

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT5932045

SUBMISSION TYPE:	RESUBMISSION
NATURE OF CONVEYANCE:	RELEASE AND SETTLEMENT AGREEMENT
RESUBMIT DOCUMENT ID:	505766324
CONVEYING PARTY DATA	
Name	Execution Date
INGEN1, LLC	08/23/2019
RECEIVING PARTY DATA	
Name:	FRANKIE WENDELL ERDMAN JR
Street Address:	P.O. BOX 2242
City:	FAIRHOPE
State/Country:	ALABAMA
Postal Code:	36533
PROPERTY NUMBERS Total: 1	
Property Type	Number
Patent Number:	10292675
CORRESPONDENCE DATA	
Fax Number:	(703)243-6410
<i>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.</i>	
Phone:	703-243-6333
Email:	mail@mwzb.com
Correspondent Name:	MILLEN WHITE ZELANO & BRANIGAN
Address Line 1:	2200 CLARENDON BLVD
Address Line 2:	SUITE 1400
Address Line 4:	ARLINGTON, VIRGINIA 22201
ATTORNEY DOCKET NUMBER:	CUNN-0002-X
NAME OF SUBMITTER:	SANDRA C. MELEAN
SIGNATURE:	/SANDRA C. MELEAN/
DATE SIGNED:	01/28/2020
Total Attachments: 35	
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RELEASE AND SETTLEMENT AGREEMENT
BY AND BETWEEN

FRANKIE WENDELL ERDMAN, JR., PETER T. FALKNER, CARLA WILLIAMS
FALKNER, KIRBY J. PLESSALA, DENEEN TERRITO-EVANS PLESSALA,
CLIFFORD A. HENRICKSEN, MEDICAL INGENUITY PARTNERS, LLC,
INNOVATIVE MEDICINE PARTNERS, LLC, AND INGENI, LLC

This Release and Settlement Agreement ("Agreement") is entered into and executed this 23rd day of August, 2019 by and between Frankie Wendell Erdman, Jr. ("Mr. Erdman"), on the one hand, and Peter T. Falkner ("Mr. Falkner"), Carla Williams Falkner ("Ms. Falkner"), Kirby J. Plessala ("Mr. Plessala"), Deneen Territo-Evans Plessala ("Ms. Plessala"), Clifford A. Henricksen ("Mr. Henricksen"), Medical Ingenuity Partners, LLC ("Medical Ingenuity"), Innovative Medicine Partners, LLC (formerly known as Innovative Medicine, LLC) ("Innovative Medicine"), and INGENI, LLC ("INGENI"), on the other hand (collectively, "the Parties").

WHEREAS, in October of 2016, Innovative Medicine, Mr. Falkner, Ms. Falkner, and Mr. Plessala ("NDA Signatories") entered into the Non-Disclosure Agreement ("NDA") with Mr. Erdman for the purpose of allowing the NDA Signatories to evaluate Mr. Erdman's allegedly new design for a copper medical device ("Medical Device") to determine whether the Medical Device would be a good candidate for commercialization;

WHEREAS, in conjunction with the NDA, Innovative Medicine entered into a development agreement with Mr. Erdman which outlined the various "phases" of the development process and the costs involved ("Development Agreement");

WHEREAS, on or about August 24, 2018, Mr. Erdman ("Plaintiff") filed in *Frankie Wendell Erdman, Jr. v. Peter T. Falkner, et al.*, now pending in the United States District Court for the Southern District of Alabama, Southern Division, Civil Action No. 1:18-cv-414-TFM-C, a Complaint against Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI ("Defendants"), which was amended on June 6, 2019, alleging against certain Defendants fraudulent misrepresentation, fraudulent inducement, fraudulent deceit, conversion, misappropriation of trade secrets under 18 U.S.C. § 1836(b), misappropriation of trade secrets under Ala. Code § 8-274, *et seq.*, breach of contract of non-disclosure and confidentiality, tortious interference with contract, and injunction in regard to supposed use, disclosure, marketing, and/or exploitation of Plaintiff's Medical Device;

WHEREAS, on or about April 8, 2019, Defendants filed counterclaims against Mr. Erdman alleging declaratory judgment of patent ownership, declaratory judgment of patent inventorship, tortious interference with business relations of INGENI, tortious interference with business relations of Mr. Henricksen, breach of NDA, and declaratory judgment of invalidity and unenforceability of NDA pleaded in the alternative to tortious interference with business relations of Mr. Henricksen;

WHEREAS, on or about April 8, 2019, Defendants also filed a separate action, *INGENI, LLC, et al. v. Frankie Wendell Erdman, Jr.*, Civil Action No. 1:19-cv-00183-TFM-C, now consolidated with *Wendell Erdman, Jr. v. Peter T. Falkner, et al.* in the United States District Court for the Southern District of Alabama, Southern Division, alleging declaratory judgment of patent ownership, declaratory judgment of patent inventorship, tortious interference with business relations of INGENI, tortious interference with business relations of Mr. Henricksen, breach of nondisclosure agreement, and declaratory judgment of invalidity and unenforceability of NDA pleaded in the alternative to tortious interference with business relations of Mr. Henricksen;

WHEREAS, on or about May 21, 2019, US Patent No. 10,292,675 (attached hereto as "Exhibit A"), with named inventors Ms. Falkner, Ms. Plessala, and Mr. Henricksen, was issued to INGENI;

WHEREAS, Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI continue to deny any and all liability to Mr. Erdman;

WHEREAS, Mr. Erdman continues to deny any and all liability to Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI; and

WHEREAS, the Parties now desire to resolve fully and finally any and all disputes between them, known and unknown, accrued and unaccrued, regarding the subject matter of US Patent No. 10,292,675 or otherwise, existing up to and including the date on which this Agreement is executed;

The Parties hereby knowingly, willingly, voluntarily, freely, with the advice of counsel and without any coercion enter into and agree to the following Agreement:

1. In consideration of the assignment, transfer, and conveyance of the assigned Intellectual Property as described in Exhibit B to Mr. Erdman, and the payment of One Hundred Fifteen Thousand Five Hundred and 00/100 Dollars (\$115,500.00) in accordance with the provisions of the last sentence of this paragraph by Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI to Mr. Erdman, the sufficiency of which are hereby acknowledged, Mr. Erdman (including his assigns and successors in interest, and the heirs, executors, administrators, and personal representatives of any of them), do hereby irrevocably and unconditionally release Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI (and all of their past and present officers, directors, employees, attorneys, successors, assigns, shareholders, owners, insurers, purchasers and sellers; and all parent, subsidiary and affiliate entities) from any and all causes of action, demands, claims, damages, indemnities, warranties, known or unknown, accrued or unaccrued, arising out of or relating in any manner whatsoever to the NDA, Development Agreement, US Patent No. 10,292,675, the Complaint, Amended Complaint, or Counterclaims filed in the United States District Court for the Southern District of

Alabama, Southern Division, styled: *Frankie Wendell Erdman, Jr. v. Peter T. Falkner, et al.*, Civil Action No. 1:18-cv-414-TFM-C, and/or the Complaint filed in the United States District Court for the Southern District of Alabama, Southern Division, styled: *INGENI, LLC, et al. v. Frankie Wendell Erdman, Jr.*, Civil Action No. 1:19-cv-00183-TFM-C, and any and all claims, known or unknown, which were asserted or could have been asserted by Mr. Erdman. This is a complete, final, full, absolute and unconditional release of any and all claims Mr. Erdman has against Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI of any kind or nature whatsoever up to and including the date on which this Agreement is executed. The payment of One Hundred Fifteen Thousand Five Hundred and 00/100 Dollars (\$115,500.00) to Mr. Erdman described in this paragraph shall be made as follows: (1) Twenty-Five Thousand Five Hundred Dollars (\$25,500) shall be paid contemporaneously with the execution of this Agreement; and (2) the remaining Ninety Thousand Dollars (\$90,000) shall be paid in three separate Thirty Thousand Dollar (\$30,000) payments, each respective Thirty Thousand Dollar (\$30,000) payment to be made thirty (30), sixty (60), and ninety (90) days from the date of execution of this Agreement. Notwithstanding this recital, Mr. Erdman's release of Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI described in this paragraph will not become effective until the \$115,500.00 is paid in full.

