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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	1537-004USU1	3349

145340 7590 01/09/2024

Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2691	

NOTIFICATION DATE	DELIVERY MODE
01/09/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

annie@caldwellip.com
docketing@caldwellip.com
rachel@caldwellip.com

Luxottica et al. v. Solos
IPR2026-00413
Petitioners' Ex. 1002

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APPLICATION NO.	ISSUE DATE	PATENT NO.
16/781,897	09-Jan-2024	11871174

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200 Clarendon Street
Boston, MA 02116

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	01/09/2024	11871174	1537-004USU1	3349

145340 7590 12/20/2023

Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Center (https://patentcenter.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional inventors):

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA;
Chiu Ming So, Hong Kong, HONG KONG;
Kwok Wah Law, Hong Kong, HONG KONG;
Wai Kuen Cheung, Hong Kong, HONG KONG;

APPLICANT(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional applicants):

SOLOS TECHNOLOGY LIMITED, Hong Kong, HONG KONG

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PTO/SB/08a (07-09)
Approved for use through 05/31/2024. OMB 0651-0031
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 11,086,147 B2	08-10-2021	Howell et al.	
		US- 11,204,512 B2	12-21-2021	Howell et al.	
		US- 11,243,416 B2	02-08-2012	Howell et al.	
		US- 11,326,941 B2	~~04-09-2020~~	Howell et al. 05/2022	
		US- 11,513,371 B2	~~09-19-2019~~	Howell et al. 11/2022	
		US- 11,630,331 B2	~~09-12-2019~~	Howell et al. 04/2023	
		US- 11,644,361 B2	~~06-09-2022~~	Howell et al. 05/2023	
		US- 11,644,693 B2	~~11-10-2022~~	Howell et al. 05/2023	
		US- 20140347265	11-2014	AIMONE; CHRISTOPHER ALLEN	
		US- 20220107202	04-2022	TIROSH; EHUD	
		US- 20170176778	06-2017	USHAKOV; ALEXEY LEONIDOVICH	
		US- 20220113562	04-2022	ANDERSON; CHRISTOPHER JOHN	
		US- 20120237075	09-2012	EAST; JAMES	
		US-			
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		US-			
		US-			

Change(s) applied to document, /B.P./ 9/15/2023

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature	/KILE O BLAIR/	Date Considered	06/17/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0031. Public burden for this form is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, 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 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.B./

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/781,897	**11/30/2023 03:12:29 PM Z ET**	**1537-004USU1**

Title of Invention

PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3349	FILED BY	Rachel Riley
PATENT CENTER #	63442057	FILING DATE	02/04/2020
CUSTOMER #	145340	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Keegan Caldwell

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-004USU1_Issue_Fee_20231130.pdf	1	Issue Fee Payment (PTO-85B)	1185 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
1537-004USU1_Issue_Fee_20231130.pdf	D5F43ADB6957F8716A130A1E386665AAD19D28CA7D9CAFDB3E8CE467425511C5B4B9BBC8F98C4DA1BA23C70DD93D1A4BD8C8F8F568C7A25927A56CD1352EE56C

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 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.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

145340 7590 08/31/2023
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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Rachel Riley	(Typed or printed name)
/Rachel Riley/	(Signature)
11/30/2023	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	1537-004USU1	3349

TITLE OF INVENTION: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	11/30/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
BLAIR, KILE O	2651	381-327000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Caldwell Intellectual Property Law
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: SOLOS TECHNOLOGY LIMITED

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Hong Kong (HK)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via Patent Center or EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☒ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /KEEGAN CALDWELL/ Date 11/30/2023

Typed or printed name Keegan Caldwell Registration No. 73731

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/781,897	11/30/2023 03:12:29 PM Z ET	1537-004USU1

Title of Invention

PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3349	FILED BY	Rachel Riley
PATENT CENTER #	63442057	AUTHORIZED BY	Keegan Caldwell
CUSTOMER #	145340	FILING DATE	02/04/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 2227	E2023ATF13057737	Rachel Riley

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2501	UTILITY ISSUE FEE	480.00	1	480.00
			TOTAL AMOUNT:	$480.00

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NOTICE OF ALLOWANCE AND FEE(S) DUE

145340 7590 08/31/2023
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

EXAMINER
BLAIR, KILE O

ART UNIT	PAPER NUMBER
2651	

DATE MAILED: 08/31/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	1537-004USU1	3349

TITLE OF INVENTION: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	11/30/2023

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

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Commissioner for Patents
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By fax, send to: (571)-273-2885

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Certificate of Mailing or Transmission

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(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	1537-004USU1	3349

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nonprovisional	SMALL	$480	$0.00	$0.00	$480	11/30/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
BLAIR, KILE O	2651	381-327000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

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❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	1537-004USU1	3349

145340 7590 08/31/2023

Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2651	

DATE MAILED: 08/31/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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.

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.

Notice of Allowability	Application No. 16/781,897	Applicant(s) Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 8/21/23.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-28 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/KILE O BLAIR/
Primary Examiner, Art Unit 2651

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	Art Unit
	Kile Blair	2651

CPC - Searched*		
Symbol	**Date**	**Examiner**
G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335	02/12/2022	KB
updated above	08/27/2022	KB
updated above	03/11/2023	KB
updated above	06/17/2023	KB
updated above	08/26/2023	KB

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
see search printout	03/11/2023	KB
see search printout	06/17/2023	KB
see search printout	08/26/2023	KB

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	Art Unit
	Kile Blair	2651

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	see search printout	03/11/2023	KB
	see search printout	06/17/2023	KB
	see search printout	08/26/2023	KB

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	**Art Unit**
	Kile Blair	2651

CPC						
Symbol					**Type**	**Version**
H04R	/	1	/	105	F	2013-01-01
H04R	/	1	/	026	I	2013-01-01
H04R	/	25	/	65	I	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	28	
/KILE O BLAIR/ Primary Examiner, Art Unit 2651	26 August 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	18

U.S. Patent and Trademark Office — Part of Paper No.: 20230826

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	**Art Unit**
	Kile Blair	2651

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04R1/10	/	1	/	10

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/KILE O BLAIR/ Primary Examiner, Art Unit 2651	26 August 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	18

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	**Art Unit**
	Kile Blair	2651

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/KILE O BLAIR/ Primary Examiner, Art Unit 2651	26 August 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	18

U.S. Patent and Trademark Office — Part of Paper No.: 20230826

Bibliographic Data

Application No: 16/781,897

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /KILE O BLAIR/ (Examiner's Signature) KB (Initials)

Title: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/04/2020	381	2651	S120219.P003
RULE			

APPLICANTS

SOLOS TECHNOLOGY LIMITED, Hong Kong, HONG KONG

INVENTORS

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Chiu Ming So, Hong Kong, HONG KONG

Kwok Wah Law, Hong Kong, HONG KONG

Wai Kuen Cheung, Hong Kong, HONG KONG

CONTINUING DATA

This application is a CIP of 16711340 12/11/2019

16711340 has PRO of 62873889 07/13/2019

This application has PRO of 62873889 07/13/2019

This application has PRO of 62801468 02/05/2019

16711340 has PRO of 62778709 12/12/2018

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

02/21/2020

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

PELOQUIN, PLLC

PO Box 748

VASHON, WA 98070-0748

UNITED STATES

FILING FEE RECEIVED

$2,875

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	16683352	(eyeglasses glasses spectacles) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:23 AM
L2	4545234	(loudspeaker speaker transducer near12 ear)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L3	650755	L1 AND L2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L4	81089	L1 AND L2 NEAR100 (chamber volume cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/02/09 05:26 AM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L5	3330	(eyeglasses glasses spectacles) NEAR50 L2 NEAR100 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L6	2073	(eyeglasses glasses spectacles) NEAR20 L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L7	5707	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:28 AM

		@repd)<"20200205"	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	3316	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:28 AM
L9	130522	(loudspeaker speaker transducer) NEAR10 ear	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L10	166879	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L11	57455	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/02/09 05:30 AM

		AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	94	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND ((loudspeaker speaker transducer) NEAR10 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:30 AM
L13	11	wakeland AND struzik AND williams AND silver	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:41 AM
L14	23483	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:57 AM

		@pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	11886	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L16	13857	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L17	338	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND (loudspeaker speaker transducer near12 ear) NEAR30	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/09 05:58 AM

		(chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	16	((US-20210168481-A1 OR US-20210067858-A1 OR US-20190238971-A1 OR US-20120237075-A1 OR US-20030048915-A1 OR US-20050084127-A1).did. AND PGPB.dbnm.) OR ((CN-111771387-A OR WO-2017144269-A1 OR DE-202010001503-U1 OR WO-2020206775-A1 OR WO-2020038479-A1 OR WO-2020038486-A1 OR CN-110636414-A OR KR-101819530-B1 OR KR-101786613-B1).did. AND FTDB.dbnm.) OR ((DE-102016103477-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:14 AM
L19	11	L18 AND (rubber foam vinyl loss adjfactor Young$2 modulus elastomer polyurethane melamine foam butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L20	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine foam butyl	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/02/09 06:16 AM

		rubber halobutyl)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L22	101952	(G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 11:58 PM
L23	47256	L22 AND (eyeglasses glasses spectacles)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/02/10 06:50 PM

			JPO; DERWENT; IBM_TDB)				
L24	1	(10/190604).APP.	(USPAT; USOCR)	OR	ON	ON	2022/02/12 05:52 PM
L25	17505036	(eyeglasses glasses spectacles) NEAR/10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L26	65	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L27	54	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:58 PM
L28	3	((WO-2020038479-A1 OR WO-2020206775-A1).did. AND FTDB.dbnm.) OR ((US-	(FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP,	OR	ON	ON	2022/02/12 09:30 PM

		20120237075-A1).did. AND PGPB.dbnm.)	ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); US-PGPUB)				
L29	22804	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L30	55355	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L31	97767	L22 AND (eyeglasses glasses spectacles) NEAR15L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM

L32	51928	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L33	177267	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L34	79	L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L35	55	(L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/12 09:42 PM

		@pt1d @pt3d @ptpd @read @repd)<"20200205")	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	573	L12 L17 L19 L20 L21 L26 L27 L34 L35	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L37	15	L36 AND @pd>"20220201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L38	35	L36 AND @pd>"20220801"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/03/11 02:27 PM
L39	51	L36 AND @pd>"20220801"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/06/17 05:20 PM

			AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L40	23	L36 AND @pd>"20230201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/17 05:20 PM
L41	28	L36 AND @pd>"20230201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/26 11:50 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	3	((eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable	(US-PGPUB; USPAT)	OR	ON	ON	2023/03/11 06:29 PM

		detach$4 removable remove$4 remov$4 interchang$5)).clm.					
N2	3	((eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:21 PM
N3	19	("7192136" "7255437" "7380936" "7401918" "7438410" "7481531" "7500746" "7500747" "7581833" "7621634" "7677723" "7760898" "7771046" "7792552" "7806525" "7922321" "8109629" "8337013" "8430507").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:23 PM
N4	19	("8434863" "8465151" "8500271" "8770742" "8905542" "9033493" "9488520" "9547184" "9690121" "10042186" "10060790" "10061144" "10310296" "10330956" "10345625" "10359311" "10539459" "10777048" "11042045").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:26 PM
N5	12	("11086" "11204512" "11243416" "11326941" "11513371" "11630331" "11644361" "11644693" "20140347265" "20220107202" "20170176778" "20220113562" "20120237075").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:36 PM
N6	13	("11086147" "11204512" "11243416" "11326941" "11513371" "11630331" "11644361" "11644693" "20140347265" "20220107202" "20170176778" "20220113562" "20120237075").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:36 PM
N7	8	("20190101977" "20180242064" "20180097920" "20150248026" "20190297701"	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:38 PM

		"20170032646" "20150126845" "20190158946").pn.					
N8	10	("20170108715" "20180124497" "20180103139" "20070030442" "20160246059" "20130250232" "20170078883" "20180234847" "20180088340" "20160299569").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:40 PM
N9	3	((eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/26 11:51 PM

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

145340
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

POA ACCEPTANCE LETTER

OC000000061259630

Date Mailed: 08/31/2023

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/25/2023.

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.

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**.

/sibrahim/

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

51340
PELOQUIN, PLLC
PO Box 748
VASHON, WA 98070-0748

POWER OF ATTORNEY NOTICE

OC000000061259479

Date Mailed: 08/31/2023

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/25/2023.

- The Power of Attorney to you in this application has been revoked by the applicant. 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**.

/sibrahim/

PTO/AIA/82A (07-13)
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Application Number	16/781,897
Filing Date	02/04/2020
First Named Inventor	Ernesto Carlos Martinez Villalpando
Title	Personalized Directional Audio For Head-Worn Audio Projection Systems, Apparatuses, And Methods
Art Unit	2651
Examiner Name	Kilee Blair
Attorney Docket Number	1537-004USU1

SIGNATURE of Applicant or Patent Practitioner

Signature	/Keegan Caldwell/	Date (Optional)	
Name	Keegan Caldwell	Registration Number	73731
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 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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Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 145340

OR

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Address					
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Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Solos Technology Limited

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Kenneth Fan	Date (Optional)	
Name	Kenneth Fan		
Title	Co-Founder		

DocuSigned by: D409388C60ED4C5...

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No more than ten (10) patent practitioners total may be appointed as set forth below by name and registration number. This page need not be submitted if appointing the Patent Practitioner(s) associated with a Customer Number (see form PTO/AIA/82B):

Name	Registration Number

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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)).
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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:	48494715
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Keegan M. Caldwell/Rachel Riley
Filer Authorized By:	Keegan M. Caldwell
Attorney Docket Number:	S120219.P003
Receipt Date:	25-AUG-2023
Filing Date:	04-FEB-2020
Time Stamp:	16:33:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	1537-004USU1_POA.pdf	270862 a1503efcf97d37168645960ce1cda1c5fee4d078	no	4

Warnings:

Information:	
Total Files Size (in bytes):	270862

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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.

Electronic Acknowledgement Receipt

EFS ID:	48467067
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Keegan M. Caldwell/Annelise Hurley
Filer Authorized By:	Keegan M. Caldwell
Attorney Docket Number:	S120219.P003
Receipt Date:	21-AUG-2023
Filing Date:	04-FEB-2020
Time Stamp:	13:58:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response after Ex Parte Quayle Action	1537-004USU1_ExParte_Quayle_Response_20230821.pdf	173712 b1ca73ef4a02c4c3b0e76595efb8906faa6d1cae	no	6

Warnings:

Information:	
Total Files Size (in bytes):	173712

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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Ernesto Carlos Martinez Villalpando
Serial No.:	16/781,897
Filed:	February 4, 2020
Title:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
Group Art Unit:	2651
Examiner:	Kilee Blair
Confirmation No.:	3349
Attorney Docket No.:	1537-004USU1

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-01450

August 21, 2023

RESPONSE AFTER *EX PARTE QUAYLE* ACTION

This paper is in response to an *Ex Parte Quayle Action* dated June 21, 2023. This response is filed by the 2-month due date of August 21, 2023. No extension of time is needed.

Amendments to the Claims are reflected in the listing of claims beginning on page 2 of this paper.

Remarks begin on page 7 of this paper..

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LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented.) A method to provide audio signals to a user from an eyewear device, comprising;
   generating audio signals within a chamber, the chamber is a part of a volume of the eyewear device;
   concentrating the audio signals for delivery to the user's ear; and
   transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.
2. (Original.) The method of claims 1, wherein a shape of the chamber contributes to the concentrating.
3. (Original.) The method of claim 2, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.
4. (Original.) The method of claim 2, wherein the shape is generally parabolic.
5. (Original.) The method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.
6. (Original.) The method of claim 5, the portion absorbs vibrational energy.
7. (Original.) The method of claim 6, wherein the portion is forward of the chamber.
8. (Original.) The method of claim 6, wherein the portion is rear of the chamber.
9. (Original.) The method of claim 6, wherein the portion is an outer surface of the chamber.
10. (Original.) The method of claim 1, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the eyewear device.
11. (Original.) The method of claim 1, wherein a speaker is used in the generating.
12. (Original.) The method of claim 11, wherein the speaker is located within a temple of the eyewear device.

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13. (Original.) The method of claim 11, wherein the speaker is located within a temple insert module of the eyewear device.

14. (Original.) An apparatus to provide audio signals to a user from an eyewear device, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is a part of a volume of the eyewear device, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume;

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

15. (Original.) The apparatus of claim 14, wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

16. (Previously Presented.) The apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy.

17. (Original.) The apparatus of claim 14, wherein the inner surface forms a curved shape around the at least one speaker.

18. (Original.) The apparatus of claim 17, wherein the curved shape is generally parabolic.

19. (Original.) The apparatus of claim 14, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

20. (Original.) The apparatus of claim 19, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of acoustic energy.

21. (Original.) The apparatus of claim 19, wherein a shape of the external sound cover is concave towards the user's ear.

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22. (Original.) The apparatus of claim 14, wherein the chamber is located within a temple of the eyewear device.
23. (Original.) The apparatus of claim 14, wherein the chamber is located within a temple insert module of the eyewear device.
24. (Original.) The apparatus of claim 14, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.
25. (Original.) The apparatus of claim 24, the portion absorbs vibrational energy.
26. (Original.) The apparatus of claim 25, wherein the portion is forward of the chamber.
27. (Original.) The apparatus of claim 25, wherein the portion is rear of the chamber.
28. (Original.) The apparatus of claim 25, wherein the portion is an outer surface of the chamber.
29. (Cancelled.)
30. (Cancelled.)
31. (Cancelled.)
32. (Cancelled.)
33. (Cancelled.)
34. (Cancelled.)
35. (Cancelled.)
36. (Cancelled.)
37. (Cancelled.)
38. (Cancelled.)
39. (Cancelled.)
40. (Cancelled.)
41. (Cancelled.)
42. (Cancelled.)
43. (Cancelled.)
44. (Cancelled.)
45. (Cancelled.)
46. (Cancelled.)

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47. (Cancelled.)

48. (Cancelled.)

49. (Cancelled.)

50. (Cancelled.)

51. (Cancelled.)

[THE REST OF THIS PAGE INTENTIONALLY LEFT BLANK]

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REMARKS

Claims 1-28 are pending in the present application. No claims are amended in this paper. Claims 29-51 are canceled in this paper. No new claims are added in this paper.

In taking the foregoing actions, Applicant respectfully submits Applicant is not necessarily conceding in this application that these claims, as originally presented, are not patentable over the references cited by the U.S. Patent and Trademark Office (USPTO), as pertinent ones of the present claim amendments and cancellations are only for facilitating expeditious prosecution. Applicant respectfully reserves the right to pursue the canceled claims and/or other claims in one or more continuing applications.

Allowable Subject Matter

The Office asserts at page 3-4 of the Office Action that claims 1-28 contain allowable subject matter. Additionally, previously withdrawn claims 2-3, 10, 12, and 17-22 contain allowable subject matter because they are dependent from an allowed base claim.

Claims 29-51 have been canceled in this paper because they are directed to a non-elected invention. Therefore, Applicant respectfully requests withdrawal of the objections of claims 29-51, thereby placing the current application in condition for allowance.

Conclusion

Accordingly, Applicant respectfully submits that all claims in the application are in a condition for allowance and respectfully solicit the prompt issuance of a Notice of Allowance. If any issues remain, the Examiner is encouraged to call the undersigned practitioner at the number listed below.

Respectfully submitted,

/Warren Conway/

Warren Conway
Registration No.: 81,846
CALDWELL INTELLECTUAL PROPERTY LAW, LLC
Tel: (857) 496-8909

Caldwell Intellectual Property Law, LLC
200 Clarendon St.
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Boston, MA 02116

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/781,897	Filing Date 02/04/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	08/21/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 28	Minus	** 51	= 0		x $40 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 5	= 0		x $192 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/JULIET MCMILLAN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

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PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8082151

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
ERNESTO CARLOS MARTINEZ VILLALPANDO	01/03/2019

RECEIVING PARTY DATA

Name:	KOPIN CORPORATION
Street Address:	125 NORTH DRIVE
City:	WESTBOROUGH
State/Country:	MASSACHUSETTS
Postal Code:	01581

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16781897

CORRESPONDENCE DATA

Fax Number: (206)770-6562

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 2062511699
Email: mark@peloquinlaw.com
Correspondent Name: PELOQUIN, PLLC
Address Line 1: 701 FIFTH AVE
Address Line 2: STE 4200
Address Line 4: SEATTLE, WASHINGTON 98104

ATTORNEY DOCKET NUMBER:	S120219.P003
NAME OF SUBMITTER:	MARK S PELOQUIN
SIGNATURE:	/MARK S PELOQUIN/
DATE SIGNED:	07/27/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
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source=04 62778709 0717.2267-001_Assignment as filed 2-13-19_Imanage_2933145_1#page2.tif

Sole

ASSIGNMENT

WHEREAS, I, **Ernesto Carlos Martinez Villalpando**, have invented a certain improvement in **Modularized Eyewear System with Interchangeable Frame and Temples with Embedded Electronics for Mobile Audio-Visual Augmented and Assisted Reality** described in an application for Patent,

☐ the specification of which is about to be filed in the United States Patent Office *(use for utility (37 CFR § 1.53(b)) and design filings only)*;

☐ is about to be filed in the United States Patent Office as a Provisional Application;

☒ the specification of which is United States Application No. **62/778,709**, filed **December 12, 2018**;

☐ the specification of which is a Patent Cooperation Treaty Application, International Application No. [ ], filed [ ], which designates the United States of America [and is assigned United States Application No. [ ]];

☐ which was patented under United States Patent No. [ ].

WHEREAS, **Kopin Corporation** (hereinafter "ASSIGNEE"), a corporation organized and existing under the laws of the **State of Delaware** and having a usual place of business at **125 North Drive, Westborough, Massachusetts 01581** desires to confirm its interest therein in accordance with agreements duly entered into with me;

NOW, THEREFORE, to all whom it may concern be it known that for and in consideration of said agreements and of other good and valuable consideration, the receipt of which is hereby acknowledged, I have sold, assigned and transferred and by these presents do hereby sell, assign and transfer unto said ASSIGNEE, its successors, assigns and legal representatives, the entire right, title and interest in and throughout the United States of America, its territories and all foreign countries, in and to said invention as described in said application, together with the entire right, title and interest in and to said application and such Letters Patent as may issue on said invention; said invention, application and Letters Patent to be held and enjoyed by said ASSIGNEE for its own use and behalf and for its successors, assigns and legal representatives, to the full end of the term for which said Letters Patent may be granted as fully and entirely as the same would have been held by me had this assignment and sale not been made; I hereby convey all rights arising under or pursuant to any and all international agreements, treaties or laws relating to the protection of industrial property by filing any such applications for Letters Patent. I hereby acknowledge that this assignment, being of the entire right, title and interest in and to said invention, carries with it the right in ASSIGNEE to apply for any and all related provisional and nonprovisional, international and national phase applications, including any and all substitution, reissue, divisional, continuation, and continuation-in-part applications, and obtain from competent authorities in all countries of the world any and all Letters Patent by attorneys and agents of ASSIGNEE's selection and the right to procure the grant of all such Letters Patent to ASSIGNEE for its own name as assignee of the entire right, title and interest therein; I hereby expressly authorize the filing of an International

Patent Application under the Patent Cooperation Treaty which corresponds to and claims the priority of the above-identified application;

AND, I hereby further agree for myself and my executors and administrators to execute upon request any other lawful documents and likewise to perform any other lawful acts which may be deemed necessary to secure fully the aforesaid invention to said ASSIGNEE, its successors, assigns and legal representatives, but at its or their expense and charges, including the execution of applications for patents in foreign countries, and the execution of any further applications including substitution, reissue, divisional or continuation, continuation-in-part applications, and all related provisional and nonprovisional, international and national phase applications, and preliminary or other statements and the giving of testimony in any interference or other proceeding in which said invention or any application or patent directed thereto may be involved;

AND, I do hereby authorize and request each Patent Office and the Commissioner of Patents of the United States to issue such Letters Patent as shall be granted upon said invention to said ASSIGNEE, its successors, assigns, and legal representatives.

Inventor _____ Date Jan 13 2019
Ernesto Carlos Martinez Villalpando

Witness Signature _____

Print Witness Name Andrea M Bethune

Witness Signature _____

Print Witness Name Kacca Mitchell

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8082176

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
ERNESTO CARLOS MARTINEZ VILLALPANDO	02/12/2019

RECEIVING PARTY DATA

Name:	KOPIN CORPORATION
Street Address:	125 NORTH DRIVE
City:	WESTBOROUGH
State/Country:	MAINE
Postal Code:	01581

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16781897

CORRESPONDENCE DATA

Fax Number: (206)770-6562

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Email: mark@peloquinlaw.com
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Address Line 2: STE 4200
Address Line 4: SEATTLE, WASHINGTON 98104

ATTORNEY DOCKET NUMBER:	S120219.P003
NAME OF SUBMITTER:	MARK S PELOQUIN
SIGNATURE:	/MARK S PELOQUIN/
DATE SIGNED:	07/27/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
source=05 62801468 0717.2268-000 Assignment as filed 2-25-19_Imanage_2938054_1#page1.tif
source=05 62801468 0717.2268-000 Assignment as filed 2-25-19_Imanage_2938054_1#page2.tif

sole

ASSIGNMENT

WHEREAS, I, **Ernesto Carlos Martinez Villalpando**, have invented a certain improvement in **Personalized Directional Audio for Head-worn Audio Projection Devices with Near-ear (Electro-dynamic) Microspeaker System** described in an application for Patent,

☐ the specification of which is about to be filed in the United States Patent Office *(use for utility (37 CFR § 1.53(b)) and design filings only)*;

☐ is about to be filed in the United States Patent Office as a Provisional Application;

☒ the specification of which is United States Application No. **62/801,468**, filed **February 5, 2019**;

☐ the specification of which is a Patent Cooperation Treaty Application, International Application No. [ ], filed [ ], which designates the United States of America [and is assigned United States Application No. [ ]];

☐ which was patented under United States Patent No. [ ].

WHEREAS, **Kopin Corporation** (hereinafter "ASSIGNEE"), a corporation organized and existing under the laws of the **State of Delaware** and having a usual place of business at **125 North Drive, Westborough, Massachusetts 01581** desires to confirm its interest therein in accordance with agreements duly entered into with me;

NOW, THEREFORE, to all whom it may concern be it known that for and in consideration of said agreements and of other good and valuable consideration, the receipt of which is hereby acknowledged, I have sold, assigned and transferred and by these presents do hereby sell, assign and transfer unto said ASSIGNEE, its successors, assigns and legal representatives, the entire right, title and interest in and throughout the United States of America, its territories and all foreign countries, in and to said invention as described in said application, together with the entire right, title and interest in and to said application and such Letters Patent as may issue on said invention; said invention, application and Letters Patent to be held and enjoyed by said ASSIGNEE for its own use and behalf and for its successors, assigns and legal representatives, to the full end of the term for which said Letters Patent may be granted as fully and entirely as the same would have been held by me had this assignment and sale not been made; I hereby convey all rights arising under or pursuant to any and all international agreements, treaties or laws relating to the protection of industrial property by filing any such applications for Letters Patent. I hereby acknowledge that this assignment, being of the entire right, title and interest in and to said invention, carries with it the right in ASSIGNEE to apply for any and all related provisional and nonprovisional, international and national phase applications, including any and all substitution, reissue, divisional, continuation, and continuation-in-part applications, and obtain from competent authorities in all countries of the world any and all Letters Patent by attorneys and agents of ASSIGNEE's selection and the right to procure the grant of all such Letters Patent to ASSIGNEE for its own name as assignee of the entire right, title and interest therein; I hereby expressly authorize the filing of an International

Patent Application under the Patent Cooperation Treaty which corresponds to and claims the priority of the above-identified application;

AND, I hereby further agree for myself and my executors and administrators to execute upon request any other lawful documents and likewise to perform any other lawful acts which may be deemed necessary to secure fully the aforesaid invention to said ASSIGNEE, its successors, assigns and legal representatives, but at its or their expense and charges, including the execution of applications for patents in foreign countries, and the execution of any further applications including substitution, reissue, divisional or continuation, continuation-in-part applications, and all related provisional and nonprovisional, international and national phase applications, and preliminary or other statements and the giving of testimony in any interference or other proceeding in which said invention or any application or patent directed thereto may be involved;

AND, I do hereby authorize and request each Patent Office and the Commissioner of Patents of the United States to issue such Letters Patent as shall be granted upon said invention to said ASSIGNEE, its successors, assigns, and legal representatives.

Inventor _____ Date 2/12/2019
Ernesto Carlos Martinez Villalpando

Witness Signature Andrea M Bethune

Print Witness Name Andrea M Bethune

Witness Signature Kara Mitchell

Print Witness Name Kara Mitchell

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8082200

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
KOPIN CORPORATION	11/12/2019

RECEIVING PARTY DATA

Name:	SOLOS TECHNOLOGY LIMITED
Street Address:	UNIT 211, 2/F., PHOTONICS CENTER, NO. 2 SCIENCE PARK EAST AVENUE
Internal Address:	HONG KONG SCIENCE PARK, SHATIN, N.T.
City:	HONG KONG
State/Country:	HONG KONG

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16781897

CORRESPONDENCE DATA

Fax Number: (206)770-6562

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Address Line 4: SEATTLE, WASHINGTON 98104

ATTORNEY DOCKET NUMBER:	S120219.P003
NAME OF SUBMITTER:	MARK S PELOQUIN
SIGNATURE:	/MARK S PELOQUIN/
DATE SIGNED:	07/27/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 4
source=06 Assignment - Kopin Corp to Solos Technology Ltd efiled 11-15-19_Imanage_3095057_1#page1.tif
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source=06 Assignment - Kopin Corp to Solos Technology Ltd efiled 11-15-19_Imanage_3095057_1#page4.tif

ASSIGNMENT OF UNITED STATES PATENTS AND PATENT APPLICATIONS

Whereas, **Kopin Corporation**, a Delaware corporation, having a place of business at 125 North Drive, Westborough, Massachusetts 01581 (hereinafter "Assignor") is the sole owner of the entire right, title and interest in and to the United States Letters Patents and Patent Applications described in Schedule A attached hereto and made a part hereof (hereinafter "Patents"); and

Whereas, **Solos Technology Limited**, a Hong Kong corporation, having a place of business at Unit 211, 2/F., Photonics Centre, No. 2 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T, Hong Kong (hereinafter "Assignee") is desirous of acquiring the entire right, title and interest in and to the Patents.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, the Assignor has sold, assigned and transferred, and by these presents does hereby sell, assign and transfer Assignor's entire right, title and interest in and to the Patents and all reissues and extensions thereof, including all claims, if any, which may have arisen for infringement of the patents prior to the date of this assignment, all said rights to be held and enjoyed by the Assignee for its own use and for the use of its successors, assigns or other legal representatives, to the full end of the term for which the Patents have been or will be granted, extended or reissued, as fully and entirely as the same would have been held and enjoyed by the Assignor if this assignment and sale had not been made.

Assignor further agrees that Assignor will, without demanding any further consideration therefore, at the request but at the expense of Assignee, do all lawful and just acts, including the execution and acknowledgment of instruments, that may be or become necessary for obtaining, sustaining, or reissuing the Patents, and for maintaining and perfecting Assignee's right to the Patents.

ASSIGNOR **Kopin Corporation**	ASSIGNEE **Solos Technology Limited**
Signature: H. K Choi	Signature:
Printed Name: Hong Choi	Printed Name: KENNY CHEUNG
Title: Chief Technology Officer	Title: General Manager
Date: Nov. 12, 2019	Date: 6 Nov 2019

3085629.v1

SCHEDULE A

UNITED STATES PATENTS

FILE NUMBER	PATENT NO.	ISSUE DATE	TITLE
0717.2196-003	10,070,211	September 4, 2018	Digital Voice Processing Method And System For Headset Computer
0717.2216-001	9,810,925	November 7, 2017	Noise Cancelling Microphone Apparatus
0717.2216-007	10,379,386	August 13, 2019	Noise Cancelling Microphone Apparatus
0717.2220-001	9,753,311	September 5, 2017	Eye Glasses With Microphone Array
0717.2252-000	D820,258	June 12, 2018	Eyewear Viewing Device
0717.2265-000	D855,687	August 6, 2019	Eyewear Viewing Device (Solos 2)

UNITED STATES PATENT APPLICATIONS

FILE NUMBER	SERIAL NO.	FILING DATE	TITLE
0717.2267-000	62/727,775	September 6, 2018	Modularized Eyewear System with Interchangeable Frame and Temples with Embedded Electronics for Mobile Audio-Visual Augmented and Assisted Reality
0717.2267-001	62/778,709	December 12, 2018	Modularized Eyewear System with Interchangeable Frame and Temples with Embedded Electronics for Mobile Audio-Visual Augmented and Assisted Reality
0717.2267-002	62/789,818	January 8, 2019	Modularized Eyewear System with Interchangeable Frame and Temples with Embedded Electronics for Mobile Audio-Visual Augmented and Activity Monitoring
0717.2268-000	62/801,468	February 5, 2019	Personalized Directional Audio for Head-worn Audio Projection Devices with Near-ear (Electro-dynamic) Microspeaker System
0717.2269-000	29/679,387	February 5, 2019	Modularized Electronic Eyewear For Personalized Augmented Reality Audio

FOREIGN PATENTS

FILE NUMBER	PATENT NO.	ISSUE DATE	TITLE
0717.2216-003	TW I624829	May 21, 2018	Noise Cancelling Microphone Apparatus
0717.2216-004	CN ZL201480022740.3	May 17, 2019	Noise Cancelling Microphone Apparatus
0717.2216-005	EP 2973556	July 11, 2018	Noise Cancelling Microphone Apparatus
0717.2216-006	JP 6375362	July 27, 2018	Noise Cancelling Microphone Apparatus
0717.2216-008	FR 2973556	July 11, 2018	Noise Cancelling Microphone Apparatus
0717. 2216-009	DE 602014028236.9	July 11, 2018	Noise Cancelling Microphone Apparatus
0717.2216-010	UK 2973556	July 11, 2018	Noise Cancelling Microphone Apparatus
0717.2217-002	CN 02809177.9	May 25, 2011	Cardioid Beam With Desired Null Based Acoustic Devices, Systems And Methods
0717.2217-003	JP 4378170	September 18, 2009	The Acoustic Device, The System And The Mannered Null Majority Which Are Based On The Cardioid Beam Possessing Zero
0717.2218-000	CN 03146280.4	September 16, 2009	Minitype Embeddable Sound Pickup Array Microphone And Application Thereof
0717.2220-003	TW I624709	May 21, 2018	Eye Glasses With Microphone Array
0717.2252-001	EP 0030063110001	April 15, 2016	Eyewear Viewing Device
0717. 2252-002	CN ZL201630059218.4	August 24, 2016	Eyewear Viewing Device
0717.2252-003	JP 1555634	July 8, 2016	Eyewear Viewing Device
0717.2252-004	KR 300879351	October 27, 2016	Eyewear Viewing Device
0717.2252-005	TW D181784	March 11, 2017	Eyewear Viewing Device
0717.2252-006	AU 201610995	April 22, 2016	Eyewear Viewing Device
0717.2252-007	CA 167,222	January 10, 2017	Glasses With Near-Eye Display Module
0717.2252-008	MX 51237	November 1, 2017	Eyewear Viewing Device

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8067071

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
KWOK WAH LAW	07/31/2019
WAI KUEN CHEUNG	07/31/2019
CHIU MING SO	07/31/2019

RECEIVING PARTY DATA

Name:	KOPIN CORPORATION
Street Address:	125 NORTH DRIVE
City:	WESTBOROUGH
State/Country:	MASSACHUSETTS
Postal Code:	01581

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16781897

CORRESPONDENCE DATA

Fax Number: (206)770-6562

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ATTORNEY DOCKET NUMBER:	S120219.P003
NAME OF SUBMITTER:	MARK S PELOQUIN
SIGNATURE:	/MARK S PELOQUIN/
DATE SIGNED:	07/19/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 6
source=01 20190806170942266-executed#page1.tif
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source=01 20190806170942266-executed#page6.tif

ASSIGNMENT

Attorney's Docket No.: K41090.Z017 ASSIGNMENT (For Execution After Filing Patent Application)

In consideration of good and valuable consideration, the receipt of which is hereby acknowledged, I/we the undersigned, KWOK WAH LAW,

hereby sell, assign, and transfer to Kopin Corporation,
a Corporation of DE, having a principal place of business

125 North Drive, Westborough, MA 01581, ("Assignee"),
and its successors, assigns, and legal representatives, the entire right, title, and interest for the United States and all foreign countries, in and to any and all improvements that are disclosed in the application for the United States patent that was filed July 13, 2019 and assigned Application No. 62/873,889 and is entitled

WEARABLE DEVICES APPARATUSES, SYSTEMS, AND METHODS

and in and to said application and all divisional applications, continuation applications, continued prosecution applications, continuation-in-part applications, substitute applications, renewal applications, reissue applications, reexaminations, extensions, and all other patent applications that have been or shall be filed in the United States and all foreign countries on any of said improvements; and in and to all original patents, reissued patents, reexamination certificates, and extensions, that have been or shall be issued in the United States and all foreign countries on said improvements; and in and to all rights of priority resulting from the filing of said United States application;

agree that said Assignee may apply for and receive a patent or patents for said improvements in its own name; and that, when requested, without charge to, but at the expense of, said Assignee, its successors, assigns, and legal representatives, to carry out in good faith the intent and purpose of this Assignment, the undersigned will execute all divisional applications, continuation applications, continued prosecution applications, continuation-in-part applications, substitute applications, renewal applications, reissue applications, reexaminations, extensions and all other patent applications on any and all said improvements; execute all rightful oaths, assignments, powers of attorney, and other papers; communicate to said Assignee, its successors, assigns, and representatives all facts known to the undersigned relating to said improvements and the history thereof; and generally assist said Assignee, its successors, assigns, or representatives in securing and maintaining proper patent protection for said improvements and for vesting title to said improvements, and all applications for patents and all patents on said improvements, in said Assignee, its successors, assigns, and legal representatives; and

covenant with said Assignee, its successors, assigns, and legal representatives that no assignment, grant, mortgage, license, or other agreement affecting the rights and property herein conveyed has been made to others by the undersigned, and that full right to convey the same as herein expressed is possessed by the undersigned.

ASSIGNMENT

Each Inventor: Please Sign and Date Below:

31/7, 2019 — K.W. Law
Date — Name of Inventor: KWOK WAH LAW

Witness One: Please Sign and Date Below:

31/7, 2019 — [signature]
Date — Name of Witness One: LAM LAI CHU

Witness Two: Please Sign and Date Below:

31/7, 2019 — [signature]
Date — Name of Witness Two: YIU HOI YAN

ASSIGNMENT

PATENT

Attorney's Docket No.: K41090.Z017 ASSIGNMENT (For Execution After Filing Patent Application)

In consideration of good and valuable consideration, the receipt of which is hereby acknowledged, I/we the undersigned, WAI KUEN CHEUNG,

hereby sell, assign, and transfer to Kopin Corporation,
a Corporation of DE, having a principal place of business

125 North Drive, Westborough, MA 01581, ("Assignee"),
and its successors, assigns, and legal representatives, the entire right, title, and interest for the United States and all foreign countries, in and to any and all improvements that are disclosed in the application for the United States patent that was filed July 13, 2019 and assigned Application No. 62/873,889 and is entitled

WEARABLE DEVICES APPARATUSES, SYSTEMS, AND METHODS

and in and to said application and all divisional applications, continuation applications, continued prosecution applications, continuation-in-part applications, substitute applications, renewal applications, reissue applications, reexaminations, extensions, and all other patent applications that have been or shall be filed in the United States and all foreign countries on any of said improvements; and in and to all original patents, reissued patents, reexamination certificates, and extensions, that have been or shall be issued in the United States and all foreign countries on said improvements; and in and to all rights of priority resulting from the filing of said United States application;

agree that said Assignee may apply for and receive a patent or patents for said improvements in its own name; and that, when requested, without charge to, but at the expense of, said Assignee, its successors, assigns, and legal representatives, to carry out in good faith the intent and purpose of this Assignment, the undersigned will execute all divisional applications, continuation applications, continued prosecution applications, continuation-in-part applications, substitute applications, renewal applications, reissue applications, reexaminations, extensions and all other patent applications on any and all said improvements; execute all rightful oaths, assignments, powers of attorney, and other papers; communicate to said Assignee, its successors, assigns, and representatives all facts known to the undersigned relating to said improvements and the history thereof; and generally assist said Assignee, its successors, assigns, or representatives in securing and maintaining proper patent protection for said improvements and for vesting title to said improvements, and all applications for patents and all patents on said improvements, in said Assignee, its successors, assigns, and legal representatives; and

covenant with said Assignee, its successors, assigns, and legal representatives that no assignment, grant, mortgage, license, or other agreement affecting the rights and property herein conveyed has been made to others by the undersigned, and that full right to convey the same as herein expressed is possessed by the undersigned.

ASSIGNMENT

Each Inventor: Please Sign and Date Below:

31 July, 2019 — Date

Name of Inventor: WAI KUEN CHEUNG

Witness One: Please Sign and Date Below:

31 July, 2019 — Date

Name of Witness One: LAM LAI CHU

Witness Two: Please Sign and Date Below:

31/7, 2019. — Date

Name of Witness Two: YIU HOI YAN

ASSIGNMENT

PATENT

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WEARABLE DEVICES APPARATUSES, SYSTEMS, AND METHODS

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covenant with said Assignee, its successors, assigns, and legal representatives that no assignment, grant, mortgage, license, or other agreement affecting the rights and property herein conveyed has been made to others by the undersigned, and that full right to convey the same as herein expressed is possessed by the undersigned.

ASSIGNMENT

Each Inventor: Please Sign and Date Below:

3/7, 2019 — Name of Inventor: CHIU MING SO

Witness One: Please Sign and Date Below:

3/7, 2019 — Name of Witness One: LAM LAI CHU

Witness Two: Please Sign and Date Below:

3/7, 2019 — Name of Witness Two: YIU HOI YAN

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8067094

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
KOPIN CORPORATION	11/22/2019

RECEIVING PARTY DATA

Name:	SOLOS TECHNOLOGY LIMITED
Street Address:	UNIT 211, 2/F., PHOTONICS CENTER, NO. 2 SCIENCE PARK EAST AVENUE
Internal Address:	HONG KONG SCIENCE PARK, SHATIN, N.T.
City:	HONG KONG
State/Country:	HONG KONG

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16781897

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DATE SIGNED:	07/19/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 4
source=02 Solos Patent Assignment-executed#page1.tif
source=02 Solos Patent Assignment-executed#page2.tif
source=02 Solos Patent Assignment-executed#page3.tif

source=02 Solos Patent Assignment-executed#page4.tif

ASSIGNMENT No.: KSTL20191112

ASSIGNMENT OF UNITED STATES PATENTS, UNITED STATES PATENT APPLICATIONS, AND INTERNATIONAL (PCT) & FOREIGN PATENT APPLICATIONS

Whereas, **Kopin Corporation,** a Delaware corporation, having a place of business at 125 North Drive, Westborough, Massachusetts 01581 (hereinafter "Assignor") is the sole owner of the entire right, title and interest in and to the United States Patents, United States Patent Applications, and International (PCT) and Foreign Patent Applications all of which are described in the **IP Schedule** attached hereto and made a part hereof (hereinafter "Patents"); and

Whereas, **Solos Technology Limited**, a Hong Kong corporation, having a place of business at Unit 211, 2/F., Photonics Centre, No. 2 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T, Hong Kong (hereinafter "Assignee") is desirous of acquiring the entire right, title and interest in and to the Patents.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, the Assignor has sold, assigned and transferred, and by these presents does hereby sell, assign and transfer Assignor's entire right, title and interest in and to the Patents and all reissues and extensions thereof, including all claims, if any, which may have arisen for infringement of the patents prior to the date of this assignment, all said rights to be held and enjoyed by the Assignee for its own use and for the use of its successors, assigns or other legal representatives, to the full end of the term for which the Patents have been or will be granted, extended or reissued, as fully and entirely as the same would have been held and enjoyed by the Assignor if this assignment and sale had not been made.

Assignor further agrees that Assignor will, without demanding any further consideration therefore, at the request but at the expense of Assignee, do all lawful and just acts, including the execution and acknowledgment of instruments, that may be or become necessary for obtaining, sustaining, or reissuing the Patents, and for maintaining and perfecting Assignee's right to the Patents.

ASSIGNOR **Kopin Corporation**	ASSIGNEE **Solos Technology Limited**
Signature: H. K. Cho	Signature:
Printed Name: Hong Cho	Printed Name: Kenny Cheung
Title: Chief Technology Officer	Title: General Manager
Date: Nov. 22, 2019	Date: 22 Nov 2019

IP SCHEDULE

UNITED STATES PATENTS

FILE NUMBER	PATENT NO.	ISSUE DATE	TITLE
41090.C001	7,386,135	June 10, 2008	Cardioid Beam with a Desired Null Based Acoustic Devices, Systems and Methods
41090.C011	8,885,850	November 11, 2014	Cardioid Beam with a Desired Null Based Acoustic Devices, Systems and Methods
41090.C022	9,456,275	September 27, 2016	Cardioid Beam with a Desired Null Based Acoustic Devices, Systems and Methods
41090.C033	9,491,544	November 8, 2016	Frequency Domain Noise Cancellation With A Desired Null Based Acoustic devices, Systems, and Methods
41090.C044	9,406,293	August 2, 2016	Apparatus and Methods to Detect and Obtain Desired Audio
K41090.P001	9,633,670	April 25, 2017	Dual Stage Noise Reduction Architecture For Desired Signal Extraction
K41090.P002	9,257,952	February 9, 2016	Apparatuses and Methods for Multi-Channel Signal Compression During Desired Voice Activity Detection
K41090.P2C1	9,792,927	October 17, 2017	Apparatuses and Methods for Multi-Channel Signal Compression During Desired Voice Activity Detection
K41090.P003	9,312,826	April 12, 2016	Apparatus and Methods for Acoustic Channel Auto-Balancing During Multi-Channel Signal Extraction
K41090.P005	10,306,389	May 28, 2019	Head Wearable Acoustic System with Noise Canceling Microphone Geometry Apparatuses and Methods
K41090.P008	9,941,895	April 10, 2018	Time Delay in Digitally Oversampled Sensor Systems, Apparatuses, and Methods
K41090.P8C1	10,298,253	May 21, 2019	Time Delay in Digitally Oversampled Sensor Systems, Apparatuses, and Methods
K41090.P2C2	10,339,952	July 2, 2019	Apparatuses and Systems for Acoustic Channel Auto-Balancing During Multi-Channel Signal Extraction

HC

IP SCHEDULE (Continued)

UNITED STATES PATENT APPLICATIONS

FILE NUMBER	SERIAL NO.	FILING DATE	TITLE
K41090.P004	14/886,054	October 18, 2015	Wrist Wearable Apparatuses and Methods with Desired Signal Extraction
K41090.P007	14/886,080	October 18, 2015	Apparatuses and Methods for Enhanced Speech Recognition in Variable Environments
K41090.P8C2	16/399,867	April 30, 2019	Beamforming Using Fractional Time Delay in Digitally Oversampled Sensor Systems, Apparatuses, and Methods
K41090.P013	16/171,254	October 25, 2018	Programmable Fractional Time Delay in Digitally Oversampled Microphone Systems, Circuits, and Methods
K41090.P014	16/171,266	October 25, 2018	Fractional Time Delay Structures in Digitally Oversampled Microphone Systems, Circuits, and Methods
K41090.P016	16/420,082	May 22, 2019	Microphone Configurations for Eyewear Devices Systems, Apparatus, and Methods
K41090.Z017	62/873,889	July 13, 2019	Wearable Devices Apparatuses, Systems, and Methods

HC

IP SCHEDULE (Continued)

INTERNATIONAL (PCT) & FOREIGN PATENT APPLICATIONS

FILE NUMBER	SERIAL NO.	FILING DATE	TITLE
K41090P08PCT-CN	201780047952.0 (China)	January 31, 2017	Time Delay in Digitally Oversampled Sensor Systems, Apparatuses, and Methods
K41090P08PCT-JP	2019-526185 (Japan)	January 30, 2019	Time Delay in Digitally Oversampled Sensor Systems, Apparatuses, and Methods
K41090P013PCT	PCT/US2018/057869	October 26, 2018	Programmable Fractional Time Delay in Digitally Oversampled Microphone Systems, Circuits, and Methods
K41090P014PCT	PCT/US2018/057879	October 27, 2019	Fractional Time Delay Structures in Digitally Oversampled Microphone Systems, Circuits, and Methods

HC

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8067105

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
ERNESTO CARLOS MARTINEZ VILLALPANDO	07/14/2023

RECEIVING PARTY DATA

Name:	SOLOS TECHNOLOGY LIMITED
Street Address:	UNIT 211, 2/F., PHOTONICS CENTER, NO. 2 SCIENCE PARK EAST AVENUE
Internal Address:	HONG KONG SCIENCE PARK, SHATIN, N.T.
City:	HONG KONG
State/Country:	HONG KONG

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16781897

CORRESPONDENCE DATA

Fax Number: (206)770-6562

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 2062511699
Email: mark@peloquinlaw.com
Correspondent Name: PELOQUIN, PLLC
Address Line 1: 701 FIFTH AVE
Address Line 2: STE 4200
Address Line 4: SEATTLE, WASHINGTON 98104

ATTORNEY DOCKET NUMBER:	S120219.P003
NAME OF SUBMITTER:	MARK S PELOQUIN
SIGNATURE:	/MARK S PELOQUIN/
DATE SIGNED:	07/19/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
source=03 K41090.Z017 - AF Assignment VILLALPANDO to SOLOS pg1&pg2 ex#page1.tif
source=03 K41090.Z017 - AF Assignment VILLALPANDO to SOLOS pg1&pg2 ex#page2.tif

ASSIGNMENT

Attorney's Docket No.: K41090.Z017 ASSIGNMENT (For Execution After Filing Patent Application)

In consideration of good and valuable consideration, the receipt of which is hereby acknowledged, we the undersigned, ERNESTO CARLOS MARTINEZ VILLALPANDO, hereby sell, assign, and transfer to Solos Technology Limited, a Corporation of Hong Kong, having a principal place of business at Unit 211, 2/F., Photonics Centre, No. 2 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T., Hong Kong, ("Assignee"), and its successors, assigns, and legal representatives, the entire right, title, and interest for the United States and all foreign countries, in and to any and all improvements that are disclosed in the application for the United States patent that was filed July 13, 2019 and assigned Application No. 62/873,889 and is entitled

WEARABLE DEVICES APPARATUSES, SYSTEMS, AND METHODS

and in and to said application and all divisional applications, continuation applications, continued prosecution applications, continuation-in-part applications, substitute applications, renewal applications, reissue applications, reexaminations, extensions, and all other patent applications that have been or shall be filed in the United States and all foreign countries on any of said improvements; and in and to all original patents, reissued patents, reexamination certificates, and extensions, that have been or shall be issued in the United States and all foreign countries on said improvements; and in and to all rights of priority resulting from the filing of said United States application;

agree that said Assignee may apply for and receive a patent or patents for said improvements in its own name, and that, when requested, without charge to, but at the expense of, said Assignee, its successors, assigns, and legal representatives, to carry out in good faith the intent and purpose of this Assignment, the undersigned will execute all divisional applications, continuation applications, continued prosecution applications, continuation-in-part applications, substitute applications, renewal applications, reissue applications, reexaminations, extensions and all other patent applications on any and all said improvements; execute all rightful oaths, assignments, powers of attorney, and other papers; communicate to said Assignee, its successors, assigns, and representatives all facts known to the undersigned relating to said improvements and the history thereof; and generally assist said Assignee, its successors, assigns, or representatives in securing and maintaining proper patent protection for said improvements and for vesting title to said improvements, and all applications for patents and all patents on said improvements, in said Assignee, its successors, assigns, and legal representatives; and

covenant with said Assignee, its successors, assigns, and legal representatives that no assignment, grant, mortgage, license, or other agreement affecting the rights and property herein conveyed has been made to others by the undersigned, and that full right to convey the same as herein expressed is possessed by the undersigned.

ASSIGNMENT

Each Inventor: Please Sign and Date Below:

July 19, 2023
Date

Name: ERNESTO CARLOS MARTINEZ VILLALPANDO

State of: _____ }
} SS.
County of: _____ }

Assignment Document Return Address:
PELOQUIN, PLLC
701 Fifth Avenue, Suite 4200
Seattle, WA 98104
(206) 251-1699

On this _____ day of _____ 20_____, before me, _____, the undersigned Notary Public, personally appeared _____

[___] personally known to me [___] proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) _____ subscribed to the within instrument, and acknowledged that _____ executed it.

WITNESS my hand and official seal.

_____
Notary's Signature

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003	3349

51340 7590 06/21/2023

PELOQUIN, PLLC
PO Box 748
VASHON, WA 98070-0748

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2651	

MAIL DATE	DELIVERY MODE
06/21/2023	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 16/781,897	Applicant(s) Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 3/1/23.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☑ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-51 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-28 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-51 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restrictions

Claims 1 and 14 are allowable. The restriction requirement, as set forth in the Office action mailed on 6/7/21, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Specifically, the restriction requirement of claims 1-28 is withdrawn. Claims 1-28 , no longer withdrawn from consideration because the claim(s) requires all the limitations of an allowable claim. However, claims 29-51, withdrawn from consideration because they do not require all the limitations of an allowable claim.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See In re Ziegler, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Allowable Subject Matter

Claims 1-28 are allowed.

This application is in condition for allowance except for the presence of claims 29-51 directed to an invention non-elected with traverse in the reply filed on 11/8/21. Applicant is given **TWO (2) MONTHS** from the date of this letter to cancel the noted claims or take other appropriate action (37 CFR 1.144). Failure to take action during this period will be treated as authorization to cancel the noted claims by Examiner's Amendment and pass the case to issue. Extensions of time under 37 CFR 1.136(a) will not be permitted since this application will be passed to issue.

The prosecution of this case is closed except for consideration of the above matter.

Conclusion

This application is in condition for allowance except for the following formal matters:

Withdrawn claims 29-51.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 25 USPQ 74, 453 O.G. 213, (Comm'r Pat. 1935).

A shortened statutory period for reply to this action is set to expire **TWO (2) MONTHS** from the mailing date of this letter. Extensions of time may be granted under 37 CFR 1.136 but in no case can any extension carry the date for reply to this Office action beyond the maximum period of SIX MONTHS set by statute (35 U.S.C. 133).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kile Blair whose telephone number is (571)270-3544. The examiner can normally be reached M-F.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is

encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc Nguyen can be reached on 571-272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KILE O BLAIR/
Primary Examiner, Art Unit 2651

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	Art Unit
	Kile Blair	2651

CPC - Searched*		
Symbol	Date	Examiner
G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335	02/12/2022	KB
updated above	08/27/2022	KB
updated above	03/11/2023	KB
updated above	06/17/2023	KB

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
see search printout	03/11/2023	KB
see search printout	06/17/2023	KB

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	see search printout	03/11/2023	KB
	see search printout	06/17/2023	KB

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	**Art Unit**
	Kile Blair	2651

Attorney's Docket No. S120219.P003 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: SOLOS TECHNOLOGY LIMITED	Examiner: KILE O BLAIR
Application No.: 16/781,897	Art Unit: 2651
Filed: FEBRUARY 04, 2020	
For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

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

INFORMATION DISCLOSURE STATEMENT

Sir:

Enclosed is a copy of Information Disclosure Citation Form PTO/SB/08a and PTO/SB/08b. It is respectfully requested that the cited documents be considered and that the enclosed copy of Information Disclosure Citation Forms PTO/SB/08a and PTO/SB/08b be initialed by the Examiner to indicate such consideration and a copy thereof returned to applicant(s).

Pursuant to 37 C.F.R. § 1.97, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made and is not to be construed as an admission that the information cited in this statement is material to patentability.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.B./

Attorney's Docket No. S120219.P003 PATENT

Pursuant to 37 C.F.R. § 1.97, this Information Disclosure Statement is being submitted under one of the following (as indicated by an "X" to the left of the appropriate paragraph):

_____ 37 C.F.R. §1.97(b).

_____ 37 C.F.R. §1.97(c). If so, then enclosed with this Information Disclosure Statement is one of the following:

____ A statement pursuant to 37 C.F.R. §1.97(e) or

__X__ Payment of $104.00 for the fee under 37 C.F.R. § 1.17(p).

_____ 37 C.F.R. §1.97(d). If so, then enclosed with this Information Disclosure Statement are the following:

(1) A statement pursuant to 37 C.F.R. §1.97(e); and

(2) Payment of $104.00 for the fee under 37 C.F.R. §1.17(p) for submission of the Information Disclosure Statement.

Respectfully submitted,

PELOQUIN, PLLC

Dated: June 07, 2023 /Mark S. Peloquin/
Mark S. Peloquin, Esq.
Reg. No. 50,787

PELOQUIN, PLLC
PO BOX 748
VASHON, WA 98070
206-251-1699 telephone
206-770-6562 facsimile

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.B./

PTO/SB/08a (07-09)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 7,192,136 B2	03-20-2007	Howell et al.	
		US- 7,255,437 B2	08-14-2007	Howell et al.	
		US- 7,380,936 B2	06-03-2008	Howell et al.	
		US- 7,401,918 B2	07-22-2008	Howell et al.	
		US- 7,438,410 B1	10-21-2008	Howell et al.	
		US- 7,481,531 B2	01-27-2009	Howell et al.	
		US- 7,500,746 B1	03-10-2009	Howell et al.	
		US- 7,500,747 B2	03-10-2009	Howell et al.	
		US- 7,581,833 B2	09-01-2009	Howell et al.	
		US- 7,621,634 B2	11-24-2009	Howell et al.	
		US- 7,677,723 B2	03-16-2010	Howell et al.	
		US- 7,760,898 B2	07-20-2010	Howell et al.	
		US- 7,771,046 B2	08-10-2010	Howell et al.	
		US- 7,792,552 B2	09-07-2010	Thomas et al.	
		US- 7,806,525 B2	10-05-2010	Howell et al.	
		US- 7,922,321 B2	04-12-2011	Howell et al.	
		US- 8,109,629 B2	02-07-2012	Howell et al.	
		US- 8,337,013 B2	12-25-2012	Howell et al.	
		US- 8,430,507 B2	04-30-2013	Howell et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature	/KILE O BLAIR/	Date Considered	06/17/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0031. Public burden for this form is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, 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 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.B./

PTO/SB/08a (07-09)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 8,434,863 B2	05-07-2013	Howell et al.	
		US- 8,465,151 B2	06-18-2013	Howell et al.	
		US- 8,500,271 B2	08-06-2013	Howell et al.	
		US- 8,770,742 B2	07-08-2014	Howell et al.	
		US- 8,905,542 B2	12-09-2014	Howell et al.	
		US- 9,033,493 B2	05-19-2015	Howell et al.	
		US- 9,488,520 B2	11-08-2016	Howell et al.	
		US- 9,547,184 B2	01-17-2017	Howell et al.	
		US- 9,690,121 B2	06-27-2017	Howell et al.	
		US- 10,042,186 B2	08-07-2018	Chao et al.	
		US- 10,060,790 B2	08-28-2018	Howell et al.	
		US- 10,061,144 B2	08-28-2018	Howell et al.	
		US- 10,310,296 B2	06-04-2019	Howell et al.	
		US- 10,330,956 B2	06-25-2019	Howell et al.	
		US- 10,345,625 B2	07-09-2019	Howell et al.	
		US- 10,359,311 B2	07-23-2019	Howell et al.	
		US- 10,539,459 B2	01-21-2020	Howell et al.	
		US- 10,777,048 B2	09-15-2020	Howell et al.	
		US- 11,042,045 B2	06-22-2021	Chao et al.	

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Examiner Signature	/KILE O BLAIR/	Date Considered	06/17/2023

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

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		US- 11,086,147 B2	08-10-2021	Howell et al.	
		US- 11,204,512 B2	12-21-2021	Howell et al.	
		US- 11,243,416 B2	02-08-2012	Howell et al.	
		US- 11,326,941 B2	04-09-2020	Howell et al.	
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		US- 11,644,361 B2	06-09-2022	Howell et al.	
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		US- 20140347265	11-2014	AIMONE; CHRISTOPHER ALLEN	
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		US- 20170176778	06-2017	USHAKOV; ALEXEY LEONIDOVICH	
		US- 20220113562	04-2022	ANDERSON; CHRISTOPHER JOHN	
		US- 20120237075	09-2012	EAST; JAMES	
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FOREIGN PATENT DOCUMENTS

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Examiner Signature	/KILE O BLAIR/	Date Considered	06/17/2023

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PTO/SB/08a (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 4 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 20190101977	04-2019	ARMSTRONG-MUNTNER; JOEL S	
		US- 20180242064	08-2018	HONEYCUTT; ROB	
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		US- 20190297701	09-2019	CAO; WEI	
		US- 20170032646	02-2017	ALAMEH; RACHID M	
		US- 20150126845	05-2015	JIN; ZHANPENG	
		US- 20190158946	05-2019	HONEYCUTT; ROB	
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Examiner Signature	/KILE O BLAIR/	Date Considered	06/17/2023

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(Use as many sheets as necessary)

Sheet 5 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

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		US- 20170108715-A1	04-2017	BAUER; EDDIE	
		US- 20180124497-A1	05-2018	BOESEN; PETER VINCENT	
		US- 20180103139-A1	04-2018	GRIFFIN; KEVIN	
		US- 20070030442-A1	02-2007	HOWELL; THOMAS A.	
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		US- 20170078883-A1	03-2017	RODRIGUEZ; TONY F.	
		US- 20180234847-A1	08-2018	RODRIGUEZ; TONY F.	
		US- 20180088340-A1	03-2018	AMAYEH; GHOLAMREZA	
		US- 20160299569-A1	10-2016	FISHER; RONALD	
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FOREIGN PATENT DOCUMENTS

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Sheet 6 of 6

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Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ VILLAL
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		PCT SEARCH REPORT PCT/IB2020/000831, April 16, 2021 (3 pages)	
		PCT WRITTEN OPINION PCT/IB2020/000831, April 16, 2021 (3 pages)	
		PCT SEARCH REPORT PCT/IB2020/000231, November 03, 2020 (4 pages)	
		PCT WRITTEN OPINION PCT/IB2020/000231, November 03, 2020 (5 pages)	
		PCT SEARCH REPORT PCT/IB2020/000021, July 22, 2020 (3 pages)	
		PCT WRITTEN OPINION PCT/IB2020/000021, July 22, 2020 (4 pages)	
		PCT SEARCH REPORT PCT/IB2019/001447, July 24, 2020 (3 pages)	
		PCT SEARCH REPORT PCT/IB2019/001447, July 22, 2020 (5 pages)	

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	16683352	(eyeglasses glasses spectacles) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:23 AM
L2	4545234	(loudspeaker speaker transducer near12 ear)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L3	650755	L1 AND L2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L4	81089	L1 AND L2 NEAR100 (chamber volume cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/02/09 05:26 AM

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L5	3330	(eyeglasses glasses spectacles) NEAR50 L2 NEAR100 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L6	2073	(eyeglasses glasses spectacles) NEAR20 L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L7	5707	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:28 AM

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L8	3316	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:28 AM
L9	130522	(loudspeaker speaker transducer) NEAR10 ear	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L10	166879	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L11	57455	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/02/09 05:30 AM

		AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	94	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND ((loudspeaker speaker transducer) NEAR10 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:30 AM
L13	11	wakeland AND struzik AND williams AND silver	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:41 AM
L14	23483	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:57 AM

		@pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	11886	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L16	13857	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L17	338	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND (loudspeaker speaker transducer near12 ear) NEAR30	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/09 05:58 AM

		(chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	16	((US-20210168481-A1 OR US-20210067858-A1 OR US-20190238971-A1 OR US-20120237075-A1 OR US-20030048915-A1 OR US-20050084127-A1).did. AND PGPB.dbnm.) OR ((CN-111771387-A OR WO-2017144269-A1 OR DE-202010001503-U1 OR WO-2020206775-A1 OR WO-2020038479-A1 OR WO-2020038486-A1 OR CN-110636414-A OR KR-101819530-B1 OR KR-101786613-B1).did. AND FTDB.dbnm.) OR ((DE-102016103477-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:14 AM
L19	11	L18 AND (rubber foam vinyl loss adjfactor Young$2 modulus elastomer polyurethane melamine foam butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L20	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine foam butyl	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/02/09 06:16 AM

		rubber halobutyl)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L22	101952	(G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 11:58 PM
L23	47256	L22 AND (eyeglasses glasses spectacles)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/02/10 06:50 PM

			JPO; DERWENT; IBM_TDB)				
L24	1	(10/190604).APP.	(USPAT; USOCR)	OR	ON	ON	2022/02/12 05:52 PM
L25	17505036	(eyeglasses glasses spectacles) NEAR/10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L26	65	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L27	54	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:58 PM
L28	3	((WO-2020038479-A1 OR WO-2020206775-A1).did. AND FTDB.dbnm.) OR ((US-	(FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP,	OR	ON	ON	2022/02/12 09:30 PM

		20120237075-A1).did. AND PGPB.dbnm.)	ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); US-PGPUB)				
L29	22804	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L30	55355	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L31	97767	L22 AND (eyeglasses glasses spectacles) NEAR15L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM

L32	51928	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L33	177267	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L34	79	L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L35	55	(L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/12 09:42 PM

		@pt1d @pt3d @ptpd @read @repd)<"20200205")	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	573	L12 L17 L19 L20 L21 L26 L27 L34 L35	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L37	15	L36 AND @pd>"20220201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L38	35	L36 AND @pd>"20220801"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/03/11 02:27 PM
L39	51	L36 AND @pd>"20220801"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/06/17 05:20 PM

			AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L40	23	L36 AND @pd>"20230201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/17 05:20 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	3	((eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/03/11 06:29 PM
N2	3	((eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:21 PM
N3	19	("7192136" "7255437" "7380936" "7401918" "7438410" "7481531"	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:23 PM

		"7500746" "7500747" "7581833" "7621634" "7677723" "7760898" "7771046" "7792552" "7806525" "7922321" "8109629" "8337013" "8430507").pn.					
N4	19	("8434863" "8465151" "8500271" "8770742" "8905542" "9033493" "9488520" "9547184" "9690121" "10042186" "10060790" "10061144" "10310296" "10330956" "10345625" "10359311" "10539459" "10777048" "11042045").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:26 PM
N5	12	("11086" "11204512" "11243416" "11326941" "11513371" "11630331" "11644361" "11644693" "20140347265" "20220107202" "20170176778" "20220113562" "20120237075").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:36 PM
N6	13	("11086147" "11204512" "11243416" "11326941" "11513371" "11630331" "11644361" "11644693" "20140347265" "20220107202" "20170176778" "20220113562" "20120237075").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:36 PM
N7	8	("20190101977" "20180242064" "20180097920" "20150248026" "20190297701" "20170032646" "20150126845" "20190158946").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:38 PM
N8	10	("20170108715" "20180124497" "20180103139" "20070030442" "20160246059" "20130250232" "20170078883" "20180234847" "20180088340" "20160299569").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 05:40 PM

PTO/SB/30 (11-17)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	16781897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ VILLALPAN
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

   a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

      i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

      ii. ☐ Other _____

   b. ☑ Enclosed

      i. ☐ Amendment/Reply

      ii. ☐ Affidavit(s)/ Declaration(s)

      iii. ☑ Information Disclosure Statement (IDS)

      iv. ☐ Other _____

2. Miscellaneous

   a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

   b. ☐ Other _____

3. Fees The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

   a. ☐ The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. _____.

      i. ☐ RCE fee required under 37 CFR 1.17(e)

      ii. ☐ Extension of time fee (37 CFR 1.136 and 1.17)

      iii. ☐ Other _____

   b. ☐ Check in the amount of $ _____ enclosed

   c. ☐ Payment by credit card (Form PTO-2038 enclosed)

   d. ■ Payment by EFS-Web

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/MARK S PELOQUIN/	Date	JUNE 07, 2023
Name (Print/Type)	MARK S PELOQUIN	Registration No.	50787

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being EFS-Web transmitted to the United States Patent and Trademark Office (USPTO), deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the USPTO on the date shown below.

Signature	/MARK S PELOQUIN/		
Name (Print/Type)	MARK S PELOQUIN	Date	JUNE 07, 2023

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

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Instruction Sheet for RCEs

(not to be submitted to the USPTO)

NOTES:

An RCE is not a new application, and filing an RCE will not result in an application being accorded a new filing date.

Filing Qualifications:

The application must be a utility or plant application filed on or after June 8, 1995. The application cannot be a provisional application, a utility or plant application filed before June 8, 1995, a design application, or a patent under reexamination. See 37 CFR 1.114(e).

Filing Requirements:

Prosecution in the application must be closed. Prosecution is closed if the application is under appeal, or the last Office action is a final action, a notice of allowance, or an action that otherwise closes prosecution in the application (e.g., an Office action under *Ex parte Quayle*). See 37 CFR 1.114(b).

A submission and a fee are required at the time the RCE is filed. If reply to an Office action under 35 U.S.C. 132 is outstanding (e.g., the application is under final rejection), the submission must meet the reply requirements of 37 CFR 1.111. If there is no outstanding Office action, the submission can be an information disclosure statement, an amendment, new arguments, or new evidence. See 37 CFR 1.114(c). The submission may be a previously filed amendment (e.g., an amendment after final rejection).

WARNINGS:

Request for Suspension of Action:

All RCE filing requirements must be met before suspension of action is granted. A request for a suspension of action under 37 CFR 1.103(c) does not satisfy the submission requirement and does not permit the filing of the required submission to be suspended.

Improper RCE will NOT toll Any Time Period:

Before Appeal - If the RCE is improper (e.g., prosecution in the application is not closed or the submission or fee has not been filed) and the application is not under appeal, the time period set forth in the last Office action will continue to run and the application will be abandoned after the statutory time period has expired if a reply to the Office action is not timely filed. No additional time will be given to correct the improper RCE.

Under Appeal - If the RCE is improper (e.g., the submission or the fee has not been filed) and the application is under appeal, the improper RCE is effective to withdraw the appeal. Withdrawal of the appeal results in the allowance or abandonment of the application depending on the status of the claims. If there are no allowed claims, the application is abandoned. If there is at least one allowed claim, the application will be passed to issue on the allowed claim(s). See MPEP 1215.01.

See MPEP 706.07(h) for further information on the RCE practice.

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If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

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Additional USPTO uses of the information in this record may include disclosure to: 1) the International Bureau of the World Intellectual Property Organization, if the record is related to an international application filed under the Patent Cooperation Treaty; 2) the public i) after publication of the application pursuant to 35 U.S.C. 122(b), ii) after issuance of a patent pursuant to 35 U.S.C. 151, iii) 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 inspections, or an issued patent, or iv) without publication of the application or patent under the specific circumstances provided for by 37 CFR 1.14(a)(1)(v)-(vii); and/or 3) the National Archives and Records Administration, for inspection of records.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:	
SOLOS TECHNOLOGY LIMITED	Examiner: KILE O BLAIR
Application No.: 16/781,897	Art Unit: 2651
Filed: FEBRUARY 04, 2020	
For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

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

INFORMATION DISCLOSURE STATEMENT

Sir:

Enclosed is a copy of Information Disclosure Citation Form PTO/SB/08a and PTO/SB/08b. It is respectfully requested that the cited documents be considered and that the enclosed copy of Information Disclosure Citation Forms PTO/SB/08a and PTO/SB/08b be initialed by the Examiner to indicate such consideration and a copy thereof returned to applicant(s).

Pursuant to 37 C.F.R. § 1.97, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made and is not to be construed as an admission that the information cited in this statement is material to patentability.

Pursuant to 37 C.F.R. § 1.97, this Information Disclosure Statement is being submitted under one of the following (as indicated by an "X" to the left of the appropriate paragraph):

_____ 37 C.F.R. §1.97(b).

_____ 37 C.F.R. §1.97(c). If so, then enclosed with this Information Disclosure Statement is one of the following:

____ A statement pursuant to 37 C.F.R. §1.97(e) or

__X__ Payment of $104.00 for the fee under 37 C.F.R. § 1.17(p).

_____ 37 C.F.R. §1.97(d). If so, then enclosed with this Information Disclosure Statement are the following:

(1) A statement pursuant to 37 C.F.R. §1.97(e); and

(2) Payment of $104.00 for the fee under 37 C.F.R. §1.17(p) for submission of the Information Disclosure Statement.

Respectfully submitted,

PELOQUIN, PLLC

Dated: June 07, 2023 /Mark S. Peloquin/
Mark S. Peloquin, Esq.
Reg. No. 50,787

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PO BOX 748
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 7,192,136 B2	03-20-2007	Howell et al.	
		US- 7,255,437 B2	08-14-2007	Howell et al.	
		US- 7,380,936 B2	06-03-2008	Howell et al.	
		US- 7,401,918 B2	07-22-2008	Howell et al.	
		US- 7,438,410 B1	10-21-2008	Howell et al.	
		US- 7,481,531 B2	01-27-2009	Howell et al.	
		US- 7,500,746 B1	03-10-2009	Howell et al.	
		US- 7,500,747 B2	03-10-2009	Howell et al.	
		US- 7,581,833 B2	09-01-2009	Howell et al.	
		US- 7,621,634 B2	11-24-2009	Howell et al.	
		US- 7,677,723 B2	03-16-2010	Howell et al.	
		US- 7,760,898 B2	07-20-2010	Howell et al.	
		US- 7,771,046 B2	08-10-2010	Howell et al.	
		US- 7,792,552 B2	09-07-2010	Thomas et al.	
		US- 7,806,525 B2	10-05-2010	Howell et al.	
		US- 7,922,321 B2	04-12-2011	Howell et al.	
		US- 8,109,629 B2	02-07-2012	Howell et al.	
		US- 8,337,013 B2	12-25-2012	Howell et al.	
		US- 8,430,507 B2	04-30-2013	Howell et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

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If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
Attorney Docket Number	S120219.P003

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		US- 8,770,742 B2	07-08-2014	Howell et al.	
		US- 8,905,542 B2	12-09-2014	Howell et al.	
		US- 9,033,493 B2	05-19-2015	Howell et al.	
		US- 9,488,520 B2	11-08-2016	Howell et al.	
		US- 9,547,184 B2	01-17-2017	Howell et al.	
		US- 9,690,121 B2	06-27-2017	Howell et al.	
		US- 10,042,186 B2	08-07-2018	Chao et al.	
		US- 10,060,790 B2	08-28-2018	Howell et al.	
		US- 10,061,144 B2	08-28-2018	Howell et al.	
		US- 10,310,296 B2	06-04-2019	Howell et al.	
		US- 10,330,956 B2	06-25-2019	Howell et al.	
		US- 10,345,625 B2	07-09-2019	Howell et al.	
		US- 10,359,311 B2	07-23-2019	Howell et al.	
		US- 10,539,459 B2	01-21-2020	Howell et al.	
		US- 10,777,048 B2	09-15-2020	Howell et al.	
		US- 11,042,045 B2	06-22-2021	Chao et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
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		US- 11,086,147 B2	08-10-2021	Howell et al.	
		US- 11,204,512 B2	12-21-2021	Howell et al.	
		US- 11,243,416 B2	02-08-2012	Howell et al.	
		US- 11,326,941 B2	04-09-2020	Howell et al.	
		US- 11,513,371 B2	09-19-2019	Howell et al.	
		US- 11,630,331 B2	09-12-2019	Howell et al.	
		US- 11,644,361 B2	06-09-2022	Howell et al.	
		US- 11,644,693 B2	11-10-2022	Howell et al.	
		US- 20140347265	11-2014	AIMONE; CHRISTOPHER ALLEN	
		US- 20220107202	04-2022	TIROSH; EHUD	
		US- 20170176778	06-2017	USHAKOV; ALEXEY LEONIDOVICH	
		US- 20220113562	04-2022	ANDERSON; CHRISTOPHER JOHN	
		US- 20120237075	09-2012	EAST; JAMES	
		US-			
		US-			
		US-			
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 4 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR; KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 20190101977	04-2019	ARMSTRONG-MUNTNER; JOEL S	
		US- 20180242064	08-2018	HONEYCUTT; ROB	
		US- 20180097920	04-2018	HOELLWARTH;QUIN C	
		US- 20150248026	09-2015	WILLEY; CHARLES	
		US- 20190297701	09-2019	CAO; WEI	
		US- 20170032646	02-2017	ALAMEH; RACHID M	
		US- 20150126845	05-2015	JIN; ZHANPENG	
		US- 20190158946	05-2019	HONEYCUTT; ROB	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 5 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 20170108715-A1	04-2017	BAUER; EDDIE	
		US- 20180124497-A1	05-2018	BOESEN; PETER VINCENT	
		US- 20180103139-A1	04-2018	GRIFFIN; KEVIN	
		US- 20070030442-A1	02-2007	HOWELL; THOMAS A.	
		US- 20160246059-A1	08-2016	HALPIN; DECLAN	
		US- 20130250232-A1	09-2013	BELBEY; JASON	
		US- 20170078883-A1	03-2017	RODRIGUEZ; TONY F.	
		US- 20180234847-A1	08-2018	RODRIGUEZ; TONY F.	
		US- 20180088340-A1	03-2018	AMAYEH; GHOLAMREZA	
		US- 20160299569-A1	10-2016	FISHER; RONALD	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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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.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 6 of 6

Complete if Known	
Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ VILLAL
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		PCT SEARCH REPORT PCT/IB2020/000831, April 16, 2021 (3 pages)	
		PCT WRITTEN OPINION PCT/IB2020/000831, April 16, 2021 (3 pages)	
		PCT SEARCH REPORT PCT/IB2020/000231, November 03, 2020 (4 pages)	
		PCT WRITTEN OPINION PCT/IB2020/000231, November 03, 2020 (5 pages)	
		PCT SEARCH REPORT PCT/IB2020/000021, July 22, 2020 (3 pages)	
		PCT WRITTEN OPINION PCT/IB2020/000021, July 22, 2020 (4 pages)	
		PCT SEARCH REPORT PCT/IB2019/001447, July 24, 2020 (3 pages)	
		PCT SEARCH REPORT PCT/IB2019/001447, July 22, 2020 (5 pages)	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

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If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference **S120219PCT1**	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/IB2019/001447**	International filing date *(day/month/year)* **12 December 2019**	(Earliest) Priority Date *(day/month/year)* **12 December 2018**
Applicant **SOLOS TECHNOLOGY LIMITED**		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **3** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☑ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. **2**

   ☑ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2019/001447

A. CLASSIFICATION OF SUBJECT MATTER

G02C 11/00(2006.01)i; H04R 5/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02C, H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, WPI, EPODOC, CNKI: eyewear, glasses, temple, wireless, remote, audio, communication, speaker, cord, strap, neck, back, sensor?, microphone, project+, display

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102792713 A (MARCUS, Lewis) 21 November 2012 (2012-11-21) paragraphs [0019]-[0028], figures 1-3	1, 22-24, 29, 32-43
Y	CN 102792713 A (MARCUS, Lewis) 21 November 2012 (2012-11-21) paragraphs [0019]-[0028], figures 1-3	2-21, 25-28, 30, 31, 44-47
Y	CN 103941854 A (OLYMPUS CORPORATION) 23 July 2014 (2014-07-23) paragraphs [0060]-[0128], figures 1-11	2-21, 25-28, 30, 31, 44-47
X	US 2010272304 A1 (THIEL, Joseph Adam et al.) 28 October 2010 (2010-10-28) paragraphs [0024]-[0051], figures 1-6	48-73
A	CN 105242411 A (GAO, Chao) 13 January 2016 (2016-01-13) the whole document	1-73
A	CN 104793352 A (JING, Yanjie) 22 July 2015 (2015-07-22) the whole document	1-73
A	CN 101458399 A (YUANYI ENTREPRISE CO., LTD.) 17 June 2009 (2009-06-17) the whole document	1-73

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07 July 2020	**24 July 2020**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **AN,Jing** Telephone No. **86-(10)-53962583**

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2019/001447

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	102792713	A	21 November 2012	SG	10201408085R	A	29 January 2015
				GB	0921227	D0	20 January 2010
				WO	2011067578	A1	09 June 2011
				GB	2475975	A	08 June 2011
				AU	2010326368	A1	19 July 2012
				KR	20120101487	A	13 September 2012
				GB	201020458	D0	19 January 2011
				SG	181167	A1	30 July 2012
				AU	2010326368	B2	07 July 2016
				GB	2476033	A	15 June 2011
				CN	102792713	B	17 February 2016
				EP	2508012	A1	10 October 2012
				MX	2012006404	A	23 November 2012
				US	2012328134	A1	27 December 2012
				JP	5792182	B2	07 October 2015
				JP	2013513275	A	18 April 2013
CN	103941854	A	23 July 2014	US	2014204021	A1	24 July 2014
				JP	6076099	B2	08 February 2017
				JP	2014137522	A	28 July 2014
US	2010272304	A1	28 October 2010	WO	2010126550	A1	04 November 2010
				US	8094858	B2	10 January 2012
CN	105242411	A	13 January 2016	None			
CN	104793352	A	22 July 2015	WO	2015106500	A1	23 July 2015
CN	101458399	A	17 June 2009	None			

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
98104
China PELOQUIN,PLLC 800 Fifth Ave,Suite 4100
Seattle, Massachusetts, United States of America

PeloquinMark S.

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	**24 July 2020**
Applicant's or agent's file reference **S120219PCT1**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2019/001447	**12 December 2019**	**12 December 2018**

International Patent Classification (IPC) or both national classification and IPC
G02C 11/00(2006.01)i; H04R 5/02(2006.01)i

Applicant
SOLOS TECHNOLOGY LIMITED

1. This opinion contains indications relating to the following items:
   - ☑ Box No. I Basis of the opinion
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☑ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☑ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

   If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

   If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

   For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer
National Intellectual Property Administration, PRC **China 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088**	**21 July 2020**	**AN,Jing**
Facsimile No. **(86—10) 62019451**		Telephone No. **86-(10)-53962583**

Form PCT/ISA/237 (Cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2019/001447

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [✓] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-47, 49, 52-56, 60-62, 65-68, 71-73	YES
	Claims	48, 50, 51, 57-59, 63, 64, 69, 70	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-73	NO
Industrial applicability (IA)	Claims	1-73	YES
	Claims	None	NO

2. Citations and explanations :

[1] 2.1 Reference is made to the following documents:

[2] D1: CN102792713A 21.11.2012

[3] D2: CN103941854A 23.07.2014

[4] D3: US2010272304A1 28.10.2010

[5] 2.2 Novelty

[6] 1. D1 (paragraphs [0019]-[0028], figures 1-3) discloses a reconfigurable component for use in an eyewear device and a method to provide data to a user through an eyewear device, comprising:

[7] a first temple 14, the first temple is configured for use with the eyewear device, the first temple further comprising:

[8] a first engagement portion;

[9] a first temple module 10, wherein the first temple module 10 is releasably couplabe with the first engagement portion, the first temple module further comprising:

[10] a first wireless communieation system 30, the first wireless communication system is configured to communicate wireless with a user device 34;

[11] a processor 28, the processor is configured to receive an input from the first wireless communication system and to generate an output; and

[12] a first speaker 12, the first speaker is configured to receive the output, in operation, when a user wears the eyewear device the user can hear audio broadcast from the first speaker when the first wireless communication system is in an on state.

[13] So the difference between claims 1,22,29,38 and D1 is: 1) the first temple module is a first temple insert module. It can be understood that not all technical features of claims 1,22,29,38 have been disclosed by D1, therefore the subject-matter of claims 1,22,29,38 is new in the sense of Article 33(2) PCT.

[14] 2. Claims 1,22,29,38 are new, so the dependent claims 2-21,23-28,30-37,39-47 are also new in the sense of Article 33(2) PCT.

[15] 3. D3 (paragraphs [0024]-[0051], figures 1-6) discloses a behind neck module assembly for an eyewear device and a method to provide data to a user from a behind the neck module assembly for an eyewear device, comprising:

[16] an electronics pod 70, the electronics pod having an electronics unit, the electronics unit further comprising:

[17] wireless receiver 44 (wireless communication system);

[18] controls 38 (processor);

[19] a left smart cord and a right smart cord;

[20] a left temple interlock, the left temple interlock containing a left audio device 30 (speaker); and

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

[21] a right temple interlock, the right interlock containing a right audio device 30 (speaker), wherein the left smart cord provides electrical and mechanical coupling between the electronics pod and the left temple interlock, the right smart cord provides electrical and mechanical coupling between the electronics pod and the right temple interlock, in operation when a left temple 24 of the eyewear device is coupled with the left temple interlock and a right temple 24 of the eyewear device is coupled with the right temple interlock, the wireless receiver 44 receives data and provides an input signal to the controls 38, the controls provides and output to the right audio device and the left audio device such that a user can hear an audio signal from the right and left audio devices.

[22] It can be understood that all technical features of claims 48,64 have been disclosed by D1, therefore the subject-matter of claims 48,64 is not new in the sense of Article 33(2) PCT.

[23] 4. All the additional technical features of claims 50,51,57-59,63,69,70 have been disclosed by D1, not all the additional technical features of claims 49,52-56,60-62,65-68,71-73 have been disclosed by D1, therefore the subject-matter of claims 50,51,57-59,63,69,70 is not new in the sense of Article 33(2) PCT, the subject-matter of claims 49,52-56,60-62,65-68,71-73 is new in the sense of Article 33(2) PCT.

[24] 2.3 Inventive step

[25] 1. The difference 1) between claims 1,22,29,38 and D1 is obvious to the person skilled in the art. Therefore, the subject-matter of claims 1,22,29,38 can not be considered as involving an inventive step, and do not meet the criteria set out in PCT Article 33(3).

[26] 2. The subject-matter of claims 48,50,51,57-59,63,64,69,70 is not new, so the claims 48,50,51,57-59,63,64,69,70 can not be considered as involving an inventive step, and do not meet the criteria set out in PCT Article 33(3).

[27] 3. D2 (paragraphs [0060]-[0128], figures 1-11) discloses part of the additional features of claims 2-8,17-19,25-27,30,31,44-47, D1 discloses part of the additional features of claims 9,10,12-15,21,23,24,32-35,39,42,43, the other additional features is the common technical means in the field of the eyewear devices technologies. The additional features of claims 11,16,20,28,36,37,40,41,52-56,60-62, 65-68,71-73 belong to the common technical means in the field of the display technologies. So the subject-matter of claims 2-21,23-28,30-37,39-47,49,52-56,60-62,65-68,71-73 can not be considered as involving an inventive step, and do not meet the criteria set out in PCT Article 33(3).

[28] 2.4 Industrial applicability

[29] The subject-matter of claims 1-73 can be found applicability in the field of eyewear devices, and therefore meet the criteria set out in PCT Article 33(4).

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

[1] The feature 'a right smart chord' of claim 48 and the feature 'the behind the neck module assembly of claim 591' of claim 60 are unclear, so the claims 48,60 do not meet the criteria set out in PCT Article 6.

[2] The examiner can expect that the features 'a right smart chord' refers to 'a right smart cord', 'the behind the neck module assembly of claim 591' refers to 'the behind the neck module assembly of claim 59', and establish the reasoned statement with regard to novelty, inventive step and industrial applicability for claims 48,60 on the above reasonable expectation.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
98104
China PELOQUIN,PLLC 800 Fifth Ave,Suite 4100
Seattle, Washington, United States of America

PeloquinMark S.

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	**22 July 2020**
Applicant's or agent's file reference **S120219PCT02**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2020/000021	**08 January 2020**	**08 January 2019**

International Patent Classification (IPC) or both national classification and IPC
G02C 11/00(2006.01)i

Applicant
SOLOS TECHNOLOGY LIMITED

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer
National Intellectual Property Administration, PRC **China 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088**	**15 July 2020**	**WANG,Dechuang**
Facsimile No. **(86—10) 62019451**		Telephone No. **86-(10)-53961791**

Form PCT/ISA/237 (Cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2020/000021

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [✓] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	5-38	YES
	Claims	1-4	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-38	NO
Industrial applicability (IA)	Claims	1-38	YES
	Claims	None	NO

2. Citations and explanations :

[1] D1: CN201060334Y (14.05.2008)

[2] D1 discloses a pair of anti-drowsy eyeglasses (see description, page 2 line 21 to page 3 line 14, figure 1). The inner of an eyeglasses frame is provided with a battery unit, an image identification sensor (namely "the first sensor is incorporated into the eyewear device") unit and a reminding unit. The battery unit provides a power supply for the image identification sensor unit and the reminding unit. The image identification sensor unit (namely "first sensor") judges whether a person wearing the eyeglasses is in a drowsy state (namely "the state of the user") by monitoring the opening and closing of the eye of the person wearing the eyeglasses (namely "the first sensor measures a parameter related to the user"). When judging the person wearing the eyeglasses is in the drowsy state (namely "the negative condition"), the image identification sensor unit sends a control signal to drive the reminding unit to remind the person wearing the eyeglasses by shaking or sound (namely "the assistance is in a form of feedback which is related to the state"), in figure 1, the unit for transmitting the shaking or sound is in a temple of the eyeglasses.

[3] All features in claims 1-4 are disclosed by D1, therefore claims 1-4 do not meet PCT 33(2) and PCT 33(3).

[4] The additional features in claims 5-9 are normal designs in the art. Therefore claims 5-9 meet PCT 33(2), but do not meet PCT 33(3).

[5] The additional features in claim 10 relate to the contents of determining and using the context of the user, adopting the context of the user instead of the state of the user is a normal design in the art. Therefore claim 10 meets PCT 33(2), but does not meet PCT 33(3).

[6] The dependent claims 11-18 cite claim 10 directly or indirectly, the additional features in claims 11-18 are either disclosed by D1, or normal designs in the art. Therefore claims 11-18 meet PCT 33(2), but do not meet PCT 33(3).

[7] Claim 19 differs from D1 in that: it is the context of the user in claim 19. It is a normal design in the art for adopting the context of the user instead of the state of the user. Therefore claim 19 meets PCT 33(2), but does not meet PCT 33(3).

[8] Claim 25 differs from D1 in that: it is the context of the user and the computer readable storage medium storing program code. They are normal designs in the art. Therefore claim 25 meets PCT 33(2), but does not meet PCT 33(3).

[9] The additional features in claims 20-24, 26-31 are either partly disclosed by D1, or normal designs in the art. Therefore claims 20-24, 26-31 meet PCT 33(2), but do not meet PCT 33(3).

[10] Claim 32 differs from D1 in that: the voice interface with a microphone and a speaker, and the voice interface to receive user commands and to provide assistance to the user; the processor and computer program; further including that determining and using the context of the user in claim 32. They are normal designs in the art. Therefore claim 32 meets PCT 33(2), but does not meet PCT 33(3).

[11] The additional features in claims 33-38 are either partly disclosed by D1, or normal designs in the art. Therefore claims 33-38 meet PCT 33(2), but do not meet PCT 33(3).

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

[12] Claims 1-38 can find industrial applicability in the technical field of wearable device, and thus meet the criteria set out in PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference **S120219PCT03**	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/IB2020/000231**	International filing date *(day/month/year)* **05 February 2020**	(Earliest) Priority Date *(day/month/year)* **05 February 2019**
Applicant **SOLOS TECHNOLOGY LIMITED**		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **4** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☑ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. **16**

   ☑ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2020/000231

A. CLASSIFICATION OF SUBJECT MATTER

H04R 1/00(2006.01)i; G02C 11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04R G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, CNKI, WPI, EPODOC: eyewear, glasses, headset, ear w phone, chamber, speaker, cover, housing, port, audio, sound, speech, voice, acoustic, concentrat+, gather, reflect

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010272304 A1 (THIEL, Joseph Adam et al.) 28 October 2010 (2010-10-28) description, paragraphs [0024]-[0051] and figures 1-6	1-51
Y	CN 105828234 A (QINGDAO GOERTEK TECHNOLOGY CO., LTD.) 03 August 2016 (2016-08-03) abstract, description, paragraphs [0023]-[0030] and figures 1-3	1-51
Y	CN 205812312 U (QINGDAO GOERTEK TECHNOLOGY CO., LTD.) 14 December 2016 (2016-12-14) abstract, description, paragraphs [0023]-[0030] and figures 1-3	1-51
Y	CN 204155028 U (LI, Weixiong) 11 February 2015 (2015-02-11) abstract, description, paragraphs [0012]-[0013] and figure 1	1-51
Y	CN 206920741 U (ZHANG, Hao) 23 January 2018 (2018-01-23) abstract, description, paragraphs [0022]-[0029] and figures 1-8	1-51
Y	CN 204465821 U (SHENZHEN GENAISKY SCIENCE AND TECHNOLOGY CO., LTD.) 08 July 2015 (2015-07-08) description, paragraphs [0013]-[0017] and figures 1-2	1-51
A	US 2003068057 A1 (MILLER, Eric C. et al.) 10 April 2003 (2003-04-10) the whole document	1-51

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 October 2020	**03 November 2020**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China**	Authorized officer **CHEN,Xiaowei**
Facsimile No. **(86-10)62019451**	Telephone No. **86-(10)-53961673**

Form PCT/ISA/210 (second sheet) (January 2015)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 207992602 U (DONGGUAN ZHONGTIAN ELECTRONIC TECH. CO., LTD. et al.) 19 October 2018 (2018-10-19) the whole document	1-51

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2020/000231

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
US 2010272304 A1	28 October 2010	WO 2010126550 A1	04 November 2010
CN 105828234 A	03 August 2016	None	
CN 205812312 U	14 December 2016	None	
CN 204155028 U	11 February 2015	WO 2016065889 A1	06 May 2016
CN 206920741 U	23 January 2018	None	
CN 204465821 U	08 July 2015	None	
US 2003068057 A1	10 April 2003	None	
CN 207992602 U	19 October 2018	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference **S120219PCT02**	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/IB2020/000021**	International filing date *(day/month/year)* **08 January 2020**	(Earliest) Priority Date *(day/month/year)* **08 January 2019**
Applicant **SOLOS TECHNOLOGY LIMITED**		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☑ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☐ the text is approved as submitted by the applicant.

   ☑ the text has been established by this Authority to read as follows:

   EYEWEAR SYSTEMS,APPARATUSES,AND METHODS FOR PROVIDING ASSISTANCE TO USER

5. With regard to the **abstract**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 23

   ☑ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2020/000021

A. CLASSIFICATION OF SUBJECT MATTER

G02C 11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02C;A61B;G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI;CNPAT;WPI;EPODOC: state, status, condition, context, eyeglass??, eyewear, user, sound, voice, alert, broadcast, analysis+, wearable, assistance, feedback, correct, temple

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 201060334 Y (SHENZHEN UNIVERSITY) 14 May 2008 (2008-05-14) description, page 2 line 21 to page 3 line 14	1-38
X	US 2015087924 A1 (QUANTA COMPUTERS INC.) 26 March 2015 (2015-03-26) description, paragraphs 0015-0032	1-38
X	CN 206532049 U (HENAN TECHNOLOGY UNIVERSITY) 29 September 2017 (2017-09-29) description, paragraphs 0007-0019	1-38
A	US 2015161783 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION) 11 June 2015 (2015-06-11) the whole document	1-38
A	WO 2014088971 A1 (MICROSOFT CORP.) 12 June 2014 (2014-06-12) the whole document	1-38

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 July 2020	**22 July 2020**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **WANG,Dechuang** Telephone No. **86-(10)-53961791**

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2020/000021

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	201060334	Y	14 May 2008	None			
US	2015087924	A1	26 March 2015	CN	104434058	A	25 March 2015
				TW	201511734	A	01 April 2015
CN	206532049	U	29 September 2017	None			
US	2015161783	A1	11 June 2015	US	2017095151	A1	06 April 2017
WO	2014088971	A1	12 June 2014	EP	2929424	A1	14 October 2015
				JP	2016507802	A	10 March 2016
				CN	105122201	A	02 December 2015
				US	2014160424	A1	12 June 2014
				KR	20150091322	A	10 August 2015

Form PCT/ISA/210 (patent family annex) (January 2015)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
98104
China PELOQUIN,PLLC 800 Fifth Ave,Suite 4100
Seattle, Washington, United States of America

PeloquinMark S.

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	**03 November 2020**
Applicant's or agent's file reference **S120219PCT03**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2020/000231	**05 February 2020**	**05 February 2019**

International Patent Classification (IPC) or both national classification and IPC
H04R 1/00(2006.01)i; G02C 11/00(2006.01)i

Applicant
SOLOS TECHNOLOGY LIMITED

1. This opinion contains indications relating to the following items:
   - [✓] Box No. I Basis of the opinion
   - [ ] Box No. II Priority
   - [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - [ ] Box No. IV Lack of unity of invention
   - [✓] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
   - [ ] Box No. VI Certain documents cited
   - [ ] Box No. VII Certain defects in the international application
   - [✓] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

   If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

   If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

   For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer
National Intellectual Property Administration, PRC **China 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088**	**23 October 2020**	**CHEN,Xiaowei**
Facsimile No. **(86—10) 62019451**		Telephone No. **86-(10)-53961673**

Form PCT/ISA/237 (Cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2020/000231

Box No. I **Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of:
   - [✓] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-51	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-51	NO
Industrial applicability (IA)	Claims	1-51	YES
	Claims	None	NO

2. Citations and explanations :

[1] The reasoning for claims 20, 29 and 30 is based on the prediction in Box No. VIII.

[2] (1) Reference is made to the following documents:

[3] D1: US2010272304A1

[4] D2: CN105828234A

[5] (2) Novelty and Inventive step (PCT 33(2), PCT 33(3))

[6] D1 discloses a behind neck module assembly for an eyewear device and a method to provide data to a user from a behind the neck module assembly for an eyewear device (description, paragraphs [0024]-[0051] and figures 1-6): Referring to FIG. 1, an eyewear retention device is provided. The eyewear retention device is used to retain eyewear, such as glasses, sunglasses, safety glasses or shooting glasses, on a user's head or around a user's neck. A user can removably connect earpieces of an eyewear device such as glasses to the eyewear retention device and wear the retention device such that the device is placed around the user's head or neck to help keep the eyewear in place while being worn by the user. Strap 1 can have a hollow center or hollow ends or sockets with a diameter capable of inserting the ends of earpieces of an eyewear device therein. The eyewear retention device includes a receiver 2 placed at a location substantially near one of the ends of strap 1. Receiver 2 may receive signals from a variety of sound transmission devices. The eyewear retention device also includes at least one and preferably a pair of audio devices 4 and 5 associated with earpiece connectors 16, 17 at a location substantially at or near one or both ends of strap 1, and thus substantially at or near the ends of the retention device. Audio devices 4 and 5 are capable of playing one or more audio signals for transmission to one or more surfaces of a human auditory passage at a location proximate to and outside of the ear.

[7] D2 discloses a headset (abstract, description, paragraphs [0023]-[0030] and figures 1-3): the headset includes speakers, focus and positioning tube and guide housing. Guide housing has parabolic surface. The sound input end of the focus and positioning tube is fixed at the bottom of the guide housing and is connected through one end of the sound tube of the speaker. The sound end is located on the focus of the parabolic surface where the guide housing is located; the speaker is arranged below the bottom of the guide housing, and the sound outlet thereof faces the bottom of the guide housing. The sound waves emitted by the focus and positioning tube are reflected by the guide housing and then emitted in a direction parallel to its axial direction. The handset is assembled on the collar, and the opening of the guide housing is aimed at the user's ears, and the sound waves can be directed to the ears.

[8] Claims 1 and 40 differ from D1 in that: 1) concentrating the audio signals for delivery to the user's ear.

[9] Claims 14 and 29 differ from D1 in that: 2) an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device.

[10] Claims 48 differs from D1 in that: 3) audio signals emitted from an acoustic port of an eyewear device reflect off of the inner surface and are directed thereby toward the user's ear, and increase a signal-to-noise ratio of audio signals directed towards a user's ear.

[11] Therefore, claims 1, 14, 29, 40 and 48 are novel.

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

[12] The above differences 1) and 2) are disclosed by D2. The above difference 3) can be easily obtained based on the disclosure of D2. Hence, it is a normal design option known to the person skilled in the art to obtain claims 1, 14, 29, 40 and 48 based on the disclosure of D1 and D2.

[13] Therefore, claims 1, 14, 29, 40 and 48 do not involve an inventive step.

[14] Claims 2-13, 15-28, 30-39, 41-47, 49-51 are dependent claims. The additional features in those claims are disclosed in D1 or D2 and/or regarded as normal designs in the art. Those claims are novel and meet the criteria set out in PCT Article 33(2), but do not involve an inventive step and do not meet the criteria set out in PCT Article 33(3).

[15] (3) Industrial applicability (PCT 33(4))

[16] The inventions of claims 1-51 can find industrial applicability in the technical field of communication.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

[1] The following features written behind claims 20, 29 cannot be understood as parts of claims 20, 29: [Shape of external sound covert], [Variable material properties in the eyewear device]. Claim 30 recites claim C1. Hence claims 20, 29 and 30 are not clear in the sense of PCT Article 6.

[2] The reasoning for claims 20, 29 and 30 in Box No. V is based on the following prediction: Claims 20, 29 are considered to be without the above additional features; Claim 30 is considered to recite claim 29.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference **S120219PCT4**	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/IB2020/000831**	International filing date *(day/month/year)* **13 July 2020**	(Earliest) Priority Date *(day/month/year)* **13 July 2019**
Applicant **SOLOS TECHNOLOGY LIMITED**		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **3** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☑ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. **16**

   ☑ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2020/000831

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/0346(2013.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI,WPI,EPODOC,CNPAT,IEEE: eyewear, embedded, sensor, wireless, glasses, temple, insert, parameter,control

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 109032384 A (OPPO GUANGDONG MOBILE TELECOMMUNICATIONS CO., LTD.) 18 December 2018 (2018-12-18) description, paragraphs [0027]-[0066]	1-24
Y	CN 109407858 A (HENZHEN QIANHAI GEWU ZHIZHI TECHNOLOGY CO., LTD.) 01 March 2019 (2019-03-01) description, paragraphs [0022]-[0023], [0044]-[0046], claim 1	1-24
A	US 2017015260 A1 (LAFORGE OPTICAL, INC.) 19 January 2017 (2017-01-19) the whole document	1-24
A	US 9910298 B1 (VISION SERVICE PLAN) 06 March 2018 (2018-03-06) the whole document	1-24

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 April 2021	**16 April 2021**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **LIU,Zhangyong** Telephone No. **86-(10)-53961368**

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2020/000831

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 109032384 A	18 December 2018	None	
CN 109407858 A	01 March 2019	None	
US 2017015260 A1	19 January 2017	WO 2017131814 A1	03 August 2017
US 9910298 B1	06 March 2018	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
98104
China PELOQUIN,PLLC 800 Fifth Ave,Suite 4100
Seattle, Washington, United States of America

PeloquinMark S.

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	**16 April 2021**
Applicant's or agent's file reference	**FOR FURTHER ACTION** See paragraph 2 below
S120219PCT4	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2020/000831	**13 July 2020**	**13 July 2019**

International Patent Classification (IPC) or both national classification and IPC
G06F 3/0346(2013.01)i

Applicant
SOLOS TECHNOLOGY LIMITED

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer
National Intellectual Property Administration, PRC **China 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088**	**12 April 2021**	**LIU,Zhangyong**
Facsimile No. **(86—10) 62019451**		Telephone No. **86-(10)-53961368**

Form PCT/ISA/237 (Cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2020/000831

Box No. I **Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of:
   - [x] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2020/000831

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-24	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	None	NO

2. Citations and explanations :

[1] Cited documents

[2] D1: CN 109032384 A

[3] D2: CN 109407858 A

[4] **1. Novelty and Inventive Step**

[5] D1 discloses (see description, paragraphs [0027]-[0066]):The intelligent glasses include glasses frame body and lens. The glasses frame body comprises a temple and a frame. The lens barrel is also provided with an acceleration sensor and a gyroscope.

[6] The glasses legs are also provided with a micro-processing area. A processor is arranged in the micro-processing area and is respectively connected with the acceleration sensor and the gyroscope. Acquiring the shaking state information through a motion sensor of the wearable device. Matching the target music to be played according to the shaking state information. Controlling the playing of the target music.

[7] Claim 1 differs from D1 in that: (1)the embedded electronics system is configured for wireless communications; (2)the plurality of sensors is embedded into one or more of the reconfigurable component.

[8] Claim 12 differs from D1 in that: the above (1) ; (3) a temple insert module, wherein the temple insert module is releasably couplable with an engagement portion of a temple and the plurality of sensors is embedded into one or more of the temple insert module.

[9] Claim 20 differs from D1 in that: the processor is contained within a temple insert module and the temple insert module is contained within a temple of the eyewear device.

[10] Therefore, claims 1-24 are novel in the sense of PCT Article 33(2).

[11] D2 discloses (see description, paragraphs [0022]-[0023], [0044]-[0046],claim 1):Input module and the output module is embedded in the legs of the glasses. The processing module is embedded in the flexible circuit board of the legs of the glasses. The glasses are connected with the mobile device through Bluetooth. Therefore D2 discloses above the temple insert module and the wireless communication.

[12] Other technical features of the above-mentioned distinguishing technical features

[13] are well known in the art. Therefore, claims 1,12, 20 do not meet the requirement of PCT Article 33(3).

[14] The additional features of claims 2-11,13-19,21-24 are disclosed by D1 or are well known in the art. Therefore, claims 2-11,13-19,21-24 do not meet the requirement of PCT Article 33(3).

[15] 2 Industrial applicability

[16] Claims 1-24 meet PCT Article 33 (4).

