



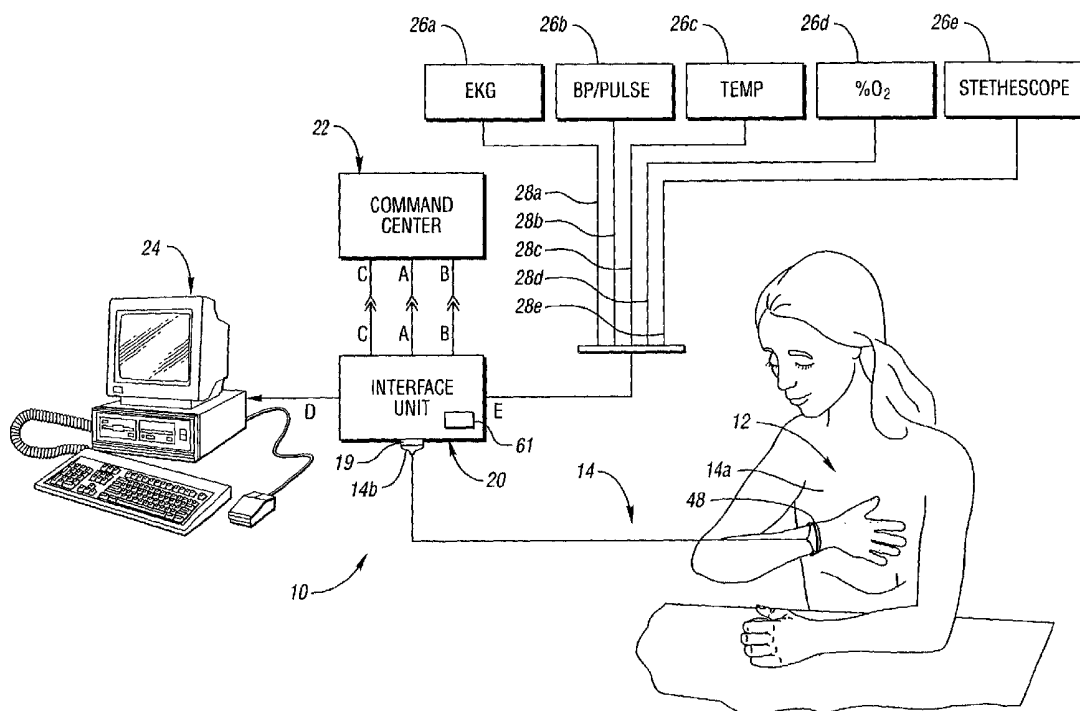
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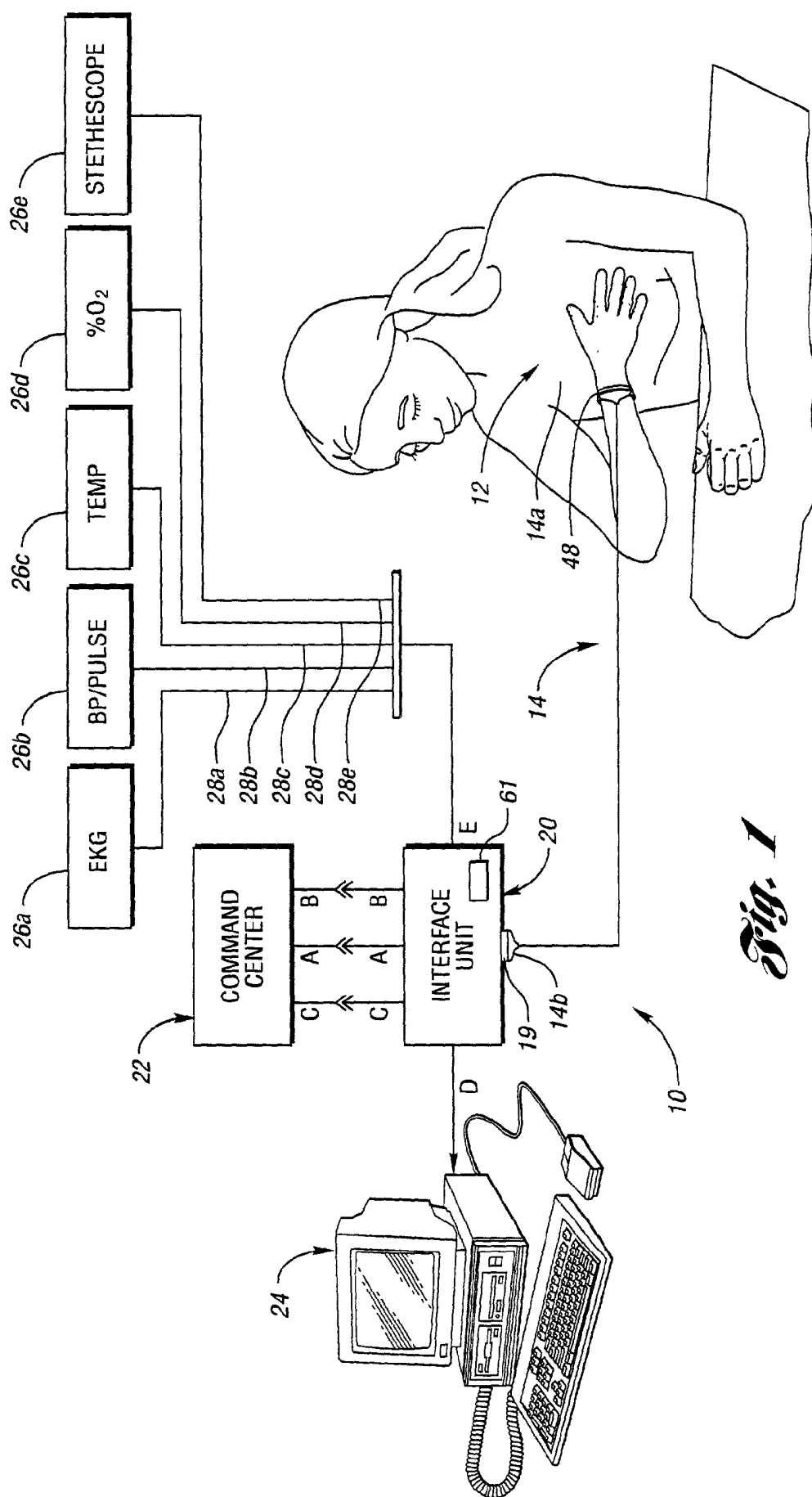
(19) **United States**(12) **Patent Application Publication**
Gopinathan et al.(10) **Pub. No.: US 2002/0045805 A1**(43) **Pub. Date: Apr. 18, 2002**(54) **TELE-DIAGNOSTIC DEVICE****Related U.S. Application Data**(75) Inventors: **Govindan Gopinathan**, Ordell, NJ
(US); **Arthur R. Tilford**, Yorba Linda,
CA (US)(63) Continuation-in-part of application No. 09/884,371,
filed on Jun. 19, 2001, which is a continuation of
application No. 09/084,647, filed on May 26, 1998,
now patented.