2. For good and valuable considerations, Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI (including their owners, principals, representatives, managers, shareholders, directors, officers, assigns, affiliated companies, successors in interest, and the heirs, executors, administrators, and personal representatives of any of them), do hereby irrevocably and unconditionally release Mr. Erdman (and all of his past and present attorneys, successors, and assigns) from any and all causes of action, demands, claims, damages, indemnities, warranties, known or unknown, accrued or unaccrued, arising out of or relating in any manner whatsoever to the NDA, Development Agreement, US Patent No. 10,292,675, Complaint, Amended Complaint, or Counterclaims, filed in the United States District Court for the Southern District of Alabama, Southern Division, styled: in *Frankie Wendell Erdman, Jr. v. Peter T. Falkner, et al.*, Civil Action No. 1:18-cv-414-TFM-C, and/or the Complaint filed in the United States District Court for the Southern District of Alabama, Southern Division, styled: *INGENI, LLC, et al. v. Frankie Wendell Erdman, Jr.*, Civil Action No. 1:19-cv-00183-TFM-C, and any and all claims, known or unknown, which were asserted or could have been asserted by Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI. This is a complete, final, full, absolute and unconditional release of any and all claims Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI have against Mr. Erdman of any kind or nature whatsoever up to and including the date on which this Agreement is executed.

3. Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI recognize that Mr. Erdman denies any and all liability for any allegations made by Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI

against him. Mr. Erdman recognizes that Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI deny any and all liability for any allegations made by Mr. Erdman against them. Mr. Erdman acknowledges the assignment made to him pursuant to this Agreement is not an admission of liability, but rather, is made by Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI in order to avoid the costs and uncertainty of further litigation.

4. INGENI shall execute Exhibit B to this agreement to assign, transfer, and convey the Intellectual Property described in Exhibit B to Mr. Erdman within fifteen (15) days of execution of this Agreement by the Parties. . A Joint Stipulation of Dismissal in the consolidated *Frankie Wendell Erdman, Jr. v. Peter T. Falkner, et al.*, Civil Action No. 1:18-cv-414-TFM-C and *INGENI, LLC, et al. v. Frankie Wendell Erdman, Jr.*, Civil Action No. 1:19-cv-00183-TFM-C, pending in the United States District Court for the Southern District of Alabama, Southern Division will be filed upon receipt of a fully executed Exhibit B and the \$115,500.00 consideration described in Paragraph 1. The United States District Court for the Southern District of Alabama will retain jurisdiction over the interpretation and enforcement of this Agreement regardless of whether the above-captioned cases have been dismissed with prejudice.

5. Mr. Erdman is solely responsible for the characterization of the assignment, transfer, and conveyance of US Patent No. 10,292,675 and the payment for federal and state tax purposes and for the distribution of any and all proceeds received by him under this Agreement, and they acknowledges Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI have no responsibility whatsoever to direct in any manner the characterization of the assignment, transfer, and conveyance of US Patent No. 10,292,675 and settlement payment and distribution of the settlement proceeds. Mr. Erdmann represents, warrants and agrees he is not relying on the advice of Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI or anyone associated with Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI, including legal counsel for or any insurer for Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI, as to any tax consequences of any kind arising out of this Agreement. Any tax obligations which may arise from receipt of US Patent No. 10,292,675 and settlement proceeds under this Agreement are Mr. Erdman's sole obligation. Mr. Erdman hereby agrees to indemnify and hold harmless Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI (and all of their past and present officers, directors, employees, attorneys, successors, assigns, shareholders, owners, insurers, and all parent, subsidiary and affiliate corporations) from any and all taxes, interest, penalties or the like which may be asserted against Mr. Erdman by any taxing authority as a result of the taxes on US Patent No. 10,292,675 and settlement proceeds assigned, transferred, conveyed, and/or paid under Paragraph 4 of this Agreement.

6. Mr. Erdman expressly warrants that only he, and no other entity or

individual, has or had any interest in any claim(s) or matters referred to in this Agreement and that he has not in any way transferred, assigned, conveyed, mortgaged, or granted any security interest in his claims against Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI which are being released pursuant to this Agreement.

7. Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI hereby expressly warrant to Mr. Erdman that no money has been raised by outside investors for the development of the intellectual property that is being transferred pursuant to Exhibit B.. Mr. Falkner, Ms. Falkner, Mr. Plessala, Ms. Plessala, Mr. Henricksen, Medical Ingenuity, Innovative Medicine, and INGENI agree to defend and indemnify Mr. Erdman from any claim that is brought by an individual or entity that invested money up through and including the date of this settlement for the development of the intellectual property that is being transferred pursuant to Exhibit B.

8. The Parties hereby agree the terms, conditions, and amount of assignment and/or settlement payment made pursuant to this Agreement are confidential and shall not be disclosed to any person or entity with the following exceptions. The Parties may make full disclosure to their attorneys, accountants, insurers, or tax return preparers, any local, State or Federal tax agency, any regulatory agency, or pursuant to a valid subpoena, document request or other legal process. If any Party discloses the amount of settlement to anyone in violation of this paragraph, then, upon proof by a preponderance of the evidence that a Party to this Agreement has breached this confidentiality provision, the breaching party shall be liable to the non-breaching party for all actual damages sustained by the non-breaching party as a result of the breach.

9. Should any Party to this Agreement be found by a court of competent jurisdiction to have breached this Agreement or the confidentiality provision in Paragraph No. 8 of this Agreement, the prevailing Party shall be entitled to any and all reasonable court and litigation costs and expenses, including a reasonable attorney's fee incurred in defending or prosecuting a claim for breach of this Agreement or the confidentiality provision in Paragraph No. 8 of this Agreement.

10. The Parties agree they will not make any disparaging remarks or comments or written or electronic statements of any sort related to any and all conduct or misconduct arising out of or relating in any manner whatsoever to the NDA, Development Agreement, US Patent No. 10,292,675, Complaint, Amended Complaint, or Counterclaims filed in the United States District Court for the Southern District of Alabama, Southern Division, styled: in Frankie Wendell Erdman, Jr. v. Peter T. Falkner, et al., Civil Action No. 1:18-cv-414-TFM-C, and/or the Complaint filed in the United States District Court for the Southern District of Alabama, Southern Division, styled: INGENI, LLC, et al. v. Frankie Wendell Erdman, Jr., Civil Action No. 1:19-cv-00183-TFM-C, about any Party to this Agreement to place them in a negative light, unless compelled to testify pursuant to a court order.

11. This Agreement supersedes any and all other or prior agreements, either in writing or oral, between the Parties with respect to the subject matter of this Agreement and any amendment or termination of this Agreement must be in writing and signed by all Parties to this Agreement.

12. Should any Party to this Agreement be found by a court of competent jurisdiction to have breached this Agreement, the non-breaching Party or Parties shall be entitled to any and all court costs, reasonable litigation costs and a reasonable attorney's fees, incurred in enforcing this Agreement or bringing a lawsuit for breach of this Agreement.

13. This Agreement shall be construed in its entirety and according to its plain meaning. The Parties hereby agree that this Agreement shall be construed as a product of negotiations at arms length between equally sophisticated persons advised by counsel and shall not be construed against the Party who provided or drafted the Agreement.

14. The individuals signing this Agreement and the Parties, on whose behalf such individuals are signing, hereby represent that they are empowered and authorized to sign on behalf of and bind the Parties for whom they have signed in all respects. Each Party agrees to indemnify and hold harmless the others from all loss, damage or cost arising from any breach of the foregoing representation and warranty.

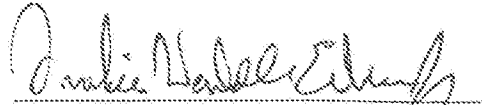
15. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original.

16. This Agreement shall be construed, interpreted and enforced according to the laws of the State of Alabama, without regard to Alabama's conflict of laws principle.

17. Ms. Falkner, Ms. Plessala, and Mr. Henricksen agree to complete and notarize the Inventorship Statement attached hereto as Exhibit C and acknowledge that it is expressly incorporated herein and that it contains material representations upon which Mr. Erdman relied with respect to his decision to enter into this Settlement Agreement. The Defendants further warrant that they will take all necessary steps requested of them to give full force and effect to the spirit and purpose of this Agreement, where any such steps taken in furtherance of this provision shall be taken without cost, charge or expense of or to the Defendants, their successors, legal representatives, heirs and assigns, but at the sole reasonable cost, charge and expense of Plaintiff, his successors, legal representatives, heirs and assigns, and Plaintiff (or his successors, legal representatives, heirs and assigns) shall reimburse Defendants for any such reasonable charges, costs or expenses upon written request.

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IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.


Frankie Wendell Erdman, Jr.

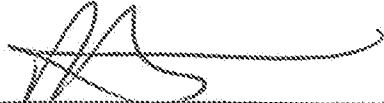
STATE OF ALABAMA
COUNTY OF MOBILE

Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared Frankie Wendell Erdman, Jr., who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement

SWORN TO and subscribed to before me this 31st day of August, 2019.


Notary Public S. J. [unclear]
My Commission Expires: 3-15-2022

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.