Electronic Patent Application Fee Transmittal

Application Number:	16781897
Filing Date:	04-Feb-2020
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	2251	1	88	88
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	2820	1	800	800
		Total in USD ($)		**888**

Electronic Acknowledgement Receipt

EFS ID:	48115662
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	07-JUN-2023
Filing Date:	04-FEB-2020
Time Stamp:	14:11:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$888
RAM confirmation Number	E202367E11596508
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	20230607S120219P003EXTOFTIMEaia0022i.pdf	758546 b12cd9155ea03b51bc3d87896ac0559fa41e8887	no	2
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	20230607S120219P003RequestforContinuedExaminationRCETransmittali.pdf	1194544 3ad1d554f99cc070c45878f60e9530e4c5a06d67	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	20230606S120219P003IDSpg1to6i.pdf	1663285 c2a4d79c074e7793f18886d5ea69a40c7ed6d271	no	8
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Non Patent Literature	01S120219PCT1PCTIB2019001447isrei.pdf	1762765 699e4244d13e39bf328b7ae5d69b748adaa7101a	no	3
Warnings:					
Information:					
5	Non Patent Literature	02S120219PCT1PCTIB2019001447wosai.pdf	2515426 499d090e716c75d692850adb731e4716eeac9bd1	no	5
Warnings:					
Information:					
6	Non Patent Literature	04S120219PCT02PCTIB2020000021wosai.pdf	1878761 11f0d2aa15eabd6b39e258b93eec4708dc885a2b	no	4

Warnings:					
Information:					
7	Non Patent Literature	05S120219PCT03PCTIB2020000231isrei.pdf	1824265 c43cc5f0414dda8fdc4dfb44061015a02acd11ba	no	4
Warnings:					
Information:					
8	Non Patent Literature	03S120219PCT02PCTIB2020000021isrei.pdf	1619611 ddd86116284fce7ec5e7ad9a3a8190dfc3e56561	no	3
Warnings:					
Information:					
9	Non Patent Literature	06S120219PCT03PCTIB2020000231wosai.pdf	2259364 87c85047a4515342c60d9bd5ab01da6f5d4b20e7	no	5
Warnings:					
Information:					
10	Non Patent Literature	07S120219PCT4PCTIB2020000831isre000068enCNi.pdf	1508316 c864c88d1f2fb4937ada81c1de205af947f9e266	no	3
Warnings:					
Information:					
11	Non Patent Literature	08S120219PCT4PCTIB2020000083wosa000070enCNi.pdf	1704480 44881d036204019b5fd2e22978faf1598eaba90d	no	3
Warnings:					
Information:					
12	Fee Worksheet (SB06)	fee-info.pdf	41086 f9913286b4bb600e3a0fb72e309d8a003e0e241b	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	18730449	

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.

PTO/AIA/22 (09-22)
Approved for use through 05/31/2024. 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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): S120219.P003

Application Number: 16/781,897

Filed: FEBRUARY 04, 2020

For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Art Unit: 2651

Examiner: BLAIR, KILE O

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):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$220	$110	$55	$ 110.00
☐	Two months (37 CFR 1.17(a)(2))	$640	$320	$160	$
☐	Three months (37 CFR 1.17(a)(3))	$1,480	$740	$370	$
☐	Four months (37 CFR 1.17(a)(4))	$2,320	$1,160	$580	$
☐	Five months (37 CFR 1.17(a)(5))	$3,160	$1,580	$790	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 _____.

☑ Payment made via USPTO's patent electronic filing system (Patent Center or EFS-Web).

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 50787.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/MARK S. PELOQUIN/ — Signature

JUNE 07, 2023 — Date

MARK S. PELOQUIN — Typed or printed name

(206) 251-1699 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 forms are submitted.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0031. Public burden for this form is estimated to average 6 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, 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.

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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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013), https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to: 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law; 2) a Federal, state, local, or international agency, in response to its request; 3) a contractor of the USPTO having need for the information in order to perform a contract; 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record; 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record; 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations; 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals; 8) 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)); 9) the Office of Personnel Management (OPM) for personnel research purposes; and 9) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003	3349

51340 7590 03/15/2023

PELOQUIN, PLLC
PO Box 748
VASHON, WA 98070-0748

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2651	

MAIL DATE	DELIVERY MODE
03/15/2023	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 16/781,897	Applicant(s) Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 3/1/23.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☑ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-51 is/are pending in the application.

5a) Of the above claim(s) 29-51 is/are withdrawn from consideration.

6) ☑ Claim(s) 1-28 is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-51 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restrictions

Claims 1 and 14 are allowable. The restriction requirement, as set forth in the Office action mailed on 6/7/21, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Specifically, the restriction requirement of claims 1-28 is withdrawn. Claims 1-28 , no longer withdrawn from consideration because the claim(s) requires all the limitations of an allowable claim. However, claims 29-51, withdrawn from consideration because they do not require all the limitations of an allowable claim.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See In re Ziegler, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Allowable Subject Matter

Claims 1-28 are allowed.

The following is an examiner's statement of reasons for allowance: Applicant's argument is persuasive and applicant does discuss a sealed acoustic chamber as the enclosure which fairly suggests walls as would be understood by one of ordinary skill in the art (see provisional, page 4 of 11).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

This application is in condition for allowance except for the presence of claims 29-51 directed to an invention non-elected with traverse in the reply filed on 11/8/21. Applicant is given **TWO (2) MONTHS** from the date of this letter to cancel the noted claims or take other appropriate action (37 CFR 1.144). Failure to take action during this period will be treated as authorization to cancel the noted claims by Examiner's Amendment and pass the case to issue. Extensions of time under 37 CFR 1.136(a) will not be permitted since this application will be passed to issue.

The prosecution of this case is closed except for consideration of the above matter.

Conclusion

This application is in condition for allowance except for the following formal matters:

Withdrawn claims 29-51.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 25 USPQ 74, 453 O.G. 213, (Comm'r Pat. 1935).

A shortened statutory period for reply to this action is set to expire **TWO (2) MONTHS** from the mailing date of this letter. Extensions of time may be granted under 37 CFR 1.136 but in no case can any extension carry the date for reply to this Office action beyond the maximum period of SIX MONTHS set by statute (35 U.S.C. 133).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kile Blair whose telephone number is (571)270-3544. The examiner can normally be reached M-F.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc Nguyen can be reached on 571-272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC)

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/KILE O BLAIR/
Primary Examiner, Art Unit 2651

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	Art Unit
	Kile Blair	2651

CPC - Searched*		
Symbol	Date	Examiner
G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335	02/12/2022	KB
updated above	08/27/2022	KB
updated above	03/11/2023	KB

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
see search printout	03/11/2023	KB

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	see search printout	03/11/2023	KB

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	16683352	(eyeglasses glasses spectacles) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:23 AM
L2	4545234	(loudspeaker speaker transducer near12 ear)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L3	650755	L1 AND L2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L4	81089	L1 AND L2 NEAR100 (chamber volume cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/02/09 05:26 AM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L5	3330	(eyeglasses glasses spectacles) NEAR50 L2 NEAR100 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L6	2073	(eyeglasses glasses spectacles) NEAR20 L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L7	5707	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:28 AM

		@repd)<"20200205"	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
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L9	130522	(loudspeaker speaker transducer) NEAR10 ear	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L10	166879	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L11	57455	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/02/09 05:30 AM

		AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	94	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND ((loudspeaker speaker transducer) NEAR10 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:30 AM
L13	11	wakeland AND struzik AND williams AND silver	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:41 AM
L14	23483	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:57 AM

		@pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	11886	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L16	13857	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L17	338	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND (loudspeaker speaker transducer near12 ear) NEAR30	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/09 05:58 AM

		(chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	16	((US-20210168481-A1 OR US-20210067858-A1 OR US-20190238971-A1 OR US-20120237075-A1 OR US-20030048915-A1 OR US-20050084127-A1).did. AND PGPB.dbnm.) OR ((CN-111771387-A OR WO-2017144269-A1 OR DE-202010001503-U1 OR WO-2020206775-A1 OR WO-2020038479-A1 OR WO-2020038486-A1 OR CN-110636414-A OR KR-101819530-B1 OR KR-101786613-B1).did. AND FTDB.dbnm.) OR ((DE-102016103477-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:14 AM
L19	11	L18 AND (rubber foam vinyl loss adjfactor Young$2 modulus elastomer polyurethane melamine foam butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L20	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine foam butyl	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/02/09 06:16 AM

		rubber halobutyl)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L22	101952	(G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 11:58 PM
L23	47256	L22 AND (eyeglasses glasses spectacles)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/02/10 06:50 PM

			JPO; DERWENT; IBM_TDB)				
L24	1	(10/190604).APP.	(USPAT; USOCR)	OR	ON	ON	2022/02/12 05:52 PM
L25	17505036	(eyeglasses glasses spectacles) NEAR/10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L26	65	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L27	54	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:58 PM
L28	3	((WO-2020038479-A1 OR WO-2020206775-A1).did. AND FTDB.dbnm.) OR ((US-	(FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP,	OR	ON	ON	2022/02/12 09:30 PM

		20120237075-A1).did. AND PGPB.dbnm.)	ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); US-PGPUB)				
L29	22804	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L30	55355	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L31	97767	L22 AND (eyeglasses glasses spectacles) NEAR15L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM

L32	51928	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L33	177267	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L34	79	L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L35	55	(L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/12 09:42 PM

		@pt1d @pt3d @ptpd @read @repd)<"20200205")	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	573	L12 L17 L19 L20 L21 L26 L27 L34 L35	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L37	15	L36 AND @pd>"20220201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L38	35	L36 AND @pd>"20220801"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/03/11 02:27 PM

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	3	((eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/03/11 06:29 PM

PTO/SB/30 (11-17)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	16/781,897
Filing Date	FEBRUARY 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ VILLALPAN
Art Unit	2651
Examiner Name	BLAIR, KILE O
Attorney Docket Number	S120219.P003

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

   a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

      i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

      ii. ☐ Other _____

   b. ☑ Enclosed

      i. ☑ Amendment/Reply

      ii. ☐ Affidavit(s)/ Declaration(s)

      iii. ☐ Information Disclosure Statement (IDS)

      iv. ☐ Other _____

2. Miscellaneous

   a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

   b. ☐ Other _____

3. Fees The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

   a. ☐ The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. _____.

      i. ☑ RCE fee required under 37 CFR 1.17(e)

      ii. ☐ Extension of time fee (37 CFR 1.136 and 1.17)

      iii. ☐ Other _____

   b. ☐ Check in the amount of $ _____ enclosed

   c. ☐ Payment by credit card (Form PTO-2038 enclosed)

   d. ■ Payment by EFS-Web

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/MARK S PELOQUIN/	Date	MARCH 01 2023
Name (Print/Type)	MARK S PELOQUIN	Registration No.	50787

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being EFS-Web transmitted to the United States Patent and Trademark Office (USPTO), deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the USPTO on the date shown below.

Signature			
Name (Print/Type)		Date	

This collection of information is required by 37 CFR 1.114. 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: Mail Stop RCE, 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.

Instruction Sheet for RCEs

(not to be submitted to the USPTO)

NOTES:

An RCE is not a new application, and filing an RCE will not result in an application being accorded a new filing date.

Filing Qualifications:

The application must be a utility or plant application filed on or after June 8, 1995. The application cannot be a provisional application, a utility or plant application filed before June 8, 1995, a design application, or a patent under reexamination. See 37 CFR 1.114(e).

Filing Requirements:

Prosecution in the application must be closed. Prosecution is closed if the application is under appeal, or the last Office action is a final action, a notice of allowance, or an action that otherwise closes prosecution in the application (e.g., an Office action under *Ex parte Quayle*). See 37 CFR 1.114(b).

A submission and a fee are required at the time the RCE is filed. If reply to an Office action under 35 U.S.C. 132 is outstanding (e.g., the application is under final rejection), the submission must meet the reply requirements of 37 CFR 1.111. If there is no outstanding Office action, the submission can be an information disclosure statement, an amendment, new arguments, or new evidence. See 37 CFR 1.114(c). The submission may be a previously filed amendment (e.g., an amendment after final rejection).

WARNINGS:

Request for Suspension of Action:

All RCE filing requirements must be met before suspension of action is granted. A request for a suspension of action under 37 CFR 1.103(c) does not satisfy the submission requirement and does not permit the filing of the required submission to be suspended.

Improper RCE will NOT toll Any Time Period:

Before Appeal - If the RCE is improper (e.g., prosecution in the application is not closed or the submission or fee has not been filed) and the application is not under appeal, the time period set forth in the last Office action will continue to run and the application will be abandoned after the statutory time period has expired if a reply to the Office action is not timely filed. No additional time will be given to correct the improper RCE.

Under Appeal - If the RCE is improper (e.g., the submission or the fee has not been filed) and the application is under appeal, the improper RCE is effective to withdraw the appeal. Withdrawal of the appeal results in the allowance or abandonment of the application depending on the status of the claims. If there are no allowed claims, the application is abandoned. If there is at least one allowed claim, the application will be passed to issue on the allowed claim(s). See MPEP 1215.01.

See MPEP 706.07(h) for further information on the RCE practice.

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 Patent Application Fee Transmittal

Application Number:	16781897
Filing Date:	04-Feb-2020
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	592	592
Miscellaneous:				
RCE- 1ST REQUEST	2801	1	544	544
		Total in USD ($)		**1136**

Electronic Acknowledgement Receipt

EFS ID:	47616168
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	01-MAR-2023
Filing Date:	04-FEB-2020
Time Stamp:	21:32:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1136
RAM confirmation Number	E202331L33537201
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	20230301S120219P003EXTTIMEaia0022i.pdf	773774 b15f1b706c260f08f003cbcd307279c6c24a3332	no	2
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	20230301s120219P003RCEsb0030i.pdf	1221319 42565809ee70c556bb3033f0ccaf66c434023ff9	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Amendment Submitted/Entered with Filing of Continued Prosecution Application (CPA)/Request for Continued Examination(RCE)	20230301Respto1stOAS120219P003v02i.pdf	7410958 20cc4a072c1a741f5f783377bceb800e4fe509c5	no	32
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	40923 93013e9f1339df9495381fc53d2b435d749dde94	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	9446974		

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.

PTO/AIA/22 (03-13)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): S120219.P003

Application Number	Filed
16/781,897	02/04/2020

For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Art Unit	Examiner
2651	BLAIR, KILE O

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):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 700
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 50,787.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/MARK SPELOQUIN/ — Signature

MARCH 01, 2023 — Date

MARK S PELOQUIN — Typed or printed name

(206) 447-1336 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	16/781,897
First Named Inventor	:	Ernesto Carlos Martinez Villalpando
Filed	:	02/04/2020
TC/A.U.	:	2651
Examiner	:	BLAIR, KILE O
Confirmation No.	:	3349
Docket No.	:	S120219.P003
Customer No.	:	51340

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

COMMUNICATED VIA EFS-Web TO USPTO on 01 MARCH 2023

REQUEST FOR CONTINUED EXAMINATION (RCE) UNDER 37 CFR § 1.114

Sir:

In response to the Office Action mailed on September 01, 2022, please consider the following:

Amendments to the Claims are reflected in the listing of claims which begin on page 2 of this paper.

Remarks/Arguments begin on page 12 of this communication.

Annotated Provisional 62/801,468 is attached starting at page 22 of this communication (11 pages in length).

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims

Claim 1 (Previously presented). A method to provide audio signals to a user from an eyewear device, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the eyewear device;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

Claim 2 (Withdrawn). The method of claims 1, wherein a shape of the chamber contributes to the concentrating.

Claim 3 (Withdrawn). The method of claim 2, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

Claim 4 (Withdrawn). The method of claim 2, wherein the shape is generally parabolic.

Claim 5 (Original). The method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 6 (Original). The method of claim 5, the portion absorbs vibrational energy.

Claim 7 (Original). The method of claim 6, wherein the portion is forward of the chamber.

Claim 8 (Original). The method of claim 6, wherein the portion is rear of the chamber.

Claim 9 (Original). The method of claim 6, wherein the portion is an outer surface of the chamber.

Claim 10 (Withdrawn). The method of claim 1, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the eyewear device.

Claim 11 (Original). The method of claim 1, wherein a speaker is used in the generating.

Claim 12 (Withdrawn). The method of claim 11, wherein the speaker is located within a temple of the eyewear device.

Claim 13 (Original). The method of claim 11, wherein the speaker is located within a temple insert module of the eyewear device.

Claim 14 (Original). An apparatus to provide audio signals to a user from an eyewear device, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is a part of a volume of the eyewear device, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume;

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

Claim 15 (Original). The apparatus of claim 14, wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

Claim 16 (Previously presented). The apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy.

Claim 17 (Withdrawn). The apparatus of claim 14, wherein the inner surface forms a curved shape around the at least one speaker.

Claim 18 (Withdrawn). The apparatus of claim 17, wherein the curved shape is generally parabolic.

Claim 19 (Withdrawn). The apparatus of claim 14, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

Claim 20 (Withdrawn). The apparatus of claim 19, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of acoustic energy.

Claim 21 (Withdrawn). The apparatus of claim 19, wherein a shape of the external sound cover is concave towards the user's ear.

Claim 22 (Withdrawn). The apparatus of claim 14, wherein the chamber is located within a temple of the eyewear device.

Claim 23 (Original). The apparatus of claim 14, wherein the chamber is located within a temple insert module of the eyewear device.

Claim 24 (Original). The apparatus of claim 14, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 25 (Original). The apparatus of claim 24, the portion absorbs vibrational energy.

Claim 26 (Original). The apparatus of claim 25, wherein the portion is forward of the chamber.

Claim 27 (Original). The apparatus of claim 25, wherein the portion is rear of the chamber.

Claim 28 (Original). The apparatus of claim 25, wherein the portion is an outer surface of the chamber.

Claim 29 (Withdrawn). An apparatus to provide audio signals to a user from a temple interlock, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is contained within a volume of the temple interlock, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume; and

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the temple interlock is attached to the eyewear device and the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

Claim 30 (Withdrawn). The apparatus of claim 29, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 31 (Withdrawn). The apparatus of claim 30, the portion absorbs vibrational energy.

Claim 32 (Withdrawn). The apparatus of claim 31, wherein the portion is forward of the chamber.

Claim 33 (Withdrawn). The apparatus of claim 31, wherein the portion is rear of the chamber.

Claim 34 (Withdrawn). The apparatus of claim 31, wherein the portion is an outer surface of the chamber.

Claim 35 (Withdrawn). The apparatus of claim 29, wherein the inner surface forms a curved shape around the at least one speaker.

Claim 36 (Withdrawn). The apparatus of claim 35, wherein the curved shape is generally parabolic.

Claim 37 (Withdrawn). The apparatus of claim 29, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

Claim 38 (Withdrawn). The apparatus of claim 37, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of vibrational energy.

Claim 39 (Withdrawn). The apparatus of claim 37, wherein a shape of the external sound cover is concave towards the user's ear.

Claim 40 (Withdrawn). A method to provide audio signals to a user from a temple interlock, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the temple interlock;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

Claim 41 (Withdrawn). The method of claims 40, wherein a shape of the chamber contributes to the concentrating.

Claim 42 (Withdrawn). The method of claim 41, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

Claim 43 (Withdrawn). The method of claim 41, wherein the shape is generally parabolic.

Claim 44 (Withdrawn). The method of claim 40, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the temple interlock has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 45 (Withdrawn). The method of claim 44, the portion absorbs vibrational energy.

Claim 46 (Withdrawn). The method of claim 45, wherein the portion is an outer surface of the chamber.

Claim 47 (Withdrawn). The method of claim 40, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the temple interlock.

Claim 48 (Withdrawn). An apparatus to increase a signal-to-noise ratio of audio signals directed towards a user's ear, comprising:

an external sound cover, the external sound cover further comprising:

an inner surface; and

an outer surface, the external sound cover is configured for attachment to a temple of an eyewear device, wherein in operation, audio signals emitted from an acoustic

port of an eyewear device reflect off of the inner surface and are directed thereby toward the user's ear.

Claim 49 (Withdrawn). The apparatus of claim 48, wherein a material property of the outer surface is selected to provide absorption of acoustic energy incident thereon, thereby increasing a signal-to-noise ratio of the audio signals.

Claim 50 (Withdrawn). The apparatus of claim 48, wherein a material property of the outer surface is selected to reflect acoustic energy incident thereon away from the user, thereby increasing a signal-to-noise ratio of the audio signals.

Claim 51 (Withdrawn). The apparatus of claim 48, wherein in operation the external sound cover prevents windborne turbulence from impinging on the user's ear, thereby increasing a signal-to-noise ratio of the audio signals.

Response to Rejection of: Claims 1, 11, 13, 14, and 23 are rejected under 35 U.S.C. § 103 – as being unpatentable over Huang WO 2020206775 (hereinafter referred to as "Huang."

Response to Rejection of: Claim 5-9, 15, 16, and 24-28 are rejected under 35 U.S.C. § 103 – as being unpatentable over Huang, Chen (WO 2020038479, and East (US 20120237075.

Applicant respectfully points out that according to the MPEP §2143, to establish a *prima facie* case of obviousness, three basic criteria must be met:

- 1st there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings;
- 2nd there must be a reasonable expectation of success;
- 3rd the prior art reference (or references when combined) must teach or suggest all of the claim limitations (arranged as in the claim).

These criteria have not been met by the Office's rejection of Applicant's Claims 1, 5-9, 11, 13-16, and 23-28.

Claims 1, 11, 13, 14, and 23

Huang Is Not A Proper Reference to Sustain A Rejection Under 35 USC 103. The Huang Reference's Priority Date Is Not Earlier Than Applicant's Priority Date.

Applicant's instant patent application SN 16/781,897 claims the benefit of earlier filed provisional patent application SN 62/801,468. SN 62/801,468 has a filing date of February 5, 2019.

Huang states "This application is based on a Chinese patent application with an application number of 201910296023.4 having a filing date of April 12, 2019, and claims its priority." Applicant's priority date is earlier than Huang's priority date. Therefore, Huang is not a proper reference to use in the current rejection under 35 USC 103.

Applicant respectfully requests the removal of the 35 USC 103 rejection and the allowance of all claims.

Claims 5-9, 15, 16, and 24-28.

Dependent claims 5-9, 15, 16, and 24-28 depend from independent claims 1 and 14. Applicant's priority date is earlier than Huang's priority date. Therefore, Huang is not a proper reference to use in the current rejection under 35 USC 103. Dependent claims, 5-9, 15, 16, and 24-28, are allowable over the cited art for at least the reasons presented above in regard to independent claims 1 and 14. Applicant respectfully requests the removal of the 35 USC 103 rejection and the allowance of all claims.

PROVISIONAL 62/801,468

The Office contends that:

"the Provisional 62/801,468 does not clearly demonstrate the concept that the port is in the chamber or that the port is positioned in a wall of the chamber as recited in claims 1 and 14."

Office Action, pg 8.

Applicant respectfully disagrees, the opening is clearly taught as being in a wall of the chamber thereby directing sound out from the chamber in a downward angle in a direction of a user's ear. Provisional 62/801,468, hereinafter the '468 Provisional contains full and unambiguous support for the detailed description and claims in the non-provisional patent application 16/781,897. The '468 Provisional (annotated) is attached below for the convenience of the Office.

Applicant's claims 1 and 14 read as follows:

"Claim 1 (Previously presented). A method to provide audio signals to a user from an eyewear device, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the eyewear device;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber."

Applicant's Claim 1.

"Claim 14 (Original). An apparatus to provide audio signals to a user from an eyewear device, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is a part of a volume of the eyewear device, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume;

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface."

Applicant's Claim 14.

'468 PROVISIONAL SUPPORT

Support for a chamber and an audio port as claimed is found in the excerpts from the '468 Provisional shown directly below:

"**Each temple portion can house a speaker arrangement** therein that is configured and positioned for **directing concentrated sound out of the audio port rearwardly and at a downward angle into a respective ear**....**The microspeaker can be positioned** at about the **focus of the generally parabolic shape** of the concave sound reflecting surface **to direct sound waves towards or into the concave sound reflecting surface**, which then reflects and concentrates the sound waves into the generally parallel column of sound waves which travels away from the concave sound reflecting surface and **out the audio port** in the direction of the axis of symmetry of the generally parabolic shape."

'468 Provisional, p. 2, lines 3-6, and 7-12.

The '468 Provisional provides clear support for the claim limitations. Note that the excerpt from '468 provisional cited directly above teaches that the temple portion houses a speaker arrangement thereby creating a chamber. The micro speaker directs sound waves towards or into the concave reflecting surface, which then reflects and concentrates the sound waves into the generally parallel column of sound waves which travels away from the concave sound reflecting surface and **out the audio port rearwardly** and at a down angle into a respective ear. This arrangement is shown in Figure 2 and Figure 3 below. It is clear from the '468 Provisional excerpts, discussed above, that there is an opening in the chamber through which sound is directed into a direction of the user's ear.

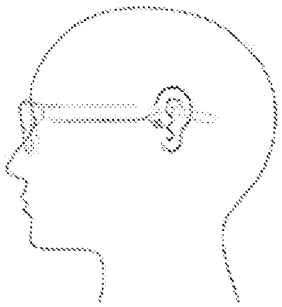


Figure 2. Microspeaker projection speaker location embedded inside temple housing.

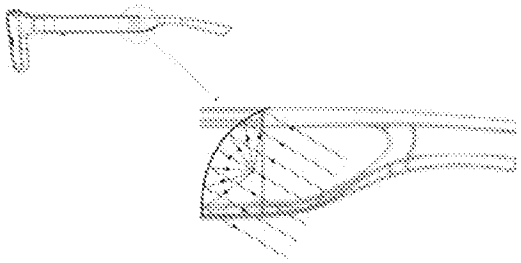


Figure 3. Parabolic inner sealed structure.

2. Variable density thermoplastic acoustic enclosure:

In addition to the inner structure design of the acoustic chamber, the material of the inner wall of the device temples that house the electronics and sealed microspeakers are utilized to enhance the directionality of the audible sound that is being emitted. The inner wall material of the overall enclosure can have a variation of its density properties to maximize the dampening and reflectivity effects of of the sound wave emitted by the microspeakers. This material density can have a non-linear variation to optimize the sound wave directionality characteristics and will consider the location with respect to the ear canal. The material distal to the ear canal (i.e. proximal to the front of the frame) can have increased dampening properties and the zone that encloses that speaker box and

---

'468 Provisional Fig. 2 & 3

Further teaching concerning the opening is found in the following, but not limited to:

> "The at least one speaker arrangement can have a sound generating speaker positioned adjacent to an acoustic reflector that is shaped to concentrate sound or sound waves generated by the speaker and directionally **deliver the sound into an ear of a user through an audio port located near the ear** for listening by the user, but not bystanders…… The speaker can be a microspeaker, and the **audio ports** can be positioned to be oriented diagonally relative to the user's ear canal (emphasis added) (emphasis added)."

'468 Provisional, p. 1.

> "**Each temple portion can house a speaker arrangement** therein that is configured and positioned for **directing concentrated sound out of the audio port rearwardly and at a downward angle into a respective ear** (emphasis added)."

'468 Provisional, p. 2, lines 3-6.

1. Parabolic **microchamber** design for sound pressure concentration and directionality. The microspeaker system and electronics are embedded in each of the temples of the modularized glasses. The relative location of the each of the speakers inside the temple enclosure minimizes the linear distance with respect to the ear canal. Furthermore, the **microspeaker output ports are diagonally facing the ear canals** for the left and side of the eyewear. The temples act as the the enclosure of the electronics and house the microspeakers. The design of the temples provide a sealed acoustic chamber. The **acoustic enclosure** that **surrounds the micro speaker chamber** has an **internal concave structure** with parabolic design that allows for enhanced focal reflectivity directed to the listeners ear canal.

'468 Provisional, p. 3-4.

EXTERNAL SOUND COVERS EXTEND BEYOND THE AUDIO PORTS

Note that external sound covers extend from each temple beyond the audio ports as shown in Figure 5 and described on page 2:

> "External sound covers can be included and extend from each temple portion **beyond the audio port** for further directing the concentrated sound from the speaker arrangement into the user's ear and minimizing entry of external sounds (emphasis added)."

'468 Provisional, p. 2.

personal audio directionality, and sound vectoring and transfer to the target listener. This reflector minimizes the audible sound broadcasting and leakage reducing the audible-level the sound that becomes noise to non-target-listeners. This reflector cover can be permanently attached and hinged to the temple of the eyewear. The listener can rotate the cover and further provide a reflection surface to direct the sound. While not in use, the listener can retract or remove the cover back to the temple or remove it entirely. This reflector can consist of the same material of the temple and if fully removable can be added in variable sizes depending on the user's requirements. One additional benefit of this reflector is the deflection of headwind if the listener uses the audio headworn device in mobile and outdoor environments where wind conditions can negatively impact the audio performance and directionality of the audible sound.

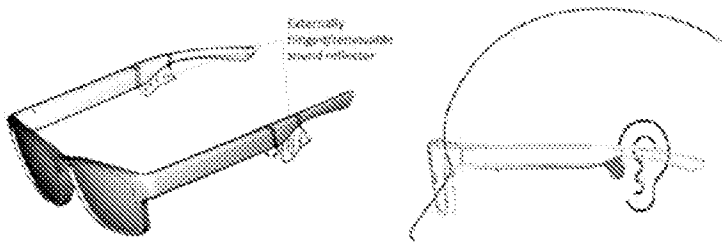


Figure 5. External sound reflector cover.

2926736_1

‘468 Provisional Fig. 5

CONCLUSION

Claims 1, 5-9, 11, 13-16, and 23-28 are pending.

Applicant respectfully submits that all claims are in condition for allowance and requests such.

Communication via cleartext email is authorized.

Respectfully submitted,

PELOQUIN, PLLC

March 01, 2023
Date

/Mark S. Peloquin/
Mark S. Peloquin, Esq.
USPTO Registration # 50,787

Docket No. 0717.2268-000

Inventor(s): Ernesto Carlos Martinez Villalpando

Personalized Directional Audio For Head-Worn Audio Projection Devices With Near-Ear (Electro-Dynamic) Microspeaker System

Background

With the rapid development of head-worn wearable audio and multimedia devices such as wireless headphones, augmented reality headsets and smart eyewear with embedded audio, technologies such as microspeaker audio projection systems have been recently increased their range of applications. Specifically, the integration of these systems to provide personal audible sound transmission experiences has been rapidly been of interest to the consumer market. Creating and enhanced audible user experience for the listener is one of the major concerns for the device designers, manufacturer and ultimately the consumer. An enhanced personalized audio experience directly results from the design, development and integration of the embedded microspeaker system and its acoustic performance.

Summary

The present invention can provide a head worn audio system including a head securement unit. At least one speaker unit or arrangement can be associated with the head securement unit. The at least one speaker arrangement can have a sound generating speaker positioned adjacent to an acoustic reflector that is shaped to concentrate sound or sound waves generated by the speaker and directionally deliver the sound into an ear of a user through an audio port located near the ear for listening by the user, but not bystanders.

In particular embodiments, the acoustic reflector can have a curved concave sound reflecting surface. The curved concave sound reflecting surface can have a generally parabolic shape for reflecting and directing a generally parallel column of sound waves to the user's ear. The speaker can be a microspeaker, and the audio ports can be positioned to be oriented diagonally relative to the user's ear canal. Two speaker arrangements can be associated with the head

securement unit on opposite sides for directionally delivering concentrated sound to the right and left ears of the user. In some embodiments, the head securement unit can comprise eyewear or eyeglasses having a front frame portion and two side stem or temple portions. Each temple portion can house a speaker arrangement therein that is configured and positioned for directing concentrated sound out of the audio port rearwardly and at a downward angle into a respective ear. In some embodiments, each acoustic reflector can be positioned within a respective temple portion, with the concave sound reflecting surface facing in a rearward downward angle. The microspeaker can be positioned at about the focus of the generally parabolic shape of the concave sound reflecting surface to direct sound waves towards or into the concave sound reflecting surface, which then reflects and concentrates the sound waves into the generally parallel column of sound waves which travels away from the concave sound reflecting surface and out the audio port in the direction of the axis of symmetry of the generally parabolic shape. Each temple portion can have a region of vibration damping material between the speaker arrangement and the front frame portion for minimizing mechanical vibration and leakage of sound. Each temple portion can include inner wall material that varies in density properties, providing acoustic reflectivity around the speaker or speaker arrangement, and acoustic damping between the speaker or speaker arrangement and the front frame portion. The inner wall material can have a material density with a non-linear variation extending in the direction from the speaker to the front frame portion. In some embodiments, the inner wall material can be layered. External sound covers can be included and extend from each temple portion beyond the audio port for further directing the concentrated sound from the speaker arrangement into the user's ear and minimizing entry of external sounds. The sound covers can be adjustable, removable or integral.

The present invention can also provide a method of using a head worn audio system including securing the head worn audio system to user's head with a head securement unit. The user can listen to sound generated by at least one speaker arrangement associated with the head securement unit. The at least one speaker arrangement can include a speaker adjacent to an acoustic reflector that is shaped to concentrate sound generated by the speaker and directionally deliver the concentrated sound into an ear of the user through an audio port located near the ear for listening by the user, but not bystanders.

Particular embodiments can include features of claims 2-11.

Invention includes:

Head-worn electrodynamic microprojection speaker system that can be embedded on modular eyewear with interchangeable temples with integrated electronics or it can be embedded in a stand-alone audio device. The purpose of this invention is for reproducing audible sound in stereo mode or monoaural sound with personalized directionality to a single user while minimizing the audible sound to multiple listeners at the same time. The system can reduce to a minimum audible-level the sound that becomes noise to non-target-listeners. The system described is in a modular eyewear system that can be used with ophthalmic frames and lenses or with sunglasses design embodiments.

A sharper directivity for personal listening serves as a basis for mobile Augmented and Assisted Reality head-worn device applications. Current methods for sound transmission to a user include broad projection speakers and/or bone-conduction technologies which have lower transmission efficiencies with lower sound energy levels delivered to the user.

A Parabolic MicroChamber Design for personalized directional near-ear projection speaker system with headwear Integration is covered in this invention. This design allows for Sound Pressure Concentration vector to maximize individual audible -sound perception by single user while integrated in headwear accessories including eyewear.

This invention covers a novel approach to maximize audible sound perception by a user leading with a spot design and facilitation of sound pressure/wave travel, absorption and directionality. In combination, the following list approach can result in reduction of sound leakage, enhancement of audible sound pressure directionality and a reduction of power (battery) requirements for sound transmission.

The invention description is comprised of three areas:

1. Parabolic microchamber design for sound pressure concentration and directionality. The microspeaker system and electronics are embedded in each of the temples of the modularized glasses. The relative location of the each of the speakers inside the temple

enclosure minimizes the linear distance with respect to the ear canal. Furthermore, the microspeaker output ports are diagonally facing the ear canals for the left and side of the eyewear. The temples act as the the enclosure of the electronics and house the microspeakers. The design of the temples provide a sealed acoustic chamber. The acoustic enclosure that surrounds the micro speaker chamber has an internal concave structure with parabolic design that allows for enhanced focal reflectivity directed to the listeners ear canal. With the concave inner structure design of the microspeaker sealed enclosure inside the eyewear the device achieves higher sound energy delivered to the user while minimizing audible sound dispersion that can be perceived by non-targeted listeners.

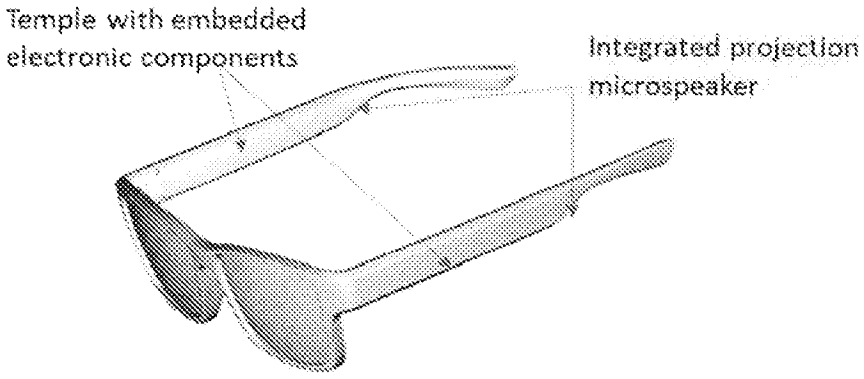


Figure 1. Electronic eyewear with integrated electronics in the temple housing and microspeaker projection system

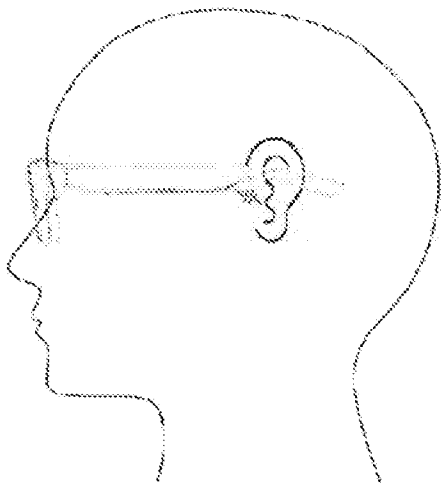


Figure 2. Microspeaker projection speaker location embedded inside temple housing.

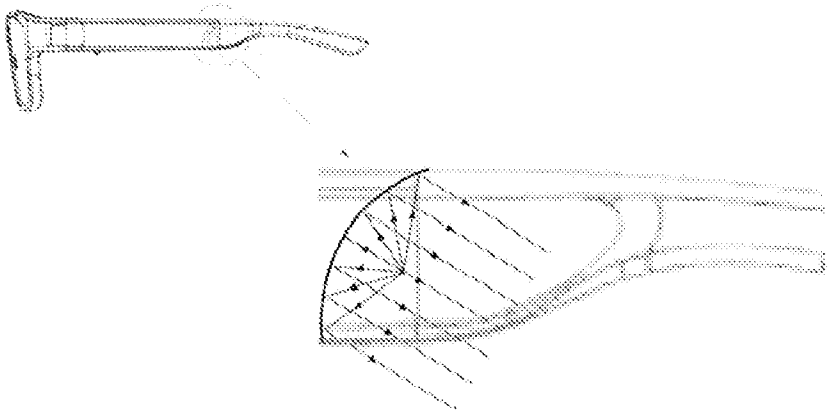


Figure 3. Parabolic inner sealed structure.

2. Variable density thermoplastic acoustic enclosure:

In addition to the inner structure design of the acoustic chamber, the material of the inner wall of the device temples that house the electronics and sealed microspeakers are utilized to enhance the directionality of the audible sound that is being emitted. The inner wall material of the overall enclosure can have a variation of its density properties to maximize the dampening and reflectivity effects of of the sound wave emitted by the microspeakers. This material density can have a non-linear variation to optimize the sound wave directionality characteristics and will consider the location with respect to the ear canal. The material distal to the ear canal (i.e. proximal to the front of the frame) can have increased dampening properties and the zone that encloses that speaker box and

microspeaker (proximal to the ear canal) increases the sound reflectivity. The dampening effect of the material proximal to the front of the frame minimizes mechanical vibration that can translate to leaked sound as a result from the resonance of the enclosed speaker while emitting audible sound. Furthermore, this material can act as an inner enclosure insulator to minimize the tactile sensory effect that such vibrations cause on the listeners upon contact with the device while being worn. The material layering that is utilized in the surrounding zone of the microspeaker enclosure can maximize the reflectivity of the audible sound emitted and focally direct it to the listener ear canal. The combination of the variable density material layering in combination with the design of the sealed acoustic chamber as described below can maximize directionality of the projected sound. The material towards the exterior of the temple, can also act as an isolation element to avoid audible sound leakage through the rest of the frame. Combination of proprietary manufacturing processes including 3D printing, injection molding and over molding techniques can obtain the desired acoustic effects.

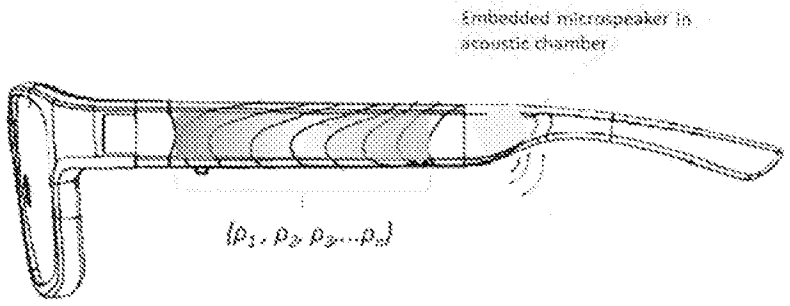


Figure 4. Variable density thermoplastic layering for inner chamber wall. Densities are described by $\{\rho_1, \rho_2, \rho_3, \ldots, \rho_n\}$

3. Mechanical external sound reflector cover. An external reflector cover or lobe can be added as a permanent hinged or removable accessory to further enhance the effect of

personal audio directionality, and sound vectoring and transfer to the target listener. This reflector minimizes the audible sound broadcasting and leakage reducing the audible-level the sound that becomes noise to non-target-listeners. This reflector cover can be permanently attached and hinged to the temple of the eyewear. The listener can rotate the cover and further provide a reflection surface to direct the sound. While not in use, the listener can retract or remove the cover back to the temple or remove it entirely. This reflector can consist of the same material of the temple and if fully removable can be added in variable sizes depending on the user's requirements. One additional benefit of this reflector is the deflection of headwind if the listener uses the audio headworn device in mobile and outdoor environments where wind conditions can negatively impact the audio performance and directionality of the audible sound.

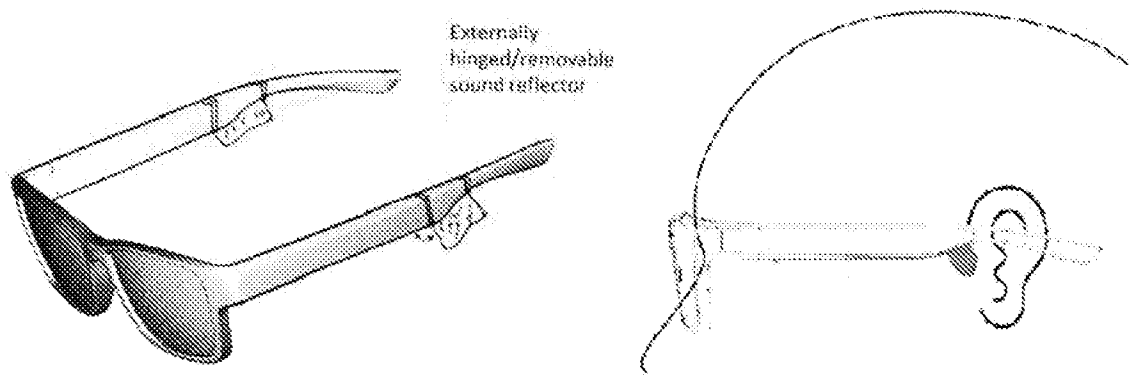


Figure 5. External sound reflector cover.

While example embodiments have been particularly shown and described, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the embodiments encompassed by the appended claims.

CLAIMS

What is claimed is:

1. A head worn audio system comprising:

a head securement unit; and

at least one speaker arrangement associated with the head securement unit, the at least one speaker arrangement including a speaker adjacent to an acoustic reflector that is shaped to concentrate sound generated by the speaker and directionally deliver the sound into an ear of a user through an audio port located near the ear for listening by the user, but not bystanders.

2. The audio system of claim 1 in which the acoustic reflector has a curved concave sound reflecting surface.

3. The audio system of claim 2 in which the curved concave sound reflecting surface has a generally parabolic shape for directing a generally parallel column of sound waves to the user's ear.

4. The audio system of claim 3 in which the speaker is a microspeaker, and the audio ports are positioned to be diagonal relative to the user's ear canal.

5. The audio system of claim 4 in which two speaker arrangements are associated with the head securement unit on opposite sides for directionally delivering concentrated sound to right and left ears of the user.

6. The audio system of claim 5 in which the head securement unit comprises eyewear having a front frame portion and two temple portions, each temple portion housing a

speaker arrangement therein positioned for directing concentrated sound out of the audio port rearwardly and angled downwardly into a respective ear.

7. The audio system of claim 6 in which each temple portion has a region of vibration damping material between the speaker arrangement and the front frame portion for minimizing mechanical vibration and leakage of sound.

8. The audio system of claim 7 in which each temple portion includes inner wall material that varies in density properties, providing acoustic reflectivity around the speaker, and acoustic damping between the speaker and the front frame portion.

9. The audio system of claim 8 in which the inner wall material has a material density with a non-linear variation extending in the direction from the speaker to the front frame portion.

10. The audio system of claim 8 in which the inner wall material is layered.

11. The audio system of claim 6 further comprising external sound covers extending from each temple portion beyond the audio port for further directing the concentrated sound from the speaker arrangement into the user's ear and minimizing entry of external sounds.

12. A method of using a head worn audio system comprising:

securing the head worn audio system to a user's head with a head securement unit; and

listening to sound generated by at least one speaker arrangement associated with the head securement unit, the at least one speaker arrangement including a speaker adjacent to an acoustic reflector that is shaped to concentrate sound generated by the

speaker and directionally deliver the concentrated sound into an ear of the user through an audio port located near the ear for listening by the user, but not bystanders.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/781,897	Filing Date 02/04/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	03/01/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 51	Minus	** 51	= 0		x $40 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $192 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VINCENT S BUTLER/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003	3349

51340 7590 09/01/2022

PELOQUIN, PLLC
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VASHON, WA 98070-0748

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2651	

MAIL DATE	DELIVERY MODE
09/01/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 16/781,897	Applicant(s) Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 8/15/22.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-51 is/are pending in the application.

5a) Of the above claim(s) 2-4,10,12,17-22 and 29-51 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,5-9,11,13-16 and 23-28 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-51 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 11, 13, 14, and 23 are rejected under 35 U.S.C. 103 as being unpatentable over Huang (WO 2020206775, see English translation).

Regarding claim 1, Huang teaches

a method to provide audio signals to a user from an eyewear device (provide directional sound output structurer near the ear and audio glasses, Huang, [0006]), comprising

generating audio signals within a chamber (sound waves are transmitted through the first sound cavity 15; sound generator 11 is mounted in first sound cavity 15, Huang, figs 5 & 6), the chamber is a part of a volume of the eyewear device (first sound cavity 15, Huang, [0043], fig 6):

concentrating the audio signals for delivery to the user's ear (the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body, Huang, [0027]; sound emitted by sounder 11 can be transmitted form the sound guide opening 172 through the first sound outlet 12, Huang, [0048]; it is noted that Huang says it backwards in [0048] that sound goes from 12 to 172 when obviously Huang or the machine translator meant 172 to 12 as is inherent in the figures; also, it is noted that this is one

meaning of "concentrating" in light of applicant's specification, see fig. 17 and [0103] of specification and compare to fig. 6 of Huang; also see [0044] of Huang where sound is concentrated on inner wall to form a concentrated state and then transmitted from the first sound outlet 12, Huang, [0044]); and

transmitting the audio signals to the user's ear (transmitted to ear hole, Huang, [0048]),

the audio signals are transmitted through a port in the chamber (first sound hole 12 is a port in the chamber first sound cavity 15, Huang, [0043], fig 6).

Regarding claim 11, Huang teaches the method of claim 1, wherein a speaker is used in the generating (sound generator 11, Huang, [0044]; sound generator is clearly a speaker, Huang, [0011]).

Regarding claim 13, Huang teaches the method of claim 11, wherein the speaker is located (sounder 11 located in mounting cavity 10, Huang, [0042]) within a temple (mounting cavity formed in inner cavity of temple, Huang, [0023]) insert module (mounting seat/base 17, Huang, [0050], figs 6 & 7) of the eyewear device (mounting base 17 is detachably fixed in the mounting cavity 10, Huang, [0050]).

Regarding claim 14, Huang teaches an apparatus to provide audio signals to a user from an eyewear device (sound output near ear in audio glasses, Huang, [0009]), comprising:

a chamber (first sound cavity 15, Huang, [0044-0045], fig 6), the chamber is defined by an interior surface (inner wall of the first sound cavity 15 has an arc-shaped structure, Huang, [0044], fig 6),

the chamber is a part of a volume of the eyewear device (first sound cavity 15, Huang, [0043], fig 6), the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume (sound generator 11, Huang [0043], fig 6);

an acoustic port (first sound outlet 12, Huang, [0044-0045], fig 6), the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device (the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body, Huang, [0027]; sound emitted by sounder 11 can be transmitted form the sound guide opening 172 through the first sound outlet 12, Huang, [0048]; it is noted that Huang says it backwards in [0048] that sound goes from 12 to 172 when obviously Huang or the machine translator meant 172 to 12 as is inherent in the figures; also, it is noted that this is one meaning of "concentrating" in light of applicant's specification, see fig. 17 and [0103] of specification and compare to fig. 6 of Huang; also see [0044] of Huang where sound is concentrated on inner wall to form a concentrated state and then transmitted from the first sound outlet 12, Huang, [0044]); and

an outer surface, the outer surface is exterior to the inner surface (external surfaces of first housing 211 and second housing 212, Huang, [0063], fig 6).

Claim 23 is substantially similar to claim 13 and is rejected for the same reasons.

Claims 5-9, 15, 16, and 24-28 are rejected under 35 U.S.C. 103 as being unpatentable over Huang, Chen (WO 2020038479, see English translation), and East (US 20120237075).

Regarding claim 5, Huang teaches the method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity,

the first acoustic reflectivity is greater than the second acoustic reflectivity.

Chen teaches audio glasses (glasses with functional component 20, where functional component can be speaker, Chen, fig 1, see pg. 4 of English translation) with a transducing device 22 housed inside a housing 210 with sound introduction holes (Chen, see pg. 28 of English translation) wherein there is a damping layer material on the outside of the opening of the sound introduction hole 230 (Chen, pg. 29 of English translation, fig 23),

East teaches that the housing for audio glasses (East, [0058], fig 2a) may be made of a rigid material or a soft material (East, [0039]).

Huang teaches the first sound cavity 15 serves a sound guiding wall which reflects sound (Huang, [0046]). Based on that it would have been readily apparent that the material used in the inner surface of the sound cavity 15 is an acoustically reflective material.

Accordingly, it would have been obvious to one of ordinary skill in the art to use a reflective material for the inner surface and an acoustically absorbing soft material for the outer surface of the housing since Huang teaches the reflective inner surface and Chen teaches a the absorptive outer surface and East generally points out that the materials used in audio glasses will be rigid acoustically reflective materials or soft acoustically absorptive materials and therefore configuring the housing such that the inner surface has a more reflective material than the outer surface would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 6, Huang, Chen, and East teach the method of claim 5, the portion absorbs vibrational energy (damping layer material on the outside of the opening of the sound introduction hole 230, Chen, pg. 29 of English translation, fig 23).

Regarding claim 7, Huang, Chen, and East teach the method of claim 6.

Although Huang, Chen, and East do not teach wherein the portion is forward of the chamber, as pointed out in the rejection of claim 5, it would have been obvious to make various parts of the outer surface of the audio glasses housing with a soft material including parts forward of the first sound cavity 15 of Huang since doing so would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 8, Huang, Chen, and East teach the method of claim 6.

Although Huang, Chen, and East do not teach wherein the portion is rear of the chamber, as pointed out in the rejection of claim 5, it would have been obvious to make various parts of the outer surface of the audio glasses housing with a soft material including parts rear of the first sound cavity 15 of Huang since doing so would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 9, Huang, Chen, and East teach the method of claim 6.

Although Huang, Chen, and East do not teach wherein the portion is an outer surface of the chamber, as pointed out in the rejection of claim 5, it would have been obvious to make various parts of the outer surface of the audio glasses housing with a soft material including parts on the outside of the shell of Huang (Huang, [0063], fig 7) such as the damping layer of Chen outside the sound introduction hole 230 (Chen, pg. 28 of English translation) since doing so would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 15, Huang, Chen, and East teach the apparatus of claim 14.

However, Huang, Chen, and East do not teach wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

Chen teaches audio glasses (glasses with functional component 20, where functional component can be speaker, Chen, fig 1, see pg. 4 of English translation) with a transducing

device 22 housed inside a housing 210 with sound introduction holes (Chen, see pg. 28 of English translation) wherein there is a damping layer material on the outside of the opening of the sound introduction hole 230 (Chen, pg. 29 of English translation, fig 23),

East teaches that the housing for audio glasses (East, [0058], fig 2a) may be made of a rigid material or a soft material (East, [0039]).

Huang teaches the first sound cavity 15 serves a sound guiding wall which reflects sound (Huang, [0046]). Based on that it would have been readily apparent that the material used in the inner surface of the sound cavity 15 is an acoustically reflective material.

Accordingly, it would have been obvious to one of ordinary skill in the art to use a reflective material for the inner surface and an acoustically absorbing soft material for the outer surface of the housing since Huang teaches the reflective inner surface and Chen teaches a the absorptive outer surface and East generally points out that the materials used in audio glasses will be rigid acoustically reflective materials or soft acoustically absorptive materials and therefore configuring the housing such that the inner surface has a more reflective material than the outer surface would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 16, Huang, Chen, and East teach the apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy (damping layer material on the outside of the opening of the sound introduction hole 230, Chen, pg. 29 of English translation, fig 23).

Claim 24 is substantially similar to claim 5 and is rejected for the same reasons.

Claim 25 is substantially similar to claim 6 and is rejected for the same reasons.

Claim 26 is substantially similar to claim 7 and is rejected for the same reasons.

Claim 27 is substantially similar to claim 8 and is rejected for the same reasons.

Claim 28 is substantially similar to claim 9 and is rejected for the same reasons.

Response to Arguments

Applicant's arguments filed 8/15/22 have been fully considered but they are not persuasive.

Applicant argues that the Huang reference is not eligible prior art; however, the provisional 62/801,468 does not clearly demonstrate the concept that the port is in the chamber or that the port is positioned in a wall of the chamber as recited in claims 1 and 14.

Accordingly, the provisional application is not effective to establish priority since it does not disclose the claimed invention with a written description as required by 35 U.S.C. 112(a).

Claim 12 should have been listed as withdrawn on the PTO-326 mailed 2/15/22 since it is part of inventions 1A, 2A, and 3A (i.e. species A).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kile Blair whose telephone number is (571)270-3544. The examiner can normally be reached M-F.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc Nguyen can be reached on 571-272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KILE O BLAIR/
Primary Examiner, Art Unit 2651

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	Art Unit
	Kile Blair	2651

CPC - Searched*		
Symbol	Date	Examiner
G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335	02/12/2022	KB
updated above	08/27/2022	KB

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	16683352	(eyeglasses glasses spectacles) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:23 AM
L2	4545234	(loudspeaker speaker transducer near12 ear)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L3	650755	L1 AND L2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L4	81089	L1 AND L2 NEAR100 (chamber volume cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/02/09 05:26 AM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L5	3330	(eyeglasses glasses spectacles) NEAR50 L2 NEAR100 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L6	2073	(eyeglasses glasses spectacles) NEAR20 L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L7	5707	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:28 AM

		@repd)<"20200205"	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	3316	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:28 AM
L9	130522	(loudspeaker speaker transducer) NEAR10 ear	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L10	166879	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L11	57455	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/02/09 05:30 AM

		AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	94	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND ((loudspeaker speaker transducer) NEAR10 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:30 AM
L13	11	wakeland AND struzik AND williams AND silver	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:41 AM
L14	23483	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:57 AM

		@pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	11886	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L16	13857	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L17	338	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND (loudspeaker speaker transducer near12 ear) NEAR30	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/09 05:58 AM

		(chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	16	((US-20210168481-A1 OR US-20210067858-A1 OR US-20190238971-A1 OR US-20120237075-A1 OR US-20030048915-A1 OR US-20050084127-A1).did. AND PGPB.dbnm.) OR ((CN-111771387-A OR WO-2017144269-A1 OR DE-202010001503-U1 OR WO-2020206775-A1 OR WO-2020038479-A1 OR WO-2020038486-A1 OR CN-110636414-A OR KR-101819530-B1 OR KR-101786613-B1).did. AND FTDB.dbnm.) OR ((DE-102016103477-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:14 AM
L19	11	L18 AND (rubber foam vinyl loss adjfactor Young$2 modulus elastomer polyurethane melamine foam butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L20	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine foam butyl	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/02/09 06:16 AM

		rubber halobutyl)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L22	101952	(G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 11:58 PM
L23	47256	L22 AND (eyeglasses glasses spectacles)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/02/10 06:50 PM

			JPO; DERWENT; IBM_TDB)				
L24	1	(10/190604).APP.	(USPAT; USOCR)	OR	ON	ON	2022/02/12 05:52 PM
L25	17505036	(eyeglasses glasses spectacles) NEAR/10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L26	65	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L27	54	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:58 PM
L28	3	((WO-2020038479-A1 OR WO-2020206775-A1).did. AND FTDB.dbnm.) OR ((US-	(FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP,	OR	ON	ON	2022/02/12 09:30 PM

		20120237075-A1).did. AND PGPB.dbnm.)	ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); US-PGPUB)				
L29	22804	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L30	55355	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L31	97767	L22 AND (eyeglasses glasses spectacles) NEAR15L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM

L32	51928	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
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L34	79	L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L35	55	(L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/12 09:42 PM

		@pt1d @pt3d @ptpd @read @repd)<"20200205")	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	573	L12 L17 L19 L20 L21 L26 L27 L34 L35	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM
L37	15	L36 AND @pd>"20220201"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/27 11:27 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Electronic Patent Application Fee Transmittal

Application Number:	16781897
Filing Date:	04-Feb-2020
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	740	740
Miscellaneous:				
			Total in USD ($)	**740**

Electronic Acknowledgement Receipt

EFS ID:	46410199
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	15-AUG-2022
Filing Date:	04-FEB-2020
Time Stamp:	13:12:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$740
RAM confirmation Number	E20228ED13110817
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	20220815EXTTIMEaia0022i.pdf	184102 1097666af7d345357e5e161e0d989d4a08cd0f54	no	2
Warnings:					
Information:					
2	Amendment/Request for Reconsideration-After Non-Final Rejection	20220815Respto1stOAS120219P003v04asfiledi.pdf	1884775 04fd4693a43b4540ffa8a305e43ddfa2932858db	no	15
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	38716 9bee1642bdebec9a9cb8c31837cc6a0616f3675e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2107593		

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.

PTO/AIA/22 (03-13)
Approved for use through 11/30/2020. 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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): S120219.P003

Application Number: 16/781,897

Filed: 02/04/2020

For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Art Unit: 2651

Examiner: BLAIR, KILE O

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):

	Fee	Small Entity Fee	Micro Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐ Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑ Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 740.00
☐ Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐ Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 50,787.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/MARK S. PELOQUIN/ — Signature

AUGUST 15, 2022 — Date

MARK S PELOQUIN — Typed or printed name

(206) 447-1336 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	16/781,897
First Named Inventor	:	Ernesto Carlos Martinez Villalpando
Filed	:	02/04/2020
TC/A.U.	:	2651
Examiner	:	BLAIR, KILE O
Confirmation No.	:	3349
Docket No.	:	S120219.P003
Customer No.	:	51340

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

RESPONSE AND AMENDMENT TO OFFICE ACTION

Sir:

In response to the Office Action mailed on February 15, 2022, please consider the following:

Amendments to the Claims are reflected in the listing of claims which begin on page 2 of this paper.

Remarks/Arguments begin on page 12 of this communication.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims

Claim 1 (Previously presented). A method to provide audio signals to a user from an eyewear device, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the eyewear device;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

Claim 2 (Withdrawn). The method of claims 1, wherein a shape of the chamber contributes to the concentrating.

Claim 3 (Withdrawn). The method of claim 2, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

Claim 4 (Withdrawn). The method of claim 2, wherein the shape is generally parabolic.

Claim 5 (Original). The method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 6 (Original). The method of claim 5, the portion absorbs vibrational energy.

Claim 7 (Original). The method of claim 6, wherein the portion is forward of the chamber.

Claim 8 (Original). The method of claim 6, wherein the portion is rear of the chamber.

Claim 9 (Original). The method of claim 6, wherein the portion is an outer surface of the chamber.

Claim 10 (Withdrawn). The method of claim 1, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the eyewear device.

Claim 11 (Original). The method of claim 1, wherein a speaker is used in the generating.

Claim 12 (Original). The method of claim 11, wherein the speaker is located within a temple of the eyewear device.

Claim 13 (Original). The method of claim 11, wherein the speaker is located within a temple insert module of the eyewear device.

Claim 14 (Original). An apparatus to provide audio signals to a user from an eyewear device, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is a part of a volume of the eyewear device, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume;

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

Claim 15 (Original). The apparatus of claim 14, wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

Claim 16 (Previously presented). The apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy.

Claim 17 (Withdrawn). The apparatus of claim 14, wherein the inner surface forms a curved shape around the at least one speaker.

Claim 18 (Withdrawn). The apparatus of claim 17, wherein the curved shape is generally parabolic.

Claim 19 (Withdrawn). The apparatus of claim 14, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

Claim 20 (Withdrawn). The apparatus of claim 19, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of acoustic energy.

Claim 21 (Withdrawn). The apparatus of claim 19, wherein a shape of the external sound cover is concave towards the user's ear.

Claim 22 (Withdrawn). The apparatus of claim 14, wherein the chamber is located within a temple of the eyewear device.

Claim 23 (Original). The apparatus of claim 14, wherein the chamber is located within a temple insert module of the eyewear device.

Claim 24 (Original). The apparatus of claim 14, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 25 (Original). The apparatus of claim 24, the portion absorbs vibrational energy.

Claim 26 (Original). The apparatus of claim 25, wherein the portion is forward of the chamber.

Claim 27 (Original). The apparatus of claim 25, wherein the portion is rear of the chamber.

Claim 28 (Original). The apparatus of claim 25, wherein the portion is an outer surface of the chamber.

Claim 29 (Withdrawn). An apparatus to provide audio signals to a user from a temple interlock, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is contained within a volume of the temple interlock, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume; and

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the temple interlock is attached to the eyewear device and the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

Claim 30 (Withdrawn). The apparatus of claim 29, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 31 (Withdrawn). The apparatus of claim 30, the portion absorbs vibrational energy.

Claim 32 (Withdrawn). The apparatus of claim 31, wherein the portion is forward of the chamber.

Claim 33 (Withdrawn). The apparatus of claim 31, wherein the portion is rear of the chamber.

Claim 34 (Withdrawn). The apparatus of claim 31, wherein the portion is an outer surface of the chamber.

Claim 35 (Withdrawn). The apparatus of claim 29, wherein the inner surface forms a curved shape around the at least one speaker.

Claim 36 (Withdrawn). The apparatus of claim 35, wherein the curved shape is generally parabolic.

Claim 37 (Withdrawn). The apparatus of claim 29, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

Claim 38 (Withdrawn). The apparatus of claim 37, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of vibrational energy.

Claim 39 (Withdrawn). The apparatus of claim 37, wherein a shape of the external sound cover is concave towards the user's ear.

Claim 40 (Withdrawn). A method to provide audio signals to a user from a temple interlock, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the temple interlock;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

Claim 41 (Withdrawn). The method of claims 40, wherein a shape of the chamber contributes to the concentrating.

Claim 42 (Withdrawn). The method of claim 41, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

Claim 43 (Withdrawn). The method of claim 41, wherein the shape is generally parabolic.

Claim 44 (Withdrawn). The method of claim 40, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the temple interlock has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 45 (Withdrawn). The method of claim 44, the portion absorbs vibrational energy.

Claim 46 (Withdrawn). The method of claim 45, wherein the portion is an outer surface of the chamber.

Claim 47 (Withdrawn). The method of claim 40, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the temple interlock.

Claim 48 (Withdrawn). An apparatus to increase a signal-to-noise ratio of audio signals directed towards a user's ear, comprising:

an external sound cover, the external sound cover further comprising:

an inner surface; and

an outer surface, the external sound cover is configured for attachment to a temple of an eyewear device, wherein in operation, audio signals emitted from an acoustic

port of an eyewear device reflect off of the inner surface and are directed thereby toward the user's ear.

Claim 49 (Withdrawn). The apparatus of claim 48, wherein a material property of the outer surface is selected to provide absorption of acoustic energy incident thereon, thereby increasing a signal-to-noise ratio of the audio signals.

Claim 50 (Withdrawn). The apparatus of claim 48, wherein a material property of the outer surface is selected to reflect acoustic energy incident thereon away from the user, thereby increasing a signal-to-noise ratio of the audio signals.

Claim 51 (Withdrawn). The apparatus of claim 48, wherein in operation the external sound cover prevents windborne turbulence from impinging on the user's ear, thereby increasing a signal-to-noise ratio of the audio signals.

Status of Restriction With Respect To Claim 12

Applicant requests the Office clarify the status of claim 12 with respect to the restriction requirement because claim 12 has not been referenced in the Office Action having mail date February 15, 2022 under "Disposition of Claims."

Response to Rejection of: Claims 1, 11, 13, 14, and 23 are rejected under 35 U.S.C. § 103 – as being unpatentable over Huang WO 2020206775 (hereinafter referred to as "Huang."

Response to Rejection of: Claim 5-9, 15, 16, and 24-28 are rejected under 35 U.S.C. § 103 – as being unpatentable over Huang, Chen (WO 2020038479, and East (US 20120237075.

Applicant respectfully points out that according to the MPEP §2143, to establish a *prima facie* case of obviousness, three basic criteria must be met:

- 1st there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings;
- 2nd there must be a reasonable expectation of success;
- 3rd the prior art reference (or references when combined) must teach or suggest all of the claim limitations (arranged as in the claim).

These criteria have not been met by the Office's rejection of Applicant's Claims 1, 5-9, 11, 13-16, and 23-28.

Claims 1, 11, 13, 14, and 23

Huang Is Not A Proper Reference to Sustain A Rejection Under 35 USC 103. The Huang Reference's Priority Date Is Not Earlier Than Applicant's Priority Date.

Applicant's instant patent application SN 16/781,897 claims the benefit of earlier filed provisional patent application SN 62/801,468. SN 62/801,468 has a filing date of February 5, 2019.

Huang states "This application is based on a Chinese patent application with an application number of 201910296023.4 having a filing date of April 12, 2019, and claims its priority." Applicant's priority date is earlier than Huang's priority date. Therefore, Huang is not a proper reference to use in the current rejection under 35 USC 103.

Applicant respectfully requests the removal of the 35 USC 103 rejection and the allowance of all claims.

Claims 5-9, 15, 16, and 24-28.

Dependent claims 5-9, 15, 16, and 24-28 depend from independent claims 1 and 14. Applicant's priority date is earlier than Huang's priority date. Therefore, Huang is not a proper reference to use in the current rejection under 35 USC 103. Dependent claims, 5-9, 15, 16, and 24-28, are allowable over the cited art for at least the reasons presented above in regard to independent claims 1 and 14. Applicant respectfully requests the removal of the 35 USC 103 rejection and the allowance of all claims.

CONCLUSION

Claims 1, 5-9, 11, 13-16, and 23-28 are pending.

Applicant respectfully submits that all claims are in condition for allowance and requests such.

Communication via cleartext email is authorized.

Respectfully submitted,

PELOQUIN, PLLC

August 15, 2022
Date

/Mark S. Peloquin/
Mark S. Peloquin, Esq.
USPTO Registration # 50,787

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/781,897	Filing Date 02/04/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	08/15/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 51	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 5	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/MINNIE A JACKSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003	3349

51340 7590 02/15/2022

PELOQUIN, PLLC
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VASHON, WA 98070-0748

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2651	

MAIL DATE	DELIVERY MODE
02/15/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 16/781,897	Applicant(s) Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 11/8/21.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-51 is/are pending in the application.

5a) Of the above claim(s) 2-4,10,17-22 and 29-51 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,5-9,11,13-16 and 23-28 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-51 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 2/4/20, 6/12/20 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restrictions

Applicant's election with traverse of Group 2, Species B in the reply filed on 11/8/21 is acknowledged. The traversal is on the grounds that the examiner didn't show two-way distinctness, that the examiner did a species restriction using figures, that there is a financial burden on applicant, that there is not a search burden, and the examiner did not give reasons to support the restriction. This is not found persuasive because of the following reasoning below.

The requirement is still deemed proper and is therefore made FINAL.

On pg. 17, applicant argues that the examiner has not demonstrated two-way distinctness; however, MPEP 806.05(d) states:

> To support a restriction requirement where applicant separately claims plural subcombinations usable together in a single combination and claims a combination that requires the particulars of at least one of said subcombinations, both two-way distinctness and reasons for insisting on restriction are necessary.

Essentially, two-way distinctness is required when two conditions are met. Applicant does not claim a "combination" related to any of the three subcombinations (i.e. the second condition). Rather, there are generic independent claims which don't address the subcombinations which then lead to separate subcombinations in separate dependent claims. A combination is an organization of which a subcombination or element is a part.[1] A broad claim

[1] MPEP 806.05(a)

that doesn't require any subcombinations, even in broad form, is not a combination of which a subcombination is a part.

Furthermore, MPEP 806.05(d) states "[t]he examiner must show, by way of example, that ***one*** of the subcombinations has utility other than in the disclosed combination." The examiner furnished an example that the subcombination 1 has separate utility such as directivity do to the shape of the chamber. It is clear that an acoustic chamber with a special shape for concentrating sound also retains that utility when not also combined with specific reflectivity of portions of the speaker chamber and an external sound cover.

The examiner also notes the difference between a disclosed combination and a claimed combination.

Applicant argues that the examiner has not proferred the reasons needed to support a restriction and is vague, lacks concrete facts that the applicant needs in order to respond, and is therefore not sufficient to support restriction. It is not clear what further discussion the applicant feels is necessary.

It is self-evident that the three groups of subcombinations are independent in their design, mode of operation, function and effect by virtue of the description of each one given by the examiner. A shape of a chamber, reflectivity properties of portions of the chamber, and an external cover are all clearly different aspects of inventive endeavor. It is not apparent which further commentary applicant's wishes the examiner to make with regards to the subcombinations.

Furthermore, the three species are clearly three different embodiments which are completely different ways of embodying a speaker and they are clearly mutually exclusive to the extent they are disclosed in applicant's disclosure.

Furthermore, applicant's arguments on pp. 18-21 about the impropriety of a restriction into species based on figures are not persuasive because restriction into species based on figures are in fact proper and consistent with established practice as discussed below in relation to MPEP 806.04(e) and MPEP 809.02(a)(B).

See MPEP 806.04(e) (italics emphasis in original):

> Claims are definitions or descriptions of inventions. *Claims themselves are never species*. The scope of a claim may be limited to a single disclosed embodiment (i.e., a single species, and thus be designated a *specific species claim*). Alternatively, a claim may encompass two or more of the disclosed embodiments (and thus be designated *a generic or genus claim).*
>
> *Species always refer to the different embodiments of the invention.*

Also see MPEP 809.02(a) (some emphasis added, some original):

> Where restriction between species is appropriate (see **MPEP § 808.01(a))** the examiner should send a letter including only a restriction requirement or place a telephone requirement to restrict (the latter being encouraged). See **MPEP § 812.01** for telephone practice in restriction requirements.
>
> Action as follows should be taken:
>
> - (A) Identify generic claims or indicate that no generic claims are present. See **MPEP § 806.04(d)** for definition of a generic claim.
> - (B) Clearly identify each (or in aggravated cases at least exemplary ones) of the disclosed species, *to which claims are to be restricted.* ***The species are preferably identified as the species of figures 1, 2, and 3*** or the species of examples I, II, and III, respectively. In the absence of distinct figures or examples to identify the several species, the mechanical means, the particular material, or other distinguishing characteristic of the species should be stated for each species identified. If the species *cannot be conveniently identified,* the claims may be grouped in accordance with the species to which they are restricted. Provide reasons why the species are independent or distinct.
> - (C) Applicant should then be required to elect a single disclosed species under **35 U.S.C. 121**, and advised as to the requisites of a complete reply and his or her rights under **37 CFR 1.141**.

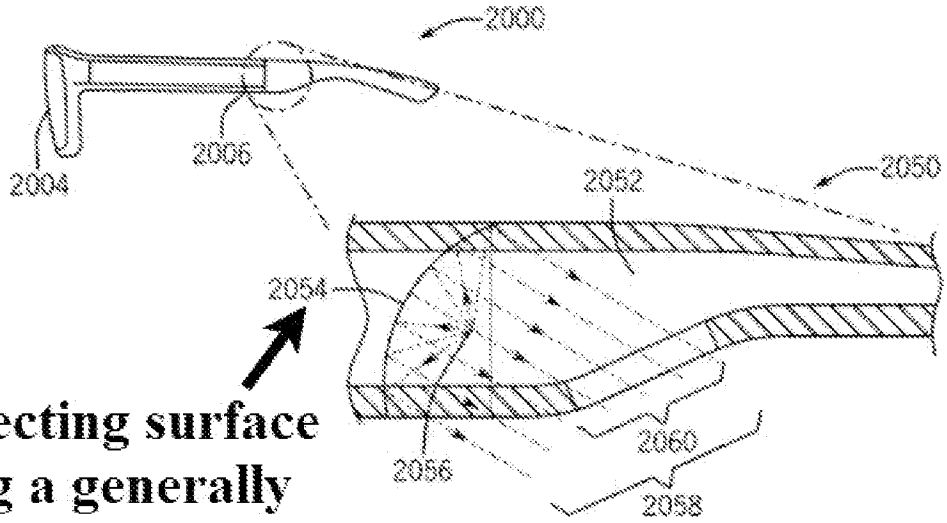
Particularly, MPEP 809.02(a)(B) states that "the species are preferably identified as the species of figures 1, 2, and 3 [...]."

Applicant argues that there is no serious examination burden; however, the examiner notes that the character of the three groups and three species is such that a search for one is not likely to be a similar effort as a search for the others.

The examiner has noted that there is a different field of search for the inventions.

The examiner has included six figures out of the 28 figures present in the application that show the six different inventions.

Searching for a parabolic shaped speaker chamber would not be reasonably expected to yield pertinent prior art on special materials that make up the speaker chamber inner surface. Nor would searching for a shape of a speaker chamber likely lead to pertinent prior art on an external sound reflector cover. It is readily apparent that the six inventions are different from each other.



acoustic reflecting surface 2054 having a generally parabolic shape (group 1)

FIG. 20

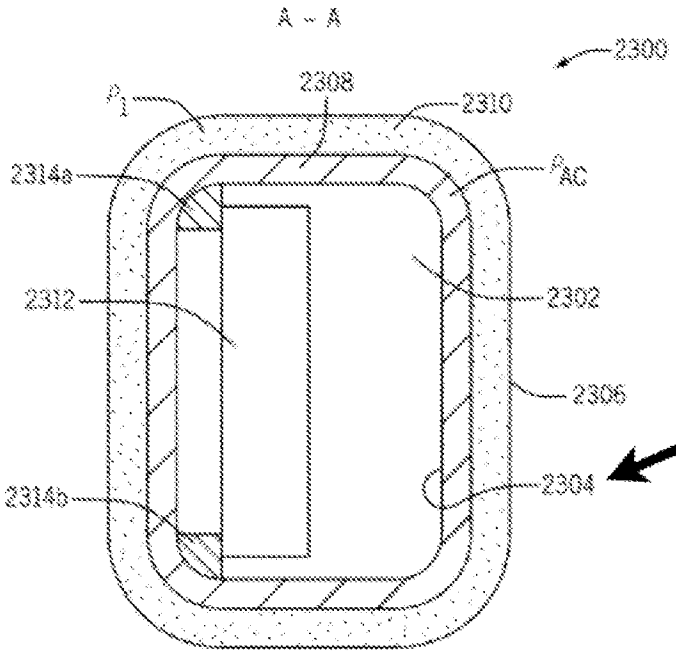


FIG. 23

inner surface 2304 made with a material that provides a high degree of acoustic reflectivity (group 2)

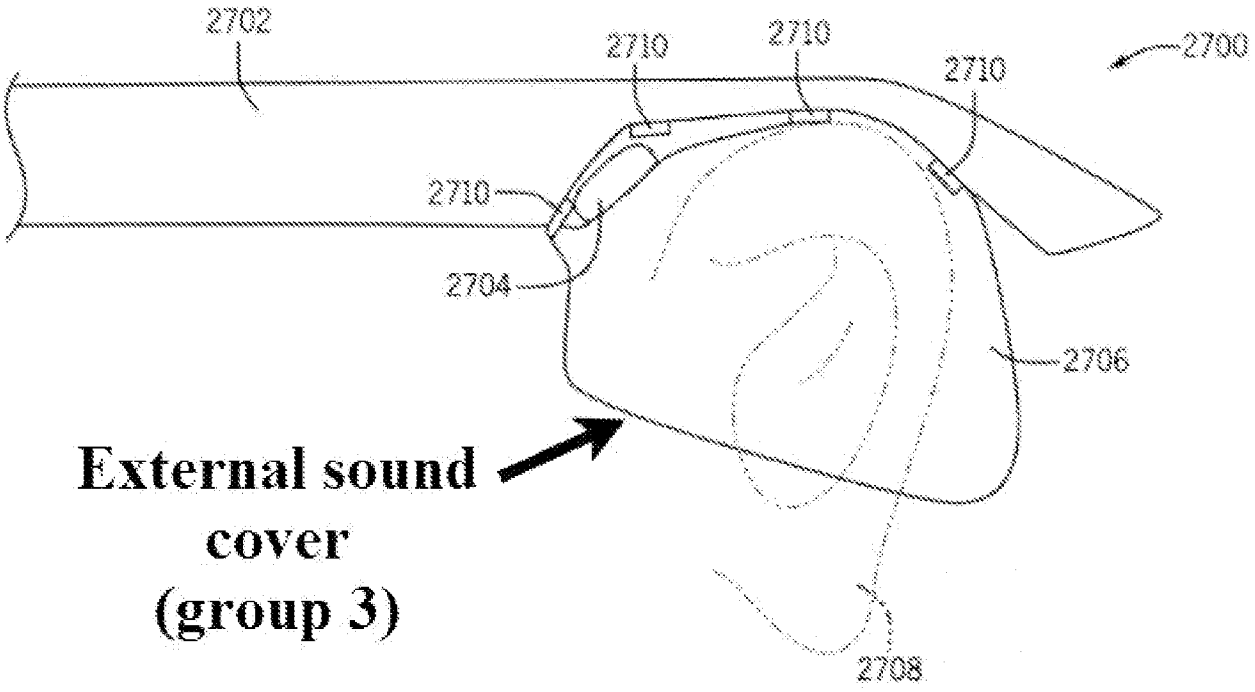

2702
2710
2710
2710
2700
2710
2704
2706
2708
External sound cover (group 3)

FIG. 27

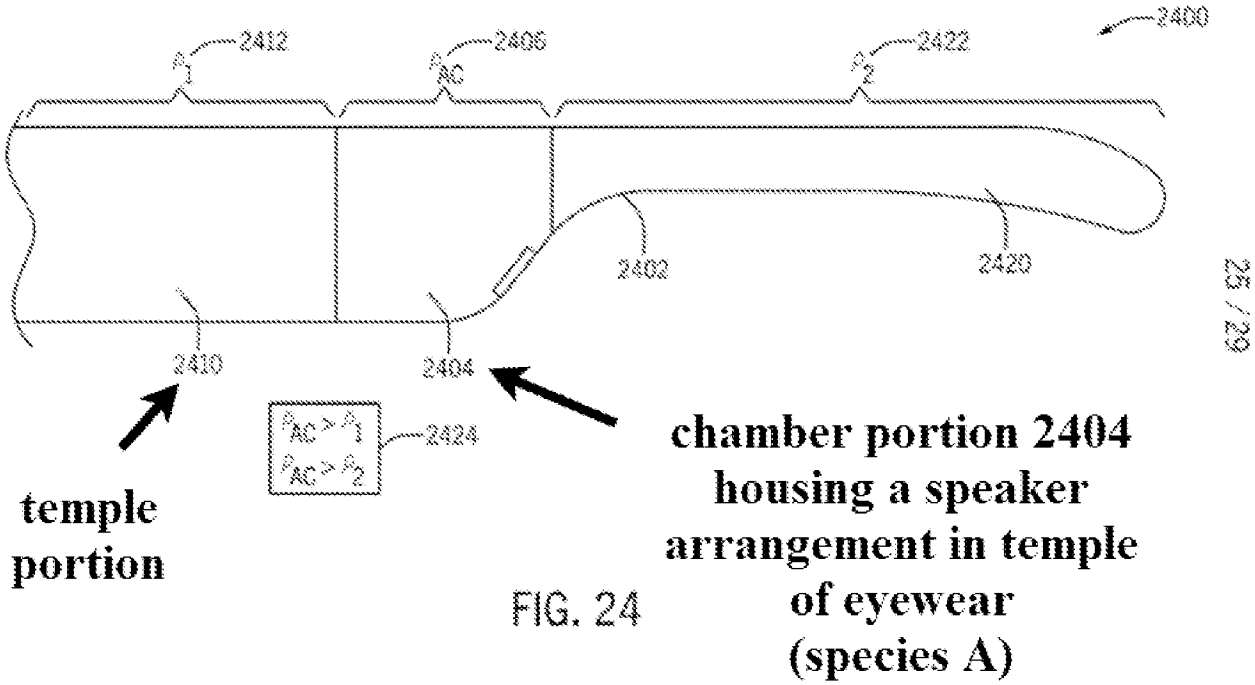
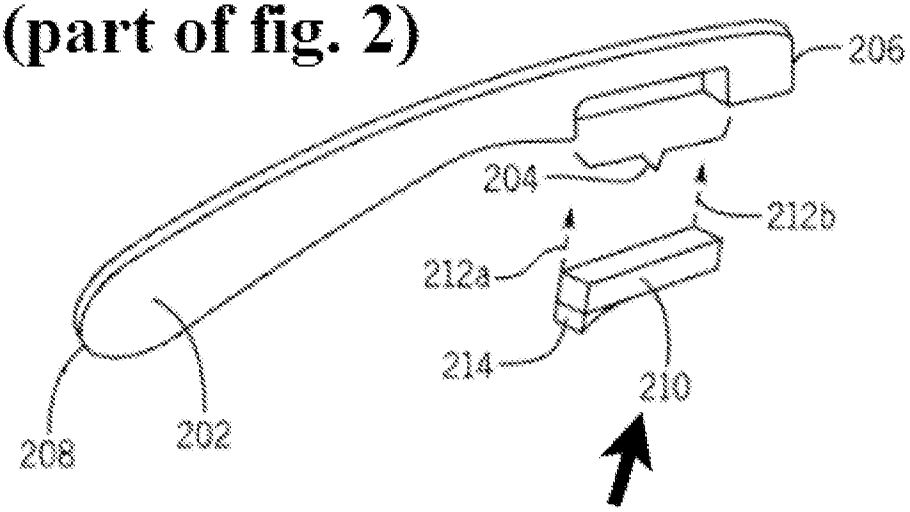
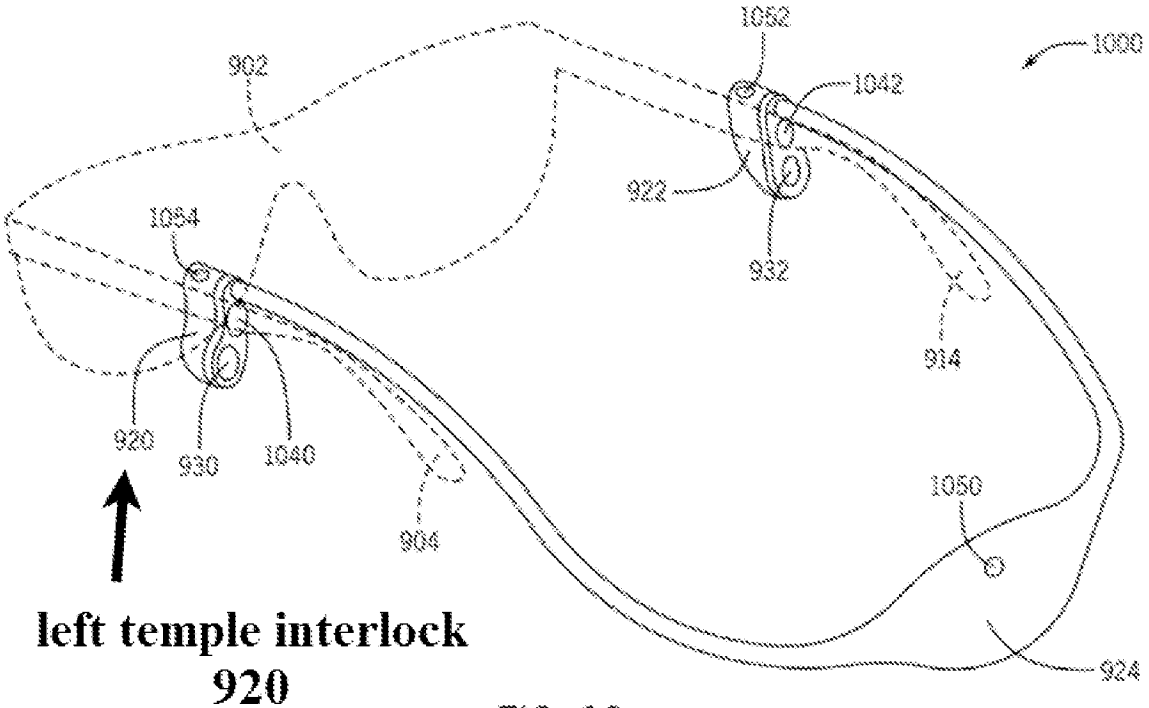

2400
2412
2406
2422
2402
2420
2410
2404
2424
temple portion
chamber portion 2404 housing a speaker arrangement in temple of eyewear (species A)

FIG. 24

(part of fig. 2)



temple insert module 210
(species B)



left temple interlock 920
(species C)

FIG. 10

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 11, 13, 14, and 23 are rejected under 35 U.S.C. 103 as being unpatentable over Huang (WO 2020206775, see English translation).

Regarding claim 1, Huang teaches

a method to provide audio signals to a user from an eyewear device (provide directional sound output structurer near the ear and audio glasses, Huang, [0006]), comprising

generating audio signals within a chamber (sound waves are transmitted through the first sound cavity 15; sound generator 11 is mounted in first sound cavity 15, Huang, figs 5 & 6), the chamber is a part of a volume of the eyewear device (first sound cavity 15, Huang, [0043], fig 6):

concentrating the audio signals for delivery to the user's ear (the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body, Huang, [0027]; sound emitted by sounder 11 can be transmitted form the sound guide opening 172 through the first sound outlet 12, Huang, [0048]; it is noted that Huang says it backwards in [0048] that sound goes from 12 to 172 when obviously Huang or the machine translator meant 172 to 12 as is inherent in the figures; also, it is noted that this is one meaning of "concentrating" in light of applicant's specification, see fig. 17 and [0103] of specification and compare to fig. 6 of Huang; also see [0044] of Huang where sound is concentrated on inner wall to form a concentrated state and then transmitted from the first sound outlet 12, Huang, [0044]); and

transmitting the audio signals to the user's ear (transmitted to ear hole, Huang, [0048]),

the audio signals are transmitted through a port in the chamber (first sound hole 12 is a port in the chamber first sound cavity 15, Huang, [0043], fig 6).

Regarding claim 11, Huang teaches the method of claim 1, wherein a speaker is used in the generating (sound generator 11, Huang, [0044]; sound generator is clearly a speaker, Huang, [0011]).

Regarding claim 13, Huang teaches the method of claim 11, wherein the speaker is located (sounder 11 located in mounting cavity 10, Huang, [0042]) within a temple (mounting cavity formed in inner cavity of temple, Huang, [0023]) insert module (mounting seat/base 17, Huang, [0050], figs 6 & 7) of the eyewear device (mounting base 17 is detachably fixed in the mounting cavity 10, Huang, [0050]).

Regarding claim 14, Huang teaches an apparatus to provide audio signals to a user from an eyewear device (sound output near ear in audio glasses, Huang, [0009]), comprising:

a chamber (first sound cavity 15, Huang, [0044-0045], fig 6), the chamber is defined by an interior surface (inner wall of the first sound cavity 15 has an arc-shaped structure, Huang, [0044], fig 6),

the chamber is a part of a volume of the eyewear device (first sound cavity 15, Huang, [0043], fig 6), the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume (sound generator 11, Huang [0043], fig 6);

an acoustic port (first sound outlet 12, Huang, [0044-0045], fig 6), the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device (the sound guide

wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body, Huang, [0027]; sound emitted by sounder 11 can be transmitted form the sound guide opening 172 through the first sound outlet 12, Huang, [0048]; it is noted that Huang says it backwards in [0048] that sound goes from 12 to 172 when obviously Huang or the machine translator meant 172 to 12 as is inherent in the figures; also, it is noted that this is one meaning of "concentrating" in light of applicant's specification, see fig. 17 and [0103] of specification and compare to fig. 6 of Huang; also see [0044] of Huang where sound is concentrated on inner wall to form a concentrated state and then transmitted from the first sound outlet 12, Huang, [0044]); and

an outer surface, the outer surface is exterior to the inner surface (external surfaces of first housing 211 and second housing 212, Huang, [0063], fig 6).

Claim 23 is substantially similar to claim 13 and is rejected for the same reasons.

Claims 5-9, 15, 16, and 24-28 are rejected under 35 U.S.C. 103 as being unpatentable over Huang, Chen (WO 2020038479, see English translation), and East (US 20120237075).

Regarding claim 5, Huang teaches the method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity,

the first acoustic reflectivity is greater than the second acoustic reflectivity.

Chen teaches audio glasses (glasses with functional component 20, where functional component can be speaker, Chen, fig 1, see pg. 4 of English translation) with a transducing device 22 housed inside a housing 210 with sound introduction holes (Chen, see pg. 28 of

English translation) wherein there is a damping layer material on the outside of the opening of the sound introduction hole 230 (Chen, pg. 29 of English translation, fig 23),

East teaches that the housing for audio glasses (East, [0058], fig 2a) may be made of a rigid material or a soft material (East, [0039]).

Huang teaches the first sound cavity 15 serves a sound guiding wall which reflects sound (Huang, [0046]). Based on that it would have been readily apparent that the material used in the inner surface of the sound cavity 15 is an acoustically reflective material.

Accordingly, it would have been obvious to one of ordinary skill in the art to use a reflective material for the inner surface and an acoustically absorbing soft material for the outer surface of the housing since Huang teaches the reflective inner surface and Chen teaches a the absorptive outer surface and East generally points out that the materials used in audio glasses will be rigid acoustically reflective materials or soft acoustically absorptive materials and therefore configuring the housing such that the inner surface has a more reflective material than the outer surface would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 6, Huang, Chen, and East teach the method of claim 5, the portion absorbs vibrational energy (damping layer material on the outside of the opening of the sound introduction hole 230, Chen, pg. 29 of English translation, fig 23).

Regarding claim 7, Huang, Chen, and East teach the method of claim 6.

Although Huang, Chen, and East do not teach wherein the portion is forward of the chamber, as pointed out in the rejection of claim 5, it would have been obvious to make various parts of the outer surface of the audio glasses housing with a soft material including parts

forward of the first sound cavity 15 of Huang since doing so would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 8, Huang, Chen, and East teach the method of claim 6.

Although Huang, Chen, and East do not teach wherein the portion is rear of the chamber, as pointed out in the rejection of claim 5, it would have been obvious to make various parts of the outer surface of the audio glasses housing with a soft material including parts rear of the first sound cavity 15 of Huang since doing so would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 9, Huang, Chen, and East teach the method of claim 6.

Although Huang, Chen, and East do not teach wherein the portion is an outer surface of the chamber, as pointed out in the rejection of claim 5, it would have been obvious to make various parts of the outer surface of the audio glasses housing with a soft material including parts on the outside of the shell of Huang (Huang, [0063], fig 7) such as the damping layer of Chen outside the sound introduction hole 230 (Chen, pg. 28 of English translation) since doing so would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 15, Huang, Chen, and East teach the apparatus of claim 14.

However, Huang, Chen, and East do not teach wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

Chen teaches audio glasses (glasses with functional component 20, where functional component can be speaker, Chen, fig 1, see pg. 4 of English translation) with a transducing device 22 housed inside a housing 210 with sound introduction holes (Chen, see pg. 28 of English translation) wherein there is a damping layer material on the outside of the opening of the sound introduction hole 230 (Chen, pg. 29 of English translation, fig 23),

East teaches that the housing for audio glasses (East, [0058], fig 2a) may be made of a rigid material or a soft material (East, [0039]).

Huang teaches the first sound cavity 15 serves a sound guiding wall which reflects sound (Huang, [0046]). Based on that it would have been readily apparent that the material used in the inner surface of the sound cavity 15 is an acoustically reflective material.

Accordingly, it would have been obvious to one of ordinary skill in the art to use a reflective material for the inner surface and an acoustically absorbing soft material for the outer surface of the housing since Huang teaches the reflective inner surface and Chen teaches a the absorptive outer surface and East generally points out that the materials used in audio glasses will be rigid acoustically reflective materials or soft acoustically absorptive materials and therefore configuring the housing such that the inner surface has a more reflective material than the outer surface would have been the use of a known technique to improve a similar device in the same way.

Regarding claim 16, Huang, Chen, and East teach the apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy (damping layer material on the outside of the opening of the sound introduction hole 230, Chen, pg. 29 of English translation, fig 23).

Claim 24 is substantially similar to claim 5 and is rejected for the same reasons.

Claim 25 is substantially similar to claim 6 and is rejected for the same reasons.

Claim 26 is substantially similar to claim 7 and is rejected for the same reasons.

Claim 27 is substantially similar to claim 8 and is rejected for the same reasons.

Claim 28 is substantially similar to claim 9 and is rejected for the same reasons.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kile Blair whose telephone number is (571)270-3544. The examiner can normally be reached M-F.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc Nguyen can be reached on 571-272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/KILE O BLAIR/
Primary Examiner, Art Unit 2651

Notice of References Cited	Application/Control No. 16/781,897	Applicant(s)/Patent Under Reexamination Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	Page 1 of 1

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*	A	US-20120237075-A1	09-2012	East; James	H04R1/105	381/381
	B					
	C					
	D					
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	F					
	G					
	H					
	I					
	J					
	K					
	L					
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/781,897	Villalpando et al.
	Examiner	Art Unit
	Kile Blair	2651

CPC - Searched*		
Symbol	Date	Examiner
G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335	02/12/2022	KB

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

NEAR-EAR DIRECTIONAL SOUND OUTPUT STRUCTURE, AND AUDIO GLASSES

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INVENTOR INFORMATION

NAME	CITY	STATE	ZIP CODE	COUNTRY
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Abstract

The present application relates to a near-ear directional sound output structure, and a pair of audio glasses. A near-ear directional sound output structure, comprising a mounting cavity and a sound emission device arranged in the mounting cavity, wherein the mounting cavity is provided with sound output holes; the sound output holes are in communication with the sound emission device by means of provided sound output cavities; the sound output holes comprise a first sound output hole provided near an ear, and a second sound output hole provided away from the ear; the first sound output hole is arranged near the sound emission device; and the second sound output hole is arranged away from the sound emission device, and the second sound output hole is in communication with the sound emission device by means of a provided second sound output cavity. A sound emitted from a sound emission device can form a sound field at an earhole under the action of a directional sound emission structure, and the sound emitted from the sound emission device cannot be heard in a surrounding environment outside an ear due to an interference cancellation effect, thereby achieving the function of directional sound emission. According to the pair of audio glasses, by means of the directional effect of a directional sound output structure, insofar as the power of a sound emission device is unchanged, a sound reaching an ear of a human body is enhanced while sounds propagated to other places are attenuated.

Description

Directional sound output structure near ear and audio glasses

[0001] This application is based on a Chinese patent application with an application number of 201910296023.4 and a filing date of April 12, 2019, and claims its priority. The entire content of the application is hereby incorporated into this application as a whole.

[0002] Technical Field
[0003] This application relates to audio equipment, and more specifically to a near-ear directional sound output structure and its audio glasses
[0004] Background Technology
[0005] Commonly used audio equipment, when the equipment is used, the sound has no directionality and radiates from the center to the surroundings. Except for the reflector, it basically radiates in the form of rays. In order to achieve a small range of use, the volume can only be reduced, such as earphones. After wearing the earphones, the ambient sound cannot be heard (the external sound is blocked). If the earphones are worn for a long time, the ears will feel uncomfortable. If worn for a long time, the ears and hearing will be damaged. On the other hand, the bone conduction earphone transmits sound directly to the eardrum through the skull, which may cause discomfort such as itching for the first time wearer and impaired sound effect. It can only be used for special occasions.
[0006] The Chinese patent "A New Type of Glasses" discloses a new type of glasses, including a spectacle frame, temples hingedly arranged on both sides of the spectacle frame, a circuit board, a Bluetooth chip, a microphone radio chip, an audio driver chip, and a speaker And a battery, wherein the temple includes a first shell and a second shell that are snap-connected, the first shell has a mounting cavity, the circuit board, the Bluetooth chip, the microphone radio chip, The audio driver chip, the speaker, and the battery are respectively fixedly arranged in the mounting cavity, and a plurality of sound outlets are opened on the lower side of the first housing near the speaker; and the circuit board is provided with Switch button, the switch button penetrates the lower side of the first housing; the Bluetooth chip, the microphone radio chip and the audio driver chip are fixedly arranged on the circuit board, the speaker and the speaker The batteries are respectively electrically connected with the circuit board; the circuit board is provided with a charging contact, and the charging contact penetrates through the lower side of the first housing.
[0007] The above-mentioned patents only install a circuit board, a Bluetooth chip, a microphone radio chip, an audio driver chip, a speaker, and a battery on the temples, and a sound hole is provided near the speaker. The sound from the speakers on the temples is only transmitted through the sound hole, and the sound effect is not designed. The sound will follow --> The sound hole emits to the surroundings, there is no directionality, the sound effect is poor, and the experience is affected.
[0008] Application content
[0009] The purpose of the present application is to overcome the defects of the prior art and provide a directional sound output structure near the ear and audio glasses.
[0010] In order to achieve the above purpose, the application adopts the following technical solutions:
[0011] A directional sound output structure close to the ear, comprising a mounting cavity and a sound generator arranged in the mounting cavity; the mounting cavity is provided with a plurality of sound holes; the sound holes pass through the sound cavity provided Connect with the speaker;
[0012] The sound hole includes a first sound hole arranged close to the ear, and a second sound hole arranged far from the ear
The first sound hole is arranged close to the sounder, and the second sound hole is arranged farther than the sounder; the second sound hole communicates with the sounder through a second sound cavity provided.
[0013] A further technical solution is: further comprising a third sound outlet; the third sound outlet communicates with the sounder through a third sound cavity provided.
[0014] The further technical solution is: the first sound outlet is communicated with the sounder through a first sound-out cavity; the first sound-out cavity is provided with a sound guide wall, so that the sound of the sounder can pass from the sound guide wall After reflection, it comes out from the first sound hole.
[0015] A further technical solution is as follows: the sound generator is connected to the mounting cavity through a mounting seat provided; the mounting seat is arranged close to the first sound outlet cavity.
[0016] The further technical solution is: a plurality of installation protrusions are provided in the installation cavity; the installation seat is provided with an installation groove matching the installation protrusions; and the installation cavity is provided with a plurality of installation protrusions; The installation seat is provided with an installation groove matching the installation protrusion; the installation seat is detachably fixed in the installation cavity through the installation groove and the installation protrusion.
[0017] A further technical solution is as follows: the third sound outlet is communicated with the back cavity

of the sound generator through the third sound cavity; the back cavity is arranged in the opposite direction of the sound output direction of the sound generator.
[0018] The further technical solution is: the second sound outlet is communicated with the back cavity of the sound generator through the second sound cavity; the first sound cavity is connected to the third sound cavity and the second sound outlet through the sound device Sound cavity partition.
[0019] A further technical solution is that the inner wall of the third sound outlet cavity relative to the third sound outlet hole is an arc structure.
[0020] A further technical solution is as follows: the installation cavity is constituted by a housing inner cavity; the outer side of the housing close to the first sound-out cavity is an arc-shaped recess; the first sound-out hole is arranged in The arc-shaped recessed portion is such that the first sound hole has an arc-shaped structure and faces the ear hole. --> [0021] An audio glasses for directional sound output, comprising a glasses body, the above-mentioned directional sound output structure, a control circuit and a battery; the directional sound output structure is arranged on the ears of the glasses body, and the control circuit , The battery is located in the temple of the glasses body;
[0022] The first sound hole is provided at the side of the temple near the ear; the second sound hole is provided at the end of the temple
[0023] A further technical solution is: the mounting cavity and the sound outlet cavity are formed in the inner cavity of the temple; the first sound hole and the third sound hole are provided on the lower side of the temple.
[0024] The further technical solution is: a fixed cavity for installing a control circuit or a battery is provided in the eyeglass legs; the control circuit and the battery are located on the same eyeglass leg or are respectively located on the two eyeglass legs near one end of the eyeglass frame .
[0025] The further technical solution is: the control circuit is provided with a Bluetooth module; or/and a microphone.
[0026] A further technical solution is: the control circuit is provided with a charging port, and the charging port is provided on the lower side of the temple.
[0027] The beneficial effects of the present application compared with the prior art are: the directional sound output structure of the present application is provided with a number of sound holes on the mounting cavity, and the sound holes communicate with the sounder through the sound cavity, making it close to The sound hole of the ear hole can propagate normal phase sound waves, and the sound hole farther than the ear hole propagates anti-phase sound waves at the time, causing interference near the ear and superimposing each other, so that a superimposed sound field is formed in the near ear area, and the sound wave in the area far away from the ear The interference cancels out, and the sound decays rapidly. In addition, the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body. Setting the directional sound output structure on the glasses can form audio glasses with directional sound output. This application has a simple structure, the sound emitted by the sounder can form a sound field at the ear hole through the action of the directional sounding structure, and the outside of the ear can not hear the sound from the sounder in the surrounding environment due to the effect of interference cancellation, thus realizing the function of directional sounding . Through the directional effect of the directional sound output structure, the audio glasses make the sound reaching the human ears increase while the power of the sound generator is unchanged, and the sound transmitted to other places is weakened.
[0028] The application will be further described below with reference to the drawings and specific embodiments.
[0029] BRIEF DESCRIPTION
[0030] FIG. 1 is a three-dimensional structure diagram of a near-ear directional sound output structure of the present application;
[0031] FIG. 2 is a front view of a directional sound output structure near the ear of the present application;
[0032] FIG. 3 is a side view of a directional sound output structure near the ear of the present application; -->
[0033] FIG. 4 is an internal structure diagram of a near-ear directional sound output structure of the present application;
[0034] FIG. 5 is an internal structure diagram of a near-ear directional sound output structure of the present application;

[0035] FIG. 6 is an exploded view of a directional sound output structure near the ear of the present application;
[0036] FIG. 7 is a structural diagram of a mounting seat of a near-ear directional sound output structure of the present application;
[0037] FIG. 8 is a schematic view of the sound field of a near-ear directional sound output structure of the present application;
[0038] FIG. 9 is a three-dimensional structure diagram of an audio glasses for directional sound output in this application.
[0039] Specific embodiments
[0040] In order to fully understand the technical content of the present application, the technical solution of the present application will be further introduced and illustrated below in conjunction with specific embodiments, but it is not limited thereto.
[0041] Figures 1 to 9 are drawings of embodiments of the application.
[0042] A near-ear directional sound output structure Q, as shown in FIGS. 1 to 6, includes a mounting cavity 10, and a sounder 11 provided in the mounting cavity 10. The installation cavity 10 is provided with a plurality of sound holes. The sound hole communicates with the sounder 11 through the sound cavity provided. The sounder 11 may be a horn. The sound emitted by the sounder 11 is transmitted from the sound hole after the sound cavity is adjusted. The sound cavity is specially processed to make the sound propagate from the sound hole meet the requirements.
[0043] The sound hole includes a first sound hole 12 arranged close to the ear, and a third sound hole 13 and a second sound hole 14 arranged far from the ear. The first sound hole 12 is arranged close to the sound generator 11, and the third sound hole 13 and the second sound hole 14 are arranged farther than the sound generator 11. The first sound hole 12, the third sound hole 13, and the second sound hole 14 are arranged in different positions and have different functions. Since the sound generator 11 can generate positive and anti-phase sound waves, the positive phase sound waves are transmitted through the first sound cavity 15 to the first sound hole 12, and then transmitted to the human ear through the first sound hole 12; The inverted sound wave is transmitted to the third sound hole 13 and the second sound hole 14 through the third sound outlet 16 and the second sound cavity 18, and then to the environment around the ear.
[0044] The first sound outlet 12 communicates with the sounder 11 through the first sound outlet cavity 15. The inner wall of the first sound outlet cavity 15 has an arc-shaped structure, so that after the sound emitted by the sound generator 11 propagates to the inner wall, it is emitted back to form a concentrated state, and then is transmitted from the first sound outlet 12.
[0045] Preferably, an inclined sound guide wall is provided in the first sound outlet cavity 15, so that the sound of the sound generator 11 is reflected from the sound guide wall and then transmitted from the first sound outlet hole 12.
[0046] Alternatively, when the sound generator 11 is arranged obliquely, the inner wall of the first sound outlet cavity 15 serves as a sound guide wall, so that the sound generator 11 --> Sound can be reflected through.
[0047] Since the first sound hole 12 is facing the ear hole, the sound of the sound generator 11 is reflected to the ear hole after passing through the sound guide wall, thereby achieving the purpose of directional sound output.
[0048] Wherein, as shown in FIG. 7, the sounder 11 is connected to the mounting cavity 10 through a mounting seat 17 provided. The mounting seat 17 is arranged close to the first sound outlet 15. The mounting seat 17 is provided with a sound guide opening 172, so that the sound emitted by the sounder 11 can be transmitted from the first sound outlet 12 through the sound guide opening 172. The mounting base 17 is provided with a fixing hole 171 for fixing the sounder 11, so that the sounder 11 is fixed to the mounting cavity 10 behind the mounting base. The sound guide port 172 is set according to requirements, so that the sound of the sound generator 11 can be transmitted to the ear hole.
[0049] In other embodiments, the sounder 11 may be directly installed in the installation cavity 10.
[0050] Specifically, a number of mounting protrusions 101 are provided in the mounting cavity 10. The mounting base 17 is provided with a mounting groove 173 matching the mounting protrusion 101. The mounting base 17 is detachably fixed in the mounting cavity 10 through the mounting groove 173 and the mounting protrusion 101.

