Samsung Electronics Co., Ltd.;
Samsung Electronics America, Inc.,
v.
Ouraring, Inc.,

Petitioner's Presentation For IPR2024-00928, PGR2024-00030, -00039

U.S. Patent Nos. 9,582,034; 11,868,178; 11,874,702

September 11, 2025

Demonstrative Exhibit Not Evidence

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0002

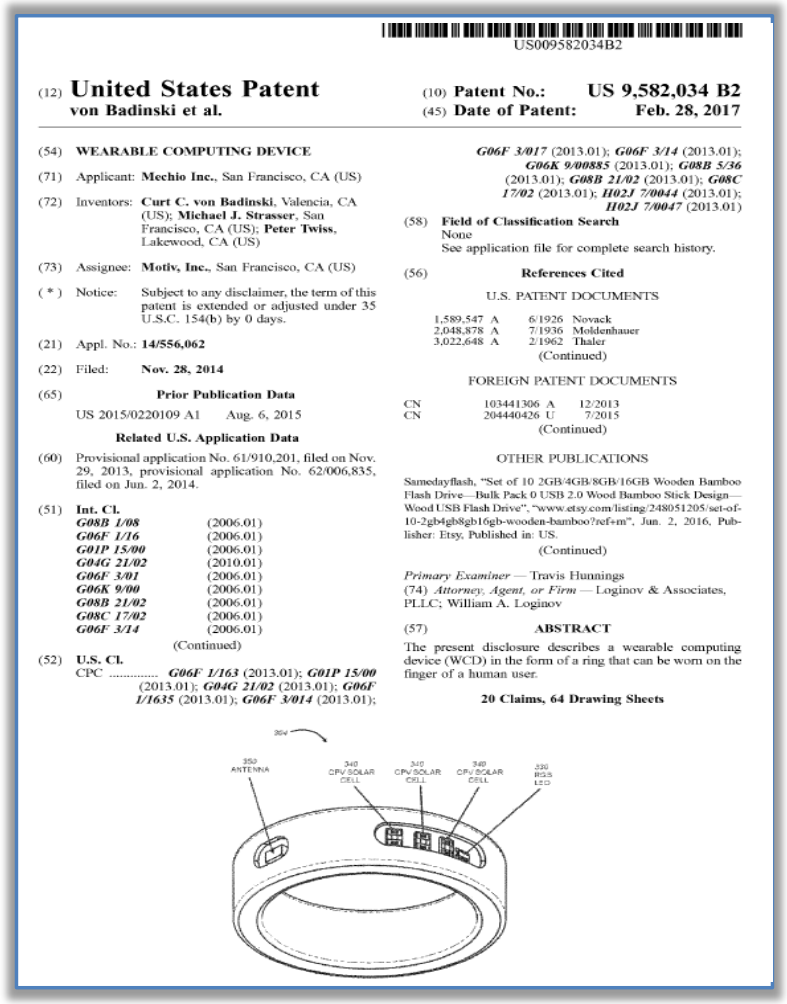
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- Internal and external housing components (034, 178, 702)
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- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0003

034, 178, and 702 patents: Wearable computing device



US009582034B2

(12) **United States Patent**
von Badinski et al.

(10) **Patent No.: US 9,582,034 B2**
(45) **Date of Patent: Feb. 28, 2017**

(54) **WEARABLE COMPUTING DEVICE**

(71) Applicant: **Mechio Inc.**, San Francisco, CA (US)

(72) Inventors: **Curt C. von Badinski**, Valencia, CA (US); **Michael J. Strasser**, San Francisco, CA (US); **Peter Twiss**, Lakewood, CA (US)

(73) Assignee: **Motiv, Inc.**, San Francisco, CA (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.: **14/556,062**

(22) Filed: **Nov. 28, 2014**

(65) **Prior Publication Data**

US 2015/0220109 A1 Aug. 6, 2015

Related U.S. Application Data

(60) Provisional application No. 61/910,201, filed on Nov. 29, 2013, provisional application No. 62/006,835, filed on Jun. 2, 2014.

(51) **Int. Cl.**

G08B 1/08	(2006.01)
G06F 1/16	(2006.01)
G01P 15/00	(2006.01)
G04G 21/02	(2010.01)
G06F 3/01	(2006.01)
G06K 9/00	(2006.01)
G08B 21/02	(2006.01)
G08C 17/02	(2006.01)
G06F 3/14	(2006.01)

(Continued)

(52) **U.S. Cl.**
CPC ***G06F 1/163*** (2013.01); ***G01P 15/00*** (2013.01); ***G04G 21/02*** (2013.01); ***G06F 1/1635*** (2013.01); ***G06F 3/014*** (2013.01); ***G06F 3/017*** (2013.01); ***G06F 3/14*** (2013.01); ***G06K 9/00885*** (2013.01); ***G08B 5/36*** (2013.01); ***G08B 21/02*** (2013.01); ***G08C 17/02*** (2013.01); ***H02J 7/0044*** (2013.01); ***H02J 7/0047*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,589,547	A	6/1926	Novack
2,048,878	A	7/1936	Moldenhauer
3,022,648	A	2/1962	Thaler

(Continued)

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CN	103441306	A	12/2013
CN	204440426	U	7/2015

(Continued)

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Samedayflash, "Set of 10 2GB/4GB/8GB/16GB Wooden Bamboo Flash Drive—Bulk Pack 0 USB 2.0 Wood Bamboo Stick Design—Wood USB Flash Drive", "www.etsy.com/listing/248051205/set-of-10-2gb4gb8gb16gb-wooden-bamboo?ref=m", Jun. 2, 2016, Publisher: Etsy, Published in: US.

(Continued)

Primary Examiner — Travis Hunnings
(74) *Attorney, Agent, or Firm* — Loginov & Associates, PLLC; William A. Loginov

(57) **ABSTRACT**

The present disclosure describes a wearable computing device (WCD) in the form of a ring that can be worn on the finger of a human user.

20 Claims, 64 Drawing Sheets

DETAILED DESCRIPTION

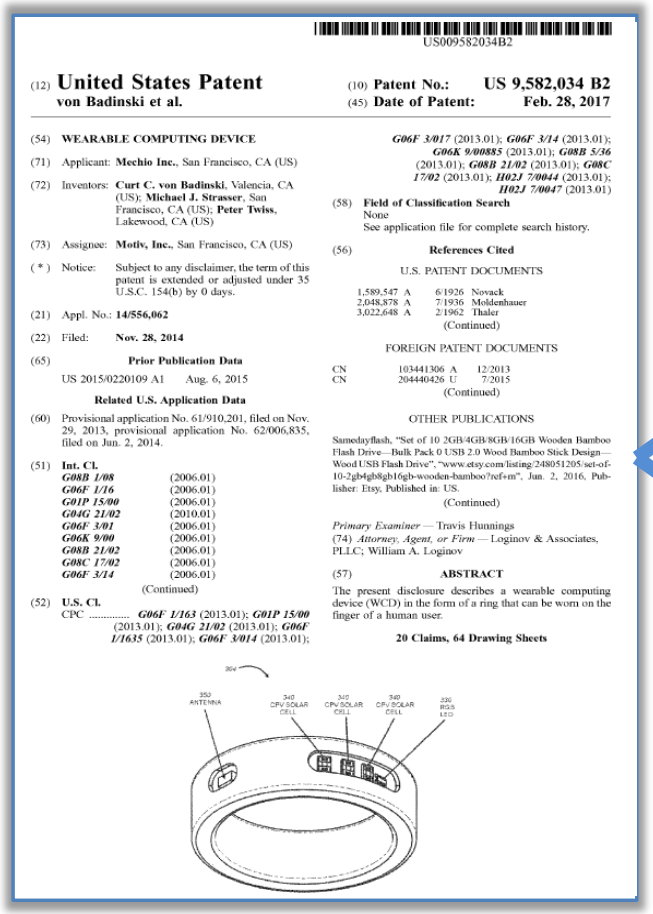
The present disclosure describes a wearable computing device (WCD) that enables a wearable fitness monitor(s)/ computer(s) which is suitable for prolonged usage with accurate results. The WCD can be in the form of a ring that can be worn on the finger of a human (or animal) user. Although the WCD of the present disclosure is depicted as a ring that can be worn on the finger of a user, other shapes, designs, and form factors can be utilized for the WCD. For example, the WCD can be in the form of a wrist band, bracelet, necklace, earring, or any other type of wearable accessory. In this regard, references to the finger of a user in the present application can be considered to apply to other portions of a human body depending on the form of the WCD, such as wrist, neck, ear, etc.

Ex-1001 at Cover

Demonstrative Exhibit Not Evidence

178 and 702 patents are continuations of the 034 patent and share a common specification

034 Patent



US009582034B2

(12) **United States Patent**
von Badinski et al.

(10) **Patent No.: US 9,582,034 B2**
(45) **Date of Patent: Feb. 28, 2017**

(54) **WEARABLE COMPUTING DEVICE**

(71) Applicant: **Mechio Inc.**, San Francisco, CA (US)

(72) Inventors: **Curt C. von Badinski**, Valencia, CA (US); **Michael J. Strasser**, San Francisco, CA (US); **Peter Twiss**, Lakewood, CA (US)

(73) Assignee: **Motiv, Inc.**, San Francisco, CA (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.: **14/556,062**

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G08B 1/08	(2006.01)
G06F 1/16	(2006.01)
G01P 15/00	(2006.01)
G04G 21/02	(2010.01)
G06F 3/01	(2006.01)
G06K 9/00	(2006.01)
G08B 21/02	(2006.01)
G08C 17/02	(2006.01)
G06F 3/14	(2006.01)

(Continued)

(52) **U.S. Cl.**
CPC ***G06F 1/163*** (2013.01); ***G01P 15/00*** (2013.01); ***G04G 21/02*** (2013.01); ***G06F 1/1635*** (2013.01); ***G06F 3/014*** (2013.01); ***G06F 3/017*** (2013.01); ***G06F 3/14*** (2013.01); ***G06K 9/00885*** (2013.01); ***G08B 5/36*** (2013.01); ***G08B 21/02*** (2013.01); ***G08C 17/02*** (2013.01); ***H02J 7/0044*** (2013.01); ***H02J 7/0047*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,589,547	A	6/1926	Novack
2,048,878	A	7/1936	Moldenhauer
3,022,648	A	2/1962	Thaler

(Continued)

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CN	204440426	U	7/2015

(Continued)

OTHER PUBLICATIONS

Samedayflash, "Set of 10 2GB/4GB/8GB/16GB Wooden Bamboo Flash Drive—Bulk Pack 0 USB 2.0 Wood Bamboo Stick Design—Wood USB Flash Drive", "www.etsy.com/listing/248051205/set-of-10-2gb4gb8gb16gb-wooden-bamboo?ref=m", Jun. 2, 2016, Publisher: Etsy, Published in: US.

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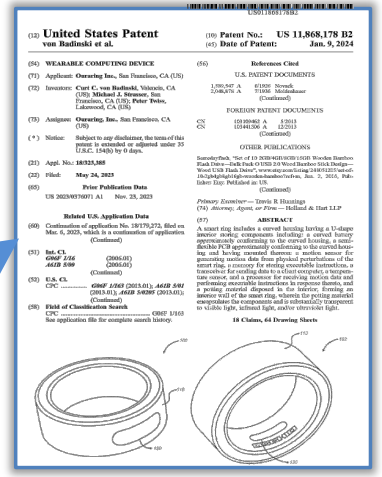
Primary Examiner — Travis Hunnings
(74) *Attorney, Agent, or Firm* — Loginov & Associates, PLLC; William A. Loginov

(57) **ABSTRACT**

The present disclosure describes a wearable computing device (WCD) in the form of a ring that can be worn on the finger of a human user.

20 Claims, 64 Drawing Sheets

178 Patent



US011868178B2

(12) **United States Patent**
von Badinski et al.

(10) **Patent No.: US 11,868,178 B2**
(45) **Date of Patent: Jan. 9, 2024**

(54) **WEARABLE COMPUTING DEVICE**

(71) Applicant: **Ouwaring Inc.**, San Francisco, CA (US)

(72) Inventors: **Curt C. von Badinski**, Valencia, CA (US); **Michael J. Strasser**, San Francisco, CA (US); **Peter Twiss**, Lakewood, CA (US)

(73) Assignee: **Ouwaring, Inc.**, San Francisco, CA (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.: **18/323,388**

(22) Filed: **May 24, 2023**

(65) **Prior Publication Data**

US 2023/0376071 A1 Nov. 23, 2023

Related U.S. Application Data

(60) Continuation of application No. 18/179,272, filed on Mar. 6, 2023, which is a continuation of application

(Continued)

(51) **Int. Cl.**

G06F 1/16	(2006.01)
A61B 5/00	(2006.01)

(Continued)

(52) **U.S. Cl.**
CPC ***G06F 1/163*** (2013.01); ***A61B 5/01*** (2013.01); ***A61B 5/0205*** (2013.01);

(Continued)

(58) **Field of Classification Search**
CPC G06F 1/163
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,589,547	A	6/1926	Novack
2,048,878	A	7/1936	Moldenhauer

(Continued)

FOREIGN PATENT DOCUMENTS

CN	103441306	A	12/2013
CN	204440426	U	7/2015

(Continued)

OTHER PUBLICATIONS

Samedayflash, "Set of 10 2GB/4GB/8GB/16GB Wooden Bamboo Flash Drive—Bulk Pack 0 USB 2.0 Wood Bamboo Stick Design—Wood USB Flash Drive", www.etsy.com/listing/248051205/set-of-10-2gb4gb8gb16gb-wooden-bamboo?ref=m, Jun. 2, 2016, Publisher: Etsy, Published in: US.

(Continued)

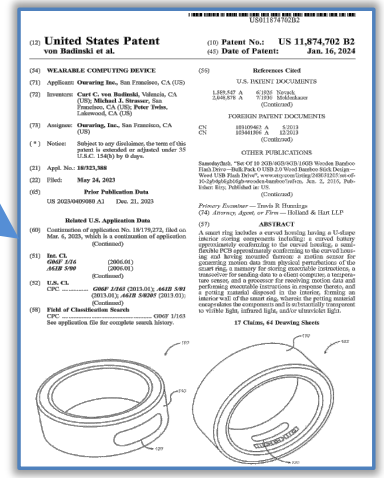
Primary Examiner — Travis R Hunnings
(74) *Attorney, Agent, or Firm* — Holland & Hart LLP

(57) **ABSTRACT**

A smart ring includes a curved housing having a U-shape interior storing components including: a curved battery approximately conforming to the curved housing, a semi-flexible PCB approximately conforming to the curved housing and having mounted thereon: a motion sensor for generating motion data from physical perturbations of the smart ring, a memory for storing executable instructions, a transceiver for sending data to a client computer, a temperature sensor, and a processor for receiving motion data and performing executable instructions in response thereto, and a potting material disposed in the interior, forming an interior wall of the smart ring, wherein the potting material encapsulates the components and is substantially transparent to visible light, infrared light, and/or ultraviolet light.

18 Claims, 64 Drawing Sheets

702 Patent



US011874702B2

(12) **United States Patent**
von Badinski et al.

(10) **Patent No.: US 11,874,702 B2**
(45) **Date of Patent: Jan. 16, 2024**

(54) **WEARABLE COMPUTING DEVICE**

(71) Applicant: **Ouwaring Inc.**, San Francisco, CA (US)

(72) Inventors: **Curt C. von Badinski**, Valencia, CA (US); **Michael J. Strasser**, San Francisco, CA (US); **Peter Twiss**, Lakewood, CA (US)

(73) Assignee: **Ouwaring, Inc.**, San Francisco, CA (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.: **18/323,388**

(22) Filed: **May 24, 2023**

(65) **Prior Publication Data**

US 2023/0409080 A1 Dec. 21, 2023

Related U.S. Application Data

(60) Continuation of application No. 18/179,272, filed on Mar. 6, 2023, which is a continuation of application

(Continued)

(51) **Int. Cl.**

G06F 1/16	(2006.01)
A61B 5/00	(2006.01)

(Continued)

(52) **U.S. Cl.**
CPC ***G06F 1/163*** (2013.01); ***A61B 5/01*** (2013.01); ***A61B 5/0205*** (2013.01);

(Continued)

(58) **Field of Classification Search**
CPC G06F 1/163
See application file for complete search history.

(56) **References Cited**

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(Continued)

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CN	204440426	U	7/2015

(Continued)

OTHER PUBLICATIONS

Samedayflash, "Set of 10 2GB/4GB/8GB/16GB Wooden Bamboo Flash Drive—Bulk Pack 0 USB 2.0 Wood Bamboo Stick Design—Wood USB Flash Drive", www.etsy.com/listing/248051205/set-of-10-2gb4gb8gb16gb-wooden-bamboo?ref=m, Jun. 2, 2016, Publisher: Etsy, Published in: US.

(Continued)

Primary Examiner — Travis R Hunnings
(74) *Attorney, Agent, or Firm* — Holland & Hart LLP

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A smart ring includes a curved housing having a U-shape interior storing components including: a curved battery approximately conforming to the curved housing, a semi-flexible PCB approximately conforming to the curved housing and having mounted thereon: a motion sensor for generating motion data from physical perturbations of the smart ring, a memory for storing executable instructions, a transceiver for sending data to a client computer, a temperature sensor, and a processor for receiving motion data and performing executable instructions in response thereto, and a potting material disposed in the interior, forming an interior wall of the smart ring, wherein the potting material encapsulates the components and is substantially transparent to visible light, infrared light, and/or ultraviolet light.

17 Claims, 64 Drawing Sheets

Ex-1001 at Cover

Demonstrative Exhibit Not Evidence

Challenged patents focus on internal packaging in a wearable form factor

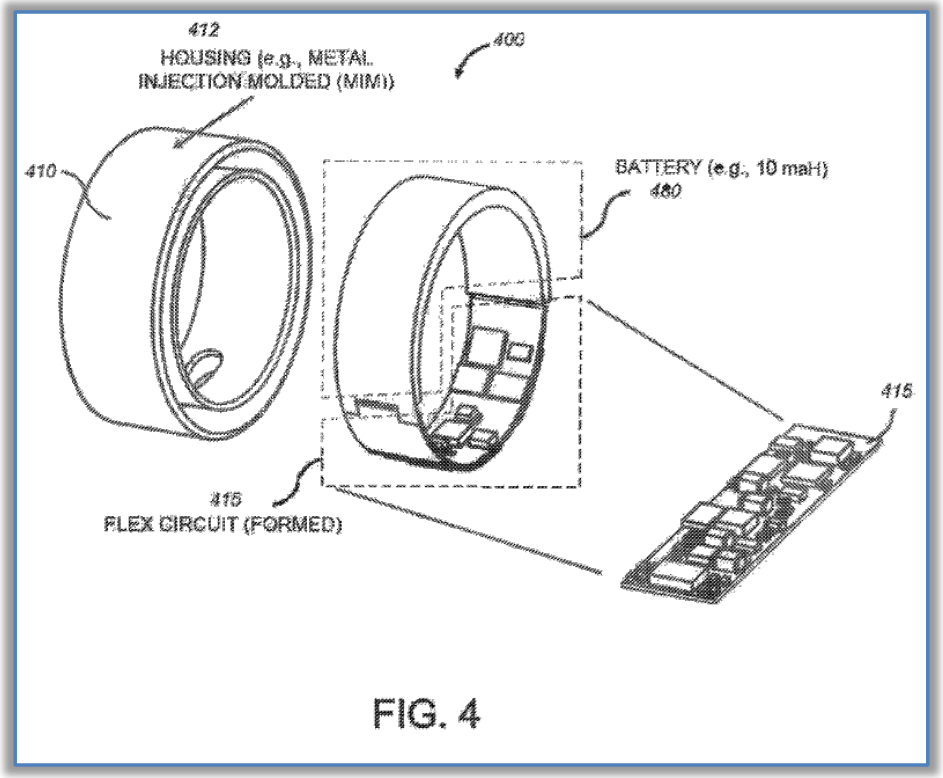


FIG. 4

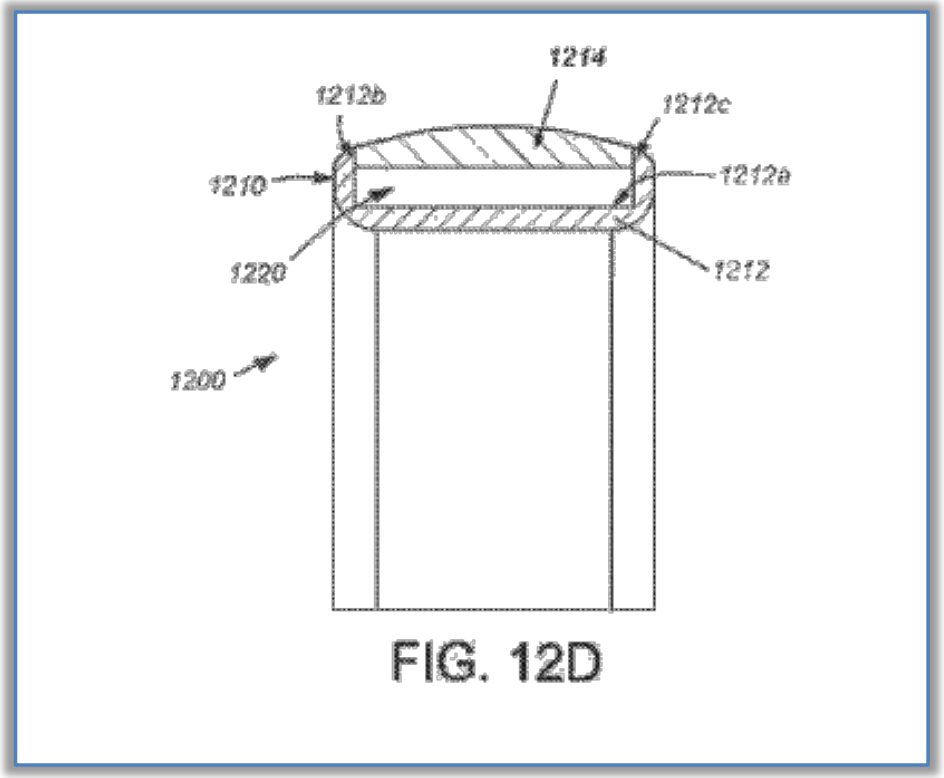


FIG. 12D

Challenged patents are about packaging, not miniaturization of internal components

E.g., Ex-1001, Figs. 4, 12D, 178Reply (Paper 31) at 3, 4-6, 8, 9, 034Reply (Paper 19) at 2-5

Demonstrative Exhibit Not Evidence

Challenged patents focus on internal packaging in a wearable form factor

PO Expert, Dr. Mercier:

> The '178 patent, you know, has a lot of descriptive drawings of, you know, the ring geometries, the batteries, the arrangements, and packaging and so on. So the '178 patent gives a lot of technical details and blueprints about how a POSITA, you know, might go about designing one of these smart rings. Does it offer or teach on how to do battery manufacturing? No, it does not.

> Q. You would agree that the specific steps required from going from a larger curved battery to a ring-sized curved battery are not taught by the '178 patent, right?
>
> ATTORNEY PLUTA: Object to form. Relevance.
>
> THE WITNESS: I mean, yeah. The '178 patent is not -- is not a manufacturing recipe for batteries. So, no, that's not disclosed.

Challenged patents are about packaging, not miniaturization of internal components

Ex-1081, 134:2-8, 135:4-10; *e.g.*, 178Reply (Paper 31) at 1-4

Demonstrative Exhibit Not Evidence

Substantial overlap of issues across challenged patents

Claimed Features	178 Patent	702 Patent	034 Patent
Internal and external housing components	✔		✔
Flexible PCB	✔	✔	✔
Battery limitations	✔	✔	
Sensors electrically coupled to the PCB and battery	✔	✔	
Substantially transparent material		✔	✔
Waterproof cavity			✔
Objective indicia	✔	✔	

Demonstrative Exhibit Not Evidence

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- Overview of the prior art
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- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0009

Schröder
(178, 702, and 034 Grounds)

(12) **United States Patent**
Schröder

(10) **Patent No.: US 10,303,867 B2**
(45) **Date of Patent: May 28, 2019**

(54) **EXTERNAL SECURE UNIT**

(71) Applicant: **GIESECKE & DEVRIENT GMBH**, Munich (DE)

(72) Inventor: **Sönke Schröder**, Munich (DE)

(73) Assignee: **GIESECKE+DEVRIENT MOBILE SECURITY GMBH**, Munich (DE)

(*) 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.: **14/907,336**

(22) PCT Filed: **Jun. 18, 2014**

(86) PCT No.: **PCT/EP2014/001693**
§ 371 (c)(1),
(2) Date: **Jan. 25, 2016**

(87) PCT Pub. No.: **WO2015/010758**
PCT Pub. Date: **Jan. 29, 2015**

(65) **Prior Publication Data**

US 2016/0171201 A1 Jun. 16, 2016

(30) **Foreign Application Priority Data**

Jul. 25, 2013 (DE) 10 2013 012 339

(51) **Int. Cl.**
G06F 21/62 (2013.01)
G06F 21/34 (2013.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G06F 21/34*** (2013.01); ***G06F 21/32*** (2013.01); ***G06F 21/35*** (2013.01); ***H04B 5/0031*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G06F 13/368
See application file for complete search history.

(56) **References Cited**

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(Continued)

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OTHER PUBLICATIONS

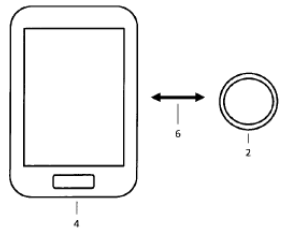
German Search Report for corresponding German Application No. 102013012339.9, dated Jan. 28, 2014.
(Continued)

Primary Examiner — Josnel Jeudy
(74) *Attorney, Agent, or Firm* — Workman Nydegger

(57) **ABSTRACT**

A method for operating an external secure unit comprises at least a memory for storing data, a processor for processing the data, at least one interface for receiving data from a communication device or sending them thereto, wherein the communication device comprises at least a memory for storing at least one application program, a processor for processing and executing the application program, at least a first interface for sending data to the external secure unit or receiving them therefrom, at least a second interface for sending data to a transmission network or receiving them therefrom, wherein the method is wherein security-relevant data necessary for executing the application program in the communication device are stored in the external secure unit, and the communication device requests the security-relevant data from the external secure unit for executing the application program.

14 Claims, 5 Drawing Sheets



(57) **ABSTRACT**

A method for operating an external secure unit comprises at least a memory for storing data, a processor for processing the data, at least one interface for receiving data from a communication device or sending them thereto, wherein the communication device comprises at least a memory for storing at least one application program, a processor for processing and executing the application program, at least a first interface for sending data to the external secure unit or receiving them therefrom, at least a second interface for sending data to a transmission network or receiving them therefrom, wherein the method is wherein security-relevant data necessary for executing the application program in the communication device are stored in the external secure unit, and the communication device requests the security-relevant data from the external secure unit for executing the application program.

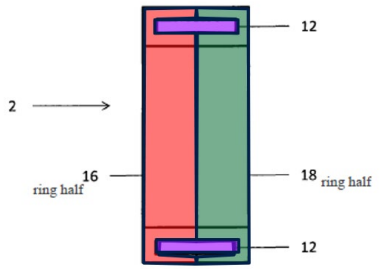


Fig. 5

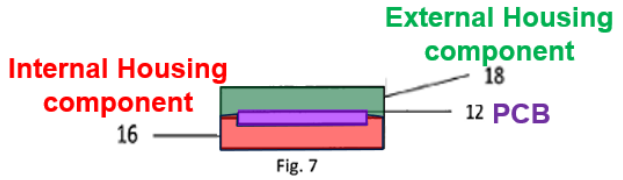


Fig. 7

Ex-1007 at Cover, Figs. 5, 7 (annotated); *e.g.*, 178Petition (Paper 3) at 24-25; 178Reply (Paper 31) at 5-7

Demonstrative Exhibit Not Evidence

Mestas
(178 and 702 Grounds)

(19) **United States**
(12) **Patent Application Publication**
Mestas

(10) **Pub. No.: US 2014/0244009 A1**
(43) **Pub. Date: Aug. 28, 2014**

(54) **ACTIVITY MONITORING, TRACKING AND SYNCHRONIZATION**

(71) Applicant: **NIKE, INC.**, Beaverton, OR (US)

(72) Inventor: **Alex Mestas**, Portland, OR (US)

(73) Assignee: **NIKE, INC.**, Beaverton, OR (US)

(21) Appl. No.: **14/186,425**

(22) Filed: **Feb. 21, 2014**

Related U.S. Application Data

(60) Provisional application No. 61/768,279, filed on Feb. 22, 2013.