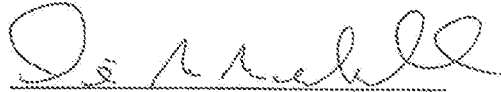


Peter T. Falkner

STATE OF ALABAMA
COUNTY OF MOBILE

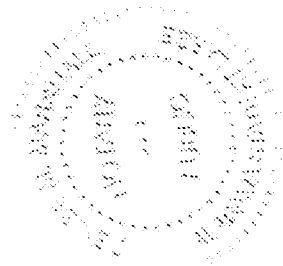
Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared Peter T. Falkner, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 28th day of August, 2019.



Notary Public

My Commission Expires: 11/7/2021




IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.

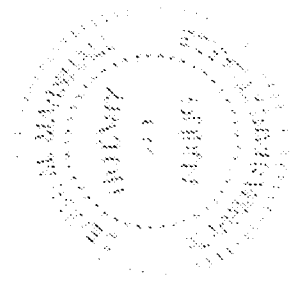

Carla Williams Falkner

STATE OF ALABAMA
COUNTY OF MOBILE

Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared Carla Williams Falkner, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 28th day of August, 2019.


Notary Public
My Commission Expires: 11/7/2021



IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.




Kirby J. Plessala

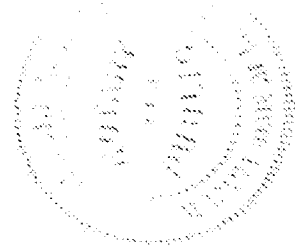
STATE OF ALABAMA
COUNTY OF MOBILE

Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared Kirby J. Plessala, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 28th day of August, 2019.



Notary Public
My Commission Expires: 8/22/23



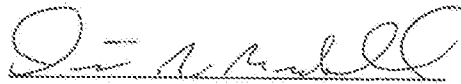
IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.


Deneen Territo-Evans Plessala

STATE OF ALABAMA
COUNTY OF MOBILE

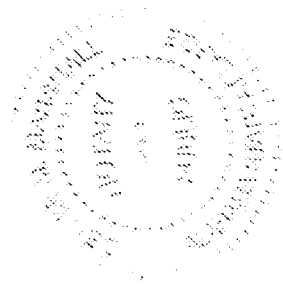
Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared Deneen Territo-Evans Plessala, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 2nd day of August, 2019.

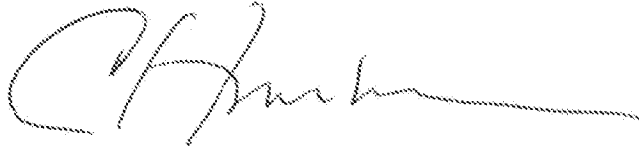


Notary Public

My Commission Expires: 11/7/2021



IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.



Clifford A. Henricksen

STATE OF ALABAMA
COUNTY OF MOBILE

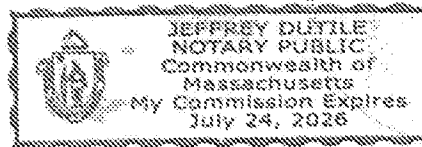
Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared Clifford A. Henricksen, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 29 day of August, 2019.



Notary Public

My Commission Expires: 24 July 2026



IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.

MEDICAL INGENUITY PARTNERS, LLC

By: *Carla W. Falner*
Its Authorized Representative

STATE OF ALABAMA
COUNTY OF MOBILE

Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared CARLA W. FALNER as Authorized Representative of Medical Ingenuity Partners, LLC, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 28th day of August, 2019.

D. A. Mull

Notary Public

My Commission Expires: 11/7/2021



IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first written above.

INNOVATIVE MEDICINE PARTNERS, LLC

By: *Carol Pulkrna*
Its Authorized Representative

STATE OF ALABAMA
COUNTY OF MOBILE

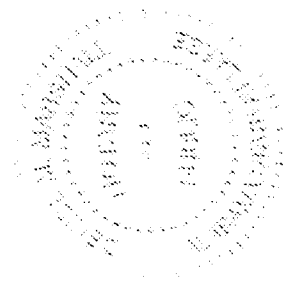
Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared CAROL W. PULKRNA as Authorized Representative of Innovative Medicine Partners, LLC, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 26th day of August, 2019.

Jim Hill

Notary Public

My Commission Expires: 11/7/2021



IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date

first written above.

INGENI, LLC

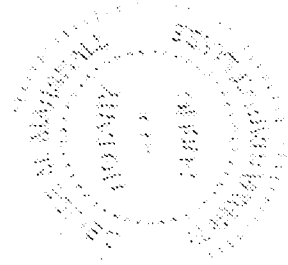
By: *Carla W. Falkner*
Its Authorized Representative

STATE OF ALABAMA
COUNTY OF MOBILE

Before me, the undersigned authority, a notary public, in and for said County and said State, personally appeared CARLA W. FALKNER as Authorized Representative of INGENI, LLC, who after first being duly sworn does say that being informed and aware of the contents of the foregoing Agreement he/she has executed it on the day that appears on the Agreement.

SWORN TO and subscribed to before me this 28th day of August, 2019.

D. M. [Signature]
Notary Public
My Commission Expires: 11/7/2021





US010292675B2

(12) **United States Patent**
Falkner et al.

(10) **Patent No.:** US 10,292,675 B2
(45) **Date of Patent:** May 21, 2019

(54) **STETHOSCOPE**

(71) Applicant: INGENI, LLC, Mobile, AL (US)

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Deneen T. Plessala, Mobile, AL (US);
Clifford A. Henriksen, Framingham,
MA (US)

(73) Assignee: INGENI, L.L.C., Mobile, AL (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days

(21) Appl. No.: 16/152,706

(22) Filed: Oct. 5, 2018

(65) **Prior Publication Data**

US 2019/0105012 A1 Apr. 11, 2019

Related U.S. Application Data

(63) Continuation of application No.
PCT/US2018/030807, filed on May 3, 2018.

(60) Provisional application No. 62/570,302, filed on Oct.
10, 2017, provisional application No. 62/645,553,
filed on Mar. 20, 2018.

(51) **Int. Cl.**
A61B 7/02 (2006.01)
H04R 7/26 (2006.01)
H04R 9/06 (2006.01)
A61B 7/00 (2006.01)

(52) **U.S. Cl.**
CPC A61B 7/02 (2013.01); A61B 7/003
(2013.01); A61L 2202/14 (2013.01); H04R
9/06 (2013.01)

(58) **Field of Classification Search**

CPC A61B 7/02; A61B 7/003; A61B 7/026;
A61B 7/04; H04R 7/26; H04R 7/16;
H04R 9/043

See application file for complete search history.

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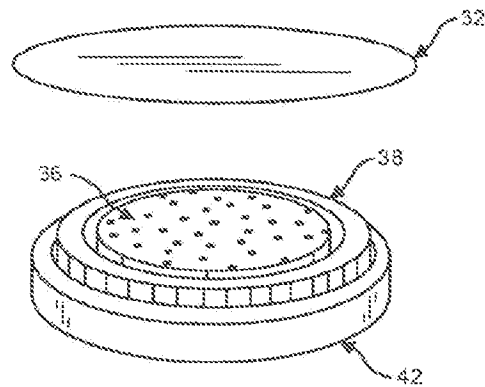
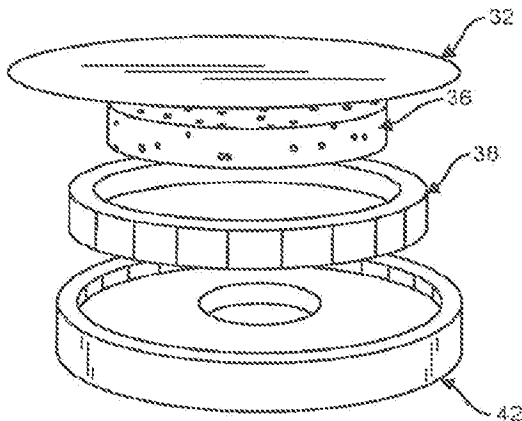
Primary Examiner --- Edgardo San Martin

(74) *Attorney, Agent, or Firm* --- Christina Chamberlain;
Stephen M. Kepper, Intellectual Property Consulting,
L.L.C.

(57) **ABSTRACT**

A stethoscope with a body; a diaphragm; and an integral
annular axially compliant suspension. The annular axially
compliant suspension is located below the diaphragm and
inside an inner perimeter of the body. An axially compliant
reticulated foam pressure pad is located within the annular
suspension, and the diaphragm is a very thin foil, preferably
made from copper, to provide antimicrobial properties.

