UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC. and FITBIT, INC.
Petitioner

v.

VALENCELL, INC.
Patent Owner

Case IPR2017-00317[1]
U.S. Patent No. 8,989,830

DECLARATION OF BRIAN W. ANTHONY, PH.D. IN SUPPORT OF PETITIONER APPLE INC.'S SUR-REPLY TO PATENT OWNER'S CONDITIONAL MOTION TO AMEND

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[1] Case IPR2017-01553 has been joined with this proceeding.

I. Introduction

1. This declaration supplements my declaration (APL1103) submitted with Apple's Opposition to Patent Owner's Motion to Amend. I maintain my opinions in that declaration and incorporate herein my qualifications and understanding of legal principles. (APL1103, ¶¶1, 6-17.) This declaration more specifically addresses positions in Valencell's Reply in Support of Its Conditional Motion to Amend ("PO MTA Reply") and the declaration of Dr. Albert Titus (Ex. 2151) submitted therewith.

2. In preparing this declaration, I have reviewed and am familiar with all the references cited herein. I have reviewed and am familiar with the '830 patent and its file history. I confirm that to the best of my knowledge the accompanying exhibit (APL1112) is a true and accurate copy of what it purports to be, and that an expert in the field would reasonably rely on it to formulate opinions such as those set forth in this declaration.

3. I am being compensated at my rate of $350 per hour for my work on this case. My compensation is not dependent upon my opinions or testimony or the outcome of this case.

II. Substitute Claims 21-38 are Unpatentable Under 35 U.S.C. § 103

A. There Is Ample Motivation to Combine Goodman and Han

4. I understand that Valencell ("PO") contends that a person of ordinary

skill in the art ("POSA") would not be motivated to combine Goodman and Han. (PO MTA Reply, 7.) I disagree.

5. Goodman discloses a non-invasive optical biosensor for obtaining a photoplethysmography (PPG) signal. (APL1003, ¶27; APL1103, ¶21; APL1007, 1:20-40.) Likewise, Han discloses a non-invasive optical biosensor for obtaining a PPG signal. (APL1103, ¶35; APL1104, 1581.) Both the Goodman and Han devices include finger bands. (APL1104, 1581-1582, FIG. 1; APL1103, ¶36; APL1003, ¶52; APL1007, 9:65-68, FIGs. 4, 6A-6B.) Thus, as demonstrated throughout this proceeding, the Goodman and Han sensors are quite similar in structure, function, and design.

6. Noise sources and artifacts for non-invasive optical bio-sensors have been known since non-invasive optical biosensors were first used decades ago. (APL1103, ¶43; APL1003, ¶35.) Noise sources corrupt the information measuring human function that is obtained from non-invasive optical biosensors. (*Id.*) Motion artifacts are one type of noise source. (*Id.*) Motion artifacts arise from kinematic or mechanical forces, changes in the coupling of the sensor to the human subject, local variation in patient anatomy, optical properties of tissue due to geometric realignment or compression, or combinations of these effects. (*Id.*) Multiple ways to compensate for these artifacts were well understood before 2009, including coupling techniques and signal processing techniques. (APL1003, ¶36.)

7. Against this background, Goodman focuses on motion artifacts attributable to relative motion of a sensor to the human appendage upon which it is attached, referred to as differential-based motion artifacts. (APL1007, 4:30-37.) Goodman recognizes the need to reduce all motion artifacts, including those associated with motion of the human subject, referred to as internal inertial motion artifacts.

8. Han does just that–address reduction of internal inertial motion artifacts associated with the motion of a human subject (e.g., movement of the subject, walking, running, etc.)–by using an accelerometer, filters, and an active noise cancellation algorithm. Moreover, using an accelerometer as a motion sensor to measure motion and a signal processor to reduce internal inertial motion artifacts in a PPG signal based on the measured motion was a conventional technique known well prior to the '830 patent. (APL1006, 4:40-66; APL1103, ¶44.) A POSA would have therefore been motivated to modify Goodman's non-invasive optical biosensor to include Han's on-board accelerometer and filters for performing the active noise cancellation algorithm capable of reducing internal inertia-based motion artifacts to further reduce overall motion artifacts. (APL1103, ¶45.)

9. I understand that PO presents three arguments that a POSA would not be motivated to combine Goodman and Han. First, PO contends that the

"significant complexity, size, weight and mass" of Han defeat Goodman's "intended form and function." (PO MTA Reply, 8.) I disagree.

10. Including an accelerometer, filters, and processing algorithm would not add appreciable complexity, size, or mass to the Goodman sensor. In fact, a key design criteria of Han that was ignored by PO is that "[t]he wearable sensor should be small and light and attach to [sic] body tightly to reduce noise effect and feel comfortable to wear." (APL1104, 1581-1582.) Additionally, at the time of the invention, the size of a microelectromechanical ("MEMs") based accelerometer was in the range of a millimeter high with a total area in the range of $2.5mm^2$ and a MEMS area of only $0.22mm^2$. (APL1112, 64.) Goodman indicates that the substrates upon which the light emitters and detectors are attached are typically 4 by 6 mm, while the adhesive band is significantly larger. (APL1007, 8:61-65.) An accelerometer would easily fit within the existing substrates of Goodman and be comparable in size to the light emitter and detector. Thus, the accelerometer would not add to the aspect ratio, nor appreciably increase the overall sensor weight. Given the limited extent that the addition of an accelerometer would potentially induce differential motion artifacts, a POSA would understand that those impairments would far be exceeded by the improvements in the reduction of motion artifacts associated with human motion (e.g., moving, hand motions, walking, running).

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