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(54) **METHOD AND APPARATUS FOR MONITORING AND TREATING SUDDEN INFANT DEATH SYNDROME**

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This patent is subject to a terminal disclaimer.

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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,306,567 A		12/1981	Krasner	600/484
4,738,266 A		4/1988	Thatcher	600/473
4,851,816 A		7/1989	Macias et al.	340/573.1
5,277,194 A		1/1994	Hosterman et al.	600/534
5,317,767 A		6/1994	Hargest et al.	5/725
5,360,008 A		11/1994	Campebell, Jr.	600/484
5,483,711 A		1/1996	Hargest et al.	5/725
5,505,199 A		4/1996	Kim	600/323
5,515,865 A		5/1996	Scanlon	600/534
5,615,688 A		4/1997	O'Dwyer	600/534
5,684,460 A		11/1997	Scanlon	340/573.1
5,727,562 A	*	3/1998	Beck	600/529
5,774,055 A		6/1998	Pomerantz	340/573.7
5,787,534 A		8/1998	Hargest et al.	5/726
5,796,340 A	*	8/1998	Miller	340/573.7
5,825,293 A		10/1998	Ahmed et al.	340/573.1
6,064,910 A		5/2000	Andersson et al.	607/20
6,150,941 A	*	11/2000	Geiger et al.	340/573.1
6,208,897 B1	*	3/2001	Jorgenson et al.	607/5

OTHER PUBLICATIONS

Schwartz et al., Prolongation of the QT Interval and the Sudden Infant Death Syndrome, New England Journal of Medicine 338(24), pp. 1709–1714, Jun. 11, 1998.

* cited by examiner

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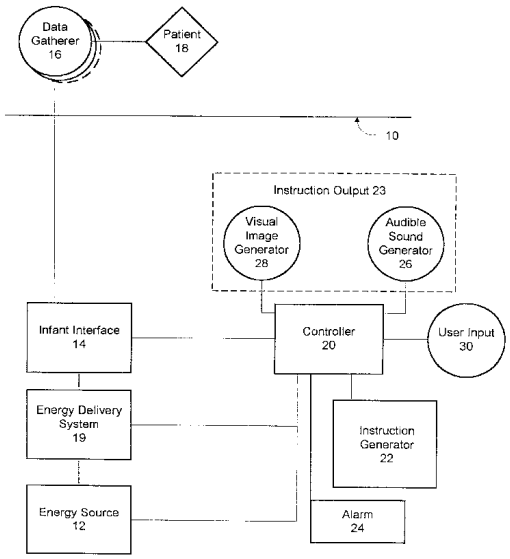
(57) **ABSTRACT**

This invention relates generally to a device for monitoring an infant for the onset of sudden infant death syndrome (SIDS), detecting the onset of SIDS and providing immediate treatment. In the broadest sense, the invention includes an apparatus for detecting and treating SIDS. The apparatus comprises a data gatherer for monitoring an infant parameter, a controller for communicating with the data gatherer, an energy source operable to power the data gatherer for monitoring the infant parameter and further operable to provide energy to an energy delivery system which is operable to deliver an electric shock from an energy source to an electrode interface, and an alarm which is activated by the controller for alerting a remote caregiver to the onset of symptoms associated with SIDS. The invention also relates to a method of operating a SIDS monitor. The method comprises the steps of monitoring an infant parameter, determining whether the monitored parameter is an acceptable value. If the monitored parameter is an acceptable value, then an alarm is activated to alert a caretaker of the onset of SIDS symptoms, if the monitored parameter is within an acceptable value, then continuing to monitor the infant parameter.