7 Claims, 10 Drawing Sheets



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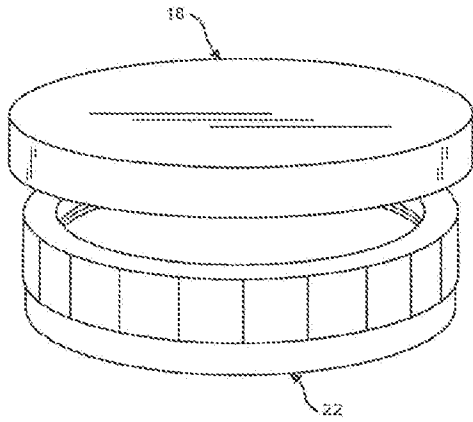


FIG. 1

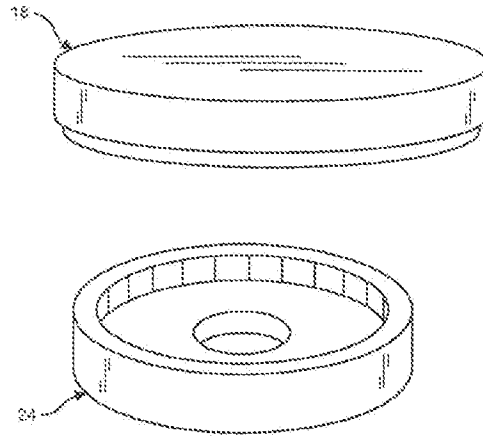


FIG. 2

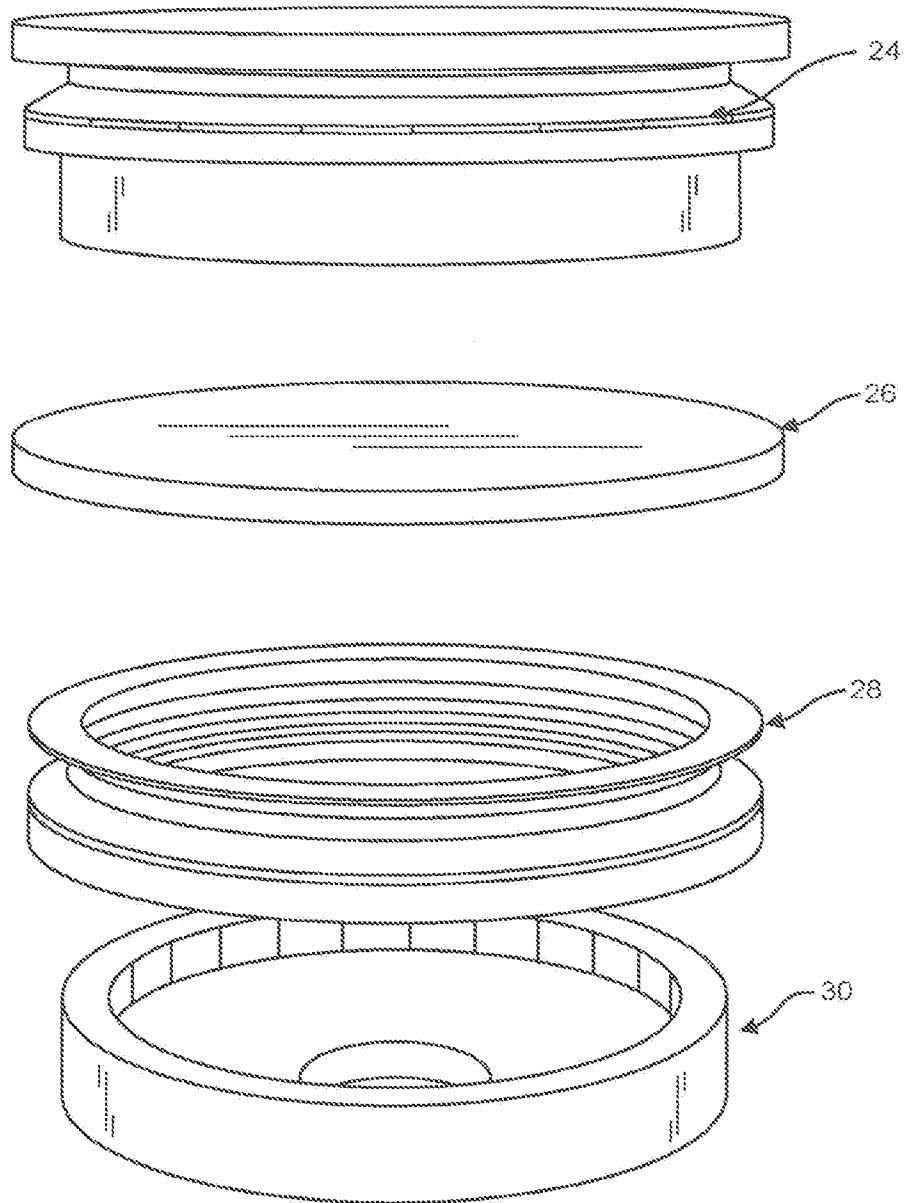


FIG. 3

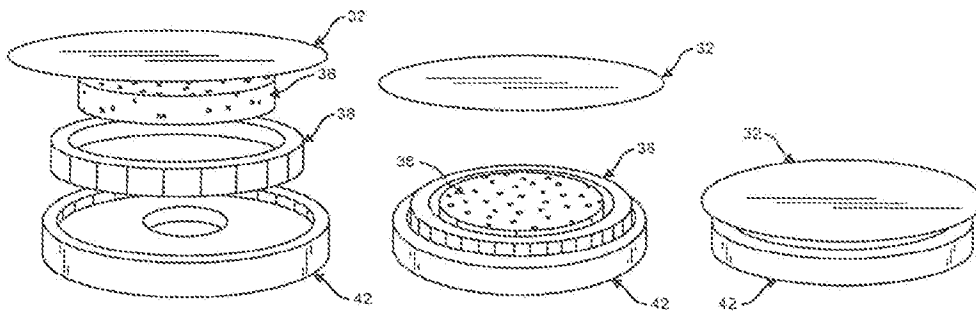
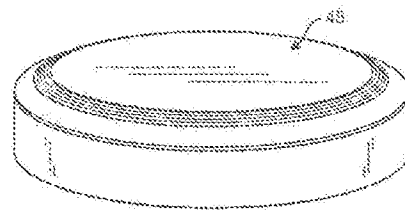
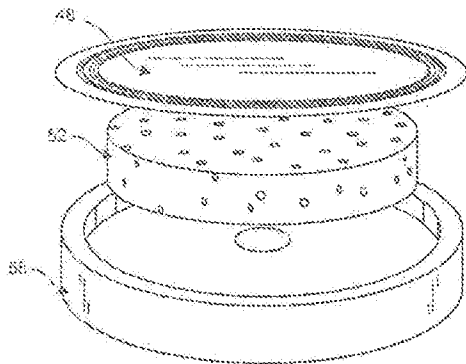


