Apple Inc. (Petitioner)
v.
Masimo Corporation (Patent Owner)

Petitioner Demonstratives

Case No. IPR2020-01523
U.S. Patent No. 8,457,703

Before Hon. Josiah C. Cocks, Robert L. Kinder, Amanda F. Wieker
Administrative Patent Judges

FISH.

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FISH.

Overview of the ’703 Patent

FISH.

’703 Patent Overview

Representative Independent Claims

1. A method of managing power consumption during continuous patient monitoring by adjusting behavior of a patient monitor, the method comprising:

driving one or more light sources configured to emit light into tissue of a monitored patient;

receiving one or more signals from one or more detectors configured to detect said light after attenuation by said tissue;

continuously operating a patient monitor at a lower power consumption level to determine measurement values for one or more physiological parameters of a patient;

comparing processing characteristics to a predetermined threshold; and

when said processing characteristics pass said threshold, transitioning to continuously operating said patient monitor at a higher power consumption level, wherein said continuously operating at said lower power consumption level comprises reducing activation of an attached sensor, said sensor positioning said light sources and said detectors proximate said tissue.

APPLE-1001, 11:32-51

9. A method of managing power consumption during continuous patient monitoring by adjusting behavior of a patient monitor, the method comprising:

driving one or more light sources configured to emit light into tissue of a monitored patient;

receiving one or more signals from one or more detectors configured to detect said light after attenuation by said tissue;

continuously operating a patient monitor at a lower power consumption level to determine measurement values for one or more physiological parameters of a patient;

comparing processing characteristics to a predetermined threshold; and

when said processing characteristics pass said threshold, transitioning to continuously operating said patient monitor at a higher power consumption level, wherein said continuously operating at said lower power consumption level comprises reducing an amount of processing by a signal processor.

APPLE-1001, 12:5-23

’703 Patent Overview

Representative Dependent Claims

4. The method of claim **1**, wherein said processing characteristics comprise signal characteristics from one or more light sensitive detectors.

5. The method of claim **4**, wherein said signal characteristics comprise signal strength.

6. The method of claim **4**, wherein said signal characteristics comprise a presence of noise.

7. The method of claim **4**, wherein said signal characteristics comprise a presence of motion induced noise.

8. The method of claim **1**, wherein said processing characteristics include determining an estimate of current power consumption and comparing said estimate with a target power consumption.

APPLE-1001, 11:59-12:4

11. The method of claim **10**, wherein said processing less data comprises reducing an overlap in data blocks being processed.

APPLE-1001, 12:26-28

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Issue 1

"Processing Characteristics"
Does Not Require Construction

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"Processing Characteristics" Does Not Require Construction

Petition

"processing characteristics." APPLE-1003, ¶98. Indeed, the plain meaning of "processing characteristics" includes characteristics or features obtained from or used for processing information, including Amano's acceleration sensor output,

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Patent Owner's Response

The Board should construe "processing characteristics" to require that the processing characteristics are determined from a signal received from one or more detectors configured to detect light. (Ex. 2001, ¶44.) Masimo's construction is

PO Response, 23

Petitioner's Reply

from one or more detectors configured to detect light." POR, 23-27. But the '703 claims and specification demonstrate that Masimo's construction is unjustifiably limiting, and thus should not be adopted.

Pet. Reply, 1

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Masimo's Construction Is Unjustifiably Limiting

'703 Patent Claims

Claim 1	"comparing processing characteristics to a predetermined threshold"
Claim 4	"said processing characteristics comprise signal characteristics from one or more light sensitive detectors."

APPLE-1001, 11:43-44, 11:59-61

Petitioner's Reply

one or more light sensitive detectors." APPLE-1001, 11:59-61. If "processing characteristics" were required to be "determined from a signal received from one or more detectors," claim 4 would be rendered meaningless. Such an interpretation

Pet. Reply, 1

FISH.

Masimo's Construction Is Unjustifiably Limiting

'703 Patent

8. The method of claim **1**, wherein said processing characteristics include determining an estimate of current power consumption and comparing said estimate with a target power consumption.

APPLE-1001, 12:1-4

In addition, FIG. **4** shows that the power status calculator **460** has a control state input **442** and a power status output **462**. The control state input **442** indicates the current state of the control engine **440**. The power status calculator **460** utilizes an internal time base, such as a counter, timer or real-time clock, in conjunction with the control engine state to estimate the average power consumption of at least a portion of the pulse oximeter **300**. The power status calculator **460** also stores a predetermined power target and compares its power consumption estimate to this target. The power status calculator **460** generates the power status output **462** as an indication that the current average power estimate is above or below the power target and provides this output **462** to the control engine **440**.

APPLE-1001, 6:45-51 (cited at Pet. Reply, 2)

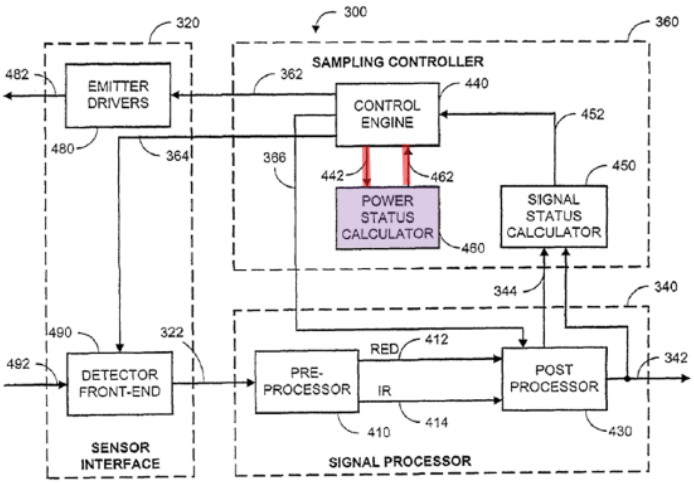

FIG. 4

APPLE-1001, FIG. 4 (as annotated at Pet. Reply, 3)

Issue 2

Obviousness Based on Diab-Amano Combination (Ground 1A) and Diab and GK-POSITA (Ground 2A)

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Issue 2A

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

FISH.

Overview of Diab's Motion Artifact Suppression

Diab

pulse. The secondary portion is noise. In accordance with the present invention, the measured signals are modeled such that this secondary portion of the signal is related to the venous blood contribution to attenuation of energy as it passes through the body. The secondary portion also includes artifacts due to patient movement which causes the venous blood to flow in an unpredictable manner, causing unpredictable attenuation and corrupting the otherwise periodic plethysmographic waveform. Respiration also causes the secondary or noise portion to vary, although typically at a lower frequency than the patients pulse rate. Accordingly,

APPLE-1007, 4:35-45 (cited at PO Sur-reply, 9)

The volume of blood in the veins varies with the rate of breathing, which is typically much slower than the heartbeat. Thus, when there is no motion induced variation in the thickness of the veins, venous blood causes a low frequency variation in absorption of energy. When there is motion induced variation in the thickness of the veins, the low frequency variation in absorption is coupled with the erratic variation in absorption due to motion artifact.

APPLE-1007, 33:45-50 (cited at Pet. Reply, 4-5)

secondary signal approximation n"(t), respectively. The constant portion and predictable portion of the secondary signal n(t) are easily removed with traditional filtering techniques, such as simple subtraction, low pass, band pass, and high pass filtering. The erratic portion is more difficult to remove due to its unpredictable nature. If something is known about the erratic signal, even statistically, it could be removed, at least partially, from the measured signal via traditional filtering techniques. However, often no information is known about the erratic portion of the secondary signal n(t). In this case, traditional filtering techniques are usually insufficient.