[0051] The inner wall of the third sound outlet cavity 16 relative to the third sound hole 13 has an arc structure, so that the sound output direction of the third sound hole 13 is determined and the sound wave energy is relatively concentrated.
[0052] The third sound outlet hole 13 communicates with the back cavity of the sound generator 11 through the third sound outlet cavity 16. The end of the third sound output cavity 16 is in communication with the back cavity, and the back cavity is set in the opposite direction of the sound output direction of the sound generator 11. The third sound outlet 13 is provided at the other end of the third sound cavity 16. The third sound-out cavity 16 is a long and narrow sound-guiding cavity, and the sound emitted by the sounder 11 is reflected and interfered by the second sound-guiding cavity 16, so that the sound propagated from the third sound-out hole 13 is an inverted sound wave, and The high frequency sound waves are filtered, and the low frequency sound waves are transmitted from the third sound outlet 13. The end of the second sound guide cavity 16 communicating with the back cavity is a big end, so that the sound waves of the sound generator 11 can fill the second sound guide cavity 16.
[0053] The second sound outlet hole 14 communicates with the back cavity of the sound generator 11 through the second sound outlet cavity 18. One end of the second sound outlet cavity 18 communicates with the back cavity, and the second sound outlet hole 14 is provided at the other end of the second sound outlet cavity 18. The end of the second sound outlet cavity 18 that communicates with the sounder 11 is the big end, and the cross-sectional area of the inner cavity of the second sound outlet cavity 18 gradually decreases in the direction in which it extends, and when it reaches the middle position, the second sound outlet The direction of the hole 14 gradually increases, forming a structure where the cross-sectional area of the inner cavity of the second sound cavity 18 is small in the middle and large at the two ends. The reverse cross-acoustic wave of the sounder 11 is transmitted from the back cavity through the second sound outlet cavity 18 and then from the second sound outlet hole 14. Since the second sound outlet cavity 18 has a filtering effect on high-frequency sound waves, the second sound outlet A low-to-mid frequency sound wave coming out of the hole 14.
[0054] Wherein, in order to achieve the low, medium and high frequency positive phase sound waves transmitted from the first sound outlet 12, the low, medium frequency reverse sound waves --> From the third sound hole 13 and the second sound hole 14, the first sound cavity 15 is separated from the third sound cavity 16 and the second sound cavity 18 through the sound generator 11 and the mounting seat 17, so that the positive The cross-talk wave is transmitted from the first sound hole 12, and the antiphase sound wave is transmitted from the third sound hole 13 and the second sound hole 14.
[0055] Preferably, the third sound-out cavity 16, the second sound-out cavity 18 are respectively arranged on both sides of the back cavity, and the first sound-out cavity 15, the third sound-out cavity 16, and the second sound-out cavity 18 are located The planes are parallel to each other.
[0056] The installation cavity 10 is constituted by the inner cavity of the housing 21 provided. The shell 21 is hollowed out inside, and the inner cavity is divided into the required first sound cavity 15, the third sound cavity 16, and the second sound cavity 18 as required. The outer side of the housing 21 close to the first sound outlet cavity 15 is an arc-shaped recess 211. The first sound hole 12 is provided in the arc-shaped recess 211, so that the first sound hole 12 has an arc structure. The bottom of the arc-shaped recess 211 matches the upper end of the root of the human ear. The first sound hole 12 is located at one end of the arc-shaped recess, so that the first sound hole 12 is directly opposite to the ear hole, so that the first sound hole 12 spreads Sound can be conducted to the eardrum through the ear hole.
[0057] The sound output directions of the first sound outlet hole 12 and the third sound outlet hole 13 are located on the same side of the housing 21, and the sound output direction of the second sound outlet hole 14 is the same as that of the first sound outlet hole 12 and the third sound outlet. The sound outlet direction of the sound hole 13 is vertical or forms a set angle. Specifically, the first sound hole 12 and the third sound hole 13 are provided on the lower side of the housing 21 so that the direction of sound is downward, and the second sound hole 14 is provided on the outside of the housing 21, so that the The tone direction is outward.
[0058] As shown in FIG. 7, the positive phase sound wave is transmitted from the first sound hole 12 near the ear hole, the reverse sound wave is transmitted through the third sound hole 13 and the second sound hole 14, and the reverse sound wave is relatively positive. The cross sound wave is far away from the ear hole. According to the wave interference theory, when the normal phase sound wave and the reverse phase sound wave meet, they can produce a cancellation effect at a local position, and attenuate with distance, the

sound wave has a superposition effect at the local position, and a strengthened sound field is obtained. Therefore, the sound wave can only produce a sound field in a local area (SPL) (that is, the sound field is at the distance from the ear hole), and the sound field far away from this local area is zero.
[0059] In another embodiment, the number of sound holes is not limited to three, and there may be multiple sound holes according to structural requirements and sound emission requirements.
[0060] An audio glasses for directional sound output, as shown in FIGS. 1 to 8 and 9, includes a glasses body 20, the above-mentioned directional sound output structure Q, a control circuit 22, and a battery 23. The directional sound output structure Q is arranged on the temple of the glasses body 20 close to one end of the ear. Similarly, the control circuit 22 and the battery 23 are provided on the temples of the glasses body 20 close to one end of the glasses frame. The first sound hole 12 is provided on the side of the temple near the ear. The second sound hole 14 is provided at the end of the temple, and the direction of the second sound hole 14 can be any direction. --> [0061] Wherein, the distance between the first sound hole 12 and the third sound hole 13 is Al, and the first sound hole 12 and the second sound hole
The distance of 14 is A2, Al: A2 is approximately equal to 1:1.
[0062] The installation cavity 10. The sound outlet cavity is formed in the inner cavity of the temple, and the sound outlet is also provided in the temple.
[0063] Wherein, the outer shell of the temple is formed by extending the shell 21 of the sound-emitting structure Q. The housing of the temple includes a first housing 211 and a second housing 212, and the cavity formed between the first housing 211 and the second housing 212 is the installation cavity 10. The installation cavity 10 is not only used to install the sound generator 11 and the sound guide cavity, but also can be used to install the control circuit 22 and the battery 23. Wherein, a fixed cavity 19 for installing the control circuit 22 or the battery 23 is provided in the temple. The fixed cavity 19 is separated by a baffle 24 provided in the installation cavity 10, so that the fixed cavity 19 does not interfere with the sound output cavity.
[0064] Preferably, the control circuit 22 and the battery 23 are provided on one of the temples or on the two temples respectively. In order to make the whole glasses more balanced, the battery 23 is arranged on one of the eyeglass legs, the control circuit 22 is arranged on the other eyeglass leg, and the battery 23 and the control circuit 22 are connected by wires passing through the glasses frame. At the same time, the battery 23 and the control circuit 22 can also be arranged in the same temple.
[0065] The control circuit 22 has a pickup for picking up environmental sounds. The sound field of the environment can be read by the pickup, and after electronic amplification, it is output to the sound generating device. The amplified sound field will only be heard by the user with the device, and will not be transmitted to the surrounding users. In this way, far-field pickup can be realized. The distance is played to users, such as those who need hearing assistance. In order to facilitate wireless connection with other electronic devices, the control circuit 22 is provided with a Bluetooth module
[0066] FIG. 8 is a schematic diagram of simulated sound output.
[0067] The control circuit 22 is provided with a charging interface, and the charging interface is provided on the underside of the temples, which is convenient for charging and beautiful.
[0068] In summary, the directional sound output structure of the present application is provided with a plurality of sound holes on the mounting cavity, and the sound holes communicate with the sound generator through the sound cavity, so that the sound holes close to the ear holes can be transmitted positively. Cross-acoustic waves, the sound holes farther than the earholes propagate antiphase sound waves at the time, causing interference near the ears, and superimposing each other, so that the near ear area forms a superimposed sound field, and the sound wave interference in the area away from the ears cancels out, and the sound attenuates rapidly. In addition, the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body. Setting the directional sound output structure on the glasses can form audio glasses with directional sound output. This application has a simple structure, the sound emitted by the sounder can form a sound field at the ear hole through the action of the directional sounding structure, and the ear --> Due to the effect of interference cancellation on the outside of the flower, the surrounding environment cannot hear the sound from the speaker, so that the function of directional pronunciation is realized. Through the directional effect of the directional sound output structure, the audio glasses make the sound reaching the human ears increase while the power of the sound generator is unchanged, and the sound transmitted to other places is weakened.

[0069] The foregoing only uses examples to further illustrate the technical content of this application for easier understanding by readers, but it does not mean that the implementation of this application is limited to this. Any technical extension or re-creation made according to this application is all Protected by this application. The scope of protection of this application is subject to the claims.
Summary of the invention
technical problem
The solution to the problem
The beneficial effects of the invention

Claims

[Claim 1] A directional sound output structure near the ear, characterized in that it comprises a mounting cavity, and a sound generator provided in the mounting cavity; a sound hole provided in the mounting cavity; and the sound hole passes through the device Some sound cavity is connected with the speaker;
The sound hole includes a first sound hole arranged close to the ear, and a second sound hole arranged far away from the ear; the first sound hole is arranged close to the sound generator, and the second sound hole is farther than The sound generator is arranged; the second sound hole communicates with the sound generator through a second sound cavity provided.
[Claim 2] The near-ear directional sound output structure according to claim 1, characterized in that it further comprises a third sound outlet; the third sound outlet passes through a provided third sound cavity Connect with speaker
[Claim 3] The near-ear directional sound output structure according to claim 1, wherein the first sound output hole communicates with the sounder through a first sound output cavity; the first sound output The cavity is provided with a sound guide wall, so that the sound of the sound generator is reflected from the sound guide wall and then transmitted from the first sound outlet hole.
[Claim 4] A directional sound output structure near the ear according to claim 3, wherein the sound generator is connected to the mounting cavity through a mounting seat provided; the mounting seat is close to the first output The sound cavity is set; the installation cavity is provided with a plurality of installation protrusions; the installation seat is provided with an installation groove matching the installation protrusion; the installation seat is detachably fixed to the installation cavity through the installation groove and the installation protrusion Inside.
[Claim 5] A near-ear directional sound output structure according to claim 2, wherein the third sound hole communicates with the back cavity of the sound generator through the third sound cavity; The back cavity is set in the opposite direction of the sound output direction of the speaker.
[Claim 6] The near-ear directional sound output structure according to claim 5, wherein the second sound hole communicates with the back cavity of the sounder through the second sound cavity; The first sound cavity is separated from the second sound cavity and the third sound cavity by the sound generator.
[Claim 7] The third sound-out cavity is a near-ear directional sound-out structure according to claim 6, wherein the mounting cavity is composed of a housing cavity provided; the housing is close to The outer side of the first sound outlet cavity is an arc-shaped recess; the first sound hole is provided in the arc-shaped recess, so that the first sound hole has an arc structure and faces the ear hole. -->
[Claim 8] An audio glasses for directional sound output, characterized by comprising the glasses body, the directional sound output structure of any one of claims 1 to 7, a control circuit and a battery; the directional sound output structure device The temple of the glasses body is close to one end of the ear, and the control circuit and the battery are arranged in the temple of the glasses body;
The first sound hole is arranged at the side of the temple near the ear; the second sound hole is arranged at the end of the temple.
[Claim 9] The audio glasses with directional sound output according to claim 8, wherein the mounting cavity and the sound output cavity are formed in the inner cavity of the temple; the first sound hole, the first sound outlet Three sound holes are provided on the underside of the temples.
[Claim 10] The audio glasses with directional sound output according to claim 8, characterized in that, a fixed cavity for mounting a control circuit or a battery is provided in the temples; the control circuit and the battery

are provided in The same eyeglass legs or two eyeglass legs are respectively arranged at one end of the glasses frame.
[Claim 11] The audio glasses for directed sound output according to claim 8, characterized in that the control circuit is provided with a Bluetooth module; or/and a sound pickup.
[Claim 12] The audio glasses with directional sound output according to claim 8, wherein the control circuit is provided with a charging port, and the charging port is provided on the lower side of the temple.

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(12) 按照专利合作条约所公布的国际申请

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(54) **Title:** NEAR-EAR DIRECTIONAL SOUND OUTPUT STRUCTURE, AND AUDIO GLASSES

(54) **发明名称:** 一种近耳的定向出音结构及其音频眼镜

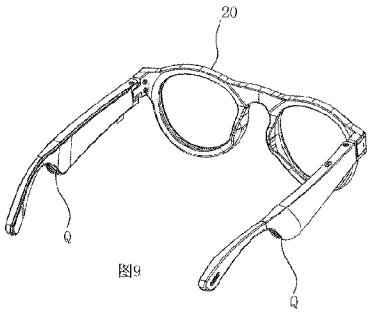


图9

(57) **Abstract:** The present application relates to a near-ear directional sound output structure, and a pair of audio glasses. A near-ear directional sound output structure, comprising a mounting cavity and a sound emission device arranged in the mounting cavity, wherein the mounting cavity is provided with sound output holes; the sound output holes are in communication with the sound emission device by means of provided sound output cavities; the sound output holes comprise a first sound output hole provided near an ear, and a second sound output hole provided away from the ear; the first sound output hole is arranged near the sound emission device; and the second sound output hole is arranged away from the sound emission device, and the second sound output hole is in communication with the sound emission device by means of a provided second sound output cavity. A sound emitted from a sound emission device can form a sound field at an earhole under the action of a directional sound emission structure, and the sound emitted from the sound emission device cannot be heard in a surrounding environment outside an ear due to an interference cancellation effect, thereby achieving the function of directional sound emission. According to the pair of audio glasses, by means of the directional effect of a directional sound output structure, insofar as the power of a sound emission device is unchanged, a sound reaching an ear of a human body is enhanced while sounds propagated to other places are attenuated.

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[见续页]

本国际公布:
— 包括国际检索报告(条约第21条(3))。

(57) 摘要: 本申请涉及一种近耳的定向出音结构及其音频眼镜。一种近耳的定向出音结构，包括安装腔，及设于安装腔的发音器；安装腔设有出音孔；出音孔通过设有的出音腔与发音器联通；出音孔包括近于耳部设置的第一出音孔，及远离耳部设置的第二出音孔；第一出音孔近于发音器设置，第二出音孔远于发音器设置；第二出音孔通过设有的第三音腔与发音器联通。发音器发出的声音经过定向发音结构的作用能在耳孔处形成声场，而耳朵外侧由于干涉抵消的作用，周边的环境听不到发音器发出的声音，从而实现定向发音的功能。本音频眼镜通过定向出音结构的定向作用，使得发音器的功率不变的情况下，到达人体耳部的声音增强，传播到其它地方的声音减弱。

一种近耳的定向出音结构及其音频眼镜

[0001] 本申请是以申请号为201910296023.4、申请日为2019年4月12日的中国专利申请为基础，并主张其优先权，该申请的全部内容在此作为整体引入本申请中。

[0002] 技术领域

[0003] 本申请涉及音频设备，更具体地说是指一种近耳的定向出音结构及其音频眼镜。

[0004] 背景技术

[0005] 常用的音频设备，设备使用时，声音没有方向性，由中心向四周辐射，除了遇到反射物，基本是射线形式辐射。为了实现小范围的使用，只能将音量调小，例如耳机。耳机戴上后，无法听到环境音（外界的声音被阻隔），耳机戴久了，耳朵会难受，如果长期配戴，会造成耳朵听力受损。而另外一种骨传导式耳机，通过头骨将声音直接传到耳膜，初戴者会有痒等不适，而且音效受损，只能针对特殊用途的场合。

[0006] 中国专利《一种新型眼镜》公开了一种新型眼镜，包括眼镜架、铰接设置于所述眼镜架两侧的眼镜腿、电路板、蓝牙芯片、麦克风收音芯片、音频驱动芯片、喇叭和电池，其中，所述眼镜腿包括扣合连接的第一壳体和第二壳体，所述第一壳体具有安装腔，所述电路板、所述蓝牙芯片、所述麦克风收音芯片、所述音频驱动芯片、所述喇叭和所述电池分别固定设置于所述安装腔内，所述第一壳体靠近所述喇叭的下侧开设有若干出音孔；所述电路板上设置有开关按键，所述开关按键穿设于所述第一壳体的下侧；所述蓝牙芯片、所述麦克风收音芯片和所述音频驱动芯片固定设置于所述电路板上，所述喇叭和所述电池分别与所述电路板电连接；所述电路板上设置有充电触点，所述充电触点穿设于所述第一壳体的下侧。

[0007] 上述专利只是在眼镜腿上安装了电路板、蓝牙芯片、麦克风收音芯片、音频驱动芯片、喇叭和电池，并且在近于喇叭的位置设置有出音孔。眼镜腿上的喇叭发出的声音仅仅通过出音孔进行传播，并没有对出音效果进行设计，声音会随

着出音孔向四周发射，没有定向性，音效较差，影响体验。

[0008] 申请内容

[0009] 本申请的目的在于克服现有技术的缺陷，提供一种近耳的定向出音结构及其音频眼镜。

[0010] 为实现上述目的，本申请采用以下技术方案：

[0011] 一种近耳的定向出音结构，包括安装腔，及设于安装腔的发音器；所述安装腔设有若干个出音孔；所述出音孔通过设有的出音腔与发音器联通；

[0012] 所述出音孔包括近于耳部设置的第一出音孔，及远离耳部设置的第二出音孔；所述第一出音孔近于发音器设置，第二出音孔远于发音器设置；所述第二出音孔通过设有的第二出音腔与发音器联通。

[0013] 其进一步技术方案为：还包括第三出音孔；所述第三出音孔通过设有的第三出音腔与发音器联通。

[0014] 其进一步技术方案为：所述第一出音孔通过第一出音腔与发音器联通；所述第一出音腔设有导音壁，以使发音器的声音从导音壁反射后从第一出音孔传出。

[0015] 其进一步技术方案为：所述发音器通过设有的安装座与安装腔联接；所述安装座近于第一出音腔设置。

[0016] 其进一步技术方案为：所述安装腔内设有若干个安装凸起；所述安装座设有与安装凸起匹配的安装槽；所述安装腔内设有若干个安装凸起；所述安装座设有与安装凸起匹配的安装槽；所述安装座通过安装槽、安装凸起可拆式固定于安装腔内。

[0017] 其进一步技术方案为：所述第三出音孔通过第三出音腔与发音器设有的背腔联通；所述背腔设于发音器出音方向的反方向。

[0018] 其进一步技术方案为：所述第二出音孔通过第二出音腔与发音器的背腔联通；所述第一出音腔通过发音器与第三出音腔、第二出音腔隔断。

[0019] 其进一步技术方案为：所述第三出音腔相对第三出音孔的内壁为弧形结构。

[0020] 其进一步技术方案为：所述安装腔由设有的壳体内腔构成；所述壳体近于第一出音腔的外侧为弧形凹陷部；所述第一出音孔设于弧形凹陷部，以使第一出音孔为弧形结构且正对耳孔。

[0021] 一种定向出音的音频眼镜，包括眼镜本体，上述的定向出音结构，控制电路及电池；所述定向出音结构设于眼镜本体的眼镜腿近于耳朵一端，所述控制电路、电池设于眼镜本体的眼镜腿；

[0022] 所述第一出音孔设于眼镜腿近于耳朵一侧；所述第二出音孔设于眼镜腿末端。

[0023] 其进一步技术方案为：所述安装腔、出音腔形成于眼镜腿的内腔；所述第一出音孔、第三出音孔设于眼镜腿下侧。

[0024] 其进一步技术方案为：所述眼镜腿内设有用于安装控制电路或电池的固定腔；所述控制电路、电池设于同一眼镜腿或分别设于两条眼镜腿近于眼镜框一端。

[0025] 其进一步技术方案为：所述控制电路设有蓝牙模块；或/和拾音器。

[0026] 其进一步技术方案为：所述控制电路设有充电口，所述充电口设于眼镜腿的下侧。

[0027] 本申请与现有技术相比的有益效果是：本申请定向出音结构通过在安装腔上设置若干个出音孔，且出音孔通过出音腔与发音器联通，使得近于耳孔的出音孔能传播正相声波，远于耳孔的出音孔由于时传播反相声波，在耳部附近产生干涉，并相互叠加，使得近耳区域形成叠加声场，远离耳部的区域声波干涉抵消，声音急速衰减。还有，第一音腔内部的导音壁，能将发音器发出的声波定向的导向人体的耳孔。把定向出音结构设在眼镜上，就可以形成具有定向出音作用的音频眼镜。本申请结构简单，发音器发出的声音经过定向发音结构的作用能在耳孔处形成声场，而耳朵外侧由于干涉抵消的作用，周边的环境听不到发音器发出的声音，从而实现定向发音的功能。本音频眼镜通过定向出音结构的定向作用，使得发音器的功率不变的情况下，到达人体耳部的声音增强，传播到其它地方的声音减弱。

[0028] 下面结合附图和具体实施例对本申请作进一步描述。

[0029] 附图说明

[0030] 图1为本申请一种近耳的定向出音结构的立体结构图；

[0031] 图2为本申请一种近耳的定向出音结构的前视图；

[0032] 图3为本申请一种近耳的定向出音结构的侧视图；

[0033] 图4为本申请一种近耳的定向出音结构的内部结构图；

[0034] 图5为本申请一种近耳的定向出音结构的内部结构图；

[0035] 图6为本申请一种近耳的定向出音结构的爆炸图；

[0036] 图7为本申请一种近耳的定向出音结构的安装座结构图；

[0037] 图8为本申请一种近耳的定向出音结构的声场示意图；

[0038] 图9为本申请一种定向出音的音频眼镜的立体结构图。

[0039] 具体实施方式

[0040] 为了更充分理解本申请的技术内容，下面结合具体实施例对本申请的技术方案进一步介绍和说明，但不局限于此。

[0041] 如图1至9为本申请实施例的图纸。

[0042] 一种近耳的定向出音结构Q，如图1至6所示，包括安装腔10，及设于安装腔10的发音器11。安装腔10设有若干个出音孔。出音孔通过设有的出音腔与发音器11联通。发音器11可以为是喇叭，发音器11发出的声音经过出音腔的调整后从发音孔传出去，其中，发音腔是经过特殊处理，使得声音从发音孔传播出去符合要求。

[0043] 出音孔包括近于耳部设置的第一出音孔12，及远离耳部设置的第三出音孔13、第二出音孔14。第一出音孔12近于发音器11设置，第三出音孔13、第二出音孔14远于发音器11设置。第一出音孔12、第三出音孔13、第二出音孔14设置在不同的位置，所具有的功能不一同。由于发音器11能产生正、反相的声波，其中，正相声波通过出第一出音腔15传到第一出音孔12，再通过第一出音孔12传到人的耳朵内；反相声波通过第三出音腔16、第二出音腔18传到第三出音孔13、第二出音孔14，再传到耳朵周围的环境中。

[0044] 第一出音孔12通过第一出音腔15与发音器11联通。第一出音腔15的内壁为弧形结构，使得发音器11发出的声音传播到内壁后，发射回来形成聚集状态，然后从第一出音孔12传出。

[0045] 优选的，在第一出音腔15内设置有倾斜的导音壁，使得发音器11的声音从导音壁反射后从第一出音孔12传出。

[0046] 或者，在发音器11倾斜设置，第一出音腔15内壁作为导音壁，以使发音器11的

声音能反射穿出。

[0047] 由于第一出音孔12正对着耳孔，以使发音器11的声音经过导音壁后反射传到耳孔，进而达到定向出音的目的。

[0048] 其中，如图7所示，发音器11通过设有的安装座17与安装腔10联接。安装座17近于第一出音腔15设置。安装座17上设有导音口172，使得发音器11发出的声音能通过导音口172从第一出音孔12传播出去。安装座17设有用于固定发音器11的固定孔171，使得发音器11固定在安装座后于安装腔10固定。导音口172按照要求设置，使得发音器11的声音能对着耳孔传播。

[0049] 于其他实施例中，发音器11可以直接安装在安装腔10内。

[0050] 具体的，安装腔10内设有若干个安装凸起101。安装座17设有与安装凸起101匹配的安装槽173。安装座17通过安装槽173、安装凸起101可拆式固定于安装腔10内。

[0051] 第三出音腔16相对第三出音孔13的内壁为弧形结构，使得第三出音孔13的出音方向确定、并且声波能相对聚集。

[0052] 第三出音孔13通过第三出音腔16与发音器11设有的背腔联通。第三出音腔16一端与背腔联通，且背腔设于发音器11出音方向的反方向。第三出音孔13设于第三出音腔16的另一端。第三出音腔16为狭长的导音腔，发音器11发出的声音在第二导音腔16的反射、干涉后，使得从第三出音孔13传播出去的声音为反相声波，并且将高频声波过滤，低频声波从第三出音孔13传出。第二导音腔16与背腔联通的一端为大端，使得发音器11的声波能将第二导音腔16填满。

[0053] 第二出音孔14通过第二出音腔18与发音器11的背腔联通。第二出音腔18的一端与背腔联通，所述第二出音孔14设于第二出音腔18的另一端。第二出音腔18与发音器11联通的一端的为大端，然后第二出音腔18的内腔的截面积往其延伸的方向逐渐减小，到达中间位置时再往第二出音孔14的方向逐渐变大，形成第二出音腔18的内腔的截面积中间小两端大的结构。发音器11的反向相声波从背腔通过第二出音腔18再从第二出音孔14传出，由于第二出音腔18具有对高频声波过滤作用，所以从第二出音孔14出来的低中频的声波。

[0054] 其中，为了达到低中高频的正相声波从第一出音孔12传出，低中频的反向声波

从第三出音孔13、第二出音孔14传出，第一出音腔15通过发音器11、安装座17与第三出音腔16、第二出音腔18隔离开，使得正相声波从第一出音孔12传出，反相声波从第三出音孔13、第二出音孔14传出。

[0055] 优选的，第三出音腔16、第二出音腔18分别设置于背腔的两侧，且第一出音腔15、第三出音腔16、第二出音腔18所在平面相互平行。

[0056] 安装腔10由设有的壳体21内腔构成。壳体21内部镂空，再将内腔分隔成需求的第一出音腔15、第三出音腔16、第二出音腔18。壳体21近于第一出音腔15的外侧为弧形凹陷部211。第一出音孔12设于弧形凹陷部211，以使第一出音孔12为弧形结构。弧形凹陷部211的底部与人体耳朵的根部上端匹配，第一出音孔12位于弧形凹陷的一端，使得第一出音孔12正对着耳孔，从而使得第一出音孔12传播的声音能通过耳孔对耳膜进行传导。

[0057] 第一出音孔12与第三出音孔13的出音方向位于壳体21的同一侧，所述第二出音孔14出音方向与第一出音孔12、第三出音孔13的出音方向垂直或形成设定夹角。具体的，第一出音孔12、第三出音孔13设于壳体21的下侧，以使的出音方向向下侧，第二出音孔14设于壳体21外侧，使得出音方向向外。

[0058] 如图7所示，正相声波在靠近耳孔处第一出音孔12传出，反向声波通过第三出音孔13、第二出音孔14传出，反向声波相对正相声波远离耳孔处。根据波干涉理论正相声波和反相声波相遇时，可以在局部位置产生抵消作用，随距离衰减，声波在局部位置产生叠加作用，得到加强的声场，因此可以使声波只在局部区域产生声场（SPL）（即距离耳孔处为为声场），而远离此局部区域的地方则是零声场。

[0059] 在另外实施例中，出音孔的个数不限于三个，根据结构的要求和发声的要求出音孔可以是多个。

[0060] 一种定向出音的音频眼镜，如图1至8、9所示，包括眼镜本体20，上述的定向出音结构Q，控制电路22及电池23。定向出音结构Q设于眼镜本体20的眼镜腿近于耳朵一端。同样，控制电路22、电池23设于眼镜本体20的眼镜腿近于眼镜框一端。第一出音孔12设于眼镜腿近于耳朵一侧。第二出音孔14设于眼镜腿末端，第二出音孔14的方向可以为任何方向。

[0061] 其中，第一出音孔12与第三出音孔13的距离为A1，第一出音孔12与第二出音孔14的距离为A2，A1：A2约等于1：1。

[0062] 安装腔10、出音腔形成于眼镜腿的内腔，同样出音孔设于眼镜腿。

[0063] 其中，眼镜腿的外壳由定向出音结构Q的壳体21延伸构成。眼镜腿的外壳包括第一外壳211及第二外壳212，且第一外壳211与第二外壳212之间形成有的腔体为安装腔10。安装腔10不仅用于安装发音器11、导音腔，还可以用于安装控制电路22、电池23。其中，眼镜腿内设有用于安装控制电路22或电池23的固定腔19。固定腔19通过安装腔10设置的挡板24隔开，以使得固定腔19不对出音腔造成干扰。

[0064] 优选的，控制电路22、电池23设于其中一眼镜腿或分别设于两条眼镜腿。为了使整个眼镜更加平衡，将电池23设置于眼睛本体其中一个眼镜腿，控制电路22设置于另外一个眼镜腿，电池23与控制电路22通过穿过眼镜框的导线连接。同时，也可以将电池23、控制电路22一同设置在同一条眼镜腿内。

[0065] 控制电路22有用于拾取环境声音的拾音器。拾音器可以读取环境的声场，经过电子放大后，输出给发声装置，发出的放大声场只会给带设备的用户听到，不会传到周围的用户，这样就可以实现远场拾音，近距离的播放给用户，例如需要助听的人群。为了便于与其它电子设备无线连接，控制电路22设有蓝牙模块。

[0066] 如图8为模拟出音的示意图。

[0067] 控制电路22设有充电接口，所述充电接口设于眼镜腿的下侧，方便充电并且美观。

[0068] 综上所述，本申请定向出音结构通过在安装腔上设置若干个出音孔，且出音孔通过出音腔与发音器联通，使得近于耳孔的出音孔能传播正相声波，远于耳孔的出音孔由于时传播反相声波，在耳部附近产生干涉，并相互叠加，使得近耳区域形成叠加声场，远离耳部的区域声波干涉抵消，声音急速衰减。还有，第一音腔内部的导音壁，能将发音器发出的声波定向的导向人体的耳孔。把定向出音结构设在眼镜上，就可以形成具有定向出音作用的音频眼镜。本申请结构简单，发音器发出的声音经过定向发音结构的作用能在耳孔处形成声场，而耳

朵外侧由于干涉抵消的作用，周边的环境听不到发音器发出的声音，从而实现定向发音的功能。本音频眼镜通过定向出音结构的定向作用，使得发音器的功率不变的情况下，到达人体耳部的声音增强，传播到其它地方的声音减弱。

[0069] 上述仅以实施例来进一步说明本申请的技术内容，以便于读者更容易理解，但不代表本申请的实施方式仅限于此，任何依本申请所做的技术延伸或再创造，均受本申请的保护。本申请的保护范围以权利要求书为准。

发明概述

技术问题

问题的解决方案

发明的有益效果

权利要求书

[权利要求 1] 一种近耳的定向出音结构，其特征在于，包括安装腔，及设于安装腔的发音器；所述安装腔设有的出音孔；所述出音孔通过设有的出音腔与发音器联通；

所述出音孔包括近于耳部设置的第一出音孔，及远离耳部设置的第二出音孔；所述第一出音孔近于发音器设置，第二出音孔远于发音器设置；所述第二出音孔通过设有的第二出音腔与发音器联通。

[权利要求 2] 根据权利要求1所述的一种近耳的定向出音结构，其特征在于，还包括第三出音孔；所述第三出音孔通过设有的第三出音腔与发音器联通。

[权利要求 3] 根据权利要求1所述的一种近耳的定向出音结构，其特征在于，所述第一出音孔通过第一出音腔与发音器联通；所述第一出音腔设有导音壁，以使发音器的声音从导音壁反射后从第一出音孔传出。

[权利要求 4] 根据权利要求3所述的一种近耳的定向出音结构，其特征在于，所述发音器通过设有的安装座与安装腔联接；所述安装座近于第一出音腔设置；所述安装腔内设有若干个安装凸起；所述安装座设有与安装凸起匹配的安装槽；所述安装座通过安装槽、安装凸起可拆式固定于安装腔内。

[权利要求 5] 根据权利要求2所述的一种近耳的定向出音结构，其特征在于，所述第三出音孔通过第三出音腔与发音器设有的背腔联通；所述背腔设于发音器出音方向的反方向。

[权利要求 6] 根据权利要求5所述的一种近耳的定向出音结构，其特征在于，所述第二出音孔通过第二出音腔与发音器的背腔联通；所述第一出音腔通过发音器与第二出音腔、第三出音腔隔断。

[权利要求 7] 第三出音腔根据权利要求6所述的一种近耳的定向出音结构，其特征在于，所述安装腔由设有的壳体内腔构成；所述壳体近于第一出音腔的外侧为弧形凹陷部；所述第一出音孔设于弧形凹陷部，以使第一出音孔为弧形结构且正对耳孔。

[权利要求 8] 一种定向出音的音频眼镜，其特征在于，包括眼镜本体，权利要求1至7任一项所述的定向出音结构，控制电路及电池；所述定向出音结构设于眼镜本体的眼镜腿近于耳朵一端，所述控制电路、电池设于眼镜本体的眼镜腿；

所述第一出音孔设于眼镜腿近于耳朵一侧；所述第二出音孔设于眼镜腿末端。

[权利要求 9] 根据权利要求8所述的一种定向出音的音频眼镜，其特征在于，所述安装腔、出音腔形成于眼镜腿的内腔；所述第一出音孔、第三出音孔设于眼镜腿下侧。

[权利要求 10] 根据权利要求8所述的一种定向出音的音频眼镜，其特征在于，所述眼镜腿内设有用于安装控制电路或电池的固定腔；所述控制电路、电池设于同一眼镜腿或分别设于两条眼镜腿近于眼镜框一端。

[权利要求 11] 根据权利要求8所述的一种定向出音的音频眼镜，其特征在于，所述控制电路设有蓝牙模块；或/和拾音器。

[权利要求 12] 根据权利要求8所述的一种定向出音的音频眼镜，其特征在于，所述控制电路设有充电口，所述充电口设于眼镜腿的下侧。

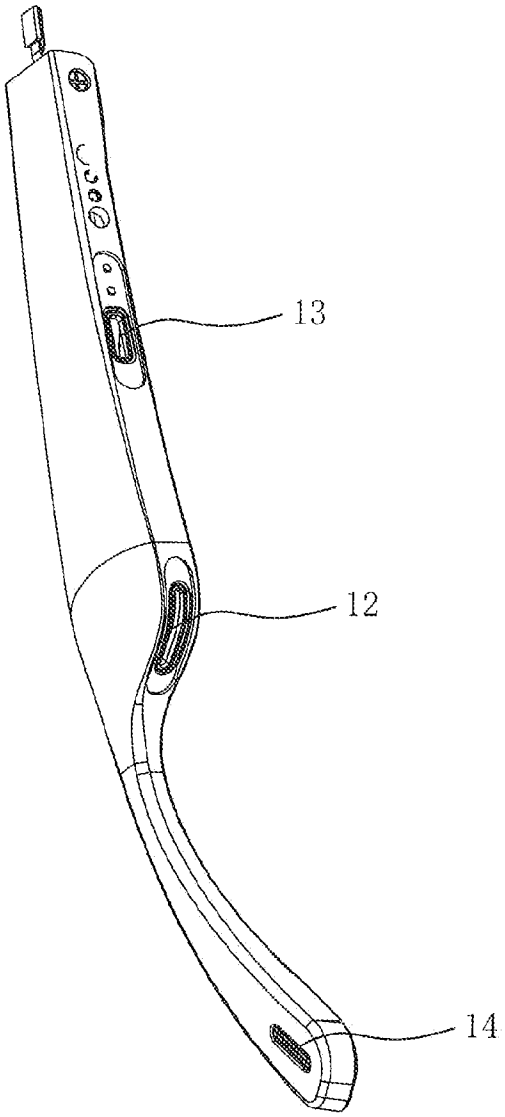


图1

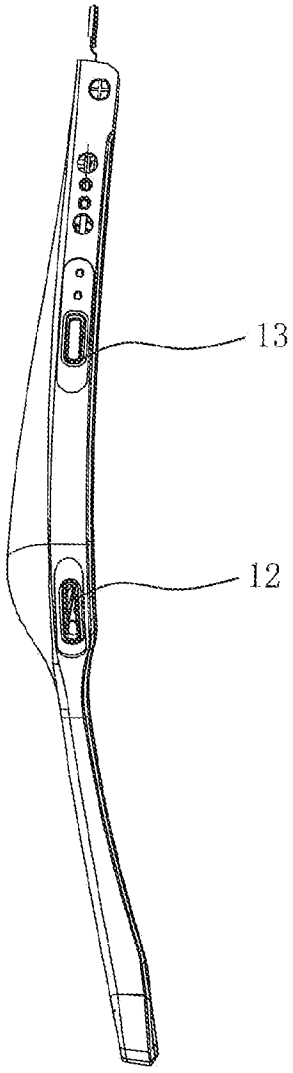


图2

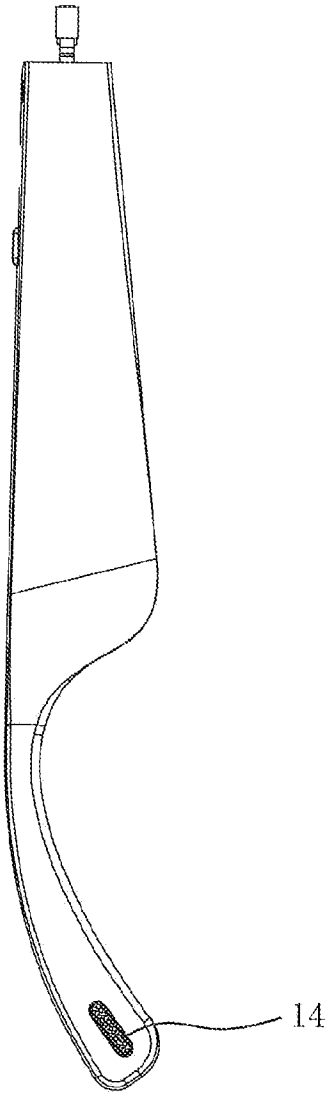


图3

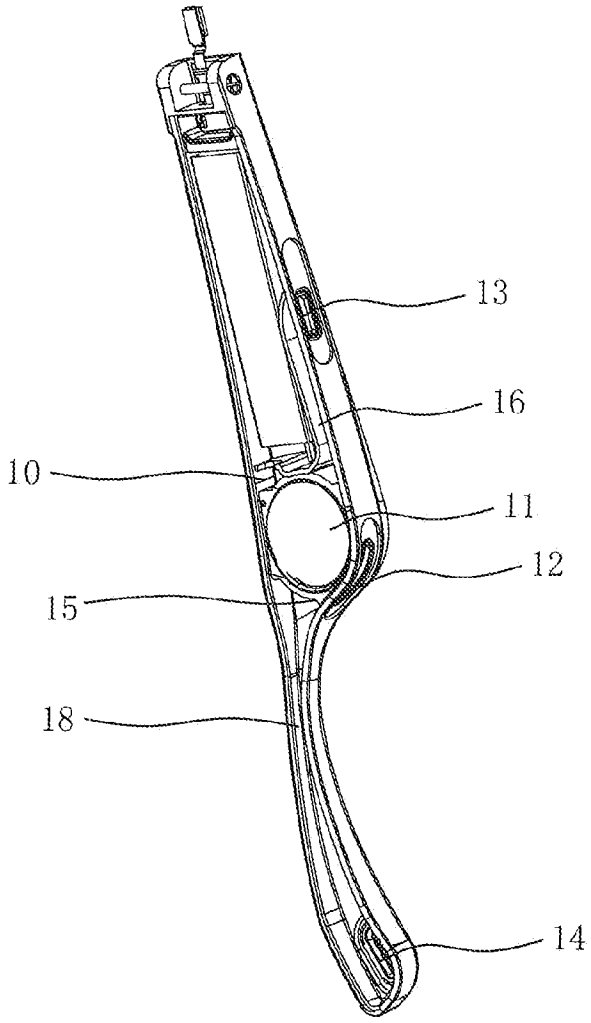


图4

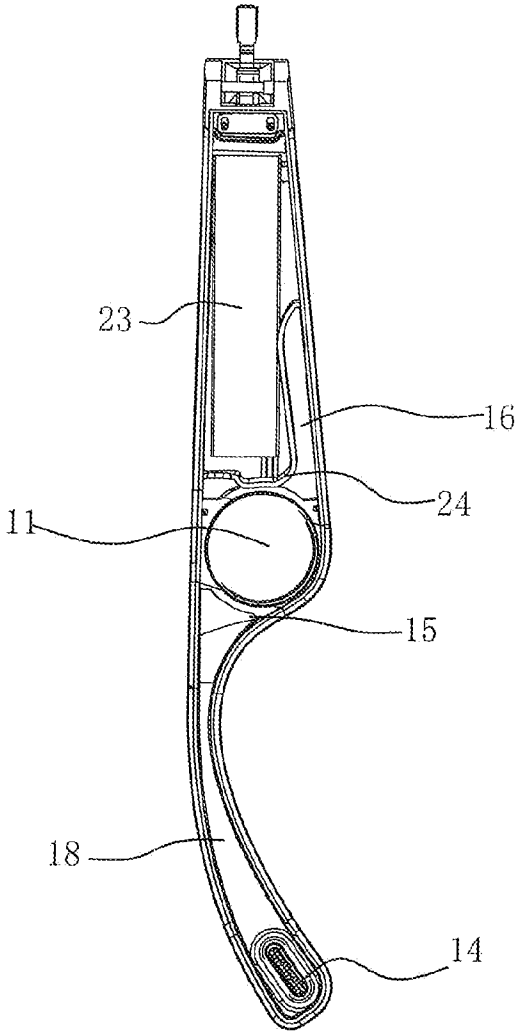


图5

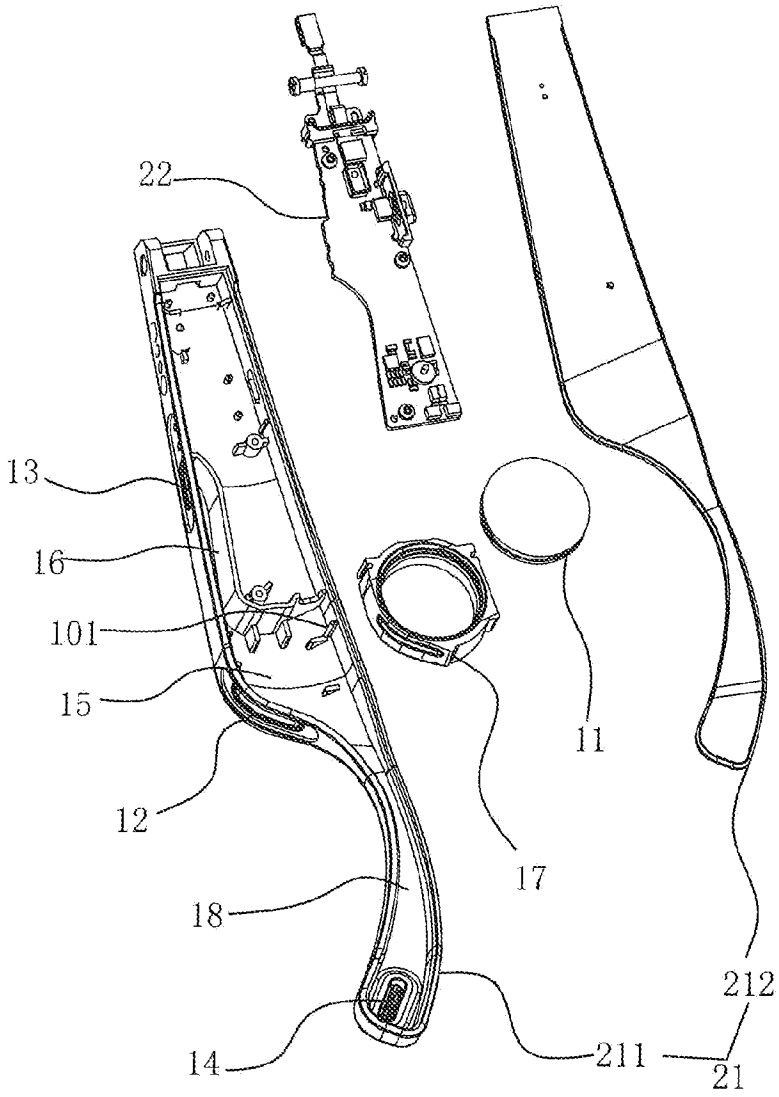


图6

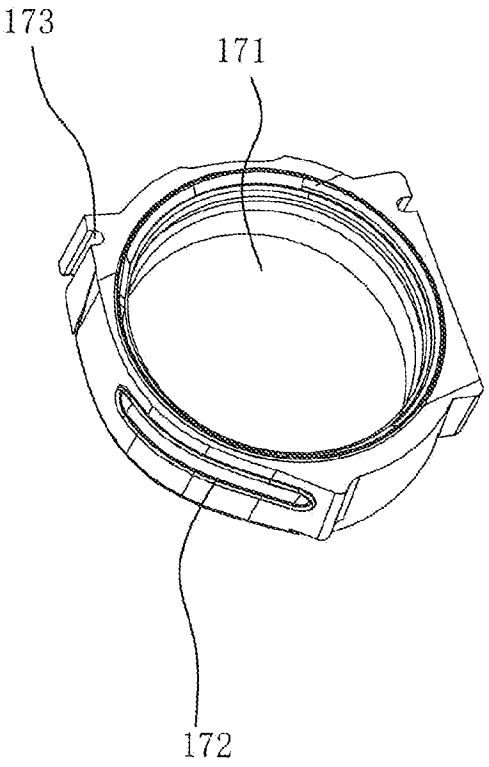


图7

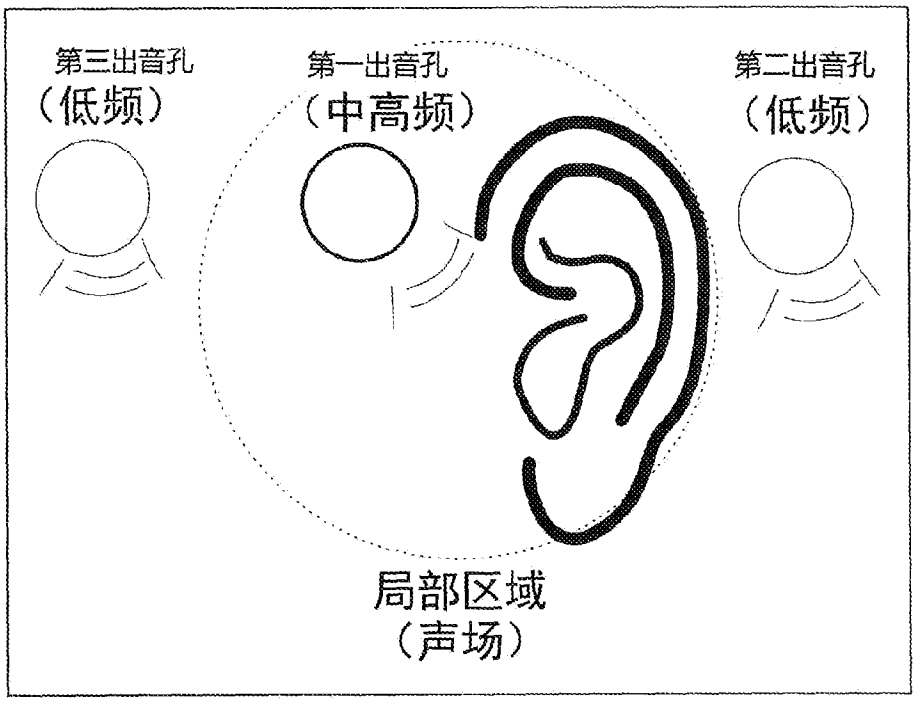


图8

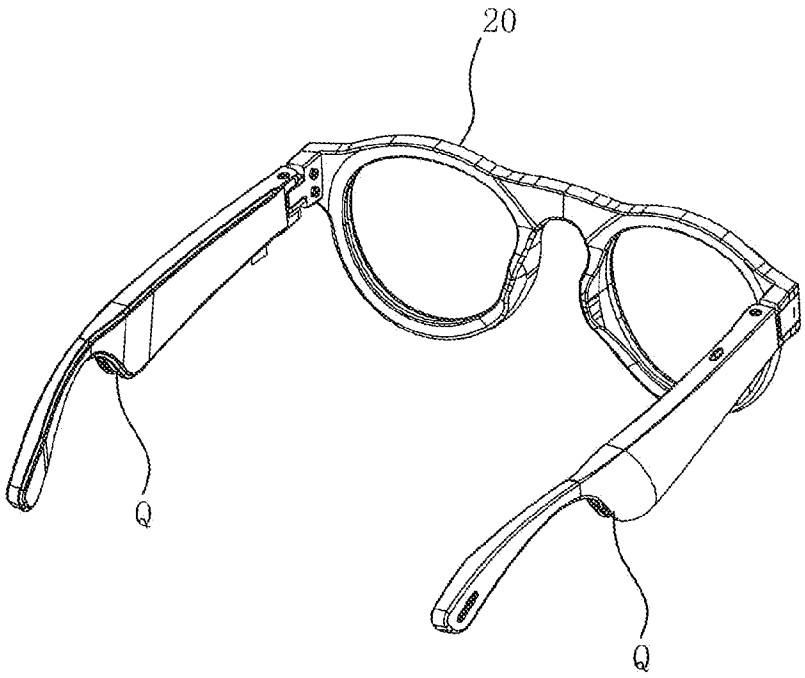


图9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/085750

A. CLASSIFICATION OF SUBJECT MATTER

G02C 11/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT, CNABS, CNKI, VEN, USTXT, JPTXT, WOTXT, EPTXT: 眼镜, 扬声器, 喇叭, 出音, 孔, 抵消, 反相, 消减, eyeglasses, sunglasses, trumpet, speaker, sound hole, opending, invert+, attenuat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 105227719 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 06 January 2016 (2016-01-06) description, paragraphs [0013]-[0024], and figures 1 and 2	1-7
Y	CN 105227719 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 06 January 2016 (2016-01-06) description, paragraphs [0013]-[0024], and figures 1 and 2	8-12
Y	CN 206975346 U (SHENZHEN XINLYUMEI TECHNOLOGY CO., LTD.) 06 February 2018 (2018-02-06) description, paragraphs [0012]-[0016], and figure 1	8-12
A	CN 101227758 A (CHEN, Li) 23 July 2008 (2008-07-23) entire document	8-12
A	CN 206039076 U (SHENZHEN QIANHAI LIVALL IOT TECHNOLOGY CO., LTD.) 22 March 2017 (2017-03-22) entire document	8-12
A	EP 2717550 A1 (ACER INC.) 09 April 2014 (2014-04-09) entire document	1-12

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 December 2019	**03 January 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/085750

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 105227719 A	06 January 2016	CN 105227719 B	03 April 2018
CN 206975346 U	06 February 2018	None	
CN 101227758 A	23 July 2008	None	
CN 206039076 U	22 March 2017	None	
EP 2717550 A1	09 April 2014	TWI 493982 B	21 July 2015
		TW 201415910 A	16 April 2014
		US 8804990 B2	12 August 2014
		US 2014098982 A1	10 April 2014

国际检索报告

国际申请号
PCT/CN2019/085750

A. 主题的分类

G02C 11/06(2006.01)i

按照国际专利分类(IPC)或者同时按照国家分类和IPC两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

G02C

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用））

CNTXT, CNABS, CNKI, VEN, USTXT, JPTXT, WOTXT, EPTXT：眼镜，扬声器，喇叭，出音，孔，抵消，反相，消减，eyeglasses, sunglasses, trumpet, speaker, sound hole, opending, invert+, attenuat+

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
X	CN 105227719 A (广东欧珀移动通信有限公司) 2016年 1月 6日 (2016-01-06) 说明书第[0013]-[0024]段，附图1和2	1-7
Y	CN 105227719 A (广东欧珀移动通信有限公司) 2016年 1月 6日 (2016-01-06) 说明书第[0013]-[0024]段，附图1和2	8-12
Y	CN 206975346 U (深圳市新律美科技有限公司) 2018年 2月 6日 (2018-02-06) 说明书第[0012]-[0016]段，附图1	8-12
A	CN 101227758 A (陈笠) 2008年 7月 23日 (2008-07-23) 全文	8-12
A	CN 206039076 U (深圳前海零距物联网科技有限公司) 2017年 3月 22日 (2017-03-22) 全文	8-12
A	EP 2717550 A1 (ACER INC) 2014年 4月 9日 (2014-04-09) 全文	1-12

☐ 其余文件在C栏的续页中列出。

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CPCI	H04R1/1066	2013-01-01
CPCI	H04R1/028	2013-01-01
CPCI	H04R1/028	2013-01-01
CPCI	H04R1/025	2013-01-01
CPCI	G02C11/10	2013-01-01
CPCI	G02C5/2254	2013-01-01
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CPCA	H04R1/347	2013-01-01

Abstract

Disclosed is a type of spectacles, comprising: a spectacle frame (10), the spectacle frame (10) comprising spectacle rims (11) and two spectacle legs (12), and the two spectacle legs (12) being rotatably connected to the spectacle rims (11) respectively; two loudspeaker assemblies (21), with the two loudspeaker assemblies (21) respectively comprising an earphone core, the two loudspeaker assemblies (21) being respectively connected to the two spectacle legs (12) via hinge assemblies (122) on the two spectacle legs (12), and the hinge assemblies (122) being rotatable to change the positions of the loudspeaker assemblies (21) with respect to the spectacle legs (12) connected thereto; and control circuits or batteries accommodated in the spectacle leg (12), with the control circuits or batteries driving the earphone cores to vibrate to generate sound comprising two harmonic peaks.

Description

INVENTION-TITLE
Priority information
This application claims priority from Chinese application CN201810975515.1, filed on August 24, 2018, the entire contents of which are incorporated herein by reference.
Technical field
The present application relates to the field of eyeglasses, and in particular, to eyeglasses with hinge components.
Background technique
People often wear glasses in daily life, such as short-sighted glasses, far-sighted glasses, sunglasses, VR glasses, massage glasses and so on. However, these glasses have a single function and cannot meet the multiple needs of people at the same time. For example, people often wear sunglasses when going out for sports or traveling, but if they want to listen to music at the same time, they need to prepare additional headphones, which is not convenient to carry and store. Therefore, glasses with a headset function bring great convenience to the user.
Summary of the Invention
An embodiment of the present specification provides glasses. The glasses include: a spectacle frame. The spectacle frame includes a spectacle frame and two spectacle legs. The two spectacle legs are rotatably connected to the spectacle frame. Two speaker components. The two speaker components include a headphone core, and the two speaker components are connected to the two temples through hinge components on the two temples, respectively, and the hinge components can be rotated to change each The position of the speaker component relative to the temples to which it is connected; the temples contain a control circuit or battery that drives the headphone core to vibrate to produce sound, and the sound includes at least two resonance peaks .
BRIEF DESCRIPTION OF THE DRAWINGS
This application will be further explained by way of exemplary embodiments, which will be described in detail with reference to the accompanying drawings. These embodiments are not restrictive. In these embodiments, the same numbers represent the same structures, where:
FIG. 1 is a schematic structural diagram of glasses provided according to some embodiments of the present application; FIG.
FIG. 2 is a schematic structural diagram of a hinge assembly according to some embodiments in the present application; FIG.
3 is a schematic diagram of an explosion structure according to some embodiments in the present application;
4 is a sectional view of the hinge assembly of FIG. 2 along the A-A axis;

5 is a schematic structural diagram of a hinge assembly according to some embodiments of the present application;
FIG. 6 is an original state diagram of a protective sleeve according to some embodiments in the present application; FIG.
7 is a partial cross-sectional view of an original state of a protective sleeve of a hinge assembly according to some embodiments of the present application;
8 is a bending state diagram of a protective sleeve of a hinge assembly according to some embodiments of the present application;
9 is a partial cross-sectional view of a folded state of a protection sleeve of a hinge assembly according to some embodiments of the present application;
10 is a partial cross-sectional view of glasses provided according to some embodiments of the present application;
11 is an enlarged view of a portion A in FIG. 10;
12 is an enlarged view of a portion B in FIG. 11;
13 is a partial cross-sectional view of glasses provided according to some embodiments of the present application;
14 is an enlarged view of a portion C in FIG. 13;
15 is an exploded structural view of glasses provided according to some embodiments of the present application;
FIG. 16 is a schematic flowchart of a voice control system according to some embodiments in the present application; FIG.
17 is an equivalent model of a vibration generating and transmitting system of a speaker assembly according to some embodiments in the present application;
18 is a structural diagram of a composite vibration device of a speaker assembly provided according to some embodiments of the present application;
19 is a structural diagram of a speaker assembly composite vibration device provided according to some embodiments of the present application;
20 is a frequency response curve of a speaker component provided according to some embodiments of the present application;
21 is a structural diagram of a speaker assembly and a composite vibration device thereof provided according to some embodiments of the present application;
22 is a vibration response curve of a speaker assembly provided according to some embodiments of the present application;
23 is a structural diagram of a vibration generating portion of a speaker assembly provided according to some embodiments of the present application;
24 is a vibration response curve of a vibration generating portion of a speaker assembly provided according to some embodiments of the present application;
25 is a vibration response curve of a vibration generating part of a speaker assembly provided according to some embodiments of the present application;
26A is a schematic structural diagram of a speaker assembly provided according to some embodiments in the present application;
26B is a schematic structural diagram of a speaker assembly provided according to some embodiments in the present application; and
27 is a noise suppression effect diagram of the speaker assembly provided in FIGS. 26A and 26B; and
FIG. 28 is a schematic diagram of transmitting sound by air conduction in the present application.
detailed description
In order to more clearly illustrate the technical solutions of the embodiments of the present application, the drawings used in the description of the embodiments will be briefly introduced below. Obviously, the drawings in the following description are just some examples or embodiments of the present application. For those of ordinary skill in the art, the present application can also be applied to these drawings without creative efforts. Other similar scenarios. It should be understood that these exemplary embodiments are given only to enable those skilled in the relevant art to better understand and implement the present invention, and not to limit the scope of the present invention in any way. Unless obvious from a locale or

otherwise stated, the same reference numerals in the figures represent the same structure or operation. As shown in this application and the claims, the words "a", "an", "an" and / or "the" do not specifically refer to the singular, but may include the plural unless the context clearly indicates an exception. In general, the terms "including" and "comprising" are only meant to include clearly identified steps and elements, and these steps and elements do not constitute an exclusive list, and the method or device may also include other steps or elements. The term "based on" is "based at least in part on." The term "one embodiment" means "at least one embodiment"; the term "another embodiment" means "at least one other embodiment". Related definitions of other terms will be given in the description below. In the following, without loss of generality, in the description of the conduction-related technology in the present invention, the description of "glasses" or "sunglasses" will be used. This description is just a form of conduction application. For those of ordinary skill in the art, "glasses" or "sunglasses" can also be replaced with other similar words, such as "eye protection device", "eye wearable device", etc. . In fact, the various implementations of the present invention can be easily applied to other non-speaking component hearing devices. For example, for a person skilled in the art, after understanding the basic principles of glasses, various modifications and changes in the form and details of the specific methods and steps of implementing glasses may be made without departing from this principle. In particular, the environmental sound pickup and processing function is added to the glasses, so that the glasses can realize the function of a hearing aid. For example, a microphone such as a microphone can pick up the sound of the surroundings of the user / wearer, and send the processed (or generated electrical signal) sound to the speaker component under a certain algorithm. That is, the glasses can be modified to include the function of picking up ambient sounds, and after certain signal processing, the sound is transmitted to the user / wearer through the speaker component part, thereby realizing the function of the hearing aid. As an example, the algorithms mentioned here may include noise cancellation, automatic gain control, acoustic feedback suppression, wide dynamic range compression, active environment recognition, active noise reduction, directional processing, tinnitus processing, multi-channel wide dynamic range compression, and active howling A combination of one or more of suppression, volume control, etc.

Please refer to FIG. 1, which is a schematic structural diagram of an embodiment of glasses according to the present application. In this embodiment, the glasses include: a spectacle frame 10 and a functional component 20.

In some embodiments, the spectacle frame 10 in the present application may include spectacle frames of various glasses such as nearsightedness, farsightedness, sunglasses, 3D glasses, etc., which is not limited herein.

The functional component 20 may be connected with the spectacle frame 10 so that the spectacles further have some other functions or components. For example, the functional component 20 may be a speaker assembly, and may include a bone conduction speaker assembly, an air conduction speaker assembly, and the like. Specifically, the functional component 20 may be a bone conduction speaker assembly 21, so that the glasses also have the function of the bone conduction speaker assembly 21. Of course, the functional component 20 may also be other components, such as a positioning device, which is not limited herein.

In some embodiments, the spectacle frame 10 may include a spectacle frame 11 and two spectacle legs 12. The spectacle main body 121 and the hinge assembly 122 may be rotatably connected to the spectacle frame 11, and the speaker assembly 21 may pass the hinge assembly 122. Attached to the temple 12.

FIG. 2 is a schematic structural diagram of an embodiment of a hinge assembly of the present application, and FIG. 3 is an exploded structural schematic diagram of an embodiment of a hinge assembly of the present application. In some embodiments, the hinge assembly 122 of the present application may be used in glasses in the embodiments of the present application.

In the present application, the hinge assembly 122 includes a hinge 30, which is a structure for connecting two solid bodies and allowing relative rotation between the two solid bodies.

Specifically, when the hinge assembly 122 in this embodiment is used in the above-mentioned glasses embodiment, the hinge assembly 122 is disposed at an end of the temple main body 121 away from the eyeglass frame 11, and further connects the functional member 20 to the mirror through the hinge 30. The leg body 121 is far from the end of the eyeglass frame 11.

In some embodiments, the hinge assembly 122 may further include a rod 40 and a fixing member 50. In some embodiments, the hinge 30 may include a hinge base 31 and a hinge arm 32. In some embodiments, the hinge arm 32 is rotatably connected to the hinge base 31 through a rotation shaft 33. It is easy to

understand that the hinge base 31 and the hinge arm 32 may be respectively connected to two components that need to be rotationally connected, so that the two components are rotationally connected together through the rotation shaft 33 of the hinge 30.
In some embodiments, the hinge seat 31 of the hinge 30 is connected to the rod-shaped member 40. In some embodiments, the rod-shaped member 40 may be a partial structure or an overall structure of one of the two members rotationally connected through the hinge 30, or may be one of the two members that need to be rotationally connected to be connected to the hinge 30. Connection structure. When the hinge assembly 122 in this embodiment is used for glasses, the rod-shaped member 40 may be at least a part of the temple main body 121 of the glasses, for example, may be all of the temple main body 121 or the temple main body 121 is far away from the eyeglass frame 11 A part of one end is further provided with the hinge main body 121 through this part of the temple main body 121 at the end of the temple main body 121 away from the eyeglass frame 11.
Specifically, the rod-like member 40 is provided along the length direction with a hinge cavity 41 communicating with the end surface of the rod-like member 40. A side wall of the rod-like member 40 is provided with a first insertion hole 42 communicating with the hinge cavity 41 and a hinge seat. An end of 31 which is remote from the hinge arm 32 is inserted into the hinge cavity 41 from an end surface of the rod-shaped member 40, and is fixed in the hinge cavity 41 by a fixing member 50 inserted in the first insertion hole 42.
In this embodiment, the hinge cavity 41 communicates with the end surface of the temple main body 121 away from the end of the spectacle frame 11, so that the hinge base 31 is inserted into the hinge cavity 41 to connect the hinge 30 with the temple main body 121.
In some embodiments, the hinge cavity 41 may be formed during the molding process of the rod-shaped member 40. For example, the material of the rod-shaped member 40 may be rubber or plastic. At this time, the hinge cavity 41 may be formed by injection molding. The shape of the hinge cavity 41 is matched with the hinge base 31 so that the hinge base 31 can be accommodated in the hinge cavity 41. In this embodiment, the temple main body 121 may be a long straight rod along the length direction. Correspondingly, the rod 40 may be a straight rod along the length direction. The hinge cavity 41 is provided in the straight rod. Further, the hinge The seat 31 is matched with the hinge cavity 41 to be accommodated in the hinge cavity 41 so as to realize the installation of the hinge 30. Of course, in other embodiments, the rod-shaped member 40 may have other shapes such as an arc-shaped rod.
In addition, the first insertion hole 42 may also be formed during the molding process of the rod-shaped member 40, or may be further formed on the side wall of the rod-shaped member by a method such as drilling after the molding. Specifically, in this embodiment, the shape of the first insertion hole 42 may be circular, and in other embodiments, it may be square, triangular, or other shapes. The shape of the fixing member 50 is matched with the first insertion hole 42 so that the fixing member 50 can be inserted into the first insertion hole 42 from the outside of the rod-like member 40, and further by abutting the side wall of the hinge base 31, or Further penetrate the outer wall of the hinge base 31 to fix the hinge base 31 in the hinge cavity 41 by plugging in or the like. Specifically, matching threads may be provided on the inner wall of the first insertion hole 42 and the outer wall of the fixing member 50 so that the fixing member 50 can be connected to the first insertion hole 42 by screwing to further connect the hinge seat 31. It is fixed in the hinge cavity 41. Of course, it may also be connected in other ways, for example, through an interference fit between the first insertion hole 42 and the fixing member 50.
Further, the hinge arm 32 can also be connected with other components, so that the component can be connected with the rod-shaped member 40 or with the rod-shaped member 40 by mounting the hinge seat 31 in the hinge cavity 41 of the rod-shaped member 40 after the hinge arm 32 is connected. The other members connected to the rod-shaped member 40 can rotate around the rotation shaft 33. For example, when the hinge assembly 122 is used in the above-mentioned glasses, the functional member 20 (such as the speaker assembly 21) is connected to the end of the hinge arm 32 away from the hinge base 31, and is connected to the temple main body 121 away from the eyeglass frame 11 through the hinge 30. Ends.
In the above manner, the rod-like member 40 is provided with a hinge cavity 41 communicating with the end surface of the rod-like member 40. The hinge 30 receives the hinge seat 31 in the hinge cavity 41, and further passes the fixing member 50 through the first The insertion hole 42 penetrates the side wall of the rod-shaped member 40 to fix the hinge seat 31 accommodated in the hinge cavity 41 in the hinge cavity 41,

so that the hinge 30 can be detached from the rod-shaped member 40 for convenience. Replacement of the hinge 30 or the rod 40. When applied to the glasses in the above-mentioned glasses embodiment of the present application, the hinge 30 and the functional member 20 can be detached from the temple main body 121, so that when the functional member 20 or the spectacle frame 11, the temple main body 121 and the like are damaged For easy replacement.

Further, please refer to FIG. 3. In one embodiment, the hinge seat 31 is provided with a second insertion hole 311 corresponding to the first insertion hole 42, and the fixing member 50 is further inserted into the second insertion hole 311. Inside.

Specifically, the shape of the second insertion hole 311 matches the shape of the fixing member 50, so that after the fixing member 50 passes through the first insertion hole 42, it is further inserted into the second insertion hole 311 to fix the hinge base 31, so that The sway of the hinge base 31 in the hinge cavity 41 is reduced, so that the hinge 30 is fixed more firmly. Specifically, similar to the connection manner of the first insertion hole 42 and the fixing member 50, the inner wall of the second insertion hole 311 may be provided with matching threads on the outer wall corresponding to the fixing member 50, so that the fixing member 50 And the hinge base 31 is screwed together; or, the outer wall at the position where the inner wall of the second insertion hole 311 and the fixing member 50 correspond to each other is a smooth surface, and the fixing member 50 and the second insertion hole 311 are in interference. The cooperation is not specifically limited here.

Further, the second insertion hole 311 can also be provided through both sides of the hinge base 31, so that the fixing member 50 can further penetrate the entire hinge base 31, so as to fix the hinge base 31 more firmly in the hinge cavity 41.

Please refer to FIG. 4, which is a cross-sectional view of the hinge assembly 122 along the A-A axis in FIG. 2. In this embodiment, the cross-sectional shape of the hinge base 31 and the cross-sectional shape of the hinge cavity 41 are matched in a cross section perpendicular to the longitudinal direction of the rod 40 so that the hinge base 31 and the rod 40 are inserted after insertion. Forms a tight fit.

In some embodiments, in the cross-section shown in FIG. 4, the cross-sectional shape of the hinge base 31 and the cross-sectional shape of the hinge cavity 41 may be any shape, as long as the hinge base 31 can be separated from the rod 40 away from the hinge arm 32. The end surface can be inserted into the hinge cavity 41. Further, the first insertion hole 42 is provided on a side wall of the hinge cavity 41 and communicates with the hinge cavity 41 through the side wall of the hinge cavity 41.

In an application scenario, the cross-sectional shape of the hinge base 31 and the cross-sectional shape of the hinge cavity 41 are both rectangular, and the first insertion hole 42 is perpendicular to one side of the rectangle.

Specifically, in this application scenario, the corners of the outer wall of the hinge base 31 or the corners of the inner wall of the hinge cavity 41 may be further rounded, so that the contact between the hinge base 31 and the hinge cavity 41 is more smooth, so that the hinge base 31 Can be smoothly inserted into the hinge cavity 41.

It should be further pointed out that before the hinge 30 is assembled, a certain amount of gas is stored in the hinge cavity 41. Therefore, if the hinge cavity 41 is only a cavity with one end open, it will be difficult due to the gas in the hinge cavity 41 during assembly. Discharging is not conducive to the insertion of the hinge seat 31, thereby affecting assembly. The first insertion hole 42 in this embodiment penetrates the side wall of the hinge cavity 41 and communicates with the hinge cavity 41, which can assist in exhausting the internal gas from the first insertion hole 42 through the hinge cavity 41 during the assembly process. Facilitates normal assembly of the hinge 30.

Please refer to FIG. 5, which is a schematic structural diagram of an embodiment of a hinge assembly of the present application. In the implementation of the hinge assembly 122 in the present application, the hinge assembly 122 further includes a connecting wire 60 disposed outside the hinge 30.

In some embodiments, the connection line 60 may be a connection line 60 having an electrical connection function and / or a mechanical connection function. When applied to the spectacles in the above-mentioned spectacles implementation of the present application, the hinge assembly 122 is used to connect the functional element 20 to the end of the temple main body 121 away from the eyeglass frame 11, and a control circuit or the like related to the functional element 20 may be provided In the temple main body 121, at this time, a connecting wire 60 is required to electrically connect the functional component 20 and a

control circuit in the temple main body 121 together. Specifically, the connecting wire 60 may be located on one side of the hinge base 31 and the hinge arm 32, and is disposed in the same accommodation space as the hinge 30.
Further, the hinge base 31 includes a first end surface 312, and the hinge arm 32 has a second end surface 321 disposed opposite the first end surface 312. It is easy to understand that there is a certain gap between the first end surface 312 and the second end surface 321. The hinge base 31 and the hinge arm 32 can be relatively rotated around the rotation shaft 33. In this embodiment, during the relative rotation of the hinge arm 32 and the hinge base 31, the relative position between the first end surface 312 and the second end surface 321 changes accordingly, so that the gap between the two becomes larger or Get smaller.
In this embodiment, the gap between the first end surface 312 and the second end surface 321 is always kept larger or smaller than the diameter of the connecting line 60, so that the connecting line 60 located outside the hinge 30 cannot fall between the hinge base 31 and the hinge arm. During the relative rotation of 32, it is clamped into the gap between the first end surface 312 and the second end surface 321, thereby reducing the damage of the connecting line 60 by the hinge. Specifically, the ratio of the gap between the first end surface 312 and the second end surface 321 to the diameter of the connecting wire 60 during the relative rotation of the hinge arm 32 and the hinge base 31 can always be kept greater than 1.5 or less than 0.8, such as greater than 1.5 , 1.7, 1.9, 2.0, etc., or less than 0.8, 0.6, 0.4, 0.2, etc., which are not specifically limited here.
Please refer to FIG. 2, FIG. 6 to FIG. 9 together, FIG. 6 is an original state diagram of the protective sleeve in one embodiment of the hinge assembly of the present application, and FIG. 7 is an original state diagram of the protective sleeve in one embodiment of the hinge assembly of the present application. FIG. 8 is a partial cross-sectional view of a bending state of a protective sleeve in an embodiment of the hinge assembly of the present application, and FIG. 9 is a partial cross-sectional view of a bending state of the protective sleeve in an embodiment of the hinge assembly of the present application. In this embodiment, the hinge assembly 122 may further include a protective sleeve 70.
Specifically, the protective sleeve 70 is sleeved on the periphery of the hinge 30 and is bent along with the hinge 30. In some embodiments, the protective sleeve 70 may include a plurality of annular ridge portions 71 disposed at intervals along the length direction of the protective sleeve 70 and two annular ridge portions 71 disposed between the annular ridge portions 71 and used to connect two adjacent ones. In some embodiments, the thickness of the pipe wall of the annular ridge portion 71 is greater than the thickness of the pipe wall of the annular connection portion 72.
In some embodiments, the length direction of the protection sleeve 70 may be consistent with the length direction of the hinge 30, and the protection sleeve 70 may be disposed along the length direction of the hinge base 31 and the hinge arm 32. The protective sleeve 70 may be made of a soft material, such as soft silicone, rubber, or the like.
The annular ridge portion 71 may be formed by protruding outwardly from the outer sidewall of the protective sleeve 70, and the shape of the inner sidewall of the protective sleeve 70 corresponding to the annular ridge portion 71 is not specifically limited herein. For example, the inner wall may be smooth, or a recess may be provided on the inner wall at a position corresponding to the annular ridge portion 71.
The ring-shaped connecting portion 72 is used to connect adjacent ring-shaped ridge portions 71, and is specifically connected to an edge region of the ring-shaped ridge portion 71 near the inside of the protective sleeve 70, so that the outer side of the protective sleeve 70 can be It is provided in a recessed manner with respect to the annular ridge portion 71.
Specifically, the number of the annular ridge portion 71 and the annular connection portion 72 may be determined according to actual use. For example, the number of the annular ridge portion 71 and the annular connection portion 72 may be determined by the length of the protective sleeve 70. The width of the protective sleeve 70 in the longitudinal direction is set.
Further, the pipe wall thicknesses of the annular ridge portion 71 and the annular connection portion 72 refer to the thickness between the inner wall and the outer wall of the protective sleeve 70 corresponding to the annular ridge portion 71 and the annular connection portion 72, respectively. . In the present embodiment, the tube wall thickness of the annular ridge portion 71 is greater than the tube wall thickness of the annular connection portion 72.
It is easy to understand that when the hinge base 31 and the hinge arm 32 of the hinge 30 are relatively

rotated around the rotation shaft 33, the angle between the hinge base 31 and the hinge arm 32 changes, so that the protective sleeve 70 is bent, as shown in the figure. 8 and 9 are shown. Specifically, when the protective sleeve 70 is bent with the hinge 30, the annular ridge portion 71 and the annular connecting portion 72 located in the outer region of the bent shape formed by the protective sleeve 70 are in a stretched state and are located in The annular ridge portion 71 and the annular connection portion 72 in the inner region of the bent shape are in a squeezed state.

In this embodiment, the thickness of the tube wall of the annular ridge portion 71 is greater than the thickness of the tube wall of the annular connection portion 72, so that the annular ridge portion 71 is harder than the annular connection portion 72, thereby protecting the sleeve 70. When in the bent state, the protective sleeve 70 on the outer side of the bent shape is in a stretched state, and the annular ridge portion 71 can provide a certain strength support for the protective sleeve 70; at the same time, the inside of the bent state The area of the protective sleeve 70 on one side is squeezed, and the annular ridge 71 can also withstand a certain pressing force, thereby protecting the protective sleeve 70, improving the stability of the protective sleeve 70, and extending the protective sleeve. The life of the tube 70.

Further, it should be noted that the shape of the protective sleeve 70 is consistent with the state where the hinge 30 is located. In one application scenario, both sides of the protective sleeve 70 along the length direction and rotating around the rotation axis may be stretched or squeezed. In another application scenario, the hinge base 31 and the hinge arm 32 of the hinge 30 can only rotate within a range of less than or equal to 180 ° about the rotation axis 33, that is, the protective sleeve 70 can only be bent toward one side , Then one side of the two sides of the protective sleeve 70 in the length direction may be squeezed and the other side may be stretched. At this time, the protective sleeve may be changed according to the different forces on the two sides of the protective sleeve 70. The two sides of the tube 70 with different forces are provided with different structures.

In one embodiment, when the protective sleeve 70 is in a bent state, the annular ridge portion 71 has a width in the longitudinal direction of the protective sleeve 70 that is greater than the direction of the bending when the protective sleeve 70 is formed on the outer side of the bent shape. The width of the inner side of the shape along the length of the protective sleeve 70.

In some embodiments, increasing the width of the annular ridge 71 in the length direction of the protective sleeve 70 can further increase the strength of the protective sleeve. Meanwhile, in this embodiment, the angle of the initial included angle between the hinge base 31 and the hinge arm 32 is less than 180 °. At this time, if the annular ridge portion 71 of the protection sleeve 70 is uniformly disposed, the protection sleeve will be made 70 was squeezed in its original state. In this embodiment, the width of the annular ridge portion 71 corresponding to the side of the outer region of the bent shape in the bent state is large, so that the length of the side protective sleeve 70 can be enlarged, and the protective sleeve can be improved. At the same time, the strength of 70 also reduces the degree of stretching on the stretching side to a certain extent when the protective sleeve 70 is bent; at the same time, the annular ridge portion 71 faces the bend when the protective sleeve 70 is in a bent state The width of the inner side of the folded shape along the length of the protective sleeve 70 is small, which can increase the space of the extruded ring-shaped connecting portion 72 in the length direction of the protective sleeve 70, thereby alleviating the squeeze to a certain extent Press on the side.

Further, in an application scenario, the width of the annular ridge portion 71 gradually decreases from the side of the outer region facing the bent shape to the side of the inner region facing the bent shape, so that the protective sleeve 70 is in a bent shape. In the folded state, the width toward the outer region side of the bent shape formed by the protective sleeve 70 is greater than the width toward the inner region side of the bent shape.

It is easily understood that the annular convex ridge portion 71 is provided around the periphery of the protective sleeve 70. In the length direction of the protective sleeve 70, one side corresponds to the stretched side, and the other side corresponds to the squeezed side. In this embodiment, the width of the annular ridge portion 71 gradually decreases from the side of the outer region facing the bent shape to the side of the inner region facing the bent shape, so that the width is more uniform and can be increased to a certain extent. Protects the stability of the sleeve 70.

In one embodiment, the annular ridge portion 71 is provided with an inner annular surface inside the protective sleeve 70 facing the outer region side of the bent shape formed by the protective sleeve 70 when

the protective sleeve 70 is in a bent state. Groove 711.
Specifically, the groove 711 in this embodiment is provided along a length direction perpendicular to the protective sleeve 70, so that the corresponding annular ridge portion 71 can be appropriately adjusted when the protective sleeve 70 is stretched in the length direction. stretch.
As described above, when the protective sleeve 70 is in a bent state, the protective sleeve 70 facing the outer side of the bent shape formed by the protective sleeve 70 is in a stretched state. In this embodiment, the protective sleeve 70 is further in a corresponding loop shape. A groove 711 is provided on the inner ring surface inside the protective sleeve 70 corresponding to the ridge portion 71, so that when the side protective sleeve is stretched, the annular ridge portion 71 corresponding to the groove 711 can be appropriately extended to take part Stretching, thereby reducing the tensile force experienced by the side protective sleeve, thereby protecting the protective sleeve 70.
It should be noted that when the protective sleeve 70 is in a bent state, the annular ridge portion 71 on the side facing the inner region of the bent shape may not be provided with a groove 711 on the inner side wall of the corresponding protective sleeve 70 . In one embodiment, the width of the groove 71 along the longitudinal direction of the protective sleeve 70 is gradually reduced from the side of the outer region facing the bent shape to the side of the inner region facing the bent shape, so that The inner side wall of the protective sleeve 70 corresponding to the annular ridge 71 on the inner side of the inner region is not provided with a groove 711.
Specifically, when the hinge assembly 122 in this embodiment is applied to the spectacles in the spectacles embodiment of the present application, the protective sleeve 70 may be different from the temple main body 121 provided on both sides of the protective sleeve 70 in the length direction. And the functional pieces 20 are connected together. In an application scenario, the protective sleeve 70 can also be integrally formed for other structures in the glasses, such as the protective cover of some components, so that the glasses are more closed and integrated.
It should be pointed out that the hinge assembly 122 in the embodiment of the hinge assembly in the present application can be used not only for the glasses in the embodiment of the glasses of the present application, but also in other devices, and the hinge assembly 122 can also include a rod shape Other components other than the member 40, the fixing member 50, the connecting wire 60, the protective sleeve 70, and the like are associated with the hinge 30 to achieve the corresponding functions.
Specifically, please refer to FIGS. 10 to 14 together. FIG. 10 is a partial cross-sectional view of an embodiment of the hinge of the present application, FIG. 11 is an enlarged view of part A in FIG. 10, and FIG. 12 is part B in FIG. An enlarged view when the first support surface and the third support surface abut to the second support surface and the third support surface and the connection between the first support surface and the second support surface makes initial contact with the third support surface, FIG. 13 is a partial cross-sectional view of an embodiment of the hinge of the present application, and FIG. 14 is an enlarged view of a portion C in FIG. 13. It should be noted that the hinge 30 in the hinge embodiment of the present application can be used in the glasses in the glasses embodiment of the present application, and can also be used in the hinge assembly 122 in the hinge assembly embodiment of the present application. It can also be used in other devices. No specific restrictions are made here.
In this embodiment, the hinge arm 32 of the hinge 30 has a first support surface 322 and a second support surface 323 connected to each other.
The hinge 30 further includes a support member 34 and an elastic member 35. The support member 34 is movably disposed on the hinge base 31 and has a third support surface 341. The elastic member 35 is used for elastically biasing the support member 34 toward the hinge arm 32, so that the third support surfaces 341 can be elastically abutted respectively. On the first support surface 322 and the second support surface 323. In some embodiments, when the hinge arm 32 is rotated relative to the hinge base 31 by an external force, the support member 34 is pushed by the connection point 324 of the first support surface 322 and the second support surface 323 to overcome the elastic bias of the elastic member 35. The reverse movement causes the third support surface 341 to switch from one of the first support surface 322 and the second support surface 323 to the other of the first support surface 322 and the second support surface 323. Those flexibly abut.
In one application scenario, the support member 34 is connected to the end of the elastic member 35 facing the hinge arm 32, and the third support surface 341 faces the side of the hinge arm 32. The hinge arm 32 is

exposed to external forces around the rotation axis 33 relative to the hinge base. During the rotation of 31, the third supporting surface 341 can be pushed so that the supporting member 34 presses the elastic member 35, and further elastically biases under the action of the elastic member 35. Of course, the support member 34 may not be connected to the elastic member 35 but only abuts on one side of the support member 34 as long as the support member 34 can achieve the above-mentioned elastic bias.

In some embodiments, the first support surface 322 and the second support surface 323 are respectively two sides of the hinge arm 32 adjacent to each other and at least partially parallel to the central axis of the rotating shaft 33, or part of the two sides. When the hinge arm 32 rotates relative to the hinge base 31, the first support surface 322 and the second support surface 323 rotate with the hinge arm 32 about the rotation axis 33, so that different sides of the hinge arm 32 face the hinge base 31, and thus the hinge arm 32 faces each other. The hinge base 31 can have different relative positional relationships.

In addition, the elastic member 35 is a member capable of providing elastic force and being capable of being compressed in the direction of the elastic force to provide a certain compression space. For example, the elastic member 35 may be a spring, and one end of the spring abuts the support member 34. When the third support surface 341 of the support member 34 is pushed toward the elastic member 35, the elastic member 35 resists the support member 34 and compresses so that Provide space in the direction of the third support surface 341 of the support member 34, so that when the relative position of the rotation shaft 33 is not changed, there is still enough space for the different sides of the hinge arm 32 to rotate to the rotation shaft 33 and the third support surface Between 341.

Specifically, when the hinge arm 32 rotates relative to the hinge base 31, the relative position of the rotating shaft 33 does not change, and the contact position of the hinge arm 32 and the third support surface 341 of the hinge base 31 changes. The distance from the position to the rotation axis 33 is different. Therefore, when the different positions of the hinge arm 32 such as the first support surface 322 and the second support surface 323 are in contact with the third support surface 341, the required rotation axis 33 to The space between the contact points of the hinge arm 32 and the third support surface 341 is different. However, due to the limitation of the elastic force and the space, the space provided by the compression of the elastic member 35 may be limited. Therefore, during the rotation of the hinge arm 32 relative to the hinge base 31, if a certain position on the hinge arm 32 and the rotation axis 33 is too large in a cross section perpendicular to the central axis of the rotation axis 33, the position will be changed during the rotation. It will be locked in another position on the third supporting surface and cannot continue to rotate the hinge arm 32, so that the hinge arm 32 and the hinge base 31 can only rotate relatively within a certain range. In an application scenario, during the relative rotation between the hinge arm 32 and the hinge base 31 about the rotation axis 33, there are only the first support surface 322 and the second support surface 323 and the first support surface 322 and the second support surface 323. The area corresponding to the connection point 324 can abut the third support surface 341.

Further, in this embodiment, the first support surface 322 and the second support surface 323 may both be planes, and the distance from the rotation shaft 33 to the connection point 324 of the two is greater than the distance from the rotation shaft 33 to the first support surface 322 and to the first support surface 322. For the distance between the two supporting surfaces 323, the hinge 30 may have two relatively stable states: the third supporting surface 341 abuts against the first supporting surface 322, and the third supporting surface 341 abuts against the second supporting surface 323.

Of course, in this embodiment, the first support surface 322 and the second support surface 323 may also be curved surfaces with a certain radian, or may even include different sub-support surfaces, as long as the distance between the hinge arm 32 and the hinge base 31 can be made. It suffices that the positional relationship of at least two corresponding relatively stable states is not specifically limited here. In addition, the hinge arm 32 may be provided with other support surfaces so that when the hinge arm 32 receives an external force and rotates relative to the rotation axis 33 and the hinge base 31, different support surfaces on the hinge arm 32 and the third The supporting surface 341 is elastically abutted, so that the hinge arm 32 and the hinge base 31 have different relative positional relationships, which are not specifically limited herein.

Specifically, the initial state is an example where the first support surface 322 abuts the third support surface 341 of the support member 34 as shown in FIG. 11 and FIG. 12. At this time, the elastic member 35 may have elastic compression deformation, or may be in an original natural state, which is not limited herein.

When the hinge 30 is subjected to an external force to cause the hinge arm 32 to rotate relative to the hinge shaft 33 and the hinge base 31 so that the second support surface 323 gradually approaches the third support surface 341, the connection between the first support surface 322 and the second support surface 323 The position 324 is in contact with the third support surface 341. Since the distance from the connection point 324 to the rotation shaft 33 is greater than the distance from the first support surface 322 to the rotation shaft 33, the connection point 324 abuts the support member 34 and pushes the support member 34 to move toward the elastic member. The movement of the direction of 35 causes the elastic member 35 to overcome the thrust and generate compression. And when the hinge arm 32 is further stressed, the connection point 324 gradually approaches the area between the rotation shaft 33 and the third support surface 341. In the process, the distance between the rotation shaft 33 and the third support surface 341 gradually increases; It is easy to understand that when the connecting line of the connection point 324 and the rotation shaft 33 is perpendicular to the third support surface 341, the distance from the rotation shaft 33 to the third support surface 341 is equal to the rotation shaft 33 to the connection on a cross section perpendicular to the center axis of the rotation shaft 33. Distance 324 at this time, the rotation axis 33 is farthest from the third support surface 341 at this time; if at this time, if the hinge 30 continues to be forced, the distance from the rotation axis 33 to the third support surface 341 will gradually decrease, so that The required compression space of the elastic member 35 is reduced, and then the elastic member 35 gradually releases the elastic force and recovers, until the connection point 324 leaves the third support surface 341 and the second support surface 323 abuts against the third support surface 341, thereby Switching from abutting the first support surface 322 and the third support surface 341 to the second support surface 323 and the third support surface 341 is realized.

Similarly, in the initial state, the second support surface 323 is in contact with the third support surface 341 of the support member 34, and the first support surface 322 is in contact with the third support surface 341 of the support member 34. 13 and 14) are similar to the above process.

It should be noted that the hinge 30 in this embodiment can be applied to the hinge assembly 122 in the glasses embodiment of the present application. When the third support surface 341 is switched from elastic contact with one of the first support surface 322 and the second support surface 323 to elastic contact with the other of the first support surface 322 and the second support surface 323, The hinge assembly 122 drives the speaker assembly 21 to switch between a first relatively fixed position and a second relatively fixed position relative to the temple main body 121, and can be fitted to the user when the speaker assembly 21 is in the first relatively fixed position. Back of the pinna. Among them, the auricle is a part of the external ear and is mainly composed of cartilage. In some embodiments, the speaker assembly 21 may be a bone conduction speaker assembly. By attaching the speaker assembly to the back of the auricle, the cartilage of the auricle can be used to transmit bone conduction sound / vibration. Placing the bone conduction speaker components on the back of the auricle can improve the sound quality and reduce the impact on the ear canal during sound transmission.

It should be noted that the distance between the rotation shaft 33 and the connection point 324 is greater than the vertical distance from the first support surface 322 and the second support surface 323, so that the third support surface 341 is separated from the first support surface 322 and the second support. The state of the hinge 30 jumps to a certain degree during the process of one of the surfaces 323 being elastically abutted to the other of the first supporting surface 322 and the second supporting surface 323.

Taking the elastic contact of the first support surface 322 and the third support surface 341 to the elastic contact of the second support surface 323 and the third support surface 341 as an example, the maximum distance h1 between the rotation shaft 33 and the connection point 324 and the rotation shaft 33 to the first When the ratio between the shortest distances h2 of the support surfaces 322 is different, the degree of jumps generated during the switching process is different.

In an embodiment, the ratio between the maximum distance h1 of the rotation shaft 33 to the connection 324 and the shortest distance h2 of the rotation shaft 33 to the first support surface 322 in a cross section perpendicular to the central axis of the rotation shaft 33 is between 1.1 and 1.5. between.

Specifically, the maximum distance h1 between the rotation shaft 33 and the connection point 324 may be greater than that of the rotation shaft 33 to the first by disposing the rotation shaft 33 away from the second support surface 323 and close to one side of the hinge arm 32 opposite to the second support surface 323. The shortest distance h2 of the support surface 322 further satisfies the above ratio.

It should be noted that when the ratio between h1 and h2 is too large, the jump is obvious, but it may take a large amount of force to be able to switch the first support surface 322 and the third support surface 341 to the second support elastically. The surface 323 and the third support surface 341 elastically abut, which inconveniences the use to a certain extent; and the ratio between h1 and h2 is too small. Although the state switching is relatively easy, the degree of transition may be small, such as When the user pulls the hinge 30, there is no obvious tactile sensation, which may cause inconvenience. In this embodiment, setting the ratio of h1 to h2 to be between 1.1 and 1.5 can enable the third support surface 341 to switch from elastic contact with the first support surface 322 to elastic contact with the second support surface 323 The hinge 30 has a relatively obvious jump, so that during use, the user has a relatively obvious feel when pulling the hinge 30, and at the same time, the jump state is not too abrupt, making it difficult for the user to switch the state of the hinge 30.

In an application scenario, the ratio of h1 to h2 may also be between 1.2 and 1.4. Specifically, the ratio of h1 to h2 may also be 1.1, 1.2, 1.3, 1.4, 1.5, etc., which is not specifically limited here.

In addition, the position of the first support surface 322 and the second support surface 323 on the hinge arm 32 will affect the hinge arm when the third support surface 341 is in contact with one of the first support surface 322 or the second support surface 323. The angle of the included angle between 32 and the hinge base 31, therefore, the positions of the first support surface 322 and the second support surface 323 on the hinge arm 32 can be set differently according to specific usage requirements. In some embodiments, the angle between the hinge arm 32 and the hinge base 31 is as shown in FIG. 9 and FIG. 12. Ω1 is the hinge arm 32 and the hinge base when the third support surface 341 is in contact with the first support surface 322. The angle ω2 between 31 is the angle between the hinge arm 32 and the hinge base 31 when the third support surface 341 and the second support surface 323 abut. In one embodiment, the hinge arm 32 and the hinge base 31 each have a certain length. The hinge arm 32 is provided on an end side in the length direction of the hinge base 31. The first support surface 322 is provided in the length direction of the hinge arm 32. Close to the end of the hinge base 31, the second support surface 323 is disposed at one end in the width direction of the hinge arm 32 and is disposed parallel to the central axis of the rotation shaft 33. At this time, when the third supporting surface 341 and the first supporting surface 322 elastically abut, the angle between the hinge arm 32 and the hinge base 31 is the largest, and the third supporting surface 341 and the second supporting surface 323 elastically abut. At this time, the angle between the hinge arm 32 and the hinge base 31 is the smallest, so that when the third support surface 341 is switched from elastic contact with the first support surface 322 to elastic contact with the second support surface 323, the hinge base 31 and The included angle between the hinge arms 32 decreases from ω1 to ω2.

It needs to be further pointed out that if the third support surface 341 is switched from elastic contact with the first support surface 322 to elastic contact with the second support surface 323, the direction of the force applied to the hinge arm 32 and the hinge arm 32 itself The direction of gravity is the same, then switching in this state will make the included angle between the hinge base 31 and the hinge arm 32 small. In this embodiment, the setting of the ratio between h1 and h2 can also make the third support surface When 341 and the first support surface 322 elastically abut, the hinge arm 32 will not or hardly reduce the angle between the hinge arm 32 and the hinge base 31 spontaneously due to its own gravity.

In an embodiment of the hinge of the present application, please refer to FIG. 12. In a cross section perpendicular to the central axis of the rotation shaft 33, the angle ω3 between the first support surface 322 and the second support surface 323 is an obtuse angle.

In some embodiments, when the hinge 30 is switched from a state where the first support surface 322 and the third support surface 341 are elastically abutted to a state where the second support surface 323 and the third support surface 341 are elastically abutted, the first support surface The smaller the angle ω3 between 322 and the second support surface 323, the larger the relative rotation angle between the hinge base 31 and the hinge arm 32 when the state is switched, that is, when the hinge base 31 is fixed, The user needs to move the hinge arm 32 by a relatively large angle to be able to switch the state of the hinge 30, so that the user is laborious to use and brings inconvenience to the user.

Since the hinge arm 32 has a certain length, and the first support surface 322 is disposed at one end in the length direction of the hinge arm 32, and the second support surface 323 is disposed adjacent to the first support surface 322 in the width direction of the hinge arm 32 on. Generally, the first support surface 322

and the second support surface 323 are vertically arranged. At this time, when the hinge 30 is switched between the above two states, the hinge arm 32 and the hinge base 31 need to be pulled relative to each other by 90 °.

In this embodiment, in a cross section perpendicular to the central axis of the rotating shaft 33, the angle ω3 between the first support surface 322 and the second support surface 323 is an obtuse angle, so when the hinge 30 is switched between the two states The required relative pulling angle of the hinge arm 32 and the hinge base 31 is less than 90 °, so as to provide convenience to users to a certain extent.

Specifically, when the hinge 30 in this embodiment is used in the glasses embodiment of the present application, the hinge 30 is used to connect the temple main body 121 and the speaker assembly 21. In some embodiments, the speaker assembly 21 may be a bone conduction speaker assembly. For example, when the hinge 30 is in the second state where the second support surface 323 and the third support surface 341 elastically abut, the speaker assembly 21 is in a first relatively fixed position to fit the back of the auricle of the user. When using the function of the speaker assembly 21 of the glasses, it is only necessary to rotate the speaker assembly 21 by an angle of less than 90 ° to fit it to the back of the user's auricle; in addition, the hinge 30 is on the first support surface 322 and the first In the first state where the three support surfaces 341 are elastically abutted, the hinge arm 32 and the connected bone conduction speaker assembly 21 form a certain angle, so that when the user wears glasses, the hinge arm 32 and the connected speaker assembly 21 can be located at the user It is set behind the ear and in the direction of the user's ear, so that it can play a certain blocking and fixing role on the glasses, and it is not easy to fall from the user's head.

It should be noted that the specific angle of the angle ω3 between the first support surface 322 and the second support surface 323 can be set according to actual needs. When the included angle is too large, the included angle between the hinge arm 32 and the function piece 20 connected to the end of the hinge arm 32 away from the hinge base 31 and the hinge base 31 will be small, so that when the user wears the hinge The arm 32 and the functional part 20 will be too close to the user's ear, which will cause pressure on the user's ear and reduce the user's comfort; if the included angle is too small, on the one hand, the user is pulling the bone conduction speaker assembly 21 to make it at When switching between the first relative position and the second relative position, the required angle is too large, which is inconvenient for the user. On the other hand, the formation between the temple main body 121 and the hinge 30 and the speaker assembly 21 The included angle is small and it is difficult to play a role of blocking and fixing the glasses, so that when the user wears the glasses, the glasses are easily dropped from the front side of the user's head. Specifically, the specific angle of the included angle between the first support surface 322 and the second support surface 323 may be set according to the head shape of the user.

Specifically, in an application scenario, the angle ω3 between the first support surface 322 and the second support surface 323 is between 100 ° and 120 ° on a cross section perpendicular to the central axis of the rotating shaft 33. Specifically, it may be 100 °, 110 °, 120 °, or the like. The setting of this angle enables the user to wear glasses and the speaker module 21 in the first relatively fixed position, so that the speaker module 21 is not too close to the user's ears to cause discomfort to the user's ears. There is no need to turn the hinge too much when switching the relative position, which is convenient for users.

In some embodiments, the third support surface 341 is switched from elastic contact with one of the first support surface 322 and the second support surface 323 to the other of the first support surface 322 and the second support surface 323. During the elastic abutment process, the connection point 324 between the first support surface 322 and the second support surface 323 abuts the third support surface 341, and pushes the support member 34 to move backwards against the elastic bias of the elastic member 35. . Taking the third supporting surface 341 and the first supporting surface 322 elastically abutting before switching as an example, during the initial switching, while the first supporting surface 322 gradually moves away from the third supporting surface 341, the connection point 324 gradually abuts against the third supporting surface. 341, and during the switching process, sliding from one side of the third support surface 341 to the other side of the third support surface 341, and finally further transitioning to elastic contact between the second support surface 323 and the third support surface 341. During the state switching process, the connection point 324 always abuts and interacts with the third support surface 341, and the shape of the connection point 324 will have a certain effect on the state switching process. For example, if the first support surface

322 and the second support surface 323 are connected in line, then the connection point 324 has a relatively sharp angle, so that when the user pulls the hinge base 31 and / or the hinge arm 32 to perform the state of the hinge 30 During the switching process, on the one hand, when the connection point 324 is in contact with the third support surface 341 and the connection point 324 is in contact with the first support surface 322 and the second support surface 323 for switching, the buffer is small, the switching is abrupt, and The feel of the movable hinge 30 is poor; on the other hand, the connection point 324 is relatively sharp, which will cause certain wear to the third support surface 341 during repeated switching processes.

In an embodiment of the present application, the connection point 324 is arc-shaped on a cross section perpendicular to the central axis of the rotating shaft 33. As a result, the connection between the first support surface 322 and the second support surface 323 is an arc surface connection, and during the state switching process of the hinge 30, the connection point 324 abutting the third support surface 341 is relatively smooth, so that the user can pull The hinge 30 has a better feel and can reduce damage to the third support surface 341 during repeated switching processes.

Specifically, in an embodiment, the connection point 324 is arc-shaped, and the curvature of the arc is different, and the effects brought by it are also different. The specific curvature value needs to be set in combination with the actual use situation. In this embodiment, the curvature of the arc is between 5 and 30, and may specifically be 5, 10, 15, 20, 25, 30, etc., which is not limited herein.

It should be noted that, when the hinge 30 in this embodiment is applied to the glasses in the glasses embodiment described above, the curvature of the connection point 324 provided by the arc can enable the user to pull the hinge 30 so that the bone conduction speaker component When switching between a relatively fixed position and a second relatively fixed position, it has a better feel.

In an embodiment, the third support surface 341 is provided such that an external force required when the third support surface 341 is switched from being elastically abutted with the first support surface 322 to being elastically abutted with the second support surface 323 is different from that The three supporting surfaces 341 are switched from elastic contact with the second support surface 323 to external force required when elastic contact with the first support surface 322.

It should be pointed out that, in a specific use scenario, the hinge 30 corresponding to different states of the hinge 30 or the structure to which the hinge 30 is connected have different functions, or due to the position of the hinge 30, a certain state is caused. It is not convenient for the user to apply force when switching the other state, and when the user switches the state of the hinge 30, it is necessary to distinguish the strength of the hinge 30 to facilitate the user to apply force, or to distinguish the two types for the user. The hinge state provides an intuitive feel and more.

Specifically, when the hinge 30 in this embodiment is applied to the glasses described above, the switching of the state of the hinge 30 will drive the speaker assembly 21 between the first relatively fixed position and the second relatively fixed position relative to the temple main body 121. Switch. Correspondingly, the two relatively fixed positions correspond to the two situations where the user uses the speaker assembly 21 and the user does not use the speaker assembly 21, and when the user wears glasses, the hand exerts force on the back of the head to switch between the two states. The degree of difficulty of the force is not the same. Therefore, correspondingly, the switching of different states is designed to require the application of different external forces, which can be used by the user.

Specifically, in an embodiment, when the third supporting surface 341 is switched from being elastically abutted with the first supporting surface 322 to being elastically abutting with the second supporting surface 323, it corresponds to relatively fixing the speaker assembly 21 by the second The position is moved to the first relatively fixed position so as to fit on the back of the auricle of the user.

Further, in this embodiment, the third support surface 341 is provided such that the external force required when the third support surface 341 is switched from the elastic abutment with the first support surface 322 to the second abutment surface 323 is less than The third support surface 341 is switched from an elastic contact with the second support surface 323 to an external force required when the third support surface 341 is elastically contacted with the first support surface 322.

It should be noted that when applying the above-mentioned glasses, when using the bone conduction speaker assembly 21, the third support surface 341 needs to be switched from elastic contact with the first support surface 322 to elastic contact with the second support surface 323 When the bone conduction speaker assembly 21 is not used, the third support surface 341 needs to be switched from elastic contact

with the second support surface 323 to elastic contact with the third support surface 341. According to this embodiment, when the user uses The force to be applied when the bone conduction speaker assembly 21 is smaller than the force required to use the bone conduction speaker assembly 21, which can facilitate the user to use the function of the bone conduction speaker assembly 21 to a certain extent.

Specifically, please refer to FIG. 12 and FIG. 14 together. In an application scenario, when the third support surface 341 is switched from the elastic abutment with the first support surface 322 to the elastic abutment with the second support surface 323, the connection place 324 initially contacts the first position 3411 of the third support surface 341. When the third support surface 341 switches from elastic contact with the second support surface 323 to elastic contact with the first support surface 322, the connection point 324 initially contacts at The second position 3412 of the third support surface 341. In some embodiments, the distance d1 between the contact point of the first position 3411 with the elastic member 35 and the support member 34 along the elastic biasing direction of the elastic member 35 is smaller than the second position in a cross section perpendicular to the central axis of the rotating shaft 33. The distance d2 between 3412 and the contact point in the direction of the elastic bias.

It should be noted that when the third support surface 341 and the first support surface 322 elastically resist, the connection point 324 is located near one end of the third support surface 341, and the third support surface 341 and the second support surface 323 elastically resist. When connected, the connection point 324 is located near the other end of the third support surface 341. Therefore, the above-mentioned first position 3411 and second position 3412 are respectively located at two ends near the third support surface 341. That is, in this embodiment, the distances between the positions of the third support surface 341 of the support member 34 near the two ends and the contact points of the elastic member 35 and the support member 34 in the elastic biasing direction of the elastic member 35 are different. The distance corresponding to the second position 3412 is smaller than the distance corresponding to the first position 3411. At this time, when the third support surface 341 is switched from being elastically abutted with the first support surface 322 to being elastically abutted with the second support surface 323, the connection point 324 does not immediately abut the third support surface 341 and is received by the elastic member. The reaction force of 35 is gradually abutted against the third support surface 341 during the switching process and is subject to the reaction force of the elastic member 35; and the third support surface 341 is elastically abutted from the first support surface 322 to the second support surface 322. When the supporting surface 323 switches elastically, the connection point 324 initially abuts the third supporting surface 341 and receives the reaction force of the elastic member 35, or at least elastically abuts against the second supporting surface 323 with respect to the third supporting surface 341. The switching of the abutting contact with the first supporting surface 322 is to be received by the reaction force of the elastic member 35 early. Therefore, in this case, when the hinge 30 is switched from the elastic abutment with the first support surface 322 to the elastic abutment with the second support surface 323, the required force is small, so that the user can use the speaker assembly 21 when using the speaker assembly 21. The force required to actuate the bone conduction speaker assembly 21 is relatively small, which is convenient for users.