9 Claims, 2 Drawing Sheets



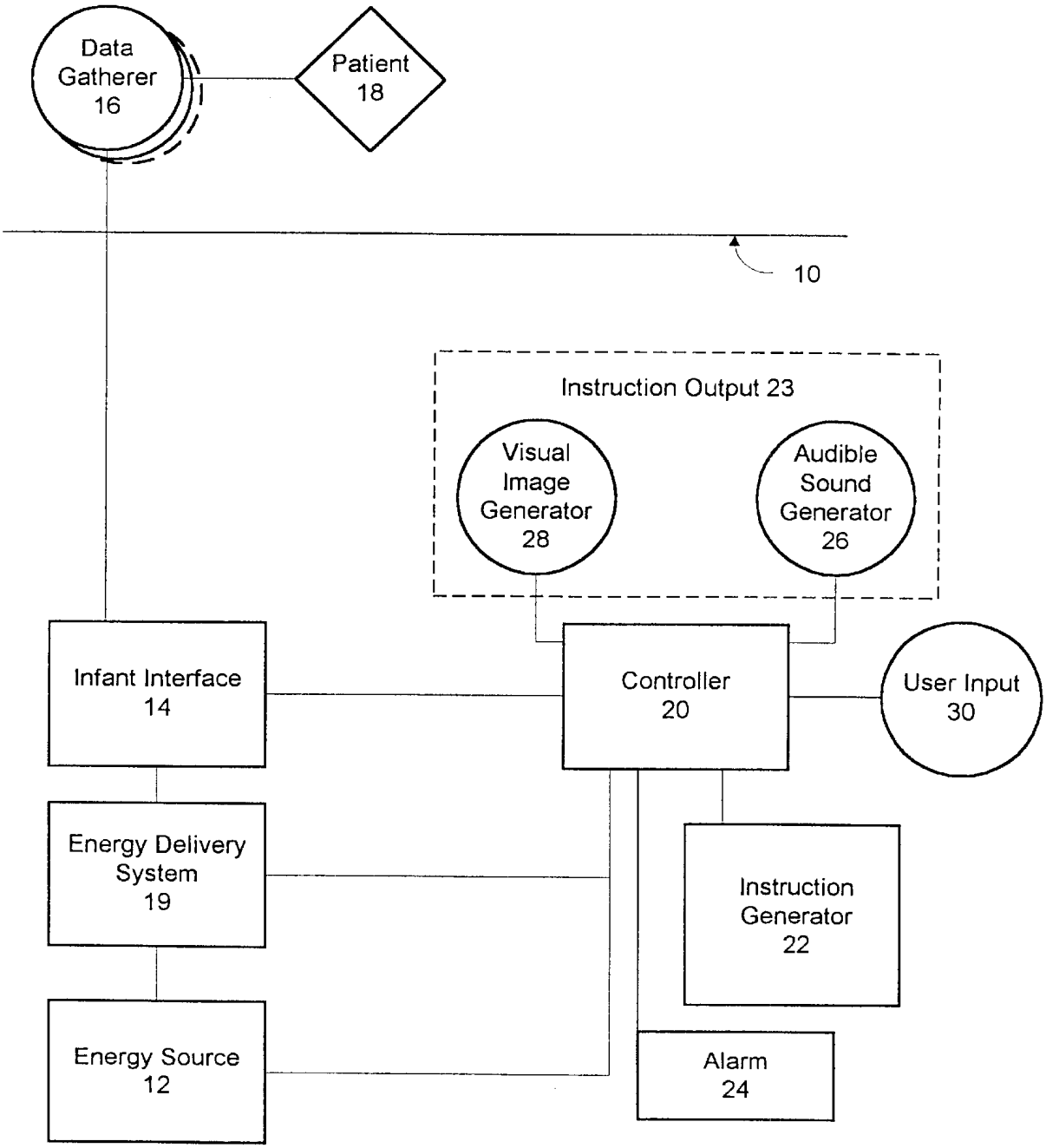

Data Gatherer 16
Patient 18
10
Instruction Output 23
Visual Image Generator 28
Audible Sound Generator 26
Infant Interface 14
Controller 20
User Input 30
Energy Delivery System 19
Instruction Generator 22
Energy Source 12
Alarm 24