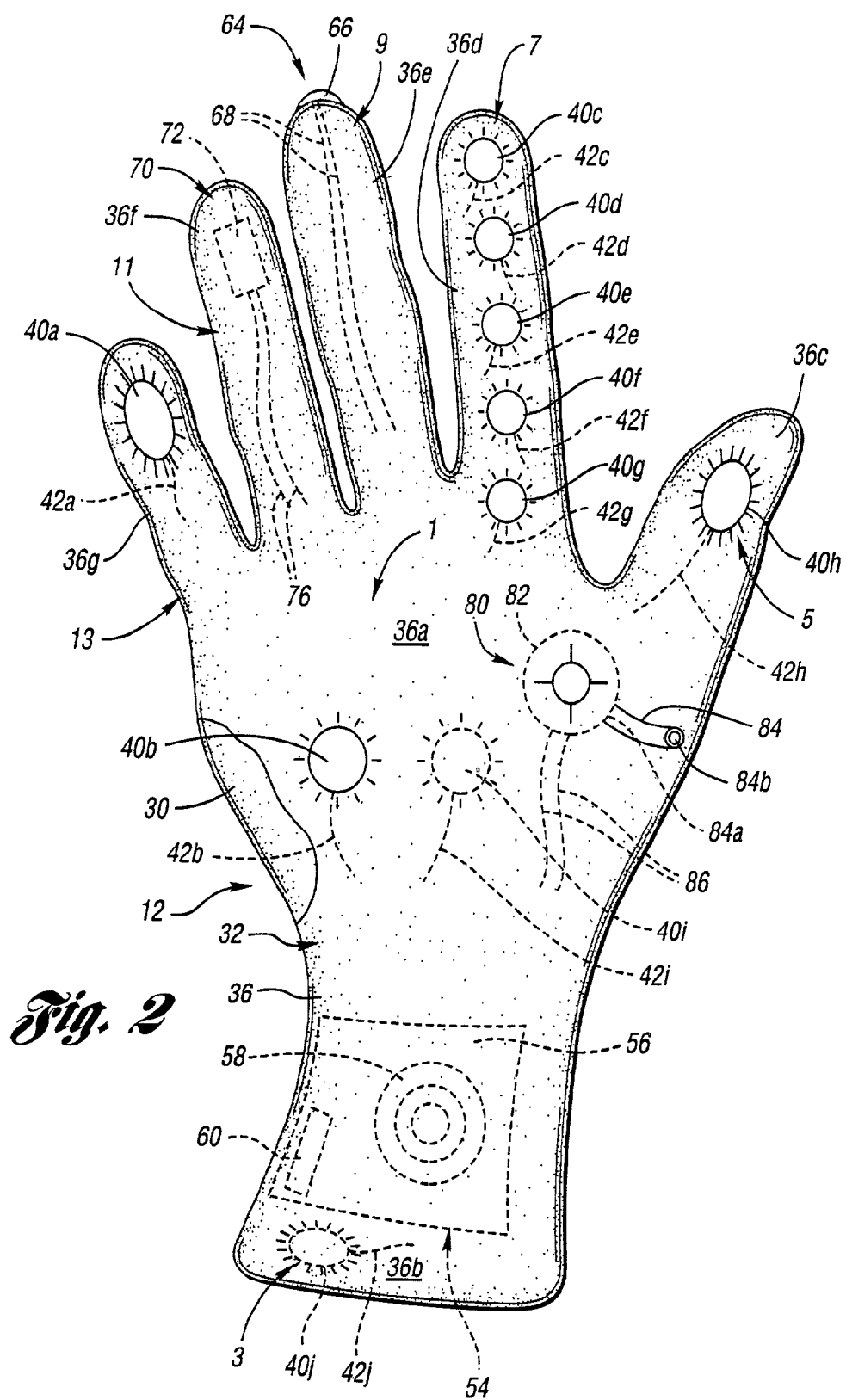
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Michael S. Brodbine**Brooks & Kushman P.C.****22nd Floor****1000 Town Center****Southfield, MI 48075-1351 (US)****Publication Classification**(51) **Int. Cl.⁷** **A61B 5/00**(52) **U.S. Cl.** **600/300; 600/301; 128/903**(57) **ABSTRACT**

A system (10), probe, and method for collecting a plurality of diagnostic information and transmitting the diagnostic information to a remote location. The system (10) comprises a member (12) contoured to at least a portion of a person's hand, and an interface unit (20) in electrical communication with the member (12). The interface unit (20) is capable of transmitting information to a remote location. The member (12) comprises at least eight sensors.

(73) Assignee: **INEEDMD.com, Inc.**, Great Neck, NY(21) Appl. No.: **10/024,105**(22) Filed: **Dec. 18, 2001**





