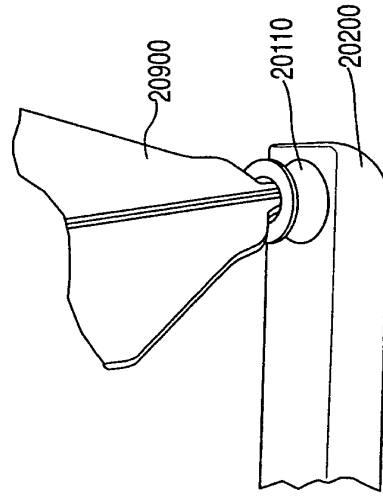


FIG. 20C

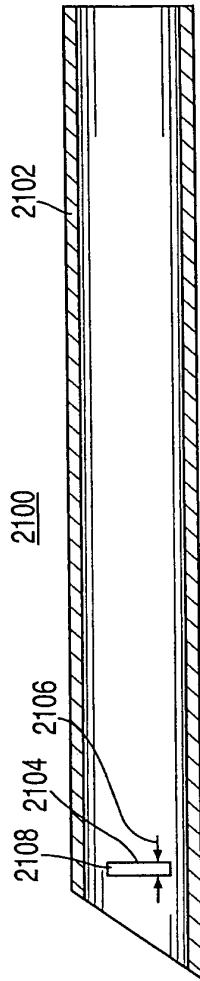


FIG. 21

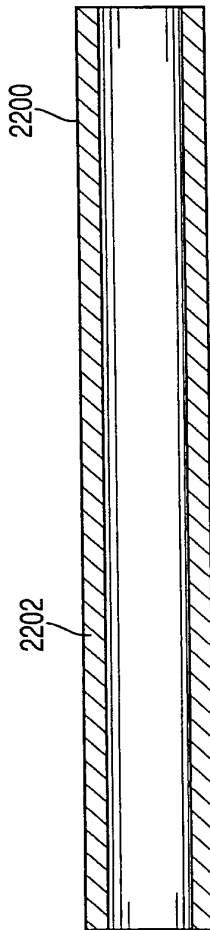


FIG. 22

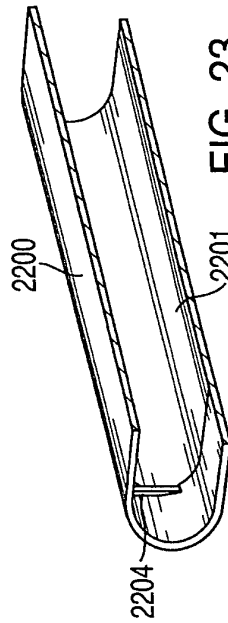
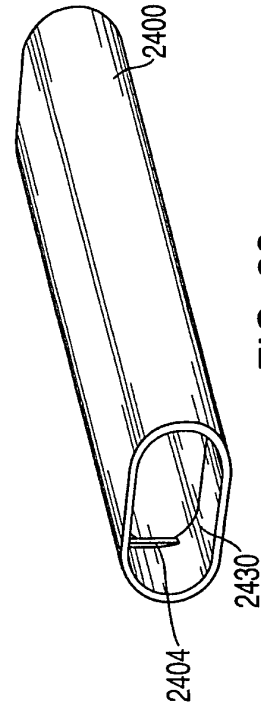
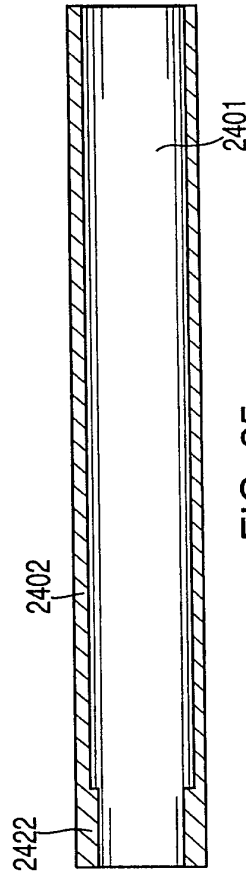
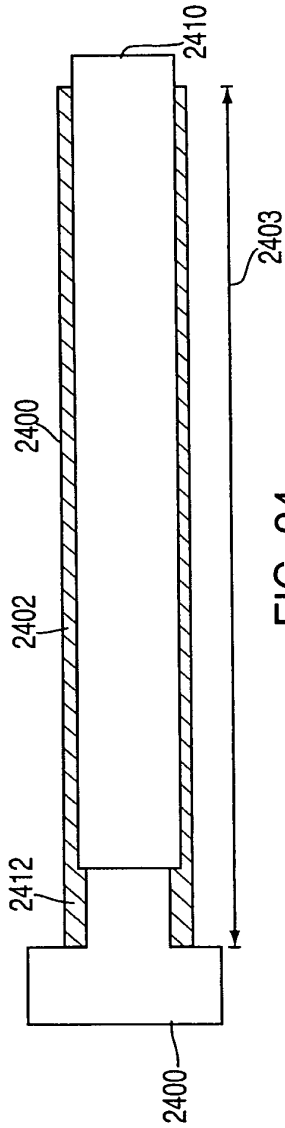