APPLE-1007, 9:16-27 (cited at Pet. Reply, 4-5)

A specific example of a physiological monitor utilizing a processor of the present invention to determine a secondary reference n'(t) for input to a correlation canceler that removes erratic motion-induced secondary signal portions is a pulse oximeter. Pulse oximetry may also be performed

APPLE-1007, 33:19-23 (cited at Pet. Reply, 4-5)

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Diab

In the case of motion, motion artifacts are suppressed using the motion artifact suppression module **580**. The

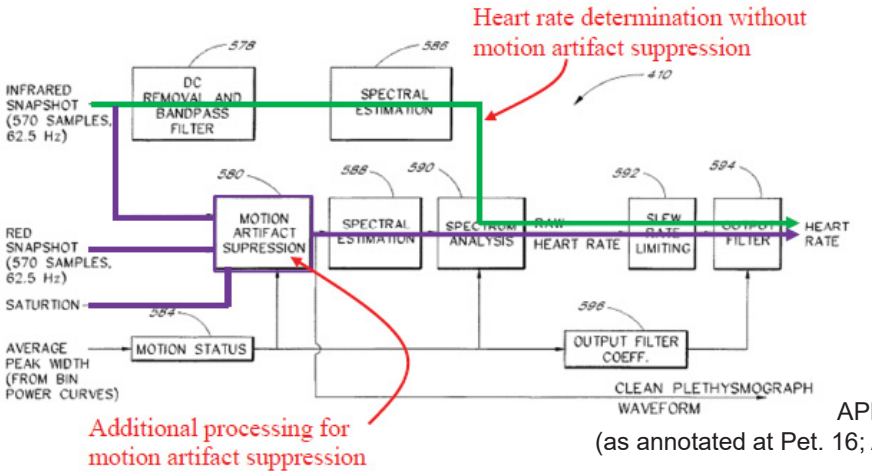
APPLE-1007, 47:55-56 (cited at Pet. 15)

peaks are wide, this is taken as an indication of motion. If motion is not detected, spectral estimation on the signals is carried out directly without motion artifact suppression.

APPLE-1007, 47:52-54 (cited at Pet. 15)

In the case of no motion, one of the signals (the infrared signal in the present embodiment) is subjected to DC removal and bandpass filtering as represented in the DC removal and bandpass filter module **578**. The DC removal

APPLE-1007, 48:6-9 (cited at Pet. 15)



APPLE-1007, FIG. 20
(as annotated at Pet. 16; APPLE-1003, ¶53)

FISH.

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Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Petitioner's Reply

Id. If Diab required "continuous operation of the motion artifact suppression module," as Masimo alleged, there would be no reason to provide the motion status to the motion artifact suppression module since the motion artifact suppression module would not "operate ***differently*** depending on whether motion is detected." *See id.;* POR, 34, 46; EX2001, ¶¶57, 75.

Based on Diab's disclosure, a POSITA would have recognized that Diab's motion artifact suppression module does, in fact, "operate ***differently*** depending on whether motion is detected." APPLE-1007, 2:24-45, 3:6-9, 4:20-64, 5:3-9, 9:16-27, 13:15-20, 33:19-23, 33:45-50, 33:64-34:7, 47:52-56, 48:6-13, 48:34-42, FIGS.

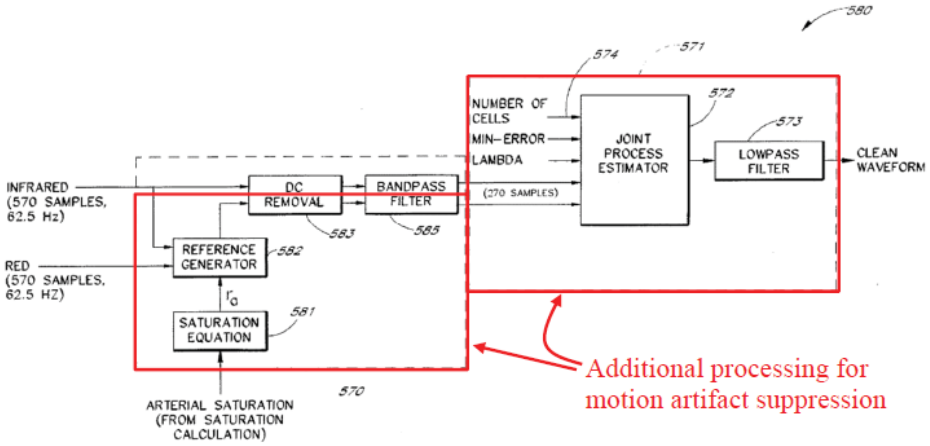
Pet. Reply, 6

FISH.

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Petitioner's Reply

1, 3. The Petition provided an annotation of Diab's FIG. 21 showing an example (reproduced below) of the additional processing performed by the motion artifact suppression module when motion is detected, and showing that Diab's motion artifact suppression module does "operate ***differently*** depending on whether motion is detected" in accordance with Diab's disclosure. *Id.*; Petition, 17.



APPLE-1007, Detail of FIG. 21 (annotated)

Pet. Reply, 6-7

FISH.

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Petitioner's Reply

As shown in the example above, the clean plethysmograph waveform can be generated using "traditional filtering techniques, such as... band pass... filtering" of the infrared signal if motion is not detected, or using a correlation canceler 571 if motion is detected, consistent with Diab's disclosure. *Id.*; APPLE-1007, 49:18-21. Alternatively, because Diab's FIG. 21 DC removal module 583 and the bandpass filter module 585 are the same as the FIG. 20 DC removal and bandpass filter module 578, a POSITA would have found it obvious to suspend and not execute all the operations of the motion artifact suppression module 580 and instead provide the clean plethysmograph waveform from the FIG. 20 DC removal and bandpass filter module 578. *Id.*; APPLE-1007, 48:6-11, 48:48-53, 42:27-30. In any case, a POSITA would have found it obvious not to execute operations of Diab's motion artifact suppression module 580 if no motion is detected. *Id.*; APPLE-1003, ¶¶52-54.

Pet. Reply, 7-8

FISH.

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Patent Owner's Response

Diab discloses that generating the clean plethysmograph waveform requires continuous operation of the motion artifact suppression module 580. (Ex. 2001,

PO Response, 34

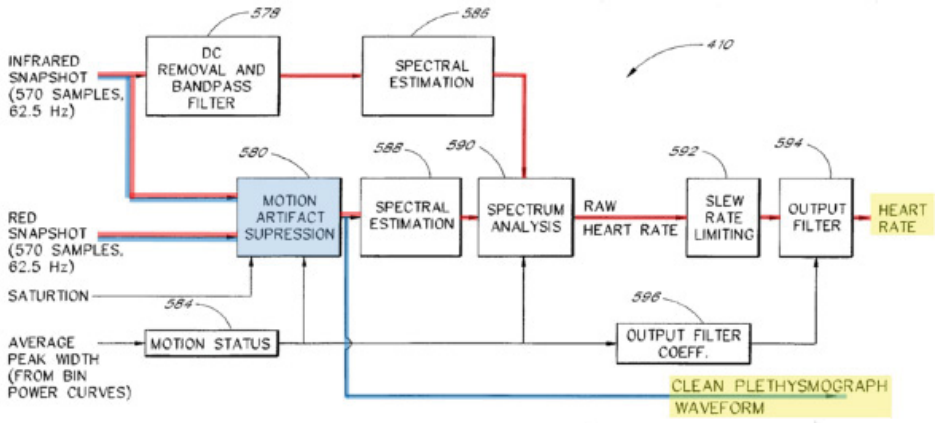


FIG. 20

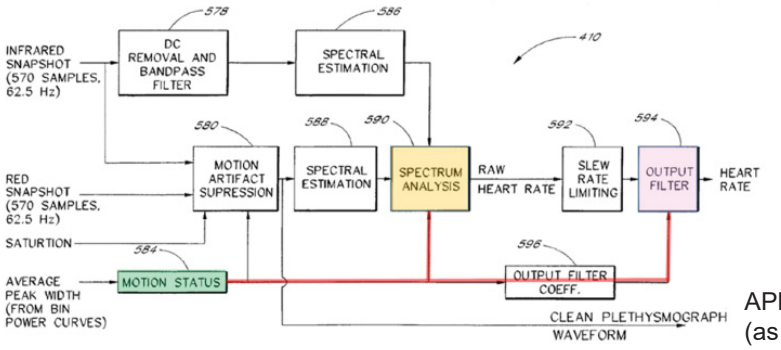
APPLE-1007, FIG. 20 (as annotated at POR, 34)

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Petitioner's Reply

Masimo's contention that Diab "requires continuous operation of the motion artifact suppression module" is contradicted by their assertion that modules "operate ***differently*** depending on whether motion is detected" by the motion status module. POR, 34, 46; EX2001, ¶¶57, 75. Masimo's POR and Dr. Madisetti's declaration provide annotations to Diab's FIG. 20 (reproduced below) to show that the spectrum analysis module and the output filter "operate ***differently*** depending on whether motion is detected," but omit highlighting that the signal generated by the motion status module 584 is also provided to the motion artifact suppression module 580:

Pet. Reply, 5



APPLE-1007, FIG. 20
(as annotated at POR, 46)

FISH.

Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Petitioner's Reply

advantageously provided"). Additionally, Diab teaches that a "clean" plethysmograph waveform would only need to be generated by the correlation canceler of the motion artifact suppression module if motion is detected. APPLE-1007, 2:24-27, 3:6-9, 4:39-43, 5:3-9, 9:20-27, 13:15-20, 33:19-23, 33:47-50, 34:1-7, 47:55-56, 48:34-42, FIG. 3. If motion is not detected, the signal measured by

Pet. Reply, 4

Dr. Anthony

plethysmograph signal. And so if motion is not present, we don't need to remove it to generate the clean plethysmograph signal as highlighted here that if no motion is detected, estimation is carried out directly without motion artifact suppression. So no need to suppress -- it's not dirty with motion artifacts, so no need to clean it. It's already clean. In the case of motion, it's dirty, so we need

EX-2003, 68:15-69:6 (cited at Pet. Reply, 5)

FISH.

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Diab Renders Obvious Adjusting Behavior of a Patient Monitor By Reducing an Amount of Processing

Petitioner's Reply

7, 47:55-56, 48:34-42, FIG. 3. If motion is not detected, the signal measured by the detector is representative of the arterial pulse, and a plethysmograph waveform can be generated from the signal using "traditional filtering techniques, such as simple subtraction, low pass, band pass, and high pass filtering" or "[a] static filtering system, such as a bandpass filter." APPLE-1007, 2:31-45, 4:20-35, 4:59-64, 9:16-20, 33:45-47, 33:64-34:1, 47:52-54, 48:6-13, FIG. 1. Indeed, Dr.

Pet. Reply, 4

Diab

secondary signal approximation n"(t), respectively. The constant portion and predictable portion of the secondary signal n(t) are easily removed with traditional filtering techniques, such as simple subtraction, low pass, band pass, and high pass filtering. The erratic portion is more difficult to remove due to its unpredictable nature. If something is known about the erratic signal, even statistically, it could be removed, at least partially, from the measured signal via traditional filtering techniques. However, often no information is known about the erratic portion of the secondary signal n(t). In this case, traditional filtering techniques are usually insufficient.

APPLE-1007, 9:16-27 (cited at Pet. Reply, 4-5)

FISH.

Issue 2B

Suspending Diab's Motion Artifact Suppression Reduces Amount of Processing

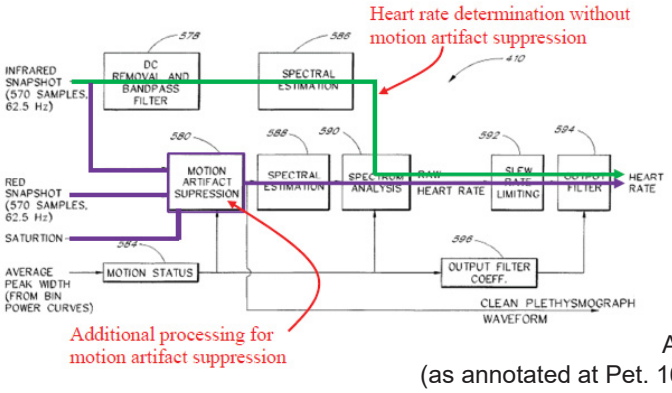
FISH.

Suspending Diab's Motion Artifact Suppression Reduces Amount of Processing

Dr. Anthony's Declaration

53. A functional diagram of the pulse rate module 410 is shown below, with annotations showing the signals (only infrared samples) and the modules 578, 586, 590, 592, and 594 used to determine the pulse rate "without motion artifact suppression" (green line) when motion is not detected by the motion status module 584. APPLE-1007, 48:6-33, 50:1-29. As a comparison, the functional diagram is also annotated to show the signals (infrared samples, red samples, saturation value) and the motion artifact suppression module 580 (purple box) and modules 588, 590, 592, and 594 used to determine the pulse rate (purple line) when motion is detected by the motion status module 584. APPLE-1007, 47:47-49, 47:55-50:29

APPLE-1003, ¶53
(as cited at Pet. 16)



APPLE-1007, FIG. 20
(as annotated at Pet. 16; APPLE-1003, ¶53)

FISH.

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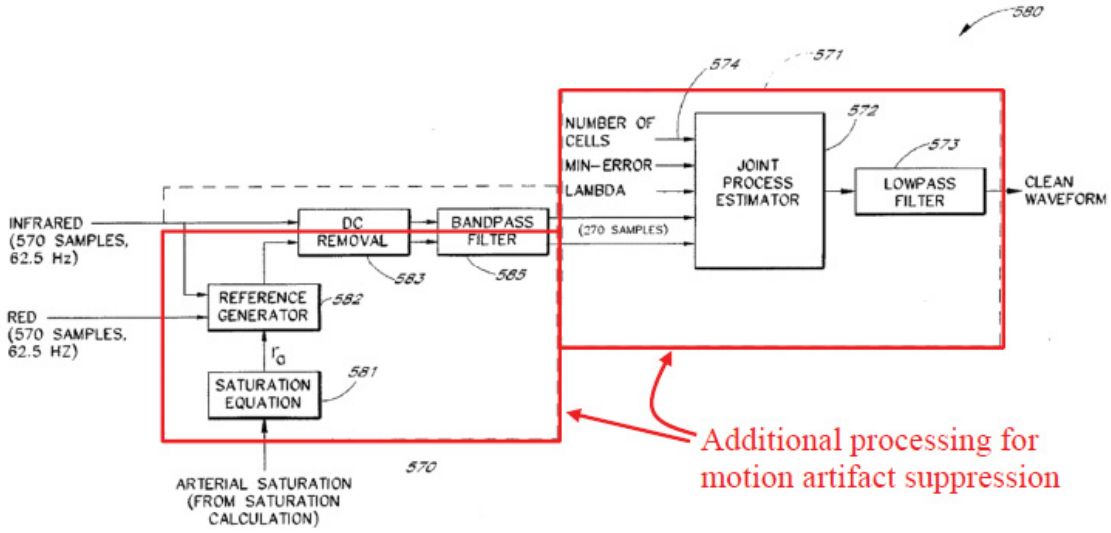
Suspending Diab's Motion Artifact Suppression Reduces Amount of Processing

Dr. Anthony's Declaration



APPLE-1007, FIG. 21
(as annotated at Pet. 17; APPLE-1003, ¶54)

FISH.

Issue 2C

A POSITA Would Have Found It Obvious From Amano's Teachings That Diab Reduces Power Consumption When Motion is Absent

FISH.

Overview of Amano's Teachings

Amano

In the meantime, when the body movement component eliminating section **30** is made to operate for the elimination of the body movement component even if there is no body movement, the noise of the body movement detecting section **20** causes a deterioration of the S/N ratio of the signal output from the body movement component eliminating section **30**, and power is consumed by the body movement eliminating operation. Hence, in this embodiment, a judging section **22** is provided. The judging section **22** determines whether body movement is present or not, based on the body movement waveform TH, to yield a control signal C. Specifically, the judging section **22** makes a judgment by comparing a threshold value with the body movement waveform TH. The threshold value is prescribed in advance, taking a noise level into consideration, so that whether the body movement is present or not can be determined. Then, when the control signal C indicates that no body movement is present, the operations of the waveform treating section **21** and body movement component eliminating section **30** are suspended. In this case, the pulse waveform MH is output directly from the body movement component eliminating section **30**. This can improve the SN ratio of the output signal from the body movement component eliminating section **30** and reduce power consumption in the apparatus.

APPLE-1004, 21:50-22:6
(cited at Pet. 9)

FISH.

Overview of Amano's Teachings Applied to Diab

Dr. Anthony's Declaration

43. In light of Amano's teaching that "power is consumed by the body movement eliminating operation," a POSITA would have found obvious that operating Diab's "motion artifact suppression module 580" likewise consumes power. APPLE-1004, 21:50-22:6, 35:54-64; APPLE-1007, 47:52-56, 48:34-49:38. Additionally, in light of Amano's teaching that suspending "the operations of... body movement component eliminating section" reduces power consumption, a POSITA would have found obvious that performing Diab's "spectral estimation on the signals... directly without motion artifact suppression"[1] similarly reduces consumption by suspending unnecessary processing operations, a POSITA would have found obvious that Diab's oximeter likewise reduces power consumption by performing "spectral estimation on the signals... directly without motion artifact suppression." *Id.*

FISH.