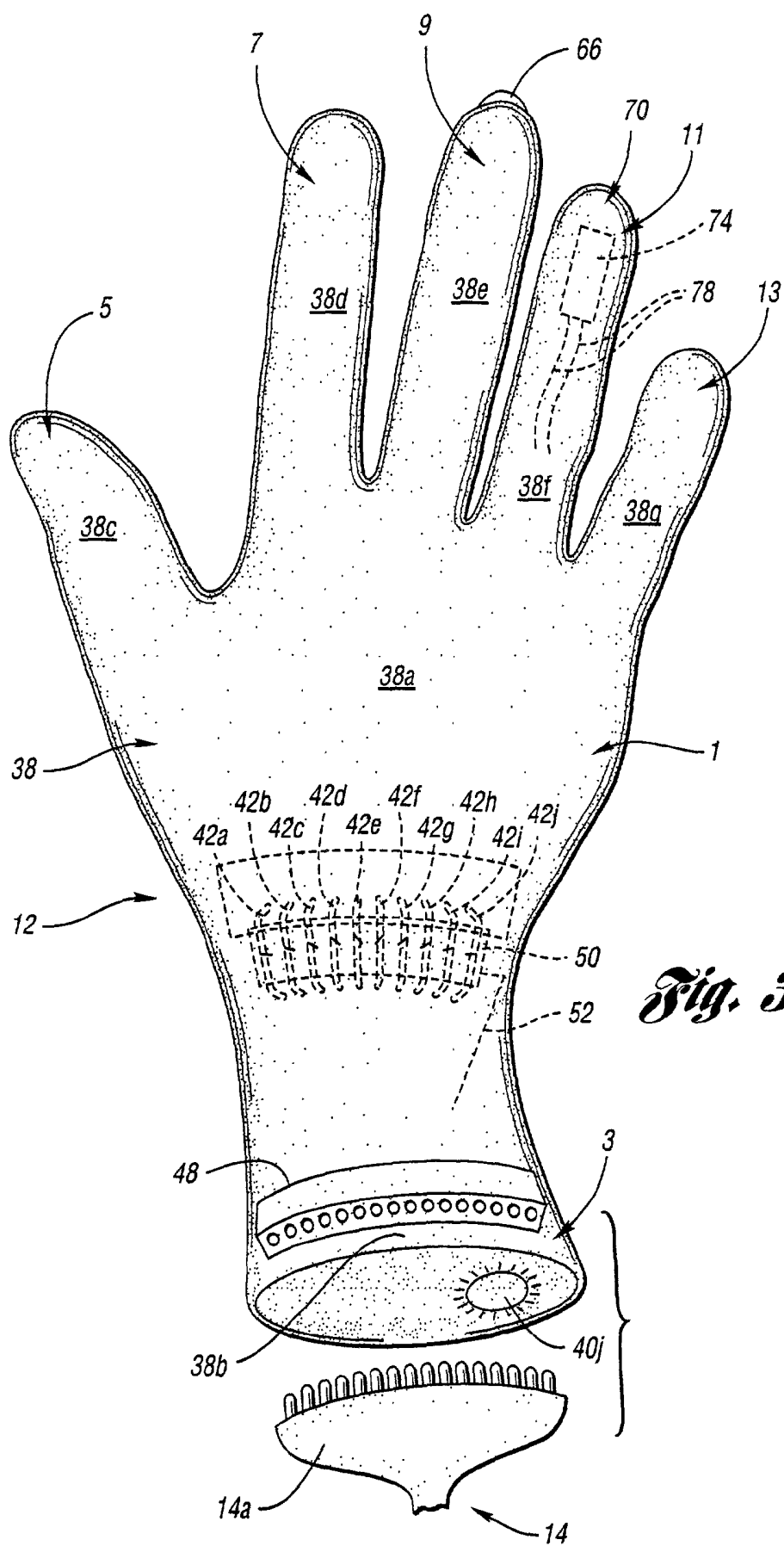
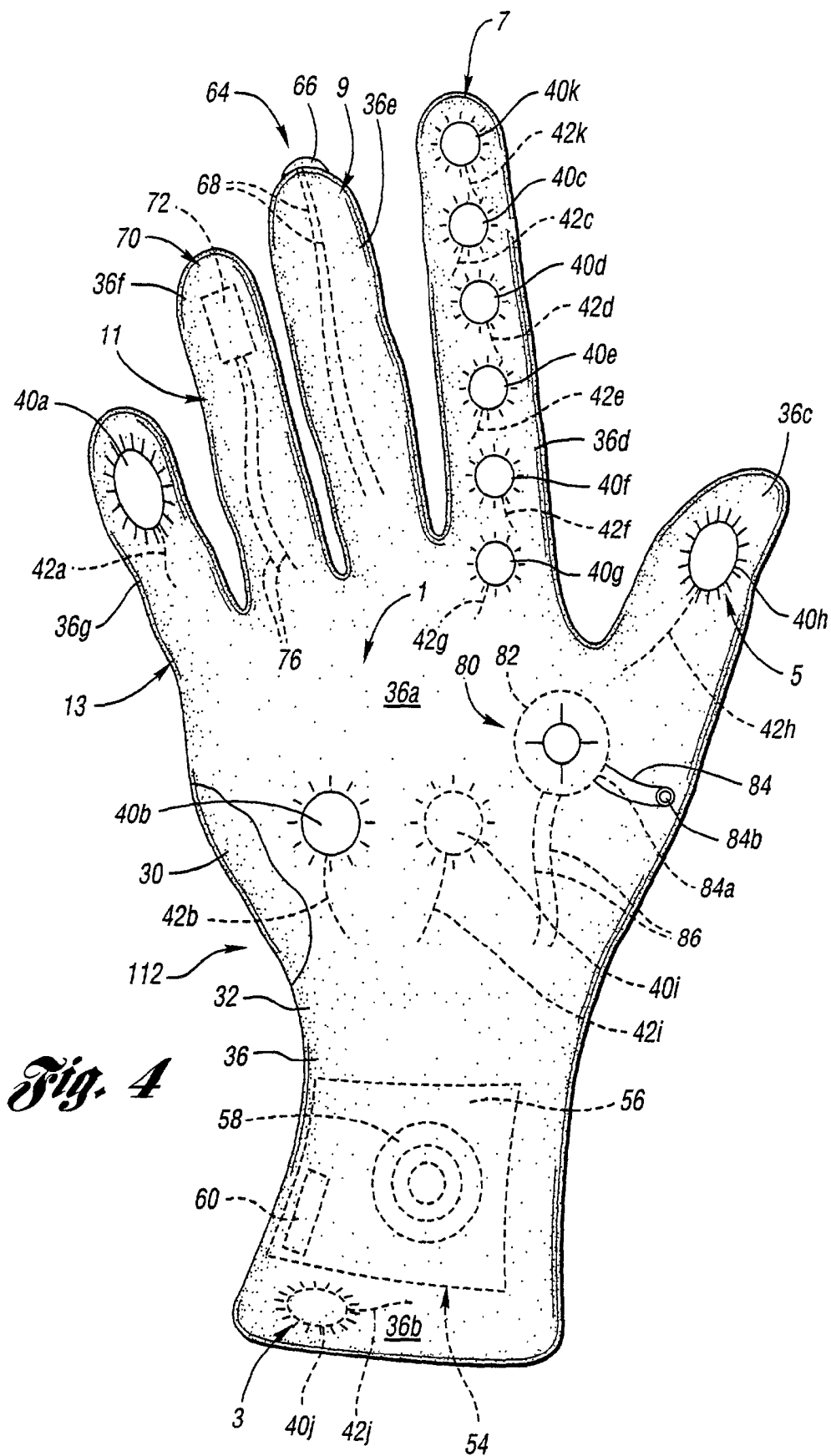


Fig. 3



TELE-DIAGNOSTIC DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. application Ser. No. 09/884,371, filed Jun. 19, 2001 (pending), which is a continuation of U.S. Ser. No. 09/084,647, filed May 26, 1998, which issued as U.S. Pat. No. 6,224,548 on May 1, 2001.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to a probe, and a system and method for use with the probe, for obtaining medical diagnostic and monitoring information from persons and others using the probe.

[0004] 2. Background Art

[0005] Doctor-patient relationships are as old as human civilization itself. Over the centuries this relationship has undergone, surprisingly enough, very little change. One way or another the patient and the doctor came into contact with each other in person. This process was called a patient visit or doctor visit, as the case may be. From the very beginning of this patient-doctor interaction, a certain format and structure evolved and later this was laid down as a stipulated discipline in the practice of medicine. The doctor interrogates the patient in a methodical way, the patient provides the answers, which in fact, is the history of the evolution of the patient's illness. The doctor then examines the patient, makes crucial observations and gathers diagnostic data, or information, which are the fingerprints of the illness the patient is suffering from. An intellectual process ensues in the doctor's mind, where he correlates the history of the illness with the diagnostic information he gathered and the conclusion he arrives at, essentially, is the diagnosis of the patient's malady.