Further, the third support surface 341 includes a first sub-support surface 3413 and a second sub-support surface 3414. In some embodiments, the first position 3411 is provided at the first sub-support surface 3413, and the second position 3412 is provided at the second Support surface 3414. That is, the first sub-supporting surface 3413 and the second sub-supporting surface 3414 are respectively disposed at positions close to both ends of the third support surface 341.

In some embodiments, the second sub-support surface 3414 may be a flat surface. Specifically, when the first support surface 322 or the second support surface 323 and the third support surface 341 elastically abut, the second sub-support surface 3414 may be The first support surface 322 or the second support surface 323 is parallel. The first sub-support surface 3413 may be a flat surface or an arc surface, which is not limited herein.

Further, the first sub-supporting surface 3413 and the second sub-supporting surface 3414 are not located on the same plane, the first sub-supporting surface 3413 is inclined with respect to the second sub-supporting surface 3414, and the angle between the two may not be greater than 10 °, for example, may be not more than 2 °, 4 °, 6 °, 8 °, 10 °, and the like. Specifically, the first sub-supporting surface 3413 is disposed in a direction away from the hinge arm 32, so that the contact point of the first position 3411 with the elastic member 35 and the support member 34 is along the elastic member in a cross section

perpendicular to the central axis of the rotation shaft 33. The distance in the elastically biased direction of 35 is smaller than the distance between the second position 3412 and the contact point in the elastically biased direction. In some embodiments, when the first sub-support surface 3413 is an arc surface and the second sub-support surface 3414 is a plane, the angle between the first sub-support surface 3413 and the second sub-support surface 3414 is between the two. The angle between the plane where the intersection is tangent to the first sub-support surface 3413 and the second sub-support surface 3414.

Please further refer to FIG. 15, which is an exploded structural view of an embodiment of the hinge of the present application. In this embodiment, the hinge base 31 includes a base body 313 and first and second lugs 314 and 315 protruding from the base body 313 and spaced apart from each other, and the hinge arm 32 includes an arm body 325 and a protrusion from the arm body 325 The third lug 326 is provided, and the third lug 326 is inserted into the space between the first lug 314 and the second lug 315 and is rotatably connected to the first lug 314 and the second lug 315 through the rotating shaft 33. The first support surface 322 and the second support surface 323 are disposed on the third lug 326. The support member 34 is at least partially disposed in the interval region and is located on the side of the third lug 326 facing the seat body 313 on the seat body 313. An accommodating cavity 3121 is provided in communication with the interval region. The elastic member 35 is disposed in the accommodating cavity 3121 and elastically biases the support member 34 toward the third lug 326.

Specifically, the first lugs 314, the second lugs 315, and the third lugs 326 may be respectively provided with corresponding first through holes, second through holes, and third through holes in the same axial direction. The inner diameter of each through hole can be not less than the outer diameter of the rotating shaft 33, so that when the rotating shaft 33 passes through the corresponding through hole, the hinge base 31 where the first lug 314 and the second lug 315 are located can be connected to the third lug The hinge arms 32 where 326 is located are rotationally connected together.

In some embodiments, the first support surface 322 and the second support surface 323 are both disposed on the third lug 326 and are parallel to the central axis of the rotation shaft 33, so that the hinge arm 32 surrounds the rotation shaft 33 relative to the hinge base 31. When rotating, both the first support surface 322 and the second support surface 323 may enter the space between the first lug 314 and the second lug 315.

Further, the supporting member 34 is located between the first lug 314 and the second lug 315 of the seat body 313, and the third supporting surface 341 of the supporting member 34 is disposed toward the third lug 326. In one application scenario, the elastic member 35 is completely disposed in the accommodating cavity 3121 and is in contact with the support member 34 on a side facing a spaced region between the first lug 314 and the second lug 315. When the elastic member 35 is in a natural state, an area of the support member 34 near the elastic member 35 is at least partially located in the accommodation cavity 3121. It should be noted that the shape of the portion of the support member 34 located in the accommodation cavity 3121 matches the shape of the accommodation cavity 3121, so that when the elastic member 35 elastically biases the support member 34, the support member 34 is located in the accommodation cavity 3121. A part can slide stably in the receiving cavity 3121.

In an application scenario, the cross-sectional area of the receiving cavity 3121 is smaller than the cross-sectional area of the space between the first lug 314 and the second lug 315 in a cross section perpendicular to the length direction of the hinge base 31. The support member 34 The shape of the area outside the accommodation cavity 3121 matches the space area, so that when the support member 34 moves toward the elastic member 35 side, it does not all enter the accommodation cavity 3121.

Of course, in other embodiments, the cross-sectional shape of the receiving cavity 3121 may be the same as the interval between the first lug 314 and the second lug 315 in a cross section perpendicular to the length direction of the hinge base 31. At this time, the support member 34 can be completely accommodated in the accommodation cavity 3121, so that when the support member 34 receives the pushing action, it slides in the entire accommodation cavity 3121.

Further, when the hinge 30 in the above embodiment is applied to the hinge assembly 122 in the embodiment of the hinge assembly of the present application, the first end surface 312 of the hinge base 31 is a hinge arm facing the first lug 314 and the second lug 315 An end surface of 32, a third lug 326 protruding toward the arm body 325 is located in a space between the first lug 314 and the second lug 315, so that the first lug 314 and the second lug 315 The first end surface 312 is disposed toward the arm body

325. In a cross-section in the center axis direction of the rotation shaft 33, the arm body 325 further protrudes from the third lug 326 to form a first end 321 and a second end surface 321 of the second lug 315 facing the hinge base 31.
In this embodiment, during the relative rotation of the hinge arm 32 and the hinge base 31, the gap between the first end surface 312 of the first and second lugs 314 and 315 and the second end surface 321 of the arm body 325 is always Larger or smaller than the diameter of the connecting wire 60 so that the connecting wire 60 will not be caught between the first and second lugs 314 and 315 and the arm body 325 during the relative rotation of the hinge base 31 and the hinge arm 32, and further The damage to the connecting wire 60 by the hinge 30 is reduced.
In an application scenario, the gap between the second end surface 321 of the first and second lugs 314 and 315 and the first end surface 312 of the arm body 325 is always during the relative rotation of the hinge arm 32 and the hinge base 31. It is kept much larger or smaller than the diameter of the connecting wire 60, thereby further reducing the damage of the connecting wire 60 by the hinge 30.
It should be noted that, in this embodiment, the gap between the first end surface 312 and the second end surface 321 may be a uniform gap of the same size, so that they all meet the above conditions that are larger or smaller than the diameter of the connecting line 60; or in another In the embodiment, only the gaps at the positions where the two end faces are close to the connection line 60 may be greater than or smaller than the diameter of the connection wire 60, and the gaps at other positions on both end faces may not be required to satisfy the above conditions.
Specifically, in an application scenario, in a cross section perpendicular to the center axis of the rotating shaft 33, the end faces of the first and second lugs 314 and 315 facing the hinge arm 32 and the end faces of the arm body 325 facing the hinge base 31 At least one may be chamfered so that the position of the gap between the hinge arm 32 and the hinge base 31 near the connection line 60 is always kept larger than the diameter of the connection line 60 during relative rotation.
In some embodiments, the chamfer setting may be either a fillet or a direct chamfer.
In this application scenario, it is only necessary to chamfer at least one of the end face of the first lug 314 and the second lug 315 near the connecting line 60 toward the hinge arm 32 and the end face of the arm body 325 toward the hinge base 31. It is arranged so that the connecting wire 60 will not be clamped into the gap between the two end surfaces during the relative rotation of the hinge arm 32 and the hinge base 31.
The hinge in the above-mentioned hinge embodiment in the present application may be applied to the hinge assembly embodiment of the present application, but it is not limited. In other embodiments, it may also be applied to other hinge assemblies, or two components to be connected in rotation. direct connection.
It should be noted that the above description of the hinge assembly of the glasses is only a specific example, and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principle of the hinge assembly of glasses, it is possible to form and detail the specific ways and steps of implementing the hinge assembly of the glasses without departing from this principle. Various modifications and changes, but these modifications and changes are still within the scope described above. For example, the cross-sectional shapes of the hinge base 31 and the hinge cavity 41 may be circular, oval, trapezoidal, or the like. Such deformations are all within the protection scope of this application.
In some embodiments, the glasses may further include a key module. In some embodiments, the key module may include a power key, a function shortcut key, and a menu shortcut key. In some embodiments, the function shortcut keys may include a volume up key and a volume down key for adjusting the sound size, a fast forward key and a fast backward key for adjusting the progress of the sound file, and a control for connecting the glasses to an external device (for example, , Bluetooth connection). In some embodiments, the key module may include two types of physical keys and virtual keys. For example, when the key module exists in the form of a physical key, the key may be disposed on the temple 12, the frame 11, or the temple main body 121. When the user wears the glasses in this embodiment, the key module is not in contact with human skin and is exposed on the outside to facilitate the user's wearing and operation of each key. In some embodiments, an end surface of each key in the key module may be provided with an identifier corresponding to its function. The identification may specifically include text (for example, Chinese and English), symbols (for example, the volume plus key is marked with "+", and the volume minus key is marked with "-"). In some embodiments, the logo may be provided on the button by means of laser printing, screen

printing, pad printing, laser filler, thermal sublimation, hollowed out text, or the like. In some embodiments, the label on the button may also be provided on the surface of the casing located on the peripheral side of the button, which may also serve as a label. In some embodiments, the glasses may be a touch screen, and a control program installed in the glasses may generate a virtual key on a touch screen having an interactive function. The virtual key may select a function, a volume, and a file of the player. In addition, the glasses may also be a combination of a physical display and physical keys.

In some embodiments, the functional component of the glasses may be a speaker assembly 21. The speaker module 21 may be provided with at least one key module 4d, and the key module 4d may be used for human-computer interaction. For example: implement pause / start, recording, answering calls, etc. It should be known that the key module 4d is only for the purpose of illustration. Those skilled in the art can adjust parameters such as the position, number, and shape of the key module on the basis of fully understanding the function of the key module.

In some embodiments, the key module 4d can implement different interactive functions based on the user's operation instructions. For example, clicking the key module 4d once can implement pause / start (such as music, recording, etc.); and quickly clicking the key module 4d twice, Can answer the call; click regularly (for example, click every other second, click a total of two times) to achieve the recording function. In some embodiments, the operation instruction of the user may be an operation of clicking, sliding, scrolling, or a combination thereof. For example, sliding on the surface of the key module 4d up and down to achieve the function of turning up / down the volume.

In other embodiments, the key module 4d may have at least two, and respectively correspond to the left and right two speaker components 21. The user can operate the key module 4d with his left and right hands, respectively, to improve the user experience.

In an application scenario, in order to further improve the human-computer interaction experience of the user, the functions of human-computer interaction can be assigned to the left and right key modules 4d, and the user can operate the corresponding key module 4d according to different functions. For example, corresponding to the left button module 4d: click once to turn on the recording function, and then click again to turn off the recording function; click twice quickly to implement the pause / play function. Quickly click twice on the key module 4d on the right to realize the function of answering calls (if music is playing at this time and there is no call access, you can switch to the next / previous song function).

In some embodiments, the functions corresponding to the left and right button modules 4d described above may be user-defined. For example, the user can use the application software settings to assign the pause / play function performed by the left key module 4d to the right key module 4d; or assign the call answering function performed by the right key module 4d to the left The key module 4d is executed. In addition, the user can also set the operation instructions (for example, the number of clicks and the swipe gesture) to achieve corresponding functions through application software. For example, the operation instruction corresponding to the call answering function is set from one click to two clicks, and the operation instruction corresponding to the switch to the next / previous song function is set from two clicks to three clicks. User-defined can be more in line with the user's operating habits, to some extent, to avoid operating errors and improve user experience.

In some embodiments, the aforementioned human-computer interaction function may not be unique, but may be set according to functions commonly used by users. For example, the key module 4d can also implement functions such as rejecting calls and reading text messages by voice. Users can customize the functions and operation instructions corresponding to the functions to meet different needs.

In some embodiments, the glasses may be connected to an external device through at least one key module. For example, the glasses may be connected to the mobile phone through a button on the glasses that controls a wireless connection (for example, a button that controls a Bluetooth connection). Optionally, after the connection is established, the user can directly operate the glasses on the external device (for example, a mobile phone) to implement one or more of the functions mentioned above.

It should be noted that the above description of the glasses is only a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principles of the glasses, it is possible to make various changes in the form and details of the specific ways and steps of implementing the glasses without departing from this principle. Amendments and changes, but these amendments and changes are still within the scope described above. For example, the

shape of the key may be a regular shape or an irregular shape such as a rectangle, a circle, an oval, or a triangle. As another example, the shapes of the keys may be the same or different. Such deformations are all within the protection scope of this application.
It should be noted that the above description of the glasses is only a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principles of the glasses, it is possible to make various changes in the form and details of the specific ways and steps of implementing the glasses without departing from this principle. Amendments and changes, but these amendments and changes are still within the scope described above. For example, the shape of the key may be a regular shape or an irregular shape such as a rectangle, a circle, an oval, or a triangle. As another example, the shapes of the keys may be the same or different. Such deformations are all within the protection scope of this application.
In some embodiments, the glasses further include a voice control function. FIG. 16 is a schematic diagram of a voice control module of glasses according to some embodiments of the present application. The voice control system can be used as part of the auxiliary key module, or can be integrated into the speaker device as a separate module. In some embodiments, the voice control module includes a receiving module 601, a processing module 603, a recognition module 605, and a control module 607.
The receiving module 601 may be configured to receive a voice control instruction and send the voice control instruction to the processing module 603. In some embodiments, the receiving module 601 may be one or more microphones. In some embodiments, when the receiving module 601 receives a voice control instruction issued by a user, for example, when the receiving module 601 receives a voice control instruction of "start playing", the voice control instruction is sent to the processing module 603.
The processing module 603 is communicatively connected with the receiving module 601, generates an instruction signal according to the voice control instruction, and sends the instruction signal to the identification module 605.
In some embodiments, when the processing module 603 receives a voice control instruction issued by the current user from the receiving module 601 through the communication connection, it generates an instruction signal according to the voice control instruction.
In some embodiments, the identification module 605 is communicatively connected with the processing module 603 and the control module 607, identifies whether the instruction signal matches a preset signal, and sends a matching result to the control module 607.
In some embodiments, when the identification module 605 determines that the instruction signal matches a preset signal, the identification module 605 sends the matching result to the control module 607. The control module 607 controls the operation of the speaker device according to the instruction signal. For example, when the receiving module 601 receives a voice control instruction of "start playing" and the recognition module 605 determines that the command signal corresponding to the voice control instruction matches a preset signal, the control module 607 automatically executes the voice control instruction, that is, Start playing audio material immediately. When the instruction signal does not match the preset signal, the control module 607 may not execute the control instruction.
In some embodiments, the voice control system may further include a storage module in communication with the receiving module 601, the processing module 603, and the recognition module 605; the receiving module 601 may receive a preset voice control instruction and send it to the processing module 603; processing The module 603 generates a preset signal according to the preset voice control instruction, and sends the preset signal to the storage module.
When the identification module 605 needs to match the instruction signal received by the receiving module 601 with a preset signal, the storage module sends the preset signal to the identification module 605 through a communication connection.
In some embodiments, the processing module 603 further includes removing the ambient sound included in the voice control instruction.
In some embodiments, the processing module 603 in the voice control system in this embodiment may further include a process of denoising the voice control instructions. The denoising process refers to removing the ambient sound included in the voice control instruction. In some embodiments, for example, when in a complex environment, the receiving module 601 receives a voice control instruction and sends it to the processing module 603. Before the processing module 603 generates a corresponding instruction

signal according to the voice control instruction, in order to avoid environmental sound The recognition process of the subsequent recognition module 605 interferes, and the voice control instruction is first denoised. For example, when the receiving module 601 receives a voice control instruction issued by a user while on an outdoor road, the voice control instruction includes noisy environmental sounds such as vehicles driving on the road, whistle, and the like. The processing module 602 can reduce the The effect of ambient sound on voice control instructions.

It should be noted that the above description of the voice control system is only a specific example and should not be considered as the only feasible implementation solution. Obviously, for the professionals in the field, after understanding the basic principles of the voice control system, they may make various changes in the form and details of the specific ways and steps of implementing the voice control system without departing from this principle. Amendments and changes, but these amendments and changes are still within the scope described above. For example, the receiving module 601 and the processing module 603 may be the same module. Such deformations are all within the protection scope of this application.

In some embodiments, the glasses may further include an indicator module (not shown in the figure) to display the current working status of the speaker component in the glasses. Specifically, the indicator module can emit a light signal, and by observing the light signal, the current working state of the speaker module can be obtained.

In some embodiments, the indicator light can show the power of the speaker component. For example, when the indicator light is red, it means that the power of the speaker component is not good (for example, the power is less than 5%, 10%, etc.). As another example, when the speaker device is being charged, the indicator light is blinking. As another example, when the indicator light is green, it indicates that the speaker device has sufficient power (for example, the power is 50% or more, 80% or more). In some embodiments, the color displayed by the indicator can be adjusted as needed, which is not limited herein.

Of course, it is easy to understand that the indicator light can indicate the power of the speaker device in other ways. In some embodiments, the indicator light may include a plurality of indicators, and the number of the indicator lights may indicate the current power of the speaker device. Specifically, in an application scenario, three indicators may be set. When only one indicator is on, it indicates that the power of the speaker device is insufficient and may be turned off at any time (for example, the power is between 1% and 20%). When the indicator lights only two, it indicates that the power of the speaker device is in a normal use state and can be charged (for example, the power is 21% to 70%, etc.). When the indicator lights are all on, it means that the power of the speaker device is in a full state, no charging is required, and the standby time is long (for example, the power is between 71% and 100%).

In some alternative embodiments, the indicator light may indicate the current communication status of the speaker device. For example, when the speaker device is in a communication connection with other devices (such as wifi, Bluetooth connection, etc.), the indicator light can remain blinking, or it can be displayed in other colors (such as blue).

It should be noted that the above description of the speaker device is only a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principle of the speaker device, it is possible to make various modifications in the form and details of the specific methods and steps of implementing the speaker device without departing from this principle. Changes, but these amendments and changes are still within the scope described above. For example, when the speaker device is in a charging state, the indicator light may be displayed in another color (such as purple). Such deformations are all within the protection scope of this application.

Under normal circumstances, the sound quality of the speaker component is affected by the physical properties of the components of the speaker component itself, the vibration transmission relationship between the components, the vibration transmission relationship between the speaker component and the outside world, and the efficiency of the vibration transmission system when transmitting vibration. Influencing factors. Each component part of the speaker assembly itself includes a component that generates vibration (such as, but not limited to, a transducer), a component that fixes the speaker component (such as, but not limited to, an ear hook), and a component that transmits vibration (such as, but not limited to, a movement case) Panel, vibration transmission layer, etc.). The vibration transmission relationship between the various components and the vibration transmission relationship between the speaker component and the outside world are determined by the contact manner between the speaker component and the user (such as, but not

limited to, clamping force, contact area, contact shape, etc.).
For the purpose of illustration only, the relationship between the sound quality and the components of the speaker component will be further described below based on the bone conduction speaker component. What needs to be known is that the content described below can also be applied to the air-conducted speaker component without violating the principle.
FIG. 17 is an equivalent model of a vibration generating and transmitting system of a speaker assembly according to some embodiments of the present application. As shown in FIG. 17, it includes a fixed end 1101, a sensing terminal 1102, a vibration unit 1103, and a transducing device 1104. Among them, the fixed end 1101 is connected to the vibration unit 1103 through a transmission relationship K1 (k .sub.4 in FIG. 17), and the sensing terminal 1102 is connected to the vibration unit 1103 through a transmission relationship K2 (R .sub.3 , k .sub.3 in FIG. 17), and the vibration unit 1103 is connected through The transfer relationship K3 (R .sub.4 , k .sub.5 in FIG. 17) is connected to the transducing device 1104.
The vibration unit referred to here is a movement case, and the transmission relationships K1, K2, and K3 are descriptions of the functional relationships between the corresponding parts of the speaker system equivalent system (which will be described in detail below). The vibration equation of an equivalent system can be expressed as:

$$m_{.sub.3}\, x''_{.sub.3} + R_{.sub.3}\, x'_{.sub.3} - R_{.sub.4}\, x'_{.sub.4} + (k_{.sub.3} + k_{.sub.4})\, x_{.sub.3} + k_{.sub.5}\,(x_{.sub.3} - x_{.sub.4}) = f_{.sub.3} \quad (1)$$

$$m_{.sub.4}\, x''_{.sub.4} + R_{.sub.4}\, x''_{.sub.4} - k_{.sub.5}\,(x_{.sub.3} - x_{.sub.4}) = f_{.sub.4} \quad (2)$$

Among them, m .sub.3 is the equivalent mass of the vibration unit 1103, m .sub.4 is the equivalent mass of the transducer 1104, x .sub.3 is the equivalent displacement of the vibration unit 1103, x .sub.4 is the equivalent displacement of the transducer 1104, and k .sub.3 Is the equivalent elastic coefficient between the sensing terminal 1102 and the vibration unit 1103, k .sub.4 is the equivalent elastic coefficient between the fixed end 1101 and the vibration unit 1103, and k .sub.5 is the equivalent between the transducer 1104 and the vibration unit 1103 Effective elastic coefficient, R .sub.3 is the equivalent damping between the sensing terminal 1102 and the vibration unit 1103, R .sub.4 is the equivalent damping between the transducer 1104 and the vibration unit 1103, and f .sub.3 and f .sub.4 are the vibration unit 1103, respectively Interaction force with the transducing device 1104. The equivalent amplitude A .sub.3 of the vibration unit in the system is:

Among them, f .sub.0 represents a unit driving force, and ω represents a vibration frequency. It can be seen that the factors that affect the frequency response of the bone conduction speaker component include the vibration generating part (such as, but not limited to, the vibration unit, the transducing device, the housing, and the interconnection method, such as m .sub.3 , m .sub.4 , k in formula (3) .sub.5, R .sub.4, etc.), the vibration transmitting portion (e.g., but not limited to, skin-contact manner, earhook attributes, as shown in equation (3), k .sub.3, k .sub.4, R .sub.3, etc.). Change the structure of each component of the speaker module and the parameters of the connection between the components, for example, changing the size of the clamping force is equivalent to changing the size of k .sub.4 , changing the bonding method of the glue is equivalent to changing the size of R .sub.4 and k .sub.5 , Changing the hardness, elasticity, and damping of the related materials is equivalent to changing the size of k .sub.3 and R .sub.3 , which can change the frequency response and sound quality of the bone conduction speaker components.
In a specific embodiment, the fixed end 1101 may be a relatively fixed point or a relatively fixed position (for example, an ear hook) of the bone conduction speaker assembly during vibration, and these points or areas may be regarded as bone conduction. The fixed end of the speaker assembly during vibration. The fixed end may be composed of specific components, or may be a position determined according to the overall structure of the bone conduction speaker assembly. For example, the bone conduction speaker component can be hung, bonded, or adsorbed near the human ear by a specific device, or the structure and shape of the bone conduction speaker component can be designed so that the bone conduction site can be attached to the human skin.
The sensing terminal 1102 is a hearing system for the human body to receive sound signals. The vibration unit 1103 is a part of the bone conduction speaker assembly for protecting, supporting, and connecting a transducing device, and includes a vibration transmission layer or panel that transmits vibration to a user.

Parts that come into direct or indirect contact with the user, and housings that protect and support other vibration-generating components. The transducing device 1104 is a sound vibration generating device, and may be one or a combination of the transducing devices discussed above.
The transmission relationship K1 is connected to the fixed end 1101 and the vibration unit 1103, and represents the vibration transmission relationship between the vibration generating part and the fixed end of the bone conduction speaker assembly during operation. K1 depends on the shape and structure of the bone conduction device. For example, the bone conduction speaker component can be fixed to the human head in the form of a U-shaped headphone holder / headphone strap, or it can be installed on a helmet, fire mask or other special-purpose masks, glasses and other equipment. Different bone conduction speakers are used. The shape and structure of the acoustic component will affect the vibration transmission relationship K1. Furthermore, the structure of the speaker component also includes physical properties such as the composition material and quality of different parts of the bone conduction speaker component. The transmission relationship K2 connects the sensing terminal 402 and the vibration unit 1103.
K2 depends on the composition of the transmission system including, but not limited to, transmitting sound vibrations to the hearing system through user tissues. For example, when sound is transmitted to the hearing system through the skin, subcutaneous tissue, bones, etc., the physical properties of different human tissues and their interconnections will affect K2. Further, the vibration unit 1103 is in contact with human tissue. In different embodiments, the contact surface on the vibration unit may be a vibration transmission layer or a side of the panel. The surface shape, size, and interaction between the contact surface and the human tissue Force and so on will affect the transmission coefficient K2.
The transmission relationship K3 of the vibration unit 1103 and the transducing device 1104 is determined by the internal connection properties of the bone conduction speaker component vibration generating device. The transducing device and the vibrating unit are connected in a rigid or elastic manner, or the connection is changed between the transducing device and the transducing device. The relative position between the vibration units will change the transmission efficiency of the transducer to the vibration unit, especially the transmission efficiency of the panel, thereby affecting the transmission relationship K3.
During the use of the bone conduction speaker module, the sound generation and transmission process will affect the sound quality felt by the final human body. For example, the above-mentioned fixed end, human sensory terminal, vibration unit, transducing device, and transmission relations K1, K2, and K3, etc. may all affect the sound quality of the bone conduction speaker component. It should be noted that K1, K2, and K3 are only a representation of the connection modes of different device parts or systems involved in the vibration transmission process, and can include, but are not limited to, physical connection methods, force transmission methods, and sound transmission efficiency. Wait.
The above description of the bone conduction speaker assembly equivalent system is just a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principles of bone conduction speaker components, it is possible to form specific methods and steps that affect the vibration transmission of bone conduction speaker components without departing from this principle. And various modifications and changes in details, but these modifications and changes are still within the scope of the above description. For example, K1, K2, and K3 described above may be a simple vibration or mechanical transmission mode, or may include a complex non-linear transmission system. The transmission relationship may be formed by directly connecting the various parts, or it may be performed in a non-contact manner. transfer.
FIG. 18 is a structural diagram of a composite vibration device of a speaker assembly according to an embodiment of the present application.
In some embodiments, a composite vibration device is further provided on the glasses. In some embodiments, the composite vibration device may be part of a transducing device. In some embodiments, the composite vibration device in FIG. 18 may be a vibration portion that provides sound inside the headphone core. Specifically, the composite vibration device in the embodiment of the present application is equivalent to the specific embodiment of the transmission relationship K3 of the vibration unit 1103 and the transducing device 1104 in FIG. 17. An embodiment of a composite vibration device of a speaker assembly is shown in FIG. 18 and FIG. 19. A vibration transmitting plate 1801 and a vibration plate 1802 form a composite vibration device. The vibration transmitting plate 1801 is provided as a first annular body 1813, and The first ring body is provided with three first supporting rods 1814 which are radiated toward the center,

and the position of the radiating center is fixed to the center of the vibration plate 1802. The center of the vibration plate 1802 is a groove 1820 matching the center of the spoke and the first support rod. The vibration plate 1802 is provided with a second annular body 1821 having a radius different from that of the vibration transmitting plate 1801, and three second struts 1822 different in thickness from the first strut 1814. The first rod 1814 and the second rod 1822 are staggered, and may be, but not limited to, an angle of 60 degrees.

Both the first and second poles can be straight rods or other shapes that meet specific requirements. The number of poles can be set to two or more, and symmetrical or asymmetrical arrangements are used to meet economic and practical effects. Requirements. The vibration transmitting plate 1801 has a thin thickness and can increase elastic force. The vibration transmitting plate 1801 is clamped in the center of the groove 1820 of the vibration plate 1802. A voice coil 1808 is attached to the lower side of the second annular body 1821 of the vibration plate 1802. The composite vibration device further includes a bottom plate 1812 on which an annular magnet 1810 is disposed, and an inner magnet 1811 is concentrically disposed in the annular magnet 1810. An inner magnetic plate 1809 is provided on the top surface of the inner magnet 1811, and a ring magnetic plate 1807 is provided on the ring magnet 1810. A washer 1806 is fixedly disposed above the ring magnetic plate 1807. The first annular body 1813 of the vibration transmitting plate 1801 is fixedly connected to the washer 1806. The entire composite vibration device is connected to the outside through a panel 1830. The panel 1830 is fixedly connected to the center of the convergence of the vibration transmitting plate 1801, and is fixed to the center of the vibration transmitting plate 1801 and the vibration plate 1802. By using the composite vibration device composed of the vibration plate and the vibration transmitting plate, a frequency response as shown in FIG. 20 can be obtained, and two resonance peaks are generated. By adjusting parameters such as the size and material of the two components, the resonance peaks can be caused to appear at different positions, for example, the low-frequency resonance peaks can appear at a lower-frequency moving position, and / or the high-frequency resonance peaks can appear at more High frequency location. Preferably, the stiffness coefficient of the vibration plate is greater than the stiffness coefficient of the vibration transmitting plate, the vibration plate generates a high frequency resonance peak among the two resonance peaks, and the vibration transmission plate generates a low frequency resonance peak among the two resonance peaks. The range of these resonance peaks may be set within or outside the frequency range of sounds audible by the human ear. Preferably, neither of the resonance peaks is within the frequency range of sounds audible by the human ear; more preferably , One resonance peak is within the frequency range of the sound audible by the human ear, and the other resonance peak is outside the frequency range of the sound audible by the human ear; more preferably, both resonance peaks are audible by the human ear Within the frequency range of the sound; and even more preferably, both resonance peaks are within the frequency range of the sound audible to the human ear, and their peak frequencies are between 80 Hz and 18000 Hz; even more preferably, two The resonance peaks are both in the frequency range of the sound that can be heard by the human ear, and its peak value is between 200Hz-15000Hz; even more preferably, both resonance peaks are in the frequency range of the sound that can be reached by the human ear, and its The peak value is between 500 Hz and 12000 Hz; even more preferably, both resonance peaks are in the frequency range of the sound accessible to the human ear, and the peak value is between 800 Hz and 11000 Hz. The frequency of the peaks of the resonance peaks should preferably have a certain difference, for example, the peaks of the two resonance peaks differ by at least 500 Hz; preferably, the peaks of the two resonance peaks differ by at least 1000 Hz; even more preferably, the peaks of the two resonance peaks differ At least 2000 Hz; even more preferably, the peaks of the two resonance peaks differ by at least 5000 Hz. In order to achieve better results, both resonance peaks can be within the audible range of the human ear, and the peak frequencies of the resonance peaks differ by at least 500 Hz; preferably, both resonance peaks can be within the audible range of the human ear, The peaks of the two resonance peaks differ by at least 1000 Hz; still further preferably, the two resonance peaks may both be within the audible range of the human ear, and the peaks of the two resonance peaks differ by at least 2000 Hz; and still further preferably, the two resonance peaks Both can be within the audible range of the human ear, and the peaks of the two resonance peaks differ by at least 3000 Hz; it can be further preferred that both resonance peaks can be within the audible range of the human ear, and the peaks of the two resonance peaks differ At least 4000Hz. One of the two resonance peaks can be within the audible range of the human ear and the other is outside the audible range of the human ear, and

the peak frequencies of the two resonance peaks differ by at least 500 Hz; preferably, one resonance peak is audible in the human ear Within the range, the other is outside the audible range of the human ear, and the peak frequencies of the two resonance peaks differ by at least 1000 Hz; more preferably, one of the resonance peaks is within the audible range of the human ear, and the other is audible by the human ear Outside the range, and the peak frequencies of the two resonance peaks differ by at least 2000 Hz; further preferably, one resonance peak is within the audible range of the human ear, the other is outside the audible range of the human ear, and the peak values of the two resonance peaks The frequencies differ by at least 3000 Hz; even more preferably, one resonance peak is within the audible range of the human ear and the other is outside the audible range of the human ear, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 5Hz-30000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 5Hz-30000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 5 Hz and 30 000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, the two resonance peaks may both be at a frequency of 5 Hz to 30 000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; further preferably, the two resonance peaks may both be between 5 Hz and 30000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 20Hz-20000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 20Hz-20000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 20 Hz and 20,000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, the two resonance peaks may be at a frequency of 20 Hz to 20,000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; even more preferably, the two resonance peaks may both be between 20 Hz and 20,000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 100Hz-18000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 100Hz-18000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 100 Hz and 18000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, the two resonance peaks may be at a frequency of 100 Hz to 18000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; further preferably, the two resonance peaks may both be between 100 Hz and 18000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 200Hz-12000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 200Hz-12000Hz, and the peaks of the two resonance peaks The frequencies differ by at least 1000 Hz; more preferably, the two resonance peaks can be between 200 Hz and 12,000 Hz, and the peak frequencies of the two resonance peaks can differ by at least 2000 Hz; further preferably, both resonance peaks can be between 200 Hz and 12000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; even more preferably, the two resonance peaks may both be between 200 Hz and 12000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 500Hz-10000Hz, and the peak frequencies of the two resonance peaks are at least 400Hz different; preferably, both resonance peaks can be between 500Hz-10000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 500 Hz and 10000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, both resonance peaks may be between 500 Hz and 10000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; even more preferably, the two resonance peaks may both be between 500 Hz and 10000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. In this way, the resonance response range of the speaker component is widened, and the sound quality that satisfies the conditions is obtained. It is worth noting that in the actual use process, multiple vibrating plates and vibration plates can be set to form a multi-layer vibration structure, which respectively correspond to different frequency response ranges to achieve full-range full-frequency response and high-quality speaker assembly vibration. , Or make the frequency response curve meet the requirements in some specific frequency ranges. For example, in a bone-

conduction hearing aid, in order to meet normal hearing requirements, a transducing device composed of one or more vibration plates and vibration transmitting plates with a resonance frequency in the range of 100 Hz to 10000 Hz may be selected. The description of the composite vibration device composed of a vibration plate and a vibration transmitting plate appears in the Chinese Patent Application No. 201110438083.9 filed on December 23, 2011 and entitled "A Bone Conduction Speaker and Composite Vibration Device" This patent document is incorporated herein by reference in its entirety.

21 is a structural diagram of a composite vibration device of a speaker component in glasses provided by some embodiments of the present application. In another embodiment, as shown in FIG. 20, the composite vibration device of the speaker assembly includes a vibration plate 2002, a first vibration transmitting piece 2003 and a second vibration transmitting piece 2001. The first vibration transmitting plate 2003 fixes the vibration plate 2002 and the second vibration transmitting plate 2001 on the housing 2019. The composite vibration device composed of the vibration plate 2002, the first vibration transmitting plate 2003 and the second vibration transmitting plate 2001 can generate a lot of At the two resonance peaks, a flatter frequency response curve is generated in the audible range of the hearing system, thereby improving the sound quality of the speaker component.

The number of resonance peaks generated in the triple compound vibration system of the first vibration transmitting plate is greater than that of the composite vibration system without the first vibration transmitting plate. Preferably, the triple compound vibration system can generate at least three resonance peaks; more preferably, at least one resonance peak is not within the range audible to the human ear; more preferably, all resonance peaks are audible to the human ear It is further preferred that the resonance peaks are all within the range audible to the human ear, and its peak frequency is not higher than 18000 Hz; even more preferably, the resonance peaks are all within the audible range of the human ear. Within the frequency range, and its peak value is between 100 Hz and 15000 Hz; even more preferably, the resonance peaks are all within the frequency range of the sound accessible to the human ear, and its peak value is between 200 Hz and 12000 Hz; even more preferably, the resonance The peaks are all in the frequency range of the sound that can be reached by the human ear, and their peaks are between 500Hz-11000Hz. The frequency of the peaks of the resonance peaks should preferably have a certain difference, for example, the peaks of at least two resonance peaks differ by at least 200 Hz; preferably, the peaks of at least two resonance peaks differ by at least 500 Hz; more preferably, at least two The peaks of the resonance peaks differ by at least 1000 Hz; still further preferably, the peaks of at least two resonance peaks differ by at least 2000 Hz; still more preferably, the peaks of at least two resonance peaks differ by at least 5000 Hz. In order to achieve a better effect, the resonance peaks can both be within the audible range of the human ear, and the peak frequencies of at least two resonance peaks have a difference of at least 500 Hz; preferably, the resonance peaks can both be within the audible range of the human ear. The peaks of at least two resonance peaks have a difference of at least 1000 Hz; more preferably, the resonance peaks can both be within the audible range of the human ear, and the peaks of at least two resonance peaks have a difference of at least 1000 Hz; even more preferably, the resonance peaks can be both Within the audible range of the human ear, the peaks of at least two resonance peaks differ by at least 2000 Hz; and even more preferably, the resonance peaks may both be within the audible range of the human ear, and the peaks of at least two resonance peaks differ by at least 3000 Hz; it may be even further preferred that the resonance peaks may all be within the audible range of the human ear, and the peaks of at least two resonance peaks differ by at least 4000 Hz. Two of the resonance peaks may be within the audible range of the human ear, and the other is outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 500 Hz; preferably, the two resonance peaks are in the human ear. Within the audible range of the ear, another resonance peak is outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 1000 Hz; more preferably, the two resonance peaks are within the audible range of the human ear , The other is outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 2000 Hz; further preferably, the two resonance peaks are within the audible range of the human ear, and the other is audible by the human ear Outside the range, and there are at least two resonance peaks with a peak frequency difference of at least 3000 Hz; even more preferably, the two resonance peaks are within the audible range of the human ear, and the other is outside the audible range of the human ear, and at least The peak frequencies of the two resonance peaks differ by at least 4000 Hz. One of the resonance peaks can be within the audible range of the human

ear, the other two are outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 500 Hz; preferably, one resonance peak is in the human ear Within the audible range, the other two resonance peaks are outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 1000 Hz; more preferably, one resonance peak is within the audible range of the human ear, The other two are outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 2000 Hz; further preferably, one of the resonance peaks is within the audible range of the human ear, and the other two are audible by the human ear Outside the range, and there are at least two resonance peaks with a peak frequency difference of at least 3000 Hz; even more preferably, one resonance peak is within the audible range of the human ear, and the other two are outside the audible range of the human ear, and at least The peak frequencies of the two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 5Hz-30000Hz, and the peak frequencies of at least two resonance peaks are different by at least 400Hz; preferably, the resonance peaks can be both between 5Hz-30000Hz, and there must be at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks can both be between 5 Hz and 30 000 Hz, and the peak frequencies of at least two resonance peaks can be at least 2000 Hz; further preferably, the resonance peaks can be both between 5 Hz and 30 000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may both be between 5 Hz and 30000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 20Hz-20000Hz, and the peak frequencies of at least two resonance peaks differ by at least 400Hz; preferably, the resonance peaks can be both between 20Hz-20000Hz, and the peaks of at least two resonance peaks exist. The frequency difference is at least 1000Hz; more preferably, the resonance peaks can be both between 20Hz-20000Hz, and the peak frequencies of at least two resonance peaks can be at least 2000Hz different; further preferably, the resonance peaks can be both between 20Hz-20000Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may both be between 20 Hz and 20,000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 100 Hz and 18000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 400 Hz. Preferably, the resonance peaks can be both between 100 Hz and 18000 Hz, and there must be at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks can all be between 100 Hz and 18000 Hz, and the peak frequencies of at least two resonance peaks can be at least 2000 Hz; further preferably, the resonance peaks can be both between 100 Hz and 18000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may all be between 100 Hz and 18000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 200Hz-12000Hz, and the peak frequencies of at least two resonance peaks differ by at least 400Hz; preferably, the resonance peaks can all be between 200Hz-12000Hz, and there must be at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks may be between 200 Hz and 12,000 Hz, and the peak frequencies of at least two resonance peaks may be at least 2000 Hz; further preferably, the resonance peaks may be between 200 Hz and 12000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may all be between 200 Hz and 12000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 500Hz and 10000Hz, and the peak frequencies of at least two resonance peaks differ by at least 400Hz; preferably, the resonance peaks can be both between 500Hz and 10000Hz, and there are at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks may be between 500 Hz and 10000 Hz, and the peak frequencies of at least two resonance peaks may be at least 2000 Hz; further preferably, the resonance peaks may be between 500 Hz and 10000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may all be between 500 Hz and 10000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. In one embodiment, by using a triple compound vibration system composed of a vibration plate, a first vibration transmitting plate, and a second vibration transmitting plate, the frequency response shown in FIG. 25 can be obtained, and three distinct resonance peaks can be generated. The sensitivity of the speaker component's frequency response in the low frequency range (about 600 Hz) is greatly improved, and the sound quality is improved.

By changing parameters such as the size and material of the first vibration transmitting plate, the resonance peak can be moved, and finally a more ideal frequency response can be obtained. Preferably, the first vibration transmitting sheet is an elastic sheet. The elasticity is determined by various aspects such as the material, thickness, and structure of the first vibration transmitting plate. The material of the first vibration transmitting plate, such as, but not limited to, steel (such as, but not limited to, stainless steel, carbon steel, etc.), light alloy (such as, but not limited to, aluminum alloy, beryllium copper, magnesium alloy, titanium alloy, etc.), plastic (Such as, but not limited to, high-molecular polyethylene, blown nylon, engineering plastics, etc.), or other single or composite materials that can achieve the same performance. For composite materials, such as but not limited to glass fiber, carbon fiber, boron fiber, graphite fiber, graphene fiber, silicon carbide fiber, or aramid fiber, and other reinforcing materials, it can also be a composite of other organic and / or inorganic materials, such as glass Fiber-reinforced unsaturated polyester, epoxy resin or phenolic resin matrix. The thickness of the first vibration transmitting plate is not less than 0.005mm, preferably, the thickness is 0.005mm-3mm, more preferably, the thickness is 0.01mm-2mm, even more preferably, the thickness is 0.01mm-1mm, and even more preferably, the thickness is It is 0.02mm-0.5mm. The structure of the first vibration transmitting plate may be set in a ring shape, preferably, it includes at least one ring, preferably, it includes at least two rings, which may be concentric rings or non-concentric rings. At least two struts are connected, and the struts radiate from the outer ring to the center of the inner ring, further preferably including at least one elliptical ring, further preferably including at least two elliptical rings, and different elliptical rings have different curvatures Radius, the rings are connected by a support rod, and further preferably, the first vibration transmitting plate includes at least one square ring. The structure of the first vibration transmitting sheet may also be set in a sheet shape. Preferably, a hollow pattern is provided on the top, and the area of the hollow pattern is not smaller than the area without the hollow. In the above description, materials, thicknesses, and structures can be combined into different vibration-transmitting sheets. For example, the ring-shaped vibration transmitting plate has different thickness distributions. Preferably, the thickness of the support rod is equal to the thickness of the ring. Further preferably, the thickness of the support rod is greater than the thickness of the ring. More preferably, the thickness of the inner ring is greater than the thickness of the outer ring. .

In the present application, specific embodiments of the vibration plate, the first vibration transmitting sheet, and the second vibration transmitting sheet are also disclosed for the above contents. FIG. 25 is a speaker in an MP3 player provided according to some embodiments of the present application. Structural drawing of the vibration generating part of the component. As shown in FIG. 25, the energy conversion device includes a magnetic circuit system composed of a magnetically permeable plate 2210, a magnet 2211, and a magnetically permeable plate 2212, a vibration plate 2214, a coil 2215, a first vibration transmitting plate 2216, and a second vibration transmitting plate 2217. The panel 2213 (that is, the side of the movement case that is close to the user) protrudes the housing 2219, and is bonded to the vibration plate 2214 by glue. The first vibration transmitting plate 2216 connects and fixes the transducer to the housing 2219 to form a suspension structure.

During the operation of the speaker module, the triple vibration system composed of the vibration plate 2214, the first vibration transmitting plate 2216, and the second vibration transmitting plate 2217 can generate a flatter frequency response curve, thereby improving the sound quality of the speaker module. The first vibration transmitting piece 2216 elastically connects the transducing device to the housing 2219, which can reduce the vibration transmitted from the transducing device to the housing, thereby effectively reducing the sound leakage caused by the vibration of the housing, and reducing the vibration of the housing. The effect of sound component sound quality. Figure 25 shows the response curves of the vibration intensity of the casing and the vibration intensity of the panel with frequency. Among them, the thick line shows the frequency response of the vibration generating portion after the first vibration transmitting plate 2216 is used, and the thin line shows the frequency response of the vibration generating portion after the first vibration transmitting plate 2216 is not used. It can be seen that in the frequency range above 500 Hz, the vibration of the housing of the speaker module without the first vibration transmitting plate 2216 is significantly greater than the vibration of the housing of the speaker module containing the first vibration transmitting plate 2216. FIG. 25 shows a comparison of sound leakage in the case where the first vibration transmitting plate 2216 is included and the case where the first vibration transmitting plate 2216 is not included. Wherein, the leakage sound of the device containing the first vibration transmitting plate 2216 in the intermediate frequency (for

example, about 1000 Hz) is smaller than the leakage sound of the device without the first vibration transmitting plate 2216 in the corresponding frequency range. It can be seen that after the first vibration transmitting plate is used between the panel and the casing, the vibration of the casing can be effectively reduced, thereby reducing the sound leakage. In some embodiments, the first vibration transmitting plate may include, but is not limited to, stainless steel, beryllium copper, plastic, and polycarbonate materials, and the thickness is in the range of 0.01 mm-1 mm.

It should be noted that the above description of the vibration mechanism is only a specific example and should not be regarded as the only feasible implementation solution. Obviously, for those skilled in the art, after understanding the basic principles of the vibration mechanism, it is possible to make various modifications in the form and details of the specific ways and steps of implementing the vibration mechanism without departing from this principle. Changes, but these amendments and changes are still within the scope described above. For example, the first vibration transmitting plate is not limited to the one or two rings described above, and the number may be two or more. For another example, the shapes of the plurality of components of the first vibration transmitting plate may be the same or different (the components include a circular ring and a square ring). Such deformations are all within the protection scope of this application.

26A and 26B are schematic diagrams showing the structure of a spectacle speaker assembly movement according to some embodiments of the present application. In some embodiments, the speaker assembly 21 includes a housing 210 (ie, a movement case), a vibration panel 221 and a transducing device 22. In some embodiments, the transducing device 22 is housed inside the housing 210 and generates vibration. The vibration of the energy conversion device 22 will cause the housing 210 to vibrate, and thereby the air outside the housing will be vibrated to generate a sound leakage. At least one sound guiding hole 230 is formed in at least a part of the casing 210, and the sound guiding hole 230 is used to lead the sound waves in the casing formed by the air vibration inside the casing 210 to the outside of the casing 210, and The leakage of the sound waves caused by the vibration of the outer shell 210 pushing the air outside the shell interferes. In some embodiments, the interference may reduce the amplitude of the leaky sound wave.

The vibration panel 221 is fixedly connected to the energy conversion device 22, and is synchronously vibrated by the energy conversion device 22. The vibration panel 221 protrudes from the housing 210 through the opening of the housing 210, and at least partially fits the human skin. The vibration is transmitted to the auditory nerve through human tissues and bones, thereby enabling people to hear sound. The transducing device 22 and the housing 210 may be connected by a connecting member 23, and the connecting member 23 positions the transducing device 22 in the housing 210.

The connecting member 23 may be one or more independent components, and may also be provided integrally with the transducing device 22 or the housing 210. In some embodiments, in order to reduce the constraint on vibration, the connecting member 23 may be made of an elastic material.

In some embodiments, the sound introduction hole 230 may be provided at an upper portion of the side wall height, for example, a portion from the top (the panel 221) to the 1/3 height in the side wall height direction. Taking a cylindrical casing as an example, for the installation position, according to different requirements, the sound introduction hole 230 may be opened in a side wall 211 and / or a bottom wall 212 of the casing. Preferably, the sound introduction hole 230 is opened in an upper part and / or a lower part of the casing side wall 211. The number of sound introduction holes provided in the side wall 211 of the housing may be at least two, and preferably, they are uniformly distributed in a circular circumferential direction. The number of sound introduction holes provided in the bottom wall 212 of the housing may be at least two, and the center of the bottom wall is a circle center, and is uniformly distributed in a ring shape. The sound introduction holes distributed in a ring shape may be provided at least one circle. There may be only one sound induction hole provided in the bottom wall 212 of the housing, and the sound induction hole is disposed at the center of the bottom wall 212.

As for the number, there may be one or more sound guiding holes, preferably a plurality of sound holes, and they are evenly arranged. For ring-shaped sounding holes, the number of sounding holes per circle can be, for example, 6-8.

The shape of the sound introduction hole can be circular, oval, rectangular, or long. A long bar generally refers to a bar shape along a straight line, curve or arc. The sound introduction holes of various shapes may be the same or different on a speaker component.

In some embodiments, a penetrating sound introduction hole 230 is formed in a lower portion of the sidewall

of the housing 210 (a portion from the height of the sidewall in the height direction from the 2/3 to the bottom). The number of the sound introduction holes 230 may be, for example, eight, and the shape may be, for example, a rectangle. Each sound introduction hole 230 is uniformly distributed on the side wall of the casing 210 in a ring shape.
In some embodiments, the casing 210 is cylindrical, and a sound guide hole 230 is formed in a middle portion of the sidewall of the casing 210 (a portion in the height direction of the sidewall from 1/3 to 2/3 height). The number of the sound introduction holes 230 may be, for example, eight, and the shape may be, for example, a rectangle. Each sound introduction hole 230 is uniformly distributed on the side wall of the casing 210 in a ring shape.
In some embodiments, a penetrating sound introduction hole 230 is provided in the circumferential direction of the bottom wall of the housing 210. The number of the sound introduction holes 230 may be, for example, eight, and the shape may be, for example, a rectangle. Each sound introduction hole 230 is uniformly distributed on the side wall of the casing 210 in a ring shape.
In some embodiments, penetrating sound introduction holes 230 are respectively formed in upper and lower sides of the side wall of the housing 210. The sound introduction holes 230 are evenly distributed in the upper part and the lower part of the side wall of the casing 210 in a ring shape, and the number of sound introduction holes 230 per circle is eight. In addition, the sound introduction holes 230 provided at the upper and lower portions are symmetrically disposed with respect to the middle section of the casing 210. The shape of each sound introduction hole 230 is circular.
In some embodiments, penetrating sound introduction holes 230 are respectively formed in the upper and lower portions of the side wall of the casing 210 and the bottom wall of the casing 210. The sound introduction holes 230 formed on the side wall are uniformly distributed in a ring shape at the upper and lower portions of the side wall of the housing 210, and the number of the sound introduction holes 230 in each circle is symmetrical with respect to the middle section of the housing 210. Each sound introduction hole 230 opened on the side wall is rectangular. The shape of the sound introduction holes 230 formed on the bottom wall is an elongated shape arranged along an arc, the number of which is four, and the shape is uniformly distributed in a ring shape with the center of the bottom wall as the circle center. The sound introduction hole 230 opened on the bottom wall also includes a circular through hole opened at the center.
In some embodiments, through sound guide holes 230 are opened in the upper part of the side wall of the housing 210, and are uniformly distributed in a ring shape on the upper part of the side wall of the housing 10, for example, the number of the sound guide holes 230 is circular. .
In some embodiments, in order to show a better effect of suppressing sound leakage, sound induction holes 230 are uniformly distributed in the upper, middle and lower sides of the side wall 11, respectively, and a circle of sound guides is also provided in the bottom wall 212 of the housing 210 in the circumferential direction. Sound hole 230. The pore size and the number of holes of each sound introduction hole 230 are the same.
In some embodiments, the sound guiding hole 230 may be an unobstructed through hole.
In order to control the effect of the sound wave propagating from the sound introduction hole 230 in the shell, a damping layer (not shown in the description of the specification) can be provided at the opening of the sound introduction hole 230 to adjust the phase and amplitude of the sound wave, thereby correcting the guidance The effect of sound waves inside the shell. There are many ways to choose and set the material of the damping layer. For example, the damping layer is made of tuning paper, tuning cotton, non-woven fabric, silk, cotton, sponge, or rubber, which has a certain damping effect on sound quality transmission. A damping layer is attached to the inner wall of the sound introduction hole 230, or a damping layer is covered on the outside of the opening of the sound introduction hole 230.
In some embodiments, the corresponding damping layers may be set to have the same phase difference between different sound-inducing holes 230 between different sound-inducing holes to suppress leakage sound at the same wavelength, or may be set differently. The sound introduction holes 230 have different phase differences between them to suppress leakage sounds of different wavelengths (that is, leakage sounds in a specific band).
In some embodiments, different parts of the same sound introduction hole 230 are set to have the same phase (for example, using a pre-designed step or step-shaped damping layer) to suppress leakage sound waves of the same wavelength; or, Different parts of the same sound introduction hole 230 are set to have

different phases to suppress leaky sound waves of different wavelengths.
The transducer 22 not only drives the vibration panel 221 to vibrate, but also the transducer 22 itself is a vibration source, which is housed inside the housing 210. The surface vibration of the transducer 22 causes the air in the housing to vibrate accordingly, and the sound waves formed are in the housing. Inside 210, it can be called sound in the shell. The vibration panel 221 and the energy conversion device 22 are positioned on the housing 210 through the connecting member 23, which inevitably applies vibration to the housing 210 and drives the housing 210 to vibrate synchronously. Therefore, the housing 210 pushes the vibration of the air outside the housing to form a sound leakage sound wave . Leaked sound waves propagate outward, forming a leaked sound.
According to the following formula to determine the position of the sound hole to suppress leakage, the reduction in leakage is proportional to:
Among them, the S .sub.opening is the opening area of the sound hole, and the S .sub.shell is the area of the .sub.shell that does not contact the human face.
Pressure inside the shell:
P = P .sub.a + P .sub.b + P .sub.c + P .sub.e , (5)
P .sub.a , P .sub.b , P .sub.c , and P .sub.e are the sound pressures generated by the a-plane, b-plane, c-plane, and e-plane at any point in the shell space.

among them, An observation point (x, y, z) to the b sound source surface that the distance (x ', y', 0) .sub.of; S a, S b, S c, S e respectively a plane, b plane, c plane Area of the e-plane;
Is the distance from the observation point (x, y, z) to a point (x ′ .sub.a , y ′ .sub.a , z .sub.a) on the a surface sound source;
Is the distance from the observation point (x, y, z) to a point on the c-plane sound source (x ′ .sub.c , y ′ .sub.c , z .sub.c);
Is the distance from the observation point (x, y, z) to a point (x ′ .sub.e , y ′ .sub.e , z .sub.e) on the sound source of the e-plane; k = ω / u wave number (u is the speed of sound), ρ .sub.0 is the air density, ω is the angular frequency of vibration, P .sub.a resistance , P .sub.b resistance , P .sub.c resistance , and P .sub.e resistance are the acoustic resistance of air itself, which are:

Among them, r is the sound damping per unit length, r ′ is the sound mass per unit length, z .sub.a is the distance from the observation point to the sound source on the a plane, z .sub.b is the distance from the observation point to the sound source on the b plane, and z .sub.c is The distance from the observation point to the c-plane sound source, and z .sub.e is the distance from the observation point to the e-plane sound source.
W .sub.a (x, y), W .sub.b (x, y), W .sub.c (x, y), We .sub.e (x, y), and W .sub.d (x, y) are a, b, c, e, and d, respectively The sound source intensity per unit area can be derived from the following formula group (14):

Among them, F is the driving force converted by the transducer, F .sub.a , F .sub.b , F .sub.c , F .sub.d , and F .sub.e are the driving forces of a, b, c, d, and e, respectively, and S .sub.d is the housing (d Face), f is the viscous resistance formed by the small gap in the side wall, fηΔs (dv / dy), L is the equivalent load of the face when the vibration plate acts on the face, and y is the dissipation on the elastic element 2 Energy, k .sub.1 and k .sub.2 are the elastic coefficients of elastic element 1 and elastic element 2 respectively, η is the fluid viscosity coefficient, dv / dy is the velocity gradient of the fluid, Δs is the cross-sectional area of the object (plate), and A is the amplitude. Is the area of the sound field, δ is a high-order quantity (derived from the

incomplete symmetry of the shape of the casing), and at any point outside the casing, the sound pressure generated by the vibration of the casing is:

among them, Is the distance from the observation point (x, y, z) to a point (x ′ .sub.d , y ′ .sub.d , z .sub.d) on the d-plane sound source.
P .sub.a , P .sub.b , P .sub.c , and P .sub.e are all functions of position. When we open a hole at any position on the shell, if the opening area is S opening, the total effect of sound pressure at the opening is Since the vibration panel 221 on the housing 10 is closely attached to the human body tissue, and its output energy is absorbed by the human tissue, then only the d-plane pushes the air outside the shell to vibrate, forming a sound leakage. The total effect of the housing to push the air vibration outside the shell is
In some application scenarios, our goal is to make versus The size is the same, and the directions are opposite, so as to reduce the effect of leakage. Once the basic structure of the device is determined, Is an amount we cannot adjust, so adjust Make it with offset. and It contains complete phase and amplitude information. The phase, amplitude, and shell size of the speaker component, the vibration frequency of the transducer, the opening position, shape, number, size of the sound hole, and whether there is damping on the hole are all closely related. This allows us to achieve the purpose of suppressing sound leakage by adjusting the opening position, shape and number of sound introduction holes and / or increasing damping and / or adjusting damping materials.
In-shell sound waves and leak sound waves are equivalent to the two sound sources shown in. In the embodiment of the present invention, a penetrating sound introduction hole 230 is provided on the wall surface of the housing, which can guide and propagate the sound waves inside the shell to the outside of the shell, and propagate in the air with the leaked sound waves to interfere with each other, thereby reducing the leaked sound waves The amplitude, which reduces the sound leakage. Therefore, the technical solution of the present application, through the convenient improvement of opening sound introduction holes in the housing, solves the problem of sound leakage to a certain extent without increasing the volume and weight of the speaker component.
According to the above formula deduced by the inventors, those skilled in the art can easily understand that the elimination effect of the sound leakage sound, the shell size of the speaker assembly, the vibration frequency of the transducing device, the opening position, shape, and number of sound introduction holes , Size and whether there is damping on the hole are closely related, so the opening position, shape, number of the sound hole, damping material on the hole, etc. can have a variety of different schemes according to needs.
FIG. 27 is a diagram illustrating an effect of suppressing sound leakage by a speaker assembly according to some embodiments of the present application. In the target area of the accessory of the speaker component (for example, the speaker component shown in FIGS. 26A and 26B), the phase of the leaked sound wave transmitted to the target area, and the sound wave in the shell propagates to the target area through the sound introduction hole. The phase difference is close to 180 degrees. With this setting, the leakage sound waves generated by the shell can be significantly reduced or even eliminated in the target area.
As shown in FIG. 27, in the frequency band of 1500 Hz to 4000 Hz, the leakage sound wave is significantly suppressed. Among them, in the frequency band of 1500Hz to 3000Hz, the suppressed leakage sound basically exceeds 10dB. Especially in the frequency band of 2000Hz 2500Hz, the sound leakage is reduced by more than 20dB compared with the scheme without opening the sound hole after opening the sound hole in the upper part of the side of the shell.
It should be noted that the above description of the noise reduction sound hole of the glasses is only a specific example and should not be regarded as the only feasible implementation solution. Obviously, for a person skilled in the art, after understanding the basic principle of noise reduction sound hole of glasses, it is possible to implement specific methods and steps of noise reduction sound hole of glasses without departing from this principle. Various modifications and changes in form and detail are made, but these modifications and changes are still within the scope described above. For example, to illustrate what variations there are, many can be listed. The aperture sizes of the sound introduction holes 60 may be inconsistent, so as to suppress sound leakage in different bands. Such deformations are all within the protection scope of this application.

In some embodiments, the speaker device described above can transmit sound to a user by means of air conduction. When air is used to transmit sound, the speaker device may include one or more sound sources. The sound source may be located at a specific position on the user's head, for example, the top of the head, forehead, cheeks, horns, auricle, back of auricle, etc., without blocking or covering the ear canal. For the purpose of description, FIG. 28 shows a schematic diagram of transmitting sound through air conduction. As shown in FIG. 28, the sound source 2810 and the sound source 2820 can generate sound waves with opposite phases ("+" and "-" in the figure indicate opposite phases). For simplicity, the sound source referred to here refers to the sound output hole on the speaker device for outputting sound. For example, the sound source 2810 and the sound source 2820 may be two sound outlet holes respectively located at specific positions (for example, a movement case or a circuit case) on the speaker device.

In some embodiments, the sound source 2810 and the sound source 2820 may be generated by the same vibration device 2801. The vibration device 2801 includes a diaphragm (not shown in the figure). When the diaphragm is driven by electric signals to vibrate, the front face of the diaphragm drives air to vibrate, and a sound source 2810 is formed at the sound outlet through the sound guide channel 2812. A sound source 2820 is formed at the hole. The sound conducting channel refers to a sound propagation path from the diaphragm to the corresponding sound emitting hole. In some embodiments, the sound guiding channel is a path surrounded by a specific structure (for example, a movement case, or a circuit case) on the speaker. It should be known that, in some alternative embodiments, the sound source 2810 and the sound source 2820 may also be generated by different vibration devices through different diaphragm vibrations.

Among the sounds generated by the sound source 2810 and the sound source 2820, one part is transmitted to the user's ear to form the sound heard by the user, and the other part is transmitted to the environment to form a leaked sound. Considering that the sound source 2810 and the sound source 2820 are relatively close to the user's ear, for convenience of description, the sound transmitted to the user's ear may be referred to as near-field sound, and the leaked sound transmitted to the environment may be referred to as far-field sound. In some embodiments, the near-field / far-field sounds of different frequencies generated by the speaker device are related to the distance between the sound source 2810 and the sound source 2820. Generally speaking, the near-field sound generated by the speaker device will increase as the distance between the two sound sources increases, and the far-field sound (leakage) generated will increase as the frequency increases.

For different frequencies of sound, the distance between the sound source 2810 and the sound source 2820 can be designed separately, so that the low-frequency near-field sound (for example, a sound with a frequency less than 800 Hz) generated by the speaker device is as large as possible, and the high-frequency far-field sound (for example, (Sounds with a frequency greater than 2000 Hz) as small as possible. In order to achieve the above purpose, the speaker device may include two or more sets of dual sound sources, and each set of dual sound sources includes two sound sources similar to the sound source 2810 and the sound source 2820, and respectively generates sounds with specific frequencies. Specifically, the first group of dual sound sources may be used to generate low-frequency sounds, and the second group of dual sound sources may be used to generate high-frequency sounds. In order to obtain a large low-frequency near-field sound, the distance between two sound sources in the first set of dual sound sources can be set to a larger value. And because the low-frequency signal has a longer wavelength, a larger distance between the two sound sources will not cause an excessive phase difference in the far field, and therefore will not form too much sound leakage in the far field. In order to make the high-frequency far-field sound smaller, the distance between the two sound sources in the second set of dual sound sources can be set to a smaller value. Because the high-frequency signal has a shorter wavelength, a smaller distance between the two sound sources can prevent a large phase difference from being formed in the far field, and thus can prevent a large sound leakage. The distance between the second group of dual sound sources is smaller than the distance between the first group of dual sound sources.

The beneficial effects that the embodiments of the present application may bring include but are not limited to: (1) Different from the situation of the prior art, in the present application, when the hinge arm is subjected to an external force and rotates relative to the hinge base, the first support surface and the first support surface The connection of the two supporting surfaces pushes the supporting member to move in the opposite direction against the elastic bias of the elastic member, thereby causing the third supporting surface to switch from elastic abutment with one of the first supporting surface and the second supporting surface to

the first supporting surface. The other of the support surface and the second support surface elastically abut, in a cross section perpendicular to the central axis of the rotating shaft, the ratio between the maximum distance from the rotating shaft to the connection and the shortest distance from the rotating shaft to the first supporting surface is between Between 1.1 and 1.5, so that when the state of the hinge is switched by the push of the connection, the hinge has a suitable degree of jump, and then the user has a more obvious touch when the hinge is pulled, and the transition state is not too It is abrupt and difficult to switch the state of the hinge, thereby providing convenience for users. (2) It is possible to reduce casing vibration and suppress sound leakage. (3) The sound quality of the speaker can be improved. It should be noted that different embodiments may have different beneficial effects. In different embodiments, the possible beneficial effects may be any one or a combination of the foregoing, or any other beneficial effects that may be obtained.

The basic concepts have been described above. Obviously, for those skilled in the art, the above disclosure of the invention is merely an example, and does not constitute a limitation on the present application. Although it is not explicitly stated here, those skilled in the art may make various modifications, improvements and amendments to this application. Such modifications, improvements and amendments are suggested in this application, so such modifications, improvements and amendments still belong to the spirit and scope of the exemplary embodiments of this application.

Meanwhile, specific words are used in this application to describe the embodiments of this application. For example, "one embodiment", "an embodiment" and / or "some embodiments" means a certain feature, structure or characteristic related to at least one embodiment of the present application. Therefore, it should be emphasized and noted that the "one embodiment" or "one embodiment" or "an alternative embodiment" mentioned two or more times in different places in this specification does not necessarily refer to the same embodiment . In addition, certain features, structures, or characteristics in one or more embodiments of the present application may be appropriately combined.

In addition, those skilled in the art can understand that aspects of this application can be illustrated and described through several patentable categories or situations, including any new and useful process, machine, product or substance combination, or their Any new and useful improvements. Accordingly, various aspects of the present application can be executed entirely by hardware, can be executed entirely by software (including firmware, resident software, microcode, etc.), and can also be executed by a combination of hardware and software. The above hardware or software can be called "data block", "module", "engine", "unit", "component" or "system". In addition, aspects of the present application may manifest as a computer product located in one or more computer-readable media, the product including a computer-readable program code.

In addition, unless explicitly stated in the claims, the order of processing elements and sequences described herein, the use of alphanumeric characters, or the use of other names is not intended to limit the order of processes and methods of the present application. Although the above disclosure discusses some embodiments of the invention that are currently considered useful through various examples, it should be understood that such details are for illustrative purposes only, and that the appended claims are not limited to the disclosed embodiments only. Instead, the rights The requirements are intended to cover all modifications and equivalent combinations that are within the spirit and scope of the embodiments of this application. For example, although the system components described above can be implemented by hardware devices, they can also be implemented only by software solutions, such as installing the described system on an existing server or mobile device.

For the same reason, it should be noted that, in order to simplify the expressions disclosed in this application and thereby help the understanding of one or more inventive embodiments, the foregoing description of the embodiments of the application sometimes incorporates multiple features into one embodiment, In the drawings or their description. However, this disclosure method does not mean that the subject of the present application requires more features than those mentioned in the claims. Indeed, the features of an embodiment are less than all the features of a single embodiment disclosed above.

In some embodiments, numbers describing components and the number of attributes are used. It should be understood that, for such numbers used in the description of the embodiments, the modifiers "about", "approximately" or "substantially" are used in some examples To modify. Unless stated otherwise, "about", "approximately" or "substantially" indicates that the number allows for a variation of ± 20%. Accordingly, in

some embodiments, the numerical data used in the specification and claims are approximate values, and the approximate values may be changed according to the characteristics required by individual embodiments. In some embodiments, the numerical data should take the specified significant digits into account and adopt a general digits retention method. Although the numerical ranges and data used to confirm the breadth of the range in some embodiments of this application are approximate values, in specific embodiments, the setting of such values is as accurate as possible within the feasible range.
Finally, it should be understood that the embodiments described in this application are only used to illustrate the principles of the embodiments of this application. Other variations may also fall within the scope of this application. Therefore, by way of example and not limitation, alternative configurations of embodiments of the present application may be considered consistent with the teachings of the present application. Accordingly, the embodiments of the present application are not limited to the embodiments explicitly introduced and described in the present application.

Claims

A pair of glasses, characterized in that the glasses include:
A spectacle frame, which includes a spectacle frame and two spectacle legs, and the two spectacle legs are respectively rotatably connected to the spectacle frame;
Two speaker components, the two speaker components including a headphone core, the two speaker components are respectively connected to the two temples through a hinge component on the two temples, and the hinge component can Rotate to change the position of each speaker component relative to the temples to which it is connected;
A control circuit or a battery is contained in the temple, and the control circuit or battery drives the earphone core to vibrate to generate sound, and the sound includes at least two resonance peaks.
The spectacles according to claim 1, wherein the hinge assembly comprises a hinge, a rod-like member, and a fixing member; and the hinge comprises:
Hinge seat
A hinge arm, the hinge arm and the hinge base are rotationally connected through a rotation shaft, and the hinge arm can rotate relative to the hinge base when an external force is applied to change the position of the speaker assembly relative to the temple;
A support member movably disposed on the hinge base;
An elastic member for elastically biasing the support member toward the hinge arm, so that the support member can elastically abut against the hinge arm.
The spectacles according to claim 2, wherein:
The hinge arm includes a first support surface and a second support surface connected to each other;
The support includes a third support surface;
When the elastic member elastically biases the support member toward the hinge arm, the third support surface can be elastically abutted on the first support surface and the second support surface, respectively;
When the hinge arm is rotated relative to the hinge base by an external force, the support is pushed by the connection between the first support surface and the second support surface to overcome the elastic bias of the elastic member. Reverse movement, so that the third support surface is switched from elastic contact with one of the first support surface and the second support surface to the first support surface and the second support surface The other one abuts elastically.
The spectacles according to claim 3, wherein in a cross section perpendicular to the central axis of the rotation axis, the maximum distance from the rotation axis to the connection and the shortest distance from the rotation axis to the first support surface The ratio between distances is between 1.1 and 1.5.
The spectacles according to claim 3, wherein when the third supporting surface is switched from elastic contact with the first supporting surface to elastic contact with the second supporting surface, the hinge seat and The included angle between the hinge arms becomes smaller.
The spectacles according to claim 3, wherein an external force required when the third supporting surface is switched from elastic contact with the first supporting surface to elastic contact with the second supporting surface is different from that The third support surface is switched from an elastic contact with the second

support surface to an external force required when the third support surface is elastically contacted with the first support surface.
The spectacles according to claim 3, wherein in a cross section perpendicular to a central axis of the rotation axis, the connection is arranged in an arc shape.
The spectacles according to claim 7, wherein the connection is arranged in an arc, and the curvature of the arc is between 5 and 30.
The spectacles according to claim 3, wherein an angle between the first support surface and the second support surface is an obtuse angle in a cross section perpendicular to a central axis of the rotation axis.
The glasses according to claim 3, wherein
The hinge seat includes a seat body and first and second lugs protruding from the seat body and spaced from each other;
The hinge arm includes an arm body and a third lug protruding from the arm body. The third lug is inserted into a space between the first lug and the second lug and passes through the space. The rotating shaft is rotatably connected with the first lug and the second lug.
The glasses according to claim 10, wherein
The support is at least partially disposed in the interval region and is located on a side of the third lug facing the seat body;
An accommodating cavity communicating with the interval region is provided on the seat body, the elastic member is disposed in the accommodating cavity, and the support member is elastically biased toward the third lug.
The glasses according to claim 1, further comprising an earphone housing for accommodating an earphone core;
The earphone core includes at least a composite vibration device composed of a vibration plate and a second vibration transmitting plate, and the composite vibration device generates the two resonance peaks.
The glasses according to claim 12, wherein the earphone core further comprises at least one voice coil and at least one magnetic circuit system; the voice coil is physically connected to the vibration plate, and the magnetic circuit system is in communication with the vibration plate The second diaphragm is physically connected.
The spectacles according to claim 12, wherein a stiffness coefficient of the vibration plate is greater than a stiffness coefficient of the second vibration transmitting plate.
The glasses according to claim 12, wherein the earphone core further comprises a first vibration transmitting sheet;
The first vibration transmitting plate and the composite vibration device are physically connected;
The first vibration transmitting sheet is physically connected to the earphone housing;
The first vibration transmitting plate can generate another resonance peak.
The spectacles according to claim 15, wherein the at least two resonance peaks are within a sound frequency range audible by a human ear.
The glasses according to claim 12, wherein at least a part of the earphone housing is provided with at least one sound introduction hole, and the at least one sound introduction hole guides out sound waves in the earphone housing and vibrates with the earphone housing. The generated sound leakage sound waves are superimposed to reduce the sound leakage.
The glasses according to claim 1, wherein the speaker assembly further comprises a voice control system for receiving and executing voice control instructions.
The glasses according to claim 12, further comprising a key module;
The key module is located on the earphone housing or the temple, and is used for controlling the speaker component.
The glasses according to claim 12, further comprising an indicator light;
The indicator light is located on the earphone housing or the temple of the glasses, and is used to display the status of the speaker component.

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(81) 指定国 (除另有指明, 要求每一种可提供的国家保护): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

(54) **Title:** SPECTACLES

(54) 发明名称: 一种眼镜

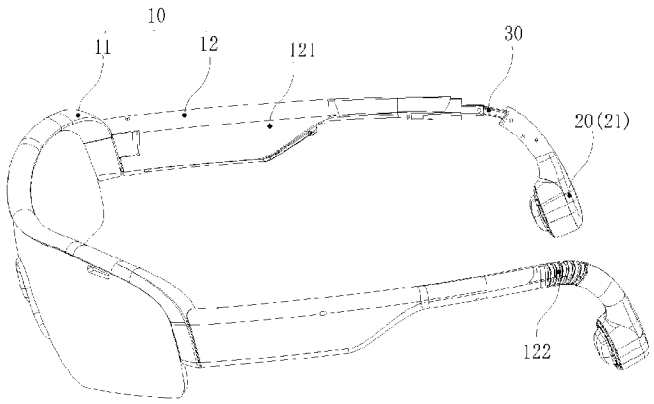


图1

(57) **Abstract:** Disclosed is a type of spectacles, comprising: a spectacle frame (10), the spectacle frame (10) comprising spectacle rims (11) and two spectacle legs (12), and the two spectacle legs (12) being rotatably connected to the spectacle rims (11) respectively; two loudspeaker assemblies (21), with the two loudspeaker assemblies (21) respectively comprising an earphone core, the two loudspeaker assemblies (21) being respectively connected to the two spectacle legs (12) via hinge assemblies (122) on the two spectacle legs (12), and the hinge assemblies (122) being rotatable to change the positions of the loudspeaker assemblies (21) with respect to the spectacle legs (12) connected thereto; and control circuits or batteries accommodated in the spectacle leg (12), with the control circuits or batteries driving the earphone cores to vibrate to generate sound comprising two harmonic peaks.

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[见续页]

(84) 指定国(除另有指明，要求每一种可提供的地区保护)：ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, RU, TJ, TM), 欧洲 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG)。

本国际公布：

— 包括国际检索报告(条约第21条(3))。

(57) 摘要：一种眼镜，包括：眼镜架（10），眼镜架（10）包括眼镜框（11）以及两条眼镜腿（12），两条眼镜腿（12）分别与眼镜框（11）转动连接；两个扬声组件机构（21），两个扬声组件机构（21）分别包括一个耳机芯，两个扬声组件机构（21）分别通过两条眼镜腿（12）上的铰链组件（122）连接到两条眼镜腿（12）上，且铰链组件（122）能够转动以改变每个扬声组件机构（21）相对于其所连接的眼镜腿（12）的位置；眼镜腿（12）中容纳控制电路或电池，控制电路或电池驱动耳机芯振动以产生声音，声音至少包括两个谐振峰。

一种眼镜

优先权信息

[0001] 本申请要求于 2018 年 8 月 24 日提交的中国申请 CN201810975515.1 的优先权，其全部内容通过引用的方式并入本文。

技术领域

[0002] 本申请涉及眼镜领域，特别涉及一种具有铰链组件的眼镜。

背景技术

[0003] 人们在日常生活中经常会佩戴眼镜，如近视眼镜、远视眼镜、太阳眼镜、VR 眼镜、按摩眼镜等。但是这类眼镜功能单一，不能同时满足人们的多种需求。例如，在外出运动、旅游时，人们经常佩戴太阳眼镜，但如果同时也想要听音乐的话，就需要另外准备耳机，携带和收纳都不方便。因此，具有耳机功能的眼镜给用户带来了极大的便利。

发明内容

[0004] 本说明书实施例提供一种眼镜，所述眼镜包括：眼镜架，所述眼镜架包括眼镜框以及两条眼镜腿，所述两条眼镜腿分别与所述眼镜框转动连接；两个扬声组件，所述两个扬声组件包括耳机芯，所述两个扬声组件分别通过所述两条眼镜腿上的铰链组件连接到两条眼镜腿上，且所述铰链组件能够转动以改变每个扬声组件相对于其所连接的眼镜腿的位置；所述眼镜腿中容纳控制电路或电池，所述控制电路或电池驱动所述耳机芯振动以产生声音，所述声音至少包括两个谐振峰。

附图说明

[0005] 本申请将以示例性实施例的方式进一步说明，这些示例性实施例将通过附图进行详细描述。这些实施例并非限制性的，在这些实施例中，相同的编号表示相同的结构，其中：

[0006] 图 1 是根据本申请中一些实施例提供的眼镜的结构示意图；

[0007] 图 2 是根据本申请中一些实施例提供的铰链组件结构示意图；

[0008] 图 3 是根据本申请中一些实施例的爆炸结构示意图；

[0009] 图 4 是图 2 中铰链组件沿 A-A 轴线的剖视图；

[0010] 图 5 是根据本申请中一些实施例提供的铰链组件结构示意图；

[0011] 图 6 是根据本申请中一些实施例提供的保护套管的原始状态图；

[0012] 图 7 根据本申请中一些实施例提供的铰链组件的保护套管的原始状态的局部截面图；

[0013] 图 8 是根据本申请中一些实施例提供的铰链组件的保护套管的弯折状态图；

[0014] 图 9 是根据本申请中一些实施例提供的铰链组件保护套管的弯折状态的局部截面图；

[0015] 图 10 是根据本申请中一些实施例提供的眼镜的局部剖面图；

[0016] 图 11 是图 10 中 A 部分的放大图；

[0017] 图 12 是图 11 中 B 部分的放大图；

[0018] 图 13 是是根据本申请中一些实施例提供的眼镜的局部剖面图；

[0019] 图 14 是图 13 中 C 部分的放大图；

[0020] 图 15 是根据本申请中一些实施例提供的眼镜的爆炸结构图；

[0021] 图 16 是根据本申请中一些实施例提供的语音控制系统的流程示意图；

[0022] 图 17 是根据本申请中一些实施例提供的扬声组件振动产生和传递系统的等效模型；

[0023] 图 18 是根据本申请中一些实施例提供的扬声组件的复合振动装置的结构图；

[0024] 图 19 是根据本申请中一些实施例提供的扬声组件复合振动装置的结构图；

[0025] 图 20 是根据本申请中一些实施例提供的扬声组件的频率响应曲线；

[0026] 图 21 是根据本申请中一些实施例提供的扬声组件及其复合振动装置的结构图；

[0027] 图 22 是根据本申请中一些实施例提供的扬声组件的振动响应曲线；

[0028] 图 23 是根据本申请中一些实施例提供的扬声组件的振动产生部分的结构图；

[0029] 图 24 是根据本申请中一些实施例提供的扬声组件振动产生部分的振动响应曲线；

[0030] 图 25 是根据本申请中一些实施例提供的扬声组件振动产生部分的振动响应曲线；

[0031] 图 26A 是根据本申请中一些实施例提供的扬声组件的结构示意图；

[0032] 图 26B 是根据本申请中一些实施例提供的扬声组件的结构示意图；以及

[0033] 图 27 是图 26A 和 26B 提供的扬声组件的抑制漏音效果图；以及

[0034] 图 28 是本申请一种通过气传导的方式传递声音的示意图。

具体实施方式

[0035] 为了更清楚地说明本申请的实施例的技术方案，下面将对实施例描述中所需要使用的附图作简单的介绍。显而易见地，下面描述中的附图仅仅是本申请的一些示例或实施例，对于本领域的普通技术人员来讲，在不付出创造性劳动的前提下，还可以根据这些附图将本申请应用于其他类似情景。应当理解，给出这些示例性实施例仅仅是为了使相关领域的技术人员能够更好地理解进而实现本发明，而并非以任何方式限制本发明的范围。除非从语言环境中显而易见或另做说明，图中相同标号代表相同结构或操作。

[0036] 如本申请和权利要求书中所示，除非上下文明确提示例外情形，“一”、“一个”、“一种”和/或“该”等词并非特指单数，也可包括复数。一般说来，术语“包括”与“包含”仅提示包括已明确标识的步骤和元素，而这些步骤和元素不构成一个排它性的罗列，方法或者设备也可能包含其他的步骤或元素。术语“基于”是“至少部分地基于”。术语“一个实施例”表示“至少一个实施例”；术语“另一实施例”表示“至少一个另外的实施例”。其他术语的相关定义将在下文描述中给出。以下，不失一般性，在描述本发明中传导相关技术时，将采用“眼镜”或“太阳镜”的描述。该描述仅仅为传导应用的一种形式，对于该领域的普通技术人员来说，“眼镜”或“太阳镜”也可用其他同类词语代替，比如“护目装置”、“眼部可穿戴装置”等。事实上，本发明中的各种实现方式可以很方便地应用到其它非扬声组件类的听力设备上。例如，对于本领域的专业人员来说，在了解眼镜的基本原理后，可能在不背离这

一原理的情况下，对实施眼镜的具体方式与步骤进行形式和细节上的各种修正和改变，特别地，在眼镜中加入环境声音拾取和处理功能，使该眼镜实现助听器的功能。例如，麦克风等传声器可以拾取使用者/佩戴者周围环境的声音，在一定的算法下，将声音处理后（或者产生的电信号）传送至扬声组件部分。即，眼镜可以经过一定的修改，加入拾取环境声音的功能，并经过一定的信号处理后通过扬声组件部分将声音传递给使用者/佩戴者，从而实现助听器的功能。作为举例，这里所说的算法可以包括噪声消除、自动增益控制、声反馈抑制、宽动态范围压缩、主动环境识别、主动抗噪、定向处理、耳鸣处理、多通道宽动态范围压缩、主动啸叫抑制、音量控制等一种或多种的组合。

[0037] 请参阅图 1，图 1 是本申请眼镜一实施方式的结构示意图。本实施方式中，眼镜包括：眼镜架 10 及功能件 20。

[0038] 在一些实施例中，本申请中的眼镜架 10 可以包括近视镜、远视镜、太阳镜、3D 眼镜等各种眼镜的眼镜架，在此不做限定。

[0039] 功能件 20 可以是与眼镜架 10 连接在一起的，使眼镜进一步具有一些其它功能的组件或构件。例如，功能件 20 可以为扬声组件，可以包括骨传导扬声组件、气传导扬声组件等。具体的，功能件 20 可以是骨传导扬声组件 21，从而使得眼镜还具有骨传导扬声组件 21 的功能。当然，功能件 20 还可以为其它组件，如定位装置等，此处不做限定。

[0040] 在一些实施例中，眼镜架 10 可以包括眼镜框 11 以及两条眼镜腿 12，眼镜腿 12 可以与眼镜框 11 转动连接的镜腿主体 121 以及铰链组件 122，扬声组件 21 可以通过铰链组件 122 连接到眼镜腿 12 上。

[0041] 图 2 是本申请铰链组件一实施方式的结构示意图，图 3 是本申请铰链组件一实施方式的爆炸结构示意图。在一些实施例中，本申请铰链组件 122 可用于本申请实施方式中的眼镜当中。

[0042] 本申请中，铰链组件 122 包括铰链 30，铰链 30 是用来连接两个固体并允许两者之间做相对转动的结构。

[0043] 具体地，本实施方式中的铰链组件 122 在用于上述眼镜实施方式中时，铰链组件 122 设置于镜腿主体 121 远离眼镜框 11 的端部，并进一步通过铰链 30 将功能件 20 连接至镜腿主体 121 远离眼镜框 11 的端部。

[0044] 在一些实施例中，铰链组件 122 还可以包括杆状件 40 和固定件 50。在一些实施例中，铰链 30 可以包括铰链座 31 以及铰链臂 32，在一些实施例中，铰链臂 32 通过转轴 33 与铰链座 31 转动连接。容易理解地，铰链座 31 与铰链臂 32 可分别连接在需要转动连接的两个构件上，以使得两个构件通过铰链 30 的转轴 33 转动连接在一起。

[0045] 在一些实施例中，铰链 30 的铰链座 31 连接设置在杆状件 40 上。在一些实施例中，杆状件 40 可以是通过铰链 30 转动连接的两个构件中的一个的部分结构或者整体结构，或者也可以是需要转动连接的两个构件中的一个与铰链 30 进行连接的连接结构。本实施方式中的铰链组件 122 在用于眼镜时，杆状件 40 可以为眼镜的镜腿主体 121 的至少一部分，例如可以是镜腿主体 121 的全部，或者是镜腿主体 121 远离眼镜框 11 的一端的一部分，进而通过该部分镜腿主体 121，将铰链 30 设

置于镜腿主体 121 远离眼镜框 11 的端部。

[0046] 具体地，杆状件 40 沿长度方向设置有与杆状件 40 的端面连通的铰链腔 41，杆状件 40 的侧壁上设置有与铰链腔 41 连通的第一插置孔 42，铰链座 31 的远离铰链臂 32 的一端从杆状件 40 的端面插入至铰链腔 41，并由插置在第一插置孔 42 内的固定件 50 固定在铰链腔 41 内。

[0047] 本实施方式中，铰链腔 41 连通镜腿主体 121 远离眼镜框 11 的端部的端面，从而使得铰链座 31 插入至铰链腔 41 内而将铰链 30 与镜腿主体 121 连接。

[0048] 在一些实施例中，可在杆状件 40 成型过程中形成铰链腔 41，例如，杆状件 40 的材质可以为橡胶或者塑料等，此时可通过注塑形成铰链腔 41。铰链腔 41 的形状与铰链座 31 匹配，以使得铰链座 31 能够容置于铰链腔 41 内。在本实施方式中，镜腿主体 121 沿长度方向可以为长直杆状，对应地，杆状件 40 则可以为沿长度方向的直杆，铰链腔 41 设置于直杆中，进一步地，铰链座 31 与铰链腔 41 匹配以容置于铰链腔 41 内进而实现铰链 30 的安装。当然，在其它实施方式中，杆状件 40 也可以为弧形杆等其它形状。

[0049] 另外，第一插置孔 42 也可由杆状件 40 在成型过程中形成，或者在成型后进一步通过钻孔等方法在杆状件的侧壁上形成。具体地，本实施方式中，第一插置孔 42 的形状可以为圆形，在其它实施方式中还可以为方形、三角形等其它形状。固定件 50 的形状与第一插置孔 42 匹配，以使得固定件 50 能够从杆状件 40 的外部插入第一插置孔 42，并进而通过抵紧铰链座 31 的侧壁的方式，或者进一步穿透铰链座 31 的外壁以插接的方式等将铰链座 31 固定在铰链腔 41 内。具体地，可以在第一插置孔 42 的内壁与固定件 50 的外壁上设置匹配的螺纹，以使得固定件 50 能够通过螺接的方式与第一插置孔 42 连接以进一步将铰链座 31 固定在铰链腔 41 内。当然，也可以通过其它方式，例如通过第一插置孔 42 与固定件 50 的过盈配合等方式进行连接。

[0050] 进一步地，铰链臂 32 还可与其它构件连接，从而使得该构件在于铰链臂 32 连接后，进一步通过将铰链座 31 装设在杆状件 40 的铰链腔 41 内从而与杆状件 40 或者与杆状件 40 连接的其它构件之间能够绕转轴 33 进行转动。例如，铰链组件 122 在应用于上述眼镜中时，功能件 20（例如扬声组件 21）连接设置在铰链臂 32 远离铰链座 31 一端，从而通过铰链 30 连接在镜腿主体 121 远离眼镜框 11 的端部。

[0051] 上述方式中，杆状件 40 上设置有与该杆状件 40 的端面连通的铰链腔 41，铰链 30 通过将铰链座 31 容置于该铰链腔 41 内，并进一步将固定件 50 通过第一插置孔 42 穿透杆状件 40 的侧壁从而将容置于铰链腔 41 内的铰链座 31 固定在铰链腔 41 内，从而能够实现铰链 30 相对于杆状件 40 可拆装，以方便铰链 30 或者杆状件 40 的更换。在应用于本申请上述眼镜实施方式中的眼镜当中时，能够实现铰链 30 与功能件 20 相对于镜腿主体 121 可拆装，从而在功能件 20 或眼镜框 11、镜腿主体 121 等损坏时，便于进行更换。

[0052] 进一步地，请继续参阅图 3，在一实施方式中，铰链座 31 上设置有与第一插置孔 42 对应的第二插置孔 311，固定件 50 进一步插置于第二插置孔 311 内。

[0053] 具体地，第二插置孔 311 的形状与固定件 50 匹配，以使得固定件 50 在穿过第一插置孔 42

后，进一步插入第二插置孔311中以将铰链座31固定，从而减少铰链座31在铰链腔41内的晃动，使得铰链30固定得更加牢固。具体地，与第一插置孔42和固定件50的连接方式相似，第二插置孔311的内侧壁上可设置有与固定件50对应的外壁上互相匹配的螺纹，以使得固定件50与铰链座31螺接在一起；或者，第二插置孔311的内壁与固定件50的对应接触的位置处的外侧壁均为平滑的面，固定件50与第二插置孔311过盈配合，此处不做具体限定。

[0054] 进一步地，第二插置孔311还可贯穿铰链座31的两侧边设置，从而使得固定件50能够进一步穿透整个铰链座31，以将铰链座31更加牢固得固定在铰链腔41内。

[0055] 请进一步参阅图4，图4是图2中铰链组件122沿A-A轴线的剖视图。本实施方式中，在垂直于杆状件40的长度方向的截面上，铰链座31的截面形状与铰链腔41的截面形状相匹配，以使得在插入后铰链座31与杆状件40之间形成密封配合。

[0056] 在一些实施例中，在图4中所示的截面上，铰链座31的截面形状和铰链腔41的截面形状可以为任意形状，只要能够使得铰链座31从杆状件40的远离铰链臂32的端面插入至该铰链腔41中即可。进一步地，第一插置孔42设置在铰链腔41的侧壁上，并贯通铰链腔41的侧壁与铰链腔41连通。

[0057] 在一个应用场景中，铰链座31的截面形状和铰链腔41的截面形状均呈矩形设置，第一插置孔42垂直于矩形的一侧边设置。

[0058] 具体地，本应用场景中，可以进一步对铰链座31外侧壁的棱角或铰链腔41的内侧壁的角倒圆角设置，使得铰链座31与铰链腔41的接触更加平滑，从而使得铰链座31能够顺利得插入至铰链腔41内。

[0059] 需要进一步指出的是，在铰链30装配前，铰链腔41内存储有一定量的气体，因此若铰链腔41仅为一端开口的腔体，那么在装配过程当中将会由于铰链腔41内的气体难以排出而不利于铰链座31插入，从而影响装配。本实施方式中的第一插置孔42贯通铰链腔41的侧壁而与铰链腔41连通，能够在装配过程中辅助将内部的气体通过铰链腔41由第一插置孔42排出，从而有助于铰链30的正常装配。

[0060] 请进一步参阅图5，图5是本申请铰链组件一实施方式的结构示意图。本申请铰链组件122实施方式中，铰链组件122进一步包括设置于铰链30外侧的连接线60。

[0061] 在一些实施例中，连接线60可以为具有电性连接作用和/或机械连接作用的连接线60。在应用于本申请上述眼镜实施方式中的眼镜当中时，铰链组件122用于将功能件20连接于镜腿主体121远离眼镜框11的端部，而与功能件20相关的控制电路等可设置于镜腿主体121当中，此时，需要连接线60将功能件20与镜腿主体121中的控制电路等电连接在一起。具体地，连接线60可位于铰链座31和铰链臂32的一侧，与铰链30设置于同一容置空间当中。

[0062] 进一步地，铰链座31包括第一端面312，铰链臂32具有与第一端面312相对设置的第二端面321，容易理解地，第一端面312和第二端面321之间存在一定的间隙，以使得铰链座31和铰链臂32能够绕转轴33进行相对转动。本实施方式中，在铰链臂32与铰链座31进行相对转动过程

中，第一端面 312 与第二端面 321 之间也随之发生相对位置的变化，从而使得二者之间的间隙变大或者变小。

{0063} 而本实施方式中，第一端面 312 与第二端面 321 之间的间隙始终保持为大于或小于连接线 60 的直径，从而使得位于铰链 30 外侧的连接线 60 不至于在铰链座 31 与铰链臂 32 的相对转动过程中夹入第一端面 312 与第二端面 321 之间的间隙中，进而减少铰链对连接线 60 的损伤。具体地，第一端面 312 与第二端面 321 之间的间隙在铰链臂 32 与铰链座 31 进行相对转动过程中与连接线 60 的直径的比例可始终保持为大于 1.5 或小于 0.8，例如大于 1.5、1.7、1.9、2.0 等，或小于 0.8、0.6、0.4、0.2 等，此处不做具体限定。

{0064} 请一并参阅图 2、图 6 至图 9，图 6 是本申请铰链组件一实施方式中保护套管的原始状态图，图 7 是本申请铰链组件一实施方式中保护套管的原始状态的局部截面图，图 8 是本申请铰链组件一实施方式中保护套管的弯折状态图，图 9 是本申请铰链组件一实施方式中保护套管的弯折状态的局部截面图。本实施方式中，铰链组件 122 还可以包括保护套管 70。

{0065} 具体地，该保护套管 70 套设在铰链 30 的外围，并随铰链 30 发生弯折。在一些实施例中，保护套管 70 可以包括沿保护套管 70 的长度方向间隔设置的多个环状凸脊部 71 以及设置于环状凸脊部 71 之间并用于连接相邻设置的两个环状凸脊部的环状连接部 72，在一些实施例中，环状凸脊部 71 的管壁厚度大于环状连接部 72 的管壁厚度。

{0066} 在一些实施例中，保护套管 70 的长度方向可以与铰链 30 的长度方向一致，保护套管 70 可沿铰链座 31 和铰链臂 32 的长度方向设置。该保护套管 70 可以由软质材料做成，例如软质的硅胶、橡胶等。

{0067} 环状凸脊部 71 可由保护套管 70 的外侧壁进一步向外凸出形成，而环状凸脊部 71 对应的保护套管 70 的内侧壁的形状此处不做具体限定。例如，内侧壁可以为平滑的，或者内侧壁上对应环状凸脊部 71 的位置还可设置凹陷等。

{0068} 环状连接部 72 用于连接相邻的环状凸脊部 71，具体连接于环状凸脊部 71 的靠近保护套管 70 内部的边缘区域，从而在保护套管 70 的外侧壁一侧可相对于环状凸脊部 71 呈凹陷设置。

{0069} 具体地，环状凸脊部 71 和环状连接部 72 的数量可以根据实际使用情况而定，例如，可以根据保护套管 70 的长度、环状凸脊部 71 和环状连接部 72 本身在保护套管 70 长度方向上的宽度等情况设定。

{0070} 进一步地，环状凸脊部 71 和环状连接部 72 的管壁厚度分别是指环状凸脊部 71 和环状连接部 72 所对应的保护套管 70 的内侧壁与外侧壁之间的厚度。本实施方式中，环状凸脊部 71 的管壁厚度大于环状连接部 72 的管壁厚度。

{0071} 容易理解地，在铰链 30 的铰链座 31 和铰链臂 32 之间绕转轴 33 相对转动时，铰链座 31 和铰链臂 32 之间的角度发生变化，从而使得保护套管 70 发生弯折，如图 8 和图 9 中所示。具体地，在保护套管 70 随铰链 30 发生弯折时，位于保护套管 70 所形成的弯折形状的外侧区域的环状凸脊部 71 和环状连接部 72 处于拉伸状态，而位于弯折形状的内侧区域的环状凸脊部 71 和环状连接部

72 处于挤压状态。

[0072] 本实施方式中，环状凸脊部 71 的管壁厚度大于环状连接部 72 的管壁厚度，从而使得环状凸脊部 71 相对于环状连接部 72 更硬，从而在保护套管 70 处于弯折状态时，处于弯折形状的外部一侧的保护套管 70 处于拉伸状态，环状凸脊部 71 能够为保护套管 70 提供一定的强度支撑；同时，处于弯折状态的内部一侧的保护套管 70 区域受到挤压，环状凸脊部 71 还能够承受一定的挤压力，从而对保护套管 70 起到保护作用，提高保护套管 70 的稳定性，延长保护套管 70 的寿命。

[0073] 进一步地，需要指出的是，保护套管 70 的形状与铰链 30 所处的状态一致。在一个应用场景中，保护套管 70 的沿长度方向上且绕转轴转动的两侧都可能受到拉伸或者挤压。在另一个应用场景中，铰链 30 的铰链座 31 和铰链臂 32 仅能够绕转轴 33 在小于或等于 180°的范围内进行转动，也就是说，保护套管 70 仅能够朝向一侧进行弯折，那么保护套管 70 的沿长度方向上的两侧中有一侧可受到挤压，另一侧可受到拉伸，此时，可以根据保护套管 70 两侧受力的不同，而将保护套管 70 受力不同的两侧设置为不同的结构。

[0074] 在一实施方式中，环状凸脊部 71 在保护套管 70 处于弯折状态时朝向保护套管 70 所形成的弯折形状外部一侧的沿保护套管 70 长度方向的宽度大于朝向弯折形状内部一侧的沿保护套管 70 长度方向的宽度。

[0075] 在一些实施例中，沿保护套管 70 长度方向上，增大环状凸脊部 71 的宽度能够进一步提高保护套管的强度。同时，本实施方式中，铰链座 31 和铰链臂 32 之间的初始夹角的角度小于 180°，此时，若保护套管 70 的环状凸脊部 71 均匀设置，则会使得保护套管 70 在原始状态下便受到挤压。本实施方式中，对应于弯折状态时朝向弯折形状的外侧区域一侧的环状凸脊部 71 的宽度较大，从而能够扩大该侧保护套管 70 的长度，从而在提高保护套管 70 的强度的同时，还使得在保护套管 70 弯折时，在一定程度上减少拉伸侧的拉伸程度；同时，环状凸脊部 71 在保护套管 70 处于弯折状态时朝向弯折形状的内侧区域一侧的沿保护套管 70 长度方向的宽度较小，能够增大挤压的环状连接部 72 在保护套管 70 长度方向上的空间，从而能够在一定程度上缓解挤压侧的挤压。

[0076] 进一步地，在一个应用场景中，环状凸脊部 71 的宽度在从朝向弯折形状的外侧区域一侧向朝向弯折形状的内部区域一侧逐渐变小，从而使得保护套管 70 处于弯折状态时朝向保护套管 70 所形成的弯折形状的外侧区域一侧的宽度大于朝向弯折形状的内侧区域一侧的宽度。

[0077] 容易理解地，环状凸脊部 71 围绕设置在保护套管 70 的外围，在保护套管 70 的长度方向上，一侧对应拉伸侧，另一侧对应挤压侧。本实施方式中，环状凸脊部 71 的宽度从朝向弯折形状的外侧区域一侧向朝向弯折形状的内侧区域一侧逐渐变小，从而使得宽度的较为均匀，能够在一定程度上提高保护套管 70 的稳定性。

[0078] 在一实施方式中，环状凸脊部 71 在保护套管 70 处于弯折状态时朝向保护套管 70 所形成的弯折形状的外侧区域一侧的保护套管 70 内部的内环面设置有凹槽 711。

[0079] 具体地，本实施方式中的凹槽 711 沿垂直于保护套管 70 的长度方向设置，进而使得对应的环状凸脊部 71 在保护套管 70 在长度方向上受到拉伸时能够进行适当的伸展。

[0080] 如上所述，在保护套管 70 处于弯折状态时，朝向保护套管 70 所形成的弯折形状外部一侧的保护套管 70 处于拉伸状态，本实施方式中，进一步在对应的环状凸脊部 71 对应的保护套管 70 内部的内环面上设置凹槽 711，从而能够在该侧保护套管拉伸时，凹槽 711 对应的环状凸脊部 71 能够适当伸展以承担部分拉伸，从而减少该侧保护套管所受到的拉力，进而对保护套管 70 起到保护作用。

[0081] 需要指出的是，在保护套管 70 处于弯折状态时，朝向弯折形状的内侧区域的一侧的环状凸脊部 71 可在对应的保护套管 70 的内侧壁上不设置凹槽 711。在一实施方式中，凹槽 71 沿保护套管 70 长度方向的宽度在从朝向弯折形状的外侧区域一侧向朝向弯折形状的内侧区域一侧逐渐变小，从而使得在朝向弯折形状的内侧区域一侧的环状凸脊部 71 所对应的保护套管 70 的内侧壁上没有凹槽 711 设置。

[0082] 具体地，在本实施方式中的铰链组件 122 应用于本申请眼镜实施方式中的眼镜当中时，保护套管 70 可以与分别设置在保护套管 70 的长度方向上的两侧的镜腿主体 121 以及功能件 20 连接在一起。在一个应用场景中，保护套管 70 还可以为眼镜中的其它结构如一些部件的保护盖层等一体成型，从而使得眼镜更加封闭、一体。

[0083] 需要指出的是，本申请中铰链组件实施方式中的铰链组件 122 不仅仅可以用于本申请眼镜实施方式中的眼镜，还可以用于其它装置当中，而且铰链组件 122 还可以包括除了上述杆状件 40、固定件 50、连接线 60、保护套管 70 等之外的其它与铰链 30 相关联的构件以实现相应的功能。

[0084] 具体地，请进一步一并参阅图 10 至图 14，图 10 是本申请铰链一实施方式的局部剖面图，图 11 是图 10 中 A 部分的放大图，图 12 是图 11 中 B 部分在由第一支撑面与第三支撑面抵接向第二支撑面与第三支撑面抵接转变而使得第一支撑面与第二支撑面的连接处与第三支撑面初始接触时的放大图，图 13 是本申请铰链一实施方式的局部剖面图，图 14 是图 13 中 C 部分的放大图。需要指出的是，本申请铰链实施方式中的铰链 30 可用于本申请眼镜实施方式中的眼镜当中，也可用于本申请铰链组件实施方式中的铰链组件 122，还可以应用于其它装置当中，此处不做具体限定。

[0085] 本实施方式中，铰链 30 的铰链臂 32 具有彼此连接的第一支撑面 322 和第二支撑面 323。

[0086] 铰链 30 还包括支撑件 34 和弹性件 35。支撑件 34 活动设置于铰链座 31 上，且具有第三支撑面 341，弹性件 35 用于将支撑件 34 朝向铰链臂 32 进行弹性偏置，以使得第三支撑面 341 能够分别弹性抵接于第一支撑面 322 和第二支撑面 323 上。

[0087] 在一些实施例中，在铰链臂 32 受到外力作用而相对铰链座 31 进行转动时，由第一支撑面 322 和第二支撑面 323 的连接处 324 推动支撑件 34 克服弹性件 35 的弹性偏置而反向移动，进而使得第三支撑面 341 从与第一支撑面 322 和第二支撑面 323 中的一者弹性抵接切换到与第一支撑面 322 和第二支撑面 323 中的另一者弹性抵接。

[0088] 在一个应用场景中，支撑件 34 连接设置在弹性件 35 朝向铰链臂 32 的一端，且使得第三支撑面 341 朝向铰链臂 32 一侧，在铰链臂 32 受到外力作用而绕转轴 33 相对铰链座 31 转动的过程中，能够推动第三支撑面 341 而使得支撑件 34 压迫弹性件 35，并进一步在弹性件 35 的作用下发生

弹性偏置。当然，支撑件 34 也可以与弹性件 35 不连接，而仅仅是抵接在支撑件 34 的一侧，只要能够使得支撑件 34 实现上述弹性偏置即可。

[0089] 在一些实施例中，第一支撑面 322 和第二支撑面 323 分别为铰链臂 32 的相邻的且至少部分与转轴 33 的中轴线平行的两个侧面，或者是两个侧面的一部分，在铰链臂 32 相对铰链座 31 转动时，第一支撑面 322 和第二支撑面 323 随铰链臂 32 围绕转轴 33 发生转动，从而使得铰链臂 32 的不同侧面朝向铰链座 31，进而使得铰链臂 32 相对于铰链座 31 能够具有不同的相对位置关系。

[0090] 另外，弹性件 35 为能够提供弹力且能够在弹力方向上压缩以提供一定的压缩空间的构件。例如，弹性件 35 可以为弹簧，弹簧的一端抵接支撑件 34，在支撑件 34 的第三支撑面 341 受到朝向弹性件 35 的推动作用时，弹性件 35 反抗支撑件 34 并发生压缩从而为支撑件 34 的第三支撑面 341 所朝向的方向上提供空间，以使得在转轴 33 的相对位置不变时，仍有足够的空间使得铰链臂 32 不同的侧面转动至转轴 33 与第三支撑面 341 之间。

[0091] 具体地，在铰链臂 32 相对于铰链座 31 转动时，转轴 33 的相对位置不发生改变，铰链臂 32 与铰链座 31 的第三支撑面 341 的接触位置发生变化，而由于铰链臂 32 的不同的位置到转轴 33 的距离不同，因此，在铰链臂 32 的不同的位置如第一支撑面 322 和第二支撑面 323 的不同位置与第三支撑面 341 接触时，所述需要的转轴 33 到铰链臂 32 与第三支撑面 341 的接触点之间的空间不同。而受弹力作用以及空间等的限制，弹性件 35 压缩而提供的空间可能是有限的。因此，在铰链臂 32 相对于铰链座 31 转动的过程中，在垂直于转轴 33 的中轴线的截面上若铰链臂 32 上某一位置与转轴 33 的距离过大，该位置在转动过程中将会卡持于第三支撑面上的另一位置而无法使得铰链臂 32 继续转动，从而使得铰链臂 32 和铰链座 31 仅能够在一定的范围内相对转动。在一个应用场景中，在铰链臂 32 与铰链座 31 之间绕转轴 33 相对转动的过程中，仅有第一支撑面 322 与第二支撑面 323 以及第一支撑面 322 与第二支撑面 323 的连接处 324 所对应的区域能够与第三支撑面 341 抵接。