FIG. 4

FIG. 5

FIG. 6



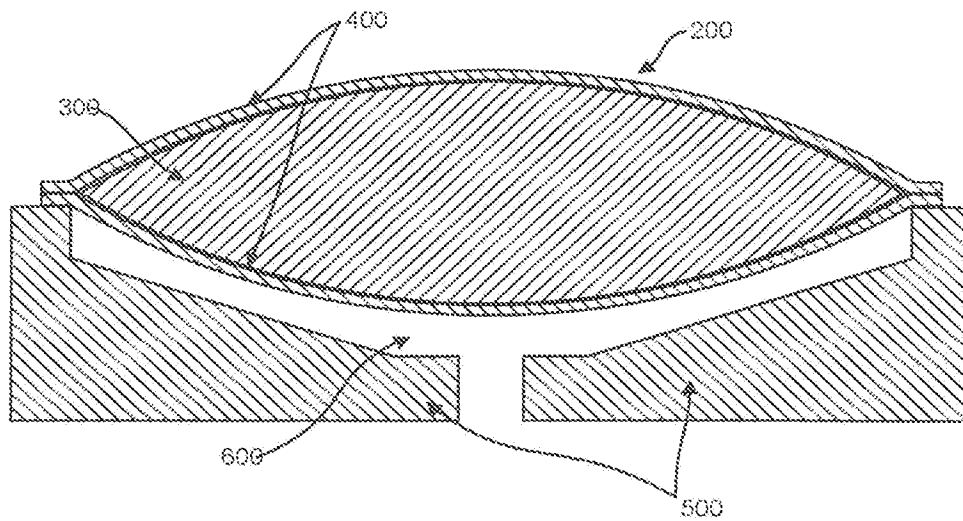


FIG. 10

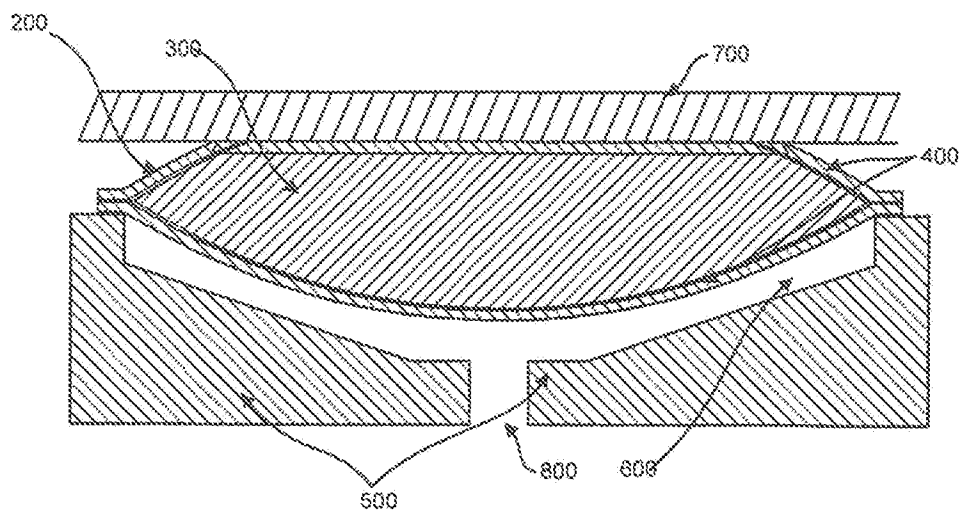


FIG. 11

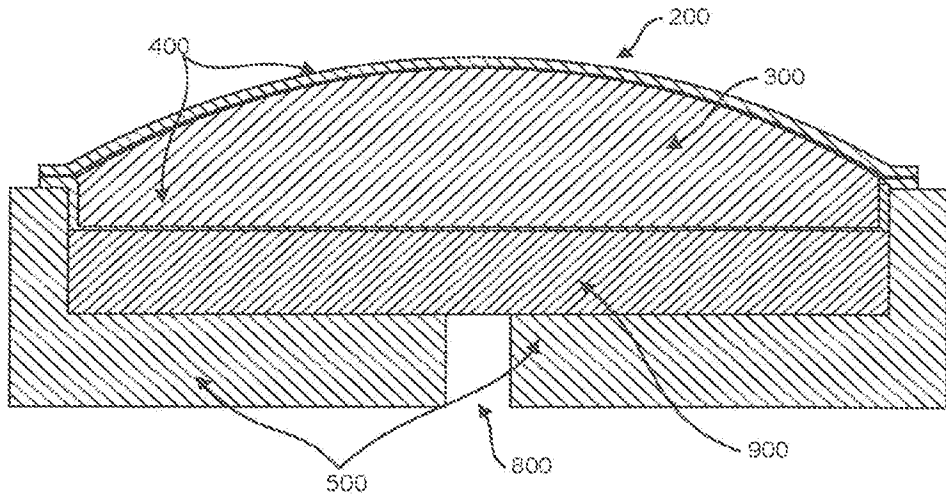


FIG. 12

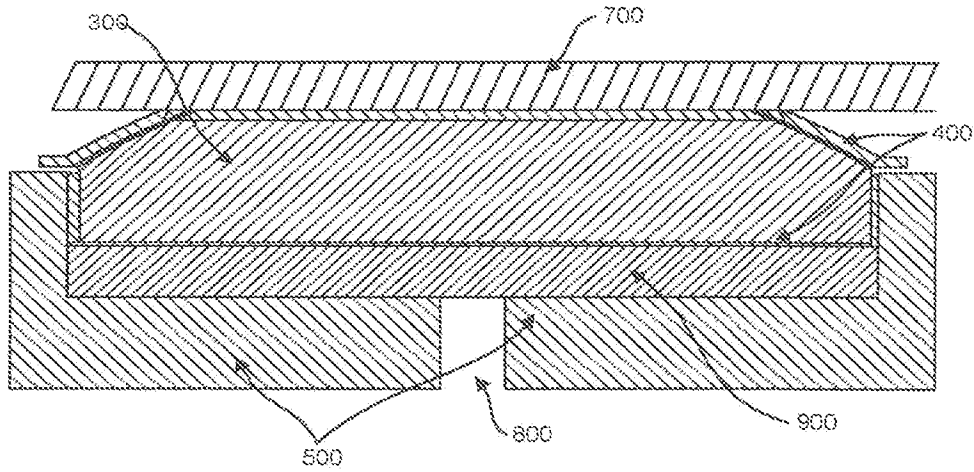


FIG. 13

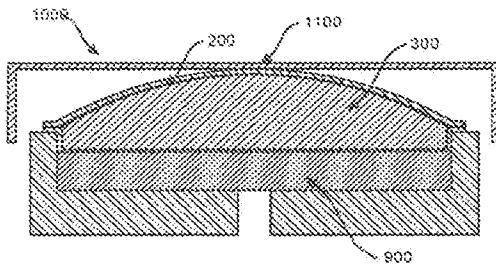


FIG. 14A

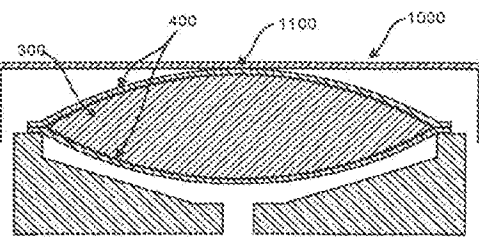


FIG. 14B

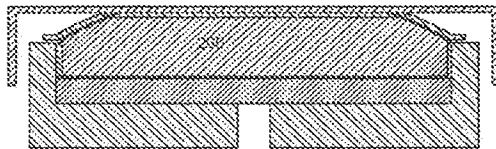


FIG. 14C

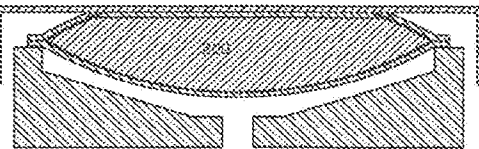
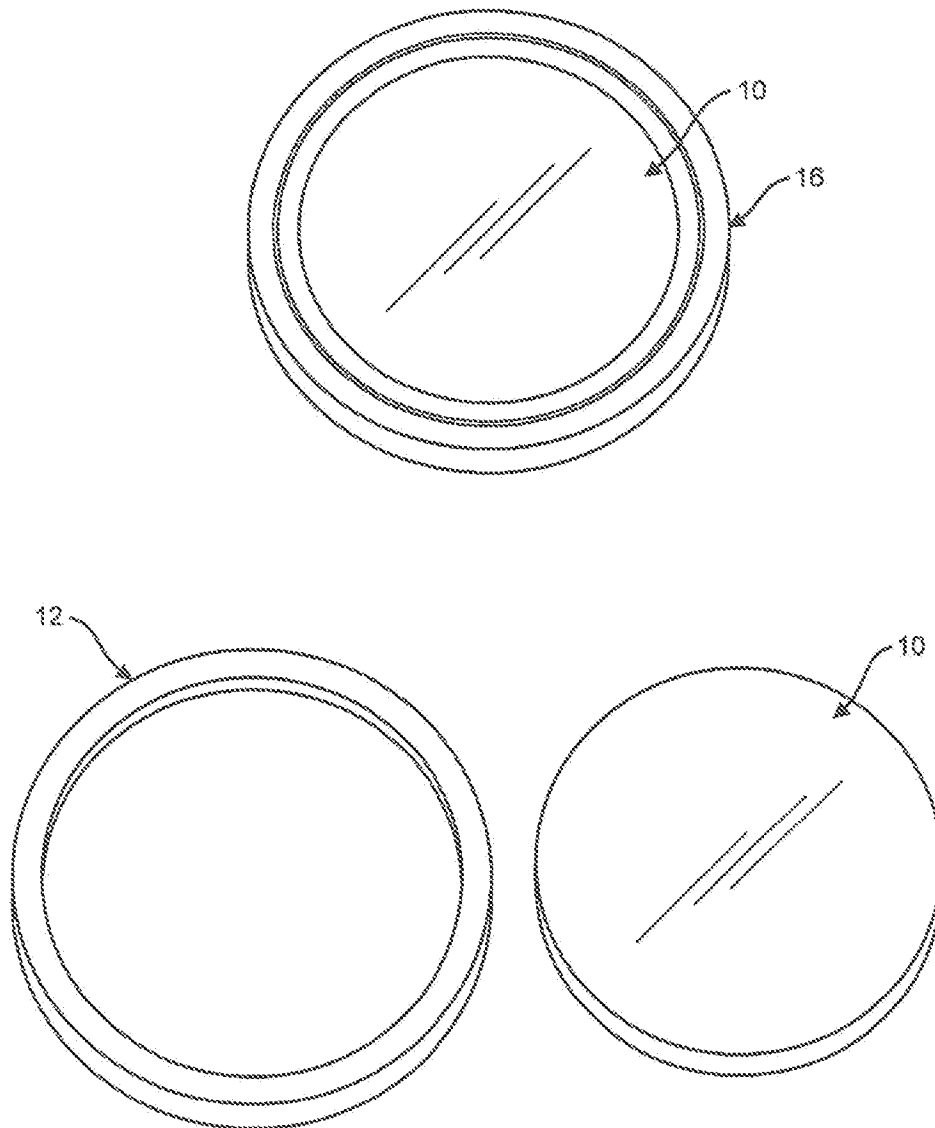


FIG. 14D



PRIOR ART

FIG. 15

1
STETHOSCOPE

RELATED APPLICATIONS

This application is a continuation of International Application No. PCT/US2018/030807, filed May 3, 2018, which claims the benefit of U.S. Provisional Application Nos. 62/570,302 filed Oct. 10, 2017 and 62/645,553 filed Mar. 20, 2018. The entire contents of the above applications are hereby incorporated by reference as though fully set forth herein.