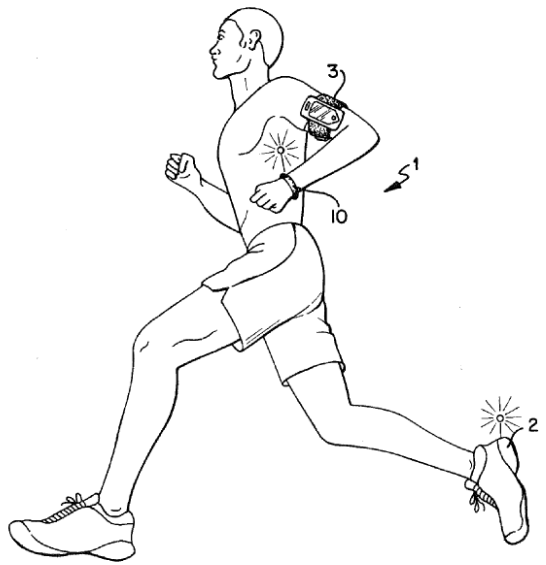
Publication Classification

(51) **Int. Cl.**
A63B 24/00 (2006.01)

(52) **U.S. Cl.**
CPC ***A63B 24/0062*** (2013.01)
USPC **700/91**

(57) **ABSTRACT**

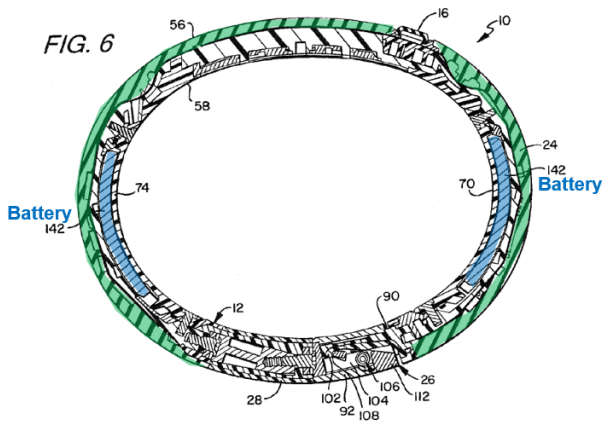
A physical activity monitoring method and system may include a competition component requiring users to compete based on various metrics. The challenge may be device-specific, activity type-specific, user-type specific and the like. In some examples, the users' performance might only affect the status of the competition if the user synchronizes the information to an activity monitoring system.



(57) **ABSTRACT**

A physical activity monitoring method and system may include a competition component requiring users to compete based on various metrics. The challenge may be device-specific, activity type-specific, user-type specific and the like. In some examples, the users' performance might only affect the status of the competition if the user synchronizes the information to an activity monitoring system.

FIG. 6



Ex-1010 at Cover, Fig. 6 (annotated); *e.g.*, 178Petition (Paper 3) at 54

Demonstrative Exhibit Not Evidence

Yuen
(178 grounds)

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

(10) **Patent No.: US 8,954,135 B2**
(45) **Date of Patent: Feb. 10, 2015**

(54) **PORTABLE BIOMETRIC MONITORING DEVICES AND METHODS OF OPERATING SAME**

(71) Applicant: **Fitbit, Inc.**, San Francisco, CA (US)

(72) Inventors: **Shelten Gee Jao Yuen**, Berkeley, CA (US); **Mark Manuel Martinez**, San Francisco, CA (US); **Andrew Cole Axley**, Oakland, CA (US); **Eric Nathan Friedman**, San Francisco, CA (US); **James Park**, Berkeley, CA (US)

(73) Assignee: **Fitbit, Inc.**, San Francisco, CA (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.: **13/924,784**

(22) Filed: **Jun. 24, 2013**

(65) **Prior Publication Data**

US 2014/0107493 A1 Apr. 17, 2014

Related U.S. Application Data

(60) Provisional application No. 61/662,961, filed on Jun. 22, 2012, provisional application No. 61/752,826, filed on Jan. 15, 2013.

(51) **Int. Cl.**
A61B 5/00 (2006.01)
A61B 5/024 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/0002*** (2013.01); ***A61B 5/02427*** (2013.01); ***A61B 5/02438*** (2013.01); ***A61B 5/02433*** (2013.01); ***A61B 5/02416*** (2013.01); ***A61B 5/11*** (2013.01); ***A61B 5/681*** (2013.01); ***A61B 5/1123*** (2013.01); ***A61B 5/4812*** (2013.01); ***H04W 4/027*** (2013.01); *H04W 4/008* (2013.01); *H04L 67/12* (2013.01)

USPC **600/476**; 600/407; 600/473; 600/479

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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EP 1 721 237 8/2012

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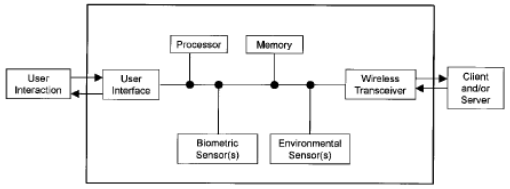
U.S. Appl. No. 14/073,657, filed Nov. 6, 2013, Park et al.
(Continued)

Primary Examiner — Joel Lamprecht
(74) *Attorney, Agent, or Firm* — Weaver Austin Villeneuve & Sampson

(57) **ABSTRACT**

The present inventions, in one aspect, are directed to portable biometric monitoring device including a housing having a physical size and shape that is adapted to couple to the user's body, at least one band to secure the monitoring device to the user, a physiological sensor, disposed in the housing, to generate data which is representative of a physiological condition of the user data. The physiological sensor may include a light source to generate and output light having at least a first wavelength, and a photodetector to detect scattered light (e.g., from the user). A light pipe is disposed in the housing and optically coupled to the light source directs/transmits light therefrom along a predetermined path to an outer surface of the housing. Processing circuitry calculates a heart rate of the user using data which is representative of the scattered light.

29 Claims, 30 Drawing Sheets



(57) **ABSTRACT**

The present inventions, in one aspect, are directed to portable biometric monitoring device including a housing having a physical size and shape that is adapted to couple to the user's body, at least one band to secure the monitoring device to the user, a physiological sensor, disposed in the housing, to generate data which is representative of a physiological condition of the user data. The physiological sensor may include a light source to generate and output light having at least a first wavelength, and a photodetector to detect scattered light (e.g., from the user). A light pipe is disposed in the housing and optically coupled to the light source directs/transmits light therefrom along a predetermined path to an outer surface of the housing. Processing circuitry calculates a heart rate of the user using data which is representative of the scattered light.

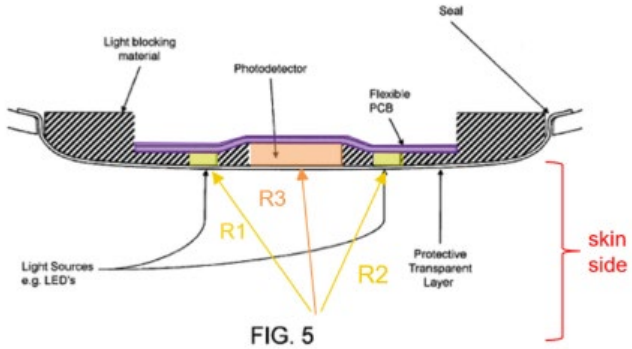


FIG. 5

Ex-1006 at Cover, Fig. 5 (annotated); *e.g.*, 178Petition (Paper 3) at 70

Demonstrative Exhibit Not Evidence

Niwa
(178 and 702 grounds)

(19) **United States**
(12) **Patent Application Publication**
Niwa et al.

(10) **Pub. No.: US 2012/0016245 A1**
(43) **Pub. Date: Jan. 19, 2012**

(54) **PLETHYSMOGRAM SENSOR**

(75) Inventors: **Daisuke Niwa**, Kyoto (JP); **Koji Terumoto**, Kyoto (JP); **Kazuhiro Oguchi**, Kyoto (JP); **Tsuyoshi Satomi**, Kyoto (JP)

(73) Assignee: **ROHM CO., LTD.**, Kyoto (JP)

(21) Appl. No.: **13/181,950**

(22) Filed: **Jul. 13, 2011**

(30) **Foreign Application Priority Data**

Jul. 14, 2010 (JP) 2010-159602
Jul. 14, 2010 (JP) 2010-159605
Jul. 14, 2010 (JP) 2010-159606
Sep. 24, 2010 (JP) 2010-214022

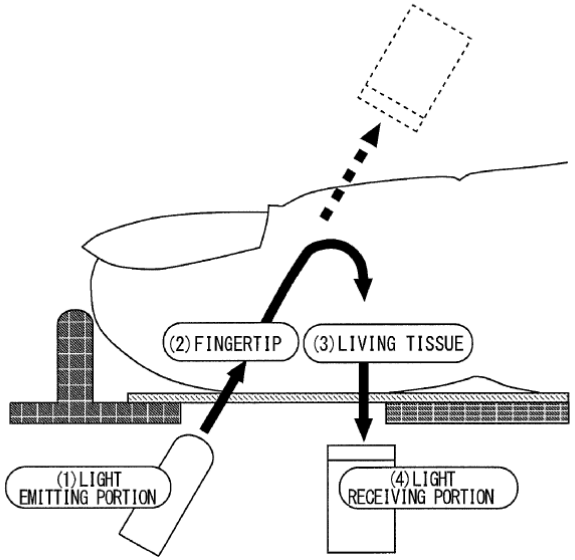
Publication Classification

(51) **Int. Cl.**
A61B 6/00 (2006.01)

(52) **U.S. Cl.** **600/476**

(57) **ABSTRACT**

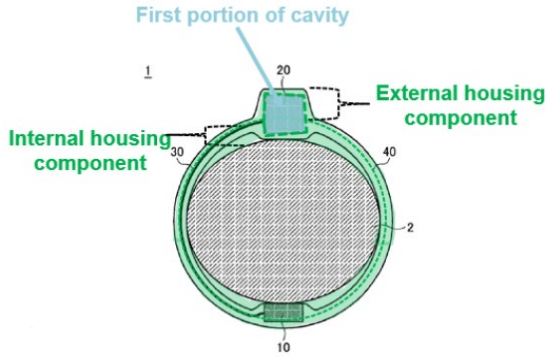
The plethysmogram sensor disclosed in this specification includes a light emitting portion whose output is variable, a light receiving portion to detect a light emitted from the light emitting portion and penetrates a living body of a measured person, and a processing unit to acquire information about the plethysmogram of the measured person based on a measured value provided from the light receiving portion.



(57) **ABSTRACT**

The plethysmogram sensor disclosed in this specification includes a light emitting portion whose output is variable, a light receiving portion to detect a light emitted from the light emitting portion and penetrates a living body of a measured person, and a processing unit to acquire information about the plethysmogram of the measured person based on a measured value provided from the light receiving portion.

FIG.22



Ex-1005 at Cover, Fig. 22 (annotated); *e.g.*, 178Petition (Paper 3) at 82-84

Demonstrative Exhibit Not Evidence

LeBoeuf
(702 and 034 grounds)

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

(10) **Patent No.: US 8,700,111 B2**
(45) **Date of Patent: *Apr. 15, 2014**

(54) **LIGHT-GUIDING DEVICES AND MONITORING DEVICES INCORPORATING SAME**

(75) Inventors: **Steven Francis LeBoeuf**, Raleigh, NC (US); **Jesse Berkley Tucker**, Knightdale, NC (US); **Michael Edward Aumer**, Raleigh, NC (US)

(73) Assignee: **Valencell, Inc.**, Raleigh, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1106 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/691,388**

(22) Filed: **Jan. 21, 2010**

(65) **Prior Publication Data**

US 2010/0217102 A1 Aug. 26, 2010

Related U.S. Application Data

(60) Provisional application No. 61/208,567, filed on Feb. 25, 2009, provisional application No. 61/208,574, filed on Feb. 25, 2009, provisional application No. 61/212,444, filed on Apr. 13, 2009, provisional application No. 61/274,191, filed on Aug. 14, 2009.

(51) **Int. Cl.**
A61B 5/00 (2006.01)

(52) **U.S. Cl.**
USPC **600/310**

(58) **Field of Classification Search**
USPC 600/310
See application file for complete search history.

(56) **References Cited**

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(Continued)

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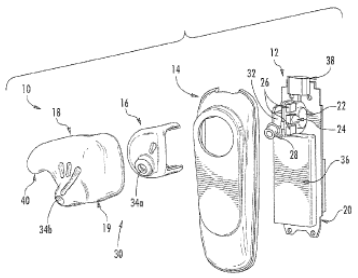
Notification of Transmittal of the International Search Report and Written Opinion issued Aug. 26, 2010 by the Korean Intellectual Property Office for corresponding International Application No. PCT/US2010/021629.
(Continued)

Primary Examiner — Rodney Fuller
(74) *Attorney, Agent, or Firm* — Myers Bigel Sibley & Sajovec, P.A.

(57) **ABSTRACT**

A monitoring device configured to be attached to the ear of a person includes a base, an earbud housing extending outwardly from the base that is configured to be positioned within an ear of a subject, and a cover surrounding the earbud housing. The base includes a speaker, an optical emitter, and an optical detector. The cover includes light transmissive material that is in optical communication with the optical emitter and the optical detector and serves as a light guide to deliver light from the optical emitter into the ear canal of the subject wearing the device at one or more predetermined locations and to collect light external to the earbud housing and deliver the collected light to the optical detector.

42 Claims, 21 Drawing Sheets



(57) **ABSTRACT**

A monitoring device configured to be attached to the ear of a person includes a base, an earbud housing extending outwardly from the base that is configured to be positioned within an ear of a subject, and a cover surrounding the earbud housing. The base includes a speaker, an optical emitter, and an optical detector. The cover includes light transmissive material that is in optical communication with the optical emitter and the optical detector and serves as a light guide to deliver light from the optical emitter into the ear canal of the subject wearing the device at one or more predetermined locations and to collect light external to the earbud housing and deliver the collected light to the optical detector.

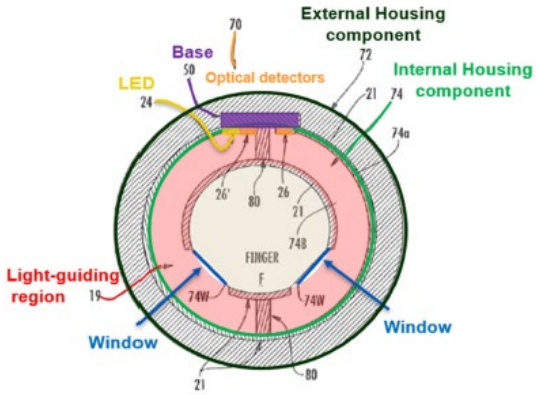


FIG. 22B

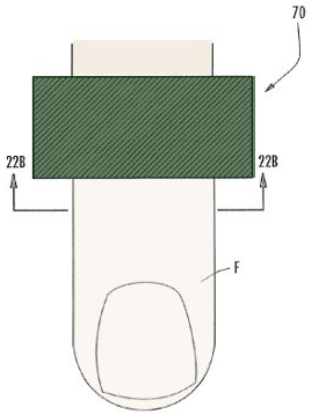


FIG. 22A

Ex-1012 at Cover, Figs. 22A-B (annotated); *e.g.*, 702Petition (Paper 3) at 44

Demonstrative Exhibit Not Evidence

Wissmar
(034 grounds)

(19) **United States**
(12) **Patent Application Publication**
Wissmar

(10) **Pub. No.: US 2012/0218184 A1**
(43) **Pub. Date: Aug. 30, 2012**

(54) **ELECTRONIC FINGER RING AND THE FABRICATION THEREOF**

(76) Inventor: **Stanley Wissmar**, Jarfalla (SE)

(21) Appl. No.: **13/505,452**

(22) PCT Filed: **Oct. 27, 2010**

(86) PCT No.: **PCT/SE2010/051167**

§ 371 (c)(1),
(2), (4) Date: **May 1, 2012**

(30) **Foreign Application Priority Data**

Nov. 2, 2009 (SE) 0901401-0

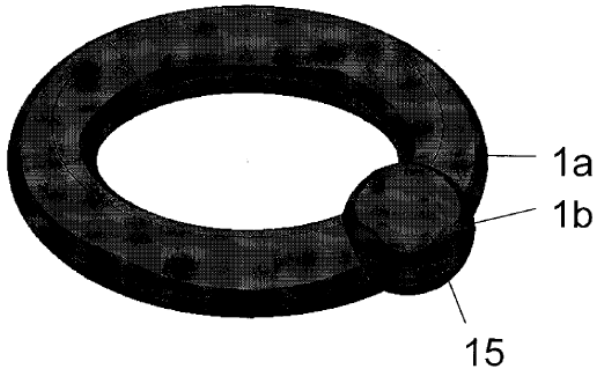
Publication Classification

(51) **Int. Cl.**
G06F 3/033 (2006.01)

(52) **U.S. Cl.** **345/158**

(57) **ABSTRACT**

The present invention provides an electronic finger ring (**1**) for wireless, 4-dimensional remote steering and/or monitoring. The electronic finger ring comprises electronic components packaged and integrated in different ways to obtain either omni- or unidirectional RF transmission dependent on its application, e.g. acting as a multiple steering device communicating with nearby electronic devices wirelessly or for wireless user medical diagnostics.



(57) **ABSTRACT**

The present invention provides an electronic finger ring (**1**) for wireless, 4-dimensional remote steering and/or monitoring. The electronic finger ring comprises electronic components packaged and integrated in different ways to obtain either omni- or unidirectional RF transmission dependent on its application, e.g. acting as a multiple steering device communicating with nearby electronic devices wirelessly or for wireless user medical diagnostics.

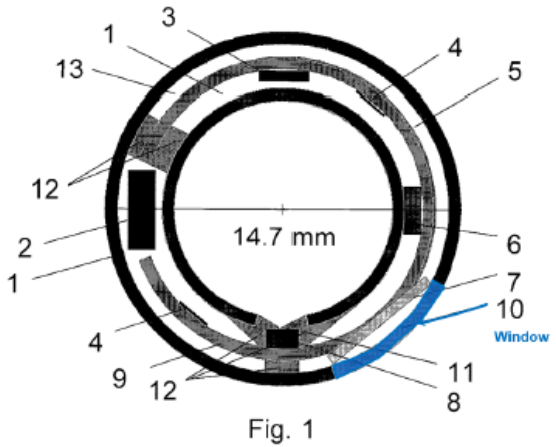


Fig. 1

Ex-1013 at Cover, Fig. 1 (annotated); *e.g.*, 034Petition (Paper 3) at 51-52

Demonstrative Exhibit Not Evidence

Asserted Grounds

702 PGR Grounds

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1, 5, 7, 12–15	103	Schröder[1]
2–4, 6, 8–11	103	Schröder, LeBoeuf[2]
8–11	103	Schröder, LeBoeuf, Niwa[3]
16, 17	103	Schröder, Mestas[4]
1–15	103	LeBoeuf, Schröder
8–11	103	LeBoeuf, Schröder, Niwa
16, 17	103	LeBoeuf, Schröder, Mestas

034 IPR Grounds

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–5, 11, 12, 16–18	103	Schröder[2]
1–5, 11–13, 16–18	103	Schröder, Yuen[3]
1, 2, 11, 12, 16–18	103	LeBoeuf[4]
4, 5	103	LeBoeuf, Wissmar[5]

178 PGR Grounds

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 17, 18	103	Schröder[3]
1–3, 13–16	103	Schröder, Niwa[4]
12	103	Schröder, Mestas[5]
1, 4–10, 13–16	103	Schröder, Yuen[6]
1–3, 13–18	103	Niwa
1–3, 13–18	103	Niwa, Schröder
12	103	Niwa, Mestas
12	103	Niwa, Schröder, Mestas
4–10	103	Niwa, Yuen
4–10	103	Niwa, Schröder, Yuen
17, 18	112(d)	Improper dependence

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0016

Prior Art and Grounds High-Level Summary

- Schröder
  - Finger ring prior art asserted as a primary reference against all challenged patents
- Mestas
  - Wearable health monitor that includes curved batteries
  - Teaches reducing “circumferential size” of wearable ring device
- Yuen
  - Wearable health monitor that teaches small form factors, such as an “earring” or “toe band”
- Niwa
  - Wearable finger ring device with transparent windows
- Leboeuf
  - Wearable finger ring device with transparent windows and potting
- Wissmar
  - Wearable finger ring device with transparent internal coatings

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0017

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0018

Internal and external housing components/portions

178 Patent

1. A finger-worn wearable ring device, comprising:
an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;
an internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, the internal housing component coupled with the external housing component, wherein at least a portion of the inner circumferential surface of the internal housing component is configured to contact a tissue of a user when the finger-worn wearable ring device is being worn by the user;

702 Patent

1. A finger-worn wearable ring device, comprising:
an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;
an internal housing component coupled to the external housing component, the internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

034 Patent

1. A wearable computing device, comprising:
an interior wall defining a first enclosing structure;
an exterior wall defining a second enclosing structure;

11. A wearable computing device, comprising:
an internal housing portion defining a first enclosing structure, the internal housing portion configured to be disposed near a finger of a user;
...
an external housing portion defining a second enclosing structure, the external housing portion configured to seal the at least one component and the printed circuit board in an internal space defined by the interior surface of the internal housing.

16. A wearable computing device, comprising:
an external housing portion defining a first enclosing structure;
...
an internal housing portion defining a second enclosing structure, the internal housing portion configured to seal the at least one component and the printed circuit board in an internal space defined by the interior surface of the external housing.

Demonstrative Exhibit Not Evidence

178Ex-1001 at Cl. 1, 702Ex-1001 at Cl. 1, 034Ex-1001 at Cls. 1, 11, 16

Schröder teaches two ring-half housing components in several different "construction variants"

FIGS. **4** to **10** describe, by way of example, possible construction variants of an external secure unit **2** in the form of a finger-ring **2**.

FIG. **4** shows a longitudinal section through a finger-ring **2**. Here, an inlay **12** is inserted into one half **18** of the finger-ring **2**. FIG. **5** shows a cross section, corresponding to FIG. **4**, of the finger-ring **2**. The finger-ring **2** consists of two ring halves **16** and **18**. The two ring halves **16** and **18** respectively have a recess into which the inlay **12** is inserted.

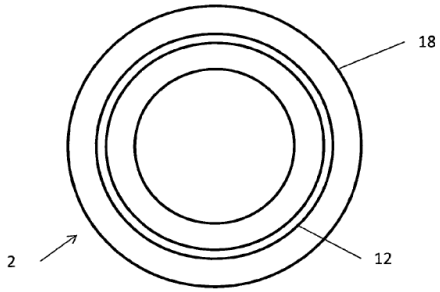


Fig. 4

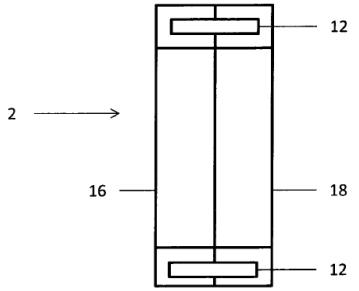


Fig. 5

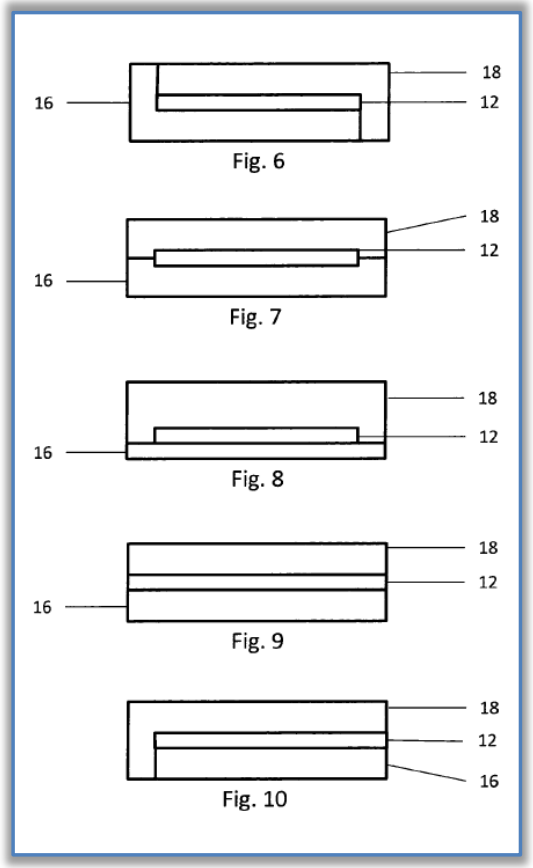
Demonstrative Exhibit Not Evidence

Ex-1007, 12:1-9, Figs. 4, 5; *e.g.*, 034Reply (Paper 19) at 2-5

Schröder teaches two ring-half housing components in several different "construction variants"

FIGS. **4** to **10** describe, by way of example, possible construction variants of an external secure unit **2** in the form of a finger-ring **2**.

FIGS. **6** to **10** show different cross sections through a finger-ring **2**, consisting of ring-shaped components **16**, **18** of the finger-ring **2** and of an inlay **12**. FIG. **6** shows a cross section with the components **14** and **16** having an L-shaped profile. Between the two L-shaped components **16** and **18** an inlay **12** is arranged. FIG. **7** accordingly shows two U-shaped components **16** and **18** between which an inlay **12** is arranged. FIG. **8** shows a U-shaped component **18** and an even component **16**, with the inlay **12** being arranged between the components **16** and **18**. FIG. **9** shows two even components **16** and **18** between which the inlay **12** is arranged. FIG. **10** shows an L-shaped component **18** and an even component **16** between which the inlay **12** is arranged.

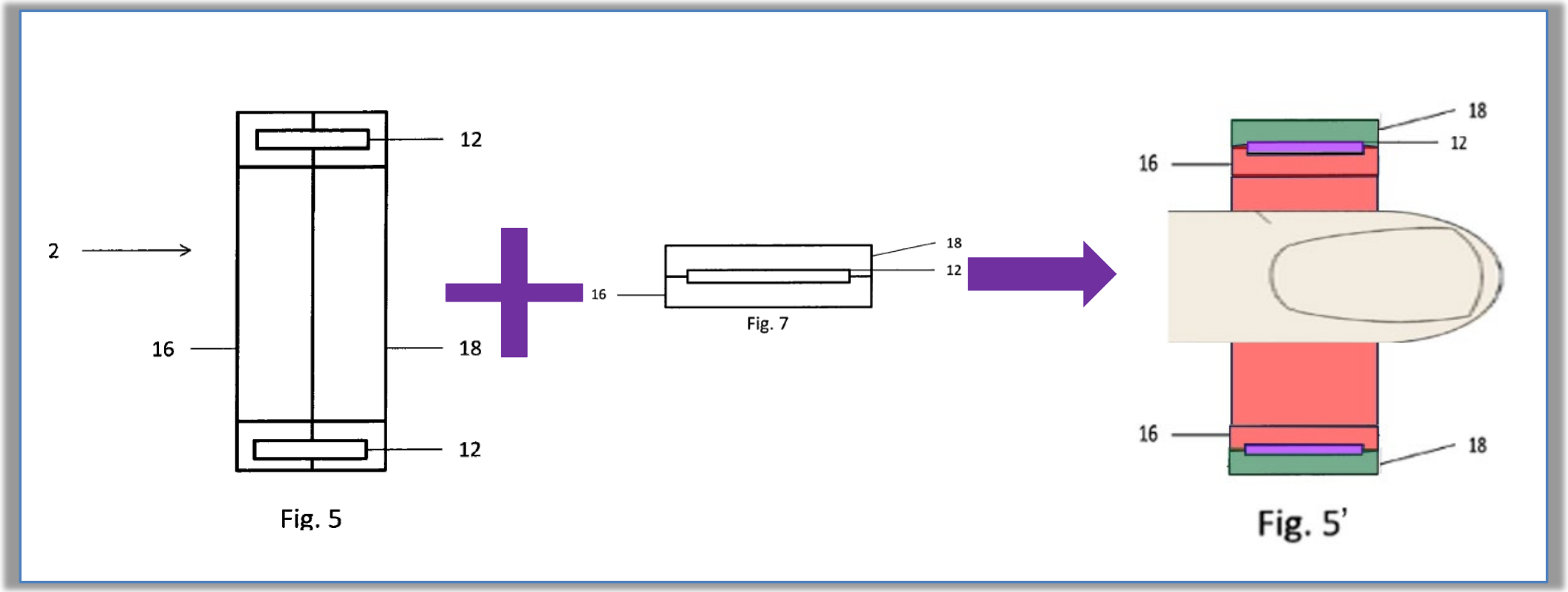


"Construction variants"

