UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOD SPORTSMAN MARKETING, LLC
Petitioner,

v.

HANGZHOU ZH TECH CO., LTD.
Patent Owner

Patent No. 11,736,855

DECLARATION OF JASON JANET, PH.D

GOOD SPORTSMAN MARKETING, LLC
EXHIBIT 1002

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,736,855 ("the '855 Patent")
1002	Declaration of Dr. Jason Janet
1003	File History of '855 Patent
1004	U.S. Patent No. 11,451,900 ("Unger")
1005	U.S. Patent No. 8,050,444 ("Smith")
1006	U.S. Patent No. 8,488,814
1007	U.S. Patent No. 3,160,717
1008	U.S. Patent No. 2,235,372
1009	U.S. Patent Application Publication No. 2020/0196698
1010	U.S. Patent 8,869,355
1011	U.S. Patent Application Publication No. 2021/0080996
1012	U.S. Patent Application Publication No. 2005/0238181 ("Nilsson")
1013	U.S. Patent No. 10,792,190 ("Hakansson")
1014	WEBSTER'S NEW WORLD COLLEGE DICTIONARY, 4th Ed. (1999)
1015	AMERICAN HERITAGE DICTIONARY, 2nd College Ed. (1982)
1016	OXFORD AMERICAN DESK DICTIONARY (1998)
1017	Samuel et al., INTRODUCTION TO ENGINEERING DESIGN (2005)

Exhibit No.	Description
1018	U.S. Patent 9,366,871
1019	Budynas et. al, SHIGLEY'S MECHANICAL ENGINEERING DESIGN 8th Ed. (2006)
1020	Animated 3D Model of Unger-Smith Torsion Spring
1021	IDC Spring, *How Springs Are Made – The Spring Manufacturing Process*, *available at* https://idcspring.com/spring-manufacturing-process/ (last accessed May 21, 2024)
1022	Lee Spring, *Torsion Springs*, *available at* https://www.leespring.com/learn-about-torsion-springs# (last accessed May 20, 2024)
1023	James Spring & Wire Company, *Torsion Springs*, *available at* https://www.jamesspring.com/our-capabilities/torsion-springs/ (last accessed May 20, 2024)
1024	*Curriculum Vitae* of Dr. Jason Janet

I, Jason Janet, declare as follows:

I. INTRODUCTION

1. I have been retained as a technical expert by Good Sportsman Marketing, LLC ("GSM").

2. I have been asked to study and provide my opinions concerning U.S. Patent No. 11,736,855 ("the '855 Patent") and the patentability of its claimed inventions in view of certain prior art references, the state of the art at the time of the claimed inventions, and the knowledge of a person of ordinary skill in the art at the time of the claimed inventions.

3. My opinions and views set forth in this declaration are based on my technical education, training, and experience in the field of electro-mechanics, as well Petitioner's Exhibits 1001-1024, and other materials that are cited and discussed herein.

II. BACKGROUND AND QUALIFICATIONS

4. In formulating my opinions, I have relied on my knowledge, training, and experience in the relevant field, which I have summarized below. I serve Applied Research Associates ("ARA") as a Corporate Director and, previously, as Chief Technology Officer ("CTO"). I have also held the rank of Adjunct Associate Professor at Duke University and at North Carolina State University, two of the universities with which ARA maintains active working relationships.

5. I received a Bachelor of Science in Mechanical Engineering from the University of Virginia in 1990; a Master of Integrated Manufacturing Systems from the Integrated Manufacturing Systems Engineering Institute at North Carolina State University in 1994; and a Ph.D. in Electrical and Computer Engineering from North Carolina State University in 1998.

6. Since the 1980s, I have served in multiple capacities while designing, engineering, implementing and supporting fluid control and filtration systems. In the construction field, I implemented multiple gravity- and pump-driven flow control and sediment separation systems. While at Nekton (which was acquired by iRobot), I engineered and implemented multiple flow control systems focused primarily on submersible robotics that operate on the water surface, at the air-water interface and below the water surface. While launching Parata, a provider of pharmacy automation/robots for filling prescriptions, I implemented a HEPA-C filtered vacuum-driven method to fluidize oral solids within hopper heaps, and a compression- driven method to singulate oral solids from inside the hoppers to a vial outside the hoppers to dispense pills from a selection of up to 252 different oral solid medications residing within the robot. Parata's in-line compressed air lines comprised filtration elements to remove potentially contaminating lubricants from the venturi ejectors.

7. While at Transdigm/Avionic Instruments, I designed and implemented multiple flow control and filtration systems for cooling aviation/aerospace subsystems (power generation/conversion/distribution, autonomy modules, DAQ/DSP, etc.), as well as vortical-flow filterless vacuums and attractors that operate in gas and liquid domains. Regarding the latter, the Vortex Regenerative Air/Aqueous Movement ("VRAM") was developed and marketed under spin-out company "Vortex HC", in part for entraining and separating micron-level and larger particles; VRAM vacuums have been integrated by and co-developed with Black & Decker, Dyson, and others. The VRAM attractor provided suction- and magnet-like attraction for wall-climbing mobile robots, attachment devices, non-dextrous gripping, hull- crawling submersible mobile robots, etc. VRAM attractors are used by companies including, but not limited to, GE-Hitachi Nuclear Energy, Teledyne SeaBotix, SeaRobotics, Oceaneering, Lockheed-Martin, BDT, Department of Defense ("DoD")/IC customers, etc. While driving the Vortex HC spin-out, I spearheaded the development of the ARTEMIS-series of submersible autonomous underwater vehicles ("AUVs"), remotely operated vehicles ("ROVs"), unmanned surface vehicles (USVs) and unmanned underwater vehicles ("UUVs") with filtration and flow control systems for vectored thrusters and high agility.

8. While at RxMedic, also a spin-out from Avionic Instruments/Transdigm, and also a provider of pharmacy automation/robots for

prescription fulfillment, I developed and implemented in-line vacuum-driven HEPA-C filtration systems to simultaneously isolate fine particles from up to 256 different oral solid medications housed in and dispensed by the robot vacuum, and assist centrifugal singulation/dispensation of oral solids from hopper heaps. Customers of the RxMedic robotic system include, but are not limited to, WakeMed, HealthMart, Dunn Discount Drug, and dozens of other chain and independent pharmacies.

9. While at Delta Five, a provider of automated systems to the hospitality field, I developed and implemented flow control and filtration systems for room-cleaning robots (air, water, solvents/soaps, particles, etc.) and internet-of- things (IoT) sensors and traps. For the latter, I developed flow management for pheromone-infused and heated air to lure specific pests to intelligent traps.

10. In my current capacity at Applied Research Associates, I contribute to multiple portfolios including technologies that purify water for intravenous (IV) bags and general consumption, that physically and chemically refine and reuse fuels, and that model human physiology for medical training and treatment.

11. In general, I have been active in the intelligent electromechanical systems field for decades. My Master's thesis, entitled Global Motion Planning and Self- Referencing for Autonomous Mobile Robots, leveraged graph theory, feedback and sensors to optimize mobile robot movement through, and perception of,

environments. My Ph.D. dissertation, entitled Pattern Analysis, Tracking and Control for Autonomous Vehicles, leveraged multiple mobile robots, sensors, and neural networks to enhance simultaneous localization and mapping (SLAM), as well as the sharing of knowledge between multiple different mobile robots. I have authored numerous publications and have co-authored a textbook entitled Computational Intelligence.

12. I have designed, built, and marketed robots, automated systems, toys, measuring systems and components thereof, including ground mobile robots, unmanned aerial vehicles ("UAVs"), unattended sensors, automated storage and retrieval systems (ASRS), submersible mobile robots, proof-of-concept extraterrestrial robots, manually manipulated ("twiddled") submersible foils, wall-climbing mobile robots, corner-grip shelving systems, proximity and ranging systems, point-cloud systems, pattern analysis tools, and augmented reality systems.

13. I have taught the following courses: Introduction to Robotics and Automation (Duke and NCSU, 1996-2016); Introduction to Control Theory (Duke and NCSU, 1999-2014); Distributed Real-Time Controls (NCSU, 1994-1998); and myriad courses in Mechanical Engineering, Biomedical Engineering, Electrical/Computer Engineering, Industrial Engineering and Systems Engineering. I have also served on several M.S.- and Ph.D.-level graduate student committees and qualifying exams, served on the NCSU IMSEI Board, and participated in curriculum

development for undergraduate and graduate-level programs, including the NCSU B.S.- and M.S.-level Mechatronics curricula.

14. I have also built, sponsored, and advised multiple champion student teams for international robot competitions including, but not limited to, the National Aeronautics and Space Administration (NASA)/American Society of Civil Engineers (ASCE) Extra-Terrestrial Robotics Competition, the Defense Advanced Research Projects Agency (DARPA) Grand Challenge, the Association for Uncrewed Vehicle Systems International (AUVSI)/ the Office of Naval Research (ONR) Autonomous Underwater Vehicle Competition, and the European Climbing and Walking Robots (CLAWAR) Wall-Climbing Robot competition.

15. I have initiated multiple unmanned systems projects at both academic and industry levels. Academic UAVs include, but are not limited to, Quadcopters with Hybrid Remote and Autonomous Control, Marsupial UAVs that Deploy and Recover Unmanned Ground Vehicles, and Wall-Climbing UAVs. Additionally, the AngelFish Cross-Domain Submersible UAV, a DARPA anti-submarine warfare (ASW) program that I launched at Teledyne, included a partnership with North Carolina State University. UUVs include, but are not limited to, the MicroHunter-class of very small underwater robots; the PilotFish, Gamera, Artemis and other holonomic robots; submersible crawlers that are used in nuclear reactors, and the little benthic crawler (LBC1) hull inspection system; and the hull bio-inspired

underwater grooming (HULLBUG) hull cleaning system. Unmanned ground vehicles include, but are not limited to, the miniature PERRY, wall- climbers, and all-terrain and subterranean crawlers.

16. I have also supported multiple toy-focused ventures with companies including, but not limited to, Marvel, Hasbro, Twidco, Spin Master, Nottingham-Spirk, IDEO, ARA, and other firms. For Marvel, multiple Spiderman toys were conceived and developed and validated, including the Spiderman Wall-Climbing Car, the Corner-Climbing Spider, and the Inflatable Wall-Climbing Spiderman. For Hasbro, a proprietary corner-gripping technology was employed to place basketball goals in corners. For Twidco, a proprietary flapping foil technology was combined with multiple fish shapes (e.g., shark and clownfish) to enable users to create fishlike motion by "twiddling" a connecting cable from above. For Spin Master and multiple design firms, multiple wall-climbing toys were developed for small wall-climbing robot concepts, including simple radio control vehicles and the "Hangtime 540" Tony Hawk aerial skateboard toy. For ARA, augmented reality systems for indoor and outdoor games were developed.

17. In 1999, while I was employed by Nekton Research ("Nekton"), I captured and managed multiple programs sponsored by the DoD and private-sector companies that focused primarily on AUVs, ROVs, TwiddleFish toys, and indirect-fire projectiles. During my tenure, Nekton entered into a joint venture agreement

with the founders of what eventually became known as Parata Systems–a pharmacy automation solutions company, which I supported launching.

18. After leaving Nekton in March 2002, I joined a then New Jersey-based company called Avionic Instruments, Inc. ("Avionic"). While at Avionic, I continued developing and marketing robots and supported engineering related to various design, manufacturing, quality and assembly issues on the core aerospace product lines. Avionic product lines include, but are not limited to, ducted fans, transformer-rectifier units ("TRU"), regulated TRU (RTRU), auxiliary power unit ("APU") control systems, power distribution systems (PDUs), frequency converters, corner clamps, and VRAM attractors/thrusters. Customers included DoD, NASA, Boeing, Sikorsky, Augusta-Westland, Dassault, and Lockheed-Martin. During my tenure at Avionic, I supported multiple AS/RS integration efforts for handling hundreds of SKU2s and tens of thousands of inventory components for applications including component-, assembly- and circuit board-level material handling and quality assurance.

19. At Avionic, I was also tasked with ruggedizing, optimizing, and commercializing two emerging proprietary technologies: the "CFG" and "VRAM". The CFG, short for Corner Friction Grip, was a proprietary technology based on non-marring and non-adhesive materials that provided optimal grip patterns on inside and outside corners. CFG formed the basis of a company called "Shelf Works

Technologies," which was spun out of Avionic Instruments in 2004, and whose products were sold in Home Depot, Bed Bath and Beyond, etc. CFG also formed the basis of multiple toys including a miniature basketball goal for Hasbro, and a corner-climbing Spiderman toy for Marvel.

20. The VRAM is a patented method for producing attraction forces between an object and a surface. VRAM is euphemistically referred to as a "tornado in a cup" and generally comprises both cylindrical and toroidal flow patterns that result in vacuum-like regions. The VRAM had several applications, including but not limited to: holding breaching charges and sensors against vertical or inverted surfaces; acting as an attractor for wall and ceiling climbing robots; acting as an attractor for submersible hull-crawling robots; filterless vacuuming (conceptually similar to the Dyson vacuum); and robotic pick-and-place end-effector (conceptually similar to a gripper) to move articles from one location (e.g., a conveyor) to another (e.g., a collator). The VRAM also formed the basis for multiple toys including: a wall-climbing car for Spin Master, IDEO and Nottingham-Spirk; a Spiderman car for Marvel; an inflatable wall-climbing Spiderman for Marvel; and the Tony Hawk Hangtime 540 aerial skateboard for IDEO.

21. My work with the filter-less vacuum VRAM prompted me to explore a concept related to pharmacy automation, which ultimately led to a Ferris- wheel concept for rapidly dispensing pills. In mid-2003, my team conceived of two

prescription pill counting mechanisms that actually benefited from centrifugal forces and optimally exploited gravity and vacuum: an inner ring with vacuum-based apertures and an inner-bowl with vacuum-based apertures. The inner-bowl with vacuum-based apertures was deemed most viable, was awarded two U.S. patents, and to this day forms the basis of the RxMedic ADS™ pharmacy robot. The VRAM formed the basis of Vortex HC technologies, many of which have been licensed out to entities including, but not limited to, Teledyne SeaBotix, SeaRobotics, and HDT. Both RxMedic and Vortex HC were officially spun out of Avionic in July 2004, the date Avionic was acquired by Transdigm.

22. In late 2004, soon after Avionic was acquired, I, along with others from Avionic, secured funding to develop an alpha-level multi-dispenser pharmacy robotic system and develop the RxMedic business plan and raise multiple rounds of venture capital. In late 2006, RxMedic (called "APDS" until November 2006) was launched as a stand-alone, sole-focus venture. After the operational launch of RxMedic, I served as General Manager and eventually Chief Technical Officer. Through my roles at RxMedic, I oversaw the development of the RxMedic ADS robot, managed the intellectual property portfolio, coordinated sales and marketing, and provided strategic, fiscal, and operational leadership. The RxMedic ADS is an AS/RS that prepares prescriptions by the storage, retrieval and bundling of bottles/vials, labels, oral solid medications, caps and quality assurance imaging,

generally within retail, hospital and mail-order settings. In May 2010, J.M. Smith Corporation acquired RxMedic, and to assist in the change of ownership, I served as a Director of Robotics until May 2011. During my tenure at RxMedic, under J.M. Smith's ownership, I supported the evaluation, development and integration of a high-volume AS/RS system at the Smith Drug wholesale distribution center in Spartanburg, South Carolina. This AS/RS system comprised a broad spectrum of interoperating robotic systems including mobile, pick-and-place, conveyor and others.

23. Also in late 2004, after Avionic was acquired, I, along with others from Avionic, secured funding for Vortex HC through DoD contracts and robot sales, to continue developing the VRAM Mobile Robot Platform (VMRP – a wall-climbing robot), the ARTEMIS AUV (a holonomic submersible robot for counter-mine and counter-obstacle operations), the submersible crawler, the nuclear-grade boiler water reactor (BWR) inspection robot, and other robot products centered around the VRAM. Some DoD programs were/are classified, for which I maintained a SECRET clearance at both the personal and facilities level, and served as the facilities security officer (FSO). In late 2006, corresponding to the full launch of RxMedic, Vortex HC technologies were largely licensed to Teledyne SeaBotix, SeaRobotics, and HDT. However, I have continued to support Vortex HC licensees and customers to-date.

24. After the sale of RxMedic, and after fulfilling my 12-month employment obligation, I joined Teledyne Technologies in Summer 2011. I served as the Senior Manager for the RTP3 division of Teledyne Scientific, and supported multiple DoD-sponsored robotic-focused programs. Some of these programs were/are classified, for which I maintained a personal SECRET clearance.

25. Among these programs were cargo unmanned ground vehicles (CUGV); squad-level autonomous unmanned ground vehicles (UGV); AUVs; UUVs; a cross-domain autonomous vehicle capable of transitioning between air, surface, and underwater-domains; the EXtreme ACcuracy Tasked Ordnance (EXACTO) program for optically tracking and steering bullets to targets; and light detection and ranging (LIDAR) systems for UGVs, as well as the mapping of urban and subterranean environments (along with sister-company Optech); and technologies for AS/RS, industrial automation and inspection systems with/for strategic partner Rockwell Automation (previous owner of what became the Teledyne Scientific & Imaging business unit).

26. Cross-domain vehicles that were evaluated, designed and prototyped included, but were not limited to, the AngelFish (later called "EagleRay") cross-domain submersible UAV for anti-submarine warfare, as well as a ball-shaped robot for beach, ground, and surf-zone countermine operations. Sensor design, refinement and signal processing was a major component of each program. Sensors employed

include, but are not limited to, proximity sensors; ranging sensors; electro-optical imaging; LIDAR; long-, short- and mid-wave infrared (IR); inertial measurement units (IMU); optical flow; and radio-frequency (RF). Additionally, control systems were designed, refined and integrated into the aforementioned systems. Most control systems were closed-loop, in that they utilized sensor-based feedback; others were open- loop, where states were estimated with little or no feedback.

27. In late 2013, Avionic, a Transdigm business unit at that point, requested that I return to turn around both a supply-chain issue and the Sikorsky S97 ("S97") Raider/JMR helicopter programs. The S97 Raider was designed to be the fastest, most maneuverable helicopter, due to its coaxial, counter- rotating variable-pitch wings, and an aft-based push-propeller. Avionic also controlled two business units named Acme Aerospace ("Acme") and Aerospace Cooling Solutions ("ACS"). Avionic, Acme and ACS supported the S97 program, which ultimately met milestones and continues to produce multiple successful demonstrations. In 2013, Transdigm expanded my role to include directorship of the Avionic, Acme and ACS revenue and engineering teams, and to report operational and financial status at six-week intervals.

28. Starting in 2011, I supported the launch of Lealear, a small private-equity backed concern focused on the automated storage and retrieval of laundry

garments, primarily for retail dry cleaning operations. I played an instrumental role in the intellectual property portfolio and the development of validating technology.

29. Starting in late 2014, as CEO of Delta Five, I led a private-equity backed, hospitality focused venture, coordinating the company's launch and strategic path including an early-stage pivot. Initially focused on back-end robotics, AS/RS and general automation, Delta Five augmented its focus to address the rampant bed bug problem—a top priority for hoteliers—with a novel unattended sensor and trap, called the Telemetered Pest Monitoring System (TPMS), which is based on computer vision, IoT, and software as a service (SaaS); it has proven capable of scaling to other pests. In addition to the TPMS, Delta Five developed a novel means to mass produce a natural, unscented aggregation pheromone that, in concert with placement and heat, lured invertebrates to the TPMS. After leading Delta Five and serving on its Board for four years, I resigned to join ARA, but continue serving Delta Five as a share-holder and transition agent.

30. In 2018, I joined ARA as CTO. My primary responsibilities include leading the commercialization and technology transition efforts, which require technical, business and corporate development, as well as the procurement of capital and managing matrixed rosters. Core technologies include, but are not limited to, energy, alternative fuels, biotechnology, robotics, autonomous systems, artificial intelligence, machine learning, non-destructive inspection/evaluation, medical

devices/systems, augmented reality, situational awareness, diversionary devices, advanced hearing protection, tactical assault kits (TAK), ballistic gear, directed energy weapons, unattended sensors, risk analysis, etc. I currently hold a Top-Secret security clearance with Sensitive Compartmented Information (TS/SCI).

31. I have previously testified as an expert witness. A list of those matters within the last four years is attached to this declaration as part of my C.V. (Exhibit 1024).

32. I am being compensated for services provided in this matter at a rate of $400.00 per hour. I am also being reimbursed for reasonable expenses, such as travel expenses. My compensation is not contingent on my opinions, on the outcome of any matter, or on any of the technical positions I explain in this declaration.

33. I have no financial interest in GSM, the Patent Owner, or the ’855 Patent.

III. BASES FOR OPINIONS

34. The opinions set forth in this declaration are my own. In forming the opinions herein, I have considered the exhibits to the Petition cited herein, as well as any additional materials cited in this declaration, and my education, training, and experience.

35. My analysis of the materials relating to this matter is ongoing and I will continue to review any new material that is provided to me. This Declaration

represents certain opinions that I have formed to date and the bases for those opinions. I reserve the right to revise, supplement, and/or amend my opinions based on new information presented to me and on my continuing analysis of the materials cited herein or later provided to me.

IV. LEGAL STANDARDS

36. I am not an attorney. For purposes of this Declaration, I have been informed about certain aspects of the law that are relevant to my opinions, as set forth below.

A. PATENTABILITY

37. I understand that there are various aspects of patentability that are examined from the perspective of a person of ordinary skill in the art. *Infra* Section IV.C.

1. Anticipation and Obviousness

38. I understand that for an invention claimed in a patent to be valid and patentable, it must be, among other things, new and not obvious in light of what was known and came before it. That which was known or came before the invention claimed is generally referred to as "prior art."

39. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to "anticipate" the claim.

Second, the prior art can show that the claim was obvious to a person of ordinary skill in the field of the invention at the time the invention was made.

40. I understand that, for a patent claim to be "anticipated" by the prior art, each and every element or requirement of the claim must be found, expressly or inherently, in a single prior art reference.

41. I understand that if a prior art reference does not expressly set forth a particular claim element, the prior art may still disclose that element if it is "inherent" in its disclosure. To establish inherency, it is my understanding that evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. It is my understanding that inherency may not be established by probabilities or possibilities. In other words, it is my understanding that the mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency.

42. I understand that under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform a claimed method, then the method will be considered to be anticipated by the prior art device. I also understand that when the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process.

43. It is my understanding that whether a claimed invention is obvious is a question of law, with underlying factual inquiries that are determined from the perspective of a person of ordinary skill in the art at the time of the claimed invention.

44. It is my understanding that a claimed invention is obvious if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art (a "POSITA").

45. It is my understanding that obviousness requires consideration of the following underlying factual inquiries:

- determining the scope and content of the prior art
- ascertaining the differences between the claimed invention and the prior art;
- resolving the level of ordinary skill in the art; and
- evaluating objective evidence or "secondary considerations" of non-obviousness, such as commercial success, long-felt but unresolved needs, failure of others, industry praise, and unexpected results.

46. It is my understanding that a reference must be analogous art to the claimed invention in order to be properly considered for use in an obviousness inquiry. It is my understanding that a reference is analogous art to the claimed invention if:

- the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or
- the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

47. It is my understanding that whether a reference is reasonably pertinent turns on how the problem faced by the inventor is reflected, either explicitly or implicitly, in the specification.

48. It is my understanding that the following are exemplary rationales that may support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of known techniques to improve a similar method or product in the same way;
- Applying a known technique to a known method or product ready for improvement to yield predictable results;
- Obvious to try – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for

use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and

- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

49. In addition to the above, I understand that a person of ordinary skill in the art may resort to logic, judgment and common sense available to him or her at the time of the invention to find a claim feature obvious, even if the prior art relied on does not explicitly state or teach that feature. I understand that when common sense is relied on to find a feature obvious, the reasoning for that conclusion must be articulated with sufficient clarity.

50. I also understand that a patent claim is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. An obviousness determination requires finding both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so. I understand that it is important to be careful not to allow hindsight reconstruction of references to produce the claimed invention, without any explanation as to how or why the references would be combined to produce the claimed invention.

51. Regarding "objective evidence" or "secondary considerations," I understand that for such evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a "nexus") between the claim and the evidence. I also understand that such objective evidence may include: commercial success of products covered by the patent claims; long-felt need for the invention; failed attempts by others to solve the problem addressed by the invention; copying of the invention by others in the field; unexpected results achieved by the invention; praise of the invention; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making or use of the invention; and that the patentee proceeded contrary to the accepted wisdom of the prior art.

52. I understand that a person of ordinary skill is also a person of ordinary creativity. I further understand that the obviousness analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, but instead can take into account "ordinary innovation" that does no more than yield predictable results, which are inferences and creative steps that a person of ordinary skill in the art would be understood to employ.

53. I understand that sometimes it will be necessary to look to interrelated teachings of multiple patents and publications; the effects of demands known to the relevant field or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art. I understand that all these

issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

2. Indefiniteness

54. I understand that a claim is indefinite, and thus invalid, when the claim (read in light of the specification and the prosecution history) fails to inform with reasonable certainty those skilled in the art about the scope of the invention. I also understand that, while "absolute precision" is not required, a claim must still provide enough certainty to one of skill in the art when read in the context of the invention.

3. Enablement

55. I understand that a claimed invention must be enabled—that is, that the patent specification must describe the invention in such terms that one skilled in the art can make and use the claimed invention. I understand that enablement is a legal determination. To be enabling, a patent's specification must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation. However, a patent need not teach what is well known in the art. Thus, I understand an inventor need not explain every detail since he is speaking to those skilled in the art such that what amounts to conventional knowledge will be read into the disclosure.

4. Written Description

56. I understand that the full scope of the claimed invention must have sufficient written description support, which means the specification must reasonably convey to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date based on an objective inquiry into the four corners of the specification. The written description requirement is satisfied when the specification sets forth enough detail to allow a person of ordinary skill in the art to understand what is claimed and to recognize that the inventor invented what is claimed. I also understand that the level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology. Factors used to evaluate the sufficiency of a disclosure include: 1) the existing knowledge in the particular field; 2) the extent and content of the prior art; 3) the maturity of the science or technology; and 4) the predictability of the aspect at issue.

B. Prior Art

57. I understand that for purposes of this proceeding, prior art includes patents and printed publications in or outside the United States before the effective filing date of the claimed invention. I also understand that prior art includes U.S. patents, published U.S. patent applications, and published international applications (pursuant to the Patent Cooperation Treaty) that themselves have an effective filing

date before the effective filing date of the claimed invention, as long as they name another inventor.

58. I also understand that prior art may also include any public disclosure, including any products in public use, on sale, or otherwise available to the public, before the effective filing date of the claimed invention. I understand that information that constitutes prior art generally must be information that was publicly disclosed before the effective filing date of the claimed invention. I understand that there may be exceptions to what is prior art but have been instructed that they are not relevant for purposes of my opinions here.

C. PERSON OF ORDINARY SKILL IN THE ART

59. I understand that "a person of ordinary skill in the art" or POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. Such a person would necessarily have the capability of understanding any scientific and engineering principles applicable to the pertinent art.

60. I understand that factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the following:

a. the educational level of the inventor;

b. the type of problems encountered in the art;

c. prior art solutions to those problems;

d. the rapidity with which innovations are made;

e. the sophistication of the technology; and

f. the educational level of active workers in the field.

61. I understand that a person of ordinary skill in the art is not a real person, but rather is a hypothetical individual having the qualities reflected by the factors above. This hypothetical person has knowledge of all prior art in the relevant field as if it were arranged on a workshop wall and takes from each reference what it would teach to a person of ordinary skill in the art.

62. I understand that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton. In many cases a person of ordinary skill will be able to fit the teachings of multiple prior art references together like pieces of a puzzle.

63. I understand that a person of ordinary skill in the art can collaborate with one or more other persons of ordinary skill in the art for one or more aspects with which the other person may have superior expertise, experience, and/or knowledge.

D. CLAIM CONSTRUCTION

64. It is my understanding that claim construction, or the interpretation of the claims of a patent, is ultimately a question of law. I have been informed that

claim terms are generally presumed to carry their ordinary and customary meaning. However, I understand that a patent applicant is his own lexicographer and is entitled to provide alternate definitions of words in common usage, but if the patent applicant uses a term that is in common usage without providing an alternate definition, then that term should generally be understood as having its common meaning.

65. I understand that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent specification and the "file history" of the patent developed during examination by the Patent Office.

66. I understand that the claims, the specification, and the file history are referred to as "intrinsic evidence," and are to be read as a person of ordinary skill in the art at the time of the invention would have done at the time of the alleged invention.

67. In addition to the intrinsic evidence, I understand that the court or tribunal may also consider other relevant evidence, which is called "extrinsic evidence," concerning relevant scientific principles, the meaning of technical terms, and the state of the art. Such evidence includes the testimony of expert witnesses. Although extrinsic evidence may be used to resolve ambiguities that may exist after reviewing the intrinsic evidence, I understand that extrinsic evidence cannot be used to contradict a claim construction that is clear from the intrinsic evidence.

68. I understand that some claims are independent, and that those independent claims are complete by themselves. Other claims refer to these independent claims, or other dependent claims, and are "dependent" on those claims. The dependent claims include all of the limitations of the claims on which they depend.

V. SUMMARY OF OPINIONS

69. For reasons described in more detail in this Declaration, my opinions are summarized as follows:

70. Claims 1-19 were obvious under 35 U.S.C. § 103 over U.S. Patent No. 11,451,900 ("Unger") in view of U.S. Patent No. 8,050,444 ("Smith"). Unger discloses a two-way radio communication device that is attachable to and detachable from hearing protection devices, such as earmuffs. Smith discloses a mechanism that allows headset clamping pressure to be adjusted while the headset is being worn, and specifically a torsion spring. The differences between Unger in view of Smith and the claimed invention of each claim are such that it was obvious to a person having ordinary skill in the art when considering Unger in view of Smith. This combination is referred to as "Ground 1."

71. Claim 18 was obvious over Unger and Smith, further in view of U.S. Patent No. 10,792,190 ("Hakansson"). Unger discloses a two-way radio communication device that is attachable to and detachable from hearing protection

devices, such as earmuffs. Smith discloses a mechanism that allows headset clamping pressure to be adjusted while the headset is being worn, and specifically a torsion spring. Hakansson discloses earmuffs comprising a rigid shell or housing with mounted cushions or flexible parts. The differences between Unger in view of Smith, further in view of Hakannson and the claimed invention of claim 18 are such that it was obvious to a person having ordinary skill in the art when considering Unger in view of Smith, further in view of Hakannson. This combination is referred to as "Ground 2."

72. Claims 3-6, 8, 9 and 16 are indefinite as they fail to inform those of skill in the art about the scope of the invention with reasonable certainty. This is referred to as "Ground 3."

73. Claim 10 is not enabled as required by 35 U.S.C. § 112. This is referred to as "Ground 4."

74. Claim 10 lacks written description support as required by 35 U.S.C. § 112. This is referred to as "Ground 5."

VI. OVERVIEW OF '855 PATENT AND PROSECUTION HISTORY

75. I understand, for purposes of the Petition, that the effective filing date of the invention can be no earlier than January 10, 2023, the filing date of the Chinese patent application from which the '855 Patent claims priority. Ex. 1001, 1.

A. SPECIFICATION

76. The ’855 Patent relates to the field of “communication transceivers and in particular to a communication device for hearing protection equipment, and a system for connecting a communication device to a hearing protection equipment.” Ex. 1001, 1:16-20. The specification’s “Background” section teaches that personal protective equipment, such as earmuffs or earplugs, are used to protect users “by providing a barrier which reduces the level of noise or other sounds that is able to reach the users’ ears” and further that “[u]sers often equip the equipment with a communication device, so they can use their mobile phones normally when wearing the equipment.” *Id.* at 1:24-34. The specification further explains that “the existing communication device has a low adaptability and can only be installed on the equipment of a specific size, and the installation process is also inconvenient.” *Id.* at 1:32-35.

77. The ’855 Patent discloses a communication device (e.g., walkie-talkie) that relies on a torsion spring to attach and detach the device to hearing protection equipment (e.g., earmuffs). An exemplary embodiment of the communication device 100 is shown in Figures 1 and 2 (annotated below):

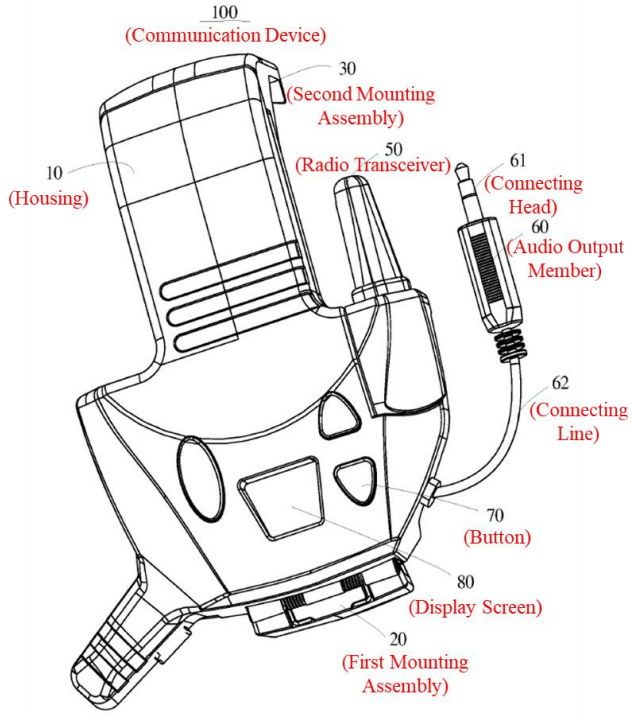


FIG. 1

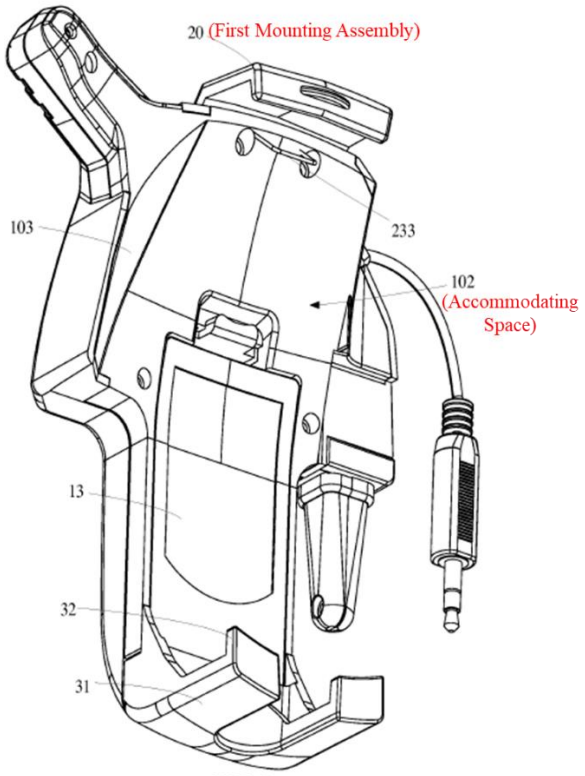


FIG. 2

Id. at 2:11-14, 2:55-58.

78. The communication device 100 includes a housing 10, a first mounting assembly 20 rotatably arranged on a first end of the housing 10, a second mounting assembly 30 arranged on a second end of the housing 10, a microphone 40 (unlabeled) for capturing audio, a radio transceiver 50 configured to wirelessly transmit the audio captured by the microphone 40 and wirelessly receive wireless signals carrying audio, an audio output member 60 (for connecting to an audio input member of the hearing protection equipment) configured to transmit the wireless signals carrying audio to the loudspeakers 202 of the hearing protection equipment, and button 70 and display screen 80. Ex. 1001, 2:62-3:19.

79. As shown in Figure 9 (annotated below), "[t]he first mounting assembly 20 and the second mounting assembly 30 are releasably mounted on two ends of the earmuff 201 respectively to connect the communication device 100 with the hearing protection equipment 200:"

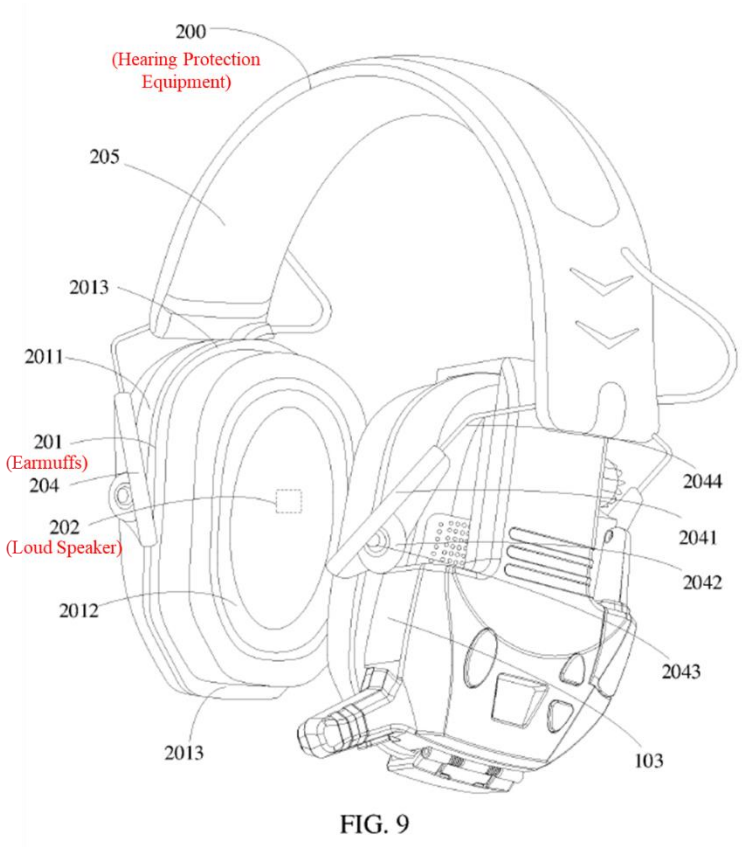


FIG. 9

Id. at 3:5-9.

80. The specification calls out the "first mounting assembly 20" as the "technical solution of the present disclosure." *Id.* at 4:14-18. First mounting assembly 20 is "rotatably arranged at the first end of the housing 10" such that when the communication device 100 needs to be installed on the hearing protection

equipment 200, the second mounting assembly 30 is installed on the top of the earmuff while the first mounting assembly 20 "is rotated in a direction away from the housing 10, so that the hearing protection equipment 200 can be placed in the housing 10 easily, then the first mounting assembly 20 is rotated in a direction close to the housing 10 to install on the other fixing part 2013 of the hearing protection equipment 200 conveniently." *Id.* at 4:14-27. According to the specification, this "installation process is simple and convenient." *Id.* at 4:27-29. Additionally, when the first mounting assembly 20 "is rotated in the direction away from the housing 10, the accommodating space 102 for accommodating the equipment 200 is expanded, so that the hearing protection equipment 200 of different sizes can be placed into the accommodating space 102, thus the communication device 100 has better adaptability." *Id.* at 4:29-36.

