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Phipps

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(54) **PERSONAL MEDICAL MONITORING UNIT AND SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(58) **Field of Search** 600/300, 301, 600/322, 595, 587, 316, 310; 128/900, 903-905, 920-925; 340/573.1-573.7; 607/32, 60; 342/457; 705/2-4; 455/404; 604/65

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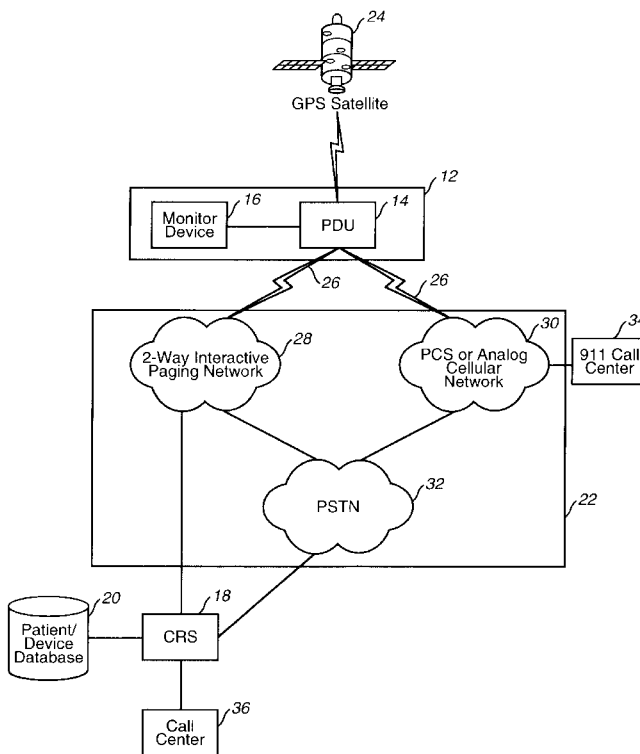
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(57) **ABSTRACT**

A portable unit worn by a subject, comprising a medical monitoring device, a data processing module with memory and transmitter for collecting, monitoring, and storing the subject's physiological data and also issuing the subject's medical alarm conditions via wireless communications network to the appropriate location for expeditious dispatch of assistance. The unit also works in conjunction with a central reporting system for long term collection and storage of the subject's physiological data. The unit may have the capability to automatically dispense chemicals that may alleviate or assist in recovery from an illness.

