**Exhibit D-3**
**Initial Invalidity Claim Chart for U.S. Patent No. 10,736,507**
**U.S. Patent Application Publication No. 2010/0324384 ("Moon")**

U.S. Patent Application Publication No. 2010/0324384 ("Moon"), which was filed on September 14, 2009, published on December 23, 2010, and issued on October 8, 2013, is prior art to U.S. Patent No. 10,736,507 (the "'507 patent") pursuant to at least pre-AIA 35 U.S.C. §§ 102(a), 102(b), and/or 102(e) under the '507 patent's proper priority date. Moon anticipates and/or renders obvious the asserted claims of the '507 patent under pre-AIA 35 U.S.C. §§ 102 and/or 103.

As set forth in the chart below, all asserted claims of the '507 patent are anticipated and/or rendered obvious over Moon under at least the apparent construction of the claims advanced by Masimo based on its Preliminary Infringement Contentions served on May 25, 2023 (the "Infringement Contentions"). The excerpts cited herein are exemplary. For any claim limitation, Apple may rely on excerpts cited for any other limitation and/or additional excerpts not set forth fully herein to the extent necessary to provide a more comprehensive explanation for a reference's disclosure of a limitation. Where an excerpt refers to or discusses a figure or figure items, that figure and any additional descriptions of that figure should be understood to be incorporated by reference as if set forth fully therein. Apple expressly reserves the right to use the entirety of any reference and otherwise to supplement these contentions to add additional information showing that Moon invalidates the asserted claims of the '507 patent.

To the extent that any of the below claim limitations are found to not be expressly disclosed by the below reference, Apple contends that any such limitation would have been obvious, either based on the knowledge of one of ordinary skill in the art or based on any of the art cited for the '507 patent in Apple's Initial Invalidity Contentions, which are incorporated herein by reference. In particular, as evidenced by the below and in Apple's Initial Invalidity Contentions, the '507 patent is merely a collection of prior art elements that fails to meet the statutory requirement of nonobviousness under § 103, and the factors delineated in *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), weigh against a finding of nonobviousness.

For example, it would have been obvious to a person of ordinary skill in the art to combine the teaching of Moon with the teachings of the other references charted for the '507 patent in Apple's Initial Invalidity Contentions; such references are in the same field of art, and discuss various techniques and improvements that would have been known to yield predictable results when applied to the technology claimed in the '507 patent, and a person of ordinary skill therefore would have been motivated to so combine them in view of the disclosures therein.

Apple also contends that one of ordinary skill in the art would find such limitation obvious for at least one or more of the following reasons: (1) the combination would unite old elements with no change in their respective function; (2) the combination would have been a predictable variation of a work in the same or a different field of endeavor; (3) the modification would have used a known technique



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to improve a similar device in the same way; (4) the modification was a known problem for which there was an obvious solution; (5) the modification would have been "obvious to try"; (6) the modification was known work in one field of endeavor that would have prompted variations of it for use in either the same or different field based on design incentives or other market forces; (7) there was an explicit teaching, suggestion, or motivation in the prior art for the modification.

These Initial Invalidity Contentions are based on Apple's present understanding of the '507 patent claims and Masimo's theories of infringement against Apple. Apple expressly does not agree that, under a correct construction or reading of the claims, that Apple's accused products meet the limitations of the asserted claims of the '507 Patent or that the claims satisfy the requirements of 35 U.S.C. § 112. Apple's contentions herein are not, and should in no way be seen as, admissions as to or adoptions of any particular claim scope or construction, or as an admission that any particular element is met by any accused product in any particular way. Apple therefore objects to any attempt to imply claim construction from this chart. Apple's Initial Invalidity Contentions do not represent Apple's agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein. However, at least under Masimo's apparent application of the claims for the purposes of infringement (which Apple expressly disagrees with), Moon would have rendered the asserted claims of the '507 patent invalid. Except where specifically noted otherwise, this chart applies the apparent constructions of claim terms as used by Masimo in its Infringement Contentions; such use, however, does not imply that Apple adopt or agree with Masimo's constructions in any way. Apple further reserves the right to supplement these contentions in response to any claim construction orders by the Court.

Apple is investigating this prior art and has not yet completed discovery from third parties who may have information concerning it. Pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules of the District of Delaware, and the Orders of record in this matter Apple reserves the right to modify, amend, and/or supplement these contentions as information becomes available (*e.g.*, witness testimony and/or non-public documentation) and as discovery proceeds.



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| Claim 13 | Prior Art |
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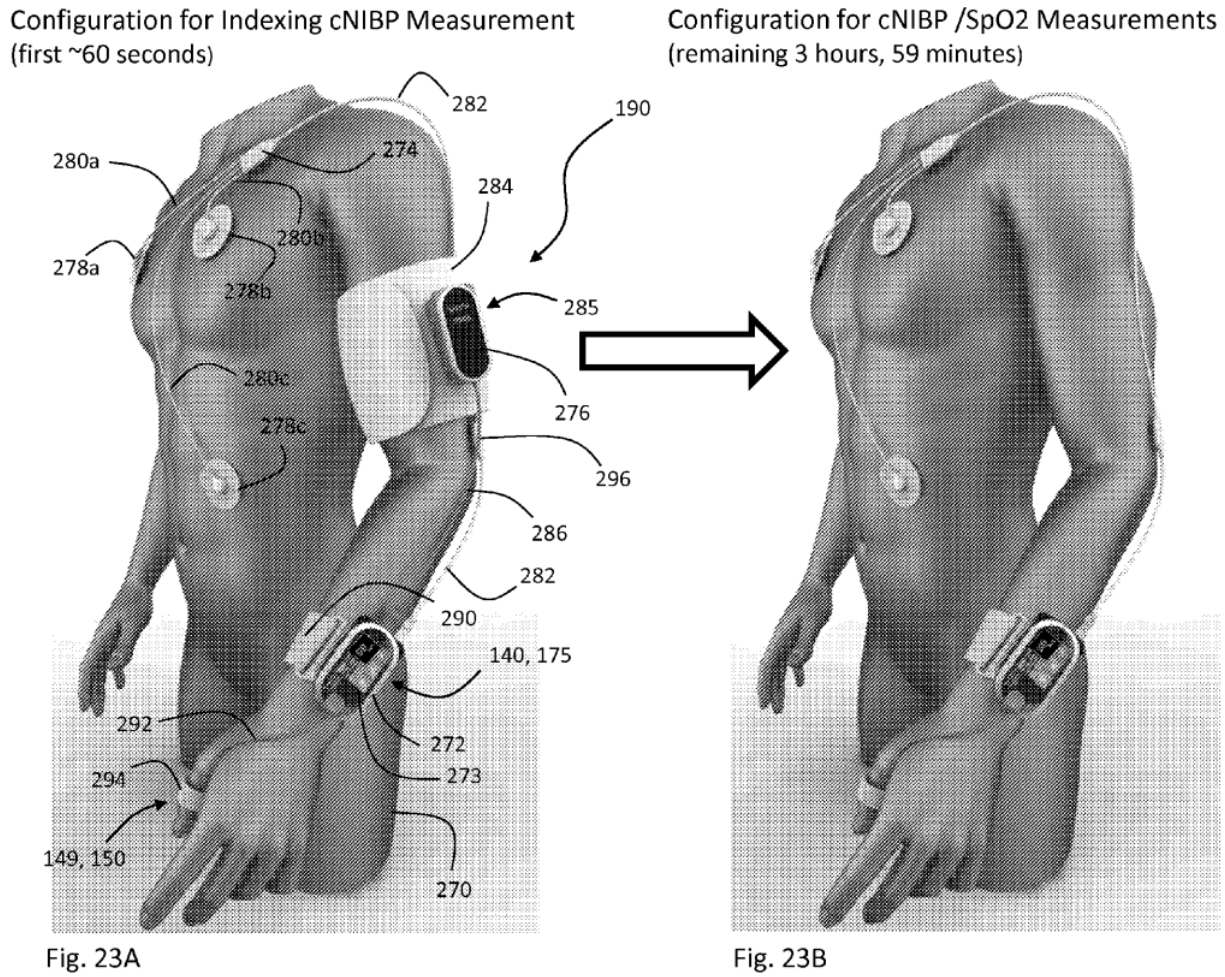
| 13[pre] A computer-implemented method of informing a user of mobile measurement of oxygen saturation (“SpO2”), the computer-implemented method comprising: | Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Moon discloses and/or renders obvious a computer-implemented method of informing a user of mobile measurement of oxygen saturation ("SpO2").<br><br>For example, Moon discloses and/or suggests a method of informing a user of mobile measurement of oxygen saturation implemented by a body-worn system that continuously measures pulse oximetry using (1) an oximetry probe, (2) a wrist worn transceiver that encloses a processing unit, and (3) a remote receiver.<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |




Figs. 23A, 23B.



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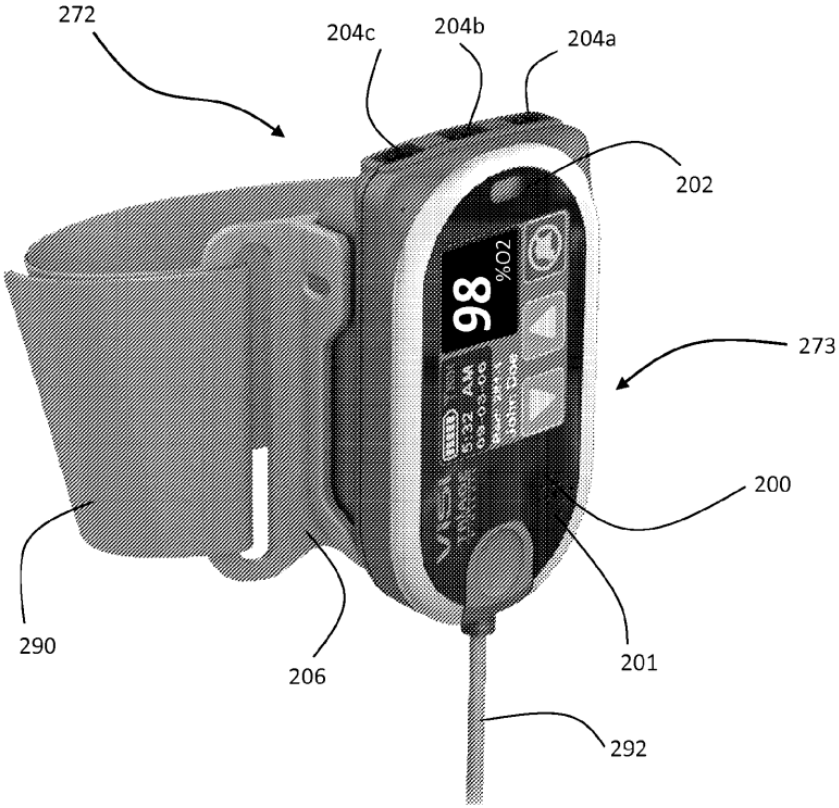


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to



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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0025] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn |



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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.<br><br>In another aspect, the invention provides a method for measuring SpO2 and cNIBP by processing ECG, PPG, and motion signals with filters that analyze both PTT and AC signals of the PPG waveforms with a mathematical filter. The filter, for example, can be a 'matched filter', described in detail below. Typically only signals that are generated when motion is relatively low are considered in this embodiment. For example, signals are typically not processed further when the motion sensors indicate that motion is greater than an acceptable level. Filtering PTT values includes, for example, determining values that lie outside a pre-determined range using statistical filters (e.g. a simple average and standard deviation). More sophisticated techniques, such as calculating a power value from a frequency-domain spectrum corresponding to the time-dependent motion signal, and then comparing this to a pre-determined value, can be used to estimate if either the PTT values or PPG signals are affected by motion. SpO2 values are typically calculated from ratios describing the AC and DC signals measured from individual pulses using optical systems operating in the red and infrared optical spectral regions. One or more ratios can be calculated for the pulse.").<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| 13[a] outputting, from an optical sensor of an SpO2 measurement system, one or more signals responsive to | Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious outputting, from an optical sensor of an SpO2 measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue. |



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| light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and | For example, Moon discloses and/or suggests outputting time-dependent signals corresponding from LEDs from an oximetry probe to a wrist-worn transceiver that encloses a processing unit.<br><br>*See, e.g.*, Moon, Abstract ("The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station."). |

Configuration for Indexing cNIBP Measurement
(first ~60 seconds)

Configuration for cNIBP /SpO2 Measurements
(remaining 3 hours, 59 minutes)

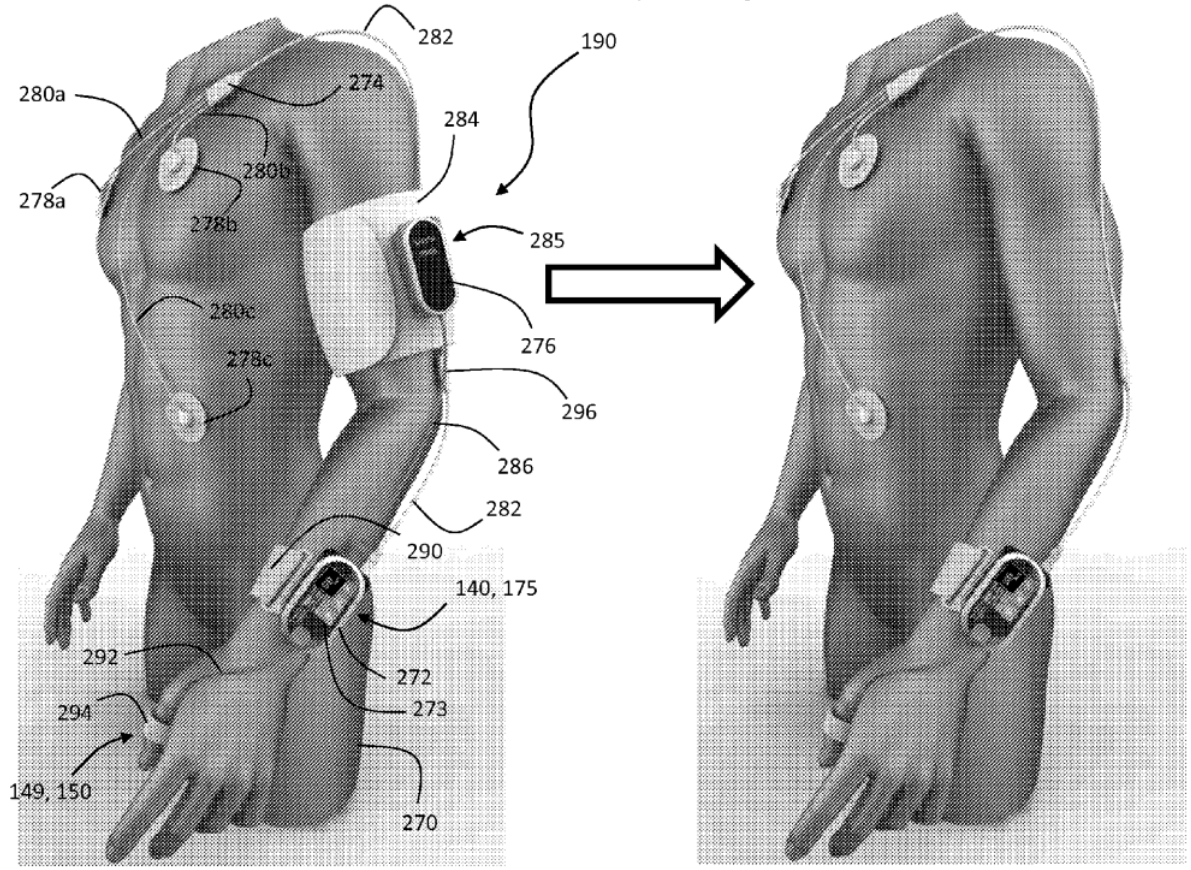


Fig. 23A

Fig. 23B



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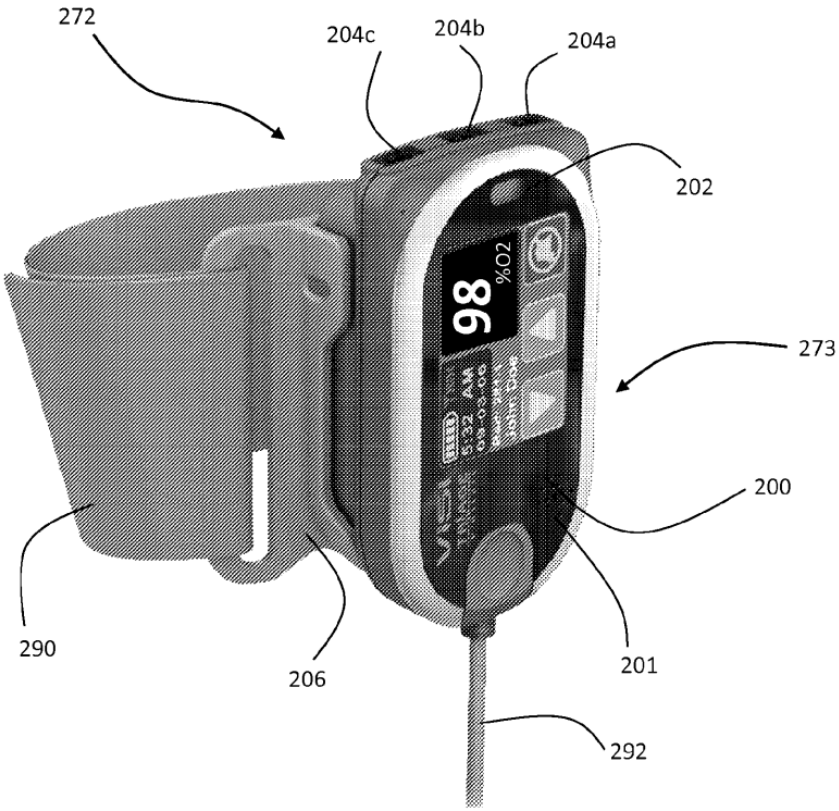


Fig. 24



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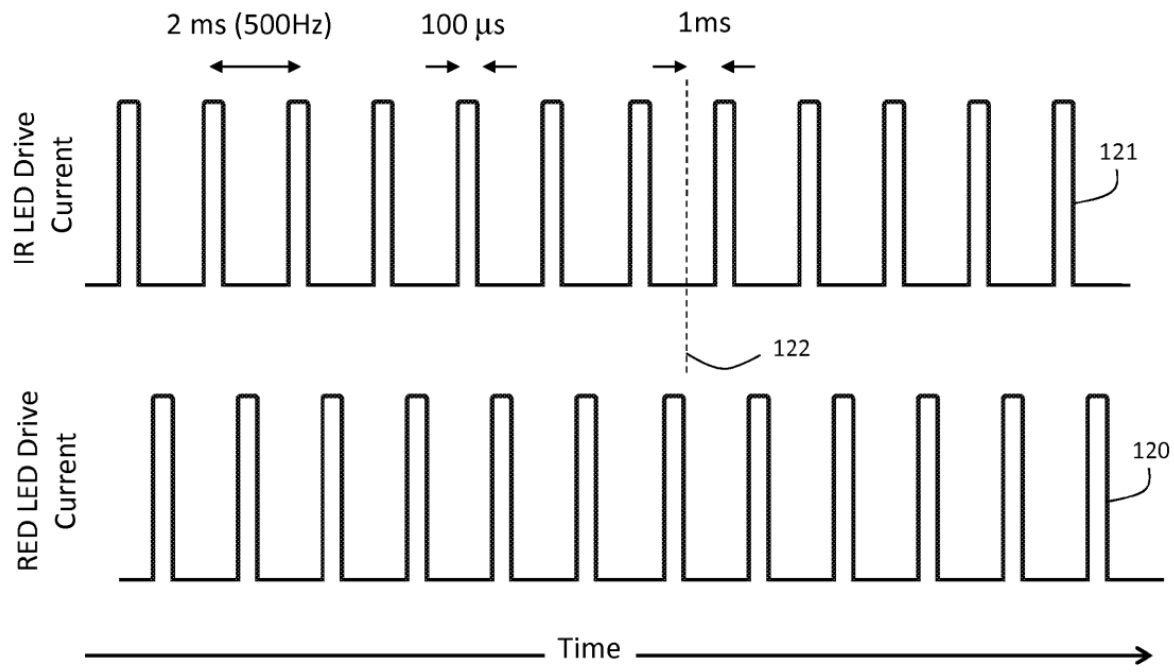