APPLE-1003, ¶43 (cited at Pet. 9)

A POSITA Would Have Found It Obvious To Suspend Diab's Motion Artifact Suppression If No Motion Is Detected Based On Amano's Teachings

Dr. Anthony's Declaration

executing the motion artifact suppression module 580 if motion is not detected, it would have also been obvious to suspend and not execute the operations of Diab's motion artifact suppression module 580 if motion is not detected based on Amano's teaching of suspending "the operations of... body movement component eliminating section" "when no body movement is present" (APPLE-1004, 21:65-22:6).

APPLE-1003, ¶54 (cited at Pet. 16)

35:54-64; APPLE-1007, 48:34-49:38. A POSITA would have been motivated and would have found it obvious and straightforward to combine Diab with Amano to "reduc[e] calculation time and power consumption," as suggested by Amano, "[i]f motion is not detected" by performing "spectral estimation on the signals... directly *without* motion artifact suppression," as taught by Diab. *Id.* Accordingly, the

APPLE-1003, ¶55 (cited at Pet. 18)

FISH.

A POSITA Would Have Found It Obvious To Suspend Diab's Motion Artifact Suppression If No Motion Is Detected Based On Amano's Teachings

Patent Owner's Response

A POSITA also would not have been motivated to combine Diab and Amano due to the differences in the systems. (Ex. 2001, ¶¶70-73.) Diab and Amano disclose different processing algorithms that result in different outputs that are not directly applicable to each other. (*Id.*) For example, Diab, as discussed

PO Response, 41

FISH.

A POSITA Would Have Found It Obvious To Suspend Diab's Motion Artifact Suppression If No Motion Is Detected Based On Amano's Teachings

To justify combining reference teachings in support of a rejection it is not necessary that a device shown in one reference can be physically inserted into the device shown in the other. *In re Griver*, 53 CCPA 815, 354 F.2d 377, 148 USPQ 197 (1966); *In re Billingsley*, 47 CCPA 1108, 279 F.2d 689, 126 USPQ 370 (1960). The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *In re Wood*, 599 F.2d 1032, 202 USPQ 171 (CCPA 1979); *In re Passal*, 57 CCPA 1151, 426 F.2d 828, 165 USPQ 720 (1970); *In re Richman*, 57 CCPA 1060, 424 F.2d 1388, 165 USPQ 509 (1970); *In re Rosselet*, 52 CCPA 1533, 347 F.2d 847, 146 USPQ 183 (1965).

In re Keller, 642 F.2d 413, 425 (CCPA 1981)
(cited at Pet. Reply, 8)

FISH.

Issue 2D

Diab Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

FISH.

Diab Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

Diab

The average peak width value provides an input to a motion status module **584.** In the present embodiment, if the peaks are wide, this is taken as an indication of motion. If motion is not detected, spectral estimation on the signals is carried out directly without motion artifact suppression.

APPLE-1007, 47:50-54 (cited by Pet. 19)

Dr. Anthony's Declaration

47:30-38, 47:47-49, FIGS. 14, 20. An "average peak width value" (processing characteristics) is input to the "motion status module 584." APPLE-1007, 47:50-52, FIG. 20. Diab teaches that "[t]he width of the peaks provides some indication of motion by the patient—wider peaks indicating motion" and "[i]f the peaks are wide, this is taken as an indication of motion." APPLE-1007, 46:53-55, 47:51-52. As such, the motion status module 584 detects motion by determining "if the peaks are wide." APPLE-1007, 47:50-56. A POSITA would have understood that in order to determine whether the peaks are "wide," the width of the peaks would be compared to a width value above which the peaks are considered "wide" (a threshold). *Id.*. Accordingly, Diab teaches comparing processing characteristics ("average peak width value") to a predetermined threshold (a value corresponding to "wider peaks indicating motion"). *Id.*

APPLE-1003, ¶57 (cited at Pet. 20)

Diab Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

Patent Owner's Response

Petitioner's declarant largely copies the Petition in addressing this limitation. (Ex. 1003 ¶¶56-57.) However, Petitioner's declarant includes a final conclusory sentence stating, "Accordingly, Diab teaches comparing processing characteristics ("average peak width value") to a predetermined threshold (a value corresponding to 'wider peaks indicating motion')." (*Id.* ¶57 (emphasis added).) Petitioner's declarant cites a small section of Diab as allegedly supporting this conclusion. (*Id.* (citing Ex. 1007, 47:50-56).) However, the cited section does not use the word predetermined and Petitioner's declarant does not explain how the section teaches a "predetermined threshold." (Ex. 1003, ¶57.) Thus, the declarant's unsubstantiated and conclusory opinion is insufficient to meet Petitioner's burden to show that Diab describes a "predetermined threshold." *See* 37 C.F.R. § 42.65; *Harmonic*, 815 F.3d at 1363.

PO Response 50-51

FISH.

Diab Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

Petitioner's Reply

The '703 patent provides no further insight into the meaning of "predetermined" that would justify deviating from its plain meaning relied on by Petitioner and Dr. Anthony. The '703 patent uses the terms "predetermined" and "predetermining" with respect to "a target power level," "power target," and "target power consumption level." APPLE-1001, 2:34-37, 3:23-27, 3:52-56, 6:15-19, 6:49-51, 8:22-28. But the '703 patent provides no definition for "predetermined" nor does it provide an explanation of how or why the "target power level," "power target," and "target power consumption level" are predetermined. As such, the Petition and Dr. Anthony properly applied the plain meaning of "predetermined" and established that Diab teaches "comparing processing characteristics to a predetermined threshold," as required by the claims. Petition, 18-20; APPLE-1003, ¶¶56-57.

Pet. Reply, 14-15

Issue 3

Obviousness Based on Amano (Ground 3A)

FISH.

Overview of Amano

Amano

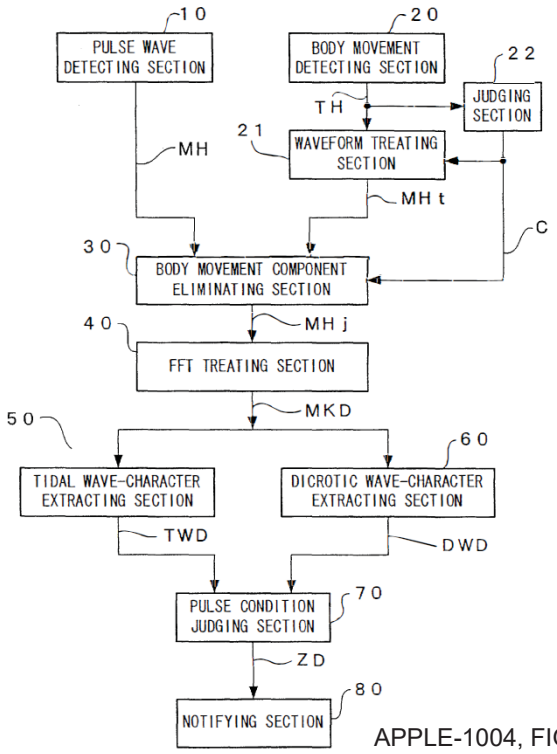
FIG. **1** is a block diagram showing the functional structure of the pulse wave examination apparatus according to this embodiment. In this figure, a pulse wave detecting section **10** detects the pulse waveform of, for instance, the periphery (e.g., arteria radialis) of a subject, to output the detected signal as MH to a body movement eliminating section **30**.

APPLE-1004, 21:3-8 (cited at Pet. 49)

section **30**, and power is consumed by the body movement eliminating operation. Hence, in this embodiment, a judging section **22** is provided. The judging section **22** determines whether body movement is present or not, based on the body movement waveform TH, to yield a control signal C. Specifically, the judging section **22** makes a judgment by comparing a threshold value with the body movement waveform TH. The threshold value is prescribed in advance, taking a noise level into consideration, so that whether the body movement is present or not can be determined. Then, when the control signal C indicates that no body movement is present, the operations of the waveform treating section **21** and body movement component eliminating section **30** are suspended. In this case, the pulse waveform MH is output directly from the body movement component eliminating section **30**. This can improve the SN ratio of the output signal from the body movement component eliminating section **30** and reduce power consumption in the apparatus.

APPLE-1004, 21:50-22:6 (cited at Pet. 49-50)

FIG. 1



APPLE-1004, FIG. 1
(cited at Pet. 52; APPLE-1003, ¶105)

FISH.