81. Figures 6-8 (annotated below) show one embodiment of the first mounting assembly, which includes, *inter alia*, a first connecting member 21 (green-highlighted pin) accommodated in opening 2211 of connecting part 221, an elastic member 23 (a torsion spring having two yellow-highlighted elastic bodies 231, two opposite purple-highlighted butting parts 232, and two opposite blue-highlighted fixing parts 233) sleeved on the connecting member 21, and first mounting member 22 with receiving portion 2221 for receiving the butting parts 232 (each having a straight section 2321 and bending section 2322):

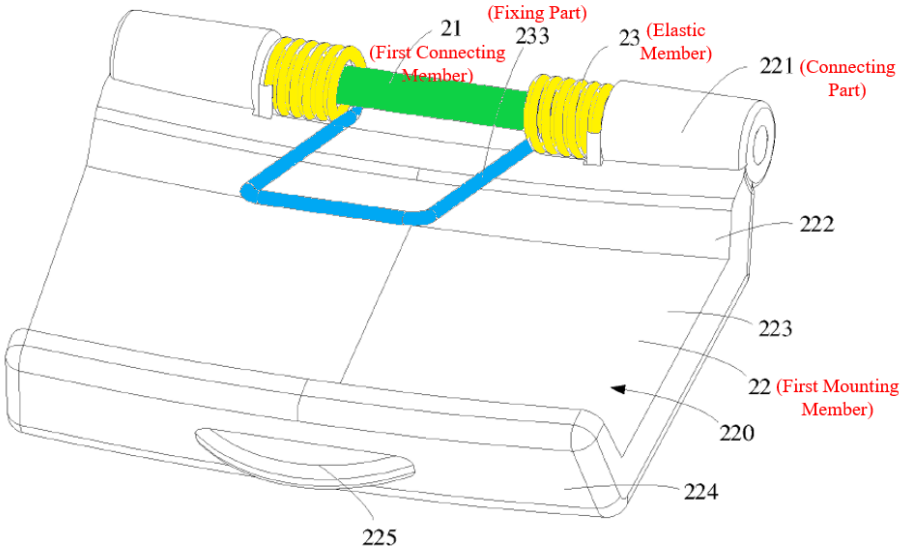

21
(First Connecting Member)
(Fixing Part)
233
23 (Elastic Member)
221 (Connecting Part)
222
223
22 (First Mounting Member)
220
224
225

FIG. 6

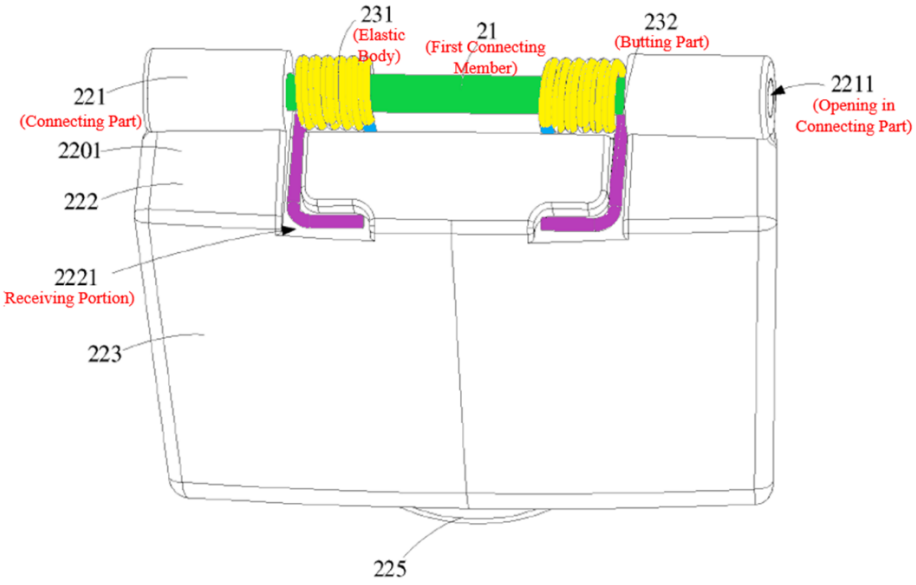

231
(Elastic Body)
21
(First Connecting Member)
232
(Butting Part)
2211
(Opening in Connecting Part)
221
(Connecting Part)
2201
222
2221
Receiving Portion)
223
225

FIG. 7

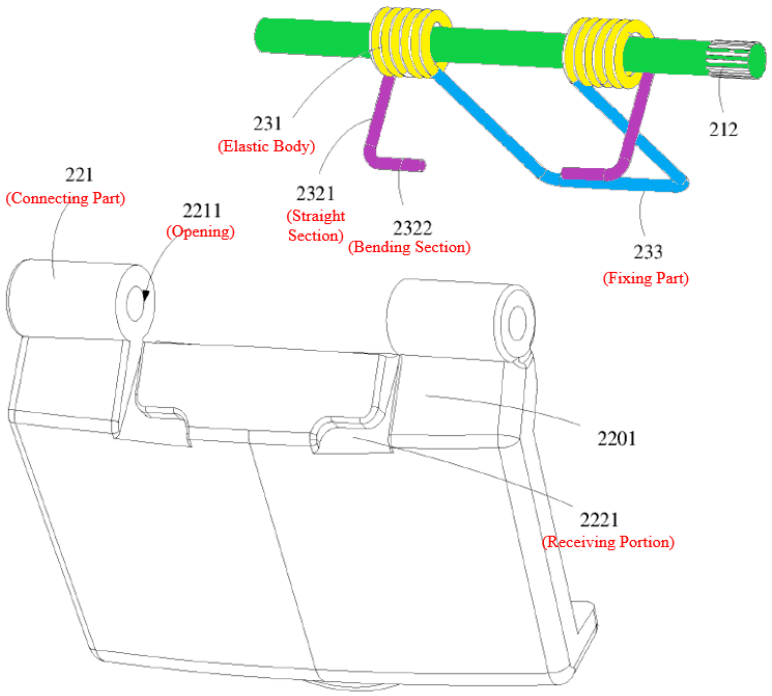


FIG. 8

Ex. 1001, 4:37-5:48.

82. The Specification explains that "[t]he first mounting member 22 is rotatably connected with the first connecting member 21 by the elastic member 23. The first mounting member 22 is clamped with the earmuff 201 under the elastic force of the elastic member 23, the clamping strength between the first mounting member 22 and the earmuff 201 is increased. The first mounting member 22 can be separated from the earmuff 201 after overcoming the elastic force of the elastic member 23." *Id.* at 5:48-61. That is, the first mounting assembly 20 "clamps" onto the earmuff 201 due to a rotational, spring-biased force but can be rotated away from the earmuff 201 to allow the earmuff cup to be released by, and separated from, the first mounting assembly of the communication device.

83. Figures 11 and 12 depict additional embodiments of elastic members, which are also torsion springs but have different designs than the embodiment of Figures 6-8 discussed above. *See id.* at 6:29-52. For example, the elastic member of Figures 11 and 12 each have a single "elastic body" design, rather than the dual-body design of Figures 6-8, and the Figure 12 embodiment does not appear to have the component identified as a "fixing part" in the Figures 6-8 and 11 embodiments. *Id.*

B. PROSECUTION HISTORY

84. I understand that the application for the '855 Patent was subject to prioritized examination under the "Track One" program. Ex. 1003, 84. The Examiner issued a single office action rejecting claims 1, 14-17 and 20 as obvious over U.S. Patent Publication No. 2018/0176673 to Madsen et al. ("Madsen") and claims 18 and 19 as anticipated by Madsen. *Id.* at 43-47. Claims 2-13 were objected to as being dependent upon a rejected base claim, but the Examiner stated those claims would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. *Id.* at 47.

85. To overcome the rejection, the patentee amended then-independent claims 1 and 18 to incorporate the limitations of dependent claim 2, as shown below:

1. (Currently amended) A communication device for a hearing protection equipment, the hearing protection equipment comprising at least one earmuff, at least one loudspeaker and an audio input member, wherein the communication device comprises:

a housing;

a first mounting assembly, rotatably arranged on a first end of the housing;

a second mounting assembly, arranged on a second end of the housing, the first mounting assembly and the second mounting assembly are connected to two ends of the earmuff respectively to releasably connect the communication device with the hearing protection equipment;

a microphone, configured for capturing an audio;

a radio transceiver, configured for wirelessly transmitting the audio captured by the microphone to user and wirelessly receiving a wireless signal containing an audio from the user; and

an audio output member, communicated with the audio input member and configured for transmitting the wireless signal containing the audio to the at least one loudspeaker, wherein

the first mounting assembly comprises:

a first connecting member, connected with the housing;

an elastic member;

a first mounting member, rotatably connected with the first connecting member by the elastic member, the first mounting member is coupled with the earmuff under an elastic force of the elastic member; and the first mounting member is separated from the earmuff after overcoming the elastic force of the elastic member.

18. (Currently amended) A system for connecting a communication device to a hearing protection equipment, the system comprising:

a communication device, comprising:

a housing;

a first mounting assembly, rotatably arranged on a first end of the housing; and

a second mounting assembly, arranged on a second end of the housing;

and a hearing protection equipment, comprising:

at least one earmuff, comprising two fixing parts, the first mounting assembly and the second mounting assembly are installed on the two fixing parts respectively, to connect the communication device to the hearing protection equipment, wherein

the first mounting assembly comprises:

a first connecting member, connected with the housing;

an elastic member;

a first mounting member, rotatably connected with the first connecting member by the elastic member, the first mounting member is coupled with the earmuff under an elastic force of the elastic member; and the first mounting member is separated from the earmuff after overcoming the elastic force of the elastic member.

Id. at 33, 36-39. A Notice of Allowance then issued. *Id.* at 10-14. As the Notice of Allowance issued without any explanation, it appears that the claims were allowed over the art of record because of the added limitations related to the "first mounting assembly."

VII. LEVEL OF ORDINARY SKILL IN THE ART

86. As previously discussed, I understand that "a person of ordinary skill in the art" or POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. In my opinion, a POSITA in this instance would have had, as of January 10, 2023, a bachelor's degree in mechanical

engineering or a similar field and at least one year of practical mechanical design experience with electro-mechanical products. A person could also have qualified as a POSITA with some combination of more formal education (e.g., a Ph.D.) and less technical experience or less formal education and more technical or professional experience in the foregoing fields. For example, an experienced machinist with no formal education could be a POSITA. A master machinist is typically an expert in computer-controlled machinery. Also known as CNC machinists, these experienced professionals use computer-numerically controlled (CNC) machines to cut, assemble, and fabricate materials into parts or products. Master machinists have a breadth of knowledge in metals, including steel, copper, brass, aluminum, and more. They are also proficient in blueprint reading, manufacturing software programs, and using various equipment like lathes, mills, and drill presses. Master machinists are masters of the trade – the CNC machining trade, specifically. They value the standards of the field and are able to deliver consistent, high-quality designs. They also have the ability to teach other machinists the techniques for top-quality work. It typically takes more than 8000 hours (4+ years) to be a master machinist. A journeyman machinist is not yet a master machinist. It typically takes 2-3 years to become a journeyman machinist, which involves completing on-the-job training, such as operating manual and automated machine tools to produce precision metal parts, and accumulating necessary work experience and completing on-site training,

such as interpreting blueprints and sketches. Here, an experienced machinist with four years of practical experience working on electro-mechanical products may have qualified as a POSITA as of the January 10, 2023 effective filing date. This could be a master machinist, or possibly an experienced journeyman machinist.

87. My experience and qualifications exceed that of a POSITA as described in Section II above. Specifically, I have formal education as a Bachelor of Science in Mechanical Engineering, a Master of Integrated Manufacturing Systems, and a Ph.D. in Electrical and Computer Engineering. I also have substantial professional mechanical design experience with electro-mechanical products as previously discussed. I am also an experienced machinist. Thus, my education combined with my substantial design and development experience, qualify me to testify as to the knowledge and understanding of a POSITA as of the time of the patented invention.

88. All of my opinions in this declaration are given as a POSITA as of the effective filing date of the ’855 Patent, which as previously discussed I understand to be no earlier than January 10, 2023 (the filing date of the earliest application cited in the related application data on the face of the patent).

VIII. CLAIM CONSTRUCTION

89. I have been informed that the United States Patent and Trademark Office and the Patent Trial and Appeal Board (“PTAB”) only construes claims when necessary to resolve the underlying controversy between a petitioner and patent

owner. Given the disclosure of the prior art references asserted, it is my opinion that none of the claim terms require construction to resolve the patentability issues set forth in my declaration. I reserve the right to provide opinions regarding any terms proposed by Patent Owner for construction.

IX. DETAILED OPINIONS OF UNPATENTABILITY

A. The Asserted References are Analogous Prior Art

90. In this section, I first explain why, in my opinion, each of the references in those asserted grounds based on prior art constitute "analogous" prior art. As previously discussed, I understand that to be "analogous," a reference must be either (a) from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (b) reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

91. I understand that GSM asserts three prior art references in its challenges to the claims. In my opinion, all three references are "analogous" to the invention (as defined by the claims) described in the '855 Patent, because they are from the same field of endeavor as the '855 Patent, and/or are reasonably pertinent to the problem faced by the inventor.

92. The field of the '855 Patent is the design of hearing protection and communication devices. *See e.g.*, Ex. 1001, Claims 1 and 17 (reciting structure of hearing protection equipment and communication device). The specification states

that one alleged problem that the '855 patent purportedly addresses relates to attaching and detaching communication devices. *See id.* at 1:32-35, 4:14-36.

1. Unger is Analogous Prior Art

93. The non-provisional application for U.S. Patent No. 11,451,900 ("Unger") was filed on August 2, 2019, published on February 13, 2020, and issued as a patent on September 20, 2022. Ex. 1004, 1. Because the earliest possible priority date for the '855 Patent is January 10, 2023, I understand that Unger is prior art under both 35 U.S.C. § 102(a)(1) and (a)(2).

94. Unger discloses a two-way radio communication device that is attachable to and detachable from hearing protection devices, such as earmuffs. *See* Ex. 1004, Abstract. Figures 3 and 5 of Unger (annotated below) depict one embodiment of such a communication device 104:

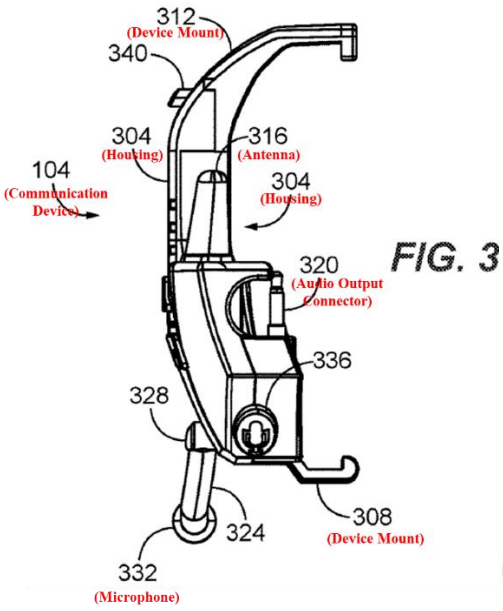


FIG. 3

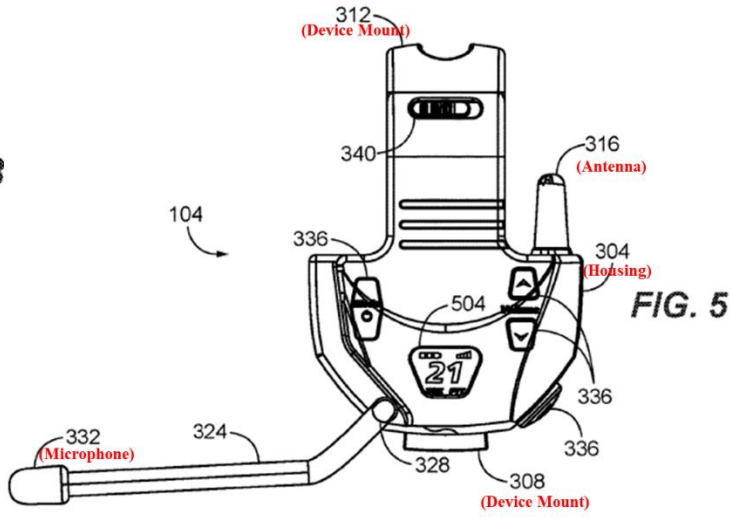


FIG. 5

95. Communication device 104 includes a housing 304 that houses or supports various components (*id.* at 4:5-9), such as microphone 332 for receiving a user's voice or other audio (*id.* at 5:3-12), antenna 316 for transmission and reception of wireless signals to allow communication between users of multiple communication devices (*id.* at 5:13-16), and audio output connector 320 for insertion into an audio input connector of a hearing protection device (*id.* at 4:48-56). Housing 304 has an upper device mount 312 and lower device mount 308, which enable the communication device to be removably attached to a hearing protection device. *Id.* at 4:10-22.

96. Figures 1 and 2 (annotated below) show communication device 104 attached to a cup 116 of hearing protection device 108 (earmuffs) via upper mount 312 and lower mount 308:

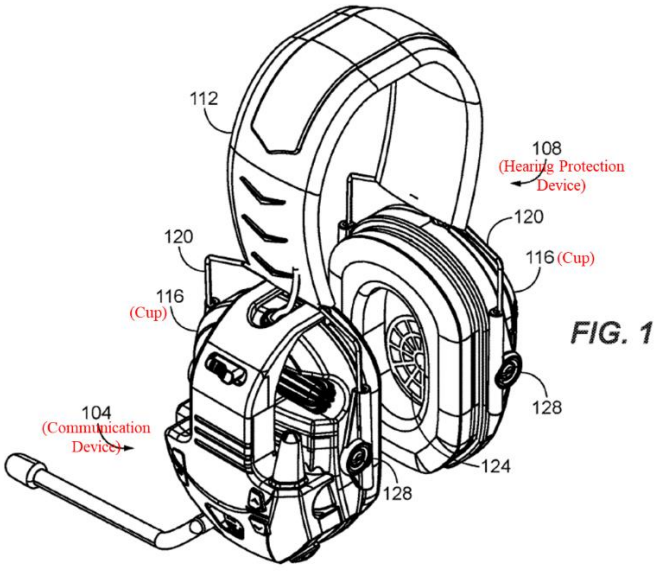


FIG. 1

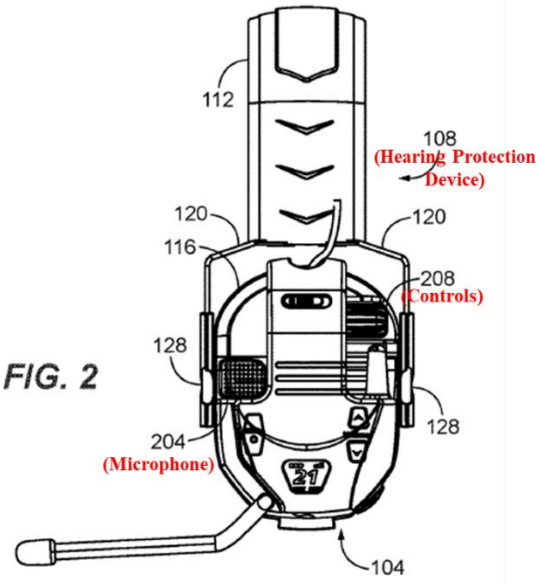


FIG. 2

Id. at 3:55-61. The hearing protection device 108 features active noise cancelling via a speaker 124 in each of the cups 112 and may include a microphone 204 for active noise cancellation as well. *Id.* at 3:64-4:5. The hearing protection device 108 also includes controls 208 (e.g., volume, active noise cancellation controls). *Id.* When the communication device 104 is attached to the cup 116, "the audio output connector 320 is automatically inserted into the corresponding connector at the cup, thereby allowing communication of audio signals therebetween." *Id.* at 4:64-5:2.

97. In the embodiment of Figure 6 (annotated below), the upper mount 312 is detachable from the rest of housing 304 via tab or member 604 that is received within a corresponding groove, slot or compartment 608:

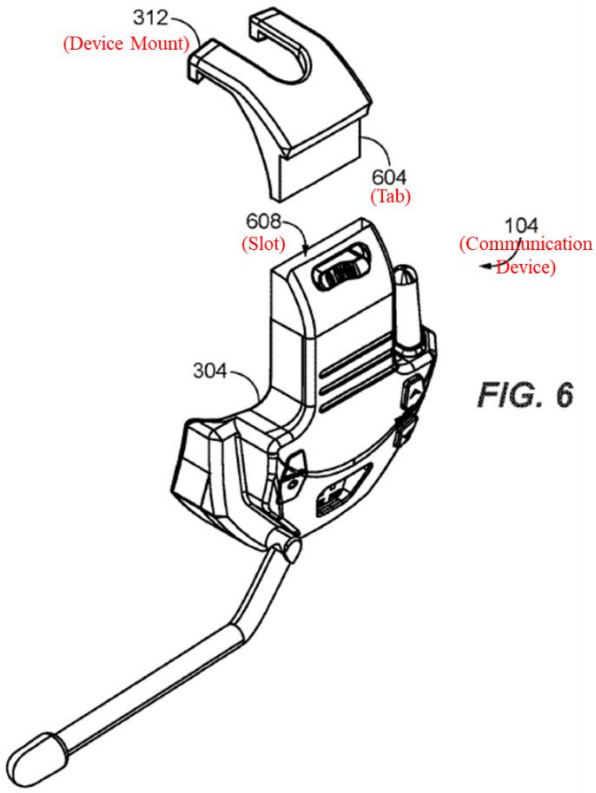


FIG. 6

Id. at 5:65-6:8. To attach communication device 104 to a hearing protection device, Unger teaches that (1) the upper mount 312 may first be removed from housing 304, (2) then the lower mount 308 is engaged with the lower portion of the earmuff cup 116, and (3) the upper mount 312 is then reattached to the housing 304 while engaging the upper portion of the earmuff cup 116. *Id.* at 5:42-55. To remove communication device 104, a reverse procedure is used where: (1) the upper mount 312 is removed from housing 304, (2) then the remainder of the communication device 104 is then detached from the hearing protection device. *Id.* at 6:9-19.

98. Unger also expressly teaches and suggests various other embodiments of device mounts:

> In some embodiments, device mounts 308, 312 need not be removable. As set forth above, a device mount 308, 312 may be flexible or resilient such as to allow malleability during attachment to and removal from a hearing protection device 108. To illustrate, one or more device mounts 308, 312 may be bent or otherwise manipulated when a cup 316 or other portion of a hearing protection device 108 is received or engaged by the enclosure 304 of a communication device 104. A device mount 308, 312 can then be allowed returned [*sic*] to a normal or at rest state to secure a communication device 104 to a hearing protection device 108. Likewise, one or more device mounts 308, 312 can be bent or manipulated to allow a cup 316 to be disengaged from an enclosure 304 when removing the communication device 104 from a hearing protection device 108. It is contemplated that one

> or more portions of an enclosure may be formed of a resilient material to aid in attachment and removal as well.

Id. at 6:20-37. Unger thus specifically contemplates embodiments where device mounts 308, 312 can be manipulated (e.g., via bending, flexibility or resilience) between two states—a "normal or at rest" state" and a "manipulated" state—to facilitate attachment and detachment with hearing protection equipment.

99. Unger is analogous art because it is from the from the same field of endeavor as the claimed invention, namely the design of hearing protection equipment and communication devices. As shown above, Unger is directed toward the design of hearing protection equipment (e.g., earmuffs) as well as the design of communication devices (e.g., walkie-talkies), including mounts for such devices. Unger is also reasonably pertinent to the problem of attaching and detaching communication devices. Unger is focused on more effectively attaching a communication device to hearing protection equipment using, for example, removable, flexible and/or resilient components. A POSITA would have thus looked toward Unger because it is pertinent to the problem of more effectively attaching and removing hearing-related devices.

2. Smith is Analogous Prior Art

100. The application for U.S. Patent No. 8,050,444 ("Smith") was filed on January 19, 2007 and issued as a patent on November 1, 2011. Ex. 1005, 1. Because

the earliest possible priority date for the ’855 Patent is January 10, 2023, I understand that Smith is prior art under both 35 U.S.C. § 102(a)(1) and (a)(2).

101. Smith explains that headphones or ear protectors are designed for noisy environments and “include features that reduce or eliminate environmental noises,” but that they are “often uncomfortable due to the pressures they exert on a user’s head and ears.” Ex. 1005, 1:11-15. To address this concern, Figure 1 of Smith (annotated below) “shows a mechanism that allows headset clamping pressure to be adjusted while the headset is being worn.” *Id.* at 5:55-56.

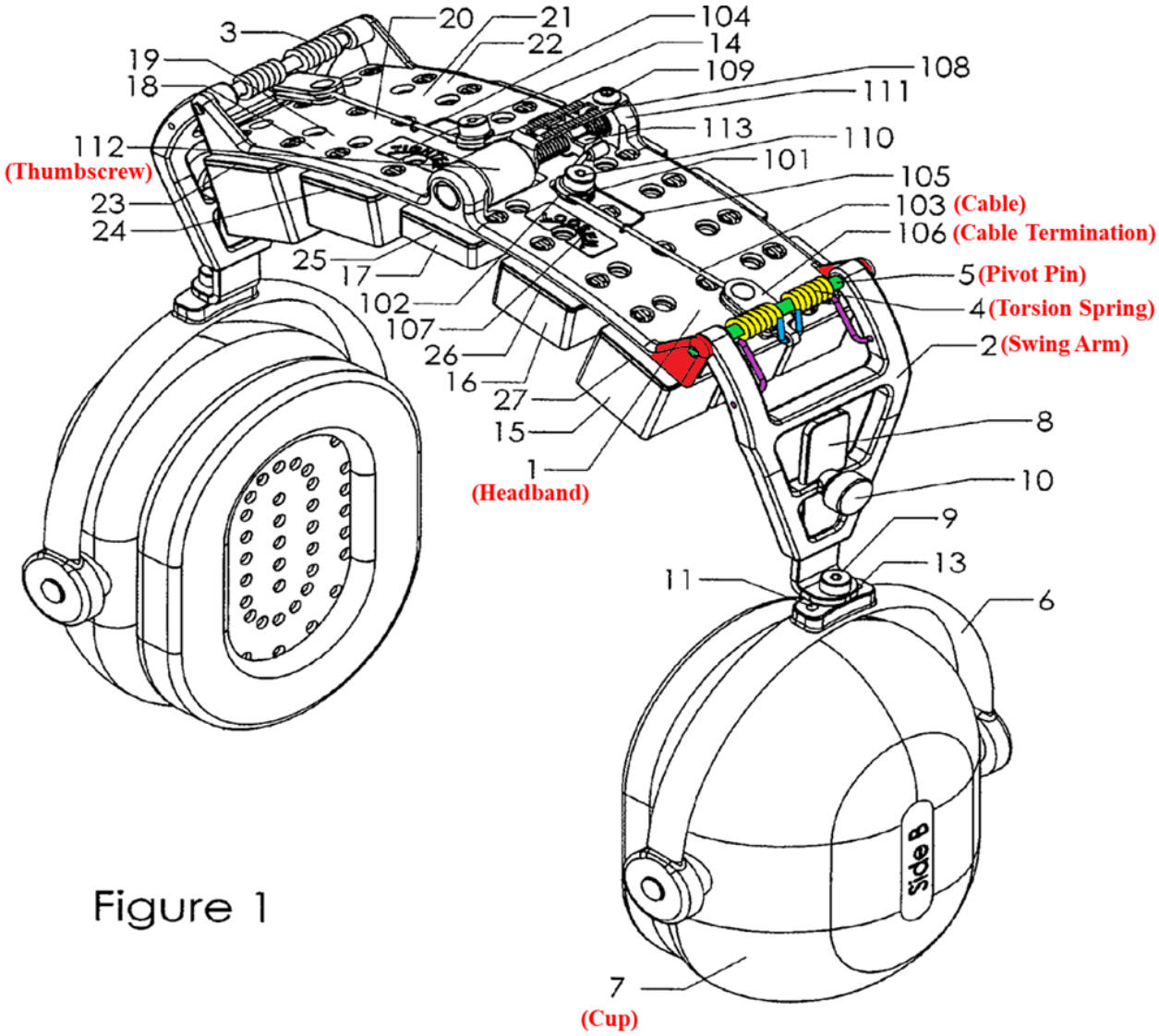
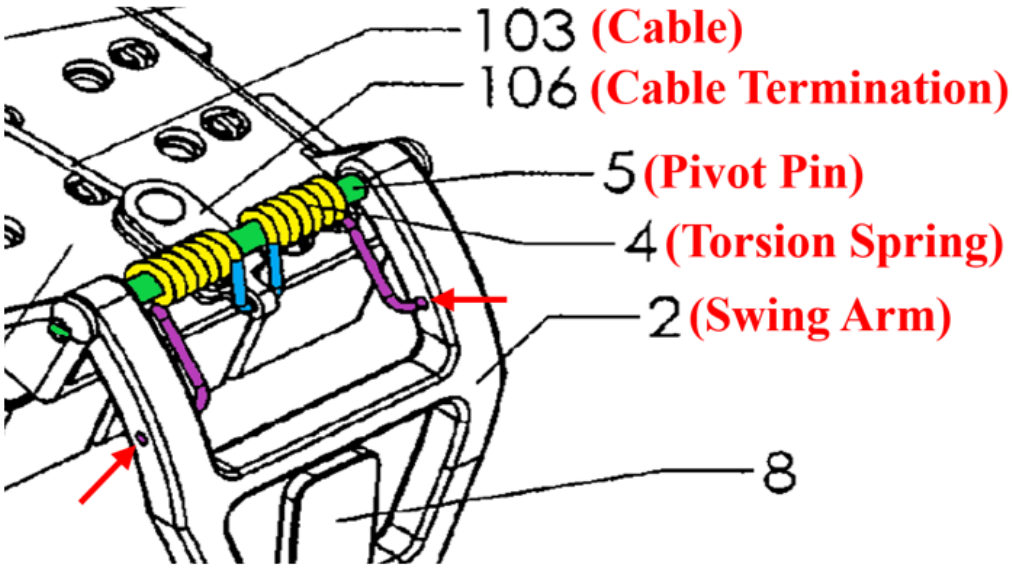


Figure 1

102. Torsion spring 4 (combination of yellow, blue and purple) is wound about pivot pin 5 (green) that couples the arm 2 to the headband 1. *Id.* at 5:55-61, 6:64-65. Specifically, as shown each end of pivot pin 5 (green) extends through opposing through-holes in the arm 2 and into through-holes of opposing lobe-portions (red) of headband 1, thereby rotatably coupling the arm 2 to the headband

1 about the pivot pin 5.[1] One portion (blue) of the spring 4 is fixed to the headband 1 via cable termination 106, and other portions (purple) of the spring 4 are connected to the swing arm 2 by bending portions that extend into through-holes in the swing arm 2. *Id.* at 4:63-65, 5:59-6:1. The connection of the bending portions to swing arm 2 is not discussed but is clearly visible, as indicated by the red arrows below pointing to the through-holes in the arm 2 that the bending portions extend into:

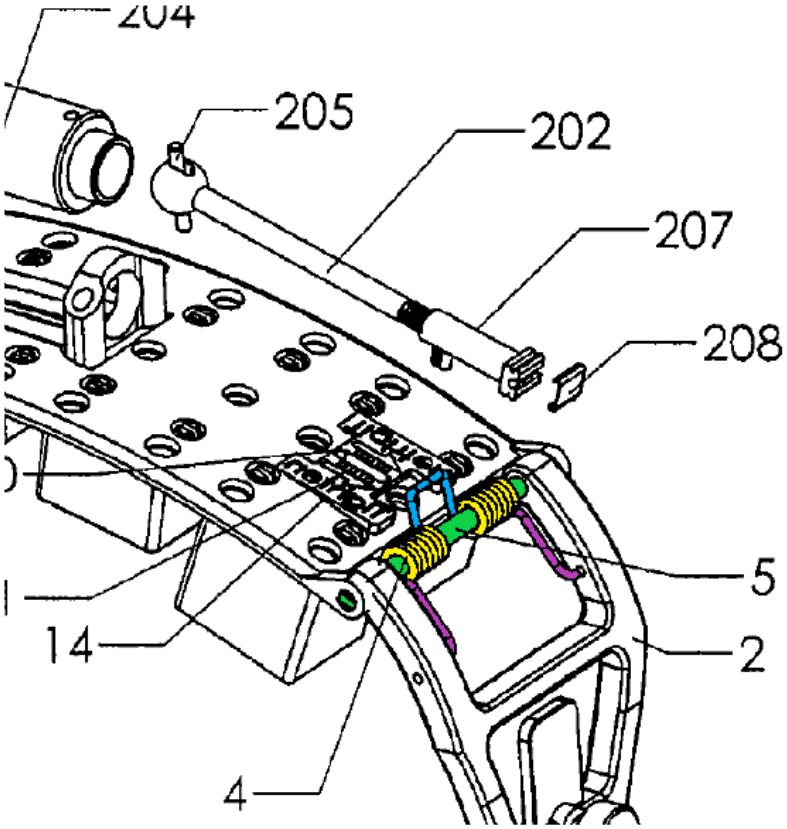


103. Smith explains how the torsion spring mechanism can be adjusted. Specifically, thumbscrew 112 can be rotated counterclockwise by the user to retract cable 103 to pull the blue-highlighted end of torsion spring 4 in the direction of cable

[1] Figure 2 depicts an alternative "driveshaft" embodiment where pivot pin 5 also extends through openings in the arm 2 and lobes. *Id.* at 7:27-43.

termination 106, which causes the spring 4 to apply more inward pressure to earcup 7. *Id.* at 6:3-10. Conversely, rotating thumbscrew 112 in the opposite direction allows the blue-highlighted end of spring 4 to pull cable 103 in the direction away from cable termination 106, lessening the clamping pressure applied to earcup 7 by spring 4. *Id.* at 6:10-16. An identical spring mechanism (e.g., comprising torsion spring 3) is on the opposite end of the headband 1. *Id.* at 6:1-2, 15-17.

104. Smith also discloses another embodiment in Figure 2 (partial, annotated below), which as shown below has a torsion spring 4 that is identical to the torsion spring of Figure 1 and that is also wound about a pivot pin 5 (green) that is coupled the arm 2 to the headband 1:

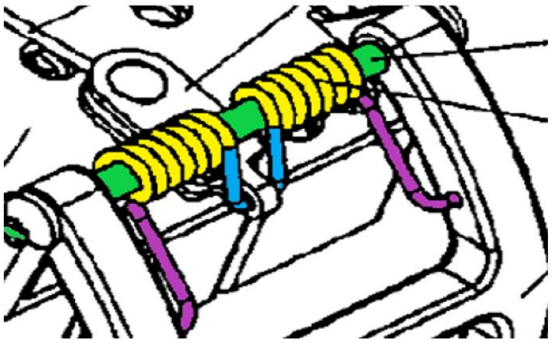


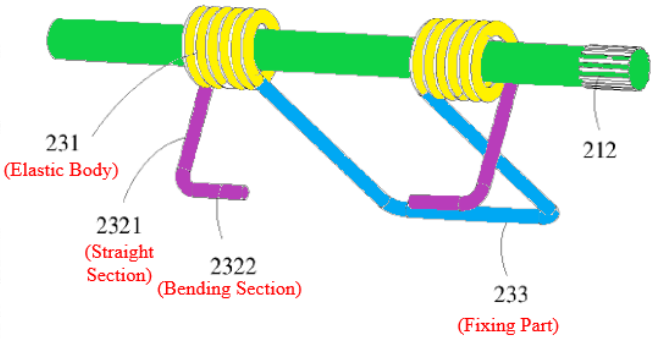
However, in this embodiment the end 208 of driveshaft 202 is attached to the blue portion of the torsion spring 4 and the drive shaft 202 can be pushed and pulled to adjust the inward pressure applied by the spring. *Id.* at 7:27-8:30.

105. Consequently, just as the torsion spring mechanism of the ’855 Patent provides spring-biased rotational freedom to the lower mount assembly to facilitate attachment and detachment, the torsion spring mechanism of Smith provides spring-biased rotational freedom to the swing arms and their earmuff cups, allowing each cup to be manipulated or rotated away from the wearer’s head to make it easier to put the earmuffs on the wearer’s head while applying a clamping force the wearer’s head to provide a more comfortable fit. *See id.* at 4:60-65.

106. The torsion spring 4 of Figure 1 of Smith (partial, annotated below) has identical constituent parts as the torsion spring in Figure 8 of the ’855 patent (partial, annotated below), as evidenced by the following side-by-side comparison:

Smith, Figure 1 **’855 Patent, Figure 8**





107. Specifically, like the torsion spring mechanism of Figure 8, Smith’s torsion spring mechanism also includes a torsion spring 4 comprising two spaced apart elastic bodies (yellow), two butting parts (purple) each having a straight section and a bending section, and a fixing part (blue), where the spring’s bodies are sleeved on a connecting member (green).

108. Smith thus discloses a torsion spring mechanism that applies a rotatable clamping force to the swing arm 2, which can be adjusted as desired so that the earmuff cups are more comfortable for the wearer. As Smith explains, “embodiments herein disclosed allow a user to easily adjust the pressure of headset earphones while wearing the headset so that he or she can choose the optimum balance between clamping pressure and passive noise reduction.” *Id.* at 11:11-22.

109. Smith is analogous art because it is from the same field of endeavor as the claimed invention, the design of hearing protection equipment and

communication devices. Like the claimed invention, Smith is directed toward the design of hearing protection equipment (e.g., earmuffs).

110. Smith is also reasonably pertinent to the problem of attaching and detaching communication devices. Smith is focused on more effectively attaching headphones or hearing protection equipment to a wearer's head using an adjustable torsion spring mechanism. Therefore, one of ordinary skill would have looked toward Smith because it is pertinent to the problem of more effectively attaching and removing hearing-related devices.

3. Hakansson is Analogous Prior Art

111. The application for U.S. Patent No. 10,792,190 ("Hakansson") was filed on April 2, 2020, and issued as a patent on October 6, 2020. Ex. 1013, 1. Because the earliest possible priority date for the '855 Patent is January 10, 2023, I understand that Hakansson is prior art under both 35 U.S.C. § 102(a)(1) and (a)(2).

112. Hakannson teaches a hearing protector, and a method of making a hearing protector. Ex. 1013 at 1. Hakannson is focused on increasing the technical reliability and comfort of earmuffs and their manufacture. *See e.g.,* Ex. 1013, Abstract ("The hearing protector facilitates manufacturing and maintenance and provides for maximize wearing comfort and technical reliability."). Hakannson discloses earmuffs having a generally rigid shell, combined with a cushion made of

"elastically deformable material" for cushioning and sealing to the wearer's head, as shown in annotated Figure 2 from Hakannson below.

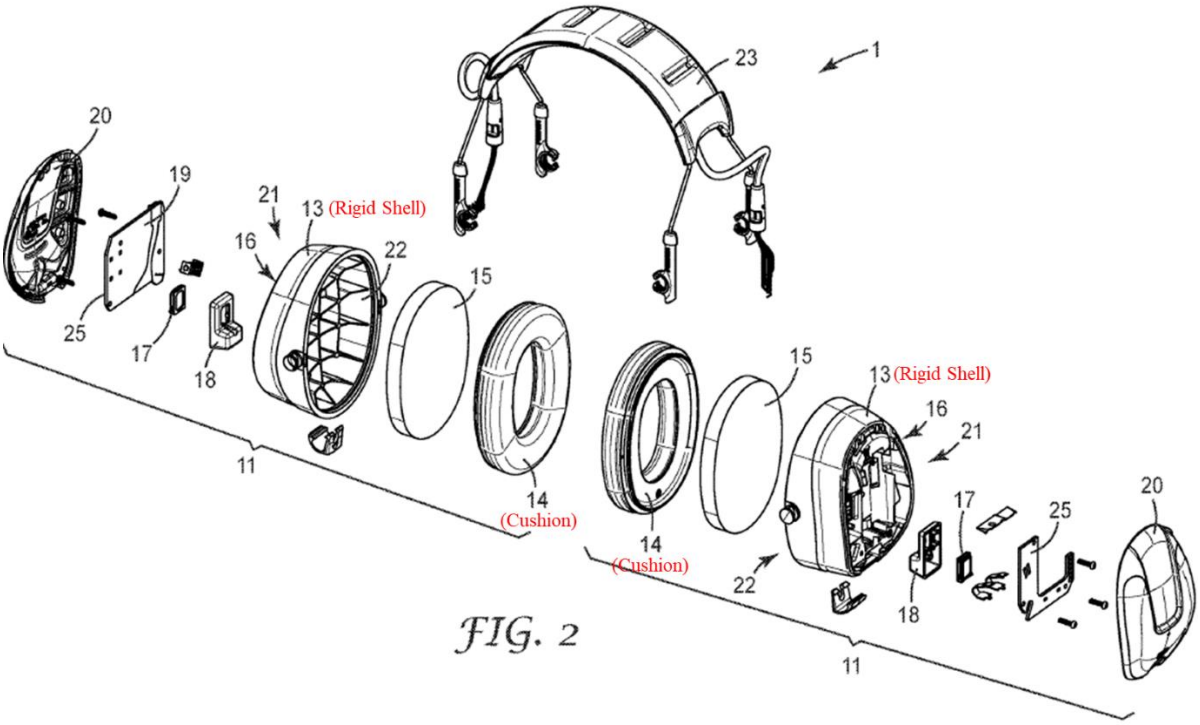


FIG. 2

Id. at 4:67-5:37.

113. Hakansson is analogous art to the claimed invention because it is from the same field of invention. Specifically, Hakansson is directed toward the design of hearing protection equipment (e.g., earmuffs). Hakannson is also reasonably pertinent to the problem faced by the inventor of the '855 Patent. Hakansson is focused on increasing the technical reliability and comfort of earmuffs and the manufacturer thereof. *See e.g., Id.* at Abstract; *see also* Section IX.B.4 (claim 18) below. Consequently, one of ordinary skill would have looked toward Hakansson

because it is pertinent to the problem of improving the reliability of hearing protection equipment.

B. GROUND 1

114. This section explains where the references comprising Ground 1 demonstrate the limitations of the challenged claims and why a POSITA would consider the challenged claims obvious in view of the prior art. I note that, although the discussions regarding the dependent claims may not explicitly reference the analyses of the limitations from which they depend, it should be understood that those analyses are part of my testimony with regard to each dependent claim.

1. Articulated Rationales to Combine

115. A POSITA would have found it obvious to modify Unger's lower and/or upper mount to incorporate a torsional spring mechanism as taught by Smith for several reasons. There are at least four independent reasons for this conclusion.

a. Express teaching, motivation, and suggestion to combine.