FIG. 23



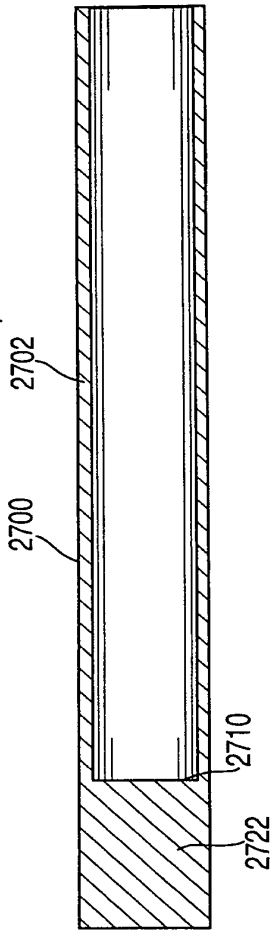


FIG. 27

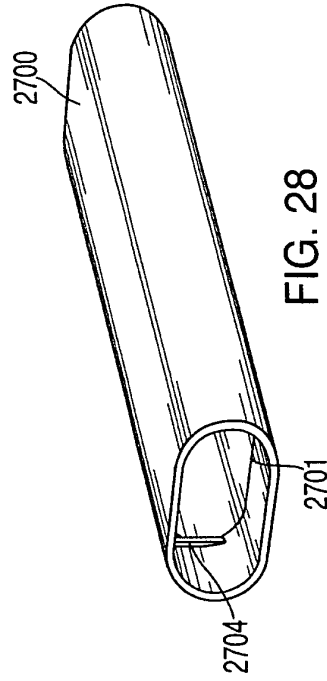


FIG. 28

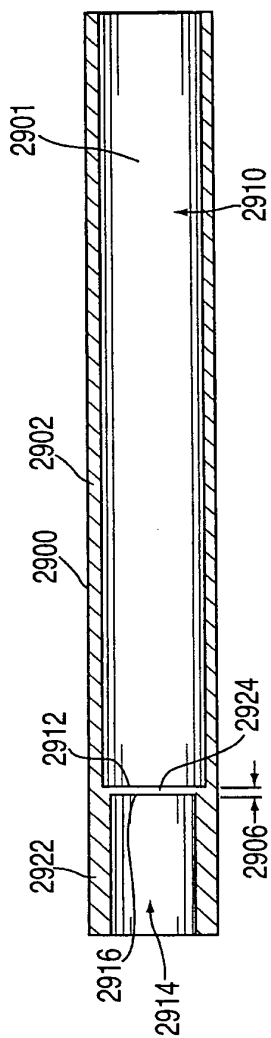


FIG. 29

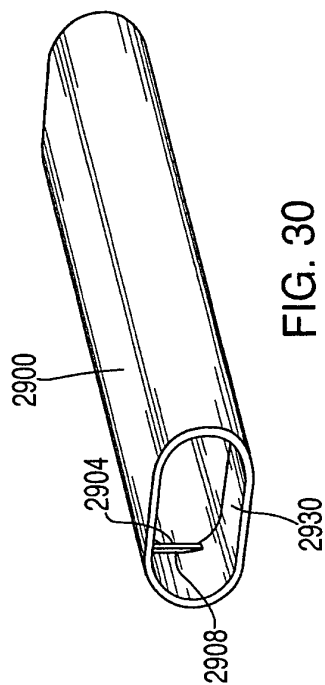


FIG. 30

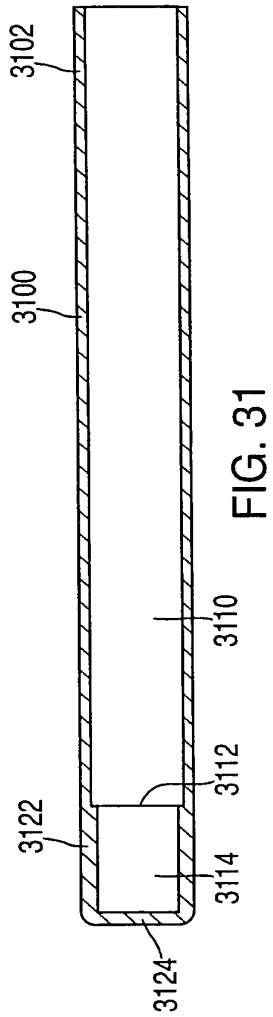


FIG. 31

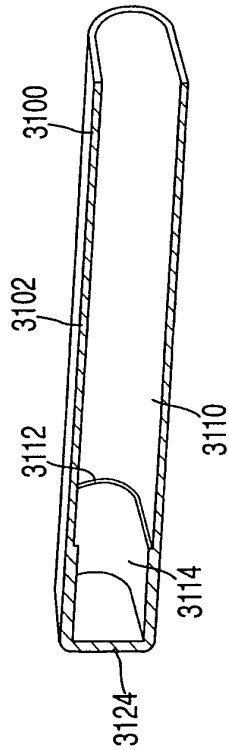


FIG. 32

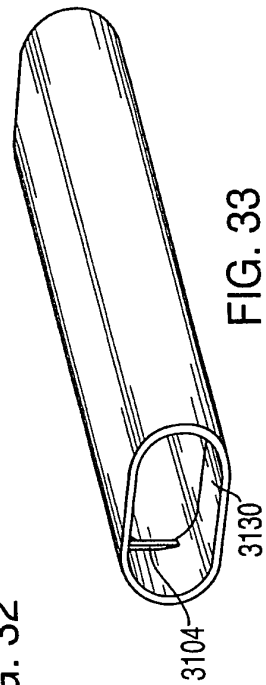