Issue 3A

Amano Renders Obvious Determining Measurement Values for a Physiological Parameter of a Patient

FISH.

Amano Renders Obvious Determining Measurement Values for a Physiological Parameter of a Patient

'703 Patent Claim 1

continuously operating a patient monitor at a lower power consumption level to determine measurement values for one or more physiological parameters of a patient;

APPLE-1001, 11:40-42

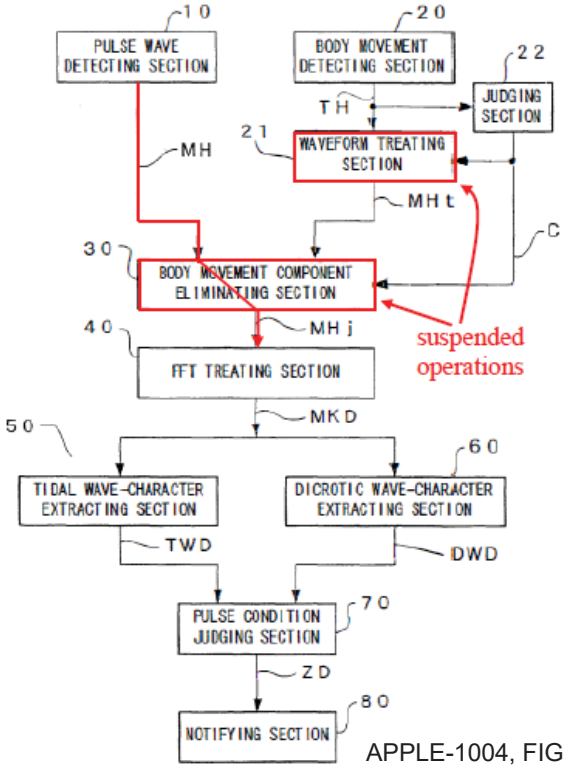
Amano

body movement component, hence the subject can detect his pulse condition continuously in his daily life.

APPLE-1004, 36:26-27 (cited at Pet. 54)

and body movement component eliminating section **30** are suspended. In this case, the pulse waveform MH is output directly from the body movement component eliminating section **30**. This can improve the SN ratio of the output signal from the body movement component eliminating section **30** and reduce power consumption in the apparatus.

APPLE-1004, 22:1-7 (cited at Pet. 54)



APPLE-1004, FIG. 1
(as annotated at Pet. 55; APPLE-1003, ¶105)

FISH.

Amano Renders Obvious Determining Measurement Values for a Physiological Parameter of a Patient

Dr. Anthony's Declaration

section 40 annotated, is shown below. A POSITA would have understood that the sections other than sections 21 and 30 are continuously operating to determine a pulse waveform and a pulse condition while sections 21 and 30 are suspended.

APPLE-1004, 21:57-22:9, 34:3-15, 35:54-64, 36:23-27, 38:26-27, FIGS. 1, 3, 24.

APPLE-1003, ¶105 (cited at Pet. 55)

Petitioner's Reply

The Petition establishes that Amano determines measurement values for a physiological parameter of a patient by determining a pulse waveform and a pulse condition of a subject being monitored: the pulse waveform and the pulse condition are "measurement values for a physiological parameter of a patient."

Pet. Reply, 23

FISH.

Amano Renders Obvious Determining Measurement Values for a Physiological Parameter of a Patient

Patent Owner's Response

23.) Consistent with this description, the embodiment in Figure 1 provides a single output through the notifying section 80 that qualitatively describes the patient's pulse condition according to classifications from Chinese medicine. (*Id.*, 1:39-45, 23:5-9.) Amano states, "For instance, the notifying section 80 displays the characters 'Hua mai, Ping mai, Xuan mai' or symbols, e.g., icons." (*Id.*, 23:5-7.) Notably, Amano does not disclose that the notifying section displays any measurement values. (Ex. 2001, ¶¶124-127.)

Amano confirms that Hua mai, Ping mai, and Xuan mai are not measurement values but qualitative classifications of the patient's condition. Amano defines "Ping mai" as "the pulse condition of a normal man in good health." (Ex. 1004, 1:46-48.) "Hua mai … is the pulse condition of a man who shows an abnormality in his blood stream condition." (*Id.*, 1:51-53.) "Xuan mai … is the pulse condition of a man whose blood vessel wall tension has increased." (*Id.*, 1:64-66.)

PO Response, 72

FISH.

Amano Renders Obvious Determining Measurement Values for a Physiological Parameter of a Patient

Petitioner's Reply

classifications of the patient's condition." POR, 72; APPLE-1004, 23:5-7. But Masimo did not explain why these alleged "qualitative classifications" are not "measurement values." *Id.* Amano's pulse condition is determined from the harmonics of a measured pulse waveform. *See, e.g.,* APPLE-1004, 21:3-23:9, FIG. 1. The pulse condition is therefore "measurement values for a physiological parameter of a patient." *See* EX2003, 165:20-166:11.

Pet. Reply, 24

FISH.

Amano Renders Obvious Determining Measurement Values for a Physiological Parameter of a Patient

Amano

and outputs pulse wave analysis data MKD showing each energy level of the fundamental wave f1 and of the second harmonic f2 to the tenth harmonic f10 .

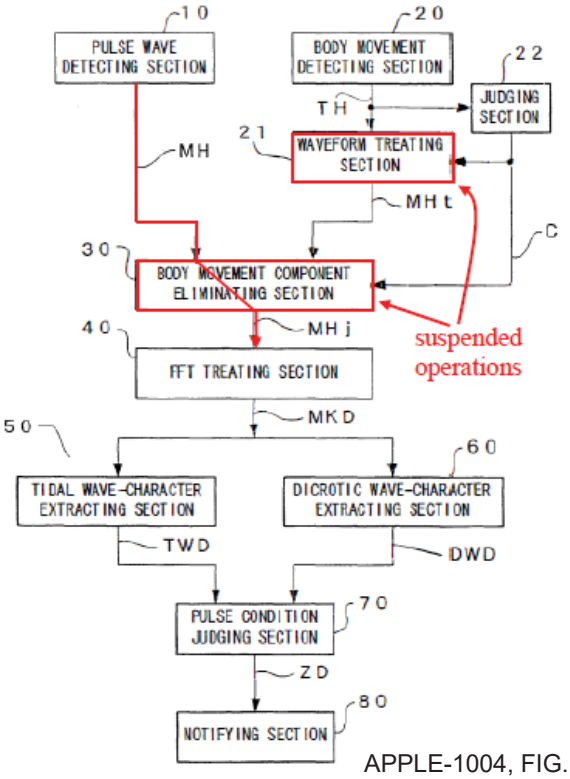
yield a tidal wave-character data TWD showing the characteristics of the tidal wave on the basis of the pulse wave analysis data MKD. As outlined above, the characteristics of the tidal wave can be expressed by the ratio of the sum of the fifth harmonic f5, the sixth harmonic f6, and the seventh harmonic f7 to the fundamental wave f1 in the pulse waveform. Hence the tidal wave-character extracting section

yields dicrotic wave-character data DWD showing the characteristics of the dicrotic wave. As outlined above, the characteristics of the dicrotic wave can be expressed by the ratio of the sum of the second harmonic f2, the third harmonic f3, and the fourth harmonic f4 to the fundamental wave f1 in the pulse waveform. Hence the tidal wave-

data ZD1 showing that the pulse condition is a Xuan mai if the tidal wave-character data TWD exceeds the first threshold value. The first threshold value is prescribed in advance

value. If the dicrotic wave-character data DWD is less than the second threshold value, pulse condition data ZD2 showing that the pulse condition is a Ping mai is yielded, whereas, if the dicrotic wave-character data DWD exceeds the second threshold value, pulse condition data ZD3 showing that the pulse condition is a Hua mai is yielded. Here, the second

APPLE-1004, 22:7-66
(cited at Pet. Reply, 24)



APPLE-1004, FIG. 1
(as annotated at Pet. 55; APPLE-1003, ¶105)

FISH.

Issue 3B

Amano Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

FISH.

Amano Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

Patent Owner's Response

waveform TH." (*Id.*) However, as Amano repeatedly states, and Petitioner admits, the body movement waveform TH, which Petitioner identifies as the "processing characteristics," is received from an "acceleration sensor," not a detector configured to detect light. (*Id.*, 21:9-12, 35:25-27, 40:65-41:3; Pet. 50.)