116. Unger contains an express teaching, motivation and suggestion to incorporate an element such as Smith's torsional spring into the lower and/or upper mount assemblies 308, 312 to facilitate attachment and detachment:

> In some embodiments, device mounts 308, 312 need not be removable. As set forth above, a device mount 308, 312 may be **flexible or resilient** such as to allow malleability during

> attachment to and removal from a hearing protection device 108. To illustrate, one or more device mounts 308, 312 may be **bent or otherwise manipulated** when a cup 316 or other portion of a hearing protection device 108 is received or engaged by the enclosure 304 of a communication device 104. A device mount 308, 312 **can then be allowed returned [sic] to a normal or at rest state** to secure a communication device 104 to a hearing protection device 108. Likewise, one or more device mounts 308, 312 can be bent or manipulated to allow a cup 316 to be disengaged from an enclosure 304 when removing the communication device 104 from a hearing protection device 108. **It is contemplated that one or more portions of an enclosure may be formed of a resilient material to aid in attachment and removal as well**.

Ex. 1004, 6:20-37 (emphasis added).

117. A POSITA would understand this to teach that mount arms 308, 312 could be removable from the housing 304 (e.g., as mount arm 312 is in Figure 6) and/or they could be designed to be "flexible" or "resilient" such that they can be manipulated. A POSITA would also understand that "resilient" is defined as "bouncing or *springing back* into shape, position, etc. after being stretched, *bent*, or, esp., *compressed*." Ex. 1014, 6 (italics added); *see also* Ex. 1015, 6-7; Ex. 1016, 5. Consequently, this teaching alone suggests the use of a torsion spring.

118. The passage further expressly teaches that the arms could be "bent or otherwise manipulated" in one direction by an applied force to allow for easier attachment of the mounts to the cups of hearing protection equipment, while also being biased in the opposite direction when the applied force ceases such that the arms attempt to return to their "normal or at rest" state. A POSITA would understand this to strongly suggest the use of a torsion spring to facilitate attachment and detachment, as torsion springs are specifically designed to impart this type of manipulation into devices by allowing for a component to be moved from a "normal or at rest" state to a "manipulated state," while applying a spring-biased force toward the "normal or at rest state." Indeed, the statement that the arms may be "resilient" explicitly suggests an elastic or spring-like characteristic.

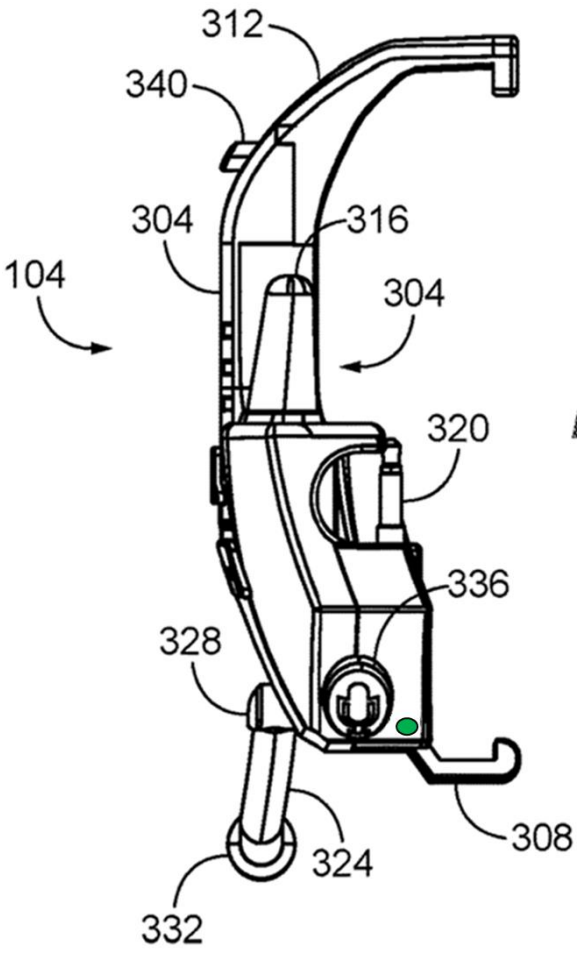
119. A POSITA would also note that the last sentence of the passage—"[i]t is contemplated that one or more portions of an enclosure may be formed of a resilient material to aid in attachment and removal as well"— expressly teaches that one or more portions of the enclosure (*i.e.*, the housing 304) may be formed of a "resilient material," in addition to or in lieu of the mounts themselves being made of a resilient or flexible material. This suggests incorporating a spring (a "resilient" component) in the housing to "aid in attachment and removal," in addition to or instead of forming the mount arms of a flexible or resilient material.

120. A POSITA would understand that there were a limited number of ways to impart the referenced resilient or flexible "manipulation," such as forming the mounts of a resilient or flexible materials and/or relying on a resilient component (e.g., rubber, rigid yet pliable plastic, a spring) mechanism in the housing 304 to apply a biasing-force to the arms. Indeed, as discussed above Unger "contemplate[s] that one or more portions of an enclosure may be formed of a resilient material to aid in attachment and removal as well" (*id.* at 6:34-37) and Unger refers to its housing 304 as an "enclosure." *See e.g.*, Ex. 1004, 4:7-12, 5:5-6, 6:1-3.

121. This teaches, in addition to the fact that the mounts themselves may be flexible or resilient, that there may be a separate component (e.g., a spring) in the housing 304 "to aid in attachment and removal." Based on this teaching, a POSITA was motivated to look toward various known solutions to impart the suggested functionality, including the torsional spring mechanism of Smith that is used in a similar hearing protection device application for a similar purpose as the mounting arms of Unger (e.g., to apply a clamping force).

122. A POSITA understood that Smith's torsional spring mechanism would "aid in attachment and removal" when incorporated into Unger. A POSITA would understand that using Smith's spring mechanism in the upper and/or lower device mount assemblies 308, 312 of Unger's communication device would allow the mount arms to be more easily attached and detached from the communication device

by allowing the mount arm to be more easily manipulated. For example, Figure 3 of Unger has been annotated below to show where a POSITA would have understood that the pivot pin (green) of Smith could be incorporated through the lower end of Unger's housing or enclosure 304 and through the base of a separately fabricated mount arm 308:



123. Below, I have included images of a computer-generated model below showing one way that a POSITA would have understood Smith's torsion spring

(combination of yellow, purple, blue) could be sleeved on the pivot pin (green) and the pin inserted through openings in the housing 304 and base of the lower arm 308 to firmly couple those components together in a rotational manner.[2] However, it is important to note that Smith's torsion spring could be incorporated into the upper arm 312 of Unger in the same manner, and that the model below is only an example intended to show how simple it would have been to incorporate Smith's torsion spring into Unger.[3]

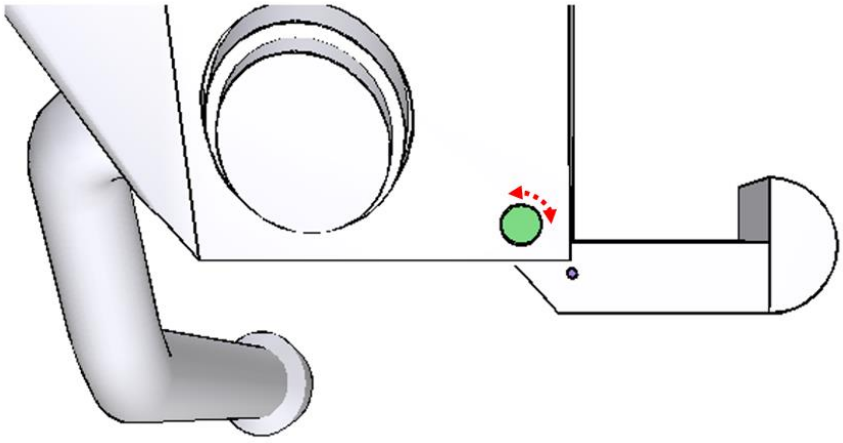
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[2] The 3D model was created by a third-party graphics and technology firm using a 3D modeling program called Blender. The model was prepared with my oversight and guidance.

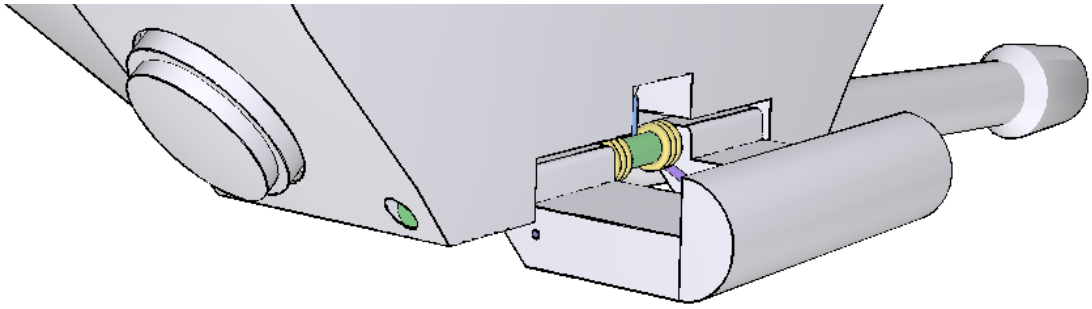
[3] I understand that a demonstration of bodily incorporation into Unger is not required. For example, Unger also teaches that the audio output connector 320 "will typically extend outward from an enclosure 304" (Id. at 4:48-4:49) and "it can be seen that the enclosure 304 supports the audio output connector 320 at a particular location. This location is selected to align with a corresponding connector of a hearing protection device. In this case, the 65 audio output connector 320 extends upright from a platform at a back end of the enclosure." *Id.* at 4:61-4:66. A POSITA would thus understand that the orientation of the audio output connector 320 shown

in Figure 3 is not limiting. Rather, a POSITA would understand that the audio output 320 may also be oriented generally perpendicular to the orientation shown in Unger's Figure 3 so as to allow the communication device 104 to attach with a lateral motion, or alternatively could be located at the top of communication device to align with the audio input on the top of an ear cup so that the audio connection is established by a downward movement of the communication device to attach to the earmuff cup.

Side-View



Perspective View

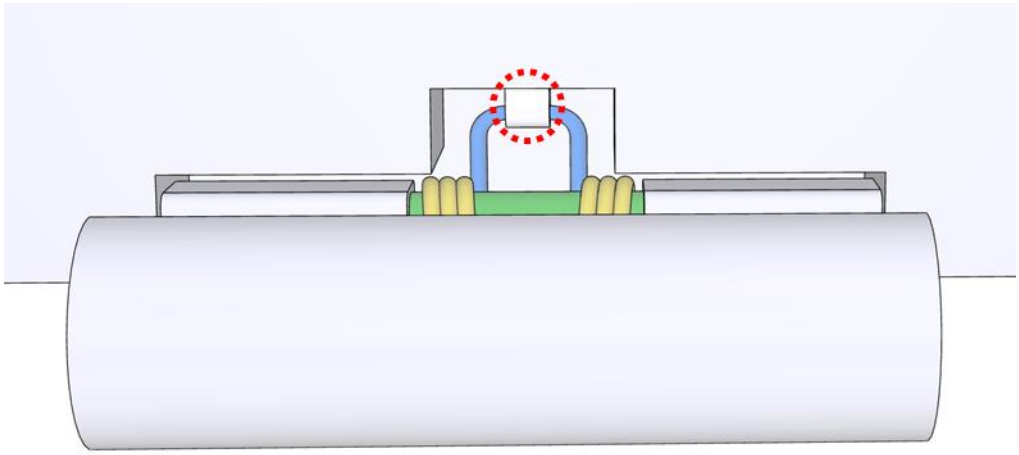


The red-dashed arrow indicates how the mount arm can rotate about the pin. This is only one example of how a POSITA would have understood the torsional spring mechanism of Smith could be incorporated into the mounting assemblies of Unger. A POSITA would have recognized that there were numerous different obvious ways to incorporate the torsion spring mechanism into Unger to provide the referenced

advantages.

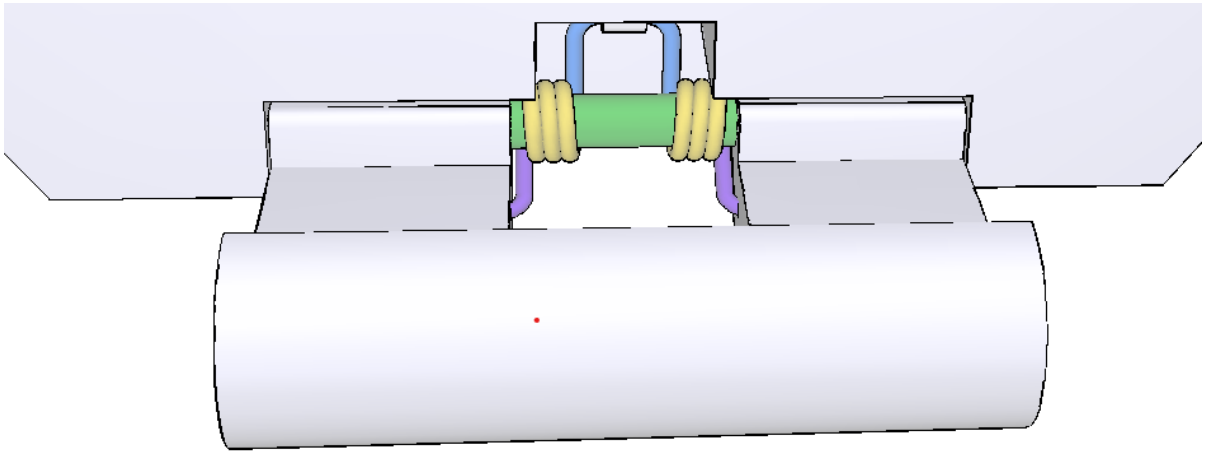
124. The first front view below shows how the blue end of the spring is fixed to the housing 304 via a though-hole in a ring-lobe (red-dashed circle) of the housing 304:

First Front View



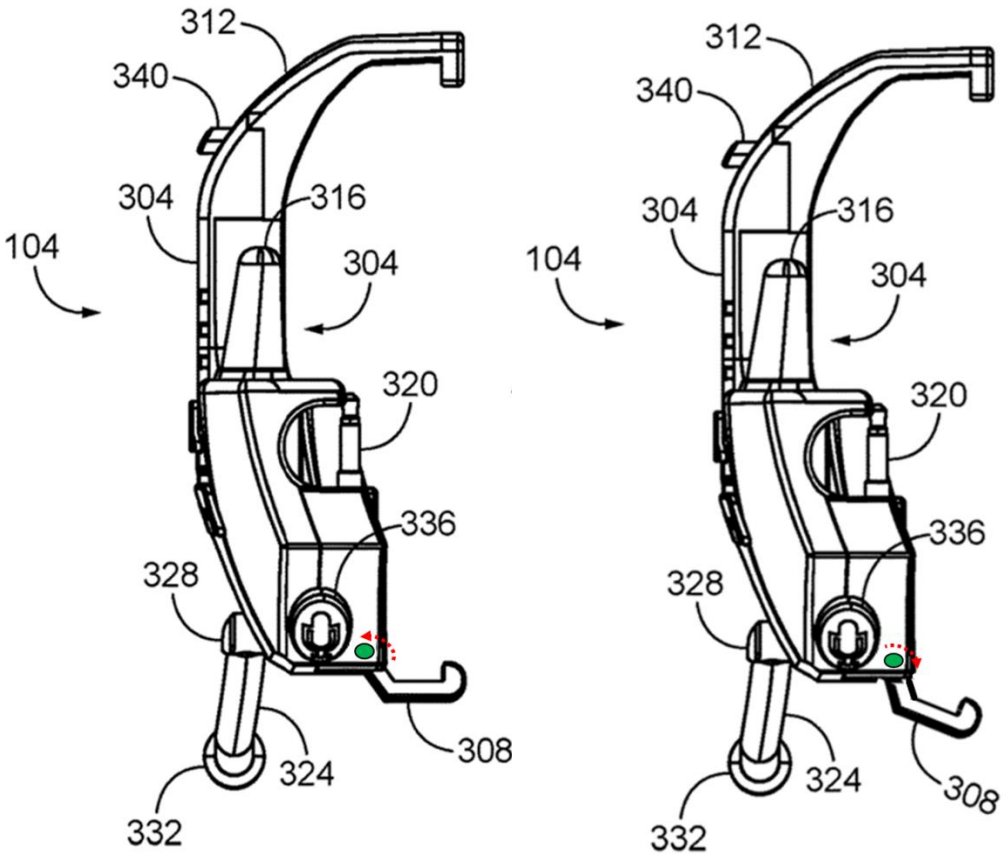
Another front view below shows how the purple ends of the spring bend into openings inside the lower mount arm, securely connecting the purple ends to the lower arm.

Second Front View



125. As shown in annotated versions of Figure 3 of Unger below, a POSITA would understand that the incorporation of Smith's torsion spring into Unger in this manner would allow for the lower mount arm to be rotated away from the hearing protection device to more easily attach/detach the communication device (see right image below), while also rotationally biasing the lower mount arm toward the hearing protection device so that it returns to its "normal or at rest" state to securely clamp the mount to the cup of the hearing protection device once attached (see left figure below):

"Normal or at Rest" State **"Manipulated" State**



An animation of the 3D model has been provided as well showing how the lower mount can be rotated. *See* Ex. 1020.[4] A POSITA would understand this design to make it easier to attach to and detach from the earmuffs, as compared to using only a rigidly coupled monolithic lower mount 308 made of a resilient material (e.g.,

[4] The animation was created by a third-party graphics and technology firm using Adobe's After Effects software. The animation was prepared with my oversight and guidance.

rubber, plastic). Specifically, a POSITA would understand that such rigidly coupled mount arms would provide some spring-like flexibility to allow for attachment/detachment (e.g., by bending the arms slightly to initially attach and initially detach), but that flexibility is limited because the arm material must still be sufficiently rigid to ensure a secure coupling without the arm breaking and/or without exceeding the material's plasticity threshold. By comparison, a multi-part mount incorporating Smith's torsion spring mechanism would be easier to attach and detach because the torsion spring mechanism provides more freedom for the mounting arm to be manipulated (i.e., rotated away) relative to the earmuff cups while still providing a spring-biased "clamping" force to ensure a secure coupling. A POSITA would recognize the choice between a monolithic mount arm and a torsion spring-based mount arm as simply a design decision, as the two can yield very similar results.

126. A POSITA would have understood this added freedom of movement would allow the communication device to adapt to a wider array of hearing protection equipment having external profiles (e.g., outer earmuff shape) that do not closely conform to the inner profile of the communication device. While a lower mount arm made of a resilient material provides some adaptability, that adaptability is limited because the resilient material must also be sufficiently rigid to ensure secure attachment. The spring-biased "clamping" force of the torsional spring allows

for the lower mount arm to securely attach to earmuffs with external profiles less conformant to the inner profile of the communication device. In fact, Unger expressly teaches that one of its goals is to "allow[] a communication device 104 to connect to *a wide variety* of hearing protection devices 108," thus further motivating one of skill in the art to look toward known, available mechanisms in the art that would allow the communication device to attach to as many hearing protection device designs as possible. Ex. 1004, 7:56-59.

127. Moreover, while in the 3D model the torsion spring mechanism is only depicted for the lower device mount 308, a POSITA would have readily understood that Unger teaches that the upper device mount 312 need not be removable and thus could be identical to lower device mount 308. A POSITA would thus understand that the torsion spring mechanism could be incorporated into upper device mount 312, in the same manner the spring mechanism is incorporated in the lower device mount 308 shown above. The spring could be incorporated into the upper mount 312 in addition to the spring of lower mount 308, or in lieu of the spring of lower mount 308. A POSITA would understand that the former would provide the added benefit of providing more flexibility and freedom of movement for attachment and detachment, as both arms would have more freedom of manipulation.

128. To further reinforce Unger's express teaching, motivation and suggestion to incorporate an element such as Smith's torsional spring to facilitate attachment and detachment:

> A device mount 308, 312 may be a hook or hook shaped, like that shown, or may comprise other structures that facilitate removable attachment to a hearing protection device in one or more embodiments. It is noted that a device mount 308, 312 may be formed of a flexible or resilient material to aid in attachment to and removal from a hearing protection device, while an enclosure 304 remains rigid or at least more rigidly formed. One or more fasteners, such as screws, pins, or the like may be used to secure a communication device 104 in one or more embodiments.

Ex. 1004, 4:23-32

129. A POSITA would know that latches are a common category of "fastener", and that the disclosed fasteners include spring latches. Spring latches are a type of mechanical fastener that joins two or more objects and allows for regular separation or disconnection. Spring latches typically consist of a spring-loaded mechanism that securely holds objects together and can be easily released when torqued counter to the spring's bias. Spring latches can be found in a wide range of forms, including, but not limited to, toggle latches, draw latches, spring-loaded slide-bolt latches, spring safety latches, torsion spring latches, double torsion spring latches, etc. The double torsion spring, like that of Smith, can be designed with two

coils wound in opposite directions, enabling the application of torque or rotational force in opposing directions.

b. Application of a known technique to a known device ready for improvement to yield predictable results.

130. I understand that if a technique has been used to improve one device, and a POSITA would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond the skill of a POSITA.

131. Incorporating Smith's torsional spring mechanism into Unger's upper and/or lower device mounts in the manner discussed above would have involved applying a known technique to a known device ready for improvement to yield predictable results. Unger's communication device constitutes a "base" device upon which the claimed invention would be seen as an improvement by allowing for improved mount arm manipulation to make attachment/detachment easier and for attachment to a wider array of earmuffs. Smith discloses the known technique of using a torsion spring to impart a rotational "clamping" force to earmuff cups to better adapt earmuffs to a wearer's head. Applying that technique to Unger as discussed above would improve Unger's communication device in the same way by better adapting the communication device to the earmuffs. As shown above, this involves simply using Smith's dual-body torsion spring in the same manner in Unger

as it is used in Smith, and thus it is well within the skill of a POSITA. Therefore, a POSITA would understand that the claimed invention was obvious.

c. Combining prior art elements using known methods to achieve predictable results.

132. I understand that combining familiar elements according to known methods is likely to be obvious when it does nothing more than yield predictable results.

133. Here, incorporating Smith's torsion spring mechanism into the upper and/or lower mount of Unger constitutes combining prior art elements using known methods to achieve predictable results. As shown in the element-by-element analysis in Section IX.B.4 below, the combination of Unger and Smith contains all claim elements. The only difference between the claimed invention and the prior art references is that all the elements are not expressly included in a single prior art reference (which I understand would constitute anticipation, not obviousness). A POSITA would have readily understood and appreciated how the known torsion spring mechanism of Smith would be incorporated into Unger using at least the known methods demonstrated above with reference to the model images. A POSITA would also have understood that the torsion spring mechanism merely performs the same function (i.e., applying a spring-biased rotational clamping force) in the

combination as it does separately in Smith. Therefore, a POSITA would understand that the claimed invention was obvious.

d. Simple substitution of a known element for another

134. I understand that the simple substitution of one known element for another makes the claimed invention obvious.

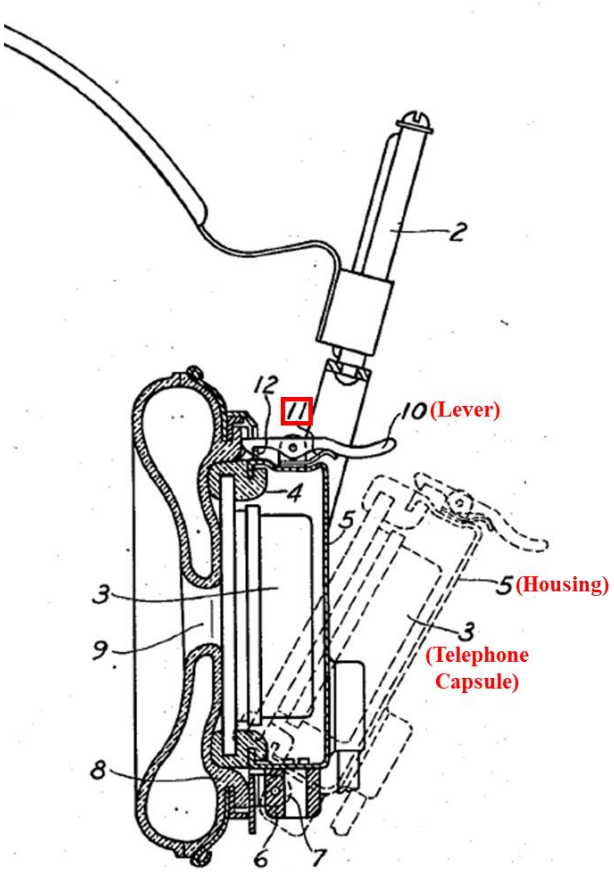
135. Incorporating Smith's torsion spring mechanism into the lower mount of Unger constitutes the simple substitution of one known element (i.e., Smith's torsion spring mechanism) into another (i.e., the connection point of Unger's lower mount arm 308 and housing 304). The function of Smith's torsion spring mechanism and Unger's rigidly coupled lower mount arm 308 were both well-known in the art, as were their designs. For example, as explained in Section IX.B.2 below, it was well-known that torsion springs, such as Smith's, typically comprised one or more spring windings mounted on a shaft (or pin) to allow for a rotational force to be exerted in a desired direction. Therefore, a POSITA would understand that the claimed invention was obvious.

2. Reasonable Expectation of Success and Predictable Results

136. A POSITA would have had a reasonable expectation of success in incorporating Smith's torsion spring mechanism into Unger and would have found the results of the combination to be predictable. There are multiple reasons for this conclusion.

137. First, the use of spring mechanisms, including torsion springs, to provide additional freedom of manipulation and to impart a rotational biasing force in headset devices was ubiquitous, as evidenced by the teachings of the prior art discussed below.

138. U.S. Patent No. 2,235,372 issued in 1941. That patent is directed toward a telephone apparatus that is attachable to earphones or a helmet. Ex. 1008, 1:1-3. As shown in Figure 1 (partial, annotated below), the telephone apparatus comprises a capsule 3 and housing 5, which are attachable and detachable from headphones by a rotatable locking lever 10 that is biased to the latching position by spring 11:



Id. at 1:51-2:24. Consequently, as early as 1941 it was known that springs could be used to aid in coupling a communication device (e.g., telephone apparatus) to a hearing device.[5]

139. U.S. Patent 3,160,717 is a 1964 patent directed toward an "ear-protector." Ex. 1007, 1:8-11. As shown in Figures 4 and 6 (annotated below), the ear protector incorporates two torsion springs 32 (yellow) wound about a pivot pin 28 (green) to apply a spring-biased force to rotatable door 24 in the direction of the ear canal 66 so that the end portion 42 creates an "airtight" fit within the ear canal when the ear protector is worn:

[5] While spring 11 does not appear to be a torsion spring, as discussed below the use of such springs to facilitate coupling was well-known and common in the field of hearing protection devices.

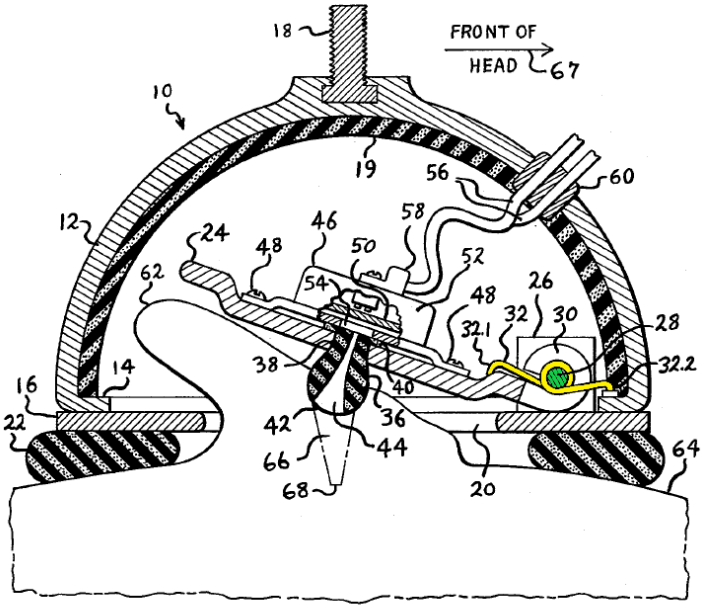


Fig. 6

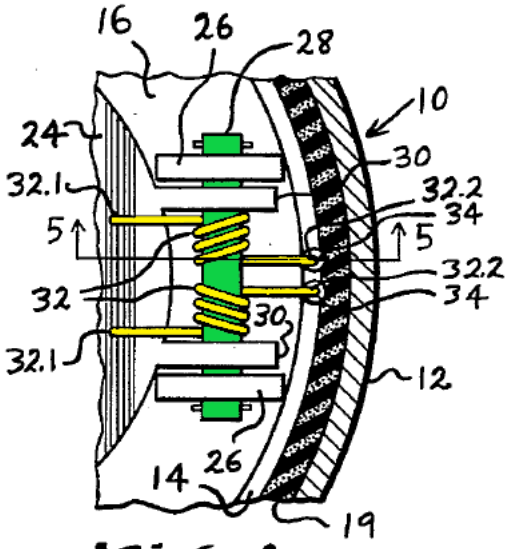


Fig. 4

Id. at 3:15-32, 4:39-72, 5:19-43. Thus, by at least 1964 it was known that torsion springs could be used to provide spring-biased rotational movement to aid in attaching a hearing protection device.

140. U.S. Patent No. 8,488,814 issued in 2013 and is directed toward an acoustic headset that may be used with a helmet. Ex. 1006, 1:11-13. As shown in Figure 1 (annotated below), the assembled acoustic headset includes two abutment plates 16, 18 each coupled to an acoustic module 4 and 6, respectively:

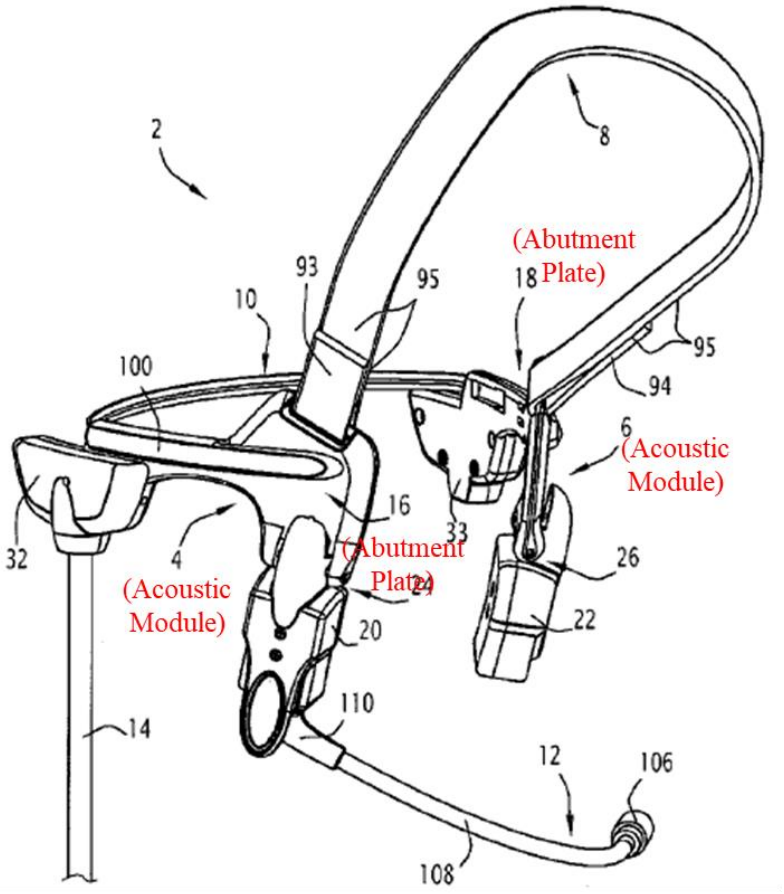


FIG.1

Id. at 2:30-37. Each acoustic module 4, 6 is spring biased toward the face of the wearer via a torsion spring mechanism. More specifically, as shown in Figures 3 and 4 (annotated below), the spring mechanism associated with acoustic module 4 comprises a torsion spring 28 mounted on articulation shaft 80, which is received within through holes 86 of the transducer 20 and mounted to through holes 84 of abutment plate 16:

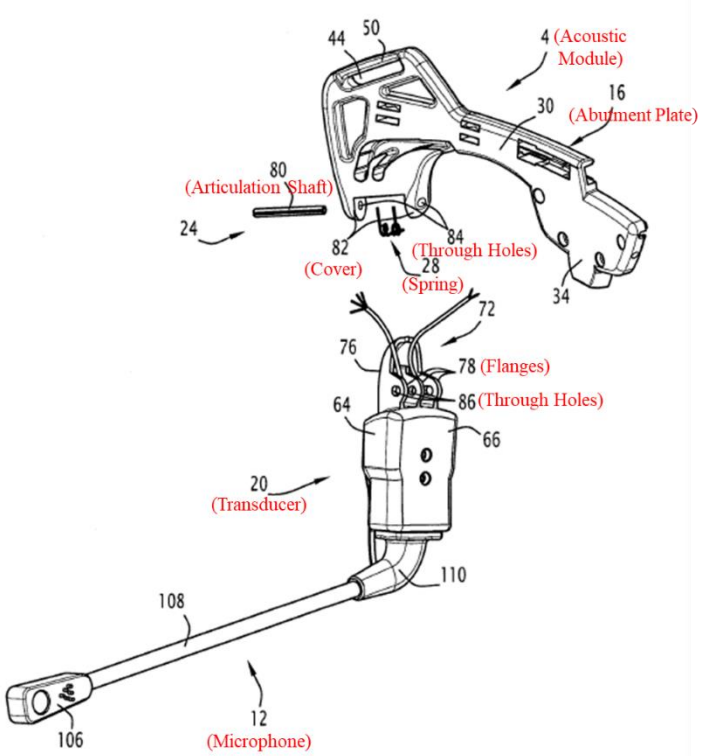


FIG.3

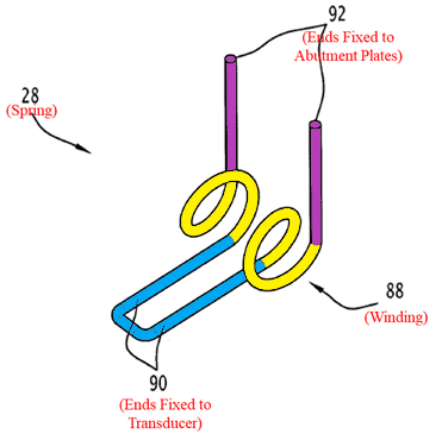


FIG.4

Id. at 3:30-64. Spring ends 90 are fixed to transducer 20 and spring ends 92 are fixed to abutment plates 16 of acoustic module 4. *Id.* at 3:57-62. Notably, this torsion spring comprises the same constituent parts as the dual-body torsion spring depicted in Figure 8 of the '855 patent, namely two spaced apart spring "bodies" (yellow) indirectly connected with one another via a "fixing part" (blue), and "butting parts" (purple).

141. As explained in this patent, "the return movement applied by the spring 28, when the spring 28 is not in a rest position, is directed from one module 4, 6 towards the other module 4, 6." *Id.* at 3:56-62; *See also* 2:35-43. More specifically, "the spring 28 allow the transducers 20, 22 to be kept in contact with the right and

left temporal bones of the skull." *Id.* at 5:9-11. In other words, the torsional force of the spring allows for rotational force (or "torque") to be applied to each transducer toward the wearer's head, while still allowing the transducer to be rotated away from the wearer's face to facilitate removal of the headset.

142. Second, in addition to these specific examples of torsion-spring mechanisms in hearing protection devices, the design and functionality of torsion springs was well understood in the mechanical arts. Torsion spring design was taught as part of a standard mechanical engineering curriculum, demonstrating that the design, functions and capabilities of such springs were well-known and predictable in the arts. *See e.g.*, Ex. 1017, 8-11 (discussing formulas, properties, and "design rules" for designing helical torsion springs); Ex. 1019, 12-19 (same). For example, the torsion spring design of Smith is a commonly used design known as a "double torsion" or "double-bodied" torsion spring. Ex. 1019, 12-13 (depicting double torsion design).

143. The equations for torsion springs in general, including double torsion springs, define precisely how rotational mechanical energy (or "torque") is stored and released through twisting; the amount of torque exerted is directly proportional to the angle of twist, and the restoring torque predictably brings the spring back to its original position. A POSITA would have thus readily known how to incorporate Smith's torsion spring mechanism into Unger and determine the optimal design to

provide sufficient clamping force to the earmuffs while also making it sufficiently easy to rotate the lower mount away from the earmuffs to provide for easier attachment and detachment.

144. For example, a POSITA would have recognized that the thickness and material of the spring and the number and spacing of spring windings are characteristics that could be adjusted to reach an optimal design. Such design would account for bending stress, deflection and spring rate static strength, and fatigue strength—all well-understood considerations when describing a torsion spring. *See e.g.*, Ex. 1019, 13-17.

145. At the time of the invention, a POSITA would also have been able to perform computer modeling simulations using off-the-shelf engineering software such as ANSYS[6], COMSOL[7], SpringCreator[8], Newtum[9], NewComb[10], and

[6] https://Ansys.com

[7] https://www.comsol.com

[8] https://springcreator.com/

[9] https://newtum.com/calculators/physics/torsion-spring-calculator

[10] https://www.newcombspring.com/springulator/torsion-spring-calculator

ODOP:Spring[11], or simply undertaken basic prototyping, to determine the optimal spring mechanism design needed to ensure that the rotational force applied by the spring is sufficient to provide "clamping" power to the cup of an earmuff while still allowing a wearer to easily rotate the mount away from the cup for removal and attachment.

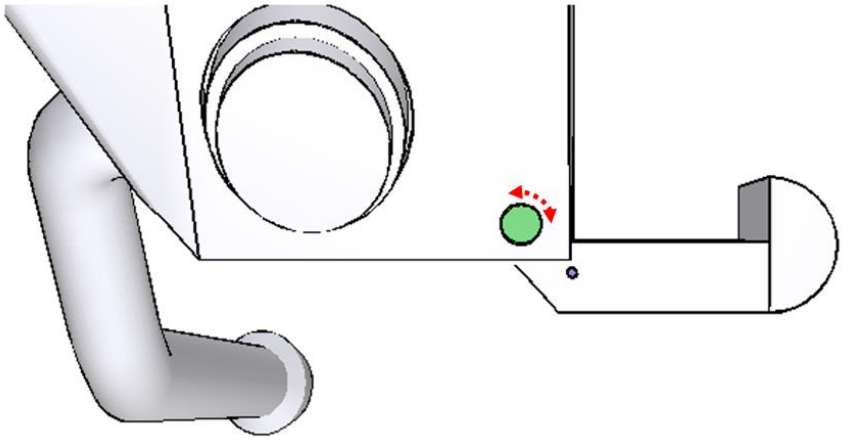
146. The torque equations for torsion springs are well-known, and refer to the rotational force exerted by the spring when it is twisted from its equilibrium position. In general, this value is directly proportional to the angular displacement (*twist*) applied to the spring and is given by the equation $T = k\theta$, where T = torque of a torsion spring [N-mm], k = torsional spring constant [N-mm/rad], and θ = angular deflection of the torsion spring [rad]. Similar to the stiffness of traditional compression/tension springs, the torsional spring constant, k, indicates the spring's resistance to twisting and determines the amount of torque needed to achieve a given angular deflection. The torsional spring constant is a physical property of the spring and may be determined empirically or calculated based on the spring's geometry and material properties using formulae comprising the longitudinal elastic modulus of the spring material, the wire diameter, the mean coil diameter, and the number of active turns in the spring. With this and similar information, a POSITA would be

[11] https://www.springdesignsoftware.org/torsion-springs/

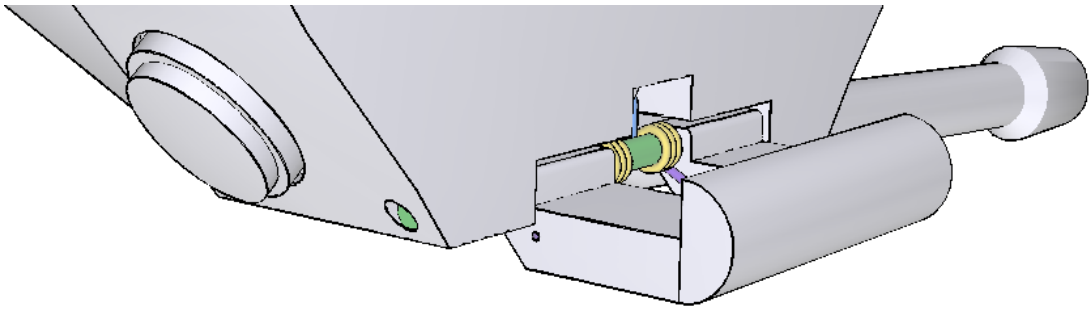
able to simply calculate the torsion spring specifications to match the torque needed to allow for the desired manipulation and durable fastening.