Fig. 20



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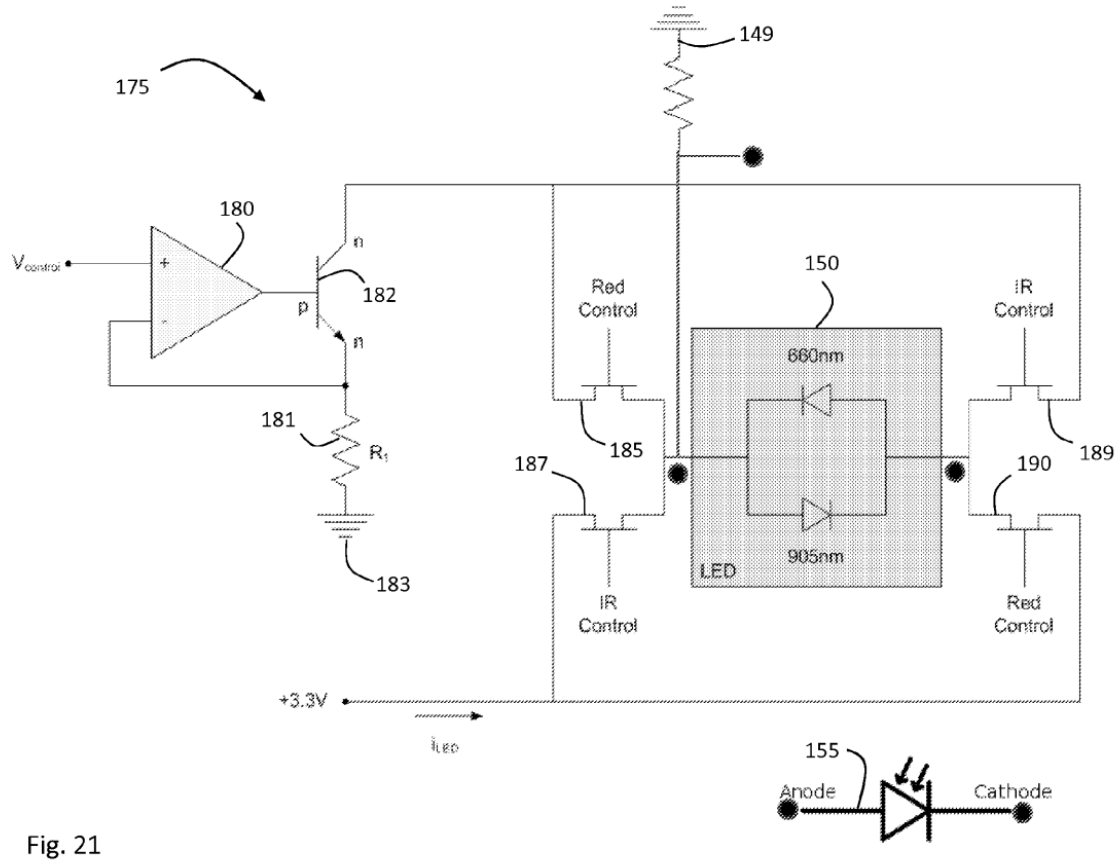


Fig. 21



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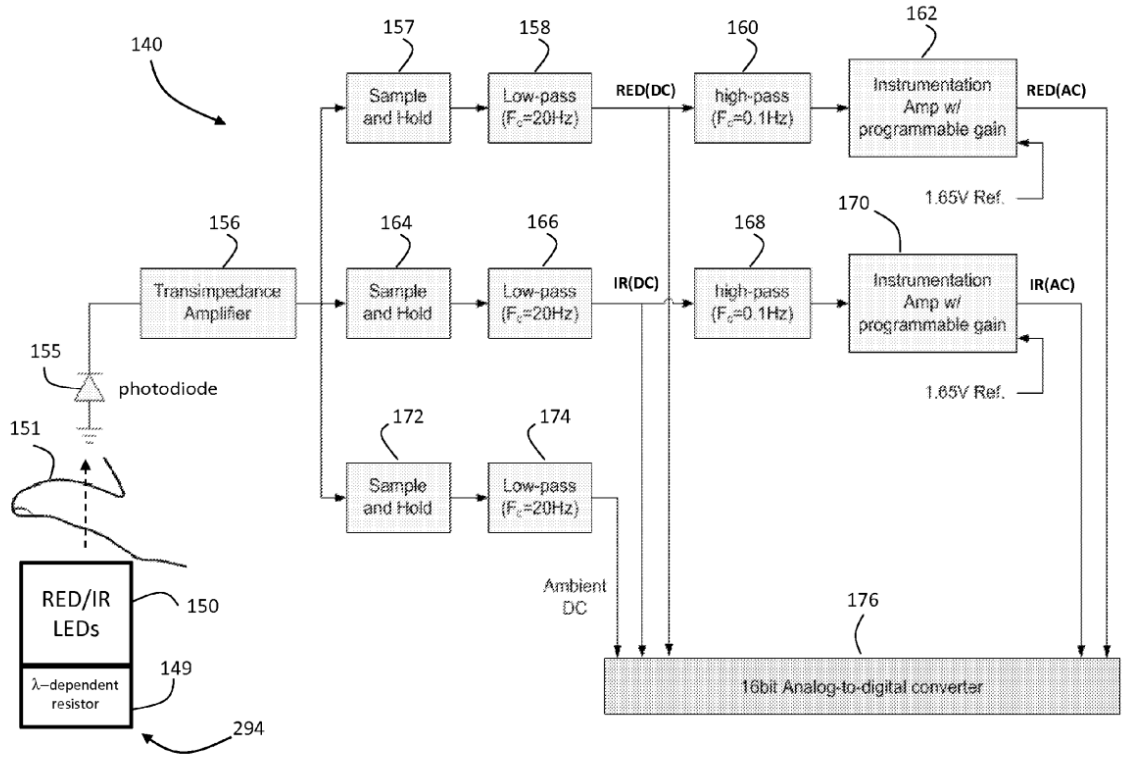


Fig. 22

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG))

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| | corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0025] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm. |

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| | In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.<br><br>In another aspect, the invention provides a method for measuring SpO2 and cNIBP by processing ECG, PPG, and motion signals with filters that analyze both PTT and AC signals of the PPG waveforms with a mathematical filter. The filter, for example, can be a 'matched filter', described in detail below. Typically only signals that are generated when motion is relatively low are considered in this embodiment. For example, signals are typically not processed further when the motion sensors indicate that motion is greater than an acceptable level. Filtering PTT values includes, for example, determining values that lie outside a pre-determined range using statistical filters (e.g. a simple average and standard deviation). More sophisticated techniques, such as calculating a power value from a frequency-domain spectrum corresponding to the time-dependent motion signal, and then comparing this to a pre-determined value, can be used to estimate if either the PTT values or PPG signals are affected by motion. SpO2 values are typically calculated from ratios describing the AC and DC signals measured from individual pulses using optical systems operating in the red and infrared optical spectral regions. One or more ratios can be calculated for the pulse.").<br><br>Moon, [0059]-[0061] ("FIGS. 1 and 2 show a pulse oximeter probe 1 shaped as a finger ring that wraps around a base of patient's thumb 3 to measure SpO2 and cNIBP. The probe 1 is designed to be comfortably worn for extended periods (e.g. several days) while freeing up the patient's thumb and hands for activities such as reading and eating that are commonplace in, e.g., a hospital. Motion corresponding to these and other activities can affect the SpO2 measurement and is detected with a network of accelerometers worn on the patient's body. The probe 1 makes a transmission-mode optical measurement along an inner portion of the thumb 3 with a pair of embedded LEDs 9, 10 operating at, respectively, 660 and 905 nm, and a single photodetector 12 that detects these wavelengths after they pass through vasculature and other tissue lying beneath the LEDs 9,10. Specifically, both LEDs 9, 10 and the photodetector 12 are positioned to measure blood pulsing in portions of the princeps pollicis artery, which is the principal artery of the thumb and stems from the radial artery. As described in detail below, measuring blood flowing in this artery enhances the accuracy of the cNIBP measurement. A small circuit board 11 supports the photodetector 12 and may additionally include, for example, a trans-impedance amplifier for amplifying photocurrent from the photodetector 12 and converting it into a corresponding voltage. The circuit board 12 also includes a |



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| | resistor 19 that identifies specific wavelengths emitted by the LEDs 9, 10; these wavelengths, in turn, influence values of correlation coefficients that relate RoR to SpO2, as described below. Some of these circuit elements are described in more detail below with reference to FIGS. 21 and 22.<br><br>A ring-shaped, flexible plastic housing 6 formed into a cylindrical radius of curvature features rectangular openings 18, 22 that support the LEDs 9, 10 and circuit board 11. The housing 6 features three cut-out portions 23A-C, or 'living hinges', that make it easily bendable and able to accommodate thumbs of difference sizes. It is held in place around the base of the thumb with a flexible nylon strap 2 threading through two D- ring openings 13A, 13B located the housing's distal ends. A portion 4 of the strap 2 features a patch 17 of Velcro (containing, e.g., 'hooks') that adheres to a mated patch 16 (containing, e.g., 'loops') on the strap's main portion; the patches 16, 17 temporarily adhere to each other when the housing 6 is worn on the patient's thumb 3, and easily detach so that it can be removed. The straps 2, 4 allow the probe 1 to be securely fastened, which in turn minimizes motion relative to the measurement site. A flexible, cable 5 connects the oximeter probe 1 to a wrist-worn transceiver, similar to the one shown in FIG. 24. The cable 5 carries I/O signals from the wrist-worn transceiver that drive the LEDs according to the timing diagram in FIG. 20, and analog signals measured by the photodetector to an amplifying/filtering circuit within the transceiver, as shown in FIG. 22. There, the analog signals are amplified, filtered, digitized, and processed to measure SpO2, as described in detail below.<br><br>As shown in FIGS. 3A and B, during a pulse oximetry measurement the LEDs 9, intermittently emit beams 28, 29 of radiation at 660 nm and 905 nm at roughly 500 Hz according to the timing diagram in FIG. 20. Once emitted, the beams 28, 29 pass through the base of the thumb 3 and rapidly diverge to scatter off tissue such as skin 24, bone 25, capillaries 26 near the thumb's outer surface, and a portion of the princeps pollicis artery 27 before reaching the photodetector 12. To increase the amount of radiation that passes through the artery 27 and capillaries 26, and thereby optimize signal quality, the LEDs 9, 10 and photodiode 12 are separated by approximately 35-55 degrees. Optical components separated at this angle tend to increase the relative contribution of signal coming from the artery 27; ultimately this improves the accuracy of the cNIBP measurement, as PTT values measured from arterial components correlate better to blood pressure than those measured from capillary components. Both the capillaries 26 and princeps pollicis artery 27 carry blood that pulsates with each heartbeat and absorbs radiation emitted by the LEDs 9, 10. This results in separate time-dependent optical waveforms (i.e. RED/IR(PPG), shown in FIG. 6, generated by the 660 and 905 nm |



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| | radiation. Both waveforms feature AC signals corresponding to the time-dependent pulsating blood, and DC signals corresponding to time-independent scattering off the skin 24, bone 25, and non-pulsating components of the capillaries 26 and artery 27. Prior to any filtering the AC component typically represents about 0.5-1% of the total signal.”).<br><br>Moon, [0064], [0065] (“The exact values of parameters shown in Table 1 will depend of the specific wavelengths of the LEDs used in the pulse oximeter probe. This is because the SpO2 measurement is fundamentally determined by the relative optical absorption of Hb and HbO2 in the red and infrared spectral regions, and absorption, in turn, will depend on the wavelength emitted by the LEDs. The absorption spectra of Hb and HbO2 are relatively flat in the infrared spectral region, but strongly diverge in the red spectral region. The coefficients shown in Table 1 are thus relatively sensitive to the exact wavelength of the red LED. For this reason, a series of empirical studies need to be performed using pulse oximeter probes featuring LEDs of varying wavelengths surrounding the red emission wavelength (e.g. 600-610 nm) prior to manufacturing. Such a study, for example, is described with reference to FIG. 8. It is typically classified as a ‘breathe down’ study because it involves lowering the SpO2 values of a series of patients (typically about 10-15) under medical supervision. SpO2 is typically lowered by decreasing the amount of oxygen each patient inhales through a specialized ventilator mask; this is often done in a room with a reduced temperature. Blood from the patients is extracted from an arterial line and analyzed with a blood gas analyzer to determine its oxygen content. Simultaneously, a pulse oximeter probe with known LED wavelengths is attached to each patient (in this case at the base of the thumb) and used to measure the RoR described in equation (3). SpO2 values for this experiment, as measured with the blood gas analyzer, typically range from 70-100%. Simultaneous studies are typically done using pulse oximeter probes having LEDs with different red emission spectra. Upon completion of the studies, the wavelength-dependent values of RoR are related to SpO2, as determined by the blood gas analyzer, to calculate coefficients a, b, c as described in Table 1. In general, a different set of coefficients will result for the different LED wavelengths. These coefficients and the optical wavelengths they correspond to, along with a resistor value described below, are stored in a database in memory on the wrist-worn transceiver.<br><br>Prior to manufacturing of the pulse oximeter probe (e.g. the probe shown in FIG. 1), the wavelengths of the LEDs are determined, typically with a resolution of about 1 nm, using an emission spectrophotometer. LEDs are then sorted by wavelength and associated with a resistor having a value |



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| | that is stored in the above-described database. During manufacturing, the resistor is soldered to the circuit board (and optionally trimmed with a laser to give it a well-defined resistance) within the pulse oximeter probe shown in FIG. 1. During an actual measurement, the wrist-worn transceiver delivers a voltage through the cable connecting it to the pulse oximeter probe that decreases in value after passing through the resistor. This voltage drop is sensed by the transceiver using the analog-to-digital converter and processor, and then used to calculate the resistor value. The value is compared to the database, and ultimately used to select the appropriate a, b, and c coefficients described above. Ultimately this maximizes accuracy of the SpO2 calculation.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| 13[b] via a processing board of the SpO2 measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display: | Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious via a processing board of the SpO2 measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display.<br><br>For example, Moon discloses and/or suggests a processing unit of the body-worn pulse oximetry system in data communication with the oximetry probe and a remote receiver including a display which can be a monitor that is essentially identical to the monitor worn by the patient.<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |



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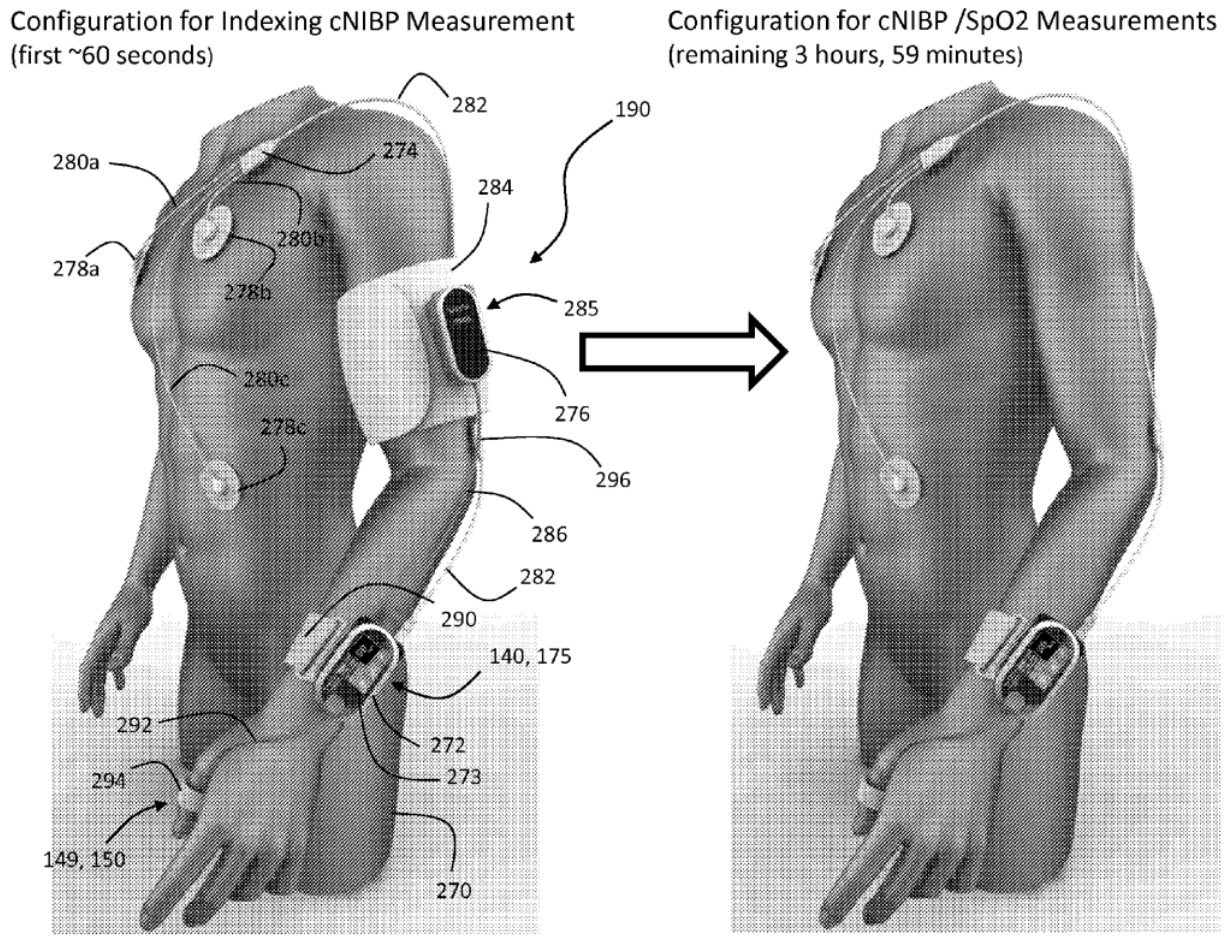


Figs. 23A, 23B.