36 Claims, 3 Drawing Sheets



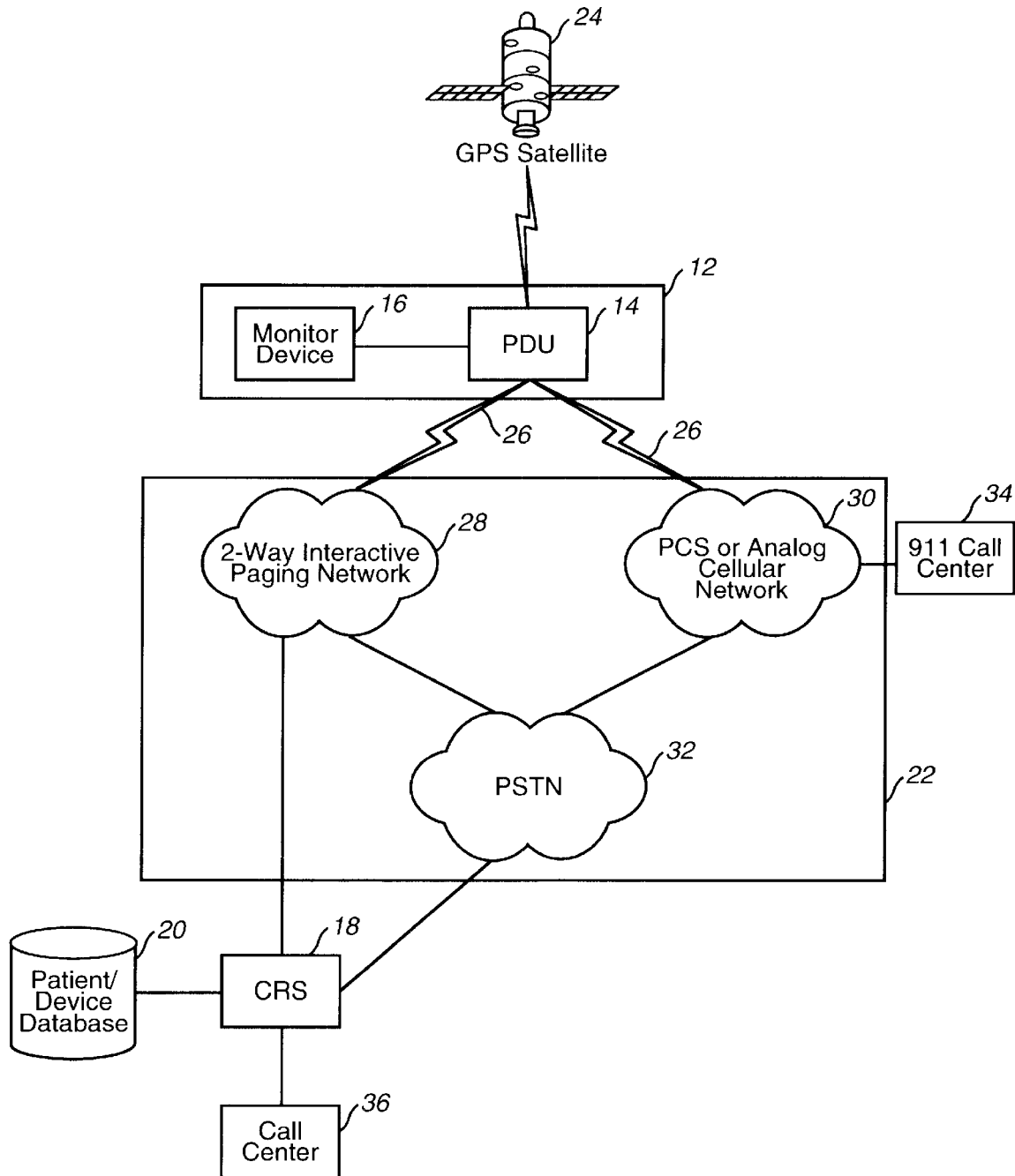


FIG. 1

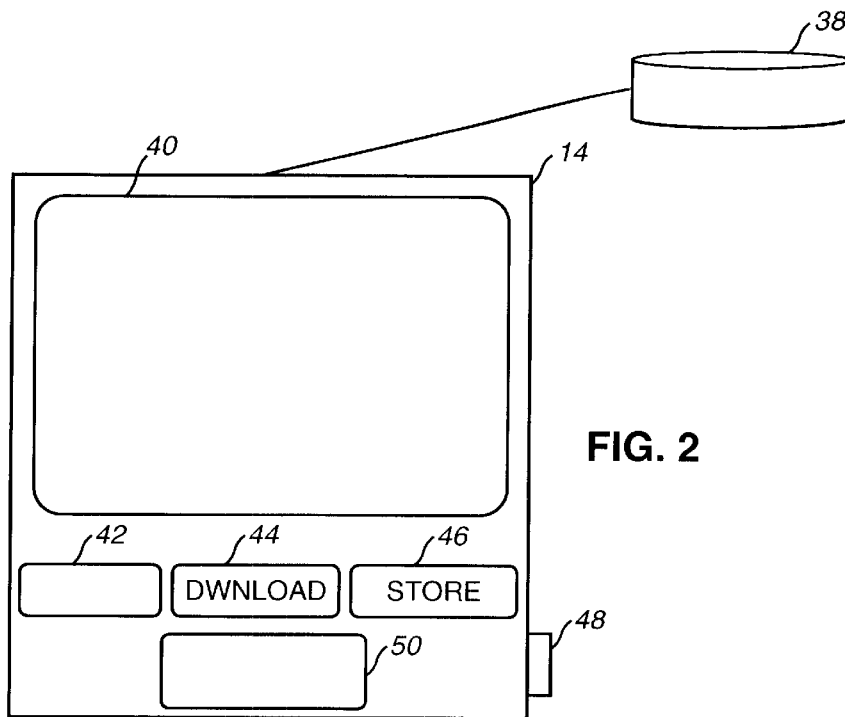


FIG. 2

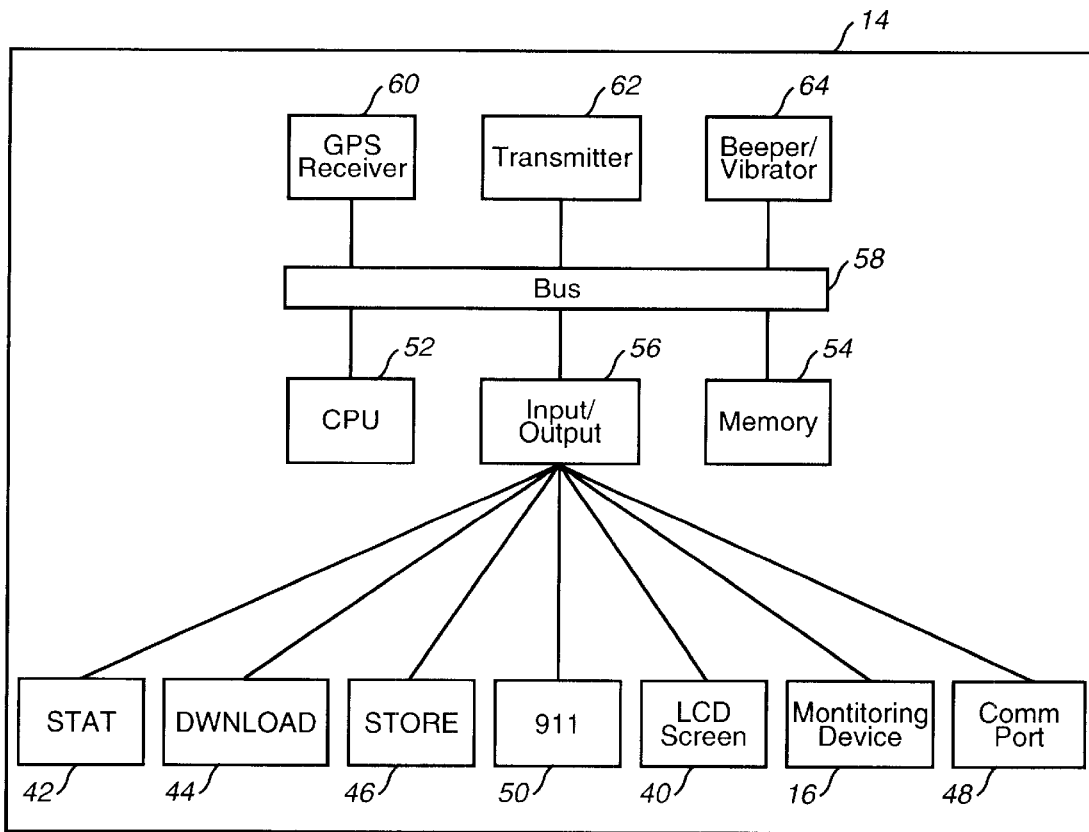


FIG. 3

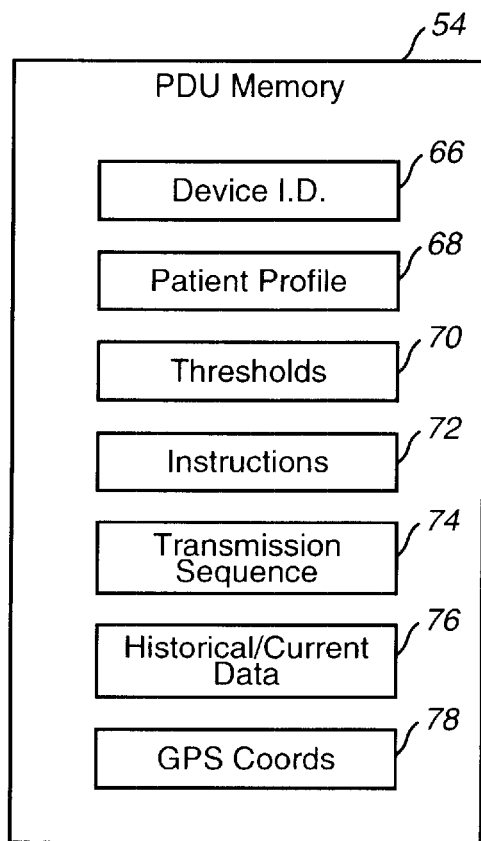


FIG. 4

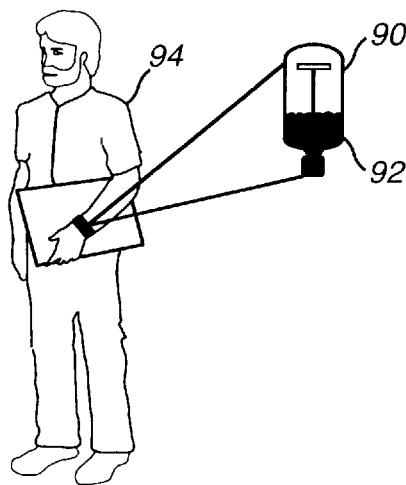


FIG. 5

PERSONAL MEDICAL MONITORING UNIT AND SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a medical monitoring unit or device for the continued examination and care of a subject. More particularly, the present invention is directed to a medical monitoring device and system for the continuous storing of a subject's current physiological or medical data, the evaluation of said data enabling the early detection of adverse health conditions should they arise, and the providing of real time notification of such health conditions to the appropriate person or persons such that a proper and expeditious response may be taken.