BACKGROUND

A stethoscope is used to amplify body-borne sounds sent from a human or animal heart, lung, stomach, etc., as a means of diagnosis. Using a stethoscope, the listener can hear normal and abnormal respiratory, cardiac, pleural, arterial, venous, uterine, fetal and intestinal sounds. Most stethoscopes have the following parts: ear tips, ear tube, tubing, headset, stem, chest-piece, diaphragm, and a bell. Sounds from the body are passively amplified and transmitted to an air volume via the bell or a diaphragm. The diaphragm mechanism is preferred for most diagnostic applications.

The diaphragm is normally a thin structure typically made of flat or curvilinear-formed plastic material with some means of creating axial compliance so that it can have motion. When the diaphragm is pressed to the patient's flesh, it will move due to body-generated pressures. The diaphragm is air-sealed to an enclosed or captive air volume which has a small hole in it leading to air tubes. The diaphragm's motion changes the volume of captive air, thus creating an acoustic signal at the exit hole that enters the air tubes. The resulting acoustic signals are then sent via the tube assembly to the stethoscope operator's ears.

There have been numerous studies that indicate that stethoscopes transmit infectious agents between patients and are a source of healthcare associated infections.¹ Many show that the contamination level of the stethoscope is substantial after a single physical examination. While healthcare workers are mandated to wash or otherwise sanitize their hands after patient contact, there are currently no guidelines that require stethoscopes be sanitized after every use. The diaphragm is the part of the stethoscope that maintains the most contact with the patient. As such, it would be useful for stethoscope diaphragms to be constructed from materials that are known to be antimicrobial in nature, such as copper and copper alloys, and still retain their acoustic-transduction properties.

¹<https://www.snews-medical.net/Vie/vs/20170511/1/1/New-study-reveals-80-5-of-stethoscopes-are-contaminated-with-infectious-bacteria.aspx> (accessed Mar. 1, 2018) (discussing a study performed by the American Journal of Infection Control revealing that "80 percent of the stethoscopes they studied were contaminated by high concentrations of bacteria.")

BRIEF SUMMARY OF THE INVENTION

In a first embodiment, the present invention is a stethoscope with a body; a diaphragm; and an integral annular axially compliant suspension. The annular axially compliant suspension fits under the diaphragm and inside an inner perimeter of the body. In the preferred embodiment, a reticulated foam pressure pad with an annular suspension is sealed on the interior or outer diameter of the body. In an additional embodiment, the diaphragm is comprised of a very thin foil, preferably made from copper in order to provide antimicrobial properties.

2

In a second embodiment, the present invention is a stethoscope with a body and a diaphragm comprised of a flexible enclosure containing an incompressible liquid suspended in the stethoscope body. In the preferred embodiment, a reticulated foam pressure pad with an annular suspension is sealed on the interior or outer diameter of the body. In an additional embodiment, the diaphragm has a cap over a top end of the suspended flexible enclosure, preferably made from copper in order to provide antimicrobial properties.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of an exemplary embodiment of the interior portion of a simple planar/cup diaphragm with annular sealed foamed suspension of the present invention.

FIG. 2 is an exploded perspective view of an exemplary embodiment of the exterior portions of a simple planar/cup diaphragm with annular sealed foamed suspension of the present invention.

FIG. 3 is a side exploded view of an exemplary embodiment of a simple planar/cup diaphragm with axial elastic bellows suspension.

FIG. 4 is a perspective exploded view of an exemplary embodiment of a planar diaphragm with integral annular outer-suspension and reticulated-foam pressure pad.

FIG. 5 is a perspective view of an exemplary embodiment of a planar diaphragm with integral annular outer-suspension and reticulated-foam pressure pad with the diaphragm removed.

FIG. 6 is a perspective view of an exemplary embodiment of a planar diaphragm with integral annular outer-suspension and reticulated-foam pressure pad with the diaphragm attached.

FIG. 7 is a perspective view of the annular bellows suspension of a planar diaphragm.

FIG. 8 is an exploded perspective view of an exemplary embodiment of a planar diaphragm with annular bellows suspension and internal pressure pad.

FIG. 9 is a side perspective view of an exemplary embodiment of a planar diaphragm with annular bellows suspension and internal pressure pad.

FIG. 10 is a cross-sectional view of the stethoscope head with a suspended sealed flexible enclosure containing an incompressible liquid while not in use.

FIG. 11 is a cross-sectional view of the stethoscope head of FIG. 10 when the diaphragm is applied to the patient's skin.

FIG. 12 is a cross-sectional view of the stethoscope head with a sealed flexible enclosure containing an incompressible liquid that is suspended above the stethoscope body by a pressure pad while not in use.

FIG. 13 is a cross-sectional view of the stethoscope head with a sealed flexible enclosure containing an incompressible liquid that is suspended above the stethoscope body by a pressure pad when the diaphragm is applied to the patient's skin.

FIG. 14A contains cross-sectional views of the stethoscope head of FIG. 12 with the additional antimicrobial cap.

FIG. 14B contains cross-sectional views of the stethoscope head of FIG. 10 with the additional antimicrobial cap.

FIG. 14C contains cross-sectional views of the stethoscope head of FIG. 13 with the additional antimicrobial cap when in use.

FIG. 14D contains cross-sectional views of the stethoscope head of FIG. 11 with the additional antimicrobial cap when in use.

FIG. 15 is a top view of a first version of a diaphragm inside a viscoelastic annular suspension ring and a urethane holding rim used in a stethoscope of the prior art.

DETAILED DESCRIPTION

Turning to FIG. 15, the typical stethoscope of the prior art is shown where the stethoscope diaphragm is held in place to the stethoscope body by the ring 12, which has a matching thread-closure. The ring 12 generally comprises a viscoelastic annular suspension that surrounds the diaphragm 10 as a means of improving its ability to move in concert with body vibrations. The diaphragm 10 and the ring 12 are then positioned within the stethoscope body and sealed with a urethane rim 16 that fits around the ring 12 and body assembly. The diaphragm 10 could be made of anti-microbial copper, but in order to be effective in preventing the transmission of bacteria, the diaphragm 10 as well as the ring 12 and urethane rim 16 would also need to be made of copper since all of these components contact the patient's skin. But, if the ring 12 is made of stiffer copper, the diaphragm 10 would be unable to vibrate and the stethoscope would not work. Additionally, the crevices created between the diaphragm 10 and the ring 12 or the ring 12 and the rim 16 facilitate the transmission of bacteria if the entire surface is not flush and made with an antimicrobial material, such as copper.

In order to utilize the antimicrobial properties of copper and copper alloys, it becomes important to suspend the diaphragm with a suspension element that does not come in contact with the patient; an axially-compliant element under and at the outer perimeter of the copper diaphragm is the preferred embodiment to meet this requirement. The more compliant the suspension, the more output is suspected. Additionally, a back-chamber behind the diaphragm must be air-sealed at all its internal boundaries including those of any suspension element. The smaller the volume of the back-chamber, the more high-frequency output is expected (as is the case in electrodynamic "compression driver" loudspeakers).

The back chamber should be fitted with a small exit port, which is in turn connected to air tubes. These tubes carry the acoustic signals generated by the motion of the diaphragm to the user's ears.

Also, a larger diaphragm and a smaller feed-exit, relative to the size of the diaphragm results in higher sensitivity. The ratio of diaphragm area to feed-exit area will henceforth be called the "compression ratio" of the stethoscope.

An advanced design employs multiple small feed exits (in the back chamber) that are in turn manifolded into a single main exit port to improve the smoothness of the high-frequency output of the stethoscope. With a single feed-exit, a series of dips and bumps in output (harmonically related) occur.

Several embodiments are disclosed herein that meet these aforementioned design requirements.

Turning to FIG. 2, in a first design, a simple planar or cup-shaped diaphragm 18 has annular closed cell foamed suspension wherein the foam 22 of the foamed suspension is sealed in the stethoscope body 24 with highly compliant coating on the foamed suspension interior diameter or outer diameter. The foamed suspension is axially compliant.

Turning to FIG. 3, in a second design, the simple planar or cup-shaped diaphragm 26 of FIG. 2 uses an axially

compliant elastomeric (e.g. rubber) bellows suspension 28 sealed in the stethoscope body 30.