FIG. 33

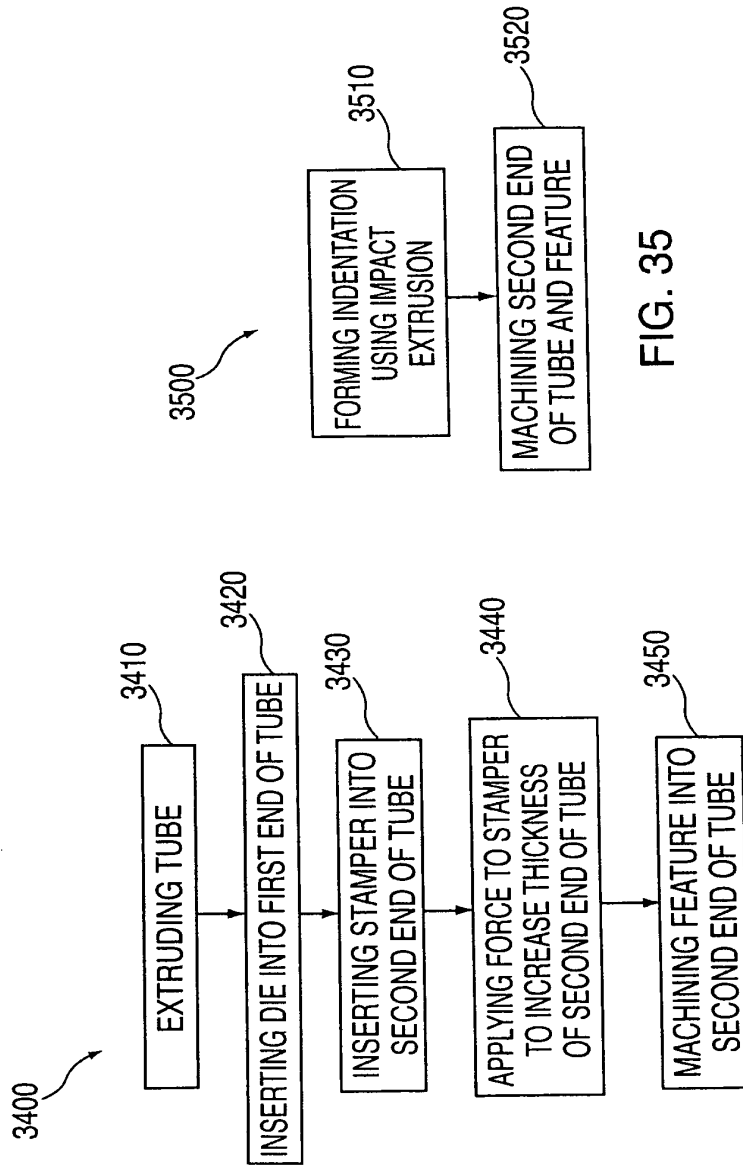


FIG. 34

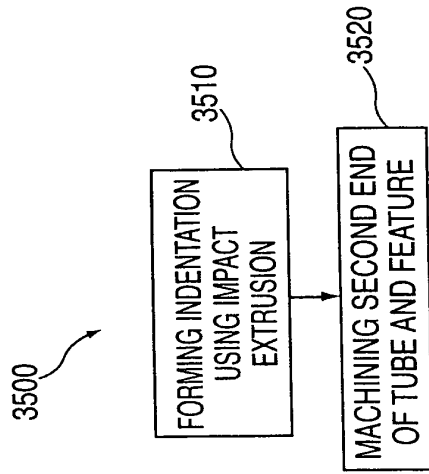


FIG. 35

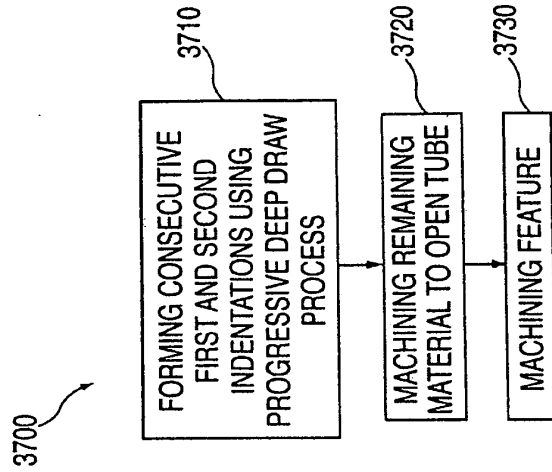


FIG. 37

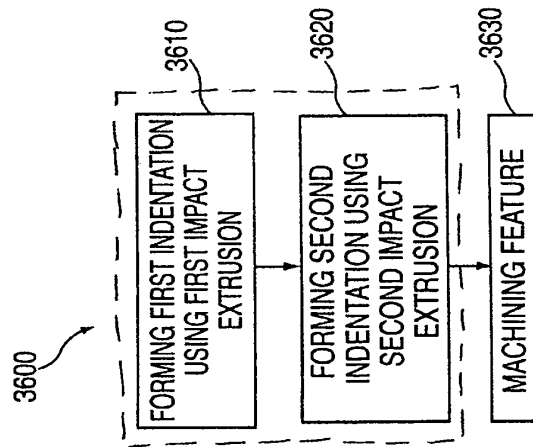


FIG. 36

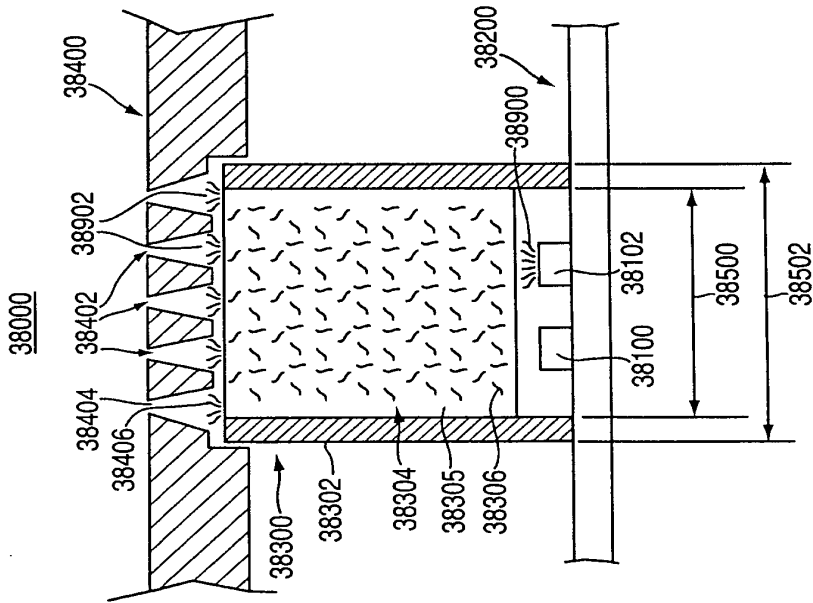


FIG. 38

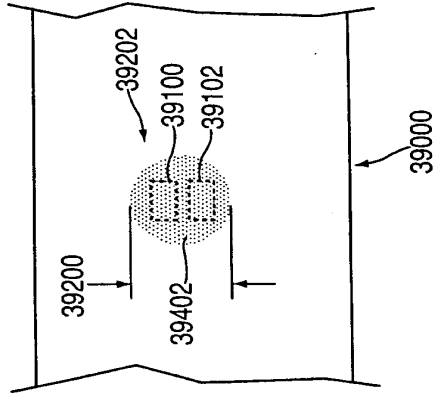


FIG. 39