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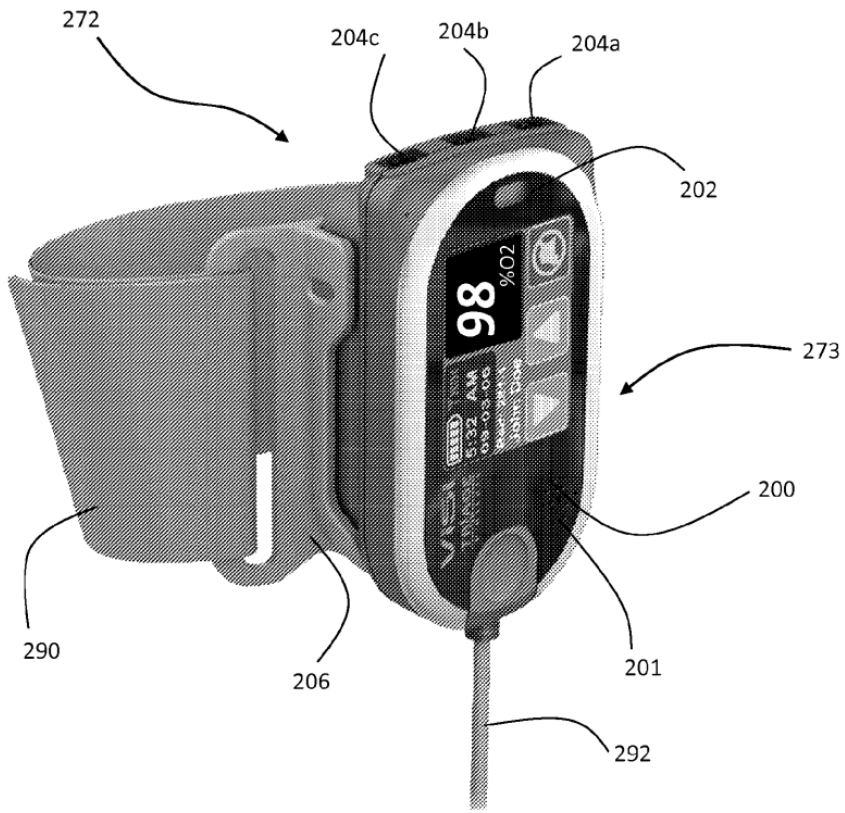


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to

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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0025] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn |



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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.<br><br>In another aspect, the invention provides a method for measuring SpO2 and cNIBP by processing ECG, PPG, and motion signals with filters that analyze both PTT and AC signals of the PPG waveforms with a mathematical filter. The filter, for example, can be a 'matched filter', described in detail below. Typically only signals that are generated when motion is relatively low are considered in this embodiment. For example, signals are typically not processed further when the motion sensors indicate that motion is greater than an acceptable level. Filtering PTT values includes, for example, determining values that lie outside a pre-determined range using statistical filters (e.g. a simple average and standard deviation). More sophisticated techniques, such as calculating a power value from a frequency-domain spectrum corresponding to the time-dependent motion signal, and then comparing this to a pre-determined value, can be used to estimate if either the PTT values or PPG signals are affected by motion. SpO2 values are typically calculated from ratios describing the AC and DC signals measured from individual pulses using optical systems operating in the red and infrared optical spectral regions. One or more ratios can be calculated for the pulse.").<br><br>Moon, [0125] ("The body-worn monitor 190 features a wrist-worn transceiver 272, described in more detail in FIG. 24, featuring a touch panel interface 273 that displays SpO2, blood pressure values and other vital signs. A wrist strap 290 affixes the transceiver 272 to the patient's wrist like a conventional wristwatch. A flexible cable 292 connects the transceiver 272 to a pulse oximeter probe 294 that wraps around the base of the patient's thumb. During a measurement, the probe 294 generates a time-dependent PPG waveform which is processed along with an ECG to measure cNIBP and SpO2. This provides an accurate representation of blood pressure in the central regions of the patient's body, as described above."). |



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| | Moon, [0062] ("Collectively processing both the AC and DC signals of the RED/IR(PPG) waveforms yields a SpO2 value. The body-worn monitor calculates these components using a number of signal-processing methodologies that are additionally important for determining PTT-based cNIBP. Ultimately the AC and DC components yield a RoR which then relates to a SpO2 using a series of empirically determined coefficients. In one embodiment, for example, the RoR is determined by first measuring RED/IR(PPG) waveforms, and then passing them through a low-pass filter characterized by a 20 Hz cutoff. The averaged baseline components of each waveform are sampled and stored in memory, and represent RED/IR(DC). Both waveforms are then additionally filtered with high-pass filter having a 0.1 Hz cutoff frequency, which is typically implemented with a finite impulse response function, and finally amplified with a variable gain amplifier. These steps can be done with either analog electronic or digital software filters. Components passing through this filter are isolated as described below with reference to FIGS. 6 and 7 to yield RED/IR(AC). Once determined, the AC and DC signals are processed to yield a RoR value, described in equation (3), which relates to SpO2.").<br><br>Moon, [0139]-[0142] ("In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient's vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general |



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| | location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.<br><br>Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>Moon, [0132] (“FIG. 24 shows a close-up view of the wrist-worn transceiver 272. As described above, it attaches to the patient’s wrist using a flexible strap 290 which threads through two D-ring openings in a plastic housing 206. The transceiver 272 houses portions of the circuits 175, 140 described in FIGS. 20 and 21, and additionally features a touchpanel display 200 that renders a GUI 273 which is altered depending on the viewer (typically the patient or a medical professional). Specifically, the transceiver 272 includes a small-scale infrared barcode scanner 202 that, during use, can scan a barcode worn on a badge of a medical professional. The barcode indicates to the transceiver’s software that, for example, a nurse or doctor is viewing the user interface. In response, the GUI 273 displays vital sign data and other medical diagnostic information appropriate for medical professionals. Using this GUI 273, the nurse or doctor, for example, can view the vital sign information, set alarm parameters, and enter information about the patient (e.g. their demographic information, medication, or medical condition). The nurse can press a button on the GUI 273 |



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| | indicating that these operations are complete. At this point, the display 200 renders an interface that is more appropriate to the patient, such as time of day and battery power.”).<br><br>Moon, [0142] (“The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| 13[c] receiving said one or more signals from the optical sensor; | Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious the processing board receiving said one or more signals from the optical sensor.<br><br>For example, Moon discloses and/or suggests passing signals from LEDs of the oximetry probe to the wrist-worn transceiver that encloses a processing unit.<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist- |

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| | worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |



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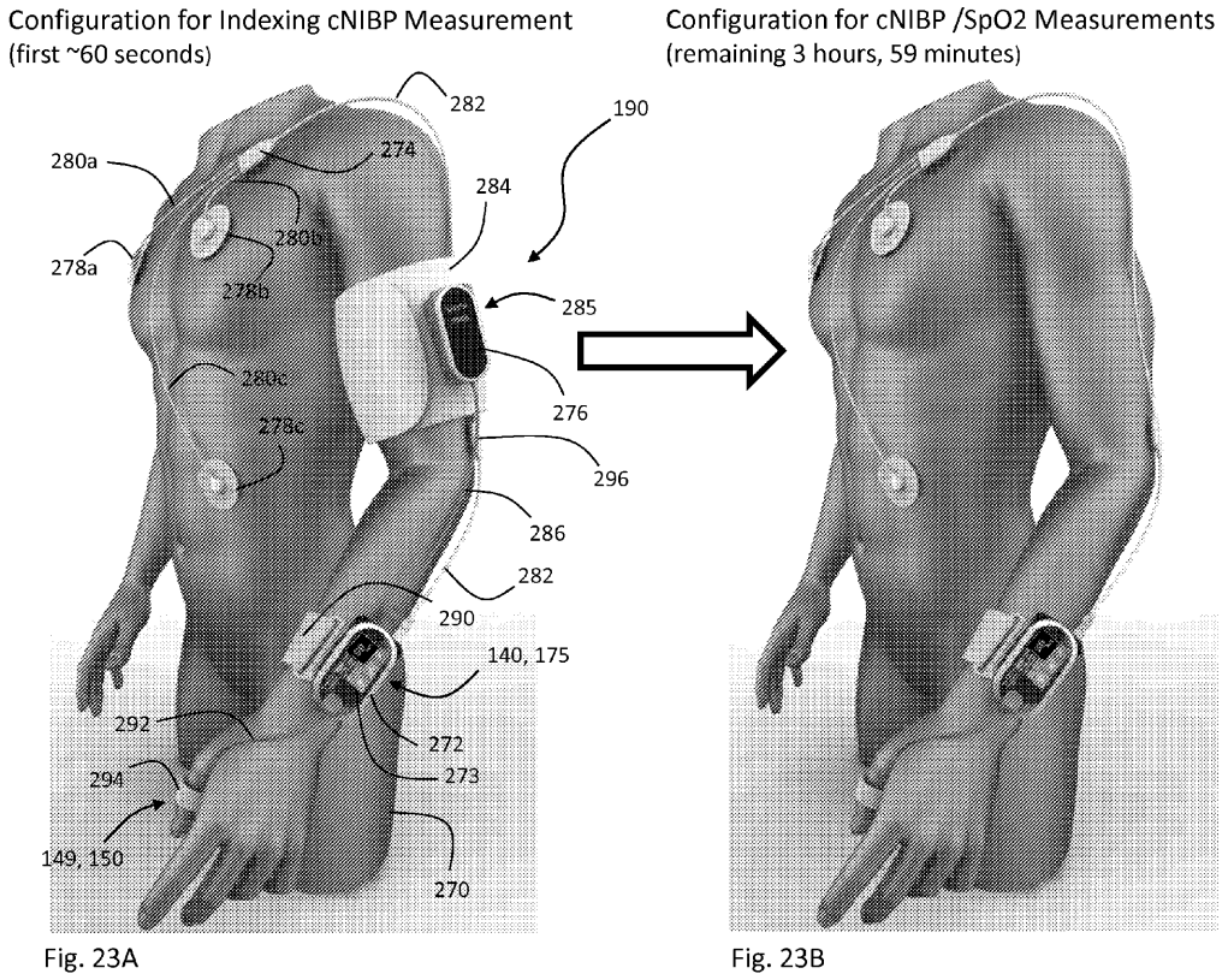


Figs. 23A, 23B.



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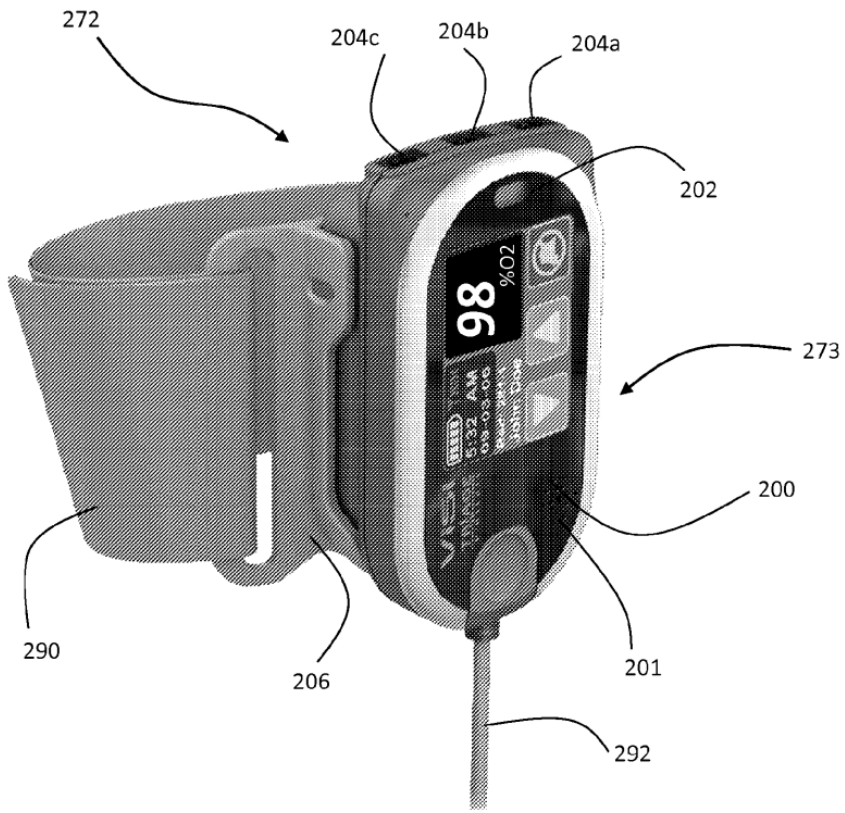


Fig. 24

Fig. 24.



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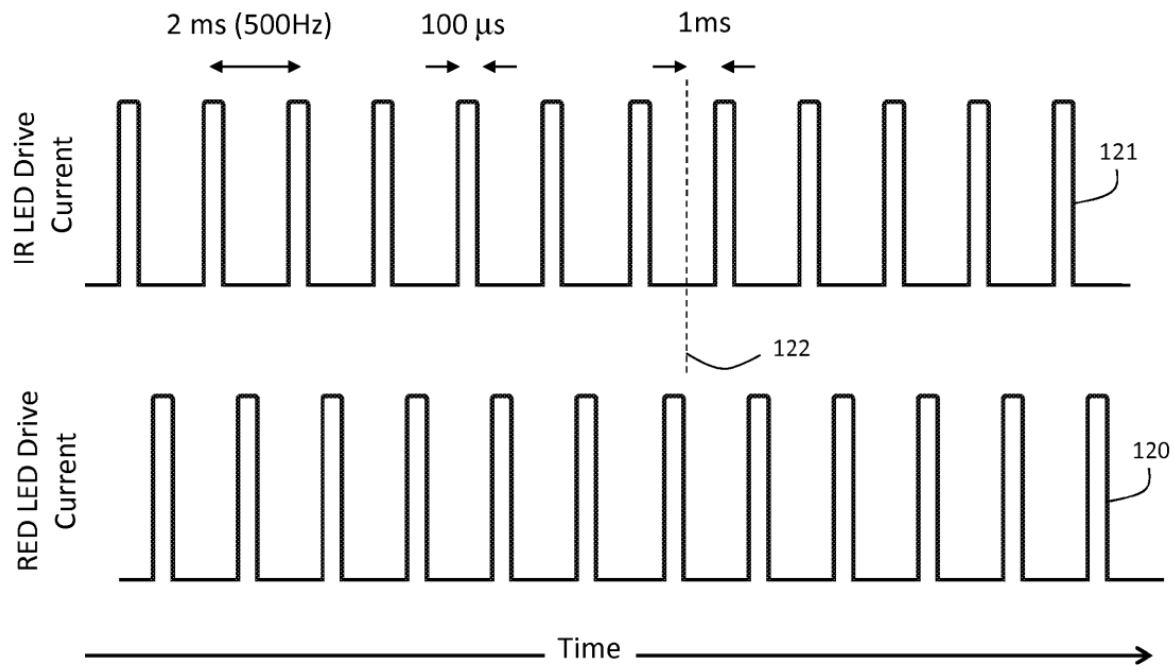


Fig. 20



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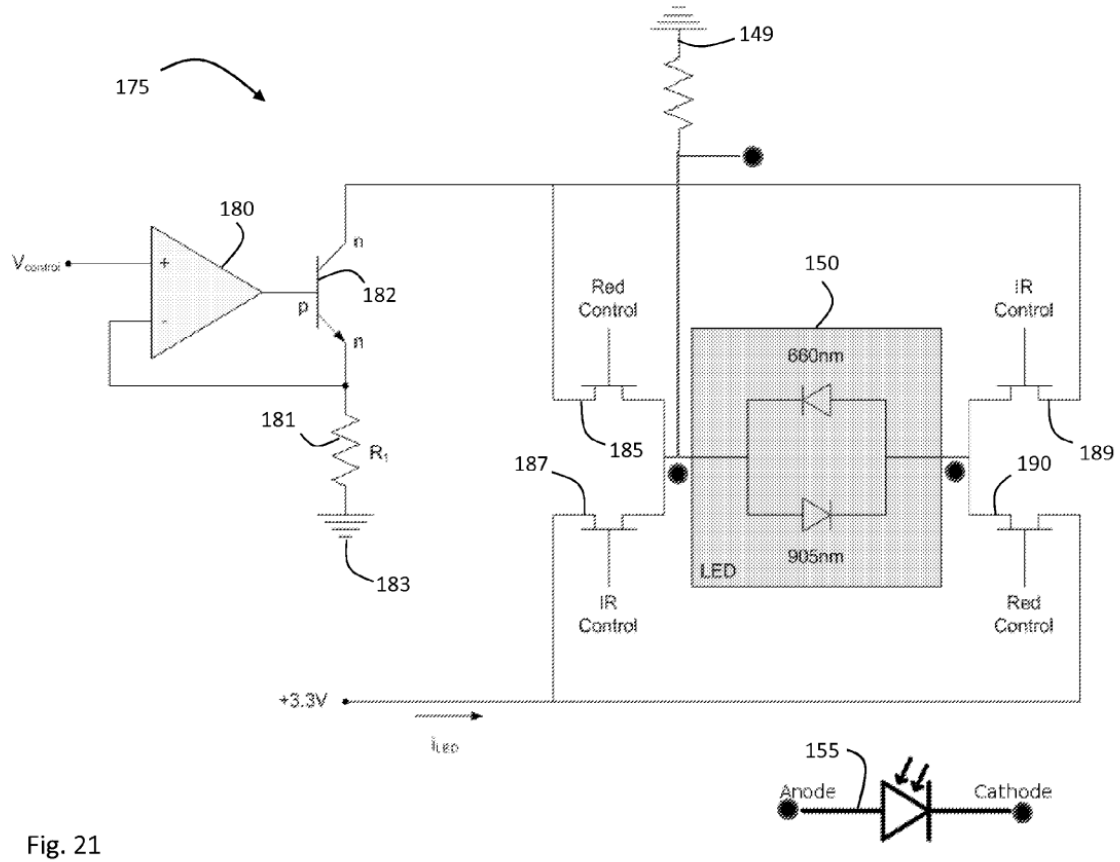


Fig. 21



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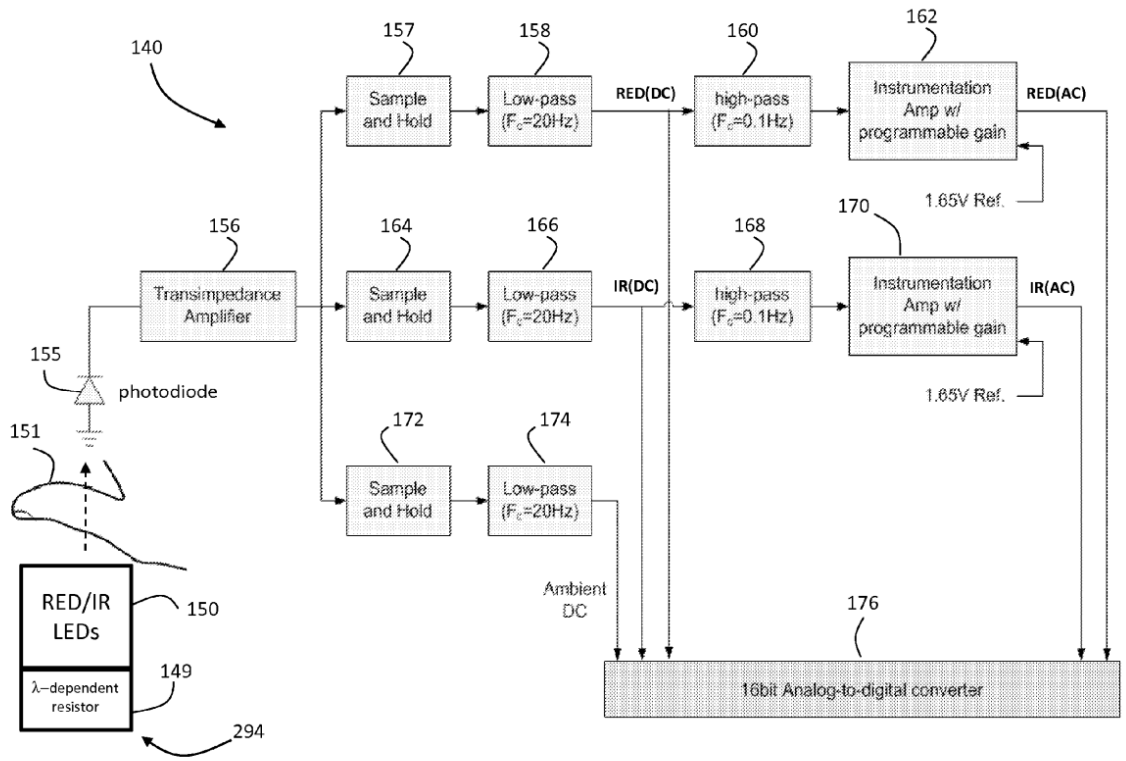