Ex-1007, 12:1-9, 12:45-50, Figs. 6-10; *e.g.*, 034Reply (Paper 19) at 2-6

Demonstrative Exhibit Not Evidence

Schröder's Figure 7 "construction variant" and Figure 5

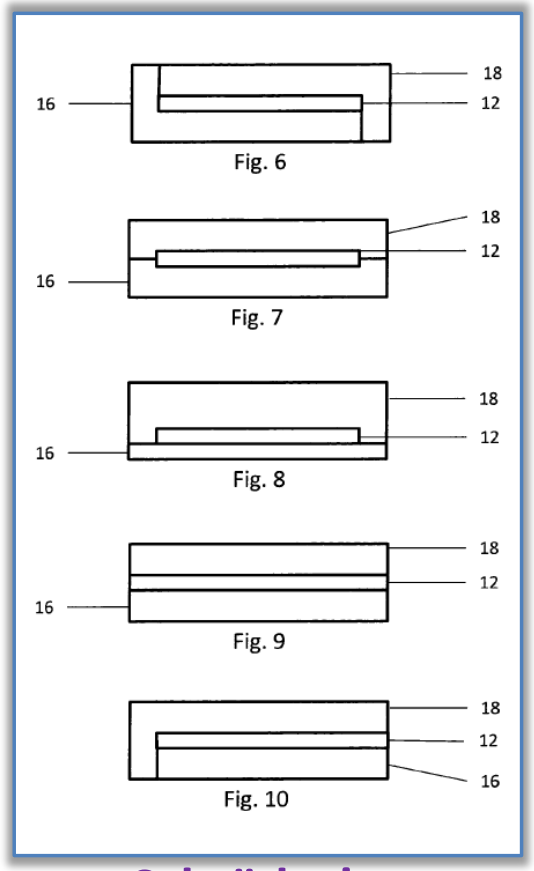


Schröder teaches an inner ring half and an outer ring half

Demonstrative Exhibit Not Evidence

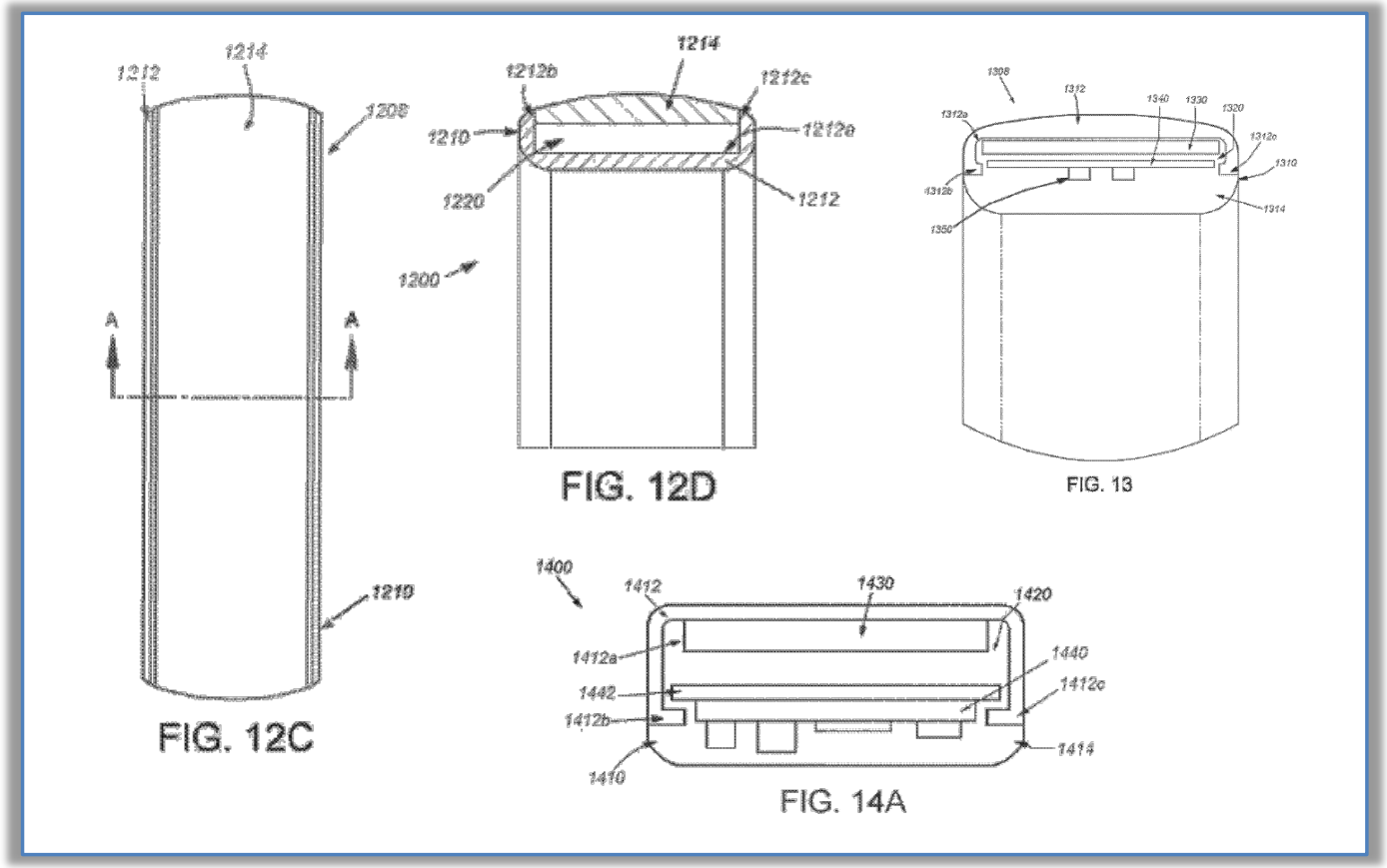
Ex-1007, Figs. 5, 7 (annotated), *e.g.*, 178Petition (Paper 3) at 19-21, 178Reply (Paper 31) at 5-6, 034Reply (Paper 19) at 4-6

Schröder teaches the same housing/packaging as the challenged patents



Schröder's "Construction variants"

Demonstrative Exhibit Not Evidence



Cross-sections of Challenged patents

E.g., 034Reply (Paper 19) at 6-7, Ex-1007, Figs. 6-10; Ex-1001, Figs. 12C, 12D, 13, 14A

PO attacks Schröder's Figure 3 but Petitioner relies on different embodiments

PO's Response

Second, Fig. 3 is the only figure that shows the position and size of the chip module 10, which (as shown) is external to and incapable of fitting within inlay 12 between ring halves 16 and 18 (Fig. 4):

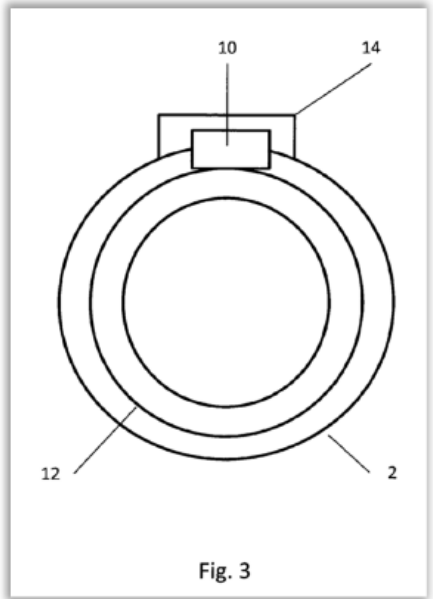


Fig. 3

178POR (Paper 19) at 33-34, Ex-1007, Fig. 3

Demonstrative Exhibit Not Evidence

PO attacks Schröder's Figure 3 but Petitioner relies on different embodiments

Dr. Mercier's testimony

Q: And so would you agree that the figure 4 embodiment is a different embodiment from the figure 3 embodiment?

A: Yeah. It would -- it would have to be.

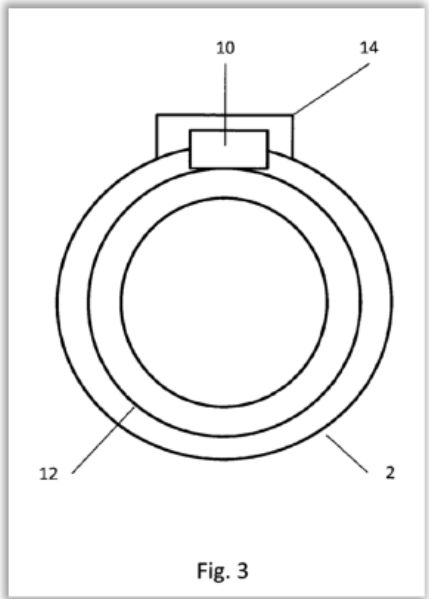


Fig. 3

≠

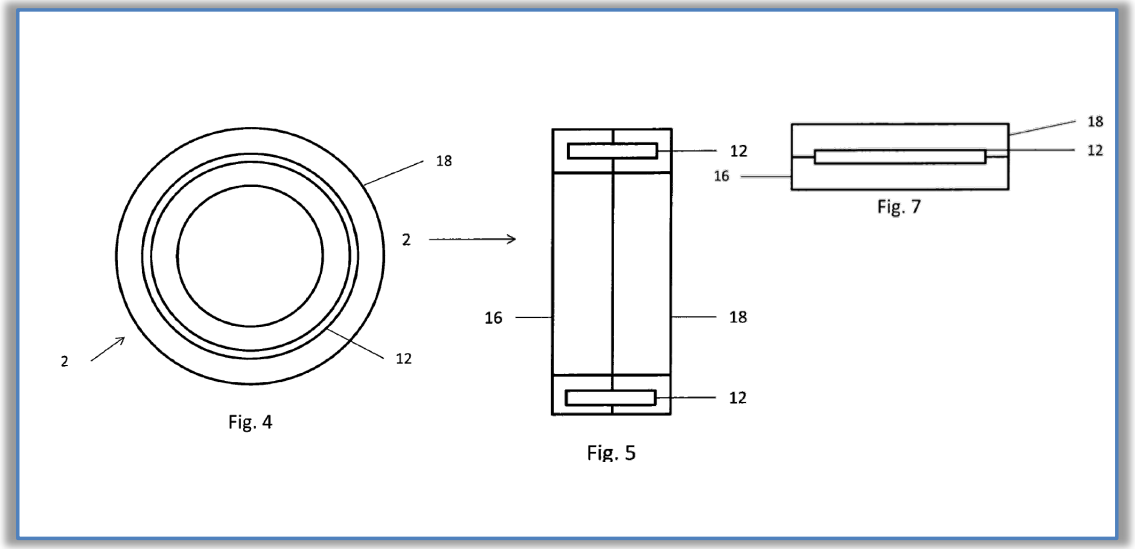


Fig. 4

Fig. 5

Fig. 7

Demonstrative Exhibit Not Evidence

Ex-1081, 77:15-18, Ex-1007, Figs. 3-4, 7

Schröder teaches two ring housing components

178/702/034

Petition

Id. As shown in Figures 4 and 7 below, Schröder's finger ring consists of "two ring halves 16 and 18" with a recess so that "inlay 12 is inserted." Ex-1007, 12:7-9. Schröder's ring halves can be formed in a U-shape with inlay 12 arranged between the components 16 and 18. *Id.*, 12:45-55. Ring half 18 (dark green) is the external housing component defining an outer circumferential surface because it is the circumferential outer surface of Schröder's finger ring that is exposed to the environment. Ex-1002 ¶151.

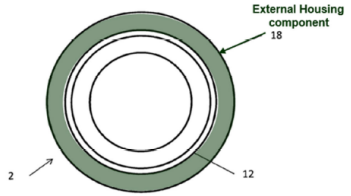


Fig. 4

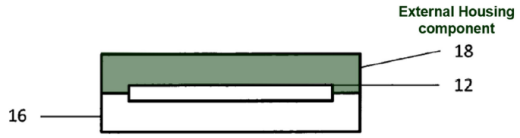


Fig. 7

Schröder's internal housing component also defines an inner circumferential surface of the finger ring. As shown in Figures 4 and 7 below, Schröder's finger ring consists of "two ring halves 16 and 18." Ex-1007, 12:7-9. Schröder's ring halves can be formed in a U-shape to enclose inlay 12 between the components 16 and 18. *Id.*, 12:45-55. Moreover, Schröder's ring halves further define an inner circumferential surface that fits over the ring finger of the wearer. Ex-1002 ¶¶152-153.

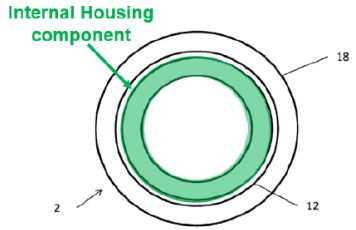


Fig. 4



Fig. 7

Demonstrative Exhibit Not Evidence

702Petition (Paper 3) 18-21, Ex-1007, Figs. 4, 7 (annotated)

PO resorts to bakery analogies hoping to refute Schröder's actual teachings

PO's Response:

As Dr. Anthony acknowledged at his deposition, however, ring halves 16 and 18 of Figures 4 and 5 in Schröder are not respective internal and external housing structures that each define inner and outer circumferential surfaces of a finger-worn wearable ring, as claimed. Ex-2020 at 30:15-34:3; 37:20-39:17. Rather, Figures 4 and 5 shows top and bottom ring halves 16 and 18 that are joined in the middle of the ring (like two halves of a bagel), not inner and outer surfaces of a ring. *Id.* at 40:9-13. Dr. Anthony acknowledged this "mistake" at his deposition:

PO's Sur-Reply

As Oura explained, (POR 57, 84), Figures 4 and 5 show top and bottom ring halves 16 and 18 that are joined in the middle of the ring (like two halves of a bagel), not inner and outer surfaces of a ring:

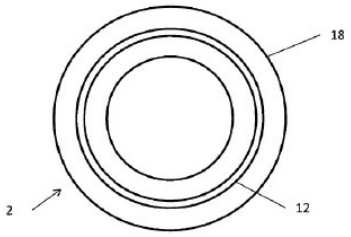
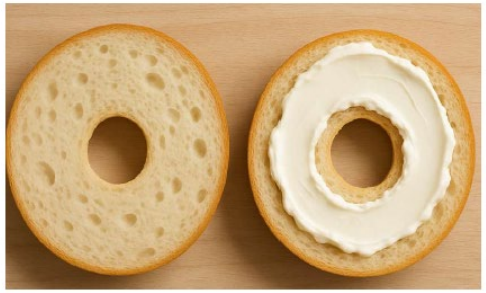


Fig. 4



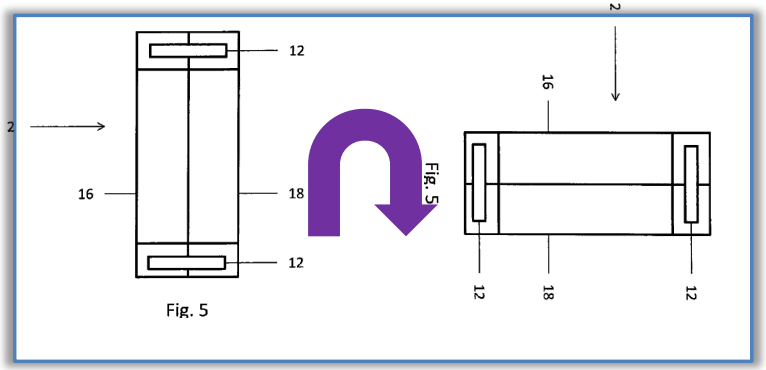
Demonstrative Exhibit Not Evidence

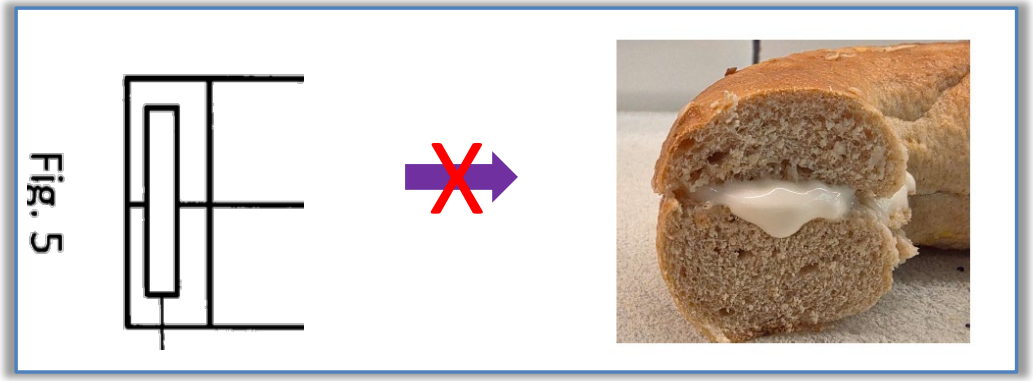
178POR (Paper 19) at 57; 178Sur-Reply (Paper 38) at 5-6

PO's analogies are inapt

178/702/034

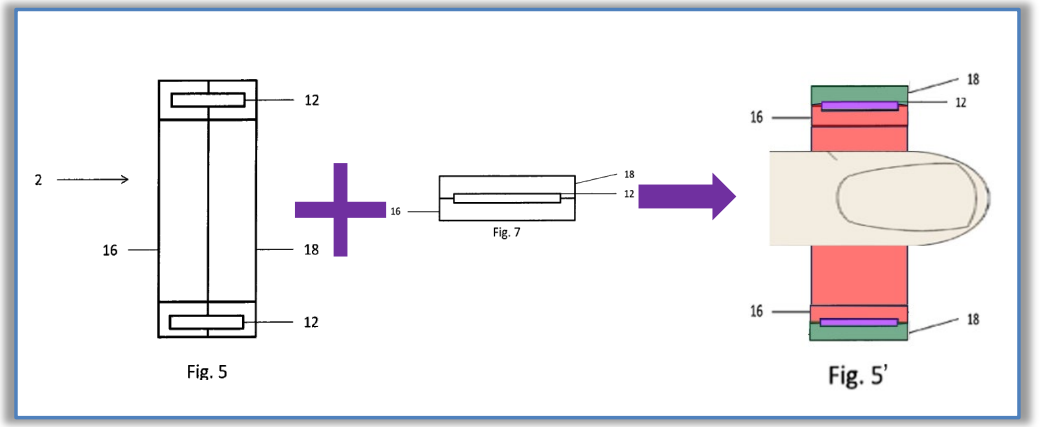
PO's Position – mere rotation of Figure 5





Schröder teaches several ways to vary construction

profile. Between the two U-shaped components **16** and **16** an inlay **12** is arranged. FIG. **7** accordingly shows two U-shaped components **16** and **18** between which an inlay **12** is arranged. FIG. **8** shows a U-shaped component **18** and an even component **16**, with the inlay **12** being arranged between the components **16** and **18**. FIG. **9** shows two even



Rotating Schröder's 5 on its side is not a variation in its construction

178Sur-Reply (Paper 38) at 8; Ex-1007, 12:45-50, Figs. 5, 7; 178Petitioner's Reply (Paper 31) at 5-6

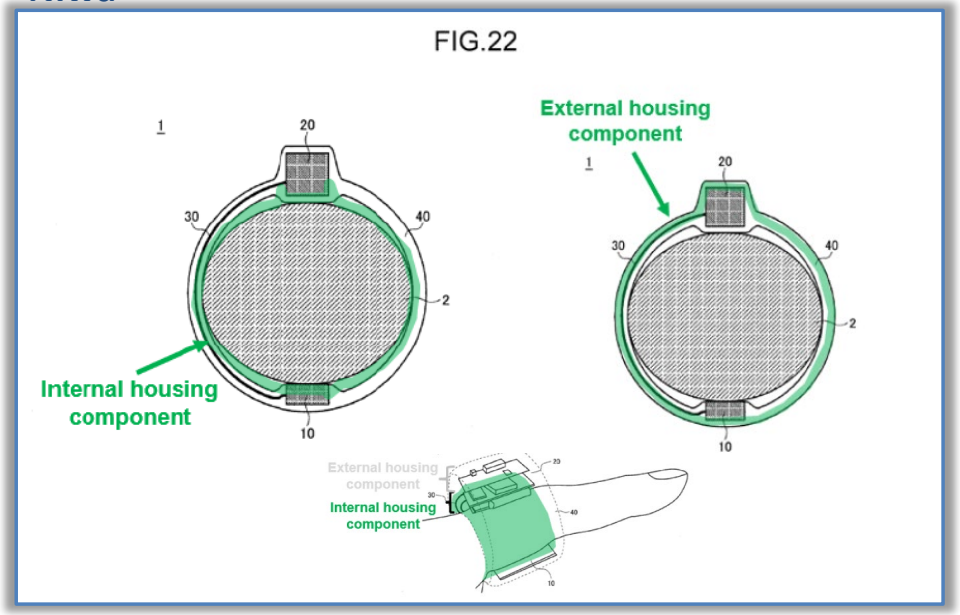
Demonstrative Exhibit Not Evidence

Niwa teaches internal and external housing components

PO's Response

Niwa does not disclose or suggest internal and external housing components, as claimed. Ex-2018, ¶182. Rather, Niwa discloses a unitary, component-less housing 40, shown in Fig. 23 below, and fails to disclose how the housing is constructed.

Niwa



Dr. Anthony's Testimony

outer ring design). Housing is not limited to two separate components that are bounded together and then later could be separated again. A POSITA would have understood that the external portion of the Niwa's ring defines an outer circumferential surface of the ring.

…

320. In my opinion, a POSITA would have understood that the internal housing component with the external housing component together form the housing for a unified device. This understanding includes recognizing various assembly techniques that might be used, whether the components are integrated through direct physical contact—which simplifies the design and enhances structural integrity—or through the use of an intermediary structure—that might add functionality or facilitate assembly. The choice in the formation would depend on the specific design requirements, including considerations for durability, maintenance, and performance optimization.

Demonstrative Exhibit Not Evidence

178POR (Paper 19) at 78; Ex-1002 ¶¶315, 320; Ex-1005, Figs. 22, 26 (annotated); 178Petition (Paper 3) at 77-79

Niwa-Schröder teaches internal and external housing components

PO's Response

As stated above with respect to limitation 1[a], Petitioner again relies on the disclosure of Schröder, but includes no analysis or reasoning as to how or why it would have been obvious to use the "ring halves" of Schröder in the unitary structure of Niwa that teaches a "stacking arrangement." Pet. at 79-80. Moreover, as explained above with reference to Schröder, ring halves 16 and 18 of Fig. 5 do not define outer and inner circumferential surfaces of a finger-worn wearable ring, as claimed. Pet. at 81. Rather, Fig. 5 discloses top and bottom ring halves 16 and 18 that are joined in the middle of the ring (like a bagel), not inner and outer surfaces. Ex-2018, ¶197. Thus, neither ring half 16 or 18 of Fig. 5 constitute an inner or outer component. *Id.*

Dr. Anthony's Testimony

A POSITA would have understood that the inner circumferential surface of the finger ring is defined by an internal housing component which couples with the external housing component, as taught in Schröder. As described above in Section VIII.A.1.c, Schröder's "finger-ring" consists of "two ring halves 16 and 18" with a recess so that "inlay 12 is inserted." Ex-1007, 12:7-9. As shown in Figure 4 below, ring half 16 (green) is the internal housing component defining an inner circumferential surface of the finger-worn wearable ring device because it is the inside ring that contacts the user's skin when the user is wearing the "finger-ring."

322. Schröder's internal housing component is coupled with the external housing component to form the "finger-ring." As shown below in Figure 5, Schröder's inner ring half 16 and outer ring half 18 "are interconnected by a suitable technology, e.g., by plugging, gluing, screwing, crimping, etc." Ex-1007, 12:20-22. Schröder's internal housing component is thus coupled with the external housing component, as illustrated by the abutting components 16 and 18 forming the "finger-ring" in Figure 5.

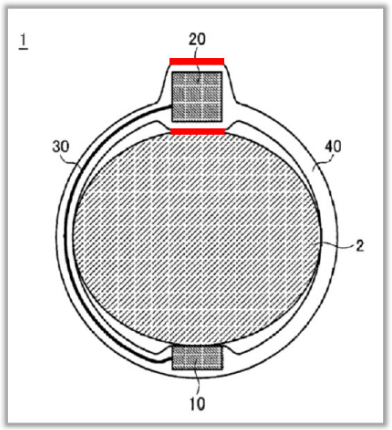
178POR (Paper 19) at 84; 178Ex-1002 ¶¶321-322

Demonstrative Exhibit Not Evidence

Niwa's housings have circumferential surfaces

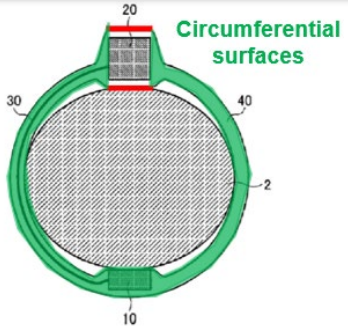
PO's Response

Second, as shown in Fig. 22 of Niwa, unit 20 contains battery 24. But the unit is not disposed "between" outer and inner circumferential surfaces of Niwa. Ex-2018, ¶187. Rather, the battery is located between two planar surfaces of the housing protrusion, as shown below in red:



Dr. Anthony's Testimony

68. For Grounds 5 and 6, Dr. Mercier argues that Niwa does not teach a battery or PCB between the internal and external housing components because Niwa does not disclose internal and external housing components. Ex-2018 ¶¶189-190. I disagree. Dr. Mercier's argument relies on Niwa's unit 20 being a protrusion with "flat" and "planar" portions. But that part of the outer circumferential surface is planar does not preclude the existence of an external housing component. A POSITA would have understood that Niwa's external housing component is a structure that encloses space. *See* Ex-2020, 62-63 (Anthony Tr. 248:19-252:16); Ex-1005, Fig. 26.



178POR (Paper 19) at 80; Ex-1079 ¶68; Ex-1005, Fig. 22 (annotated)

Demonstrative Exhibit Not Evidence

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0032

PCB/flexible PCB

178 Patent

1. A finger-worn wearable ring device, comprising:

an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;

an internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, the internal housing component coupled with the external housing component, wherein at least a portion of the inner circumferential surface of the internal housing component is configured to contact a tissue of a user when the finger-worn wearable ring device is being worn by the user;

...

a printed circuit board disposed between the internal housing component and the external housing component, wherein the printed circuit board extends through at least a second portion of the cavity of the finger-worn wearable ring device different from the first portion; and

702 Patent

1. A finger-worn wearable ring device, comprising:

an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;

an internal housing component coupled to the external housing component, the internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

a printed circuit board disposed within a cavity defined by the external housing component and the internal housing component, wherein the printed circuit board is configured to conform to arc within the cavity;

034 Patent

1. A wearable computing device, comprising:

an interior wall defining a first enclosing structure;

an exterior wall defining a second enclosing structure;

a flexible printed circuit board disposed between the interior wall and the exterior wall;

11. A wearable computing device, comprising:

an internal housing portion defining a first enclosing structure, the internal housing portion configured to be disposed near a finger of a user;

a flexible printed circuit board arranged around a portion of a circumference of an interior surface of the internal housing;

at least one component disposed on the flexible printed circuit board; and

16. A wearable computing device, comprising:

an external housing portion defining a first enclosing structure;

a flexible printed circuit board arranged around a portion of a circumference of an interior surface of the external housing;

Demonstrative Exhibit Not Evidence

178Ex-1001 at Cl. 1, 702Ex-1001 at Cl. 1, 034Ex-1001 at Cls. 1, 11, 16

Schröder's "inlay 12" corresponds to the claimed "flexible PCB"

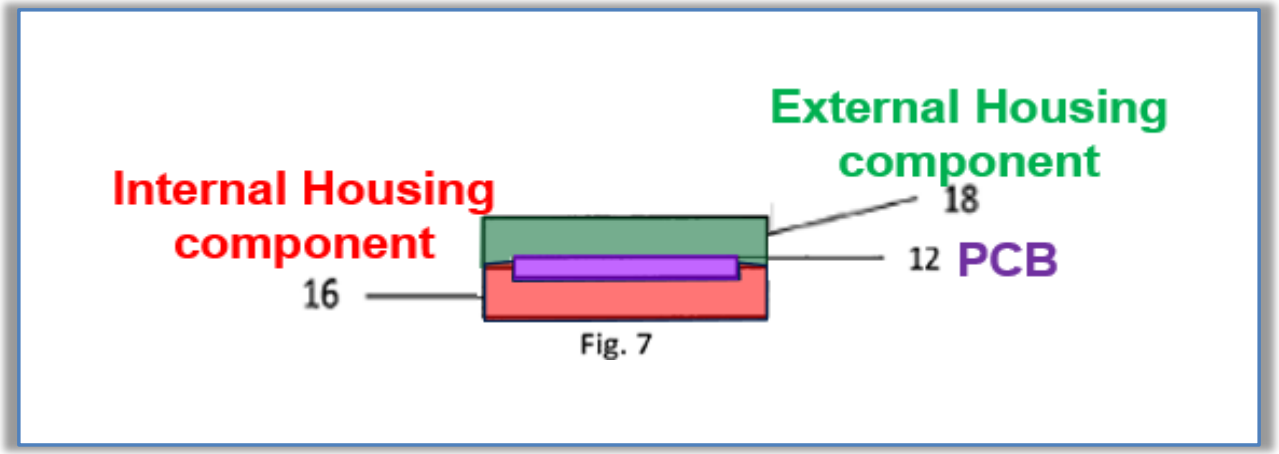


Fig. 7

finger-ring **2**. FIG. **5** shows a cross section, corresponding to FIG. **4**, of the finger-ring **2**. The finger-ring **2** consists of two ring halves **16** and **18**. The two ring halves **16** and **18** respectively have a recess into which the inlay **12** is inserted.

Demonstrative Exhibit Not Evidence

Ex-1007, Fig. 7 (annotated), 12:6-9; *e.g.*, 034Reply (Paper 19) at 8-10, 178Petition (Paper 3) at 24-25

Schröder's "inlay 12" is made of the same flexible material described in the challenged patents

Schröder

There are applied to a carrier foil at least one chip module **10** and at least one antenna coil **8** and optionally further electronic devices, e.g. a further antenna coil **8** or a display. The antenna coil **8** can for example be printed on the carrier foil by means of a conductive paste. Advantageously, a depression is manufactured in the carrier foil, e.g. by milling, lasering, etching, before the chip module **10**, the antenna coil **8** and optional further electronic devices are inserted into the depression. The depression has the purpose that the devices to be inserted into the depression should not protrude beyond the carrier foil if possible, so that an even surface is present on the carrier foil to facilitate a later processing of the carrier foil with inserted devices. The carrier foil itself consists of a flexible plastic material, e.g. PET or Kapton. The carrier foil consists of at least one foil. A strip-shaped ring blank is singled out of the carrier foil, e.g. by punching, lasering. Alternatively, it is possible that a ring blank is first singled out of a carrier foil, a depression is formed in said blank, and then the devices are inserted into the depression. Advantageously, a plurality of depressions for the later ring blanks are formed in a foil sheet, the devices are inserted into the depressions and finally the ring blanks with the inserted devices are singled out of the carrier foil. Further, a manufacture of ring blanks is accordingly also possible by a roll-to-roll process.