[0006] Over the years, innovations like the telegraph, the telephone, fax machines and of late, the e-mail and the Internet, has enhanced the patient-doctor relationship quite substantially. These innovations have curtailed the need for more frequent personal visits, by the patient or the doctor, as the case may be. Doctors on their part however, always prefer to speak to the patient and gather vital diagnostic information personally by themselves, even when the patient is located remotely from the doctor. U.S. Pat. Nos. 6,224,548 and 6,248,064, assigned to the assignee of the present application, disclose diagnostic probes and systems for collecting and transmitting diagnostic information to a remote location. The probes disclosed in those patents are capable of generating 3, 5 and 7 leadwire scenarios. While these scenarios are excellent for providing emergency diagnosis, a thorough examination, such as one that is typically conducted during a physical or routine check-up, typically calls for the generation of at least 10 leadwires so that at least an 11 lead EKG, and preferably a full conventional 12 lead EKG, can be generated.

[0007] Accordingly, it would be desirable to provide an inexpensive, simple to use, and portable probe device, system and method that could gather diagnostic/monitoring information, including at least a 10 leadwire EKG to enable generation of an 11 lead EKG, and preferably a 12 lead EKG.

SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide an inexpensive, simple to use, and portable probe, and a system and method for use with the probe, that could gather a plurality of diagnostic/monitoring information, including a 10 leadwire EKG.

[0009] In carrying out the above object, a system for collecting diagnostic information and transmitting the diagnostic information to a remote location is provided. The system comprises a member contoured to at least a portion of a person's hand and an interface unit in electrical communication with the member. The interface unit is capable of transmitting information to a remote location. The member comprises at least eight sensors.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a schematic view of the system of the present invention;

[0011] FIG. 2 is a plan view of a first, palmar, side of an apparatus of the present invention;

[0012] FIG. 3 is a plan view of a second, dorsal, side of an apparatus of the present invention; and

[0013] FIG. 4 illustrates another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] The present invention relates to a diagnostic/monitoring probe, and a system and method for use with the probe, for obtaining medical diagnostic information. In particular, the present invention relates to a probe, and a system and method for use with the probe, for obtaining cardiac related diagnostic and monitoring information.

[0015] As representative of the present invention, FIG. 1 illustrates a system 10 for obtaining diagnostic information. The system 10 includes a glove probe 12. The glove probe 12 is a unitary member which is adaptable to be worn over a person's hand. The glove probe 12 includes a plurality of medical diagnostic probes which detect diagnostic signals, as will be explained in more detail below. The glove probe 12 is preferably connected via a cable 14 to an interface unit 20 and, thus communicates with, and is capable of transmitting diagnostic signals, or information, from the medical diagnostic probes to the interface unit. The glove 12 could alternatively be in wireless communication such as IR or RF, with the interface unit 20. The interface unit 20 can communicate with a remote command center 22 via a telephone wire or fiber A, a satellite connection B, or a radio wave (wireless) connection C. The interface unit 20 alternatively can communicate with a personal computer (PC) 24 via an interface connection D. The interface unit 20 can also communicate with a plurality of local diagnostic readout apparatuses 26a, 26b, 26c, 26d, and 26e via EKG interface connections E and 28a, 28b, 28c, 28d and 28e, respectively, or the like. The diagnostic readout apparatuses 26a-e are preferably an electrocardiogram (EKG) readout, a blood pressure (BP) and pulse readout, a temperature readout, an % O₂ oxygen readout, and a stethoscope, respectively.

[0016] Referring to FIG. 2, the glove probe 12 comprises a first glove layer 30 and a second glove layer 32 secured to

the first glove layer such that the second glove layer overlies at least most, and preferably all, of the first glove layer. The first glove layer **30** is preferably made of a cloth of natural or synthetic fibers, leather, or other suitable material. The second layer **32** is preferably made of a rubber or rubber-like material, such as Nitrile.

[0017] The glove probe **12**, which has portions shaped to the contour of a person's hand, includes a palm portion **1**, a wrist portion **3**, a thumb phalange portion **5**, an index finger phalange portion **7**, a middle finger phalange portion **9**, a ring finger phalange portion **11** and a pinky finger phalange portion **13**. The glove probe **12** further includes a palmar side **36** (FIG. 2) and a dorsal side **38** (FIG. 3). The palmar side **36** (FIG. 2) includes a palmar palm portion surface **36a**, a palmar wrist portion surface **36b**, a palmar thumb phalange portion surface **36c**, a palmar index finger phalange portion surface **36d**, a palmar middle finger phalange portion surface **36e**, a palmar ring finger phalange portion surface **36f** and a palmar pinky finger phalange portion surface **36g**. The dorsal side **38** (FIG. 3) includes a dorsal palm portion surface **38a**, a dorsal wrist portion surface **38b**, a dorsal thumb phalange portion surface **38c**, a dorsal index finger phalange portion surface **38d**, a dorsal middle finger phalange portion surface **38e**, a dorsal ring finger phalange portion surface **38f** and a dorsal pinky finger phalange portion surface **38g**.

[0018] As discussed previously, the glove probe **12** contains a plurality of medical diagnostic/monitoring probes. In the embodiment shown in FIGS. 2 and 3, the glove probe **12** contains an EKG diagnostic device, a blood pressure and pulse rate device **54**, a temperature device **64**, a % O₂ device **70**, and an auscultation device **80**.

[0019] The EKG device is capable of measuring the EKG currents of the heart muscle and preferably includes a plurality of sensors **40a** (FIG. 2), **40b**, **40c**, **40d**, **40e**, **40f**, **40g**, **40h**, **40i**, and **40j** which are secured to the first layer **30** of the glove probe **12**. Exemplary sensors are described in detail in U.S. patent application Ser. No. 09/971,204, entitled "Sensor Electrode" filed on Oct. 4, 2001. In general, each of the sensors **40a-40j** includes a stainless-steel mesh screen on top of a mesh or coiled cylindrical wall and an EKG jelly sponge disposed within the cylindrical wall between the screen and, preferably, the first glove layer **30** of the glove probe **12**. Sensors **40a-40j** are all mounted on the palmar side **36** of the glove probe **12**. Each of the sensors **40a-40h** preferably extends through, or are not covered by, the second glove layer **32** so that they are exposed to the environment, allowing free and close contact with the skin surface of the person using the probe **12**. Sensors **40i** and **40j** are not exposed to the environment and instead face the dorsal side **38** of the glove probe **12**.