FIG. 1

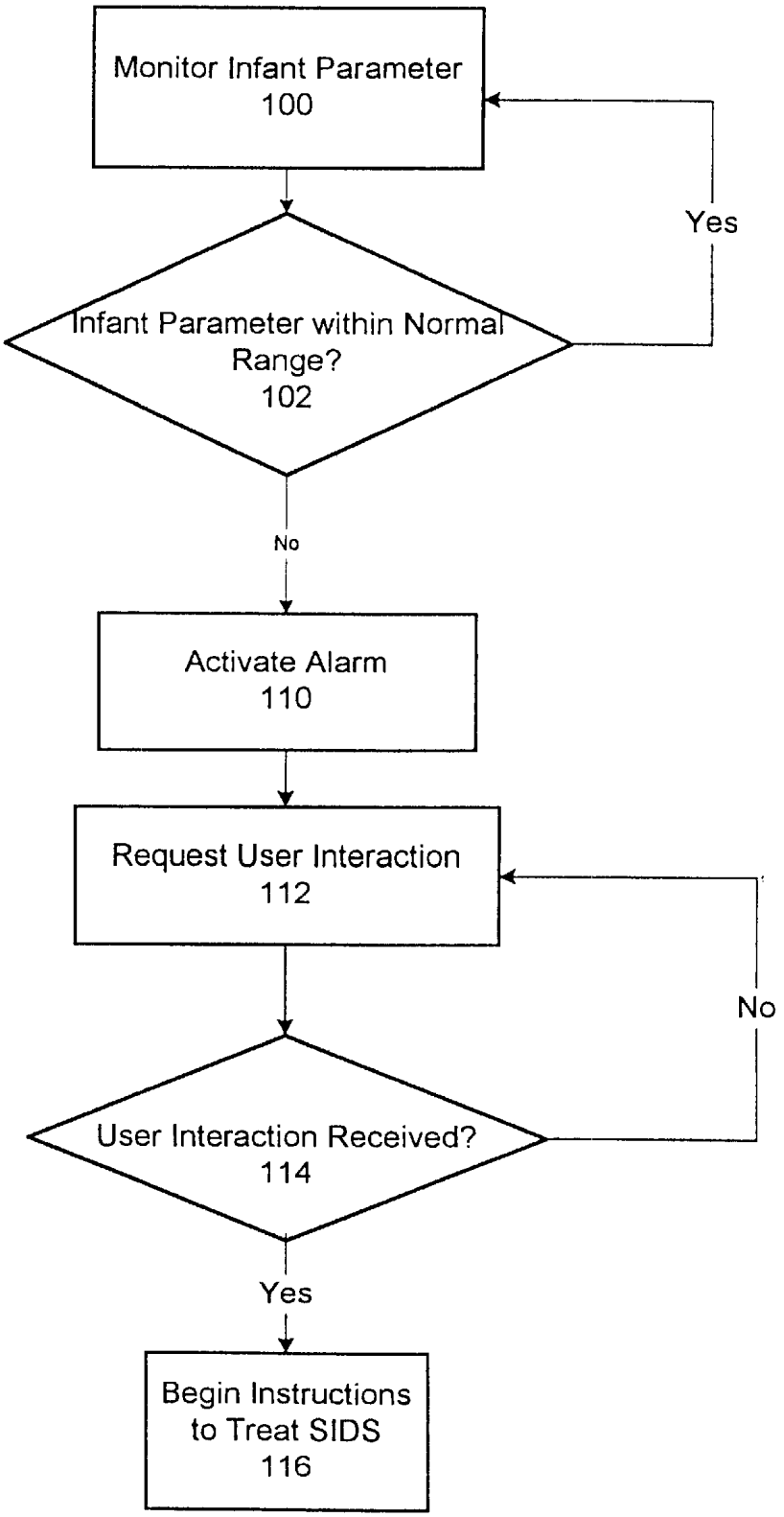

Monitor Infant Parameter
100
Infant Parameter within Normal Range?
102
Yes
No
Activate Alarm
110
Request User Interaction
112
User Interaction Received?
114
No
Yes
Begin Instructions to Treat SIDS
116

FIG. 2

METHOD AND APPARATUS FOR MONITORING AND TREATING SUDDEN INFANT DEATH SYNDROME

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a device for monitoring an infant for the onset of sudden infant death syndrome (SIDS), detecting the onset of SIDS and providing immediate treatment. Treatment could include instructions for administering cardiopulmonary resuscitation (CPR) as well as delivery of a defibrillation pulse from an automatic or semi-automatic external defibrilator (AED). The device may be a SIDS monitor as well as a SIDS trainer, or a SIDS monitor which has the ability to function as a trainer.

2. Description of the Prior Art

SIDS is a phenomenon which has been used to describe the sudden unexpected and unexplained death of an infant. Infant mortality is classified as SIDS when, despite a thorough investigation, no explanation can be found for the death of the infant. Currently, the incident of SIDS in the United States is approximately 1.6 per 1000 live births; upwards of 10,000 deaths per year in the United States alone. SIDS is the most common cause of death among children from one to six months of age.

Because SIDS is identified in situations where no explanation for the death can be found, the potential causes of SIDS has been largely speculative. Potential causes include cardiac disorders, respiratory abnormalities, gastrointestinal diseases, metabolic disorders, injury and child abuse.