Turning to FIG. 4-6, in a third design, a planar diaphragm 32 with integral annular outer suspension and reticulated-foam pressure pad 36 has an annular suspension 38 sealed on the interior diameter or outer diameter in the stethoscope head 42 with compliant, viscoelastic coating. The pressure pad 36 is made of reticulated foam. The free-air pressure pad 36 extends the effective area of a thin-foil diaphragm 32 by pressing the diaphragm against the skin of the patient. Reticulated foam is preferred for the pressure pad as it is an elastomer that has open cells so it can act as a compliant element but also allow sound to pass through it unimpeded. Closed-cell foams are compliant but will block sound because they have closed "windows."

Turning to FIGS. 7-9, in a fourth embodiment, a planar diaphragm 48 with integral annular suspension 50 inside the stethoscope head 58 and internal pressure pad 52 (reticulated foam) has a formed-foil (or other material) diaphragm 48 with circumferential, annular corrugations that allow freedom of axial motion of the diaphragm. This is similar to suspensions of loudspeaker diaphragms. If the diaphragm 48 were made of very thin foil (copper or other), the pressure pad 52 would improve motion of the entire diaphragm surface by pressing it against the patient's skin.

In the preferred embodiment, as depicted in FIGS. 4-6, the stethoscope of the present invention, the stethoscope body 30 is an axisymmetric structure of a rigid material (e.g. aluminum, or other suitable light-weight metal or metal alloy) with a sound port in the back of the stethoscope body 30 feeding the output port radially. The stethoscope body 30 is about 3.2 inches outer diameter, giving an effective diaphragm 32 of about 2.6 inches outer diameter. The preferred foam suspension of the pushpad 36 is very compliant foam rubber that is closed-cell. The pushpad 36 is air-sealed on the inner diameter of the annular suspension 38 with a substantially viscoelastic coating applied with a brush. Preferentially, the annular suspension 38 is bonded to the stethoscope body 30 first, then coated on the inner diameter with the viscoelastic coating. The final step is an application of adhesive to the top of the annular suspension 38, then squeeze the diaphragm 32 down, thus compressing the diaphragm 32 onto the adhesive/suspension 38 along with the pushpad 36, which is spot-bonded to the stethoscope body 30 to keep it centered.

The pushpad 36 holds the diaphragm 32 taut because it is thicker than the suspension ring 38. The pushpad 36 is reticulated with a plurality of spaces and no closed cells, so it springs evenly against the diaphragm 32 but allows full airflow and sound generation into the center port of the stethoscope body 30. In the preferred embodiment, the diaphragm-to-body spacing along the main boundaries of the back-chamber is important, with the smaller the space resulting in better stethoscope performance. Further, the pushpad 36 is an important aspect of the present invention as a thin foil diaphragm 32 on its own would never be able to contact the skin uniformly, which in turn results in the internal pressure waves moving the diaphragm uniformly.

It is important to note that a thin foil diaphragm is superior as a rigid diaphragm (such as the typical formed "cup" diaphragm with a spherical-like surface that contacts the skin) does not conform to skin irregularities because it is a rigid three-dimensional structure.

In an alternative embodiment, a copper/copper alloy thin foil diaphragm with a solid annular outer suspension (as opposed to a compliant outer suspension) comprised of a raised outer ridge on the stethoscope body with the foil

diaphragm bonded thereto is also functional as a stethoscope with antimicrobial properties for the diaphragm.

Turning to FIG. 10, in an alternative embodiment, the diaphragm comprises a suspended flexible enclosure 200 that contains an incompressible liquid 300 (e.g. water or a saline solution) that is completely sealed by a non-permeable membrane 400. In the preferred embodiment, the membrane 400 is composed of a flexible material, like an elastomer or rubber. The diaphragm is suspended in a solid body 500 that creates an air cavity 600 between the body 500 and the diaphragm. The cavity 600 allows the diaphragm to freely flex downward into the cavity 600 when the diaphragm is pressed against a patient's skin 700 (as shown in FIG. 11).

Turning to FIG. 11, when the stethoscope is pressed against the patient's skin 700, body-borne pressure is applied to the diaphragm causing the sealed flexible enclosure 200 to fill the cavity 600 and reduce the air volume in the cavity 600; the result is a higher frequency output being generated and directed to the hearing-tube assembly through the exit portal 800 at the bottom of the cavity 600.

Turning to FIG. 12, in another embodiment, the diaphragm comprises a similarly sealed flexible enclosure 200 containing an incompressible liquid 300 that is suspended above the stethoscope body 500 by a pressure pad 900 with an annular suspension sealed on the interior or outer diameter of the body. In the preferred embodiment, the pressure pad 900 is constructed from reticulated foam, such as "Scottfoam" or any other reticulated foam product known in the art. The free-air pressure pad 900 substantially fills the cavity between the stethoscope body 500 and the sealed flexible enclosure 200. The pressure pad 900 is reticulated with a plurality of spaces and no closed cells, so it springs evenly against the sealed flexible enclosure 200 but allows virtually unimpeded airflow and sound generation into the exit portal 800 at the bottom of the stethoscope body 500.

As seen in FIG. 13, when body-borne pressure is applied to the sealed flexible enclosure 200, the incompressible liquid 300 in the sealed flexible enclosure 200 will naturally push against the pressure pad 900, thus minimizing the volume of air consumed by the pressure pad 900 and resulting in a higher sound output at the exit portal 800.

In both FIGS. 10 and 12, the stethoscope body 500 comprises an axisymmetric structure (e.g. a disc) of a solid, rigid material (e.g. metal, metal alloy, or plastic), with a sound port 800 in the back of the stethoscope body feeding the output port radially.

As seen in FIGS. 14A-D, a copper or other rigid material "cap" 1000 may be bonded to a small area at the center 1100 of the sealed flexible enclosure 200; this can be accomplished by any form of adhesive-bonding or other means of attachment known in the art. This centrally located attachment 1100 allows the cap 1000 to freely "wobble" on its vertical axis. When the sealed flexible enclosure 200 is pressed against the patient's skin 700, the compliant sealed flexible enclosure 200 conforms to the underside of the cap 1000, resulting in a low-impedance contact with the cap. The cap itself becomes the forcing member, directly driven by the body-borne pressure waves.

Additionally, the use of a liquid-based and flexible enclosure 200 in both embodiments has shown verifiable improvement in transduction. When pressed against the skin as shown in FIGS. 14 C-D, the flexible enclosure 200 essentially becomes an extension of the body in terms of structure—forming an intimate hydrodynamic connection to

the body, via this skin interface that allows pressure waves to be received more efficiently. As a result, the acoustic impedance matching between the human body and the stethoscope is greatly improved over its mechanical counterpart known in the prior art.

For the purposes of promoting an understanding of the principles of the invention, reference has been made to the preferred embodiments illustrated in the drawings, and specific language has been used to describe these embodiments. However, this specific language intends no limitation of the scope of the invention, and the invention should be construed to encompass all embodiments that would normally occur to one of ordinary skill in the art. The particular implementations shown and described herein are illustrative examples of the invention and are not intended to otherwise limit the scope of the invention in any way. For the sake of brevity, conventional aspects of the method (and components of the individual operating components of the method) may not be described in detail. Furthermore, the connecting lines, or connectors shown in the various figures presented are intended to represent exemplary functional relationships and/or physical or logical couplings between the various elements. It should be noted that many alternative or additional functional relationships, physical connections or logical connections might be present in a practical device. Moreover, no item or component is essential to the practice of the invention unless the element is specifically described as "essential" or "critical". Numerous modifications and adaptations will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

What is claimed is:

1. A stethoscope comprising:

- a. a body;
 - b. a diaphragm;
 - c. an integral annular axially compliant suspension; and
 - d. a reticulated foam pressure pad;
- wherein the annular axially compliant suspension surrounds the reticulated foam pressure pad and is located below the diaphragm and inside an inner perimeter of the body.

2. The stethoscope of claim 1 wherein the diaphragm is planar.

3. The stethoscope of claim 1 wherein the diaphragm is comprised of copper.

4. The stethoscope of claim 1 wherein the diaphragm is comprised of a very thin foil with circumferential, annular corrugations.

5. The stethoscope of claim 4 wherein the thin foil is comprised of copper.

6. The stethoscope of claim 1 wherein the pressure pad has a compliant, viscoelastic coating.

7. A stethoscope comprising:

- a. a body;
 - b. a diaphragm;
 - c. an integral annular axially compliant suspension; and
 - d. a reticulated foam pressure pad;
- wherein the annular axially compliant suspension is comprised of foam, surrounds the reticulated foam pressure pad, and is located below the diaphragm and inside an inner perimeter of the body;

wherein the diaphragm is comprised of a very thin foil of copper with circumferential, annular corrugations.