147. A POSITA would have had a reasonable expectation of success in combining the two references as discussed, as it involves nothing more than the application of basic mechanical design principles. This is evidenced by the images of the previously-referenced 3D model provided below, which provide one example of how a POSITA would have understood to modify Unger's lower mount arm 308 and housing 304 to incorporate Smith's torsion spring mechanism to provide the advantages discussed:

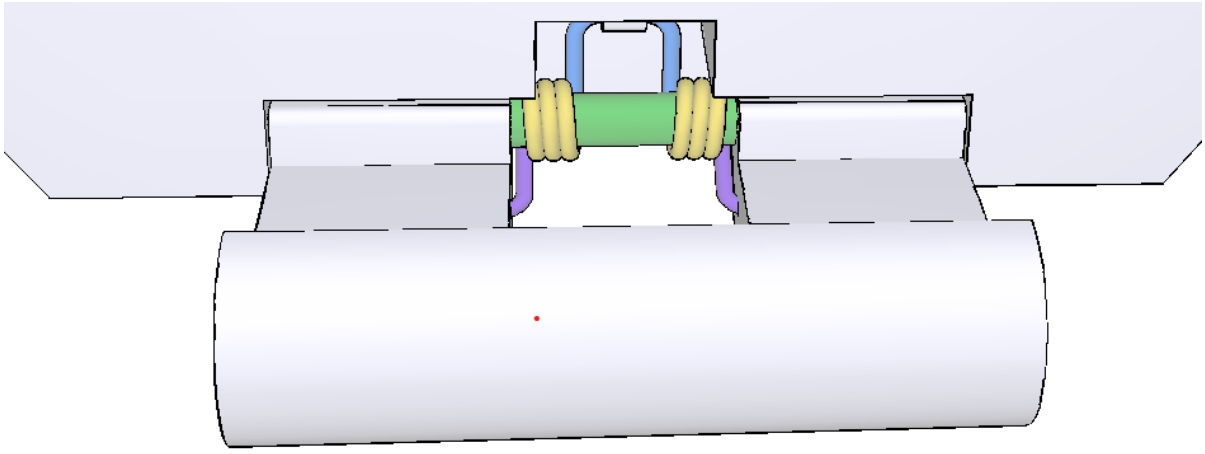
Side-View



Perspective View



Front View



148. As shown by the model images above, this modification would have involved simply: (1) adding a through-hole in the protruding side portions of housing 304 and to the base of the lower mount 308 for receiving Smith's pivot pin 5 (green); (2) sleeving Smith's dual-body (yellow) torsion spring 4 on the shaft; (3) fixing one portion of the spring (blue portion of spring 4 in Smith) to the housing 304 via a ring-lobe; and (4) fixing other portions of the spring (purple portions of spring 4 in Smith) to openings in the lower mount 308. This would achieve the entirely

predictable result of a lower mount 308 that is rotationally biased toward the hearing protection device, which would provide the benefits of (1) allowing the communication device to be easily attached and removed from hearing protection equipment while also providing a secure "clamping" force and (2) allowing the communication device to adapt to a wider variety of hearing protection device designs.

149. Identical modifications could be made to a non-removable upper mount 312, either in lieu of adding the torsion spring mechanism to the lower mount 308 or in addition to doing so. This would achieve the same predictable result with upper mount 312 with precisely the same reasonable expectation of success. For these reasons, it would have been obvious to combine the torsion spring mechanism of Smith into the lower mount of Unger.[12]

[12] A POSITA would also understand that cantilevered beams, such as mount arm 308, can be modeled as segments connected with one or more torsion springs, based on the Euler-Bernoulli beam theory. This entails, first, discretizing the beam into small segments that represent a portion of the beam from the base to the end. Second, model the connections between the small beam segments as torsion springs. Third, sum the deflections from all segments to obtain the total deflection of the cantilever beam 308. This approach assumes linear behavior and neglects shear deformation.

3. Secondary Considerations Of Non-Obviousness

150. I understand that part of the determination of whether a claim is obvious requires a consideration of what are called "objective evidence" or "secondary considerations" of non-obviousness, in addition to the "primary" considerations which evaluate the scope of the prior art, differences between the claimed subject matter and the prior art, including rationales that support a conclusion of obviousness, and the level of ordinary skill in the art.

151. At this time, I am unaware of any such evidence. Should I be presented with any such evidence, I will review it and consider it in conjunction with the opinions I express herein for Grounds 1 and 2.

But it is a well-known method to model a component like Unger's device mount 308. Based on this, a POSITA would also understand that a torsion spring could be physically integrated into a cantilevered beam 308 to achieve displacement à la an external force as it functions as a latch. The major difference is that the effective product of the Young's modulus and moment of inertia of the beam cross section changes at each location where a torsion spring is integrated.

4. Analysis of Claim Elements

152. In this section, I explain where each element of the challenged claims is disclosed in the combination of Unger and Smith, where Unger incorporates the torsion spring mechanism of Smith to improve Unger's device as discussed in Section IX.B.1-2 above. In this section, I use italics to note where I quote the language of the challenged claims.

Claim 1

[Preamble]: A communication device for a hearing protection equipment, the hearing protection equipment comprising at least one earmuff, at least one loudspeaker and an audio input member, wherein the communication device comprises:

153. In reference to Figure 1 below, Unger discloses a ***communication device*** 104 for ***hearing protection equipment*** 108 ("hearing protection device"):

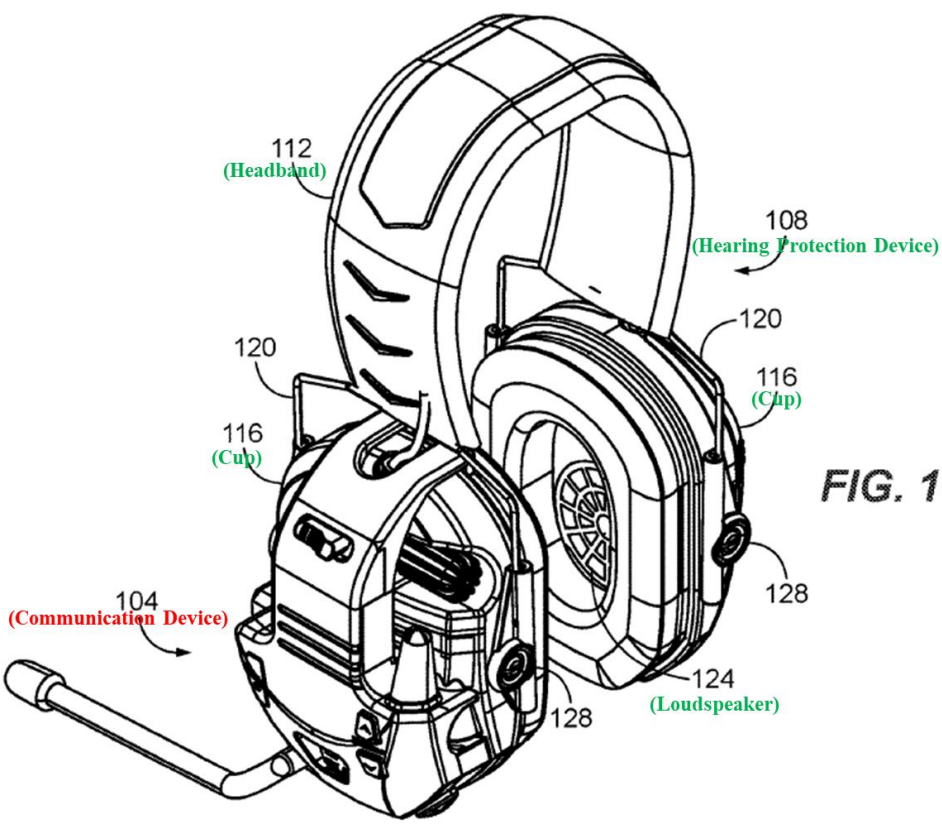


FIG. 1

See Ex. 1004, 3:55-57. Hearing protection equipment 108 includes *earmuffs* that comprise a headband 112, cups 116 and active noise cancellation via speaker 124 in the cups. *Id.* at 3:57-66. A POSITA would understand speaker 124 to be a *loudspeaker*, a device that converts electrical impulses or signals into audible sound. Ex. 1016, 4; Ex. 1015, 5; Ex. 1014, 5, 8. Unger expressly teaches that a communication device 104 outputs a remote user's voice via the speaker 124 of the hearing protection device 108, which necessarily requires converting electrical signals into audible sound. *See* Ex. 1004, 8:31-43.

154. Unger teaches in reference to Figure 8 (annotated below) that the *hearing protection device* 108 (green square) has an *audio input member* (audio

connector 824, green circle) that connects to audio output 320 (red circle) of communication device 104 (red box):

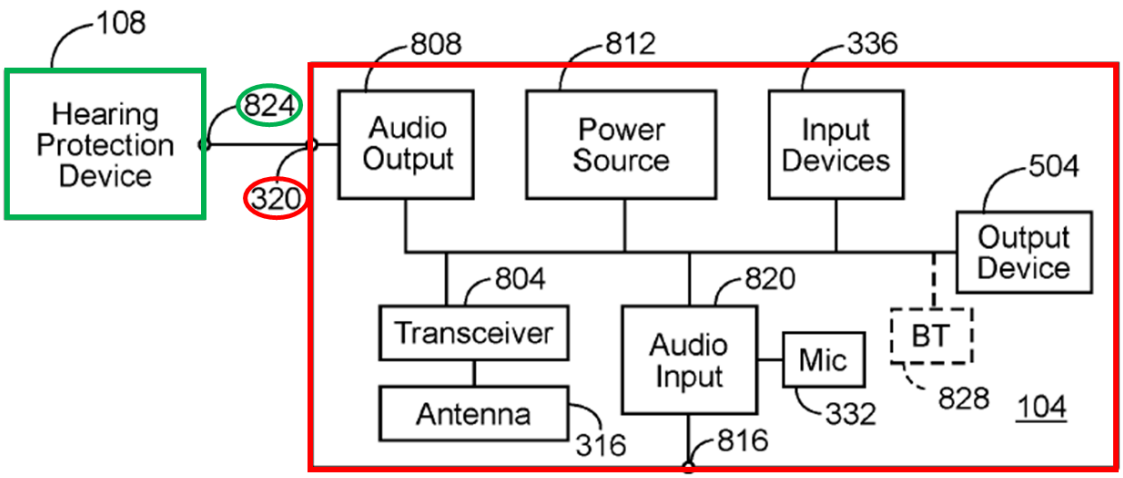


FIG. 8

Id. at 7:46-53 ("As shown in FIG. 8, this output is received at a hearing protection device 108, when the hearing protection device is connected to the communication device 104. As disclosed above, the connection with a hearing protection device 108 may occur via one or more audio output connectors 320 of the communication device 104 that connect to **a corresponding connector 824 of the hearing protection device**.") (emphasis added). Figure 3 depicts the audio output 320 of communication device 104 as a male-type auxiliary audio output port:

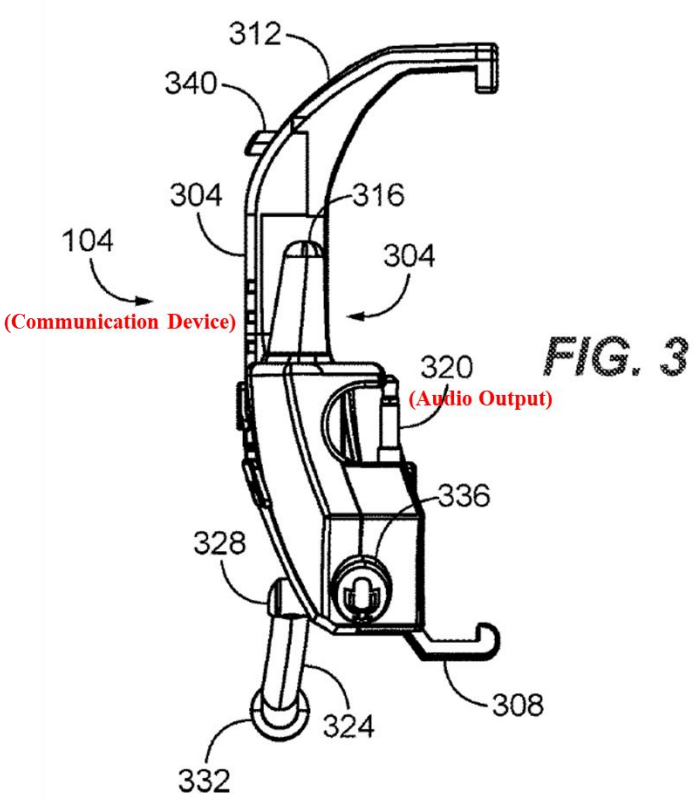


FIG. 3

Id. at 4:48-5:2.

155. A POSITA would understand that the male-type output 320 of communication device 104 inserts into the female-type audio input member 824 of hearing protection device 108 when the communication device is coupled to the hearing protection device (as shown in Figure 1 above). *See id.* at 4:66-5:2 ("When attached to cup, the audio output connector 320 is **automatically inserted into** the corresponding connector at the cup, thereby allowing communications of audio signals therebetween."). Consequently, the audio connector 824 of hearing protection device 108 is an *audio input member* that receives audio signals from the audio output 320 of communication device 104.

[1.1] a housing;

156. Unger discloses that communication device 104 has a ***housing*** 304 (also referred to as "enclosure"), which is identified in Figures 3 and 5 below:

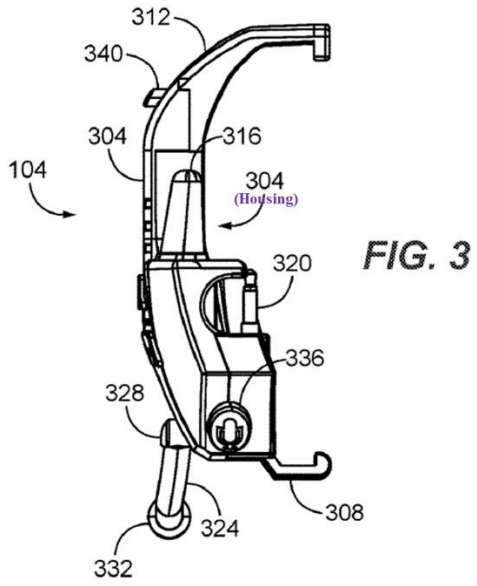


FIG. 3

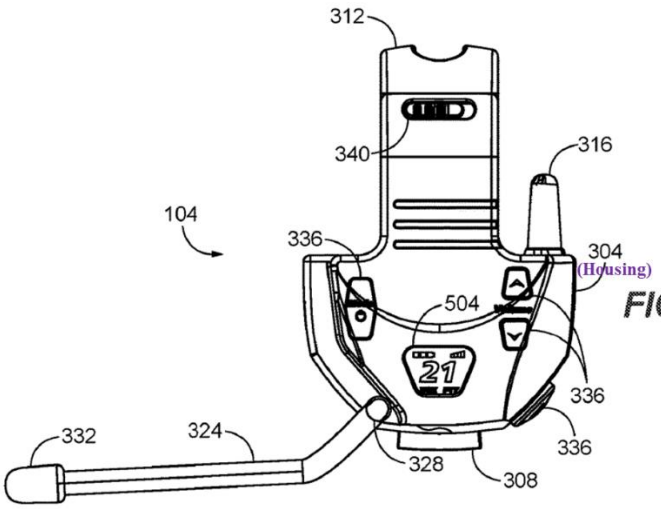


FIG. 5

Id. at 4:5-12 ("A communication device 104 may comprise a **housing** or enclosure 304 that houses or supports various components of the communication device. An enclosure 304 will typically also facilitate removable attachment to a hearing protection device.") (emphasis added).

[1.2] a first mounting assembly, rotatably arranged on a first end of the housing;

157. As shown in Figures 3 and 5 below, Unger discloses a *first mounting assembly* (lower "device mount 308") *arranged on a first end* (lower end) of the *housing* 304 for mounting the communication device 104 to the hearing protection device 108:

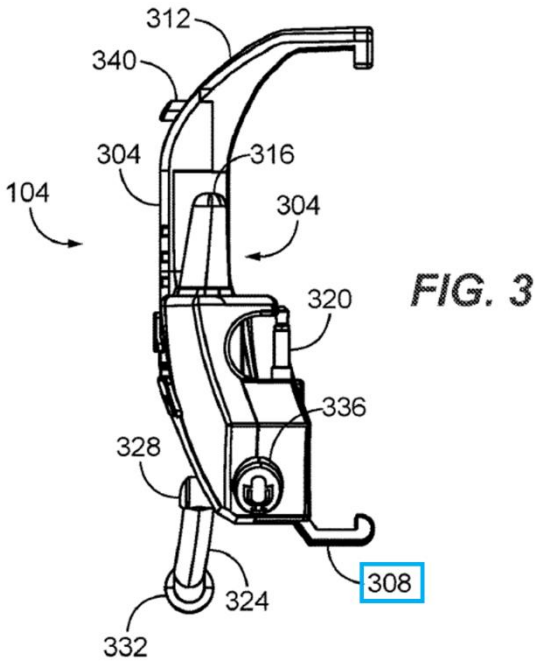


FIG. 3

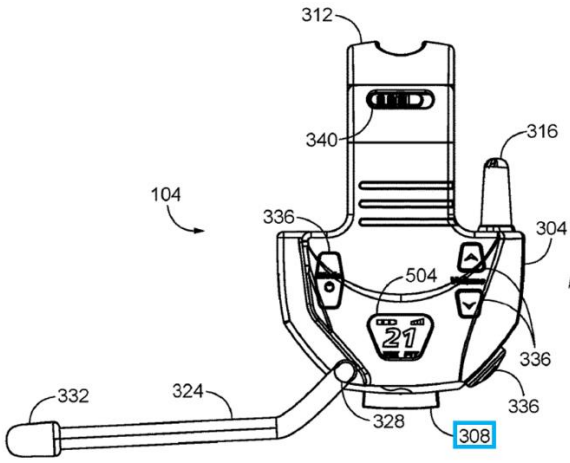


FIG. 5

Id. at 4:16-22 ("As can be seen from FIG. 3, a device mount 308, 312 may be shaped to engage a hearing protection device to attach a communication device 104 thereto. In the embodiment of FIG. 3, for instance, the device mounts 308, 312 extend rearward from the enclosure 304 and comprise a projection at their distal ends that engage a cup of a hearing protection device."); *id.* at 4:34-40 ("As shown, a first device mount 308 is **at a one end** of the enclosure 304….") (emphasis added).

158. Unger further explains that lower device mount 308 and upper device mount 312:

> may be a hook or hook shaped, like that shown, or may comprise other structures that facilitate removable attachment to a hearing protection device in one or more embodiments. It is noted that a device mount 308, 312 may be formed of a flexible or resilient

> material to aid in attachment to and removal from a hearing protection device, while an enclosure 304 remains rigid or at least more rigidly formed. One or more fasteners, such as screws, pins, or the like may be used to secure a communication device 104 in one or more embodiments.

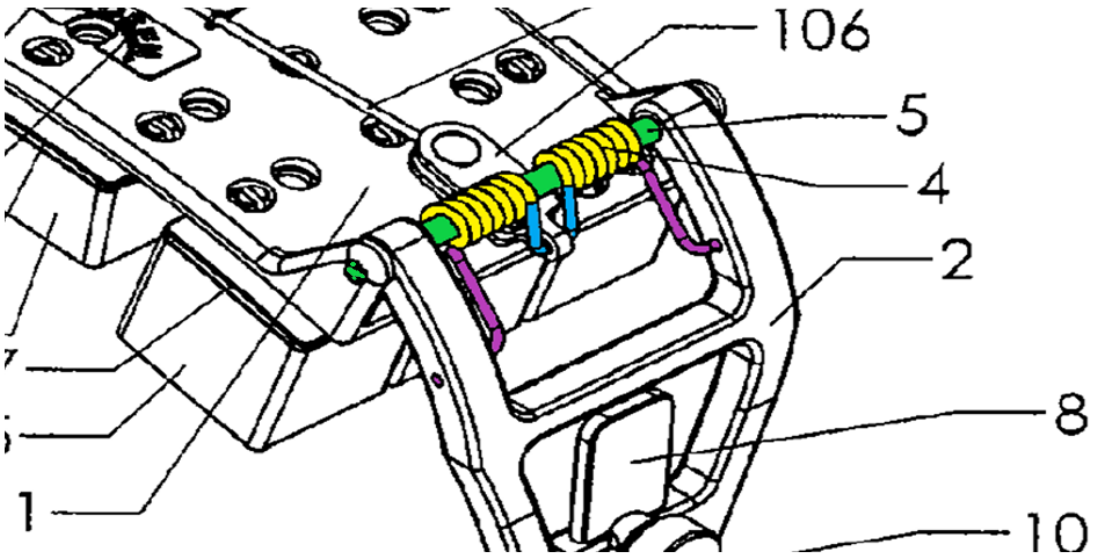
Id. at 4:23-32; *see also id.* at 5:57-60 ("As can be seen, a projection or hook of the device mounts 308, 312 engage the cup 116 to secure the communication device 104 thereto."). Consequently, the lower device mount 308 is a *first mounting assembly* for mounting the communication device 104 to the hearing protection device 108.

159. Alternatively, upper mount 312 could be considered the *first mounting assembly* if modified to incorporate the torsion spring mechanism of Smith as discussed in Section IX.B.1. In that case, the *first end of the housing* would be the upper end of housing 304.

160. Unger does not expressly disclose that either its lower or upper device mount 308, 312 is *rotatably* arranged on the first end of the housing. However, as discussed in Section IX.B.1-2 it would have been obvious to incorporate the torsion spring mechanism of Smith into the lower and/or upper mounting assembly of Unger, in which case this limitation is satisfied as shown below.

161. As shown in Figure 1 (partial, annotated below), Smith independently discloses an assembly comprising pivot pin 5 (green) and torsion spring 28

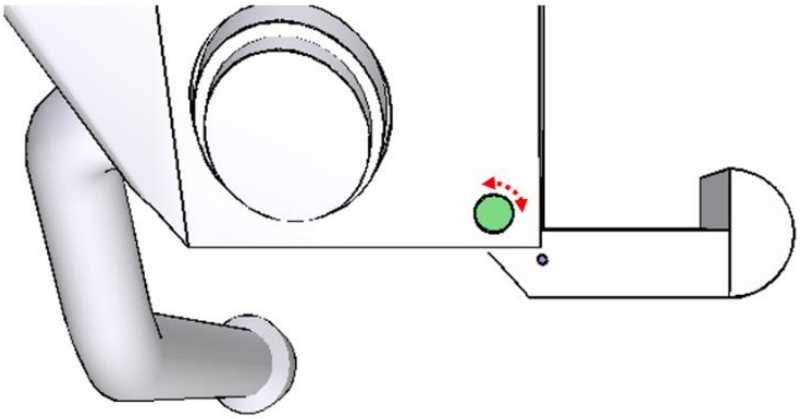
(comprising two spaced apart elastic bodies (yellow), butting parts (purple), and fixing part (blue)):



Ex. 1005, 5:55-6:16; *see also id.* at 7:39-8:29 (describing driveshaft embodiment). The assembly is *rotatably arranged* on a first end of the housing of headband 1, as the arm 2 and torsion spring 4 can rotate about the pin 5 to manipulate movement of the swing arm 2. *Id.* at 5:49-61 ("Torsion spring 4 applies inward **rotational** force to swing arm 2, which pivots on the same axis that torsion spring 4 **rotates on**.") (emphasis added); *see also id.* at 7:39-44 (describing driveshaft embodiment).

162. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, the torsion spring (combination of yellow, blue, purple) and lower mount arm are rotatable about the pivot pin (green) as indicated by the red-dashed arrow:

Side-View



Perspective View

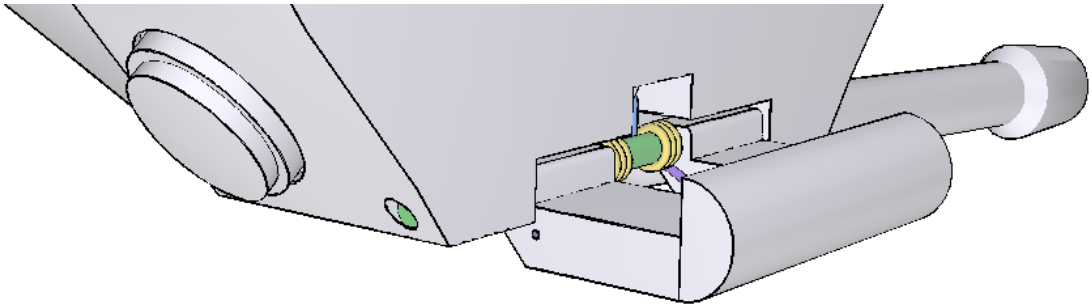
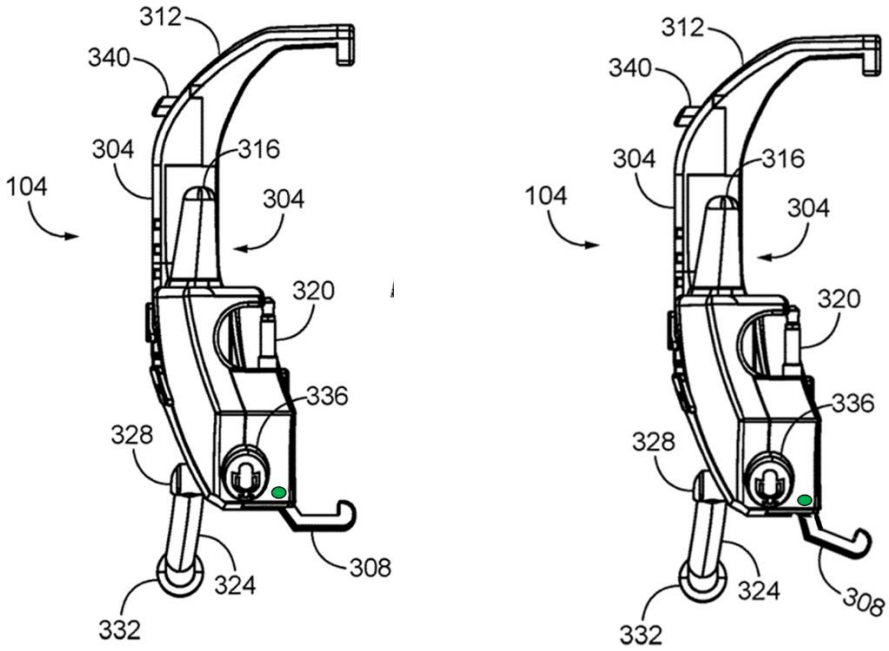


Figure 3 of Unger has been annotated below to show where the pivot pin (green) would be placed, and how the lower mount arm 308 would be *rotatably arranged* on *a first end of the housing* as claimed:

“Normal or at Rest” State **“Manipulated” State**



The animation provided in Exhibit 1020 also shows the rotation of the mount arm. This torsion spring mechanism could be incorporated into the upper device mount 312 in the same manner. Thus, the combination of Unger and Smith discloses this limitation regardless of whether the torsion spring mechanism is incorporated into the lower mount 308 and/or upper mount 312.

> **[1.3] a second mounting assembly, arranged on a second end of the housing, the first mounting assembly and the second mounting assembly are connected to two ends of the earmuff respectively to releasably connect the communication device with the hearing protection equipment;**

163. As shown in Figures 3 and 7 (annotated below), Unger discloses a *second mounting assembly* (upper “device mount 312”) arranged on *second end*

(upper end) of the *housing 304*, and the *first mounting assembly* (lower mount 308) and the *second mounting assembly* (upper mount 312) *are connected to two ends of the earmuff respectively* (upper mount 312 is connected to an upper end of the earmuff cup 116 and lower mount 308 is connected to a lower end of the earmuff cup 116) *to releasably connect the communication device 104 with the hearing protection equipment 108*:

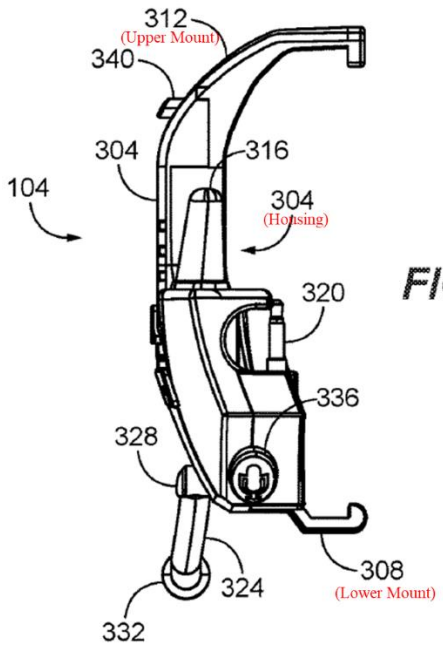


FIG. 3

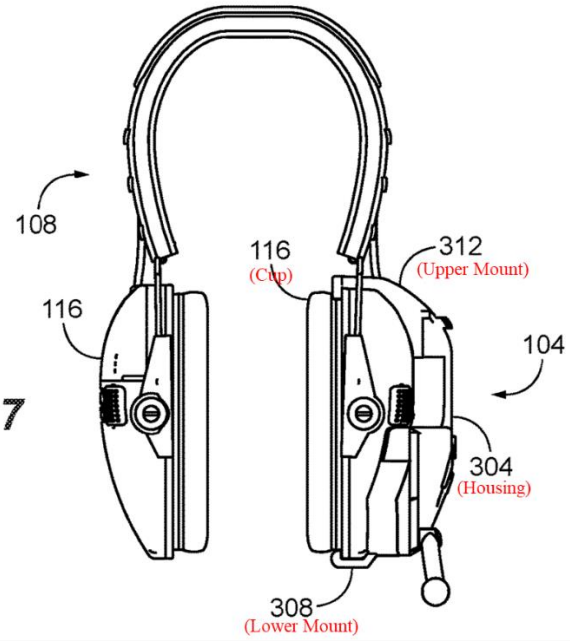


FIG. 7

Ex. 1004, 4:33-40 ("As shown, a first device mount 308 is at a one end of the enclosure 304 while a second device mount is at an opposite end. Specifically, in the embodiment of FIG. 3, the first device mount 308 is at the bottom of the communication device 104 while the second device mount 312 is at the top. In such embodiments, one or more device mounts 308, 312 may engage a peripheral area of

a cup to attach a communication device 104 thereto."); *See also id.* at 5:49-55 ("The back end of the enclosure 304 may then receive or engage a portion of the hearing protection device 108, such as a cup 116 of the hearing protection device, with a second device mount 308 engaging a structure thereof, such as a lip, edge, or other portion of the cup.").

164. Alternatively, the lower mount 308 could be considered the *second mounting assembly* and the upper mount 312 the *first mounting assembly* when the torsion spring is incorporated into the upper mount arm assembly 312, in which case the *second end of the housing* would be the lower end of cup 116 and the *first end of the housing* would be the upper end of cup 116, as discussed in Claim 1.2.

165. The first and second device mounts also *releasably connect the communication device with the hearing protection equipment*. Unger teaches that "device mounts 308, 312 [are] for removably attaching the communication device to a hearing protection device." *Id.* at 4:13-22. Unger also teaches that: (1) the mounts may include "structures" (e.g., hook shapes) that "facilitate removable attachment to hearing protection equipment" (*Id.* at 4:23-26) (2) the mounts may be "flexible or resilient such as to allow malleability during attachment to and removal from a hearing protection device 108" (*Id.* at 4:26-30, 6:20-35); (3) "fasteners, such as screws, pins, or the like may be used to secure a communication device 104" (*Id.* at 4:30-33) and (4) that the housing or enclosure 304 may include a resilient material

to aid in attachment and detachment of the mounts from the hearing protection device (*Id.* at 6:34-37). A POSITA would understand the device mounts 308 and 312 to be *releasably connected* to the hearing protection device 108 because they can be released from the hearing protection device 108 by manipulating the mounts. For example, a flexible or resilient device mount can be bent or manipulated to unhook from the earmuff cups, whereas a removable device mount (element 312 in Figure 6) can also be released by separating the mount 312 from the housing 304. Moreover, when Unger's lower mount 308 and/or upper mount 312 incorporates the torsion spring mechanism of Smith, it is further *releasable* by rotating mounts away from the earmuffs.

[1.4] a microphone, configured for capturing an audio;

166. As shown in Figures 3, 5, and 8 (annotated below), Unger discloses that the communication device 104 includes "one or more *microphones 332* to receive a user's voice or other audio:"

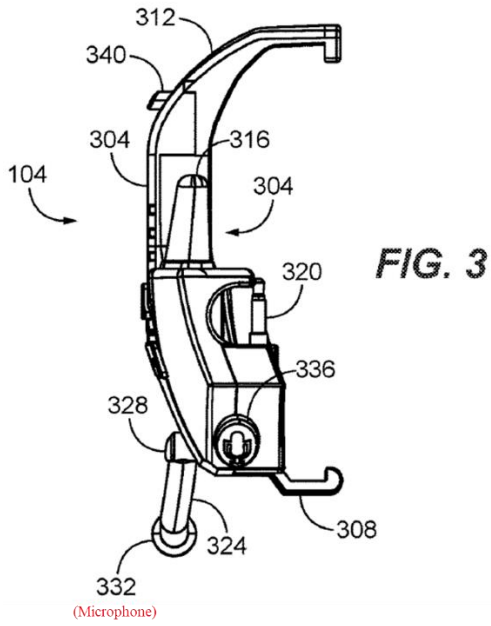


FIG. 3

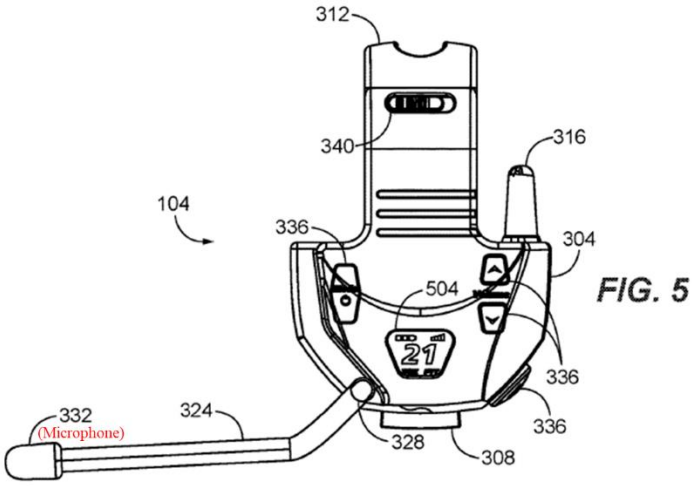


FIG. 5

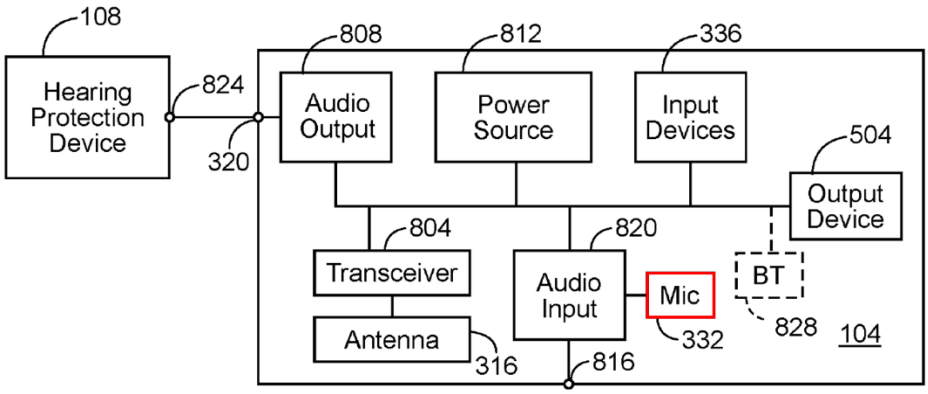


FIG. 8

Id. at 5:3-12 ("A communication will typically include one or more recording devices, such as one or more microphones 332 to receive a user's voice or other audio."); *see also id.* at 7:16-22.

[1.5] a radio transceiver, configured for wirelessly transmitting the audio captured by the microphone to user and wirelessly receiving a wireless signal containing an audio from the user; and

167. As an initial matter, I note that this claim does not require the *user* to be the wearer (or local "user") of the specifically claimed *communication device*. In fact, a POSITA would understand this claim to necessarily be referring to a *user* of another communication device that is communicating with the claimed *communication device*. The claim would be nonsensical if *user* refers to the local user, for multiple reasons.

168. First, such an interpretation would require the radio transceiver of the claimed communication device to wirelessly transmit microphone audio of the wearer back to the wearer. It is illogical that the audio of the wearer captured by the microphone would be ***wirelessly transmitted back to himself or herself*** (i.e., the person that spoke the audio), which would necessarily create a highly undesirable audio echo due to the inherent delay associated with wireless transmission. Instead, the captured audio is wirelessly transmitted to a user of another communication device that is communicating with the wearer of the claimed communication device.

169. Second, understanding "user" to refer to the wearer of the claimed *communication device* would mean this claim element requires that the transceiver wirelessly receives a wireless signal containing the wearer's own audio. In fact, claim 14 further requires *transmitting the wireless signal containing the audio to the*

at least one loudspeaker, which would illogically require that wearer's own microphone audio to be wirelessly received and played out of the loudspeaker of the wearer's own communication device. A POSITA would understand that the received wireless signals are instead those containing audio of a user of another communication device that is communicating with the wearer of the claimed *communication device*.

170. Third, if the *transceiver* was illogically being used to wirelessly transmit and receive the wearer's (or local user's) own audio as discussed above, the claim would not also recite an *audio input member* of the hearing protection equipment or *audio output member* of the communication device. Indeed, those members would be unnecessary because the *transceiver* would perform their functions wirelessly. Consequently, a POSITA would understand that *user* refers to a remote user of another communication device and certainly does not exclude a remote user.

171. In reference to Figure 8 (annotated below), Unger teaches that the communication device 104 includes "one or more *radio transceivers 804*" that "may wirelessly transmit audio or other signals, receive such signals, or both:"

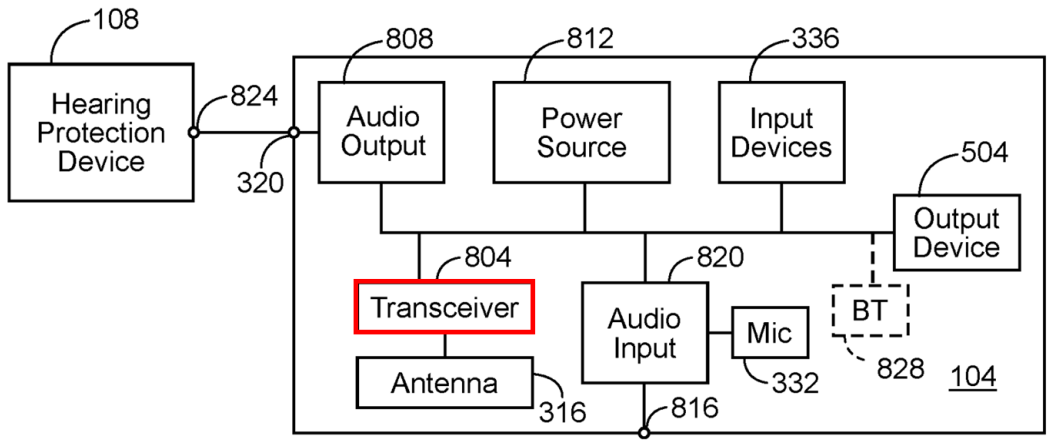


FIG. 8

Id. at 6:43-57. Unger further explains that "[t]he communication device also includes a microphone that captures audio, a *radio transceiver* that wirelessly transmits the audio captured by the microphone **to a remote *user*** and wirelessly receives one or more wireless signals carrying audio **from the remote *user***, and an audio output that connects to the audio input of the hearing protection device. The audio carried by the wireless signals is transmitted to the speakers via the audio output." *Id.* at 1:53-61; *see also id.* at 9:7-10, 9:44-45. Consequently, the *transceiver* 804 is configured to wirelessly transmit the audio captured locally by the microphone to *a user* ("a remote user") and wirelessly receive a wireless signal containing audio from *the user* ("the remote user").

[1.6] an audio output member, communicated with the audio input member and configured for transmitting the wireless signal containing the audio to the at least one loudspeaker,

172. Unger teaches that the communication device 104 has an *audio output member* (audio output connector 320) that extends outward from housing 304. *Id.* at 4:48-5:2. The audio output connector 320 is depicted in Figure 3 (annotated below) as a male-type member that a POSITA would understand to be received within a female-type *audio input member* (audio connector 824, Figure 8) of hearing protection device 108.