Fig. 22

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG))

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| | corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0025] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm. |

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| | In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.<br><br>In another aspect, the invention provides a method for measuring SpO2 and cNIBP by processing ECG, PPG, and motion signals with filters that analyze both PTT and AC signals of the PPG waveforms with a mathematical filter. The filter, for example, can be a 'matched filter', described in detail below. Typically only signals that are generated when motion is relatively low are considered in this embodiment. For example, signals are typically not processed further when the motion sensors indicate that motion is greater than an acceptable level. Filtering PTT values includes, for example, determining values that lie outside a pre-determined range using statistical filters (e.g. a simple average and standard deviation). More sophisticated techniques, such as calculating a power value from a frequency-domain spectrum corresponding to the time-dependent motion signal, and then comparing this to a pre-determined value, can be used to estimate if either the PTT values or PPG signals are affected by motion. SpO2 values are typically calculated from ratios describing the AC and DC signals measured from individual pulses using optical systems operating in the red and infrared optical spectral regions. One or more ratios can be calculated for the pulse.").<br><br>Moon, [0125] ("The body-worn monitor 190 features a wrist-worn transceiver 272, described in more detail in FIG. 24, featuring a touch panel interface 273 that displays SpO2, blood pressure values and other vital signs. A wrist strap 290 affixes the transceiver 272 to the patient's wrist like a conventional wristwatch. A flexible cable 292 connects the transceiver 272 to a pulse oximeter probe 294 that wraps around the base of the patient's thumb. During a measurement, the probe 294 generates a time-dependent PPG waveform which is processed along with an ECG to measure cNIBP and SpO2. This provides an accurate representation of blood pressure in the central regions of the patient's body, as described above.").<br><br>Moon, [0062] ("Collectively processing both the AC and DC signals of the RED/IR(PPG) waveforms yields a SpO2 value. The body-worn monitor calculates these components using a number of signal-processing methodologies that are additionally important for determining PTT-based cNIBP. Ultimately the AC and DC components yield a RoR which then relates to a SpO2 using a series of empirically determined coefficients. In one embodiment, for example, the RoR is determined by first measuring RED/IR(PPG) waveforms, and then passing them through a low-pass filter characterized |



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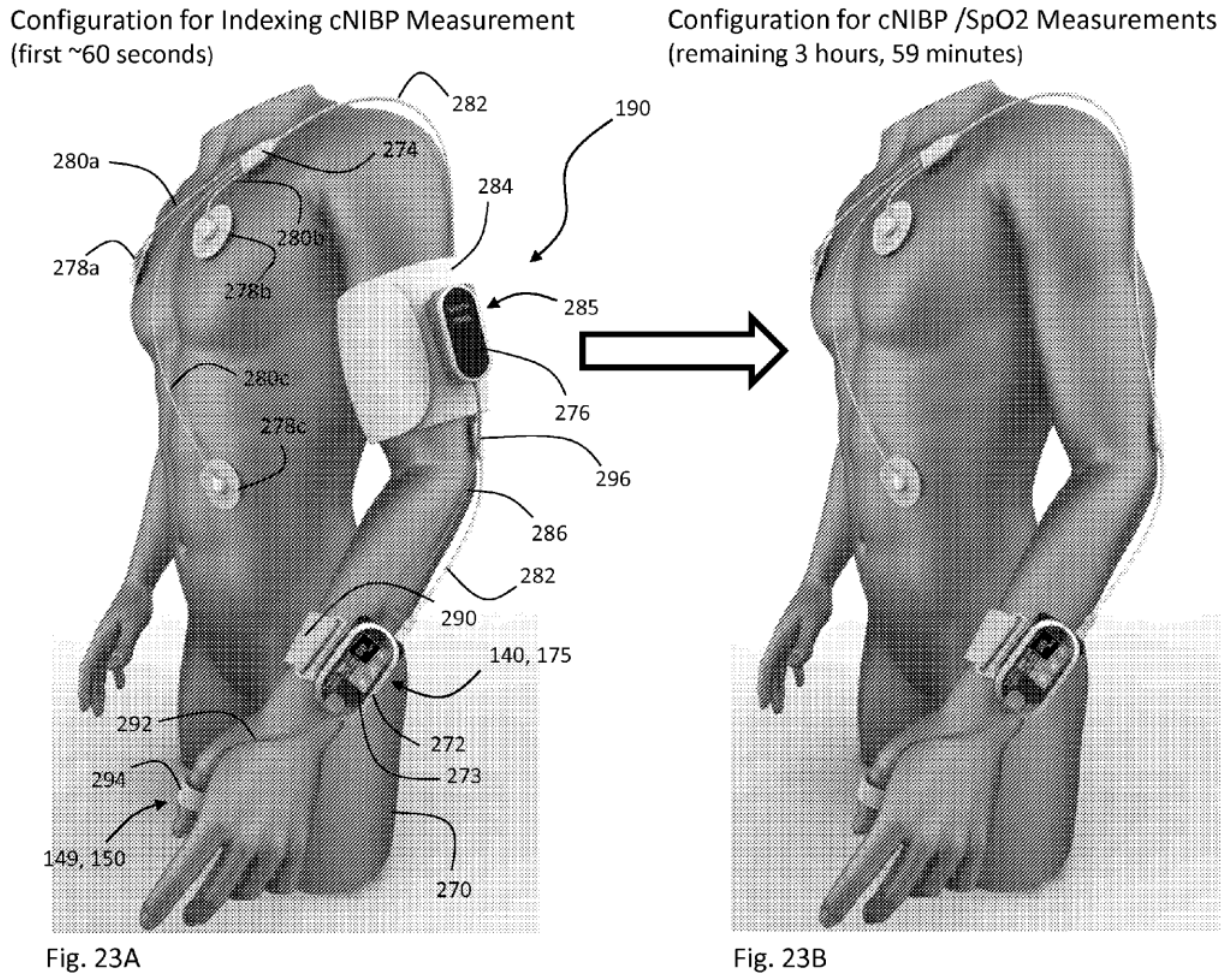
| | by a 20 Hz cutoff. The averaged baseline components of each waveform are sampled and stored in memory, and represent RED/IR(DC). Both waveforms are then additionally filtered with high-pass filter having a 0.1 Hz cutoff frequency, which is typically implemented with a finite impulse response function, and finally amplified with a variable gain amplifier. These steps can be done with either analog electronic or digital software filters. Components passing through this filter are isolated as described below with reference to FIGS. 6 and 7 to yield RED/IR(AC). Once determined, the AC and DC signals are processed to yield a RoR value, described in equation (3), which relates to SpO2.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| 13[d] processing said one or more signals to generate the SpO2 measurement values; and | Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious the processing board processing said one or more signals to generate the SpO2 measurement values.<br><br>For example, Moon discloses and/or suggests processing the signals from the LEDs on the processing unit to generate SpO2 values.<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |




Figs. 23A, 23B.



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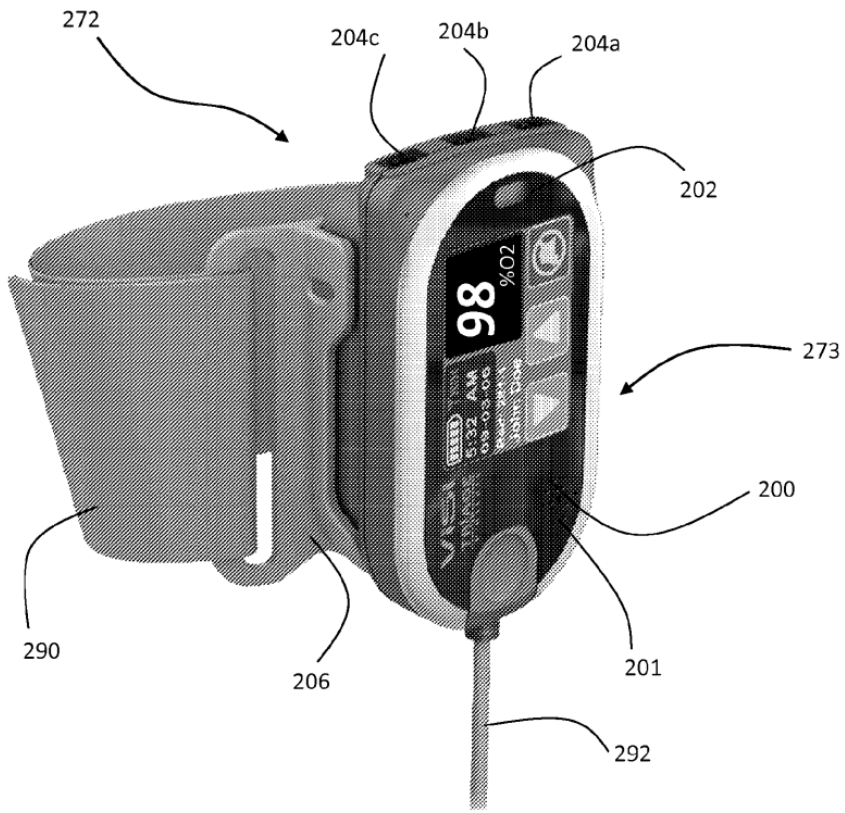


Fig. 24

Fig. 24.



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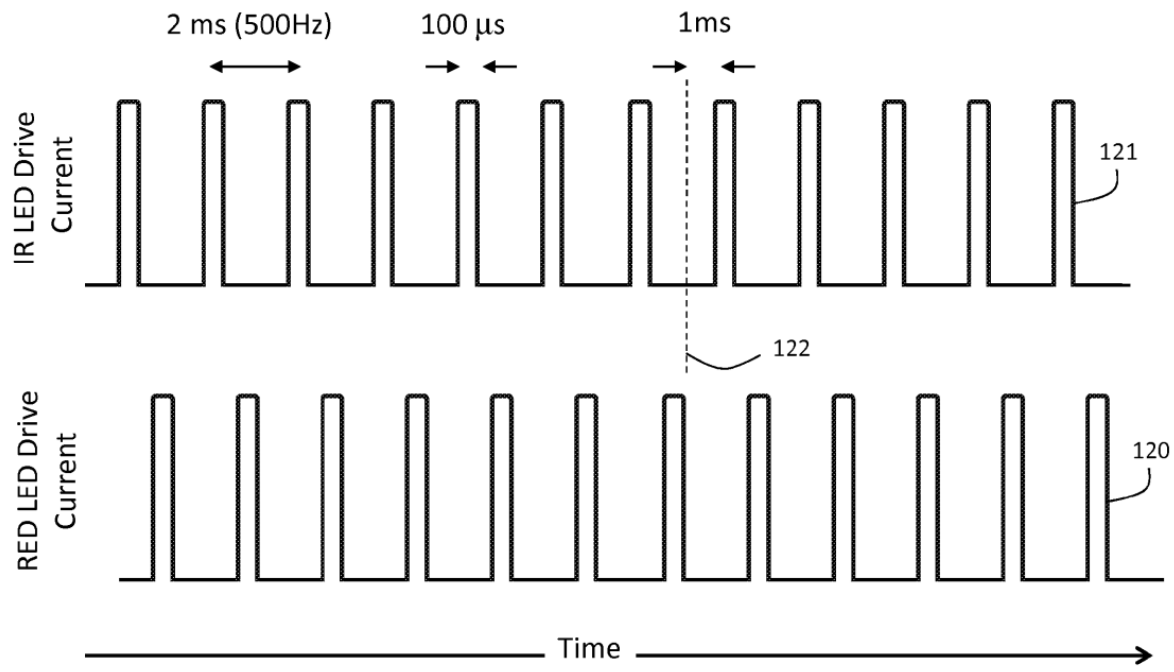


Fig. 20



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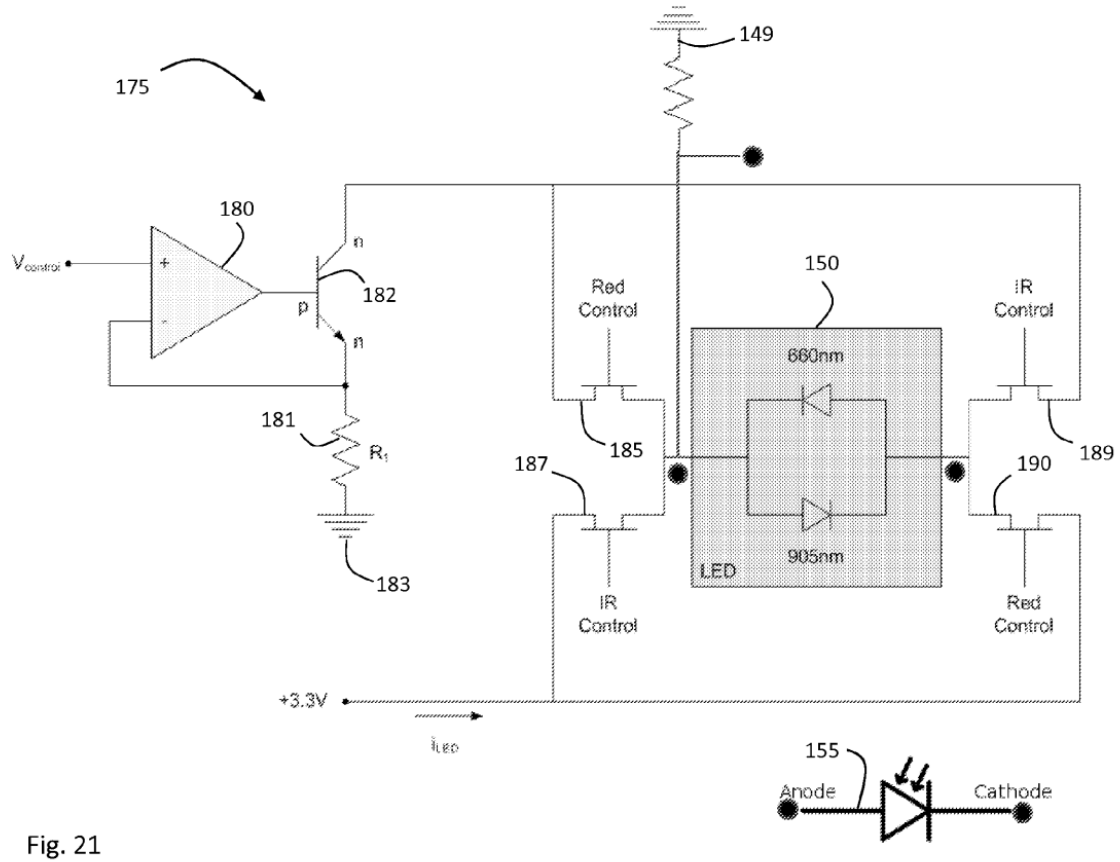


Fig. 21



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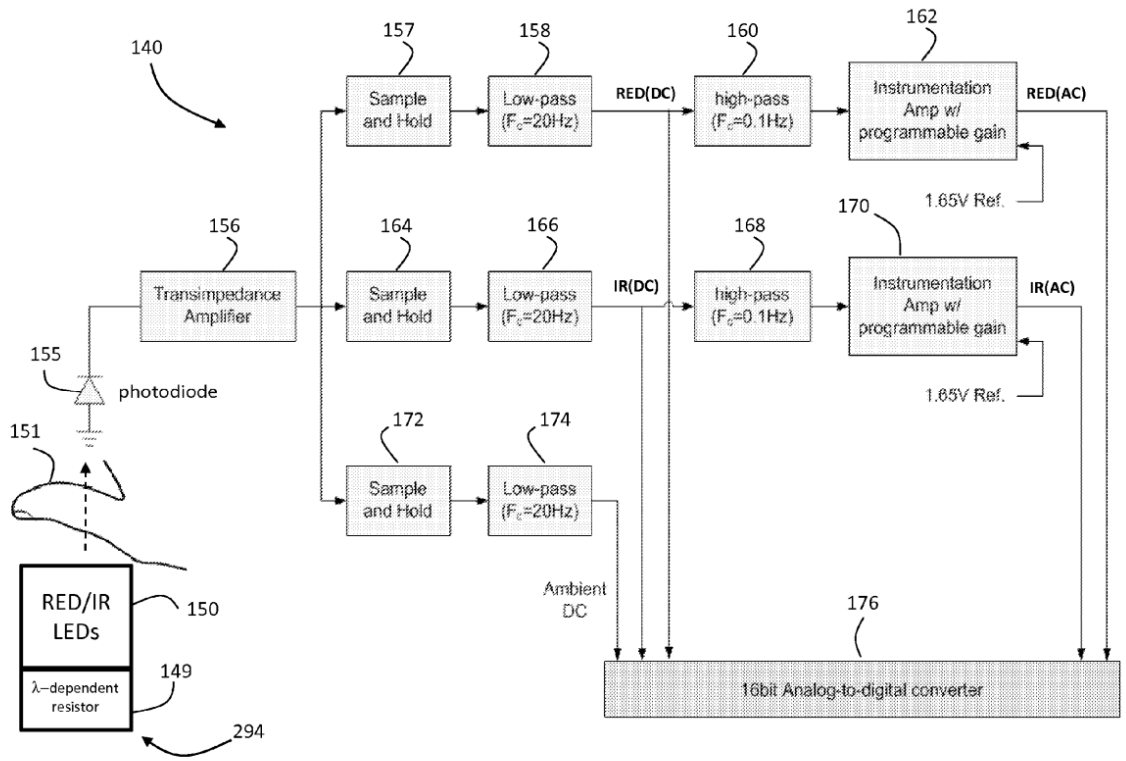


Fig. 22

Moon, [0010] ("Pulse oximeters for measuring SpO2 were originally developed in 1972, and have evolved over the last 30 years to a point where they are commonplace in nearly all vital sign monitors for in-hospital use. Typical pulse oximeters feature a probe encased in a clothespin-shaped housing that includes both red and infrared LEDs, and a photodetector that detects radiation from the LEDs after it passes through a portion of the patient's body. The probe typically clips to a patient's index finger. Most probes operate in a transmission-mode optical geometry, and relay analog waveforms measured by LEDs and the photodetector to an external processing unit. The processing unit is

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| | typically integrated into a stand-alone monitor that measures only SpO2 and pulse rate (determined from the AC signal of one of the PPG waveforms), or a complete vital sign monitor that measures SpO2 along with systolic (SYS), mean (MAP), and diastolic (DIA) blood pressure, heart rate (HR), respiratory rate (RR), and temperature (TEMP). In both cases the oximeter probe typically connects to the monitor through a cable. Alternate configurations of SpO2 monitors include those that operate in reflection-mode optical geometries, probes that clip onto appendages other than the patient's finger (e.g. their ear or forehead), and processing units that are worn directly on the patient's body (e.g. their wrist). In some cases PPG waveforms, along with SpO2 and pulse rate values, are sent wirelessly from the oximeter to a remote display.").<br><br>Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A |