Many devices have been developed that provide a way to monitor an infant for the onset of SIDS by detecting cessation of movement, cessation of respiration or detection of urination that may accompany agonal movement. Other devices have been developed to prevent SIDS from occuring, such as by providing an oxygenated mattress. The following summarizes a selection of previously patented approaches to SIDS detection and/or prevention.

U.S. Pat. No. 4,306,567 to Krasner describes a detector and monitoring device to be used to detect the onset of SIDS. The device of Krasner is an apnea monitor that is non-contacting. The device of Krasner detects the acoustical signal generated as a function of the breathing cycle to determine whether or not the infant is breathing.

U.S. Pat. No. 4,738,266 to Thatcher describes an apnea monitor. The device of Thatcher is in the form of a crib with a hood over the top. The hood collects the exhaled breath of in infant. Infrared energy is emitted into the hood and monitored such that, as long as CO_2 is present in the hood (from exhaled breath), the device continues in monitoring mode. However, if the level of CO_2 decreases there will be a corresponding change in the IR activity and an alarm will sound.

U.S. Pat. No. 4,851,816 by Macias et al. is directed to an apparatus for detecting the moment of urination for an infant. According to Macias, it is estimated that 85% of SIDS victims have some sort of agonal motor activity. Since urination would be expected to accompany agonal motor activity, by detecting the moment of urination, a parent would be alerted to the onset of SIDS and would attend to the infant. Additionally, a cardioverter is provided to stimulate conduction of tetanic contraction in an offending muscle by stimulating reflexive hyperdistension. One drawback of the device described by Macias is that it cannot detect the difference between urination as a result of agonal movement and urination generally. As a result, a parent might be watchful initially, but after a few days or weeks, would likely either discontinue using the device or would not respond immediately thereby eliminating the potential likelihood of discovering SIDS within the first few minutes.

U.S. Pat. No. 5,277,194 by Hosterman et al. is directed to a breathing monitor and stimulator. Hosterman provides an apparatus that is worn around the chest of the infant and monitors the breathing pattern. A bladder is provided in the device that can be cyclically operated to induce breathing when either a change in breathing rate is detected or cessation of breathing. An alarm may also sound when the device detects a change in breathing pattern, thus alerting a primary caregiver that a problem exists.

U.S. Pat. Nos. 5,317,767, 5,483,711 and 5,787,534 are a series of patents to Hargest et al. directed to a safety pad for use in a crib which prevents SIDS by ensuring an oxygenated breathing space beneath the infant. As noted in Hargest et al., the weight of an infant's head relative to the rest of the body is quite high. Further, the nect muscles of an infant are not well developed. Thus, if an infant is placed in the prone position for a nap (i.e., on their stomach) and they attempt to turn their head from one side to the other they could become stuck with their face pressed into the mattress due to lack of strength of their neck muscles. This would result in suffocation. Thus, the apparatus of Hargest et al. would prevent such suffocation by providing an oxygen saturated mattress.

U.S. Pat. No. 5,505,199 to Kim is a monitor which determines oxygen saturation and movement. When a change in oxygen saturation is detected along with lack of movement, the device brings a video image of the infant into the parent's room, thus enabling the parents to see the condition of the child.

U.S. Pat. No. 5,615,688 to O'Dwyer is directed to an apnea detection device. A strap is provided for the wearer's chest. The strap provides a detection mechanism in a housing for monitoring the respiration of an infant. A transmitter is also provided which transmits a signal to a receiver in the event that an anomoly in breathing is detected. Upon receipt of the signal from the transmitter the receiver emits an alarm to warn of the breathing anomoly.

U.S. Pat. No. 5,360,008 to Campbell Jr. is directed to a respiratory and cardiac monitor. Campbell Jr. monitors the electromagnetic permeability of the trunk, which changes during the respiratory cycle, to detect the respiratory cycle and cardiac cycle. A receiver/transducer is worn on a belt by the patient. The receiver/transducer communicates with a transmitter/transducer which is mounted on a suitable housing and disposed within close proximity to the receiver/transducer. An electronic signal which is modulated in its amplitude by the varying permeability of the patient's body (occurring during the respiration process) is sent by the receiver/transducer to the transmitter/transducer. The received signal is amplified and filtered to obtain a signal corresponding to the patient's pulse and the patient's respiration.