Challenged Patents

The stiffener element **1442** can be formed of any material, such as polyamide or thin FR4, depending on construction of the PCB **1440**. In particular, the material of the stiffener can be chosen to be more or less flexible than the PCB **1440**.

Schröder uses the same material for its inlay/carrier as the challenged patents

Demonstrative Exhibit Not Evidence

Ex-1007, 13:22-47; 178Ex-1001, 19:54-59; *e.g.*, 034Reply (Paper 19) at 8-9, 178Reply (Paper 31) at 6

Schröder's multi-layer carrier holds all of the internal electrical components

178/702/034

Schröder

There are applied to a carrier foil at least one chip module **10** and at least one antenna coil **8** and optionally further electronic devices, e.g. a further antenna coil **8** or a display. The antenna coil **8** can for example be printed on the carrier foil by means of a conductive paste. Advantageously, a depression is manufactured in the carrier foil, e.g. by milling, lasering, etching, before the chip module **10**, the antenna coil **8** and optional further electronic devices are inserted into the depression. The depression has the purpose that the devices to be inserted into the depression should not protrude beyond the carrier foil if possible, so that an even surface is present on the carrier foil to facilitate a later processing of the carrier foil with inserted devices. The carrier foil itself consists of a flexible plastic material, e.g. PET or Kapton. The carrier foil consists of at least one foil. A strip-shaped ring blank is singled out of the carrier foil, e.g. by punching, lasering. Alternatively, it is possible that a ring blank is first singled out of a carrier foil, a depression is formed in said blank, and then the devices are inserted into the depression. Advantageously, a plurality of depressions for the later ring blanks are formed in a foil sheet, the devices are inserted into the depressions and finally the ring blanks with the inserted devices are singled out of the carrier foil. Further, a manufacture of ring blanks is accordingly also possible by a roll-to-roll process.

Schröder

At least one further foil can be applied to the carrier foil or the ring blank on at least one side. A multilayer foil composite can therefore be produced. The foils can be interconnected e.g. by means of glue or lamination.

178Reply (Paper 31) at 5-7; Ex-1007, 13:22-47; 13:47-51

Demonstrative Exhibit Not Evidence

Schröder's inlay 12 is formed flat, and then rolled into a ring shape around a "u-shaped" "core ring"

178/702/034

Schröder

There are applied to a carrier foil at least one chip module **10** and at least one antenna coil **8** and optionally further electronic devices, e.g. a further antenna coil **8** or a display. The antenna coil **8** can for example be printed on the carrier foil by means of a conductive paste. Advantageously, a depression is manufactured in the carrier foil, e.g. by milling, lasering, etching, before the chip module **10**, the antenna coil **8** and optional further electronic devices are inserted into the depression. The depression has the purpose that the devices to be inserted into the depression should not protrude beyond the carrier foil if possible, so that an even surface is present on the carrier foil to facilitate a later processing of the carrier foil with inserted devices. The carrier foil itself consists of a flexible plastic material, e.g. PET or Kapton. The carrier foil consists of at least one foil. A strip-shaped ring blank is singled out of the carrier foil, e.g. by punching, lasering. Alternatively, it is possible that a ring blank is first singled out of a carrier foil, a depression is formed in said blank, and then the devices are inserted into the depression. Advantageously, a plurality of depressions for the later ring blanks are formed in a foil sheet, the devices are inserted into the depressions and finally the ring blanks with the inserted devices are singled out of the carrier foil. Further, a manufacture of ring blanks is accordingly also possible by a roll-to-roll process.

Schröder

After the ring blank has been prepared and singled to a certain desired length in accordance with the above steps, the ring blank is wound or rolled up to obtain the form of a finger-ring **2** with a corresponding diameter and thickness of the finger-ring **2**. To form a firm bond, the ring blank is laminated under pressure and heat in a mold into which the rolled ring blank has been inserted.

Alternatively, the ring blank can be wound around a core ring. The core ring has the form e.g. of a finger-ring **2**. Further, the core ring has for example a U-shaped cross-sectional profile. The core ring advantageously consists of plastic. Preferably, the core ring is manufactured by an injection-molding or die-casting process.

Demonstrative Exhibit Not Evidence

E.g., 178Petition (Paper 3) at 30-31, 74-75; Ex-1007, 13:22-47, 14:14-26

Schröder's inlay design and packaging is the same as the challenged patents

Schröder

There are applied to a carrier foil at least one chip module **10** and at least one antenna coil **8** and optionally further electronic devices, e.g. a further antenna coil **8** or a display. The antenna coil **8** can for example be printed on the carrier foil by means of a conductive paste. Advantageously, a depression is manufactured in the carrier foil, e.g. by milling, lasering, etching, before the chip module **10**, the antenna coil **8** and optional further electronic devices are inserted into the depression. The depression has the purpose that the devices to be inserted into the depression should not protrude beyond the carrier foil if possible, so that an even surface is present on the carrier foil to facilitate a later processing of the carrier foil with inserted devices. The carrier foil itself consists of a flexible plastic material, e.g. PET or Kapton. The carrier foil consists of at least one foil. A strip-shaped ring blank is singled out of the carrier foil, e.g. by punching, lasering. Alternatively, it is possible that a ring blank is first singled out of a carrier foil, a depression is formed in said blank, and then the devices are inserted into the depression. Advantageously, a plurality of depressions for the later ring blanks are formed in a foil sheet, the devices are inserted into the depressions and finally the ring blanks with the inserted devices are singled out of the carrier foil. Further, a manufacture of ring blanks is accordingly also possible by a roll-to-roll process.

Challenged Patents

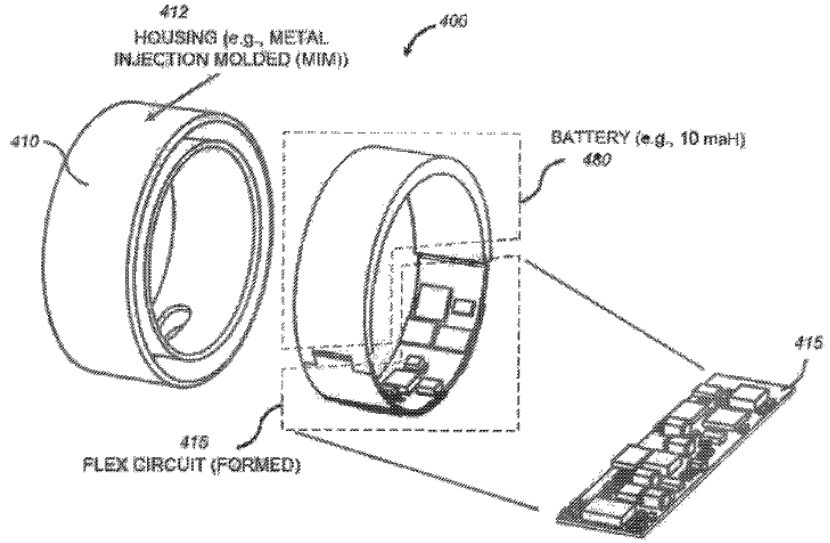


FIG. 4

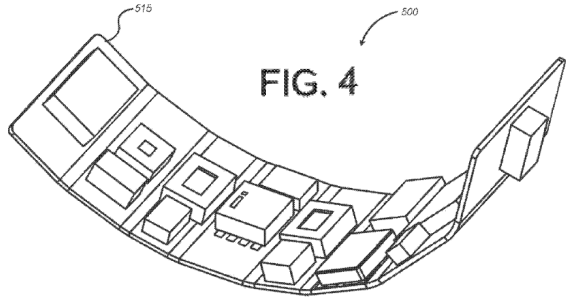


FIG. 5

178Reply (Paper 31) at 3-7; Ex-1007, 13:22-47; 178Ex-1001, Figs 4 and 5

Demonstrative Exhibit Not Evidence

PO argues that Schröder's inlay 12 is not a PCB, but its own definition proves otherwise

178/702/034

PO sur-reply

> Dr. Mercier explained that a POSITA would require, at minimum, etched or printed conductive traces, multiple layers, and mounted components before calling a structure a "printed circuit board." Ex-1081, 69:18-71:17.

Schröder

> There are applied to a carrier foil at least one chip module **10** and at least one antenna coil **8** and optionally further electronic devices, e.g. a further antenna coil **8** or a display. The antenna coil **8** can for example be printed on the carrier foil by means of a conductive paste. Advantageously, a depression is manufactured in the carrier foil, e.g. by milling, lasering, etching, before the chip module **10**, the antenna coil **8** and optional further electronic devices are inserted into the depression. The depression has the purpose that the devices to be inserted into the depression should not protrude beyond the carrier foil if possible, so that an even surface is present on the carrier foil to facilitate a later processing of the carrier foil with inserted devices. The

Schröder

> At least one further foil can be applied to the carrier foil or the ring blank on at least one side. A multilayer foil composite can therefore be produced. The foils can be interconnected e.g. by means of glue or lamination.

Demonstrative Exhibit Not Evidence

178Reply (Paper 31) at 6-7; Ex-1007, 13:22-47; 13:47-51; PO Sur-reply (Paper 38) at at 13-14

PO disputes Niwa's PCB only on the basis that it is not between separable components

PO's Response

3. Niwa does not disclose or suggest limitation 1[d].

As stated above, because Niwa does not disclose or suggest internal and external housing components, Niwa does not disclose or suggest "a printed circuit board disposed between the internal housing component and the external housing component." *Id.*, ¶190.

FIG.28

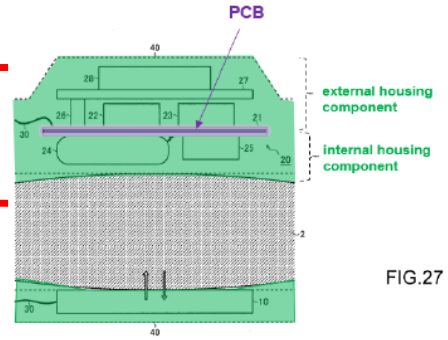


FIG.26

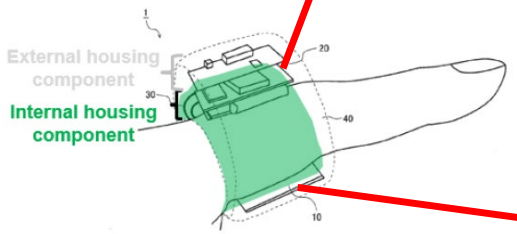
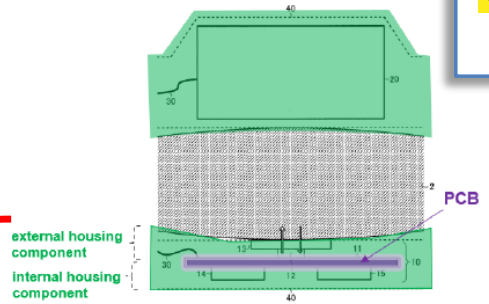


FIG.27



Demonstrative Exhibit Not Evidence

Dr. Anthony's Testimony

336. Niwa's finger ring has a substrate disposed between the internal housing component and the external housing component. Niwa describes components and circuits that are "mounted" onto the surface or back side of the "substrate." *See, e.g.*, Ex-1005 (Niwa) ¶¶68, 69, 213. Niwa also describes an "electrical connection…established between the surface and back side of the…substrate…by means of the through hole and the via hole." *Id.* ¶214. Thus a POSITA would have understood Niwa's substrate to be a PCB.

337. As shown in Figures 27 and 28 (cross-sections) below, Niwa utilizes substrates in first unit 10 and second unit 20, all of which exist within finger ring type housing 40. Ex-1005 ¶¶194-95, 207. A POSITA would have understood that the claimed PCB corresponds to a substrate in Niwa because its substrate is a PCB disposed between the internal and external housing components which electrically connects components and circuits.

178POR (Paper 19) at 81; 178Petition (Paper 3) at 85-86; Ex-1002 ¶¶335-338

Yuen's flexible PCB

Yuen

FIG. 5 illustrates a cross sectional view of a sensor protrusion of an exemplary portable biometric monitoring device; notably, two light sources (e.g. LED's) may be located on one or more sides of the photodetector (for example, either side or opposing sides of a photodetector) to enable photoplethysmography (PPG) sensing wherein light blocking material may be placed between the light sources and the photodetector to prevent any light from the light sources from going through the device body and being detected by the photodetector (in one embodiment, the light sources and photodetector are placed on a flexible PCB); a flexible transparent layer may be placed on the lower surface of the sensor protrusion to form a seal wherein the transparent layer may provide other functions such as preventing liquid from entering the device where the light sources or photodetectors are disposed or placed; notably, the transparent layer may be formed through in-mold labeling or "IML";

Yuen

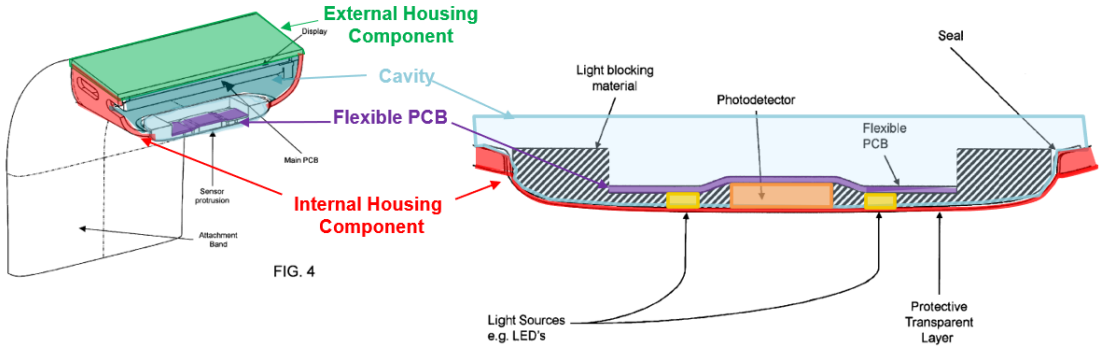


FIG. 5

Demonstrative Exhibit Not Evidence

E.g., 178Petition (Paper 3) at 58-59; Ex-1006, Figs. 4, 5 (annotated), 2:38-39, 12:35-38

LeBouef's flexible PCB

702 Patent

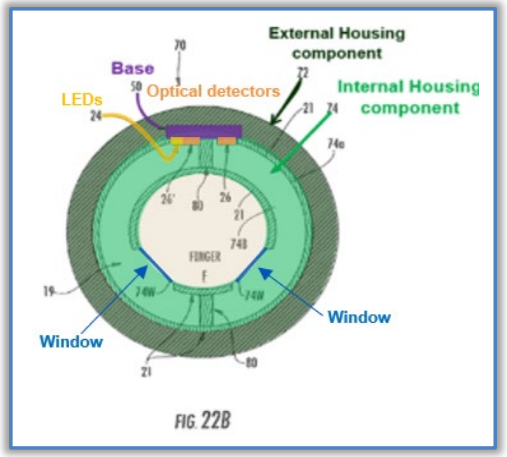
a printed circuit board disposed within a cavity defined by the external housing component and the internal housing component, wherein the printed circuit board is configured to conform to arc within the cavity;

PO's Response

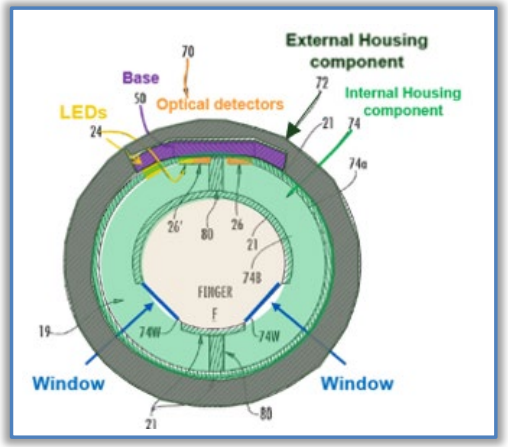
LeBoeuf states that the outer body portion 72 and inner body portion 74 are "secured together in a concentric relationship." Ex-1012 at 27:64-28:1. Claim 1 requires that the printed circuit board "is configured to conform to [an] arc within the cavity[.]" Ex-1001 at 45:8-11. Petitioners' argument fails on two fronts. First, there is no cavity formed between the inner and outer body portions that has an "arc." Ex-2018, ¶151. Even if the base 50 is construed to occupy a cavity defined by the inner body and outer body, the cavity is rectangular and has no arc. *Id.*

In a confusing exercise of picking and choosing elements guided by hindsight, Petitioner and Dr. Anthony propose a different proposed modification of LeBoeuf and Schröder. Pet. at 76; Ex-1002, ¶237 ("A POSITA would have been motivated to have LeBoeuf's printed circuit board as Schröder's flexible carrier material in order to provide electrical connections to all of components inside the ring, such as additional light emitters."). This modification apparently relies on the fact that Schröder discloses that inlay 12 is a printed circuit board, which, as explained above, it is not. Ex-2018, ¶154.

LeBouef



LeBouef-Schröder



LeBouef teaches a flexible PCB

a remote location. For example, these flexible devices may include an organic LED (OLED) and an organic optical detector circuit. This embodiment may be useful for generating a diffuse light beam towards the ear region and for detecting a diffuse optical scatter response from the ear region. In some embodiments, the emitter and detector on the flexible optical emitter **24** may be a traditional light-emitting diode (LED) and photodetector (PD) integrated onto a flexible printed circuit board. In other embodiments, transparent solid

Demonstrative Exhibit Not Evidence

702Ex-1001, Cl. 1, 702Petition (Paper 3) at 71-77, 98-99; 702POR (Paper 18) 58-59; Ex-1012, 18:22-27, Fig. 22B (annotated and modified)

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0043

Battery Limitations

178 Patent

Independent Claim 1

1. A finger-worn wearable ring device, comprising:

an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;

an internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, the internal housing component coupled with the external housing component, wherein at least a portion of the inner circumferential surface of the internal housing component is configured to contact a tissue of a user when the finger-worn wearable ring device is being worn by the user;

a battery positioned within a cavity formed between the internal housing component and the external housing component, wherein the battery comprises a shape and size configured to fit within the cavity between the outer circumferential surface of the external housing component and the inner circumferential surface of the internal housing component, and wherein the battery extends through at least a first portion of the cavity of the finger-worn wearable ring device;

Dependent Claims

12. The finger-worn wearable ring device of claim 1, wherein the battery comprises a curved battery, wherein an arc of the curved battery approximates a corresponding arc of the external housing component.

2. The finger-worn wearable ring device of claim 1, wherein the first portion of the cavity of the finger-worn wearable ring device is non-overlapping with the second portion of the cavity of the finger-worn wearable ring device.

3. The finger-worn wearable ring device of claim 1, wherein the first portion of the cavity of the finger-worn wearable ring device at least partially overlaps with the second portion of the cavity of the finger-worn wearable ring device.

4. The finger-worn wearable ring device of claim 1, further comprising:

one or more magnetic components configured to magnetically interact with one or more additional magnetic components of a charger device to align the finger-worn wearable ring device in a charging position on or within the charger device to facilitate charging of the finger-worn wearable ring device.

5. The finger-worn wearable ring device of claim 4, further comprising:

a charging component configured to wirelessly transfer energy from an additional charging component of the charger device to the battery when the finger-worn wearable ring device is oriented in the charging position.

NOT DISPUTED

702 Patent

16. The finger-worn wearable ring device of claim 1, further comprising:

a curved battery electrically coupled with the one or more light-emitting components, the one or more light-receiving components, the one or more processors, and the communication module.

17. The finger-worn wearable ring device of claim 16, wherein the curved battery comprises an arc that approximates an arc of the cavity.

12. The finger-worn wearable ring device of claim 1, further comprising:

a power management module disposed within the cavity between the inner circumferential surface and the outer circumferential surface, the power management module configured to wirelessly transfer energy from an external energy source to a battery of the finger-worn wearable ring device through the inner circumferential surface, the outer circumferential surface, or both.

13. The finger-worn wearable ring device of claim 12, wherein the power management module comprises an inductive charging component configured to transfer energy from the external energy source to the battery via an inductive charging process.

NOT DISPUTED

178Ex-1001 at Cls. 1-4, 12; 702Ex-1001 at Cls. 12-13, 16-17

Demonstrative Exhibit Not Evidence

PO's expert requires a curved battery even for claims in which this feature is not recited

178 Patent, Independent Claim 1

1. A finger-worn wearable ring device, comprising:
an external housing component defining an outer circumferential surface of the finger-worn wearable ring device; ...
a battery positioned within a cavity formed between the internal housing component and the external housing component, wherein the battery comprises a shape and size configured to fit within the cavity between the outer circumferential surface of the external housing component and the inner circumferential surface of the internal housing component, and wherein the battery extends through at least a first portion of the cavity of the finger-worn wearable ring device;

Dependent Claim 12

12. The finger-worn wearable ring device of claim 1, wherein the battery comprises a curved battery, wherein an arc of the curved battery approximates a corresponding arc of the external housing component.

PO's Expert Dr. Mercier

You would agree that claim 1, strictly speaking, does not require a curved battery, right?
A. Again, the answer isn't quite a simple yes-or-no question because, you know, the claims need to be read in light of the specification. And the specification, you know, repeatedly, both in text and in figures, describes the use of a curved battery, and so, again, a POSITA reading this isn't -- you know, the first thought that's going to come into a POSITA's mind isn't a noncurved battery. It's going to be a curved battery because of the specification and everything preceding as well as the description of the mechanical design of the device in which a curved battery would be possibly the only solution that would provide sufficient power given the mechanical physical constraints described in claim 1.

And so could someone, a non-POSITA, interpret claim 1 to consider a noncurved battery? Possibly. Would a POSITA consider a noncurved battery in light of the specification the language of the construction described in the claims and their knowledge of the power requirements of all the blocks that need to go into such a device? It's my opinion that they would not.

Demonstrative Exhibit Not Evidence

178Reply (Paper 31) at 1; Ex-1001 at Cls. 1, 12; Ex-1081 at 26:10-24, 29:14-20

Schröder expressly teaches a battery

Schröder

In a further embodiment example, the external secure unit **2** has an energy storage device, e.g. an accumulator or a battery. The energy storage device is connected to the chip module **10** in order to supply the chip module **10** with energy outside an electromagnetic field of a reader. Within the reader's field the energy of the energy storage device can be additionally employed in order to increase the range of the antenna coil **8** upon transmission. The energy storage device is preferably charged by means of the reader's electromagnetic field. The energy storage device can also be employed to operate alternative communication channels, such as wireless LAN, infrared, etc., which are likewise supported by the chip module **10**, outside the reader's field. Further, the energy storage device can be employed for operating electronic components, such as display units or display elements, and supplying them with energy. The energy storage device further enables uninterrupted operation of the processor after leaving the reader's field. The energy storage device can, for charging, be connected directly to the antenna coil **8** via a rectifier circuit, with the chip module **10** connecting the energy storage device to the antenna coil **8** accordingly by means of a suitable connection device.

178Petition (Paper 3) at 22-23; Ex-1007, 11:45-67

Demonstrative Exhibit Not Evidence

Dr. Mercier disputes that the battery fits in Schröder's recess, but this is what Schröder says

PO's Expert Dr. Mercier:

20 Q. And so Schroder says that inlay 12 can have on it
21 at least chip module 10, further antenna coil 8, and at
22 least one or more electronic component, such as a battery,
23 right?
24 A. Yes. And to further that, in figure 3, you know,
25 which is the -- well, figure 2 and 3, which are the only

Schröder

FIG. **4** shows a longitudinal section through a finger-ring **2**. Here, an inlay **12** is inserted into one half **18** of the finger-ring **2**. FIG. **5** shows a cross section, corresponding to

Schröder

crimping. Besides the chip module **10**, at least one further electronic component can also be located on the carrier, e.g.

178Reply (Paper 31) at 3; Ex-1081, 98:20-24, Ex-1007, 12:4-6, 12:40-42

Dr. Mercier admits that inlay 12 is inserted into Schröder's recess

178/702/034

Q. And so inlay 12, with chip module 10 and various other components on it, is inserted into a recess between ring halves 16 and 18 in Schroder, right?

A. Yes.

Q. So figure 4 talks about a recess in which inlay 12 is inserted. Right? Kind of implies that there's a recess that exists, and then inlay 12 is put into that recess, right?

A. That's right.

178Reply (Paper 31) at 3; Ex-1081, 82:10-13, 101:17-21

PO incorrectly suggests that Schröder doesn't teach anything about a battery's position

PO's Response:

> In contrast, Schröder does not disclose ***any*** position of a battery, or what such a battery would look like, and thus cannot meet any of the structural limitations set forth in limitation 1[c]. Indeed, as the Board acknowledged in the Institution



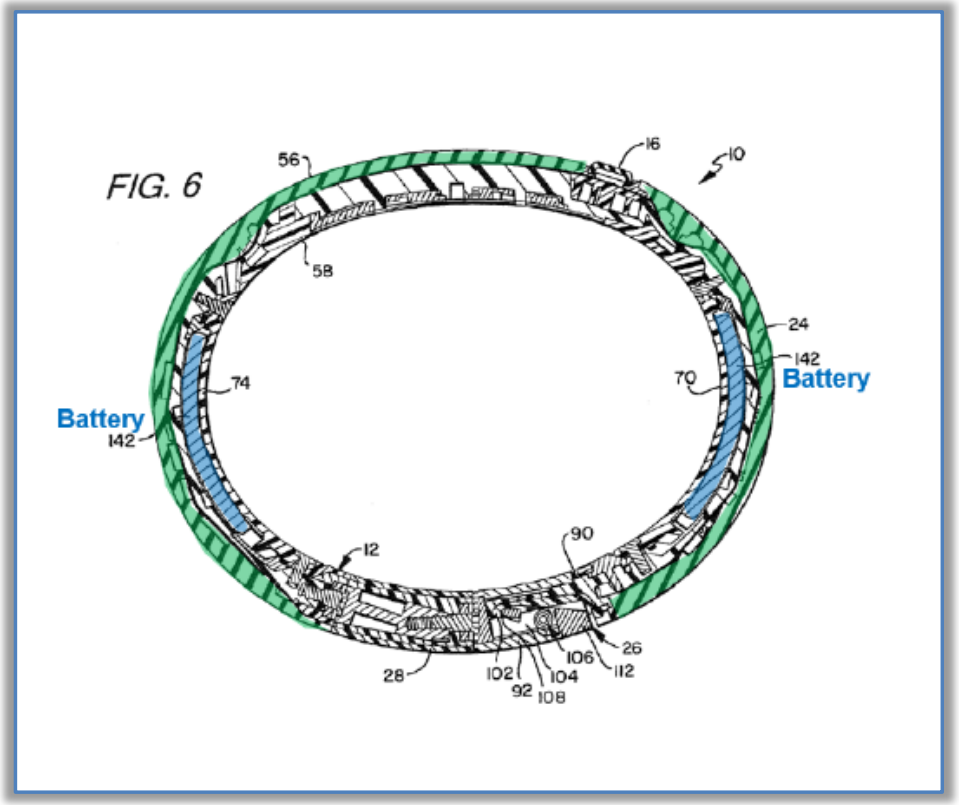
Schröder's teaching related to positioning electronic components such as a battery

- Battery "connected to chip module"
- Electronic components, such as a battery, "on the carrier"
- Electronic components, such as a battery, "applied to a carrier foil"
- "further electronic devices are inserted into the depression" in the carrier
- Electronic component, such as a battery, should "not protrude beyond the carrier foil"
- Carrier "wound or rolled up" around a "core ring" that has a "u-shaped cross- sectional profile"

Demonstrative Exhibit Not Evidence

178POR (Paper 19) at 29; 178Reply (Paper 31) at 1-4; Ex-1007, 11:48-49, 12:40-43, 13:22-25, 13:30-31, 13:32-35, 14:14-26

Mestas expressly teaches a curved battery



[0168] As discussed, the controller **14** includes the power supply **142** in the form of batteries **142**. It is understood that a single battery **142** could be utilized in the design. Such a design may allow for a flexible circuit member having additional areas to support additional components associated with the device **10**. In an exemplary embodiment, however, the power supply **142** utilizes a pair of batteries **142**. As can be appreciated from FIGS. **6** and **20**, the batteries **142** have a curvilinear or curved configuration and are generally rigid members. The batteries **142** define curved planar surfaces. In an exemplary embodiment, the device **10** utilizes the pair of batteries **142**. The first battery **142** is positioned in the first recessed compartment **50** of the spine member **22**, and the second battery **142** is positioned in the second recessed compartment **52** of the spine member **22**. The batteries **142** have a thickness that generally corresponds to a depth of the recesses **50**,**52**. The batteries **142** are generally flush with the

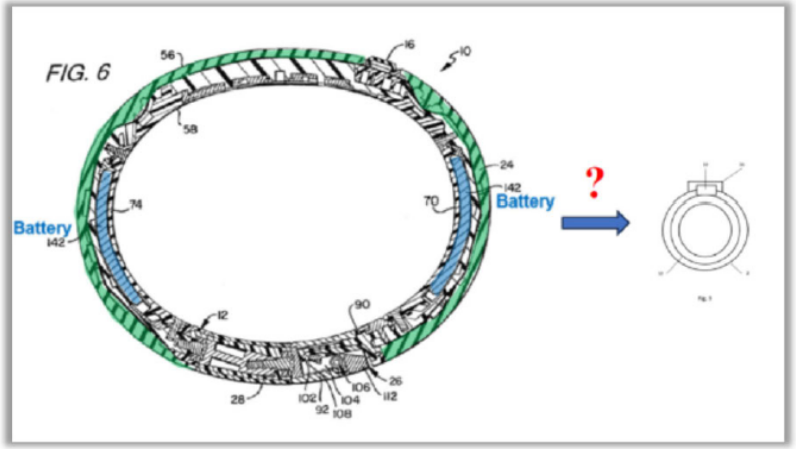
Demonstrative Exhibit Not Evidence

E.g., 178Reply (Paper 31) at 11-12; Ex-1010, Fig. 6 (annotated), ¶168

PO argues against bodily incorporation of Mestas's battery into Schröder's ring

PO's Response:

The combination of Schröder and Mestas does not teach a "curved battery that approximates a corresponding arc of the external housing component" for use in a "finger-worn wearable ring device" as recited in claim 12. Ex-2018, ¶163. At best, the Schröder-Mestas combination teaches curved batteries that are 5-10 times too big to be of any use in a finger ring (Ex-2021 at 313:12), as illustrated below:



PO's response relies on bodily incorporation

Demonstrative Exhibit Not Evidence

POR (Paper 19) at 69; Ex-1018 ¶151

Using a curved battery, as taught be Mestas, in a curved recess, as taught by both Mestas and Schröder, would have been obvious

Petitioner's Expert Dr. Anthony:

58. Dr. Mercier also argues as if a POSITA would be literally shrinking Mestas's components to fit into Schröder's ring. Ex-2018 ¶¶138-140. But I am not bodily incorporating Mestas's battery into Schröder's ring. *See* Ex-2021 (Anthony Tr. 307:7-17) (Q: "Whether we're talking about using one or both of Mestas's batteries, the battery disclosed in Mestas's bracelet is too big to put in a ring like Schröder, correct?" A: "... what's taught is the benefit of a curved battery. And ***I'm not proposing a wholesale, just copying and paste that battery into a device of the size of a ring***, but a POSITA would curve the battery to beneficially use the space and size the -- use an appropriate energy density as well as for the power requirements for."). Mestas teaches having curved batteries in a wearable device. It is that teaching that a POSITA would have considered implementing into Schröder. As I explained in my declaration, a battery having a curved shape like the "curved battery" of Mestas would have been obvious to avoid increasing the ring's thickness or straining the battery or housing. Ex-1002 ¶¶214-220. While Dr. Mercier argues

PO's Expert Dr. Mercier:

12 Q. Okay. But you would agree that there was kind of
13 a general pressure in the industry around 2013 to attempt
14 to miniaturize batteries, correct?
15 ATTORNEY PLUTA: Object to form. Object to form.
16 THE WITNESS: I do. And one other piece of

PO's expert acknowledges general pressures in the industry to make electronic components smaller

Demonstrative Exhibit Not Evidence

178Reply (Paper 31) at 11-13; Ex-1079 ¶ 58; Ex-1081 at 148:12-149:16

Size reduction does not impart patentability



"There certainly is nothing patentable in merely reducing the size of the bracelet so as to adapt it to use in a necklace."