Thus, there is no dispute that Grounds 3A-3B cannot render the claims obvious under the proper construction of "processing characteristics." (Ex. 2001, ¶¶128-129.)

PO Response, 74-75

FISH.

Amano Renders Obvious Comparing Processing Characteristics to a Predetermined Threshold

Dr. Anthony's Declaration

characteristics" that is met by Amano's acceleration sensor output. The non-limiting plain meaning of the phrase "processing characteristics" includes characteristics or features obtained from or used for processing information. *Id.* Amano's acceleration sensor output provides a body movement waveform that is a result of processing performed by the acceleration sensor and is used for processing of the pulse waveform. APPLE-1004, 21:9-49. Therefore, Amano's acceleration sensor output is a processing characteristic. Accordingly, the teachings of Amano alone satisfy the "processing characteristics" limitations.

APPLE-1003, ¶98 (cited at Pet. 51)

FISH.

Issue 4

Obviousness Based on Diab (Alone or With Amano) and Turcott (Grounds 1C and 2C)

Obviousness Based on Amano and Turcott (Ground 3B)

FISH.

Overview of Turcott

Turcott

FIG. **5***a* shows the preferred embodiment of the combined O_2 saturation and vascular plethysmography sensor of the monitor **20**, in which the light source **26**, preferably parallel and oppositely oriented red and infrared LEDs, are positioned such that light is directed into the overlying tissue,

APPLE-1006, 11:15-19 (cited at Pet. 37)

To conserve energy, the source is preferably driven with a low duty cycle pulse train. Requiring the duty cycle to be less than 100%/n, where n is the number of wavelengths, allows a single broad-spectrum detector to be used. The optical power generated by the source is adjusted to optimize the signal to noise ratio and to minimize power consumption. This can be done by adjusting the drive current, the frequency of the pulse train, the pulse duration, or the duty cycle of the pulse train. In addition, the frequency of the pulse train can be shifted such that a quiet region of the noise spectrum is used.

APPLE-1006, 11:51-61 (cited at Pet. 37)

FISH.

Overview of the Combination of Diab (Alone or With Amano) and Turcott

Diab

provided. The digital signal processing system **334** also provides control for driving the light emitters **301**, **302** with an emitter current control signal on the emitter current control output **337**. This value is a digital value which is

APPLE-1007, 35:50-53 (cited at Pet. 41)

and infrared emitters is maintained constant. It should be understood, however, that the current could be adjusted for changes in the ambient room light and other changes which would effect the voltage input to the front end analog signal conditioning circuitry **330**. In the present invention, the red

APPLE-1007, 36:2-6 (cited at Pet. 41)

Turcott

To conserve energy, the source is preferably driven with a low duty cycle pulse train. Requiring the duty cycle to be less than 100%/n, where n is the number of wavelengths, allows a single broad-spectrum detector to be used. The optical power generated by the source is adjusted to optimize the signal to noise ratio and to minimize power consumption. This can be done by adjusting the drive current, the frequency of the pulse train, the pulse duration, or the duty cycle of the pulse train. In addition, the frequency of the pulse train can be shifted such that a quiet region of the noise spectrum is used.

APPLE-1006, 11:51-61 (cited at Pet. 42)

Dr. Anthony's Declaration

1006, 11:51-59. A POSITA would have recognized that the predictable modification of Diab (as supplemented with Amano's teachings) as suggested by Turcott would include implementing the oximeter's signal processor to reduce the drive current or the duty cycle of the pulse train of the LEDs when the oximeter is operating at the lower power consumption level, further minimizing power consumption. APPLE-1006, 11:51-59.

APPLE-1003, ¶85 (cited at Pet. 42)

APPLE-1004, 21:50-53, 22:4-6, 35:54-64; APPLE-1006, 11:54-59. Turcott teaches that reducing the duty cycle of the light source optimizes the signal-to-noise ratio and minimizes power consumption. APPLE-1006, 11:54-59. A POSITA would have been motivated to implement Turcott's teaching of reducing the duty cycle to decrease power consumption in a pulse oximeter in Diab's oximeter (as supplemented with Amano's teachings) to further minimize power consumption of the combined device. APPLE-1006, 11:54-59. A POSITA would have understood further minimizing power consumption in the combined device to be desirable because further reduction would lead to longer battery life.

APPLE-1003, ¶81 (cited at Pet. 39)

Overview of the Combination of Amano and Turcott

Amano

section **30**. This can improve the SN ratio of the output signal from the body movement component eliminating section **30** and reduce power consumption in the apparatus.

APPLE-1004, 22:4-6 (cited at Pet. 64)

Turcott

To conserve energy, the source is preferably driven with a low duty cycle pulse train. Requiring the duty cycle to be less than 100%/n, where n is the number of wavelengths, allows a single broad-spectrum detector to be used. The optical power generated by the source is adjusted to optimize the signal to noise ratio and to minimize power consumption. This can be done by adjusting the drive current, the frequency of the pulse train, the pulse duration, or the duty cycle of the pulse train. In addition, the frequency of the pulse train can be shifted such that a quiet region of the noise spectrum is used.

APPLE-1006, 11:51-61 (cited at Pet. 64, 66)

Dr. Anthony's Declaration

123. A POSITA would have recognized that the predictable modification of Amano's pulse wave examination apparatus as suggested by Turcott would include implementing the apparatus to reduce the drive current or the duty cycle of the pulse train of the LED, further minimizing power consumption. APPLE-1006, 11:51-59. When the apparatus is operating in the lower power consumption state, the apparatus also reduces the drive current or the duty cycle of the pulse train of the LED to further minimize power consumption. *Id.*

APPLE-1003, ¶123 (cited at Pet. 67)

A POSITA would have been motivated to implement Turcott's teaching of reducing the duty cycle to lower power consumption in a pulse oximeter in combination with Amano's pulse wave examination apparatus to further minimize power consumption. APPLE-1006, 11:54-59. A POSITA would have understood further minimizing power consumption in Amano's device to be desirable because further minimization would lead to longer battery life.

APPLE-1003, ¶119 (cited at Pet. 65)

A POSITA Would Have Been Motivated to Modify Diab based on Turcott's Teachings

Petitioner's Reply

consumption." APPLE-1006, 11:54-59. Contrary to Masimo's contentions (POR, 62), a POSITA would not have merely wanted to minimize power consumption of the patient monitor, but would have also wanted to optimize signal to noise ratio (as explained in the Petition). Petition, 38; APPLE-1003, ¶81; APPLE-1004, 21:50-53, 22:4-6, 35:54-64; APPLE-1006, 11:54-59. Thus, a POSITA would have also been motivated to adjust, *e.g.*, by increasing, activation of the sensor to optimize signal to noise ratio when the signal to noise ratio is low. APPLE-1006, 11:54-59.

Pet. Reply, 19

FISH.

Issue 4A

The Diab, Amano, and Turcott Combinations Render Obvious Reducing Activation of an Attached Sensor

FISH.

The Diab, Amano, and Turcott Combinations Render Obvious Reducing Activation of an Attached Sensor

Patent Owner's Response

patent. (Ex. 2001, ¶¶42, 101-104.) Rather, Turcott suggests operating a light source according to a constant low duty cycle. (*Id.*) For example, Turcott states, "[t]o conserve energy, the source is preferably driven with ***a low duty cycle*** pulse train." (Ex. 1006, 11:51-52 (emphasis added); Ex. 2001, ¶101.) Turcott never discusses intermittently operating the patient monitor at different duty cycles. (Ex. 2001, ¶¶42, 102.)

PO Response, 60

pulse train." (*Id.*, 11:57-59.) A POSITA would have understood that Turcott does not disclose or enable making these adjustments in real-time during patient monitoring. (Ex. 2001, ¶¶42, 103.) For example, Turcott does not identify any conditions during patient monitoring that would trigger a reduction in the duty cycle. (*Id.*) Turcott also does not disclose the hardware and software necessary to make the real-time adjustments. (*Id.*) Thus, rather than disclosing reducing activation of a sensor during patient monitoring, a POSITA would have understood Turcott to suggest selecting the parameters once during product design or setup. (*Id.*)

PO Response, 61

FISH.