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| | finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0025] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.<br><br>In another aspect, the invention provides a method for measuring SpO2 and cNIBP by processing ECG, PPG, and motion signals with filters that analyze both PTT and AC signals of the PPG waveforms with a mathematical filter. The filter, for example, can be a 'matched filter', described in detail below. Typically only signals that are generated when motion is relatively low are considered in this embodiment. For example, signals are typically not processed further when the motion sensors indicate that motion is greater than an acceptable level. Filtering PTT values includes, for example, determining values that lie outside a pre-determined range using statistical filters (e.g. a simple average and standard deviation). More sophisticated techniques, such as calculating a power value from a frequency-domain spectrum corresponding to the time-dependent motion signal, and then comparing this to a pre-determined value, can be used to estimate if either the PTT values or PPG signals are affected by motion. SpO2 values are typically calculated from ratios describing the AC and DC signals measured from individual pulses using optical systems operating in the red and infrared optical spectral regions. One or more ratios can be calculated for the pulse."). |



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| | Moon, [0125] ("The body-worn monitor 190 features a wrist-worn transceiver 272, described in more detail in FIG. 24, featuring a touch panel interface 273 that displays SpO2, blood pressure values and other vital signs. A wrist strap 290 affixes the transceiver 272 to the patient's wrist like a conventional wristwatch. A flexible cable 292 connects the transceiver 272 to a pulse oximeter probe 294 that wraps around the base of the patient's thumb. During a measurement, the probe 294 generates a time-dependent PPG waveform which is processed along with an ECG to measure cNIBP and SpO2. This provides an accurate representation of blood pressure in the central regions of the patient's body, as described above.").<br><br>Moon, [0062] ("Collectively processing both the AC and DC signals of the RED/IR(PPG) waveforms yields a SpO2 value. The body-worn monitor calculates these components using a number of signal-processing methodologies that are additionally important for determining PTT-based cNIBP. Ultimately the AC and DC components yield a RoR which then relates to a SpO2 using a series of empirically determined coefficients. In one embodiment, for example, the RoR is determined by first measuring RED/IR(PPG) waveforms, and then passing them through a low-pass filter characterized by a 20 Hz cutoff. The averaged baseline components of each waveform are sampled and stored in memory, and represent RED/IR(DC). Both waveforms are then additionally filtered with high-pass filter having a 0.1 Hz cutoff frequency, which is typically implemented with a finite impulse response function, and finally amplified with a variable gain amplifier. These steps can be done with either analog electronic or digital software filters. Components passing through this filter are isolated as described below with reference to FIGS. 6 and 7 to yield RED/IR(AC). Once determined, the AC and DC signals are processed to yield a RoR value, described in equation (3), which relates to SpO2.").<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |

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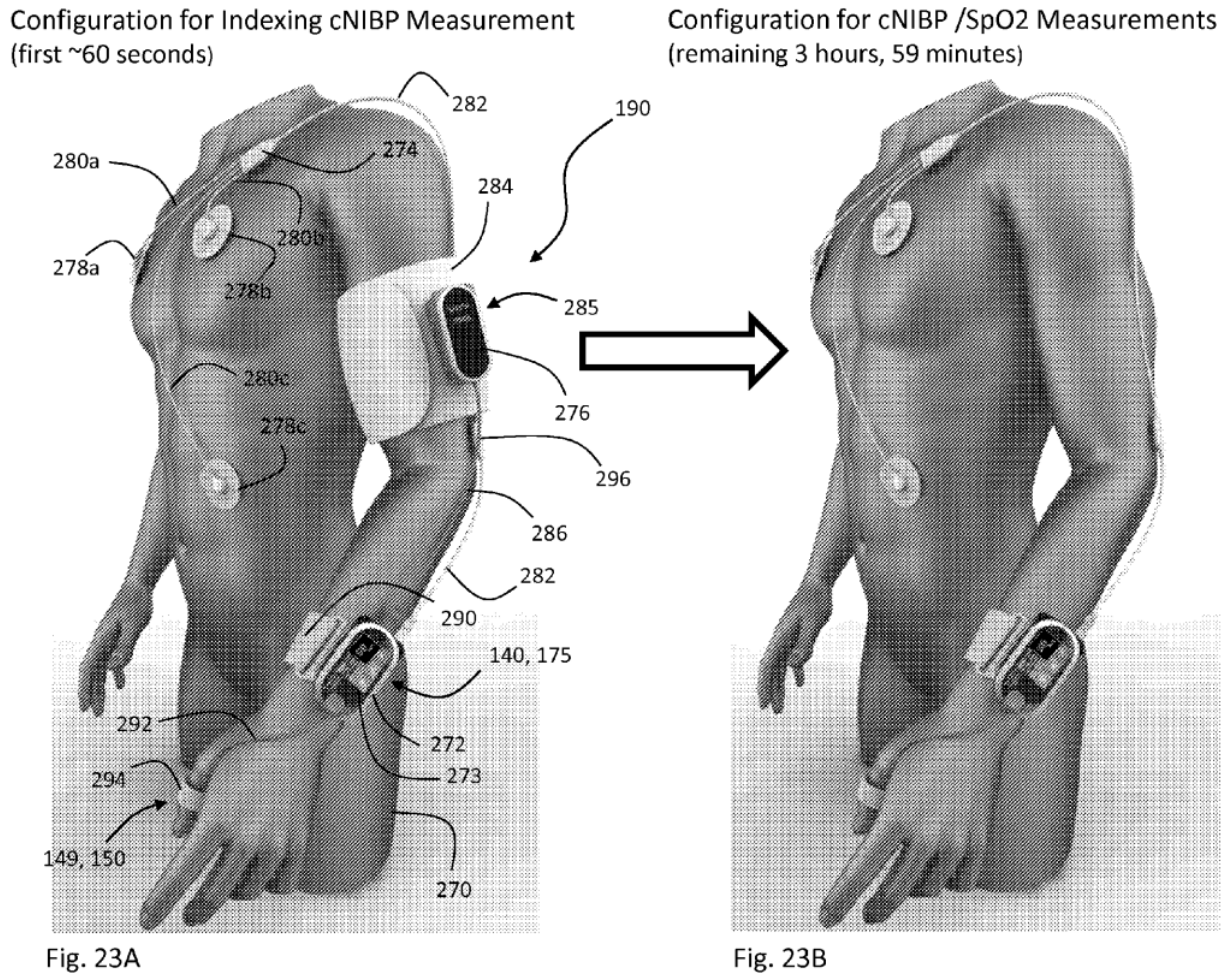
| 13[e] outputting the SpO2 measurement values to the mobile computing device; and | Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious the processing board outputting the SpO2 measurement values to the mobile computing device.<br><br>For example, Moon discloses and/or suggests outputting the SpO2 measurement values from the transceiver enclosing the processing unit to the remote receiver.<br><br>*See, e.g.*, Moon, Abstract ("The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station."). |




Figs. 23A, 23B.



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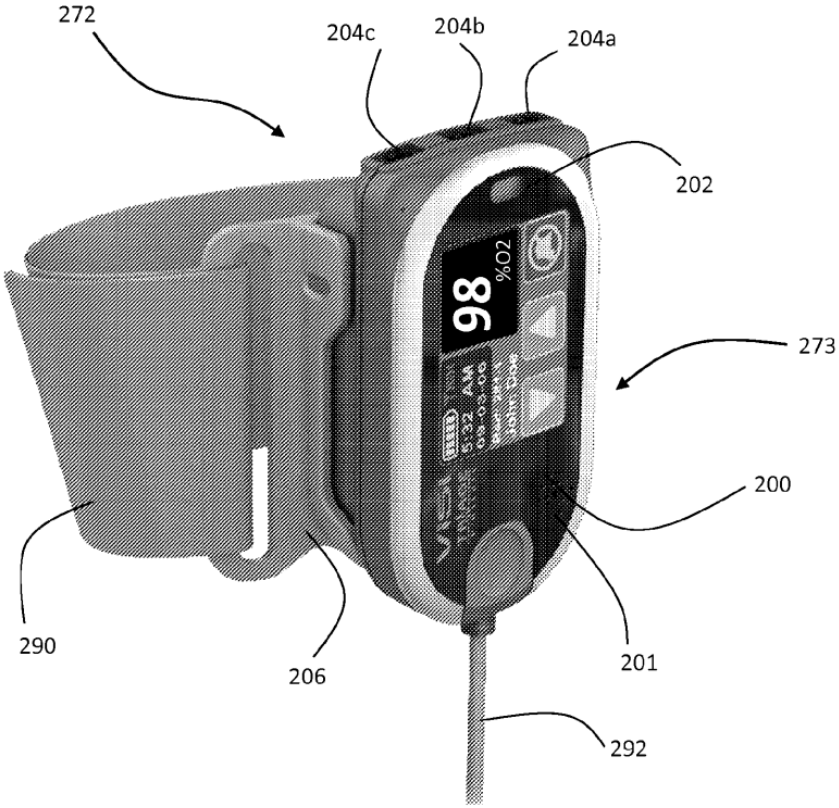


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to

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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.”).<br><br>Moon, [0139]-[0142] (“In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient’s vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.<br><br>Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or |



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| | simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| 13[f] via an application configured to execute commands on the mobile computing device: | Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious via an application configured to execute commands on the mobile computing device.<br><br>For example, Moon discloses and/or suggests executing an application on the remote monitoring system.<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist- |

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| | worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |



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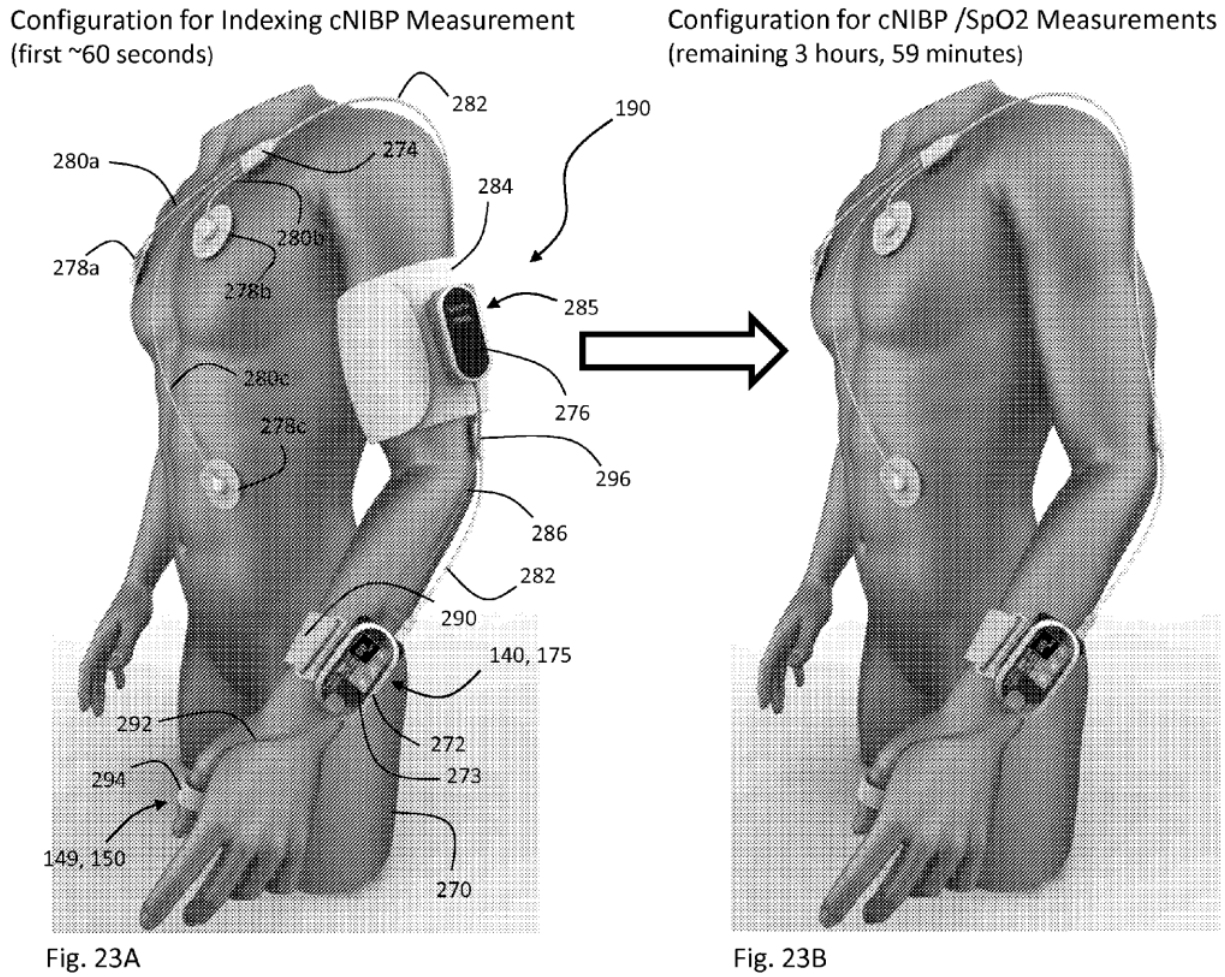


Figs. 23A, 23B.



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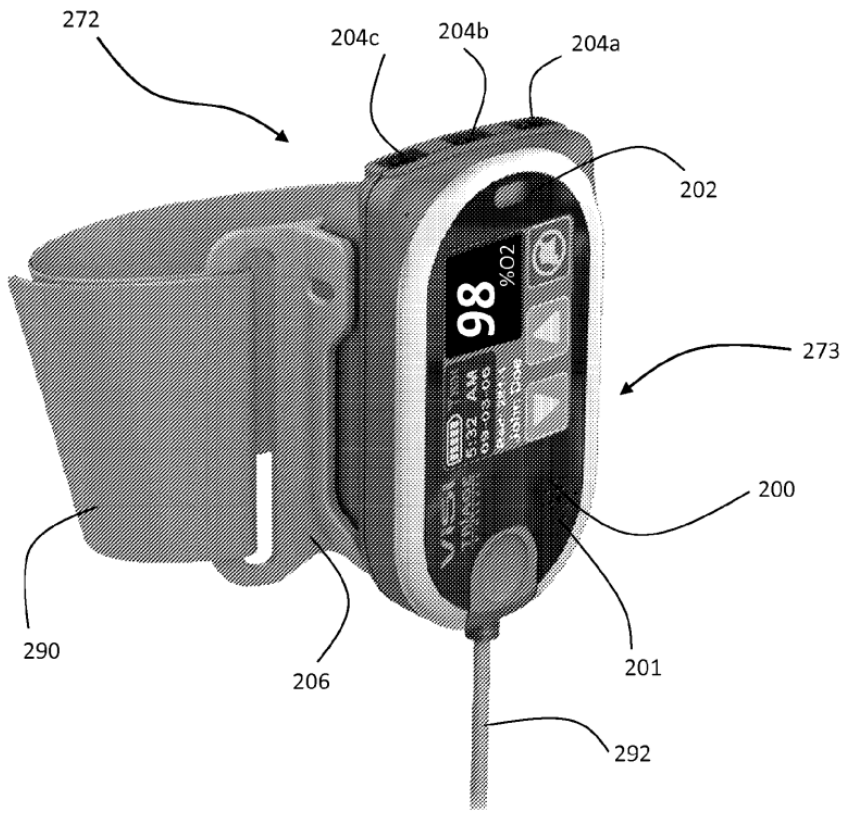


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to



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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0024] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn |



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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.”).<br><br>Moon, [0139]-[0142] (“In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient’s vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.<br><br>Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or |



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| | simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>Moon, [0132] (“FIG. 24 shows a close-up view of the wrist-worn transceiver 272. As described above, it attaches to the patient’s wrist using a flexible strap 290 which threads through two D-ring openings in a plastic housing 206. The transceiver 272 houses portions of the circuits 175, 140 described in FIGS. 20 and 21, and additionally features a touchpanel display 200 that renders a GUI 273 which is altered depending on the viewer (typically the patient or a medical professional). Specifically, the transceiver 272 includes a small-scale infrared barcode scanner 202 that, during use, can scan a barcode worn on a badge of a medical professional. The barcode indicates to the transceiver’s software that, for example, a nurse or doctor is viewing the user interface. In response, the GUI 273 displays vital sign data and other medical diagnostic information appropriate for medical professionals. Using this GUI 273, the nurse or doctor, for example, can view the vital sign information, set alarm parameters, and enter information about the patient (e.g. their demographic information, medication, or medical condition). The nurse can press a button on the GUI 273 indicating that these operations are complete. At this point, the display 200 renders an interface that is more appropriate to the patient, such as time of day and battery power.”).<br><br>Moon, [0142] (“The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the |



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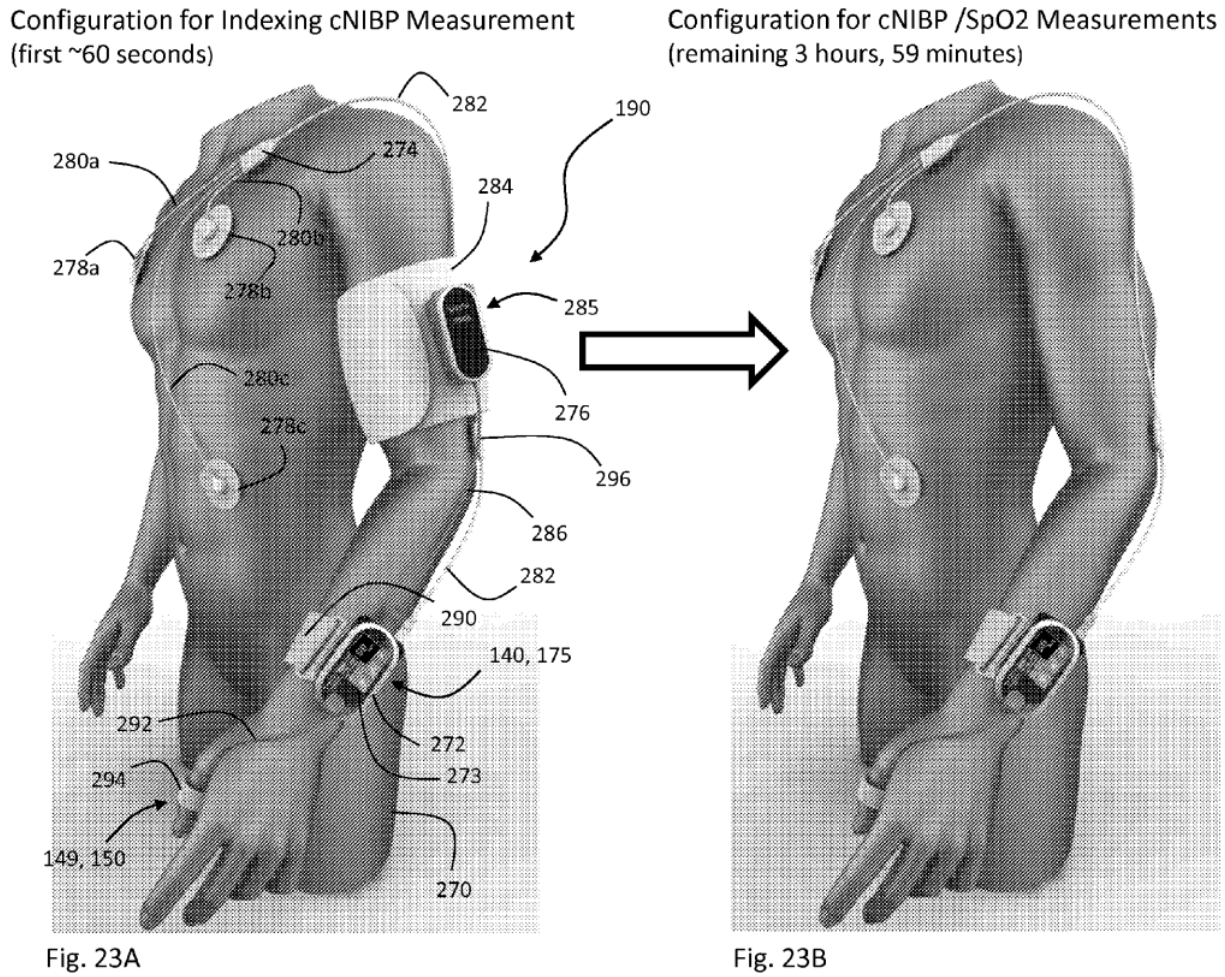
| 13[g] generating a graphical user interface having a plurality of display portions; | Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious generating a graphical user interface having a plurality of display portions.<br><br>For example, Moon discloses and/or suggests a remote monitor which features a GUI wherein the user can select to display information (e.g., vital signs, location, and alarms) corresponding to a particular patient.<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |




Figs. 23A, 23B.