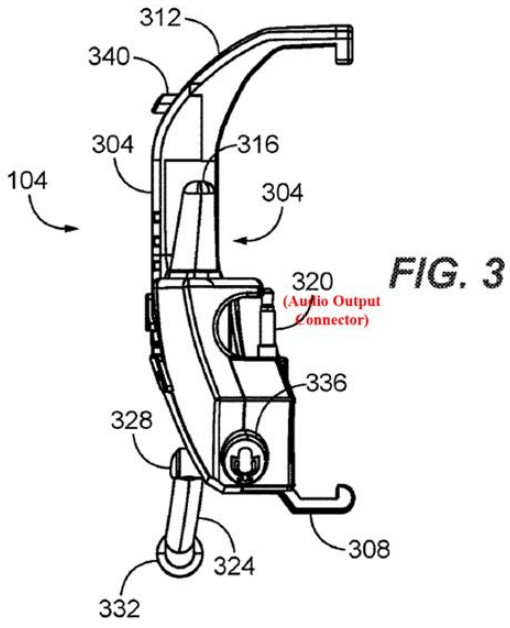


FIG. 3

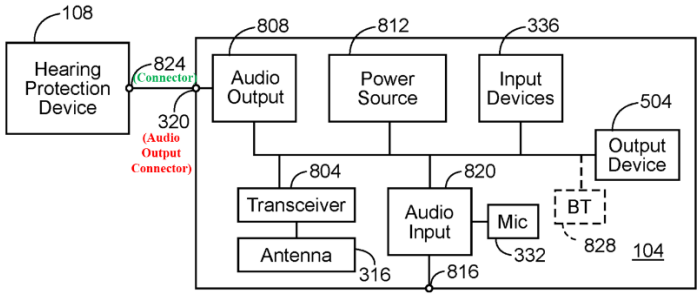


FIG. 8

173. Unger explains that when the communication device 104 is attached to a cup, "the audio output connector 320 is **automatically inserted into** the corresponding connector at the cup, thereby allowing communication of audio

signals therebetween." *Id.* at 4:66-5:2 (emphasis added); *see also id.* at 7:47-59. Thus, the connector 824 of hearing protection device 108 is an *audio input member* that receives audio from audio output 320.

174. Unger further teaches in reference to Figure 9 (reproduced below) that "[a]s each user speaks, their voice is captured and transmitted from their communication device 104 to other communication devices via one or more wireless connections 904. The receiving communication devices 104 output the user's voice ***via a speaker*** of the attached hearing protection device 108." *Id.* at 8:31-36 (emphasis added); *see also id.* at 2:12-15 ("An audio output connects to the audio input of the hearing protection headset such that the audio from the wireless signals is transmitted to the speakers via the audio output.").

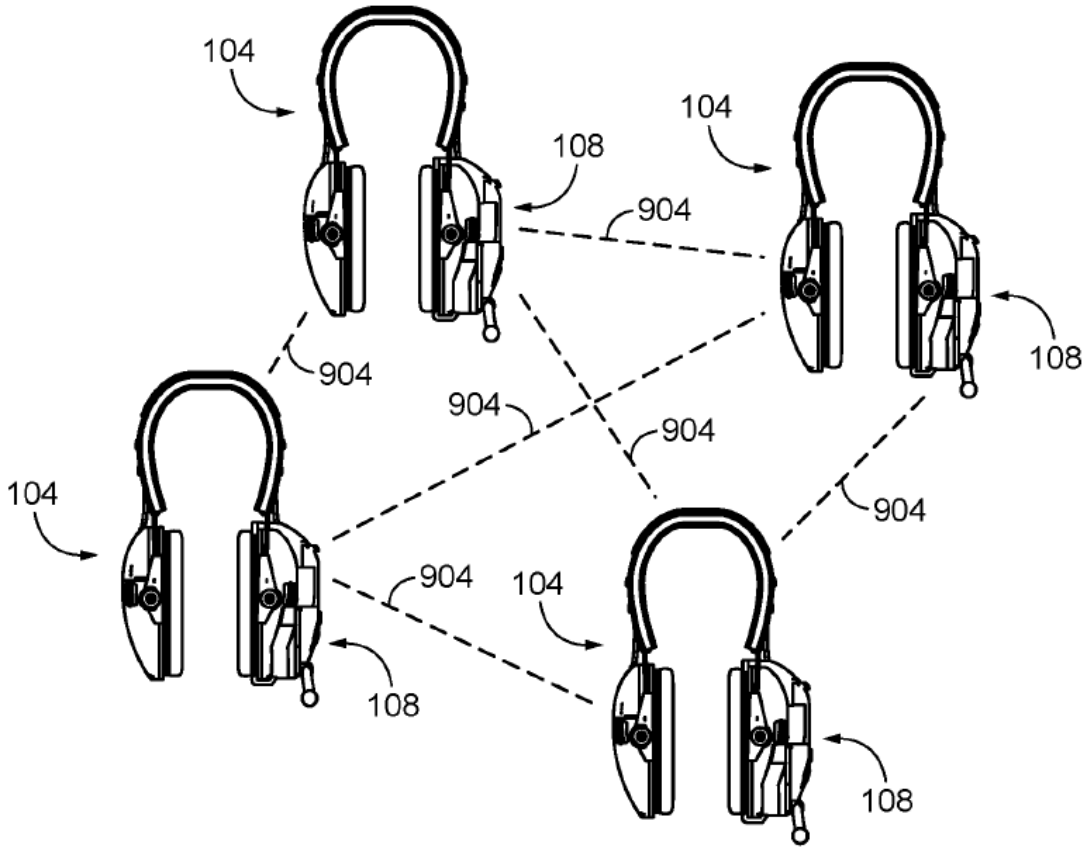


FIG. 9

Thus, as shown in annotated Figure 8 below, when the communication device 104 receives a wireless signal (red dashed line) from a remote user of another communication device, the signal is received at transceiver 804 (via antenna 316), passed to audio output 808, then to audio output connector 320, then to connector 824 and then played through the loudspeaker 124 of hearing protection device 108:

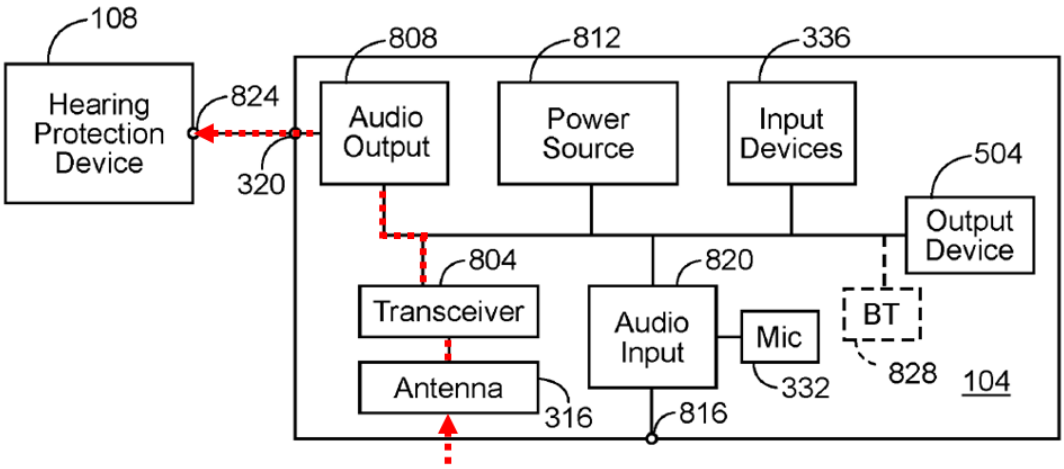


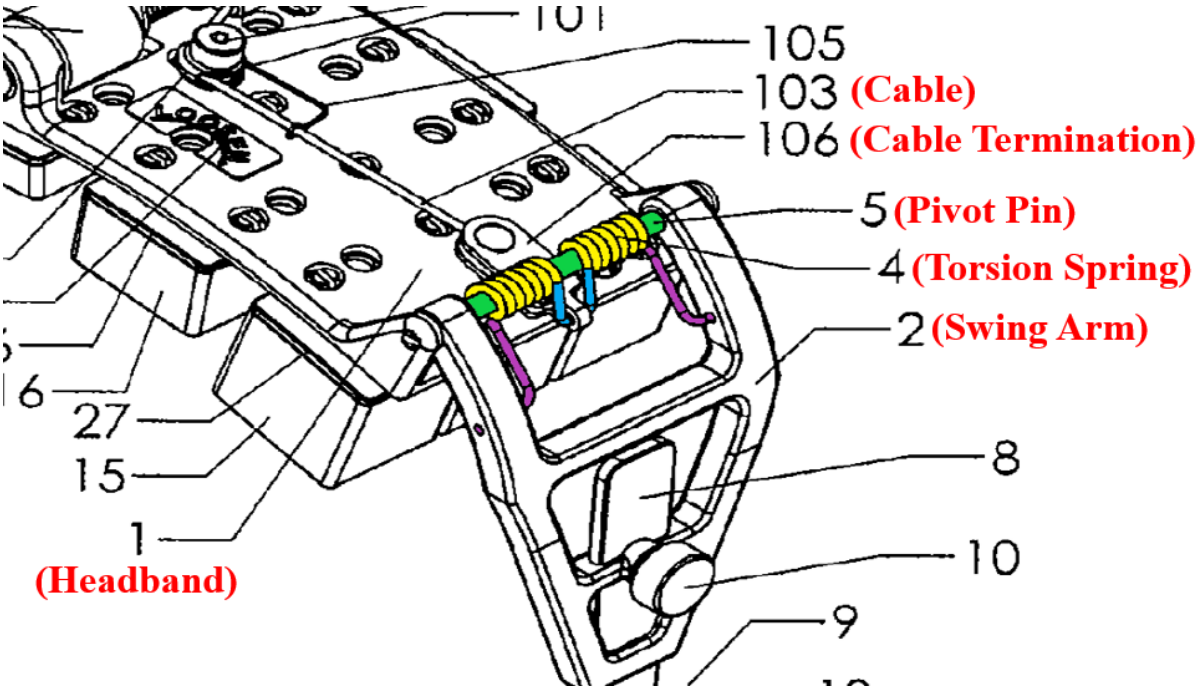
FIG. 8

[1.7] wherein the first mounting assembly comprises: [A] a first connecting member, connected with the housing; [B] an elastic member; [C] a first mounting member, rotatably connected with the first connecting member by the elastic member, the first mounting member is coupled with the earmuff under an elastic force of the elastic member; and the first mounting member is separated from the earmuff after overcoming the elastic force of the elastic member.

175. For elements not expressly taught by Unger, I will explain how the combination discloses the claim element by first discussing where the limitation is found in Smith. I will then explain how the combination satisfies the claim element.

176. Here, Unger as modified by Smith renders this limitation obvious. As shown in Figure 1 of Smith (partial, annotated below), Smith expressly discloses a torsion spring assembly comprising a *first connecting member* (green pivot pin 5) connected with a *housing* (enclosure of headband 1), an *elastic member* (double-

bodied spring 4, colored yellow, blue, purple), a *first mounting member* (swing arm 2 and attached earcup 7, used to mount the headset to a wearers head), *rotatably connected with the first connecting member* (pivot pin 5) *by the elastic member* (spring 4):

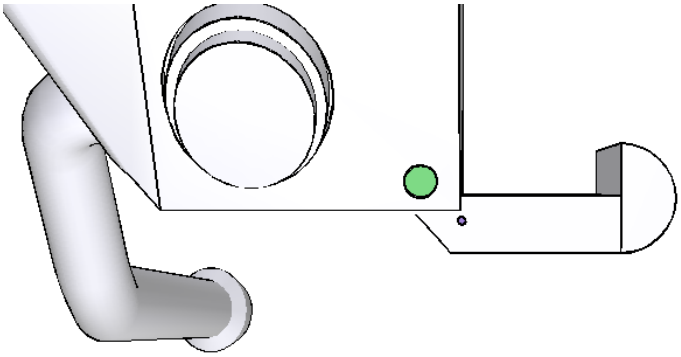


The swing arm 2 and cup 7 are coupled with the wearer's head under an elastic force of the elastic member and are separated from the wearer's head after overcoming an elastic force of the elastic member. *See* Ex. 1005, 5:59-65 ("Torsion spring 4 applies inward rotational force to swing arm 2, which pivots on the same axis that torsion spring 4 rotates on."); *id.* at 7:39-44 (describing same principle for driveshaft embodiment); *see also id.* at 4:60-65. More specifically, the elastic clamping force of the torsion spring that securely engages the cups 7 to the wearer's head can be overcome by the wearer pulling the cups 7 outward, thereby allowing the earmuffs

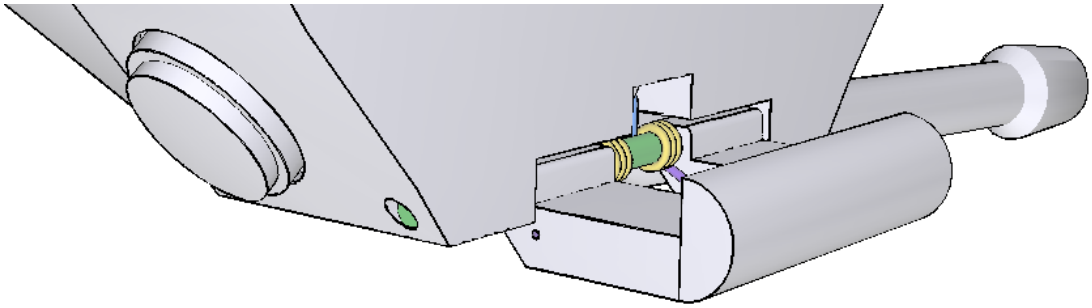
to be lifted away from, and off of, the wearer's head.

177. Smith expressly discloses that its upper mount 312 and lower mount 308 may be manipulated to attach and detach the communication device 104, including manipulation between a "normal or at rest" state and a "manipulated" state. *See* Ex. 1004, 4:12-40, 5:41-64, 6:9-37. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, all of the elements of this limitation are taught by the combination.

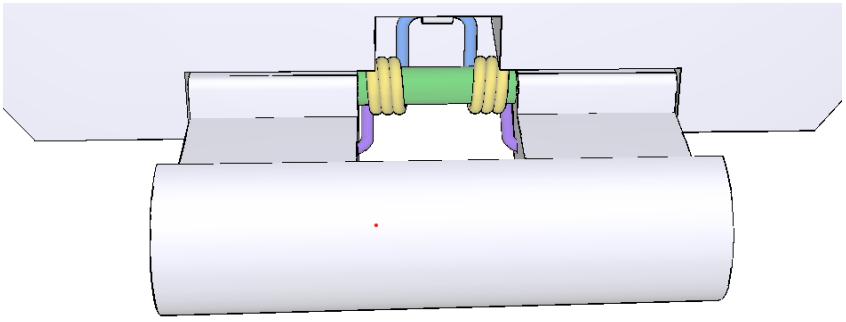
Side-View



Perspective View



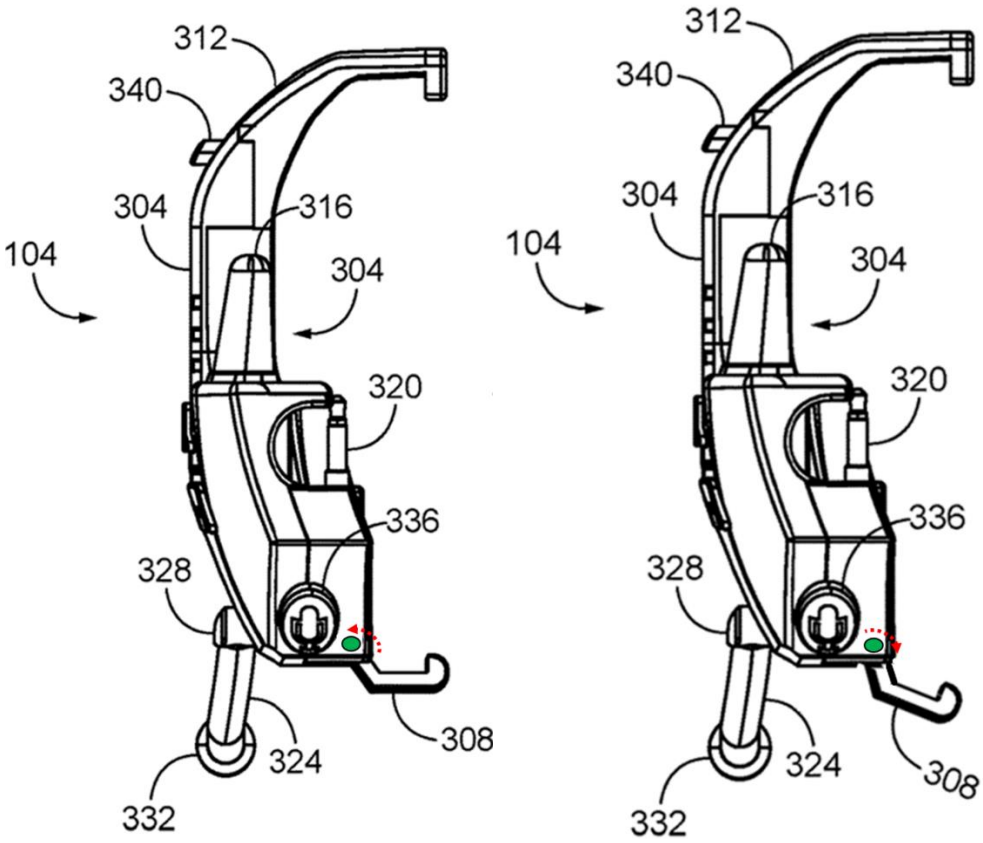
Front View



Specifically, Unger as modified by Smith includes a *first mounting assembly* comprising: [A] *a first connecting member* (green pivot pin), *connected with the housing* (lower end of communication device housing 304); [B] *an elastic member* (double-bodied torsion spring colored yellow, purple, blue); and [C] *a first mounting member* (lower mount arm 308), *rotatably connected with the first connecting member* (green pivot pin) *by the elastic member* (torsion spring, colored yellow, purple, blue).

178. Figure 3 of Unger has been annotated below to show where the pivot pin (green) is placed, and how in the "normal or at rest" state the *elastic member* (torsion spring) applies an elastic force to the *first mounting member* (lower mount arm 308) to facilitate attachment of the mounting member to the earmuff, and how in the "manipulated state" *the elastic force of the elastic member* is overcome to facilitate separating the mounting member from the earmuff:

"Normal or at Rest" State **"Manipulated" State**

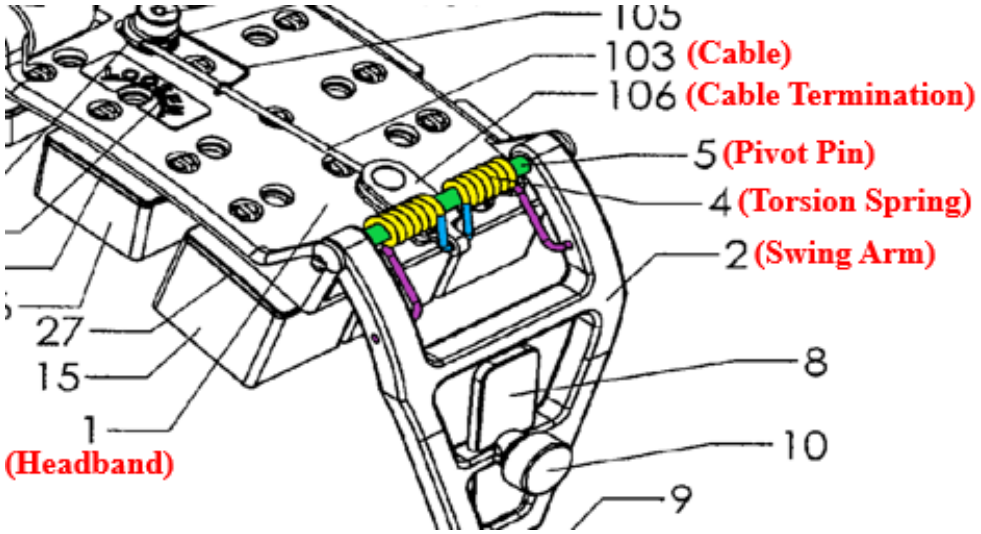


This manipulation is also shown in the animation provided as Exhibit 1020. This is consistent with how Unger expressly discloses manipulating the lower mount between two states to attach and detach the communication device. *See* Ex. 1004, 4:12-40, 5:41-64, 6:9-37. Thus, the combination of Unger and Smith discloses this limitation.

Claim 2

The communication device according to claim 1, wherein the elastic member comprises: at least one elastic body, arranged on the first connecting member; and at least one butting part, connected with the elastic body and butted against the first mounting member, wherein when a pressure is applied on the first mounting member, the first mounting member rotates in a direction away from the housing, so that the butting part rotates to compress the elastic body; and the elastic body in a compressed state rotates the first mounting member to an initial state when the pressure applied on the first mounting member is released.

179. As shown in Figure 1 of Smith (partial, annotated below), Smith expressly discloses an *elastic member* (torsion spring 4) comprising *at least one elastic body* (e.g., yellow-highlighted winding body to left of blue) *arranged on the first connecting member* (green-highlighted pin 5) *and at least one butting part connected with the elastic body* (the left purple-highlighted portion connected to the left yellow-highlighted winding) *and butted against the first mounting member* (swing arm 2 and attached cup 7):



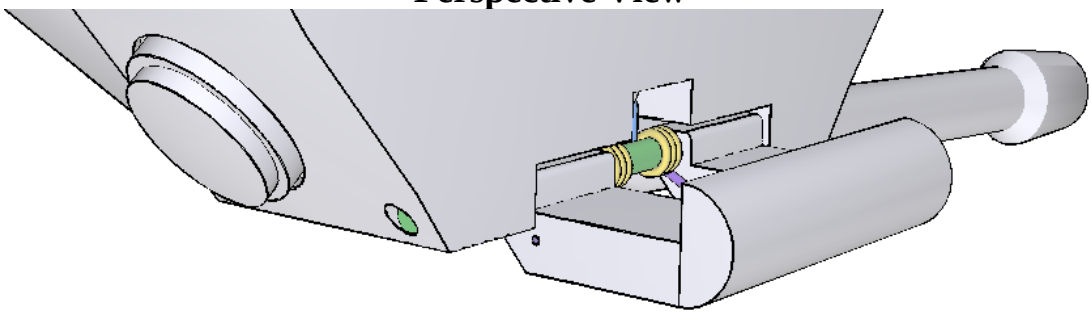
Moreover, when a pressure is applied on the *first mounting member* (swing arm 2 and cup 7), the *first mounting member* rotates in a direction away from the housing (housing of headband 1), so that the butting part (left purple-portion) rotates to compress the elastic body (the as-shown yellow-highlighted winding body). *See* Ex. 1005, 5:59-65 ("Torsion spring 4 applies inward rotational force to swing arm 2, which pivots on the same axis that torsion spring 4 rotates on."); *id.* at 7:39-44 (describing same principle for driveshaft embodiment); *see also id.* at 4:60-65. To elaborate, the butting part (left purple-portion) acts as a movable lever arm on one end of the elastic body (yellow-highlighted winding body), and the fixing part (blue-highlighted) acts as an adjustable, but functionally static lever on the other side of the elastic body (yellow-highlighted winding body). The butting part (left purple-portion) is loaded when the swing arm rotates the butting part away from its free position. In some cases, the free position for the torsion spring's butting part correlates to an angle at which the swing arm places the earmuff cup close to, if not against, the opposing earmuff cup. In fact, many sound suppressors are designed such that the swing arm earmuff cup would naturally cross the chin centerline to reach its free position, causing both earmuff cups to press against each other to seal and keep ambient dust, gasses, and liquids from fouling the earmuff's interior components. When the user separates the cups to, for example, allow placement over the user's head, the swing arm rotates the butting part (further) away from its free

position in a counter-clockwise manner (as it is shown in the above figure). For the configuration shown, where the butting part (left purple-portion) is connected to the counter-clockwise winding of the elastic body, this compresses the torsion spring elastic body (yellow-highlighted winding).

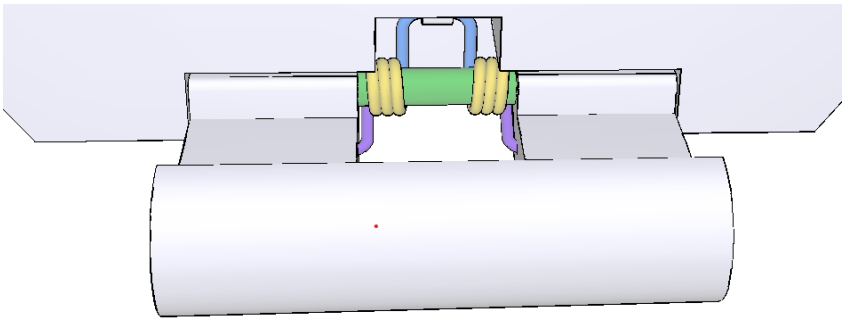
180. A POSITA would understand that when the pressure applied on the *first mounting member* is released, the *elastic body* (the left yellow-highlighted winding) in a compressed state rotates the *first mounting member* (swing arm 2) to an initial state (normal, free, end-of-travel or at rest state). In other words, as the windings spring back from their compressed state, they impart a rotational force to the swing arm 2 and attached cup 7 to place them back in their initial, unmanipulated position. Consequently, the torsion spring mechanism of Smith independently teaches the specific structure of the claimed *first mounting assembly*.

181. Smith expressly discloses that its upper mount 312 and lower mount 308 may be manipulated to attach and detach the communication device 104, including manipulation between a "normal or at rest" state and a "manipulated" state. *See* Ex. 1004, 4:12-40, 5:41-64, 6:9-37. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, all of these limitations are taught by the combination.

Perspective View



Front View



182. Specifically, Unger as modified by Smith expressly discloses an *elastic member* (torsion spring 4) comprising *at least one elastic body* (e.g., left yellow-highlighted winding body) *arranged on the first connecting member* (green-highlighted pin 5) *and at least one butting part connected with the elastic body* (the left purple-highlighted portion directly connected to the left yellow highlighted winding) *and butted against the first mounting member* (lower mount arm 308).

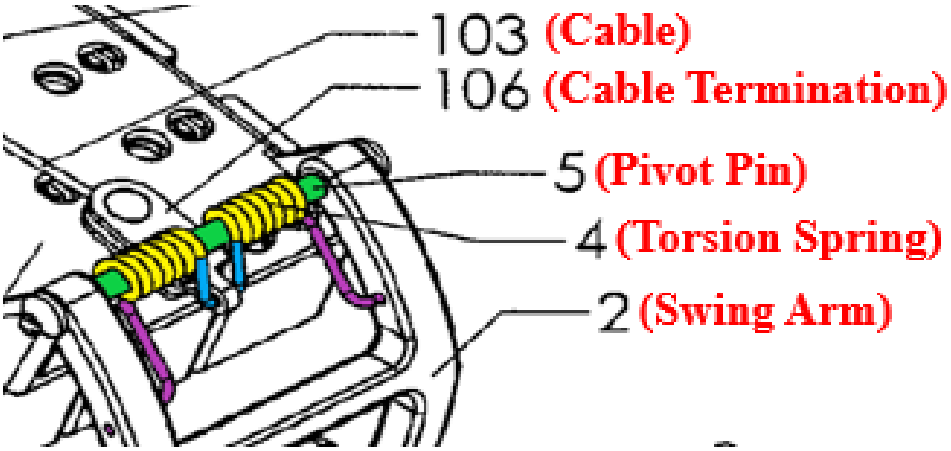
183. When a pressure is applied on the *first mounting member* (downward force applied to the top of lower arm 308), the *first mounting member* rotates in a direction away from the housing (communication device housing 304), so that the butting part (left purple-highlighted portion) rotates to compress the elastic body (the

left yellow-highlighted winding body). A POSITA would understand that when the pressure applied on the *first mounting member* is released, the *elastic body* (the left yellow-highlighted winding body) in a compressed state rotates the *first mounting member* (lower mounting arm 308) to an initial state (normal or at rest state). In other words, as the windings spring-back from their compressed state, they impart a rotational force on the mounting arm 308 to move it back in its initial unmanipulated state, which clamps the communication device to the cup of the earmuffs.

Claim 3

The communication device according to claim 1, wherein the at least one elastic body sleeves on the first connecting member.

184. As shown in Figure 1 of Smith (partial, annotated below), Smith independently discloses that *the at least one elastic body* (the left, yellow-highlighted winding) *sleeves on the first connecting member* (green-highlighted pivot pin 5):

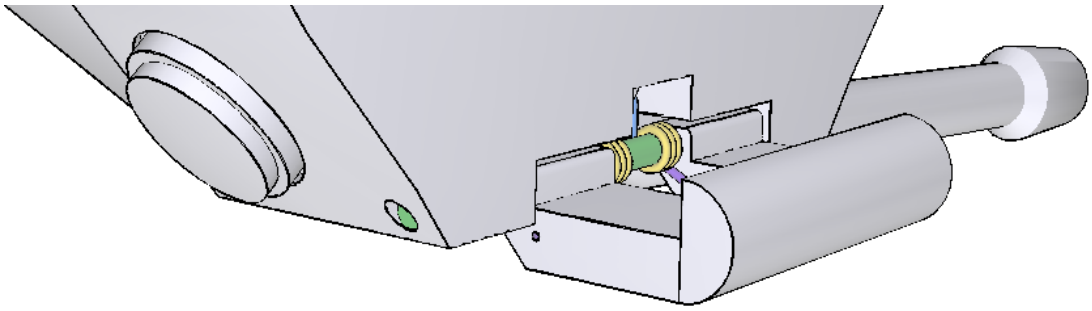


See Ex. 1005, 5:59-65 ("Torsion spring 4 applies inward rotational force to swing arm 2, which pivots on the same axis that torsion spring 4 rotates on."); *id.* at 7:39-44 (describing same principle for driveshaft embodiment); *see also id.* at 4:60-65.

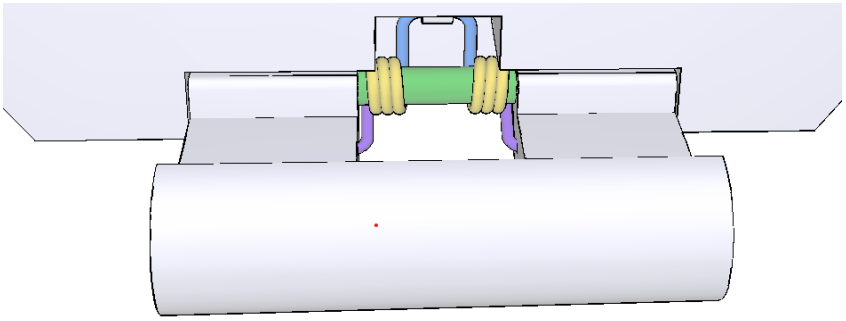
185. A POSITA would understand that the term *sleeves* refers to how the elastic body fits over the connecting member (e.g., similar to the sleeve of a shirt over a person's arm). *See e.g.*, Ex. 1014, 7; Ex. 1015, 8; Ex. 1016, 6 (defining "sleeve"). This is consistent with how the '855 Patent teaches that "[t]he elastic body 231 can sleeve on the first connecting member 21" in reference to Figure 7. Ex. 1001, 4:56-57.

186. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, the *at least one elastic body* (left yellow-highlighted winding body) *sleeves on the first connecting member* (green pivot pin 5):

Perspective View



Front View

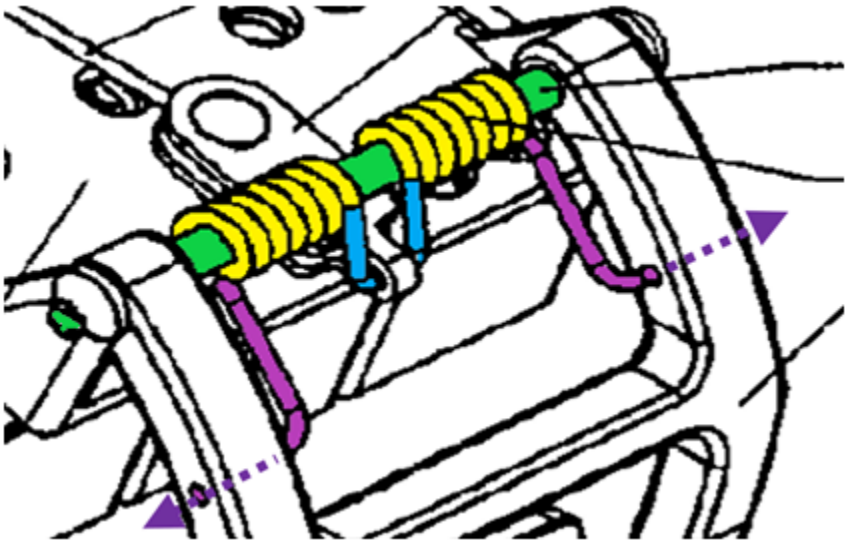


Claim 4

The communication device according to claim 1, wherein the first mounting member comprises: a receiving portion, the at least one butting part is received in the receiving portion.

187. As shown in Figure 1 of Smith (partial, annotated below), Smith independently discloses *a first mounting member* (swing arm 2 and attached earcup 7) that *comprises a receiving portion* (a through-hole in the swing arm, as indicated

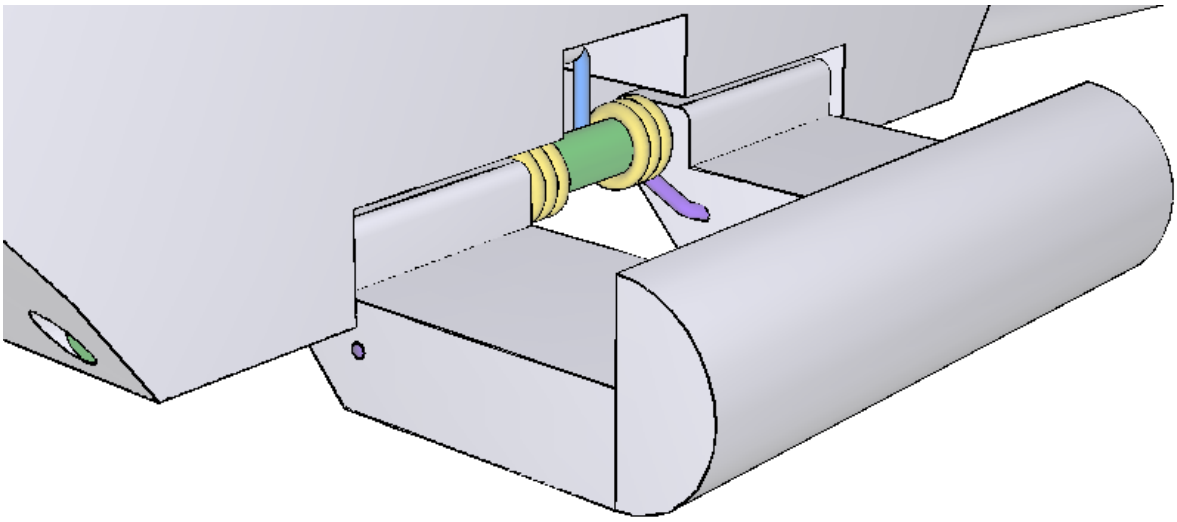
by purple dashed arrows),[13] *the at least one butting part* (i.e., each purple portion of spring 5) *is received in the receiving portion*:



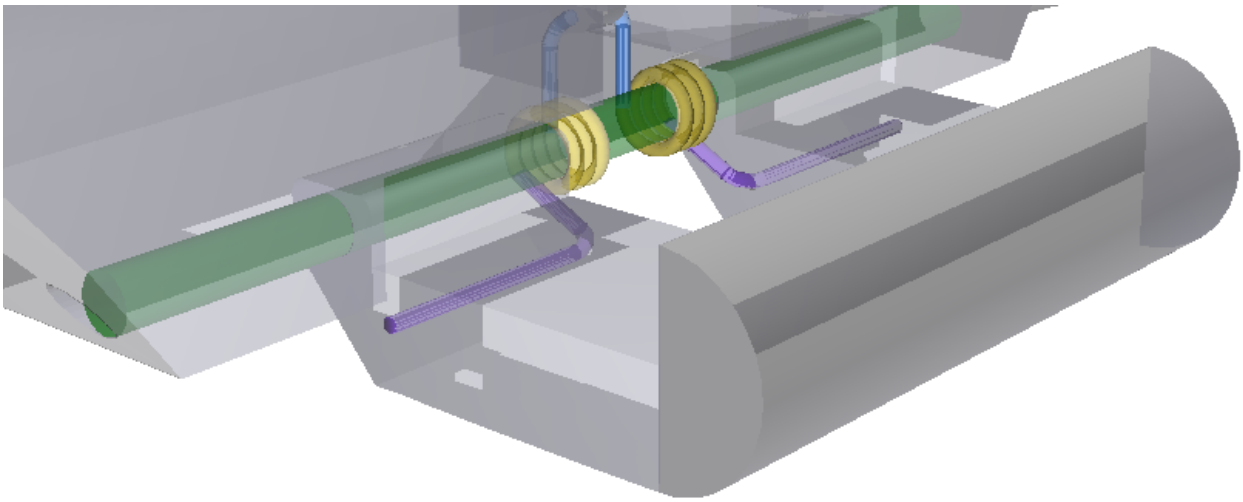
188. Specifically, as shown the bending portion of the *at least one butting part* (purple-highlighted parts) extends into the through-holes (indicated by purple-dashed arrow), thereby making each through-hole a *receiving portion*. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, this same arrangement is maintained:

[13] The circular end of the swing arm's left side through-hole is visible below.

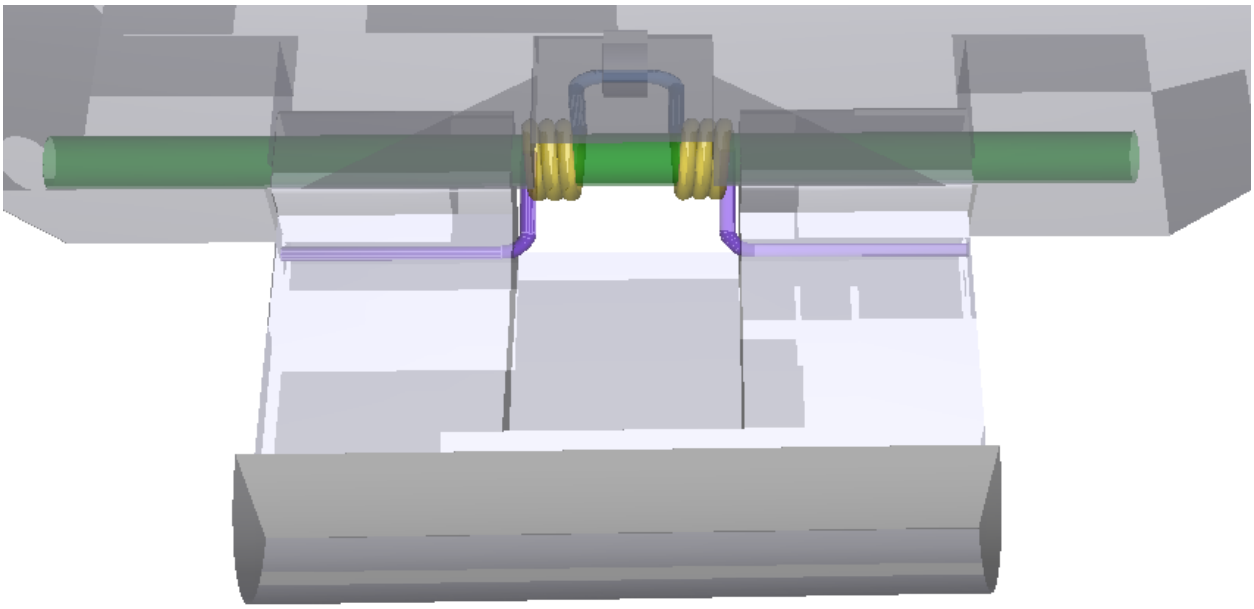
Perspective View



Transparent Perspective View



Transparent Front View

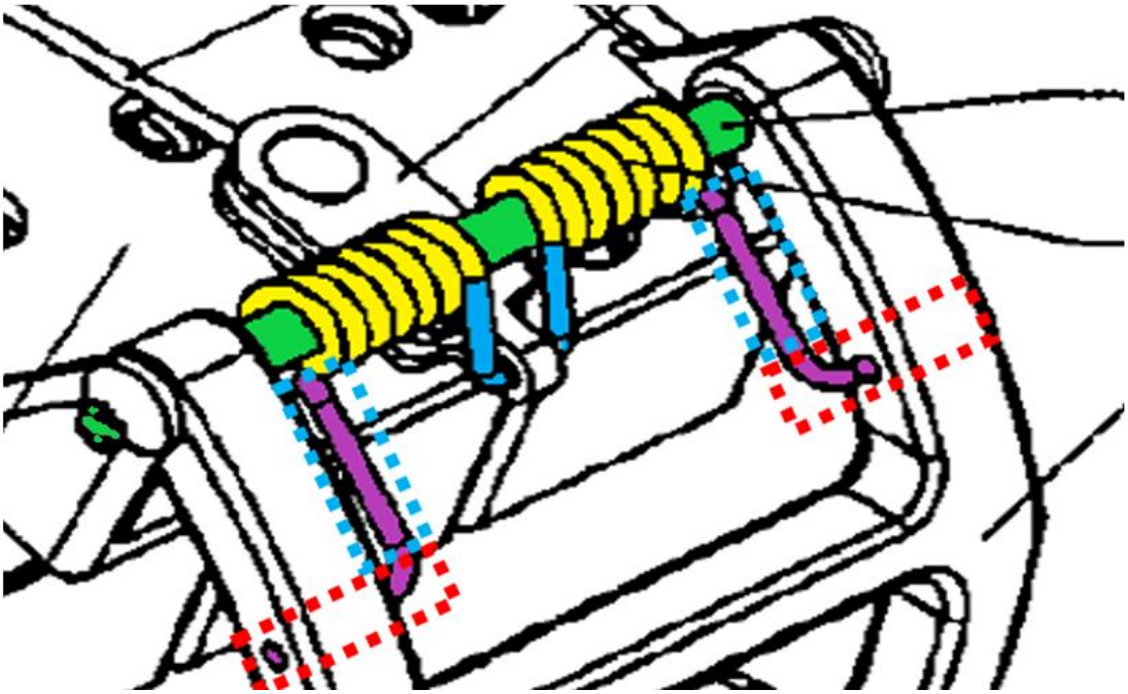


As shown by the transparent perspective views, the *first mounting member* (lower mount 308) *comprises a receiving portion* (each through-hole on each side of the mount 308), and *the at least one butting part* (each purple portion of spring 5) *is received in the receiving portion*, as each purple portion extends into a respective through-hole. Consequently, Unger as modified by Smith renders this limitation obvious.