Pearce v. Mulford, 102 U.S. 112, 116, 26 L. Ed. 93 (1880)

Demonstrative Exhibit Not Evidence

178Reply (Paper 31) at 12

The challenged patents do not teach routine battery miniaturization details because the such details would have been known to a POSITA

178/702

Q. And so the question that I'm asking you is relative to the curved batteries that were known at the time the '178 patent. Does the '178 patent teach anything about reducing the size of a curved battery for use in a ring wearable device?

A. And, again, I'll say that the '178 patent does describe, you know, manufacturing of smart rings and integration techniques of things like curved batteries and so on. As it relates to, you know, manufacturing efforts specifically on how to reduce the size of a curved battery, no.

178Reply (Paper 31) at 1; Ex-1081, 18:6-16

Battery overlapping or not overlapping with PCB

178 Patent, Dependent Claims 2-3

2. The finger-worn wearable ring device of claim **1**, wherein the first portion of the cavity of the finger-worn wearable ring device is non-overlapping with the second portion of the cavity of the finger-worn wearable ring device.

3. The finger-worn wearable ring device of claim **1**, wherein the first portion of the cavity of the finger-worn wearable ring device at least partially overlaps with the second portion of the cavity of the finger-worn wearable ring device.

PO's Response

FALSE

mechanical or electrical connections to each other."). Dr. Anthony fails to explain how a POSITA would consider both arrangements obvious given the stated reasons he gives for choosing one over the other. Ex-2018, ¶124. This is especially true considering that Schröder does not disclose *any* structure of the inlay nor provides any explanation as to where the battery would be located in relation to the inlay.

Dr. Anthony's Testimony

Q. Okay. So in paragraph 188, you say POSITA would have been motivated to design a first portion of the cavity that has the battery to at least partially overlap with the portion of the cavity that has the PCB to reduce the risk of electrical components and the PCB losing mechanical or electrical connections to each other.

Is that losing electrical connections to non-overlap? Is that a problem in the art?

A. Well, again, here and with knowledge of a POSITA, in order -- and considering design trade-offs and manufacturing trade-offs, having them at least partially overlap would help to serve to reduce the risk of electrical components and PCB losing connection, as opposed to if they weren't overlapping and given other design trade-offs, they could have an increased risk of losing connection, electrical and mechanical.

Q. Can you give me an example of that where non-overlapping components have a risk of losing mechanical and electrical connections?

A. Well, for example, on a wearable device that's experiencing a lot of potential motion and vibration from its use, depending on the design trade-offs of the battery, the size of the components, the size of the cavity, and the expected level of vibration induced, having them more intimately coupled could serve to reduce the risk of disconnection.

Having them further apart could have other advantages but would potentially increase the risk of having the electrical or mechanical components disengage under extreme motions, for example.

Demonstrative Exhibit Not Evidence

178Ex-1001, Cls. 2-3; 178POR (Paper 19) at 51-52; 178Reply (Paper 31) at 10-11; Ex-2020, 220:19-221:5, 221:17-21

Schröder-Niwa's teaching of its battery overlapping or not overlapping with PCB

178 Patent, Dependent Claims 2-3

2. The finger-worn wearable ring device of claim 1, wherein the first portion of the cavity of the finger-worn wearable ring device is non-overlapping with the second portion of the cavity of the finger-worn wearable ring device.

3. The finger-worn wearable ring device of claim 1, wherein the first portion of the cavity of the finger-worn wearable ring device at least partially overlaps with the second portion of the cavity of the finger-worn wearable ring device.

PO's Response

4. Schröder in view of Niwa does not disclose or suggest claims 2 and 3.

Petitioner relies on Niwa to meet the "non-overlapping" and "partially overlaps" limitations of claims 2 and 3. Pet. at 38-41. Petitioner fails to explain, however, how or why the flat components located between the flat housing surfaces of Niwa housing would be adapted to the curved inlay of Schröder. Ex-2018, ¶142. A POSITA simply would not apply those teachings from Niwa, as it would not be compatible with curved inlay 12. *Id.* As such, claims 2 and 3 are not taught by the combination of Schröder and Niwa.

Non-overlapping

FIG.28

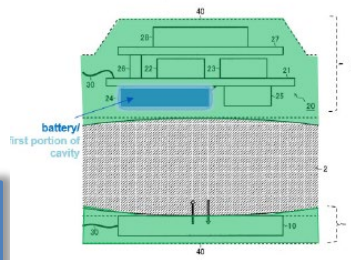
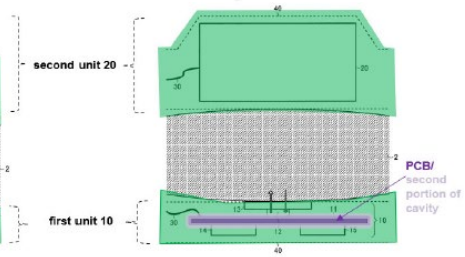
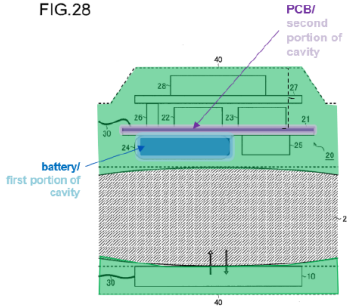


FIG.27



Overlapping

FIG.28



Dr. Anthony's Testimony

Q. Does Schr der in isolation teach stacked layer construction anywhere in his disclosure?

A. Sorry. You said Schr der?

Q. Schr der, yes. Exhibit 2.

A. A POSITA reading Schr der would understand, for example, when we talk about the carrier material having the chip module connected to the antenna coil, and other electronic components could also be stacked as described with the carrier foil as described in 13 for an alternative manufacturing flexibility.

So I think the POSITA reading this would understand that there is stacking potential, stacking that could be used and would also be motivated to look to other teachings of stacking, which is, as motivated, to combine Niwa with Schr der.

Q. So Figure 3 of Schr der, again -- I appreciate that you state you haven't relied on Figure 3. But Figure 3 in isolation is an example of where Schr der could be stacking elements?

A. Well, again, I was not using Figure 3. I was discussing the -- the variant, for example, of Figure 7, which would have an inlay which would have stacked -- potential for stacked construction, as they described. Could there be stacking used in Figure 3? Potentially. But that's not what I was opining about.

Demonstrative Exhibit Not Evidence

178POR (Paper 19) at 60-62; 178Petition (Paper 3) at 38-41; Ex-1002 ¶¶208-214; Ex-1005, Figs. 27, 28 (annotated); Ex-2021, 279:10:-280:15

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Sensors

178 Patent

1. A finger-worn wearable ring device, comprising:

an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;

an internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, the internal housing component coupled with the external housing component, wherein at least a portion of the inner circumferential surface of the internal housing component is configured to contact a tissue of a user when the finger-worn wearable ring device is being worn by the user;

...

one or more sensors electrically coupled with the printed circuit board and the battery and configured to acquire data from the user through the internal housing component.

702 Patent

1. A finger-worn wearable ring device, comprising:

an external housing component defining an outer circumferential surface of the finger-worn wearable ring device:

an internal housing component coupled to the external housing component, the internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

a printed circuit board disposed within a cavity defined by the external housing component and the internal housing component, wherein the printed circuit board is configured to conform to arc within the cavity;

one or more light-emitting components electrically coupled with the printed circuit board, the one or more light-emitting components configured to emit light through the substantially transparent material of the internal housing component into a tissue of a user;

one or more light-receiving components electrically coupled with the printed circuit board, the one or more light-receiving components configured to receive, through the substantially transparent material of the internal housing component, the light transmitted by the one or more light-emitting components;

Demonstrative Exhibit Not Evidence

178Petition (Paper 3) at 25-26, 58, 87-88; 702Petition (Paper 3) at 24-26, 77-81; 178Ex-1001, Cl. 1; 702Ex-1001, Cl.1

Petitioner Samsung Ex-1339, 0058

Schröder teaches "at least one biometric sensor"

Schröder's sensor coupled to PCB

In a further embodiment example of the invention, the external secure unit **2** has a biometric sensor. This enables the user of the external secure unit **2** to authenticate himself. For example, the finger-ring **2** as an external secure unit **2** can have integrated therein at least one biometric sensor. The biometric sensor is connected suitably to the chip module **10**. The sensor can be arranged on the chip module **10** or it can be arranged in the finger-ring **2** separately from the chip module **10** e.g. on a separate circuit foil. The biometric sensor can be integrated into the finger-ring **2** e.g. such that the biometric sensor captures e.g. at least a partial vein image in the finger while the finger-ring **2** is being pushed over a finger. As biometric sensors there can be employed e.g. at least one infrared diode and at least one infrared sensor. The infrared diode and the infrared sensor are arranged e.g. opposite each other such that e.g. an finger bone located therebetween has no adverse effect on a measuring result. Upon a first capture e.g. of a vein image of the ring finger, the vein image must be captured along the whole

Schröder cont'd

finger length from all possible angles in order to enable a later authentication of the user to be carried out from arbitrary angles upon arbitrary displacements along the finger. The first capture can be effected by means of the at least one biometric sensor of the finger-ring **2** or by means of an external biometric sensor. After the first capture the captured biometric data must be stored in the chip module **10** of the finger-ring **2** as an external secure unit **2**. This can be done e.g. upon a personalization of the external secure unit **2**, i.e. here of the finger-ring **2**. Upon an authentication of the user, the captured biometric data are compared with the stored data. If the comparison yields a match of the captured data with the stored data, the user is authenticated. Upon comparison of the captured with the stored biometric data, either the complete captured data can be compared with the stored data, or only certain characteristic points of the captured data can be compared with the stored data. The characteristic data may be e.g. intersection points of veins or other unusual features. Further, a tolerance can additionally be established with regard to a position of the features or to a lightness difference relative to a captured background. The characteristic data are advantage in that less memory space is required in the chip module **10**. Alternatively, a fingerprint e.g. of one finger can also be captured.

Demonstrative Exhibit Not Evidence

Ex-1007 at 9:60-10:29; 178Petition (Paper 3) at 26; 702Petition (Paper 3) at 24-25

Petitioner relies on Niwa or Yuen for multi-wavelength light-emitting sensor claims

178 Claims

13. The finger-worn wearable ring device of claim **1**, wherein the one or more sensors comprise a first light-emitting component configured to emit light associated with a first wavelength, and a second light-emitting component configured to emit light associated with a second wavelength different from the first wavelength.

14. The finger-worn wearable ring device of claim **13**, wherein the first wavelength is associated with visible light, and wherein the second wavelength is associated with infrared light.

15. The finger-worn wearable ring device of claim **13**, wherein the first light-emitting component is positioned within the finger-worn wearable ring device at a first radial position, and the second light-emitting component is positioned within the finger-worn wearable ring device at a second radial position different from the first radial position.

16. The finger-worn wearable ring device of claim **15**, wherein the one or more sensors further comprise a photodetector positioned within the finger-worn wearable ring device at a third radial position that is between the first radial position and the second radial position.

PO does not dispute that Niwa or Yuen teaches light-emitting sensors

178 PGR Grounds

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1–3, 17, 18	103	Schröder[3]
2	1–3, 13–16	103	Schröder, Niwa[4]
3	12	103	Schröder, Mestas[5]
4	1, 4–10, 13–16	103	Schröder, Yuen[6]
5	1–3, 13–18	103	Niwa
6	1–3, 13–18	103	Niwa, Schröder
7	12	103	Niwa, Mestas
8	12	103	Niwa, Schröder, Mestas
9	4–10	103	Niwa, Yuen
10	4–10	103	Niwa, Schröder, Yuen
11	17, 18	112(d)	Improper dependence

Demonstrative Exhibit Not Evidence

Ex-1001 at Cls. 13-16; 178Petition (Paper 3) at 42-48, 67-73

Schröder-Yuen teaches that "at least one biometric sensor" may include an IR diode

178 Claims

13. The finger-worn wearable ring device of claim 1, wherein the one or more sensors comprise a first light-emitting component configured to emit light associated with a first wavelength, and a second light-emitting component configured to emit light associated with a second wavelength different from the first wavelength.

14. The finger-worn wearable ring device of claim 13, wherein the first wavelength is associated with visible light, and wherein the second wavelength is associated with infrared light.

Schröder

module **10** e.g. on a separate circuit foil. The biometric sensor can be integrated into the finger-ring **2** e.g. such that the biometric sensor captures e.g. at least a partial vein image in the finger while the finger-ring **2** is being pushed over a finger. As biometric sensors there can be employed e.g. at least one infrared diode and at least one infrared sensor. The infrared diode and the infrared sensor are arranged e.g. opposite each other such that e.g. an finger bone located therebetween has no adverse effect on a measuring result. Upon a first capture e.g. of a vein image of the

Demonstrative Exhibit Not Evidence

178Petition (Paper 3) at 67-68; Ex-1001 at Cls. 13-14; Ex-1007 at 9:60-10:29

Yuen teaches multiple wavelength sensors coupled to PCB

178

178 Claims

13. The finger-worn wearable ring device of claim 1, wherein the one or more sensors comprise a first light-emitting component configured to emit light associated with a first wavelength, and a second light-emitting component configured to emit light associated with a second wavelength different from the first wavelength.

14. The finger-worn wearable ring device of claim 13, wherein the first wavelength is associated with visible light, and wherein the second wavelength is associated with infrared light.

Yuen's sensors coupled to PCB

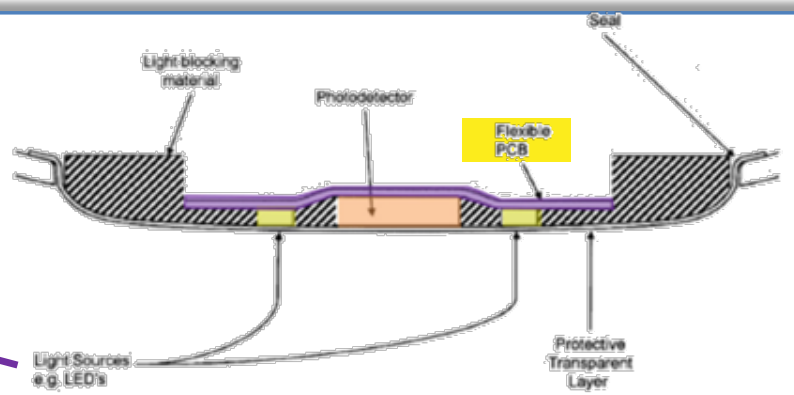


FIG. 5

[0147] FIG. 8 is a flow chart illustrating a fifth measurement operation which uses the plethysmogram sensor in FIG. 3. As a prerequisite to perform the fifth measurement operation, each output intensities I1 to I8 of the light emitting portions LED1 to LED8 is set as the constant value I in common, output wave lengths λ1 to λ8 are values different from one another (i.e., from a visible light region to a near-infrared region). In addition, as the output wave lengths λ1 to λ8, although the wave lengths which are equivalent to the light colors of blue, green, yellow, and orange are favorable, a detailed explanation about this is described below.

Ex-1006 at 2:38-39, 12:35-38, Fig. 5; 178Petition (Paper 3) at 58-59

Demonstrative Exhibit Not Evidence

62

Yuen teaches radial position claims

178

178 Claims

15. The finger-worn wearable ring device of claim 13, wherein the first light-emitting component is positioned within the finger-worn wearable ring device at a first radial position, and the second light-emitting component is positioned within the finger-worn wearable ring device at a second radial position different from the first radial position.

16. The finger-worn wearable ring device of claim 15, wherein the one or more sensors further comprise a photodetector positioned within the finger-worn wearable ring device at a third radial position that is between the first radial position and the second radial position.

Yuen's radial positioning

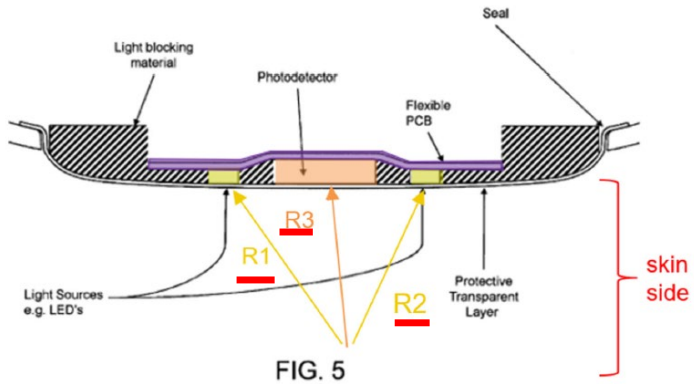


FIG. 5

Dr. Anthony's Declaration:

298. ... Yuen describes that this allows the inner surface of the device to adapt to the shape of the user's appendage so that there is "little to no gap between the skin side of the device and the juxtaposed surface of the skin of the user." Id., 12:24-42. A POSITA would have understood that Yuen's light's sources can be shaped to facilitate skin contact with the user's finger, such as the Yuen-Schröder's finger-ring. Therefore, the light sources disposed on the flexible PCB are also conformed to contact the user's finger by Schröder-Yuen's finger-ring in the same way as the light emitters contact the user's skin in Figure 5. A POSITA would have understood that Yuen's light emitters in the Schröder-Yuen's finger-ring device are at different radial positions, R1 and R2, because the LEDs are at different circumferential positions pointing along a radius from the center of the finger-ring.

178Petition (Paper 3) at 68-73; Ex-1001 at Cls. 15-16; Ex-1006, Fig. 5; 178Ex-1002 ¶ 298

Demonstrative Exhibit Not Evidence

63

Schröder-Niwa teaches radial position claims

178 Claims

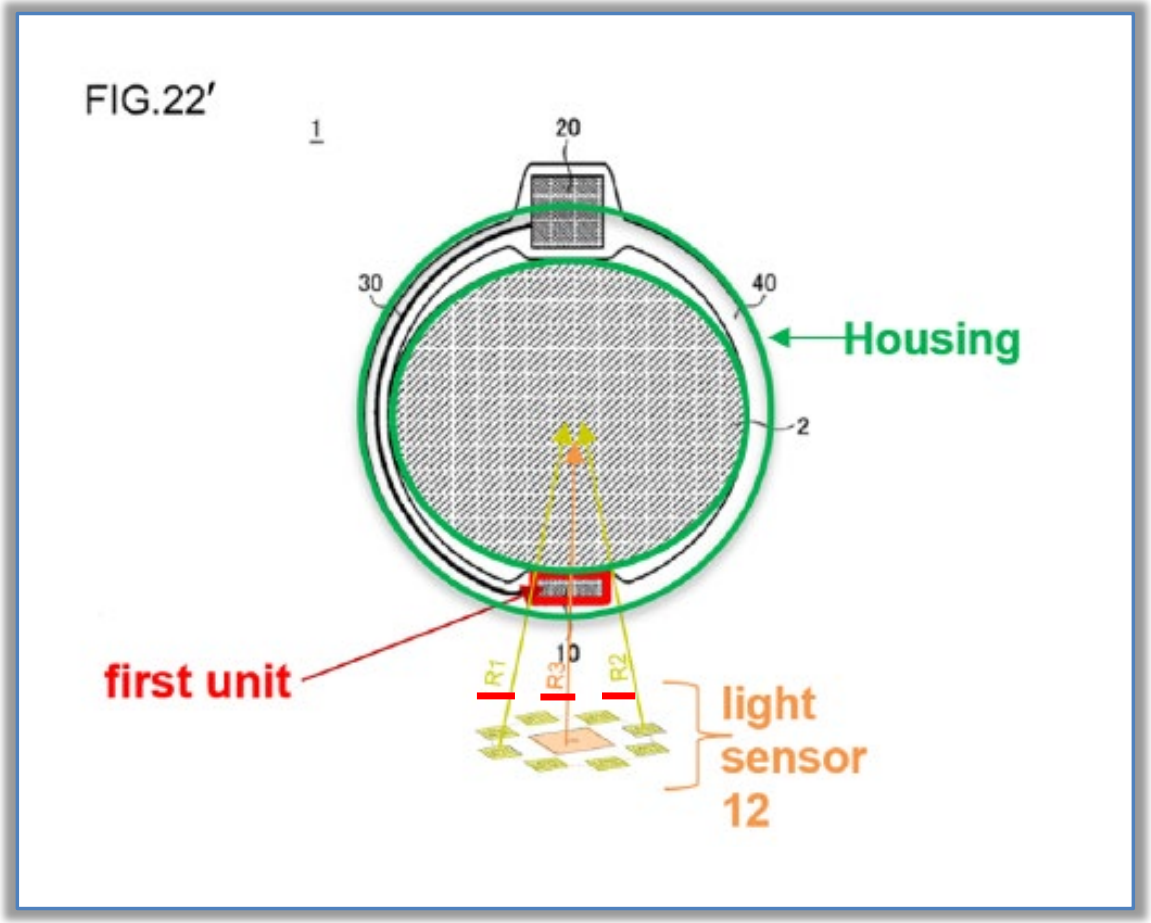
15. The finger-worn wearable ring device of claim 13, wherein the first light-emitting component is positioned within the finger-worn wearable ring device at a first radial position, and the second light-emitting component is positioned within the finger-worn wearable ring device at a second radial position different from the first radial position.

16. The finger-worn wearable ring device of claim 15, wherein the one or more sensors further comprise a photodetector positioned within the finger-worn wearable ring device at a third radial position that is between the first radial position and the second radial position.

Niwa's radial positioning

arrow in FIG. 1). The plethysmogram sensor has a construction both the light emitting portion and the light receiving portion are provided at same side against the fingertip (i.e., a so-called reflection type, in reference to a full line arrow in FIG. 1). Furthermore, as illustrated in FIG. 3, the plethysmogram sensor includes a single light receiving portion PD (i.e., a photo diode or a photo transistor) and eight light emitting portions LED1 to LED8 (i.e., a light emitting diode) equally spaced from one another and placed on a circumference with a central focus on the light receiving portion PD. In addition,

Niwa's radial positioning



Ex-1001 at Cls. 15-16; Ex-1005, Figs. 27, 3 (modified and annotated), ¶ 120; 178Petition (Paper 3) at 44-48

Demonstrative Exhibit Not Evidence

PO does not dispute Yuen's teachings, instead PO argues there is no motivation to combine Schröder with Yuen

PO's Response:

2018, ¶176. Petitioner's reasons for applying Yuen's PCB to Schröder is also lacking. No reason is given why Yuen's too large and planar PCB would offer any advantage over the inlay for the security application of Schröder. Petitioner argues that "PCBs are lightweight, save space, and are easier to assemble into curved constructions." Pet. at 55. The PCB taught by Yuen, however, certainly would not save any weight or space in Schröder's ring, nor does Petitioner point to any teaching as to how one would adapt the PCB of Yuen to an appropriate size and shape for a ring—especially given Yuen's statement that its device "is adapted" to a "size and shape" for a wrist. Ex-1006, 12:50-52. There is simply no evidence presented that

Demonstrative Exhibit Not Evidence

Ex-1001 at Cl. 37; 178POR (Paper 19) at 75

A POSITA would have been motivated to combine Schröder with Yuen

178, 034

Yuen's sampling rate

For example, in one preferred embodiment, the biometric monitoring device and technique of the present inventions may adjust and/or reduce the sampling rate of optical heart rate sampling when the motion detector circuitry detects or determines that the user's motion is below a threshold (for example, the biometric monitoring device determines the user is sedentary or asleep). (See, for example, FIG. **15**). In this way, the biometric monitoring device may control its power consumption (for example, reduce power consumption by reducing the sampling rate—for instance, the biometric monitoring device may sample the heart rate (via the heart rate sensor) once every 10 minutes, or 10 seconds out of every 1 minute. Notably, the biometric monitoring device may, in addition thereto or in lieu thereof, control power consumption via controlling data processing circuitry analysis and/or data analysis techniques in accordance with motion detection. As such, the motion of the user may impact the heart rate data acquisition parameters and/or data analysis or processing thereof.

Yuen's operational parameters

In yet another embodiment, the aforementioned processing techniques may be used in combination to optically measure physiological parameters of the user. (See, for example, FIG. **23**). This topology may allow the sensor device to operate in a low power measurement state and circuit topology when applicable and adapt to a higher power measurement state and circuit topology as necessary. For instance, the sensor device may measure the physiologic parameter of interest (e.g., heart rate) using analog signal conditioning circuitry whilst the user is immobile or sedentary to reduce power consumption, but switch to oversampled sampling of the light detector output directly whilst the user is active.

Dr. Anthony's Declaration

these imaging and sensing technologies in capturing venous information. A POSITA would have been motivated to combine these teachings because incorporating additional sensors and radial positions can enhance redundancy, thereby improving the reliability and accuracy of measurements. However, a POSITA would also recognize the need to carefully balance the increased number of radial positions against the associated costs and the added complexity of materials and manufacturing processes. This balancing act involves evaluating the benefits of additional redundancy against the practical constraints of production and budget, ensuring that the design remains feasible and cost-effective while achieving the desired level of performance and reliability.

Yuen discloses a motivation to configure sensors to collect varied and more accurate information

Demonstrative Exhibit Not Evidence

178Petition (Paper 3) at 56-57; Ex-1006 at 7:19-38, 17:5-16; 178Ex-1002 ¶ 259

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0067

Substantially transparent material

702 Patent

1. A finger-worn wearable ring device, comprising:

an external housing component defining an outer circumferential surface of the finger-worn wearable ring device;

an internal housing component coupled to the external housing component, the internal housing component defining an inner circumferential surface of the finger-worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

a printed circuit board disposed within a cavity defined by the external housing component and the internal housing component, wherein the printed circuit board is configured to conform to arc within the cavity;

one or more light-emitting components electrically coupled with the printed circuit board, the one or more light-emitting components configured to emit light through the substantially transparent material of the internal housing component into a tissue of a user;

one or more light-receiving components electrically coupled with the printed circuit board, the one or more light-receiving components configured to receive, through the substantially transparent material of the internal housing component, the light transmitted by the one or more light-emitting components;

034 Patent

12. The wearable device of claim 11, wherein the external housing portion comprises a substantially transparent external potting.

17. The wearable device of claim 16, wherein the internal housing portion comprises a substantially transparent internal potting.

NOT DISPUTED

Demonstrative Exhibit Not Evidence

702Ex-1001 at Cl. 1; 034Ex-1001 at Cls. 12, 17; 702Petition (Paper 3) at 21-26, 70-81; 034Petition (Paper 3) at 35-38, 48-49

PO argues the material must be "substantially transparent" in visible light spectra

702 Patent, Claim 1

worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

Petitioner's plain meaning
At least partial transparent to light in at least some of the following wavelengths: IR, visible, and/or UV.