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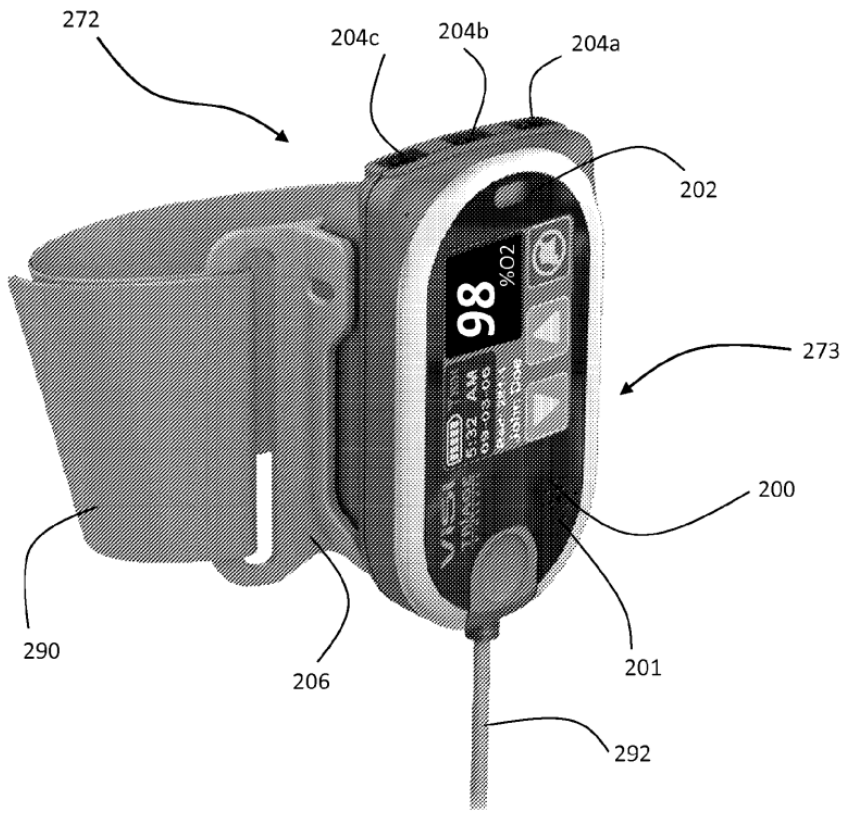


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to

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| | simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>Moon, [0132] (“FIG. 24 shows a close-up view of the wrist-worn transceiver 272. As described above, it attaches to the patient’s wrist using a flexible strap 290 which threads through two D-ring openings in a plastic housing 206. The transceiver 272 houses portions of the circuits 175, 140 described in FIGS. 20 and 21, and additionally features a touchpanel display 200 that renders a GUI 273 which is altered depending on the viewer (typically the patient or a medical professional). Specifically, the transceiver 272 includes a small-scale infrared barcode scanner 202 that, during use, can scan a barcode worn on a badge of a medical professional. The barcode indicates to the transceiver’s software that, for example, a nurse or doctor is viewing the user interface. In response, the GUI 273 displays vital sign data and other medical diagnostic information appropriate for medical professionals. Using this GUI 273, the nurse or doctor, for example, can view the vital sign information, set alarm parameters, and enter information about the patient (e.g. their demographic information, medication, or medical condition). The nurse can press a button on the GUI 273 indicating that these operations are complete. At this point, the display 200 renders an interface that is more appropriate to the patient, such as time of day and battery power.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of |



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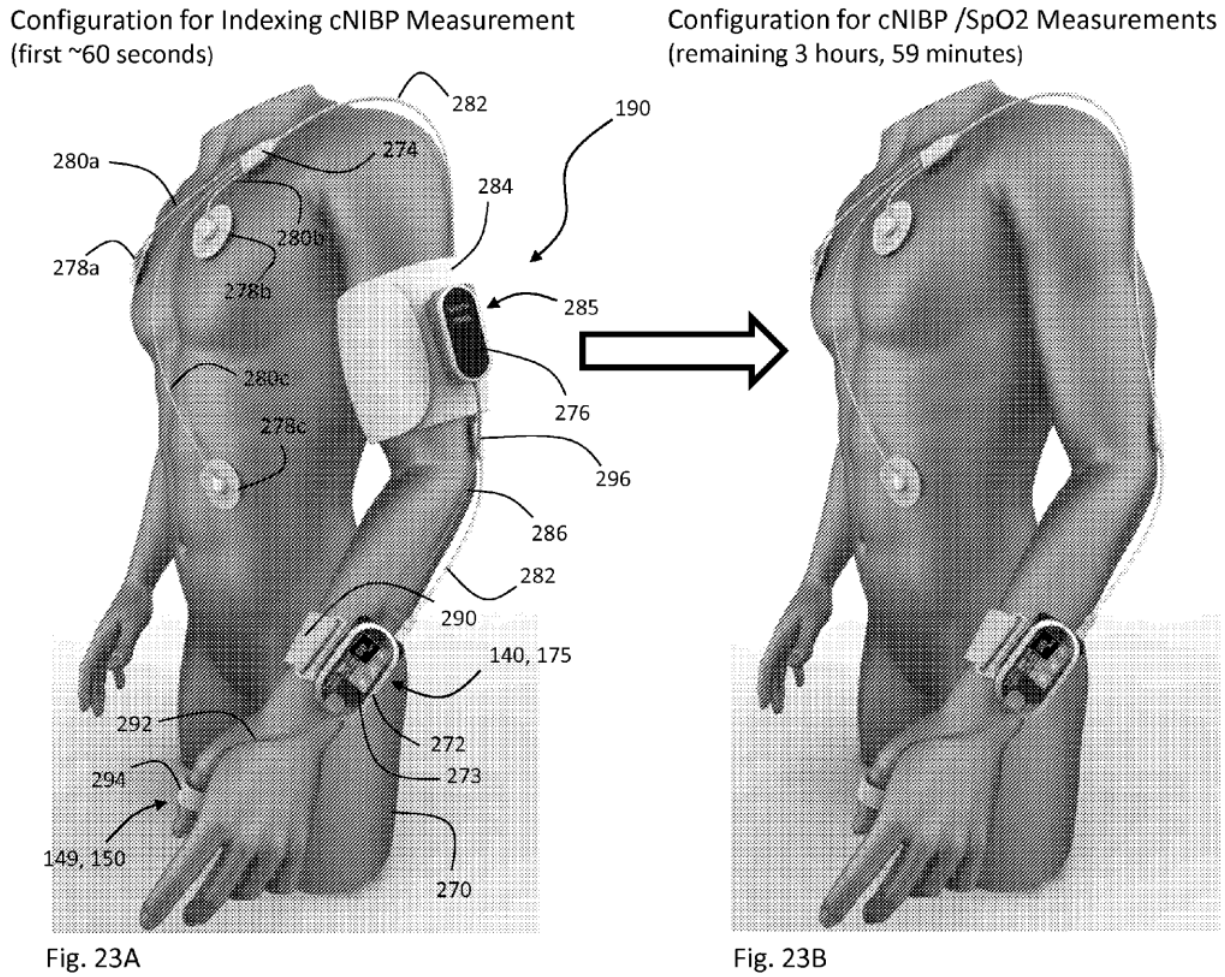
| | success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| 13[h] displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and | Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values.<br><br>For example, Moon discloses and/or suggests displaying on the GUI of a remote monitor information (e.g., vital signs, location, and alarms) corresponding to a particular patient.<br><br>*See, e.g.*, Moon, Abstract ("The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station."). |




Figs. 23A, 23B.



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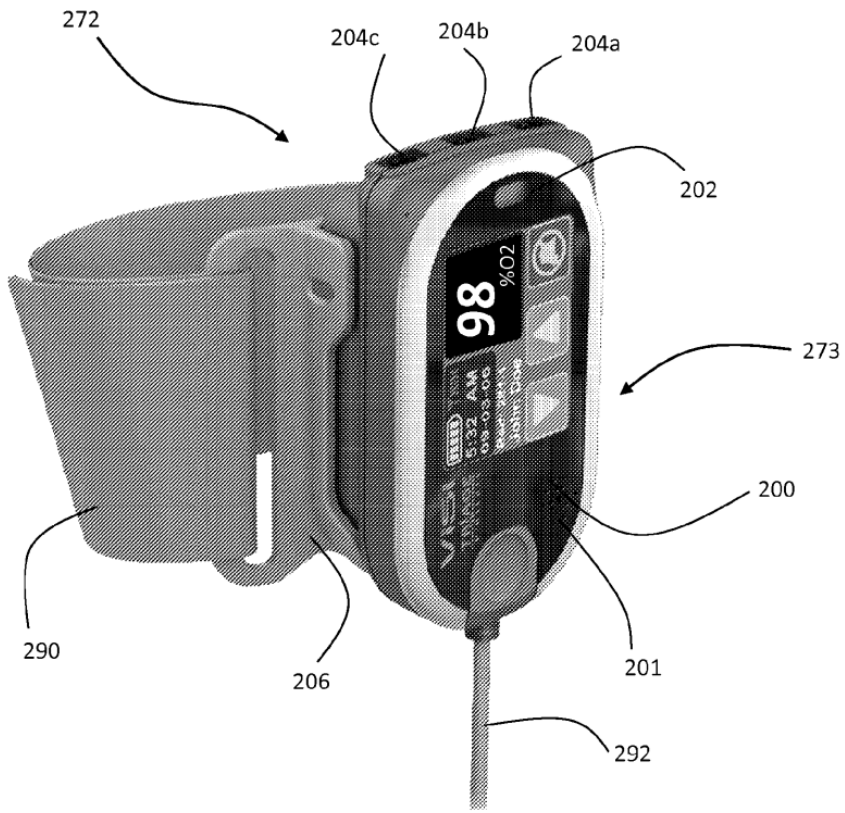


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to

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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0024] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn |



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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.”).<br><br>Moon, [0133]-[0136] (“As described above, the transceiver 272 features three CAN connectors 204 a-c on the side of its upper portion, each which supports the CAN protocol and wiring schematics, and relays digitized data to the internal CPU. Digital signals that pass through the CAN connectors include a header that indicates the specific signal (e.g. ECG, ACC, or pressure waveform from the cuff-based module) and the sensor from which the signal originated. This allows the CPU to easily interpret signals that arrive through the CAN connectors 204 a-c, and means that these connectors are not associated with a specific cable. Any cable connecting to the transceiver can be plugged into any connector 204 a-c. As shown in FIG. 23A, the first connector 204 a receives the cable 282 that transports a digitized ECG waveform determined from the ECG circuit and electrodes, and digitized ACC waveforms measured by accelerometers in the cable bulkhead 274 and the bulkhead portion 296 associated with the ECG cable 282.<br><br>The second CAN connector 204 b shown in FIG. 22 receives the cable 286 that connects to the pneumatic cuff-based system 285 used for the pressure-dependent indexing measurement (shown in FIG. 23A). This connector 204 b receives a time-dependent pressure waveform delivered by the pneumatic system 285 to the patient’s arm, along with values for SYS, DIA, and MAP values determined during the indexing measurement. The cable 286 unplugs from the connector 204 b once the indexing measurement is complete, and is plugged back in after approximately four hours for another indexing measurement.<br><br>The final CAN connector 204 c can be used for an ancillary device, e.g. a glucometer, infusion pump, body-worn insulin pump, ventilator, or end-tidal CO2 delivery system. As described above, digital information generated by these systems will include a header that indicates their origin so that the CPU can process them accordingly. |

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| | The transceiver 272 includes a speaker 201 that allows a medical professional to communicate with the patient using a voice over Internet protocol (VOIP). For example, using the speaker 201 the medical professional could query the patient from a central nursing station or mobile phone connected to a wireless, Internet-based network within the hospital. Or the medical professional could wear a separate transceiver similar to the shown in FIG. 24, and use this as a communication device. In this application, the transceiver 272 worn by the patient functions much like a conventional cellular telephone or 'walkie talkie': it can be used for voice communications with the medical professional and can additionally relay information describing the patient's vital signs and motion. The speaker can also enunciate pre-programmed messages to the patient, such as those used to calibrate the chest-worn accelerometers for a posture calculation, as described above.").<br><br>Moon, [0139]-[0142] ("In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient's vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient. |



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| | Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>Moon, [0132] (“FIG. 24 shows a close-up view of the wrist-worn transceiver 272. As described above, it attaches to the patient’s wrist using a flexible strap 290 which threads through two D-ring openings in a plastic housing 206. The transceiver 272 houses portions of the circuits 175, 140 described in FIGS. 20 and 21, and additionally features a touchpanel display 200 that renders a GUI 273 which is altered depending on the viewer (typically the patient or a medical professional). Specifically, the transceiver 272 includes a small-scale infrared barcode scanner 202 that, during use, can scan a barcode worn on a badge of a medical professional. The barcode indicates to the transceiver’s software that, for example, a nurse or doctor is viewing the user interface. In response, the GUI 273 displays vital sign data and other medical diagnostic information appropriate for medical professionals. Using this GUI 273, the nurse or doctor, for example, can view the vital sign information, set alarm parameters, and enter information about the patient (e.g. their demographic information, medication, or medical condition). The nurse can press a button on the GUI 273 indicating that these operations are complete. At this point, the display 200 renders an interface that is more appropriate to the patient, such as time of day and battery power.”). |



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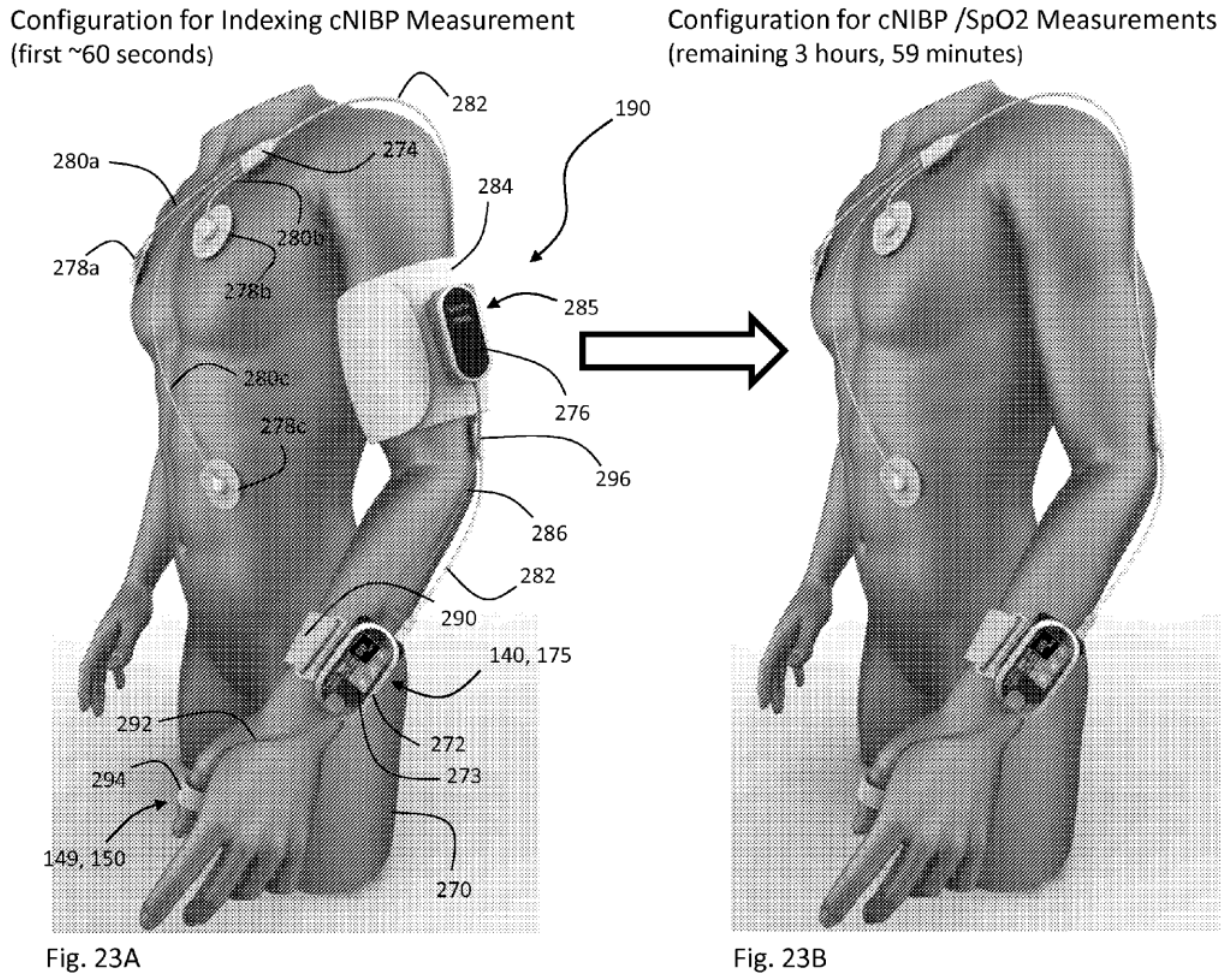
| | To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| 13[i] displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application. | Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.<br><br>For example, Moon discloses and/or suggests a remote monitor which features a GUI with multiple sections wherein the user can select to display information (e.g., vital signs, location, and alarms) corresponding to a particular patient.<br><br>*See, e.g.*, Moon, Abstract ("The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station."). |




Figs. 23A, 23B.