[0092] 进一步地，本实施方式中，第一支撑面 322 和第二支撑面 323 可以均为平面，转轴 33 到二者的连接处 324 的距离均大于转轴 33 到第一支撑面 322 的距离和到第二支撑面 323 的距离，铰链 30 可具有第三支撑面 341 抵接于第一支撑面 322，以及第三支撑面 341 抵接于第二支撑面 323 两种相对稳定的状态。

[0093] 当然，在本实施方式中，第一支撑面 322 和第二支撑面 323 也可能是具有一定弧度的曲面，甚或还可包括不同的子支撑面，只要能够使得铰链臂 32 和铰链座 31 之间的位置关系具有对应的至少两种相对稳定的状态即可，此处不做具体限定。另外，铰链臂 32 上还可以设置其它更多的支撑面，以在铰链臂 32 受到外力而绕转轴 33 与铰链座 31 之间发生相对转动时，通过铰链臂 32 上不同的支撑面与第三支撑面 341 发生弹性抵接而使得铰链臂 32 与铰链座 31 之间具有多种不同的相对位置关系，此处不做具体限定。

[0094] 具体地，以初始状态为第一支撑面 322 与支撑件 34 的第三支撑面 341 抵接为例，具体如图 11 和图 12 中所示。此时弹性件 35 可以具有弹性压缩形变，也可以处于原始的自然状态，此处不

做限定。在铰链 30 受到外力作用而使得铰链臂 32 绕转轴 33 与铰链座 31 发生相对转动以使得第二支撑面 323 逐渐靠近第三支撑面 341 时，第一支撑面 322 和第二支撑面 323 的连接处 324 与第三支撑面 341 接触，由于连接处 324 到转轴 33 的距离大于第一支撑面 322 到转轴 33 的距离，从而使得连接处 324 抵接支撑件 34 并推动支撑件 34 移动朝弹性件 35 的方向移动，进而使得弹性件 35 克服推力而产生压缩。且在铰链臂 32 进一步受力时，连接处 324 逐渐靠近转轴 33 的与第三支撑面 341 之间的区域，在此过程中，转轴 33 到第三支撑面 341 之间的距离逐渐增大；容易理解地，在连接处 324 与转轴 33 的连线垂直于第三支撑面 341 时，在垂直于转轴 33 的中轴线的截面上，转轴 33 到第三支撑面 341 的距离等于转轴 33 到连接处 324 的距离，此时转轴 33 距离第三支撑面 341 最远；而在此时，若继续对铰链 30 施力，则转轴 33 到第三支撑面 341 的距离将会逐渐变小，从而所需要的弹性件 35 压缩的空间减小，并进而使得弹性件 35 逐渐释放弹力而回复，直到连接处 324 离开第三支撑面 341 而使得第二支撑面 323 与第三支撑面 341 抵接，从而实现从第一支撑面 322 与第三支撑面 341 抵接到第二支撑面 323 与第三支撑面 341 抵接之间的切换。

[0095] 同样地，在初始状态为第二支撑面 323 与支撑件 34 的第三支撑面 341 抵接而向第一支撑面 322 与支撑件 34 的第三支撑面 341 抵接转换的过程（具体如图 13 和图 14 中所示）与上述过程类似。

[0096] 需要指出的是，本实施方式中的铰链 30 可应用于本申请眼镜实施方式中的铰链组件 122 当中。在第三支撑面 341 从与第一支撑面 322 和第二支撑面 323 中的一者弹性抵接切换到与第一支撑面 322 和第二支撑面 323 中的另一者弹性抵接时，铰链组件 122 带动扬声组件 21 相对于镜腿主体 121 能够在第一相对固定位置和第二相对固定位置之间进行切换，并在扬声组件 21 处于第一相对固定位置时能够贴合于用户的耳廓背面。其中，耳廓为外耳的一部分，主要由软骨构成。在一些实施方式中，扬声组件 21 可以为骨传导扬声组件，通过将扬声组件贴合至耳廓背面，进而可利用耳廓的软骨传递骨传导声音/振动。将骨传导扬声组件在耳廓背面贴合，在提高音质的同时，还能够减小声音传递过程中对耳道的影响。

[0097] 需要指出的是，转轴 33 到连接处 324 的距离均大于到第一支撑面 322 和第二支撑面 323 的垂直距离，从而使得在第三支撑面 341 从与第一支撑面 322 和第二支撑面 323 中的一者弹性抵接切换到与第一支撑面 322 和第二支撑面 323 中的另一者弹性抵接的过程中铰链 30 的状态发生一定程度的跳变。

[0098] 以第一支撑面 322 与第三支撑面 341 弹性抵接切换到第二支撑面 323 与第三支撑面 341 弹性抵接为例，转轴 33 到连接处 324 的最大距离 h1 与转轴 33 到第一支撑面 322 的最短距离 h2 之间的比例不同时，切换过程中产生的跳变的程度不同。

[0099] 在一实施方式中，在垂直于转轴 33 的中轴线的截面上，转轴 33 到连接处 324 的最大距离 h1 与转轴 33 到第一支撑面 322 的最短距离 h2 之间的比例介于 1.1 和 1.5 之间。

[0100] 具体地，可以通过将转轴 33 远离第二支撑面 323 而靠近与第二支撑面 323 相对的铰链臂 32 的一侧面设置，来实现转轴 33 到连接处 324 的最大距离 h1 大于转轴 33 到第一支撑面 322 的最

短距离 h2，进而满足上述比例。

[0101] 需要指出的是，h1 与 h2 之间的比例过大时，跳变明显，但是可能需要施加较大的力度才能够将第一支撑面 322 与第三支撑面 341 弹性抵接切换到第二支撑面 323 与第三支撑面 341 弹性抵接，从而在一定程度上为使用带来不便；而 h1 与 h2 之间的比例过小时，虽然状态的切换较为容易，但是可能跳变程度较小，例如在用户扳动铰链 30 时没有明显的触感，从而也会带来不便。本实施方式中的将 h1 与 h2 的比例设置为介于 1.1 和 1.5 之间，能够使得第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接时，铰链 30 的具有较为明显的跳变，从而使得在使用过程中，用户扳动铰链 30 时具有较为明显的手感，同时也不至于跳变状态太突兀而使得用户难以切换铰链 30 的状态。

[0102] 在一个应用场景中，h1 与 h2 的比例还可以介于 1.2 和 1.4 之间，具体地，h1 与 h2 的比例还可以为 1.1、1.2、1.3、1.4、1.5 等，此处不做具体限定。

[0103] 另外，第一支撑面 322 与第二支撑面 323 在铰链臂 32 上的位置的设置会影响第三支撑面 341 与第一支撑面 322 或第二支撑面 323 中的一者抵接时铰链臂 32 与铰链座 31 之间的夹角的角度，因此，可根据具体的使用需求，而对第一支撑面 322 与第二支撑面 323 在铰链臂 32 上的位置进行不同的设置。在一些实施例中，铰链臂 32 与铰链座 31 之间的夹角具体如图 9 和图 12 所示，ω1 为第三支撑面 341 与第一支撑面 322 抵接时铰链臂 32 与铰链座 31 之间的夹角，ω2 为第三支撑面 341 与第二支撑面 323 抵接时铰链臂 32 与铰链座 31 之间的夹角。在一实施方式中，铰链臂 32 与铰链座 31 均具有一定的长度，铰链臂 32 设置在铰链座 31 的长度方向上的端部一侧，第一支撑面 322 设置在铰链臂 32 长度方向上靠近铰链座 31 的端部，而第二支撑面 323 设置在铰链臂 32 宽度方向上的一端，且均平行于转轴 33 的中轴线设置。此时，当第三支撑面 341 与第一支撑面 322 弹性抵接时，铰链臂 32 与铰链座 31 之间的夹角最大，而在第三支撑面 341 与第二支撑面 323 弹性抵接时，铰链臂 32 与铰链座 31 之间的夹角最小，从而在第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接时，铰链座 31 与铰链臂 32 之间的夹角由 ω1 变为 ω2 而变小。

[0104] 需要进一步指出的是，若将第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接时对铰链臂 32 所施加的力的方向与铰链臂 32 自身重力的方向一致，那么在该状态的切换会使得铰链座 31 与铰链臂 32 之间的夹角变小时，本实施方式中上述 h1 与 h2 之间的比例的设置还可以使得在第三支撑面 341 与第一支撑面 322 弹性抵接时，铰链臂 32 不会或者难以因自身重力而自发得减小其与铰链座 31 之间的角度。

[0105] 在本申请铰链一实施方式中，请参阅图 12，在垂直于转轴 33 的中轴线的截面上，第一支撑面 322 和第二支撑面 323 之间的夹角 ω3 为钝角。

[0106] 在一些实施例中，铰链 30 在由第一支撑面 322 与第三支撑面 341 弹性抵接的状态向第二支撑面 323 与第三支撑面 341 弹性抵接的状态切换时，第一支撑面 322 和第二支撑面 323 之间的夹角 ω3 越小，则状态切换时铰链座 31 和铰链臂 32 之间相对需要转动的角度越大，也就是说，在铰链座 31 固定不动时，用户需要将铰链臂 32 扳动较大的角度才能够对铰链 30 进行状态切换，从而

用户使用费力，给用户使用带来不便。

[0107] 而由于铰链臂 32 具有一定的长度，且第一支撑面 322 设置于铰链臂 32 的长度方向上的一端，而第二支撑面 323 与第一支撑面 322 相邻设置于铰链臂 32 的宽度方向上。通常情况下，第一支撑面 322 与第二支撑面 323 垂直设置，此时，在铰链 30 在上述两种状态之间进行切换时，需要将铰链臂 32 与铰链座 31 相对扳动 90°。

[0108] 而本实施方式中，在垂直于转轴 33 的中轴线的截面上，第一支撑面 322 和第二支撑面 323 之间的夹角 ω3 为钝角，从而在铰链 30 于两种状态之间切换时，所铰链臂 32 与铰链座 31 所需要相对扳动的角度小于 90°，从而能够在一定程度上为用户提供便利。

[0109] 具体地，在本实施方式中的铰链 30 用于本申请眼镜实施方式中时，铰链 30 用于连接镜腿主体 121 和扬声组件 21。在一些实施例中，扬声组件 21 可以为骨传导扬声组件。例如，在铰链 30 处于第二支撑面 323 与第三支撑面 341 弹性抵接的第二状态时，扬声组件 21 处于第一相对固定位置以贴合于用户的耳廓背面，因此在用户需要使用眼镜的扬声组件 21 的功能时，仅需要将扬声组件 21 转动小于 90°的角度即可将其贴合于用户的耳廓背面；另外，在铰链 30 处于第一支撑面 322 与第三支撑面 341 弹性抵接的第一状态时，铰链臂 32 和连接的骨传导扬声组件 21 形成一定的角度，从而在用户佩戴眼镜时，铰链臂 32 和连接的扬声组件 21 能够位于用户耳后且朝向用户耳朵的方向设置，从而能够对眼镜起到一定的阻拦、固定作用，不易从用户头部掉落。

[0110] 需要指出的是，第一支撑面 322 和第二支撑面 323 之间的夹角 ω3 的具体角度可以根据实际需要进行设定。在该夹角的角度过大时，铰链臂 32 和连接于铰链臂 32 远离铰链座 31 的端部的功能件 20 与铰链座 31 之间的夹角将较小，从而在用户佩戴时，铰链臂 32 与功能件 20 会因过于靠近用户耳朵而对用户耳朵造成压迫，降低用户的舒适度；而若夹角的角度过小，一方面用户在扳动骨传导扬声组件 21 而使其在第一相对位置与第二相对位置之间进行切换时，所需要扳动的角度过大，用户使用不方便，另一方面，镜腿主体 121 与铰链 30 和扬声组件 21 之间所形成的夹角较小而难以起到对眼镜的阻拦、固定的作用，从而使得用户佩戴眼镜时，眼镜容易从用户头部前侧掉落。具体地，可以根据用户的头型设置第一支撑面 322 和第二支撑面 323 之间的夹角的具体角度。

[0111] 具体地，在一个应用场景中，在垂直于转轴 33 的中轴线的截面上，第一支撑面 322 和第二支撑面 323 之间的夹角 ω3 的角度介于 100°和 120°之间，具体可以为 100°、110°、120°等。该角度的设置，能够使得用户在佩戴眼镜且扬声组件 21 处于第一相对固定位置时，扬声组件 21 不会过于靠近用户耳朵而对用户耳朵造成不适，且在对扬声组件 21 的两种相对位置进行切换时也无需将铰链转动过大的角度，从而方便用户使用。

[0112] 在一些实施例中，在第三支撑面 341 从与第一支撑面 322 和第二支撑面 323 中的一者弹性抵接切换到与第一支撑面 322 和第二支撑面 323 中的另一者弹性抵接的过程当中，第一支撑面 322 和第二支撑面 323 之间的连接处 324 抵接第三支撑面 341，并推动支撑件 34 克服弹性件 35 的弹性偏置而反向移动。以切换前第三支撑面 341 与第一支撑面 322 弹性抵接为例，在初始切换时，第一支撑面 322 逐渐远离第三支撑面 341 的同时，连接处 324 逐渐抵接第三支撑面 341，并在切换过程

中，由第三支撑面 341 的一侧滑动至第三支撑面 341 的另一侧，最后进一步过渡至由第二支撑面 323 与第三支撑面 341 弹性抵接。在状态切换过程中，连接处 324 始终与第三支撑面 341 抵接而相互作用，而连接处 324 的形状会对状态切换过程产生一定的影响。例如，若第一支撑面 322 与第二支撑面 323 之间线连接，那么，连接处 324 具有较为尖锐的角度，从而在用户扳动铰链座 31 和/或铰链臂 32 以进行铰链 30 的状态切换过程中，一方面，在连接处 324 与第三支撑面 341 抵接与连接处 324 与第一支撑面 322 和第二支撑面 323 抵接进行切换时，缓冲较小，切换突兀，从而扳动铰链 30 的手感差；另一方面，连接处 324 较为尖锐，会在反复的切换过程中对第三支撑面 341 造成一定的磨损。

[0113] 而本申请一实施方式中，在垂直于转轴 33 的中轴线的截面上，连接处 324 呈弧形设置。从而使得第一支撑面 322 与第二支撑面 323 的连接为弧面连接，进而在铰链 30 的状态切换的过程当中，与第三支撑面 341 抵接的连接处 324 较为平滑，从而用户扳动铰链 30 时具有较好的手感，而且能够减少在反复的切换过程中对第三支撑面 341 的损伤。

[0114] 具体地，在一实施方式中，连接处 324 呈圆弧设置，而圆弧的曲率不同，其所带来的效果也不同，具体的曲率值需要结合实际使用情况进行设置。本实施方式中圆弧的曲率介于 5 与 30 之间，具体还可以为 5、10、15、20、25、30 等，此处不做限定。

[0115] 需要指出的是，在本实施方式中的铰链 30 应用于上述眼镜实施方式中的眼镜时，圆弧设置的连接处 324 的曲率能够使得用户在扳动铰链 30 以使得骨传导扬声组件在第一相对固定位置与第二相对固定位置之间切换时，具有较好的手感。

[0116] 在一实施方式中，第三支撑面 341 设置成使得在第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接时所需的外力不同于在第三支撑面 341 从与第二支撑面 323 弹性抵接切换到与第一支撑面 322 弹性抵接时所需的外力。

[0117] 需要指出的是，在具体的使用场景当中，铰链 30 不同的状态所对应的铰链 30、或者铰链 30 所连接的结构的功能不同，或者由于铰链 30 设置的位置问题，而使得某一种状态向另一种状态进行切换时不便于用户施力等原因，而在用户对铰链 30 的状态进行切换时需要在扳动铰链 30 的力度上进行区分，以方便用户施力，或者为用户区分两种铰链状态提供直观的感受等。

[0118] 具体地，在本实施方式中的铰链 30 应用于上述眼镜中时，铰链 30 状态的切换会带动扬声组件 21 相对于镜腿主体 121 在第一相对固定位置和第二相对固定位置之间进行切换。对应地，两种相对固定位置分别对应用户使用扬声组件 21 和用户不使用扬声组件 21 两种情况，而用户在佩戴眼镜时，手在头部后侧施力以切换两种状态时施力的难易程度并不相同，因此，对应地将不同状态的切换设计为需要施加不同的外力，能够方面用户使用。

[0119] 具体地，在一实施方式中，当第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接时，对应于将扬声组件 21 由第二相对固定位置扳动至第一相对固定位置从而贴合于用户的耳廓背面。

[0120] 进一步地，本实施方式中，第三支撑面 341 设置成使得在第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接时所需的外力小于在第三支撑面 341 从与第二支撑

面 323 弹性抵接切换到与第一支撑面 322 弹性抵接时所需的外力。

[0121] 需要指出的是，在应用于上述眼镜时，在使用骨传导扬声组件 21 时，需要将第三支撑面 341 从与第一支撑面 322 弹性抵接切换到与第二支撑面 323 弹性抵接，而在不使用骨传导扬声组件 21 时，需要将第三支撑面 341 从与第二支撑面 323 弹性抵接切换到与第三支撑面 341 弹性抵接，根据本实施方式，在用户使用骨传导扬声组件 21 时所需要施加的力小于不需要使用骨传导扬声组件 21 所需要施加的力，从而能够在一定程度上方便用户使用眼镜的骨传导扬声组件 21 的功能。

[0122] 具体地，请一并参阅图 12 和图 14，在一个应用场景中，在第三支撑面 341 从与第一支撑面 322 弹性抵接向与第二支撑面 323 弹性抵接切换时，连接处 324 初始接触于第三支撑面 341 的第一位置 3411，在第三支撑面 341 从与第二支撑面 323 弹性抵接向与第一支撑面 322 弹性抵接切换时，连接处 324 初始接触于第三支撑面 341 的第二位置 3412。在一些实施例中，在垂直于转轴 33 的中轴线的截面上，第一位置 3411 与弹性件 35 和支撑件 34 的接触点沿弹性件 35 的弹性偏置方向上的距离 d1 小于第二位置 3412 与接触点沿弹性偏置方向上的距离 d2。

[0123] 需要指出的是，第三支撑面 341 与第一支撑面 322 弹性抵时，连接处 324 位于靠近第三支撑面 341 的一端的位置，而在第三支撑面 341 与第二支撑面 323 弹性抵接时，连接处 324 位于靠近第三支撑面 341 的另一端的位置。因此，上述的第一位置 3411 与第二位置 3412 分别位于靠近第三支撑面 341 的两端处。也就是说，本实施方式中，支撑件 34 的第三支撑面 341 的靠近两端的位置与弹性件 35 和支撑件 34 的接触点在弹性件 35 的弹性偏置方向上的距离不同，且第二位置 3412 对应的距离小于第一位置 3411 对应的距离。此时，在第三支撑面 341 从与第一支撑面 322 弹性抵接向与第二支撑面 323 弹性抵接切换时，连接处 324 初始并未立即抵接第三支撑面 341 而受到弹性件 35 的反作用力，而是在切换的过程中逐渐抵接第三支撑面 341 而受到弹性件 35 的反作用力；而在第三支撑面 341 从与第一支撑面 322 弹性抵接向与第二支撑面 323 弹性抵接切换时，连接处 324 初始便抵接第三支撑面 341 而受到弹性件 35 的反作用力，或者至少相对于第三支撑面 341 从与第二支撑面 323 弹性抵接向与第一支撑面 322 弹性抵接的切换要早受到弹性件 35 的反作用力。因此，这种情况下，铰链 30 在由与第一支撑面 322 弹性抵接向与第二支撑面 323 弹性抵接切换时所需要的作用力较小，从而使得用户在使用扬声组件 21 时所扳动骨传导扬声组件 21 所需要施加的力较小，从而方便用户使用。

[0124] 进一步地，第三支撑面 341 包括第一子支撑面 3413 和第二子支撑面 3414，在一些实施例中，第一位置 3411 设置于第一子支撑面 3413，第二位置 3412 设置于第二子支撑面 3414。即第一子支撑面 3413 和第二子支撑面 3414 分别设置于靠近第三支撑面 341 的两端的位置。

[0125] 在一些实施例中，第二子支撑面 3414 可以为平面，具体地，在第一支撑面 322 或第二支撑面 323 与第三支撑面 341 弹性抵接时，第二子支撑面 3414 可与第一支撑面 322 或第二支撑面 323 平行。而第一子支撑面 3413 可以为平面，也可以为弧面，此处不做限定。

[0126] 进一步地，第一子支撑面 3413 与第二子支撑面 3414 不位于同一平面上，第一子支撑面 3413 相对于第二子支撑面 3414 倾斜设置，且二者之间的夹角可不大于 10°，例如可以为不大于 2°、

4°、6°、8°、10°等。具体地，第一子支撑面 3413 朝向远离铰链臂 32 的方向设置，从而使得在垂直于转轴 33 的中轴线的截面上，第一位置 3411 与弹性件 35 和支撑件 34 的接触点沿弹性件 35 的弹性偏置方向上的距离小于第二位置 3412 与接触点沿弹性偏置方向上的距离。在一些实施例中，在第一子支撑面 3413 为弧面而第二子支撑面 3414 为平面时，第一子支撑面 3413 与第二子支撑面 3414 之间的夹角为在二者的相交处与第一子支撑面 3413 相切的平面与第二子支撑面 3414 之间的夹角。

[0127] 请进一步参阅图 15，图 15 是本申请铰链一实施方式的爆炸结构图。本实施方式中，铰链座 31 包括座本体 313 以及从座本体 313 凸出且彼此间隔设置的第一凸耳 314 和第二凸耳 315，铰链臂 32 包括臂本体 325 以及从臂本体 325 凸出设置的第三凸耳 326，第三凸耳 326 插入至第一凸耳 314 和第二凸耳 315 之间的间隔区域，并通过转轴 33 与第一凸耳 314 和第二凸耳 315 转动连接，第一支撑面 322 和第二支撑面 323 设置于第三凸耳 326 上，支撑件 34 至少部分设置于间隔区域内且位于第三凸耳 326 朝向座本体 313 的一侧，座本体 313 上设置有与间隔区域连通的容置腔 3121，弹性件 35 设置于容置腔 3121 内，并将支撑件 34 朝向第三凸耳 326 进行弹性偏置。

[0128] 具体地，第一凸耳 314、第二凸耳 315 和第三凸耳 326 的对应位置处可分别设置有位于同一轴向上的第一通孔、第二通孔和第三通孔，三个通孔的内径均可不小于转轴 33 的外径，从而在转轴 33 穿设于对应的通孔中时，第一凸耳 314 和第二凸耳 315 所在的铰链座 31 能够与第三凸耳 326 所在的铰链臂 32 转动连接在一起。

[0129] 在一些实施例中，第一支撑面 322 和第二支撑面 323 均设置于第三凸耳 326 上，且平行于转轴 33 的中轴线，从而使得在铰链臂 32 绕转轴 33 相对于铰链座 31 转动时，使得第一支撑面 322 和第二支撑面 323 均可能进入第一凸耳 314 和第二凸耳 315 之间的间隔区域。

[0130] 进一步地，支撑件 34 位于座本体 313 的第一凸耳 314 和第二凸耳 315 之间，且支撑件 34 的第三支撑面 341 朝向第三凸耳 326 设置。在一个应用场景中，弹性件 35 完全设置于容置腔 3121 内，并在朝向第一凸耳 314 和第二凸耳 315 之间的间隔区域的一侧与支撑件 34 接触。在弹性件 35 处于自然状态时，支撑件 34 靠近弹性件 35 的区域至少部分位于容置腔 3121 内。需要指出的是，支撑件 34 位于容置腔 3121 内的部分的形状与容置腔 3121 匹配，从而使得在弹性件 35 将支撑件 34 进行弹性偏置时，支撑件 34 位于容置腔 3121 的部分能够在容置腔 3121 内稳定滑动。

[0131] 在一个应用场景中，在垂直于铰链座 31 的长度方向的截面上，容置腔 3121 的截面面积小于第一凸耳 314 和第二凸耳 315 之间的间隔区域的截面面积，支撑件 34 位于容置腔 3121 外的区域的形状与间隔区域匹配，从而使得支撑件 34 在朝向弹性件 35 一侧移动时，不至于全部进入容置腔 3121 内。

[0132] 当然，在其它实施方式中，在垂直于铰链座 31 的长度方向的截面上，容置腔 3121 的截面形状也可以与第一凸耳 314 和第二凸耳 315 之间的间隔区域相同，此时，支撑件 34 可完全容置于容置腔 3121 内，从而使得在支撑件 34 收到推动作用时，在整个容置腔 3121 内滑动。

[0133] 进一步地，在上述实施方式中的铰链 30 应用于本申请铰链组件实施方式中的铰链组件 122 时，铰链座 31 的第一端面 312 为第一凸耳 314 和第二凸耳 315 的朝向铰链臂 32 的端面，由臂本体

325 朝向凸出设置的第三凸耳 326 位于第一凸耳 314 和第二凸耳 315 之间的间隔区域内，从而使得第一凸耳 314 和第二凸耳 315 的第一端面 312 朝向臂本体 325 设置。在转轴 33 的中轴线方向的截面上，臂本体 325 进一步凸出于第三凸耳 326 从而形成朝向铰链座 31 的第一凸耳 314 和第二凸耳 315 的第二端面 321。

[0134] 本实施方式中，在铰链臂 32 与铰链座 31 进行相对转动的过程中，第一凸耳 314 和第二凸耳 315 的第一端面 312 与臂本体 325 的第二端面 321 之间的间隙始终大于或小于连接线 60 的直径，从而使得连接线 60 不至于在铰链座 31 与铰链臂 32 的相对转动过程中夹入第一凸耳 314 和第二凸耳 315 与臂本体 325 之间，进而减少铰链 30 对连接线 60 的损伤。

[0135] 在一个应用场景中，在第一凸耳 314 和第二凸耳 315 的第二端面 321 与臂本体 325 的第一端面 312 之间的间隙在铰链臂 32 与铰链座 31 进行相对转动过程中始终保持为远大于或远小于连接线 60 的直径，从而进一步减少铰链 30 对连接线 60 的损伤。

[0136] 需要指出的是，本实施方中，第一端面 312 与第二端面 321 之间的间隙可以为尺寸相同的均匀的间隙，从而均满足上述大于或者小于连接线 60 直径的条件；或者在另一实施方式中，可以仅是两端面靠近连接线 60 的位置处的间隙满足大于或者小于连接线 60 的直径，而两端面的其它位置处的间隙可以无需满足上述条件。

[0137] 具体地，在一个应用场景中，在垂直于转轴 33 的中轴线的截面上，第一凸耳 314 和第二凸耳 315 朝向铰链臂 32 的端面和臂本体 325 朝向铰链座 31 的端面中的至少一者可采用倒角设置，以使得在铰链臂 32 与铰链座 31 进行相对转动过程中二者之间的间隙靠近连接线 60 的位置始终保持为大于连接线 60 的直径。

[0138] 在一些实施例中，倒角设置既可以是倒圆角，或者也可以是直接切角。

[0139] 本应用场景中，仅需要将靠近连接线 60 位置处的第一凸耳 314 和第二凸耳 315 朝向铰链臂 32 的端面和臂本体 325 朝向铰链座 31 的端面中的至少一者进行倒角设置而使得在铰链臂 32 与铰链座 31 进行相对转动过程中不会将连接线 60 夹入两端面之间的间隙中。

[0140] 本申请中上述铰链实施方式中的铰链可应用于本申请铰链组件实施方式中，但是并不做限定，在其它实施方式中还可以应用于其它的铰链组件当中，或者两个需转动连接的构件直接连接。

[0141] 需要注意的是，以上对眼镜的铰链组件的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解眼镜的铰链组件的基本原理后，可能在不背离这一原理的情况下，对实施眼镜的铰链组件的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，铰链座 31 和铰链腔 41 的截面形状可以为圆形、椭圆形、梯形等。诸如此类的变形，均在本申请的保护范围之内。

[0142] 在一些实施例中，所述眼镜还可以包括按键模块。在一些实施例中，按键模块可以包括电源开关键、功能快捷键、菜单快捷键。在一些实施例中，功能快捷键可以包括用于调节声音大小的音量加键和音量减键、用于调节声音文件进度的快进键和快退键、用于控制眼镜与外部设备连接（例如，蓝牙连接）的按键。在一些实施例中，按键模块可以包括物理按键和虚拟按键两种形式。例如，

当按键模块为物理按键形式存在时，按键可以设置于眼镜腿 12、眼镜框 11 或者镜腿主体 121 上。用户佩戴该实施例中的所述眼镜时，按键模块不与人体皮肤相接触，并裸露在外侧，以便于用户的佩戴和对各个按键的操作。在一些实施例中，按键模块中各个按键的端部表面可以设置有与其功能对应的标识。标识具体可以包括文字（例如，中文和英文）、符号（例如音量加键用“+”标示、音量减键用“-”标示）。在一些实施例中，标识可以通过激光印刷、丝网印刷、移印法、激光填料、热升华法、镂空文字法等方式设置于按键处。在一些实施例中，按键上的标识也可以设置在位于按键周侧的壳体的表面，同样可以起到标示的作用。在一些实施例中，所述眼镜可以选用触摸屏，所述眼镜中安装的控制程序可以在具有交互功能的触摸屏上生成虚拟按键，虚拟按键可以对播放器的功能、音量、文件进行选择。此外，所述眼镜也可以是物理显示器和物理按键的结合。

[0143] 在一些实施例中，所述眼镜的功能件可以为一种扬声组件 21。扬声组件 21 上可以设置至少一个按键模块 4d，按键模块 4d 可以用于进行人机交互。例如：实现暂停/开始、录音、接听电话等操作。需要知道的是，按键模块 4d 仅仅用于说明的目的，本领域的技术人员可以在充分了解按键模块的作用的基础上，对按键模块的位置、数量、形状等参数进行调整。

[0144] 在一些实施例中，按键模块 4d 可以基于用户的操作指令实现不同的交互功能，例如：点击一次按键模块 4d，可以实现暂停/开始（例如音乐、录音等）；快速点击两次按键模块 4d，可以实现接听电话；有规律地点击（例如，隔一秒点击一次，总共点击两次）实现录音功能。在一些实施例中，用户的操作指令可以是点击、滑动、滚动等操或其组合的操作。例如在按键模块 4d 的表面上下滑动，实现调高/低音量的功能。

[0145] 在另一些实施例中，按键模块 4d 可以有至少两个，并且分别对应于左、右侧两个扬声组件 21。用户可以使用左、右手分别操作按键模块 4d，提高用户使用体验。

[0146] 在一个应用场景中，为了进一步提高用户的人机交互体验，可以将人机交互的功能分配到左、右两侧的按键模块 4d，用户可以根据功能的不同操作对应的按键模块 4d。例如，对应左侧的按键模块 4d：点击一次，可以开启录音功能，再点击一次，录音功能关闭；快速点击两次，可以实现暂停/播放功能。在右侧的按键模块 4d 上快速点击两次，可以实现接听电话功能（若此时在播放音乐且无电话通入，则可以实现切换下一首/上一首歌曲功能）。

[0147] 在一些实施例中，上述对于左、右侧按键模块 4d 对应的功能可以是用户自定义的。例如，用户可以通过应用软件设置，将由左侧按键模块 4d 执行的暂停/播放功能分配到由右侧的按键模块 4d 执行；或者将由右侧按键模块 4d 执行的接听电话功能分配到由左侧的按键模块 4d 执行。此外，对于实现对应功能的操作指令（例如点击次数、滑动手势）用户同样可以通过应用软件进行设置。例如，将接听电话功能对应的操作指令由点击一次设置为点击两次，将切换下一首/上一首歌曲功能对应的操作指令由点击两次设置为点击三次。用户自定义可以更符合用户操作习惯，一定程度上避免操作失误，提高用户体验。

[0148] 在一些实施例中，上述人机交互功能可以不是唯一的，而是根据用户常用的功能进行设定。例如，按键模块 4d 还可以实现拒接电话、语音阅读短信等功能，用户可以对于功能以及功能对应的

操作指令进行自定义设置，满足不同需求。

[0149] 在一些实施例中，眼镜可以通过至少一个按键模块和外部设备连接。例如，所述眼镜可以通过眼镜上一个控制无线连接的按键（例如，控制蓝牙连接的按键）与手机相连。可选地，当建立连接后，用户可以直接在所述外部设备（例如，手机）对眼镜进行操作，实现一个或多个上述提到的功能。

[0150] 需要注意的是，以上对所述眼镜的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解所述眼镜的基本原理后，可能在不背离这一原理的情况下，对实施所述眼镜的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，按键的形状可以为长方形、圆形、椭圆形、三角形等规则形状或不规则形状。又例如，各个按键的形状可以相同或不同。诸如此类的变形，均在本申请的保护范围之内。

[0151] 需要注意的是，以上对所述眼镜的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解所述眼镜的基本原理后，可能在不背离这一原理的情况下，对实施所述眼镜的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，按键的形状可以为长方形、圆形、椭圆形、三角形等规则形状或不规则形状。又例如，各个按键的形状可以相同或不同。诸如此类的变形，均在本申请的保护范围之内。

[0152] 在一些实施例中，所述眼镜还包括语音控制功能。图 16 是根据本申请的一些实施例所示的一种眼镜的语音控制模块示意图。所述语音控制系统可以作为辅助按键模块中的一部分，也可以作为单独的模块集成在所述扬声器装置中。在一些实施例中，语音控制模块包括接收模块 601、处理模块 603、识别模块 605、控制模块 607。

[0153] 所述接收模块 601，可以用于接收语音控制指令，并将所述语音控制指令发送至所述处理模块 603。在一些实施例中，接收模块 601 可以为一个或者多个麦克风。在一些实施例中，当接收模块 601 接收到由用户发出的语音控制指令时，如接收模块 601 接收到“开始播放”的语音控制指令时，会发送该语音控制指令至处理模块 603 中。

[0154] 所述处理模块 603，与所述接收模块 601 通讯连接，根据所述语音控制指令生成指令信号，并发送所述指令信号至所述识别模块 605。

[0155] 在一些实施例中，当处理模块 603 通过通讯连接从接收模块 601 中接收到一由当前用户发出的语音控制指令时，会根据该语音控制指令生成指令信号。

[0156] 在一些实施例中，识别模块 605，与所述处理模块 603、所述控制模块 607 通讯连接，识别所述指令信号是否与预设信号匹配，并发送匹配结果至所述控制模块 607。

[0157] 在一些实施例中，当识别模块 605 判断指令信号与预设信号匹配时，识别模块 605 会将匹配结果发送到控制模块 607。控制模块 607 会根据指令信号控制扬声器装置的运行。例如，当接收模块 601 接收到“开始播放”的语音控制指令时，经识别模块 605 判定该语音控制指令对应的指令信

号与预设信号匹配时，控制模块 607 会自动执行该语音控制指令，即立刻开始播放音频资料。当指令信号与预设信号不匹配时，控制模块 607 可以不执行控制指令。

[0158] 在一些实施例中，语音控制系统可以进一步包含一储存模块，与接收模块 601、处理模块 603、识别模块 605 通讯连接；接收模块 601 可以接收一预设语音控制指令并发送至处理模块 603；处理模块 603 根据预设语音控制指令生成预设信号，并将预设信号发送至储存模块。

[0159] 当识别模块 605 需要将接收模块 601 接收所得的指令信号与预设信号进行匹配时，储存模块通过通讯连接将预设信号发送到识别模块 605 中。

[0160] 在一些实施例中，所述处理模块 603 进一步包含去除所述语音控制指令中包含的环境声音。

[0161] 在一些实施例中，本实施例中的语音控制系统中的处理模块 603 可以进一步包含对语音控制指令进行去噪处理。去噪处理，是指去除语音控制指令中所包含的环境声音。在一些实施例中，例如，当处于复杂环境中时，接收模块 601 接收到语音控制指令并发送到处理模块 603，处理模块 603 根据该语音控制指令生成相应的指令信号之前，为了避免环境声音对后续识别模块 605 的识别过程产生干扰，会先对语音控制指令进行去噪处理。例如，当接收模块 601 接收到由用户处于室外马路上时发出的语音控制指令，该语音控制指令包含了马路上车辆行驶、鸣笛等嘈杂的环境声音，处理模块 602 可以通过去噪处理降低该环境声音对语音控制指令的影响。

[0162] 需要注意的是，以上对语音控制系统的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解语音控制系统的基本原理后，可能在不背离这一原理的情况下，对实施语音控制系统的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，接收模块 601 和处理模块 603 可以同一模块。诸如此类的变形，均在本申请的保护范围之内。

[0163] 在一些实施例中，所述眼镜还可以包括指示灯模块（图中未示出），以显示所述眼镜中扬声组件当前的工作状态。具体的，指示灯模块可以发出光信号，通过观察该光信号可以获知扬声组件当前的工作状态。

[0164] 在一些实施例中，指示灯可以显示扬声组件的电量。例如，指示灯为红色时，表示扬声组件的电量不如（例如电量低于 5%、10%等）。又例如，扬声器装置正在充电时，指示灯处于闪烁状态。又例如，指示灯为绿色时，表示扬声器装置电量充足（例如电量在 50%以上、80%以上等）。在一些实施例中，指示灯显示的颜色可以根据需要进行调整，此处不作限定。

[0165] 当然，容易理解的是，指示灯可以通过其他的方式表示扬声器装置的电量。在一些实施例中，指示灯可以包括多个，通过点亮的指示灯的个数可以表示扬声器装置目前的电量。具体的，在一个应用场景中，指示灯可以设置为 3 个，当指示灯只点亮一个时，表示扬声器装置的电量不足，随时可能关机（例如电量处于 1%~20%等）。当指示灯只点亮两个时，表示扬声器装置的电量处于正常使用状态，可以充电（例如电处于量 21%~70%等）。当指示灯全部点亮时，表示扬声器装置的电量处于充盈状态，无需充电，待机时间长（例如电量处于 71%~100%等）。

[0166] 在一些替代性实施例中，指示灯可以表示扬声器装置目前的通信状态。例如，当扬声器装

置处于与其他设备进行通信连接（如 wifi、蓝牙连接等），指示灯可以保持闪烁状态，也可以显示为其他颜色（例如蓝色）。

[0167] 需要注意的是，以上对扬声器装置的描述仅仅是具体的示例，不应该被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解扬声器装置的基本原理后，可能在不背离这一原理的情况下，对实施扬声器装置的具体方式和步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，扬声器装置处于充电状态时，指示灯可以显示为其他颜色（如紫色）。诸如此类的变形，均在本申请的保护范围之内。

[0168] 正常情况下，扬声组件音质受到扬声组件本身各组成部分的物理性质、各组成部分间振动传递关系、扬声组件与外界的振动传递关系以及振动传递系统在传递振动时的效率等多方面的影响因素。扬声组件本身的各组件部分包括产生振动的组件（例如但不限于换能装置），固定扬声组件的组件（例如但不限于耳挂），传递振动的组件（例如但不限于机芯壳体上的面板、振动传递层等）。各组成部分间振动传递关系以及扬声组件与外界的振动传递关系由扬声组件与使用者间的接触方式（例如但不限于夹紧力、接触面积、接触形状等）决定。

[0169] 仅仅为了说明的目的，以下将基于骨传导扬声组件进一步描述音质和扬声组件各组成部分的关系。需要知道的是，在不违背原理的情况下，以下描述的内容也可以同样适用于气导扬声组件。

[0170] 图 17 是根据本申请一些实施例提供的扬声组件振动产生和传递系统的等效模型，如图 17 所示，包括固定端 1101，传感终端 1102，振动单元 1103，以及换能装置 1104。其中，固定端 1101 通过传递关系 K1（图 17 中k_4）与振动单元 1103 相连，传感终端 1102 通过传递关系 K2（图 17 中R_3，k_3）与振动单元 1103 相连，振动单元 1103 通过传递关系 K3（图 17 中R_4，k_5）与换能装置 1104 相连。

[0171] 这里所说的振动单元是机芯壳体，传递关系 K1，K2 和 K3 是扬声组件等效系统中相应部分之间作用关系的描述（将在下文中详细描述）。等效系统的振动方程可以表示为：

$$m_3x_3'' + R_3x_3' - R_4x_4' + (k_3 + k_4)x_3 + k_5(x_3 - x_4) = f_3 \quad (1)$$

$$m_4x_4'' + R_4x_4'' - k_5(x_3 - x_4) = f_4 \quad (2)$$

[0172] 其中，m_3是振动单元 1103 的等效质量，m_4是换能装置 1104 的等效质量，x_3是振动单元 1103 的等效位移，x_4是换能装置 1104 的等效位移，k_3是传感终端 1102 和振动单元 1103 之间的等效弹性系数，k_4是固定端 1101 和振动单元 1103 之间的等效弹性系数，k_5是换能装置 1104 和振动单元 1103 之间的等效弹性系数，R_3是传感终端 1102 和振动单元 1103 之间的等效阻尼，R_4是换能装置 1104 和振动单元 1103 之间的等效阻尼，f_3和f_4分别是振动单元 1103 和换能装置 1104 之间的相互作用力。系统中振动单元的等效振幅A_3为：

$$A_3 = -\frac{m_4\omega^2}{(m_3\omega^2 + j\omega R_3 - (k_3 + k_4 + k_5))(m_4\omega^2 + j\omega R_4 - k_5) - k_5(k_5 - j\omega R_4)} \cdot f_0 \quad (3)$$

其中，f_0表示单位驱动力，ω表示振动频率。由此可见，影响骨传导扬声组件频率响应的因素包括振动的产生部分（例如但不限于振动单元、换能装置、外壳以及相互连接方式，如公式（3）中m_3，m_4，k_5，R_4等），振动传递部分（例如但不限于，与皮肤接触方式，耳挂的属性，如公式（3）中

k_3，k_4，R_3等）。改变扬声组件各部分的结构和各组件之间连接的参数，例如，改变夹紧力的大小相当于改变k_4的大小、改变胶水的粘结方式相当于改变R_4和k_5的大小、改变相关材料的硬度、弹性、阻尼等相当于改变k_3和R_3的大小，这些都可以改变骨传导扬声组件的频率响应和音质。

[0173] 在一个具体的实施例中，固定端 1101 可以是骨传导扬声组件在振动过程中位置相对固定的点或者位置相对固定的区域（例如，耳挂），这些点或区域可以看做是骨传导扬声组件在振动过程中的固定端，固定端可以是由特定的部件组成，也可以是根据骨传导扬声组件整体结构确定的位置。例如，可以通过特定的装置将骨传导扬声组件悬挂、粘接或吸附在人耳附近，也可以设计骨传导扬声组件的结构和外形使得骨传导部位能够贴住人体皮肤。

[0174] 传感终端 1102 是人体接收声音信号的听力系统，振动单元 1103 是骨传导扬声组件上用于保护、支撑、连接换能装置的部分，包含将振动传递给使用者的振动传递层或者面板等与使用者直接或间接接触的部分，以及保护、支撑其他振动产生元件的外壳等。换能装置 1104 是声音振动的产生装置，可以是以上讨论的换能装置中一种或几种的组合。

[0175] 传递关系 K1 连接固定端 1101 和振动单元 1103，表示骨传导扬声组件在工作过程中振动产生部分和固定端的振动传递关系，K1 取决于骨传导装置的形状和构造。例如，骨传导扬声组件可以以 U 型耳机架/耳机挂带形式固定在人体头部，也可以装置在头盔、消防面罩或者其他特殊用途的面具、眼镜等设备上使用，不同的骨传导扬声组件的形状和构造都会对振动传递关系 K1 产生影响，进一步地，扬声组件的构造还包括骨传导扬声组件不同部分的组成材质、质量等物理性能。传递关系 K2 连接传感终端 402 和振动单元 1103。

[0176] K2 取决于传递系统的组成，所述传递系统包括但不限于将声音振动通过使用者组织传递给听力系统。例如，声音通过皮肤、皮下组织、骨骼等传递给听力系统时，不同人体组织的物理性质以及相互连接关系都会对 K2 产生影响。进一步地，振动单元 1103 和人体组织接触，在不同实施例中，振动单元上的接触面可以是振动传递层或者是面板的一个侧面，接触面的表面形状、大小、与人体组织间的相互作用力等都会影响传递系数 K2。

[0177] 振动单元 1103 和换能装置 1104 的传递关系 K3 是由骨传导扬声组件振动产生装置内部的连接属性决定，换能装置和振动单元通过刚性或弹性方式相连，或者改变连接件在换能装置和振动单元间的相对位置，都会改变换能装置将振动传递给振动单元，尤其是面板的传递效率，从而影响传递关系 K3。

[0178] 在骨传导扬声组件的使用过程中，声音的产生和传递过程都会影响到最终人体感受到的音质。例如以上提到的固定端、人体感觉终端、振动单元、换能装置以及传递关系 K1、K2 和 K3 等，都可能对骨传导扬声组件的音效质量产生影响。需要注意的是，此处 K1、K2、K3 只是对振动传递过程中涉及到不同装置部分或系统连接方式的一种表示，可以包含但不限于物理连接方式、力的传导方式、声音的传递效率等。

[0179] 以上对骨传导扬声组件等效系统的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解骨传导扬声组件的基本原理后，可能在不背离这

一原理的情况下，对影响骨传导扬声组件振动传递的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，以上描述的 K1、K2、K3 可以是简单的振动或者力学传递方式，也可以包含复杂的非线性传递系统，传递关系可以是由各个部分直接连接形成，也可以是通过非接触式方式进行传递。

[0180] 图 18 是本申请实施例提供的一种扬声组件的复合振动装置的结构图。

[0181] 在一些实施例中，所述眼镜上还设置有复合振动装置。在一些实施例中，复合振动装置可以是换能装置中的一部分。在一些实施例中，图 18 中的复合振动装置可以是耳机芯内部提供声音的振动部分。具体的，本申请实施例中的复合振动装置相当于图 17 中的振动单元 1103 和换能装置 1104 的传递关系 K3 的具体体现。扬声组件的复合振动装置的实施例如图 18 和图 19 所示，传振片 1801 和振动板 1802 组成一个复合振动装置，所述传振片 1801 设置为一第一圆环体 1813，并在该第一圆环体内设置有向中心辐辏的三个第一支杆 1814，其辐辏中心位置与所述振动板 1802 的中心固定。所述振动板 1802 的中心为配合所述辐辏中心及第一支杆的凹槽 1820。所述振动板 1802 设置具有与所述传振片 1801 半径不同的第二圆环体 1821，以及与所述第一支杆 1814 不同粗厚的三个第二支杆 1822，在装配时所述第一支杆 1814 和所述第二支杆 1822 错开设置，可以但不限于呈 60 度角。

[0182] 上述第一支杆和第二支杆都可以采用直杆或者设置成其它符合特定要求的形状，支杆数目可以设置为两个以上，采用对称或非对称排布，以满足经济、实用效果等方面的要求。所述传振片 1801 具有薄的厚度并且可增加弹力，传振片 1801 是卡在振动板 1802 的凹槽 1820 中心的。在振动板 1802 的第二圆环体 1821 下侧粘结设置有音圈 1808。所述复合振动装置还包括底板 1812，在该底板 1812 上设置有环形磁体 1810，在该环形磁体 1810 内同心设置有内磁体 1811。在所述内磁体 1811 的顶面设置有内导磁板 1809，同时在所述环形磁体 1810 上设置有环形导磁板 1807，在所述环形导磁板 1807 上方固定设置有垫圈 1806，所述传振片 1801 的第一圆环体 1813 与该垫圈 1806 相固定连接。该整个复合振动装置通过一面板 1830 与外部连接，所述面板 1830 固连所述传振片 1801 的辐辏中心位置，并卡合固定在传振片 1801 和振动板 1802 的中心位置。利用上述振动板和传振片组成的复合振动装置，可以得到如图 20 所示的频率响应，产生了两个谐振峰。通过调节两个部件的尺寸和材料等参数，可以使得让谐振峰出现在不同的位置，例如，使得低频的谐振峰出现在更低频移动的位置，和/或使得高频的谐振峰出现在更高频的位置。优选地，振动板的劲度系数大于传振片的劲度系数，所述振动板产生两个谐振峰中的高频谐振峰，所述传振片产生两个谐振峰中的低频谐振峰。这些谐振峰的范围可以设置在人耳可听到的声音的频率范围之内，也可以不在其中，优选地，两个谐振峰都不在人耳可听到的声音的频率范围内；更优选地，一个谐振峰在人耳可听到的声音的频率范围之内，另一个谐振峰在人耳可听到的声音的频率范围之外；更优选的，两个谐振峰都在人耳可听到的声音的频率范围内；以及更进一步优选地，两个谐振峰都在人耳可听到的声音的频率范围内，且其峰值频率在 80Hz-18000Hz 之间；更进一步优选地，两个谐振峰都在人耳可听到的声音的频率范围内，且其峰值在 200Hz-15000Hz 之间；更进一步优选地，两个谐振峰都在人耳可到的声

音的频率范围内，且其峰值在 500Hz-12000Hz 之间；更进一步优选地，两个谐振峰都在人耳可到的声音的频率范围内，且其峰值在 800Hz-11000Hz 之间。谐振峰的峰值的频率最好能有一定差距，例如，两个谐振峰的峰值相差至少 500Hz；优选地，两个谐振峰的峰值相差至少 1000Hz；更进一步优选地，两个谐振峰的峰值相差至少 2000Hz；再更进一步优选地，两个谐振峰的峰值相差至少 5000Hz。为了达到比较好的效果，两个谐振峰可以都在人耳可听范围之内，并且谐振峰的峰值频率相差至少 500Hz；优选地，两个谐振峰可以都在人耳可听范围之内，两个谐振峰的峰值相差至少 1000Hz；再进一步优选地，两个谐振峰可以都在人耳可听范围之内，两个谐振峰的峰值相差至少 2000Hz；以及更进一步优选地，两个谐振峰可以都在人耳可听范围之内，两个谐振峰的峰值相差至少 3000Hz；还可以更进一步优选地，两个谐振峰可以都在人耳可听范围之内，两个谐振峰的峰值相差至少 4000Hz。两个谐振峰中可以一个在人耳可听范围之内，另一个在人耳可听范围之外，并且两个谐振峰的峰值频率相差至少 500Hz；优选地，一个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且两个谐振峰的峰值频率相差至少 1000Hz；更优选地，一个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，一个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，一个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且两个谐振峰的峰值频率相差至少 4000Hz。两个谐振峰可以都在频率 5Hz-30000Hz 之间，并且两个谐振峰的峰值频率相差至少 400Hz；优选地，两个谐振峰可以都在频率 5Hz-30000Hz 之间，并且两个谐振峰的峰值频率相差至少 1000Hz；更优选地，两个谐振峰可以都在频率 5Hz-30000Hz 之间，并且两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，两个谐振峰可以都在频率 5Hz-30000Hz 之间，并且两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，两个谐振峰可以都在频率 5Hz-30000Hz 之间，并且两个谐振峰的峰值频率相差至少 4000Hz。两个谐振峰可以都在频率 20Hz-20000Hz 之间，并且两个谐振峰的峰值频率相差至少 400Hz；优选地，两个谐振峰可以都在频率 20Hz-20000Hz 之间，并且两个谐振峰的峰值频率相差至少 1000Hz；更优选地，两个谐振峰可以都在频率 20Hz-20000Hz 之间，并且两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，两个谐振峰可以都在频率 20Hz-20000Hz 之间，并且两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，两个谐振峰可以都在频率 20Hz-20000Hz 之间，并且两个谐振峰的峰值频率相差至少 4000Hz。两个谐振峰可以都在频率 100Hz-18000Hz 之间，并且两个谐振峰的峰值频率相差至少 400Hz；优选地，两个谐振峰可以都在频率 100Hz-18000Hz 之间，并且两个谐振峰的峰值频率相差至少 1000Hz；更优选地，两个谐振峰可以都在频率 100Hz-18000Hz 之间，并且两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，两个谐振峰可以都在频率 100Hz-18000Hz 之间，并且两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，两个谐振峰可以都在频率 100Hz-18000Hz 之间，并且两个谐振峰的峰值频率相差至少 4000Hz。两个谐振峰可以都在频率 200Hz-12000Hz 之间，并且两个谐振峰的峰值频率相差至少 400Hz；优选地，两个谐振峰可以都在频率 200Hz-12000Hz 之间，并且两个谐振峰的峰值频率相差至少 1000Hz；更优选地，两个谐振峰可以都在频率 200Hz-12000Hz 之间，并且两个谐振

峰的峰值频率相差至少 2000Hz；进一步优选地，两个谐振峰可以都在频率 200Hz-12000Hz 之间，并且两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，两个谐振峰可以都在频率 200Hz-12000Hz 之间，并且两个谐振峰的峰值频率相差至少 4000Hz。两个谐振峰可以都在频率 500Hz-10000Hz 之间，并且两个谐振峰的峰值频率相差至少 400Hz；优选地，两个谐振峰可以都在频率 500Hz-10000Hz 之间，并且两个谐振峰的峰值频率相差至少 1000Hz；更优选地，两个谐振峰可以都在频率 500Hz-10000Hz 之间，并且两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，两个谐振峰可以都在频率 500Hz-10000Hz 之间，并且两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，两个谐振峰可以都在频率 500Hz-10000Hz 之间，并且两个谐振峰的峰值频率相差至少 4000Hz。这样就拓宽了扬声组件的谐振响应范围，得到满足条件的音质。值得注意的是，在实际的使用过程中，可以设置多个传振片和振动板，形成多层振动结构，分别对应不同的频响范围，实现全音域全频响高品质的扬声组件振动，或者使频率响应曲线在某些特定频率范围内达到使用要求。例如，在骨传导助听器中，为了满足正常听力要求，可以选择谐振频率在 100Hz-10000Hz 的范围内的一个或多个振动板、传振片构成的换能装置。关于振动板和传振片构成的复合振动装置的描述出现于 2011 年 12 月 23 日提交的中国专利申请号 201110438083.9 中披露的，名称为“一种骨传导扬声组件及其复合振动装置”的专利申请中，该专利文献全文引用在此作为参考。

[0183] 图 21 是本申请一些实施例提供的一种眼镜中扬声组件的复合振动装置的结构图。在另一个实施例中，如图 20 所示，扬声组件的复合振动装置包括一个振动板 2002，第一传振片 2003 和第二传振片 2001。第一传振片 2003 将振动板 2002 和第二传振片 2001 固定在外壳 2019 上，由振动板 2002、第一传振片 2003 和第二传振片 2001 组成的复合振动装置可以产生不少于两个谐振峰，在听力系统可听范围内产生更加平坦的频率响应曲线，从而改善扬声组件的音质。

[0184] 在第一传振片的三重复合振动系统产生的谐振峰数多于没有第一传振片的复合振动系统产生的谐振峰。优选地，所述三重复合振动系统可以产生至少有三个谐振峰；更优选地，至少有一个谐振峰不在人耳可听到的范围之内；更优选地，谐振峰都在人耳可听到的范围之内；更进一步优选地，谐振峰都在人耳可听到的范围之内，且其峰值频率不高于 18000Hz；更进一步优选地，谐振峰都在人耳可听到的声音的频率范围内，且其峰值在 100Hz-15000Hz 之间；更进一步优选地，谐振峰都在人耳可到的声音的频率范围内，且其峰值在 200Hz-12000Hz 之间；更进一步优选地，谐振峰都在人耳可到的声音的频率范围内，且其峰值在 500Hz-11000Hz 之间。谐振峰的峰值的频率最好能有一定差距，例如，至少存在两个谐振峰的峰值相差至少 200Hz；优选地，至少存在两个谐振峰的峰值相差至少 500Hz；更优选地，至少存在两个谐振峰的峰值相差至少 1000Hz；再进一步优选地，至少存在两个谐振峰的峰值相差至少 2000Hz；再更进一步优选地，至少存在两个谐振峰的峰值相差至少 5000Hz。为了达到比较好的效果，谐振峰可以都在人耳可听范围之内，并且至少存在两个谐振峰的峰值频率相差至少 500Hz；优选地，谐振峰可以都在人耳可听范围之内，至少存在两个谐振峰的峰值相差至少 1000Hz；更优选地，谐振峰可以都在人耳可听范围之内，至少存在两个谐振峰的峰值相差至少 1000Hz；再进一步优选地，谐振峰可以都在人耳可听范围之内，至少存在两个谐振峰的

峰值相差至少 2000Hz；以及更进一步优选地，谐振峰可以都在人耳可听范围之内，至少存在两个谐振峰的峰值相差至少 3000Hz；还可以更进一步优选地，谐振峰可以都在人耳可听范围之内，至少存在两个谐振峰的峰值相差至少 4000Hz。谐振峰中可以有两个在人耳可听范围之内，另一个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 500Hz；优选地，两个谐振峰在人耳可听范围之内，另一个谐振峰在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，两个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，两个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，两个谐振峰在人耳可听范围之内，另一个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。谐振峰中可以有一个在人耳可听范围之内，另外两个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 500Hz；优选地，一个谐振峰在人耳可听范围之内，另外两个谐振峰在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，一个谐振峰在人耳可听范围之内，另外两个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，一个谐振峰在人耳可听范围之内，另外两个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，一个谐振峰在人耳可听范围之内，另外两个在人耳可听范围之外，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。谐振峰可以都在频率 5Hz-30000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 400Hz；优选地，谐振峰可以都在频率 5Hz-30000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，谐振峰可以都在频率 5Hz-30000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，谐振峰可以都在频率 5Hz-30000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，谐振峰可以都在频率 5Hz-30000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。谐振峰可以都在频率 20Hz-20000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 400Hz；优选地，谐振峰可以都在频率 20Hz-20000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，谐振峰可以都在频率 20Hz-20000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，谐振峰可以都在频率 20Hz-20000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，谐振峰可以都在频率 20Hz-20000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。谐振峰可以都在频率 100Hz-18000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 400Hz；优选地，谐振峰可以都在频率 100Hz-18000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，谐振峰可以都在频率 100Hz-18000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，谐振峰可以都在频率 100Hz-18000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，谐振峰可以都在频率 100Hz-18000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。谐振峰可以都在频率 200Hz-12000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 400Hz；优选地，谐振峰可以都在频

率 200Hz-12000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，谐振峰可以都在频率 200Hz-12000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，谐振峰可以都在频率 200Hz-12000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，谐振峰可以都在频率 200Hz-12000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。谐振峰可以都在频率 500Hz-10000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 400Hz；优选地，谐振峰可以都在频率 500Hz-10000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 1000Hz；更优选地，谐振峰可以都在频率 500Hz-10000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 2000Hz；进一步优选地，谐振峰可以都在频率 500Hz-10000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 3000Hz；更进一步优选地，谐振峰可以都在频率 500Hz-10000Hz 之间，并且至少存在两个谐振峰的峰值频率相差至少 4000Hz。在一个实施例中，通过利用振动板、第一传振片和第二传振片组成的三重复合振动系统，可以得到如图 25 所示的频率响应，产生了三个明显的谐振峰，能够使扬声组件频响在低频范围（600Hz 左右）的灵敏度得到较大提升，提高了音质。

{0185} 通过改变第一传振片的尺寸和材料等参数，可以让谐振峰发生移动，最终获得更理想的频率响应。优选地，第一传振片为一弹性片。该弹性由第一传振片的材料、厚度、结构等多方面决定。第一传振片的材料，例如但不限于，钢材（例如但不限于不锈钢、碳素钢等）、轻质合金（例如但不限于铝合金、铍铜、镁合金、钛合金等）、塑胶（例如但不限于高分子聚乙烯、吹塑尼龙、工程塑料等），也可以是能达到同样性能的其他单一或复合材料。对于复合材料，例如但不限于玻璃纤维、碳纤维、硼纤维、石墨纤维、石墨烯纤维、碳化硅纤维或芳纶纤维等增强材料，也可以是其它有机和/或无机材料的复合物，例如玻璃纤维增强不饱和聚酯、环氧树脂或酚醛树脂基体组成的各类玻璃钢。第一传振片的厚度不低于 0.005mm，优选地，厚度为 0.005mm-3mm，更优选地，厚度为 0.01mm-2mm，再优选地，厚度为 0.01mm-1mm，进一步优选地，厚度为 0.02mm-0.5mm。第一传振片的结构可以设定成环状，优选地，包含至少一个圆环，优选地，包含至少两个圆环，可以是同心圆环，也可以是非同心圆环，圆环间通过至少两个支杆相连，支杆从外环向内环中心辐射，进一步优选地，包含至少一个椭圆圆环，进一步优选地，包含至少两个椭圆圆环，不同的椭圆圆环有不同的曲率半径，圆环之间通过支杆相连，更进一步优选地，第一传振片包含至少一个方形环。第一传振片结构也可以设定成片状，优选地，上面设置镂空图案，镂空图案的面积不小于没有镂空的面积。以上描述中材料、厚度、结构可以组合成不同的传振片。例如，环状传振片具有不同的厚度分布，优选地，支杆厚度等于圆环厚度，进一步优选地，支杆厚度大于圆环厚度，更进一步优选地，内环的厚度大于外环的厚度。

{0186} 本申请中针对上述的内容还公开了关于振动板、第一传振片、第二传振片的具体的实施例，图 25 是根据本申请一些实施例提供的一种 MP3 播放器中扬声组件的振动产生部分的结构图。如图 25 所示，换能装置包括由导磁板 2210，磁铁 2211 和导磁体 2212 组成的磁路系统，振动板 2214，线圈 2215，第一传振片 2216 和第二传振片 2217。面板 2213（即机芯壳体上贴近用户的一侧）突出

外壳 2219，和振动片 2214 通过胶水粘结，第一传振片 2216 将换能装置连接固定在外壳 2219 上，形成悬挂结构。

[0187] 在扬声组件工作的过程中，由振动板 2214，第一传振片 2216 和第二传振片 2217 组成的三重振动系统能够产生更为平坦的频率响应曲线，从而改善扬声组件的音质。第一传振片 2216 将换能装置弹性连接在外壳 2219 上，可以减少换能装置传递给外壳的振动，从而有效地降低由于壳体振动导致的漏音，也减少了壳体的振动对扬声组件音质的影响。图 25 所示是外壳振动强度和面板振动强度随着频率的响应曲线。其中，粗线显示的是使用第一传振片 2216 后振动产生部分的频率响应，细线显示的是不使用第一传振片 2216 后振动产生部分的频率响应。可以看出，在 500Hz 以上的频率范围，不含有第一传振片 2216 的扬声组件外壳的振动明显大于含有第一传振片 2216 的扬声组件的外壳的振动。图 25 所示是含有第一传振片 2216 和不含有第一传振片 2216 两种情况下的漏音比较。其中，含有第一传振片 2216 的装置在中频（例如 1000Hz 左右）范围的漏音小于不含有第一传振片 2216 的装置在对应频率范围的漏音。由此可以看出，面板和外壳间使用第一传振片后可以有效地降低外壳的振动，从而降低漏音。在一些实施例中，第一传振片可以采用包括但不限于不锈钢、铍铜、塑胶、聚碳酸酯材料，其厚度在 0.01mm-1mm 的范围内。

[0188] 需要注意的是，以上对振动机构的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解振动机构的基本原理后，可能在不背离这一原理的情况下，对实施振动机构的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，第一传振片不限于上述的一个或两个圆环，其数量也可以为两个以上。又例如，第一传振片的多个元件之间的形状可以相同，也可以不相同（元件中有圆环和方环）。诸如此类的变形，均在本申请的保护范围之内。

[0189] 图 26A 和 26B 是根据本申请的一些实施例所示的眼镜扬声组件机芯结构的示意图。在一些实施例中，所述扬声组件 21 包括外壳 210（即、机芯壳体）、振动面板 221 和换能装置 22。在一些实施例中，换能装置 22 容置在所述外壳 210 的内部并产生振动。所述换能装置 22 的振动会引起所述外壳 210 的振动，并由此推动壳外空气振动而产生漏音。所述外壳 210 的至少一部分上开设有至少一个引声孔 230，所述引声孔 230 用于将所述外壳 210 内部空气振动所形成的壳内声波引出至所述外壳 210 的外部，与所述外壳 210 振动推动壳外空气所形成的漏音声波发生干涉。在一些实施例中个，所述干涉可以降低所述漏音声波的振幅。

[0190] 振动面板 221 与换能装置 22 固定相连，在换能装置 22 的带动下同步振动。振动面板 221 从外壳 210 的开口伸出外壳 210，至少部分与人体皮肤贴合，振动通过人体组织与骨骼传递到听觉神经，从而使人听到声音。在换能装置 22 与外壳 210 之间可以通过连接件 23 相连，连接件 23 将换能装置 22 定位在外壳 210 中。

[0191] 连接件 23 可以为一个或多个独立的部件，也可以与换能装置 22 或外壳 210 一体设置。在一些实施例中，为了减小对振动的约束，连接件 23 可以选择弹性材料制成。

[0192] 在一些实施例中，引声孔 230 可以设置在侧壁高度的上部，例如，从顶部（面板 221）到

侧壁高度方向 1/3 高度的部分。

[0193] 以圆柱形外壳为例，对于设置位置，根据不同的需求，引声孔 230 可以开设于所述外壳的侧壁 211 和/或底壁 212。优选所述引声孔 230 开设在所述外壳侧壁 211 的上部和/或下部。开设在所述外壳侧壁 211 的引声孔数量可以为至少两个，优选是呈环状周向均匀分布。开设在所述外壳底壁 212 的引声孔数量可以为至少两个，以底壁的中心为圆心，呈环状均匀分布。呈环状分布的所述引声孔可以设置至少一圈。开设在所述外壳底壁 212 的引声孔数量可以为仅有一个，该引声孔设置在底壁 212 的中心处。

[0194] 对于数量，引声孔可以为一个或多个，优选是有多个，均匀布设。对于环状布设的引声孔，每圈引声孔的数量例如可以为 6-8 个。

[0195] 引声孔的形状可以为圆形、椭圆形、矩形或长条形等。长条形一般是指沿直线、曲线或弧线的条状。各种形状的引声孔在一个扬声组件上可以相同或不同。

[0196] 在一些实施例中，在外壳 210 的侧壁下部（侧壁高度方向 2/3 高度到底部的部分）开设有贯通的引声孔 230。引声孔 230 的数量可以是，例如，8 个，形状可以是，例如，矩形。各引声孔 230 呈环形均匀分布在外壳 210 的侧壁上。

[0197] 在一些实施例中，外壳 210 为圆柱状，在外壳 210 的侧壁中部（侧壁高度方向 1/3 高度到 2/3 高度的部分）开设有贯通的引声孔 230。引声孔 230 的数量可以是，例如，8 个，形状可以是，例如，矩形。各引声孔 230 呈环形均匀分布在外壳 210 的侧壁上。

[0198] 在一些实施例中，在外壳 210 的底壁的周向开设有贯通的引声孔 230。引声孔 230 的数量可以是，例如，8 个，形状可以是，例如，矩形。各引声孔 230 呈环形均匀分布在外壳 210 的侧壁上。

[0199] 在一些实施例中，在外壳 210 侧壁的上部和下部分别开设有贯通的引声孔 230。引声孔 230 呈环状均匀分布在外壳 210 侧壁的上部和下部，每圈引声孔 230 的数量为 8 个。且上部和下部设置的引声孔 230 相对于外壳 210 的中截面对称设置。每个引声孔 230 的形状为圆形。

[0200] 在一些实施例中，在外壳 210 侧壁的上部和下部，以及外壳 210 的底壁分别开设有贯通的引声孔 230。侧壁开设的引声孔 230 呈环状均匀分布在外壳 210 侧壁的上部和下部，每圈数量为 8 个，且上部和下部设置的引声孔 230 相对于外壳 210 的中截面对称设置。侧壁开设的每个引声孔 230 为矩形。底壁开设的引声孔 230 的形状为沿弧线设置的长条形，数量为 4 个，以底壁的中心为圆心呈环形均匀分布。且底壁开设的引声孔 230 还包括开设在中心处的圆形的通孔。

[0201] 在一些实施例中，在外壳 210 侧壁的上部开设有贯通的引声孔 230，呈环状均匀分布在外壳 10 侧壁的上部，数量例如为 8 个，引声孔 230 的形状为圆形。

[0202] 在一些实施例中，为了显示出抑制漏音的较优效果，分别在侧壁 11 的上部、中部和下部均周向均布有引声孔 230，在外壳 210 底壁 212 也周向开设有一圈引声孔 230。各引声孔 230 的孔径大小和孔的个数均相同。

[0203] 在一些实施例中，所述引声孔 230 可以为无遮挡的贯通孔。

[0204] 为了控制壳内声波从引声孔230传播而出的效果，可以在引声孔230的开口处设置阻尼层(在说明书附图中未示出)，以调节声波的相位和振幅，从而修正引导壳内声波的效果。阻尼层的材料选择和设置位置可以有多种方式，例如，阻尼层为调音纸、调音棉、无纺布、丝绸、棉布、海绵或橡胶等对音质传导具有一定阻尼的材料，可以在引声孔230内壁贴附阻尼层，或者在引声孔230的孔口外侧罩设阻尼层等。

[0205] 在一些实施例中，对应不同引声孔之间，可以将所设置的阻尼层设置为不同引声孔230之间具有相同的相位差以抑制相同波长的漏音，或设置为不同的所述引声孔230之间具有不同的相位差以抑制不同波长的漏音（即特定波段的漏音）。

[0206] 在一些实施例中，同一引声孔230的不同部位之间设置为具有相同的相位（例如，使用预先设计好的阶梯或台阶状的阻尼层），以抑制相同波长的漏音声波；或者，同一引声孔230的不同部位之间，设置为具有不同的相位，以抑制不同波长的漏音声波。

[0207] 换能装置22不仅带动振动面板221振动，换能装置22自身也是一个振动源，其容置在外壳210的内部，换能装置22表面振动使外壳内空气随之振动，形成的声波是在外壳210内部的，可称为壳内声波。振动面板221和换能装置22通过连接件23定位在外壳210上，不可避免地会将振动作用于外壳210上，带动外壳210同步振动，所以外壳210推动壳外空气振动即形成了漏音声波。漏音声波向外传播，就形成了漏音。

[0208] 根据如下公式来确定引声孔的位置来抑制漏音，漏音降低量正比于：

$$\left(\iint_{S_{开孔}} P ds - \iint_{S_{外壳}} P_d ds\right) \tag{4}$$

其中，$S_{开孔}$是引声孔的开孔面域，$S_{外壳}$是未与人脸接触的外壳面域，

[0209] 壳内压强：

$$P = P_a + P_b + P_c + P_e, \tag{5}$$

[0210] P_a、P_b、P_c、P_e分别是a面、b面、c面、e面在壳内空间任一点所生成的声压，

$$P_a(x,y,z) = -j\omega\rho_0 \iint_{S_a} W_a(x_a', y_a') \cdot \frac{e^{jkR(x_a', y_a')}}{4\pi R(x_a', y_a')} dx_a' dy_a' - P_{a\,阻} \tag{6}$$

$$P_b(x,y,z) = -j\omega\rho_0 \iint_{S_b} W_b(x', y') \cdot \frac{e^{jkR(x', y')}}{4\pi R(x', y')} dx' dy' - P_{b\,阻} \tag{7}$$

$$P_c(x,y,z) = -j\omega\rho_0 \iint_{S_c} W_c(x_c', y_c') \cdot \frac{e^{jkR(x_c', y_c')}}{4\pi R(x_c', y_c')} dx_c' dy_c' - P_{c\,阻} \tag{8}$$

$$P_e(x,y,z) = -j\omega\rho_0 \iint_{S_e} W_e(x_e', y_e') \cdot \frac{e^{jkR(x_e', y_e')}}{4\pi R(x_e', y_e')} dx_e' dy_e' - P_{e\,阻} \tag{9}$$

[0211] 其中，$R(x', y') = \sqrt{(x-x')^2 + (y-y')^2 + z^2}$是观测点（x,y,z）到b面声源上一点$(x', y', 0)$的距离；$S_a$、$S_b$、$S_c$、$S_e$分别为a面、b面、c面、e面的面域；

$R(x_a', y_a') = \sqrt{(x-x_a')^2 + (y-y_a')^2 + (z-z_a)^2}$是观测点（x,y,z）到a面声源上一点$(x_a', y_a', z_a)$的距离；

$R(x_c', y_c') = \sqrt{(x - x_c')^2 + (y - y_c')^2 + (z - z_c)^2}$是观测点（x,y,z）到 c 面声源上一点$(x_c', y_c', z_c)$的距离；

$R(x_e', y_e') = \sqrt{(x - x_e')^2 + (y - y_e')^2 + (z - z_e)^2}$是观测点（x,y,z）到 e 面声源上一点$(x_e', y_e', z_e)$的距离；k= ω/u 波数（ u 为声速），$\rho_0$ 为空气密度，ω 为振动的角频率，$P_{a阻}$、$P_{b阻}$、$P_{c阻}$、$P_{e阻}$为空气本身声阻， 分别为：

$$P_{a阻} = A \cdot \frac{z_a \cdot r + j\omega \cdot z_a \cdot r'}{\varphi} + \delta \tag{10}$$

$$P_{b阻} = A \cdot \frac{z_b \cdot r + j\omega \cdot z_b \cdot r'}{\varphi} + \delta \tag{11}$$

$$P_{c阻} = A \cdot \frac{z_c \cdot r + j\omega \cdot z_c \cdot r'}{\varphi} + \delta \tag{12}$$

$$P_{e阻} = A \cdot \frac{z_e \cdot r + j\omega \cdot z_e \cdot r'}{\varphi} + \delta \tag{13}$$

[0212] 其中， r 为单位长度上的声阻尼，r′为单位长度上的声质量，z_a为观测点到 a 面声源的距离，z_b为观测点到 b 面声源的距离，z_c为观测点到 c 面声源的距离，z_e为观测点到 e 面声源的距离。

[0213] $W_a(x,y)$、$W_b(x,y)$、$W_c(x,y)$、$W_e(x,y)$、$W_d(x,y)$分别是 a、b、c、e、d 面单位面积的声源强度，可由以下公式组(14)导出：

$$\begin{aligned}
F_e = F_a &= F - k_1 \cos \omega t - \iint_{S_a} W_a(x,y)\,dxdy - \iint_{S_e} W_e(x,y)dxdy - f \\
F_b &= -F + k_1 \cos \omega t + \iint_{S_b} W_b(x,y)dxdy - \iint_{S_e} W_e(x,y)dxdy - L \\
F_c = F_d &= F_b - k_2 \cos \omega t - \iint_{S_c} W_c(x,y)dxdy - f - \gamma \\
F_d &= F_b - k_2 \cos\omega t - \iint_{S_d} W_d(x,y)dxdy
\end{aligned} \tag{14}$$

[0214] 其中，F 为换能器转换成的驱动力，F_a、F_b、F_c、F_d、F_e分别为 a、b、c、d、e 各处的驱动力，S_d为外壳（d 面）面域，f 为侧壁的小间隙形成的粘滞阻力，$f = \eta\, \Delta s(dv/dy)$，L 为振动板作用于人脸时，人脸的等价载荷，γ 为弹性元件 2 上耗散能量， k_1、k_2分别是弹性元件 1 和弹性元件 2 的弹性系数，η 为流体粘性系数，dv/dy 为流体的速度梯度，Δs 为物体（板）的截面积，A 为幅度，φ为声场的面积，δ为高阶量（来源于外壳形状的非完全对称性），壳体外任意一点，由壳体振动产生的声压为：

$$P_d = -j\omega\rho_0 \iint W_d(x_d', y_d') \cdot \frac{e^{jkR(x_d', y_d')}}{4\pi R(x_d', y_d')} dx_d' dy_d' \tag{15}$$

[0215] 其中，$R(x_d', y_d') = \sqrt{(x - x_d')^2 + (y - y_d')^2 + (z - z_d)^2}$ 为观测点（x,y,z）到 d 面声源上一点(x_d', y_d', z_d)的距离。

[0216] P_a、P_b、P_c、P_e全都是位置的函数，当我们在壳上任一位置开孔时，若开孔面积为 S 开孔，

则开孔处声压的总作用为$\iint_{S_{开孔}} Pds$。

[0217] 而外壳 10 上由于振动面板 221 紧贴人体组织，其输出能量都被人体组织吸收，那么只有 d 面推动壳外空气振动，形成漏音，外壳推动壳外空气振动的总作用为$\iint_{S_{外壳}} P_d ds$。

[0218] 在一些应用场景中，我们的目标是使$\iint_{S_{开孔}} Pds$与$\iint_{S_{外壳}} P_d ds$大小相等，方向相反，从而达到降低漏音的效果。一旦装置基本结构确定，$\iint_{S_{外壳}} P_d ds$是一个我们无法调整的量，那么调整$\iint_{S_{开孔}} Pds$，使其与$\iint_{S_{外壳}} P_d ds$抵消。而$\iint_{S_{开孔}} Pds$上包含了完整的相位和幅度信息，其相位、幅度与扬声组件的外壳尺寸、换能装置的振动频率、引声孔的开设位置、形状、数量、尺寸及孔上是否有阻尼都有密切关系，这就使我们可以通过调整引声孔的开设位置、形状和数量和/或增加阻尼和/或调整阻尼材料来达到抑制漏音的目的。

[0219] 壳内声波和漏音声波相当于中所示的两个声源。本发明实施例在外壳的壁面上开设了贯通的引声孔 230，能够将壳内声波引导传播至壳外，与漏音声波同在空气中进行传播，发生干涉，从而降低所述漏音声波的振幅，即减小了漏音。因此，本申请的技术方案，通过在外壳上开设引声孔这一便捷改进，即在一定程度上解决漏音问题，且不增加扬声组件的体积和重量。

[0220] 根据发明人所推导的上述公式，本领域技术人员容易理解的是，漏音声波的消除效果，与扬声组件的外壳尺寸、换能装置的振动频率、引声孔的开设位置、形状、数量、尺寸及孔上是否有阻尼都有密切关系，所以，引声孔的开设位置、形状、数量、孔上的阻尼材料等可以根据需要有多种不同的变化方案。

[0221] 图 27 是根据本申请的一些实施例所示的扬声组件抑制漏音的效果图。在扬声组件（例如，如图 26A 和 26B 所示的扬声组件）附件的目标区域中，漏音声波传递至所述目标区域的相位，与壳内声波经引声孔传播至该目标区域的相位之间，相差接近 180 度。通过此设置，可使得外壳产生的漏音声波在目标区域显著降低、甚至消除。

[0222] 如图 27 所示，在 1500 Hz~4000 Hz 频段内，漏音声波被显著抑制。其中，在 1500 Hz～3000 Hz 频段内，被抑制的漏音基本超过 10 dB。特别是在 2000 Hz～2500 Hz 这个频段内，在外壳侧面上部开设引声孔后，漏音比未开设引声孔的方案降低了超过 20 dB。

[0223] 需要注意的是，以上对眼镜的降噪引声孔的描述仅仅是具体的示例，不应被视为是唯一可行的实施方案。显然，对于本领域的专业人员来说，在了解眼镜的降噪引声孔的基本原理后，可能在不背离这一原理的情况下，对实施眼镜的降噪引声孔的具体方式与步骤进行形式和细节上的各种修正和改变，但是这些修正和改变仍在以上描述的范围之内。例如，举例说明有哪些变化形式，可以列举多种。引声孔 60 的孔径大小可以不一致，以抑制不同波段的漏音。诸如此类的变形，均在本申请的保护范围之内。

[0224] 在一些实施例中，以上描述的扬声器装置可以通过气传导的方式将声音传递给用户。当采用气传导的方式传递声音时，所述扬声器装置可以包括一个或多个声源。所述声源可以位于用户头

部的特定位置，例如，头顶、额头、脸颊、鬓角、耳廓、耳廓背面等，而不用堵塞或者覆盖耳道。出于描述的目的，图 28 显示一种通过气传导的方式传递声音的示意图。

[0225] 如图 28 所示，声源 2810 和声源 2820 可以产生相位相反的声波（图中以“+”和“-”表示相位相反）。为简单起见，这里所说的声源指的是扬声器装置上输出声音的出声孔。例如，所述声源 2810 和声源 2820 可以是分别位于扬声器装置上特定位置（例如，机芯壳体，或者电路壳体 ）的两个出声孔。

[0226] 在一些实施例中，声源 2810 和声源 2820 可以由同一个振动装置 2801 产生。所述振动装置 2801 包括振膜（未显示在图中）。当所述振膜受到电信号驱动而振动时，振膜正面驱动空气振动，通过导声通道 2812 在出声孔处形成声源 2810，振膜背面驱动空气振动，通过导声通道 2822 在出声孔处形成声源 2820。所述导声通道指的是振膜到对应出声孔的声音传播路径。在一些实施例中，所述导声通道是由扬声器上特定结构（例如，机芯壳体，或者电路壳体） 围成的路径。需要知道的是，在一些可替代的实施例中，声源 2810 和声源 2820 还可以由不同的振动装置，分别通过不同的振膜振动产生。

[0227] 由声源 2810 和声源 2820 产生的声音中，一部分传递给用户耳朵形成用户听到的声音，另一部分传递到环境中形成漏音。考虑到声源 2810 和声源 2820 距离用户耳朵的位置较近，为了描述方便，所述传递到用户耳朵的声音可以称为近场声音，所述传递到环境中的漏音可以称为远场声音。在一些实施例中，所述扬声器装置产生的不同频率的近场/远场声音与声源 2810 和声源 2820 之间的间距有关。一般说来，扬声器装置产生的近场声音会随着两个声源之间间距的增大而增大，而产生的远场声音（漏音）会随着频率的增加而增大。

[0228] 针对不同频率的声音，可以分别设计声源 2810 和声源 2820 之间的间距，使得扬声器装置产生的低频近场声音（例如，频率小于 800Hz 的声音）尽可能大，且高频远场声音（例如，频率大于 2000Hz 的声音）尽可能小。为了达到以上目的，所述扬声器装置中可以包括两组或两组以上的双声源，每组双声源包含类似于声源 2810 和声源 2820 的两个声源，并分别产生特定频率的声音。具体地，第一组双声源可以用于产生低频声音，第二组双声源可以用产生高频声音。为了获得较大的低频近场声音，第一组双声源中两个声源之间的距离可以设置为较大的值。并且由于低频信号的波长较长，双声源之间较大的距离不会在远场形成过大的相位差，因而也不会在远场中形成过多的漏音。为了使得高频远场声音较小，第二组双声源中两个声源之间的距离可以设置为较小的值。由于高频信号的波长较短，双声源之间较小的距离可以避免在远场形成大的相位差，因而可以避免形成大的漏音。所述第二组双声源之间的距离小于所述第一组双声源之间的距离。

[0229] 本申请实施例可能带来的有益效果包括但不限于：（1）区别于现有技术的情况，本申请中在铰链臂受到外力作用而相对铰链座进行转动时，由第一支撑面和第二支撑面的连接处推动支撑件克服弹性件的弹性偏置而反向移动，进而使得第三支撑面从与第一支撑面和第二支撑面中的一者弹性抵接切换到与第一支撑面和第二支撑面中的另一者弹性抵接，在垂直于转轴的中轴线的截面上，转轴到连接处的最大距离与转轴到第一支撑面的最短距离之间的比例介于 1.1 和 1.5 之间，从而使

得在铰链通过连接处的推动而进行状态的切换时，铰链具有适当程度的跳变，进而在用户扳动铰链时具有较为明显的触感，且不至于跳变状态太突兀而难以切换铰链的状态，从而为用户使用提供便利。（2）能够减小外壳振动和抑制漏音。（3）能够改善扬声器的音质。需要说明的是，不同实施例可能产生的有益效果不同，在不同的实施例里，可能产生的有益效果可以是以上任意一种或几种的组合，也可以是其他任何可能获得的有益效果。

[0230] 上文已对基本概念做了描述，显然，对于本领域技术人员来说，上述发明披露仅仅作为示例，而并不构成对本申请的限定。虽然此处并没有明确说明，本领域技术人员可能会对本申请进行各种修改、改进和修正。该类修改、改进和修正在本申请中被建议，所以该类修改、改进、修正仍属于本申请示范实施例的精神和范围。

[0231] 同时，本申请使用了特定词语来描述本申请的实施例。如“一个实施例”、“一实施例”和/或“一些实施例”意指与本申请至少一个实施例相关的某一特征、结构或特点。因此，应强调并注意的是，本说明书中在不同位置两次或多次提及的“一实施例”或“一个实施例”或“一替代性实施例”并不一定是指同一实施例。此外，本申请的一个或多个实施例中的某些特征、结构或特点可以进行适当的组合。

[0232] 此外，本领域技术人员可以理解，本申请的各方面可以通过若干具有可专利性的种类或情况进行说明和描述，包括任何新的和有用的工序、机器、产品或物质的组合或对他们的任何新的和有用的改进。相应地，本申请的各个方面可以完全由硬件执行、可以完全由软件（包括固件、常驻软件、微码等）执行、也可以由硬件和软件组合执行。以上硬件或软件均可被称为“数据块”、“模块”、“引擎”、“单元”、“组件”或“系统”。此外，本申请的各方面可能表现为位于一个或多个计算机可读介质中的计算机产品，该产品包括计算机可读程序编码。

[0233] 此外，除非权利要求中明确说明，本申请所述处理元素和序列的顺序、数字字母的使用或其他名称的使用，并非用于限定本申请流程和方法的顺序。尽管上述披露中通过各种示例讨论了一些目前认为有用的发明实施例，但应当理解的是，该类细节仅起到说明的目的，附加的权利要求并不仅限于披露的实施例，相反，权利要求旨在覆盖所有符合本申请实施例实质和范围的修正和等价组合。例如，虽然以上所描述的系统组件可以通过硬件设备实现，但是也可以只通过软件的解决方案得以实现，如在现有的服务器或移动设备上安装所描述的系统。

[0234] 同理，应当注意的是，为了简化本申请披露的表述，从而帮助对一个或多个发明实施例的理解，前文对本申请实施例的描述中，有时会将多种特征归并至一个实施例、附图或对其的描述中。但是，这种披露方法并不意味着本申请对象所需要的特征比权利要求中提及的特征多。实际上，实施例的特征要少于上述披露的单个实施例的全部特征。

[0235] 一些实施例中使用了描述成分、属性数量的数字，应当理解的是，此类用于实施例描述的数字，在一些示例中使用了修饰词“大约”、“近似”或“大体上”等来修饰。除非另外说明，“大约”、“近似”或“大体上”表明所述数字允许有±20%的变化。相应地，在一些实施例中，说明书和权利要求中使用的数值数据均为近似值，该近似值根据个别实施例所需特点可以发生改变。在一些实施例中，

数值数据应考虑规定的有效数位并采用一般位数保留的方法。尽管本申请一些实施例中用于确认其范围广度的数值域和数据为近似值，在具体实施例中，此类数值的设定在可行范围内尽可能精确。

{0236} 最后，应当理解的是，本申请中所述实施例仅用以说明本申请实施例的原则。其他的变形也可能属于本申请的范围。因此，作为示例而非限制，本申请实施例的替代配置可视为与本申请的教导一致。相应地，本申请的实施例不仅限于本申请明确介绍和描述的实施例。

权利要求

1. 一种眼镜，其特征在于，所述眼镜包括：

眼镜架，所述眼镜架包括眼镜框以及两条眼镜腿，所述两条眼镜腿分别与所述眼镜框转动连接；

两个扬声组件，所述两个扬声组件包括耳机芯，所述两个扬声组件分别通过所述两条眼镜腿上的铰链组件连接到两条眼镜腿上，且所述铰链组件能够转动以改变每个扬声组件相对于其所连接的眼镜腿的位置；

所述眼镜腿中容纳控制电路或电池，所述控制电路或电池驱动所述耳机芯振动以产生声音，所述声音至少包括两个谐振峰。

2. 根据权利要求 1 所述的眼镜，其特征在于，铰链组件包括铰链、杆状件和固定件；所述铰链包括：

铰链座；

铰链臂，所述铰链臂与所述铰链座通过转轴转动连接，所述铰链臂受到外力作用时能够相对所述铰链座转动，以改变所述扬声组件相对于眼镜腿的位置；

支撑件，所述支撑件活动设置于所述铰链座上；

弹性件，所述弹性件用于将所述支撑件朝向所述铰链臂进行弹性偏置，以使得所述支撑件能够弹性抵接于所述铰链臂上。

3. 根据权利要求 2 所述的眼镜，其特征在于，

所述铰链臂上包括彼此连接的第一支撑面和第二支撑面；

所述支撑件上包括第三支撑面；

所述弹性件将所述支撑件朝向所述铰链臂进行弹性偏置时，使得所述第三支撑面能够分别弹性抵接于所述第一支撑面和第二支撑面上；

在所述铰链臂受到外力作用而相对所述铰链座进行转动时，由所述第一支撑面和所述第二支撑面的连接处推动所述支撑件克服所述弹性件的弹性偏置而反向移动，进而使得所述第三支撑面从与所述第一支撑面和所述第二支撑面中的一者弹性抵接切换到与所述第一支撑面和所述第二支撑面中的另一者弹性抵接。

4. 根据权利要求 3 所述的眼镜，其特征在于，在垂直于所述转轴的中轴线的截面上，所述转轴到所述连接处的最大距离与所述转轴到所述第一支撑面的最短距离之间的比例介于 1.1 和 1.5 之间。

5. 根据权利要求 3 所述的眼镜，其特征在于，当所述第三支撑面从与所述第一支撑面弹性抵接切换到与所述第二支撑面弹性抵接时，所述铰链座与所述铰链臂之间的夹角变小。

6. 根据权利要求 3 所述的眼镜，其特征在于，所述第三支撑面从与所述第一支撑面弹性抵接切换到与所述第二支撑面弹性抵接时所需的外力不同于所述第三支撑面从与所述第二支撑面弹性抵接切换到与所述第一支撑面弹性抵接时所需的外力。

7. 根据权利要求 3 所述的眼镜，其特征在于，在垂直于所述转轴的中轴线的截面上，所述连接处呈弧形设置。

8. 根据权利要求 7 所述的眼镜，其特征在于，所述连接处呈圆弧设置，且所述圆弧的曲率介于 5 与 30 之间。

9. 根据权利要求 3 所述的眼镜，其特征在于，在垂直于所述转轴的中轴线的截面上，所述第一支撑面和所述第二支撑面之间的夹角为钝角。

10. 根据权利要求 3 所述的眼镜，其特征在于，

所述铰链座包括座本体以及从所述座本体凸出且彼此间隔设置的第一凸耳和第二凸耳；

所述铰链臂包括臂本体以及从所述臂本体凸出设置的第三凸耳，所述第三凸耳插入至所述第一凸耳和第二凸耳之间的间隔区域，并通过所述转轴与所述第一凸耳和第二凸耳转动连接。

11. 根据权利要求 10 所述的眼镜，其特征在于，

所述支撑件至少部分设置于所述间隔区域内且位于所述第三凸耳朝向所述座本体的一侧；

所述座本体上设置有与所述间隔区域连通的容置腔，所述弹性件设置于所述容置腔内，并将所述支撑件朝向所述第三凸耳进行弹性偏置。

12. 根据权利要求 1 所述的眼镜，其特征在于，所述眼镜还包括用于容纳耳机芯的耳机壳体；

所述耳机芯至少包括振动板和第二传振片组成的复合振动装置，所述复合振动装置产生所述两个谐振峰。

13. 根据权利要求 12 所述的眼镜，其特征在于，所述耳机芯还包括至少一个音圈和至少一个磁路系统；所述音圈与所述振动板物理连接，所述磁路系统与所述第二传振片物理连接。

14. 根据权利要求 12 所述的眼镜，其特征在于，所述振动板的劲度系数大于所述第二传振片的劲度系数。

15. 根据权利要求 12 所述的眼镜，其特征在于，所述耳机芯还包括第一传振片；

所述第一传振片与所述复合振动装置通过物理方式连接；

所述第一传振片与所述耳机壳体间通过物理方式连接；

所述第一传振片能产生另一个谐振峰。

16. 根据权利要求 15 所述的眼镜，其特征在于，所述至少两个谐振峰都在人耳可听到的声音频率范围之内。

17. 根据权利要求 12 所述的眼镜，其特征在于，所述耳机壳体的至少一部分设置有至少一个引声孔，所述至少一个引声孔将耳机壳体内的声波导出，与由耳机壳体振动产生的漏音声波叠加以减小漏音。

18. 根据权利要求 1 所述的眼镜，其特征在于，所述扬声组件还包括语音控制系统，所述语音控制系统用于接收和执行语音控制指令。

19. 根据权利要求 12 所述的眼镜，其特征在于，还包括按键模块；

所述按键模块位于所述耳机壳体或眼镜腿上，用于对所述扬声组件进行控制操作。

20. 根据权利要求 12 所述的眼镜，其特征在于，还包括指示灯；

所述指示灯位于所述耳机壳体或眼镜腿上，用于显示所述扬声组件的状态。

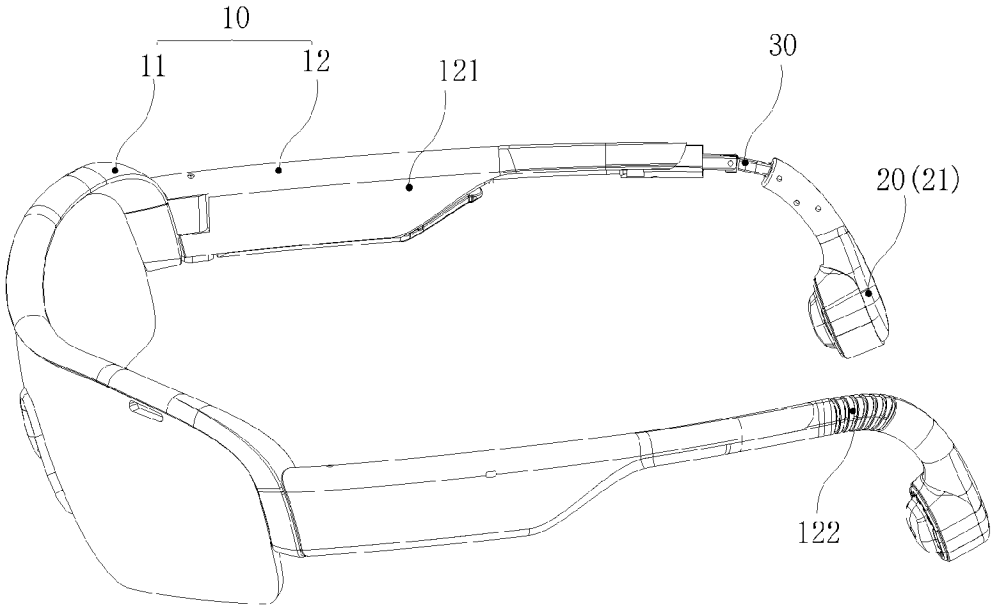


图 1

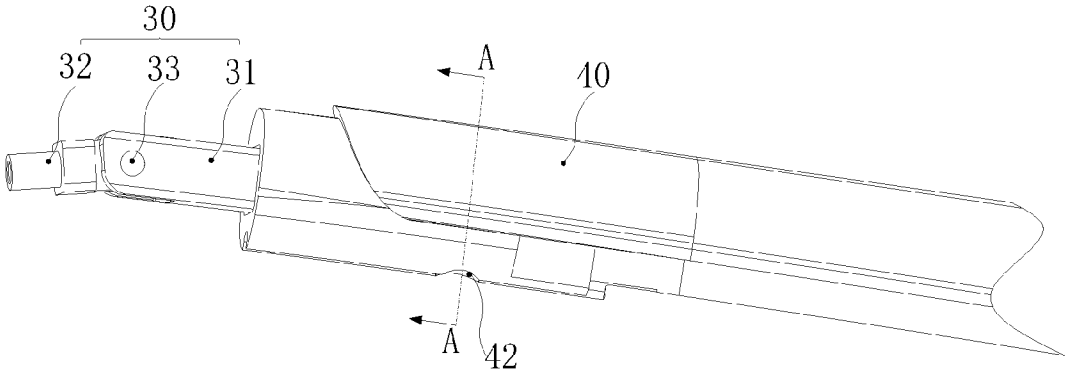


图2

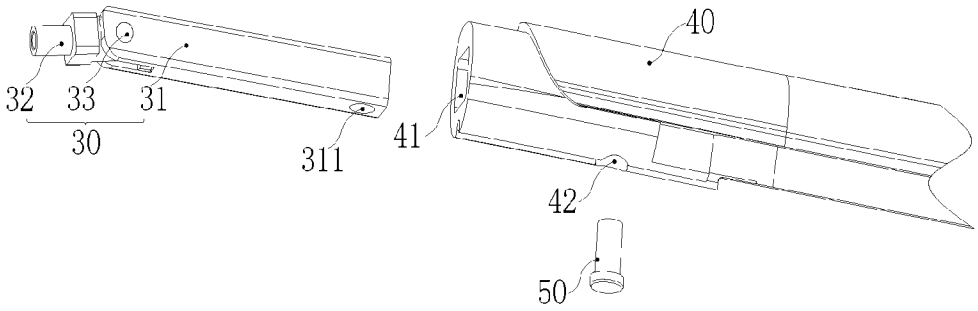


图3

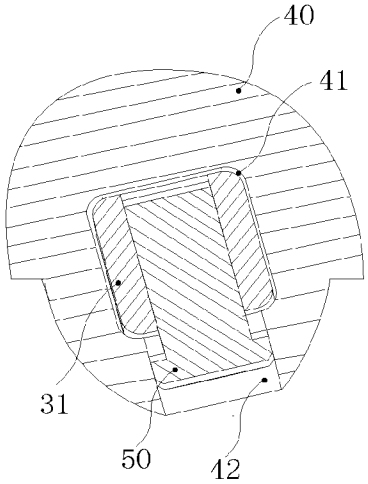


图4

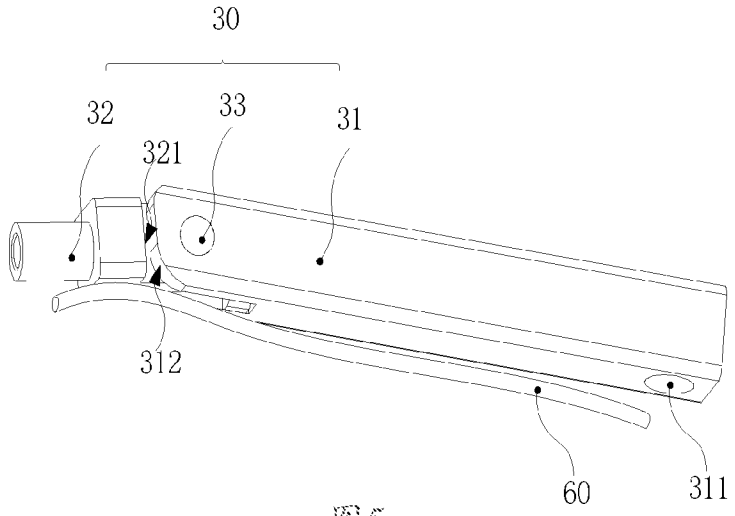


图5

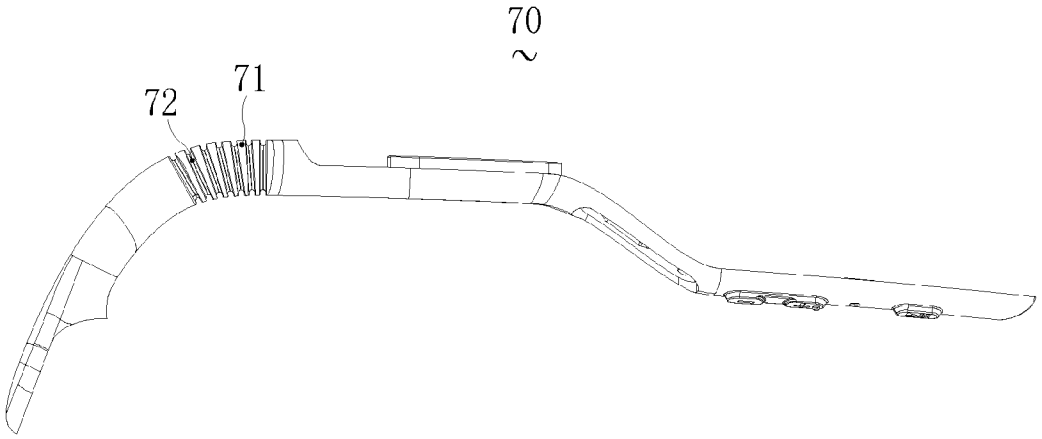


图6

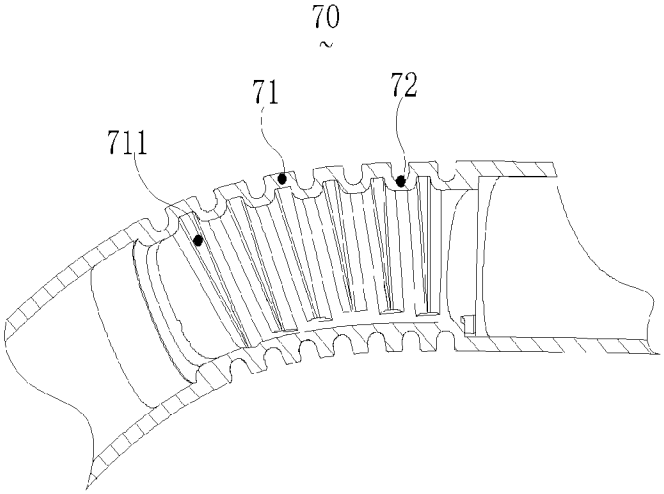


图7

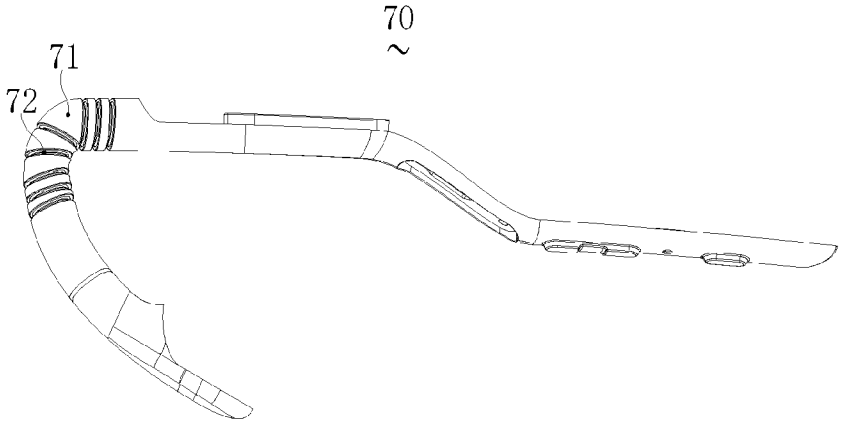


图8

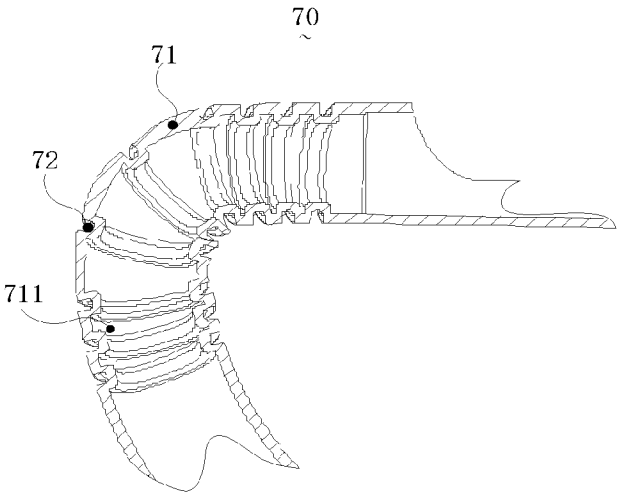


图9

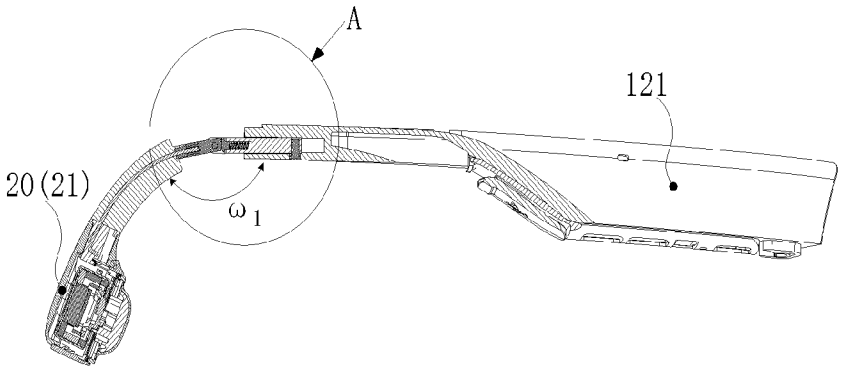


图10

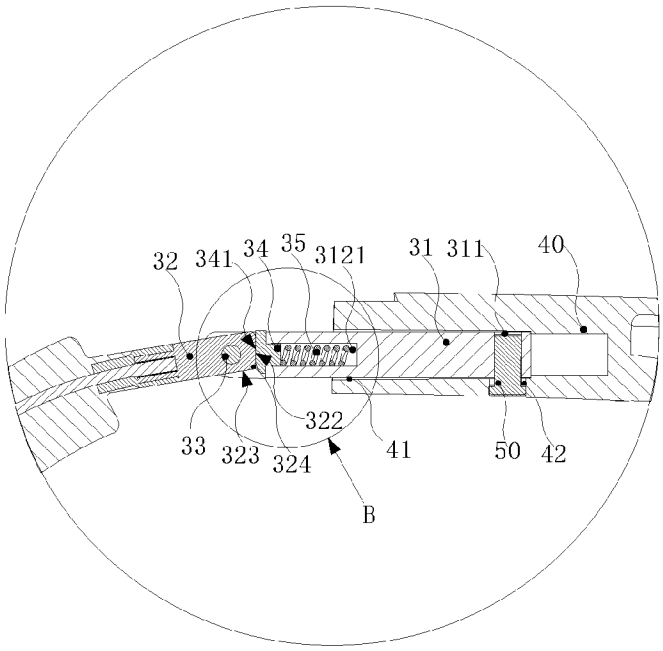

32
341
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3121
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311
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322
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323
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41
50
42
B