Claim 5

The communication device according to claim 1, wherein the butting part comprises: a straight section, connected with the elastic body; and a bending section, connected with the straight section.

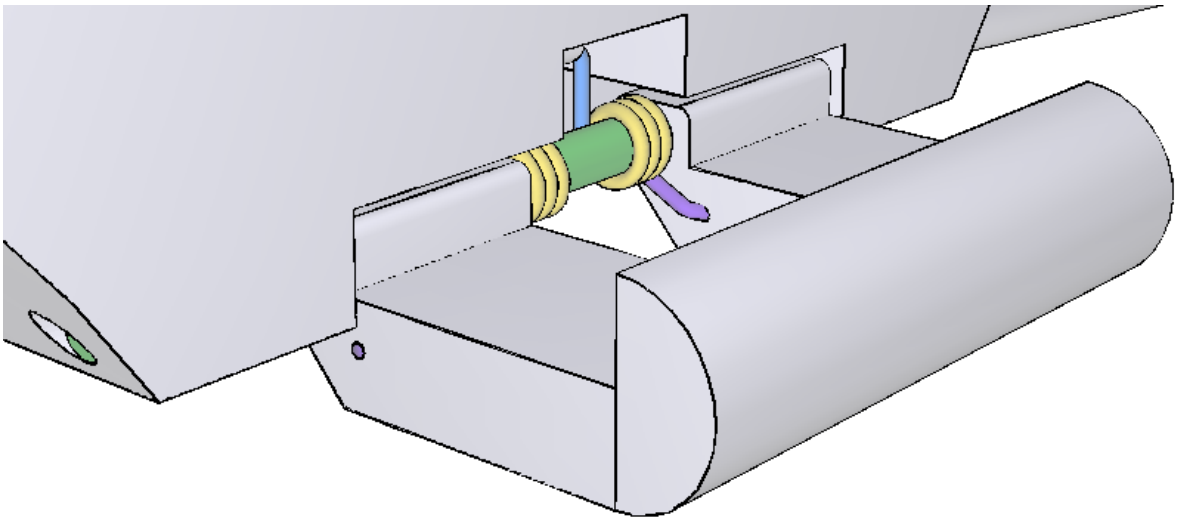
189. As shown in Figure 1 of Smith (partial, annotated below), Smith independently discloses this limitation:



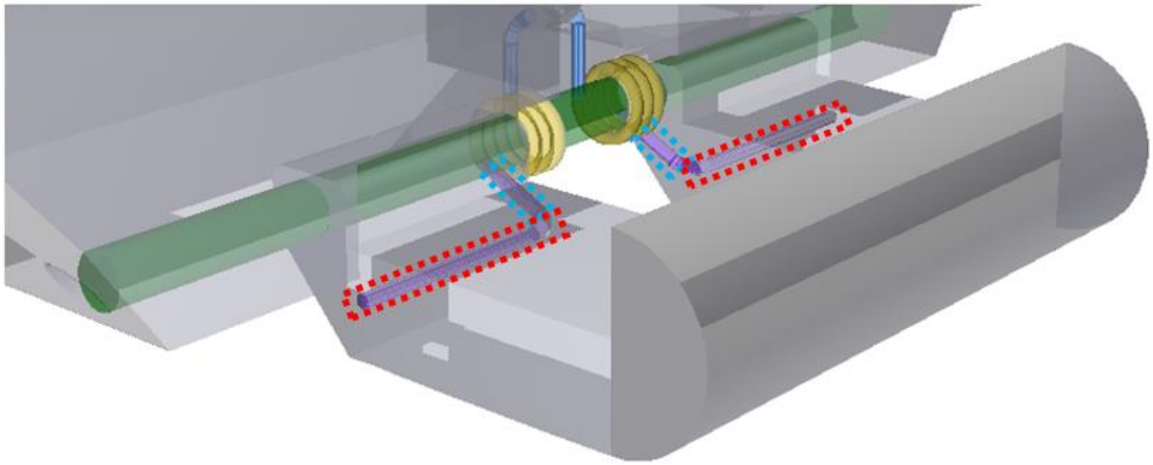
Specifically, *the butting part* (each separate purple portion) comprises a *straight section* (blue-dashed box), *connected with the elastic body* (a respective yellow-highlighted winding)*; and a bending section* (each identified by red box), *connected with the straight section* (each blue-dashed box). Each *bending section* extends into a respective through-hole (or *receiving portion*) in swing arm 2.

190. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, this same arrangement is maintained:

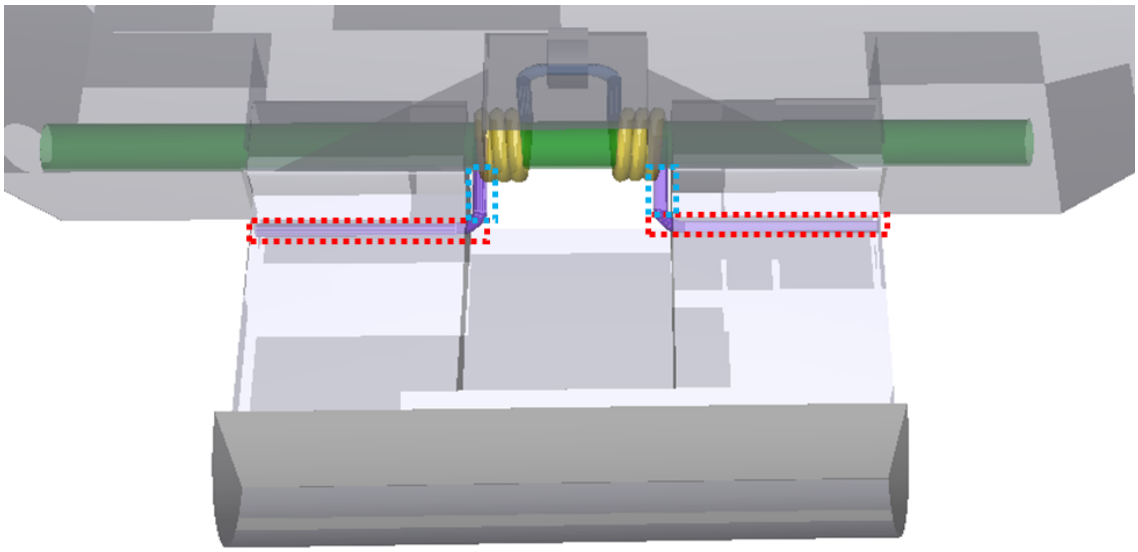
Solid Perspective View



Transparent Perspective View



Transparent Front View

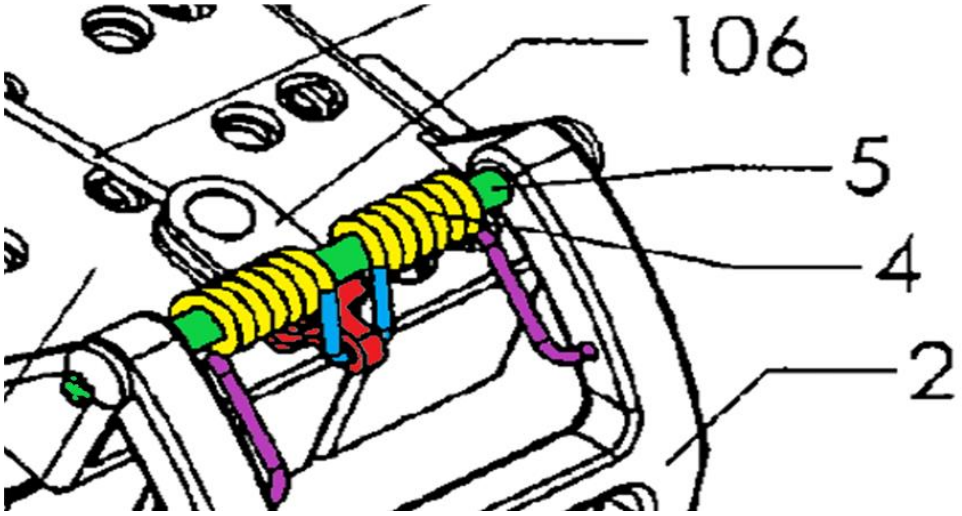


As shown, *the butting part* (each separate purple portion) comprises a *straight section* (blue-dashed box), *connected with the elastic body* (a respective yellow-highlighted winding)*; and a bending section* (each identified by red box), *connected with the straight section* (each identified by blue-dashed box). Each *bending section* extends into a respective through-hole (or *receiving portion*) in the lower mount 308.

Claim 6

The communication device according to claim 1, wherein the elastic member further comprises: at least one fixing part, connected with the elastic body and fixed on the housing.

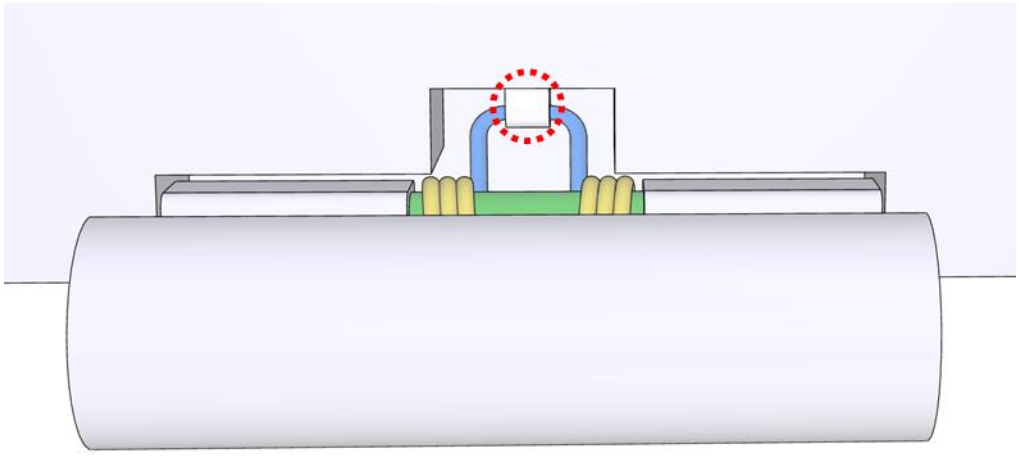
191. As shown in Figure 1 of Smith (partial, annotated below), Smith independently discloses this limitation:



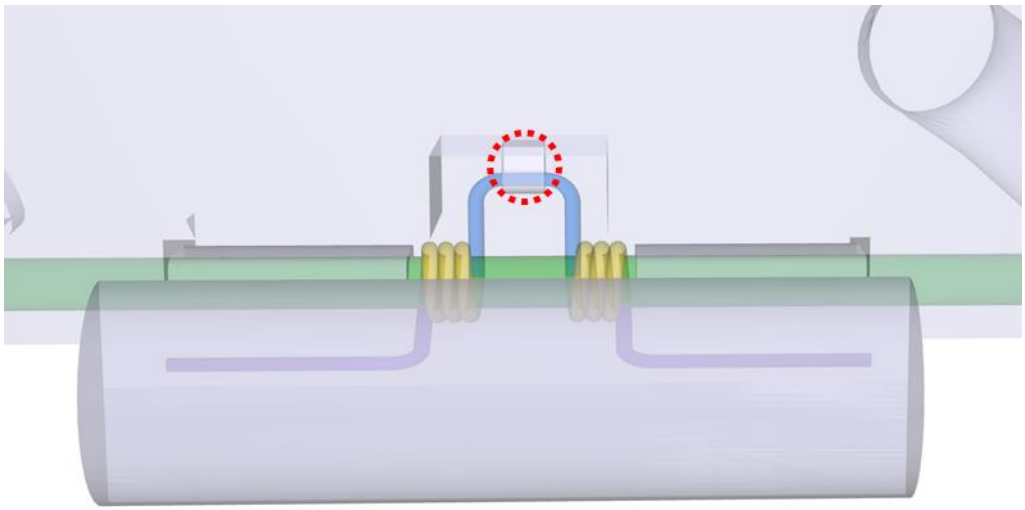
Smith discloses a *fixing part* (blue-highlighted portion of torsion spring 4), *connected with the elastic body* (either of the separate yellow-highlighted spring winding bodies) that is *fixed on the housing* via the hole of red-highlighted ring-lobe attached to the housing of headband 1. *See* Ex. 1005, 5:61-65 ("…center of the torsion spring 4 … is attached to cable termination 106"). While the position of the *fixing part* can change to adjust the clamping pressure applied to swing arm 2 and its attached earcup 7, the *fixing part* is nonetheless "fixed" to the headband at least because it is fastened securely to the headband 1 and cannot move when it is not being adjusted.

192. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, these limitations are also satisfied:

Front View



Transparent Front View

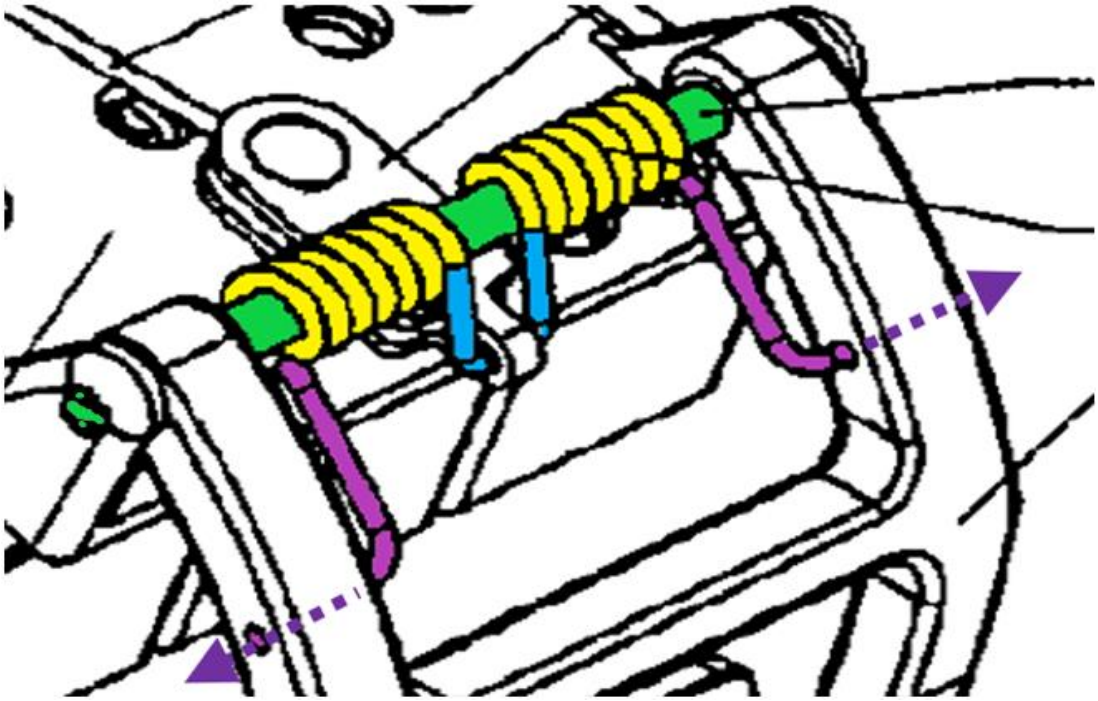


As shown, Unger as modified by Smith comprises a *fixing part* (blue-highlighted portion of torsion spring 4), *connected with the elastic body* (either of the separate yellow-highlighted spring windings) that is *fixed on the housing* (via the hole of the ring-lobe in the red-dashed circle of housing 304).

Claim 7

The communication device according to claim 1, wherein the elastic member comprises: two elastic bodies, spaced apart from each other and arranged on the first connecting member; and two butting parts, spaced apart from each other and butted against the first mounting member, each butting part is connected with one corresponding elastic body.

193. As shown in Figure 1 of Smith (partial, annotated below), Smith independently discloses this limitation:

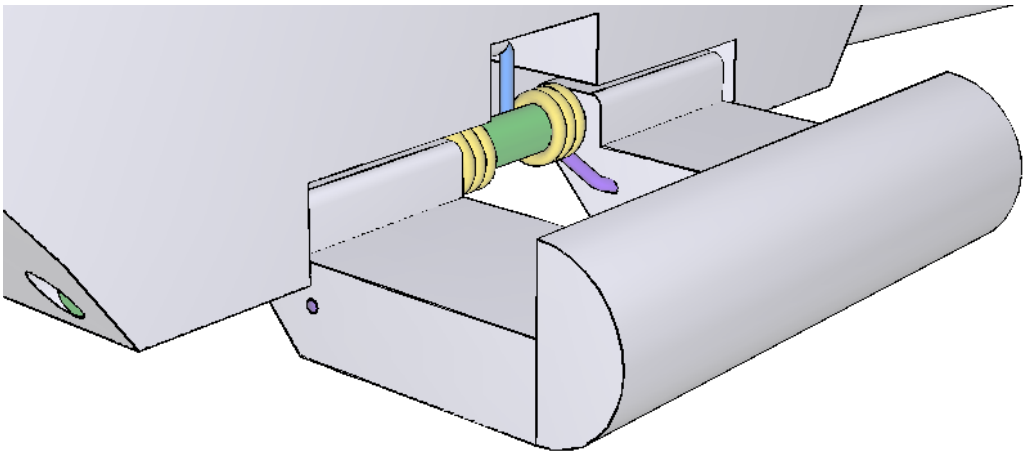


Smith depicts an elastic member (torsion spring 4) that comprises: *two elastic bodies* (each yellow-highlighted winding), *spaced apart from each other and arranged on the first connecting member* (green-highlighted pivot pin 5); and *two butting parts, spaced apart from each other* (two spaced apart purple-highlighted portions of spring 4) *and butted against the first mounting member* (swing arm 2 and attached

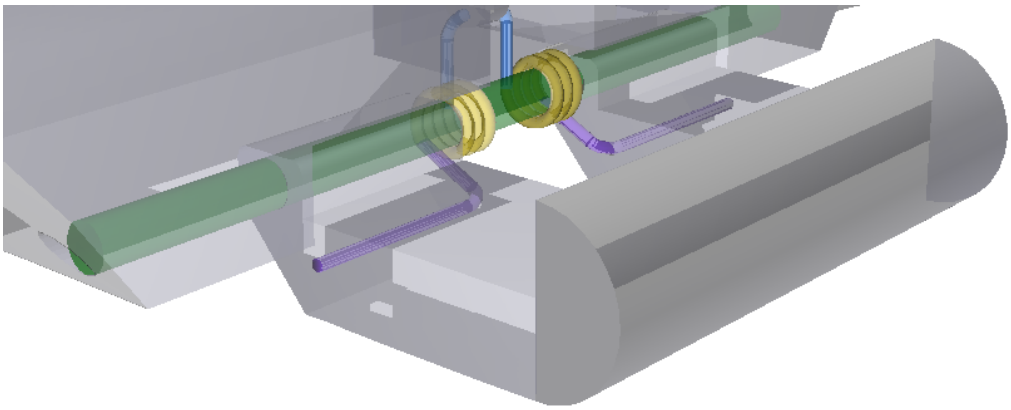
earcup 7), where *each butting part* (each purple-highlighted portion of spring 4) *is connected with one corresponding elastic body* (the left butting part is directly connected with the left-yellow highlighted winding, the right butting part is directly connected with the right yellow-highlighted winding). The two purple-highlighted portions of spring 4 are received within the through-holes (purple dashed arrow) of swing arm 2, and thus *butt against* the swing-arm to facilitate rotational movement by the spring. Ex. 1005, 5:49-65.

194. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, this same arrangement is maintained:

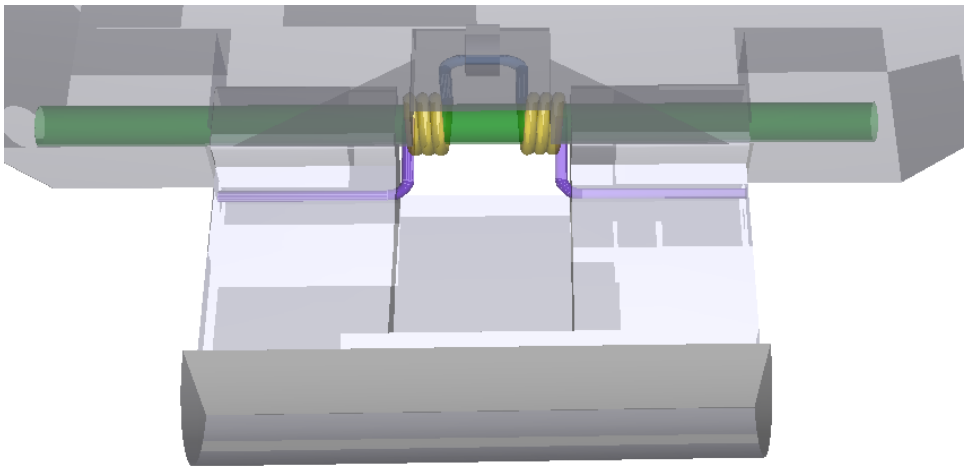
Perspective View



Transparent Perspective View



Transparent Front View



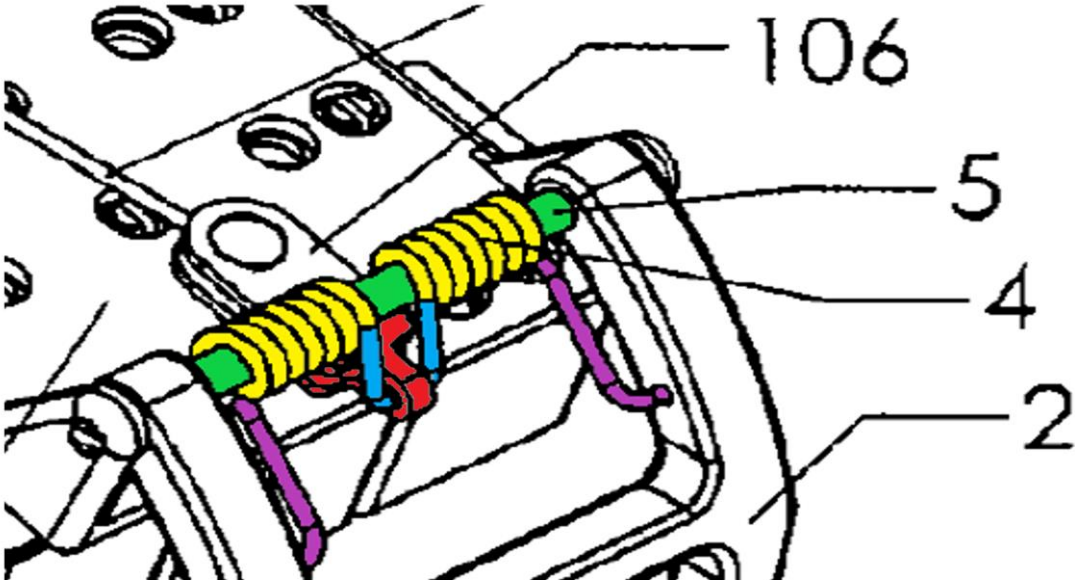
Unger as modified by Smith discloses an *elastic member* (torsion spring colored yellow, purple, blue) that comprises: *two elastic bodies* (each yellow-highlighted winding), *spaced apart from each other and arranged on the first connecting member* (green-highlighted pivot pin); and *two butting parts spaced apart from each other* (two spaced apart purple-highlighted portions of spring) and *butted against the first mounting member* (lower mount 308), where *each butting part* (each purple-highlighted portion of spring 4) *is connected with one corresponding elastic body* (a

respective yellow-highlighted winding). The two purple-highlighted portions of the spring are received within the through-holes of lower arm 308, and thus butt against the lower mount to facilitate rotational movement by the spring.

Claim 8

The communication device according to claim 1, wherein the elastic member further comprises: a fixing part, fixed on the housing, two ends of the fixing part are connected with the two elastic bodies, respectively.

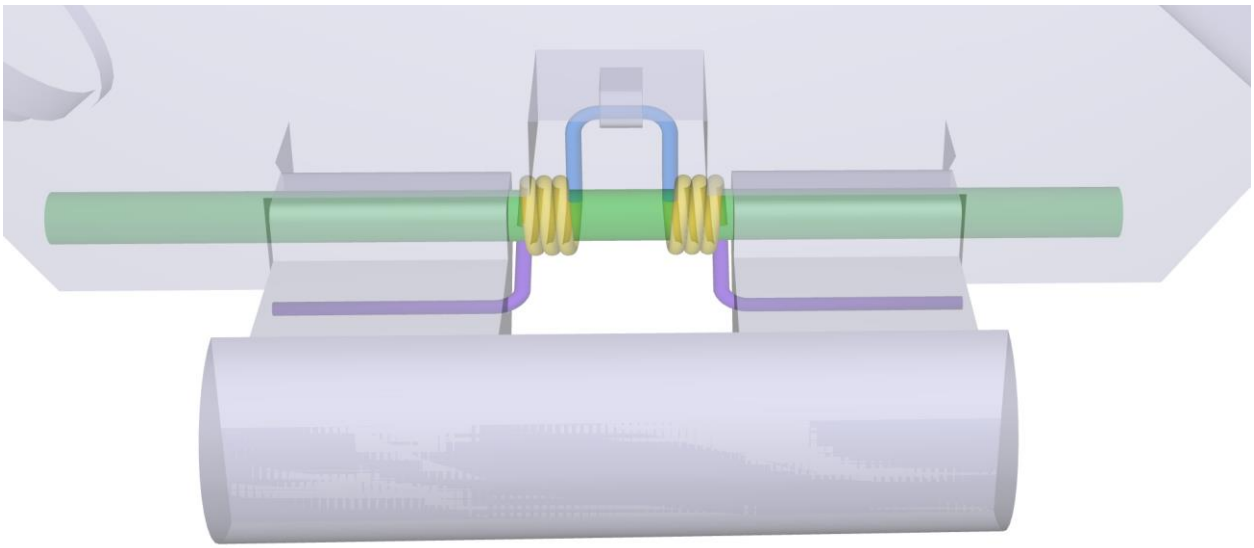
195. Unger as modified by Smith renders obvious the elastic member further comprises, a fixing part, fixed on the housing. *See* Claim 6 above. As shown below, Smith further independently teaches two ends of the fixing part are connected with the two elastic bodies (two spaced-apart, yellow-highlighted windings), respectively:



Ex. 1005, 5:61-65 (explaining that "center of the torsion spring 4" is "attached to cable termination 106"). One *fixing part end* (left end of blue-highlighted portion) is directly connected to one *elastic body* (left yellow-highlighted winding) and another *fixing part end* (right end of the blue-highlighted portion) is directly connected with another *elastic body* (right yellow-highlighted winding).

196. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, these limitations are also satisfied:

Transparent Front View

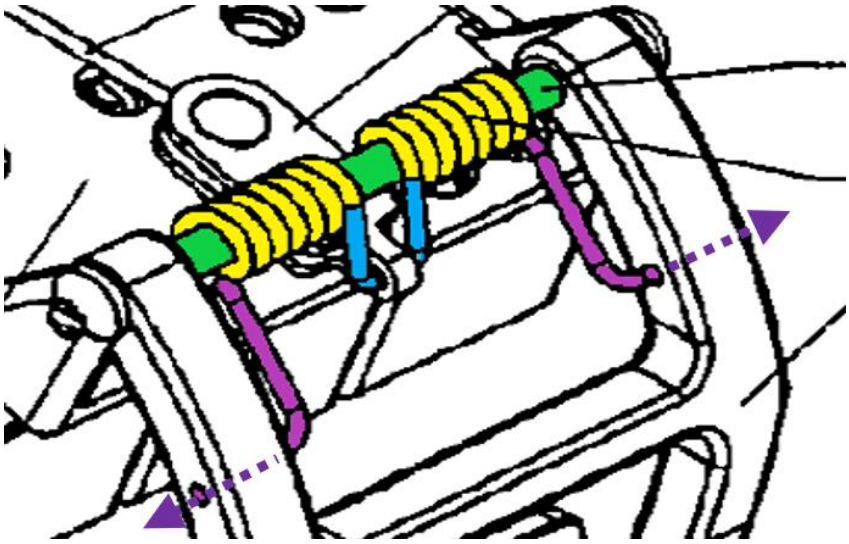


Two ends of the fixing part are *connected with the two elastic bodies* (two spaced-apart yellow-highlighted windings), *respectively*. One *fixing part end* (left end of blue-highlighted portion) is directly *connected with* the left *elastic body* and another *fixing part end* (right end of the blue-highlighted portion) is directly *connected with* the right *elastic body*.

Claim 9

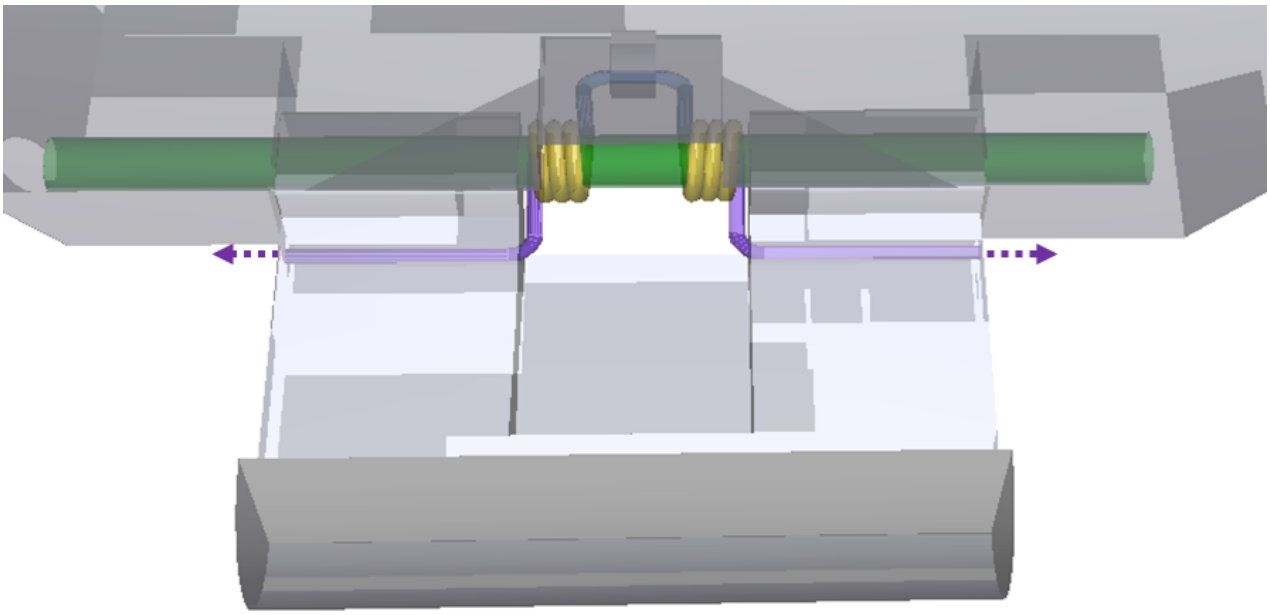
The communication device according to claim 1, wherein each butting part comprises: a bending section, the two bending sections extend towards each other or extend in opposite directions.

197. Unger as modified by Smith renders obvious an *elastic member* with *two bending sections. See* Claim 7 above. Additionally, Smith further independently discloses that *the two bending sections … extend in opposite directions* (as indicated by opposite dashed-purple arrows) in Figure 1 (partial, annotated below):



When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, the *two bending sections* also *extend in opposite directions* (as indicated by the purple dashed arrows):

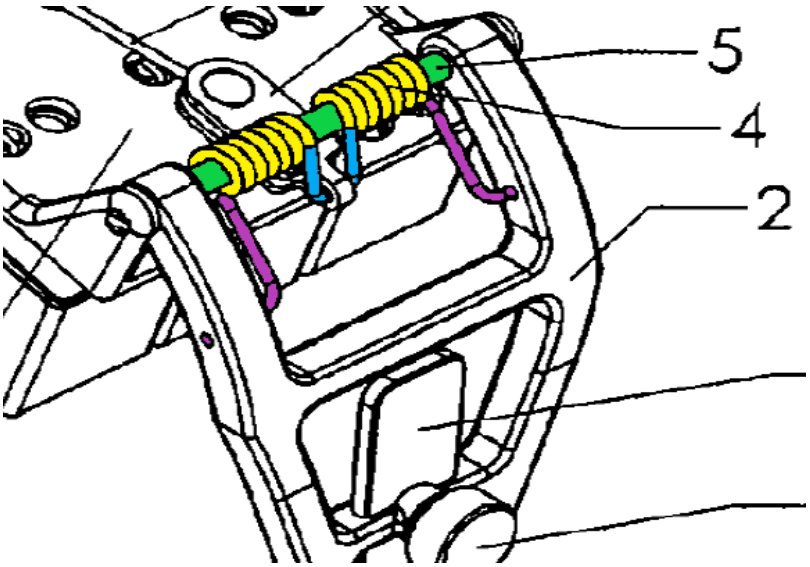
Transparent Front View



Claim 10

The communication device according to claim 1, wherein the elastic member comprises: an elastic body, arranged on the first connecting member; and two butting parts, spaced apart from each other and butted against the first mounting member, the two butting parts are both connected with the elastic body.

198. As shown below, Smith independently discloses *an elastic body* (left or right yellow-highlighted winding of torsion spring 4) *arranged on the first connecting member* (green-highlighted pivot pin 5) *and two butting parts, spaced apart from each other* (the two spaced apart purple-highlighted portions of spring 4) *and butted against the first mounting member* (swing arm 2 and attached earcup 7):

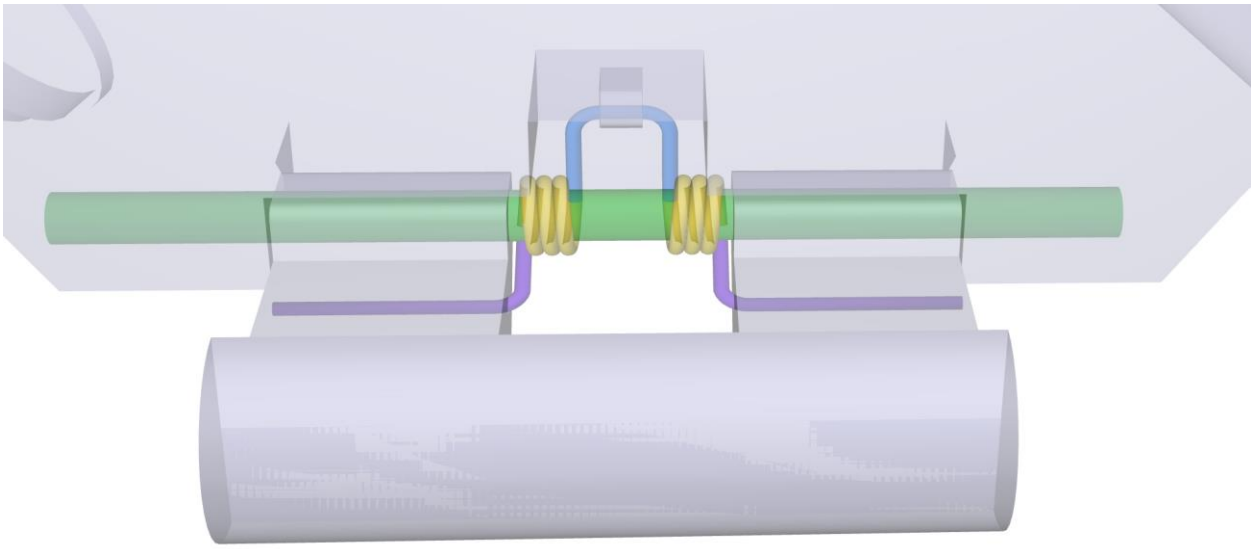


The two butting parts are *butted against* the *first mounting member* because their bending portions are each fixed within a through-openings of the arm, thereby butting them against the arm.

199. Additionally, the *two butting parts* are both *connected with the elastic body*. Specifically, the left butting part is directly *connected with* the left elastic body and indirectly *connected with* the right elastic body (via the left elastic body and blue-highlighted fixing part), while the right butting part is directly *connected with* the right elastic body and indirectly *connected with* the left elastic body (via the right elastic body part and blue-highlighted fixing part).

200. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model image below, these limitations are also satisfied:

Transparent Front View



Unger as modified by Smith includes *an elastic body* (left or right yellow-highlighted winding of torsion spring) *arranged on the first connecting member* (green-highlighted pivot pin) *and two butting parts, spaced apart from each other* (the two spaced apart, purple-highlighted portions of spring) *and butted against the first mounting member* (each *butting part* is fixed within through-openings of lower mount 308).

201. Additionally, the *two butting parts* are both *connected with* the elastic body. Specifically, the left butting part is directly *connected with* the left elastic body and indirectly *connected with* the right elastic body (via the left elastic body and blue-highlighted fixing part), while the right butting part is directly *connected with* the right elastic body and indirectly *connected with* the left elastic body (via the right elastic body part and blue-highlighted fixing part).

Claim 11

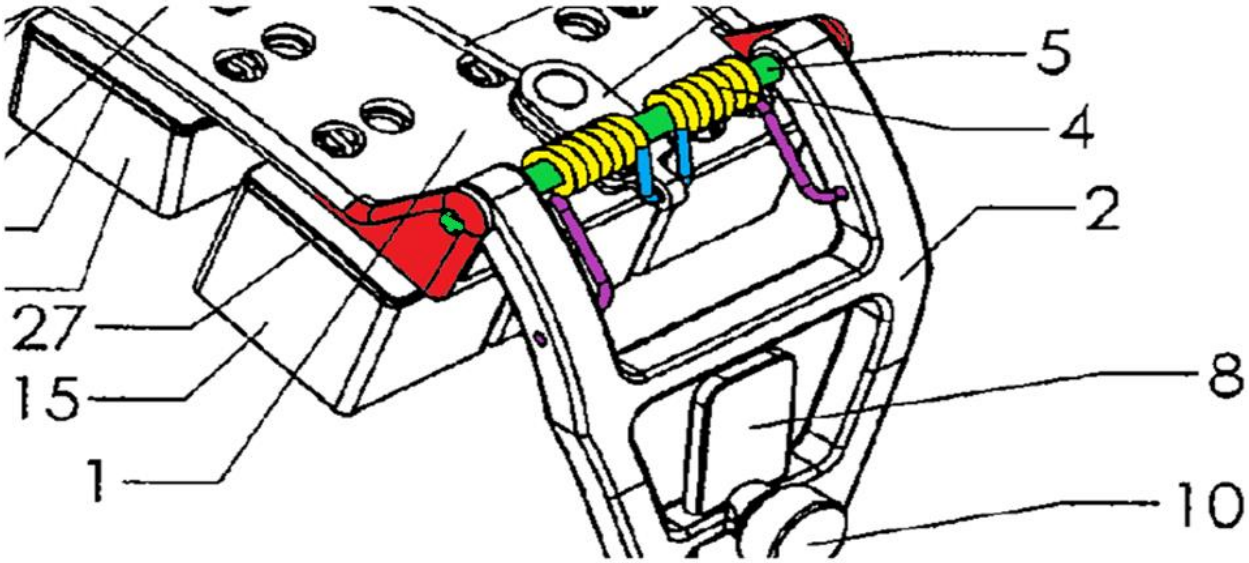
The communication device according to claim 1, wherein the elastic member comprises: an elastic body, arranged on the first connecting member; a butting part, connected with the elastic body and butted against the first mounting member; and a fixing part, connected with the elastic body and fixed on the housing.