[0020] More specifically, sensor **40a** (FIG. 2) is positioned on the tip portion of the palmar pinky finger phalange portion surface **36g** of the glove probe **12**. Sensor **40b** is positioned on the left side of the palmar palm portion surface **36a** in the hypothenar area/region of the glove probe **12**. Sensor **40c** is positioned on the tip of the palmar index finger phalange portion surface **36d** of the glove probe **12**. Sensor **40d** is positioned directly, about 0.5 cm, below sensor **40c** on the proximal upper portion of the palmar index finger phalange portion surface **36d** of the glove probe **12**. In other words, sensor **40d** is positioned directly above the mid point

on the palmar side **36** of the index finger phalange portion **7** of the glove probe. Sensor **40e** is positioned directly below sensor **40d** on the lower portion, directly below the mid point, of the palmar index finger phalange portion surface **36d** of the glove probe **12**. Sensor **40f** is positioned directly below sensor **40e** on the palmar index finger phalange portion surface **36d** of the glove probe **12**. Sensor **40g** is positioned approximately directly below sensor **40f** on the right side of the palmar palm portion surface **36a** of the glove probe **12**. Sensor **40h** is positioned on the upper portion of the palmar thumb phalange portion surface **36c** of the glove probe **12**. Sensor **40i** is positioned on the middle portion of the palmar palm portion surface **36a** of the glove probe **12**. Sensor **40j** is positioned on the palmar wrist portion surface **36b** of the glove probe **12**. Both sensor **40i** and **40j** face the dorsal side **38** of the glove probe **12** so that they can contact a person's hand when the glove probe **12** is worn by a person. Sensors **40i** and **40j** could alternatively be positioned on the dorsal side **38** of the glove probe **12**, on the dorsal palm portion surface **38a** and the dorsal wrist portion surface **38b**, respectively, and facing away from the palmar side **36** of the glove probe and activated by placing the patient's free hand over the dorsal side of the glove probe.

[0021] Each of the sensors **40a-40j** is connected to a wire **42a-42j**, respectively, which extends between and electrically connects a respective one of the sensors **40a-40j** with a female connection plug **48** (FIG. 3), which is preferably provided on the dorsal side **38** of the glove probe **12**. Each wire **42a-42j** is preferably disposed between the first and second layers **30** and **32** of the glove probe **12**, and is preferably secured to the first layer **30**. Each wire **42a-42j** may preferably be shielded and provided with a powdered-iron bead disposed adjacent to its respective sensors **40a-40j** to help prevent the detection of unwanted noise.

[0022] The glove probe **12** includes a ground strip **50** which is preferably positioned on the palm portion **1** of the dorsal side **38** between the first and second layers **30** and **32**. Each wire **42a-42j** is connected to the ground strip **50**, preferably, via each respective wire shield. The ground strip **50** is connected to a wire **52**, which extends between and connects the ground strip **50** to the female connection plug **48**. The ground strip **50** functions to bring existing electromagnetic forces (EMF) noise to a single electrical voltage point for removal.

[0023] The blood pressure device **54** (FIG. 2), which is capable of measuring systolic and diastolic blood pressure and pulse rate signals, is preferably secured to the first layer **30** of the glove probe **12** between the first layer and the second layer **32** on the wrist portion **3** of the palmar side **36** of the glove probe. The blood pressure device **54** preferably includes an expandable air bladder **56** defining a chamber for accommodating air or another suitable inflation fluid, an acoustical coupler **58** in the chamber and an air tube **60**. The air tube **60** extends between and provides fluid and audio communication between the chamber of the air bladder **56** and the female connection plug **48**. The acoustical coupler **58** is capable of collecting the sound waves in the air bladder **56** and directing the sound waves towards, and through, the air tube **60**. The blood pressure device **54** is preferably made of parts similar, or identical, to parts of the UB-302 Systolic/Diastolic (Pulse) Digital Blood Pressure monitor from A+D Engineering Inc., of Milpitas, Calif. or the CWO1 wrist mounted blood pressure cuff made by Amron.

[0024] The temperature device **64** is capable of measuring temperature signals and preferably includes a thermistor **66**. The thermistor **66** is preferably positioned on the tip of the middle finger phalange portion **9**. The thermistor **66** is preferably secured to the first layer **30** and extends through the second layer **32**. The temperature device **64** includes a pair of wires **68** which extend between and electrically connect the thermistor **66** and the female connection plug **48**. The temperature device **64** is preferably made of parts similar, or identical, to parts of the Cole-Parmer E-08402-00 thermometer and Generic thermistor E-08459-10 from Cole-Parmer Instrument Company of Vernon Hills, Ill.

[0025] The % O₂ device **70** is capable of measuring the percent oxygen saturation in the blood (%O₂) signals and preferably includes a red (600-660 nm) and infra-red (880-1000 nm) LED emitter **72** and an LED (600-1000 nm) sensor **74** (FIG. 3). The LED emitter **72** (FIG. 2) is preferably secured to the inner surface of the first layer **30** on the palmar side **36** of ring finger phalange portion **11** of the glove probe **12** and the LED sensor **74** (FIG. 3) is preferably secured to the inner surface on the dorsal surface **38** of the ring finger phalange portion **11** of the glove probe such that the LED emitter faces the LED sensor. The LED emitter **72** is connected to a pair of wires **76** which extend between and electrically connect the LED emitter and the female connection plug **48**. The LED sensor **74** is connected to a pair of wires **78** which extend between and electrically connect the LED sensor and the female connection plug **48**. The % O₂ device **70** is preferably made of parts similar, or identical, to parts of the Nonin Onyx blood flow and oxygen % reader, model No. 8500M from Nonin Medical, Inc., of Plymouth, Minn., or the DS-100A oxymeter device made by Nellcor.

[0026] The auscultation device **80** (FIG. 2) is capable of detecting the sound waves local to the patient's heart and lungs and preferably includes an acoustical coupler and microphone **82**, an air tube **84**, and a pair of wires **86**. The acoustical coupler and microphone **82** is preferably secured to the right side of the palm portion **1** of the palmar side **36** of the glove probe **12**, preferably on the first layer **30**. The acoustical coupler and microphone **82** is capable of collecting and amplifying sound waves in relative close proximity to the acoustical coupler and microphone. The air tube **84** includes a first end **84a** and a second end **84b**. The first end **84a** of the air tube **84** is preferably connected to the acoustical coupler and microphone **82** and the second end **84b** is adaptable for connection with a stethoscope. The air tube **84**, thus when connected to a stethoscope, extends between and provides audio communication between the acoustical coupler and microphone **82** and the stethoscope. The pair of wires **86** extend between and electrically connect the acoustical coupler and microphone **82** and the female plug **48**. The auscultation device **80** is preferably made of parts similar, or identical, to parts of the EG Company microphone 9445 from the Electrical Gold Co. Of Scottsdale, Ariz.