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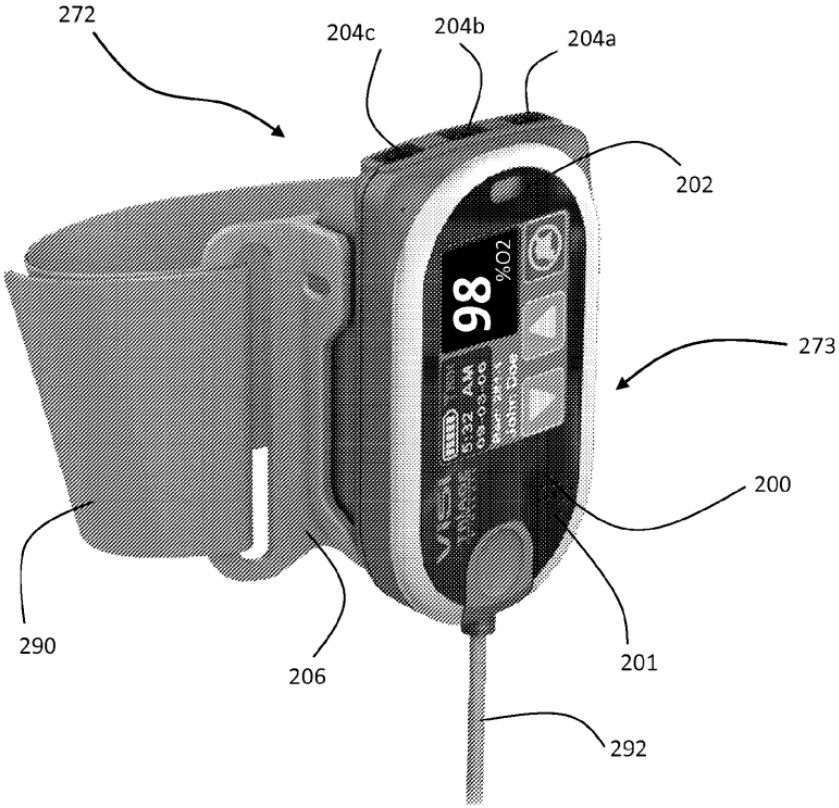


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to

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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0024] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn |

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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.”).<br><br>Moon, [0139]-[0142] (“In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient’s vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.<br><br>Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or |



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| | simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can ***select to display information*** (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>Moon, [0132] (“FIG. 24 shows a close-up view of the wrist-worn transceiver 272. As described above, it attaches to the patient’s wrist using a flexible strap 290 which threads through two D-ring openings in a plastic housing 206. The transceiver 272 houses portions of the circuits 175, 140 described in FIGS. 20 and 21, and additionally features a touchpanel display 200 that renders a GUI 273 which is altered depending on the viewer (typically the patient or a medical professional). Specifically, the transceiver 272 includes a small-scale infrared barcode scanner 202 that, during use, can scan a barcode worn on a badge of a medical professional. The barcode indicates to the transceiver’s software that, for example, a nurse or doctor is viewing the user interface. In response, the GUI 273 displays vital sign data and other medical diagnostic information appropriate for medical professionals. Using this GUI 273, the nurse or doctor, for example, can view the vital sign information, set alarm parameters, and enter information about the patient (e.g. their demographic information, medication, or medical condition). The nurse can press a button on the GUI 273 indicating that these operations are complete. At this point, the display 200 renders an interface that is more appropriate to the patient, such as time of day and battery power.”).<br><br>Moon, [0133]-[0136] (“As described above, the transceiver 272 features three CAN connectors 204 a-c on the side of its upper portion, each which supports the CAN protocol and wiring schematics, and relays digitized data to the internal CPU. Digital signals that pass through the CAN connectors include a header that indicates the specific signal (e.g. ECG, ACC, or pressure waveform from the cuff-based module) and the sensor from which the signal originated. This allows the CPU to easily |

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| | interpret signals that arrive through the CAN connectors 204 a-c, and means that these connectors are not associated with a specific cable. Any cable connecting to the transceiver can be plugged into any connector 204 a-c. As shown in FIG. 23A, the first connector 204 a receives the cable 282 that transports a digitized ECG waveform determined from the ECG circuit and electrodes, and digitized ACC waveforms measured by accelerometers in the cable bulkhead 274 and the bulkhead portion 296 associated with the ECG cable 282.<br><br>The second CAN connector 204 b shown in FIG. 22 receives the cable 286 that connects to the pneumatic cuff-based system 285 used for the pressure-dependent indexing measurement (shown in FIG. 23A). This connector 204 b receives a time-dependent pressure waveform delivered by the pneumatic system 285 to the patient's arm, along with values for SYS, DIA, and MAP values determined during the indexing measurement. The cable 286 unplugs from the connector 204 b once the indexing measurement is complete, and is plugged back in after approximately four hours for another indexing measurement.<br><br>The final CAN connector 204 c can be used for an ancillary device, e.g. a glucometer, infusion pump, body-worn insulin pump, ventilator, or end-tidal CO2 delivery system. As described above, digital information generated by these systems will include a header that indicates their origin so that the CPU can process them accordingly.<br><br>The transceiver 272 includes a speaker 201 that allows a medical professional to communicate with the patient using a voice over Internet protocol (VOIP). For example, using the speaker 201 the medical professional could query the patient from a central nursing station or mobile phone connected to a wireless, Internet-based network within the hospital. Or the medical professional could wear a separate transceiver similar to the shown in FIG. 24, and use this as a communication device. In this application, the transceiver 272 worn by the patient functions much like a conventional cellular telephone or 'walkie talkie': it can be used for voice communications with the medical professional and can additionally relay information describing the patient's vital signs and motion. The speaker can also enunciate pre-programmed messages to the patient, such as those used to calibrate the chest-worn accelerometers for a posture calculation, as described above.").<br><br>Moon, [0142] ("The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, |

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| | wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| **Claim 14** | **Prior Art** |
| 14[pre] The computer-implemented method of claim 13, further comprising, via the application: | Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Moon discloses and/or renders obvious the computer-implemented method of claim 13.<br><br>*See, e.g.*, Claim 13.<br><br>Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious the application.<br><br>For example, Moon discloses and/or suggests executing an application on the remote monitoring system.<br><br>*See* disclosure associated with limitation 13[f].<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial |



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| | Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| 14[a] performing a trend analysis on received SpO2 measurement values; and | Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious performing a trend analysis on received SpO2 measurement values.<br><br>For example, Moon discloses and/or suggests performing a trend analysis on received $SpO_2$ measurement values by measuring $SpO_2$ using mathematical filters and then performing statistical analyses on those filters.<br><br>*See, e.g.*, Moon, [0009] ("During pulse oximetry a normalized r value is typically calculated from AC and DC signals using equation (2), below:<br><br>$$r = \frac{660\ \text{nm(AC)} / 660\ \text{nm(DC)}}{905\ \text{nm(AC)} / 905\ \text{nm(DC)}} \quad (2)$$<br><br>r, which is sometimes called a ratio of ratios (RoR), represents a ratio of Hb to HbO2. It equates an actual SpO2 value, which ranges from 0-100% O2, to an empirical relationship that resembles a non-linear equation. Above about 70% O2 this equation typically yields values that are accurate to a few percent. Measurements below this value, while not necessarily accurate, still indicate a hypoxic patient in need of medical attention.").<br><br>Moon, [0025] ("In another aspect, the invention provides a method for measuring SpO2 and cNIBP by processing ECG, PPG, and motion signals with filters that analyze both PTT and AC signals of the PPG waveforms with a mathematical filter. The filter, for example, can be a 'matched filter', described in detail below. Typically only signals that are generated when motion is relatively low are considered in this embodiment. For example, signals are typically not processed further when the motion sensors indicate that motion is greater than an acceptable level. Filtering PTT values includes, for example, determining values that lie outside a pre-determined range using statistical filters (e.g. a simple average and standard deviation). More sophisticated techniques, such as calculating a power value from a frequency-domain spectrum corresponding to the time-dependent motion signal, and then comparing this to a pre-determined value, can be used to estimate if either the PTT values or PPG signals are affected by motion. SpO2 values are typically calculated from ratios describing the |

AC and DC signals measured from individual pulses using optical systems operating in the red and infrared optical spectral regions. One or more ratios can be calculated for the pulse.”).

Moon, [0082] (“Data shown in FIGS. 9A,B-11A,B indicate that motion can be detected and accounted for during pulse oximetry measurements to minimize the occurrence of false alarms and, additionally, make accurate readings in the presence of motion. For example, Equation (9), above, yields a single RoR value for each pulse in the RED/IR(PPG) waveforms. However the method for calculating SpO2 based on a single value is limited, as only one RoR can be calculated for each heartbeat; if values from several heartbeats are averaged together it can thus take several seconds to update the SpO2 value. And the single RoR value can be strongly influenced by motion during pulses within the RED/IR(PPG) waveforms, as described above with reference to FIGS. 9A, B-11A,B.”).

Moon, [0086] (“Because the patient is not moving, the sub-ratios in FIG. 12C are relatively constant and show little variation in the graph. They can be statistically processed with a variety of statistical techniques, some of which are described in the above-mentioned reference, to determine an effective RoR for each pulse in the RED/IR(PPG) waveforms. For example, each value of RoR(n) from equation (10) can be processed with a weighted average defined by wit(n) to determine the effective RoR, as shown below in equation (11):

$$\text{effective } RoR = \frac{\sum_{n \longrightarrow foot}^{n \longrightarrow peak} RoR(n) * \mathrm{wt}(n)}{\sum_{n \longrightarrow foot}^{n \longrightarrow peak} \mathrm{wt}(n)} \qquad (11)$$

In one embodiment, each weight wit(n) is determined by comparing an SpO2 calculated from its corresponding RoR(n) to a preceding value for SpO2 and determining the weight based on the correlation. For example, if the preceding value for Sp02 is 98%O2, a value for SpO2 in the range of 70-80%O2 calculated from RoR(n) is likely erroneous; the RoR(n) is therefore give a relatively low weight wit(n). Additionally, a relatively large change in the RED/IR(PPG) amplitude during the sub-ratio measurement period in typically indicates that the corresponding value of RoR(n) has a



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| | relatively high accuracy. Such values are thus given a relatively high weight wit(n). In general, a number of established statistical techniques can be used to weight the collection of RoR(n) values to generate the effective RoR, as defined above in equation (11).”).<br><br>Moon, [0087] (“In another embodiment, the collection of RoR(n) values, such as those shown in FIG. 12C, are processed to determine an average and standard deviation. Values lying more than one standard deviation outside the average are then removed from the calculation, and the average is then recalculated. This technique, while typically less accurate than that indicated by equation (11), has the advantage of not requiring a series of weights with arbitrary definitions. In yet another embodiment, the collection of RoR(n) values are fit with a numerical function, such as a linear or non-linear function, and the effective RoR value can be estimated from the coefficients derived from the fit.”). |

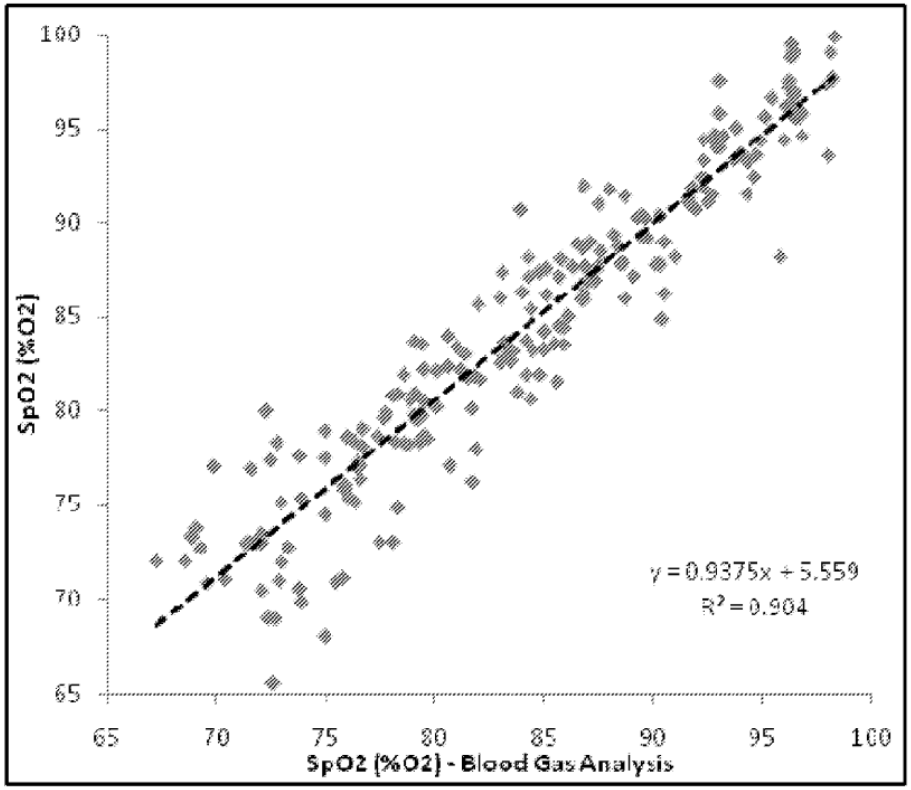


Fig. 8

Moon, [0118] ("FIGS. 19A and 19B show, respectively, graphs of time-dependent ACC waveforms 100 measured along the x, y, and z-axes, and the torso states (i.e. postures) 101 determined from these waveforms for a moving patient, as described above. As the patient moves, the DC values of the ACC waveforms measured by the chest accelerometer vary accordingly, as shown by the graph

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| | 100 in FIG. 19A. The body-worn monitor processes these values as described above to continually determine {right arrow over (R)}G and the various quantized torso states for the patient, as shown in the graph 101 in FIG. 19B. The torso states yield the patient's posture as defined in Table 5. For this study the patient rapidly alternated between standing, lying on their back, chest, right side, and left side within a time period of about 160 seconds. As described above, different alarm/alert conditions (e.g. threshold values) for vital signs can be assigned to each of these postures, or the specific posture itself may result in an alarm/alert. Additionally, the time-dependent properties of the graph 101 can be analyzed (e.g. changes in the torso states can be counted) to determine, for example, how often the patient moves in their hospital bed. This number can then be equated to various metrics, such as a 'bed sore index' indicating a patient that is so stationary in their bed that lesions may result. Such a state could then be used to trigger an alarm/alert to the supervising medical professional.").<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| 14[b] displaying results of the trend analysis in at least one portion of the plurality of display portions. | Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious displaying results of the trend analysis in at least one portion of the plurality of display portions.<br><br>For example, Moon discloses and/or suggests displaying on the GUI of a remote monitor information, including the results of trend analyses, corresponding to a particular patient.<br><br>*See* disclosures associated with limitations 13[b], 13[g], 13[h], and 14[a].<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of |

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| | success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| **Claim 16** | **Prior Art** |
| 16. The computer-implemented method of claim 13, further comprising, via the application, outputting one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles. | Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, Moon discloses and/or renders obvious the computer-implemented method of claim 13.<br><br>*See, e.g.*, Claim 13.<br><br>Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious further comprising, via the application, outputting one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles.<br><br>For example, a user could set a reminder to take future measurements via an application on mobile computing device of Moon.<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |
| **Claim 17** | **Prior Art** |
| 17. The computer-implemented method of claim 13, further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a | Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, Moon discloses and/or renders obvious the computer-implemented method of claim 13.<br><br>*See, e.g.*, Claim 13.<br><br>Under at least the apparent construction based on Masimo's Infringement Contentions, Moon discloses and/or renders obvious further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO2 |

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| plurality of graphical representations of the SpO2 measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts. | measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.<br><br>For example, Moon discloses and/or suggests updating the representation of the physiological parameter to include graphical representations of the SpO2 values and providing graphs or charts.<br><br>*See, e.g.*, Moon, Abstract ("The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist-worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station."). |



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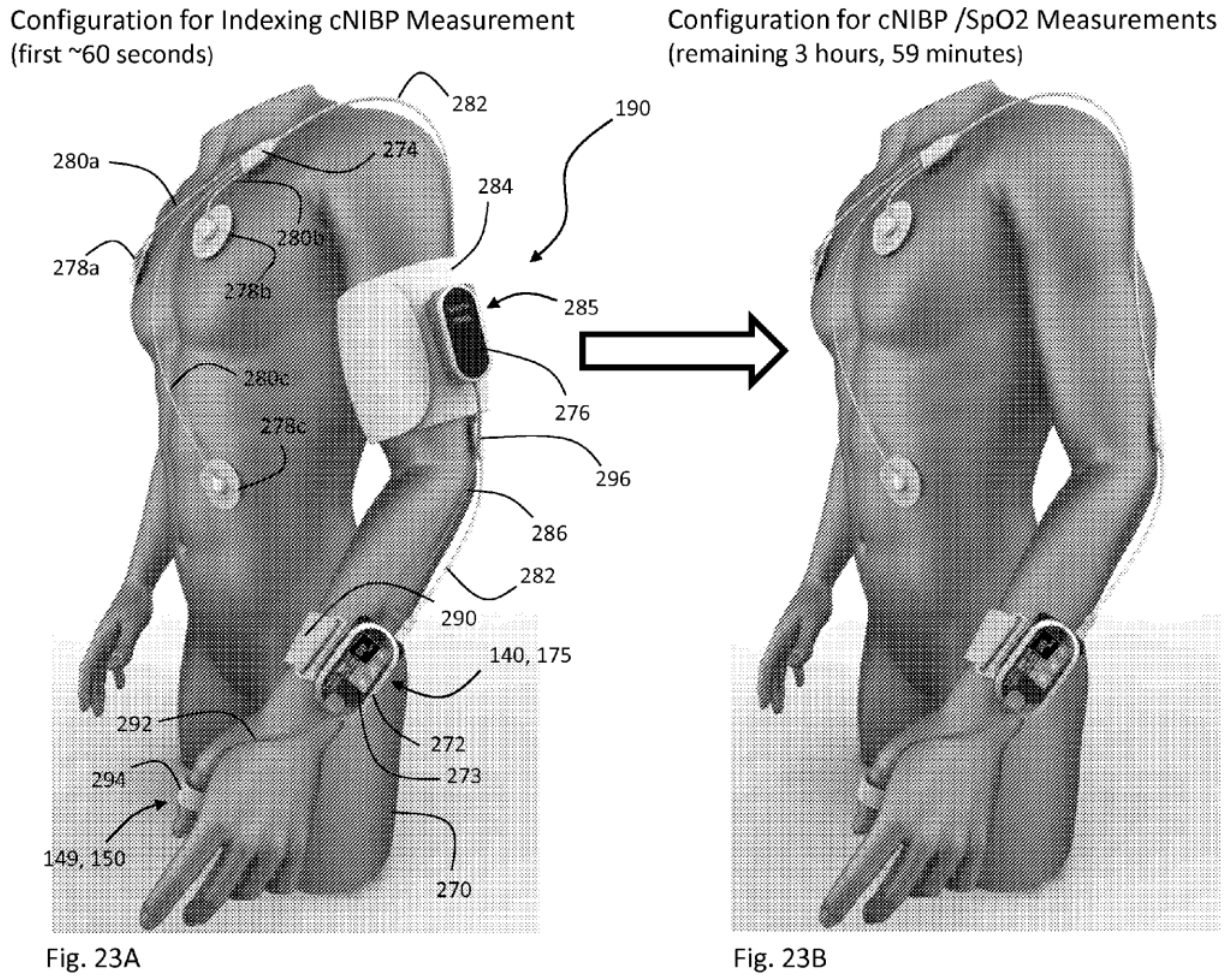


Figs. 23A, 23B.