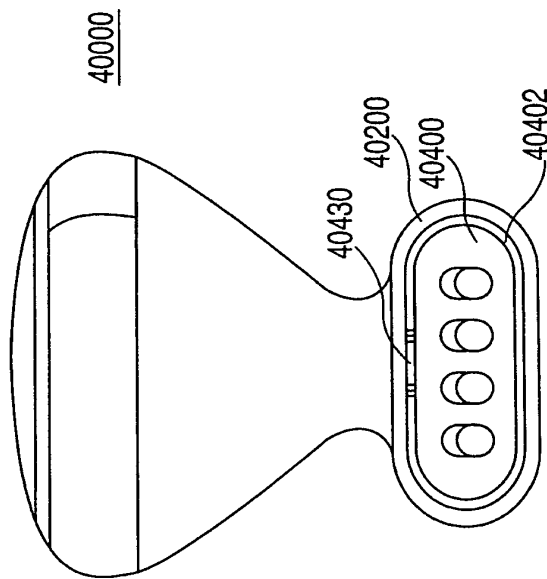


FIG. 40A

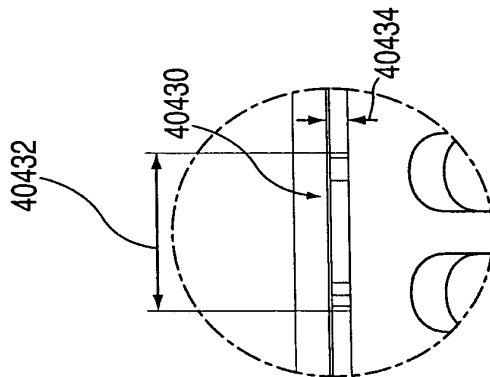


FIG. 40B

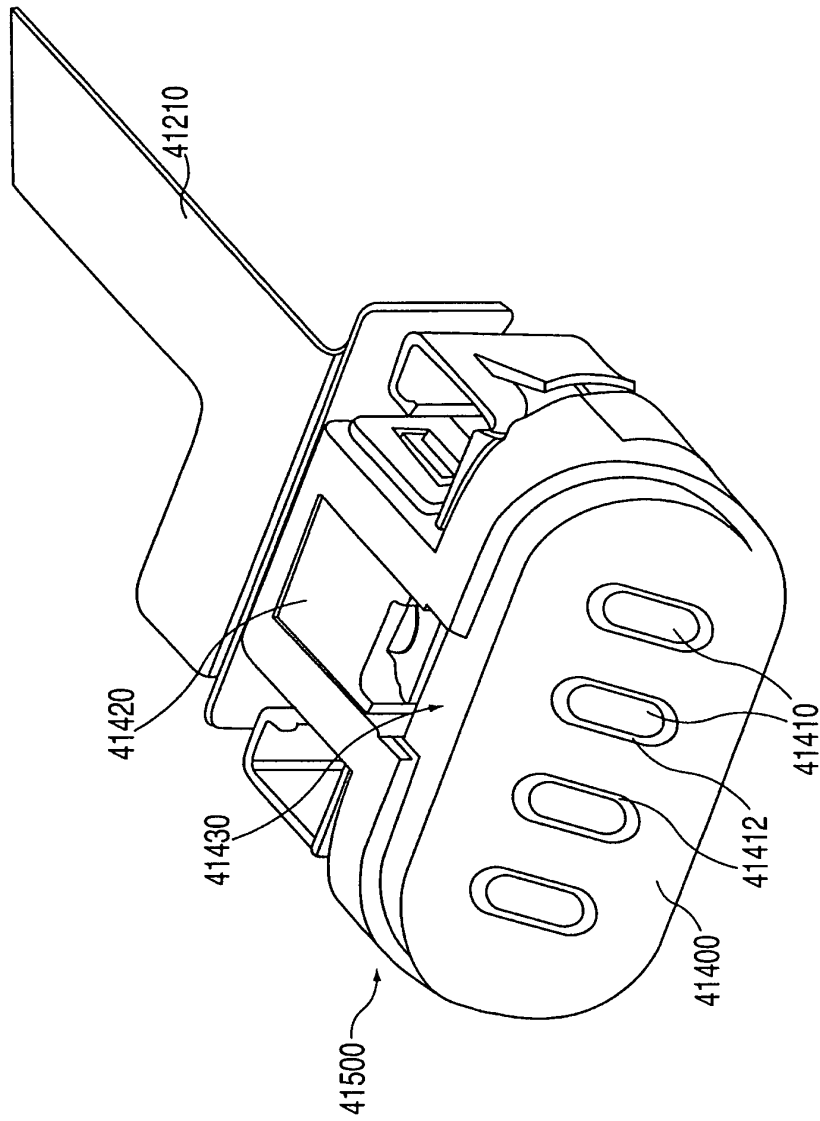


FIG. 41

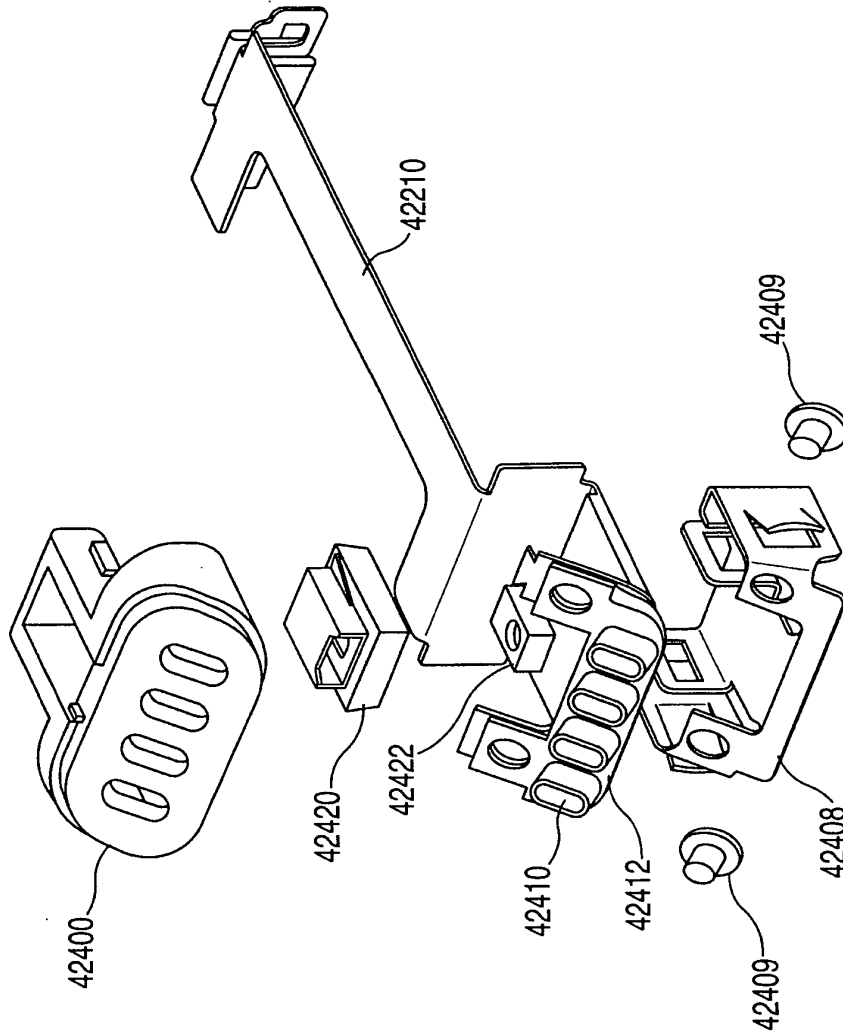


FIG. 42

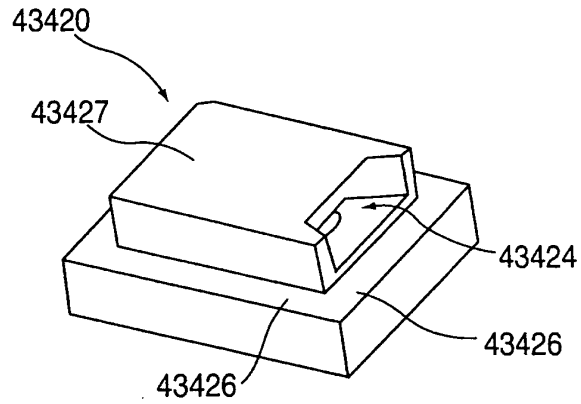


FIG. 43

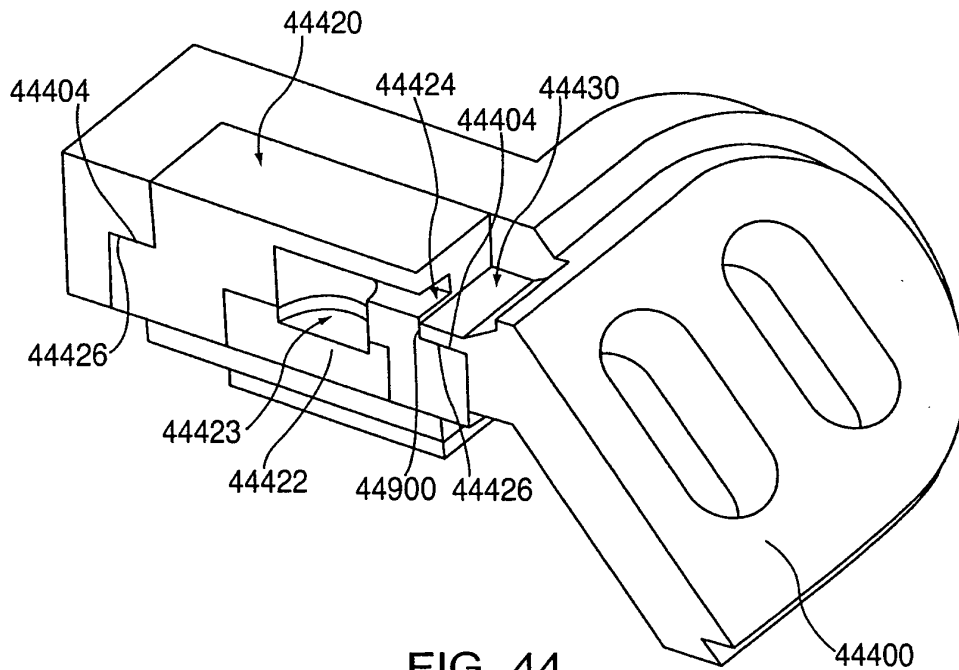


FIG. 44

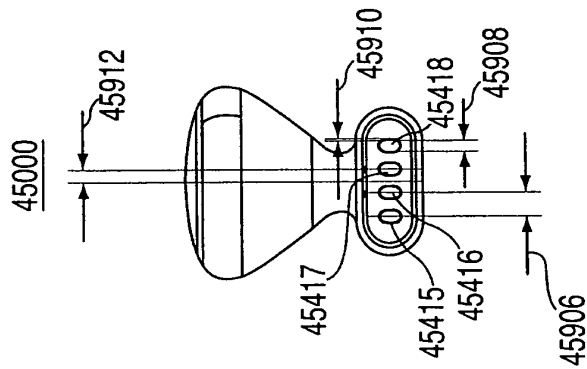


FIG. 45A