[0027] The glove probe **12** could be manufactured by any suitable method. In one method, the glove probe **12** is manufactured by securing, by any suitable means, the wires, sensors, and other components to a glove, preferably made of cloth, leather or other binding material (i.e., the first layer **30**). It should be noted that the wires and/or sensors could be made using flexible circuit technology, such as by using a

conductive printable ink. The components of the glove probe **12** that do not extend past the second layer **32** are then covered by the second layer **32** in a suitable manner, such as by spraying or dip coating. The components of the glove probe **12** that do extend past the second layer could be covered with a removable protective covering during the formation of the second layer **32** and then removed to expose these components to the environment.

[0028] The cable **14** includes a first male plug **14a** (FIG. 1), which plugs into male receptors on the female connection plug **48** on the glove probe **12**, and a second male plug **14b** which plugs into male receptors on female connection plug **19** on the interface unit **20**. The cable **14** preferably includes a plurality of electrical wires and air tubes which extend between plugs **14a** and **14b** to provide electrical, audio, and fluid communication between the glove probe **12** and the interface unit **20** when the male plugs **14a** and **14b** are plugged into their respective female connection plugs **48** and **19**. It should be understood that the cable **14** could be rendered unnecessary if wireless technology were used to transfer information between the probe **12** and the interface unit **20**.

[0029] The interface unit **20** (FIG. 1) includes circuitry and components for transmitting diagnostic information, via a distal data stream, from the probe **12** to the command center **22**, the PC **24** or the readout apparatuses **26a-26e**. While any suitable interface unit **20** can be employed, examples of suitable interface units are described in more detail in U.S. Pat. Nos. 6,224,548 and 6,248,064. Alternatively, the interface unit could be incorporated into a palm pilot or cell phone device.

[0030] The manner of operation of the system **10** will now be described. The patient places the glove probe **12** over his or her right hand so that each of the patient's fingers are received within a respective one of the phalange portions **5-13**. The glove probe **12** can then preferably be tightened around the patient's wrist by any suitable means such as a velcro strap. The glove probe **12** is then connected to interface unit **20** by cable **14**.

[0031] EKG Diagnostic Information

[0032] To obtain EKG diagnostic information, the palmar side **36** of the glove probe **12** is placed over the patient's chest area proximate to the patient's heart. The sensors **40a-40j** are located at strategic positions on the glove probe **12**, as described above, to enable ten leadwires to generate at least an eleven lead EKG when the glove probe **12** is placed over the patient's left breast as will be explained in more detail below.

[0033] With the glove probe **12** placed in a normal manner over the left breast, it is believed that at least the following leadwires are possible:

[0034] LL acting leadwire: Sensor **40a** on the tip portion of the pinky finger phalange **13** is positioned under the left breast.

[0035] LA (left arm) acting leadwire: Sensor **40i** on the center of the palmar portion of the glove probe **12** is positioned above the left breast at the left shoulder quadrant.

[0036] RA (right arm) acting leadwire: Sensor **40j** at the wrist portion of the glove probe **12** is positioned above and into the right shoulder quadrant.

[0037] C leadwire (ground wire): Sensor **40g** on the palm portion, at the root of the index finger, of the glove portion **12** is positioned at the right sternal border.

[0038] The electrodes and leadwires connecting RA, LL and LA along with the ground or C leadwire would provide all the six limb leads, I, II, III and aVR, aVL, aVF.

[0039] Pre-Cordial Leads: Electrodes and leadwires connecting **40c**, **40d**, **40e**, **40f**, **40g**, and **40h** would provide V1, V2, V3, V4 and V5 pre-cordial leads (V leads) directly by the placement of the glove probe **12** on the left side of the person's chest.

[0040] The lead V6 could be computed by derivation, from the vector forces oriented towards the other five V leads, allowing a 12 lead EKG to be generated.

[0041] It should also be noted that, in the event that distortion of the EKG waveform occurs due to misplacement of the glove EKG sensors **40a-40j**, correction of such could be accomplished using waveform modification circuits located at the command center **22**. Such waveform modification circuitry can accomplish distortion correction utilizing waveshaping techniques which filter, compare, and re-shape into readable data.

[0042] The EKG currents, or leads, detected from the sensors **40a-40j** are transmitted to the female connection plug **48**, and through the cable **14** to the interface unit **20** where they can be sent to the command center **22**, PC **24**, or to the EKG readout apparatus **26a**, preferably in a digital data stream.

[0043] In an alternative embodiment shown in FIG. 4, a glove probe **112** is provided with a somewhat longer index finger phalange portion **107** so that it is about the same length as, or as shown, longer than, the index finger phalange portion **7** of glove probe **12**. Preferably, the index finger phalange portion **107** of the glove probe **112** is about 2-4 centimeters longer than the index finger phalange portion **7** of the glove probe **12** shown in FIGS. 2 and 3. In addition to sensors **40a-j**, glove probe **112** further includes EKG sensor **40k** disposed above sensor **40c** at the tip of index finger phalange portion **107**. Sensor **40k** is provided to record the V6 lead directly, thereby alleviating the need to derive the V6 lead by computation/deviation from the V1-V5 leads.

[0044] Blood Pressure and Pulse Rate Diagnostic Information

[0045] To obtain blood pressure and pulse rate diagnostic information, when the glove probe **12** wrist portion **3** is tightened around the patient's wrist, the air bladder **56** is ready to accept air pressure from an associated air pump, preferably contained within the interface unit **20**. The air pump then transmits inflation fluid, such as air, via the cable **14** and air tube **60**, to the air bladder **56** to inflate the air bladder. Inflation of the air bladder **56** obliterates the radial artery. As the air bladder **56** releases the inflation fluid, pulse sound waves are acoustically picked-up by acoustical coupler **58** and are sent over the air tube **60** to the female connection plug **48**, and through the cable **14** to the interface unit **20** where they can be sent to the command center **22**, PC **24**, or to the blood pressure and pulse rate readout **26b**, preferably in a digital data stream, as discussed above.

[0046] Body Temperature Diagnostic Information

[0047] To obtain body temperature diagnostic information, the middle finger phalange portion **9** of the glove probe **12** is placed in an appropriate area, such as under the patient's tongue, for a period of time sufficient to receive temperature signals from the thermistor **66**, preferably about one minute. The temperature signals from the temperature device **64** can be transmitted to the female connection plug **48**, and through the cable **14** to the interface unit **20** where they can be sent to the command center **22**, PC **24**, or to the temperature readout apparatus **26c**, preferably in a digital data stream.

[0048] % O₂ Diagnostic Information

[0049] To obtain % O₂ diagnostic information, the red LED emitter **72** (FIG. 2) emits red and infra-red light toward the LED sensor **74**. When the light from the LED emitter **72** is passed through the patient's finger (non-painted finger nails only) at the nail, the LED sensor **74** detects the color light waves present. These signals are translated from light intensity and color quality to oxygen levels. More oxygen yields a light red blood while less oxygen produces a darker red to purple blood. It should be noted that pulse rate can also be ascertained from these readings.