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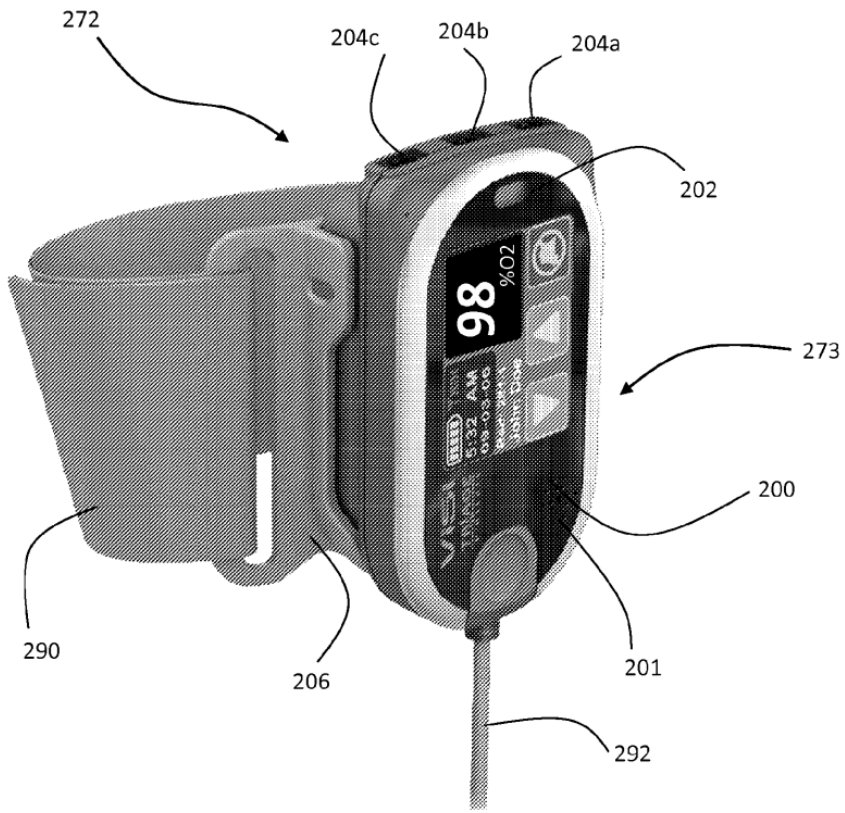


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to



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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0018] ("In one aspect, the invention provides a system and method for monitoring a physiological property of a patient's blood (e.g. a SpO2 value). The invention features a first sensor with two radiation sources that emit optical radiation at first and second wavelengths, and a photodetector configured to detect the radiation after it passes through a portion of the patient. A finger-ring housing that houses the radiation sources and the photodetector features a ring-shaped mounting portion that fits or wraps around a base of the patient's thumb. A processing unit, worn on the patient's wrist and operably connected to the finger-ring sensor, receives signals from the photodetector and includes both a motion sensor and a processor. The processor is configured to process: i) the first and second signals to determine AC signals; ii) at least one of the AC signals and the motion signal to determine selected AC signals; and iii) the selected AC signals, or signals derived therefrom, to determine the physiological property of the patient's blood.").<br><br>Moon, [0023]-[0024] ("In certain embodiments the processing unit features a touchpanel display that renders a first user interface that displays information describing oxygen saturation, a second user interface that displays information describing blood pressure, and a third user interface that displays information describing ECG signals. The processing unit can also include a barcode scanner that scans a barcode of a medical professional (located, e.g., on their badge). In response, the wrist-worn |



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| | transceiver can render a user interface corresponding to the medical professional. This prevents the patient from viewing medical information that may, for example, cause unnecessary alarm.<br><br>In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.”).<br><br>Moon, [0139]-[0142] (“In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient’s vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.<br><br>Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or |



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| | simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>Moon, [0132] (“FIG. 24 shows a close-up view of the wrist-worn transceiver 272. As described above, it attaches to the patient’s wrist using a flexible strap 290 which threads through two D-ring openings in a plastic housing 206. The transceiver 272 houses portions of the circuits 175, 140 described in FIGS. 20 and 21, and additionally features a touchpanel display 200 that renders a GUI 273 which is altered depending on the viewer (typically the patient or a medical professional). Specifically, the transceiver 272 includes a small-scale infrared barcode scanner 202 that, during use, can scan a barcode worn on a badge of a medical professional. The barcode indicates to the transceiver’s software that, for example, a nurse or doctor is viewing the user interface. In response, the GUI 273 displays vital sign data and other medical diagnostic information appropriate for medical professionals. Using this GUI 273, the nurse or doctor, for example, can view the vital sign information, set alarm parameters, and enter information about the patient (e.g. their demographic information, medication, or medical condition). The nurse can press a button on the GUI 273 indicating that these operations are complete. At this point, the display 200 renders an interface that is more appropriate to the patient, such as time of day and battery power.”).<br><br>Moon, [0118] (“FIGS. 19A and 19B show, respectively, graphs of time-dependent ACC waveforms 100 measured along the x, y, and z-axes, and the torso states (i.e. postures) 101 determined from these waveforms for a moving patient, as described above. As the patient moves, the DC values of the ACC waveforms measured by the chest accelerometer vary accordingly, as shown by the graph 100 in FIG. 19A. The body-worn monitor processes these values as described above to continually |



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| | determine {right arrow over (R)}G and the various quantized torso states for the patient, as shown in the graph 101 in FIG. 19B. The torso states yield the patient's posture as defined in Table 5. For this study the patient rapidly alternated between standing, lying on their back, chest, right side, and left side within a time period of about 160 seconds. As described above, different alarm/alert conditions (e.g. threshold values) for vital signs can be assigned to each of these postures, or the specific posture itself may result in an alarm/alert. Additionally, the time-dependent properties of the graph 101 can be analyzed (e.g. changes in the torso states can be counted) to determine, for example, how often the patient moves in their hospital bed. This number can then be equated to various metrics, such as a 'bed sore index' indicating a patient that is so stationary in their bed that lesions may result. Such a state could then be used to trigger an alarm/alert to the supervising medical professional."). |



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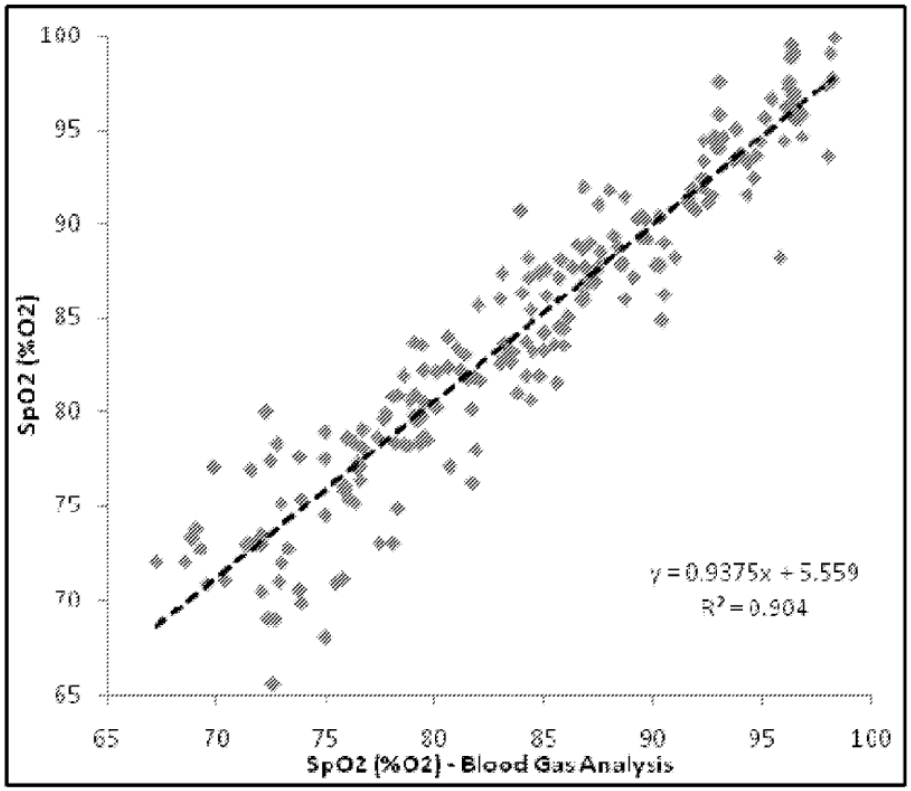


Fig. 8

Moon, [0140] ("In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient's vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area



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| | of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| **Claim 19** | **Prior Art** |
| 19. The computer-implemented method of claim 13, further comprising wirelessly transmitting the SpO2 measurement values from the SpO2 measurement system to the mobile computing device. | Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Moon discloses and/or renders obvious the computer-implemented method of claim 13.<br><br>*See, e.g.*, Claim 13.<br><br>Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious further comprising wirelessly transmitting the SpO2 measurement values from the SpO2 measurement system to the mobile computing device.<br><br>For example, Moon discloses and/or suggests wireless transmitting via a wireless system the SpO2 measurement values from the oximetry probe to the remote receiver:<br><br>*See, e.g.*, Moon, Abstract (“The invention provides a body-worn system that continuously measures pulse oximetry and blood pressure, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient’s thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe secures to the thumb and measures time-dependent signals corresponding to LEDs operating near 660 and 905 nm. Analog versions of these signals pass through a low-profile cable to a wrist-worn transceiver that encloses a processing unit. Also within the wrist- |

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| | worn transceiver is an accelerometer, a wireless system that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.”). |



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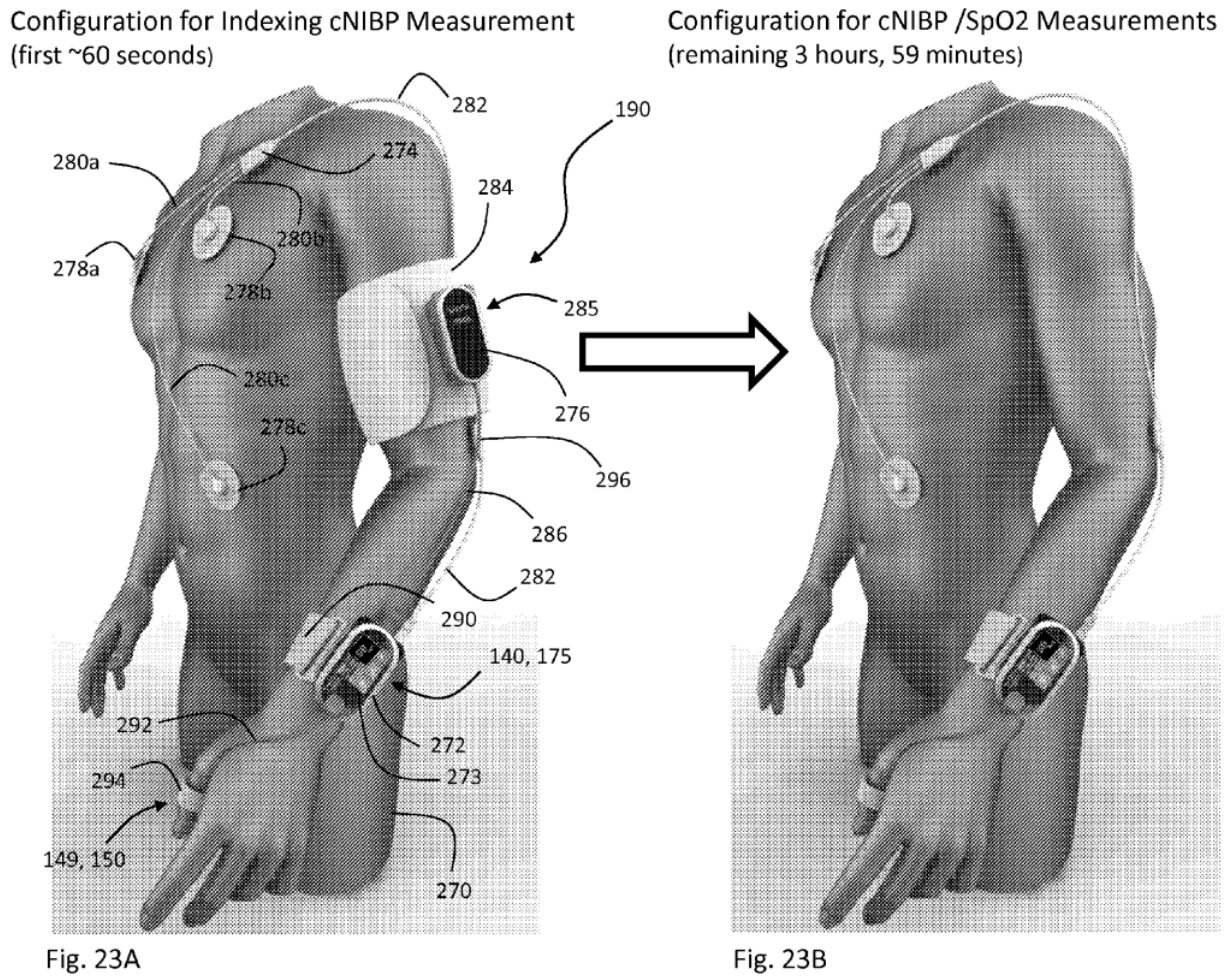


Figs. 23A, 23B.



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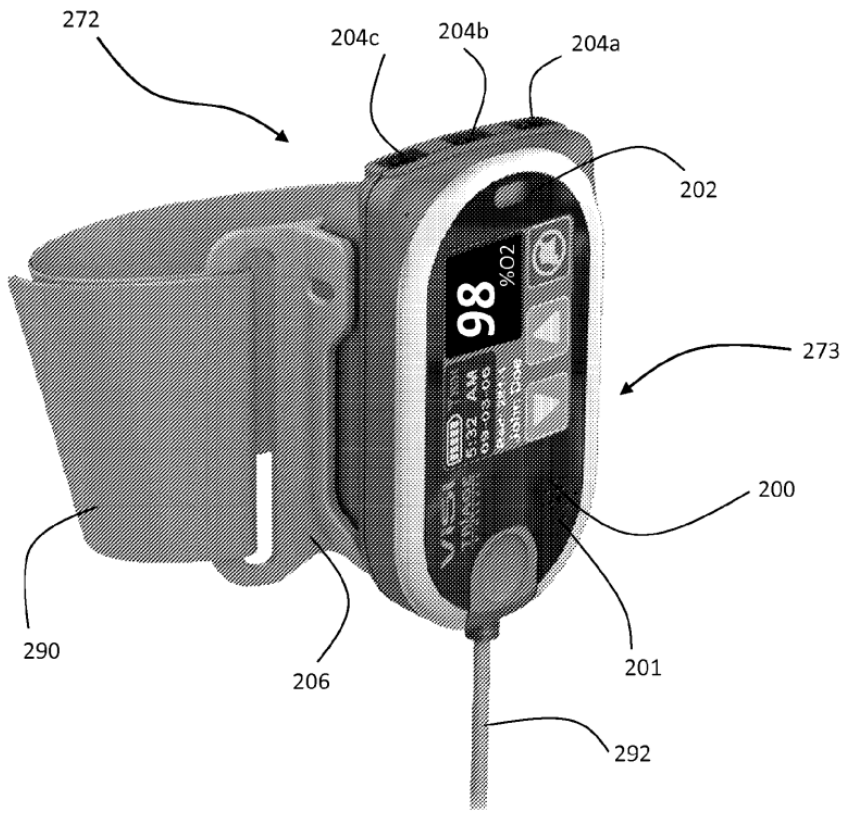


Fig. 24

Fig. 24.

Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to

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| | the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station. Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.").<br><br>Moon, [0013], [0014] ("The invention described herein provides a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient. The system features an oximetry probe that comfortably clips to the base of the patient's thumb, thereby freeing up their fingers for conventional activities in a hospital, such as reading and eating. The probe reversibly secures to the thumb with, e.g., an easy-to-use Velcro strap, disposable tape, or similar closure, or may be provided in the form of a closed ring which slips over the thumb. It measures time-dependent waveforms (RED/IR(PPG)) corresponding to LEDs typically operating near 660 nm and 905 nm. Analog versions of these waveforms pass through a low-profile cable to a wrist-worn transceiver enclosing a processing unit. Also within the wrist-worn transceiver is a wireless system (typically based wireless protocols such as 802.11 and 802.15.4) that sends information through a network to a remote receiver, e.g. a computer located in a central nursing station.<br><br>Clinically accurate pulse oximetry measurements made at the base of the patient's thumb require a set of coefficients relating r (from Eq. 2) to SpO2 that are typically determined with a set of empirical experiments (e.g. a 'breathe down' study, described below). These coefficients differ from those used in conventional oximetry measurements because of the differences between vasculature in the base |



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| | of the thumb and the tip of the index finger. Typically the base of the thumb features relatively fewer capillary beds, and thus the coefficients are preferably adjusted accordingly.”).<br><br>Moon, [0024] (“In other embodiments the processing unit includes a speaker for voice communications, or for generating audible voice messages intended for the patient. The processing unit can also include a wireless transmitter that communicates through, e.g., a hospital network.”).<br><br>Moon, [0139]-[0142] (“In other embodiments, a set of body-worn monitors can continuously monitor a group of patients, wherein each patient in the group wears a body-worn monitor similar to those described herein. Additionally, each body-worn monitor can be augmented with a location sensor. The location sensor includes a wireless component and a location-processing component that receives a signal from the wireless component and processes it to determine a physical location of the patient. A processing component (similar to that described above) determines from the time-dependent waveforms at least one vital sign, one motion parameter, and an alarm parameter calculated from the combination of this information. A wireless transceiver transmits the vital sign, motion parameter, location of the patient, and alarm parameter through a wireless system. A remote computer system featuring a display and an interface to the wireless system receives the information and displays it on a user interface for each patient in the group.<br><br>In embodiments, the interface rendered on the display at the central nursing station features a field that displays a map corresponding to an area with multiple sections. Each section corresponds to the location of the patient and includes, e.g., the patient’s vital signs, motion parameter, and alarm parameter. For example, the field can display a map corresponding to an area of a hospital (e.g. a hospital bay or emergency room), with each section corresponding to a specific bed, chair, or general location in the area. Typically the display renders graphical icons corresponding to the motion and alarm parameters for each patient in the group. In other embodiments, the body-worn monitor includes a graphical display that renders these parameters directly on the patient.<br><br>Typically the location sensor and the wireless transceiver operate on a common wireless system, e.g. a wireless system based on 802.11, 802.15.4, or cellular protocols. In this case a location is determined by processing the wireless signal with one or more algorithms known in the art. These include, for example, triangulating signals received from at least three different base stations, or |



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| | simply estimating a location based on signal strength and proximity to a particular base station. In still other embodiments the location sensor includes a conventional global positioning system (GPS).<br><br>The body-worn monitor can include a first voice interface, and the remote computer can include a second voice interface that integrates with the first voice interface. The location sensor, wireless transceiver, and first and second voice interfaces can all operate on a common wireless system, such as one of the above-described systems based on 802.11 or cellular protocols. The remote computer, for example, can be a monitor that is essentially identical to the monitor worn by the patient, and can be carried or worn by a medical professional. In this case the monitor associated with the medical professional features a GUI wherein the user can select to display information (e.g. vital signs, location, and alarms) corresponding to a particular patient. This monitor can also include a voice interface so the medical professional can communicate directly with the patient.”).<br><br>To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. |
| **Claim 20** | **Prior Art** |
| 20. The computer-implemented method of claim 13, further comprising, via the application, enabling the user to set reminders to take future measurements. | Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Moon discloses and/or renders obvious the computer-implemented method of claim 13.<br><br>*See, e.g.*, Claim 13.<br><br>Under at least the apparent construction based on Masimo’s Infringement Contentions, Moon discloses and/or renders obvious further comprising, via the application, enabling the user to set reminders to take future measurements.<br><br>For example, a user could set a reminder to take future measurements via an application on the mobile computing device of Moon. |

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| | To the extent Masimo contends or the Court determines that Moon does not expressly or inherently disclose this limitation, it would have been obvious to combine Moon with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Moon with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. |



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