PO's interpretation
transparency for "***Visible*** light" to pass through

Demonstrative Exhibit Not Evidence

702Ex-1001 at Cl. 1; 702Petition (Paper 3) at 21-22; 702Reply (Paper 28) at 1-2; 702POR (Paper 18) at 29

PO argues the material must be "substantially transparent" in visible light spectra

702 Patent, Claim 1

worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

PO's interpretation

transparency for "***visible*** light" to pass through

8 Q. In your opinion, does this term "substantially
9 transparent" require transparency to all wavelengths of
10 light?
11 A. So terms should take their plain and ordinary
12 meaning. And the plain and ordinary meaning of light
13 without any further context would -- you know, if you're
14 talking to a regular person, you would assume that would be
15 visible light unless otherwise specified.
16 So my read of substantially transparent material
17 that enables light to pass through ought to include visible
18 light.
19 Q. Okay. Just to be clear. If, for example, a
20 window was transmissive in the infrared but not
21 transmissive in a visible ultraviolet range, in your
22 opinion, that would not be substantially transparent as
23 claimed?
24 A. I think that's fair. I think, you know, the claim

Demonstrative Exhibit Not Evidence

702Ex-1001 at Cl. 1; 702POR (Paper 18) at 29; Ex-1082, 179:8-24

"Substantially transparent" in any of UV, IR, or visible

702 Patent, Claim 1

worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

Petitioner's plain meaning

At least partial transparent to light in at least some of the following wavelengths, IR, visible, and/or UV.

702 Patent Specification

(57) **ABSTRACT**

A smart ring includes a curved housing having a U-shape interior storing components including: a curved battery

• • •

performing executable instructions in response thereto, and a potting material disposed in the interior, forming an interior wall of the smart ring, wherein the potting material encapsulates the components and is substantially transparent to visible light, infrared light, and/or ultraviolet light.

Demonstrative Exhibit Not Evidence

702Ex-1001 at Cl. 1; 702Petition (Paper 3) at 21-22; Ex-1001 at Abstract

"Substantially transparent" in any of UV, IR, or visible

702 Patent, Claim 1

worn wearable ring device, wherein the internal housing component comprises a substantially transparent material that enables light to pass through the internal housing component;

Petitioner's plain meaning
At least partial transparent to light in at least some of the following wavelengths, IR, visible, and/or UV.

Dependent claims make clear that transparency can be in any light wavelength range

9. The finger-worn wearable ring device of claim **1**, wherein the one or more light-emitting components comprise a first light-emitting component configured to emit light associated with a first wavelength, and a second light-emitting component configured to emit light associated with a second wavelength different from the first wavelength.

10. The finger-worn wearable ring device of claim **9**, wherein the first wavelength is associated with visible light, and wherein the second wavelength is associated with infrared light.

12. The wearable device of claim **11**, wherein the external housing portion comprises a substantially transparent external potting.

13. The wearable computing device of claim **12**, wherein the at least one component comprises at least one LED configured to emit at least one of visible light, infrared radiation, and ultraviolet radiation through the external potting.

702Petition (Paper 3) at 21-22; Ex-1001 at Cls. 9, 10, 12, 13

Demonstrative Exhibit Not Evidence

Schröder teaches transparent windows and components, and internal-facing IR LEDs

Schröder's transparent window

tively.

In a further embodiment example, the external secure unit **2** has at least one security feature as protection against forgery. The external secure unit **2**, e.g. a finger-ring **2**, has security elements for example incorporated into the surface, applied thereto or integrated therein, such as holograms, Kinegrams, security threads, microprint, guilloches, fluorescent or phosphorescent inks, optically variable inks, color gradations, e.g. gradients, iridescent print, intaglio print, transparent regions, e.g. windows, etc. Depending on the manufacturing method for the external secure unit **2**, the

Schröder's IR LEDs to illuminate finger

In a further embodiment example of the invention, the external secure unit **2** has a biometric sensor. This enables the user of the external secure unit **2** to authenticate himself. For example, the finger-ring **2** as an external secure unit **2** can have integrated therein at least one biometric sensor. The biometric sensor is connected suitably to the chip module **10**. The sensor can be arranged on the chip module **10** or it can be arranged in the finger-ring **2** separately from the chip module **10** e.g. on a separate circuit foil. The biometric sensor can be integrated into the finger-ring **2** e.g. such that the biometric sensor captures e.g. at least a partial vein image in the finger while the finger-ring **2** is being pushed over a finger. As biometric sensors there can be employed e.g. at least one infrared diode and at least one infrared sensor. The infrared diode and the infrared sensor are arranged e.g. opposite each other such that e.g. an finger bone located therebetween has no adverse effect on a measuring result. Upon a first capture e.g. of a vein image of the

Demonstrative Exhibit Not Evidence

702Petition (Paper 3) at 24-25; Ex-1007 at 9:26-34, 9:54-10:29

PO does not and cannot dispute that Schröder teaches IR transmissive windows for its vein mapping

Board's Institution Decision

Ex. 1007, 2:38–42, 9:28–34. But Petitioner also relies on Schröder's disclosure of "biometric sensors such as an infrared diode and sensor arranged opposite to each other to capture 'a partial vein image in the finger.'" Pet. 21–22; Ex. 1007, 9:62–10:4 (cited by Petitioner). According to Petitioner and Dr. Anthony, "one or more transparent regions arranged facing the finger" would be needed "in order to allow light to pass and to capture a vein image of the finger." Pet. 22; Ex. 1002 ¶ 154. Patent Owner argues that Schröder's "plastic embodiment would need no window." Prelim. Resp. 28. At this stage of the proceeding, however, Patent Owner does not dispute Petitioner's assertion that an internal housing component made of metal would need to have a transparent region in order to capture a vein image. Pet. 22; Ex. 1002 ¶ 154.

Dr. Mercier's deposition testimony

17 Q. Okay. But one of skill in the art would have
18 understood that, in order for an IR light to be transmitted
19 from the inside of a structure to the outside of a
20 structure, there needs to be some sort of IR transmissive
21 window or other IR transmissive material that allows that
22 to happen, right? That's how that would function, right?
23 A. Yeah. I mean, that's correct. And as I stated in
24 my disclosure, you know, I do, in paragraph 92, discuss how
25 Schroder doesn't actually disclose windows on the inside of

Page 197

1 the ring or that the materials that compose the inside of
2 the ring are transparent to all light.
3 I'll concede that it would be pointless to say
4 that you would use infrared diodes and sensors to image
5 something if you can't get the light into the thing you're
6 trying to image. But, again, my position is that, even if
7 it were so, there's no disclosure about being transmissive
8 to other forms of light in Schroder.

Dr. Mercier agrees that Schröder's interior-side housing would require an IR window

Demonstrative Exhibit Not Evidence

DI at 21; Ex-1082, 196:17-197:8

Schröder-Yuen also teaches a substantially transparent material, including in the visible wavelength, on the external housing component

034

Yuen's transparent window

55 The biometric monitoring device, in one embodiment, includes a window (for example, a visually opaque window) in the housing to facilitate optical transmission between the optical sensors and the user. Here, the window may permit light (for example, a substantial portion of a selected wave-
60 length) to be emitted by, for example, one or more LEDs, onto the skin of the user and a response or reflection to pass into the housing to be sampled, measured and/or detected by, for example, one or more photodiodes. In one embodiment, the circuitry related to emitting and receiving light may be dis-
65 posed in the interior of the device housing and underneath a plastic or glass layer (for example, painted with infrared ink) or an infrared lens which permits infrared light to pass but not

Dr. Anthony's declaration

106. U.S. Patent No. 8,954,135 to Yuen (Ex-1006) is another example of a moldable filler material or "potting material" used to seal the electronic components inside a wearable device. For example, Yuen describes that its biometric monitoring device "may be filled with gel that allows the sensor to experience pressure changes outside of the gel. The use of a gel filled altimeter may give the device a higher level of environmental protection with or without the use of an environmentally sealed vent. The device may have a higher survivability rate with a gel filled altimeter in locations including but not limited to those that have high humidity, a clothes washer, a dish washer, a clothes dryer, a steam room, the shower, a pool, and any location where the device may be exposed to moisture, exposed to liquid or submerged in liquid." Ex-1006, 20:65-21:8.

Demonstrative Exhibit Not Evidence

034Petition (Paper 3) at 35-38; Ex-1006 at 10:55-58; Ex-1002 ¶106

PO does not dispute LeBoeuf grounds

034 IPR Grounds

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–5, 11, 12, 16–18	103	Schröder[2]
1–5, 11–13, 16–18	103	Schröder, Yuen[3]
1, 2, 11, 12, 16–18	103	LeBoeuf[4]
4, 5	103	LeBoeuf, Wissmar[5]

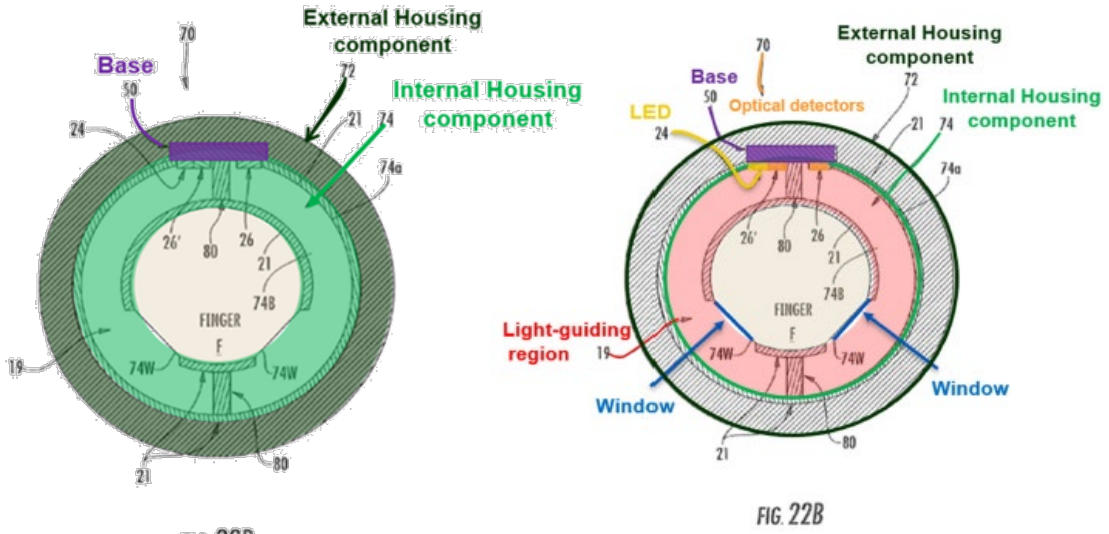
NOT DISPUTED

Demonstrative Exhibit Not Evidence

034POR (Paper 15); 034POSR (Paper 23)

PO does not dispute any of Petitioner's LeBoeuf mappings for the 034

LeBoeuf teaches a wearable computing device with interior and exterior housing (1) enclosing a PCB with a component and (2) defining a window for data acquisition, as claimed by the 034.



LeBoeuf's interior and exterior walls

etc. For example, FIGS. **22A-22B** illustrate a monitoring device **70** that is configured to fit over a finger F, for example, as a finger ring, according to some embodiments of the present invention. The illustrated monitoring device **70** includes a generally circular band capable of encircling a finger F of a subject, with a cylindrical outer body portion **72** and a generally cylindrical inner body portion **74** secured together in concentric relationship. The outer body portion may be formed from virtually any type of material and may have an ornamental configuration. In some embodiments, the

LeBoeuf's PCB

have an ornamental configuration. In some embodiments, the outer body portion **72** may include a flex circuit containing various electronic components, such as a microprocessor, D/A converter, power source, power regulator, and the like.

DI preliminarily agreed with all Petitioner's arguments on Lebouf

034Petition (Paper 3) at 39, 55; Ex-1012, 27:61-28:1, 28:3-8, 28:18-19, 28:30-47, 28:60-62, 29:5-9, 33:1-2, Figs. 22A-B, Cl. 1

LeBoeuf teaches exterior housing comprising transparent potting

034

304 Patent's transparent potting material

In the examples shown in FIG. **4**, the U-shape of the ring housing **412** allows for the flexible PCB **415** to be inserted into the edge of the WCD **410**. The windows (e.g., windows **120**, **130**) on the walls of the WCD **410** can align with the operating circuitry to allow, for example, battery charging, Bluetooth connection, and user feedback LED/micro display on the outer wall, and biological feedback sensors (e.g., pulse oximetry, temperature sensor) on the inner wall. In one or more embodiments, the WCD **410** can be completely sealed using potting epoxy. The sealing epoxy can be transparent to allow light to pass through for the CPVs and sensors. In some embodiments, the WCD **410** can be potted with two different compounds. In these embodiments, the body of the WCD **410** can be filled with clear material, and the edge of the WCD **410** can be filled with an opaque material so that different colors can be incorporated (e.g., as a decorative element). It is noted that sealing the assembly

...

of a polymer, such as plastic. The external potting **1214** can be formed of any material, solid or gelatinous, that can provide resistance to shock and/or vibration and can prevent moisture and/or debris from entering the housing **1210** of the WCD **1200**, such as silicone, epoxy, polyester resin or any other polymer.

LeBoeuf's polymer cladding material

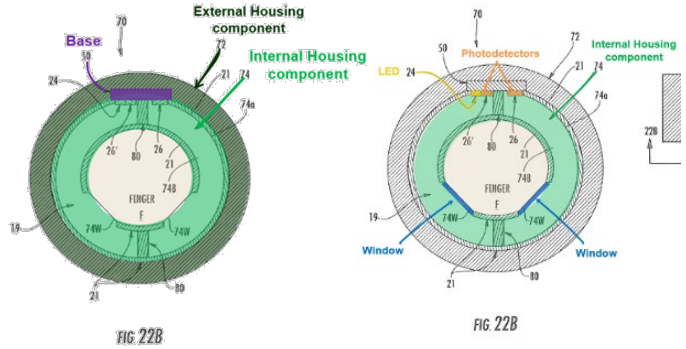
41. The earbud of claim **40**, wherein the cladding material comprises a reflective material, a polymer material, or air.

LeBoeuf's transparent potting housing

some embodiments. In other embodiments, the cladding material may be optically transparent or mostly transparent with a lower index of refraction than the light transmissive material of the cover **18**. The cladding **21** may be a layer of material applied to one or more portions of the inner and/or outer surfaces **18***a*, **18***b* of the light guide **18**. In some embodi-

...

A layer of cladding material **21** is applied to (or near) the outer surface **74***a* of the inner body portion **74** and a layer of cladding material **21** is applied to (or near) the inner surface **74***b* of the inner body portion **74**, as illustrated, to define a light-guiding region **19**. As such, the inner body portion **74** serves as a light guide that delivers light from the optical emitter **24** to the finger F of a subject at one or more predetermined locations and that collects light from the finger F and delivers the collected light to the optical detectors **26**, **26'**. In some embodiments, the cladding material **21** may be embedded within the inner body portion **74** adjacent to the outer surface **74***a* and inner surface **74***b*. In some embodiments, the outer body portion **72** may serve as a cladding layer adjacent to the inner body portion outer surface **74***a*.



Demonstrative Exhibit Not Evidence

034Petition (Paper 3) at 48-50; Ex-1001, 16:13-15, 17:17-22; Ex-1012, 14:58-67, 28:18-39, 33:1-2, Fig. 22B (annotated)

78

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0079

Sealing

034 Patent

11. A wearable computing device, comprising:

an internal housing portion defining a first enclosing structure, the internal housing portion configured to be disposed near a finger of a user;

a flexible printed circuit board arranged around a portion of a circumference of an interior surface of the internal housing;

at least one component disposed on the flexible printed circuit board; and

an external housing portion defining a second enclosing structure, the external housing portion configured to seal the at least one component and the printed circuit board in an internal space defined by the interior surface of the internal housing.

16. A wearable computing device, comprising:

an external housing portion defining a first enclosing structure;

a flexible printed circuit board arranged around a portion of a circumference of an interior surface of the external housing;

at least one component disposed on the flexible printed circuit board; and

an internal housing portion defining a second enclosing structure, the internal housing portion configured to seal the at least one component and the printed circuit board in an internal space defined by the interior surface of the external housing.

Demonstrative Exhibit Not Evidence

Ex-1001 at Cls. 11, 16; 034Petition (Paper 3) at 28-30, 46-47

Schröder teaches sealing components and PCB in internal space between external/internal housing

034 Patent

WCD **110** and are not shown for simplicity. As used herein, the term "components" is considered to generally include any of the modules depicted and/or described in FIG. **2**, as well as any other modules described herein.

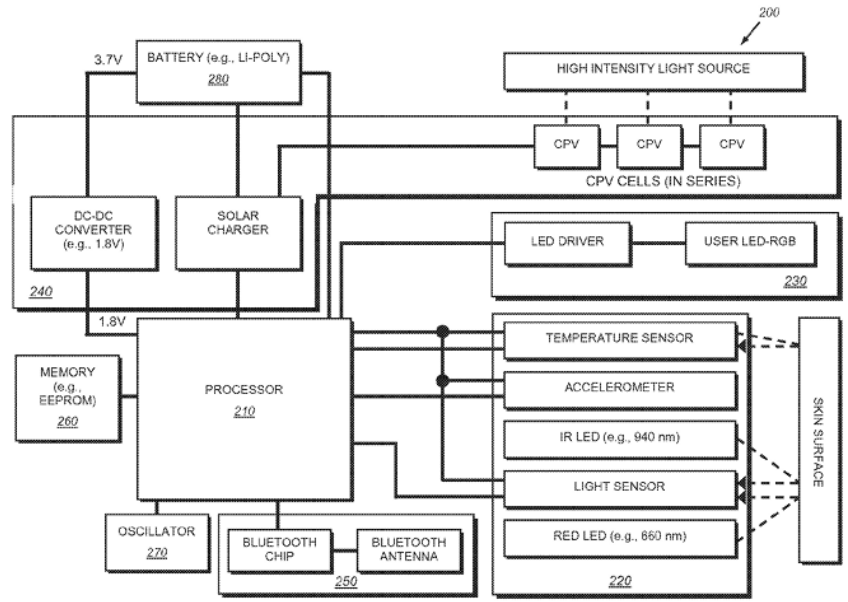


FIG. 2

Schröder

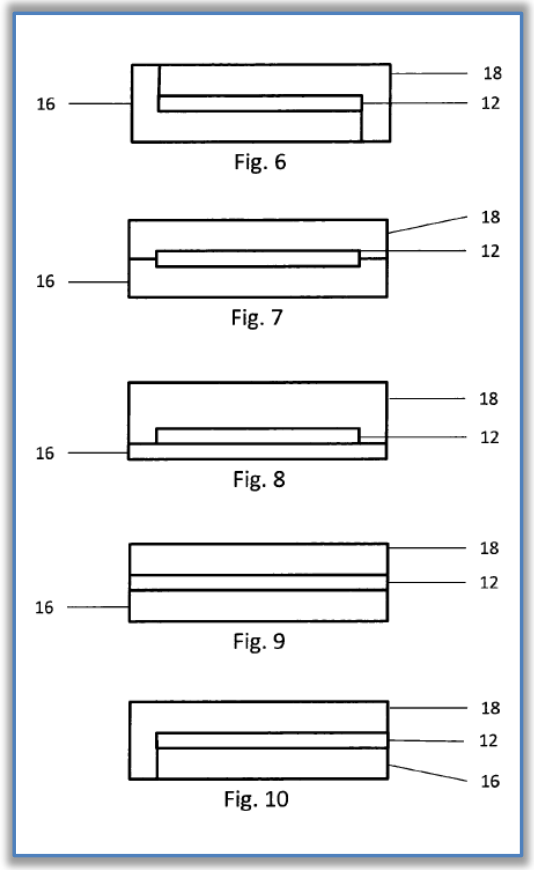
In the finger-ring **2** as an external secure unit **2** there can be arranged at least one inlay **12**. The inlay **12** can have at least one chip module **10** with at least one antenna coil **8**, with at least one further electronic device, e.g. a display, optionally being arranged on the inlay **12**.

Schröder's chip module and "further electronic device" are example "components"

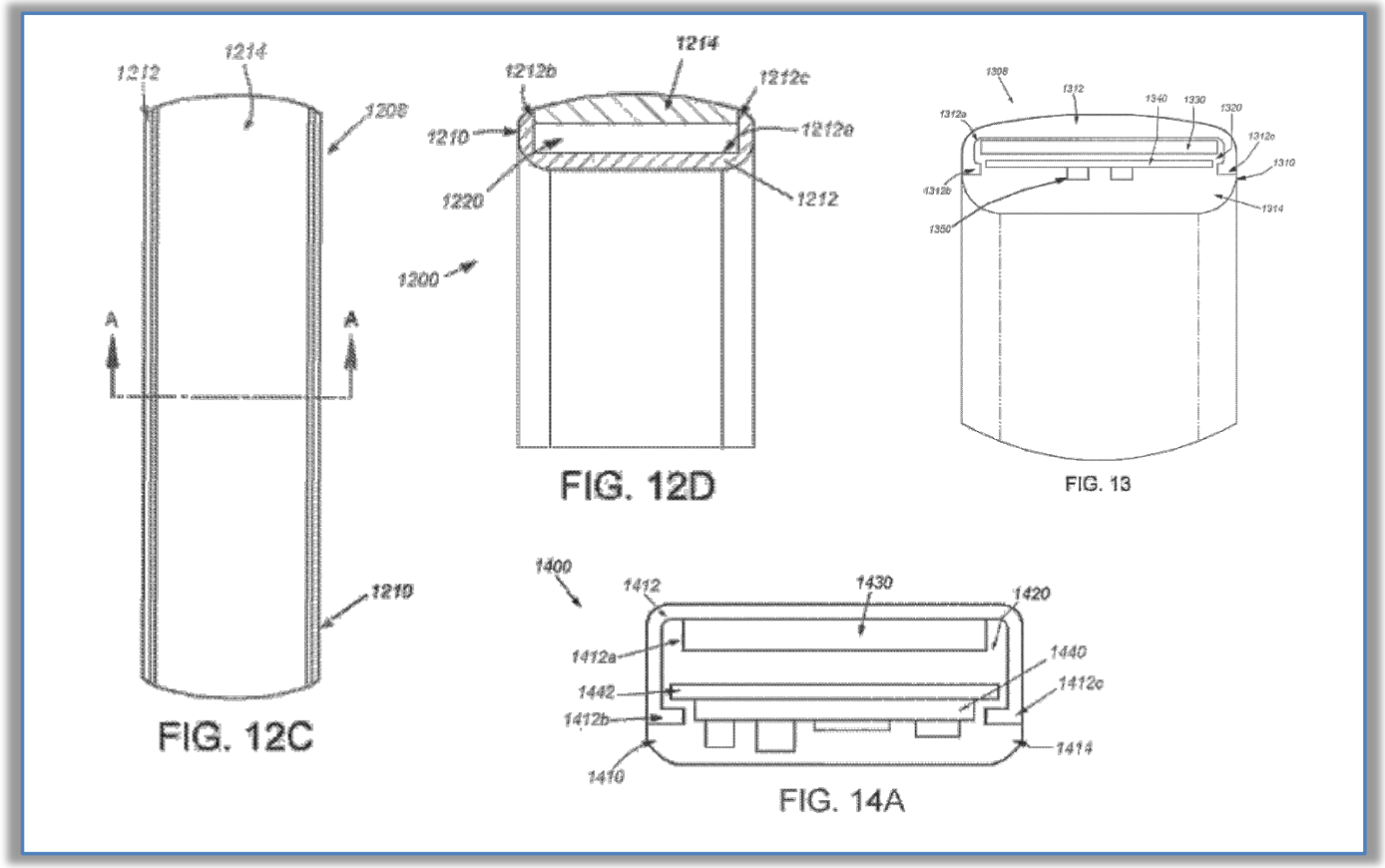
034Reply (Paper 19) at 16-17; Ex-1001 at 10:15-17, Fig. 2; Ex-1007 at 12:62-65

Demonstrative Exhibit Not Evidence

Schröder teaches the same sealed space between housing as the challenged patents



Schröder's "Construction variants"



Cross-sections of challenged patents

034Reply (Paper 19) at 16; Ex-1007, Figs. 6-10; Ex-1001 Figs 12C, 12D, 13, 14A

Yuen teaches sealing electronic components and PCB in internal space

034

Yuen's watertight seal

In a preferred embodiment, one or more components of the optical sensor (which may, in one embodiment, located in a protrusion, and/or in another embodiment, may be disposed or placed flush to the surface of the device) are attached, fixed, included and/or secured to the portable biometric monitoring device via a liquid-tight seal (i.e., a method/mechanism that prevents liquid ingress into the body of the biometric monitoring device). For example, in one embodiment, a device back made out of a metal including but not limited to stainless steel, aluminum, magnesium, or titanium or a rigid plastic could provide a structure which is stiff enough to maintain the structural integrity of the device while accommodating a watertight seal for the sensor package. (See, FIGS. **3-7**).

In a preferred embodiment, a package or module of the optical sensor would be connected to the device with a pressure sensitive adhesive and a liquid gasket. (See, FIG. **7**). Screws, rivets or the like may also be used, for example, if a stronger or more durable connection is required between the optical sensor package/module and the device body. Notably, the present inventions may also use watertight glues, hydrophobic membranes such as Gore-Tex, O-rings, sealant, grease, or epoxy to secure or attach the optical sensor package/module and the device body.

034Petition (Paper 3) at 29-30; Ex-1006 at 14:66-15:4, 15:10-14

Demonstrative Exhibit Not Evidence

83

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Sealed cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0084

Motivations

- Schröder-Niwa (178)
- Schröder-Mestas (178, 702)
- Schröder-Yuen (178, 034)
- Schröder-LeBoeuf, LeBoeuf-Schröder (702)
- Schröder-LeBoeuf-Niwa, LeBoeuf-Schröder-Niwa (702)
- Niwa-Schröder/Niwa-Schröder-Mestas (178)
- Niwa-Mestas (178)
- Niwa-Yuen (178)
- Niwa-Schröder-Yuen (178)
- LeBoeuf-Schröder-Mestas (702)
- LeBoeuf-Wissmar (034)

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0085

Motivations

- Schröder-Niwa (178)
- Schröder-Mestas (178, 702)
- Schröder-Yuen (178, 034)
- Schröder-LeBoeuf, LeBoeuf-Schröder (702)
- Schröder-LeBoeuf-Niwa, LeBoeuf-Schröder-Niwa (702)
- Niwa-Schröder/Niwa-Schröder-Mestas (178)
- Niwa-Mestas (178)
- Niwa-Yuen (178)
- Niwa-Schröder-Yuen (178)
- LeBoeuf-Schröder-Mestas (702)
- LeBoeuf-Winslow (034)

NOT DISPUTED

NOT DISPUTED

Demonstrative Exhibit Not Evidence

Petitioner Samsung Ex-1339, 0086

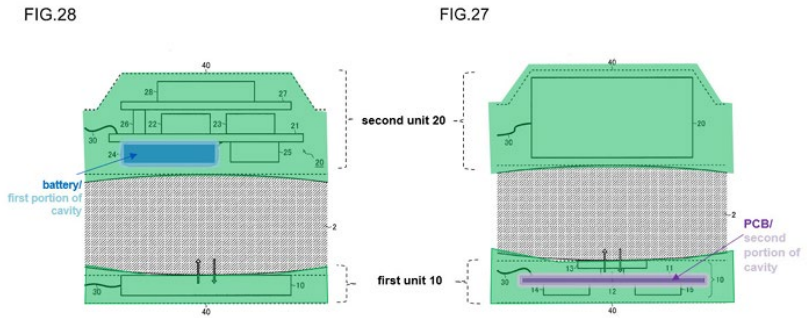
A POSITA would have been motivated to combine Schröder with Niwa

Schröder and Niwa are analogous art

Both relate to wearable biometric sensing devices with similar structures (inner/outer housing components, cavity, battery, PCB).

Niwa discloses motivations to improve component configuration and sensor functionality

Niwa's benefits



[0032] Moreover, to accomplish the aforementioned purpose, the plethysmogram sensor disclosed in this specification includes multiple light emitting portions provided at different places, at least a single light receiving portion to detect each intensity of lights emitted from each of the multiple light emitting portions and penetrates the living body of a measured person, and a processing unit to acquire data of the plethysmogram for the measured person based on a measured value provided from the light receiving portion (i.e., the construction **3-1**).

178Petition (Paper 3) at 32-35; Ex-1005 at Figs. 27-28, ¶32

Demonstrative Exhibit Not Evidence

A POSITA would have been motivated to combine Niwa with Schröder

Schröder and Niwa are analogous art

Both relate to wearable biometric sensing devices with similar structures (inner/outer housing components, cavity, battery, PCB).

Schröder discloses an improved ring construction that allows for easier part replacement and improved cavity structure

Schröder's benefits

FIG. **4** shows a longitudinal section through a finger-ring **2**. Here, an inlay **12** is inserted into one half **18** of the finger-ring **2**. FIG. **5** shows a cross section, corresponding to FIG. **4**, of the finger-ring **2**. The finger-ring **2** consists of two ring halves **16** and **18**. The two ring halves **16** and **18** respectively have a recess into which the inlay **12** is inserted.