2. Prior Art

The benefits of being able to monitor and/or study various medical characteristics of a subject on a continuous basis, store and evaluate the data of those chosen aspects of the subject and initiate a particular response based on said evaluation are numerous. To accomplish such a feat in today's world would encompass a huge undertaking.

The most obvious use of the present invention would be in connection with individuals suffering from specific health problems. Any individual with a continuing illness such as heart disease or asthma, ideally needs to be monitored continually for the slightest recurring signs of those health problems. Although the medical industry has many tools for monitoring an individual's activities and evaluating their personal responses to those activities, a person must traditionally travel periodically to a medical facility in order to obtain the proper medical care and diagnosis. Once at the facility, the individual is often hooked up to some type of a monitoring instrument and is thereafter usually confined to the particular area for the duration of the session. In some cases, this may be several hours or more. While the monitoring equipment is attached to the individual, movement by the individual is either severely restricted or not permitted at all.

Moreover, the results of these existing procedures and tests, when they are finally reviewed and interpreted by the doctor or medical technician, only give a glimpse of the subject's activity and physiological data at the time of the monitoring. Today's monitoring equipment does not provide the physician or health care providers with nearly enough information on the subject's general conditions prior to or after the tests are performed. That is, in order to be able to establish a more accurate medical diagnosis, doctors would greatly benefit from observing the history of a subject's medical data for a longer duration than the time permitted in the medical facilities. For various obvious reasons, such as the time needed to perform these tests, the costs of the tests and the headaches of trying to schedule the required number of visits which would enable a full evaluation of a subject's health history, such an observation of an individual would be infeasible.

Another major problem for many individuals is getting prompt medical attention as soon as a medical problem occurs. The providing of expeditious medical care is sometimes crucial to the individual's ability to recover. For example, a heart attack victim has a significantly greater chance of full recovery if medical attention is received within the first few hours after signs of a heart attack are detected or the actual heart attack has occurred. Unfortunately, most of the time, an individual does not

recognize the symptoms which would indicate that they were at risk. Often, by the time the individual does realize that help is needed, they are incapable of calling for emergency assistance. Yet another problem is providing the emergency medical services attending the individual with quick and accurate information which would lead to a successful diagnosis and treatment of the problem.

Portable EKG monitoring devices are known which collect medical data on cardiac functions from a plurality of sensors. After a predefined period, normally twenty-four hours, the data is transferred to a computer or strip recorder for analysis by skilled medical personnel in a conventional manner. Although such a device is very useful, there is still a time delay before the collected data is reviewed and analyzed.

Accordingly, there is still a need for a service that can provide for the continuous collection, monitoring and storing a subject's physiological data while allowing the subject complete freedom and mobility.

SUMMARY OF THE INVENTION

The present invention is directed to the continuous real time collection, monitoring and storage of an individual's physiological data without interrupting or incapacitating any aspect of the individual's everyday life. In addition, the monitoring device and system of the present invention can send out a distress call when the individual's vital signs reach a dangerous level or stop altogether.

The present invention uses a standard microcomputer in connection with various types of medical monitoring devices, and utilizes wireless communications technology known in the art. More particularly, the monitoring device employs software having the capability to monitor a subject's vital signs, record, collect and store the data. The stored information may then be downloaded into a computer to be analyzed. The computer may be located anywhere, including in a hospital, a clinic, the individuals home, or a physician's office. In addition, the monitoring device may also be able to provide real time information to the monitored subject at a touch of a button.

If the monitoring device detects abnormal behavior or stressful conditions in the subject being monitored, it can alert and notify the subject or the appropriate people such that the subject's current activities can be limited accordingly to combat the detected adverse conditions. When, and if, a subject's vital signs stop or reach a dangerous level, the monitoring device may emit some type of alarm, such as a loud beeping sound, to attract the attention of the subject and/or anyone in the immediate vicinity of the subject. If the subject is unable to respond to the alarm condition, the device may send out a distress call. The device may be programmed such that a call to 911 is immediately made and the subject's name and medical history are provided therewith. At the same time, the present device may also provide the 911 operator with the subject's exact location, by sending them a global positioning satellite (GPS) coordinate stored in the device.

Accordingly, it is an object of the present invention to provide a personal medical monitoring unit which may be worn on a subject and carried anywhere. The unit may be equipped to store current medical data and detect any pre-defined alarm conditions, such as heart failure. Upon an occurrence of one or more of such alarm conditions, the unit provides a central reporting system with emergency information for the efficient dispatching of emergency assistance.

It is another object of the present invention to combine the advantages of long range navigation systems such as a

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