U.S. Pat. Nos. 5,515,865 and 5,648,460 to Scanlon is directed to a fluid-filled sensing pad for supporting an infant. The pad uses a transducer to detect movement or acoustic activity. When no movement or acoustic activity is detected a stimulator is activated to move the infant.

U.S. Pat. No. 5,774,055 by Pomerantz is directed to an infant monitoring device comprising a sensor connected to an alarm. The sensor can alert a parent if the infant assumes

a predetermined position. Alternatively, the sensor can alert a parent if the infant is in the same position for a period of time exceeding an amount provided for by the sensor.

U.S. Pat. No. 5,825,293 to Ahmed et al. is directed to a method and apparatus for monitoring breathing magnetically. A magnet is placed so that it moves in common with either the abdominal wall or the chest wall. A receiver is placed, for example, at the edge of the crib. As the magnet moves up and down with the infant's respiration, the receiver detects the resulting change in distance from the receiver. If the infant stops breathing, no change in distance is detected and an alarm is sounded.

One disadvantage of the prior art solutions is that the systems are easily activated by conditions other than the onset of SIDS. These false alarms could condition the caretaker to be less diligent in responding to the alarm and might result in an actual SIDS episode escaping detection.

As is evident by the prior art solutions, it has been hypothecated that SIDS is the result of apnea or suffocation. Recently, however, a study by Schwartz et al. indicated that, in many cases, SIDS victims have a history of long QT syndrome. Schwartz et al. "Prolongation of the QT Interval and the Sudden Infant Death Syndrome" NEJM 338(24):1709–1714 (1998). Schwartz et al. recorded ECGs for 34,442 newborn babies over a period of 18 years. The discovered that the infants that died from SIDS typically had a longer corrected QT interval that the survivors. Long QT is known to be a marker of cardiac electrical instability which indicates a predisposition to fatal cardiac arrhythmias. As a result, even if SIDS were detected by using one of the prior art solutions, a caretaker would stand by helpless to provide assistance and would have to wait until emergency medical personnel arrived.

As will be appreciated by those skilled in the art, for those SIDS occurrences that result from a cardiac arrhythmia, blood may no longer be pumping effectively. If blood is no longer pumping effectively, it is imperative that effective resuscitative efforts begin as soon after the onset of the condition as possible since brain damage can occur after the brain is deprived of oxygen for four to six minutes. Resuscitative efforts include CPR and defibrillation if a shockable cardiac arrhythmia exists.

What is needed is a device that monitors the respiration and/or cardiac activity of an infant identified with long QT syndrome who may be at high risk for SIDS and then provides an effective mechanism for initiating treatment until an emergency medical technician (EMT) arrives.

SUMMARY OF THE INVENTION

This invention is directed to a SIDS monitor. The monitor has an energy source, an interface and an audible sound generator, wherein the interface is in electrical communication with the energy source and a detector for detecting the onset of SIDS. The detector may be a cardiac monitoring device, an electroencephalogram (EEG) monitoring device, a respiratory monitoring device, a pulse monitoring device, a pulse oximeter, or a combination thereof. The SIDS monitor includes the ability to function as an automatic or semi-automatic defibrillator (AED). The SIDS monitor also has an instruction generator which communicates with the audible sound generator. The SIDS monitor may also have a visual image generator which communicates with instruction generator. The instruction generator generates audible prompts, visual images, or a combination thereof.

In the broadest sense, the invention includes an apparatus for detecting and treating SIDS. The apparatus comprises a data gatherer for monitoring an infant parameter, a controller for communicating with the data gatherer, an energy source operable to power the data gatherer for monitoring the infant parameter and further operable to provide energy to an energy delivery system which is operable to deliver an electric shock from an energy source to an electrode interface, and an alarm which is activated by the controller for alerting a remote caregiver to the onset of symptoms associated with SIDS. The invention also relates to a method of operating a SIDS monitor. The method comprises the steps of monitoring an infant parameter, determining whether the monitored parameter is an acceptable value. If the monitored parameter is an acceptable value, then an alarm is activated to alert a caretaker of the onset of SIDS symptoms, if the monitored parameter is within an acceptable value, then continuing to monitor the infant parameter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic representation of a SIDS monitoring system.