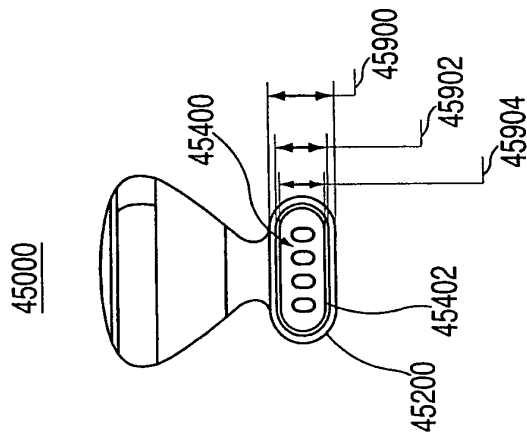


FIG. 45B

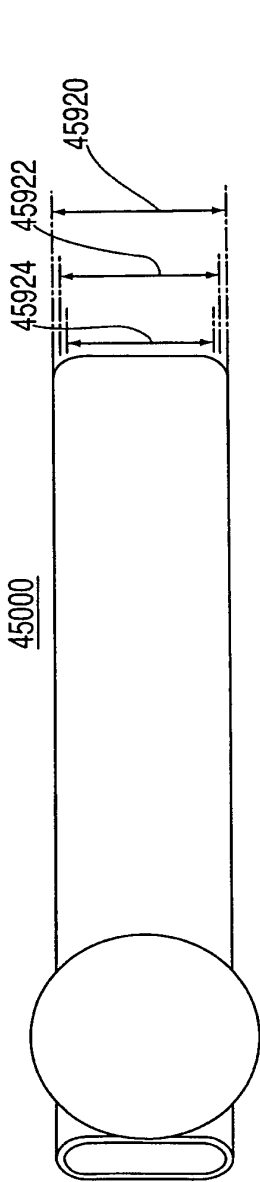


FIG. 45C

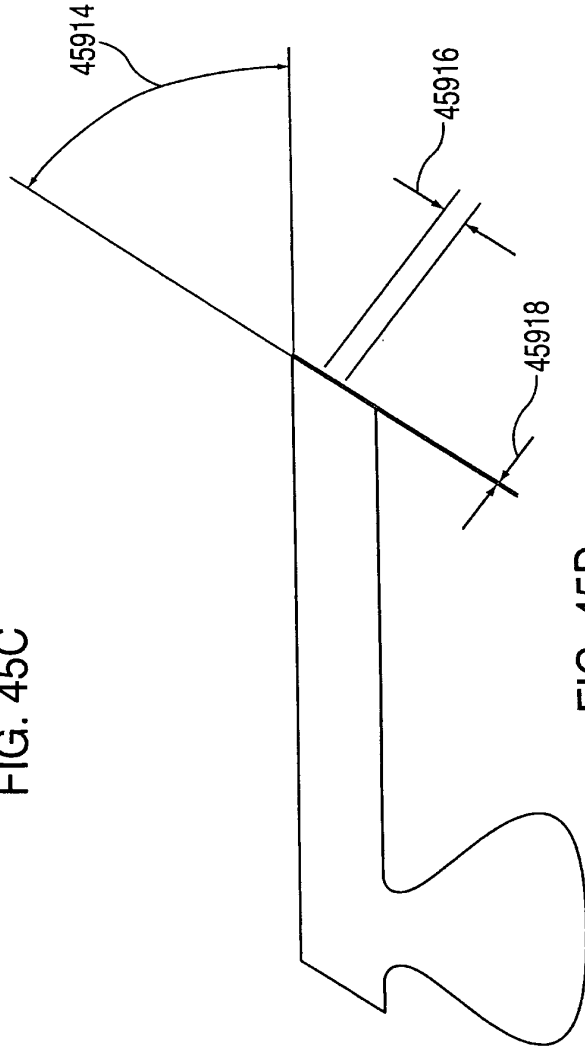


FIG. 45D

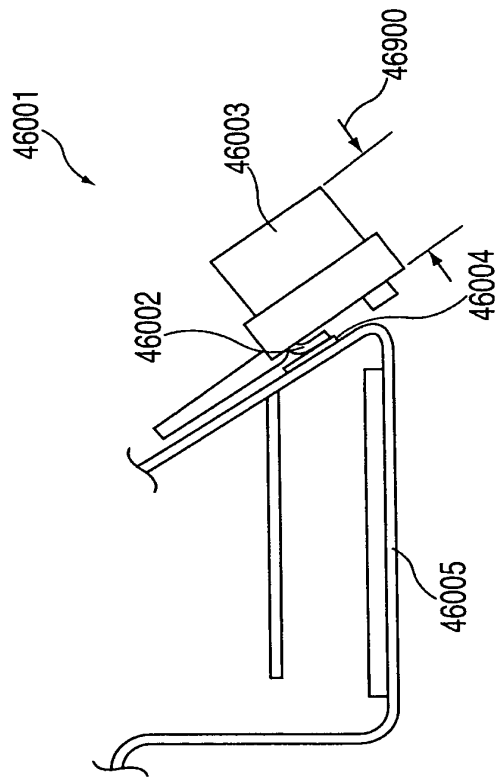


FIG. 46

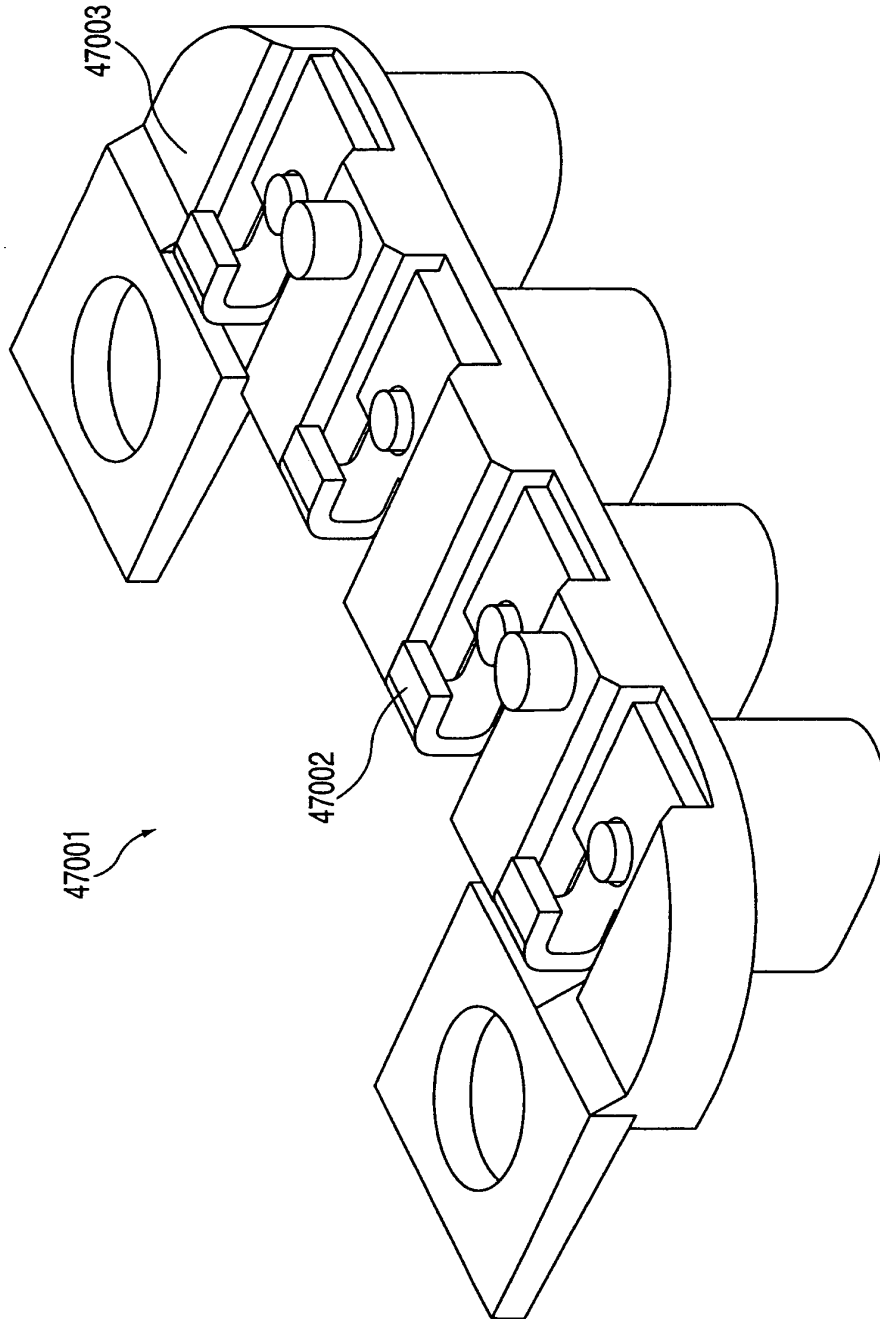


FIG. 47A

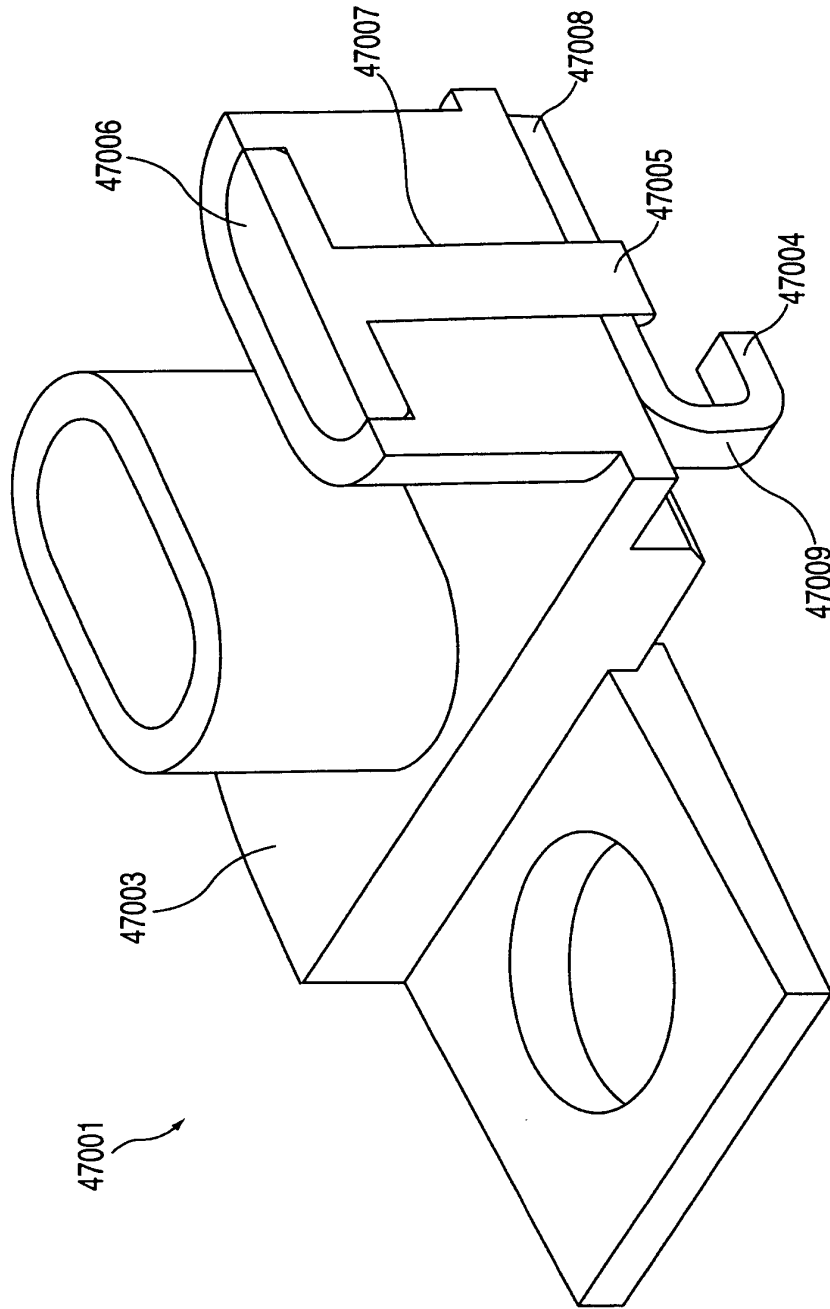
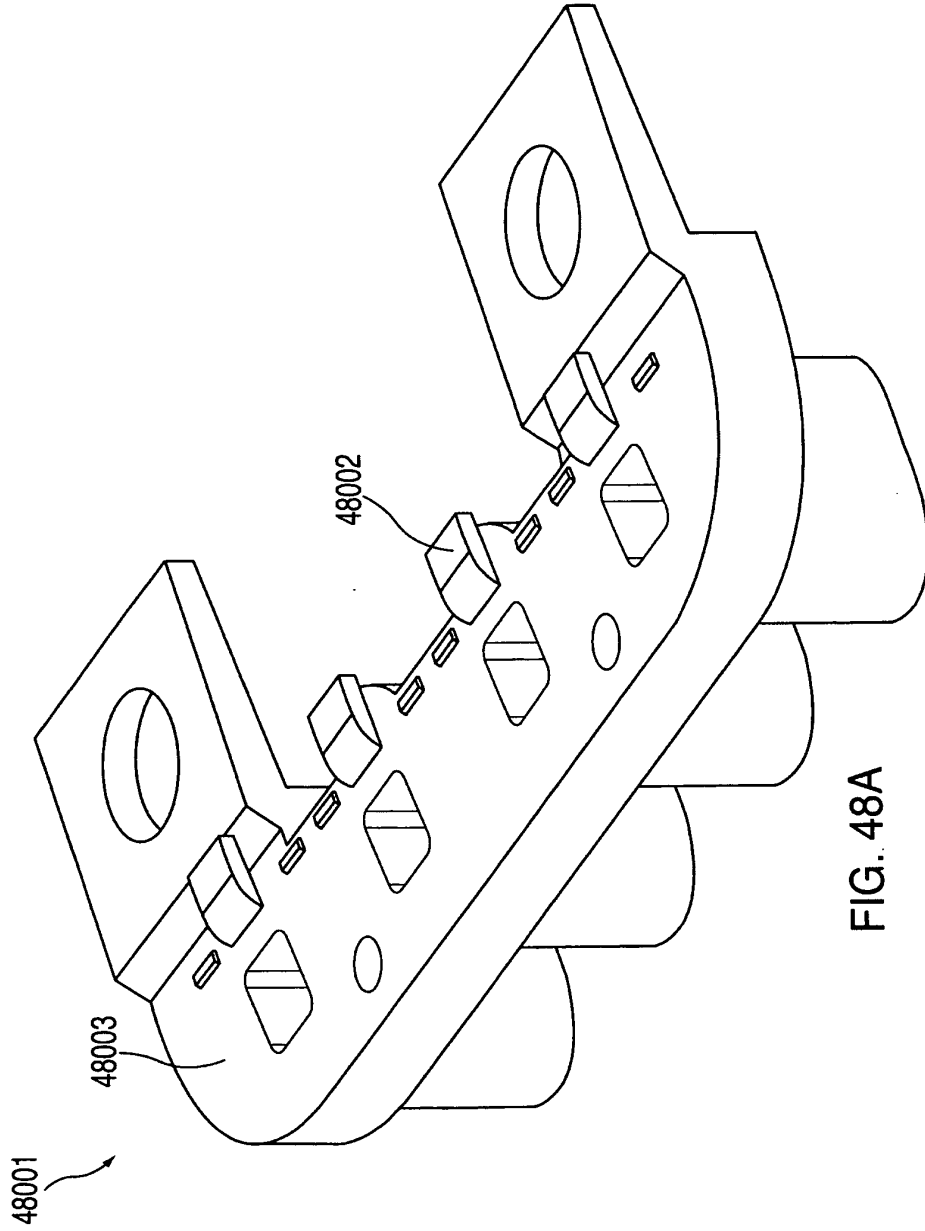