202. The combination of Unger and Smith discloses this limitation, as demonstrated above for Claim 2 (addressing *elastic body arranged on first connecting member*, and *butting part*) and Claim 6 (addressing *fixing part*).

Claim 12

The communication device according to claim 1, wherein the housing comprises: a connecting element, connected with the first connecting member to connect the first mounting member with the housing.

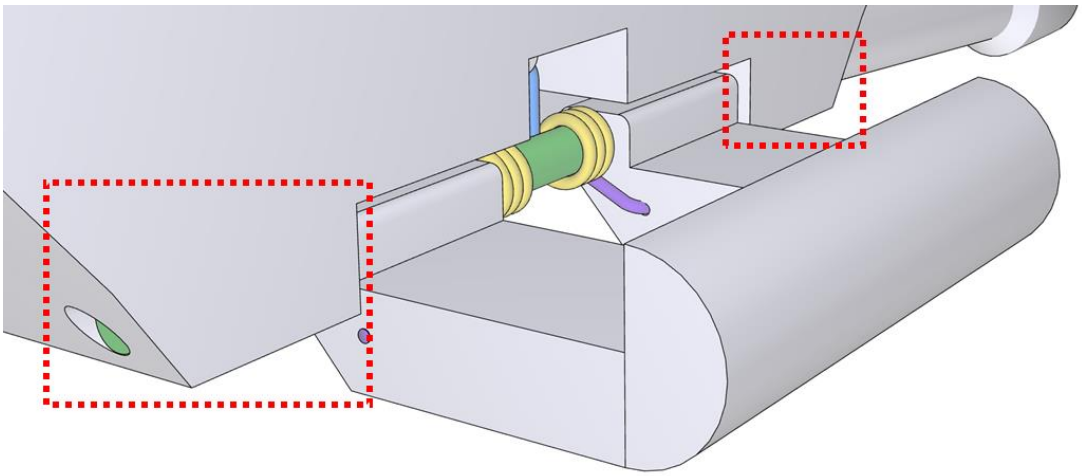
203. As shown in reference to Figure 1 (annotated, partial below), Smith independently teaches a *housing* (housing of headband 1) *comprising* a *connecting element* (each red-highlighted ring-lobe), *connected with the first connecting member* (green-highlighted pivot pin 5) *to connect the first mounting member* (swing arm 2 and attached earcup 7) *with the housing* (housing of headband 1):



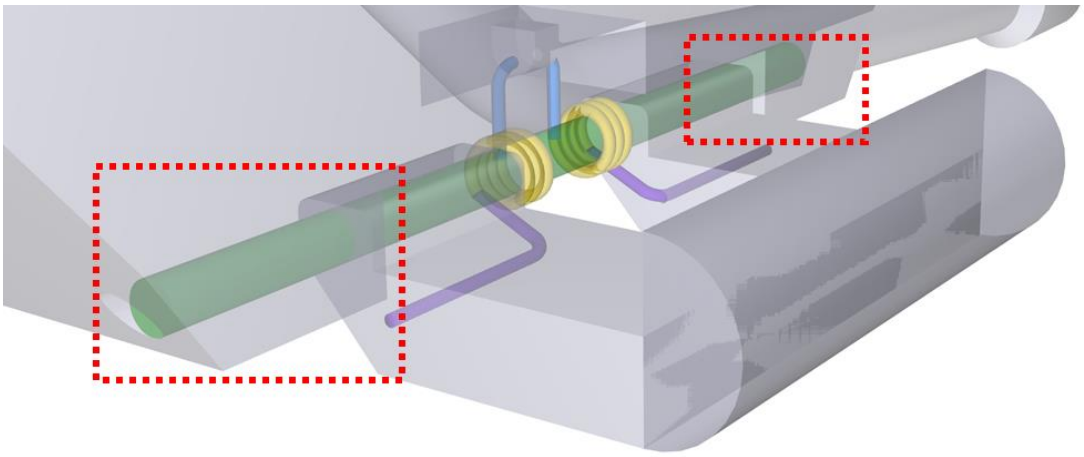
Each end of pivot pin 5 (green) extends into a respective through-hole of each ring-lobe (red-highlighted) to couple pivot pin 5 to the housing of headband 1.

204. When the torsion spring mechanism of Smith is incorporated into Unger as shown in the model images below, these limitations are also satisfied by the combination:

Perspective View



Transparent Perspective View



Unger as modified by Smith teaches a *housing* (housing 304 of communication device 104) *comprising* a *connecting element* (each protruding-lobe identified with red-dashed box), *connected with the first connecting member* (green-highlighted pivot pin) *to connect the first mounting member* (lower mount arm 308) *with the housing* (lower end of housing 304). The left end of the pin (green) extends into the left ring-lobe (left red-dashed box) and the right end of the pin (green) extends into the right ring-lobe (right red-dashed box), and thus each *connecting element* (ring-lobe) is connected with the *first connecting member* (pivot pin) to connect the *first mounting member* (lower mount arm 308) with *the housing* 304.

Claim 13

The communication device according to claim 1, wherein the second mounting assembly comprises: a second connecting member, connected with the housing; and a second mounting member, arranged on the second connecting member, and the second connecting member is detachably mounted on an end of the earmuff.

205. Unger expressly discloses the claimed *second mounting assembly*. As shown in Figure 6 (annotated below), Unger discloses a *second mounting assembly* attached to the top side of the housing 304, *comprising* a *second connecting member* (tab portion 604 of device mount 312) that is *connected with housing* 304 via slot 608:

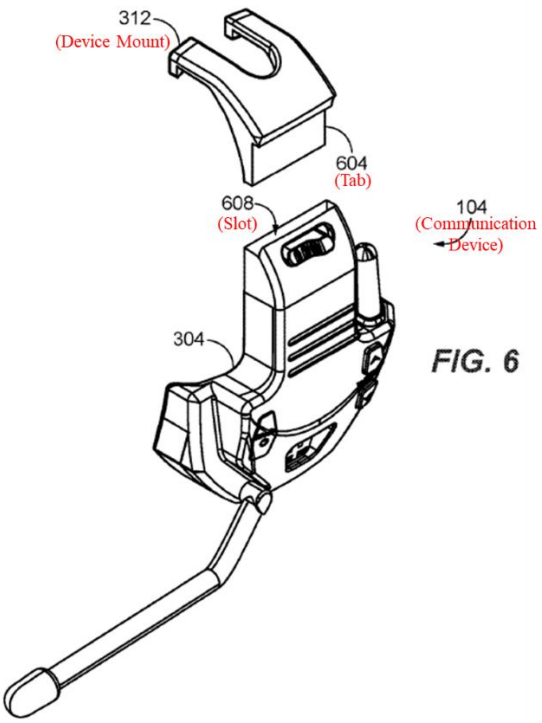


FIG. 6

Ex. 1004, 5:65-6:8. *The second mounting assembly* further comprises a *second*

mounting member (upper mount arm 312) arranged on the *second connecting member* (tab portion 604). The *second connecting member* (tab portion 604) is *detachably mounted on an end of the earmuff* as shown below:

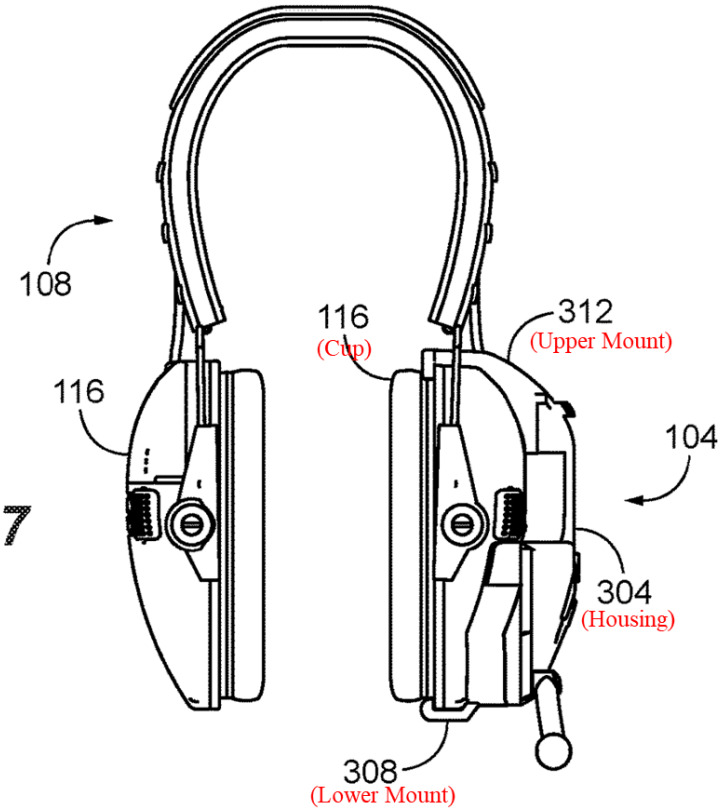


FIG. 7

More specifically, it is mounted on the upper end of earmuff cup 116. It is *detachably mounted* because it can be decoupled from the housing 304 as shown in Figure 6 to detach from the cup, and/or the upper arm can be made of a flexible or resilient material allowing for detachment of the entire communication device 104 (including tab portion 604) by bending the mount arm 308 away from the cup. *Id.* at 6:20-37. This correspondence of Unger to claim 13 is consistent with the way the '855 Patent corresponds the same terms to Figure 2. *See* '855 Patent, 5:61-67. Therefore, Unger

expressly discloses the limitations of Claim 13.

206. It would have been obvious to also modify Unger's upper mount 312 to incorporate an additional torsional spring mechanism identical to the torsional spring mechanism incorporated into the lower mount arm 308. A POSITA would recognize that this would provide rotational freedom to both mounts 308, 312, which would make it even easier attach and detach the communication device and allow the communication device to attach to a wider variety of hearing protection equipment designs. The torsion spring mechanism in the upper mount 312 would thus comprise *a second connecting member* (a second pivot pin), *connected with the housing* (upper end of housing 304)*; and a second mounting member* (the upper mount arm)*, arranged on the second connecting member, and the second connecting member* would be *detachably mounted on an end of the earmuff* (the mount 312 could be rotated away from the cup of the earmuff to dismount the communication device). Alternatively, if the lower mount 308 is considered the *second mounting assembly*, it also satisfies claim 13 for the same reason the torsion spring implementation of upper mount 312 does.

Claim 14

The communication device according to claim 1, wherein the audio output member comprises: a connecting head, communicated with the audio input member, and configured for transmitting the wireless signal containing the audio to the at least one loudspeaker; and a connecting line, connected with the connecting head, the connecting line is flexible.

207. Unger expressly teaches the limitations of this claim. In reference to Figures 3 and 8 (annotated below), Unger teaches that its communication device 104 comprises an *audio output member* (audio output connector 320) with a *connecting head* (red), which communicates audio signals to the *audio input member* (connector 824) of hearing protection device 108:

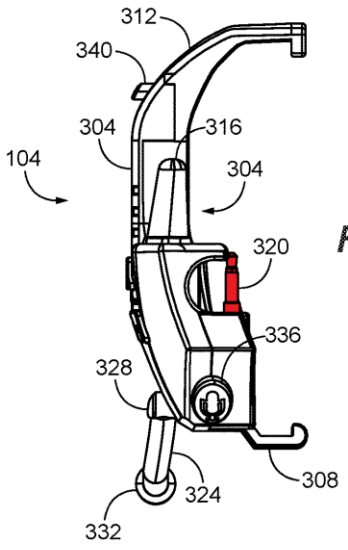


FIG. 3

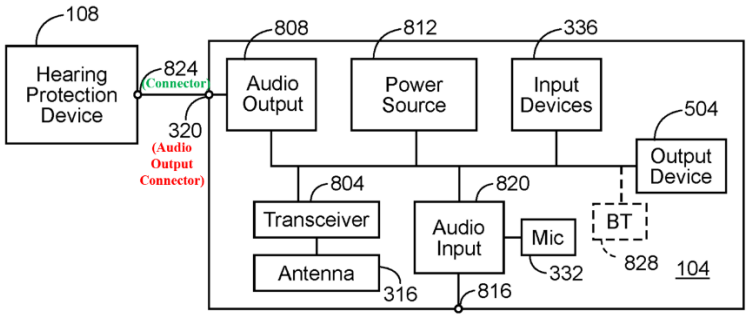


FIG. 8

Ex. 1004, 4:48-5:2; *Id.* at 7:47-59. The audio output *transmits the wireless signal containing the audio* of a remote user to *the at least one loudspeaker* of the hearing protection device. *Id.* at 1:54-61 ("The communication device also includes a

microphone that captures audio, a radio transceiver that wirelessly transmits the audio captured by the microphone to a remote user and wirelessly receives one or more wireless signals carrying audio from the remote user, and an audio output that connects to the audio input of the hearing protection device. The audio carried by the wireless signals is transmitted to the speakers via the audio output."); *see also id*. at 2:4-15, 8:31-39.

208. While Unger's Figure 3 depicts the audio output member 320 as being rigidly attached to the communication device 104, Unger also teaches that "[i]t is contemplated that a *length of cable* between an audio output connector 320 and an audio output 808 may be provided in some embodiments," which "allows a communication device 104 to connect to a wide variety of hearing protection devices 108." Ex. 1004, 7:54-59. Consequently, Unger expressly teaches that the *connecting head* (red) can be attached to the *audio output* 808 via *connecting line* that is *flexible* (both the material and the length of cable are flexible). In such a case, a POSITA would understand that the head (red) would be manually plugged into the hearing protection device by the wearer and that the *connecting head* and its associated *connecting line* could come off a different side of the communication device 104 so that it does not interfere with the physical mating of the communication device with the hearing protection equipment.

Claim 15

The communication device according to claim 1, further comprising at least one of at least one button, a display screen and a power supply.

209. Unger expressly discloses these limitations. In reference to Figure 8 (annotated below), Unger discloses that the communication device 104 has an input device 336 that "may be *a button*" such as a "push to talk button:"

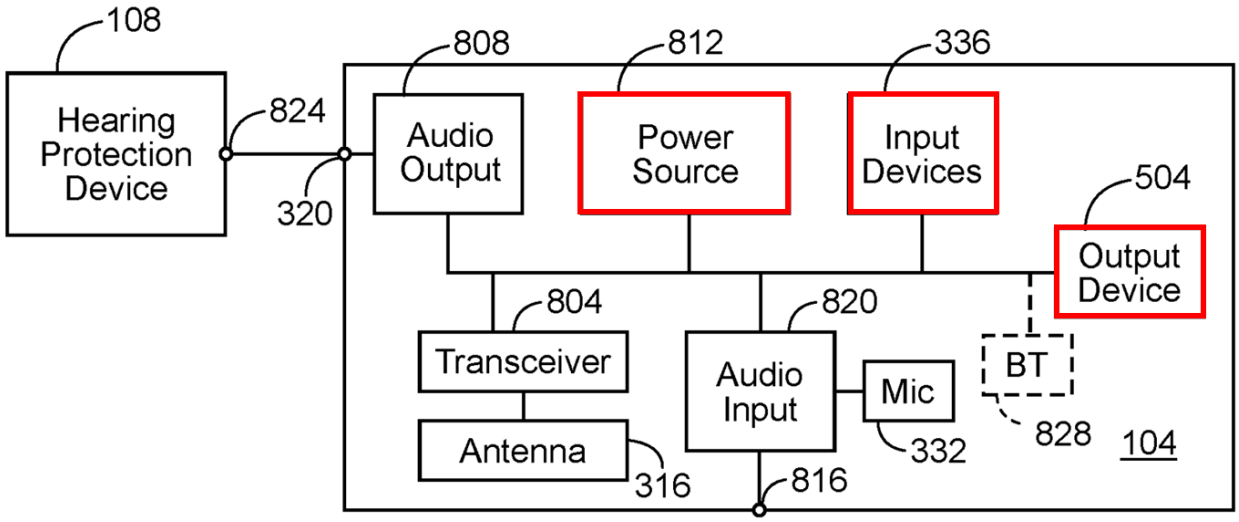


FIG. 8

Id. at 5:24-34, 7:31-35.

210. Unger also discloses that the communication device 104 may have an output device 504 that comprises a *display screen* that displays battery levels, volume information, and the current communications channel. *Id.* at 5:35-41.

211. Unger further teaches that the communication device comprises *one or more power supplies* ("one or more power sources 812"), which can include one or more batteries or solar panels. *Id.* at 6:43-52.

Claim 16

The communication device according to claim 1, wherein the housing is substantially arc-shaped, and the housing is adapted to the earmuff in shape.

212. "*Substantially* arc-shaped" renders this claim indefinite. *Infra* Section IX.D (Claim 16). Regardless, as shown in Figures 6 and 7 (produced below), each earmuff cup 116 of Unger has a pronounced outer convex *arc-shape* and the communication device housing 304 has a pronounced inner concaved *arc-shape*, so that *the housing is adapted to the earmuff in shape*:

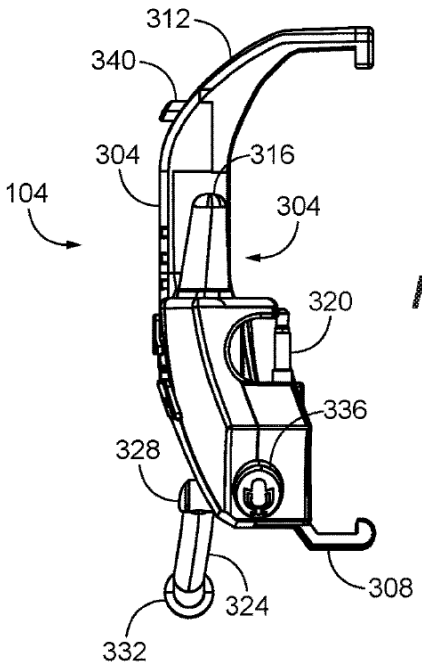


FIG. 3

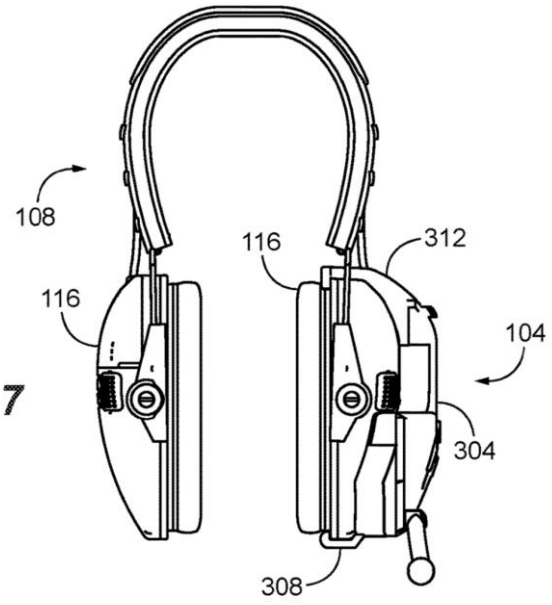


FIG. 7

Unger further teaches that "an enclosure 304 may be shaped to receive a cup of a hearing protection device, such as to help secure a communication device 104. A back end of an enclosure 304 ***may have an arcuate shape***, ***such as to correspond to and receive a cup therein***. As shown in FIG. 3 for instance, the back end of the enclosure has a ***concave*** shape." *Id.* at 4:41-47. Consequently, Unger expressly discloses that its housing has a pronounced *arc-shape*, which could be considered *substantially arc-shaped*.

213. To the extent "substantially arc-shaped" is not found to render Claim 16 indefinite and is interpreted to require a more pronounced housing arc-shape than that depicted in Figures 3 and 7 above, it would have been obvious based on the general knowledge of a POSITA to design the housing to have a shape that conforms to the shape of the cups of earmuffs, which typically have a very pronounced arc-shape. Unger expressly provides a motivation to include a housing with an inner shape that corresponds to the exterior shape of an earmuff cup, which would provide the obvious benefit of more closely conforming the communication device to the hearing protection device. This would reduce the overall size of the devices when coupled together and improve the security of the coupling by matching the inner profile of the housing with the exterior profile of the cup.

214. A POSITA would have understood that earmuff cups typically had a convex-shaped outer surface, and that the degree of "convexity" between different earmuff cup designs varied depending on the designer. It would have been obvious

to design the inner surface of the communication device housing 304 to have a *substantially arc-shaped* concave profile to match a corresponding *substantially arc-shaped* convex outer profile of an earmuff cup, which would provide the obvious benefit recognized by Unger of more effectively adapting the communication device to the cup; a conformal match between the communication device's interior surface and the earmuff cup's exterior provides stability and minimizes the required spring-loaded latching force. Consequently, a POSITA would have been motivated to design the housing to have a concave profile that closely matches the arc profile of cups, including cups that have a pronounced arc-shape as was a common design at the time of the invention.

215. A POSITA would have had a reasonable expectation of success, as it would have involved making simple mechanical engineering design changes to the shape of the housing to match a substantially arc-shaped earmuff. Such design changes are quite simple for a POSITA to make using off-the-shelf probe-based surface reconstruction, LIDAR, photogrammetry, or mechanical engineering design software, and a POSITA would have understood how and where to relocate internal electronic components (if necessary) to accommodate such shape changes. A POSITA would have also found it entirely predictable that modifying the shape of the housing to match a substantially arc-shaped earmuff cup would result in better engagement of the communication device with the earmuff, as well as reducing the

overall size of the combined hearing protection equipment and communication device. There would have been no appreciable or recognizable disadvantage to modifying the communication device housing to more closely match a highly-convex earmuff cup shape.

Claim 17

[Preamble] A system for connecting a communication device to a hearing protection equipment, the system comprising:

216. The elements of the preamble are shown in the element-by-element analysis of the other claim elements, below.

[17.1] a communication device, comprising:

217. Unger discloses a *communication device*. *See* Claim 1[Preamble] above.

[17.1.1] a housing;

218. Unger discloses a *housing*. *See* Claim 1.1 above.

[17.1.2] a first mounting assembly, rotatably arranged on a first end of the housing; and

219. The combination of Unger and Smith discloses this limitation. *See* Claim 1.2 above.

[17.1.3] a second mounting assembly, arranged on a second end of the housing;

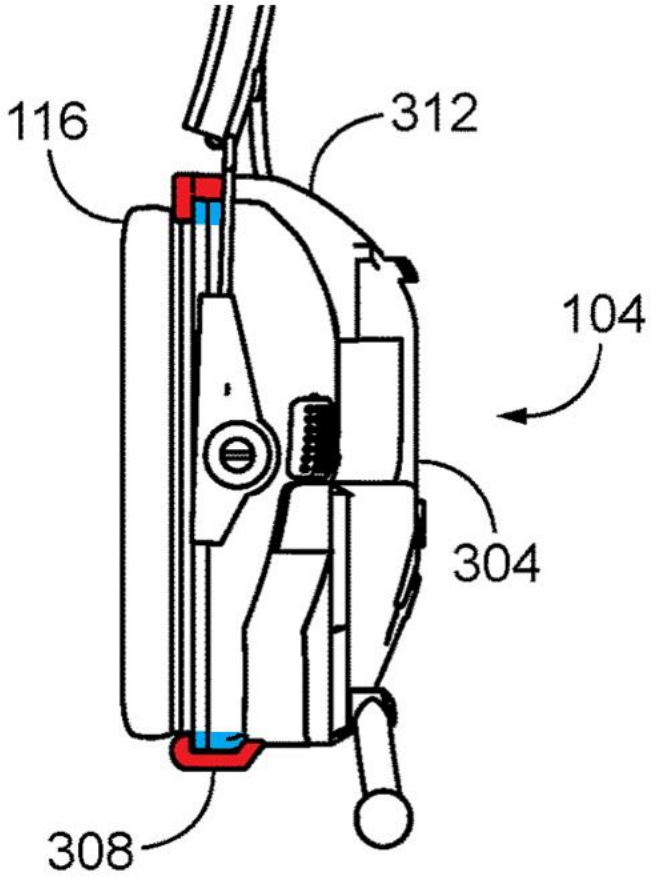
220. Unger discloses this limitation. *See* Claim 1.3 above

[17.2] and a hearing protection equipment, comprising:

221. Unger discloses this limitation. *See* Claim 1[Preamble] above.

[17.2.1] at least one earmuff, comprising two fixing parts, the first mounting assembly and the second mounting assembly are installed on the two fixing parts respectively, to connect the communication device to the hearing protection equipment,

222. Unger expressly discloses this limitation. Unger teaches that its *hearing protection equipment* ("hearing protection device 108") comprises "an earmuff comprising a headband 112 and cups 116 that cover a user's ears." Ex. 1004, 3:55-60. As shown in Figure 7 (partial, annotated below), the communication device 104 is attached at *two fixing parts* (blue) of cup 116—one *fixing part* is a lip on an upper end of the cup 116 and another *fixing part* is a lip on the lower end of the cup 116:



Id. at 4:12-22. These *fixing parts* are structurally identical to the "fixing parts 2013" of the earmuff 201 shown in Figure 10 of the '855 Patent (partial, annotated below), which are lips that the mounting assemblies can "hook" onto:

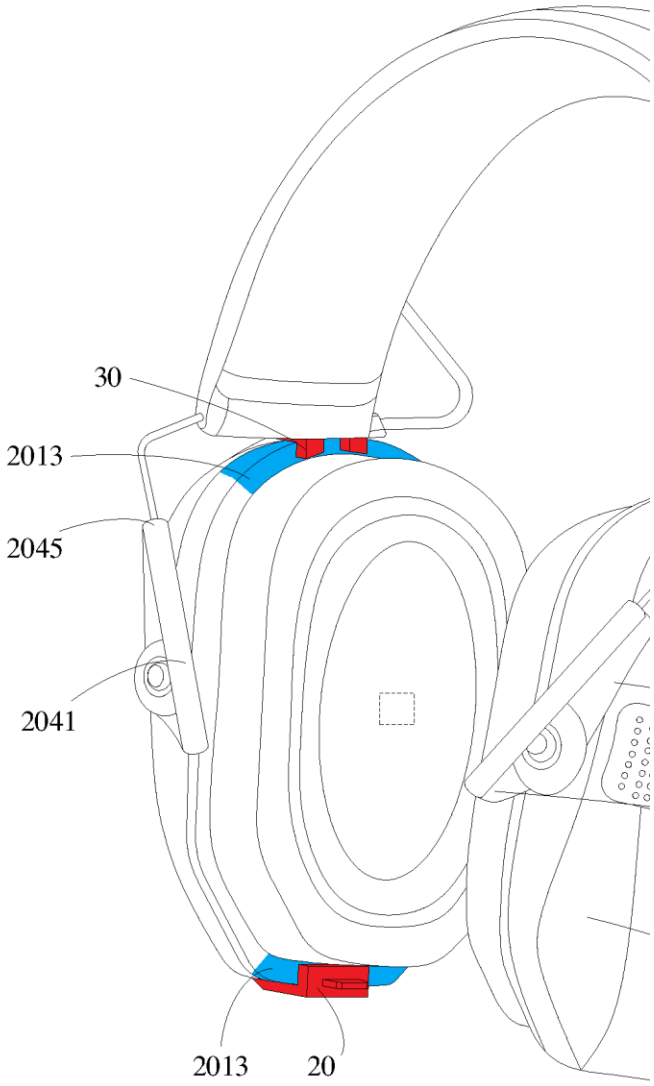


FIG. 10

Ex. 1001, 3:39-47. It is worth noting that the '855 Patent's use of the term "fixing parts" does not actually refer to "parts." Rather, "fixing parts" are merely the apex and nadir of the rigid housing, representing the logical opposing end locations of the rigid earmuff housing that a clamp should grip to hold an object like the communication device. In other words, a POSITA would understand that a *fixing*

part is not required to be a separate piece or component, but instead merely refers to a portion that the communication device is fixed to. Consequently, a POSITA would understand the blue-highlighted portions in both Unger and the ’855 Patent to be *fixing parts* because the *first mounting assembly* (lower mount 308 in Unger, lower mount 20 in the ’855 Patent) and the *second mounting assembly* (upper mount 312 in Unger, upper mount 30 in the ’855 Patent) are *installed on the lower and upper fixing parts, respectively* to *fix* the communication device to the hearing protection equipment. When Unger is modified to incorporate Smith’s torsion spring mechanism, Unger’s upper and lower mounts are *fixed* in this same way.

[17.3] wherein the first mounting assembly comprises: [A] a first connecting member, connected with the housing; [B] an elastic member; [C] a first mounting member, rotatably connected with the first connecting member by the elastic member, the first mounting member is coupled with the earmuff under an elastic force of the elastic member; and the first mounting member is separated from the earmuff after overcoming the elastic force of the elastic member.

223. The combination of Unger and Smith teaches these limitations. *See* Claim 1.7 above.

Claim 18

The system according to claim 17, wherein the earmuff further comprises: a rigid housing, comprising the two fixing parts; and a flexible part, arranged on the housing.

224. These limitations recite basic elements of hearing protection earmuffs. Unger teaches that its earmuffs comprise cups 116 having a “speaker 124 in each of

the cups," which is depicted in Figure 1 (annotated below) as being housed within cups 116:

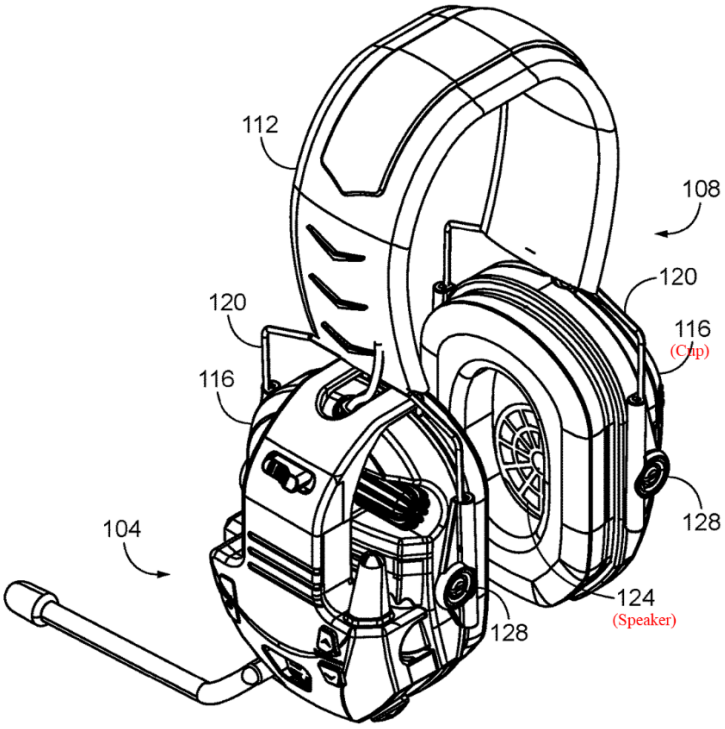
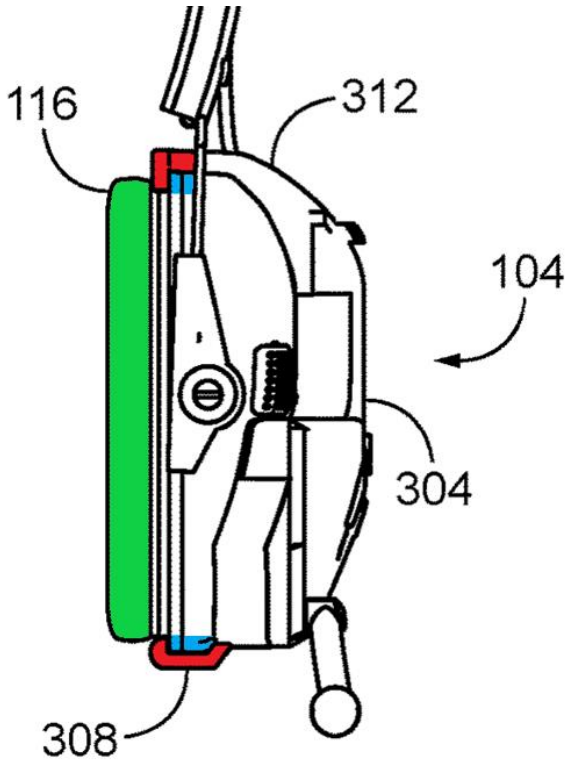


FIG. 1

Ex. 1004, 3:64-66. Cups 116 also house various other components, such as a volume control knob 208 (*see* Fig. 2) and an audio input member for receiving the audio output connector of the communication device. *Id.* at 1:47-50; 3:64-4:4. Consequently, each cup 116 is a *housing* that houses or encloses various components.

225. As explained in Claim 17.2.1 in reference to Figure 7 (partial, annotated below), each cup 116 comprises upper and lower *fixing parts* (blue) that the upper mount 312 and lower mount 308 can be fixed to, respectively.



226. While Unger does not expressly state that the cups 116 are "rigid," a POSITA would understand that the *fixing part* of each cup 116 to necessarily be rigid. A POSITA would understand that the cup 116 is rigid for multiple reasons including that the cup is a structural element that supports shafts, seals and fasteners; the cup must maintain its orientation relative to the user's outer ear; the cup must surround the outer ear without collapsing on to it to maintain internal sound-deadening material shape and gaps; and, the rigid hull aids in pressure wave abatement by reflecting at least a portion of the imposed sounds. In short, a POSITA would know that the housing must be rigid to avoid an improper fit, device deterioration, and a poor seal with the user's head, all of which contribute to reduced

earmuff performance. Indeed, the *fixing parts* must be rigid to allow for the upper mount 312 and lower mount 308 of the communication device 104 to securely attach or "fix" to cup 116. A POSITA would also understand the base of cups for hearing protection devices would be made of a rigid material (e.g., hard plastic), to which a non-rigid material (e.g., a cushion) is then attached for ear comfort. Indeed, Figure 7 (annotated above) depicts a cushion (green) on the inside of the cup 116, which is attached to the rigid part of the cup.

227. Unger also teaches a *flexible part arranged on the housing* in the form of sealing cushion (green) mounted on each cup. While Unger does not expressly identify the green portion as a "seal" or "cushion," a POSITA would understand the green portion to be a sealing cushion based on the figure. This is, first, because Unger is directed toward "hearing protection devices," which are specifically designed to protect the device wearer from loud sounds. A POSITA would understand that the cups of any hearing protection device would have some form of flexible sealing material so that the device cups can sufficiently adapt to differing wearer head features (e.g., ear shapes and sizes) to "seal off" or protect the wearer from loud exterior noises.

228. Additionally, Figure 1 (annotated on the left below) depicts seams spaced radially along the green portion, which a POSITA would understand to be a common characteristic of earmuff sealing cushions. While cushions exist without

seams and seams are not essential to cushions generally, the presence of seams expressly conveys to a POSITA that the green portions are earmuff cushions. This can be seen in, for example, Figure 1 of Hakansson (Exhibit 1013) (annotated on the right below). That figure depicts an earmuff cushion 14 (green) with seams like those in the cushion of Unger Figure 1:

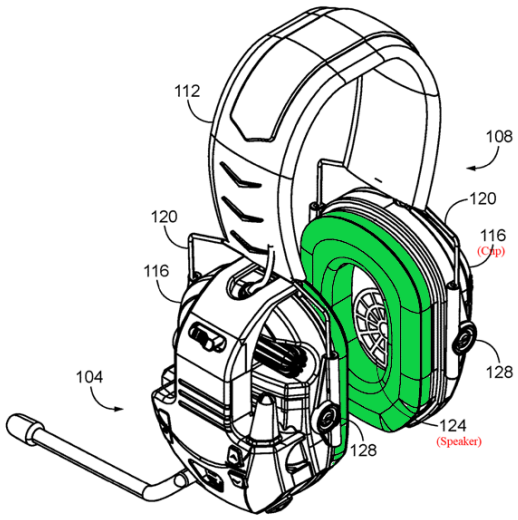


FIG. 1

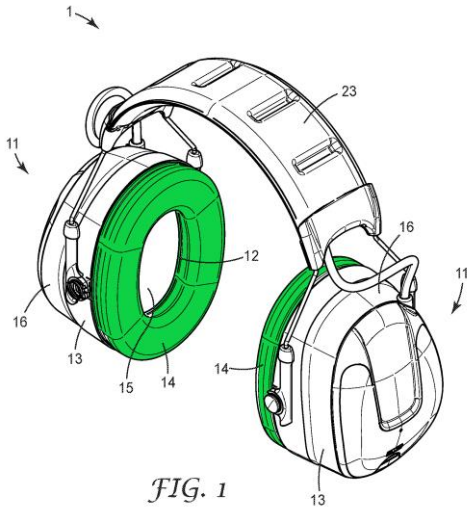


FIG. 1

Ex. 1014, 5:8-21. The *flexible part* 2012 identified in the '855 Patent looks very similar to these sealing cushions, as shown in annotated Figure 9 below:

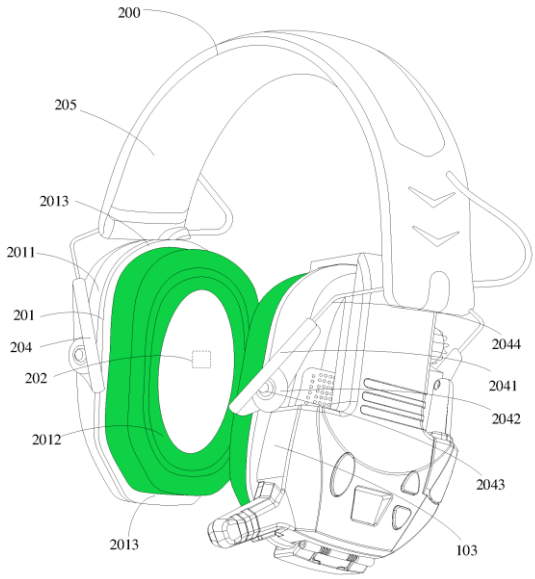
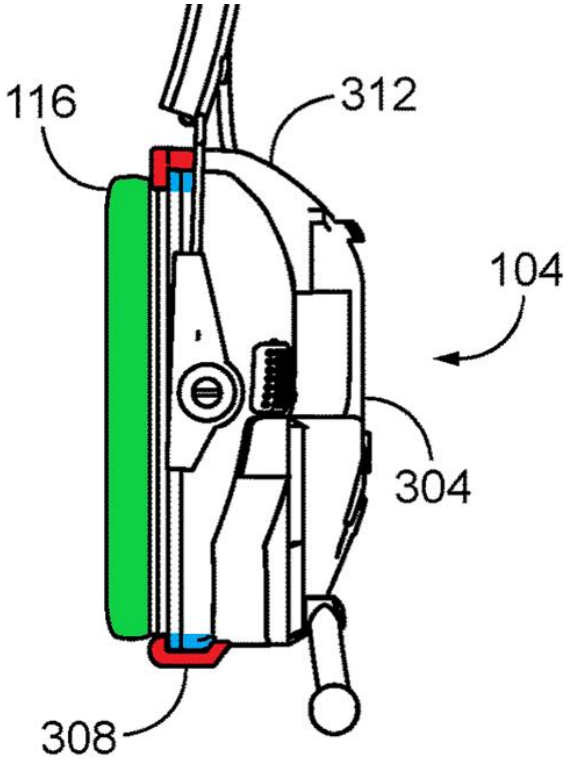


FIG. 9

229. Further, Figure 7 of Unger (partial, annotated below) shows that the green portion has a side profile characteristic of an earmuff cushion. More specifically, the upper and lower corners of the green portion are rounded out (rather than sharp turns), which is a common characteristic of sealing cushions used in earmuffs. Such sealing cushions are typically made of a soft rubber (or similar material) so that they can closely conform to a wide variety of ear shapes.



230. Even assuming Unger does not disclose the claimed *rigid housing* with the *flexible parts* arranged thereon, these features would have been obvious based on the general knowledge of a POSITA. These are nothing more than common characteristics of the cups of earmuff hearing protectors—there is nothing "novel" about using these features with hearing protection devices. Each cup is typically formed of a hard shell (often a hard plastic) and has an attached sealing cushion to provide for sound isolation and improved ear comfort.