图11

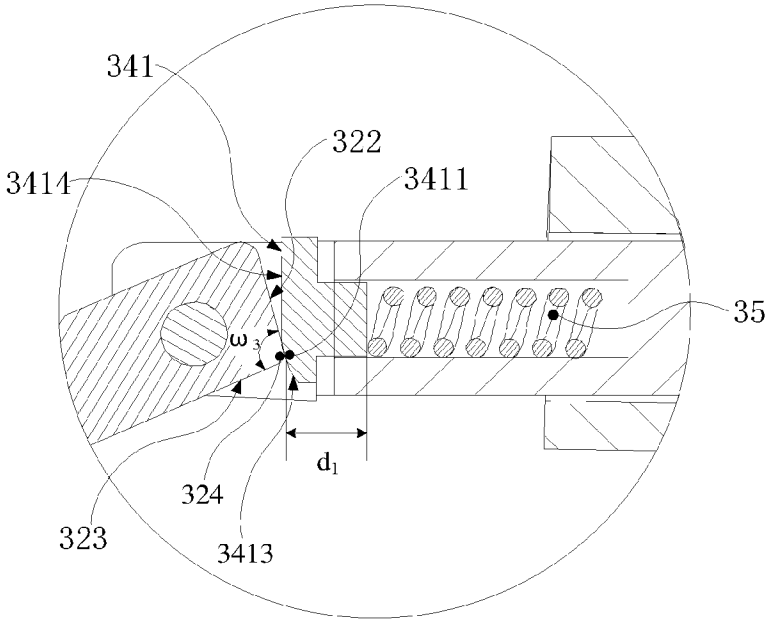

341
322
3414
3411
35
ω3
d1
324
323
3413

图12

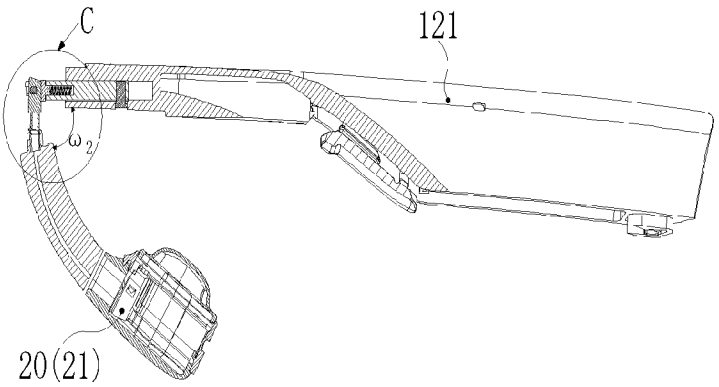


图13

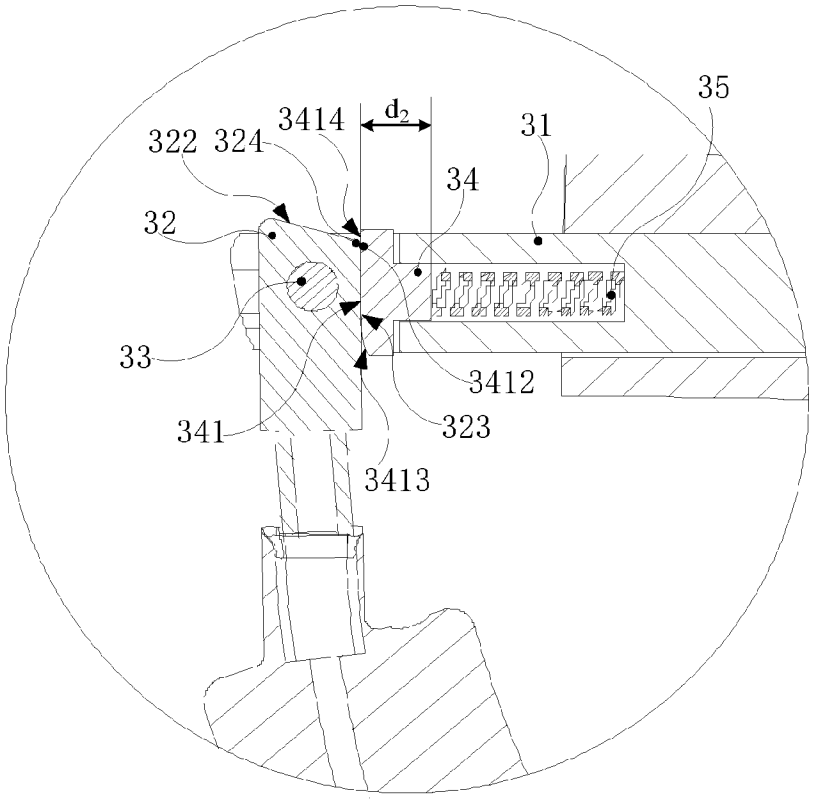


图14

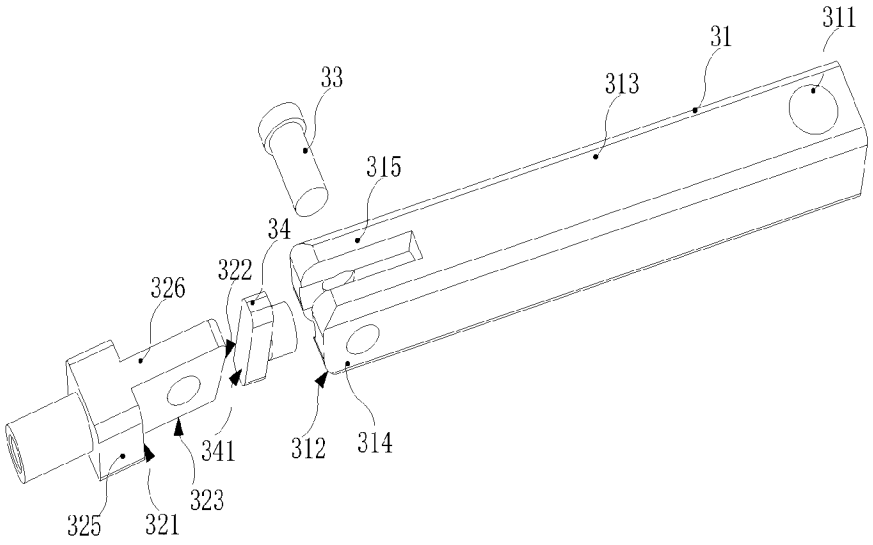


图15

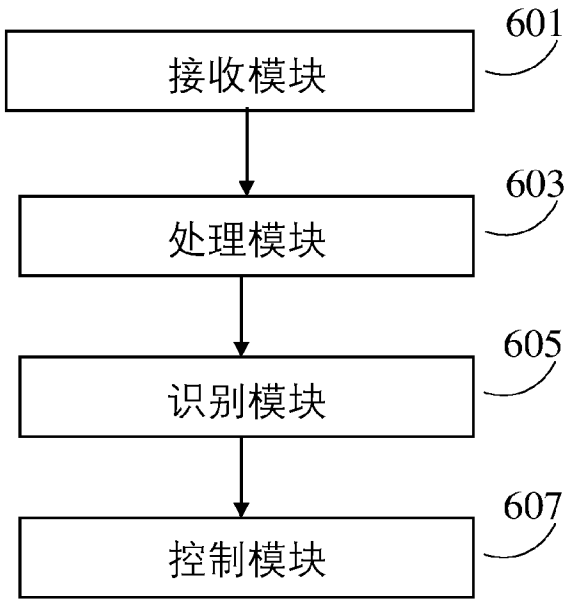

601
接收模块
603
处理模块
605
识别模块
607
控制模块

图16

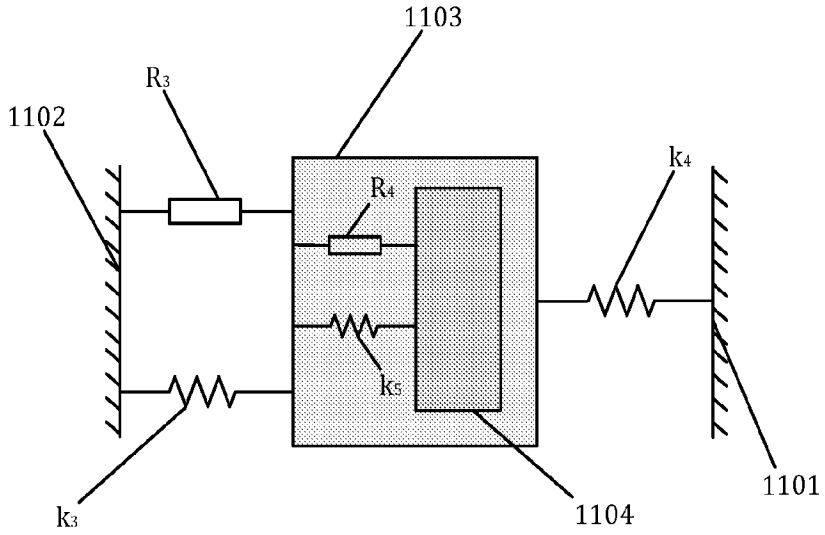

1103
R3
1102
k4
R4
k5
k3
1104
1101

图17

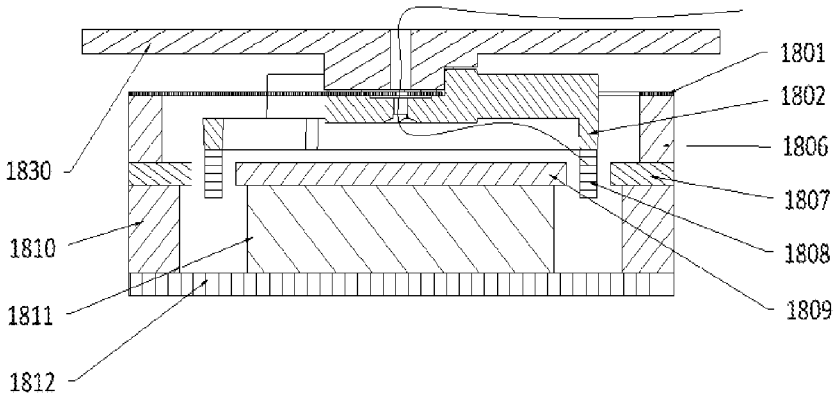


图18

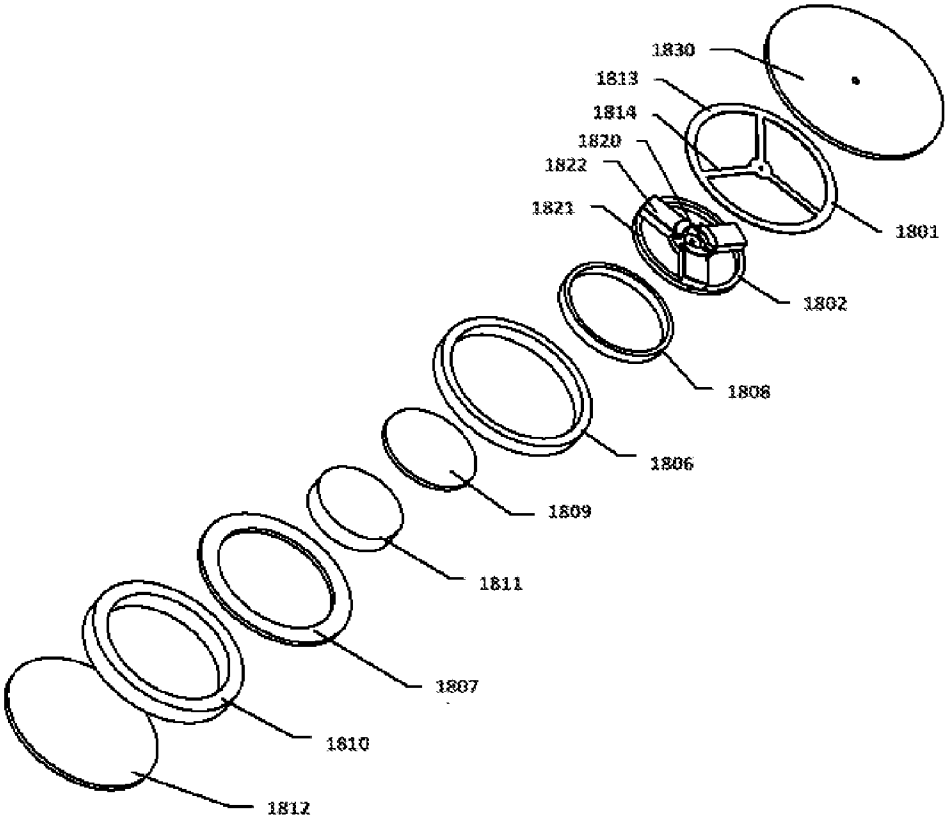

1830
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图19

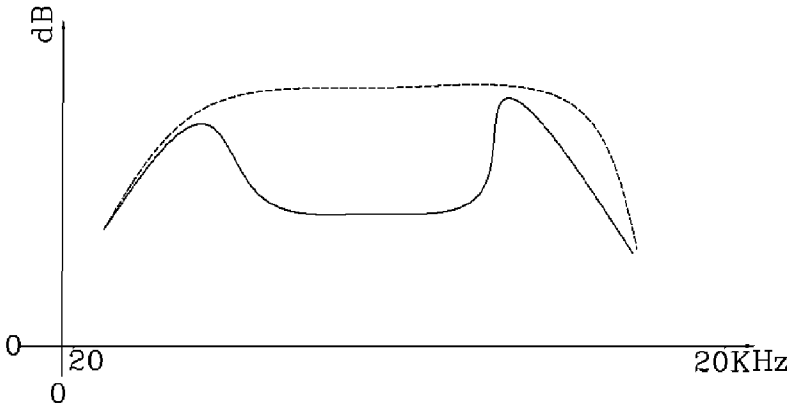

dB
0
20
0
20KHz

图20

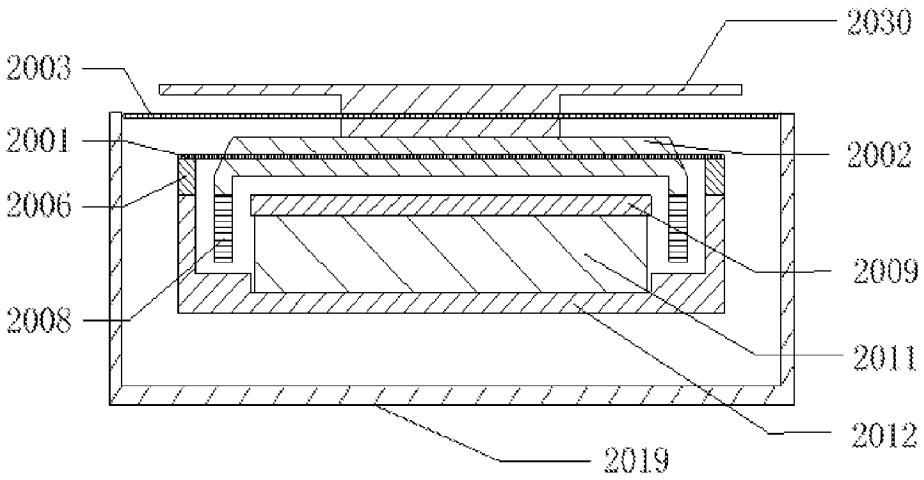

2030
2003
2001
2002
2006
2009
2008
2011
2012
2019

图21

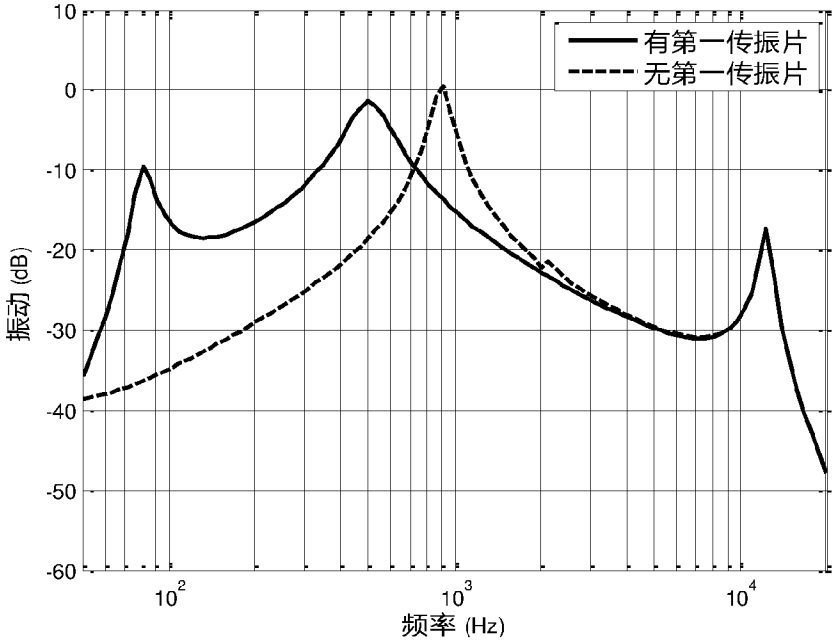


图 22

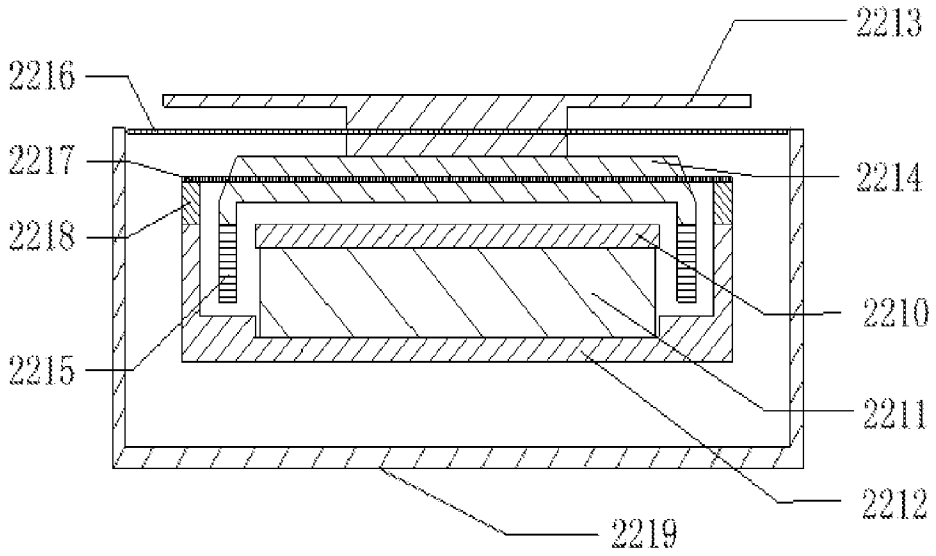


图23

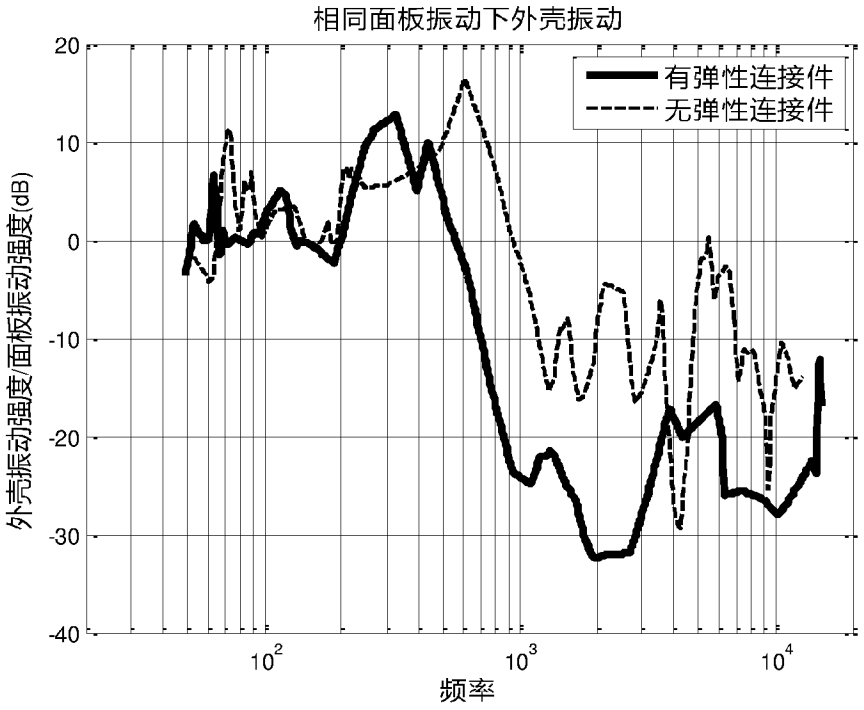

相同面板振动下外壳振动
有弹性连接件
无弹性连接件
外壳振动强度/面板振动强度(dB)
20
10
0
-10
-20
-30
-40
10^2
10^3
10^4
频率

图24

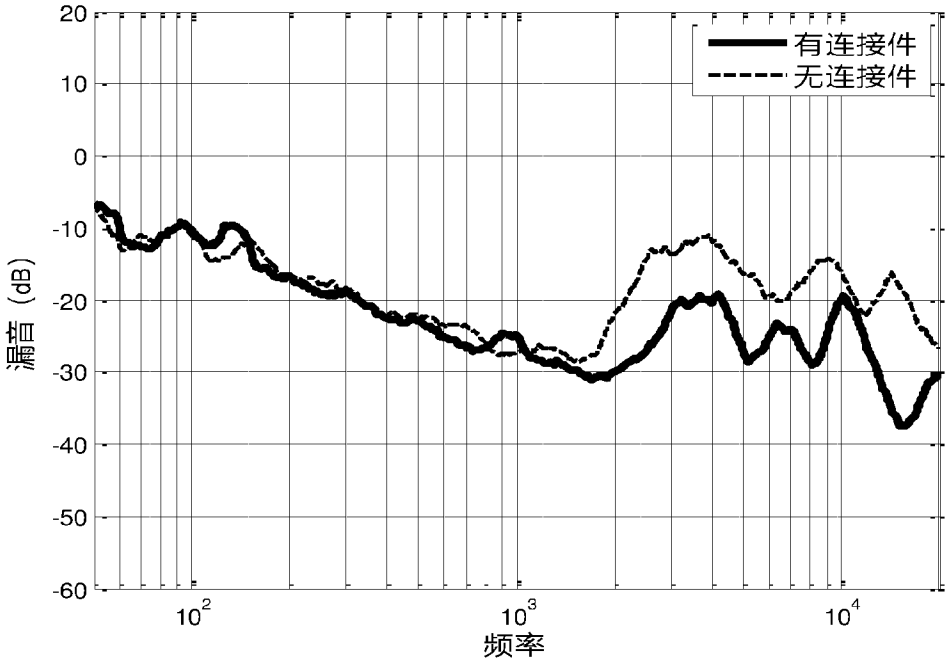

有连接件
无连接件
漏音（dB）
20
10
0
-10
-20
-30
-40
-50
-60
10^2
10^3
10^4
频率

图25

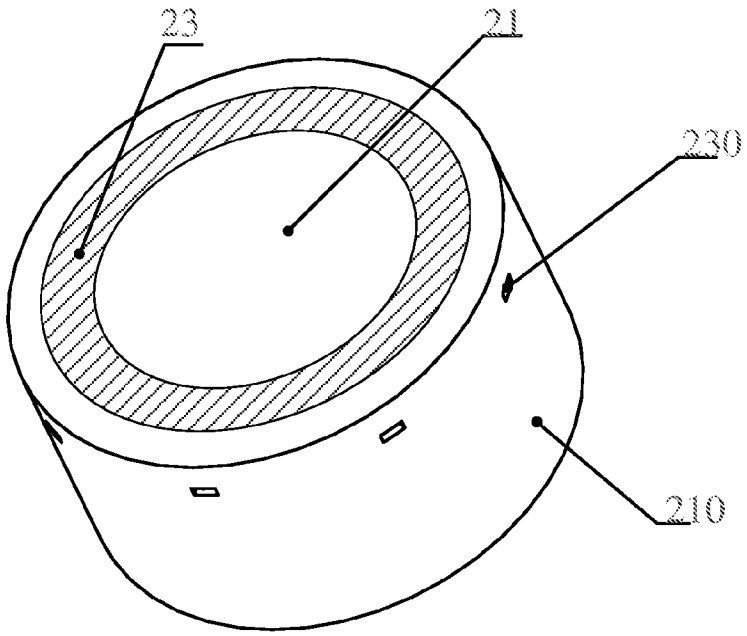


图26A

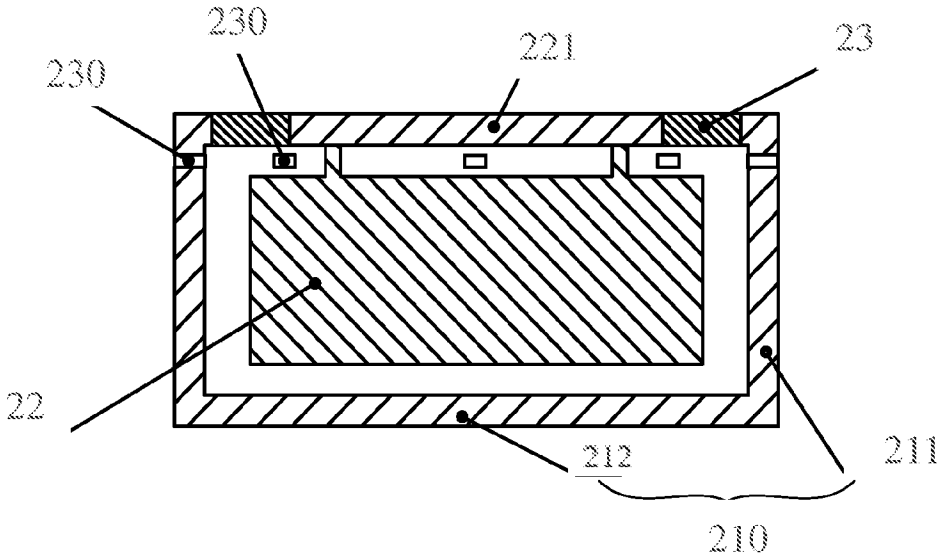


图26B

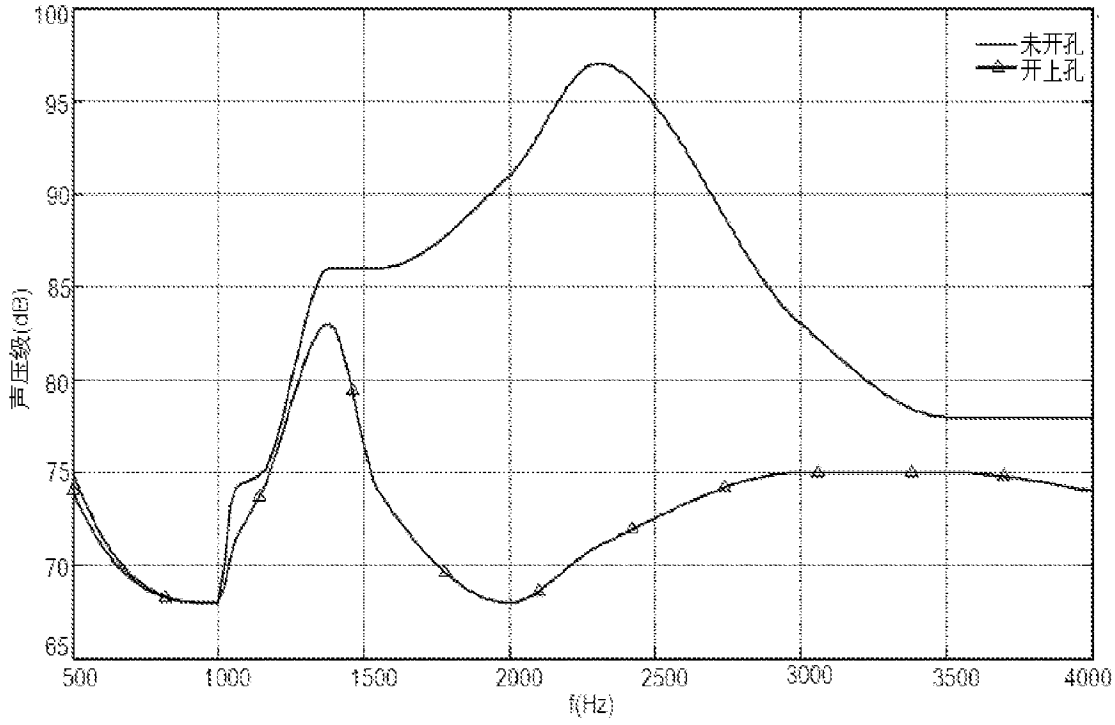

未开孔
开上孔
声压级(dB)
f(Hz)
100
95
90
85
80
75
70
65
500
1000
1500
2000
2500
3000
3500
4000

图27

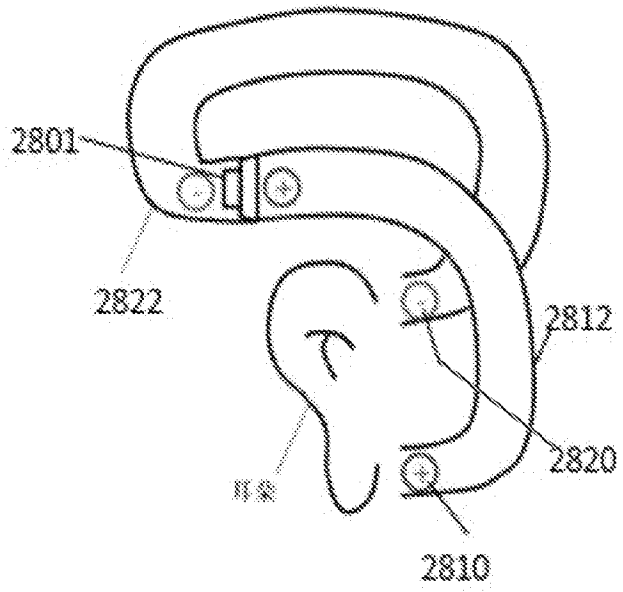


图28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/102389

A. CLASSIFICATION OF SUBJECT MATTER

G02C 11/00(2006.01)i; G02C 5/22(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, VEN, CNKI, CNTXT, 眼镜, 耳机, 扬声, 铰接, 铰链, 转轴, 枢轴, 弹性, 弹簧, 传振, 谐振峰, glasses, spectacles, sound +, +speaker+, earphone, bluetooth, hinge+, spring+, elastic+, rotat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 103792683 A (WEI, Qiang) 14 May 2014 (2014-05-14) description, paragraphs [0005]-[0032], and figures 1-8	1-20
Y	CN 106954153 A (SHENZHEN VOXTECH CO., LTD.) 14 July 2017 (2017-07-14) description, paragraphs [0047]-[0188], and figures 1-30	1-20
Y	CN 207718105 U (SHENZHEN VOXTECH CO., LTD.) 10 August 2018 (2018-08-10) description, paragraphs [0033]-[0096], and figures 1-21	1-20
Y	CN 206920741 U (ZHANG, Hao) 23 January 2018 (2018-01-23) description, paragraphs [0004]-[0028], and figures 1-8	1-20
PX	CN 108873372 A (SHENZHEN VOXTECH CO., LTD.) 23 November 2018 (2018-11-23) claims 1-10, description, paragraphs [0005]-[0173], and figures 1-26	1-20
A	CN 205301727 U (GAO, Zhengsheng) 08 June 2016 (2016-06-08) entire document	1-20
A	CN 203786416 U (YUHUAN FUHUA GLASSES CO., LTD.) 20 August 2014 (2014-08-20) entire document	1-20

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 November 2019	**28 November 2019**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/102389

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7289767 B2 (LAI CHIA SONG) 30 October 2007 (2007-10-30) entire document	1-20
A	US 2014253867 A1 (JIANG, Tao et al.) 11 September 2014 (2014-09-11) entire document	1-20
A	JP 2006157318 A (NEC TOKIN CORP.) 15 June 2006 (2006-06-15) entire document	1-20

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/102389

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	103792683	A	14 May 2014	EP	3062144	A4	12 April 2017
				CN	103792683	B	08 April 2015
				US	9939661	B2	10 April 2018
				EP	3062144	A1	31 August 2016
				WO	2015109810	A1	30 July 2015
				US	2016246076	A1	25 August 2016
CN	106954153	A	14 July 2017	CN	106954155	A	14 July 2017
				CN	106954151	B	06 September 2019
				CN	105007551	B	19 April 2017
				CN	105007551	A	28 October 2015
				CN	106954151	A	14 July 2017
				CN	106937222	A	07 July 2017
				CN	106954154	A	14 July 2017
				CN	106954152	B	19 July 2019
				CN	106954152	A	14 July 2017
				CN	106937221	B	19 July 2019
				CN	106954150	A	14 July 2017
				CN	106937221	A	07 July 2017
				CN	106954155	B	16 August 2019
CN	207718105	U	10 August 2018	CN	110018579	A	16 July 2019
CN	206920741	U	23 January 2018		None		
CN	108873372	A	23 November 2018		None		
CN	205301727	U	08 June 2016		None		
CN	203786416	U	20 August 2014		None		
US	7289767	B2	30 October 2007	US	2005159182	A1	21 July 2005
US	2014253867	A1	11 September 2014		None		
JP	2006157318	A	15 June 2006		None		

国际检索报告

国际申请号 PCT/CN2019/102389

A. 主题的分类

G02C 11/00(2006.01)i；G02C 5/22(2006.01)i

按照国际专利分类(IPC)或者同时按照国家分类和IPC两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

G02C

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用））

CNABS,VEN,CNKI,CNTXT，眼镜，耳机，扬声，铰接，铰链，转轴，枢轴，弹性，弹簧，传振，谐振峰，glasses, spectacles, sound+, +speaker+, earphone, bluetooth, hinge+, spring+, elastic+, rotat+

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
Y	CN 103792683 A (魏强) 2014年 5月 14日 (2014-05-14) 说明书第[0005]-[0032]段，图1-8	1-20
Y	CN 106954153 A (深圳市韶音科技有限公司) 2017年 7月 14日 (2017-07-14) 说明书第[0047]-[0188]段，图1-30	1-20
Y	CN 207718105 U (深圳市韶音科技有限公司) 2018年 8月 10日 (2018-08-10) 说明书第[0033]-[0096]段，图1-21	1-20
Y	CN 206920741 U (张浩) 2018年 1月 23日 (2018-01-23) 说明书第[0004]-[0028]段，图1-8	1-20
PX	CN 108873372 A (深圳市韶音科技有限公司) 2018年 11月 23日 (2018-11-23) 权利要求1-10，说明书第[0005]-[0173]段，图1-26	1-20
A	CN 205301727 U (高正生) 2016年 6月 8日 (2016-06-08) 全文	1-20
A	CN 203786416 U (玉环富华眼镜有限公司) 2014年 8月 20日 (2014-08-20) 全文	1-20
A	US 7289767 B2 (LAI CHIA SONG) 2007年 10月 30日 (2007-10-30) 全文	1-20

☑ 其余文件在C栏的续页中列出。 ☑ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
2019年 11月 20日	2019年 11月 28日

ISA/CN的名称和邮寄地址	受权官员
中国国家知识产权局(ISA/CN) 中国北京市海淀区蓟门桥西土城路6号 100088	王小丽
传真号 (86-10)62019451	电话号码 (86-10) 62085881

表 PCT/ISA/210 (第2页) (2015年1月)

国际检索报告

国际申请号
PCT/CN2019/102389

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
A	US 2014253867 A1 (JIANG TAO等) 2014年 9月 11日 (2014 - 09 - 11) 全文	1-20
A	JP 2006157318 A (NEC TOKIN CORP) 2006年 6月 15日 (2006 - 06 - 15) 全文	1-20

表 PCT/ISA/210 (第2页) (2015年1月)

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2019/102389

检索报告引用的专利文件			公布日（年/月/日）	同族专利			公布日（年/月/日）
CN	103792683	A	2014年 5月 14日	EP	3062144	A4	2017年 4月 12日
				CN	103792683	B	2015年 4月 8日
				US	9939661	B2	2018年 4月 10日
				EP	3062144	A1	2016年 8月 31日
				WO	2015109810	A1	2015年 7月 30日
				US	2016246076	A1	2016年 8月 25日
CN	106954153	A	2017年 7月 14日	CN	106954155	A	2017年 7月 14日
				CN	106954151	B	2019年 9月 6日
				CN	105007551	B	2017年 4月 19日
				CN	105007551	A	2015年 10月 28日
				CN	106954151	A	2017年 7月 14日
				CN	106937222	A	2017年 7月 7日
				CN	106954154	A	2017年 7月 14日
				CN	106954152	B	2019年 7月 19日
				CN	106954152	A	2017年 7月 14日
				CN	106937221	B	2019年 7月 19日
				CN	106954150	A	2017年 7月 14日
				CN	106937221	A	2017年 7月 7日
				CN	106954155	B	2019年 8月 16日
CN	207718105	U	2018年 8月 10日	CN	110018579	A	2019年 7月 16日
CN	206920741	U	2018年 1月 23日		无		
CN	108873372	A	2018年 11月 23日		无		
CN	205301727	U	2016年 6月 8日		无		
CN	203786416	U	2014年 8月 20日		无		
US	7289767	B2	2007年 10月 30日	US	2005159182	A1	2005年 7月 21日
US	2014253867	A1	2014年 9月 11日		无		
JP	2006157318	A	2006年 6月 15日		无		

表 PCT/ISA/210（同族专利附件）（2015年1月）

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	16683352	(eyeglasses glasses spectacles) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:23 AM
L2	4545234	(loudspeaker speaker transducer near12 ear)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L3	650755	L1 AND L2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:24 AM
L4	81089	L1 AND L2 NEAR100 (chamber volume cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/02/09 05:26 AM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L5	3330	(eyeglasses glasses spectacles) NEAR50 L2 NEAR100 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L6	2073	(eyeglasses glasses spectacles) NEAR20 L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:27 AM
L7	5707	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber volume cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:28 AM

		@repd)<"20200205"	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	3316	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L2 NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:28 AM
L9	130522	(loudspeaker speaker transducer) NEAR10 ear	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L10	166879	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:29 AM
L11	57455	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/02/09 05:30 AM

		AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	94	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND ((loudspeaker speaker transducer) NEAR10 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:30 AM
L13	11	wakeland AND struzik AND williams AND silver	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:41 AM
L14	23483	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2022/02/09 05:57 AM

		@pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	11886	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L16	13857	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 05:57 AM
L17	338	((eyeglasses glasses spectacles).ab. (eyeglasses glasses spectacles).ti. (eyeglasses glasses spectacles).bsum.) AND (loudspeaker speaker transducer near12 ear) NEAR30	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/09 05:58 AM

		(chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity) near20 (surface enclosure outer exterior inner interior outside inside)	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	16	((US-20210168481-A1 OR US-20210067858-A1 OR US-20190238971-A1 OR US-20120237075-A1 OR US-20030048915-A1 OR US-20050084127-A1).did. AND PGPB.dbnm.) OR ((CN-111771387-A OR WO-2017144269-A1 OR DE-202010001503-U1 OR WO-2020206775-A1 OR WO-2020038479-A1 OR WO-2020038486-A1 OR CN-110636414-A OR KR-101819530-B1 OR KR-101786613-B1).did. AND FTDB.dbnm.) OR ((DE-102016103477-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:14 AM
L19	11	L18 AND (rubber foam vinyl loss adjfactor Young$2 modulus elastomer polyurethane melamine foam butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L20	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine foam butyl	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/02/09 06:16 AM

		rubber halobutyl)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	8	L18 AND (rubber foam vinyl loss ADJ factor Young$2 modulus elastomer polyurethane melamine butyl rubber halobutyl)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 06:16 AM
L22	101952	(G02C11/00 G02C11/06 G02C11/10 H04N13/332 G02B2027/0178 H04R1/028 H04R1/105 H04R5/0335).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/09 11:58 PM
L23	47256	L22 AND (eyeglasses glasses spectacles)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/02/10 06:50 PM

			JPO; DERWENT; IBM_TDB)				
L24	1	(10/190604).APP.	(USPAT; USOCR)	OR	ON	ON	2022/02/12 05:52 PM
L25	17505036	(eyeglasses glasses spectacles) NEAR/10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L26	65	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:55 PM
L27	54	(eyeglasses glasses spectacles) NEAR10 (loudspeaker speaker transducer near12 ear) NEAR30 temple near3 (insert$4 detachable detach$4 removable remove$4 remov$4 interchang$5) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 05:58 PM
L28	3	((WO-2020038479-A1 OR WO-2020206775-A1).did. AND FTDB.dbnm.) OR ((US-	(FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP,	OR	ON	ON	2022/02/12 09:30 PM

		20120237075-A1).did. AND PGPB.dbnm.)	ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); US-PGPUB)				
L29	22804	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND H04R.cpcl. AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L30	55355	L22 AND (eyeglasses glasses spectacles) AND L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L31	97767	L22 AND (eyeglasses glasses spectacles) NEAR15L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM

L32	51928	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad @pt1d @pt3d @ptpd @read @repd)<"20200205" AND (absorb$5 reflect$4 reflectivity)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:39 PM
L33	177267	L22 AND (eyeglasses glasses spectacles) NEAR15 L9 (loudspeaker speaker transducer near12 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L34	79	L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/12 09:40 PM
L35	55	(L22 AND (eyeglasses glasses spectacles) NEAR15 (loudspeaker speaker transducer near8 ear) NEAR30 (chamber cavity enclosure resonan$4) AND (@pd @ad @rlad @prad @rlpd @ptad	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/02/12 09:42 PM

		@pt1d @pt3d @ptpd @read @repd)<"20200205")	NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Electronic Patent Application Fee Transmittal

Application Number:	16781897
Filing Date:	04-Feb-2020
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	740	740
Miscellaneous:				
			Total in USD ($)	**740**

Electronic Acknowledgement Receipt

EFS ID:	44233111
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	08-NOV-2021
Filing Date:	04-FEB-2020
Time Stamp:	22:25:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$740
RAM confirmation Number	E2021A8M26282394
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	20211108EXTTIMEaia0022i.pdf	774947 80a709ae8c861cc8e838666f0e785b75914fd9f1	no	2
Warnings:					
Information:					
2	Response to Election / Restriction Filed	S120219P003RESPONSETORESTRICTIONV01i.pdf	4509763 9379a4f5442b5c27e8161071cbdc7cc1eb08c734	no	24
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	38716 54966fa1b18bb6f5be8cff54fa0965e8fb8b690b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	5323426		

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.

PTO/AIA/22 (03-13)
Approved for use through 11/30/2020. 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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): S120219.P003

Application Number	Filed
16/781,897	02/04/2020

For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Art Unit	Examiner
2651	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):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 740.00
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 50,787.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/MARK S. PELOQUIN/ — Signature

NOVEMBER 08, 2021 — Date

MARK S PELOQUIN — Typed or printed name

(206) 447-1336 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 forms are submitted.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	16/781,897
Attorney Docket No.	:	S120219.P003
Applicant	:	SOLOS TECHNOLOGY LIMITED
Filed	:	February 04, 2020
TC/A.U.	:	2651
Examiner	:	BLAIR, KILE O
Confirmation No.	:	3349

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

RESPONSE TO OFFICE ACTION – RESTRICTION ELECTION & TRAVERSE

Sir:

In response to the Restriction mailed on 06/07/2021, Applicant makes the following elections and asks the Office to consider the following remarks:

The listing of claims begins on page 2 of this paper.

Remarks/Arguments begin on page 12 of this paper.

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended). A method to provide audio signals to a user from an eyewear device, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the eyewear device;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

Claim 2 (original). The method of claims 1, wherein a shape of the chamber contributes to the concentrating.

Claim 3 (original). The method of claim 2, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

Claim 4 (original). The method of claim 2, wherein the shape is generally parabolic.

Claim 5 (original). The method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 6 (original). The method of claim 5, the portion absorbs vibrational energy.

Claim 7 (original). The method of claim 6, wherein the portion is forward of the chamber.

Claim 8 (original). The method of claim 6, wherein the portion is rear of the chamber.

Claim 9 (original). The method of claim 6, wherein the portion is an outer surface of the chamber.

Claim 10 (original). The method of claim 1, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the eyewear device.

Claim 11 (original). The method of claim 1, wherein a speaker is used in the generating.

Claim 12 (original). The method of claim 11, wherein the speaker is located within a temple of the eyewear device.

Claim 13 (original). The method of claim 11, wherein the speaker is located within a temple insert module of the eyewear device.

Claim 14 (original). An apparatus to provide audio signals to a user from an eyewear device, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is a part of a volume of the eyewear device, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume;

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

Claim 15 (original). The apparatus of claim 14, wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

Claim 15~~5~~6 (currently amended). The apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy.

Claim 17 (original). The apparatus of claim 14, wherein the inner surface forms a curved shape around the at least one speaker.

Claim 18 (original). The apparatus of claim 17, wherein the curved shape is generally parabolic.

Claim 19 (original). The apparatus of claim 14, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

Claim 20 (original). The apparatus of claim 19, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of acoustic energy.

~~[Shape of external sound cover]~~

Claim 21 (original). The apparatus of claim 19, wherein a shape of the external sound cover is concave towards the user's ear.

Claim 22 (original). The apparatus of claim 14, wherein the chamber is located within a temple of the eyewear device.

Claim 23 (original). The apparatus of claim 14, wherein the chamber is located within a temple insert module of the eyewear device.

Claim 24 (original). The apparatus of claim 14, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 25 (original). The apparatus of claim 24, the portion absorbs vibrational energy.

Claim 26 (original). The apparatus of claim 25, wherein the portion is forward of the chamber.

Claim 27 (original). The apparatus of claim 25, wherein the portion is rear of the chamber.

Claim 28 (original). The apparatus of claim 25, wherein the portion is an outer surface of the chamber.

Claim 29 (original). An apparatus to provide audio signals to a user from a temple interlock, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is contained within a volume of the temple interlock, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume; and

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the temple interlock is attached to the eyewear device and the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

~~**[Variable material properties in the eyewear device]**~~

Claim 30 (currently amended). The apparatus of claim ~~C1~~29, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 31 (original). The apparatus of claim 30, the portion absorbs vibrational energy.

Claim 32 (original). The apparatus of claim 31, wherein the portion is forward of the chamber.

Claim 33 (original). The apparatus of claim 31, wherein the portion is rear of the chamber.

Claim 34 (original). The apparatus of claim 31, wherein the portion is an outer surface of the chamber.

Claim 35 (original). The apparatus of claim 29, wherein the inner surface forms a curved shape around the at least one speaker.

Claim 36 (original). The apparatus of claim 35, wherein the curved shape is generally parabolic.

Claim 37 (original). The apparatus of claim 29, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

Claim 38 (original). The apparatus of claim 37, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a

second material used for the outer surface provides substantially for absorption of vibrational energy.

Claim 39 (original). The apparatus of claim 37, wherein a shape of the external sound cover is concave towards the user's ear.

Claim 40 (currently amended). A method to provide audio signals to a user from a temple interlock, comprising:

generating audio signals within a chamber, the chamber is a part of a volume of the temple interlock;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

Claim 41 (original). The method of claims 40, wherein a shape of the chamber contributes to the concentrating.

Claim 42 (original). The method of claim 41, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

Claim 43 (original). The method of claim 41, wherein the shape is generally parabolic.

Claim 44 (original). The method of claim 40, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the temple interlock has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

Claim 45 (original). The method of claim 44, the portion absorbs vibrational energy.

Claim 46 (original). The method of claim 45, wherein the portion is an outer surface of the chamber.

Claim 47 (original). The method of claim 40, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the temple interlock.

Claim 48 (original). An apparatus to increase a signal-to-noise ratio of audio signals directed towards a user's ear, comprising:

an external sound cover, the external sound cover further comprising:

an inner surface; and

an outer surface, the external sound cover is configured for attachment to a temple of an eyewear device, wherein in operation, audio signals emitted from an acoustic port of an eyewear device reflect off of the inner surface and are directed thereby toward the user's ear.

Claim 49 (original). The apparatus of claim 48, wherein a material property of the outer surface is selected to provide absorption of acoustic energy incident thereon, thereby increasing a signal-to-noise ratio of the audio signals.

Claim 50 (original). The apparatus of claim 48, wherein a material property of the outer surface is selected to reflect acoustic energy incident thereon away from the user, thereby increasing a signal-to-noise ratio of the audio signals.

Claim 51 (original). The apparatus of claim 48, wherein in operation the external sound cover prevents windborne turbulence from impinging on the user's ear, thereby increasing a signal-to-noise ratio of the audio signals.

REMARKS

Amendments to Claims

Claims 1, 15, 30, and 40 have been amended to cure informalities therein. A line above claim 21 and a line above 30 have been removed by amendment.

Amendments to Specification

Applicant makes the following amendment to the specification at paragraph [00113] changing reference numeral "220" to "2200." No new matter has been entered. Applicant requests entry of the amendment to paragraph [00113].

[00113] **Figure 22** illustrates, generally at 2200, variable density structures, according to embodiments of the invention. **Figure 23** illustrates, generally at 2300, in cross-section, a multilayered acoustic chamber wall, according to embodiments of the invention. **Figure 24** illustrates, generally at 2400, a distribution of variable density structures in a temple of an eyewear device, according to embodiments of the invention. Referring collectively to **Figure 22** through **Figure 24**, in various embodiments, each PPMS system used in conjunction with an eyewear device can have a range of materials with varying material properties in order to provide for both good reflection and emission of acoustic signals in a direction of a user's ear canal, as well as attenuation of acoustic energy or attenuation of vibrational energy in a different direction. For example, a temple portion or a TIM, of an eyewear device, can be constructed with a region of vibration damping material between the speaker arrangement and a front frame portion of an eyewear device. For example, in **Figure 22** vibration damping material is indicated by 2208 extending from an acoustic chamber 2204 forward to a front frame section 2202. Similarly, in **Figure 24**, a temple portion 2410 is forward of an acoustic chamber portion 2404. An acoustical property, ρ_1 indicated at 2412, such as a density of the temple portion 2410 is selected to be lower

than an acoustical property, ρ_{AC} indicated at 2406, such as a density of the chamber portion 2404 housing the speaker arrangement of the PPMS system, the relationship between densities is given by the equations at 2424. Such vibration damping material(s) 2412 minimizes transmission of mechanical vibration forward of the speaker arrangement, thereby reducing the effects of mechanical vibration noise on sensors that might be located in such forward sections. In addition thereto, such vibration damping material attenuates vibration through the eyewear device which might annoy a user. Vibration damping material will also attenuate leakage of acoustic signals along unwanted forward directions of the eyewear device.

Applicant's Amended Specification, paragraph [00113].

Restriction Requirement

Election

Applicant elects claim group 2 and species B (Figures 2-4 as identified by the Office) for examination within the instant application in response to the Office's requirement of restriction, dated 06/07/2021, i.e., 2B. The claims readable on claim group 2 species B, are not only: 5-9, 15, 16, 24-28, 30-34, 44-46, but also include claims: 1-11, 14-21, 24-28, and 48-51 which were identified by the Office as being generic to species A and B. Thus, claims 1-11, 14-21, 24-28, and 48-51 must be examined with an election of claim group 2 and species B.

Traverse

Applicant respectfully traverses the restriction of the instant applicant into groups 1, 2, 3, and species A, B, and C and requests reconsideration of the restriction requirement in light of the following remarks. The Office identifies nine (9) different claim groups which is extraordinary.

In the Office Action dated 06/07/21, the Office stated that:

> "The inventions are independent or distinct, each from the other because:
> Inventions 1, 2, and 3 are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination 1 has separate utility such directivity due to shape of a chamber. The other

> subcombinations have readily identifiable distinctions and independencies in their characteristics. See MPEP § 806.05(d). Office Action, 06/07/21, page 3, paragraph 3.

Respectfully, Applicant contends that:

1. the Office has not made out the required *prima facie* case for restricting the claims in the instant application;

2. the Office has misapplied MPEP § 806.05(d) to justify restriction in the instant application;

3. the Office has not shown "two-way distinctness" as required by MPEP § 806.05(d) in order to support restriction;

4. a restriction into species, based on figures, is an abuse of Discretion by the Office, is inconsistent with the United States Patent Law, and can unfairly prejudice Applicant's rights; and

5. the instant restriction requirement places a financial burden on the Applicant.

Respectfully, the Office has not made out a proper *prima facie* case for restricting the claims in the instant application. Specifically, to establish a *prima facie* case for restriction the Office needs to:

(1) provide reasons why the inventions as claimed are distinct, and

(2) MPEP § 808.02 – establish the burden on the Office by explaining why the distinct inventions must be restricted on the basis of:

(a) separate classification;

(b) separate status in the art, or

(c) a different field of search.

Note that to support a requirement for restriction between two or more related product inventions both two-way distinctness and "reasons" for insisting on restriction are necessary. See MPEP § 806.05(d). The "reasons" are described in MPEP 808.02, wherein guidelines are given under which the Office can establish the burden giving rise to the need for restriction. Note that under MPEP § 806.05(d) the Office must first demonstrate the two elements (A), and (B):

"(A) the combination does not require the particulars of the subcombination as claimed for patentability (e.g., to show novelty and unobviousness), and

(B) the subcombination can be shown to have utility either by itself or in another materially different combination.

The examiner must show, by way of example, that one of the subcombinations has utility other than in the disclosed combination."

In the instant application, the Office has not demonstrated **two-way distinctness** nor has it proffered the "**reasons**" needed to support restriction. With regard to the two elements (A) and (B) (shown above), the Office has merely opinioned that "subcombination 1 has separate utility such directivity due to shape of the chamber. The other combinations have readily identifiable

distinctions and independence in their characteristics." This solitary statement by the Office is vague, lacks concrete facts that the Applicant needs in order to respond, and is therefore not sufficient to support restriction. The Office has not addressed elements (A) and (B) above for all nine (9) alleged distinct inventions. Specifically, the Office has not shown the alleged (9) inventions as claimed do not overlap in scope, and that the alleged (9) inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function or effect. The Office has not met its burden to provide the necessary "examples" needed to support the determination that the alleged nine (9) inventions are distinct. Thus, the restriction into groups and species should be removed and all claims should be examined together.

Restriction Into Species, Based on Figures, is an Abuse of Discretion by the Office and Should be Withdrawn Since Such a Restriction is not Consistent Nor Compatible With 35 U.S.C § 112, Paragraph 6 and 35 U.S.C. § 121.

Respectfully, a restriction requirement made on the basis that the identification of species is based upon figures unduly limits the scope of protection of any of the elected species. For example, should any of the current claims, or any claims added later in prosecution, be deemed by the Patent Office or a court to be read under 35 U.S.C. § 112, paragraph 6, then those claims would be "construed to cover the corresponding structure, material, or acts described in the specification

and equivalents thereof." However, election of a species based on a figure or figures, where all other species are also identified by a figure or figures, has the effect of "removing" from the specification all figures not identified as being a part of the elected species. Such an effect is inconsistent with application of 35 U.S.C. § 121.

In the present case, under the current restriction requirement, if Applicant elected Species A, which is based on Figure 18 & 24, then the other figures would all be essentially deleted from the application and thus unavailable as "corresponding structure, material, or acts." Thus, the only structure available for interpretation of the claims under 35 U.S.C. § 112, paragraph 6 would be Figures 18 & 24. If a claim interpreted under 35 U.S.C. § 112, paragraph 6 is allowed after Applicant elected Species A, under the current restriction requirement as described above, such a claim would be limited to Figures 18 & 24 only. Applicant would then supposedly be barred from obtaining patent protection on any of the other species (i.e., non-elected figures) because a duplicate of the allowed claim in a divisional application would be rejected under statutory double patenting (35 U.S.C. 121), despite the fact that due to the claims being interpreted using different figures the claim scope would be different. Therefore, should Applicant elect a species under the current restriction requirement, Applicant would be improperly forced to give up future versions of the claims under 35 U.S.C. 112, paragraph 6 to any of the remaining species. As such, Applicant respectfully submits that the present restriction requirement based on figures is an improper

abuse of discretion by the Office. Applicant believes that this problem does not arise if a proper restriction requirement is made based on claims. However, in the instant application no restriction requirement is warranted.

Additionally, Applicant respectfully submits that the restriction based on figures is improper because the species identified, and hence their corresponding claims, are not necessarily mutually exclusive. Specifically, one or more of the figures utilized as a basis for the restriction requirement might not be mutually exclusive from one or more of the other figures utilized as a basis for the restriction requirement. Thus, any claims chosen for the identified species could violate MPEP 806.04(f).

Furthermore, Applicant respectfully submits that the restriction is improper because such a restriction based on figures does not comport with MPEP 814, since a restriction based on figures makes it unclear as to why the limitations in the claims are considered to restrict the claims to a particular disclosed species. MPEP 814 requires that "the particular limitations in the claims and the reasons why such limitations are considered to restrict the claims to a particular disclosed species should be maintained if necessary to make the requirement clear." Applicant respectfully maintains that the requirement is unclear. As stated above, it is not clear how claims corresponding to the figures would be mutually exclusive.

Therefore, such a definition of species, as the Office has presently made, will prejudice Applicant's examination of the instant application upon requirement of an election. For the reasons articulated above, Applicant contends that any restriction into species based on figures is improper and is an abuse of discretion by the Office and that yet another restriction of species should not be undertaken by the Office. Respectfully, the application should be examined in its entirety without designation of species.

Lack of Serious Burden on the Office

MPEP 808.02, page 800-51, column 2, paragraph 5. Respectfully, Applicant maintains that the Office has failed to carry its burden under MPEP 808.02, which requires the Office to demonstrate that a serious burden is presented if the restriction is not made.

The Instant Restriction Requirement Places a Very Large and Unfair Financial Burden on the Applicant

The instant restriction into claim groups 1, 2, 3, and species A, B, and C creates an enormous financial burden on Applicant, prolongs the length of time needed to fully examine the instant application due the additional divisional applications that will need to be filed in order to get the claimed subject matter examined, as well as prejudicing Applicant's ability to get a proper examination of the subject matter contained within Applicant's patent application because of the improper restriction of species by the Office.

Requirement of Restriction is Discretionary for the Office

Applicant wishes to point out that MPEP 803 uses permissive language with regard to restriction, i.e.:

> "If the search and examination of all the claims in an application can be made without **serious** burden (emphasis added), the examiner must examine them on the merits, even though they include claims to independent or distinct inventions." MPEP 803, page 800-4, column 1, paragraph 2.

In the instant case, the present restriction places a large financial burden on the Applicant since eight divisional patent applications would be required to accomplish examination of all 44 claims. Applicant is a small entity with finite resources and respectfully states that the instant restriction requirement jeopardizes Applicant's ability to obtain a proper examination of the instant patent application.

The additional eight divisional patent applications that could result from the instant restriction will exacerbate the already large workload at the Office, lengthening the time required to complete examination of the potential nine patent applications that will flow from the instant restriction. Applicant contends that this result does not further either the interests of the Applicant, the Office, or the public.

In addition, the definition of species has been incorrectly made and an election of one of the currently defined species will not provide a correct examination of Applicant's subject matter. Thus, filing of divisional patent applications will not cure the problem created by the current restriction of species.

Applicant reserves the right to pursue the claims of any other species in a divisional application.

CONCLUSION

Applicant has provided the election of claims as requested by the Office and has traversed the restriction requirement. The Office has not demonstrated that the claim groups and species, as asserted by the Office, are distinct and that there is a **serious** burden posed by the examination of claims 1-51 as presented in the instant application. As such, the Office has failed to make out the required *prima facie* case needed to support restriction. Additionally, the present restriction of species based on figures is an abuse of discretion by the Office since such a restriction does not comport with **35 U.S.C § 112, Paragraph 6 and 35 U.S.C. § 121** as explained herein. Applicant respectfully requests reconsideration and removal of the restriction requirement and examination of all claims presented.

Respectfully submitted,
PELOQUIN, PLLC

November 08, 2021
Date

/MARK S. PELOQUIN/
Mark S. Peloquin, Esq.
USPTO Registration # 50,787

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/781,897	Filing Date 02/04/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	11/08/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 51	Minus	** 51	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RAMONA D WILSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 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.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003	3349

51340 7590 06/07/2021

PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

EXAMINER	
BLAIR, KILE O	

ART UNIT	PAPER NUMBER
2651	

MAIL DATE	DELIVERY MODE
06/07/2021	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 16/781,897	Applicant(s) Villalpando et al.	
	Examiner Kile Blair	Art Unit 2651	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-51 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-51 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restriction

Restriction to one of the following inventions is required under 35 U.S.C. 121:

1. Claims 2-4, 17, 18, 35, 36, and 41-43, drawn to a specific shape of a speaker chamber.

2. Claims 5-9, 15, 16, 24-28, 30-34, and 44-46, drawn to specific properties of the reflectivity of portions of a speaker chamber.

3. Claims 10, 19-21, 37-39, and 47-51, drawn to an external sound cover.

Furthermore, election of species is required between

A. Drawn to a speaker or chamber in the temple of eyewear (see figs 18 & 24).

B. Drawn to a speaker or chamber in a temple insert module (see figs 2-4).

C. Drawn to a speaker or chamber in a temple interlock (see figs 10 & 11).

Claims 1, 11-14, 22, 23, 29, and 40 links inventions I and II but only to the extent that rejoinder is possible for claims requiring all the limitations of the linking claims.

Claims 1-11, 14-21, and 24-28 are generic to species A and B.

Claims 48-51 are "generic" to species A, B, and C but are not considered generic claims as described in MPEP 806.04(d) because it merely describes a subcombination that is common to several species.

Accordingly applicant should elect one of inventions 1, 2, or 3 and then also elect one of species A, B, or C.

That is, applicant should elect 1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, or 3C.

The restriction requirement between the linked inventions is **subject to** the nonallowance of the linking claim(s), as appropriate. Upon the indication of allowability of the linking claim(s), the restriction requirement as to the linked inventions **shall** be withdrawn and any claim(s) depending from or otherwise requiring all the limitations of the allowable linking claim(s) will be rejoined and fully examined for patentability in accordance with 37 CFR 1.104 **Claims that require all the limitations of an allowable linking claim** will be entered as a matter of right if the amendment is presented prior to final rejection or allowance, whichever is earlier. Amendments submitted after final rejection are governed by 37 CFR 1.116; amendments submitted after allowance are governed by 37 CFR 1.312.

Applicant(s) are advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, the allowable linking claim, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Where a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

The inventions are independent or distinct, each from the other because:

Inventions 1, 2, and 3 are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination 1 has separate utility such directivity due to the shape of a chamber. The other subcombinations have readily identifiable distinctions and independencies in their characteristics. See MPEP § 806.05(d).

The examiner has required restriction between subcombinations usable together. Where applicant elects a subcombination and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Restriction for examination purposes as indicated is proper because all the inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because one or more of the following reasons apply:

Different field of search.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of an invention to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention**.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other invention.

Summary of Requirement

Applicant should elect one of the following inventions which will prompt examination on the merits of the associated claims:

1A –1-4, 11, 12, 14, 17, 18, and 22 (i.e. claims 1-4, 11, 12, 14, 17, 18, and 22)

1B – 1-4, 11, 13, 14, 17, 18, and 23

1C – 29, 35, 36, and 40-43

2A – 1, 5-9, 11, 12, 14-16, 22, and 24-28

2B – 1, 5-9, 11, 13, 14-16, 23, and 24-28

2C – 29-34, 40, and 44-46

3A – 1, 10, 11, 12, 14, 19-22, and 48-51

3B – 1, 10, 11, 13, 14, 19-21, 23, and 48-51

3C – 29, 37-39, 40, and 47-51

Examiner's Comments on 35 U.S.C. 112(b) Compliance

The following comments are not substantive claim rejections and they do not indicate an examination on the merits; however, they're provided herein to help facilitate compact prosecution.

Claim 30 recites that it depends on claim "C1". Obviously, this is improper, the examiner has interpreted it depending on claim 29 and suggests such an amendment as one way to comply with 35 U.S.C. 112(b).

Also, in the specification, in paragraph [00113], "220" seems to be an incomplete reference number which should possibly be "2208".

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kile Blair whose telephone number is (571)270-3544. The examiner can normally be reached on M-F.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duc Nguyen can be reached on 571-272-7503. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KILE O BLAIR/
Primary Examiner, Art Unit 2651

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/781,897

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	51 minus 20 =	* 31	x 50 =	1550	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	* 2	x 230 =	460			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	2795		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/781,897	02/04/2020	2425	2875	S120219.P003	51	5

CONFIRMATION NO. 3349

UPDATED FILING RECEIPT

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

OC000000119496539

Date Mailed: 08/26/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. 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 submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA;
Chiu Ming So, Hong Kong, HONG KONG;
Kwok Wah Law, Hong Kong, HONG KONG;
Wai Kuen Cheung, Hong Kong, HONG KONG;

Applicant(s)

SOLOS TECHNOLOGY LIMITED, Hong Kong, HONG KONG

Assignment For Published Patent Application

SOLOS TECHNOLOGY LIMITED, Hong Kong, HONG KONG

Power of Attorney: The patent practitioners associated with Customer Number 51340

Domestic Priority data as claimed by applicant

This application is a CIP of 16/711,340 12/11/2019
which claims benefit of 62/778,709 12/12/2018
and claims benefit of 62/873,889 07/13/2019
This application 16/781,897
claims benefit of 62/801,468 02/05/2019
and claims benefit of 62/873,889 07/13/2019

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/21/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/781,897**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No
**** SMALL ENTITY ****
Title

PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Preliminary Class

725

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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 (1-866-999-4258).

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 AssetsControl, 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).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

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
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

FORMALITIES LETTER

OC000000117758322

Date Mailed: 06/15/2020

NOTICE OF INCOMPLETE REPLY (NONPROVISIONAL)

Filing Date Granted

The U.S. Patent and Trademark Office has received your reply on 06/12/2020 to the NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION (Notice) mailed 02/24/2020 and it has been entered into the application. The reply, however, is not a complete reply for the reason(s) listed below. A complete reply must be timely filed to prevent ABANDONMENT of the above-identified application. Replies should be mailed to: Mail Stop Missing Parts, Commissioner for Patents, P.O.Box 1450, Alexandria VA 22313-1450.

The period for reply continues to run from the date of the Notice mailed 02/24/2020.

Applicant's reply to the Notice mailed on 02/24/2020 was received in the U.S. Patent and Trademark Office on 06/12/2020, after the expiration of the two month period for reply set forth in the Notice. The application will become abandoned unless applicant obtains an extension of the period for reply, as above. The petition must be accompanied by the appropriate fee as set forth in 37 CFR 1.17 (see the current fees below). The date on which the reply, the petition, and the fee have been filed is the date of the reply and also the date for purposes of determining the period of extension and the corresponding amount of the fee due. The expiration of the time period is determined by the amount of the fee paid. Applicant is advised that extensions may not be granted under 37 CFR 1.136(a) for more than FIVE MONTHS beyond the time period set in the Notice.

The items listed below were received untimely:

- The drawings received 06/12/2020.

Items Required to Avoid Abandonment:

The required items noted below SHOULD be filed along with any items required above.

Mail date of Notice: 02/24/2020

Last date that extension may be obtained: (Note: The petition and fee must be received by this date, or include a proper certificate of mailing under 37 CFR 1.8 with a date on or before this date, and extend the time to include this date.) 09/24/2020

Length of Extension of Time	Fee under 37 CFR 1.17(a) effective March 19, 2013		
(response due on or before)	Undiscounted	Small Entity	Micro Entity
Two Months (06/24/2020)	$600	$300	$150
Three Months (07/24/2020)	$1400	$700	$350
Four Months (08/24/2020)	$2200	$1100	$550
Five Months (09/24/2020)	$3000	$1500	$750

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

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, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". 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.

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**.

/yteferra/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/781,897

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	51 minus 20 =	31	x 50 =	1550	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	2	x 230 =	460			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	2795		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

PTO/AIA/22 (03-13)
Approved for use through 11/30/2020. 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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): S120219.P003

Application Number: 16/781,897

Filed: 02/04/2020

For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Art Unit: Not yet assigned

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):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☑	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$ 1,100.00
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 50,787.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/MARK S. PELOQUIN/ — Signature

AUGUST 24, 2020 — Date

MARK S PELOQUIN — Typed or printed name

(206) 447-1336 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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 Patent Application Fee Transmittal

Application Number:	16781897
Filing Date:	04-Feb-2020
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 4 months with $0 paid	2254	1	1100	1100
Miscellaneous:				
			Total in USD ($)	**1100**

Electronic Acknowledgement Receipt

EFS ID:	40368309
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	24-AUG-2020
Filing Date:	04-FEB-2020
Time Stamp:	18:13:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$1100
RAM confirmation Number	E20208NI13245539
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	S120219P003NIRi.pdf	423841 fe7c0ea80cfd6a6b3e419ce123dd23f613dee5cf	no	3
Warnings:					
Information:					
2	Extension of Time	S120219P003EXTTIMEaia0022i.pdf	466270 8108b01d709ef92f3ccc8fa6e109f1ac06a676b1	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	31073 a4f1359a6f4483b54fdd685ad2ec2df06c5128ec	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	921184		

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

POA ACCEPTANCE LETTER

OC00000017756181

Date Mailed: 06/15/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/12/2020.

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.

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**.

/yteferra/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/781,897

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	51 minus 20 =	* 31	x 50 =	1550	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	* 2	x 230 =	460			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	2795		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

FORMALITIES LETTER

OC000000117758322

Date Mailed: 06/15/2020

NOTICE OF INCOMPLETE REPLY (NONPROVISIONAL)

Filing Date Granted

The U.S. Patent and Trademark Office has received your reply on 06/12/2020 to the NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION (Notice) mailed 02/24/2020 and it has been entered into the application. The reply, however, is not a complete reply for the reason(s) listed below. A complete reply must be timely filed to prevent ABANDONMENT of the above-identified application. Replies should be mailed to: Mail Stop Missing Parts, Commissioner for Patents, P.O.Box 1450, Alexandria VA 22313-1450.

The period for reply continues to run from the date of the Notice mailed 02/24/2020.

Applicant's reply to the Notice mailed on 02/24/2020 was received in the U.S. Patent and Trademark Office on 06/12/2020, after the expiration of the two month period for reply set forth in the Notice. The application will become abandoned unless applicant obtains an extension of the period for reply, as above. The petition must be accompanied by the appropriate fee as set forth in 37 CFR 1.17 (see the current fees below). The date on which the reply, the petition, and the fee have been filed is the date of the reply and also the date for purposes of determining the period of extension and the corresponding amount of the fee due. The expiration of the time period is determined by the amount of the fee paid. Applicant is advised that extensions may not be granted under 37 CFR 1.136(a) for more than FIVE MONTHS beyond the time period set in the Notice.

The items listed below were received untimely:

- The drawings received 06/12/2020.

Items Required to Avoid Abandonment:

The required items noted below SHOULD be filed along with any items required above.

Mail date of Notice: 02/24/2020

Last date that extension may be obtained: (Note: The petition and fee must be received by this date, or include a proper certificate of mailing under 37 CFR 1.8 with a date on or before this date, and extend the time to include this date.) 09/24/2020

Length of Extension of Time	Fee under 37 CFR 1.17(a) effective March 19, 2013		
(response due on or before)	Undiscounted	Small Entity	Micro Entity
Two Months (06/24/2020)	$600	$300	$150
Three Months (07/24/2020)	$1400	$700	$350
Four Months (08/24/2020)	$2200	$1100	$550
Five Months (09/24/2020)	$3000	$1500	$750

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

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, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". 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.

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**.

/yteferra/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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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
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

FORMALITIES LETTER

OC000000114935740

Date Mailed: 02/24/2020

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items 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 application is informal since it does not comply with the regulations for the reason(s) indicated below.

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

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings must be reasonably free from erasures and must be free from alterations, overwriting, interlineations, folds, and copy marks. See Figure(s) 16-28.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Additional claim fees of $ **2010** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **75** basic filing fee.
- $ **80** surcharge.
- $ **330** search fee.
- $ **380** examination fee.
- $ **460** for **2** independent claims over 3.
- $ **1550** for **31** total claims over 20.
- $(**0**) previous unapplied payment amount.
- $ **2875** TOTAL FEE BALANCE DUE.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Ernesto Carlos Martinez Villalpando
  Chiu Ming So
  Kwok Wah Law
  Wai Kuen Cheung

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

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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.

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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**.

/tnguyen/

PTO/AIA/82A (07-13)
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	Not yet assigned
Filing Date	February 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ VILLALPANDO
Title	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	S120219.P003

SIGNATURE of Applicant or Patent Practitioner

Signature	/MARK S. PELOQUIN/	Date (Optional)	JUNE 12, 2020
Name	MARK S. PELOQUIN	Registration Number	50787
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 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.**

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

Doc Code: PA..
Document Description: Power of Attorney

Attorney Docket No.: S120219.P003

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 51340

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name	PELOQUIN, PLLC				
Address	800 Fifth Ave, Suite 4100				
City	Seattle	State	WA	Zip	98104
Country	US				
Telephone	(206) 447-1336	Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

SOLOS TECHNOLOGY LIMITED

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	5 Feb., 2020
Name	WAI KUEN CHEUNG		
Title	GENERAL MANAGER, SOLOS TECHNOLOGY LIMITED		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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.

LEGAL NAME OF INVENTOR

Inventor: KWOK WAH LAW Date (Optional): 5 Feb, 2020

Signature: Kwok

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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Privacy Act Statement

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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.

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As the below named inventor, I hereby declare that:

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- [■] The attached application, or
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The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor: CHIU MING SO Date (Optional): 5 Feb, 2020

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: WAI KUEN CHEUNG Date (Optional): 5 Feb, 2020

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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☐ The attached application, or

☒ United States application or PCT international application number 16/781,897

filed on 02/04/2020.

The above-identified application was made or authorized to be made by me.

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LEGAL NAME OF INVENTOR

Inventor: ERNESTO CARLOS MARTINEZ VILLALPANDO Date (Optional): 3/18/2020

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

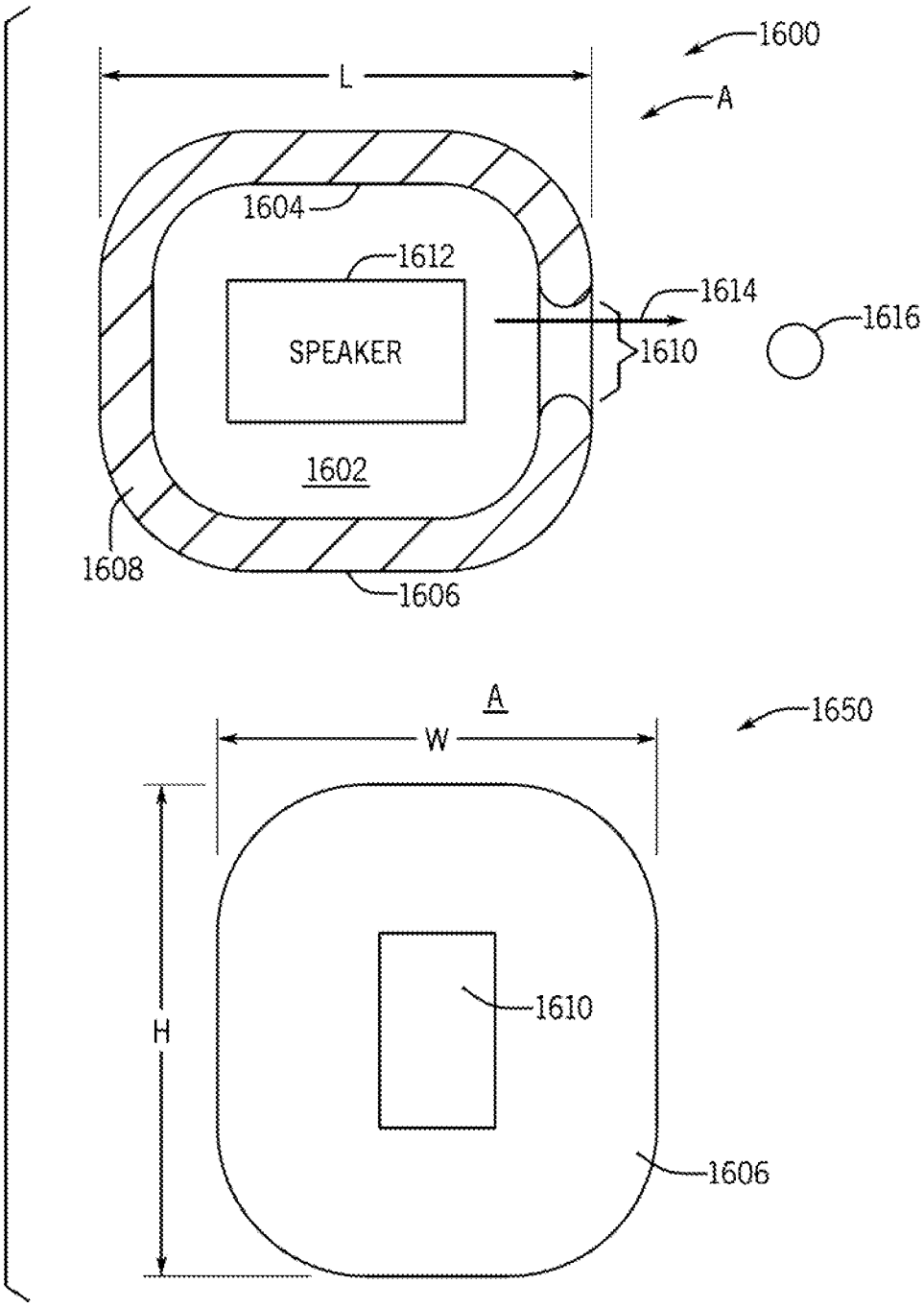

1600
L
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1604
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SPEAKER
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FIG. 16

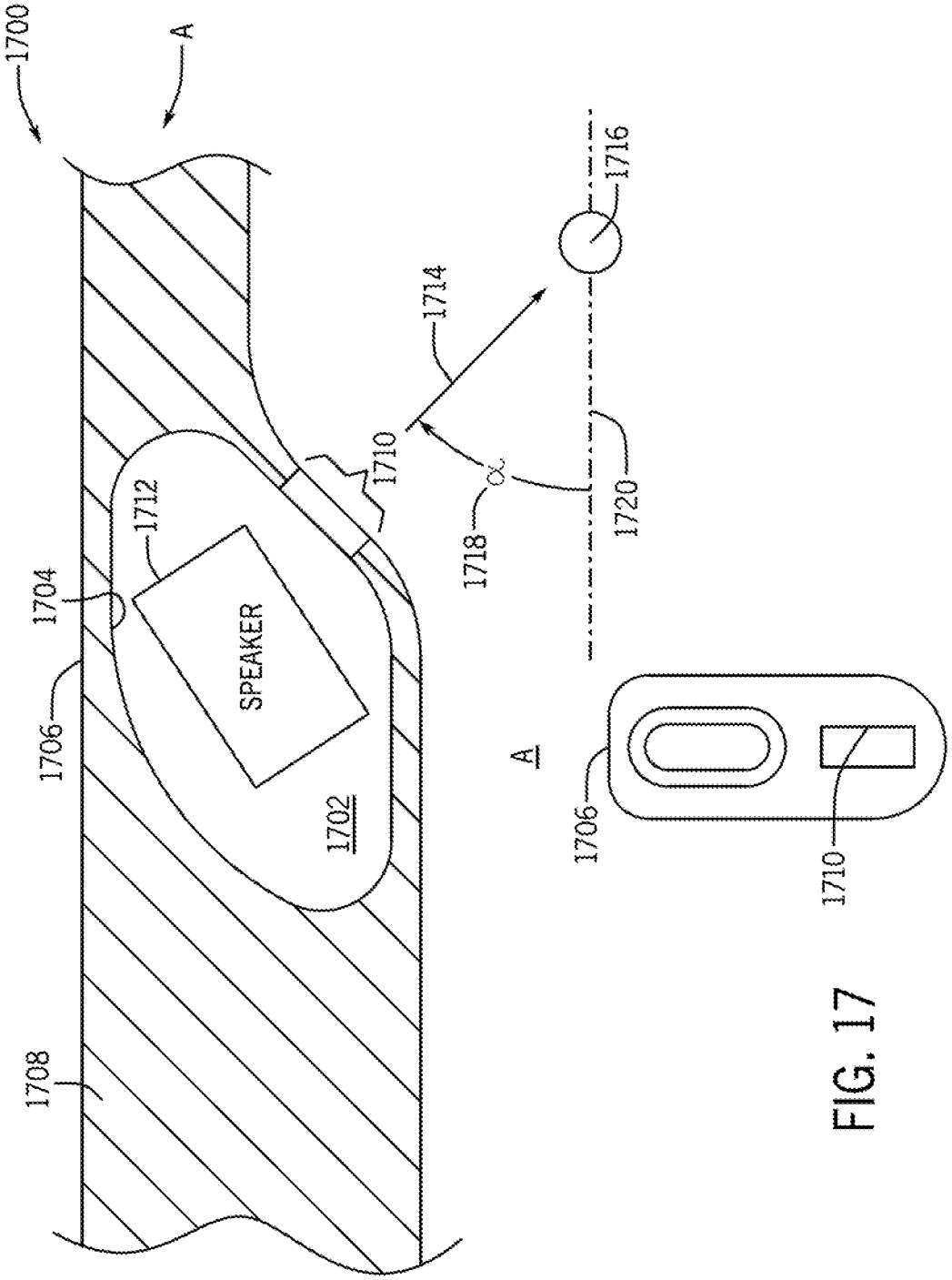

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FIG. 17

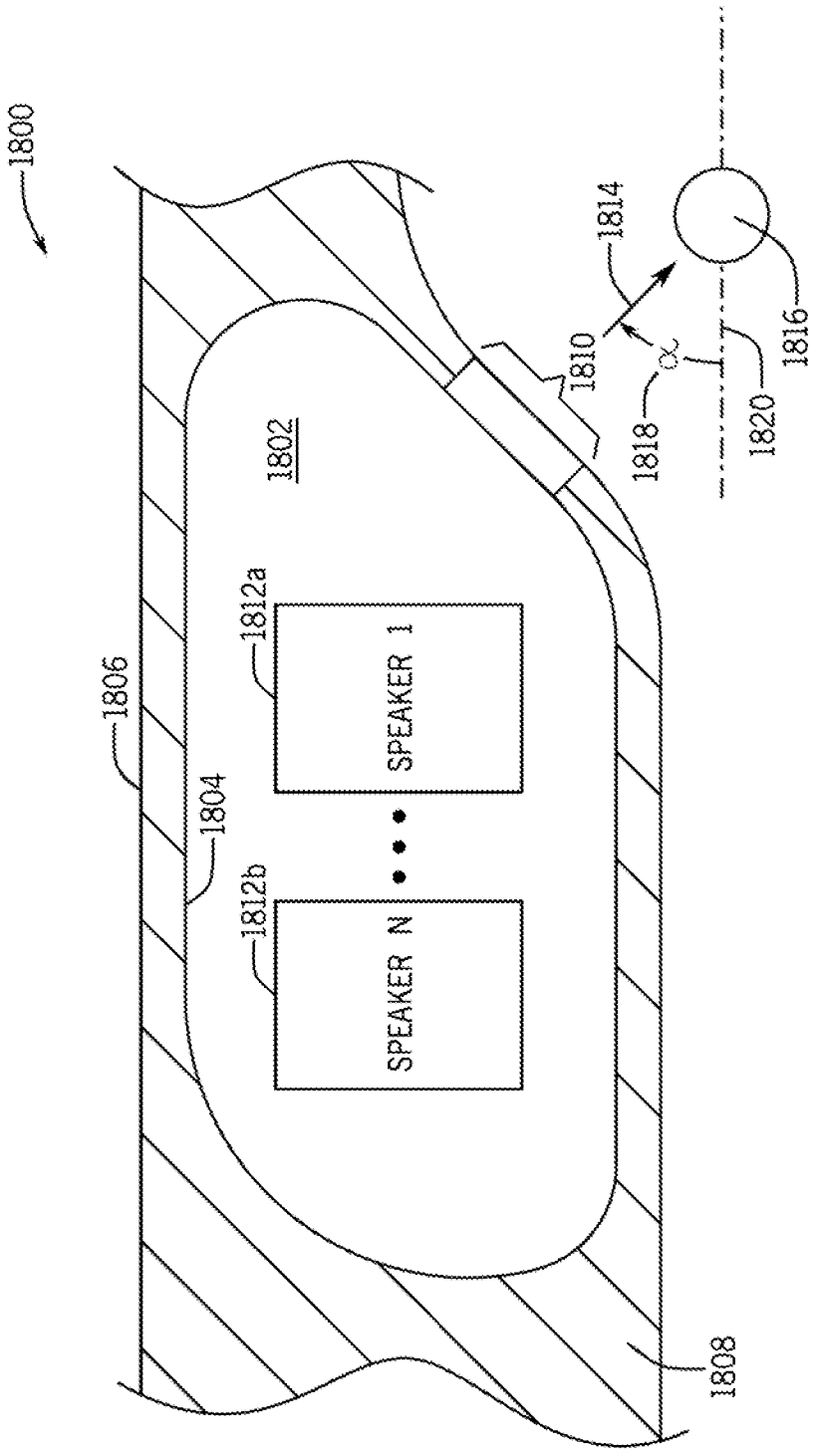

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FIG. 18

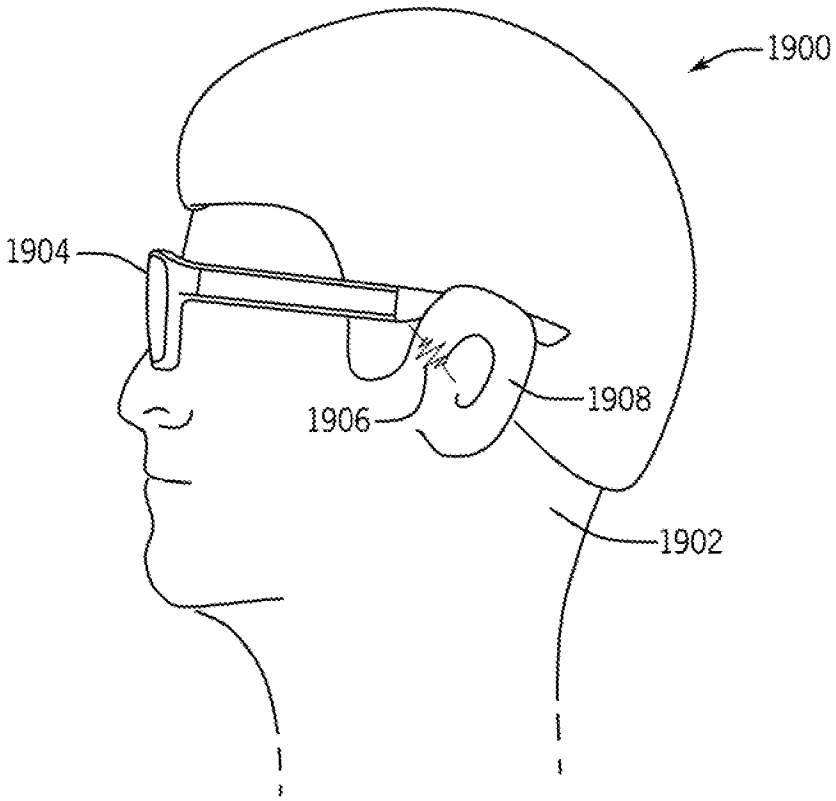


FIG. 19

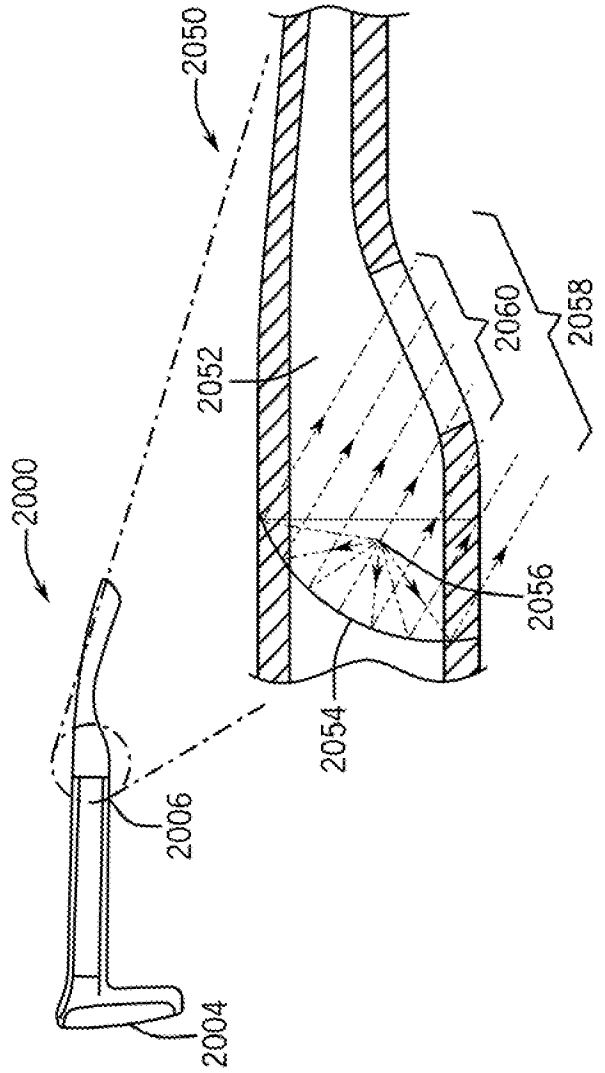


FIG. 20

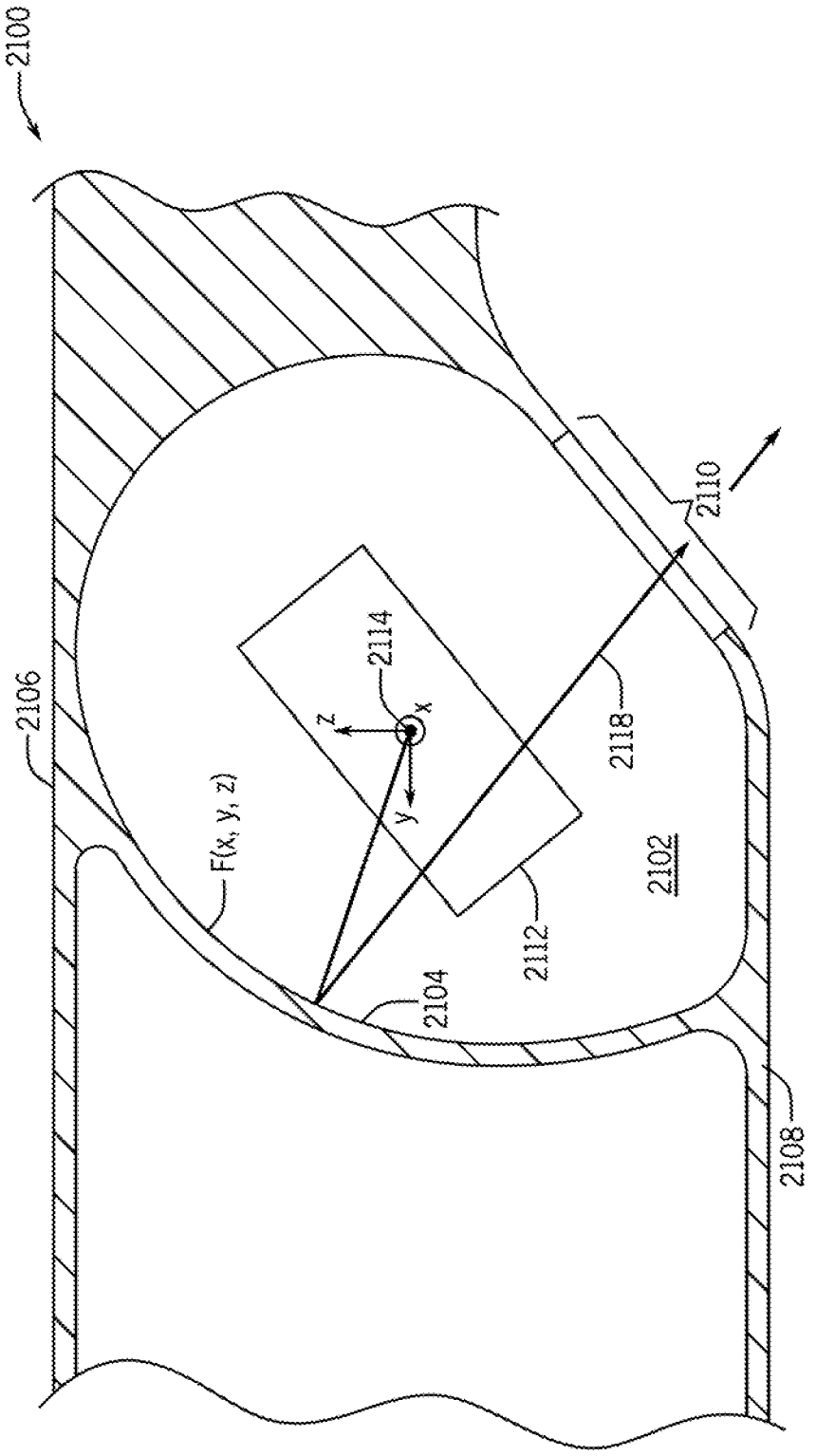


FIG. 21

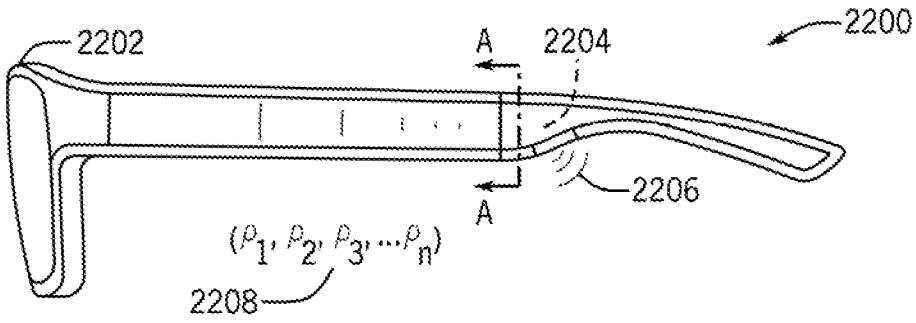


FIG. 22

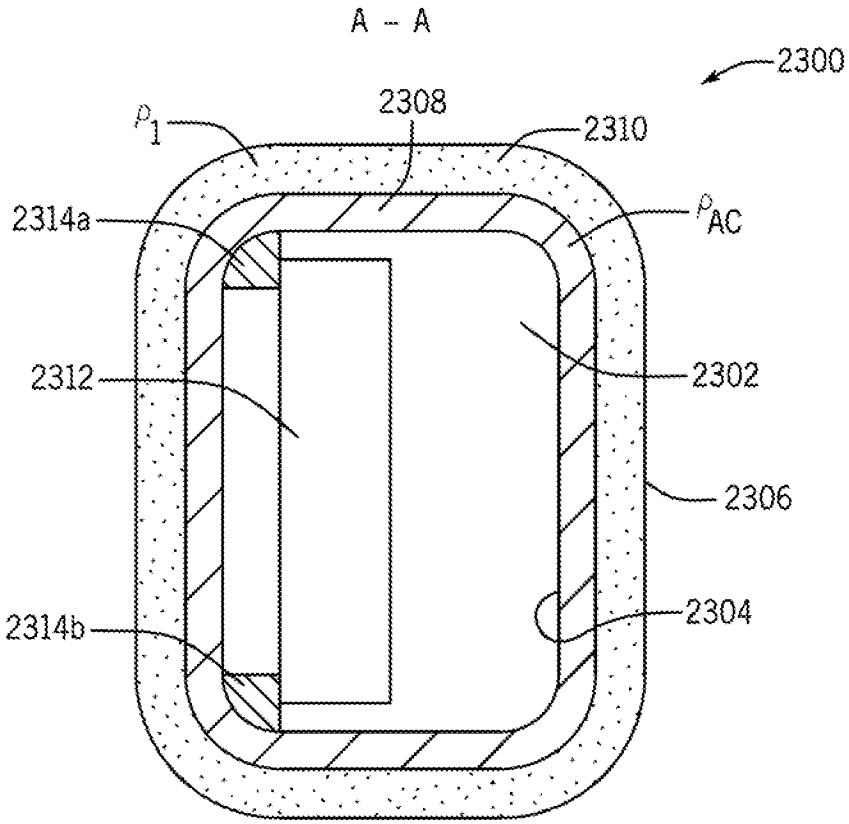


FIG. 23

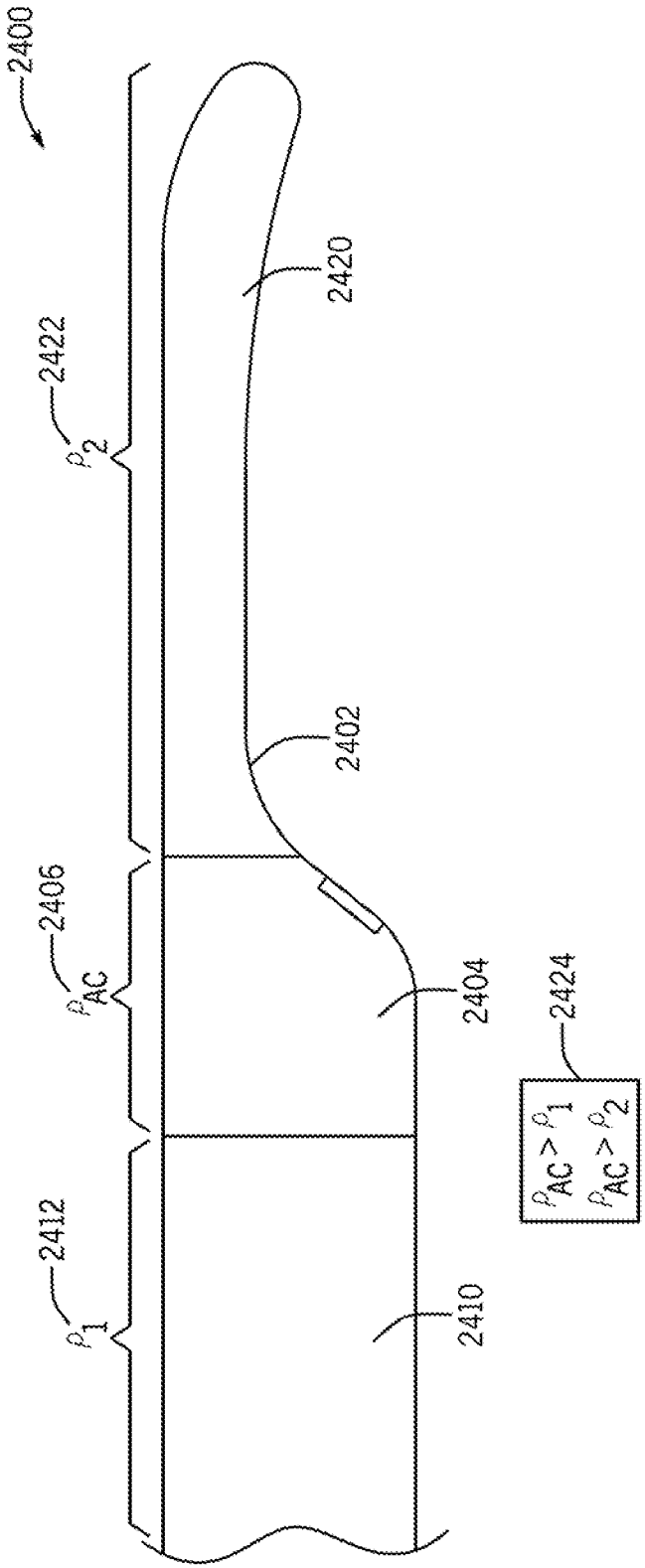

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ρ_2
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$\rho_{AC} > \rho_1$
$\rho_{AC} > \rho_2$
2412
ρ_1
2410

FIG. 24

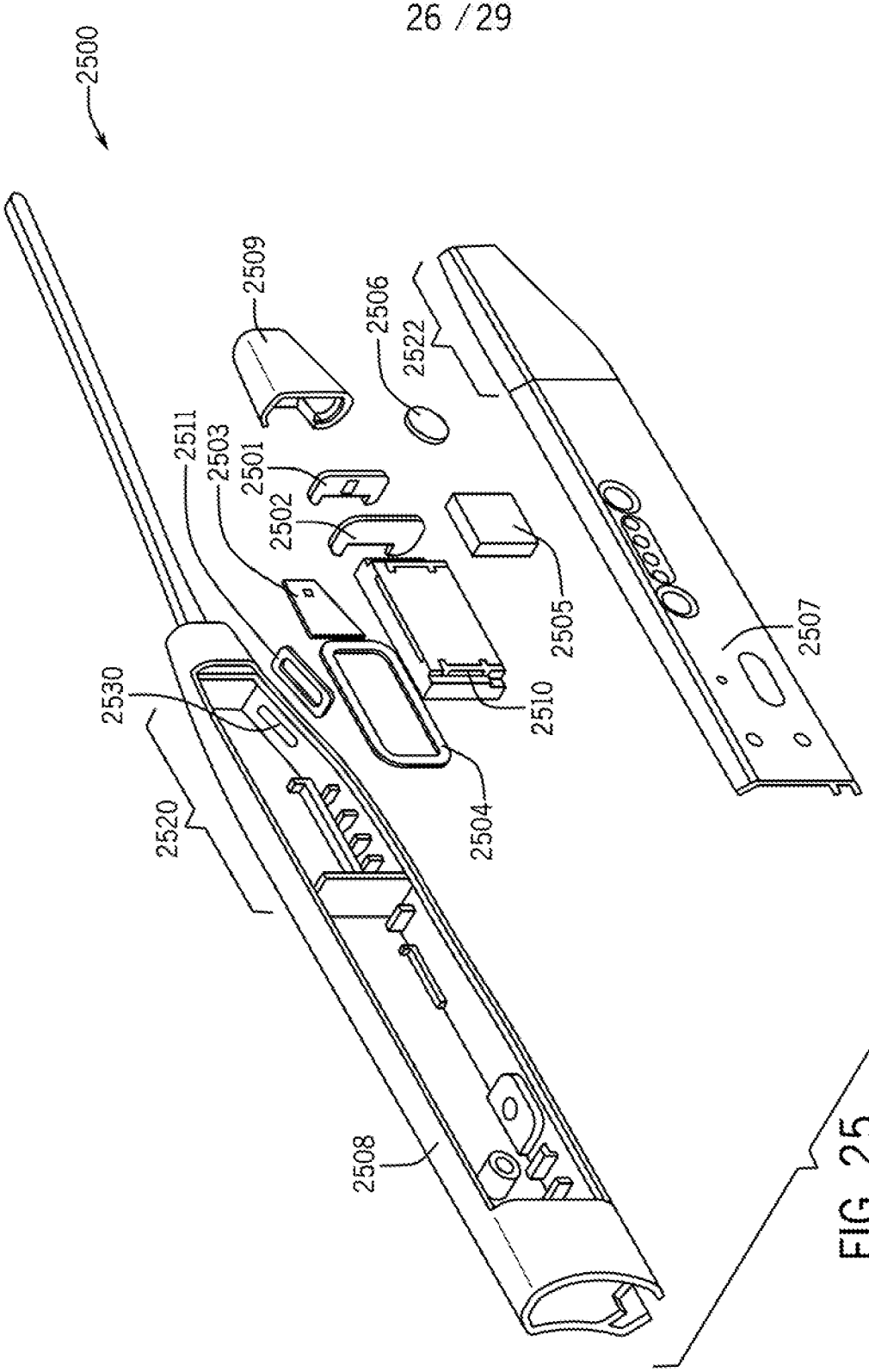

2500
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FIG. 25

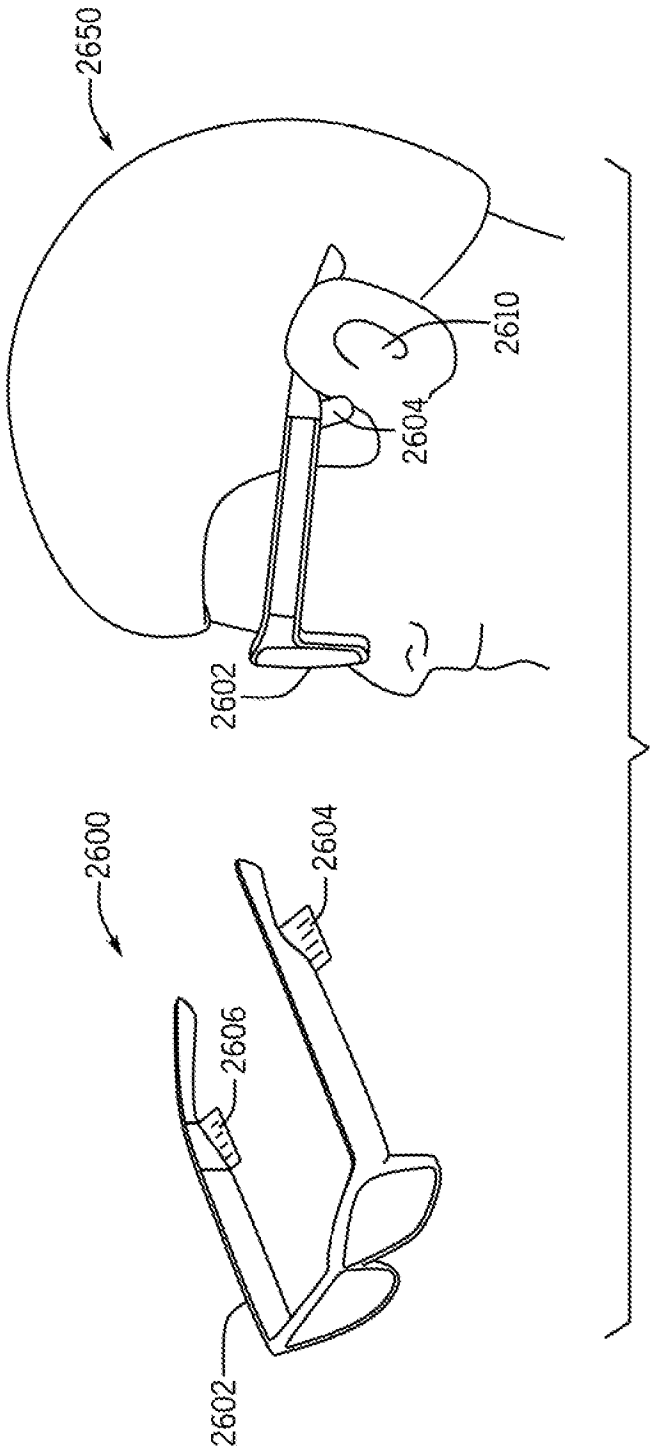


FIG. 26

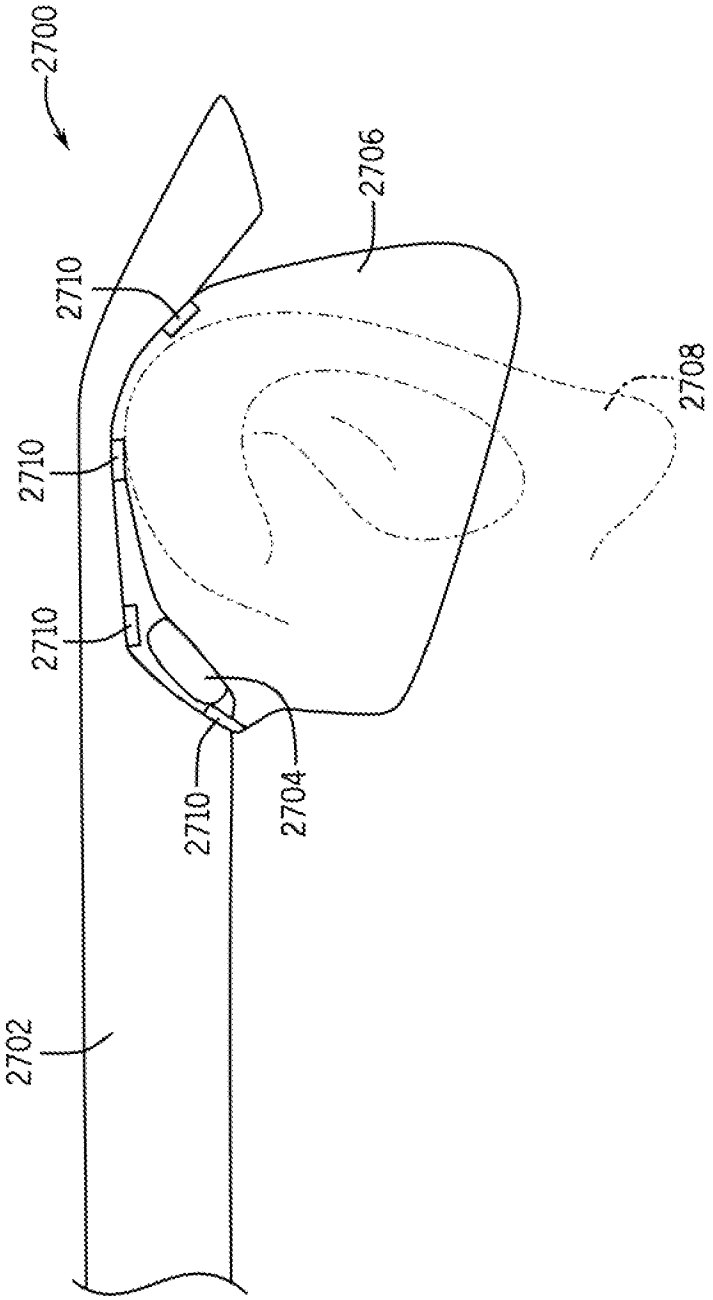


FIG. 27

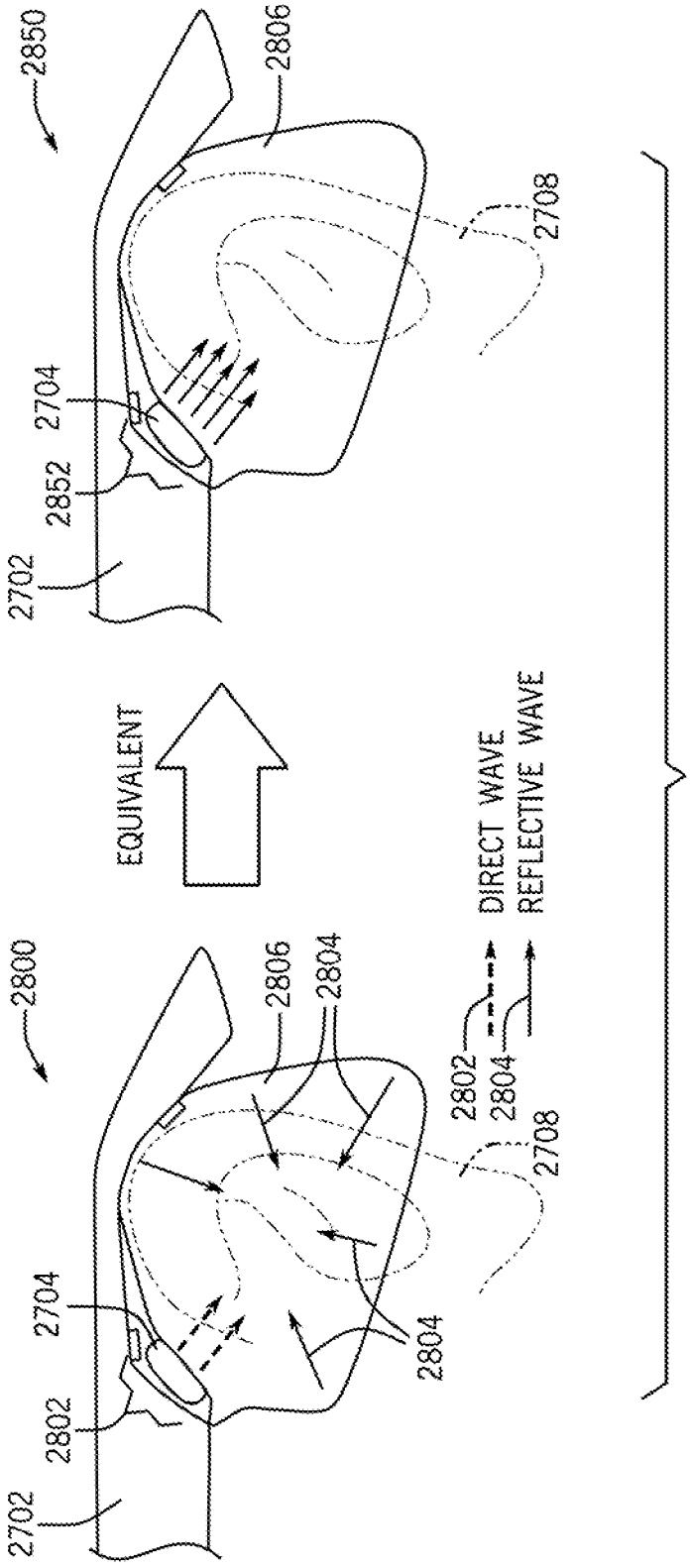

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2806
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2704
2852
2702
EQUIVALENT
2800
2806
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2708
DIRECT WAVE
REFLECTIVE WAVE
2704
2802
2702
2804

FIG. 28

Electronic Patent Application Fee Transmittal

Application Number:	16781897
Filing Date:	04-Feb-2020
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	31	50	1550
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	2	230	460
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**2875**

Electronic Acknowledgement Receipt

EFS ID:	39711109
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	Ernesto Carlos Martinez Villalpando
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	12-JUN-2020
Filing Date:	04-FEB-2020
Time Stamp:	20:44:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$2875
RAM confirmation Number	E20206BK44581184
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	K41090P003EXTTIMEaia0022i.pdf	1063978 3f5fb78261ef6e5df93da409e58451775774adf9	no	2
Warnings:					
Information:					
2	Applicant Response to Pre-Exam Formalities Notice	20200612K41090P003NTFMPi.pdf	392329 e1dd81cd224137fa66c7f002821fa7e6979fbf66	no	3
Warnings:					
Information:					
3	Power of Attorney	20200203S120219P003POAaia0082KENNYexeci.pdf	795465 0ff01f86047d7a8efc543a94f3baa10c12bd3e81	no	2
Warnings:					
Information:					
4	Oath or Declaration filed	K41090P001DeclarationSignedLawrencei.pdf	542012 d91d3a6cc830f59120d5a8c6f675f4ee5c7dce58	no	2
Warnings:					
Information:					
5	Oath or Declaration filed	K41090P001DeclarationSignedSami.pdf	542142 42e2caed1d9d678b7c2bcad68dc8466ff33cceb2	no	2
Warnings:					
Information:					
6	Oath or Declaration filed	K41090P003DeclarationSignedKennyi.pdf	540844 69a46a442c61b26744e55eb3495e856f2f9c6e8b	no	2
Warnings:					
Information:					

7	Oath or Declaration filed	K41090P003patentdeclarationsignedairgoERNESTOi.pdf	832213 edb7b2101d41c89ddf5a844db306722a495cd302	no	1
Warnings:					
Information:					
8	Drawings-only black and white line drawings	20200612S120219P003FORMALFIGURES1628v04ASFILEDwithdatai.pdf	1236709 d0edda810d95086bfbbf50f2b3b1c1a97b68a351	no	13
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	40633 645c98ba1e8828addc2692a73ebb19a5d61054e6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	5986325		

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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.