FIG. 47B



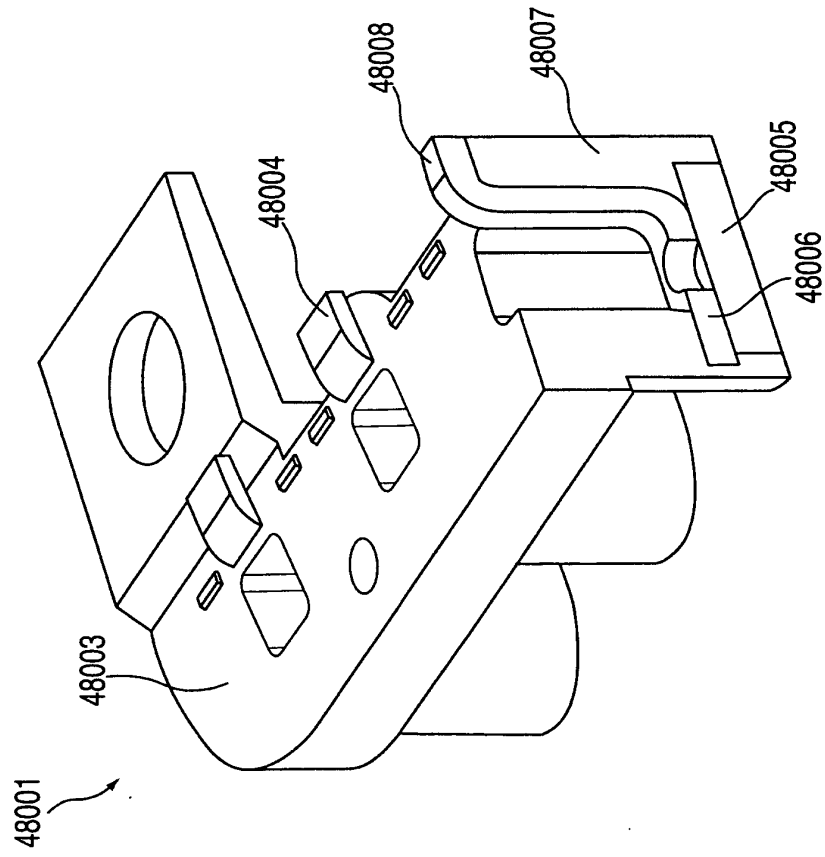


FIG. 48B

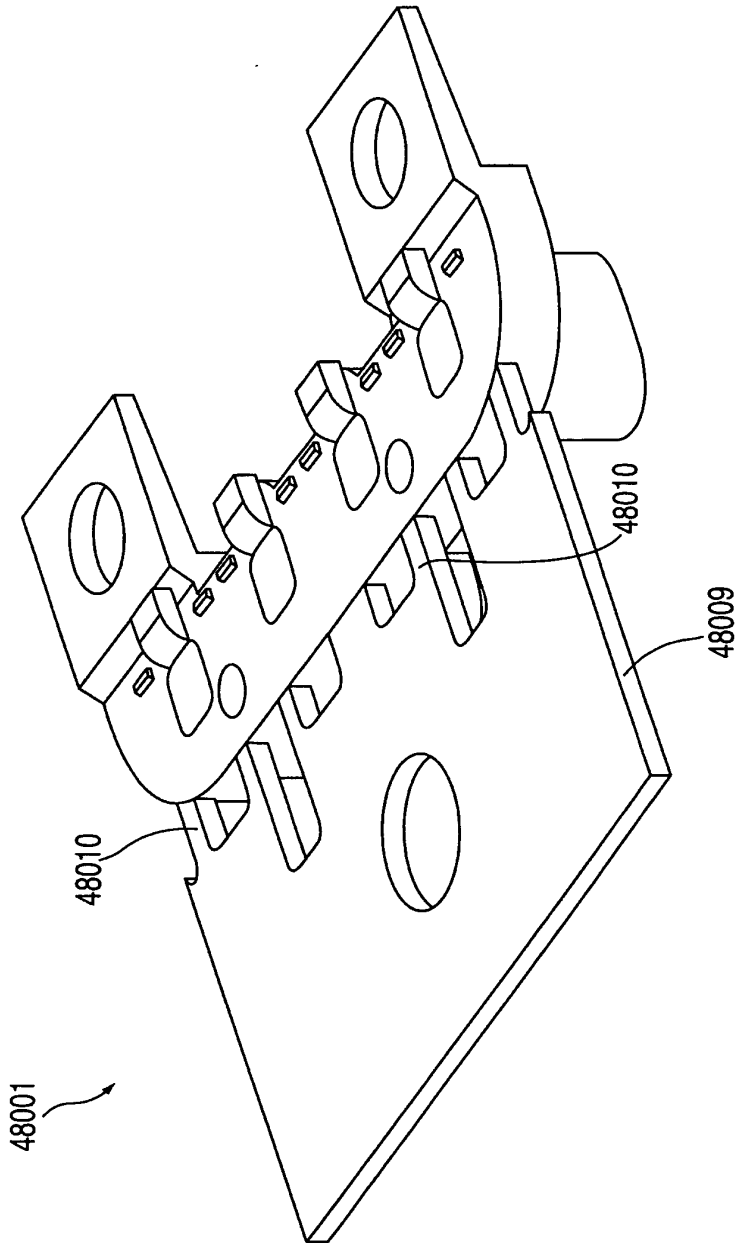


FIG. 48C

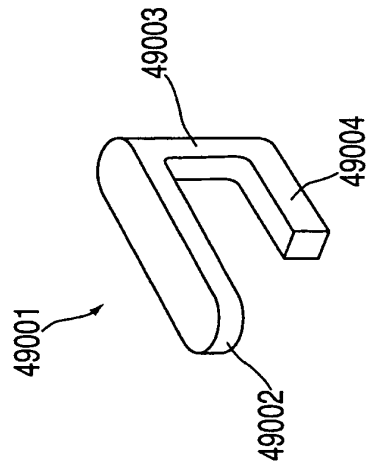


FIG. 49A

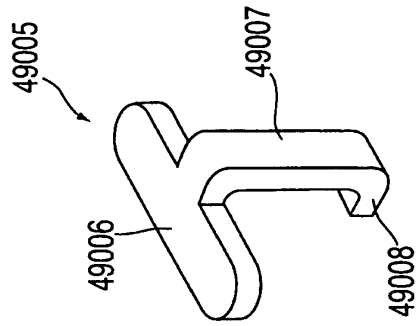


FIG. 49B

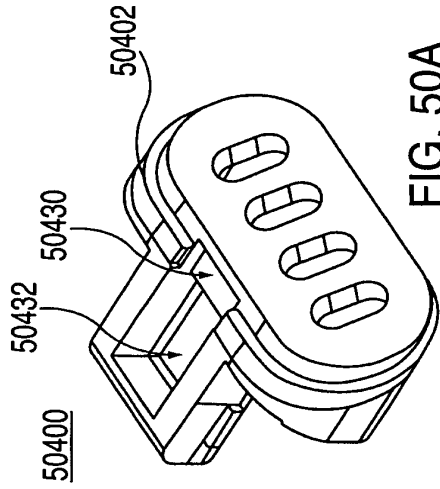


FIG. 50A

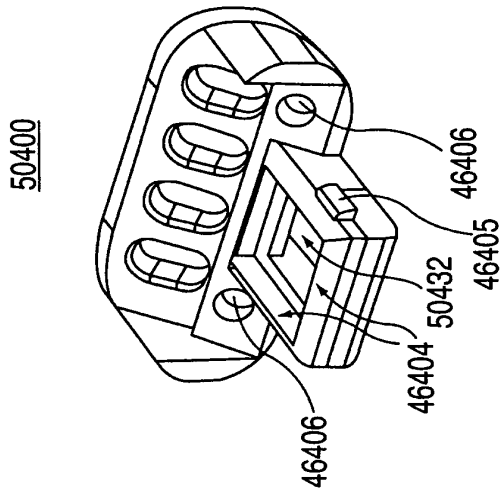


FIG. 50B

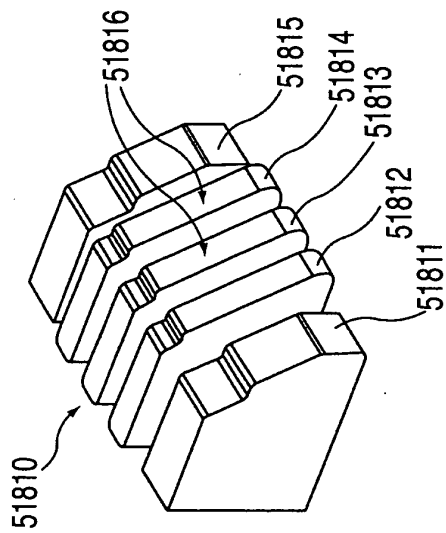


FIG. 51A

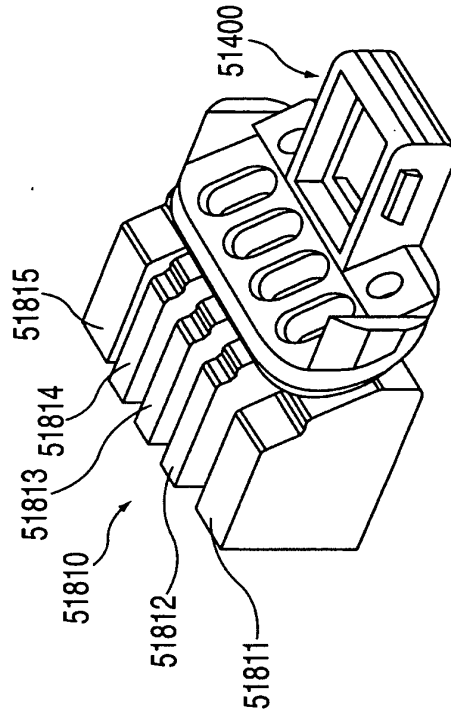


FIG. 51B

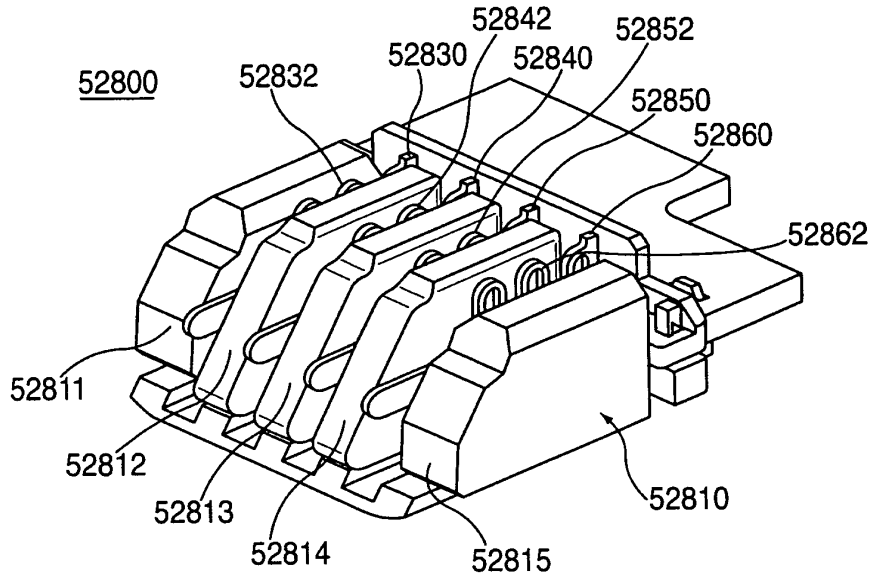


FIG. 52A

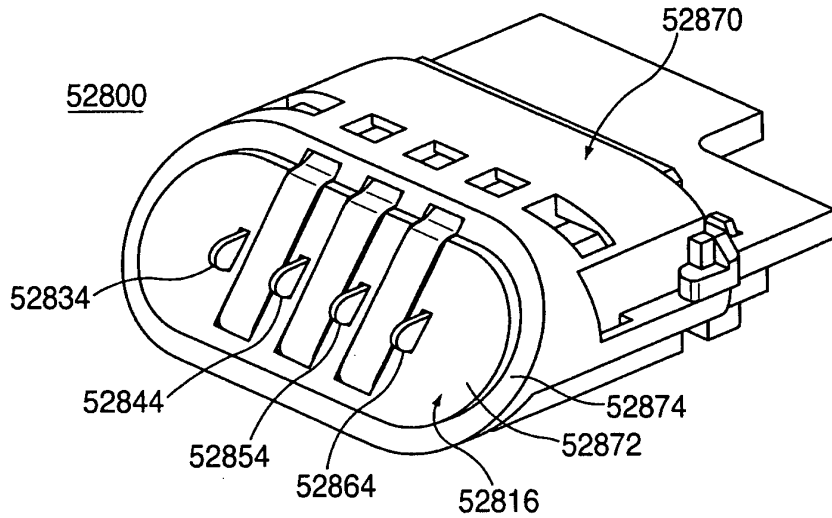


FIG. 52B

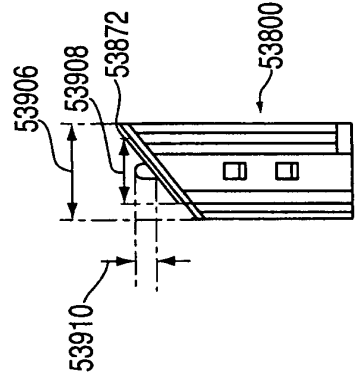


FIG. 53B

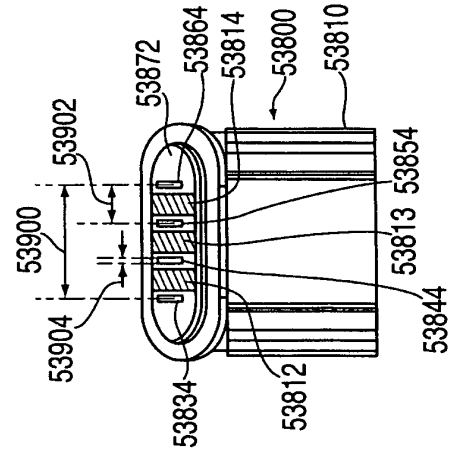


FIG. 53A

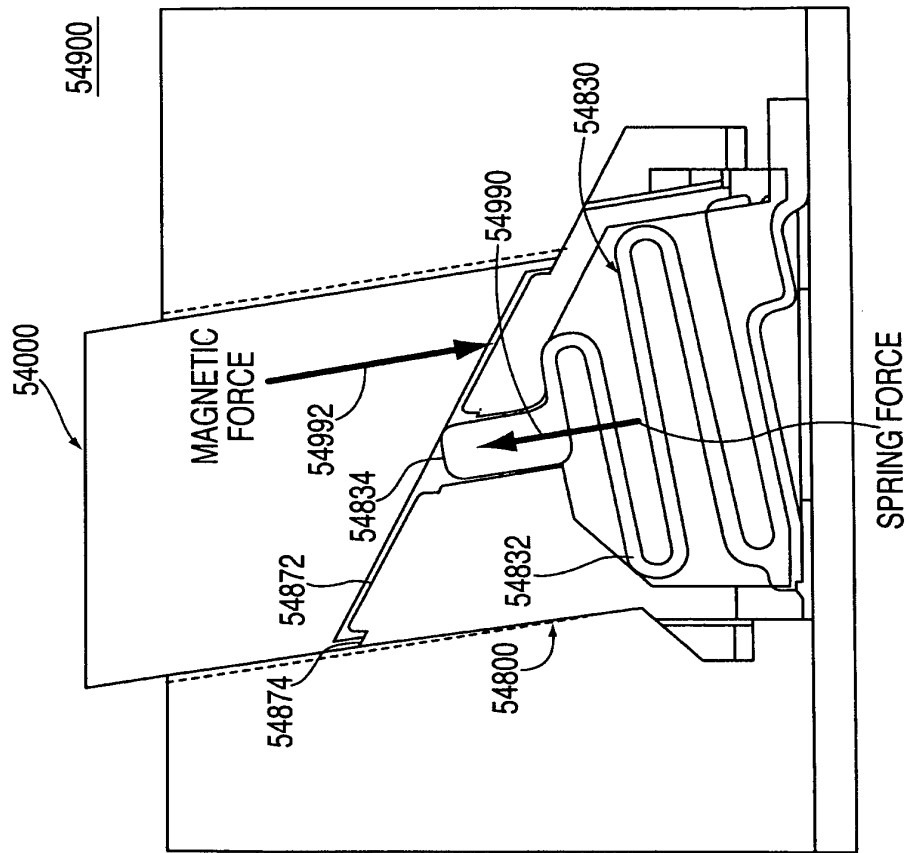


FIG. 54

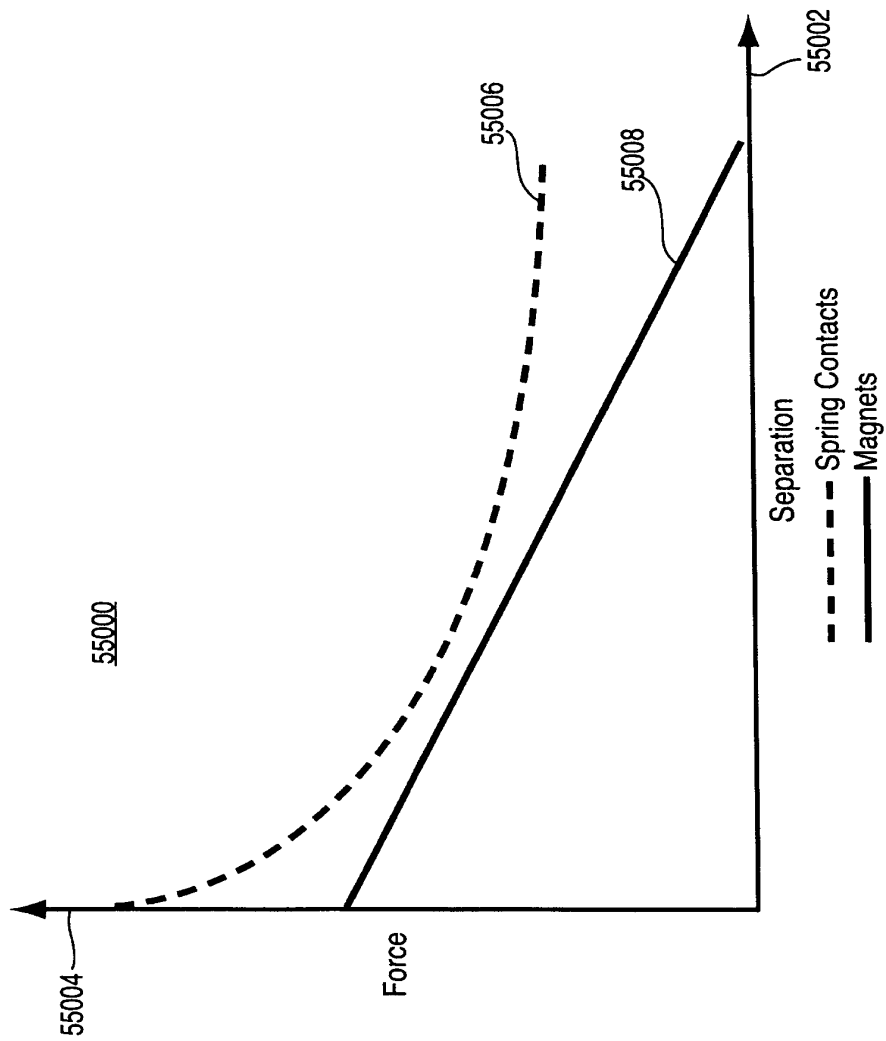


FIG. 55

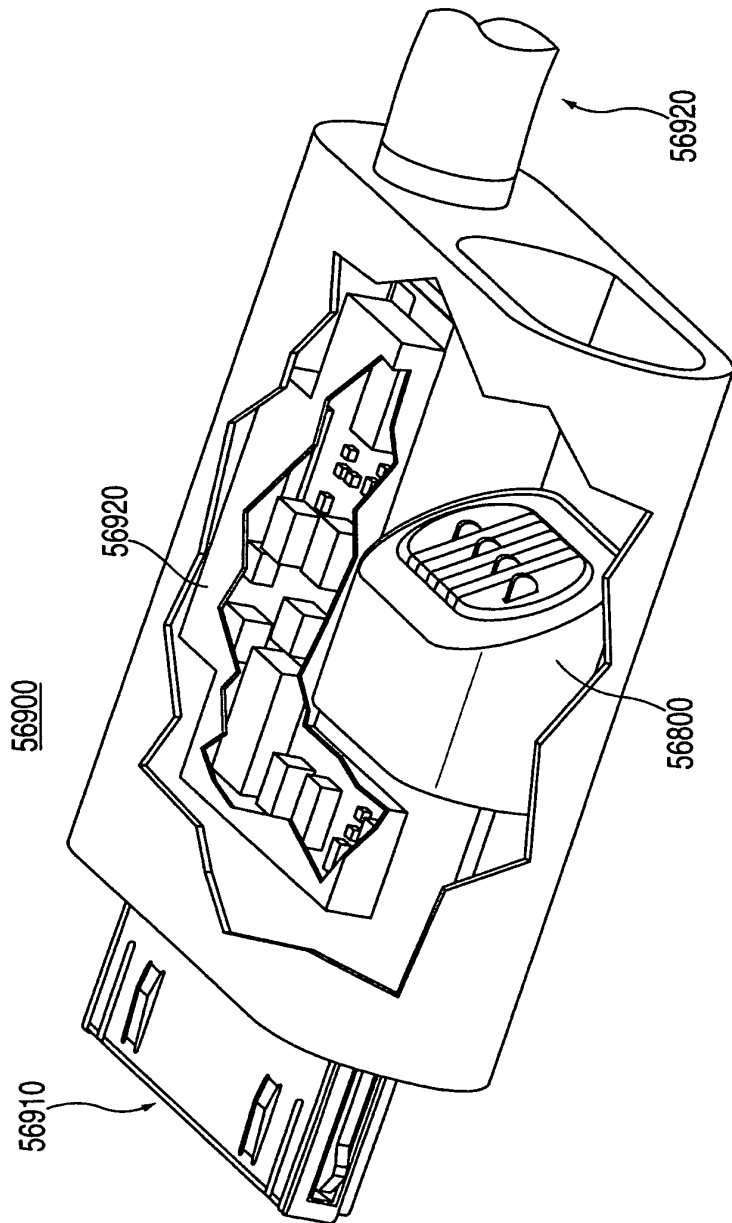
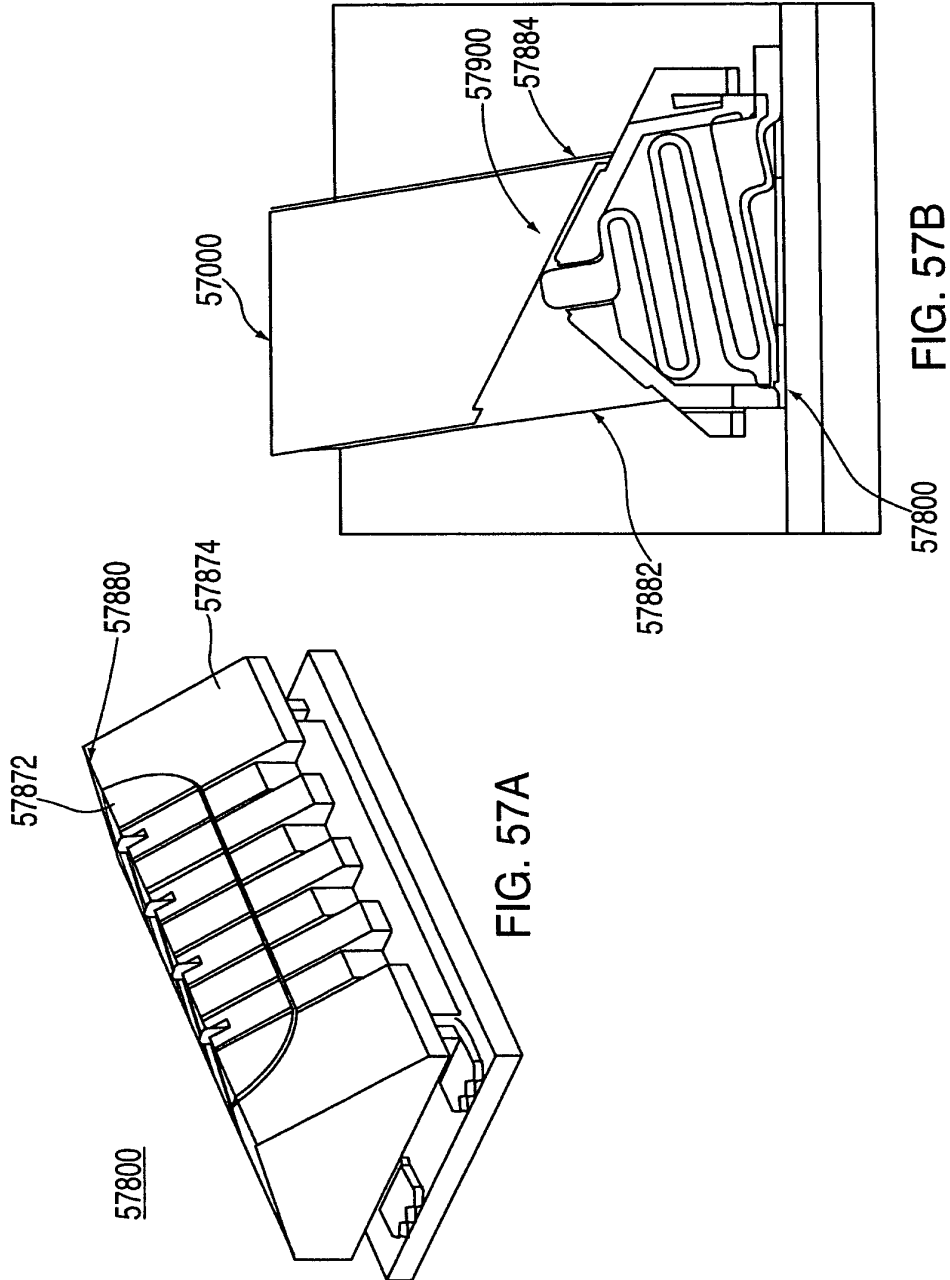


FIG. 56



PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

01/10/2007 MBELETE1 00000098 061075 60879177

01 FC:1005	200.00 DA
02 FC:1085	500.00 DA

PTO-1556
(5/87)

U.S. Government Printing Office: 2002 — 489-267/99033

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104677-0014-001 (P4672P1)
	Application Number	Not yet assigned
Title of Invention	WIRELESS HEADSET	
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.		

Secrecy Order 37 CFR 5.2

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1				
Applicant Authority <input type="checkbox"/> Inventor		<input type="checkbox"/> Legal Representative under 35 U.S.C. 117		<input type="checkbox"/> Party of Interest under 35 U.S.C. 118