The finger-ring **2** consists in principle of at least one component **16**, **18** into which at least one inlay **12** is inserted, whereby one component can be a ring half **16**, **18**. The components **16** and **18** are manufactured by a suitable technology, e.g. casting, milling, embossing. An expedient material for the components **16**, **18** is plastic or metal. The components **16** and **18** are therefore simple, fast and inexpensive to manufacture. Further, the components can be simply adapted to different dimensions and accordingly manufactured. The components **16**, **18** of the finger-ring **2** are interconnected by a suitable technology, e.g. by plugging, gluing, screwing, crimping, etc. Advantageously, the components **16**, **18** are so connected that the connection between the components **16**, **18** can be undone again in order e.g. to insert a further inlay **12** or to exchange an inlay **12**, e.g. because it is defective. The inlay **12** is for this purpose inserted into at least one recess provided therefor within at least one component **14**, **16**. The inlay **12** itself consists of a preferably flexible carrier material, e.g. PET, Kapton, etc.

178Petition (Paper 3) at 74-76; Ex-1007 at 12:15-17

Demonstrative Exhibit Not Evidence

A POSITA would have been motivated to combine Schröder with Mestas

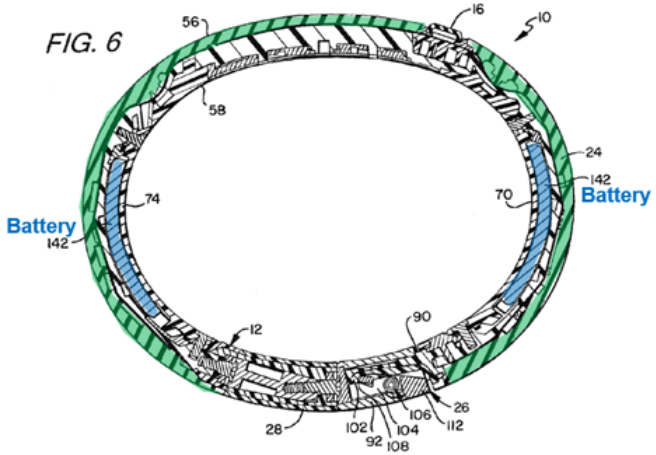
178, 702

Schröder and Mestas are analogous art

Both relate to wearable biometric sensing devices with similar structures (inner/outer surfaces, cavity, battery, PCB).

Mestas discloses a motivation to overlap portions of a cavity and to use a curved battery

Dr. Anthony's Declaration



[0168] As discussed, the controller **14** includes the power supply **142** in the form of batteries **142**. It is understood that a single battery **142** could be utilized in the design. Such a design may allow for a flexible circuit member having additional areas to support additional components associated with the device **10**. In an exemplary embodiment, however, the power supply **142** utilizes a pair of batteries **142**. As can be appreciated from FIGS. **6** and **20**, the batteries **142** have a curvilinear or curved configuration and are generally rigid members. The batteries **142** define curved planar surfaces. In

178Petition (Paper 3) at 49-50; 702Petition (Paper 3) at 58-60; Ex-1010 at Fig. 6, ¶168

Demonstrative Exhibit Not Evidence

A POSITA would have been motivated to combine Schröder with Yuen

178, 034

Yuen's liquid-tight seal

In a preferred embodiment, one or more components of the optical sensor (which may, in one embodiment, located in a protrusion, and/or in another embodiment, may be disposed or placed flush to the surface of the device) are attached, fixed, included and/or secured to the portable biometric monitoring device via a liquid-tight seal (i.e., a method/mechanism that prevents liquid ingress into the body of the biometric monitoring device). For example, in one embodiment, a device back made out of a metal including but not limited to stainless steel, aluminum, magnesium, or titanium or a rigid plastic could provide a structure which is stiff enough to maintain the structural integrity of the device while accommodating a watertight seal for the sensor package. (See, FIGS. **3-7**).

Dr. Anthony's Declaration

161. Second, a POSITA would have understood that Yuen can improve Schröder's finger ring's durability by sealing the housing components together. Schröder's ring halves 16 and 18 "are interconnected by a suitable technology, e.g., by plugging, gluing, screwing, crimping, etc." Ex-1007, 12:20-23. Yuen's metal biometric monitoring device has a "watertight seal" made using "watertight glues, hydrophobic membranes such as Gore-Tex, O-rings, sealant, grease, or epoxy to secure or attach the optical sensor package/module and the device body." Ex-1006, 14:66-15:4, 15:10-14. Based on Yuen's teachings, it would have been obvious to modify the seal of Schröder's ring halves that are interconnected to make the finger ring "watertight." A POSITA would have understood from Yuen that a watertight seal protects the interior components from water (e.g., rain) or sweat and allows the biometric monitoring device to continue acquiring the wearer's biometric data. *Id.* Thus, a POSITA would have been motivated to seal Schröder's finger ring with a watertight seal in order to make it stronger, more durable, and efficient during all of the user's daily activities. Thus, design and manufacturing incentives, consumer preferences, and market opportunities would have motivated a POSITA to apply the teachings of Yuen to Schröder.

Yuen discloses a motivation to seal Schröder's finger-ring with a watertight seal

178Petition (Paper 3) at 54-58; Ex-1006 at 14:59-66; Ex-1002 ¶161

Demonstrative Exhibit Not Evidence

A POSITA would have been motivated to combine Schröder with LeBoeuf

Schröder and LeBoeuf are analogous art

Both relate to electronic wearable devices with similar structures (inner/outer surfaces, cavity, battery, PCB, sensors, LEDs).

LeBoeuf discloses a motivation to use windows to deliver light through an inner body portion

LeBoeuf's windows

In the illustrated embodiment, windows **74***w* are formed in the cladding material **21** and serve as light-guiding interfaces to the finger F. There may be any number of these windows, as may be required for sufficient optical coupling, and the windows **74***w* may include lenses such as those described above (e.g., lens **18**L illustrated in FIG. **6**), to focus light emitted by the optical emitter **24** onto one or more portions of a finger F and/or to focus collected light on the light detectors **26**, **26'**. Similarly, the windows **74***w* may include optical filters to selectively pass one or more optical wavelengths and reflect and/or absorb other optical wavelengths.

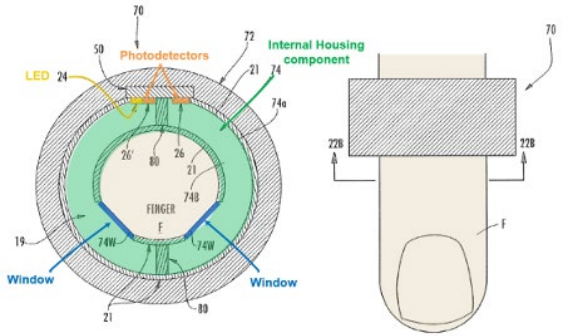


FIG. 22B FIG. 22A

702Petition (Paper 3) at 35-36; Ex-1012 at 28:40-50, Figs. 22A-B (annotated)

Demonstrative Exhibit Not Evidence

A POSITA would have been motivated to combine Schröder with LeBoeuf

Schröder and LeBeouf are analogous art

Both relate to electronic wearable devices with similar structures (inner/outer surfaces, cavity, battery, PCB, sensors, LEDs).

Schröder discloses a motivation to use injection molding to cover electronic components and cavity to form a ring-shaped body and flexible PCB

Schröder's manufacturing method and flexible PCB

The finger-ring **2** consists in principle of at least one component **16**, **18** into which at least one inlay **12** is inserted, whereby one component can be a ring half **16**, **18**. The components **16** and **18** are manufactured by a suitable technology, e.g. casting, milling, embossing. An expedient material for the components **16**, **18** is plastic or metal. The components **16** and **18** are therefore simple, fast and inexpensive to manufacture. Further, the components can be simply adapted to different dimensions and accordingly manufactured. The components **16**, **18** of the finger-ring **2** are interconnected by a suitable technology, e.g. by plugging, gluing, screwing, crimping, etc. Advantageously, the components **16**, **18** are so connected that the connection between the components **16**, **18** can be undone again in order e.g. to insert a further inlay **12** or to exchange an inlay **12**, e.g. because it is defective. The inlay **12** is for this purpose inserted into at least one recess provided therefor within at least one component **14**, **16**. The inlay **12** itself consists of a preferably flexible carrier material, e.g. PET, Kapton, etc.

Demonstrative Exhibit Not Evidence

702Petition (Paper 3) at 63-66; Ex-1007 at 12:15-29

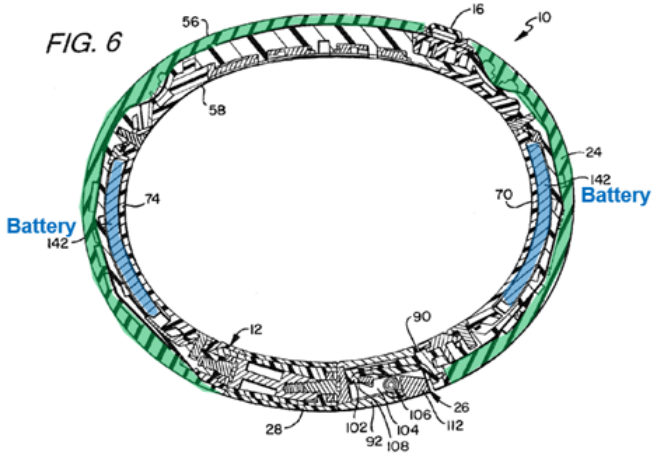
A POSITA would have been motivated to combine Niwa with Mestas

Niwa and Mestas are analogous art

Both relate to wearable electronic devices that collect health-related information.

Mestas discloses a motivation to use a curved battery to conform to a circular and more compact structure.

Mestas's curved battery



[0168] As discussed, the controller **14** includes the power supply **142** in the form of batteries **142**. It is understood that a single battery **142** could be utilized in the design. Such a design may allow for a flexible circuit member having additional areas to support additional components associated with the device **10**. In an exemplary embodiment, however, the power supply **142** utilizes a pair of batteries **142**. As can be appreciated from FIGS. **6** and **20**, the batteries **142** have a curvilinear or curved configuration and are generally rigid members. The batteries **142** define curved planar surfaces. In

178Petition (Paper 3) at 94-97; Ex-1010 at Fig. 6 (annotated), ¶168

Demonstrative Exhibit Not Evidence

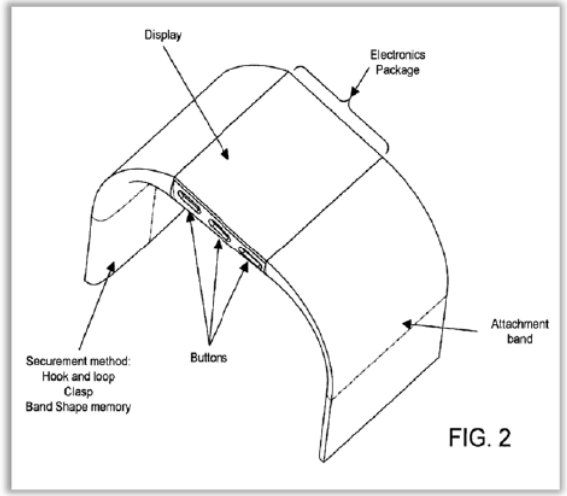
PO argues no motivation because of size disparity between Mestas and Yuen's components and the other references

PO's Response (Mestas)

Given all of the development in finger ring wearables up to the '178 patent had used "coin" type batteries, the ordinary person would look to that type of battery. *Id.*, ¶161. Mestas is further evidence of this. While Mestas does use curved batteries, it gives an exhaustive list of body locations where its device could be located. The finger is not mentioned, and all of the locations would be wrist-sized or greater. Ex-1010, ¶143 ("the wearable athletic device may be worn in a variety of locations on a user's body including on a user's chest (e.g., a chest strap), around a user's wrist, around a user's arm, on a user's head, on a user's ankle or thigh, and the like.").

PO's Response (Yuen)

As stated above with respect to Mestas, the form factor of Yuen does not translate to the finger ring of Schröder, and a POSITA would not look to combine the two with any reasonable expectation of success. Ex-2018, ¶170. Not only is Yuen's form factor 5-10 times too large, its electronics are not even formed in a "ring" shape. Rather, Yuen's "electronics package" is flat and planar:



178POR (Paper 19) at 66, 72

Demonstrative Exhibit Not Evidence

All references relate to small form factor electronic devices

- Schröder
  - "finger-ring is worn by a user, e.g., permanently on the finger"
- Niwa
  - "Plethysmogram Sensor (Finger Ring Type)"
- Mestas
  - "wearable athletic device ... worn in a variety of locations on a user's body including on a user's chest..., around a user's wrist, around a user's arm, on a user's head, on a user's ankle or thigh, and the like"
  - "may be varied in circumferential size"
- Yuen
  - "portable biometric monitoring device which may be secured to the user through the use of a band"
  - "The biometric monitoring device of the present inventions may also be integrated and worn in a necklace, chest band, bra, patch, glasses, earring, or toe band. The device ... can be worn in any number of ways including, but not limited to, those listed above."
- LeBoeuf
  - "a monitoring device includes a circular band capable of encircling a finger of a subject"
- Wissmar
  - "finger ring ... acting as a multiple sensor device"

Demonstrative Exhibit Not Evidence

Ex-1007, 3:61-63; Ex-1005 ¶¶29, 190, 192, Fig. 26; Ex-1010 ¶¶143, 162; Ex-1006, 2:7-9, 24:35-41; Ex-1012, 5:44-46; Ex-1013 ¶1

PO's expert acknowledges general trend to miniaturize electronic components

178/702/034

PO's Expert Dr. Mercier:

Q. Okay. But you would agree that there was kind of a general pressure in the industry around 2013 to attempt to miniaturize batteries, correct?

A. I do....

PO's Expert Dr. Mercier:

Q. And you would agree that between 2003 and 2017 when this paper was published, the components that Professor Asada was working with got substantially smaller than they were in 2003, right?

A. I'm not certain if the exact components did. In general, electronic miniaturization happened between 2003 and 2017. Yes.

Demonstrative Exhibit Not Evidence

Ex-1081 at 148:24-149:16; Ex-1082 at 236:14-20

PO argues that Schröder relates to security and so would find no motivation to look at the other references

178/702/034

PO's Response (Niwa):

829 F.3d at 1380. Petitioner's suggestion that one would apply Niwa's multiple wavelength teachings to Schröder has no support, and Dr. Mercier confirms that a POSITA would have no use for a PPG sensor to achieve Schröder's "sole goal" to use infrared to detect vein patterns for security verification. Ex-2018, ¶131.

...

The '178 patent discloses using different wavelengths for sensing vascular information, such as heart rate, about the wearer. Ex-1001, 11:13-16 ("As shown in the example of FIG. **3B,** the sensor modules **220** can include a temperature sensor **320a,** a red light emitting diode (LED) **320b,** a light sensor **320c,** and an infra-red LED **320d.**"). Niwa also uses multiple LEDs and wavelengths to increase the accuracy of its sensor, as shown in Figure 3.

Schröder, however, is not directed to photoplethysmography and has no use for these detection methods. Ex-2018, ¶145. Schröder discloses infrared imaging to take an image of a vein pattern and compare it to a stored pattern to verify the identity of the wearer of the ring. Ex-1007, 10:1-9. Despite the drastically different applications, Dr. Anthony thinly speculates:

PO's Response (Mestas):

As Dr. Mercier points out, the power requirements of Schröder and Mestas would also be different, given that Mestas is constantly monitoring health conditions and Schröder only takes vein pattern images in a security validation event. Ex-2018, ¶159. Given the typically low power requirements of Schröder's intended RFID and

PO's Response (Yuen):

Yuen is directed to continuous monitoring and Schröder is directed to discrete RFID or NFC security validation. *Id.*, ¶173.

Demonstrative Exhibit Not Evidence

178POR (Paper 19) at 55, 61-62, 65, 74

The challenged patents include biometric monitoring *and* security applications

178/702/034

***See, e.g.*, 178 Patent**

FIG. **47**B depicts a block process diagram for generating and managing alerts according to one or more aspects of the disclosure and FIG. **47**C is a flow chart depicting a method for generating and managing alerts according to one or more aspects of the disclosure.

At block **4710**C, and as shown at process block **4710**B, the user is authenticated with respect to the WCD. In this regard, a single user can be associated with a single WCD and can be associated with a predetermine identifier, such as an alphanumeric number. If the user is not authenticated or the authentication process is not conclusive, the WCD may invite the user to retry authentication at block **4715**C until the user is successfully authenticated. In some examples, the WCD may timeout the authentication process, lock the WCD, or place the WCD in safe mode in the event of too many unsuccessful authentication attempts as a security measure.

The user can be authenticated according to any of the authentication methods described in the present application, such as via a unique capillary map, a unique ECG profile, etc.

If the user is authenticated, biometric data can be transmitted to the server at block **4720**C. The captured biometric data **4720**B can be transmitted to the server via network **4720**A, **47222**B

Ex-1001 at 40:22-41

Demonstrative Exhibit Not Evidence

Similar subject matter (sensors) in all references

178/702/034

- Schröder
  - "finger-ring ... can have integrated therein at least one biometric sensor"
  - "infrared diode and the infrared sensor" capture "vein image of the ring finger"
- Niwa
  - "Plethysmogram Sensor (Finger Ring Type) ... "acquire[s] data of the plethysmogram for the measured person based on a measured value provided from the light receiving portion"
- Mestas
  - "sensor assembly 146 may comprise a plurality of different sensors"
  - "When worn by the user, the device 10 can track activity of the user... including sensing of activity by a user"
- Yuen
  - "a biometric monitoring device ... to collect ... physiological and/or environmental data from embedded or resident sensors"
- LeBoeuf
  - "sensor modules that includes one or more sensors for sensing physiological information and environmental information, Such as noise, for example"
  - device "may function as a physiological monitor as well as an environmental monitor. "
- Wissmar
  - "finger ring ... acting as a multiple sensor device"

Ex-1007, 9:57-58, 10:1-5; Ex-1005 ¶¶29, 32; Ex-1010¶¶ 167, 274; Ex-1006, 1:18-23; Ex-1012, 2:15-17, 4:15-20; Ex-1013 ¶1

Petitioner Samsung Ex-1339, 0099

Overview

- Alleged invention
- Overview of the prior art
- Internal and external housing components (034, 178, 702)
- Flexible PCB (034, 178, 702)
- Battery limitations (034, 178, 702)
- Sensors electrically coupled with PCB and battery (178, 702)
- Substantially transparent potting (034, 702)
- Waterproof cavity (034)
- Motivations
- Secondary indicia of non-obviousness (178, 702)

Demonstrative Exhibit Not Evidence

Objective Indicia

- Oura is not entitled to a presumption of nexus
- Oura did not prove actual nexus
- No commercial success
- No copying
- No long-felt but unmet need

Demonstrative Exhibit Not Evidence

PO's evidence is not due presumption of nexus

178, 702

"presuming nexus is appropriate '**when the patentee shows that the asserted objective evidence is tied to a specific product and that product "embodies the claimed features, and is coextensive with them**.'" ... Conversely, '[w]hen the thing that is commercially successful is not coextensive with the patented invention—for example, **if the patented invention is only a component of a commercially successful machine or process,' the patentee is not entitled to a presumption of nexus**."

Fox Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1373 (Fed. Cir. 2019)

PO is not entitled to a presumption of nexus:
PO has not shown that the product is coextensive with the claims

Demonstrative Exhibit Not Evidence

178Reply (Paper 31) at 18; 702Reply (Paper 29) at 17

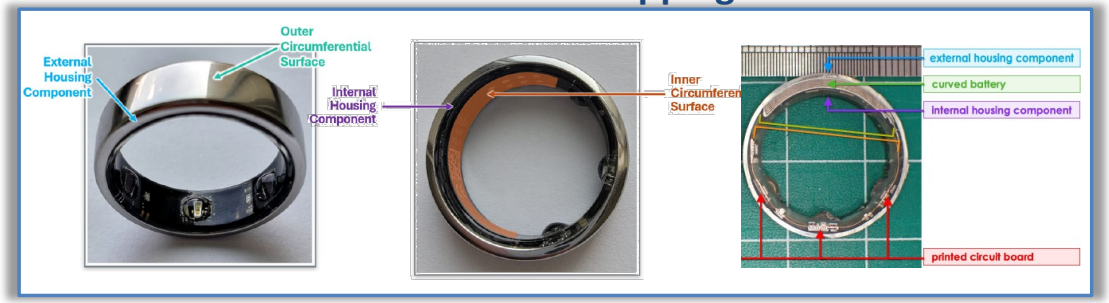
PO argues nexus for only certain product and only some claims

178, 702

PO's Response

Since the introduction of the first generation ("Gen."), Oura has released four generations of Oura Ring: Gen. 2 in 2018, Gen. 3 in 2021, and Gen. 4 in 2024. As explained by Dr. Mercier, Oura Ring Gen. 3 and Gen. 4 are coextensive commercial embodiments of the '178 patent. Ex-2018, ¶¶204-241. Thus, Oura "is entitled to a rebuttal presumption of nexus between the asserted evidence of secondary considerations and a patent claim[.]" *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (citation omitted).

PO's Gen. 3 Mapping



PO's Gen. 4 Mapping



PO asserts that Gen. 3 and 4 are *coextensive* with the claims by merely arguing that Gens. 3 and 4 *practice* a subset of claims

Demonstrative Exhibit Not Evidence

178POR (Paper 19) at 88-97; 702POR (Paper 18) at 60-78

PO itself identifies significant unclaimed features of its rings



"It is undisputed that the X-Sync chainrings include unclaimed features that the patentee describes as "critical" to the product's ability to "better retain the chain under many conditions" and that go to the "heart" of another one of SRMA's patents. See J.A. 5284, 5289. In light of the patentee's own assertions about the significance of the unclaimed features, no reasonable fact finder could conclude that these features are insignificant. As an initial matter, the fact that SRAM obtained the '250 patent covering the combination of wide and narrow teeth and >80% gap filling leads us to conclude that this combination of features amounts to more than an insignificant feature not claimed by the '027 patent."

Fox Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1375 (Fed. Cir. 2019)

"A patent claim is not coextensive with a product that includes a "critical" unclaimed feature that is claimed by a different patent and that materially impacts the product's functionality by 'lead[ing] to a chainring that will retain a chain in even the worst conditions.'"

Fox Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1375(Fed. Cir. 2019)

Demonstrative Exhibit Not Evidence

178Reply (Paper 31) at 19; 702Reply (Paper 29) at 17-18

PO's expert identifies significant unclaimed features: membership and apps

178, 702

Mr. Clarke's Testimony

illness detection and period prediction, among others (EX-2051). Oura introduced the Oura Membership in 2021 in conjunction with the launch of the Oura Ring Gen 3 (EX-2024, at 95; EX-2067). The Oura Ring and Oura Membership work "hand-in-hand," such that a user's experience improves over time as the Oura Ring gathers more data, enabling Oura to generate more nuanced insights into the user (EX-2051). The Oura Ring and Oura application collectively form a "complete solution," and the Oura application is "essential" for a user to take advantage of the ring's offerings; without the application and Membership, a user has limited access to the data tracked by the Oura Ring (EX-2024, at 88, 93-95).

PO's expert explains that Oura Application and Membership are "essential"

178Reply (Paper 31) at 18-19; Ex-2019 ¶21

Demonstrative Exhibit Not Evidence

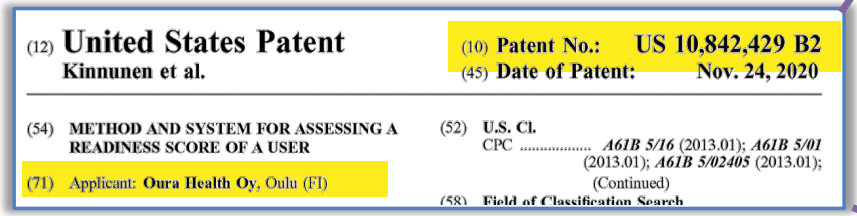
Significant, "essential" features are claimed by other Oura Patents

178, 702

Mr. Clarke's Testimony

The Oura Ring works in conjunction with the Oura application, available for both Apple and Android mobile devices, enabling users to review measured data and gain insights into their health and wellness (EX-2064; EX-2065). All Oura Ring users have access to three daily scores—Sleep, Readiness, and Activity (EX-2051). However, access to more detailed performance metrics tracked by the Oura Ring requires an ongoing paid subscription with the Oura Membership (EX-2051; EX-2066).

PO's 429 Patent



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

(10) **Patent No.: US 10,842,429 B2**
(45) **Date of Patent: Nov. 24, 2020**

(54) **METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER**

(71) Applicant: **Oura Health Oy**, Oulu (FI)

(52) **U.S. Cl.**
CPC ***A61B 5/16*** (2013.01); ***A61B 5/01*** (2013.01); ***A61B 5/02405*** (2013.01);
(Continued)

(58) **Field of Classification Search**

1. A method for assessing readiness of a user, the method comprising:

obtaining the user's movements;

using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;

measuring at least one biosignal of the user during the rest period;

determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;

determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;

determining a body response summary based on the rest summary and the activity summary;

calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user; and

using a user interface of the mobile communication device to show elements contributing to the readiness score and instructions related to physical activity and mental activity for improving the readiness score.

Ex-2019 ¶20; 178Reply (Paper 31) at 18-19 (citing Ex-1086)

Demonstrative Exhibit Not Evidence

PO's expert identifies significant unclaimed features: materials, comfort, and aesthetics

178, 702

Mr. Clarke's Testimony

In October 2024, Oura launched the fourth-generation Oura Ring ("Oura Ring Gen 4"), "bringing battery life improvements, greater measurement accuracy, and an all-new circular titanium-based design" (EX-2058). In particular, the

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sensors," among others on its website (EX-2101). In comparing the Oura Ring Gen 4 with the Oura Ring Gen 3, Oura also explains that the latest generation "features a sleeker, fully titanium design and recessed sensors on the interior, enhancing both durability and wearability" (EX-2059). Similarly, third-party review site WIRED noted how the Oura Ring Gen 4 "[l]ooks and feels more like jewelry than ever" and is "easier and more accurate to wear" (EX-2060).

PO's expert's evidence rests on materials and other issues

178Reply (Paper 31) at 19; Ex-2019 ¶¶18, 49

Demonstrative Exhibit Not Evidence

Significant unclaimed features claimed by other patents

178, 702

Mr. Clarke's Testimony

In October 2024, Oura launched the fourth-generation Oura Ring ("Oura Ring Gen 4"), "bringing battery life improvements, greater measurement accuracy, and an all-new circular titanium-based design" (EX-2058). In particular, the

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PO's 147 Patent

(12) **United States Patent**
von Badinski et al.

(10) **Patent No.: US 11,599,147 B2**
(45) **Date of Patent: *Mar. 7, 2023**

(54) **WEARABLE COMPUTING DEVICE**

(71) Applicant: **Proxy, Inc.**, San Francisco, CA (US)

(72) Inventors: **Curt C. von Badinski**, San Francisco, CA (US); **Michael J. Strasser**, San

(58) **Field of Classification Search**
CPC G08B 1/142
See application file for complete search history.

(56) **References Cited**

1. A wearable electronic device comprising:
a body part made of a material, having an inner surface and an outer surface, wherein a cavity is formed on the inner surface of the body part, the cavity extending from the inner surface of the body part towards the outer surface of the body part and having a depth arranged within the inner surface of the body part,
an electronic part arranged in the cavity, wherein at least a portion of the electronic part has a thickness that is less than the depth of the cavity, and
a coating made of a potting material on the inner surface of the body part, covering the electronic part and the cavity.

2. The wearable electronic device according to claim **1**, wherein the material is a titanium material.

3. The wearable electronic device according to claim **1**, wherein the material is selected from a group consisting of: steel, platinum, gold, silver, aluminum, polymer, plastic, tungsten carbide and a metal alloy.

PO obtained the 147 Patent directed to titanium and other construction materials

Ex-2019 ¶¶18, 49; 178POR (Paper 19) at 19 (citing Ex-1087)

Demonstrative Exhibit Not Evidence

Significant unclaimed features

178, 702

Dr. Mercier's Testimony

Q. The claims don't recite an aesthetically pleasing ring, correct?

A. That's right. That language isn't in the claims,

Dr. Mercier's Testimony

Is there a certain level of comfort, user comfort, required by the claims of the '178 or '702 patents?

A. So the claims of the '178 and '702 patents don't recite comfort in the language of the claims, but, again, they need to be read in light of the specification in which comfort and wearability and so on are important objectives of the inventions.

And, you know, the specification and, subsequently, the claims, you know, offer solutions to design a ring that ultimately does enable a comfortable device to be worn.

Q. You would agree that the elements recited in claims, those are technical elements, right?

A. Correct.

Q. And so they don't have kind of subjective requirements of visually appealing or specifically comfortable to a particular user, correct?

A. Again, the language in the claims don't -- when read in light of the specification, you know, they do provide a recipe for designing something that would be comfortable.

Claims do not recite comfort or aesthetics

178Reply (Paper 31) at 19; Ex-1082, 215:3-5, 216:4-7, 15-21

Demonstrative Exhibit Not Evidence

PO has not proven nexus

178, 702



"To the contrary, the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the 'direct result of the unique characteristics of the claimed invention.'"