[0050] The % O₂ signals from the % O₂ device **70** are then sent to the female connection plug **48**, and through the cable **14** to the interface unit **20** where the % O₂ signals can be sent to the command center **22**, PC **24**, or to the % O₂ readout apparatus **26d**, preferably in a digital data stream.

[0051] Auscultation Diagnostic Information

[0052] To listen to the heart and lungs of the patient, the glove probe **12** is moved over the patient's body to enable the acoustical coupler and microphone **82** to pick up, or hear, sound waves from the patient's heart and lungs, much like a stethoscope would. The sound waves are then transmitted to the female connection plug **48**, via the pair of wires **86**, and then through the cable **14** to the interface unit **20**, where they can be sent to the command center or PC **24**, preferably in a digital data stream as described above. Alternatively, the sound waves from the acoustical coupler of the acoustical coupler and microphone **82** could also be conducted via air tube **84** to a stethoscope **26e**, as described above.

[0053] Oral Communication

[0054] To communicate orally with a remote location, such as the command center **22**, a speaker/microphone **61** (FIG. 1) is provided, preferably on the interface unit **20**, to transmit and receive sound waves. It should be noted that the interface unit **20** may not be able to transmit or receive sound waves via speaker/microphone **61** when processing diagnostic information from the EKG diagnostic device, the blood pressure device **54**, the temperature device **64**, the % O₂ device **70** and/or the auscultation device **80**.

[0055] In an alternative embodiment, a diagnostic probe could be provided comprising a pad that contains a plurality of EKG sensors, such as ones like sensors **40a-40j** and **40k**, mounted on a first side of the pad and a second plurality of sensors, such as ones like sensors **40i** and **40j**, mounted on the other side of the pad. The pad could comprise one or more layers, preferably made of rubber or a rubber-like material, such as Nitrile. The probe could be provided with one or more handles and/or straps to allow it to be directly

applied on a person's chest to enable recollection of EKG leads. The probe would be applied directly on a person's chest in substantially the same orientation as probes **12** and **112** so that the EKG sensors on the first side of the pad are placed in substantially the same orientation on a person's chest as sensors **40a-40h** and **40k** would be when using probes **12** and **112**.

[0056] Other sensors, such as ones like sensors **40i** and **40j**, could be contacted by the back of the patient's hands by placing the patient's right or left hand over the back surface of the probe. The probe could be provided with suitable circuitry to enable the EKG currents or leads detected from the sensors to be transmitted to an interface unit where they can be sent to a command center, PC, or to an EKG readout apparatus in substantially the same manner as discussed above.

[0057] While the best modes for carrying out the invention have been described in detail, those familiar with the art to which the invention relates will appreciate other ways of carrying out the invention defined by the following claims. For instance, the placement of the diagnostic devices on the probes **12** and **112** and/or specific design of the diagnostic devices could vary from that described above. For instance, the EKG device could have more or fewer sensors or the sensors could be located differently than that described above. Moreover, the glove probes **12** and **112** could be adapted to be worn on the patient's left hand.

What is claimed is:

1. A system for collecting diagnostic information and transmitting the diagnostic information to a remote location, the system comprising:

a member contoured to at least a portion of a person's hand, the member comprising at least an EKG diagnostic device, the diagnostic device comprising at least eight EKG sensors; and

an interface unit in electrical communication with the member, wherein the interface unit is capable of transmitting information to a remote location.

2. The system of claim 1 wherein the member comprises a palm portion, a wrist portion and a plurality of phalange portions.

3. The system of claim 2 wherein the EKG sensors are located on the member on at least two of the palm portion, the wrist portion, and at least one of the phalange portions.

4. The system of claim 3 wherein the EKG sensors are located on the member on the palm portion, the wrist portion and at least one of the phalange portions.

5. The system of claim 2 wherein the EKG diagnostic device comprises at least 10 sensors.

6. The system of claim 5 wherein eight of the sensors are located on the member and extend in a first direction away from the member, and the other two sensors are located on the member and extend in a second direction away from the member.

7. The system of claim 5 wherein the EKG diagnostic device comprises 11 sensors.

8. The system of claim 7 wherein the EKG diagnostic device comprises nine sensors located on the palm portion of the member extending away from the palm portion in a first direction and two sensors located on the palm portion of the member extending away from the palm portion in a second direction.

9. The system of claim 2 wherein the plurality of phalange portions comprise an index finger phalange portion and a middle finger phalange portion, wherein the index finger phalange portion is at least as long as about the middle finger phalange portion of the member.

10. The system of claim 9 wherein the index finger phalange portion is longer than the middle finger phalange portion of the member.

11. The system of claim 2 wherein the plurality of phalange portions comprise an index finger phalange portion and a middle finger phalange portion, at least four of the EKG sensors are located on the index finger phalange portion of the member.

12. The system of claim 9 wherein at least five of the EKG sensors are located on the index finger phalange portion of the member.

13. The system of claim 2 wherein the plurality of phalange portions comprise a thumb portion, with at least one of the EKG sensors being located on the thumb portion of the member.

14. The system of claim 2 wherein the plurality of phalange portions comprise a pinky finger portion, with at least one of the EKG sensors being located on the pinky finger portion of the member.

15. The system of claim 2 wherein at least one of the EKG sensors is located on a palmar surface of the palm portion of the member.

16. The system of claim 15 wherein at least one of the EKG sensors is located on a dorsal surface of the palm portion of the member.

17. The system of claim 15 wherein at least one of the EKG sensors is located on an interior surface of the wrist portion of the member.

18. The system of claim 1 wherein the member has a shape that corresponds to at least a substantial portion of a person's hand such that the member is capable of being worn on a person's hand.

19. The system of claim 18 wherein the member has a portion shaped to contour to a person's palm.

20. The system of claim 18 wherein the member has a portion shaped to contour to a person's finger.

21. The system of claim 20 wherein the member has a portion shaped to contour to a person's palm.

22. The system of claim 18 wherein the member comprises a palm portion.

23. The system of claim 22 wherein the member further comprises at least two phalange portions.

24. The system of claim 23 wherein the member comprises a glove.

25. The system of claim 18 wherein the member comprises a plurality of diagnostic devices.

26. The system of claim 25 wherein the plurality of diagnostic devices includes the EKG diagnostic device, a blood pressure and pulse diagnostic device and a temperature device.

27. The system of claim 26 wherein the plurality of diagnostic devices further includes a percent O₂ diagnostic device.

28. The system of claim 27 wherein the plurality of diagnostic devices further includes an auscultation device.

29. The system of claim 25 wherein the plurality of diagnostic devices comprises the EKG diagnostic device, a blood pressure and pulse rate device, a temperature device, a percent O₂ device, and an auscultation device.