If applicant is not an inventor, indicate the authority to file for the patent on behalf of the inventor, the inventor is:				
Prefix	Given Name	Middle Name	Family Name	Suffix
Residence Information (Select One) <input type="checkbox"/> US Residency <input type="checkbox"/> Non US Residency <input type="checkbox"/> Active US Military Service				
City	State/Province	Country of Residence ⁱ		
Citizenship under 37 CFR 1.41 (b) ⁱ				
Mailing Address of Applicant:				
Address 1				
Address 2				
City	State/Province			
Postal Code	Country ⁱ			
If the representative for the inventor is an Organization check here. <input type="checkbox"/>				

Correspondence Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104677-0014-001 (P4672P1)
	Application Number	Not Yet Known
Title of Invention	WIRELESS HEADSET	

Enter either Customer Number or complete the Correspondence Information section below.
 For further information see 37 CFR 1.33(a).

An Address is being provided for the correspondence information of this application.

Customer Number	63976
Email Address	

Application Information:

Title of the Invention	WIRELESS HEADSET		
Attorney Docket Number	104677-0014-001 (P4672P1)	Small Entity Status Claimed <input type="checkbox"/>	
Application Type	Provisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	52 (Informal)	Suggested Figure for Publication (if any)	

Publication Information:

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not been and will not be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="checkbox"/> Customer Number	<input type="checkbox"/> US Patent Practitioner	<input type="checkbox"/> US Representative (37 CFR 11.9)
Customer Number	63976		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

Domestic Priority Information:

This section allows for the applicant to claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c). Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Application Data Sheet 37 CFR 1.76		Attorney Docket Number	104677-0014-001 (P4672P1)
		Application Number	Not Yet Known
Title of Invention	WIRELESS HEADSET		

Additional Domestic Priority Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Application Number	Country i	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			<input type="checkbox"/> Yes <input type="checkbox"/> No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1

If the Assignee is an Organization check here.

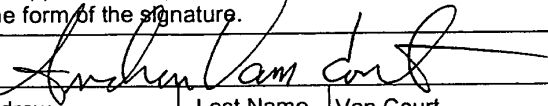
Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information:

Address 1			
Address 2			
City	State/Province		
Country i	Postal Code		
Phone Number	Fax Number		
Email Address			

Additional Assignee Data may be generated within this form by selecting the **Add** button.

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.			
Signature			Date (01-05-2007)
First Name	Andrew	Last Name	Van Court
Registration Number		48,506	
Application Data Sheet 37 CFR 1.76		Attorney Docket Number	104677-0014-001 (P4672P1)
		Application Number	Not Yet Known
Title of Invention	WIRELESS HEADSET		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.