* * * * *

EXHIBIT B

ASSIGNMENT

WHEREAS, INGENI, LLC, an Alabama limited liability company ("ASSIGNOR"), owns all rights, title, and interest in the stethoscope diaphragm as set forth in the patent application(s) and patents listed under the heading of "Filed Applications and Patents" below; and,

WHEREAS, Frankie Wendell Erdman, Jr., a resident of the state of Alabama ("ASSIGNEE"), is desirous of acquiring all right, title and interest in and to, and perfecting all of its right, title and interest in and to, all of said improvements and said Filed Applications and Patents.

NOW THEREFORE, for and in consideration of good and valuable consideration, the receipt of which is hereby acknowledged for all purposes, ASSIGNOR, by these presents, does forever, absolutely, unconditionally and irrevocably assign, convey, deliver and transfer unto said ASSIGNEE, his successors, legal representatives, heirs and assigns, the full, complete and exclusive right, title, claim and interest in the United States of America, and all foreign countries, unions, conventions and other like arrangements, whether or not the United States of America is a party thereto (collectively, "Foreign Treaties"), to the Filed Applications and Patents, as well as to said inventions as described in the specification of said Filed Applications and Patents, as well as any one or more non-provisional or other patent applications later filed with the USPTO, in any foreign country or under any Foreign Treaties, claiming priority to, or otherwise the benefit of, said Filed Applications and Patents (collectively, the "Invention");

ASSIGNOR hereby further covenants, represents, warrants and agrees that, at the time of execution of this instrument that: (a) ASSIGNOR has not previously assigned, sold, transferred, exchanged, conveyed, abandoned, mortgaged, granted a security interest in, licensed, donated, bequeathed, alienated, disposed or otherwise encumbered to any third party all or any right, title, claim or interest whatsoever in or to said Invention; (b) this assignment, transfer and conveyance is free and clear of all encumbrances and claims whatsoever; and, (c) ASSIGNOR has good and full right and lawful power and authority to assign, transfer and convey the same in the manner herein set forth.

Filed Applications and Patents

Pat. No. or Pat. App. No.
U.S. Pat. App. No. 62/645,553
U.S. Pat. App. No. 62/570,302
PCT App. No. PCT/US18/30807

Pat. No. or Pat. App. No.
U.S. Pat. App. No. 16/152,706
U.S. Pat. No. 10,292,675
U.S. Pat. App. No. 16/389,637

Pat. No. or Pat. App. No.

ASSIGNOR: INGENI, LLC

By: Carla W Folter 8/28/19
Date

Name: Carla W Folter

Position: President/COO

STATE OF ALABAMA, COUNTY OF MOBILE

On this 28 day of Aug, 2019, before me personally appeared CARLA W. FOLTER, to me personally known as the individual who executed the foregoing instrument and who acknowledged to me that he executed the same of his own free will and for the purpose therein set forth.

Die M Mahall
Notary Public
(My Commission Expires 11/17/2021)

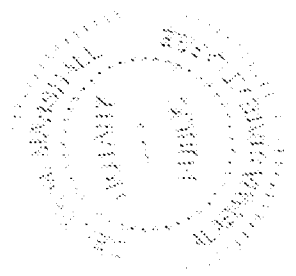


EXHIBIT C

I, Clifford A. Henricksen, am listed as an inventor on U.S. Patent No. 10,292,675 and patents and patent applications that claim priority to or from U.S. Patent No. 10,292,675.

I understand that under US patent law, conception is considered to be the cornerstone of inventorship, i.e., conception of the claimed invention. I understand conception to be the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice. Further, I understand conception to be complete when the idea is so clearly defined in the inventor's mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.

I understand that in the case of joint inventors, 35 U.S.C. § 116 makes it clear that the inventors: (1) do not have to physically work together or at the same time; (2) do not each have to make the same type or amount of contribution to the invention; and (3) do not each have to make a contribution to the subject matter of every claim of the patent.

I hereby state that I at least jointly contributed to the conception, in not an insignificant quality, of the invention(s) defined in at least the following claims of U.S. Patent No. 10,292,675:

Claim No. 1. My contribution to the conception of the invention defined in this claim was at least jointly as follows: collaborative integration of the listed elements into a functional stethoscope; design of integral annular axially compliant suspension and reticulated foam pressure pad.

Signed: [Signature]
Printed name: Clifford A. Henricksen

STATE OF MA
COUNTY OF Middlesex

Before me, the undersigned authority, a Notary Public in and for said County and said State, personally appeared Clifford A. Henricksen, who is known to me and who after being by me first duly sworn does depose and says on oath that he or she has examined the foregoing and believes that the facts stated therein are true to the best of his or her knowledge, information and belief; and that he or she voluntarily affixed his or her signature thereto.

Sworn and subscribed before me, a notary public in said sate and said county, on this the 29 day of August, 2019.

[Signature]
NOTARY PUBLIC
My Commission Expires: 24 July 2026

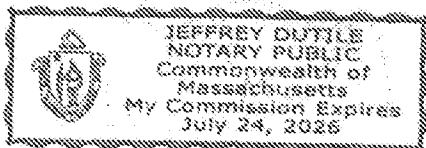


EXHIBIT C

I, Dr. Deneen T. Plessala, am listed as an inventor on U.S. Patent No. 10,292,675 and patents and patent applications that claim priority to or from U.S. Patent No. 10,292,675.

I understand that under US patent law, conception is considered to be the cornerstone of inventorship, i.e., conception of the claimed invention. I understand conception to be the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice. Further, I understand conception to be complete when the idea is so clearly defined in the inventor's mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.

I understand that in the case of joint inventors, 35 U.S.C. § 116 makes it clear that the inventors: (1) do not have to physically work together or at the same time; (2) do not each have to make the same type or amount of contribution to the invention; and (3) do not each have to make a contribution to the subject matter of every claim of the patent.

I hereby state that I at least jointly contributed to the conception, in not an insignificant quality, of the invention(s) defined in at least the following claims of U.S. Patent No. 10,292,675:

Claim No. 1. My contribution to the conception of the invention defined in this claim was at least jointly as follows: collaborative integration of the various listed elements into a functional stethoscope; design of the body.

Signed: *Deneen T. Plessala*
Printed name: Dr. Deneen T. Plessala

STATE OF ALABAMA
COUNTY OF MOBILE

Before me, the undersigned authority, a Notary Public in and for said County and said State, personally appeared Dr. Deneen T. Plessala, who is known to me and who after being by me first duly sworn does depose and says on oath that he or she has examined the foregoing and believes that the facts stated therein are true to the best of his or her knowledge, information and belief; and that he or she voluntarily affixed his or her signature thereto.

Sworn and subscribed before me, a notary public in said state and said county, on this the 28th day of AUGUST, 2019.

[Signature]
NOTARY PUBLIC
My Commission Expires: 11/7/2021

(SEAL)

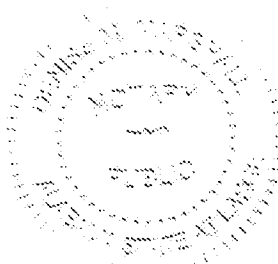


EXHIBIT C

I, Carla W. Falkner, am listed as an inventor on U.S. Patent No. 10,292,675 and patents and patent applications that claim priority to or from U.S. Patent No. 10,292,675.

I understand that under US patent law, conception is considered to be the cornerstone of inventorship, i.e., conception of the claimed invention. I understand conception to be the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice. Further, I understand conception to be complete when the idea is so clearly defined in the inventor's mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.

I understand that in the case of joint inventors, 35 U.S.C. § 116 makes it clear that the inventors: (1) do not have to physically work together or at the same time; (2) do not each have to make the same type or amount of contribution to the invention; and (3) do not each have to make a contribution to the subject matter of every claim of the patent.

I hereby state that I at least jointly contributed to the conception, in not an insignificant quality, of the invention(s) defined in at least the following claims of U.S. Patent No. 10,292,675:

Claim No. 1. My contribution to the conception of the invention defined in this claim was at least jointly as follows: collaborative integration of the listed elements into a functional stethoscope; design of the diaphragm.

Signed: Carla W. Falkner
Printed name: Carla W. Falkner

STATE OF Alabama
COUNTY OF MOBILE

Before me, the undersigned authority, a Notary Public in and for said County and said State, personally appeared Carla W. Falkner, who is known to me and who after being by me first duly sworn does depose and says on oath that he or she has examined the foregoing and believes that the facts stated therein are true to the best of his or her knowledge, information and belief; and that he or she voluntarily affixed his or her signature thereto.

Sworn and subscribed before me, a notary public in said state and said county, on this the 28 day of AUGUST, 2019.

Donna R. R. R. R.
NOTARY PUBLIC
My Commission Expires: 11/17/2021



PATENT