30. The system of claim 1 wherein the EKG diagnostic device comprises at least 10 sensors.

31. The system of claim 1 wherein the EKG diagnostic device comprises 11 sensors.

32. The system of claim 18 wherein the EKG diagnostic device comprises at least 10 sensors.

33. A system for collecting diagnostic information and transmitting the diagnostic information to a remote location, the system comprising:

a member comprising an EKG diagnostic device, the EKG diagnostic device comprising at least eight EKG sensors located on the member; and

an interface unit in electrical communication with the member, the interface unit capable of transmitting information to a remote location.

34. The system of claim 33 wherein the member comprises a palmer surface portion and a dorsal surface portion, the palmer surface portion having a first side and a second side.

35. The system of claim 34 wherein the eight sensors are located on the palmer surface portion.

36. The system of claim 35 wherein six of the eight sensors extend away from the dorsal surface portion and two of the eight sensors extend toward the dorsal surface portion.

37. The system of claim 34 wherein the EKG diagnostic device comprises 10 sensors.

38. The system of claim 37 wherein eight of the ten sensors extend away from the dorsal surface portion and two of the eight sensors extend toward the dorsal surface portion.

39. The system of claim 37 wherein the member comprises a glove.

40. The system of claim 39 wherein the EKG diagnostic device comprises 11 sensors.

41. The system of claim 40 wherein the member comprises a palm portion, a wrist portion and a plurality of phalange portions.

42. The system of claim 41 wherein the member has a shape that corresponds to at least a substantial portion of a person's hand such that the member is capable of being worn on a person's hand.

43. The system of claim 42 wherein the plurality of phalange portions comprise an index finger phalange portion and a middle finger phalange portion, wherein the index finger phalange portion is at least as long as about the middle finger phalange portion of the member.

44. The system of claim 43 wherein the index finger phalange portion is longer than the middle finger phalange portion of the member.

45. The system of claim 44 wherein at least five of the EKG sensors are located on the index finger phalange portion of the member.

46. The system of claim 45 wherein the member comprises a glove.

47. A system for collecting diagnostic information and transmitting the diagnostic information to a remote location, the system comprising:

a member contoured to at least a portion of a person's hand, the member comprising at least eight sensors; and

an interface unit in electrical communication with the member, wherein the interface unit is capable of transmitting information to a remote location.

48. A diagnostic probe comprising:

a member comprising an EKG diagnostic device, the EKG diagnostic device comprising at least eight EKG sensors located on the member.

49. The probe of claim 48 wherein the member is contoured to at least a portion of a person's hand.

50. The probe of claim 49 wherein the EKG diagnostic device comprises at least 10 sensors.

51. The probe of claim 50 wherein eight of the sensors are located on the member and extend in a first direction away from the member, and the other two sensors are located on the member and extend in a second direction away from the member.

52. The probe of claim 49 wherein the EKG diagnostic device comprises 11 sensors.

53. The probe of claim 52 wherein the EKG diagnostic device comprises nine sensors located on the palm portion of the member extending away from the palm portion in a first direction and two sensors located on the palm portion of the member extending away from the palm portion in a second direction.

54. The probe of claim 52 wherein the plurality of phalange portions comprise an index finger phalange portion and a middle finger phalange portion, wherein the index finger phalange portion is at least as long as about the middle finger phalange portion of the member.

55. The probe of claim 54 wherein the index finger phalange portion is longer than the middle finger phalange portion of the member.

56. The probe of claim 50 wherein the plurality of phalange portions comprise an index finger phalange portion and a middle finger phalange portion, at least four of the EKG sensors are located on the index finger phalange portion of the member.

57. The probe of claim 54 wherein at least five of the EKG sensors are located on the index finger phalange portion of the member.

58. The probe of claim 50 wherein the plurality of phalange portions comprise a thumb portion, with at least one of the EKG sensors being located on the thumb portion of the member.

59. The probe of claim 50 wherein the plurality of phalange portions comprise a pinky finger portion, with at least one of the EKG sensors being located on the pinky finger portion of the member.

60. The probe of claim 50 wherein at least one of the EKG sensors is located on a palmer surface of the palm portion of the member.

61. The probe of claim 60 wherein at least one of the EKG sensors is located on a dorsal surface of the palm portion of the member.

62. The probe of claim 60 wherein at least one of the EKG sensors is located on an interior surface of the wrist portion of the member.

63. The probe of claim 50 wherein the member has a shape that corresponds to at least a substantial portion of a person's hand such that the member is capable of being worn on a person's hand.

64. The probe of claim 63 wherein the member comprises a glove.

65. The probe of claim 49 wherein the member comprises a plurality of diagnostic devices.

66. The probe of claim 65 wherein the plurality of diagnostic devices includes the EKG diagnostic device, a blood pressure and pulse diagnostic device and a temperature device.

67. The probe of claim 66 wherein the plurality of diagnostic devices further includes a percent O₂ diagnostic device.

68. The probe of claim 67 wherein the plurality of diagnostic devices further includes an auscultation device.

69. The system of claim 65 wherein the plurality of diagnostic devices comprises the EKG diagnostic device, a blood pressure and pulse rate device, a temperature device, a percent O₂ device, and an auscultation device.

70. A method of obtaining and transmitting medical diagnostic information from a remote location, the method comprising:

providing a member comprising at least an EKG diagnostic device, the diagnostic device comprising at least eight EKG sensors;

using the member to collect medical diagnostic information from a first person at a remote location.

71. The method of claim **70** wherein the diagnostic information is transmitted from the first location to a second location.

* * * * *

专利名称(译)	远程诊断设备		
公开(公告)号	US20020045805A1	公开(公告)日	2002-04-18
申请号	US10/024105	申请日	2001-12-18
[标]申请(专利权)人(译)	INEEDMD.COM		
申请(专利权)人(译)	INEEDMD.COM INC.		
当前申请(专利权)人(译)	INEEDMD.COM INC.		
[标]发明人	GOPINATHAN GOVINDAN TILFORD ARTHUR R		
发明人	GOPINATHAN, GOVINDAN TILFORD, ARTHUR R.		
IPC分类号	A61B5/00 A61B5/0205 A61B5/022 A61B5/024 A61B5/0408 A61B7/00		
CPC分类号	A61B5/0002 A61B5/02055 A61B5/021 A61B5/022 A61B5/024 A61B5/02438 A61B2562/168 A61B5/04085 A61B5/1455 A61B5/14552 A61B5/6806 A61B7/003 A61B7/04 A61B5/0404		
其他公开文献	US7112175		
外部链接	Espacenet USPTO		

摘要(译)

一种系统 (10) , 探测器和/方法, 用于收集多个诊断信息并将诊断信息发送到远程位置。系统 (10) 包括与人的手的至少一部分构成轮廓的构件 (12) , 以及与构件 (12) 电连通的接口单元 (20) 。接口单元 (20) 能够将信息发送到远程位置。构件 (12) 包括至少八个传感器。