PTO/AIA/22 (03-13)
Approved for use through 11/30/2020. 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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): S120219.P003

Application Number: 16/781,897

Filed: 02/04/2020

For: PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Art Unit: Not yet assigned

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):

	Fee	Small Entity Fee	Micro Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☑ Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$ 300.00
☐ Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐ Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐ Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 50,787.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/MARK S. PELOQUIN/ — Signature

JUNE 12, 2020 — Date

MARK S PELOQUIN — Typed or printed name

(206) 447-1336 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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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.

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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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/781,897	02/04/2020	2425	0.00	S120219.P003	51	5

CONFIRMATION NO. 3349

FILING RECEIPT

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

OC000000114935739

Date Mailed: 02/24/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. 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 submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA;
Chiu Ming So, Hong Kong, HONG KONG;
Kwok Wah Law, Hong Kong, HONG KONG;
Wai Kuen Cheung, Hong Kong, HONG KONG;

Applicant(s)

SOLOS TECHNOLOGY LIMITED, Hong Kong, HONG KONG

Assignment For Published Patent Application

SOLOS TECHNOLOGY LIMITED, Hong Kong, HONG KONG

Power of Attorney: The patent practitioners associated with Customer Number 51340

Domestic Priority data as claimed by applicant

This application is a CIP of 16/711,340 12/11/2019
which claims benefit of 62/778,709 12/12/2018
and claims benefit of 62/873,889 07/13/2019
This application 16/781,897
claims benefit of 62/801,468 02/05/2019
and claims benefit of 62/873,889 07/13/2019

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/21/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/781,897**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No
**** SMALL ENTITY ****
Title

PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

Preliminary Class

725

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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 (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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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 AssetsControl, 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).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/781,897

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	51 minus 20 =	* 31	x 50 =	1550	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	* 2	x 230 =	460			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	2795		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/781,897	02/04/2020	Ernesto Carlos Martinez Villalpando	S120219.P003

CONFIRMATION NO. 3349

51340
PELOQUIN, PLLC
800 FIFTH AVENUE
SUITE 4100
SEATTLE, WA 98104-3100

FORMALITIES LETTER

OC000000114935740

Date Mailed: 02/24/2020

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items 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 application is informal since it does not comply with the regulations for the reason(s) indicated below.

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

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings must be reasonably free from erasures and must be free from alterations, overwriting, interlineations, folds, and copy marks. See Figure(s) 16-28.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Additional claim fees of $ **2010** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **75** basic filing fee.
- $ **80** surcharge.
- $ **330** search fee.
- $ **380** examination fee.
- $ **460** for **2** independent claims over 3.
- $ **1550** for **31** total claims over 20.
- $(**0**) previous unapplied payment amount.
- $ **2875** TOTAL FEE BALANCE DUE.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Ernesto Carlos Martinez Villalpando
  Chiu Ming So
  Kwok Wah Law
  Wai Kuen Cheung

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

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, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". 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.

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**.

/tnguyen/

PTO/AIA/01 (06-12)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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.

LEGAL NAME OF INVENTOR

Inventor: WAI KUEN CHEUNG Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

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Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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LEGAL NAME OF INVENTOR

Inventor: ERNESTO CARLOS MARTINEZ VILLALPANDO Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: KWOK WAH LAW Date (Optional): _____

Signature: _____

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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.

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. 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.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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.

LEGAL NAME OF INVENTOR

Inventor: CHIU MING SO Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
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 FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	Not yet assigned
Filing Date	February 04, 2020
First Named Inventor	ERNESTO CARLOS MARTINEZ VILLALPANDO
Title	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	S120219.P003

SIGNATURE of Applicant or Patent Practitioner

Signature	/MARK S. PELOQUIN/	Date (Optional)	FEBRUARY 03, 2020
Name	MARK S. PELOQUIN	Registration Number	50787
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 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.**

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

PTO/AIA/82B (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
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

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 51340

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name	PELOQUIN, PLLC				
Address	800 Fifth Ave, Suite 4100				
City	Seattle	State	WA	Zip	98104
Country	US				
Telephone	(206) 447-1336	Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

SOLOS TECHNOLOGY LIMITED

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	WAI KUEN CHEUNG		
Title	GENERAL MANAGER, SOLOS TECHNOLOGY LIMITED		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 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.**

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

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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

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.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ernesto	Carlos Martinez	Villalpando	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Shrewsbury	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	125 North Drive
Address 2	

City	Westborough	State/Province	MA
Postal Code	01581	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	CHIU	MING	SO	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hong Kong	Country of Residence	HK

Mailing Address of Inventor:

Address 1	Flat D, 15/F, Welland BLDG, No. 368
Address 2	Queen's RD Central, Sheung Wan

City	Hong Kong	State/Province	HK
Postal Code		Country	HK

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	KWOK	WAH	LAW	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hong Kong	Country of Residence i	HK

Mailing Address of Inventor:

Address 1	Flat C, 16/F, Tower 2, Green Code
Address 2	No. 1 Ma Sik Road, Fanling, New Territories

City	Hong Kong	State/Province	HK
Postal Code		Country i	HK

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	WAI	KUEN	CHEUNG	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hong Kong	Country of Residence i	HK

Mailing Address of Inventor:

Address 1	1A, Block 15, Constellation Cove
Address 2	Taipo, New Territories

City	Hong Kong	State/Province	HK
Postal Code		Country i	HK

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

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	51340		
Email Address		Add Email	Remove Email

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Application Information:

Title of the Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS		
Attorney Docket Number	S120219.P003	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	29	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

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 and will not** be the subject of an application filed in another country, or under a multilateral international 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).
Either enter 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:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	51340		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation in part of	16711340	2019-12-11
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16711340	Claims benefit of provisional	62778709	2018-12-12
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16711340	Claims benefit of provisional	62873889	2019-07-13
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62801468	2019-02-05
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62873889	2019-07-13

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. 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. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[1] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

○ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
◉ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:	

If the Applicant is an Organization check here. ☒

Organization Name	SOLOS TECHNOLOGY LIMITED

Mailing Address Information For Applicant:

Address 1	Unit 211, 2/F., Photonics Center		
Address 2	No. 2 Science Park East Avenue, Hong Kong Science		
City	Hong Kong	**State/Province**	
Country HK		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	S120219.P003
	Application Number	
Title of Invention	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS	

Assignee 1

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UNITED STATES PATENT APPLICATION

FOR

PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS

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RELATED APPLICATIONS

[0001] This patent application is a continuation-in-part of United States Non-provisional Patent Application titled "Modularized Eyewear Systems, Apparatus, and Methods," filed on December 11, 2019, Serial Number 16/711,340, which claims priority from United States Provisional Patent Application titled "Modularized Eyewear System with Interchangeable Frame and Temples with Embedded Electronics for Mobile Audio-Visual Augmented and Assisted Reality," filed on December 12, 2018, Serial Number 62/778,709 and from United States Provisional Patent Application Serial Number 62/873,889 titled "Wearable Devices Apparatuses, Systems, And Methods," filed on July 13, 2019. United States Non-provisional Patent Application Serial Number 16/711,340 titled "Modularized Eyewear Systems, Apparatus, and Methods," is hereby fully incorporated by reference. This application claims priority from co-pending U.S. Provisional Patent Application Serial Number 62/801,468 titled "Personalized Directional Audio For Head-Worn Audio Projection Devices With Near-Eye (Electro-Dynamic) Microspeaker System," filed on February 05, 2019. United States Provisional Patent Application Serial Number 62/801,468 titled "Personalized Directional Audio For Head-Worn Audio Projection Devices With Near-Eye (Electro-Dynamic) Microspeaker System," is hereby fully incorporated by reference. This application claims priority from co-pending United States Provisional Patent Application Serial Number 62/873,889 titled "Wearable Devices Apparatuses, Systems, And Methods," filed on July 13, 2019. United States Provisional Patent Application Serial Number 62/873,889 entitled "Wearable Devices Apparatuses, Systems, And Methods," is hereby fully incorporated by reference.

BACKGROUND OF THE INVENTION

1. TECHNICAL FIELD

[0002] The invention relates generally to eyewear devices, and more particularly to apparatuses, methods, and systems for providing audio signals to a user through an eyewear device.

2. BACKGROUND

[0003] The pace of modern life moves at a fast past. A person is often placed under the constraint of time and is placed in situations where his or her hands are occupied, and information is not accessible to the person. This can present a problem. Currently available eyewear such as prescription glasses, e.g., prescription reading glasses or prescription sunglasses are expensive and are not readily reconfigured to different user's needs. This can present a problem. Personalized sound transmission is often done with an occlusive in ear device known as an earphone or earbud. Such a device obstructs the ear canal and can interfere with a user's hearing of far field and near field sounds. This can present a problem. Sharp directivity for personal listening of audio serves as a basis for mobile augmented reality and assisted reality head-worn eyewear device applications. Current methods of sound transmission to a user such as bone conduction technologies have low transmission efficiencies with lower sound energy levels delivered to the user. This can present a problem. Thus, problems exist that require technical solutions that uses technical means to produce technical effects.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The invention may best be understood by referring to the following description and accompanying drawings that are used to illustrate embodiments of the invention. The invention is illustrated by way of example in the embodiments and is not limited in the figures of the accompanying drawings, in which like references indicate similar elements.

[0005] **Figure 1** illustrates a modular reconfigurable eyewear system, according to embodiments of the invention.

[0006] **Figure 2** illustrates a reconfigurable component for an eyewear device, according to embodiments of the invention.

[0007] **Figure 3** illustrates multiple reconfigurable components for an eyewear device, according to embodiments of the invention.

[0008] **Figure 4** illustrates another reconfigurable modularized eyewear system, according to embodiments of the invention.

[0009] **Figure 5** illustrates a perspective view and a top view of the modularized eyewear system from **Figure 4**, according to embodiments of the invention.

[0010] **Figure 6A** illustrates a system architecture for a modularized eyewear device, according to embodiments of the invention.

[0011] **Figure 6B** illustrates wireless networks corresponding to the system architecture for the modularized eyewear device of **Figure 6A**, according to embodiments of the invention.

[0012] **Figure 7** illustrates another system architecture for the modularized eyewear device of **Figure 4**, according to embodiments of the invention.

[0013] **Figure 8** illustrates a block diagram of a temple insert module, according to embodiments of the invention.

[0014] **Figure 9** illustrates a modularized eyewear device fitted with a behind the neck module assembly, according to embodiments of the invention.

[0015] **Figure 10** illustrates a behind the neck module assembly in perspective view configured with a wearable device, according to embodiments of the invention.

[0016] **Figure 11** illustrates coupling a temple interlock to a temple according to embodiments of the invention.

[0017] **Figure 12** illustrates coupling a behind the neck module to electronics contained within a temple, according to embodiments of the invention.

[0018] **Figure 13** illustrates a schematic for combining a behind the neck module assembly with temple electronics, according to embodiments of the invention.

[0019] **Figure 14** illustrates a user interface on a behind the neck module assembly, according to embodiments of the invention.

[0020] **Figure 15** illustrates a block diagram for an electronics unit configured for a behind the neck electronics pod (ePOD), according to embodiments of the invention.

[0021] **Figure 16** illustrates a personal projection micro speaker system in a cross-sectional view, according to embodiments of the invention.

[0022] **Figure 17** illustrates another personal projection micro speaker system in a cross-sectional view, according to embodiments of the invention.

[0023] **Figure 18** illustrates a personal projection micro speaker system, in a cross-sectional view, utilizing multiple speakers, according to embodiments of the invention.

[0024] **Figure 19** illustrates a personal projection micro speaker system on a user, according to embodiments of the invention.

[0025] **Figure 20** illustrates an internal surface of an acoustic chamber, according to embodiments of the invention.

[0026] **Figure 21** illustrates an acoustic chamber curved surface of general shape in a cross-sectional view, according to embodiments of the invention.

[0027] **Figure 22** illustrates variable density structures, according to embodiments of the invention.

[0028] **Figure 23** illustrates, in cross-section, a multilayered acoustic chamber wall, according to embodiments of the invention.

[0029] **Figure 24** illustrates a distribution of variable density structures in a temple of an eyewear device, according to embodiments of the invention.

[0030] **Figure 25** illustrates an exploded perspective view of a personal projection speaker system in a temple of an eyewear device, according to embodiments of the invention.

[0031] **Figure 26** illustrates an external sound reflector cover, according to embodiments of the invention.

[0032] **Figure 27-28** illustrate additional external sound reflector covers and acoustic gain, according to embodiments of the invention.

[0033] DETAILED DESCRIPTION

[0034] In the following detailed description of embodiments of the invention, reference is made to the accompanying drawings, in which like references indicate similar elements, and in which is shown by way of illustration, specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those of skill in the art to practice the invention. In other instances, well-known circuits, structures, and techniques have not been shown in detail in order not to obscure the understanding of this description. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the invention is defined only by the appended claims.

[0035] In one or more embodiments, methods, apparatuses, and systems are described, that provide modularization of an eyewear system for a user. As described in the description of embodiments below, various combinations and configurations of electronics are taught for incorporation into eyewear devices. Some electronics configurations are removably couplable to an eyewear device. In some embodiments, an electronics configuration is built-into an eyewear device. In yet other embodiments, a behind the neck module assembly is releasably couplable with an eyewear device. In various embodiments, the modularized reconfigurable eyewear devices provide information to a user through the eyewear device. As used in this description of embodiments, information includes streaming audio in the form of music, information also includes parameters of a user's biology (e.g., biometrics of physiology, biomechanics, etc.) such as, but not limited to; heart rate, breathing rate, posture, steps, cadence, etc. Information also includes notifications and information of interest to a user from digital applications embedded in a mobile computing platform (i.e., smart phones, Internet of Things (iOT) devices, etc.) or from environmental or spatial context based on external sensory information such as, but not limited

to; geographical positioning data, or information on a vehicle that a user is using such as; revolutions per minute (RPM) of a bicycle, engine parameters such as RPM, oil pressure, cooling water temperature, wind speed, depth of water, air speed, etc. In various embodiments, information is presented to a user through an eyewear device by, for example, an audio broadcast that a user hears and a video broadcast to a display that the user sees in the eyewear device, or sees as an image as projected onto a pupil of the user's eye. Thus, information is to be given an expansive meaning within the scope of embodiments taught herein.

[0036] **Figure 1** illustrates a modular reconfigurable eyewear system, according to embodiments of the invention. With reference to **Figure 1**, a modularized eyewear device is shown in perspective view at 100. The modularized eyewear device 100 has a frame chassis 102. In various embodiments, the frame chassis 102 is ophthalmically constructed to provide frame rim portions that hold lens 120 and lens 122. The lens 120 and 122 can provide any of the functions that eyewear devices provide, such as but not limited to, a safety glass lens, a prescriptive lens, a sunglass lens, a welding glass lens, etc. An eyewear device can also contain a single lens instead of the dual lens illustrated. In some embodiments, a nose pad is provided, thereby providing a cushion for the contact zone with a user's nose. In some embodiments, the nose pad is made from a compliant material such as silicon rubber.

[0037] A temple 104 (left temple) and a temple 114 (right temple) are coupled to the frame chassis 102. The temples 104 and 114 can be flexibly coupled to the frame chassis 102, with hinges as shown in the figure or the temples 104 and 114 can be provided with a fixed orientation relative to the frame chassis 102.

[0038] In various embodiments, one or more temples (104 and 114) and the chassis frame 102 can be fitted with electronics as described below. Within the view of 100, a left

temple insert module (TIM) 106 is configured with the left temple 104 and a right temple insert module (TIM) 116 is configured with the right temple 114. Temple insert modules (TIMs) are described more fully in conjunction with the figures below.

[0039] With continued reference to **Figure 1**, a modularized eyewear device is shown in exploded view at 130. A frame chassis 132 is ophthalmically constructed to encircle a lens 140 and a lens 142 with a frame rim thereby securing the lens 140 and the lens 142 thereto. A brow bar 146 is fastened to the frame chassis 132 in various ways, via assembly fasteners, adhesive, etc. A left temple 144 includes a left temple connector 152 which is rotatably coupleable with a left chassis connector 150. Together, the left chassis connector 150 and the left temple connector 152 form a rotatable mechanical and electrical connection between the chassis 132 and the left temple 144, thereby providing one or more electrical pathways to connect the frame chassis 132 to the left temple 144. Similarly, a right temple 134 is rotatably coupleable to the frame chassis 132 through a right hinge assembly 148.

[0040] Note that in some embodiments, a modularized eyewear device is configured such that each temple can be removed from its hinge via an electrical/mechanical connector having one or more electrical contacts, not shown for clarity in the illustration. These electrical contact points can be made using, for example, pins, points, pads, slots, contact devices, etc. For example, the line indicated at 154 demarcates the mating of the right temple connector with the right temple 134. Similarly, the line indicated at 156 demarcates the mating of the left temple connector 152 with the left temple 144.

[0041] Through the provision of electrical/mechanical connectors between each temple, e.g., 134, 144 and the frame chassis 132 the temples are interchangeable with the eyewear device. This functionality permits a user to interchange one temple with another. Different

temples can be configured with different electronics to provide different functionality as described herein. Either temple can be configured to accommodate various electronics configurations. For example, in one or more embodiments, the right interchangeable temple accommodates an electronics package that can include one or more of; a biometric sensor, a biomechanical sensor, an environmental sensor, a temperature sensor, an acoustic sensor, a motion sensor, a light sensor, a touch sensor, a proximity sensor, a velocity sensor, an acceleration sensor, a rotation sensor, a magnetic field sensor, a global position system (GPS) receiver, cables, microphones, a micro speaker, a source of electrical power (battery), a camera, a micro display, a heads-up display (HUD) module, a multiaxis inertial measurement unit, a wireless communications system. Note that a TIM can also contain the electronics package and sensor(s) described above. In various embodiments, one or more wireless communication system are provided that utilize for example; near-field communications (NFC) using the industrial-scientific-medical (ISM) frequency of 13.56 MHz, the Adaptive Network Topology (ANT) ANT+ wireless standard, wireless communications using a Bluetooth standard, a Bluetooth low energy standard (BLE), wireless communication using a Wi-Fi standard, and wireless communication using mobile telephone standards such as for example the 3G, 4G, Long Term Evolution (LTE), 5G, etc. standard or other wireless standards. In some embodiments, electrical pathways from the electronics exit a temple via a sheath cavity and travel into a temple sheath and continue into a brow bar sheath cavity. The right interchangeable temple contains a hinge-connector 148 that fastens to the brow bar 146 and chassis frame 132.

[0042] In one or more embodiments, the right interchangeable temple attaches to the front of the frame chassis via a hinge-connector that allows for power and data transferred to the left interchangeable temple through the modular brow bar. The hinge-connector mechanically

interlocks with the frame chassis and allows for power/data connectivity with electrical pin conductors. In one or more embodiments, when positioned in the open direction of wearing, the hinge-connectors sense the open state of the device allowing for power or data transfer. When in the closed position (temples folded inward), the hinge-connector in conjunction with signals received from one or more of proximity sensors and motion sensors will allow the system to sense the user-device interaction state and will deactivate the power or data transfer. Furthermore, in the open position, in some embodiments a sensor, such as, but not limited to, a proximity sensor, can detect when the device is being worn by a user and can thus operate in its active (ON) state. This function leads to reduced power consumption when folded and stowed and can lead to automatic power up while a user wears the device on his or her head. In addition to switchable data or power transfer from the hinge-connector, the hinge-connector can provide flexible circuits and wired micro-connectors that provide steady uninterrupted power and or data transfer.

[0043] In some embodiments, it is convenient to route electrical pathways within a volume of the brow bar 146. In some embodiments, the brow bar 146 is constructed to provide a channel along its length, within which the electrical pathways are routed. Thus, the brow bar 146 provides one or more sheaths, channels, etc. along its length within which electrical pathways and sensors can be contained. Examples of electrical pathways are, but are not limited to; wires, printed circuit board, flexible printed circuit board, etc. In various embodiments, it is advantageous to mount one or more sensors to the brow bar 146, thereby making an electrical sub-assembly for the frame chassis 132. In some embodiments, additional electrical pathways from the frame chassis 132 are joined with the electrical pathway contained in the brow bar 146. In some embodiments, a flexible electronic circuit is adhered to the underside top face of the

brow bar and exits the brow bar via the left and right sheath cavities. Alternatively, or in combination, fully embedded flexible electronics may be cast into the brow bar with integrated contact points exiting the brow bar near each hinge. These integrated contact points on both sides of the brow bar allow transmission of data or power when in contact with the integrated contact points of the right and left temple. In addition to facilitating connection to electronics, the brow bar can conceal an optional pupil module by a securing flange and allows the user to view a microdisplay via the brow bar pupil aperture.

[0044] In similar fashion the left temple is configured as a left interchangeable temple connected to the front frame of the eyewear with a left hinge-connector. In various embodiments, the left interchangeable temple can contain the same electronics configuration/functionality as the right interchangeable temple or interchangeable temples can contain different electronics configurations and different functionality.

[0045] With continued reference to **Figure 1**, a left temple 164 and right temple 174 are configured as shown at 160. Each of the temples 164 and 174 contain electronics which are configured to provide information and functionality to a user of the eyewear system. As shown at 160, the left temple 164 has a temple door (not shown) removed thereby exposing an electronics package indicated at 186. The temple door secures and protects electronics from environmental exposure and hazard. The temple door is secured to the temple assembly with suitable mechanical fasteners for a given application. In some embodiments, the temple door provides a rating with respect to water intrusion via an **IP** Code from International Protection Marking IEC standard 60529. A source of electrical power (battery) is illustrated at 184 and an audio speaker and port is illustrated at 182. The audio speaker and port 182 is generally located on a posterior end of a temple and in some embodiments is an integrated directional projection

speaker that privately directs sound to a user's ear. Projection stereo speakers can communicate various audio signals to the user, such as but not limited to, voice prompts, streaming music, smart audio assistance, data, etc. Notably, the projection speaker design does not occlude the user's ear. Thus, the user can hear far field sounds and the far field sounds are not degraded as they are with currently available earbud style headphones that occlude a user's ear.

[0046] The right temple 174 is also provided with an electronics package (not shown in the view) contained within the right temple 174. The right temple is provided with an audio speaker with audio speaker port 184, which can be an integrated directional projection speaker. In one or more embodiments, the right temple 174 is configured to accommodate an external assembly 190 that contains a micro display assembly 192. Similarly, the left temple could be configured for the external assembly 190 and the micro display assembly 192.

[0047] In various embodiments, a micro display assembly, such as 192, is a head up display (HUD) Pupil™ Optics Module that houses the optics, electronics, and micro display that form the optical system. The pupil mechanism also may house cables, flexible circuit boards, or wires which exit from a housing into an electronics contact pathway. In one or more embodiments, these electrical pathways are connected to a side of the left temple 174 to enable the user with a see-through head up display external accessory to enhance a visual component of a mobile assisted and/or augmented reality experience.

[0048] In one or more embodiments, wiring which exits the brow bar is concealed in the right and left sheaths of the temples and enters into the right and left temples via the sheath cavities, thereby protecting the wiring from environmental hazards. The area near the contact pathway may also accommodate motion mechanisms for customizing the interpupillary distance of the head-up micro display module.

[0049] In different embodiments, the front frame portion, such as 102 or 132 (**Figure 1**) or any similar structure in the figures below, and the right and left temple portions, such as 104, 114, 134, 144, 164, 174 (**Figure 1**) or any similar structures in the figures below, can be part of a set of interchangeable front frame portions and temple portions each having the same or different combinations of devices, accessories, capabilities and/or functions. At least one of an electronics board, microphones, speakers, battery, camera, heads-up display module, wireless Wi-Fi radio, GPS chipset, LTE cellular radio, multiaxis inertial measurement unit, motion sensor, touch sensor, light and proximity sensors, etc. can be included in desired combinations. Electronics can be further included that permit a user to perform at least one of; wirelessly connecting to a cellular service, a smart phone, a smart watch, a smart bracelet, a mobile computer, and a sensor peripheral. The electronics can further include the ability to; view see-through augmented reality images via a modular head up display (HUD), provide stereo audio content, provide voice and audio notification including music through one or more integrated projection micro-speakers. The front frame electrical contact devices and the temple electrical contact devices can include electrical contact points in or near respective hinge connectors for removable electrical contact with each other for electrically transmitting at least one of; power, electrical signals and data between the temple portions and the front frame portion when the contact points are in an electrically closed position. In some embodiments when assembled together, the front frame hinge connectors, the front frame electrical contact devices, the temple hinge connectors and the temple electrical contact devices can form electromechanical hinges, hinge connectors, assemblies or devices. In some embodiments, system electrical power can be turned off by folding the temple portions into a storage position thereby disconnecting the contact points.

[0050] In some embodiments, at least one of the front frame electronics and the temple electronics can include at least one of a battery, camera, heads-up display module, controller, digital storage electronics, CPU, projection micro-speaker, microphone, wireless Wi-Fi radio, GPS chipset, LTE cellular radio, multiaxis inertial measurement system or unit, and sensory, motion, touch, light, proximity, temperature and pressure sensors, etc.

[0051] In some embodiments, at least one temple can include a temple module insert (TIM) containing selected temple electronics, mounted thereto. In other embodiments, a neck smart cord is electrically connected to a behind the neck electronics module. The neck smart cord has right and left connectors or connector ends for mechanically and or electrically interconnecting the behind the neck electronics module with the right and left temples of an eyewear device.

[0052] **Figure 2** illustrates a reconfigurable component for an eyewear device, according to embodiments of the invention. With reference to **Figure 2** at 200, a temple 202 is provided with an engagement portion 204. A temple insert module, referred to in this description of embodiments as a "TIM" at 210 is configured to be releasably coupleable with the engagement portion 204 of the temple 202. The TIM 210 is installed into the temple 202 as indicated by arrows 212a and 212b. In various embodiments, the engagement portion 204 is accomplished by a mechanical connection, such as but not limited to; press fit, clip, mechanical interlock, hook and loop, magnetic surface, external clamp to temple, flange and mechanical coupling to temple, etc. In yet other embodiments the engagement portion 204 and the TIM 210 utilize magnetic surfaces, thereby holding the TIM 210 secure by magnetic attraction. The form of the engagement portion shown at 204, as well as the form of any engagement portion illustrated elsewhere in the figures presented herein, is given merely for illustration and does not limit

embodiments of the invention. In the view illustrated at 200, the TIM 210 only makes a mechanical connection with the temple 202 no electrical connection is provided between the TIM 210 and the temple 202.

[0053] In some embodiments, the TIM 210 is provided with a speaker and speaker port 214, which can be a micro projection speaker. The speaker provides information to a user through a directed audio broadcast. Note that the speakers provided herein are speakers that are located externally from a user's ear and are therefore not inserted into the user's ear like an earbud is inserted. The TIM 210 is configured with an electronics package that contains a processor, memory, electrical power, and one or more wireless communication protocols that enable the TIM 210 to communicate wirelessly 222 with one or more devices 220. The device 220 can be an external sensor such as, but not limited to; a biometric sensor or a vehicle sensor, a local user device, a network node, such as a wireless router, a remote network, or a remote user device such as a mobile phone accessed through a network. Different sensors, networks, and remote devices are described more fully in conjunction with the figures below.

[0054] Following the architecture of **Figure 2** at 200, in some embodiments, a second temple and a second TIM are provided. The two TIMs in such a system can engage in wireless communication between the device 220 and between themselves as needed to provide a level of design functionality to a user. For example, in one embodiment, a left TIM includes wireless network capability sufficient to communicate with the remote device 220, utilizing a first network protocol. In addition, the left TIM and the right TIM are provided with wireless network capability that supports communication utilizing a second network protocol. In order to conserve electrical power, the first network protocol has a greater range than the second network protocol because a distance between the left TIM and the remote device is greater than a

separation distance between the left TIM and the right TIM (nominally a width of user's head). The architecture illustrated at 200 is referred to as true wireless because there is no wired connection between the left TIM and the right TIM. In one or more embodiments, an audio stream is provided from a user device to a first TIM utilizing a first wireless network. Then a second wireless audio stream is provided from one TIM to the other TIM utilizing a second wireless network in order to provide the audio stream to each of a left and a right projection speakers of the eyewear device.

[0055] The temples and TIMs described at 200 provide reconfigurable components for eyewear devices as described in conjunction with the figures herein. A forward end 206 of the temple 202 is engageable with a frame chassis of an eyewear device as described above with or without a connector between a temple and a frame. Thus, the temple 202 can attain a fixed position relative to a frame chassis or the temple can be rotatably coupled to the frame chassis depending on a give design of the eyewear.

[0056] With reference to **Figure 2** at 250, a temple 252 is provided with an engagement portion 254. A temple insert module, TIM at 260, is configured to be releasably coupleable with the engagement portion 254 of the temple 252. The TIM 260 is installed into the temple 252 as indicated by arrows 262a and 262b. In various embodiments, the engagement portion 204 is accomplished by a combined electrical and mechanical connection. The mechanical connection can be as described in conjunction with 210/204 such as, but not limited to; press fit, clip, mechanical interlock, hook and loop, etc. In yet other embodiments the engagement portion 254 and the TIM 260 utilize magnetic surfaces, thereby holding the TIM 260 secure by magnetic attraction. A number of electrical contacts 280 are provided for illustration with no limitation implied thereby. The electrical contacts 280 mate with corresponding electrical contacts in the

temple 252 thereby providing electrical connection to one or more electrical pathways (not shown) in the temple 252. The electrical pathways within the temple 252 facilitate electrical connection between the TIM 260 and one or more sensors 272 and 274, which can also represent a source of signals provided to a display(s). The sensors 272 and 274 can be acoustic sensors such as microphones or any of the sensors described herein for use in conjunction with electronics packages configured with eyewear devices. In one or more embodiments, one or more of 272 and 274 provide signals to a display such as a HUD.

[0057] In some embodiments, the TIM 260 is provided with a speaker and speaker port 264, which can be a micro projection speaker. The speaker provides information to a user through an open-ear audio broadcast.

[0058] Following the architecture of **Figure 2** at 250, in some embodiments, a second temple and a second TIM are provided, as shown below in **Figure 3**. The two TIMs in such a system engage in wireless communication between the device 220 and between themselves as needed to provide a level of design functionality to a user. The temples and TIMs described at 250 provide reconfigurable components for eyewear devices as described in conjunction with the figures herein. For example, a forward end 256 of the temple 252 is engageable with a frame chassis of an eyewear device as described above with or without a connector between a temple and a frame. Thus, the temple 252 can attain a fixed position relative to a frame chassis or the temple can be rotatably coupled to the frame chassis depending on a given design of the eyewear.

[0059] **Figure 3** illustrates, at 300, multiple reconfigurable components for an eyewear device, according to embodiments of the invention. With reference to **Figure 3** at 300, the left reconfigurable component 250 from **Figure 2** is illustrated with a companion right

reconfigurable component for an eyewear device. A right temple 352 has an engagement portion that is not shown in **Figure 3** but is similar to the engagement portion 254 of the left temple 252. A temple insert module, TIM at 360 is configured to be releasably coupleable with the engagement portion of the temple 352. The TIM 360 is coupled with the temple 352 as indicated by arrows 362a and 362b. In various embodiments, the engagement portion of the temple 352 is accomplished by a combined electrical and mechanical connection. The mechanical connection can be provided as described above in conjunction with 210/204 such as, but not limited to; press fit, clip, mechanical interlock, hook and loop, etc. In yet other embodiments the engagement portion of the temple 352 and the TIM 360 utilize magnetic surfaces, thereby holding the TIM 360 secure by magnetic attraction. Several electrical contacts 380 are provided for illustration with no limitation implied thereby. The electrical contacts 380 mate with corresponding electrical contacts in the temple 352 thereby providing electrical connection to one or more electrical pathways (not shown) in the temple 352. The electrical pathways within the temple 352 facilitate electrical connection between the TIM 360 and one or more sensors 372 and 374. The sensors 372 and 374 can be acoustic sensors such as microphones or any of the sensors or displays described herein for use in conjunction with electronics packages configured with eyewear devices. In various embodiments, the TIM 360 is configured with an electronics package that contains a processor, memory, electrical power, and one or more wireless communication systems using protocols that enable the TIM 360 to communicate wirelessly as indicated by a wireless transmission at 222 with one or more devices 220. In addition, the TIM 360 and the TIM 260 can be configured with wireless communication capability that permits wireless communication between the TIMs as indicated by a wireless transmission at 382. In some embodiments, the TIM 360 is provided with a speaker and a speaker port indicated at 364,

which can be a micro projection speaker. The speaker provides information to a user through an audio broadcast.

[0060] With reference to view 390 of **Figure 3**, electrical connectivity schematics are illustrated for each of TIM 260 and TIM 360. The TIM 260 is electrically coupled to the sensor 272 with an electrical pathway 394. Similarly, the TIM 260 is electrically coupled to the sensor 274 by an electrical pathway 392. The connectivity illustrated between the TIM 260 and the respective sensors constitutes a left temple electrical schematic 384. Note that the left temple electrical schematic 384 can be more complex or less complex that the illustration. Thus, the left temple electrical schematic is provided merely for illustration with no limitation implied thereby.

[0061] Similarly, the TIM 360 is electrically coupled to the sensor 372 with an electrical pathway 398. The TIM 360 is electrically coupled to the sensor 374 by an electrical pathway 396. The connectivity illustrated between the TIM 360 and the respective sensors constitutes a right temple electrical schematic 386. Note that the right temple electrical schematic 386 can be more complex or less complex that the illustration. Thus, the right electrical schematic is provided merely for illustration with no limitation implied thereby.

[0062] The two TIMs in such a system engage in wireless communication between the device 220 and between themselves as needed to provide a level of design functionality to a user. For example, in one embodiment, a left TIM includes wireless network capability sufficient to communicate with the remote device 220, utilizing a first network protocol. In addition, the left TIM and the right TIM are provided with wireless network capability that supports wireless communication as indicated at 382. The wireless communication 382 can be performed with a second network protocol, which is different from that used at 222. In order to conserve electrical power, the first network protocol (222) has a greater range than the second network protocol

(382) because a separation distance between the left TIM 260 and the remote device 220 is greater than a separation distance between the left TIM 260 and the right TIM 360, the latter is nominally a width of user's head and the former can be as much as a distance to a mobile telephone cellular tower.

[0063] **Figure 4** illustrates another reconfigurable modularized eyewear system, according to embodiments of the invention. With reference to **Figure 4**, one or more of sensors, power components, and computational units are distributed throughout an eyewear device, including distributed throughout a frame chassis such as 402. A frame chassis 402 is ophthalmically constructed to encircle lens 440 with frame rims thereby securing the lens 440 thereto. A left temple 404 are a right temple 414 are coupled to the frame chassis 402, thereby forming an eyewear device. The left temple 404 is configured with an engagement portion indicated at 408. A left temple insert module (TIM) 406 is configured as described above to engage with the engagement portion 408, thereby providing both mechanical and electrical connection between the TIM 406 and the temple 404. Similarly, a right temple 426 is illustrated as engaged with the engagement portion of the right temple 414. The TIM 406 contains an audio speaker and audio port indicated at 410 and the TIM 426 contains an audio speaker and audio port indicated at 430. In various embodiments, the audio speakers of 410 and 430 are projection speakers. The eyewear device includes several sensors or display(s), 462, 464, 466, 468, and 470 that are integrated into an electrical pathway that extends from the left temple 404 through the frame chassis 402 to the right temple 414. In various embodiments there can be more sensors or less sensors that those shown in **Figure 4**. The sensors and the locations of the sensors shown in **Figure 4** are provided merely as an illustration and do not limit embodiments of the invention. As described above in conjunction with the previous figures, at least one of the

temple insert modules, 406 and or 426, are provided with a suite of electronics necessary to provide wirelessly connectivity 222 to a device 220.

[0064] In the eyewear device of 400, a high-level view of an electrical pathway schematic is shown at 480. With reference to 480, the left TIM 406 and the right TIM 426 are electrically coupled with sensors 462, 464, 466, 468, and 470 by electrical pathway elements 482, 484, 486, 488, 490, and 492. An electrical pathway element, such as 484, electrically connects the sensor 464. Together, the components shown in 480 provide a modularized reconfigurable set of components for an eyewear device. In one or more embodiments, one or more acoustic sensors are located in at least one of, the frame chassis 402, the left temple 404, and the right temple 414. Thus, acoustic sensors can be located anywhere on a temple (left or right) or a frame chassis of the eyewear device.

[0065] **Figure 5** illustrates, generally at 500, a perspective view and a top view of the modularized eyewear system from **Figure 4**, according to embodiments of the invention. With reference to **Figure 5**, a modularized eyewear device is illustrated in perspective view at 502. A modularized nose pad 504 is releasably couplable as indicated at 506 with the modularized eyewear device 502. Modularization of nose pads permits a user to swap nose pads in order to improve the fit between the eyewear and the user's nose and facial structure. A greater level of comfort can be achieved through modularization of the nose pad of the eyewear device. In addition, other sensors such as a biometric sensor can be provided in the nose pad.

[0066] **Figure 6A** illustrates, generally at 600, a system architecture for a modularized eyewear device, according to embodiments of the invention. With reference to **Figure 6A**, in various embodiments, a modularized reconfigurable eyewear device can contain more than one wireless communication system. In various embodiments, an eyewear device 602 has a high-

level block diagram architecture as shown at 604. In various embodiments, the eyewear device 602 is configured to communicate with a wireless sensor 640 and a mobile device 670. The wireless sensor 640 can contain a single sensor or a plurality of sensors. The wireless sensor 640 can contain any one or more of the sensors listed herein without limitation. For example, the wireless sensor 640 can include a biometric sensor or biomechanical sensor configured for use with a user or a sensor configured for use with a vehicle or building. Some examples of biometric sensors are, but are not limited to; a heart rate monitor, a perspiration sensor, a temperature sensor, etc. Some examples, of vehicle sensors are, but are not limited to; a velocity sensor, an acceleration sensor, a global position system signal, a vehicle engine parameter, a wind speed indicator, etc. Some examples of sensors for use with a building are, but are not limited to; a temperature reading from a thermostat, a water pressure value, etc. Some non-limiting examples of vehicles are, but are not limited to; a scooter, bicycle, an automobile, a boat, a yacht, a watercraft, an airplane, a military vehicle, a wing suit, etc. In some embodiments, data is received at 640 and or 616 from a special use network. An example, of a special use network, given for illustration with no imitation implied thereby, is a National Marine Electronics Association (NMEA) NMEA 2000 network designed for watercraft such as yachts (power or sail). NMEA 2000, also referred to in the art as "NMEA2k" or "N2K" is standardized as International Electrotechnical Commission (IEC) 61162-1. NMEA 200 is a plug-and-play communications standard used for connecting marine sensors and display units within ships, boats, yachts, etc. The mobile device 670 can be any one or more of the mobile devices listed herein without limitation. For example, the mobile device can be a mobile phone, a watch, a wrist band, a bracelet, a tablet computer, a laptop computer, a desktop computer, a vehicle computer, etc.

[0067] The eyewear device 602 has a high-level architecture, represented at 604, that contains a speaker 606, a central processing unit 608, a source of electrical power 610, an acoustic sensor 608, a storage device 614, and a wireless communication system 616. Wireless communication system 616 can contain one or more of the following wireless communication systems, e.g., a near-field communication system 618, a wireless communication system utilizing the Bluetooth communication protocol 620, a wireless communication system utilizing the Wi-Fi communication protocol at 624, a mobile telephone communications protocol 622. The wireless communication protocol designated by LTE at 622 is given merely as an example for wireless devices and does not limit embodiments of the invention. Those of skill in the art will recognize that one or more antennas are included, but not shown for clarity, in the wireless communication system block 616.

[0068] The wireless sensor 640 has a high-level architecture, represented at 642, that includes one or more sensors 644 and a wireless communication system 646. The wireless communications system 646 can be a low data rate communications system such as a near-field communications system, BLE, ANT+, or the like. Or the wireless communication system 646 can be provided as a higher data rate system as required by the sensor(s) 644.

[0069] The mobile device 670 has a high-level architecture, represented at 672, that includes, a central processing unit 674, a source of electrical power 676, storage 678, and one or more wireless communication systems indicated at the block 680. The mobile device 670 can be optionally configured to reach remote networks as indicated by cloud 689. The wireless communication block 680 can include one or more of the following wireless communication systems, e.g., a near-field communication system 682, a wireless communication system utilizing the Bluetooth communication protocol 684, a wireless communication system utilizing the Wi-Fi

communication protocol at 686, and a mobile telephone communications protocol at 688. The wireless communication protocol designated by LTE at 688 is given merely as an example of a communication system for mobile devices and does not limit embodiments of the invention. Those of skill in the art will recognize that one or more antennas are included, but not shown for clarity, in the wireless communication system block 680 and 642.

[0070] In some embodiments, the wireless sensor system 642 and the eyewear device 602 are configured initially by a user of the mobile device 670 and the mobile device user interface as indicated by pathways 652a and 652b. In operation, the eyewear device 602 receives data wirelessly as indicated at 650 from a suitable wireless communication system, such as for example a near-field communications system 618. Wireless data obtained from the wireless sensor system 642 can be transmitted to the user device 670/672 by another wireless communication system such as indicated at 654. The wireless communication indicated at 654 can be accomplished with a higher data rate channel using for example Bluetooth protocol at 620/684, or Wi-Fi protocols at 624/686, or mobile phone communications protocol indicated at 622/688. Data transferred from the eyewear device 602 can be stored and analyzed on the user device 670 in various embodiments and with different application programs.

[0071] **Figure 6B** illustrates, generally at 690, wireless networks corresponding to the system architecture for the modularized eyewear device of **Figure 6A**, according to embodiments of the invention. With reference to **Figure 6B**, the wireless communication block 616 can connect to a plurality of devices as shown in the figure. For example, one or more wireless sensors 640 can connect to the wireless communication block 616 utilizing low data rate near-field communication networks as indicated at 618. One or more user devices 670 can communicate wirelessly with the wireless communication block using Bluetooth communication

protocols as indicated at 620. One or more wireless nodes, such as Wi-Fi nodes indicated at 692 can communicate wirelessly with the wireless communication block 616 as indicated at 624. One or more remote networks 694 can communicate wirelessly with the wireless communication block 616 using cellular communication protocols as indicated at 622. Thus, a reconfigurable eyewear device can contain one or more of the wireless communication systems shown in the illustration at 690. An eyewear device can be reconfigured for different wireless communication by swapping for example one TIM module for another. Alternatively, one or more temples can be swapped with a frame chassis as described above to provide customized functionality to an eyewear device.

[0072] **Figure 7** illustrates, generally at 700, another system architecture for the modularized eyewear device of **Figure 4**, according to embodiments of the invention. With reference to **Figure 7**, the wireless communication block 616 of the eyewear device 602 can be configured for cellular communications via mobile telephone networks directly without needing a user device to function as an intermediary. For example, in 700, the eyewear device 602 is configured for communication with a remote device 702, which can be a mobile telephone, by a wireless communication system 622 thereby connecting with the remote device 702 directly through the external networks indicated by cloud 704. No intermediary user mobile device is needed to support this line of communication. Such a configuration of an eyewear device allows a user of the eyewear device to make telephone calls from the eyewear device with the assistance of an interface, such as a voice interface, one or more tactile interface like buttons, etc. The voice interface provides command and control of the telephone call by converting the user's voice signals to commands that the device uses to facilitate the operation of the wireless network

for the telephone call. Examples of such commands are, but are not limited to; select caller, place call, volume up, volume down, end call, etc.

[0073] **Figure 8** illustrates, generally at 800, a block diagram of a temple insert module (TIM), according to embodiments of the invention. With reference to **Figure 8**, as used in this description of embodiments, a TIM can be based on a device such as a computer, in which embodiments of the invention may be used. The block diagram is a high-level conceptual representation and may be implemented in a variety of ways and by various architectures. Bus system 802 interconnects a Central Processing Unit (CPU) 804 (alternatively referred to herein as a processor), Read Only Memory (ROM) 806, Random Access Memory (RAM) 808, storage 810, audio 822, user interface 824, and communications 830. RAM 808 can also represent dynamic random-access memory (DRAM) or other forms of memory. The user interface 824 can be in various embodiments a voice interface, a touch interface, a physical button, or combinations thereof. It is understood that memory (not shown) can be included with the CPU block 804. The bus system 802 may be for example, one or more of such buses as a system bus, Peripheral Component Interconnect (PCI), Advanced Graphics Port (AGP), Small Computer System Interface (SCSI), Institute of Electrical and Electronics Engineers (IEEE) standard number 994 (FireWire), Universal Serial Bus (USB), universal asynchronous receiver-transmitter (UART), serial peripheral interface (SPI), inter-integrated circuit (I2C), etc. The CPU 804 may be a single, multiple, or even a distributed computing resource. Storage 810 may be flash memory, etc. Note that depending upon the actual implementation of a TIM, the TIM may include some, all, more, or a rearrangement of components in the block diagram. Thus, many variations on the system of **Figure 8** are possible.

[0074] Connection with one or more wireless networks 832 is obtained via communication (COMM) 830, which enables the TIM 800 to communicate wirelessly with local sensors, local devices, as well as with remote devices on remote networks. In some embodiments, 832/830 provide access to remote voice-to-text conversion systems which can be in remote locations for example cloud based. 832 and 830 flexibly represent wireless communication systems in various implementations, and can represent various forms of telemetry, general packet radio service (GPRS), Ethernet, Wide Area Network (WAN), Local Area Network (LAN), Internet connection, Wi-Fi, WiMAX, ZigBee, Infrared, Bluetooth, near-field communications, mobile telephone communications systems, such as 3G, 4G, LTE, 5G, etc. and combinations thereof. In various embodiments, a touch interface is optionally provided at 824. Signals from one or more sensors are input to the system via 829 and 828. Global position system (GPS) information is received and is input to the system at 826. Audio 822 can represent a speaker such as a projection speaker or projection micro-speaker described herein.

[0075] In various embodiments, depending on the hardware configuration different wireless protocols are used in the networks to provide the systems described in the figures above. One non-limiting embodiment of a technology used for wireless signal transmission is the Bluetooth wireless technology standard which is also commonly known as IEEE 802.15.1 standard. In other embodiments, the wireless signal transmission protocol known as Wi-Fi is used which uses the IEEE 802.11 standard. In other embodiments, the ZigBee communication protocol is used which is based on the IEEE 802.15.4 standard. These examples are given merely for illustration and do not limit different embodiments. Transmission Control Protocol (TCP) and Internet Protocol (IP) are also used with different embodiments. Embodiments are

not limited by the data communication protocols listed herein and are readily used with other data communication protocols not specifically listed herein.

[0076] In various embodiments, the components of systems as well as the systems described in the previous figures (such as a temple insert module (TIM)) are implemented in an integrated circuit device, which may include an integrated circuit package containing the integrated circuit. In some embodiments, the components of systems as well as the systems are implemented in a single integrated circuit die. In other embodiments, the components of systems as well as the systems are implemented in more than one integrated circuit die of an integrated circuit device which may include a multi-chip package containing the integrated circuit

[0077] **Figure 9** illustrates a modularized eyewear device fitted with a behind the neck module assembly, according to embodiments of the invention. With reference to **Figure 9**, at 900, a behind the neck module assembly is fitted to a passive set of eyewear. Passive eyewear indicates that there are no electronics located in the eyewear. Alternatively, the eyewear can be active or powered eyewear, as described herein, configured with electronics packaged into one or more temples or temple insert modules (TIMs). The eyewear has a frame chassis 902 that contains lens 906. Coupled to the frame chassis 902 is a left temple 904 and a right temple 914. The behind the neck module assembly includes a behind the neck electronics pod (ePOD) 924, a left temple interlock 920 a right temple interlock 922, a left smart cord 926 and a right smart cord 928. The left smart cord 926 couples electrically and mechanically the ePOD 924 to the left temple interlock 920 and the right smart cord couples electrically and mechanically the ePOD 924 to the right temple interlock 922.

[0078] The left temple interlock 920 contains an acoustic cavity, an audio speaker, and an acoustic port. The acoustic port for the left audio speaker is indicated at 930. The left smart

cord 926 contains electrical conductors that provide an audio signal for the audio speaker contained within the left temple interlock 920. In one or more embodiments, the audio speaker contained in the left temple interlock is a micro-projection speaker. Similarly, the acoustic port for the right audio speaker is indicated at 932. The right smart cord 928 contains electrical conductors that provide an audio signal for the audio speaker contained within the right temple interlock 922. In one or more embodiments, the audio speaker contained in the right temple interlock is a micro-projection speaker

[0079] In various embodiments, the ePOD 924 contains an electronics unit. The electronics unit contains the electronic components and functionality described herein for a temple insert module (TIM). In other words, the electronics unit is a TIM mechanically and electrically packaged for use in a behind the neck module assembly.

[0080] Electronics units having different electronic configuration and functionality can be swapped in and out of the ePOD in similar fashion to the way different TIMs are swapped into and out of a temple of an eyewear device.

[0081] At 950 a length adjustment is provided to shorten or lengthen the right smart cord and the left smart cord. A behind the neck electronics pod (ePOD) 954 is configured with a left smart cord 956 and a right smart cord 958 exiting the same end of the ePOD 954. Such a configuration of the smart cords 956 and 958 permit a slider 960 to move either away from the ePOD or toward the ePOD. Moving the slider 960 away from the ePOD 954 shortens the available free length of the smart cords 965/958. Moving the slider 960 towards the ePOD 954 increases the available free length of smart cords 956/958.

[0082] In one or more embodiments, in operation when in an "on" state, audio data is streamed to the electronics unit in the ePOD 924 and is directed to the left and right speakers for

broadcast to a user when the behind the neck module assembly is installed on an eyewear device and the user wears the eyewear device.

[0083] **Figure 10** illustrates, generally at 1000, a behind the neck module assembly in perspective view configured with a wearable device, according to embodiments of the invention. With reference to **Figure 10**, a first sensor 1050 is illustrated on the ePOD 924. A second sensor 1052 is illustrated incorporated into the right temple interlock 922. A third sensor 1054 is illustrated incorporated into the left temple interlock 920. The sensors 1050, 1052, and 1054 can be any of the sensors described herein previously described for use in a TIM or directly in electronics built into a temple.

[0084] In the embodiment shown in **Figure 10**, each temple interlock module, i.e., 920 and 922 contains a through hole into which a temple of the eyewear is inserted. In this embodiment, the temple interlock modules 920 and 922 are made from a compliant material such as an elastomer or rubber that permits elongation sufficient for a temple to be inserted therethrough. For example, the left temple interlock 920 contains a through hole 1040 into which the left temple 904 is inserted. The right temple interlock 922 contains a through hole 1042 into which the right temple 914 is inserted. Each of the temple interlocks 920 and 922 are positioned on a pair of compatible eyewear such that each of the speaker ports 930 and 932 are positioned in front of and near to a user's ear. Compatible eyewear is eyewear that is compatible with the mechanical attachment provided by the temple interlocks.

[0085] **Figure 11** illustrates, generally at 1100 and 1150, coupling a temple interlock to a temple according to embodiments of the invention. With reference to **Figure 11**, at 1100 a magnetic temple interlock is illustrated. The magnetic temple interlock includes a magnetic region 1108 on a temple 1102 of an eyewear device. A temple interlock 1104 has a

corresponding magnetic region 1106. In operation, the magnetic regions 1106 and 1108 are brought together, thereby causing the magnetic regions 1106 and 1108 to attract each other which provides a clamping force between the temple interlock 1104 and the temple 1102. A port of an acoustic cavity that contains a speaker is illustrated at 1110.

[0086] Another method of clamping is illustrated at 1150. A temple interlock 1152 contains a slot 1158 between a first side 1156a and a second side 1156b of compliant material. The geometry of 1158, 1156a, and 1156b forms a U shape into which a temple of an eyewear device can be inserted. The elasticity of the material 1152 provides a releasable coupling between the temple interlock 1152 and the temple of the eyewear (not shown). An acoustic port of an acoustic cavity that houses a speaker is indicated at 1154.

[0087] **Figure 12** illustrates, generally at 1200, coupling a behind the neck module to electronics contained within a temple, according to embodiments of the invention. With reference to **Figure 12**, a behind the neck module assembly is coupled to electronics contained within a temple. A portion of a behind the neck module assembly is illustrated with a behind the neck electronics pod (ePOD) 1220, a left smart cord 1222, and a left temple interlock 1210. Any of the electronics contained with a temple, as previously described, can be contained directly within a temple without a temple insert module (TIM). Or alternatively, the electronics contained with the temple can be electronics that are part of a TIM, as indicated optionally at 1204. An acoustic port 1230 is illustrated within the temple 1202. The acoustic port 1230 permits sound generated by a speaker located there behind to be emitted therethrough for hearing by the user. Alternatively, the acoustic port 1230 can be located within the TIM 1204. In various embodiments, a temple 1202 is provided with a number of electrical contacts indicated at 1206. A corresponding number of electrical contacts 1208 are provided in the left temple

interlock 1210. A mechanical interlock between the temple 1202 and the left temple interlock 1210 is provided to make the connection between 1210 and 1202 releasably couplable. In one or more embodiments a magnetic coupling is provided near or at the location of 1206/1208 to provide a releasable coupling thereto.

[0088] **Figure 13** illustrates, generally at 1300, a schematic for combining a behind the neck module assembly with temple electronics, according to embodiments of the invention. With reference to **Figure 13**, an outline of an eyewear device is indicated at 1302. The eyewear device 1302 contains electronics and or electronic pathways in a left temple, a right temple, and a frame chassis. The outline 1302 encompasses the frame chassis, left temple, and right temple. In the system depicted in the figure, an electronics path 1308 extends between the left temple and the right temple of the eyewear device 1302.

[0089] The eyewear device contains a left temple insert module (TIM) 1304 located in a left temple and a right TIM 1306 located in a right temple. A behind the neck module assembly with electronics unit (ePOD) is indicated at 1310. A left smart cord 1312 provides an electrical pathway between the ePOD 1310 and the left TIM 1304. A right smart cord 1314 provides an electrical pathway between the ePOD 1310 and the right TIM 1306. In various embodiments both the left TIM 1304 and the right TIM 1306 are configured with one or more wireless communication network systems that permit wireless communication between the left TIM 1304 and the right TIM 1306 as indicated at 1316. A remote device 1320 is representative of one or more wireless sensors or wireless user devices as described above in conjunction with the preceding figures. Wireless communication 1322 is accomplished between the remote device 1320 and at least one of the left TIM 1304, the right TIM 1306, and the ePOD 1310. All of the

electronic system functionality described above with respect to a TIM is applicable to an ePOD such as ePOD 1310.

[0090] In some embodiments, a left temple is not electrically connected to a right temple, in such as case the electrical path 1308 is removed from the electrical schematic shown in 1300.

[0091] **Figure 14** illustrates, generally at 1400, a user interface on a behind the neck module assembly, according to embodiments of the invention. With reference to **Figure 14**, a behind the neck electronics pod (ePOD) is illustrated at 1402. The ePOD 1402 has a display interface 1404. The display interface 1404 can be implemented in various ways in different embodiments. In some embodiments the user interface is a tactile surface button. In some embodiments, the user interface is implemented with a touch screen, such as a capacitive touch screen presenting one or more controls to a user. In some embodiments, the user interface communicates information to a user. In yet other embodiments, the user interface communicates information to a person who views the user interface 1404 from behind the user who is wearing the ePOD 1402. An example of such information is, but is not limited to, an emoji, mood status, icon, etc. as indicated at 1406.

[0092] **Figure 15** illustrates, generally at 1500, a block diagram for an electronics unit configured for a behind the neck electronics pod (ePOD), according to embodiments of the invention. With reference to **Figure 15**, as used in this description of embodiments, a behind the neck electronics unit can be based on a device such as a computer, in which embodiments of the invention may be used. The block diagram is a high-level conceptual representation and may be implemented in a variety of ways and by various architectures. Bus system 1502 interconnects a Central Processing Unit (CPU) 1504 (alternatively referred to herein as a processor), Read Only Memory (ROM) 1506, Random Access Memory (RAM) 1508, storage 1510, audio 1522, user

interface 1524, and communications 1530. RAM 1508 can also represent dynamic random-access memory (DRAM) or other forms of memory. The user interface 1524 can be in various embodiments a voice interface, a touch interface, a physical button, or combinations thereof. It is understood that memory (not shown) can be included with the CPU block 1504. The bus system 1502 may be for example, one or more of such buses as a system bus, Peripheral Component Interconnect (PCI), Advanced Graphics Port (AGP), Small Computer System Interface (SCSI), Institute of Electrical and Electronics Engineers (IEEE) standard number 994 (FireWire), Universal Serial Bus (USB), universal asynchronous receiver-transmitter (UART), serial peripheral interface (SPI), inter-integrated circuit (I2C), etc. The CPU 1504 may be a single, multiple, or even a distributed computing resource. Storage 1510 may be flash memory, etc. Note that depending upon the actual implementation of a behind the neck electronics unit, the behind the neck electronics unit may include some, all, more, or a rearrangement of components in the block diagram. Thus, many variations on the system of **Figure 15** are possible.

[0093] Connection with one or more wireless networks 1532 is obtained via communication (COMM) 1530, which enables the behind the neck electronics unit 1500 to communicate wirelessly with local sensors, local devices, as well as with remote devices on remote networks. In some embodiments, 1532/1530 provide access to remote voice-to-text conversion systems which can be in remote locations for example cloud based. 1532 and 1530 flexibly represent wireless communication systems in various implementations, and can represent various forms of telemetry, general packet radio service (GPRS), Ethernet, Wide Area Network (WAN), Local Area Network (LAN), Internet connection, Wi-Fi, WiMAX, ZigBee, Infrared, Bluetooth, near-field communications, mobile telephone communications systems, such

as 3G, 4G, LTE, 5G, etc. and combinations thereof. In various embodiments, a touch interface is optionally provided at 1524. An optional display is provided at 1520. Signals from one or more sensors are input to the system via 1529 and 1528. Global position system (GPS) information is received and is input to the system at 1526. Audio 1522 can represent a speaker such as a projection speaker or projection micro-speaker described herein.

[0094] In various embodiments, depending on the hardware configuration different wireless protocols are used in the networks to provide the systems described in the figures above. One non-limiting embodiment of a technology used for wireless signal transmission is the Bluetooth wireless technology standard which is also commonly known as IEEE 802.15.1 standard. In other embodiments, the wireless signal transmission protocol known as Wi-Fi is used which uses the IEEE 802.11 standard. In other embodiments, the ZigBee communication protocol is used which is based on the IEEE 802.15.4 standard. These examples are given merely for illustration and do not limit different embodiments. Transmission Control Protocol (TCP) and Internet Protocol (IP) are also used with different embodiments. Embodiments are not limited by the data communication protocols listed herein and are readily used with other data communication protocols not specifically listed herein.

[0095] In various embodiments, the components of systems as well as the systems described in the previous figures (such as a behind the neck electronics unit) are implemented in an integrated circuit device, which may include an integrated circuit package containing the integrated circuit. In some embodiments, the components of systems as well as the systems are implemented in a single integrated circuit die. In other embodiments, the components of systems as well as the systems are implemented in more than one integrated circuit die of an integrated circuit device which may include a multi-chip package containing the integrated circuit.

[0096] In various embodiments, the descriptions of embodiments provided herein provide reconfigurable components for head wearable devices. Reconfigurable components for head wearable devices include, but are not limited to, removable temples, removable temple insert modules (TIMs), a behind the neck module assembly, an electronics pod ePOD for a behind the neck module assembly and removable electronics units for ePODs.

[0097] In various embodiments, running on the data processing system(s) created with respect to various TIMs (800 in **Figure 8**) or with respect to various behind the neck electronics units (1500 in **Figure 15**) are one or more algorithms that provide useful functionality to a user. These algorithms are described below in conjunction with the following figures as procedures or synonymously methods and it will be understood by those of ordinary skill in the art that the algorithms may be run on hardware that is distributed across the systems in different ways. For example, in some embodiments, the algorithm will run on the hardware contained within a TIM or within a behind the neck electronics unit. In other embodiments, the algorithm or parts of the algorithm will run on a combination of a TIM and a device such as the devices 220, 670, 702, 1320, etc., shown in the figures above, or on a combination of a TIM, a device (220, 670, 702, 1320, etc.), and cloud based hardware and services available through one or more communication networks as described above in conjunction with the preceding figures. Similarly, in other embodiments, an algorithm or parts of the algorithm will run on a combination of a behind the neck electronics unit and a device such as the devices 220, 670, 702, 1320, etc., shown in the figures above, or on a combination of a behind the neck electronics unit, a device (220, 670, 702, 1320, etc.), and cloud based hardware and services available through one or more communication networks as described above in conjunction with the preceding figures.

[0098] **Figure 16** illustrates, generally at 1600, a personal projection micro speaker system (PPMS) in a cross-sectional view, according to embodiments of the invention. With reference to **Figure 16**, a chamber 1602 is defined by an inner surface 1604. A chamber wall 1608 has an outer surface 1606 and an acoustic port 1610. A micro speaker 1612 is mounted within the chamber 1602 and is configured to receive electronic signals which are then converted into airborne acoustic signals by a moving surface of the micro speaker 1612. Airborne acoustic signals are equivalently referred to in the art as "sound waves," which are indicated at 1614. The terms "airborne acoustic signals" and "acoustic signals," "audio signals," "sound waves," etc. are used synonymously in this description of embodiments. Acoustic signals 1614 are directed by the system of 1600 toward a user's ear indicated at 1616 to provide a personal listening experience for the user, while at the same time, minimizing the acoustic signals 1614 that are audible to other people proximate to the user. The chamber 1602 is also referred to herein synonymously as a micro chamber or a micro acoustic chamber, etc. All such terms are used interchangeably in this description of embodiments. The micro speaker 1612 is refereed to herein synonymously as a micro-projection speaker or simply a speaker. It will be understood by those of ordinary skill in the art that the chamber is a small chamber designed to house a small speaker in order to provide a personalized listening experience to a user through a personal projection micro speaker system (PPMS).

[0099] An end view of the PPMS system is illustrated at 1650. Note that the outer dimensions of the chamber wall 1608 are nominally indicated in **Figure 16** as; width "W," height "H," and length "L." In various embodiments, the chamber 1602 can be sized as needed for the various applications in which PPMS systems are used. Thus, the chamber dimensions are qualitative in nature and are not meant to limit embodiments of the invention. No absolute value

or relative absolute values for dimensions of the chamber should be inferred therefrom. For example, PPMS systems are used within a temple of an eyewear device, a temple insert module (TIM) of an eyewear device, or in a temple interlock used in conjunction with a behind the neck module as described in conjunction with the figures above and are configured as needed for those applications. Note that PPMS systems can be incorporated into eyewear devices that have removable components and PPMS systems can be incorporated into eyewear devices that are configured with non-removable components. In various embodiments, the acoustic signals that are delivered through the PPMS systems are provided in stereo mode or in monoaural mode.

[00100] The inner surface 1604 forms a generally concave surface with respect to the speaker 1612. In some embodiments, the surface is generally parabolic. In other embodiments, the chamber is generally rectangular is shape. Within the description of embodiments presented herein, various chambers are illustrated with different interior shapes. These different shapes are provided as illustrations and do not limit embodiments of the invention. Note also that a chamber such as 1602 can be divided into multiple chambers where each chamber is configured with one or more micro speakers. There can be for example, in some embodiments, a first chamber that houses a speaker(s) used to generate a low range of acoustic frequencies and a second chamber that houses a speaker(s) used to generate a higher range of acoustic frequencies. In some embodiments, there are multiple chambers in which one or more chambers do not have a speaker installed therein and one or more chambers that do have a speaker(s) installed therein.

[00101] The chamber wall 1608 is illustrated in **Figure 16** with one layer. However, in various embodiments, a chamber is made with multiple layers and the multiple layers can be provided with different acoustical properties. For example, in one or more embodiments, a material for the chamber wall 1608 and the inner surface 1604 are selected during manufacture

to provide a high degree of acoustic reflectivity to incident acoustic energy, thereby serving to reflect and to concentrate emission of acoustic signals 1614 through the acoustic port 1610. Examples of some materials with a high degree of acoustic reflectivity and hypoallergenic properties are, but are not limited to; plastics, such as, thermoplastics, acrylonitrile butadiene styrene (ABS), cellulose acetate, polyamide, nylon, polycarbonate, carbon epoxy resin, metals, including titanium, aluminum, etc. Temples, TIMs, temple interlock devices can be made using injection molding manufacturing techniques. Thermoplastics can also be used in injection molding processes to make the temples, TIMs, or temple interlock devices. Plastics such as Acetate are used in some embodiments to make the temples, TIMs, or temple interlock devices described herein. In some embodiments, the outer surface 1606 is coated with a layer of material that is designed to absorb vibrational energy, thereby isolating a user from undesirable vibrations of the chamber 1608 which can be generated by the speaker 1612. Such materials are characterized by a high mechanical loss factor and a low Young's modulus. Examples of some materials that absorb vibrational energy are, but are not limited to an elastomer, polyurethane foam, melamine foam, butyl rubber, halobutyl rubber, etc.

[00102] **Figure 17** illustrates, generally at 1700, another personal projection micro speaker system, in a cross-sectional view, according to embodiments of the invention. With reference to **Figure 17**, a chamber wall 1708 has an inner surface 1704 and an outer surface 1706. The inner surface 1704 defines a chamber 1702, within which a speaker 1712 is mounted. In various embodiments, the speaker 1712 is mounted to an inner surface 1704 of the chamber wall 1708 with mounts that are not shown in order to maintain clarity in the illustration. The chamber wall 1708 has an acoustic port 1710 for the emission of acoustic signals 1714.

[00103] In operation, the micro speaker 1712 is configured to receive electronic signals which are then converted into airborne acoustic signals by a moving surface of the micro speaker 1712. The inner surface 1704 together with the acoustic port 1710 concentrate the acoustic signals 1714 in a direction of a user 1716. A direction α indicated at 1718, of the acoustic signals relative to the user 1716, is measured from a reference 1720. Note that α can span a range of angles and is not limited to those angles shown in the figures. **Figure 16** illustrates α equal to approximately zero. While **Figure 17** illustrates α nominally in the range of 0 to 90 degrees. Preferably, α is selected in light of a given geometry of the system 1700 in relationship to placement on a user's head.

[00104] An end view "A," corresponds to the cross-sectional view in 1700 and illustrates an end view of the eyewear device that the PPMS system is embedded into. The system can be embedded into a temple of the eyewear device, a temple insert module (TIM) of the eyewear device, a temple interlock module, etc.

[00105] **Figure 18** illustrates, generally at 1800, a personal projection micro speaker system utilizing multiple speakers in a cross-sectional view, according to embodiments of the invention. With reference to **Figure 18**, a chamber wall 1808 has an inner surface 1804 and an outer surface 1806. The inner surface 1804 defines a chamber 1802, within which, speakers 1812a through 1812b are mounted. In various embodiments, the speakers 1812a through 1812b are mounted to the inner surface 1804 of the chamber wall 1808 with mounts that are not shown in order to maintain clarity in the illustration. The chamber wall has an acoustic port 1810 for the emission of acoustic signals 1814.

[00106] In operation, the micro speakers 1812a through 1812b are configured to receive electronic signals which are then converted into airborne acoustic signals by moving surfaces of the micro speakers 1812a through 1812b. The inner surface 1804 together with the acoustic port 1810 concentrate the acoustic signals 1814 in a direction of a user 1816. A direction α indicated at 1818, of the acoustic signals relative to the user 1816, is measured from a reference 1820. Note that, as described above in conjunction with the preceding figures, α can span a range of angles and is not limited to those angles shown in the figures. For example, **Figure 16** illustrates α equal to approximately zero. **Figure 17** and **Figure 18** illustrates α nominally in the range of 0 to 90 degrees. Preferably, α is selected in light of a given geometry of the system 1700 in relationship to placement on a user's head.

[00107] A symbol "N," on 1812b, indicates a general number of speakers. One or more speakers form a speaker arrangement and are provided within the chamber 1802 as described above. Note that the speakers are represented on the figures herein with a rectangular shape, however no limitation is implied thereby. In various embodiments, a speaker(s) can have a square shape, a rectangular shape, a round shape, etc. Speakers used in the embodiments taught herein are typically referred to in the art as electrodynamic speakers. Some non-limiting examples of speakers that are suitable for use herein are, but are not limited to; a Micro-Electro-Mechanical Systems (MEMS) speaker, high performance, high fidelity and lo distortion micro-speakers, etc.

[00108] **Figure 19** illustrates, generally at 1900, a personal projection micro speaker system on a user, according to embodiments of the invention. With reference to **Figure 19**, an

eyewear device 1904 is configured with the personal projection micro speaker system and is shown worn by a user 1902. In the configuration of 1900, the PPMS system is incorporated into a temple of the eyewear device or into a TIM. Acoustic signals 1906 are concentrated and emitted from a chamber of the PPMS system and are incident upon the user's ear at 1908. The geometry of the PPMS system together with an angle α are selected during the design of the system 1900 to project the acoustic signals toward the user's ear canal. Thus, a maximum amount of desired acoustic signals are delivered to the user's ear by the system of 1900.

[00109] **Figure 20** illustrates, generally at 2000, an internal surface of an acoustic chamber, according to embodiments of the invention. With reference to **Figure 20**, an eyewear device 2004 has a PPMs system embedded therein at 2006. An enlarged view of 2006 is illustrated in cross-section at 2050. In various embodiments, the chamber 2052 is configured with an acoustic reflecting surface 2054 having a generally parabolic shape. One or more speakers are positioned at or about approximately the focus 2056 of the generally parabolic shape of the concave sound reflecting surface 2054. In operation, sound waves are directed towards or into the surface 2054 which then reflects and concentrates the sound waves into a generally parallel column of sound waves which travel away from the surface 2054 out the audio port 2060 in the direction of the user's ear canal (for example 1908 in **Figure 19**).

[00110] **Figure 21** illustrates, generally at 2100, an acoustic chamber curved surface of general shape in a cross-sectional view, according to embodiments of the invention. With reference to **Figure 21**, a chamber wall 2108 has an inner surface 2104 and an outer surface 2106. The inner surface 2104 defines a chamber 2102, within which a micro speaker arrangement 2112 is mounted. In various embodiments, the micro speaker arrangement 2112 is

mounted to an inner surface 2104 of the chamber wall 1708 with mounts that are not shown in order to maintain clarity in the illustration. The chamber wall has an acoustic port 2110 for the emission of acoustic signals 2114.

[00111] In operation, the micro speaker arrangement 2112 is configured to receive electronic signals which are then converted into airborne acoustic signals by a moving surface of the micro speaker arrangement 2112. The inner surface 2104 together with the acoustic port 2110 concentrate the acoustic signals 2114 in a direction of a user 2116.

[00112] In various embodiments, the chamber 2102 is configured with an acoustic reflecting surface 2104 having a generally parabolic shape. One or more speakers forming a micro speaker arrangement 2112 are positioned at or about approximately the focus 2114 of the generally parabolic shape of the concave sound reflecting surface 2104. The shape of the surface is indicated by $f(x, y, z)$ and is a generally curved shape, of which, 2104 is a representation of one or more embodiments and does not limit embodiments of the invention. In operation, sound waves are directed towards or into the surface 2104 which then reflects and concentrates the sound waves 2118 into a generally parallel column of sound waves which travel away from the surface 2104 and out the audio port 2110 in the direction of the user's ear canal as represented by 2116.

[00113] **Figure 22** illustrates, generally at 220, variable density structures, according to embodiments of the invention. **Figure 23** illustrates, generally at 2300, in cross-section, a multilayered acoustic chamber wall, according to embodiments of the invention. **Figure 24** illustrates, generally at 2400, a distribution of variable density structures in a temple of an eyewear device, according to embodiments of the invention. Referring collectively to **Figure 22**

through **Figure 24**, in various embodiments, each PPMS system used in conjunction with an eyewear device can have a range of materials with varying material properties in order to provide for both good reflection and emission of acoustic signals in a direction of a user's ear canal, as well as attenuation of acoustic energy or attenuation of vibrational energy in a different direction. For example, a temple portion or a TIM, of an eyewear device, can be constructed with a region of vibration damping material between the speaker arrangement and a front frame portion of an eyewear device. For example, in **Figure 22** vibration damping material is indicated by 2208 extending from an acoustic chamber 2204 forward to a front frame section 2202. Similarly, in **Figure 24**, a temple portion 2410 is forward of an acoustic chamber portion 2404. An acoustical property, ρ_1 indicated at 2412, such as a density of the temple portion 2410 is selected to be lower than an acoustical property, ρ_{AC} indicated at 2406, such as a density of the chamber portion 2404 housing the speaker arrangement of the PPMS system, the relationship between densities is given by the equations at 2424. Such vibration damping material(s) 2412 minimizes transmission of mechanical vibration forward of the speaker arrangement, thereby reducing the effects of mechanical vibration noise on sensors that might be located in such forward sections. In addition thereto, such vibration damping material attenuates vibration through the eyewear device which might annoy a user. Vibration damping material will also attenuate leakage of acoustic signals along unwanted forward directions of the eyewear device.

[00114] Similarly, a temple portion or a TIM, of an eyewear device, can be constructed with a region of vibration damping material between the speaker arrangement and a rear temple portion of an eyewear device. An acoustical property, ρ_2 indicated at 2422, such as a density of the rear temple portion 2420 is selected to be less than an acoustical property, ρ_{AC} indicated at

2406, such as a density of the chamber portion 2404 housing the speaker arrangement of the PPMS system, the relationship between densities is given by the equations at 2424. Such vibration damping material minimizes transmission of mechanical vibration energy in a direction rear of the speaker arrangement, thereby reducing the effects of mechanical vibration noise on sensors that might be located in such rear sections. In addition thereto, such vibration damping material attenuates vibration through the eyewear device which might annoy a user, such as tickling a user's ear. Vibration damping material will also attenuate leakage of acoustic signals along unwanted directions.

[00115] A chamber wall of a PPMS system can be made from layers, as indicated in the cross-section A-A displayed in **Figure 23**. In various embodiments, a chamber 2302 utilizes an inner layer 2308 that provides an inner surface 2304 made with a material that provides a high degree of acoustic reflectivity thereby enhancing sound concentration, emission, and projection of acoustic signals to a user's ear. An outer layer 2310 that is coupled to the inner layer 2308 can be made from a material selected to absorb and attenuate acoustic energy. Materials that provide a high degree of acoustic reflectivity are characterized by a density that is large, as described above. Materials that provide for acoustic absorption are characterized by a density that is low, some of which are described above. In one or more embodiments, the relationship between layers of the chamber are given by equations 2424 (**Figure 24**). A speaker arrangement 2312 is mounted to the chamber wall 2304 with mounts 2314a and 2314b. Mounts 2314a and 2314b can provide vibration isolation between the speaker 2312 and the chamber wall 2303, thereby minimizing vibrational energy that is imparted to the chamber wall 2304 when the speaker 2312 is generating acoustic signals. In some embodiments, an outer layer 2310 of one or more of; an acoustic chamber 2404, a forward temple portion 2410, and a rear temple portion

2420 is made from a plurality of layers, each having an acoustical property which can be different, one from the other, as indicated at 2208 (**Figure 22**) by: $\{\rho_1, \rho_2, \rho_3, \ldots \rho_N\}$, where ρ_1 represents a material property of a first layer up to an N^{th} layer represented by ρ_N. Thus, material properties are made to vary, in some embodiments in a non-linear way in an eyewear device in order to maximize projection of the acoustic signals to the user's ear canal. Note that PPMS systems are designed and intended to concentrate and to project acoustic signals, e.g. 2206 (**Figure 22**), in the direction of the user's ear and to attenuate acoustic energy and vibration in other directions in order to provide a comfortable and personal listening experience to the user.

[00116] In addition to the inner structural design of the acoustic chamber, the material of the inner wall of the temples that house the electronics and sealed micro speakers are utilized to enhance the directionality of the audible sound that is being emitted to the user. The inner wall material of the overall temple or TIM enclosure can have a variation of its acoustical properties (e.g., density, elastic moduli of elasticity, etc.) to maximize the dampening and reflectivity effects of sound waves emitted by the micro speakers. These materials can have a non-linear variation to optimize the sound wave directionality characteristics with consideration of the location of the material with respect to the ear canal. For example, the material distal to the ear canal (i.e., proximal to the front of the frame of an eyewear device) can have increased dampening properties and the zone that encloses the speaker box (acoustic chamber) and micro speaker (proximal to the ear canal) is designed to increase the sound reflectivity to enhance emission of acoustic energy from the acoustic chamber.

[00117] The dampening effect of material proximal to the front of a frame minimizes mechanical vibration that can translate to leaked sound resulting from, for example, the resonance of the enclosed speaker while emitting audible sound. Furthermore, a layer of damping material can act as an insulator to minimize the tactile sensory effect that such vibrations cause on the listener's body upon contact with the device while being worn. The material layer, or layering that is utilized in the surrounding zone of the micro speaker enclosure can maximize the reflectivity of the audible sound emitted and focally direct the sound to the listener's ear canal. The combination of the variable density material layering in combination with the design of the sealed acoustic chamber maximizes directionality of the projected sound. The material towards the exterior of the temple is also designed to act as an isolation element to avoid audible sound leakage through the rest of the frame.

[00118] **Figure 25** illustrates, generally at 2500, an exploded perspective view of a personal projection micro speaker (PPMS) system in a temple of an eyewear device, according to embodiments of the invention. With reference to **Figure 25**, in one embodiment, a group of components of a temple of an eyewear device that is adapted to house a PPMS system is illustrated. Although described in terms of a right temple, those of ordinary skill in the art will recognize that the description applied to **Figure 25** is applicable to a left temple as well.

[00119] A right temple body 2508 is configured to receive a speaker 2510. A right temple cover 2507 is configured to mate with the right temple body 2508. A right acoustic chamber is formed by a segment 2520 of the right temple body 2508, a segment 2522 of the right temple cover and the right chamber cover 2509. The right chamber cover 2509 provides closure between the right temple body 2508 and the right temple cover 2507. In one or more embodiments, a speaker mount is used to fasten the speaker 2510 to the right temple body 2508.

In one embodiment, in a non-limiting example, double sided tape 2504 is used as a speaker mount. In one embodiment, in a non-limiting example, a speaker stabilizer 2505 is located between the speaker 2510 and the right temple cover 2507. In one embodiment, in a non-limiting example, the speaker stabilizer is made using Ethylene-Vinyl Acetate (EVA) foam. In one embodiment, in a non-limiting example, the right chamber cover 2509 is secured to the right temple 2508 with double sided tape 2503. In one embodiment, in a non-limiting example, the right chamber cover 2509 is stabilized with a stabilizer 2506, which can be made with EVA foam. In one embodiment, in a non-limiting example, the right acoustic chamber having a length indicated by 2520 is divided into two compartments using a divider 2501. The divider 2501 has a slot that permits air to flow from a forward compartment that houses the speaker 2510 to a rear compartment that houses the acoustic port 2530. In one embodiment, in a non-limiting example, a waterproof mesh 2501 is framed around its perimeter and is mounted over the acoustic port 2530 thereby provided a waterproof chamber to seal out water, moisture, dust, dirt, etc. from the right acoustic chamber. EVA foam damps vibration which can minimize transmission of vibration from the speaker into the right temple body 2508 and the right temple cover 2507. In one embodiment, in a non-limiting example, a piece of foam 2502 is located between the speaker 2510 and the divider 2501. In one embodiment, the right temple body 2508 and the right temple cover 2507 are made of molded plastic which has a high density, is a stiff material, is highly reflective to acoustic energy, and provides effective transmission of vibrational energy. To mitigate the undesirable effects of acoustic energy leakage and vibration transmission, a closed cell energy absorbing foam such as EVA is used around the speaker 2510 as illustrated with **Figure 25**.

[00120] **Figure 26** illustrates, generally at 2600, an external sound reflector cover, according to embodiments of the invention. At 2650 the eyewear device from 2600 is shown on a user. As used in this description of embodiments, the terms "external sound cover," external sound reflector," "external reflector cover," "sound cover," "audio reflector," "lobe," and "cover" are used synonymously in this description of embodiments. With reference to **Figure 2600**, an eyewear device 2602 has a right external reflector cover 2606 fixed to a right temple and a left external reflector cover 2604 fixed to a left temple. An external reflector cover or lobe can be added to an eyewear device in a permanent fashion or it can be a removable accessory. An external reflector cover can also be hinged. An external reflector cover provides a further enhancement to the personal audio listening experience by increasing the directionality, and sound vectoring of the acoustic emission to the target listener, i.e., the user. The reflector cover minimizes the audio signals generated by a speaker, emitted from an acoustic chamber, that are not delivered to the user's ear canal. Thereby, reducing the audible sound that becomes noise to non-target listeners, i.e., bystanders.

[00121] A reflector cover can be permanently attached and hinged to a temple of an eyewear device. The listener can rotate the cover and further provide a reflection surface to direct sound to his or her ear canal. While not in use, the listener can retract or remove the cover back to the temple or remove it entirely. The reflector cover can be made from the same material used to make the temples of the eyewear device. Fully removable reflector covers can be provided to a user in a range of sizes, whereby a particular size is selected by the user for use depending on the user's requirements.

[00122] External reflector covers provide an additional benefit by moving windborne turbulent noise away from the audio signals which are broadcast from an acoustic port of a

chamber and away from the user's ear canal. In other words, the effects of a headwind and the associated turbulence induced noise are reduced by the external reflector cover when the listener uses the eyewear device in a dynamic mobile environment where wind conditions can negatively impact the audio performance and directionality of the audio signals. Windborne turbulence from the environment is considered to be noise to a user of a PPMS system, therefore use of an external reflector cover increases a signal-to-noise ratio of the PPMS system by reducing a magnitude of the windborne turbulent noise that a user can hear.

[00123] **Figure 27-28** illustrate, generally at 2700, additional external sound reflector covers and acoustic gain, according to embodiments of the invention. With reference to **Figure 27**, a temple 2702 of an eyewear device has an acoustic port 2704. An external reflector 2706 is attached to the temple 2702 with attachments 2710. Attachments 2710 are accomplished in various ways, one non-limiting example is performed with one or more magnetic contacts. In one or more embodiments, magnetic contacts are used to attach the audio reflector 2706 to the outer surface of a smart glasses temple(s) or temple tip. In other embodiments, different attachment methods, other than magnetic, are employed. Different attachment methods are, but are not limited to; hook and loop fasteners, snaps, clips, etc. The audio reflector 2706 is used to reflect audio signals coming from an acoustic port (speaker outlet) 2704 to a human ear 2708 of a user. A user can attach a single audio reflector to a left temple or to a right temple of the head wearable device or the user can use two audio reflectors (one attached to the left temple and another one attached to the right temple) to improve sound quality and or clarity. This is especially useful in a noisy environment, however, sound quality, clarity, and volume are improved in any environment through the use of an audio reflector.

[00124] **Figure 28** illustrates without any limitation implied thereby, direct wave paths 2802 and reflective wave paths 2804 for various embodiments of the invention. The external sound cover or alternatively described as an audio reflector 2806 is designed taking into consideration that the reflected wave paths 2804 from the audio reflector 2806 and direct wave paths 2804 from a speaker are at the same phase or approximately at the same phase, thereby combining coherently to increase the acoustic signal amplitudes received at the user's ear. Since a distance from a speaker, contained within an acoustic chamber of the temple 2702 to a user's ear (direct path) is very close to a distance from the speaker to the user's ear after reflection from a far end of the acoustic reflector, the direct and the reflected acoustic waves have approximately the same phase. Therefore, the waves combine coherently, in phase, resulting in an increase in sound pressure level on the order of 4 to 5 decibels. Depending on a frequency range of the acoustic signals, the increase in sound pressure level can be up to 6 decibels, i.e., a factor of two (2). Thus, the direct path 2802 and the reflected path 2804 (**Figure 28** at 2800) is functionally equivalent to acoustic signals 2852 illustrated in **Figure 28** at 2850.

[00125] In various embodiments, the audio reflector 2806 is made with an inner part and an outer part. The inner part or inner surface of the audio reflector 2806 causes reflection of the audio signals from the speaker and provides the coherent increase in signal amplitude as described above. The outer part or outer surface of the audio reflector 2806 is used to reflect ambient noise away from the user's ear. Alternatively, the outer surface of the audio reflector can be made with a material that absorbs acoustic energy. Thus, when undesired acoustic signals from the environment are incident upon the outer surface of the audio reflector, the signals are absorbed by the outer surface. In both cases, the acoustic signals from the environment are prevented from reaching the user's ear by the audio reflector through either reflection or

absorption depending on a given design. Acoustic signals from the environment are considered to be noise to a user of a PPMS system, therefore use of an audio reflector increases a signal-to-noise ratio of the PPMS system.

[00126] In one or more embodiments, both the inner part and or the inner surface and the outer part and or the outer surface are made from one or more materials that provide good reflection to acoustic signals incident thereon. Some examples of acoustically reflective materials are, but are not limited to; coated tightly woven fabrics such as vinyl coated polyester, Teflon coated fabrics, molded plastic, etc.

[00127] For purposes of discussing and understanding the different embodiments, it is to be understood that various terms are used by those knowledgeable in the art to describe techniques and approaches. Furthermore, in the description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of an embodiment. It will be evident, however, to one of ordinary skill in the art that an embodiment may be practiced without these specific details. In some instances, well-known structures and devices are shown in block diagram form, rather than in detail, in order to avoid obscuring various embodiments. These embodiments are described in sufficient detail to enable those of ordinary skill in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical, mechanical, electrical, and other changes may be made without departing from the scope of the present invention.

[00128] Some portions of the description may be presented in terms of algorithms and symbolic representations of operations on, for example, data bits within a computer memory. These algorithmic descriptions and representations are the means used by those of ordinary skill in the data processing arts to most effectively convey the substance of their work to others of

ordinary skill in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of acts leading to a desired result. The acts are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

[00129] It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the discussion, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, can refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission, or display devices.

[00130] An apparatus for performing the operations herein can implement the present invention. This apparatus may be specially constructed for the required purposes, or it may comprise a general-purpose computer, selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, but not limited to, any type of disk including floppy disks, hard disks, optical disks, compact disk- read only memories (CD-ROMs), and magnetic-optical disks, read-

only memories (ROMs), random access memories (RAMs), dynamic random access memories (DRAM), electrically programmable read-only memories (EPROM)s, electrically erasable programmable read-only memories (EEPROMs), FLASH memories, magnetic or optical cards, RAID, etc., or any type of media suitable for storing electronic instructions either local to the computer or remote to the computer.

[00131] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method. For example, any of the methods according to the embodiments can be implemented in hard-wired circuitry, by programming a general-purpose processor, or by any combination of hardware and software. One of ordinary skill in the art will immediately appreciate that the embodiments can be practiced with computer system configurations other than those described, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, digital signal processing (DSP) devices, set top boxes, network PCs, minicomputers, mainframe computers, and the like. The embodiments can also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network.

[00132] The methods herein may be implemented using computer software. If written in a programming language conforming to a recognized standard, sequences of instructions designed to implement the methods can be compiled for execution on a variety of hardware platforms and for interface to a variety of operating systems. In addition, the embodiments are not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the embodiments as

described herein. Furthermore, it is common in the art to speak of software, in one form or another (e.g., program, procedure, application, driver,...), as taking an action or causing a result. Such expressions are merely a shorthand way of saying that execution of the software by a computer causes the processor of the computer to perform an action or produce a result.

[00133] It is to be understood that various terms and techniques are used by those knowledgeable in the art to describe communications, protocols, applications, implementations, mechanisms, etc. One such technique is the description of an implementation of a technique in terms of an algorithm or mathematical expression. That is, while the technique may be, for example, implemented as executing code on a computer, the expression of that technique may be more aptly and succinctly conveyed and communicated as a formula, algorithm, or mathematical expression. Thus, one of ordinary skill in the art would recognize a block denoting A+B=C as an additive function whose implementation in hardware and/or software would take two inputs (A and B) and produce a summation output (C). Thus, the use of formula, algorithm, or mathematical expression as descriptions is to be understood as having a physical representation in at least hardware and/or software (such as a computer system in which the techniques of the present invention may be practiced as well as implemented as an embodiment).

[00134] Non-transitory machine-readable media is understood to include any mechanism for storing information (such as program code, etc.) in a form readable by a machine (e.g., a computer). For example, a machine-readable medium, synonymously referred to as a computer-readable medium, includes read only memory (ROM); random access memory (RAM); magnetic disk storage media; optical storage media; flash memory devices; except electrical, optical, acoustical or other forms of transmitting information via propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.); etc.

[00135] As used in this description, "one embodiment" or "an embodiment" or similar phrases means that the feature(s) being described are included in at least one embodiment of the invention. References to "one embodiment" in this description do not necessarily refer to the same embodiment; however, neither are such embodiments mutually exclusive. Nor does "one embodiment" imply that there is but a single embodiment of the invention. For example, a feature, structure, act, etc. described in "one embodiment" may also be included in other embodiments. Thus, the invention may include a variety of combinations and/or integrations of the embodiments described herein.

[00136] While the invention has been described in terms of several embodiments, those of skill in the art will recognize that the invention is not limited to the embodiments described, but can be practiced with modification and alteration within the spirit and scope of the appended claims. The description is thus to be regarded as illustrative instead of limiting.

What is claimed is:

1. A method to provide audio signals to a user from an eyewear device, comprising;

generating audio signals within a chamber, the chamber is a part of a volume of the eyewear device;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

2. The method of claims 1, wherein a shape of the chamber contributes to the concentrating.

3. The method of claim 2, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

4. The method of claim 2, wherein the shape is generally parabolic.

5. The method of claim 1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

6. The method of claim 5, the portion absorbs vibrational energy.

7. The method of claim 6, wherein the portion is forward of the chamber.

8. The method of claim 6, wherein the portion is rear of the chamber.

9. The method of claim 6, wherein the portion is an outer surface of the chamber.

10. The method of claim 1, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the eyewear device.

11. The method of claim 1, wherein a speaker is used in the generating.

12. The method of claim 11, wherein the speaker is located within a temple of the eyewear device.

13. The method of claim 11, wherein the speaker is located within a temple insert module of the eyewear device.

14. An apparatus to provide audio signals to a user from an eyewear device, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is a part of a volume of the eyewear device, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume;

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

15. The apparatus of claim 14, wherein the interior surface has a larger acoustic reflectivity than an acoustic reflectivity of the outer surface.

15. The apparatus of claim 15, wherein the outer surface is coated with a material that absorbs acoustic energy.

17. The apparatus of claim 14, wherein the inner surface forms a curved shape around the at least one speaker.

18. The apparatus of claim 17, wherein the curved shape is generally parabolic.

19. The apparatus of claim 14, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

20. The apparatus of claim 19, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of acoustic energy.

[Shape of external sound cover]

21. The apparatus of claim 19, wherein a shape of the external sound cover is concave towards the user's ear.

22. The apparatus of claim 14, wherein the chamber is located within a temple of the eyewear device.

23. The apparatus of claim 14, wherein the chamber is located within a temple insert module of the eyewear device.

24. The apparatus of claim 14, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

25. The apparatus of claim 24, the portion absorbs vibrational energy.

26. The apparatus of claim 25, wherein the portion is forward of the chamber.

27. The apparatus of claim 25, wherein the portion is rear of the chamber.

28. The apparatus of claim 25, wherein the portion is an outer surface of the chamber.

29. An apparatus to provide audio signals to a user from a temple interlock, comprising:

a chamber, the chamber is defined by an interior surface, the chamber is contained within a volume of the temple interlock, the chamber further comprising:

at least one speaker, the at least one speaker to generate audio signals, the at least one speaker is contained within the volume; and

an acoustic port, the acoustic port is positioned in a wall of the chamber to concentrate emission of the audio signals from the chamber in a direction of the user's ear when the temple interlock is attached to the eyewear device and the user wears the eyewear device; and

an outer surface, the outer surface is exterior to the inner surface.

[Variable material properties in the eyewear device]

30. The apparatus of claim C1, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the eyewear device has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

31. The apparatus of claim 30, the portion absorbs vibrational energy.

32. The apparatus of claim 31, wherein the portion is forward of the chamber.

33. The apparatus of claim 31, wherein the portion is rear of the chamber.

34. The apparatus of claim 31, wherein the portion is an outer surface of the chamber.

35. The apparatus of claim 29, wherein the inner surface forms a curved shape around the at least one speaker.

36. The apparatus of claim 35, wherein the curved shape is generally parabolic.

37. The apparatus of claim 29, further comprising:

an external sound cover, the external sound cover has an inner surface and an outer surface, the external sound cover is configured to attach to the eyewear device, wherein in operation, the audio signals emitted from the acoustic port reflect off of the inner surface toward the user's ear.

38. The apparatus of claim 37, wherein a first material used for the inner surface provides substantially for reflection of the audio signals and a second material used for the outer surface provides substantially for absorption of vibrational energy.

39. The apparatus of claim 37, wherein a shape of the external sound cover is concave towards the user's ear.

40. A method to provide audio signals to a user from a temple interlock, comprising;

generating audio signals within a chamber, the chamber is a part of a volume of the temple interlock;

concentrating the audio signals for delivery to the user's ear; and

transmitting the audio signals to the user's ear, the audio signals are transmitted through a port in the chamber.

41. The method of claims 40, wherein a shape of the chamber contributes to the concentrating.

42. The method of claim 41, wherein the shape provides a curved surface to a speaker, and the speaker is used in the generating.

43. The method of claim 41, wherein the shape is generally parabolic.

44. The method of claim 40, wherein an inner surface of the chamber has a first acoustic reflectivity and at least a portion of the temple interlock has a second acoustic reflectivity, the first acoustic reflectivity is greater than the second acoustic reflectivity.

45. The method of claim 44, the portion absorbs vibrational energy.

46. The method of claim 45, wherein the portion is an outer surface of the chamber.

47. The method of claim 40, wherein an external sound cover contributes to the concentrating, the external sound cover is attached to the temple interlock.

48. An apparatus to increase a signal-to-noise ratio of audio signals directed towards a user's ear, comprising:

an external sound cover, the external sound cover further comprising:

an inner surface; and

an outer surface, the external sound cover is configured for attachment to a temple of an eyewear device, wherein in operation, audio signals emitted from an acoustic port of an eyewear device reflect off of the inner surface and are directed thereby toward the user's ear.

49. The apparatus of claim 48, wherein a material property of the outer surface is selected to provide absorption of acoustic energy incident thereon, thereby increasing a signal-to-noise ratio of the audio signals.

50. The apparatus of claim 48, wherein a material property of the outer surface is selected to reflect acoustic energy incident thereon away from the user, thereby increasing a signal-to-noise ratio of the audio signals.

51. The apparatus of claim 48, wherein in operation the external sound cover prevents windborne turbulence from impinging on the user's ear, thereby increasing a signal-to-noise ratio of the audio signals.