The Diab, Amano, and Turcott Combinations Render Obvious Reducing Activation of an Attached Sensor

Petitioner's Reply

The Petition establishes that a POSITA would recognize that Diab already provides control for driving the light emitters with an emitter current and adjusting the current for changes in the ambient room light or other changes during monitoring (APPLE-1007, 35:50-36:6); and that Diab and Amano teach adjusting/suspending operations depending on motion-induced noise during monitoring (APPLE-1007, 47:52-56; APPLE-1004, 21:50-22:6). Petition, 21, 37-38. Based on these teachings, as explained in the Petition, a POSITA would have found it obvious to also adjust the drive current, the frequency of the pulse train, the pulse duration, or the duty cycle of the pulse train to optimize the signal to noise ratio and to minimize power consumption (APPLE-1006, 11:51-59). Petition, 14-18, 37-40, 41 (analysis of element 1[c] incorporating Ground 1A's analysis of element 9[c])), 41-43; APPLE-1003, ¶¶52-55, 80-86. Neither Masimo nor its declarant dispute the Petition's and Dr. Anthony's analysis in this regard, but instead improperly focus on Turcott's purported deficiencies outside the context of the proposed combination.

Pet. Reply, 17-18

FISH.

52

Diab, Amano, and Turcott Render Obvious Reducing Activation of an Attached Sensor

Petitioner's Reply

during product design or setup." *Id.* Masimo's conclusion is unsupported conjecture, as Turcott does not disclose selecting/setting the parameters only once during product design or setup. Rather, Turcott explicitly uses the terms "adjusted" and "adjusting," connoting that multiple values are possible for the adjustment during monitoring and not a single value selected during product design or setup. APPLE-1006, 11:51-59.

Pet. Reply, 18

FISH.

Diab, Amano, and Turcott Render Obvious Reducing Activation of an Attached Sensor

two references individually. A finding of obviousness, however, cannot be overcome "by attacking references individually where the rejection is based upon the teachings of a combination of references." *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (citing *In re Keller*, 642 F.2d 413, 425 (CCPA 1981)).

Bradium Technologies v. Iancu, 923 F. 3d 1032, 1050 (Fed. Cir. 2019)
(cited at Pet. Reply, 16)

a limitation recited in the patent at issue is insufficient for a conclusion of nonobviousness. Unlike a section 102 defense which requires that a single reference describe each and every element of a claimed invention, *Structural Rubber Products Co. v. Park Rubber Co.*, 749 F.2d 707, 715, 223 USPQ 1264, 1270 (Fed.Cir.1984), "the question under 35 USC 103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made." *In re Lamberti*, 545 F.2d at 750, 192 USPQ at *808 280. That this distinction was missed is

Merck & Co. v. Biocraft Labs., Inc., 874 F.2d 804, 807–08 (Fed. Cir. 1989)
(cited at Pet. Reply, 17)

Diab, Amano, and Turcott Are Directed To Non-invasive Sensors

Patent Owner's Response

However, Turcott describes an ***invasive*** "implantable monitoring device" for "monitoring the status of a patient with a chronic disease such as heart failure using heart and lung sounds." (Ex. 1006, 1:13-16.) Turcott's device is sized and shaped to be implanted within a tissue pocket in the patient. (*Id.*, 8:65-9:4, 14:11-12; *see also* Ex. 2003, 26:10-16 (testifying that device implanted "under the skin would generally not be considered a non-invasive biosensor as it is invading the skin").) Based on this difference, a POSITA would have understood that Turcott does not disclose adjusting the activation level of its sensors in real-time, but rather discloses operating the invasive implantable device at a constant low duty cycle to prolong the life of the device. (Ex. 2001, ¶¶109-110.) A POSITA would have

PO Response, 64

FISH.

Diab, Amano, and Turcott Are Directed To Non-invasive Sensors

Turcott

As with most of the sensors described here, the vascular plethysmography and arterial O_2 saturation sensors can be used in noninvasive, external embodiments, in contrast to incorporation in an implantantable monitor. These optical sensors are particularly attractive candidates for an external embodiment, since electrical contact with the skin or direct contact with subcutaneous tissue is not necessary, in contrast to, for exarnple, ECG leads and chemical sensors, respectively. Furthermore, the sensors can be made small and can conveniently attach to a peripheral portion of the body, such as finger, toe, or ear, in contrast to, for example, a surface microphone, which is optimally position over the heart or great vessels. Thus, patients are likely to tolerate regular use of these sensors for an extended period of time, such as during sleep each night. Particular embodiments include a finger cuff, a wristband, a configuration resembling a watch, and a configuration resembling a clip-on earring. The sensor

APPLE-1006, 11:66-12:15 (cited at Pet. Reply, 21)

FISH.

Issue 4B

The Combination of Diab (Alone or With Amano) and Turcott

FISH.

The Combination of Diab (Alone or With Amano) and Turcott

Patent Owner's Response

Second, a POSITA would have been ***discouraged*** from reducing activation of Diab's sensor, as argued by Petitioner, without proper patient and signal protections in place. (*Id.*, ¶107.) The '703 patent discloses that patient monitors may need to increase activation of the sensor during "low signal quality periods or when critical measurements are necessary" because a sensor operating at a reduced activation level may be more likely to miss important events. (Ex. 1001, 6:9-24; Ex. 2001, ¶107.) Consequently, the '703 patent describes methods to trigger the monitor to increase sensor activation during these critical times. (*Id.*) Diab and Turcott do not include a feedback loop whereby physiological measurements or signal statistics are used to adjust the sensor activation level. (*Id.*) Moreover, Petitioner does not propose modifying Diab or Turcott to include such a feedback loop.

PO Response, 62-63

FISH.

The Combination of Diab (Alone or With Amano) and Turcott

Petitioner's Reply

sensor activation level." POR, 62-63. But the claims of the '703 patent do not require such "a feedback loop." These arguments are therefore based on unclaimed limitations and cannot form the basis for a proper obviousness analysis:

Pet. Reply, 20-21

FISH.

The Combination of Diab (Alone or With Amano) and Turcott

Patent Owner's Response

Fourth, Petitioner fails to explain how the combination of Turcott, Diab, and Amano would operate to adjust activation of Diab's sensors "when the oximeter is operating at the lower power consumption level." (Pet. 42; Ex. 2001, ¶¶111-113.)

PO Response, 65

However, in order for Diab's oximeter to reduce activation of Diab's sensors at the lower power consumption level (i.e., during a period of no motion), the oximeter must send the motion status signal to control the emitter drivers and the emitter drivers must be capable of changing the duty cycle of supplied current between different non-zero duty cycles. (Ex. 2001, ¶¶111-113.) If the motion status signal is not provided to control the emitter drivers, the oximeter cannot synchronize the lower power consumption level (i.e., the detection of no motion) with a corresponding reduction in sensor activation. (*Id.*) If the emitter drivers are incapable of changing the duty cycle of supplied current between different non-zero duty cycles, Diab's oximeter is unable to operate the emitters at different non-zero duty cycles. (*Id.*) As explained herein, Diab does not provide the motion status signal to control the emitter drivers and also does not describe that the emitter drivers are capable of changing the duty cycle of supplied current between different non-zero duty cycles, and Petitioner does not suggest any modifications to Diab to facilitate this process and different capability. (*Id.*)

PO Response, 65-66

FISH.

The Combination of Diab (Alone or With Amano) and Turcott

Petitioner's Reply

Masimo's fourth argument that "Petitioner fails to explain how the combination of Turcott, Diab, and Amano would operate to adjust activation of Diab's sensors" (POR, 65-67) fails to acknowledge the Petition's explanation that the combination "would include implementing the oximeter's signal processor to reduce the drive current or the duty cycle of the pulse train of the LEDs when the oximeter is operating at the lower power consumption level." Petition, 42; APPLE-1003, ¶85. Masimo's argument further fails to account for what would have been suggested to a POSITA from Diab's, Amano's, and Turcott's teachings. As evident from Masimo's explanation of the combination in its POR, the modification of Diab to incorporate Turcott's teachings would have been well within the skill level of a POSITA. *See, e.g.*, *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016) ("*KSR* does not require that a combination only unite

Pet. Reply, 22

A POSITA Would Have Been Motivated to Modify Diab based on Turcott's Teachings

Contrary to ClassCo's argument, *KSR* does not require that a combination only unite old elements without changing their respective functions. *KSR*, 550 U.S. at 416, 127 S.Ct. 1727. Instead, *KSR* teaches that "[a] person of ordinary skill is also a person of ordinary creativity, not an automaton." *Id.* at 421, 127 S.Ct. 1727. And it explains that the ordinary artisan recognizes "that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420, 127 S.Ct. 1727. The rationale of *KSR* does not support ClassCo's theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B. To the contrary, *KSR* instructs that the obviousness inquiry requires a flexible approach. *Id.* at 415, 127 S.Ct. 1727. Here, the Board faithfully applied this flexible approach to find that the combination of Fujioka and Gulick "would have resulted in no more than [a] predictable result." J.A. 6.