FIG. **2** is a flow chart demonstrating a SIDS monitor operating to gather information from the infant, detect the onset of SIDS and begin delivery of instructions to a caregiver for treating the infant.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** is a schematic block diagram of a SIDS monitoring system **10** according to a preferred embodiment of this invention. The SIDS system **10** comprises an energy source **12**. The energy source **12** powers the system during the monitoring phase and provides voltage or current pulses in the event the defibrillation function is deployed. An infant interface **14** is provided which connects the monitoring system **10** to the infant **18** by a monitoring connector of a data gatherer **16**. The interface **14** is configured so that it receives input from one or more data gathering device connectors and defibrillator connectors. The monitoring connector may be a single connector or a plurality of connectors.

When the interface **14** is adapted to connect to defibrillation electrodes, the interface communicates with a controller **20** which operates to selectively connect and disconnect energy source **12** to and from a pair of defibrillation electrodes electrically attached to the infant **18** to provide electrotherapy to the infant.

The data gathering devices **16** are used to monitor biological parameters of the infant **18**; the information gathered by the devices is transmitted to the monitor **10** for use in determining the onset of SIDS. For example, data gathering device **16** may be a pulse oximeter which is used to detect a change in blood oxygen level. Alternatively, a pulse detector may be provided to detect a cessation of the pulse. Cardiac monitoring electrodes may also be used to detect cardiac rhythm or EEG monitoring electrodes may be used to detect EEG.

It will be appreciated by those of skill in the art that a single set of electrodes can be used to monitor the cardiac function and then to deliver a defibrillation energy pulse, if required. In a preferred embodiment, however, a set of wireless monitoring electrodes are provided for monitoring. Ideally, the monitoring electrodes should be low cost and reusable.

Where separate cardiac monitoring electrodes are used, a separate set of defibrillation electrodes is provided in the

event defibrillation is required. The defibrillation electrodes would not be deployed unless a shockable rhythm is detected by the monitor **10**. The SIDS monitors **10** may have any one of the data gatherers, a combination of data gatherers, or all of the data gatherers **16** providing data to the controller **20** for determination of the onset of SIDS.

It is preferably, although not required, for data gathered using any of the above gatherers to be communicated to the SIDS monitor **10** without the use of wires. For example, appropriate mechanisms for communicating the data from the data gatherers includes, but is not limited to, light wave transmission (for example, IR, or other suitable light waves), radio wave transmission, audio wave transmission, or magnetic wave transmission. In the event the data gatherers **16** communicate data to the monitor **10** using these wireless techniques, it will be appreciated by those skilled in the art that interface **14** will be appropriately adapted to receive the information from the data gatherers **16**.

Additionally, controller **20** performs a protocol using information from an instruction generator **22** to provide instructions to the SIDS monitor operator. The instruction generator **22** may also activate protocol changes being performed by the SIDS monitor **10** based on information received from the controller **22**. For example, controller **20** may assess the rate of respiration or the nature of the cardiac rhythm detected, the amount of time that has passed or the number of consecutive, or total, shocks that have been delivered, or other information that may be provided in determining which protocol to follow. Additionally, the controller **20** may be operating based on a combination of stored or generated data and interactive data, which would be the case if the SIDS monitor was either a trainer or was being used in a training mode. The amount or level of instruction generated by the instruction generator **22** can be modified according to the particular needs of the end user or any protocol that may be followed by the organization controlling the operation of the SIDS monitor (for example, where the monitor **10** is available on a check-out basis from a local hospital).

Instructions may be delivered via a visual image generator **24**, such as by displaying, among other things, commands to the user (either written or graphic representations). The visual image generator **28** may be, for example, a liquid crystal display (LCD). Additionally, an audible sound generator **26** may be provided that broadcasts audible commands from the instruction generator **22**. Audible commands may include verbal commands directing the user in the proper sequence and timing for administering CPR or instructions for enabling the defibrillator functionality. Activation of the visual image generator **28** and the audible sound generator **26** is controlled by the controller **20** in response to the information received from the instruction generator **22**. Instruction generator **22** may be a set of software commands performed by controller **20**.

An alarm **24** is provided that communicates with the user when the SIDS monitor **10** detects the onset of SIDS related symptoms. The alarm **24** receives instructions from the controller. The alarm **24** may either be associated with the audible sound generator **26** such that an audible alarm is generated in the vicinity of the infant **18** and the monitor **10** when the monitor detects the onset of SIDS. In a more preferred embodiment, the alarm **24** functions like a silent alarm by activating a system to alert a remote caretaker that the infant **18** is in distress. In an even more preferred embodiment, the alarm **24** activates a pager, or similar device, which is carried by the caretaker so that the caretaker will be alerted to the infant distress even when the caretaker is outside audible range of the SIDS monitor **10**.