Abstract

Systems, apparatuses, and methods are taught that provide audio signals to a user from an eyewear device utilizing a personal projection micro speaker system. A method includes generating audio signals within a chamber. The chamber is a part of a volume of the eyewear device. The audio signals are concentrated for delivery to the user's ear. The audio signals are transmitted to the user's ear through a port in the chamber.

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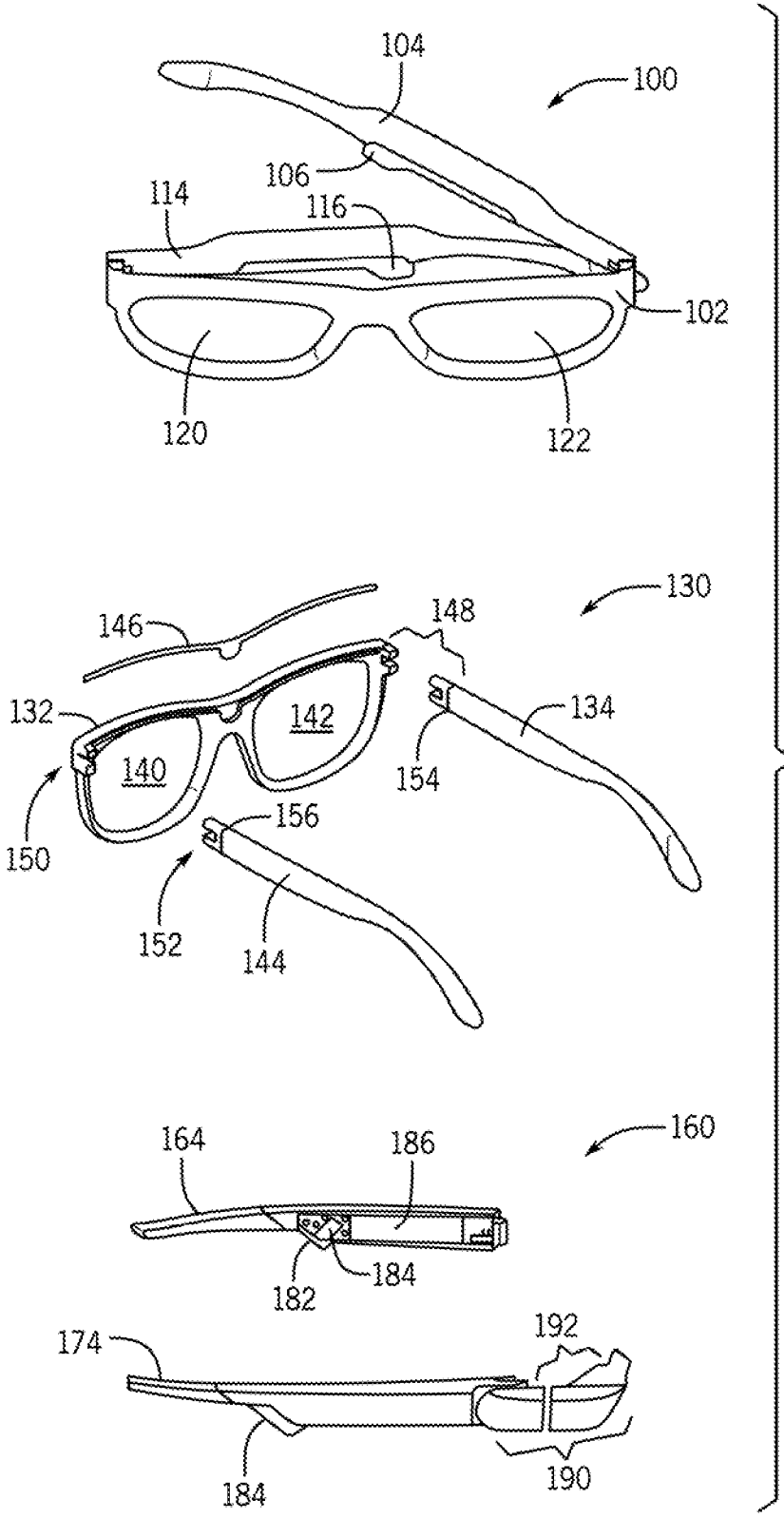

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148
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FIG. 1

FIG. 2

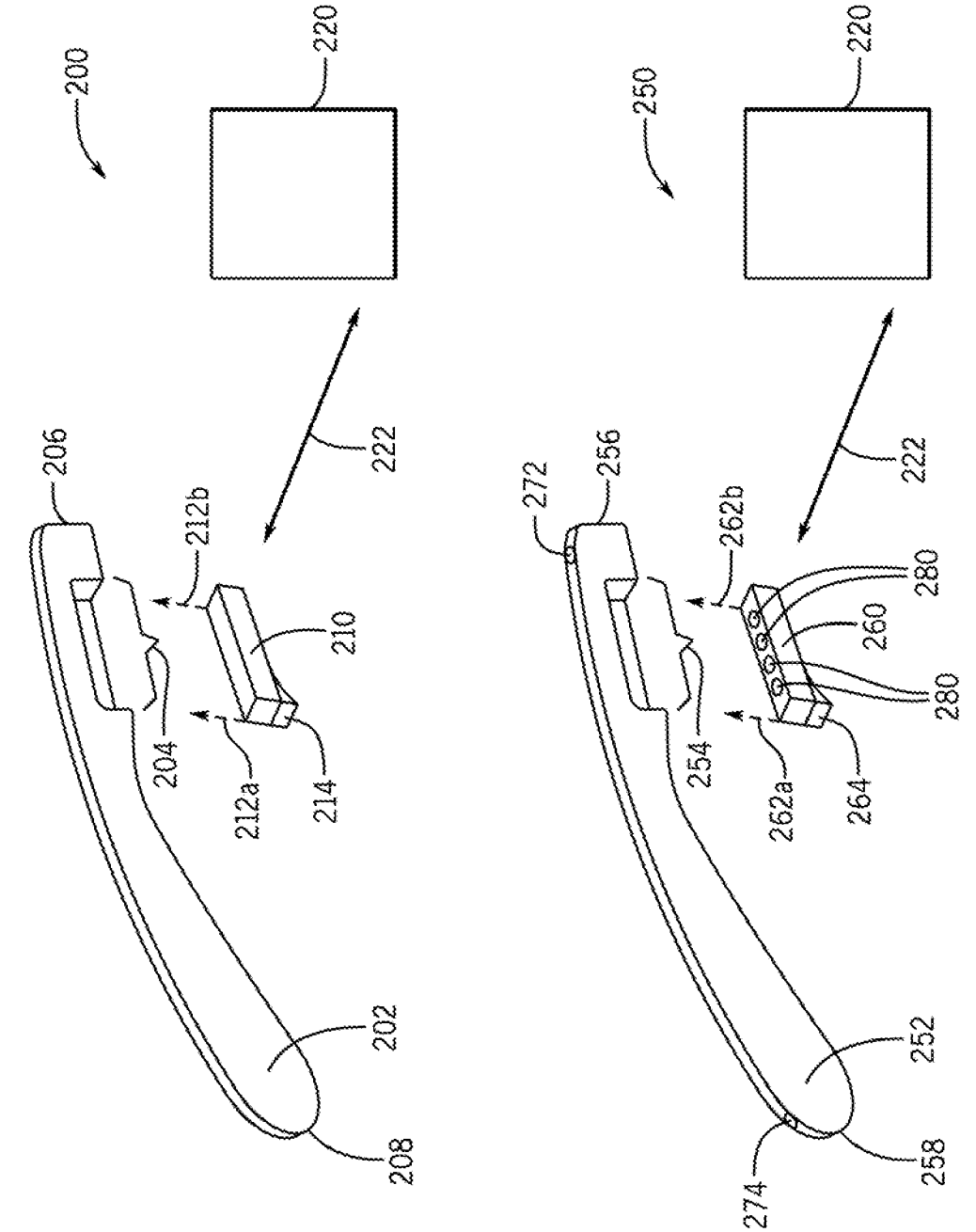

200
220
222
206
212b
210
204
212a
214
202
208
250
220
222
256
272
262b
280
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280
254
262a
264
252
258
274

FIG. 3

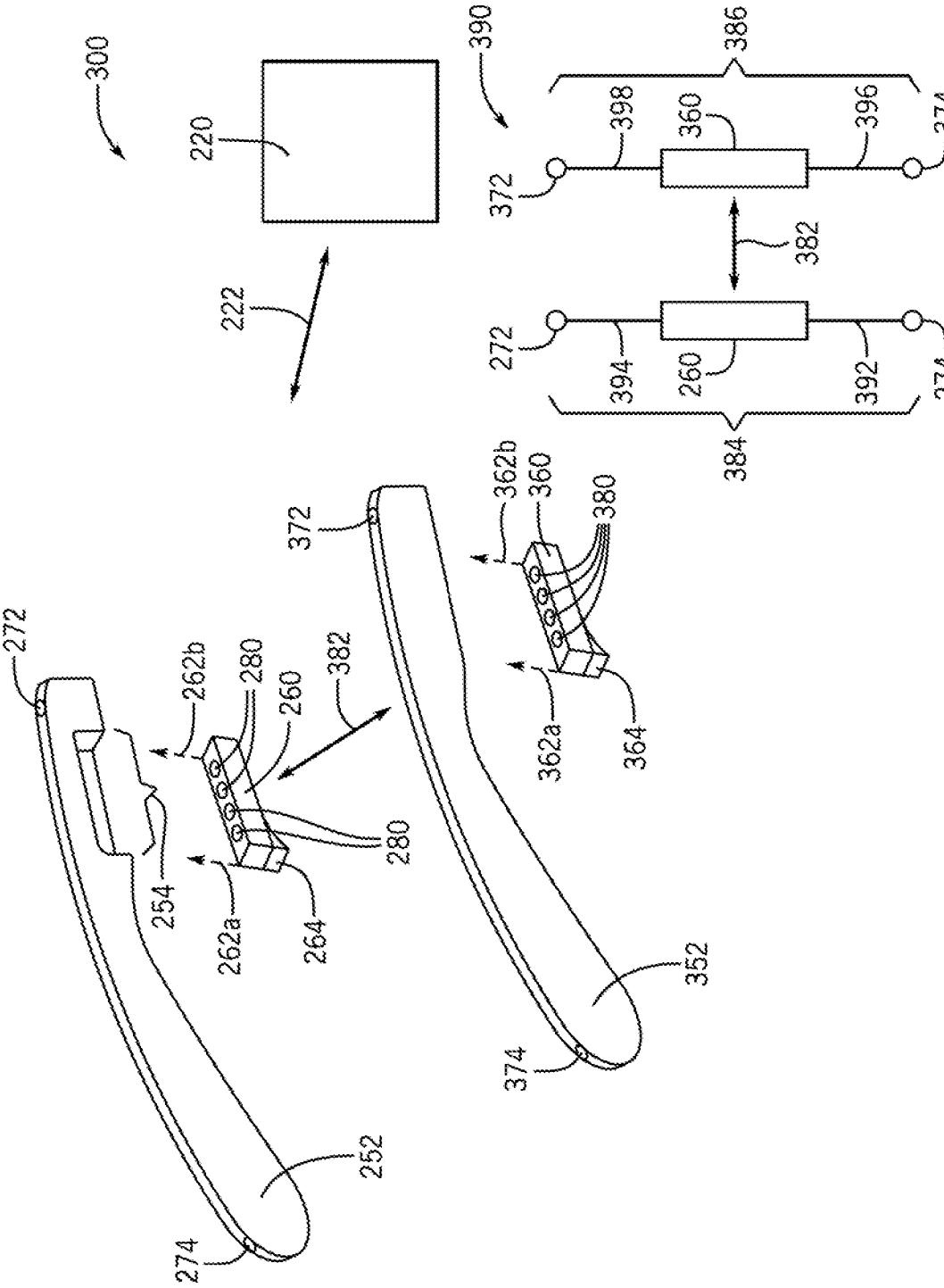
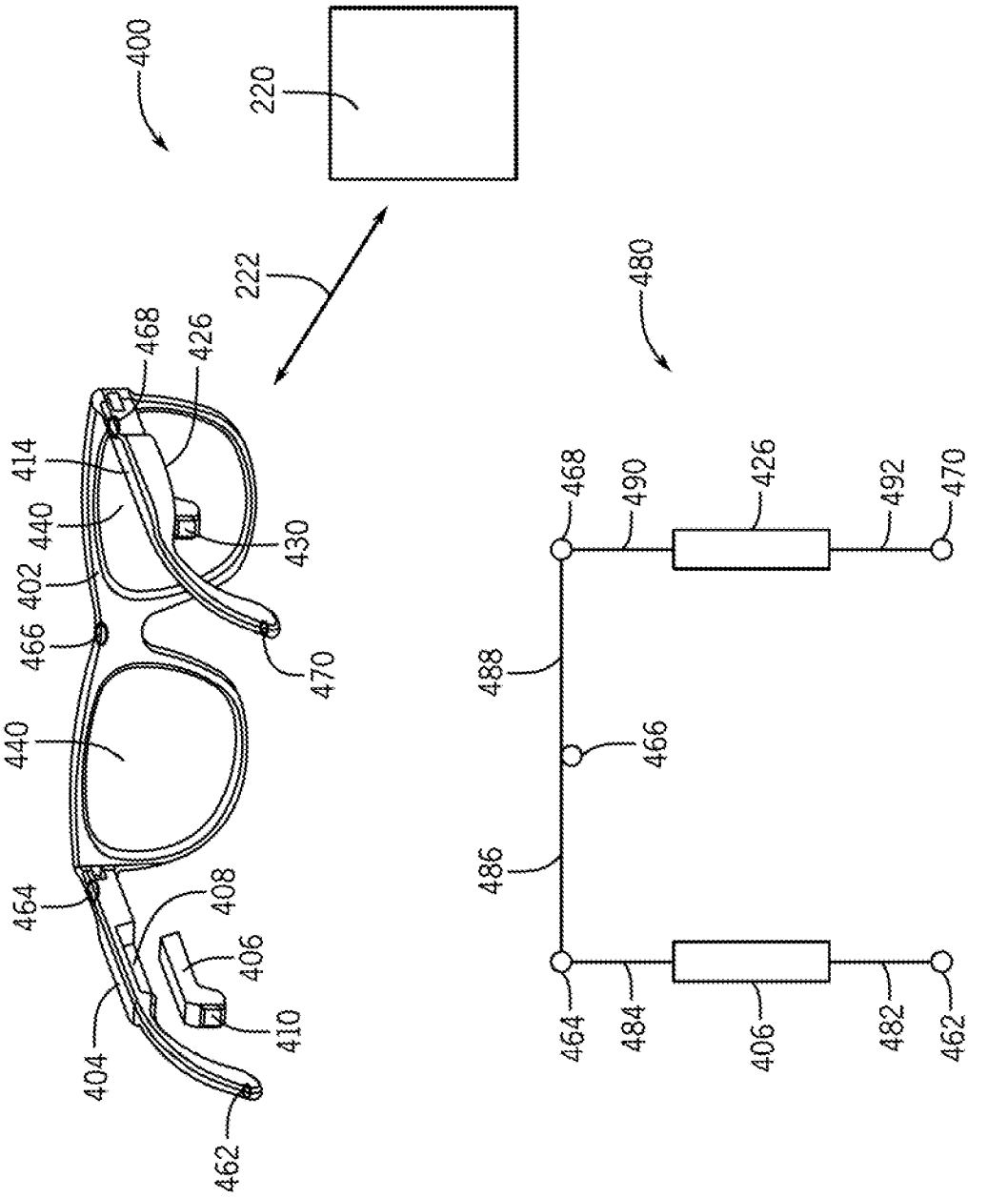

300
220
222
390
386
398
360
396
374
372
382
272
394
260
392
274
384
362b
380
362a
364
280
262b
262a
264
254
252
352

FIG. 4


400
220
222
480
468
426
414
440
402
466
430
470
440
464
408
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410
404
462
468
490
426
492
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486
464
484
406
482
462

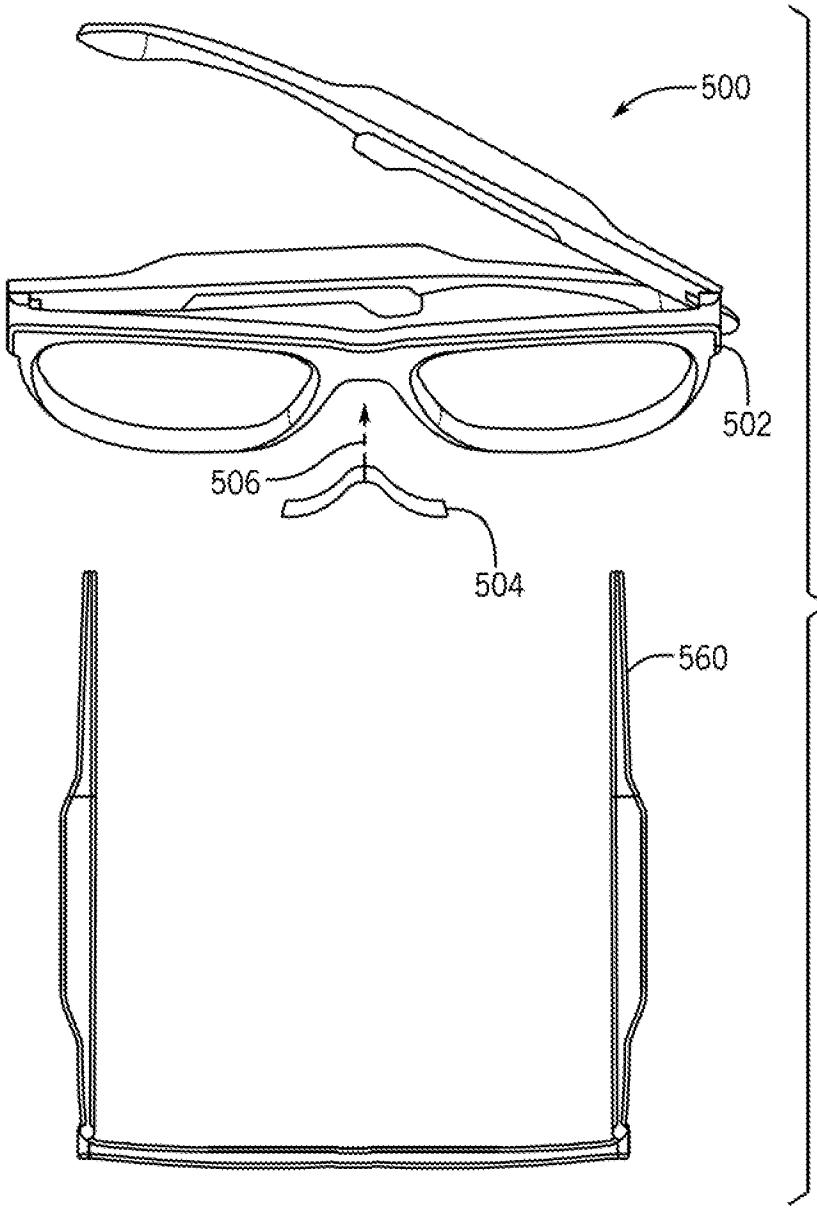


FIG. 5

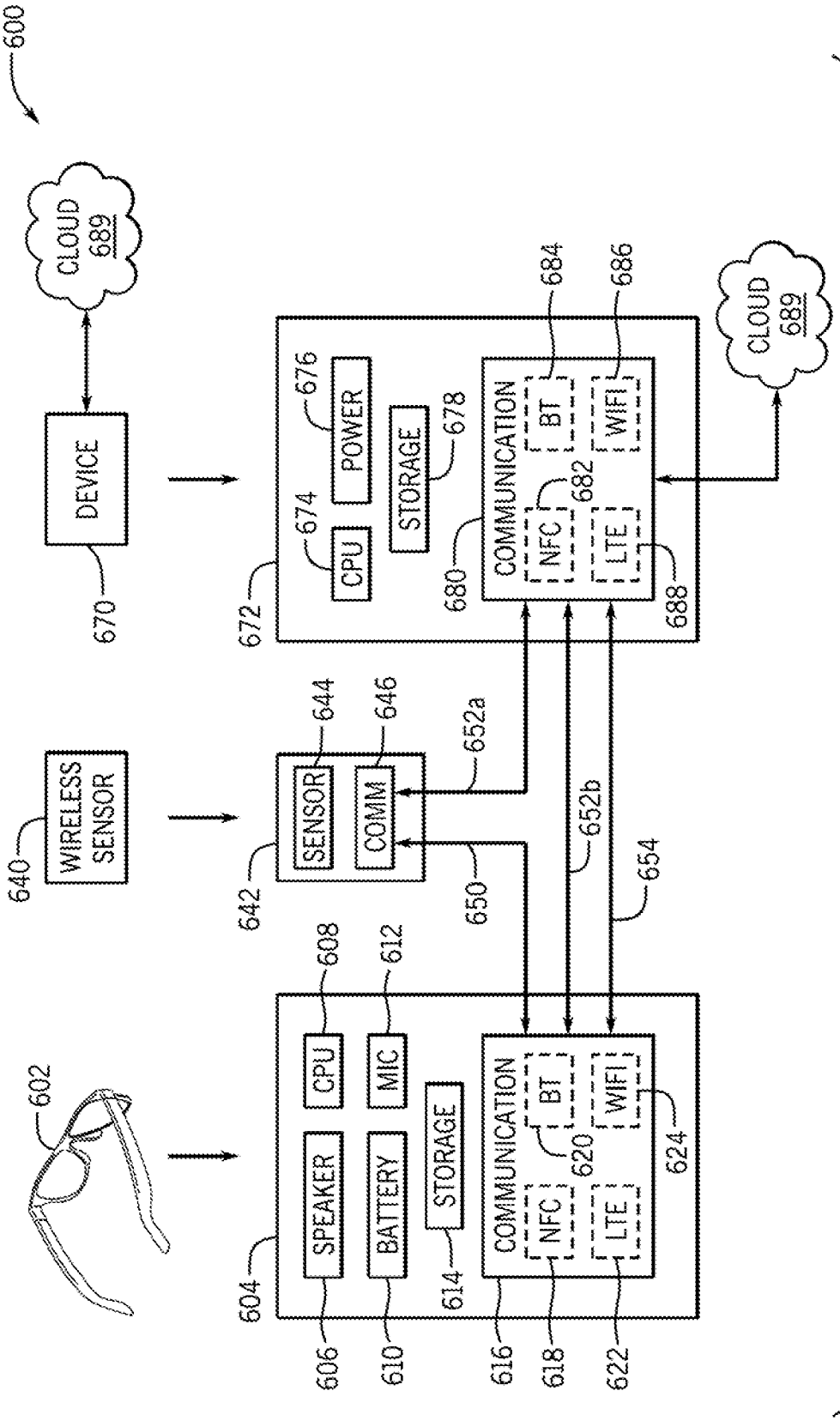

600
CLOUD 689
DEVICE
670
672
CPU
674
POWER
676
STORAGE
678
COMMUNICATION
680
NFC
682
BT
684
WIFI
686
LTE
688
CLOUD 689
WIRELESS SENSOR
640
642
SENSOR
644
COMM
646
652a
650
652b
654
602
604
SPEAKER
606
BATTERY
610
CPU
608
MIC
612
STORAGE
614
COMMUNICATION
616
NFC
618
BT
620
LTE
622
WIFI
624

FIG. 6A

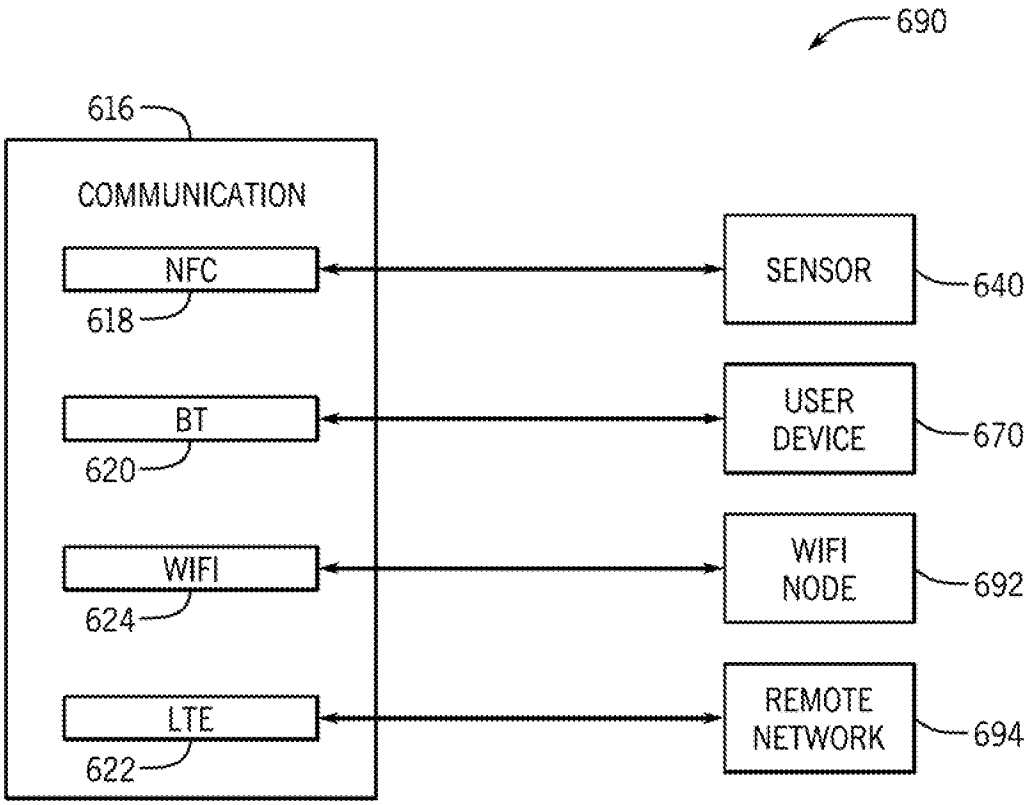

690
616
COMMUNICATION
NFC
618
BT
620
WIFI
624
LTE
622
SENSOR
640
USER DEVICE
670
WIFI NODE
692
REMOTE NETWORK
694

FIG. 6B

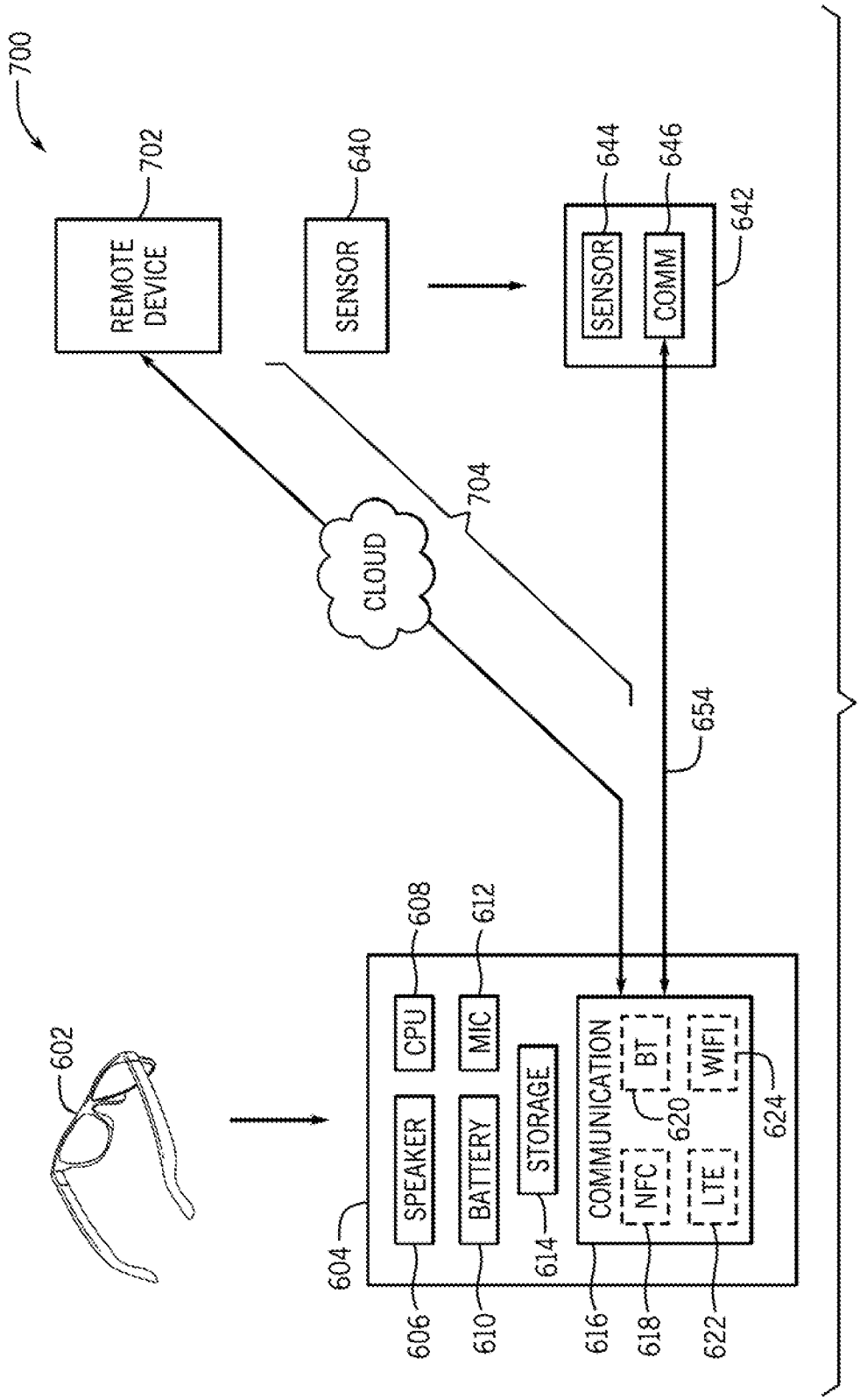

700
REMOTE DEVICE
702
SENSOR
640
SENSOR
644
COMM
646
642
CLOUD
704
654
602
CPU
608
MIC
612
SPEAKER
BATTERY
STORAGE
614
COMMUNICATION
BT
NFC
620
WIFI
LTE
624
604
606
610
616
618
622

FIG. 7

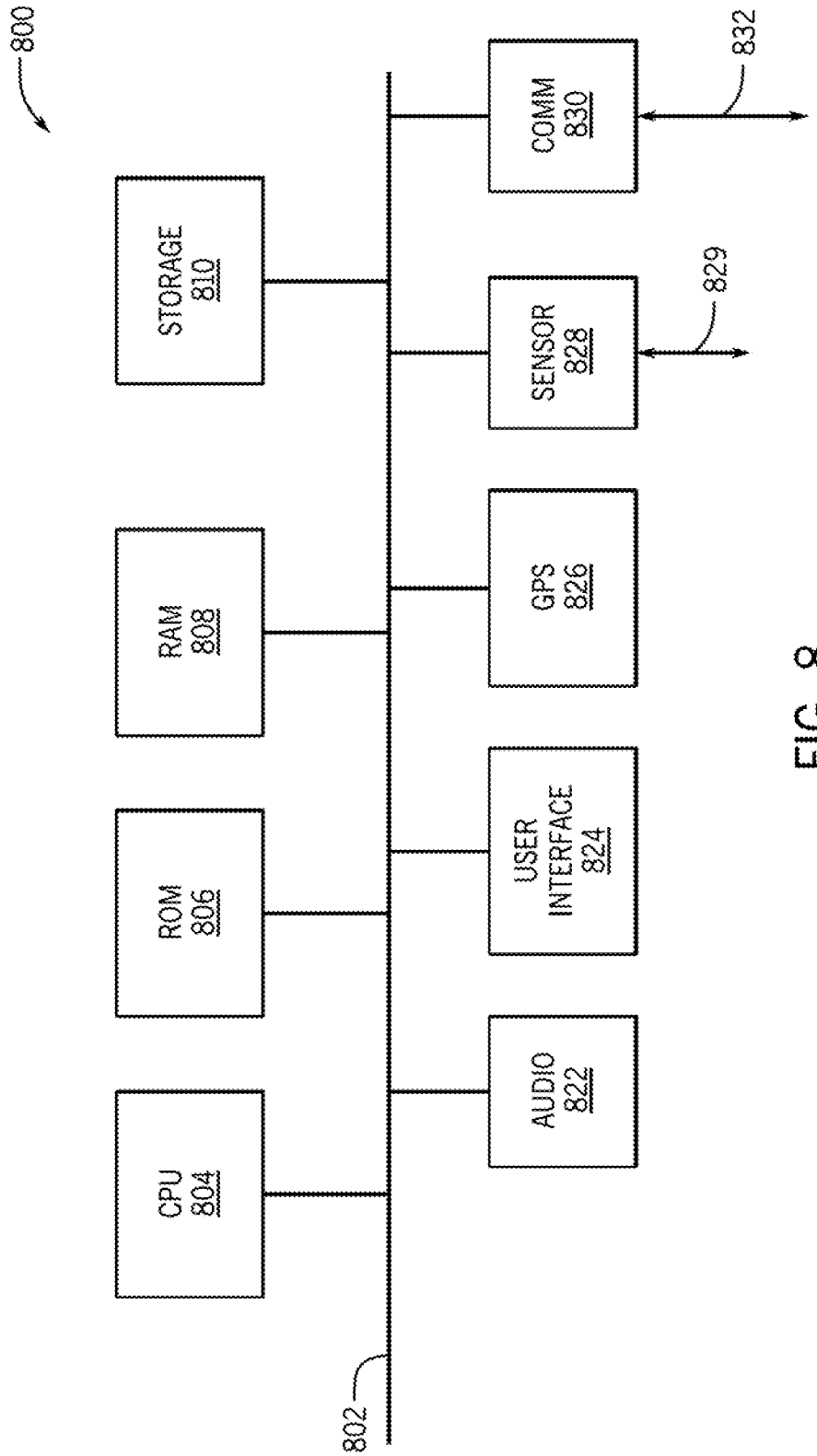

800
832
COMM 830
STORAGE 810
829
SENSOR 828
RAM 808
GPS 826
ROM 806
USER INTERFACE 824
AUDIO 822
CPU 804
802

FIG. 8

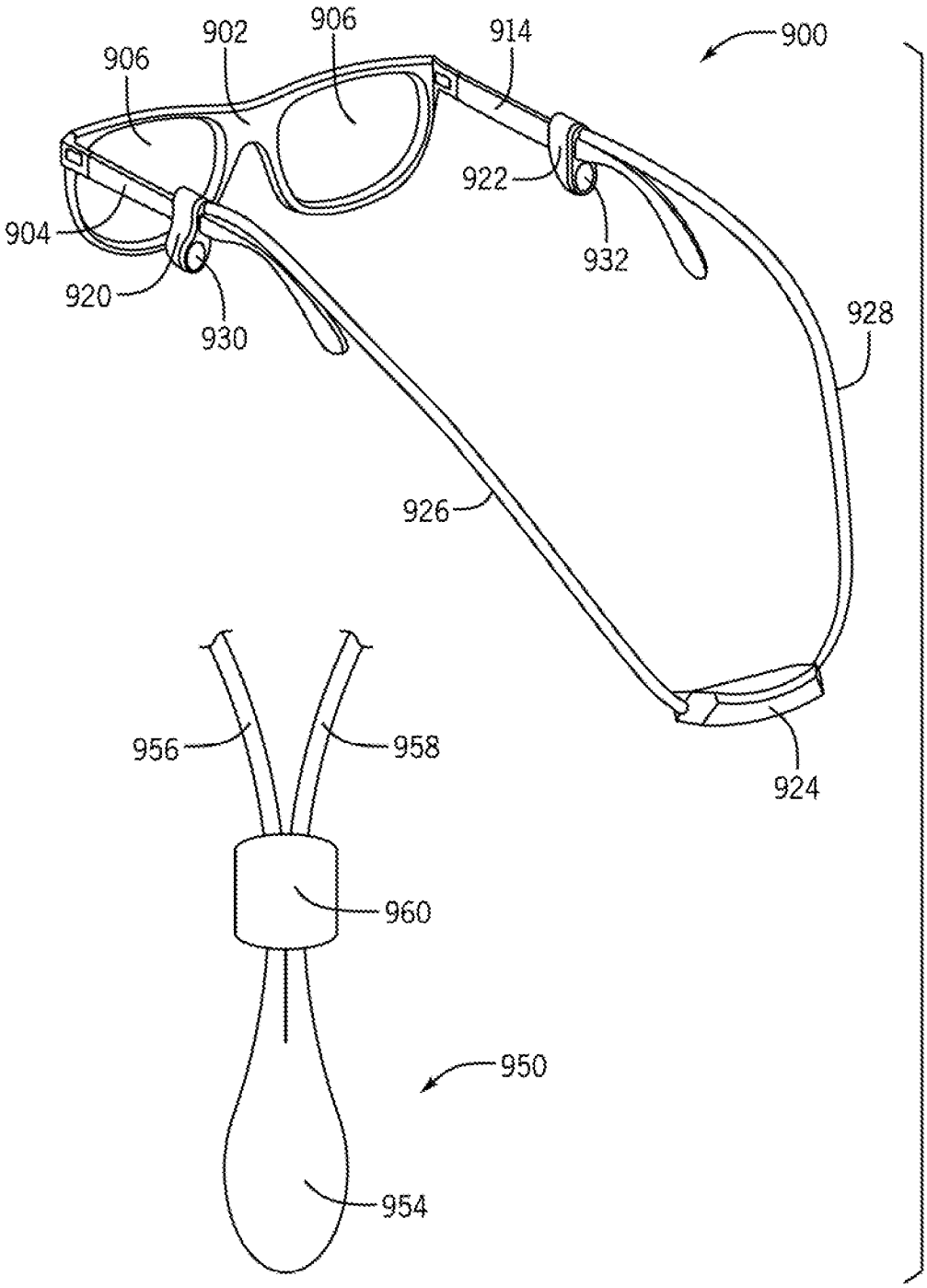

900
902
904
906
906
914
920
922
924
926
928
930
932
950
954
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958
960

FIG. 9

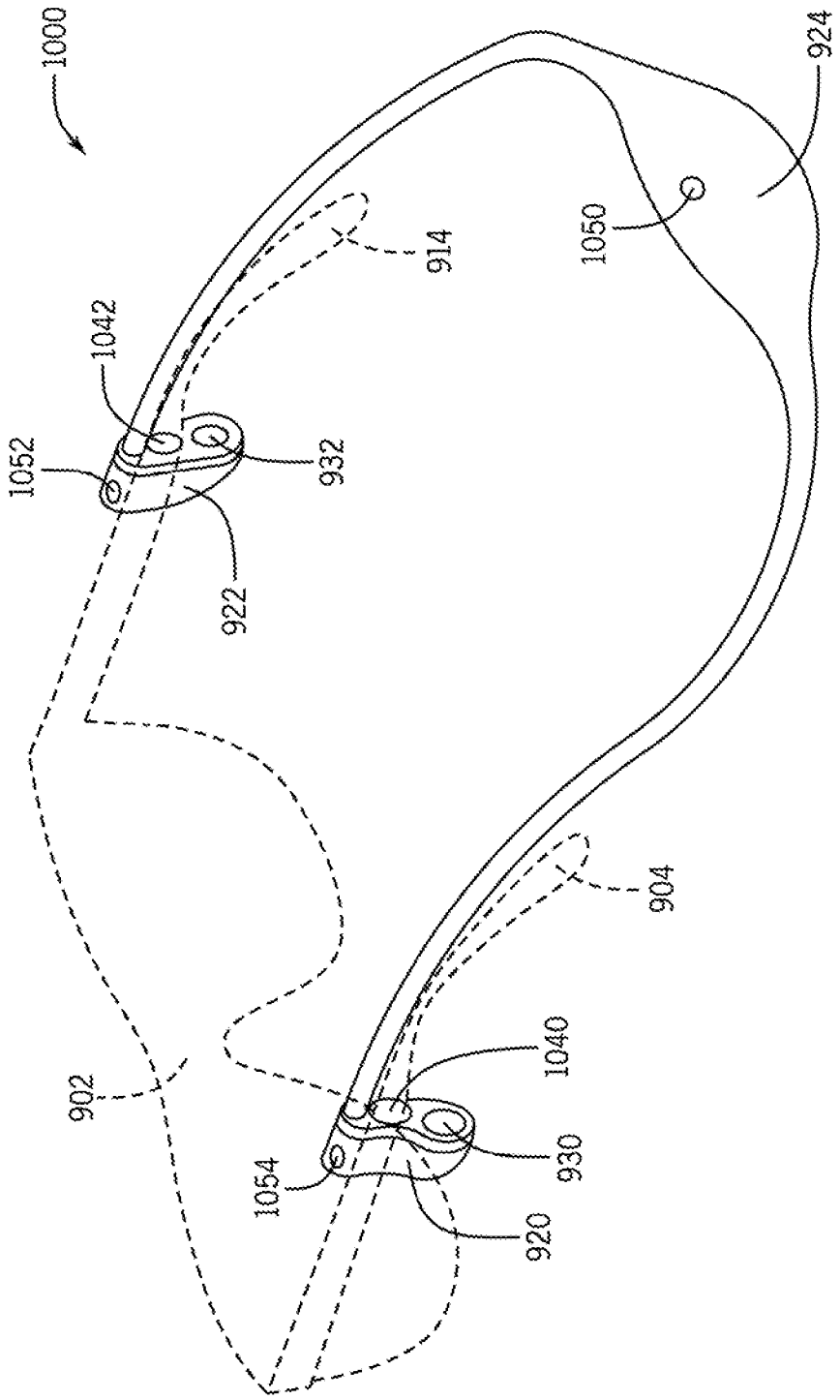
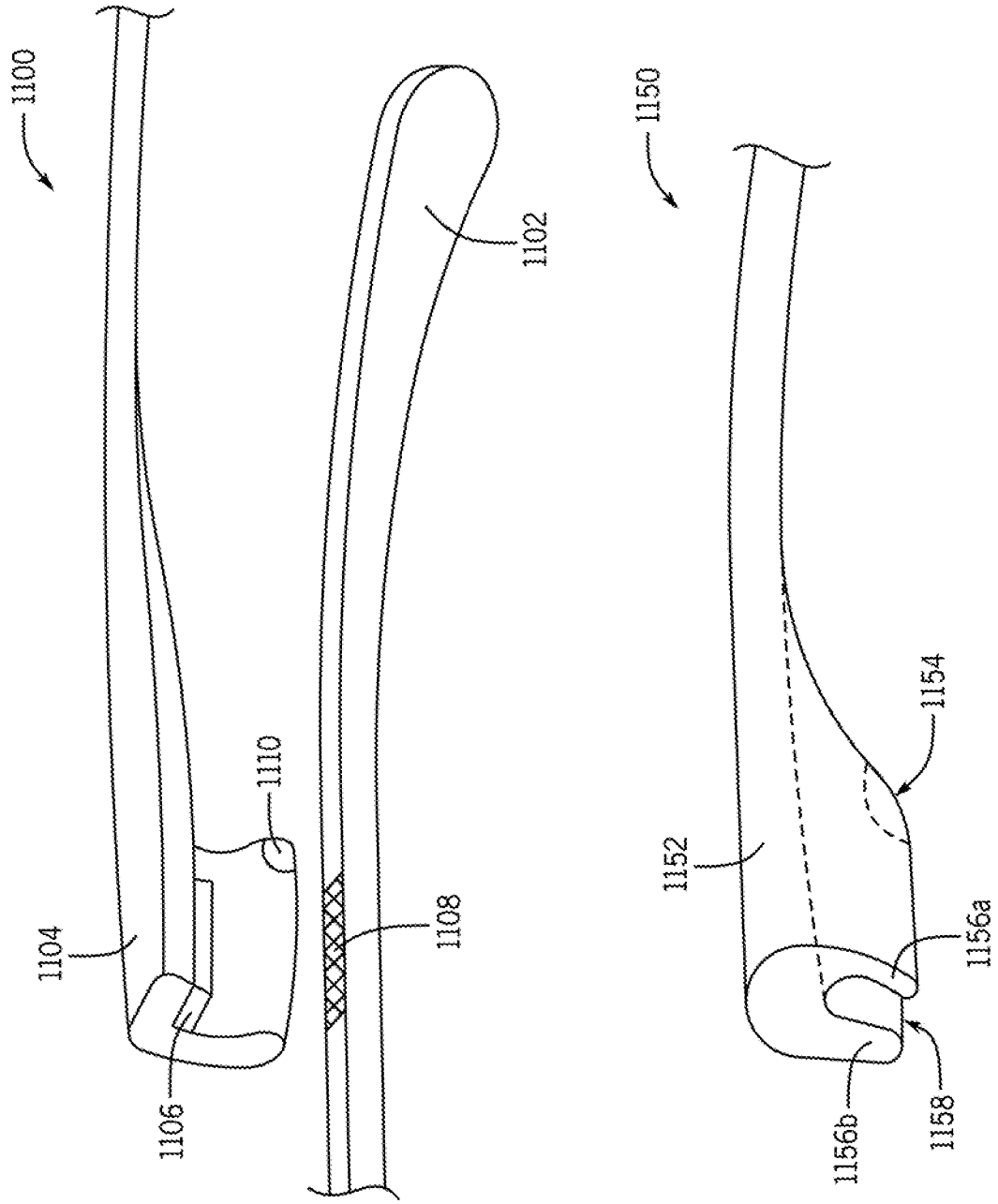


FIG. 10

FIG. 11


1100
1102
1104
1106
1108
1110
1150
1152
1154
1156a
1156b
1158

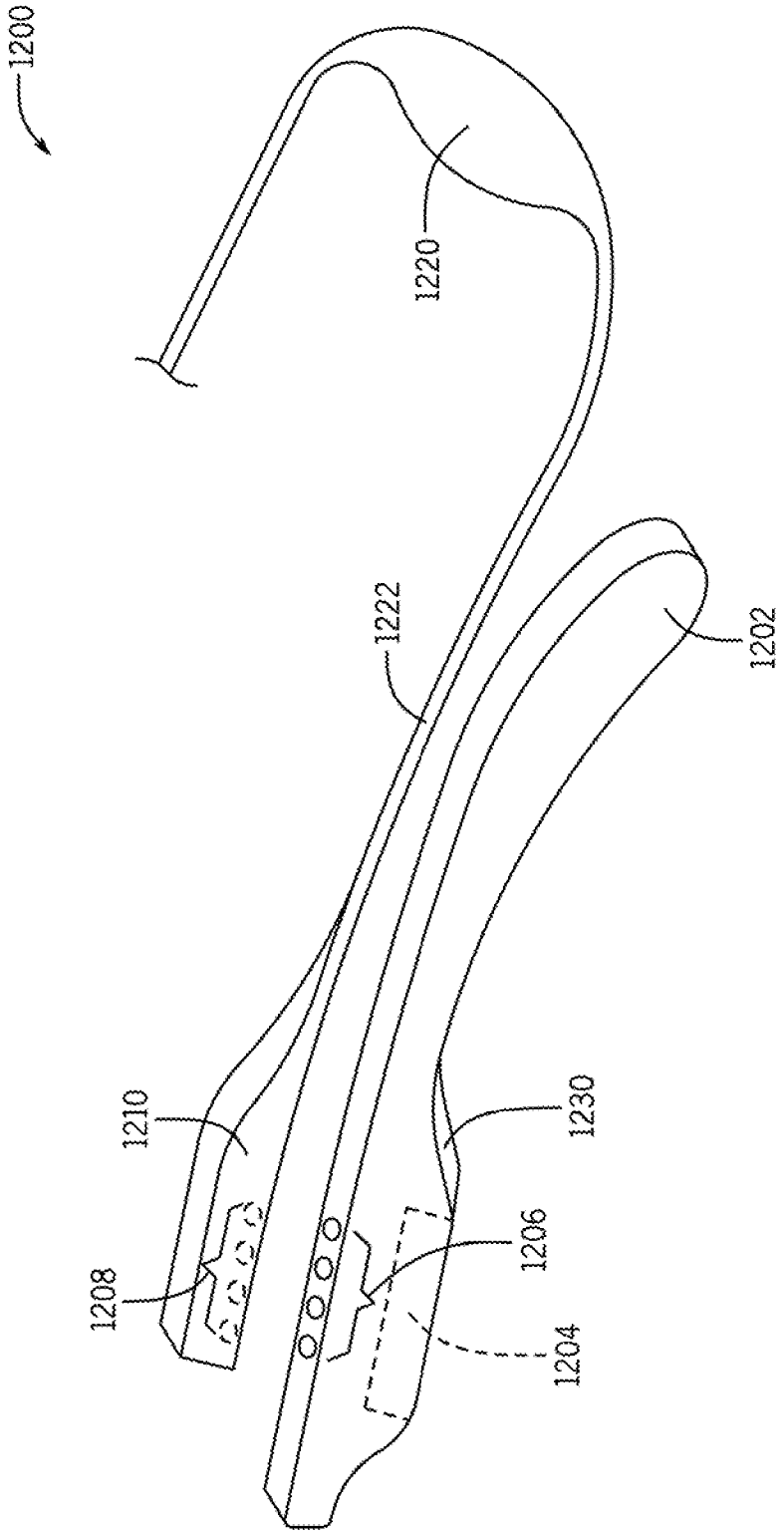


FIG. 12

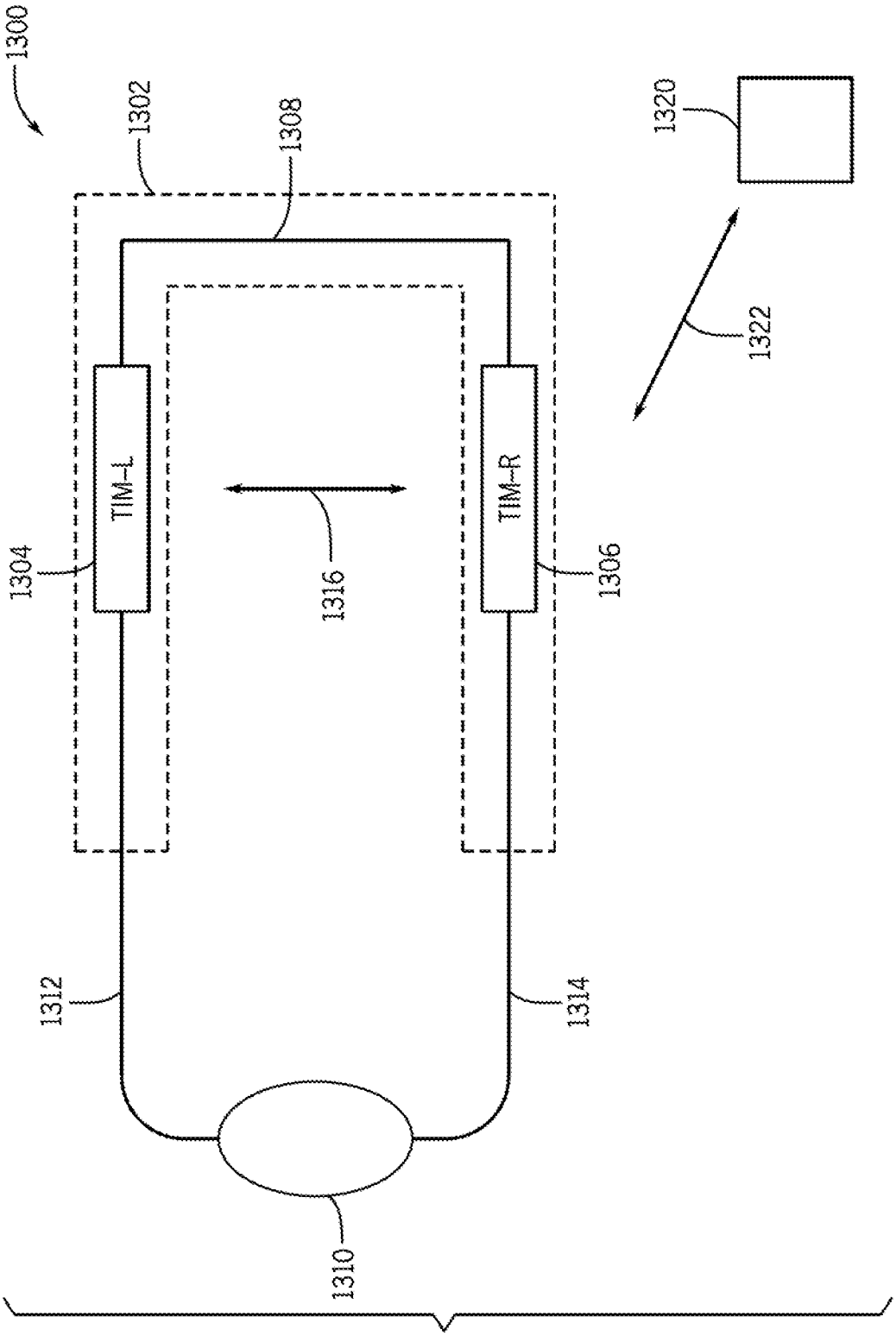

1300
1302
1308
1320
1322
TIM-L
TIM-R
1304
1306
1316
1312
1314
1310

FIG. 13

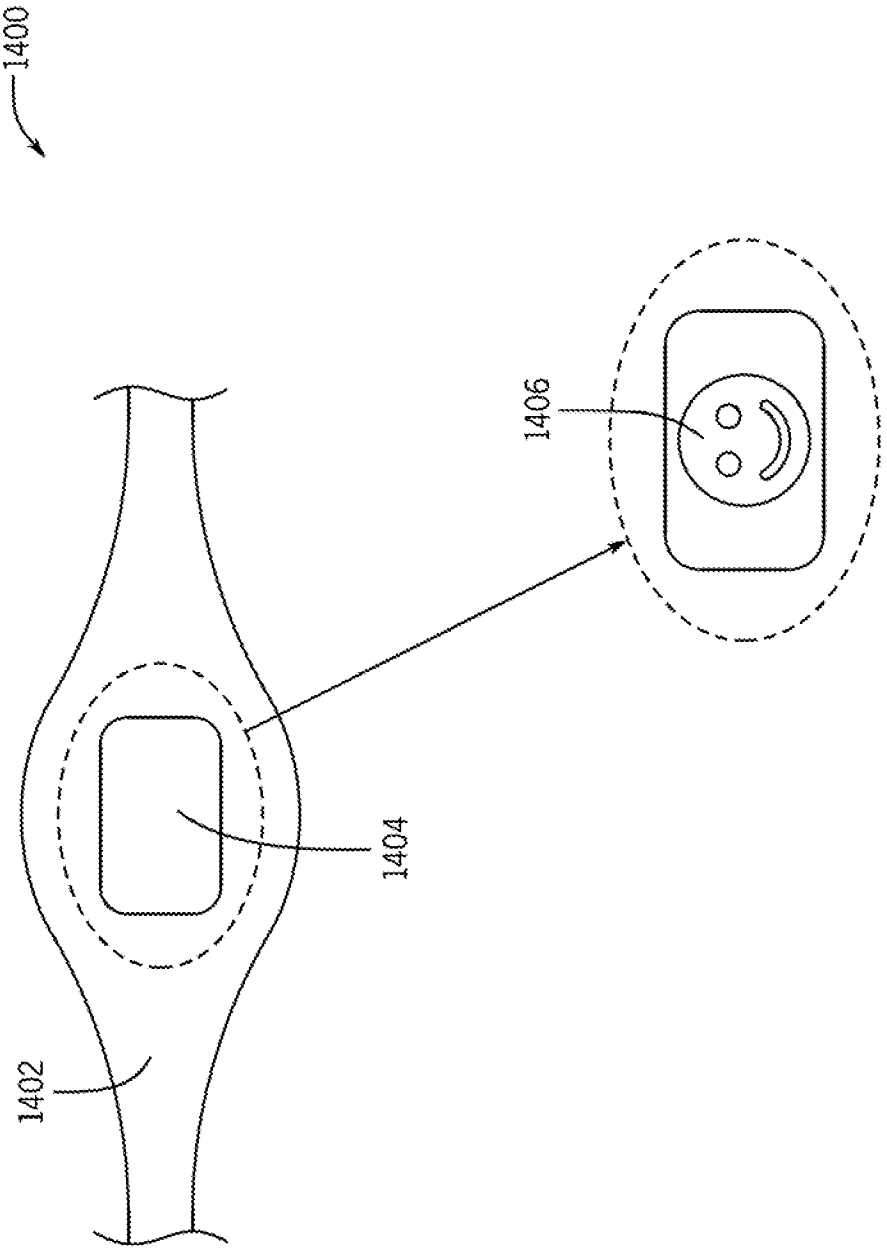


FIG. 14

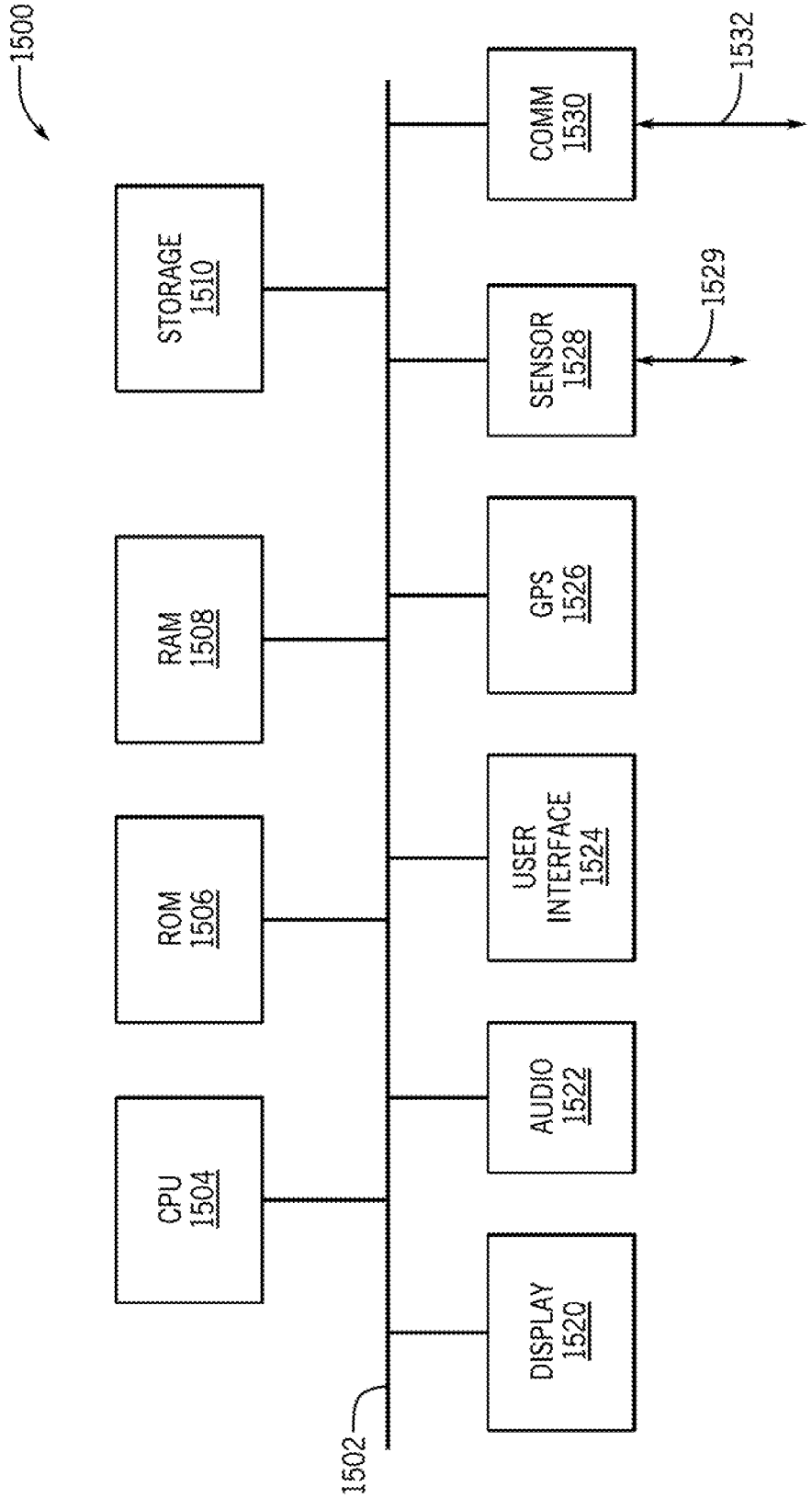
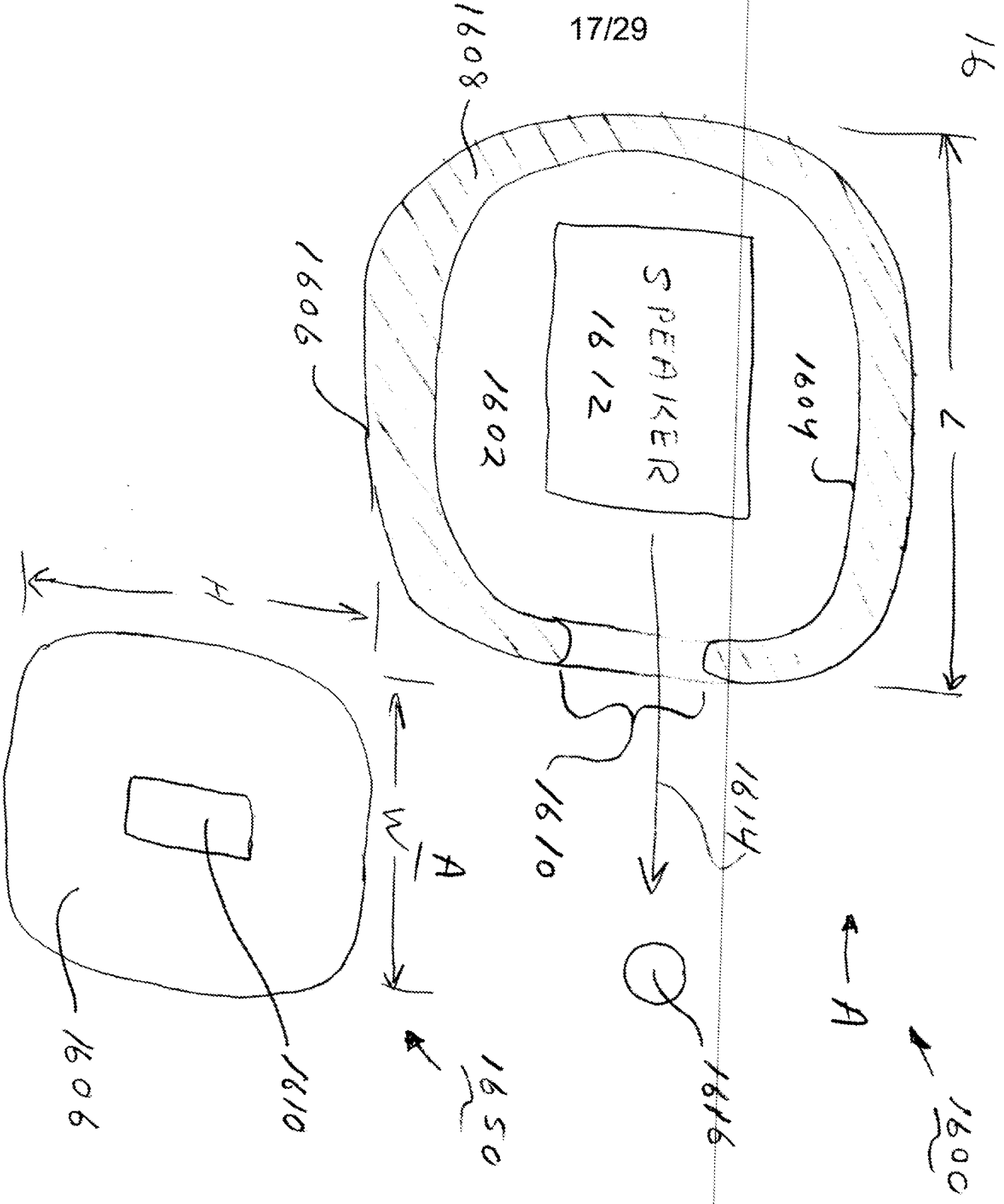

1500
COMM 1530
1532
STORAGE 1510
SENSOR 1528
1529
RAM 1508
GPS 1526
ROM 1506
USER INTERFACE 1524
CPU 1504
AUDIO 1522
DISPLAY 1520
1502

FIG. 15

FIG 16


1608
1902
1906
SPEAKER
1912
1904
L
H
W
A
1910
1914
1606
1910
1950
1916
A
1600

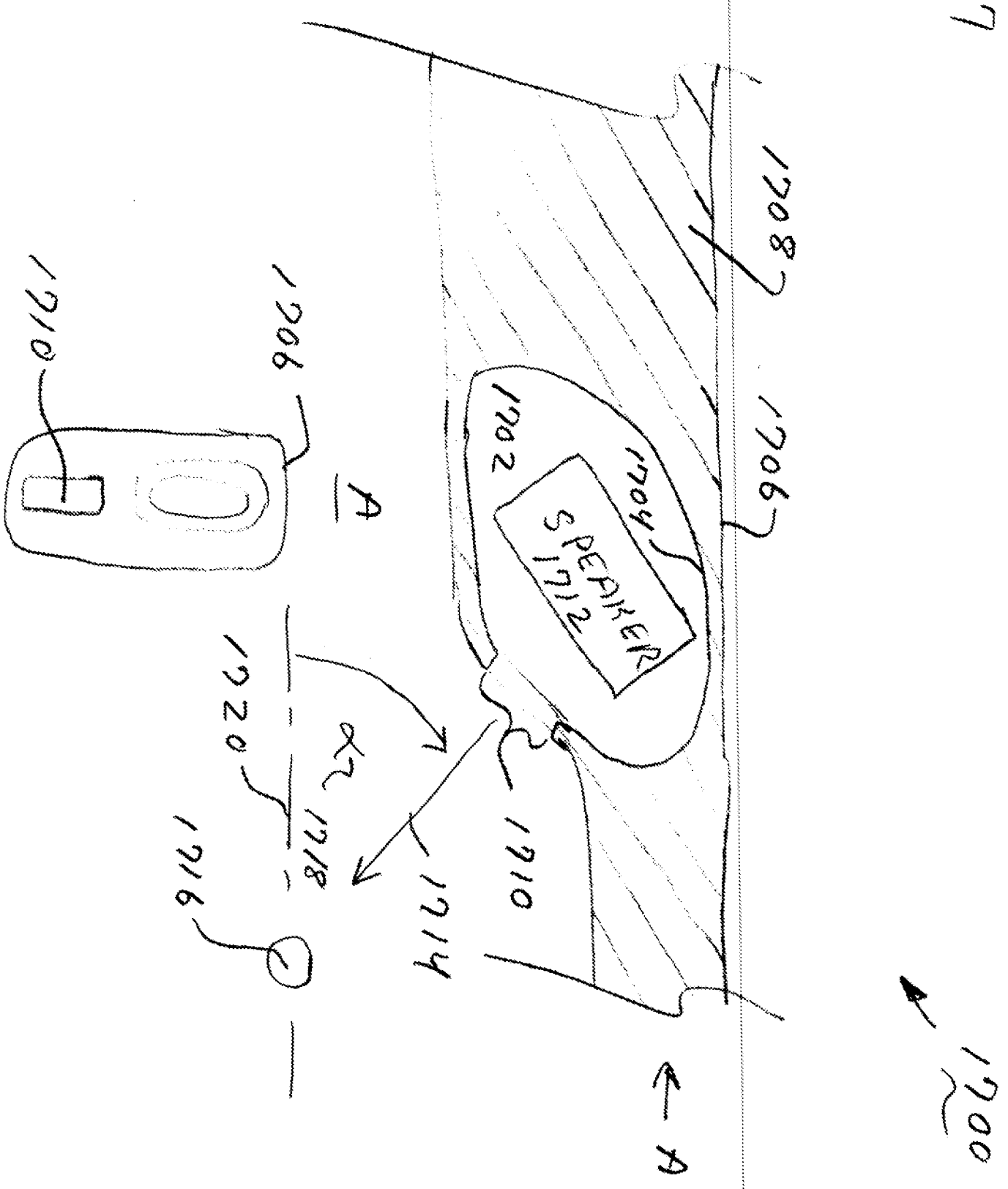

FIG 17
1700
1702
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1706
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1710
1712
SPEAKER
1714
1716
1718
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1724
1726
A
A

FIG 18

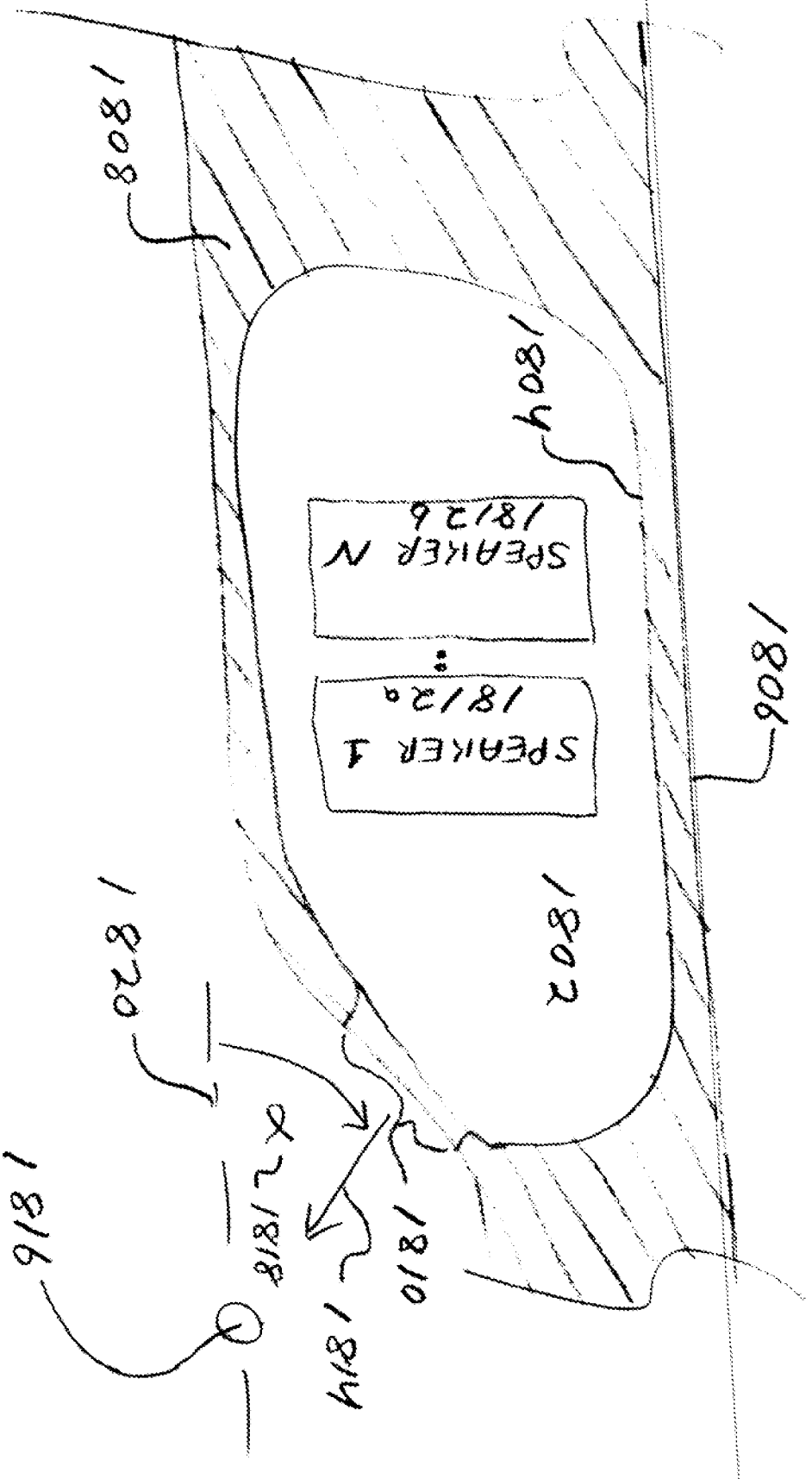

8081
1808
SPEAKER N
1812b
SPEAKER 1
1812a
9081
2081
2028
1818
9181
4181
0181
4
6081

FIG 19

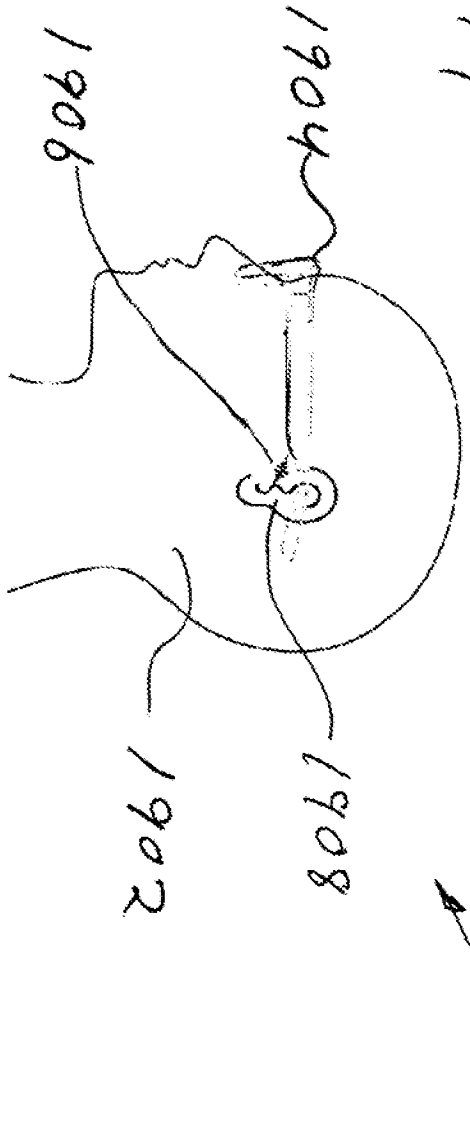


FIG 20

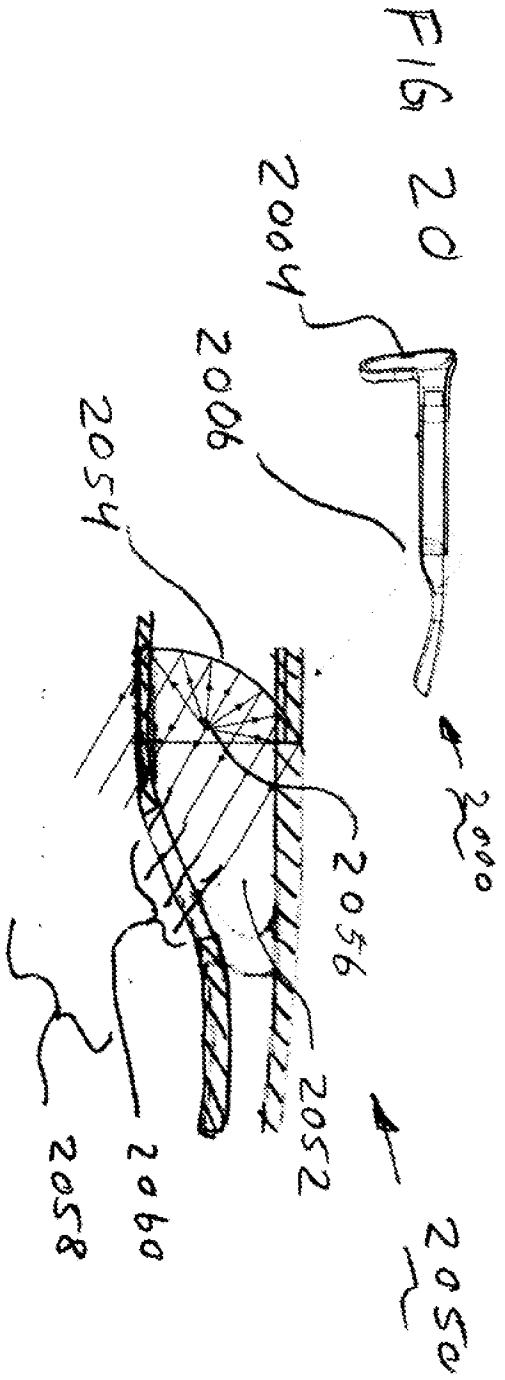
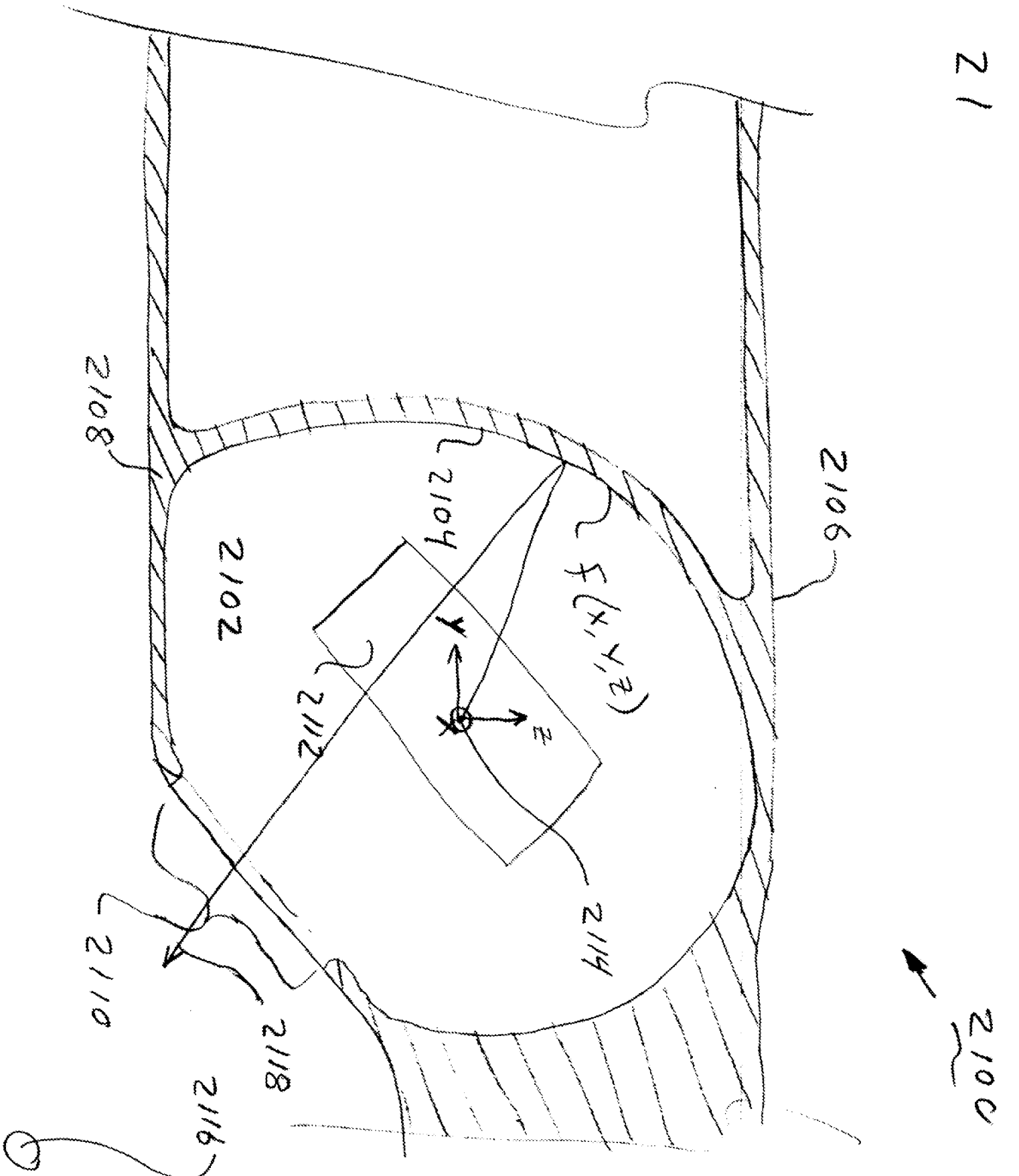


FIG 21



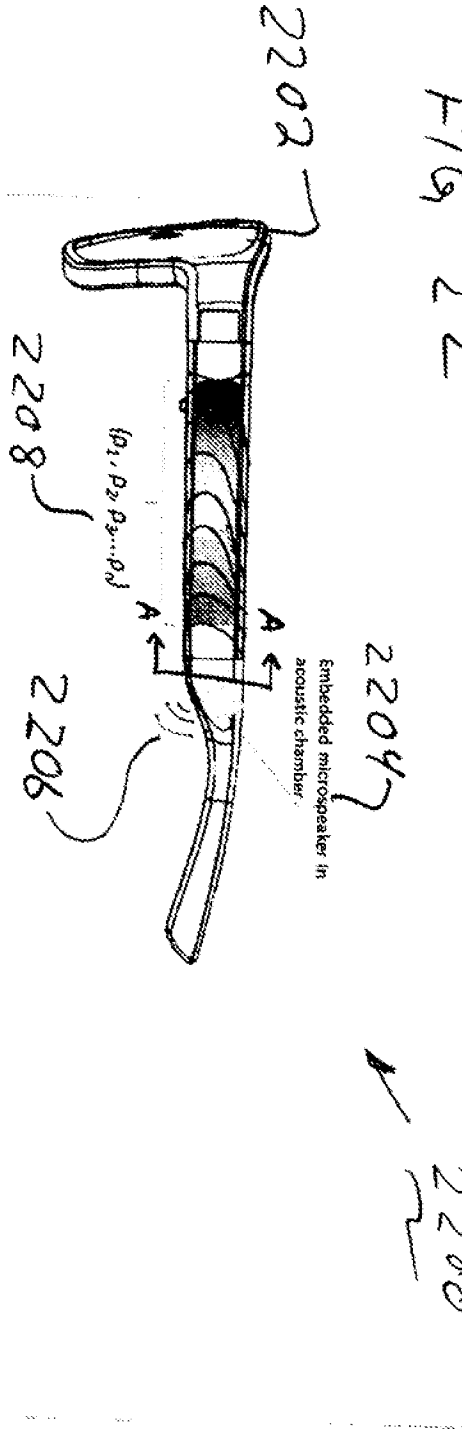
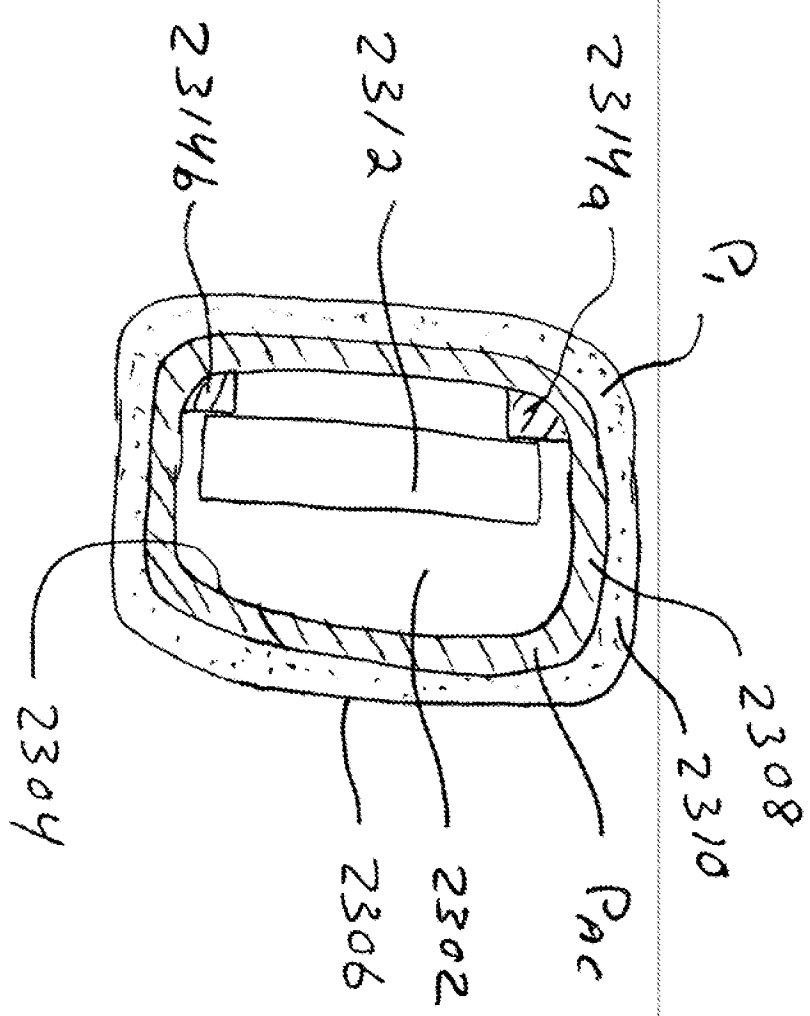

2202
2208
$(p_1, p_2, p_3 \ldots p_n)$
A
A
2206
2204
Embedded microspeaker in acoustic chamber
2200

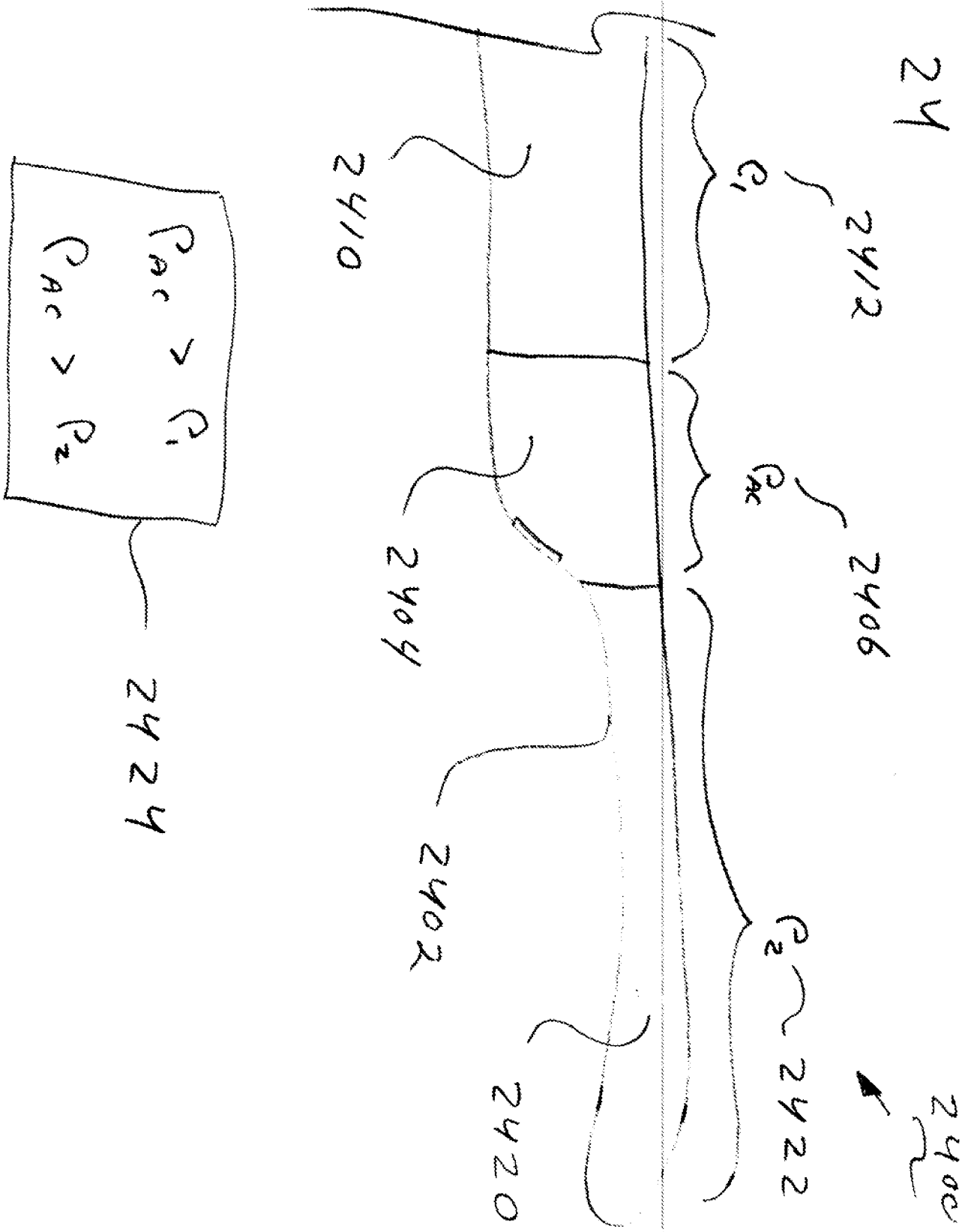
FIG 22

FIG 23



25/29

FIG 24


2410
2412
2404
2406
2402
2420
2422
2400
2424
$C_1 > C_2$
$C_1 < C_2$
$C_A < C_2$
$C_A > C_2$

26/29

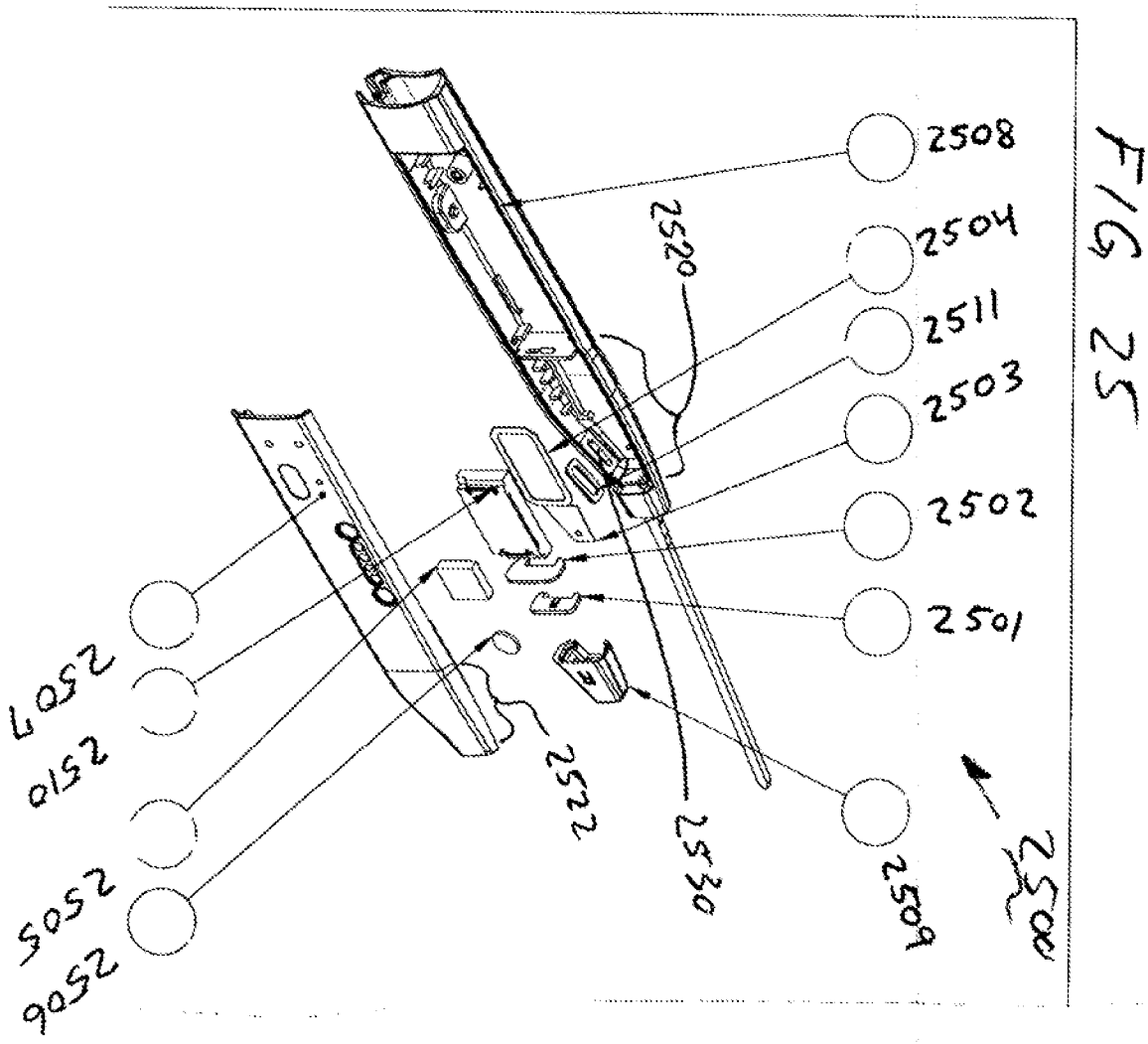

2508
2504
2511
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2520
2524
9052
5052
0152
4052

FIG 25

27/29

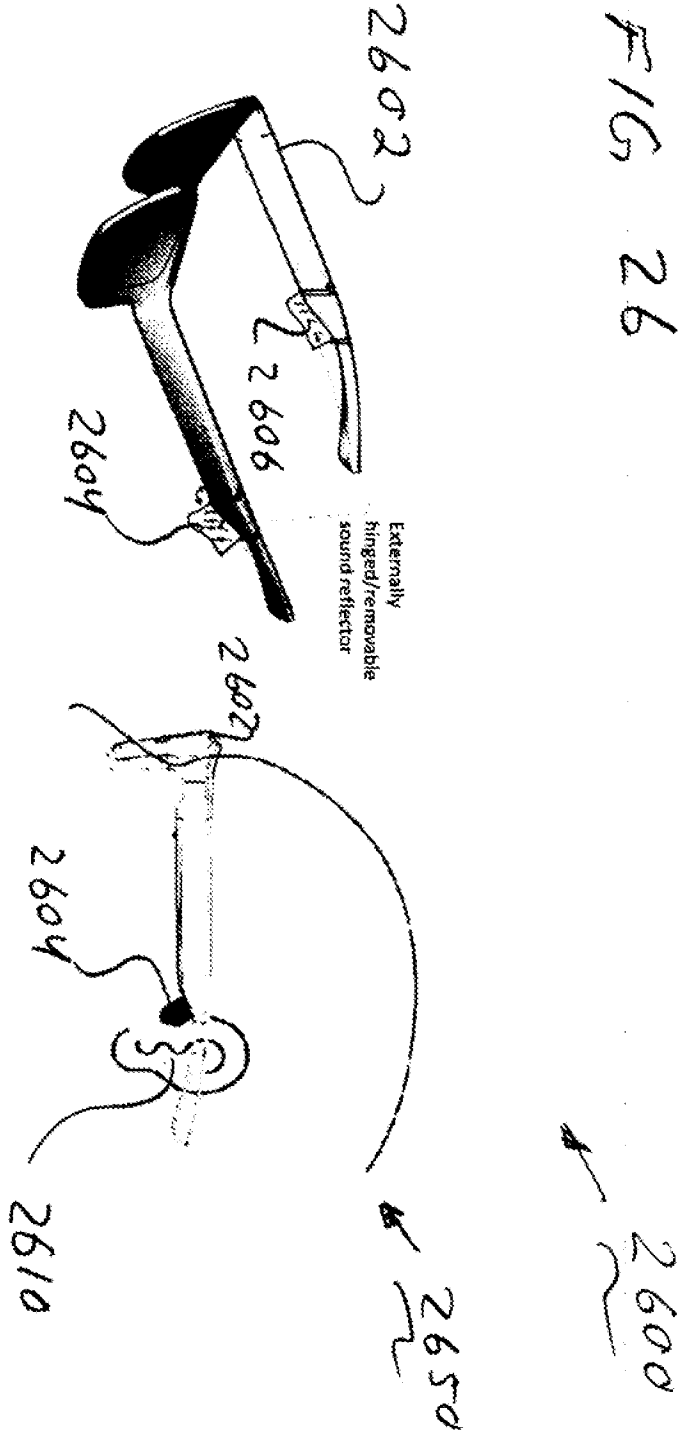
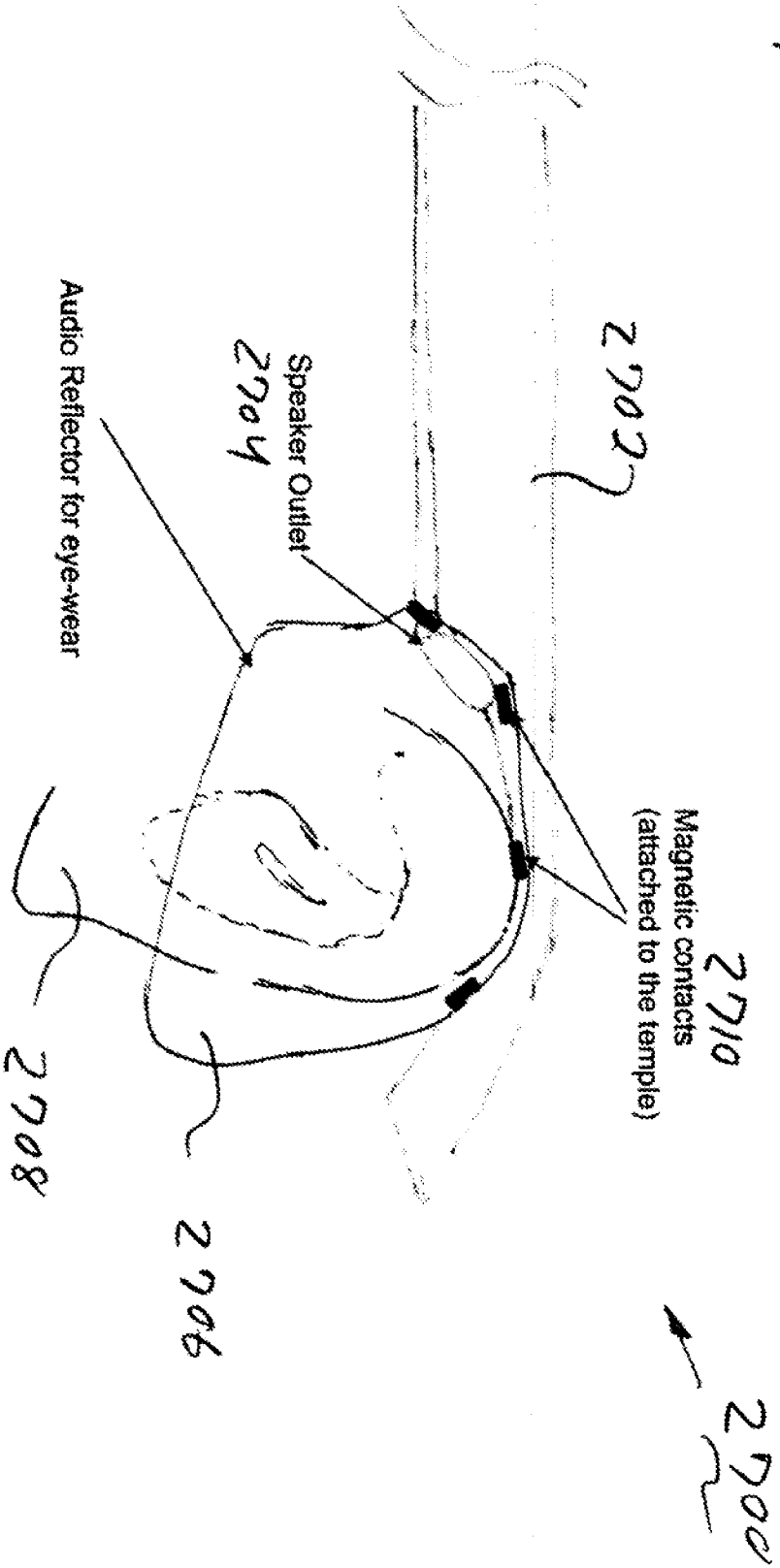

2602
2606
2604
Externally hinged/removable sound reflector
2602
2604
2610
2650
2600

FIG 26

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FIG 27


Audio Reflector for eye-wear
2704
Speaker Outlet
2702
2710
Magnetic contacts
(attached to the temple)
2708
2706
2700

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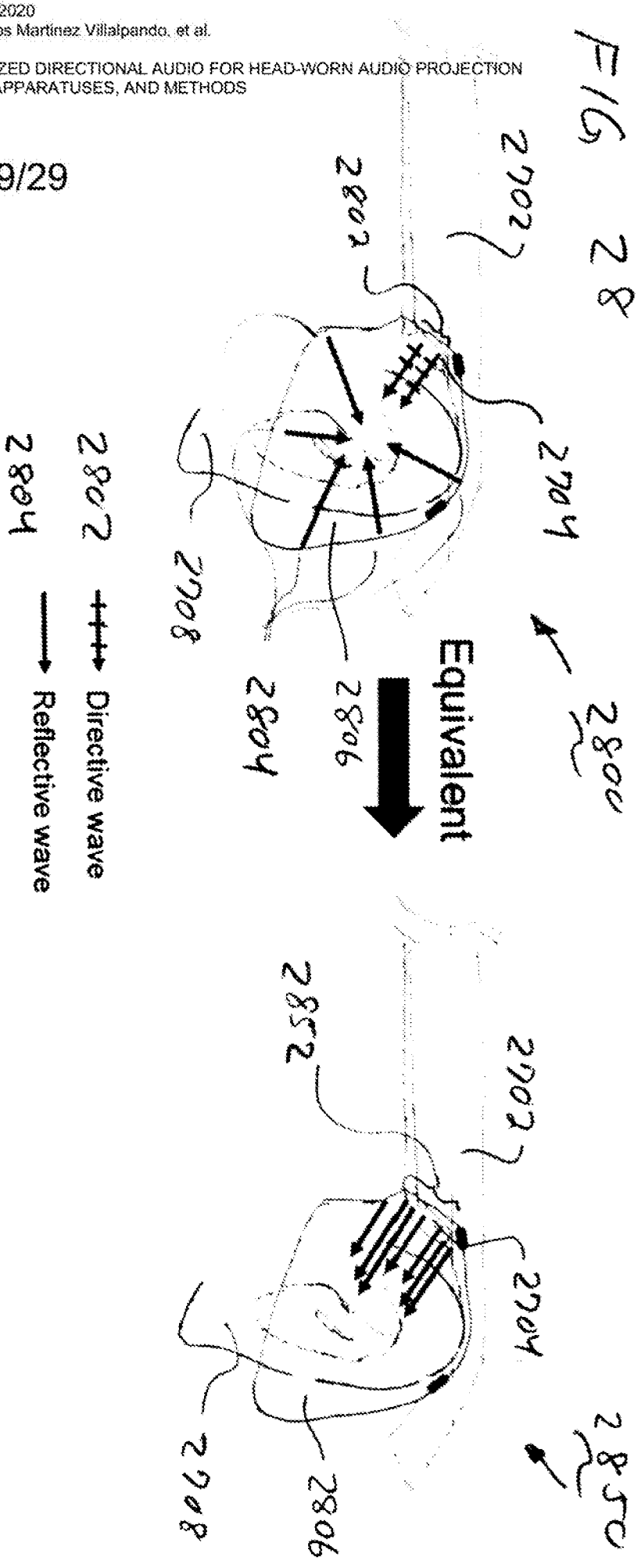

2804
Reflective wave
2802
Directive wave
2802
2702
2804
8002
9002
Equivalent
2802
2582
2702
2704
8002
9002
2582

FIG 28

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	ERNESTO CARLOS MARTINEZ VILLALPANDO
Filer:	Mark S. Peloquin
Attorney Docket Number:	S120219.P003

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	31	50	1550
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	2	230	460
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**2875**

Electronic Acknowledgement Receipt

EFS ID:	38493558
Application Number:	16781897
International Application Number:	
Confirmation Number:	3349
Title of Invention:	PERSONALIZED DIRECTIONAL AUDIO FOR HEAD-WORN AUDIO PROJECTION SYSTEMS, APPARATUSES, AND METHODS
First Named Inventor/Applicant Name:	ERNESTO CARLOS MARTINEZ VILLALPANDO
Customer Number:	51340
Filer:	Mark S. Peloquin
Filer Authorized By:	
Attorney Docket Number:	S120219.P003
Receipt Date:	04-FEB-2020
Filing Date:	
Time Stamp:	18:55:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	20200203S120219P003DECLARATIONaia0001CHEUNGi.pdf	1122415 66ef5a8c4fe436d1827c9d8771eed34aeefa4cea	no	2

Warnings:

Information:					
2	Oath or Declaration filed	20200203S120219P003DECLARATIONaia0001ERNESTOi.pdf	1126667 390f1a98b3ee992569043cbced236e6126643c93	no	2
Warnings:					
Information:					
3	Oath or Declaration filed	20200203S120219P003DECLARATIONaia0001LAWi.pdf	1122657 8c205051fb0b1d10a41b6e878697562d06de623e	no	2
Warnings:					
Information:					
4	Oath or Declaration filed	20200203S120219P003DECLARATIONaia0001SAMi.pdf	1121373 be0af824911892a582330ccd03800d6046c9eee7	no	2
Warnings:					
Information:					
5	Oath or Declaration filed	20200203S120219P003POAaia0082KENNYi.pdf	1058544 c44f3e2a7cf319fae9747af777074141e5a8eaca	no	2
Warnings:					
Information:					
6	Application Data Sheet	20200204S120219P003ADSaia0014i.pdf	1759415 39a5ff64a202b5d564b53c821527b2b360c8a127	no	10
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
7		20200204S120219P003Specificationv28ASFILEDCAnumbersi.pdf	20016665 41c065f03ac06d085d3c21fa9e550fca318c1d92	yes	66

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	57
	Claims	58	65

	Abstract		66	66	
Warnings:					
Information:					
8	Drawings-only black and white line drawings	20200204S120219P003FIGURES128v03ASFILEDwithdatai.pdf	3319655 249e717f976341657c3e9e1144e0db354026fbac	no	29
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	40141 0ddac03f1067cb1a7e14c0f3db1dbd82819b5943	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	30687532		

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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.