231. For example, Figure 2 of Hakansson depicts earmuffs comprising a *housing* ("generally rigid" "shell 13" "made of a plastic material") with a *flexible part* ("cushioning 14" formed of "preferably elastically deformable material" that

"is configured to adapt to a wearer's head in an area around the wearer's ear, so as to form a preferably air-tight seal at this area") mounted thereon, which was a very common feature of hearing protection earmuffs:

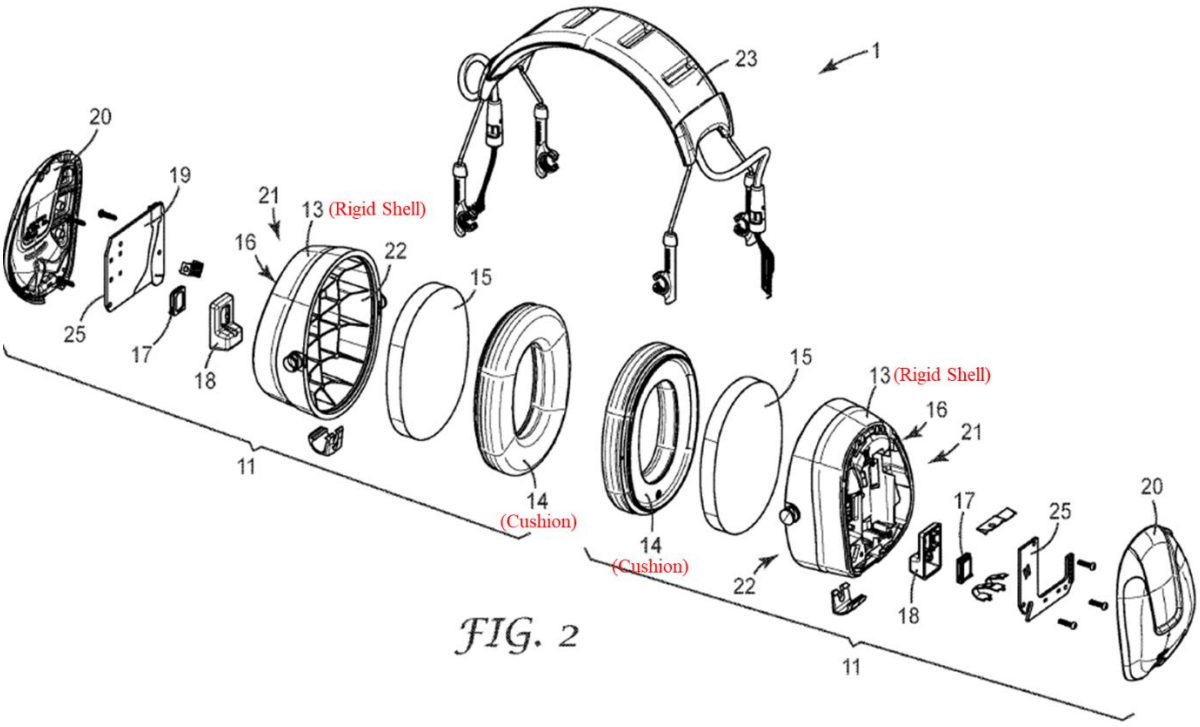


FIG. 2

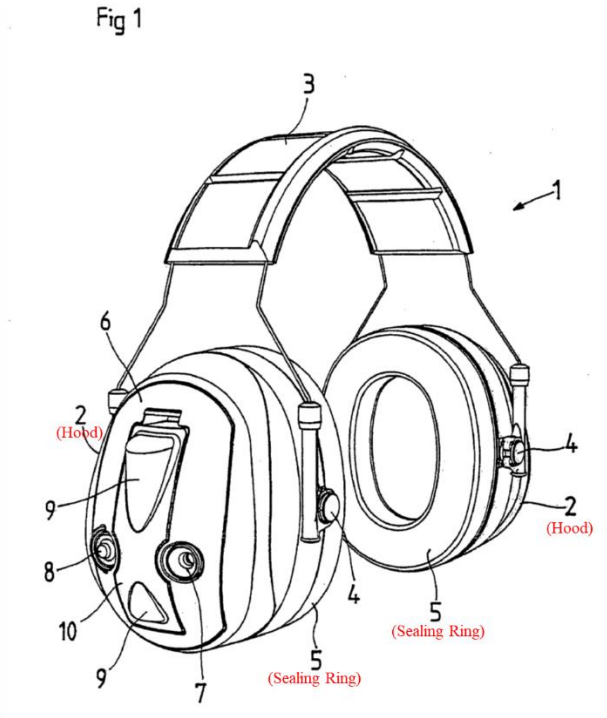
Ex. 1013, 4:67-5:37.

232. Similarly, U.S. Patent Application Publication No. 2005/0238181 ("Nilsson") is directed toward a hearing protection device and explains in the "Background of the Invention" that:

> Hearing protectors are often employed in noisy environments, such as factories, airports etc. Such hearing protectors consist of two muffs or ***hoods manufactured from hard material***, for example plastic, which ***sealingly surround*** the ears of the wearer

and which are connected to one another by the intermediary of a headband.

Ex. 1012 ¶ [0003] (emphasis added). Consistent with this common design, Nilsson discloses in reference to Figure 1 (annotated below) hearing protection earmuffs comprising *rigid housings* ("hoods 2 have hard outer shells") and a *flexible part* ("sealing ring 5 for abutment against the head of the user around the user's ear" and that "may be designed in any optional manner … known in the art"):



Id. ¶ [0027].

233. As can be seen, both Hakansson and Nilsson demonstrate that the use of hearing protection earmuffs with a *rigid housing* (e.g., plastic shell) and attached *flexible part* (e.g., sealing cushion or ring) was within the general knowledge of a

POSITA. Indeed, these were basic features that a POSITA would have been very surprised to not to find in hearing protection earmuffs.

234. It would have been obvious based on the general knowledge of a POSITA to use earmuff cups each comprising a *rigid housing* in Unger. For one, as I previously explained, rigid housing is more resistant to physical damage, provide better structural support, and provides better protection to the components enclosed within the housing (e.g., the loudspeaker, audio input) than a non-rigid housing. A POSITA would have recognized that hearing protection devices are commonly used in environments involving heavy machinery and hazards (e.g., tripping hazards, helmet hazards), making durability and resistance to physical damage even more important. Additionally, it is generally easier to manufacture and assemble a rigid housing (e.g., formed of hard shells that are easily attached via screws and can snap or form-fit together) compared to a non-rigid material.

235. It would have also been obvious based on the general knowledge of a POSITA to use a *flexible part* arranged on the *rigid housing*. As previously discussed, hearing protection devices are intended to protect the wearer from loud external noises, which can cause substantial hearing damage if not adequately sealed from the wearer. A POSITA would have been strongly motivated to include a *flexible part* (e.g., sealing ring or sealing cushion) so that the cups 116 of Unger's earmuffs can adapt to the shape of the wearer's ear and circumaural head contours

so as to effectively seal the wearer off from loud external noises in the environment. A POSITA would have also been strongly motivated to use a *flexible part* attached to the *rigid housing* to improve wearer comfort, which is very important for head worn devices.

236. A POSITA would have had a reasonable expectation of success in modifying Unger's cups to have a *rigid housing* with attached *flexible parts*, as such features were very well known and common in hearing protection earmuffs. The implementation of these features into Unger's earmuffs would have involved nothing more than the application of very basic mechanical design and fabrication principles, which were well understood and widely applied as evidenced by the commonality of these features in the prior art, such as Hakansson and Nilsson.

Claim 19

The system according to claim 17, wherein the communication device further comprises an audio output member; and the hearing protection equipment further comprises an audio input member, connected with the audio output member.

237. As explained with respect to claim 1[Preamble] and Claim 1.6, Unger's communication device comprises an *audio output member* 320 and the hearing protection equipment comprises an *audio input member* 824 that receives that audio output member when the communication device is attached to the hearing protection device:

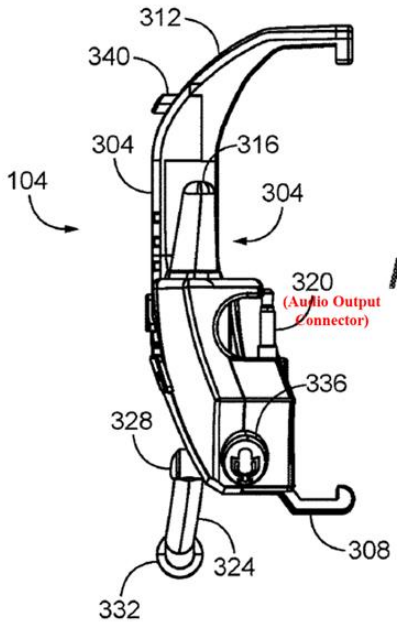


FIG. 3

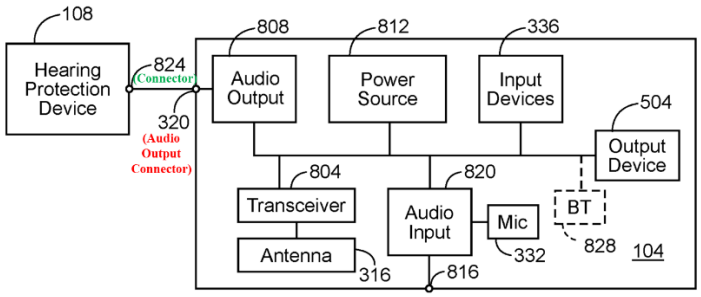


FIG. 8

While none of the other figures of Unger show the audio input connector 824, a POSITA would understand the connector 824 to necessarily be a female-type audio input connector that receives the male-type audio output connector 320 when the hearing protection device 108 and communication device 104 are coupled together via the upper mount 312 and lower mount 308. *See* Ex. 1004, 4:66-5:2 ("When attached to a cup, the audio output connector 320 is **automatically inserted into the corresponding connector** at the cup, thereby allowing communication of audio signals therebetween.") (emphasis added).

C. Ground 2

238. As discussed above for claim 18 with respect to Ground 1, in my opinion the use of a *rigid housing* with *two fixing points* and a *flexible part* is taught by Unger alone or obvious based on the combination of Unger and Smith and the

general knowledge of a POSITA. However, to the extent the Board determines that the use of a *rigid housing* with *two fixing points* and a *flexible part* arranged on the housing was not obvious based on the general knowledge of a POSITA as discussed for Ground 1, it would have been obvious based on the combination of Unger and Smith further in view of Hakansson. Although the reasons for this are generally discussed above with regard to claim 18 in Ground 1 (*see* Section IX.B.4 (Claim 18)), I reiterate them here.

239. Hakansson teaches the use of hearing protection earmuffs with a rigid housing (e.g., a plastic shell) and attached cushioning enables configuring the earmuffs to a wearer's head, to form a tight seal around the wearer's ear. For example, Figure 2 of Hakansson depicts earmuffs comprising a *housing* ("generally rigid" "shell 13" "made of a plastic material") with a *flexible part* ("cushioning 14" formed "of, preferably elastically deformable material" that "is configured to adapt to a wearer's head in an area around the wearer's ear, so as to form a preferably air-tight seal at this area") mounted thereon:

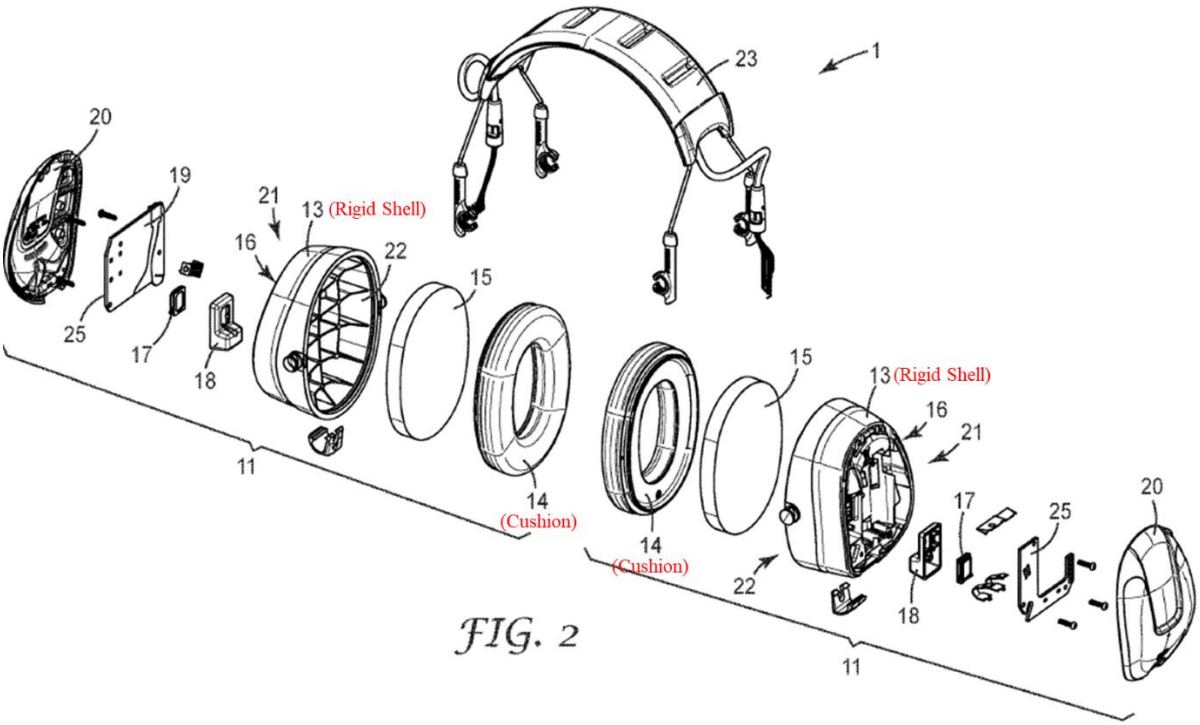


FIG. 2

Ex. 1013, 4:67-5:37.

240. A POSITA would have been motivated to combine Hakansson with the combination of Unger and Smith for several reasons. First, a POSITA would have been motivated to modify the earmuffs taught in Unger to use a rigid housing, because a rigid housing would provide a stronger point of connection for the communication device mounting arms to attach and would better protect the internal components. A POSITA would also have understood that rigid housing is more resistant to physical damage and provides better protection to the components enclosed within the housing (e.g., the loudspeaker, audio input) than a non-rigid housing. A POSITA would have recognized that hearing protection devices are

commonly used in environments involving heavy machinery and hazards (e.g., tripping hazards, helmet hazards), making durability and resistance to physical damage even more important. Additionally, it is generally easier to manufacture and assemble a rigid housing (e.g., formed of hard shells that are easily attached via screws and can snap or form-fit together) compared to a non-rigid material. Finally, mentioned earlier, a POSITA would also understand that the cup 116 is rigid for multiple reasons including that the cup is a structural element that supports shafts, seals and fasteners; the cup must maintain its orientation relative to the user's outer ear; the cup must surround the outer ear without collapsing on to it to maintain internal sound-deadening material shape and gaps; and, the rigid hull aids in pressure wave abatement by reflecting at least a portion of the imposed sounds.

241. It would have also been obvious based on the general knowledge of a POSITA to use a *flexible part* arranged on the *rigid housing*. Including a *flexible part* (e.g., sealing ring or sealing cushion) so that the cups 116 of Unger's earmuffs can adapt to the shape of the wearer's ear and effectively seal the wearer off from loud external noises from the environment would have been desirable, because a lack of an adequate seal could cause substantial hearing damage to the wearer. A POSITA would have also been strongly motivated to use the cushion from Hakansson attached to its rigid shell (*rigid housing*) to improve wearer comfort, which is very important for head worn devices.

242. A POSITA would have had a reasonable expectation of success in combining Hakansson with the combination of Unger and Smith, based on Hakansson's own disclosure demonstrating the successful use of rigid cup housing with flexible cushions or seals. This success is also present in Nilsson as discussed for Ground 1 (Claim 18). The implementation of these features into Unger's earmuffs would have involved nothing more than the application of very basic mechanical design and fabrication principles, which were well understood and widely applied as evidenced by the commonality of these features in the prior art, shown in Hakansson as well as Nilsson.

D. Ground 3

243. Dependent claims 3-6, 8, 9 and 16 are indefinite because they fail to inform those of skill in the art about the scope of the invention with reasonable certainty. Below, I discuss the reasons for this opinion with respect to each claim. Throughout this section, when discussing alternative understandings of the claim language, I use strikethroughs to indicate deletion of claim text and underlining to indicate the addition of claim text.

Claim 3

244. Claim 3 depends from claim 1 and recites "wherein ***the*** at least one elastic body sleeves on the first connecting member." However, claim 1 does not

recite an "elastic body." While dependent claim 2 recites "at least one elastic body," it is unclear whether claim 3 was intended to recite: "The communication device according to claim ~~1~~2…" or "The communication device according to claim 1, wherein ~~the~~ at least one elastic body sleeves on the first connecting member." Because both interpretations are reasonable and consistent with the specification, it is unclear which interpretation is appropriate. Further, these different interpretations result in very different claim scopes given the additional elements of claim 2 that are present in one interpretation but not the other.

245. The prosecution history is not helpful in resolving the ambiguity to arrive at the appropriate interpretation. In the final amendment leading to allowance, the applicant incorporated the limitations of dependent claim 2 into independent claim 1. Ex. 1003, 33, 38, 114. The applicant amended then-dependent claims 3-13 (which issued as dependent claims 2-12) to depend directly from independent claim 1, rather than from various intervening dependent claims. *Id.* at 34-35. Thus, issued claim 3 (then-pending claim 4) originally depended from issued claim 2 (then-pending claim 3), which itself depended from then-pending claim 2 (which was cancelled), but during this amendment issued claim 3 was modified to depend directly from claim 1.

246. Thus, it is unclear whether the patent applicant intended to: (1) retain the previous claim-dependency structure of claim 3 (then-pending dependent claim

4), in which case claim 3 should depend from claim 2; or have claim 3 establish the first instance of "at least one elastic body." Given the existence of two equally likely, reasonable interpretations resulting in differing claim scope, claim 3 fails to inform a POSITA, with reasonably certainty, about the scope of the claimed invention.

Claim 4

247. Claim 4 depends from claim 1 and recites "wherein the first mounting member comprises: a receiving portion, ***the*** at least one butting part is received in the receiving portion." However, claim 1 does not recite a "butting part." While dependent claim 2 recites "at least one butting part," it is unclear whether claim 4 was intended to recite: "The communication device according to claim ~~1~~2…" or "The communication device according to claim 1, wherein the first mounting member comprises: a receiving portion, ~~the~~ at least one butting part is received in the receiving portion." Because both interpretations are reasonable and consistent with the specification, it is unclear which interpretation is appropriate. Further, these different interpretations result in very different claim scopes given the additional elements of claim 2 that are present in one interpretation but not the other.

248. The prosecution history provides no guidance as the appropriate interpretation. As discussed above for claim 3, in the final amendment the applicant incorporated the limitations of dependent claim 2 into independent claim 1 and amended the dependent claims 3-13 (which issued as dependent claims 2-12) to

depend directly from independent claim 1, rather than from various intervening dependent claims. *Id.* at 33-35, 38, 114. It is unclear whether the applicant intended to retain the previous claim-dependency structure of claim 4 (then-pending dependent claim 5) or have claim 4 establish the first instance of "at least one butting part." Given the existence of two, equally likely reasonable interpretations resulting in differing claim scope, claim 4 fails to inform a POSITA, with reasonably certainty, about the scope of the claimed invention.

Claim 5

249. Claim 5 depends from claim 1 and recites "wherein ***the*** butting part comprises: a straight section, connected with ***the*** elastic body." However, claim 1 does not recite a "butting part" or "elastic body."

250. While dependent claim 2 recites "at least one butting part" and "at least one elastic body," it is unclear whether claim 5 was intended to recite "The communication device according to claim ~~1~~2," or "The communication device according to claim 1, wherein a~~the~~ butting part comprises: a straight section, connected with an~~the~~ elastic body." As discussed above, dependent claims 3 and 4 could have been intended to depend on dependent claim 2, in which case claim 5 possibly could have been intended to indirectly depend on claim 2 via one of those intervening claims. All of these interpretations are reasonable and consistent with the specification but result in very different claim scopes.

251. The prosecution history provides no guidance as the appropriate interpretation. As discussed for claims 3 and 4, in the final amendment the applicant incorporated the limitations of then-pending dependent claim 2 into independent claim 1 and amended then-pending dependent claims 3-13 (which issued as dependent claims 2-12) to depend directly from independent claim 1, rather than from various intervening dependent claims. *Id.* at 33-35, 38, 114. Issued claim 5 originally depended from issued claim 2, which depended from the original claim 2 that was incorporated into claim 1. *Id.* at 33-34. It is unclear whether the applicant intended to retain this dependency structure in the amended claim, or instead have claim 5 establish the first instance of "at least one butting part" and "an elastic body." Given the existence of multiple possible reasonable interpretations resulting in differing claim scope, claim 5 fails to inform a POSITA, with reasonably certainty, about the scope of the claimed invention.

Claim 6

252. Claim 6 depends from claim 1 and recites "at least one fixing part, connected with ***the*** elastic body." However, claim 1 does not recite an "elastic body."

253. While each of dependent claims 2, 3 and 5 recite "at least one elastic body" and/or "the elastic body," it is unclear whether claim 6 was intended to recite "The communication device according to claim ~~1~~2," "The communication device according to claim ~~1~~3," "The communication device according to claim ~~1~~5," or "The

communication device according to claim 1 … at least one fixing part, connected with ~~the~~ an elastic body and fixed on the housing." All four interpretations are reasonable and consistent with the specification but result in very different claim scope.

254. The prosecution history provides no guidance as the appropriate interpretation. As discussed, in the final amendment the applicant incorporated the limitations of dependent claim 2 into independent claim 1 and amended the dependent claims 3-13 (which issued as dependent claims 2-12) to depend directly from independent claim 1, rather than from various intervening dependent claims. *Id.* at 33-35, 38, 114. Claim 6 originally depended from issued claim 2, which depended from the original claim 2 that was incorporated into claim 1. *Id.* at 33-34. It is unclear whether the applicant's intent was to depend on another claim or have claim 6 establish the first instance of "an elastic body." Given the existence of multiple, equally likely reasonable interpretations resulting in differing claim scope, claim 6 fails to inform a POSITA, with reasonably certainty, about the scope of the claimed invention.

Claim 8

255. Claim 8 depends from claim 1 and recites "two ends of the fixing part are connected with ***the*** two elastic bodies, respectively." However, claim 1 does not recite an "elastic body."

256. While dependent claim 7 recites "two elastic bodies," it is unclear whether claim 8 was intended to recite "The communication device according to claim ~~1~~7," or "The communication device according to claim 1 … two ends of the fixing part are connected with ~~the~~ two elastic bodies, respectively." Both interpretations are reasonable and consistent with the specification but result in very different claim scopes.

257. The prosecution history provides no guidance as the appropriate interpretation. As discussed, in the final amendment the applicant incorporated the limitations of dependent claim 2 into independent claim 1 and amended the dependent claims 3-13 (which issued as dependent claims 2-12) to depend directly from independent claim 1, rather than from various intervening dependent claims. *Id.* at 33-35, 38, 114. Claim 8 originally depended from the claim that issued as 7, which depended from the claim issued as Claim 2. *Id.*, 33-35. It is unclear whether the applicant's intent was to depend on another claim or have claim 8 establish the first instance of "two elastic bodies." Given the existence of multiple, equally likely reasonable interpretations resulting in differing claim scope, Claim 8 fails to inform a POSITA, with reasonably certainty, about the scope of the claimed invention.

Claim 9

258. Claim 9 depends from claim 1 and recites "wherein ***each*** butting part comprises: a bending section, the two bending sections extend towards each other or extend in opposite directions." However, claim 1 does not recite a "butting part."

259. While dependent claim 2 recites "at least one butting part" and dependent claim 7 recites "two butting parts" and "each butting part," it is unclear whether claim 9 was intended to depend on claim 2 or 7, or instead recite "The communication device according to claim 1, wherein the elastic member comprises two butting parts, each comprises…" Each interpretation is reasonable and consistent with the specification but results in very different claim scopes.

260. The prosecution history provides no guidance as the appropriate interpretation. As discussed, in the final amendment the applicant incorporated the limitations of dependent claim 2 into independent claim 1 and amended the dependent claims 3-13 (which issued as dependent claims 2-12) to depend directly from independent claim 1, rather than from various intervening dependent claims. *Id.* at 33-35, 38, 114. Claim 9 originally depended from the claim that issued as 7, which depended from the claim issued as claim 2. *Id.*, 33-35. It is unclear whether the applicant intended to depend on another claim or have claim 9 establish the first instance of "butting part." Given the existence of multiple, equally likely reasonable

interpretations resulting in differing claim scope, claim 9 fails to inform a POSITA, with reasonably certainty, about the scope of the claimed invention.

Claim 16

261. Claim 16 recites "wherein the housing is ***substantially*** arc-shaped." However, the specification provides no guidance to determine or distinguish an arc-shaped housing from a *substantially* arc-shaped housing. The specification merely states that "[t]he housing 10 is *substantially* arc-shaped." Ex. 1001, 3:20-21. While Figure 2 (reproduced below) visually depicts the inside surface of the housing 10 as being arc-shaped, nothing in the figure or written description allows a POSITA to distinguish, even approximately, between a housing that is merely arc-shaped versus a housing that is *substantially* arc-shaped.

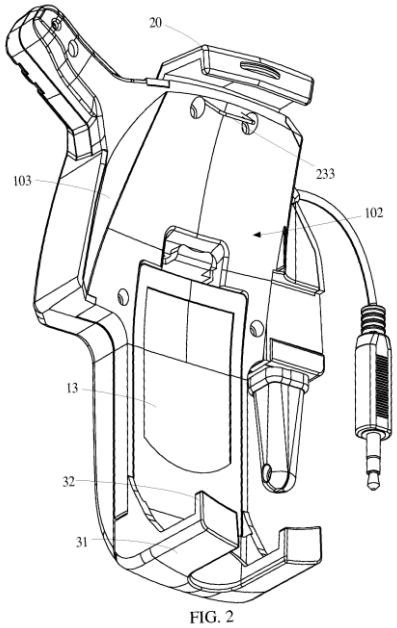


FIG. 2

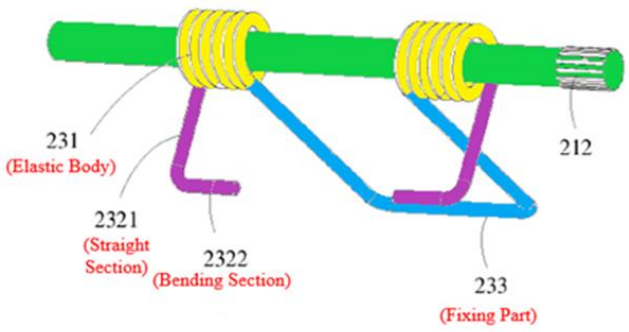
262. The specification provides no guidance on what factors or characteristics can be used to measure the degree of "arc-ness" of a shape. If half of the inside surface of the housing is flat and the other half is arc-shaped, would that housing be substantially arc-shaped? If the entire inside surface of the housing has a **shallow** concave shape, would that be substantially arc-shaped? Or does this limitation require the entire inside of the housing to have a **deeper** concave shape to be *substantially* arc-shaped? These issues make it unclear to a POSITA which characteristic of the housing must be examined to determine the degree of arc-ness of a shape, making it impossible to determine or distinguish a substantially arc-shaped housing from a housing that is merely arc-shaped (or "somewhat" arc-shaped, or some other modifier). Even if the relevant characteristic were ascertainable, there is nothing in the specification that provides any way of measuring the degree of that characteristic to distinguish between a substantially and non-substantially arc shaped housing. That is, the specification fails to provide a POSITA with sufficient guidance to determine the scope of "substantially arc-shaped" with reasonable certainty. For example, if one were to attempt to design a housing that is arc-shaped but **not** *substantially* arc-shaped, there is no guidance by which one would know whether they had succeeded with reasonable certainty.

263. Therefore, "substantially arc-shape," and therefore claim 16 as a whole, fails to inform a POSITA with reasonable certainty about the scope of the claimed invention.

E. GROUND 4

264. Claim 10 lacks enablement because the patent fails to enable ***the full scope*** of the claimed invention without undue experimentation. The lack of enablement stems from the requirement that the elastic member must have two butting parts that are "both *connected with* the elastic body" and both "butted against the first mounting member." In other words, the two butting parts must be connected to **the same** elastic body and they must also both be butted against **the same** mounting member.

265. The scope of the claim covering butting parts that are indirectly "connected with elastic body" is embodied by the dual-body torsion spring of Figure 8 (partial, annotated below):



Specifically, the left elastic body 231 (yellow) has a left butting part (purple) directly

connected with it and a right butting part (purple) indirectly connected with it via the right elastic body (yellow) and fixing part 233 (blue). GSM does not contend that this claim scope lacks enablement, as it relies on a conventional and well-known dual-body torsion spring design that relies on the spare wire between the bodies to form the fixing part. *See e.g.*, Ex. 1019 (illustrating and discussing well-known "double torsion" spring design)..

266. The lack of enablement stems from the scope of the claims where the butting parts are both directly "connected with elastic body." This claim scope is embodied by the single-body torsion spring of Figure 11 (annotated below):

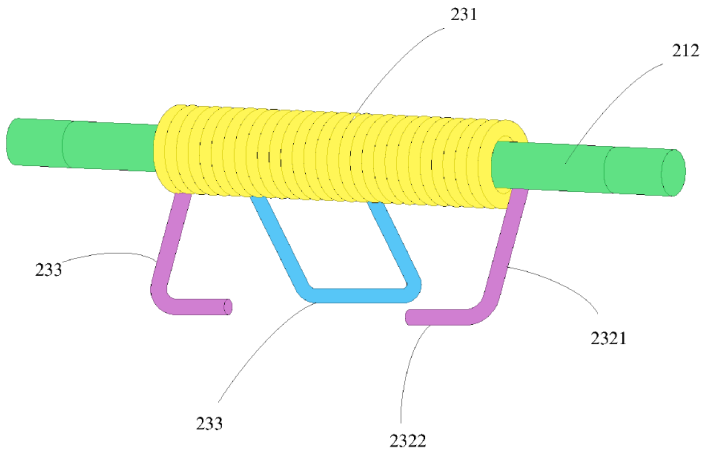


FIG. 11

It depicts two butting parts (purple) directly "connected with" the elastic body 231 (yellow) where both butting parts are "butted against the mounting member." Ex.

1001, 6:29-44.[14] As further explained below, a POSITA would not understand this embodiment to be enabled, which relies on a single-body torsion spring with a fixing part 233 (blue) that is mysteriously coming off of the back of the single-body. This is not a conventional torsion spring design and a POSITA would be baffled as to how to manufacture or create the spring depicted in Figure 11. In fact, while my qualifications far surpass that of a POSITA, I myself am quite baffled as to how the spring in Figure 11 could actually be made and used. Indeed, Figure 11 conceals the form of connection between the fixing part and body precisely because such a design is not feasible, as explained further below.

267. In understanding why Figure 11 lacks enablement, it is helpful to first discuss conventional torsion spring design. One of the most common torsion spring designs in the mechanical arts is a single-body design. Ex. 1019, 12-13 (discussing

[14] There is an obvious error in Figure 11 based on the passage describing the figure. Specifically, the figure erroneously identifies the left butting part (purple) as element 233, even though the passage refers to element 233 as the "fixing part" and element 232 as the "butting parts" A POSITA would understand based on the context of the passage that element 233 pointing to the left butting part should be labeled 232, and that element 233 is appropriately labeled the "fixing part."

and depicting various single-body torsion spring designs). The embodiment of Figure 12 (annotated below) embodies this conventional design:

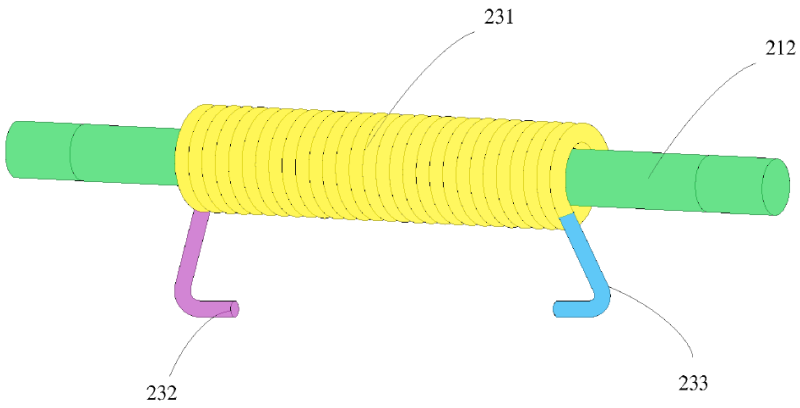


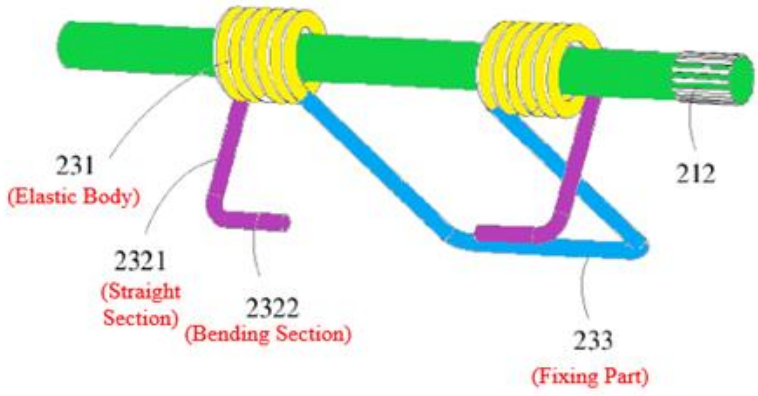
FIG. 12

It comprises an elastic member comprising a single-body 231 (yellow), butting part 232 (purple) that buts against the first mounting member, and a fixing part 233 (blue) that is fixed to the communication device housing. Ex. 1001, 6:44-52. Notably, claim 10 cannot cover the Figure 12 embodiment because the claim requires two butting parts butted against the mounting member. But in Figure 12 there is only one "butting part" (232). *Id.* . While element 233 (blue) looks identical to the "butting part" 232, element 233 is the "fixing part" that is fixed to the communication device housing 10. *Id.*

268. As shown in Figure 12, a fundamental requirement for any torsion spring to function is that one portion of the spring (e.g., fixing part 233 in Fig. 12) is fixed relative to another portion (e.g., butting part 232 in Fig. 12) such that the spring is prevented from freely rotating about the pivot pin. Indeed, if both elements 232

and 233 of Figure 12 were butted against the mounting member, rotation of the mounting member would cause the ***entire*** spring to rotate about the pivot pin, as the spring would not be fixed to the housing to prevent this free rotation. This means the spring would simply not function—it would not and could not provide a resilient or biasing force and the mounting member would simply "dangle" from the communication device housing without applying any clamping force.

269. Another common torsion spring design is the dual-body design (also called "double torsion"). Ex. 1019, 12-13 (depicting and discussing "double torsion" spring design). This design is embodied by the torsion spring of Figures 6-8 (annotated below):



The dual-body design also meets the fundamental requirement that the torsion spring be fixed, albeit in a different way than the single-body design of Figure 12. Specifically, the dual-body design relies on two spaced apart spring bodies (left yellow winding, right yellow winding) each directly connected to a butting part

(purple) that buts against the mounting member, and directly connected with a fixing part (blue) that is fixed to the communication device housing. Because the fixing part fixes the torsion spring to the housing, when force is applied to the mounting member the torsion spring does not freely rotate.

270. The embodiment of Figure 11 (annotated below), which is encompassed by claim 10, lacks enablement because the patent fails to convey to a POSITA how to make and use that embodiment. More specifically, the lack of enablement stems from the fact that the fixing part (blue) is mysteriously attached to the single-spring body (yellow):

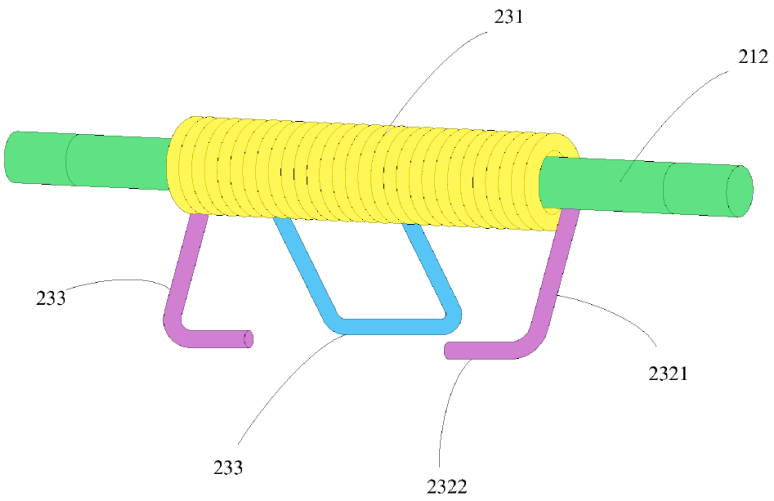


FIG. 11

Because of the perspective of the figure, the way the fixing part is somehow formed from or connected to the spring is hidden. The specification is also unhelpful as it only vaguely teaches that the mounting assembly includes “a fixing part 233” that

"can be located between the two butting parts 232." Ex. 1001, 6:29-44. Thus, the '855 Patent fails to provide any guidance whatsoever as to how the spring shown in Figure 11 can be made or used.

271. This is particularly problematic because a POSITA would understand that torsion springs are formed of wire, which is then formed into the desired spring design. *See e.g.*, Ex. 1021; Ex. 1022; Ex. 1023) (video showing spring manufacturing)). In practice, this is performed by machines that are continuously fed wire and are capable of quickly and efficiently forming the wire into a particular spring design. A POSITA would understand that in both the single-body design of Figure 12 and the dual-body design of Figures 6-8, the torsion spring necessarily begins as an unformed wire, and is then formed into the designs shown in those figures. This was and still is the well-understood way that springs are created, and a POSITA would readily understand that those two designs would easily be created this way.

272. While a POSITA would readily understand how to form the conventional single-body design of Figure 12 and the dual-body design of Figures 6-8 from wire, he or she would be baffled as to how to accomplish this with the single-body design of Figure 11. For example, the fixing part of Figures 6-8 is possible *because* there are two spaced apart bodies (yellow), and so the portion of the wire connecting those two bodies can be used to form the fixing part (blue). In

stark contrast, there is only a single body in the Figure 11 design, and so it would be impossible to form the fixing part (blue) the conventional way. Indeed, if there was any space between windings in the body of Figure 11, there would be *two* spaced apart bodies rather than a single-body design and there would not be two butting parts directly connected with the same elastic body.

273. A POSITA would also understand that attaching a fixing part to the side of an elastic body as shown in Figure 11 would meaningfully alter the functionality of the spring. While there are many well-known and understood formulas and factors to consider when designing a torsion spring (*see e.g. generally* Ex. 1017 and Ex. 1019), there is no known formula or factor for designing a spring with a fixing part coming directly off of the spring body. The specification of the '855 Patent does not provide any formulas, factors, or guidance to account for the fact that the fixing part would be applying a force directly to the side of the spring body, which would mean the spring could not be reliably designed based on conventional formulas and technical considerations. Simply put, if the patentee wanted to enable its mysterious dual-body torsion spring design where *both* butting parts are connected to the mounting member and *both* butting parts are directly *connected with* the elastic body, it should have provided enabling detail such as an illustration of the attachment of the fixing part to the single-body and at least some written description explaining

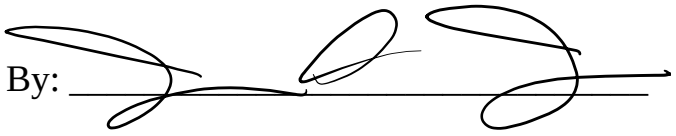
these technical considerations. For the reasons above, a POSITA would not understand the ’855 Patent to enable the full scope of claim 10.

F. GROUND 5

274. Claim 10 lacks written description because a POSITA would not understand the inventor of the ’855 Patent to have possessed or invented the dual-body torsion spring embodiment of Figure 12. As discussed in Section IX.E above, claim 10 plainly encompasses the embodiment depicted in Figure 11 but a POSITA would not recognize that embodiment to be enabled. While Figure 11 purports to depict the invention of claim 10, it conceals or hides the form of connection of the fixing part to the single-body. Given the lack of enablement and the fact that the form of connection is concealed, a POSITA would not understand the inventor to have possessed the full scope of the claimed invention—including the embodiment of Figure 12. Instead, a POSITA would understand the patentee to have simply added the fixing part to the single-body design of Figure 11 to make it *seem* as if the fixing part was attached to the single-body in a functional and enabled way, even though the patentee did not actually possess or know how to actually create such an embodiment.

X. CONCLUSION

275. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I further declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: May 21, 2024 By: 

Jason Janet, Ph.D.