Where the monitor **10** is set-up to provide defibrillator functionality on an automatic basis, it will be appreciated that the device will begin AED functionality without user intervention as described above. However, the device will, ideally, still provide some mechanism to advise the caretaker that the defibrillation operation has begun.

A memory device (not shown) may be provided for maintaining an active record of the monitored infant parameters for a period of time leading up to the onset of the SIDS symptoms, as well as a record of any parameters exhibited until the infant is transferred to an advanced life care system. In a preferred embodiment, the memory device is either removable or can be downloaded from the monitor **10**, for example with the use of an IRDA port. Further, the memory should be capable of storing at least 3 hours of information, more preferably 60 minutes of data. In order to conserve storage space, it is anticipated that the memory will be written over as new data becomes available such that the data available on the device at any given time represents only the most recent data.

Turning to FIG. **2**, a flow chart demonstrates the operation of a SIDS monitor **10**. At least one infant parameter is monitored **100**. As discussed above, monitored parameters include monitored biological activities. These biological activities include, but are not limited to, respiration, heart rate, cardiac signal, EEG, and blood oxygen level. As described above, the infant parameter may be blood oxygen level, rate of respiration, cardiac signal, EEG signal, or pulse.

The monitor **10** receives the monitored patient parameter information and determines whether the parameter is within a normal range **102**. If the parameter is within a normal range, the monitor continues to monitor infant parameter **100** using real time data. The real time data can be sampled either continuously or at a reasonable sample rate. If at any time during the monitoring process the infant parameter is not within the normal range **102**, the monitor **10** activates an alarm **110**. As described above, the alarm could either be an audible alarm issued from the monitor **10** or the activation of a remote device such as a pager. The monitor **10** will then begin requesting the user to indicate his or her presence **112**. Presence may be indicated by, for example, providing user input at **30**. If user interaction is not received, then the monitor **10** will continue to request interaction. In a preferred embodiment, if user interaction is not detected within, for example, 2 minutes, an audible alarm will be generated. Additionally or in the alternative, the monitor **10** may activate a 911 system in order to ensure that medical treatment is received. As will be appreciated by those of skill in the art, the amount of time for response as well as the point at which a 911 system is activated could be modified depending upon the needs of the particular end user. For a detailed explanation of a Communication Network System used for defibrillators, see U.S. Pat. No. 5,782,878 to Morgan et al., the specification of which is incorporated herein.

As will be appreciated by those of skill in the art, the monitor **10** may be configured such that the 911 system is activated upon detection of infant distress (at step **110**). However, such a set-up may be less desirable in some instances since it will increase the likelihood that the 911 system may be erroneously activated. Accordingly, it is contemplated that providing a delay in the activation of the 911 system would be preferable since it would tend to eliminate false activations of the emergency response system.

Once the user arrives and interacts with the monitor **10** through, for example, user input **30**, the monitor **10** will begin to provide instructions to the user to treat the infant for SIDS.

The following examples provide more specific information about the operation of the monitor **10** once the user arrives and interactions with the monitor **10**.

In an embodiment where the SIDS monitor receives infant parameter data which does not correspond to the infant's cardiac signal, the user may be prompted via instruction output **23** to attempt to rouse the infant first. If that is not effective, the user may be prompted to call 911. Alternatively, the user may be instructed to press a user input button **30** which will enable the device to automatically contact 911. Thereafter, the user may be prompted to deploy the defibrillation electrodes. Once the defibrillation electrodes are deployed, the monitor **10** will determine the existence of a shockable rhythm. If a shockable rhythm is present, the monitor **10** will begin the instruction sequence for delivering a defibrillation shock, prompting the uesr to deliver the shock when the device is ready. After the shock is delivered, the monitor **10** will again assess the heart rhythm to determine if the rhythm has returned to a normal cardiac rhythm. If the rhythm has returned to normal, the monitor **10** may then instruct the user on delivery of CPR. An example of a protocol for delivery of infant CPR is provided in co-pending application serial number 09/308,263 to Snyder et al. entitled "External Defibrillator with CPR Prompts and ACLS Prompts and Method of Use" the specification of which is incorporated herein.