Fox Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1373-1374 (Fed. Cir. 2019)

PO cannot show actual nexus:
Alleged secondary evidence is not a "direct result" of the claims

178Reply (Paper 31) at 20; 702Reply (Paper 28) at 19

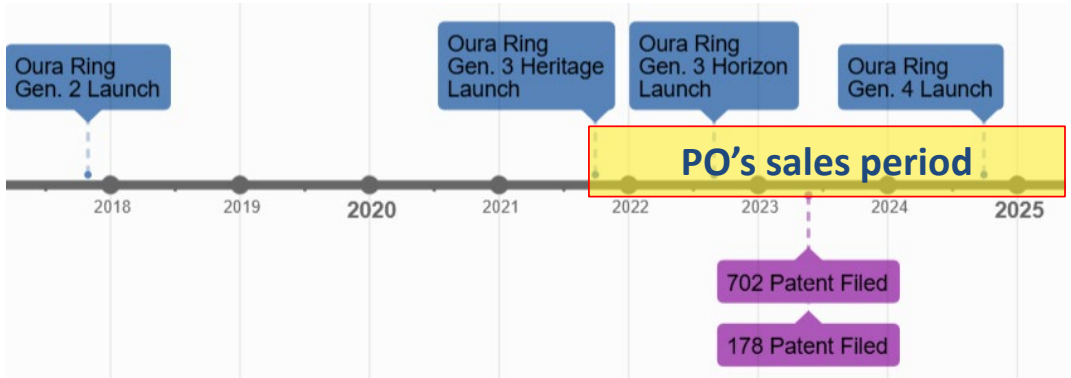
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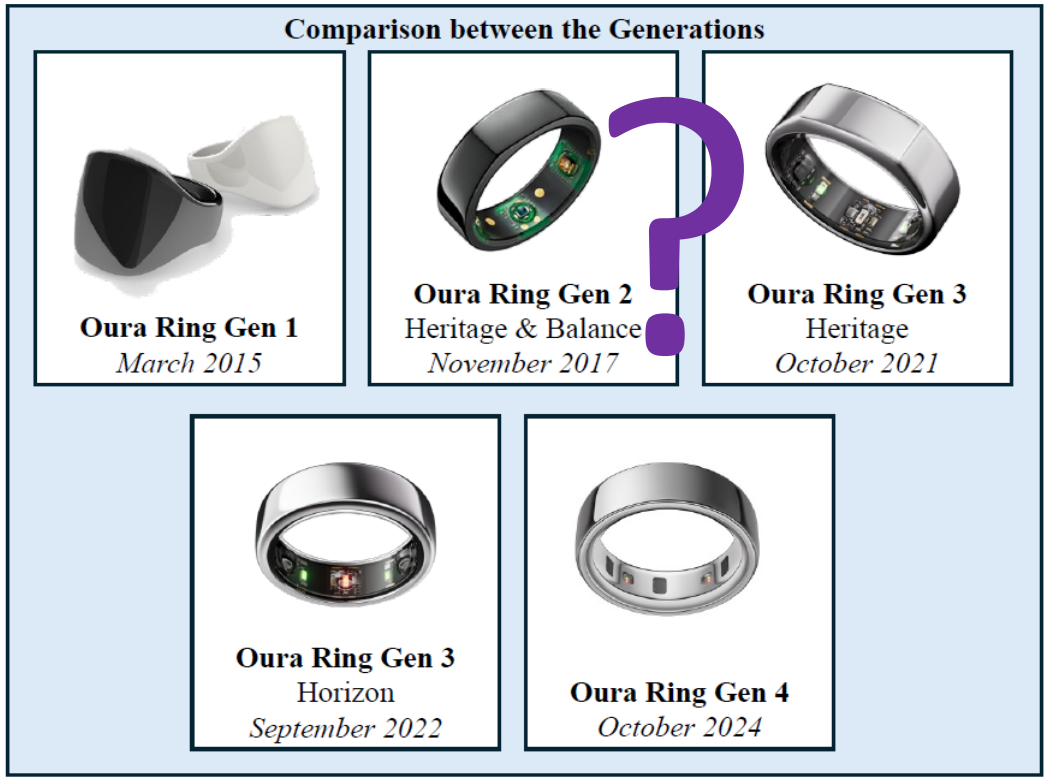
Oura cannot prove a "direct result": sales include models that PO does not allege practice the claims

PO's Response

1. Sales and Sales Growth.

The marketplace success of the Oura Ring is evidenced by substantial sales and sales growth, especially since the introduction of the Oura Ring Gen 3 in October 2021. Ex-2019, ¶33. Specifically, worldwide Oura Ring gross unit sales increased





PO provides no evidence or argument that Gen. 2 and Gen. 3 Heritage practices the claims, yet includes it in its sales data

178POR (Paper 20) at 98-100; Ex-1079 ¶¶76-83; Ex-1080 ¶117-118, 120, 220

Demonstrative Exhibit Not Evidence

Oura cannot prove a "direct result": sales include models that PO does not allege practice the claims

Mr. Clarke's Testimony

Q. You mentioned that there was a period of time when a new product is released and there are sales for the new product and for the old product during that period. Do you recall mentioning that a moment ago?

A. Generally speaking, yes. When a new product launches, there are still versions of the previous generation that are available for a short period of time.

Q. What do you call that period of time?

A. I don't know the specific name associated with that period of time.

Q. Okay. For the crossover period, how did you assign sales figures to each of the two available product generations?

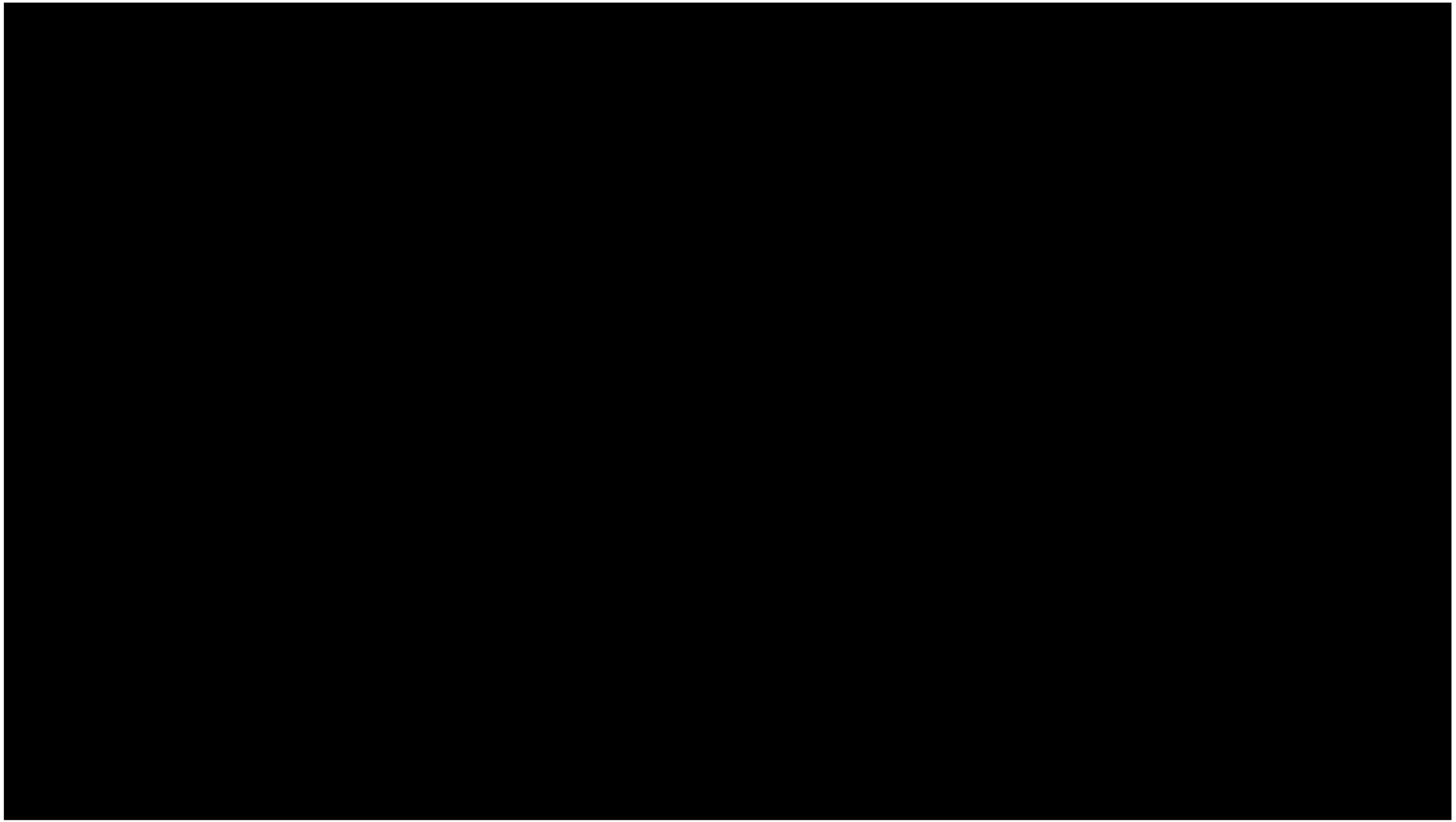
A. So this is why the analysis that we see in Appendix 7 is focused on the time period, the months in which sales were available. So as I explained in my declaration, the Gen 3 -- Oura Ring Gen 3 was available starting in October 2021 through September 2024. I think there were a few months after that that it's still been available.

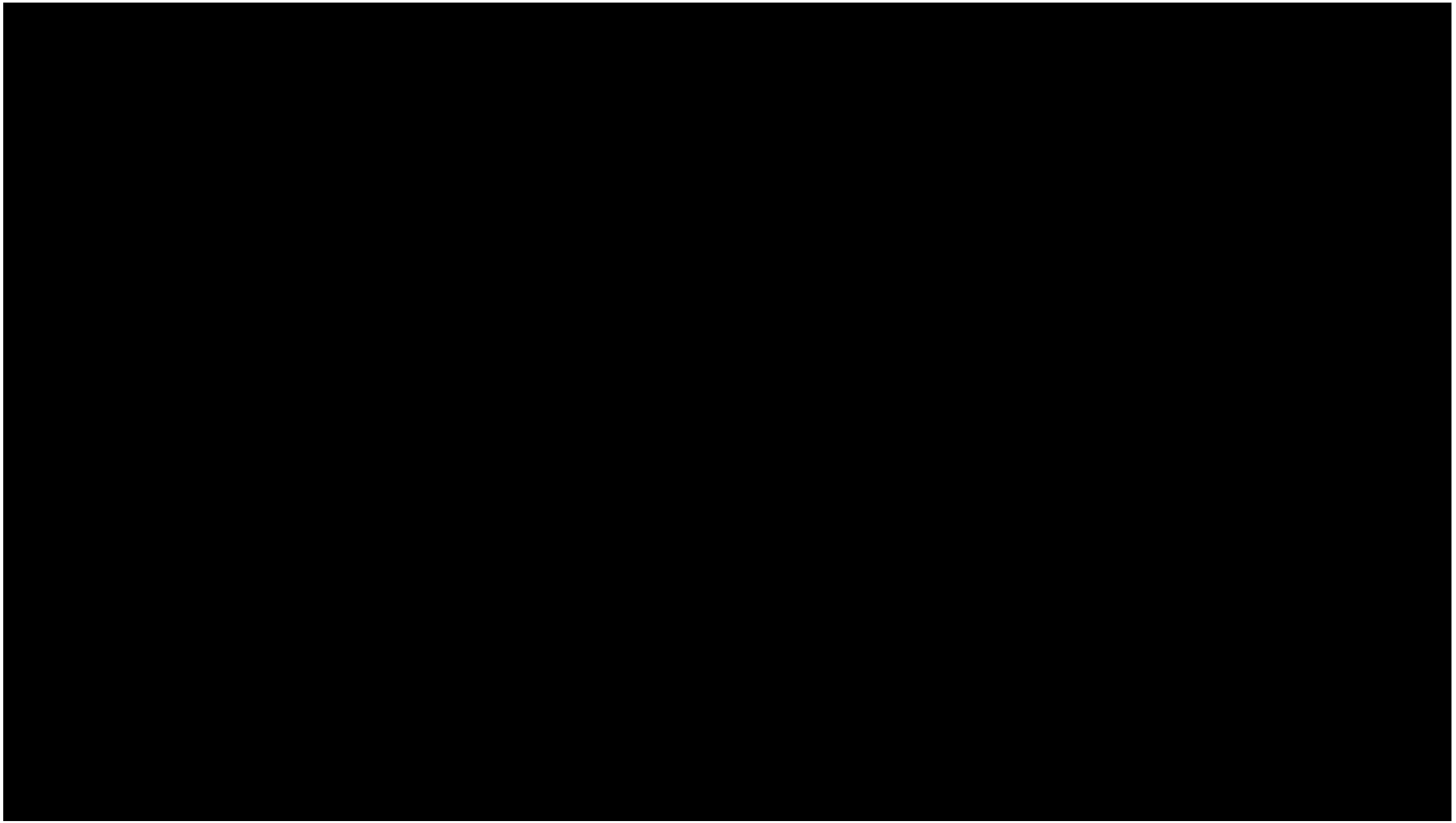
For the purposes of my analysis, I didn't seek to try to differentiate which sales during that crossover period were of one product versus the other. That wasn't -- that wasn't required to reach the opinions that I made.

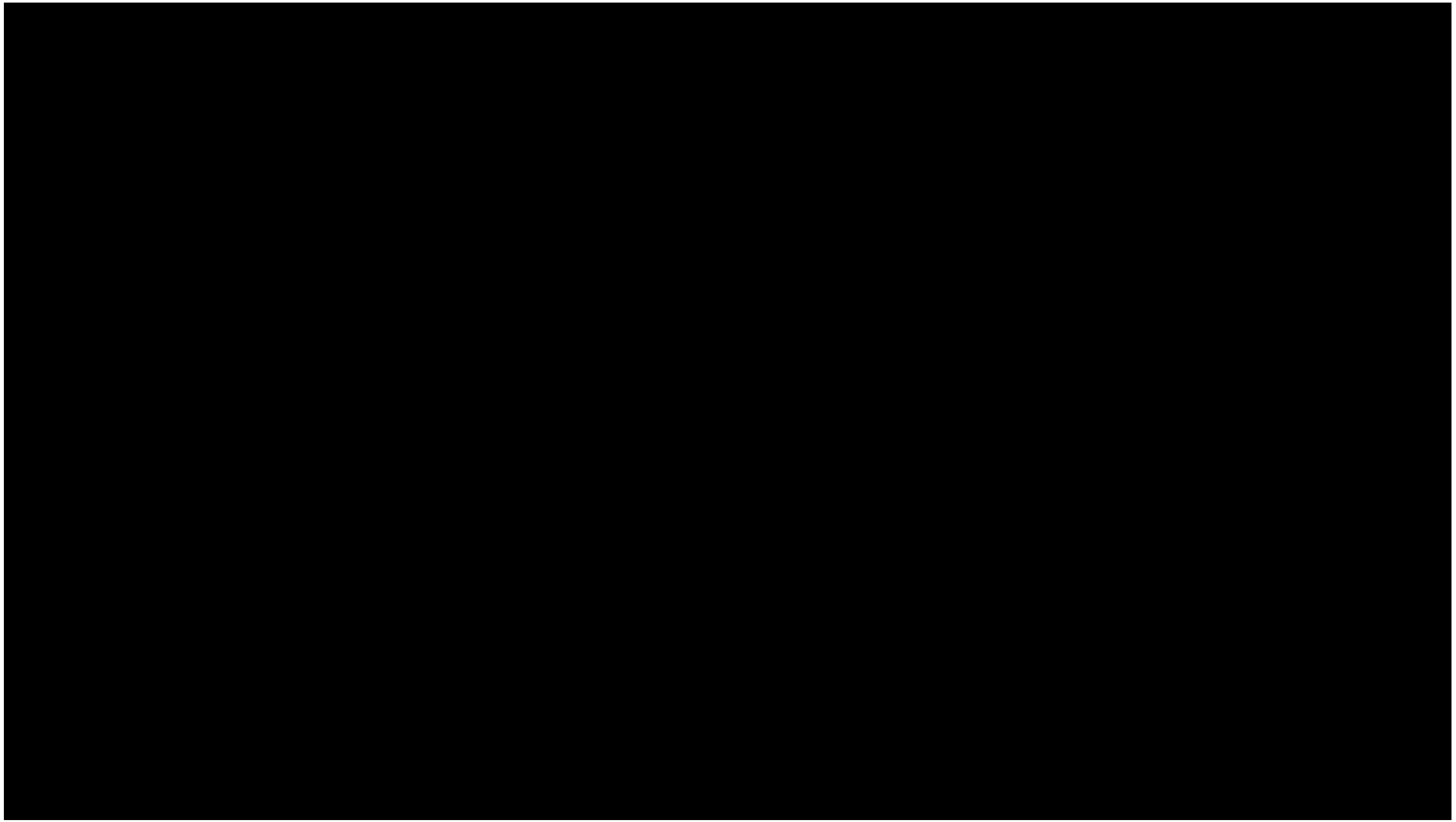
PO made no effort to differentiate products in its sales data

178Reply (Paper 31) at 21; Ex-1083, 104:3-14, 104:18-105:7

Demonstrative Exhibit Not Evidence







Mere evidence of sales is not necessarily evidence of success in the relevant market

PO's Response

3. Performance Relative to Competing Products.

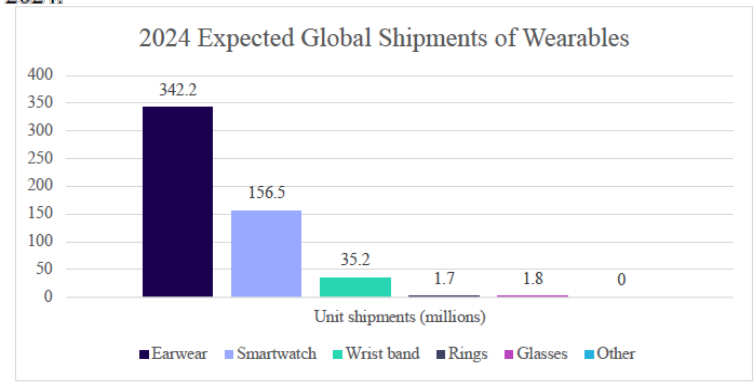
Oura's development and commercialization of the Oura Ring has resulted in the creation of a new market segment within the wearables marketplace. Ex2019, ¶41. As mentioned previously, CNBC credited Oura as "one of the market pioneers" for the smart ring marketplace segment (Ex-2036). Although there have been new

Mr. Clarke's Testimony

Smart rings, such as the Oura Ring, are part of a broader wearables marketplace, including smartwatches and fitness trackers (EX-2024, at 102-103; EX-2068). Generally, these devices track and monitor users' physiological behavior (EX-2024, at 244-245). For 2024, the global smartwatch and fitness tracker marketplaces were valued at approximately $33.6 billion and $60.9 billion, respectively, including companies such as Apple, Samsung, Garmin, and Fitbit (EX-2069; EX-2070).

Mr. Davies's Testimony

168. When considering all wearable devices (including earwear, smartwatches, wristbands, rings, glasses, and others), smart rings account for just 0.3 % of the overall expected wearables shipments in 2024.



Smart Rings make up only .3% of the wearable device market

178POR (Paper 20) at 102; Ex-2019 ¶23; Ex-1080 ¶¶167-175

Demonstrative Exhibit Not Evidence

PO did not create a smart ring market segment

PO's Response

3. Performance Relative to Competing Products.

Oura's development and commercialization of the Oura Ring has resulted in the creation of a new market segment within the wearables marketplace. Ex2[illegible] ¶41. As mentioned previously, CNBC credited Oura as "one of the market pioneers for the smart ring marketplace segment (Ex-2036). Although there have been new

FALSE

Mr. Davies's Testimony

4. The early commercial performance of the Oura Ring reflected only its serendipitous timing

176. Oura Health Oy was founded in Finland in 2013 and introduced the first generation of the Oura Ring, Oura Ring Gen 1, in March 2015.[123] Around the time of its founding and well before launching Oura Ring Gen 1, a number of companies had introduced wrist-worn wearables for tracking activity, including Jawbone (in 2011), Fitbit (in 2013), and Misfit (in 2013). These wrist-worn wearables introduced the concept of fitness tracking via screenless devices that required Bluetooth connectivity with a smartphone to access data in an application. These companies enjoyed substantial success, a factor that likely encouraged Oura and other smart ring vendors to enter the wearables market. Furthermore, these companies paved the way for smart rings from a technological standpoint showing that electronics could be miniaturized and worn on the body.

Alleged success due to timing,
and the wearable/ring market existed before Oura entered it

178POR (Paper 19) at 102; Ex-1080 ¶¶176-226

Demonstrative Exhibit Not Evidence

PO did not create a smart ring market segment

PO's Response

3. Performance Relative to Competing Products.

Oura's development and commercialization of the Oura Ring has resulted in the creation of a new market segment within the wearables marketplace. Ex2019, ¶41. As mentioned previously, CNBC credited Oura as "one of the market pioneers" for the smart ring marketplace segment (Ex-2036). Although there have been new entrants in the smart ring market since the launch of the Oura Ring, Oura has "long been synonymous with 'smart ring'" (Ex-2089). According to Athletech News,

FALSE

Mr. Davies's Testimony

179. Once Oura Ring Gen 1 entered the market in 2015, it was joined by at least 6 other smart ring vendors, most of whom were unknown start-ups reliant on crowdsourcing for funding. Oura had entered the smart ring market at a time when wrist-worn wearables and smartwatches had demonstrated market potential and technological feasibility for wearables in general. Smart ring pioneers then demonstrated there was a potential niche for smart rings within the wearables market.

180. After Oura Ring Gen 3 Horizon launched in 2022, there were 4 competitor smart rings on the market. After Oura's release of its Gen 4 ring in 2024, there were 10 competitor rings on the market, all of which adopted the dominant design form factor. This period was marked by increasing competition and slowing growth. Oura entered the smart ring market after first movers McLear and Logbar and then had several years to gain traction against limited, relatively weak competition before other new entrants started flooding in.

Alleged success due to timing,
and the wearable/ring market existed before Oura entered it

178POR (Paper 19) at 102; Ex-1080 ¶¶176-226

Demonstrative Exhibit Not Evidence

PO cannot show a "direct result" from any novelty in the claims



But there is a more fundamental requirement that must be met before secondary considerations can carry the day. "For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention." *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed.Cir.2010) (quotation omitted). **Where the offered secondary consideration actually results from something other than what is both claimed and novel in the claim, there is no nexus to the merits of the claimed invention.** *Tokai Corp. v. Easton Enters., Inc.*, 632 F.3d 1358, 1369 (Fed.Cir.2011) ("If commercial success is due to an element in the prior art, no nexus exists."); *Ormco Corp.*, 463 F.3d at 1312 ("[I]f the feature that creates the commercial success was known in the prior art, the success is not pertinent."); *In re Woodruff*, 919 F.2d 1575, 1578 (Fed.Cir.1990) ("The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims.... [and] in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." (citations omitted)).

In re Huai-Hung Kao, 639 F.3d 1057, 1068 (Fed. Cir. 2011)

178Reply (Paper 31) at 26; 702Reply (Paper 28) at 25

Demonstrative Exhibit Not Evidence

PO has not shown copying

PO's Response

There is, however, evidence that a number of manufactures of smart rings copied the Oura Ring Gen. 3, including the use of internal potting as the internal housing component as disclosed in the '178 patent. Ex-2018, ¶¶242-50. Copying can be established through evidence of access to and substantial similarity with a patented technology. *Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, 70 F.4th 1331, 1340 (Fed. Cir. 2023) ("Evidence of access and substantial similarity *is* evidence of copying") (emphasis in original). Here, as demonstrated below, the new entrants had access to the Oura Ring Gen. 3 that was launched in 2021 and each subsequently launched a product nearly identical to Oura Ring. The similarities are not a mere coincidence. Ex-2018, ¶¶242-50

Dr. Anthony's Testimony

197. But as explained in above in Section IV.A, PO has failed to show that Gen. 3 is coextensive with the challenged claims and PO cannot show the asserted copying is directed to the challenged claims or the claims of other Oura patents, or some combination thereof. Specifically, the "optical protrusions in the potting material" are not explicitly claimed in the '178 Patent.

Mr. Davies's Testimony

283. The evolution of the smart ring makes it clear that Oura did not "invent" anything but merely patented the dominant design that had already been established.

284. Oura did not invent the smart ring or the wedding ring form factor.

Copying cannot be based on unclaimed features or well-known features



McLear Ring



Logbar



HB Ring

178POR (Paper 19) at 105-112, Ex-1079 ¶197, Ex-1080 ¶¶283-291

Demonstrative Exhibit Not Evidence

There was no long-felt, unmet need

PO's Response

D. The '178 patent fulfilled a long felt need for a compact and comfortable wearable finger ring.

The world's leading wearable ring researcher Asada recognized the advantages a wearable ring has over wearables worn on other parts of the body a decade prior to the '178 patent. Ex-1025, 1:56-58. Asada acknowledged that comfort and compactness were the keys to realizing the advantages of a finger-worn ring. Ex-1035 at 9-10; Ex-1037 at 3. If the ring were as comfortable as a wedding band, the wearer would not take it off, thereby achieving the goal of round-the-clock biometric monitoring. Asada even recognized that his prototype failed to achieve these goals. Ex-1035 at 74 ("the size of the first prototype, as shown in Figure 8-1, was too large to be of use in real life.").

Dr. Anthony's Testimony

my deposition (Ex. 2020 (Anthony Tr. 125:5-127:1), Dr. Mercier mischaracterizes the scope of Asada's research by omitting the fact that Asada's primary research focus was addressing pressure-induced variations in ring sensors and mitigating associated noise. Notably, Asada did not identify nor emphasize any technical issues related to battery challenges.

94. Dr. Mercier also claims he was "surprised" of PO's use of a curved battery as evidence of long felt unresolved need. Ex. 1082 (Mercier Tr. 221:7-23). Asada's and Dr. Mercier's inability to successfully commercialize a wearable ring with a curved battery do not show that a POSITA recognized a need that was long felt or that others had tried and failed to solve the problems. Critically, Dr. Mercier fails to provide any evidence indicating that either his or Asada's attempts or inability to commercialize a wearable ring was specifically due to issues with curved battery technology. Dr. Mercier does not rule out other plausible factors for lack of commercialization success, such as insufficient marketing strategies, limited expertise regarding manufacturing scale-up, or prohibitive production costs.

Lack of commercialization does not mean a long felt unresolved need

178POR (Paper 19) at 113-114; 178Ex-1070 ¶¶93-94

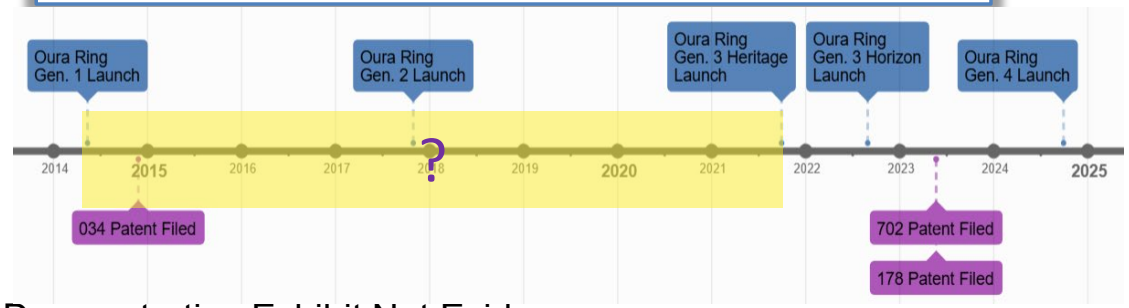
Demonstrative Exhibit Not Evidence

There was no long-felt, unmet need

PO's Response

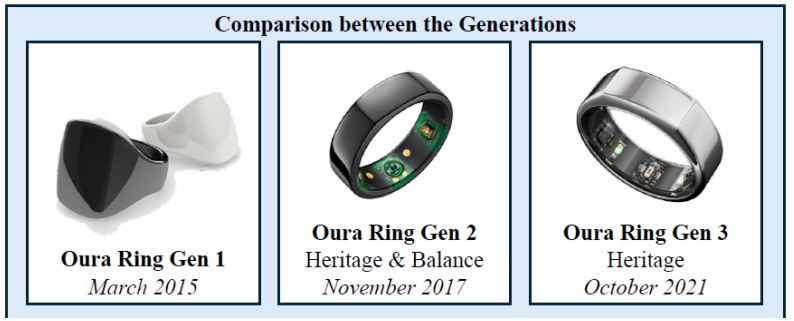
D. The '178 patent fulfilled a long felt need for a compact and comfortable wearable finger ring.

The development of wearable rings did not fulfill these needs until the '178 patent. Ex-2018, ¶¶251-52. The prior art largely followed Asada's lead, bunching components at the top of the ring in an attempt at least make the ring wearable by limiting the width of the sides of the ring. *Id.* None of these efforts proposed using a curved battery in conjunction with a PCB mounted within a ring housing. Even Dr. Mercier's own efforts in 2013 in creating a smart ring as part of the Center of Wearable Sensors at UCSD required him to put components and battery atop of the ring similar to Asada. *Id.* Indeed, in his own endeavor on this front in 2013, the



Demonstrative Exhibit Not Evidence

Not compact and comfortable?





McLear Ring



Logbar



HB Ring

Patented Rings: Schroder, Niwa, LeBoeuf, Wissmar
Patented small wearables: Mestas, Yuen

178POR (Paper 19) at 113-114; 178Ex-1080 ¶¶220, 268-292

Samsung Electronics Co., Ltd.;
Samsung Electronics America, Inc.,
v.
Ouraring, Inc.,

Petitioner's Presentation For IPR2024-00928, PGR2024-00030, -00039

U.S. Patent Nos. 9,582,034; 11,868,178; 11,874,702

September 11, 2025

Demonstrative Exhibit Not Evidence