ClassCo, Inc. v. Apple, Inc., 838 F.3d 1214, 1219 (Fed. Cir. 2016) (cited at Pet. Reply, 22)

Petitioner's Reply

APPLE-1003, ¶85. Masimo's argument further fails to account for what would have been suggested to a POSITA from Diab's, Amano's, and Turcott's teachings. As evident from Masimo's explanation of the combination in its POR, the modification of Diab to incorporate Turcott's teachings would have been well within the skill level of a POSITA. *See, e.g., ClassCo, Inc. v. Apple, Inc.*, 838 F.3d

Pet. Reply, 22

FISH.

Issue 4C

The Combination of Amano and Turcott

FISH.

The Combination of Amano and Turcott

Patent Owner's Response

Moreover, a POSITA would have been discouraged from reducing activation of Amano's sensor without the proper protections in place. The '703 patent recognizes that the patient monitor may miss patient events when the sensor is less active, particularly during periods of low signal quality. (Ex. 1001, 6:9-24; Ex. 2001, ¶132.) Consequently, the '703 patent describes methods to trigger the monitor to increase sensor activation during "low signal quality periods or when critical measurements are necessary." (*Id.*) Neither Amano nor Turcott include these protections and Petitioner does not propose to add any. For this reason, a POSITA would not have been motivated to reduce activation of Amano's sensor based on Turcott. (Ex. 2001, ¶132.)

PO Response, 76

FISH.

A POSITA Would Have Been Motivated to Modify Amano based on Turcott's Teachings

Petitioner's Reply

But the claims do not require such "protections." These arguments are therefore based on unclaimed limitations and cannot form the basis for a proper obviousness analysis. *McCarthy v. Lehigh Valley R. Co.*, 160 U.S. 110, 116 (1895); *Smith & Nephew, Inc. v. Rea*, 721 F.3d 1371, 1381 (Fed. Cir. 2013).

Pet. Reply, 27

FISH.

A POSITA Would Have Been Motivated to Modify Amano based on Turcott's Teachings

Patent Owner's Response

Petitioner also fails to explain how the combination of Amano and Turcott would operate to adjust activation of Amano's sensors "[w]hen the apparatus i operating in the lower power consumption state." (Pet. 67; Ex. 2001, ¶¶133-135.

PO Response, 76

for Amano's apparatus to reduce activation of its sensors at the lower power consumption level (i.e., during a period of no body movement), the apparatus must send the body movement signal to control the emitter drivers and the emitter drivers must be capable of changing the duty cycle of supplied current between different non-zero duty cycles. (Ex. 2001, ¶133.) If the body movement signal is not provided to the emitter drivers, the apparatus cannot synchronize the lower power consumption level (i.e., the detection of no body movement) with a corresponding reduction in sensor activation. (*Id.*) If the emitter drivers are incapable of changing the duty cycle of supplied current between different non-zero duty cycles, Amano's apparatus is unable to operate the emitters at different non-zero duty cycles. (*Id.*) As explained herein, Amano does not provide the body movement signal (determined by the "judging section") to the emitter drivers and also does not describe that the emitter drivers are capable of changing the duty cycle of supplied current between different non-zero duty cycles, and Petitioner does not suggest any modifications to Amano to facilitate this process and different capability. (*Id.*)

PO Response, 77

FISH.

A POSITA Would Have Been Motivated to Modify Amano based on Turcott's Teachings

Petitioner's Reply

Finally, Masimo's argument that "Petitioner also fails to explain how the combination of Amano and Turcott would operate to adjust activation of Amano's sensors" (POR, 76-79) fails to acknowledge the Petition's and Dr. Anthony's explanation that it "would include implementing the apparatus to reduce the drive current or the duty cycle of the pulse train of the LED." Petition, 66-67; APPLE-1003, ¶123. Masimo's argument further fails to account for what would have been suggested to a POSITA from Amano's and Turcott's teachings. As evident from Masimo's explanation of the combination in its POR, the modification of Amano to incorporate Turcott's teachings would not have been beyond the skill level of a POSITA. *See, e.g.*, *ClassCo*, 838 F.3d at 1219 ("*KSR* does not require that a combination only unite old elements without changing their respective functions. Instead, *KSR* teaches that '[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.'").

Pet. Reply, 27

FISH.

Issue 5

A POSITA Would Have Been Motivated to Modify Diab based on Edgar's Teachings (Grounds 1B and 2B) (Dependent claims 11 and 21)

FISH.

Overview of the Combination of Diab and Edgar

Dr. Anthony's Declaration

5:1-4. In particular, Edgar explains that Diab's approach to "removing motion artifacts from measured physiological signals" "is to first generate a noise reference signal from the two measured signals, and then use the noise reference signal as an input to an adaptive noise canceler along with either or both of the measured signals to remove the reference noise signal from the measured signals." APPLE-1005, 3:58-4:6. Edgar provides a technique that "eliminate[s] motion-induced noise artifacts from light signals, that is relatively simple computationally, and that does not require more than one sensor." APPLE-1005, 5:1-11. A POSITA would have recognized that the predictable modification of Diab (as supplemented with Amano) as suggested by Edgar would include implementing Edgar's technique, instead of Diab's technique that Edgar seeks to improve upon, for calculating "blood oxygen saturation" in the combined device. APPLE-1005, 3:58-4:6.

APPLE-1003, ¶69 (cited by Pet. 30)

FISH.

A POSITA Would Have Been Motivated to Modify Diab based on Edgar's Teachings

Patent Owner's Response

Notably, Edgar argues that Diab does not satisfy this need and expressly distinguishes Diab. Edgar argues, "U.S. Pat. No[]. … 5,632,272 … to Diab, disclose[s] methods and apparatuses for removing motion artifacts using adaptive noise cancellation techniques" that require two or more measured signals. (*Id.*, 3:60-64.) Edgar argues that the "Diab et al. approach appears to require the use of both measured input signals to generate a noise reference signal," and suggests that the Edgar's inventions provide an advantage over Diab's approach. (*Id.*, 4:4-6, 5:1-4.)

Thus, because Edgar distinguishes Diab's approach to cancelling noise, a POSITA would not have been motivated to combine Edgar with Diab, as Petitioner argues in Grounds 1B and 2B. (Ex. 2001, ¶¶91-93.)

PO Response, 55-56

FISH.

A POSITA Would Have Been Motivated to Modify Diab based on Edgar's Teachings

Petitioner's Reply

have been motivated to combine Edgar with Diab." POR, 55-56. Masimo appears to be arguing that Edgar teaches away from its combination with Diab. But Edgar's teachings do not establish "clear discouragement" of the combination, as required for teaching away. *In re Ethicon, Inc.*, 844 F.3d 1344, 1351 (Fed. Cir. 2017); *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) ("A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.").

In fact, as Masimo admits, Edgar suggests that its inventions provide an advantage over Diab's approach. *See* POR, 55-56. A POSITA seeking to improve Diab's device, upon reading Edgar, would have been encouraged to implement Edgar's technique, instead of Diab's technique, to calculate blood oxygen saturation using a relatively simple computation as compared to Diab's, as established in the Petition. Petition, 30-33; APPLE-1003, ¶¶68-72.

Pet. Reply, 15-16

FISH.

Appendix

Overview of the Instituted Grounds

Ground	Claims	§103 Basis
1A	**9-10, 12-14, 20, 22-24**	Diab (APPLE-1007) and Amano
1B	**11, 21**	Diab, Amano, and Edgar (APPLE-1005)
1C	**1-7, 15-18**	Diab, Amano, and Turcott (APPLE-1006)
2A	**9-10, 12-14, 20, 22-24**	Diab and the General Knowledge of a POSITA (GK-POSITA)
2B	**11, 21**	Diab, GK-POSITA, and Edgar
2C	**1-7, 15-18**	Diab, GK-POSITA, and Turcott
3A	**9-10, 12-14, 20, 22-24**	Amano (APPLE-1004)
3B	**1-3, 15-17**	Amano and Turcott (APPLE-1006)

Petition, 3; *see* Institution Decision (Paper 7), 8, 30

FISH.