In an embodiment where the SIDS monitor receives infant parameter data which corresponds to the infant's cardiac signal, if the monitor **10** has detected an abnormal cardiac rhythm the user will be instructed to remove the monitoring electrodes and to attach the defibrillation electrodes. The monitor **10** may again analyze the cardiac rhythm using the defibrillation electrodes. If a shockable rhythm is detected, the monitor **10** will begin the instruction sequence for delivering a defibrillation shock, prompting the user to deliver the shock when the device is ready. After the shock is delivered, the monitor **10** will again assess the heart rhythm to determine if the rhythm has returned to a normal cardiac rhythm. If the rhythm has returned to normal, the monitor **10** may then instruct the user on the protocol for deliver of CPR if required. The monitor **10** may be set-up to activate the 911 system in the same manner as discussed in the previous example.

In another embodiment where the SIDS monitor receives infant parameter data which corresponds to the infant's cardiac signal and is capable of functioning as an automatic external defibrillator, once the monitor **10** has detected an abnormal cardiac rhythm, the monitor **10** will begin delivering a defibrillation shock. After the shock is delivered, the monitor **10** will again assess the heart rhythm to determine if the rhythm has returned to a normal cardiac rhythm. The monitor **10** may also be set up so that it automatically activates the 911 system when a shockable rhythm is detected.

It will be appreciated by those of skill in the art that in an embodiment where the SIDS monitor **10** receives infant parameter data which corresponds to the infant's cardiac signal along with non-cardiac infant parameter data, the monitor will behave as described above with respect to the monitors which receives cardiac data.

It should be appreciated that the scope of the invention is not limited to the embodiments described above. Various modifications and alterations might be made by those skilled in the art without departing from the spirit and scope of the present invention.

What is claimed:

1. An apparatus for detecting and treating SIDS, comprising:

a data gatherer for monitoring an infant parameter;

an alarm activated by a controller;

a controller operatively connected to the data gatherer and the alarm so as to activate the alarm if the monitored parameter is not within an acceptable value; and

an energy delivery system operable by the controller to deliver a defibrillation shock to an infant through an electrode interface if the monitored parameter is not within the acceptable value.

2. The apparatus of claim **1** wherein the data gatherers are selected from the group consisting of: pulse oximeters, respiratory detectors, pulse detectors, EEG detectors, or cardiac rhythm detectors.

3. The apparatus of claim **1** wherein the apparatus has a plurality of data gatherers in communication with the controller.

4. The apparatus of claim **1** wherein the alarm activates a pager.

5. The apparatus of claim **1** wherein the apparatus further comprises a communicator for activating an emergency response system.

6. The apparatus of claim **1** wherein the apparatus delivers instructions to a user through an instruction output.

7. The apparatus of claim **1** further comprising a memory device for storing infant parameter data.

8. The apparatus of claim **7** wherein the memory device is a removable memory device.

9. The apparatus according to claim **1**, wherein the energy delivery system automatically delivers the defibrillation shock if the monitored parameter is not within the acceptable value.

* * * * *

专利名称(译)	用于监测和治疗婴儿猝死综合症的方法和装置		
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[标]申请(专利权)人(译)	皇家飞利浦电子股份有限公司		
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发明人	JORGENSON, DAWN BLILIE GLINER, BRADFORD E		
IPC分类号	A61B5/00 A61N1/39		
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外部链接	Espacenet USPTO		

摘要(译)

本发明一般涉及一种用于监测婴儿发生婴儿猝死综合症（SIDS），检测SIDS发作和立即治疗的装置。在最广泛的意义上，本发明包括用于检测和治疗SIDS的装置。该装置包括用于监控婴儿参数的数据收集器，用于与数据收集器通信的控制器，可操作用于为数据收集器供电以监控婴儿参数的能量源，并且还可操作用于向能够在其中操作的能量输送系统提供能量。从能量源向电极接口传递电击，以及由控制器激活的警报器，用于警告远程护理人员发生与SIDS相关的症状。本发明还涉及一种操作SIDS监视器的方法。该方法包括监测婴儿参数，确定所监测的参数是否是可接受值的步骤。如果监测的参数是可接受的值，则如果监测的参数在可接受的值内，则激活警报以警告看护者SIDS症状的发作，然后继续监测婴儿参数。